Exit Notes

Introductions (name/title) - Holmberg, Bilik

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

- **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. Our findings and observations from this portion of our inspection were discussed at our interim exit held on April 23rd and will not be repeated today.

  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 and have completed most of our inspection review activities under TI-150 related to your upper head inspections. 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 today and at our final exit meeting next Friday.

- **Issues:** As a result of this inspection at this point we have already discussed the one issues characterized as potential violation of very low safety significance (Green) associated with use of surface exams in your risk based ISI program. I

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will not repeat this discussion. Today I will cover the list of questions which we will document with respect to your upper and lower head inspection activities..

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,

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. I 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 your staff 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.

b. Observations

Summary

Based upon a bare metal remote visual examination of the lower head, the your staff 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. Your staff 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. Your staff 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. Your staff performed a bare metal inspection of the lower head in accordance with procedure NDE-757 "Visual Examination For Leakage of Reactor Pressure Vessel Penetrations." Your staff 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, we 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.

We 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. We 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).

Your 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. Your 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.

We 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?

Your staff 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.)?

Your staff 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?

Your staff 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?

Your staff did not identify any deposits on the Unit 1 lower head during RFO 28. We questioned 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. Your 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. Your staff 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. Your staff 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. This conclusion was based on chemical testing of 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.

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. This examination is not complete and we therefore cannot provide complete/final answers to a few of the questions which need to be answered under TI-150. The final answers to the open questions will be addressed next Friday if your inspection is completed.

a. For each of the examination methods used during the outage, was the examination performed by qualified and knowledgeable personnel? (Briefly describe the personnel training/qualification process used by the licensee for this activity.)

<u>Top of Vessel Head Visual Examinations</u>
Yes. Your staff conducted a remote visual examination and direct visual examination of the top surface of the RPV head with knowledgeable staff members certified to Level II or Level III as VT-2 examiners in accordance with procedure procedure NDE-3 "Written Practice For Qualification And Certification For NDE Personnel" These qualification and certification procedures met the industry standard ANSI/ANST CP-189 "Standard for Qualification and Certification of Nondestructive Testing Personnel." Additionally, VT-2 personnel had access to photographs of each penetration location taken during the last Unit 1 visual head inspection in 2002.

<u>Under-Vessel Head Ultrasonic Examinations</u>
Yes. Your vendor personnel are certified as UT level II or III analysts in accordance with procedure the vendor (Framatome) procedure 54-ISI-30-01 "Written Practice for the Qualification and Certification of NDE personnel." This procedure met industry standard ANSI/ANST CP-189 "Standard for Qualification and Certification of Nondestructive Testing Personnel." Additionally, UT acquisition and analysis personnel had a minimum of 16 hours training on reactor head penetration examination techniques.

<u>Under-Vessel Head Dye Penetrant Examinations</u>
Yes. Your staff conducted a solvent removable PT examination of the head vent location with a knowledgeable staff member certified to Level III as for PT examination in accordance with procedure procedure NDE-3 "Written Practice For Qualification And Certification For NDE Personnel" This qualification and certification procedures met the industry standard ANSI/ANST CP-189 "Standard for Qualification and Certification of Nondestructive Testing Personnel."

2. For each of the examination methods used during the outage, was the examination performed in accordance with demonstrated procedures?

Top of Vessel Head Visual Examinations

Yes. Your staff 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, we 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.

- demonstration of the near distance camera resolution capability.

- demonstration of color resolution or acuity.

For the items discussed above, your staff provided verbal direction or controlled the parameters, such that the inspectors did not consider the quality of the visual examination to be compromised.

We observed your staff performing the remote visual examination of the upper surface of the reactor head under the insulation using a camera mounted to a robotic crawler in accordance with procedure NDE-757 for portions of 12 VHP nozzle locations. You were able to position the inspection camera within a few inches of the VHP interface with sufficient lighting such that an excellent visual image was obtained.

Under-Vessel Head Ultrasonic Examinations of VHP Nozzles
Yes. The ultrasonic inspections were performed in accordance with Framatome ANP Nondestructive Examination Procedure 54-ISI-100-11, "Remote Ultrasonic Examination of Reactor Head Penetrations." The licensee's vendor had successfully demonstrated this procedure on mockups containing cracks and simulated flaws as documented in EPRI MRP-89 "Materials Reliability Program Demonstrations of Vendor Equipment and Procedures for the Inspection of Control Rod Drive Mechanism Head Penetrations." We reviewed the revisions to procedure 54-ISI-100-11 made since your contractor had successfully demonstrated this procedure to ensure that equipment configuration changes had not been made which would affect the flaw detection capability. Additionally, the licensee's vendor had demonstrated the capability to detect a leakage path in the interference zone using this procedure on a mockup with a simulated leak path and on power plants with observed leakage paths such as the Oconee Units.

Under-Vessel Head Ultrasonic Examinations of Head Vent line
Unknown. Your staff and vendor considered the ultrasonic equipment used on the head vent nozzle as demonstrated. You intend to conduct the below head ultrasonic examinations of the reactor vessel head vent nozzle in accordance with procedure 54-ISI-137-03 "Remote Ultrasonic Examination of Reactor Vessel Head Vent Line Penetrations." Your vendor considered this procedure demonstrated based upon the ability to see simulated cracks (EDM notches) in the ultrasonic calibration standard (reference 54-PQ-137-01 "Remote Ultrasonic Examination of Reactor Vessel Head Vent Line Penetrations"). We believe that this type of demonstration does not necessarily confirm the ability of this equipment to detect PWSCC type flaws. Therefore, we could not independently confirm the confirm the capability of this equipment to detect PWSCC. Additionally, this examination would not confirm ability to detect PWSCC contained entirely within the J-weld. To rule out PWSCC in the J-weld area, the licensee performed a PT of the J-weld around the head vent penetration.

Under-Vessel Head PT Examinations of Head Vent Line J-weld
Yes. Your staff conducted a PT examination of the head vent line J-weld in accordance with procedure NDE-451 "Visible Dye Penetrant Examination Temperature Applications 45oF to 125oF." You considered

the use of an ASME Code qualified solvent removable visible PT procedure to detect surface breaking PWSCC flaws in the head vent line J-weld as demonstrated. We confirmed that this procedure met the ASME Code requirements including review of the comparison block demonstration required by the Code to use the expanded temperature range allowed by the procedure.

3. For each of the examination methods used during the outage, was the examination able to identify, disposition, and resolve deficiencies and capable of identifying the PWSCC and/or head corrosion phenomena described in Order EA-03-009?

Top of Vessel Head Visual Examinations
Yes. We determined through direct observation of the bare metal head, interviews with inspection personnel, reviews of procedures and inspection reports, and reviews of video tape documentation that your techniques were capable of detecting and characterizing leakage from cracking in VHP nozzles.

The upper head had been cleaned during the previous outage and was relatively free of debris or deposits which would mask evidence of leakage. We performed a direct visual examination through five of six viewing ports in the service structure and observed the licensee performing the remote video inspection of the bare metal head conducted under the insulation with a camera mounted to a magnetic crawler. Your staff performed frequent checks of the VT-2 visual examination quality indicator card during this inspection. Overall, the we concluded that the remote visual examination resolution and picture quality equal or superior to a direct visual examination. Further, your staff was able to obtain a complete visual examination at each of the 49 VHPs, the 3/4" head vent, with no obstructions or interferences. Therefore, the inspectors concluded that the inspection performed was capable of detecting evidence of leakage at VHPs cause by PWSCC or corrosion of the vessel head caused by boric acid. However, this examination will not be completed until the direct visual of the downslope side of the upper vessel head is completed. There are will be no viewing obstructions for this examination based upon discussions with your staff.

Under-Vessel Head Penetration Ultrasonic Examinations
Yes. For the VHP nozzle base metal material the UT equipment, techniques and procedures had been demonstrated as effective in detection of PWSCC and EDM notches. Your staff used UT equipment

with two different configurations. The blade probe was used to acquire data for sleeved VHP and relied on a single pair of transducers optimized for detection of circumferentially oriented flaws using a time of flight diffraction (TOFD) detection technique. A rotating head probe will be used to acquire data from open VHP housing. The rotating probe contains multiple TOFD transducer configurations and shear wave transducers which are designed to optimize detection of both circumferential and axial flaws. Both the blade probe and rotating probes were also configured to detect evidence of corrosion in the interference zone behind the nozzle based on the pattern of the UT backwall response. However, these techniques are not demonstrated as capable of detecting flaws which lie entirely within the J-weld behind the VHPs.

Under-Vessel Head Vent Line Penetration Ultrasonic Examinations
Unknown. Your staff intends to use a rotating probe with pulse echo type shear and longitudinal wave transducers to acquire data from the head vent line penetration. Your vendor considered the ultrasonic equipment used on the head vent nozzle as demonstrated based upon the ability to see simulated cracks (EDM notches) in the ultrasonic calibration standard (reference 54-PQ-137-01 "Remote Ultrasonic Examination of Reactor Vessel Head Vent Line Penetrations"). We believe that type of demonstration would not necessarily confirm the ability of this probe to detect PWSCC.

Under-Vessel Head Vent Line Penetration PT Examinations
Yes. Your staff conducted a PT examination of the head vent line J-weld in accordance with a Code procedure NDE-451 and this would have detected PWSCC if present. We observed the videotaped PT conducted on the head vent line J-weld and confirmed that youmet Code penetrant dwell time and developer times and observed that no recordable indications were identified. We concluded that this Code qualified PT procedure would have been capable of detecting PWSCC if present based on review of vendor data that clearly showed the ability of Code PT examinations to detect PWSCC at other reactor sites.

4. What was the physical condition of the reactor head (debris, insulation, dirt, boron from other sources, physical layout, viewing obstructions)?

Top of Vessel Head Visual Examinations
The Unit 1 RPV head insulation consisted of reflective metal insulation panels installed on a support structure over the top of the reactor head with access for visual examinations through six viewing ports in the metal

service structure surrounding the top of the head. We viewed the bare metal head condition through five of these six viewing ports and considered the head condition relatively clean. However, the CRDM housings (above the head interface area) generally contained a sprayed on white mastic coating which had been applied as a sealer in the original head insulation design. The bare metal head was covered with a light gray colored coating applied by the head fabricator, which provided an adequate surface for visual resolution of boric acid deposits. We also observed portions of your visual examination and videotaped portions completed on other shifts. The remote camera visual inspection was conducted under the insulation support structure and the as-found head condition was generally clean (free of debris, insulation, dirt). For some penetrations, the annulus gap contained loose debris (presumed to be mastic which was scraped off the upper CRDM housings during installation of new insulation during the last outage). These deposits did not hinder your evaluation of the penetrations because your staff vacuumed up this debris. You have not identified any obstructions which would limit your visual inspection and you were able to fully examined the 49 VHPs, including the 3/4" head vent. However, the downslope side of the service structure is still in need of a visual inspection.

5. Could small boron deposits, as described in Bulletin 2001-01, be identified and characterized?

   Top of Vessel Head Visual Examinations

   Yes. Based upon the quality and scope of your visual examination, and independent direct observations, we concluded that any boron deposits characteristic of coolant leakage would have been identified (if any had been present). The inspectors noted that no boric acid deposits were found on the 49 VHPs, including the 3/4" head vent. The inspectors independently observed the remote visual examination for portions of 12 VHPs and direct examinations of portions of 30 VHPs and did not observe white deposits (boric acid) with characteristics (popcorn like) indicative of reactor coolant system leakage. Your staff performed a systematic inspection and documented the visual examination results for every VHP nozzle-to-vessel interface. No indications of head leakage were recorded.

6. **What material deficiencies (i.e., cracks, corrosion, etc) were identified that require repair?**

   None.

7. **What, if any, impediments to effective examinations, for each of the applied methods, were identified (e.g., centering rings, insulation, thermal sleeves, instrumentation, nozzle distortion)?**

Top of Vessel Head Visual Examinations
NRC order EA-03-009 dated February 20, 2004, required your staff to complete a 95 percent surface area examination of the upper head including areas upslope and downslope of the support structure. The service structure and vertical insulation panels represented areas where the vessel head surface was not examined and your staff has not yet examined or evaluate what percentage of uninspected coverage that these areas represent and had not completed a bare metal head inspection downslope of the service structure. This is therefore an open inspection question which I hope to close next week.

Under-Vessel Head PT Examination of Head Vent Line
None.

Under-Vessel Head Ultrasonic Examinations
NRC Order EA-03-009 dated February 20, 2004 required licensee's to scan to at least 1 inch below the lowest point at the toe of the J-weld for each penetration and all areas with greater than 20 ksi tension residual and normal operating stress. It does not appear that you will be able to obtain at least a full 1 inch below the J-weld for VHPs near the periphery such as nozzles No. 13 and 16. For these nozzles the maximum extent volumetrically scanned below the downhill side of the weld was less than the 1 inch due to the UT transducer reaching the end of the penetration tube. I understand that you intend to document these limitations of scanning in an order relaxation request, which will be discussed in future phone calls with NRR.

8. What was the basis for the temperatures used in the susceptibility ranking calculation, were they plant-specific measurements, generic calculations, (e.g., thermal hydraulic modeling, instrument uncertainties), etc.?

NRC Order EA-03-009 required licensee's to calculate the susceptibility category of each reactor head to PWSCC-related degradation. The susceptibility category in EDY establishes the basis for the your staf to select and perform appropriate head inspections during each refueling outage. For the Unit 1 RPV head EDY in calculation C11470 "Reactor Vessel Head Effective Degradation Year (EDY)" your staff applied the appropriate formula required by NRC Order EA-03-009 and determined the correct EDY for each operating Unit. As of April 1, 2004, Unit 1 was at 15.5 EDY which placed this unit in the high susceptibility category. We also reviewed the examination records from the previous Unit 1 head examinations and confirmed that no PWSCC of VHPs had been identified.

NRC Order EA-03-009 also required the licensee to have used best estimate values in determining the susceptibility category for the vessel head. We reviewed Table 2-1 of EPRI MRP-48 "PWR Materials Reliability Program Response to NRC Bulletin 2001-01," which documented an operating head temperatures of 559 through 592 degrees Fahrenheit over the operating life of the plant for Unit 1. Your current operating head temperature was identified as 592 degrees Fahrenheit in MRP-48 and this value had been used in the Unit 1 susceptibility ranking calculation. Our questions as to the source of this head temperature used in MRP-48 prompted your staff to document information obtained from your vendor. In a memorandum to file dated April 22, 2004, your staff documented that an upper head bulk mean fluid temperature of 591.6 degrees Fahrenheit had been calculated for Unit 1 using a proprietary vendor THRIVE computer model. This model was used to produce a range of head temperatures based on vessel core inlet operating temperatures. The temperature for Point Beach was determined by graphical interpolation from the THRIVE computer runs.

We also noted that the changed the vessel head insulation design for the upcoming replacement head could potentially impact upper head operating temperatures for future susceptibility ranking calculations. Your staff has this observation documented in OTH012761 that the calculation will need revision to consider the new insulation design for the replacement head.

9. **During non-visual examinations, was the disposition of indications consistent with the guidance provided in Appendix D of this TI? If not, was a more restrictive flaw evaluation guidance used?.**

We determined that this question was not applicable, because the licensee did not identify any flaws that required evaluation. However, we intend to reviewed the weld zone indications in nozzle 0-1 and compared them with the indications identified during the previous outage. We also understand that you have a vendor WCAP-15950 "Structural Integrity Evaluation of Reactor Vessel Upper Head Penetrations To Support Continued Operation of Point Beach Units 1 and 2." (Sept 2002), which you intend to apply to any flaws that you do identify. This WCAP appears to be consistent with our TI guidance.

10. Did procedures exist to identify potential boric acid leaks from pressure-retaining components above the RPV head?

    Yes. Your staff performs inspections of components within containment to identify leakage which included the area above the RPV head. This inspection is conducted by Operations and Maintenance Department personnel during the conduct of the reactor coolant system leakage test in accordance with procedure 1-PT-RCS-1 "Reactor Coolant System (RCS) Pressure Test- Inside/Outside Containment Unit 1." This procedure is implemented 4-5 weeks prior to the outage with the plant at power to do an "as-found" leakage inspection, but the scope of this inspection does not include areas above the reactor head. This procedure is implemented following plant shutdown and is also scheduled to be performed again prior to plant startup from the refueling outage. During these two inspections with the plant shutdown, the inspection scope includes areas above the reactor head. Indications of boric acid or active leakage (none identified) were documented on evaluation sheets of Appendix C of the Boric Acid Leakage and Corrosion Monitoring Program. The overall responsibilities and integrated actions to address boric acid leakage was identified in NP 7.4.14 "Boric Acid Leakage and Corrosion Monitoring" and the Boric Acid Leakage and Corrosion Monitoring Program.

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

    Not applicable. Your staff has not identified any instances of active boric acid leakage from components above the Unit 1 head. We independently reviewed data records of leakage identified during the last Unit 1 RCS leakage tests to confirmed that no indications of boric acid leakage were recorded for areas near the reactor vessel head. Additionally, the we confirmed that no evidence of boric acid leakage had contacted the Unit 1 head during the prior outage bare metal head examination (reference NRC inspection report 2002-013).

Questions??

Proprietary???

Schedule - Return Thursday and Friday (final exit)

- URI - Partial Data Acquisition Due To Coupling Slippage (11 nozzles).
- Review completed UT results and actual UT data to resolve URI and completed visual exam records to address the three remaining open questions for TI-150.
- Review final ET indication list for SG A & B to finish baseline ISI.

This concludes my exit.