Union Electric
Callaway Plant

PO Box 620
Fulton, MO 65251

January 30, 2003

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

ULNRC-04799
TAC NO. MB4532

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NRC BULLETIN 2002-01, "REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY"

Ref: 1. ULNRC-04663, dated May 17, 2002
2. NRC letter to Mr. G. L. Randolph, dated November 21, 2002

Reference 1 transmitted the Callaway Plant 60-day response to Nuclear Regulatory Commission (NRC) Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity" dated March 18, 2002. During the review of the 60-day response NRC developed a request for additional information (RAI) that was transmitted by reference 2. Attachment II to this letter provides the additional information in response to the NRC questions contained in the RAI request.

If you should have any questions regarding this submittal, please contact us.

Very truly yours,

JBlosser

John D. Blosser
Manager - Regulatory Affairs

BFH/mlo
Attachments: I – Affidavit
II – RAI Responses
III – List of Commitments

A095

cc: U. S. Nuclear Regulatory Commission (Original and 1 copy)
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

Mr. Ellis W. Merschoff
Regional Administrator
U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

Senior Resident Inspector
Callaway Resident Office
U.S. Nuclear Regulatory Commission
8201 NRC Road
Steedman, MO 65077

Mr. Jack N. Donohew (2 copies)
Licensing Project Manager, Callaway Plant
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 7E1
Washington, DC 20555-2738

Manager, Electric Department
Missouri Public Service Commission
PO Box 360
Jefferson City, MO 65102

STATE OF MISSOURI)
) S S
COUNTY OF CALLAWAY)

John D. Blosser, of lawful age, being first duly sworn upon oath says that he is Manager, Regulatory Affairs for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By JBlosser
John D. Blosser
Manager, Regulatory Affairs

SUBSCRIBED and sworn to before me this 30th day of January, 2003.

Gloria J. Taylor

GLORIA J. TAYLOR
NOTARY PUBLIC
STATE OF MISSOURI - CALLAWAY COUNTY
NOTARY SEAL
MY COMMISSION EXPIRES JUNE 21, 2003

Response to Request for Additional Information (RAI)
NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation
and Reactor Coolant Pressure Boundary Integrity"

Below, please find the Callaway Plant response to the Nuclear Regulatory Commission (NRC) letter dated November 21, 2002 and entitled "Bulletin 2002-01, "Reactor pressure vessel head degradation and reactor coolant pressure boundary integrity," 15-day and 60-day responses for Callaway Plant – Request for Additional Information (TAC NO. MB4532)". Note that the questions from the letter are provided in bold and Callaway Plant responses follow.

Callaway Plant fully complies with American Society of Mechanical Engineers (ASME) Section XI requirements, as provided for in 10 CFR 50.55a. It was assumed that a review of these requirements was not the subject for the Request for Additional Information (RAI) and was not included here, unless specifically noted. For example, question one inquired about "*...examination of* Alloy 600 pressure boundary material and *dissimilar metal Alloy 82/182 welds...*" (emphasis added). In this case, Callaway Plant's response did not mention the ASME Section XI Code requirements of Examination Category B-F, "Pressure Retaining Dissimilar Metal Welds". On the other hand, where ASME Code mandated examinations were deemed pertinent to the discussion of boric acid leakage identification, such as VT-2 examinations, mention was made for clarity and completeness of response.

Because the RAI is directed at "the rest of the RCPB" (i.e., not the structural integrity of the reactor pressure vessel upper head), that will be the focus of this report. For the same reason, there is no discussion regarding Steam Generator tubing inspections.

RAI question:

1. **Provide detailed information on, and the technical basis for, the inspection techniques, scope, extent of coverage, and frequency of inspections, personnel qualifications, and degree of insulation removal for examination of Alloy 600 pressure boundary material and dissimilar metal Alloy 82/182 welds and connections in the reactor coolant pressure boundary (RCPB). Include specific discussion of inspection of locations where reactor coolant leaks have the potential to come in contact with and degrade the subject material (e.g., reactor pressure vessel (RPV) bottom head).**

Callaway Plant response:

Inspection techniques and scope:

Callaway Plant's policy is to minimize boric acid corrosion by applying an administrative program that provides for:

1. early detection of boric acid leaks,
2. thorough inspection of the areas surrounding identified boric acid leakage,
3. proper evaluation of areas where leakage has occurred, and
4. prompt action to mitigate the leak, perform repairs, and avoid future damage.

The Reactor Coolant System (RCS) pressure boundary, including Alloy 600/82/182 locations and bolted connections is examined near the beginning of each refueling outage by a Boric Acid Corrosion Inspection (BACINS), guided by procedure QCP-ZZ-05048, "Boric Acid Walkdown for RCS Pressure Boundary" using VT-2 qualified personnel. As committed to in ULNRC-4663 (Reference 10), QCP-ZZ-05048 was developed to consolidate and address NRC Generic Letter 88-05 concerns and contains a listing of sources of boric acid leaks in the RCS pressure boundary and targets. Targets are low alloy systems, structures and components that could be adversely affected by boric acid leakage. Although the focus of the Boric Acid Corrosion inspection procedure (and Generic Letter 88-05) is mechanical connections, all accessible RCS piping is walked down except for under the reactor vessel lower head[1].

However, during the most recent refueling outage, due to boric acid corrosion concerns, the annulus between the lower RPV head and insulation was accessed by two station personnel for inspection (Health Physics technician and a member of senior management). It was noted that the sides of the vessel and approximately 270 degrees of each cold and hot leg nozzles could be viewed from this area. No pressure boundary leakage or RPV wastage was identified. This area has not been accessed in the past for leakage inspection due to ALARA concerns. It is being added to the boric acid corrosion walkdown procedure, so that in the future, this area will be inspected on a refueling frequency (Commitment 1). All identified boric acid leakage[2], including from Alloy 600/82/182 pressure boundary material is evaluated for boric acid corrosion concerns.

Additionally, in accordance with ASME Section XI Code, the entire RCS pressure boundary (Class 1) and all ASME Class 2 and 3 systems, including Alloy 600/82/182 RCS pressure boundary locations are currently VT-2 examined. The Class 1 portion is examined every outage at normal operating pressure and temperature (NOP/NOT). The reactor vessel lower head area is included in this VT-2 examination. The Class 2 and 3 pressure boundaries are VT-2 inspected once per 40 month period as required by ASME Section XI Code.

---

[1] The lower head is VT-2 Examined as described later.

[2] All identified boric acid leaks are evaluated using the same criteria (Reference 1) regardless of how identified, i.e VT-2, BACINS inspection, operational leakage or incidental observation

Further, during Refuel 12 (Fall 2002) the Reactor Pressure Vessel (RPV) upper head was examined by bare metal visual examination utilizing robotic crawlers and video probes. This examination was guided by procedure QCP-ZZ-05049, "RPV Head Bare Metal Examination" using VT-2 qualified personnel.

Personnel Qualifications:

The Boric Acid Walkdown, VT-2 examinations, and the RPV Head Bare Metal Visual examination are performed by VT-2 personnel, qualified in accordance with ANSI/ASNT CP-189, 1995 Edition, as referenced in ASME Section XI, paragraph IWA-2310.

Technical basis:

ASME Visual examination (VT-2) techniques are recognized by the industry as being effective for identification of leakage. VT-2 techniques include requirements for personnel qualification (training, visual acuity, etc.), illumination and access. In addition to evidence of larger active leakage such as wetting, borated systems leave visible and easily identifiable residue that readily indicates the presence of very minor leaks due to the crystallization of the evaporated boric acid. These techniques coupled with the refueling frequency of examination provide a high level of assurance of system integrity and are consistent with As Low as Reasonably Achievable (ALARA) practices. CP-189 is a recognized industry standard for qualification and certification of nondestructive testing personnel.

Frequency of inspections:

The Boric Acid walkdown (QCP-ZZ-05048) is performed once per refueling. This examination is normally performed at the beginning of the refueling outage.

The VT-2 examination of the Class 1 RCS pressure boundary is performed once per refueling outage. This examination is normally performed at the end of the refueling outage at NOP/NOT.

The RPV bare metal examination (QCP-ZZ-05049) was performed during Refuel 12 as committed to in response to NRC Bulletin 2002-01 and 2002-02 (Reference 9 and 12). Future inspections, not currently planned, will be based on best industry practices.

Extent of coverage:

All accessible locations of the RCS are examined. The following locations are considered inaccessible, with reason noted:

1. The Section of RCS main loop piping from the RPV inlet and outlet nozzles until the piping exits the Primary Shield Wall for all four loops. These segments have not been regularly accessed for Boric Acid Walkdown or VT-2 examination due to dose rates. It was accessed in the past to address specific inspection concerns (e.g., RPV support bolting inspection). As noted earlier, during Refuel 12 (Fall 2002), the underside of the RPV inlet and outlet nozzles (approximately 270 degrees of circumference) were viewed from below the RPV lower head during a walkdown inspection of the lower head penetrations. The only portion that cannot be examined from below the RPV

lower head is the top 90 degrees and the RCS piping from where it exits the mirror insulation to where it exits the concrete bioshield wall. This segment of stainless steel piping (outside of mirror insulation to outside of concrete bioshield wall) contains no bolted connections or Alloy 82/182 welds.

2. Portions of the RPV head vent piping and the Reactor Vessel Level Indicating System (RVLIS) tubing within the shroud. Portions of this are visible from the shroud duct openings and viewport. The portion above this and until the piping leaves the shroud cylinder is inaccessible due to configuration of shroud and Control Rod Drive Mechanism (CRDM) stacks, however this portion contains no mechanical connections or Alloy 82/182 welds.

Degree of insulation removal:

Insulation is not removed for examination of the RCS pressure boundary with the following exceptions:

1. The RPV upper head bare metal visual examination (insulation removed as required to provide access for robotic inspection),
2. RPV lower head VT-2 examination (access to the annulus between the insulation and the RPV is gained via installed hatches),
3. Bolted connections fabricated from carbon steel materials. Carbon steel bolted connections within the Inservice Inspection boundaries receive an inspection for boric acid residue with the insulation removed. In addition, a VT-2 inspection is performed in accordance with ASME Section XI requirements with the insulation installed at normal operating pressure and temperature.
4. Insulation is not removed for initial examination of bolted connections fabricated of materials resistant to boric acid corrosion as provided for in Callaway Plant Inservice Inspection (ISI) Relief Request ISI-12A. However, per ISI-12A, "*If evidence of leakage is detected, either by discovery of active leakage or evidence of boric acid crystals, the insulation shall be removed and the bolted connection shall be re-examined and, if necessary, evaluated in accordance with the corrective measures of Subarticle IWA-5250.*"

   Additionally, ISI-12A states, "*If insulation is removed for planned maintenance, repair or other inspection at a bolted connection in a system borated for the purpose of controlling reactivity, a visual examination shall be performed on the bolted connection prior to disassembly and, if evidence of leakage is discovered, evaluated in accordance with the corrective measures of Subarticle IWA-5250.*"
5. Dissimilar metal welds, including 82/182 welds are nondestructively examined (NDE) in accordance with ASME Section XI requirements. When those welds are examined from the outside diameter (OD), the insulation is removed to access the weld as necessary to perform the NDE. During the course of the NDE, if leakage were noted, it would be documented and evaluated in accordance with EDP-ZZ-01004, "Boric Acid Corrosion Inspection Program", and

6. If leakage or evidence of leakage (boric acid crystals, etc.) were noted during the conduct of the VT-2 examination, Boric Acid Corrosion Inspection (BACINS) or incidental observation, insulation would be removed as necessary to identify the source of the leakage.

Insulation removal has not been necessary for the industry to identify small boric acid leaks. Even very small leak rates can be identified due to the crystalline residue left by evaporating borated water. Because of the high pressure of the RCS when at power, very small leaks tend to find a release path around the insulation, which is not a pressure boundary. The boric acid crystals are then identified during subsequent examinations, if not noted first by station personnel as part of watchstation tours, entry inspections, etc. The effectiveness of visual examinations for identifying leaks in insulated systems is demonstrated by the fact that the majority of leaks have been first identified through visual examination.

<u>RAI question:</u>

2. **Provide the technical basis for determining whether or not insulation is removed to examine all locations where conditions exist that could cause high concentrations of boric acid on pressure boundary surfaces or locations that are susceptible to primary water stress corrosion cracking (Alloy 600 base metal and dissimilar metal Alloy 82/182 welds). Identify the type of insulation for each component examined, as well as any limitations to removal of insulation. Also include in your response actions involving removal of insulation required by your procedures to identify the source of leakage when relevant conditions (e.g., rust stains, boric acid stains, or boric acid deposits) are found.**

<u>Callaway Plant response:</u>

The only carbon steel bolted connections at the Callaway Plant on systems borated for the purpose of controlling reactivity inside the bioshield are Steam Generator man-ways, Reactor Coolant Pump bolting and Pressurizer man-ways. These areas are inspected with the insulation removed in accordance with Code Case N533. Bolted connections which are fabricated of material resistant to boric acid attack (stainless steels, superalloys, etc.) are inspected with insulation installed in accordance with Callaway Plant ISI Relief Request ISI-12A. If leakage or evidence of leakage is noted, insulation is removed as required to ascertain the source and extent of the leakage.

The reactor vessel upper head (outside of the shroud) is examined each refueling with insulation removed. The reactor vessel upper head (inside of the shroud) was examined using robotic crawlers and video probes during Refuel 12 (Fall 2002) as described in Callaway Plant response to question 1 above. The reactor vessel lower head is examined each refueling outage by VT-2 qualified personnel as described in Callaway Plant response to question 1 above.

Alloy 600 base metal used as pressure boundary material in Class 1 applications:

Component	Application	Insulation removed for examination	Insulation type
Steam Generator	Heat exchanger tubing	N/A	N/A
RPV upper head	penetration nozzles	Yes	Mirror
RPV lower head	penetration nozzles	Yes	Mirror
RPV flange leak detection system	tubing	Yes	Mirror

Alloy 82/182 weld metal utilized in pressure boundary applications:

Component	Configuration	Insulation removed or accessible (for visual examination)	Insulation type
RPV hot leg nozzles	safe-end welds	No (Note 1)	Mirror
RPV cold leg nozzles	safe-end welds	No (Note 1)	Mirror
RPV upper head nozzles (CRDM)	J-groove welds, Alloy 600 nozzle to SS tube weld.	Yes	Mirror
RPV upper head nozzle (Vent Pipe)	Low alloy to Inconel weld.	Yes	Mirror
RPV flange tell-tell drain	buttering and welds	Yes	Mirror
RPV lower head nozzles	J-groove welds	Yes	Mirror
Pressurizer safety and relief nozzles	Buttering and safe-end to buttering weld	No (Note 2)	Nukon
Pressurizer spray nozzle	Buttering and safe-end to buttering weld	No (Note 2)	Nukon
Pressurizer surge	Buttering, safe-end to	No (Note 2)	Nukon

Component	Configuration	Insulation removed or accessible (for visual examination)	Insulation type
nozzle	buttering weld and thermal sleeve to build up weld		
S/G channel head bottom drain	Stainless steel coupling to shell weld	No (Note 3)	Nukon

Note 1: The lower 270 degrees is visible for inspection from below as described in response to question 1.

Note 2: These welds will be inspected with insulation removed in the future to perform the boric acid walkdown (Commitment 2).

Note 3: The Steam Generator replacement, currently scheduled for Refuel 14 (Fall 2005), will replace this weld with a Non Alloy 82/182 type filler material.

<u>RAI question:</u>

3. **Describe the technical basis for the extent and frequency of walkdowns and the method for evaluating the potential for leakage in inaccessible areas. In addition, describe the degree of inaccessibility, and identify any leakage detection systems that are being used to detect potential leakage from components in inaccessible areas.**

<u>Callaway Plant response:</u>

The extent of the walkdowns is the entire RCS pressure boundary, except where access is limited as described in Callaway Plant response to question 1 above. The frequency of the BACINS walkdown is on a refueling basis due to the inaccessibility of the bioshield area while at power. The frequency of the ASME Section XI VT-2 (Class 1) is at the frequency specified in the Code, once per refueling outage.

Leakage in inaccessible areas leaves evidence of that leakage in other areas. For example, if there were a leak in the RVLIS tubing inside the vessel upper head shroud, boric acid crystals would build up not just at the leak location but would also migrate down to the upper surface of the upper head mirror insulation. It would then be identified by the inspection inside the shroud. Any evidence of leakage would result in evaluation and appropriate corrective actions.

RCS leakage is continuously monitored by Operations personnel. The containment normal sumps and containment air cooler drains are trended to look for evidence of leak rate inside of containment. A surveillance is performed on a three-day frequency to determine identified and unidentified leak rates.

Containment leak detection systems are in place to monitor unidentified RCS leakage at levels significantly below the Tech Spec value of 1 gpm. These systems include:

1. Containment sump level and flow monitors
2. Containment cooler condensate collection monitoring
3. Containment particulate or gas monitors
4. Containment humidity monitors

Excessive leakage identified through one or more of the above listed techniques would be evaluated in accordance with station procedures, which direct leak location identification. Efforts to identify the leak location may result (if indication exists that leakage is within containment) in containment entry and shutdown, if necessary to enter the bioshield. Callaway Plant operating experience has shown that the combination of the above leakage detection systems and the leak rate surveillance have successfully identified RCS leakage (typically sample valve leak-by or flange leakage) at levels significantly below the Technical Specification value.

<u>RAI question:</u>

4. **Describe the evaluations that would be conducted upon discovery of leakage from mechanical joints (e.g., bolted connections) to demonstrate that continued operation with the observed leakage is acceptable. Also describe the acceptance criteria that was established to make such a determination. Provide the technical basis used to establish the acceptance criteria. In addition,**

    a. **if observed leakage is determined to be acceptable for continued operation, describe what inspection/monitoring actions are taken to trend/evaluate changes in leakage, or**

    b. **if observed leakage is not determined to be acceptable, describe what corrective actions are taken to address the leakage.**

<u>Callaway Plant response:</u>

All identified boric acid leaks are evaluated in accordance with the requirements of EDP-ZZ-01004, "Boric Acid Corrosion Inspection Program" (Reference 2).

The EDP-ZZ-01004 evaluation consists of the following:

"If an active leak is identified, the BACINS Program Engineer SHALL perform an evaluation to determine whether the source must be repaired immediately or repair can be deferred.

If boric acid corrosion is present, the BACINS Program Engineer SHALL ensure that an evaluation is performed to determine whether the component can remain in service, must be repaired, or must be modified.

The BACINS Program Engineer SHALL determine if additional monitoring or visual examination of affected components is needed to ensure that boric acid corrosion does not adversely impact the reactor coolant pressure boundary."

Callaway Plant ISI Relief Request ISI-08 is used as guidance for the evaluation. This evaluation will assure that wastage and wastage rates are evaluated such that structural integrity of the components is maintained. Callaway's Corrective Action Program's Screening Committee adds Keyword "GL 9118" to each CARS document identifying or addressing nonconforming or Degraded Conditions as defined in Generic Letter 91-18. This ensures that Generic Letter 91-18 concerns are addressed.

The acceptance criteria established for the examination is no leakage. Any evidence of leakage is a relevant condition and requires evaluation in accordance with EDP-ZZ-01004 and Callaway Plant's corrective action program (discussed earlier).

Station procedure requires documentation of each identified active leak. Active leaks receive corrective action, as applicable, to address leakage. This corrective action can consist of tightening bolting materials, replacement of gaskets, flange face machining, use of Belleville washers, etc. The effectiveness of the corrective action is verified by follow-up reinspection. For boric acid deposits that do not appear to be active, cleaning and reinspection to determine if the leak is active is performed. If the subsequent inspection ascertains that the identified deposit is due to active leakage, corrective action as described above is then performed.

"RCS pressure boundary leakage" is not allowed by Technical Specifications.

<u>**RAI question:**</u>

5. **Explain the capabilities of your program to detect the low levels of reactor coolant pressure boundary leakage that may result from through-wall cracking in the bottom reactor pressure vessel head incore instrumentation nozzles. Low levels of leakage may call into question reliance on visual detection techniques or installed leakage detection instrumentation, but has the potential for causing boric acid corrosion. The NRC has had a concern with the bottom reactor pressure vessel head incore instrumentation nozzles because of the high consequences associated with loss of integrity of the bottom head nozzles. Describe how your program would evaluate evidence of possible leakage in this instance. In addition, explain how your program addresses leakage that may impact components that are in the leak path.**

<u>Callaway Plant response:</u>

As described Callaway Plant response to question 1 above, the lower reactor pressure vessel head is visually inspected each refueling outage during the VT-2 inspection. In addition, during RF12 (Fall 2002) two personnel entered the annulus to inspect the lower head penetrations. They identified no evidence of pressure boundary leakage in the incore instrumentation nozzles or associated J-groove welds. Station procedure QCP-ZZ-

05048 is being enhanced to require this level of inspection each refueling outage (Commitment 1).

Any evidence of boric acid leakage, in the lower head penetrations (incore instrumentation nozzles) would require characterization of the source of the leakage. This could include, but is not limited to, Non-destructive Examination (NDE) techniques such as Ultrasonic (UT) or Eddy Current (ET) testing. Should these techniques lead to confirmation of pressure boundary leakage, action would be taken in accordance with ASME Section XI repair and replacement requirements.

As with all boric acid leaks, station procedures require evaluation of all possible targets (low alloy components within the leak path) for signs of degradation. In the case of the bottom reactor pressure vessel head incore instrumentation nozzles, potential carbon steel components in the leak path would include support steel for the incore instrumentation tubing and support steel for the mirror insulation. In the event of identification of boric acid leakage through the bottom reactor pressure vessel head incore instrumentation nozzles, these targets would be examined and evaluated for impact and corrective actions would be taken as appropriate per approved station procedures.

<u>RAI question:</u>

6. **Explain the capabilities of your program to detect the low levels of reactor coolant pressure boundary leakage that may result from through-wall cracking in certain components and configurations for other small diameter nozzles. Low levels of leakage may call into question reliance on visual detection techniques or installed leakage detection instrumentation, but has the potential for causing boric acid corrosion. Describe how your program would evaluate evidence of possible leakage in this instance. In addition, explain how your program addresses leakage that may impact components that are in the leak path.**

<u>Callaway Plant response:</u>

RCS leakage is continuously monitored by operations personnel. The containment normal sumps and containment air cooler drains are trended to look for evidence of leak rate inside of containment. A surveillance is performed on a three-day frequency to determine identified and unidentified leak rates.

Containment leak detection systems are in place to monitor unidentified RCS leakage at levels significantly below the Technical Specification value of 1 gpm. These systems include:

1. Containment sump level and flow monitors
2. Containment cooler condensate collection monitoring
3. Containment particulate or gas monitors
4. Containment humidity monitors

Excessive leakage identified through one or more of the above listed techniques would be evaluated in accordance with station procedures, which direct leak location identification. Callaway Plant operating experience has shown that the combination of the above leakage detection systems and the leak rate surveillance have successfully identified RCS leakage (typically sample valve leak-by or flange leakage) at levels significantly below the Technical Specification value.

Any evidence of boric acid leakage would require characterization of the source of the leakage. This could include, but is not limited to, Non-destructive Examination (NDE) techniques such as Ultrasonic (UT) or Eddy Current (ET) testing. Should these techniques lead to identification of cracking in the pressure boundary, action would be taken in accordance with ASME Section XI repair and replacement requirements.

As with all boric acid leaks, station procedures require evaluation of all possible targets (low alloy components within the leak path) for signs of degradation. Corrective actions would be taken as appropriate per approved station procedures.

RAI question:

7. **Explain how any aspects of your program (e.g., insulation removal, inaccessible areas, low levels of leakage, evaluation of relevant conditions) make use of susceptibility models or consequence models.**

Callaway Plant response:

Susceptibility and consequence models are not utilized in BACINS or VT-2 inspection programs. The EPRI Risk-Informed Inservice Inspection has been implemented for Class 1 butt welds (Category B-F and B-J), but applies only to volumetric examinations (UT).

RAI question:

8. **Provide a summary of recommendations made by your reactor vendor on visual inspections of nozzles with Alloy 600/82/182 material, actions you have taken or plan to take regarding vendor recommendations, and the basis for any recommendations that are not followed.**

Callaway Plant response:

Westinghouse provided its recommendation (Reference 14) which contained the following summary related to this question:

"Westinghouse reviewed its databases and applicable communications to determine what recommendations Westinghouse had made to the owners of Westinghouse NSSSs on visual inspections of Alloy 600/82/182 materials in the reactor coolant pressure boundary. The detailed review of this information that may have contained such recommendations did not identify any Westinghouse recommendations on visual inspections of Alloy 600/82/182 locations in Westinghouse NSSSs."

RAI question:

9. Provide the basis for concluding that the inspections and evaluations described in your responses to the above questions comply with your plant Technical Specifications and Title 10 of the Code of Federal Regulations (10 CFR), Section 50.55(a), which incorporates Section XI of the American Society of Mechanical Engineers (ASME) Code by reference. Specifically, address how your boric acid corrosion control program complies with ASME Section XI, paragraph IWA-5250 (b) on corrective actions. Include a description of the procedures used to implement the corrective actions.

Callaway Plant response:

The Boric Acid Corrosion Program, while not mandated by ASME Section XI (it was developed in response to boric acid corrosion concerns and committed to in response to Generic Letter 88-05) is intended to identify boric acid residues. IWA-5250 applies to leakages identified in the performance of pressure tests (see ASME Section XI interpretation XII-1-92-03). However the intent of this paragraph is incorporated in the evaluation required by EDP-ZZ-01004 which requires documentation and evaluation of the depth and extent of any boric acid corrosion. This evaluation will determine if adequate wall thickness remains for continued service, or whether repair or replacement is required.

Callaway Plant complies fully with the requirements of ASME Section XI, 1989 Edition. Callaway Plant has established station procedures to identify boric acid leakage in RCPB components through visual examination on a refueling frequency. Between refueling outages, the leak rate is monitored through diverse techniques to ensure that Technical Specification limits are not exceeded. Any boric acid leaks that are identified will result in a thorough evaluation that includes characterization of the leak source, degradation of the leaking component and consideration of the effect of the boric acid on low carbon components within the leak path.

The combination of Technical Specifications, Inservice Inspections, Boric Acid Corrosion Inspection Program requirements and other station procedures provide a high level of assurance that we will identify and correct any leakage that may exist. Any degradation due to that leakage would also be identified, evaluated and if necessary, corrected.

References:

1. Station Procedure EDP-ZZ-01003 Rev. 17, "Inservice Inspection Program"
2. Station Procedure EDP-ZZ-01004 Rev. 0, "Boric Acid Corrosion Program"
3. Station Procedure QCP-ZZ-05048 Rev. 0, "Boric Acid Walkdown for RCS Pressure Boundary"

4. Station Procedure QCP-ZZ-05049 Rev. 0, "RPV Head Bare Metal Examination"
5. Station Procedure APA-ZZ-00500, Rev. 32, "Corrective Action Program"
6. ULNRC-1779, "Response to Generic Letter 88-05 Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants", May 27, 1988.
7. ULNRC-4519, "Response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles"", August 31, 2001.
8. ULNRC-4521, "Correction to Response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles"", September 5, 2001.
9. ULNRC-4630, "Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"", April 1, 2002.
10. ULNRC-4663, "60-Day Response to NRC Bulletin 2002-01 "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"", May 17, 2002.
11. ULNRC-4668, "Supplemental Information to 15-Day Response to NRC Bulletin 2002-01 "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity"", May 23, 2002.
12. ULNRC-4731, "Response to NRC Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs"", September 11, 2002.
13. ULNRC-4788, "Response to Information Requested 30 days after the next refueling outage by NRC Bulletins 2001-01, 2002-01, and 2002-02.", December 20, 2002.
14. WOG –02-223, "Transmittal of Response to NRC Request for Information, Bulletin 2002-01: Vendor Recommendations for Visual Inspections of Alloy 600/82/182 Component Locations (MHUP-5035, CEOG 2046)", December 13, 2002.

LIST OF COMMITMENTS

The following table identifies those actions committed to by Callaway Plant in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Dave E. Shafer, Superintendent Licensing (314) 554-3104.

COMMITMENT	Due Date/Event
1. Perform visual inspection of the lower reactor pressure vessel head penetrations.	Each Refueling outage
2. The following component welds will be inspected with insulation removed in the future to perform the boric acid walkdown. • Pressurizer safety and relief nozzles • Pressurizer spray nozzle • Pressurizer surge nozzle	Refueling Outage 13, Spring 2004