*Union Electric*
*Callaway Plant*

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September 11, 2002

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

Ladies and Gentlemen: ULNRC-04731

## DOCKET NUMBER 50-483
## CALLAWAY PLANT UNIT 1
## UNION ELECTRIC CO.
## FACILITY OPERATING LICENSE NPF-30
## RESPONSE TO NRC BULLETIN 2002-02, "REACTOR PRESSURE VESSEL HEAD AND VESSEL HEAD PENETRATION NOZZLE INSPECTION PROGRAMS"

Attached is the Callaway Plant response to U.S. Nuclear Regulatory Commission (NRC) Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs " dated August 9, 2002. NRC Bulletin 2002-02 requested information concerning our reactor pressure vessel head and vessel head penetration nozzle inspection program and a summary of supplemental inspections to be implemented or justification for continued reliance on visual examination as the primary inspection method.

AmerenUE understands that the issues addressed in NRC Bulletin 2002-02 are of significant current interest. AmerenUE will continue to remain actively involved in resolution of these issues through industry interactions and participation in the Electric Power Research Institute's Material Reliability Program (MRP). Currently, a bare metal visual inspection of Callaway Plant reactor vessel head meets the basic recommendations of both the MRP Inspection Plan and the NRC's "Example Supplemental Inspection" plan. Callaway Plant has committed to completing a bare metal visual inspection of the reactor vessel head during Refueling outage #12, which begins in October 2002.

In addition, Callaway Plant will continue to actively collaborate with the other participants in the Strategic Teaming and Resource Sharing (STARS) group to share knowledge, equipment and experience regarding this issue.

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

JBlosser

John D. Blosser
Manager, Regulatory Affairs

BFH/mlo

Attachments: I – Affidavit
II – Response to NRC Bulletin 2002-01
III – List of Commitments

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Attachment I to ULNRC-04731
Page 1 of 1

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 Blosser
John D. Blosser
Manager, Regulatory Affairs

SUBSCRIBED and sworn to before me this 11th day

of September, 2002.

CATHY J. CRISP
JAN. 29, 2006

Cathy J. Crisp
Notary Public
Notary Seal
State of Missouri
Commissioned for Callaway County
My commission expires 1-29-06

# 30-Day Response to NRC Bulletin 2002-02
# Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs

Below is the Callaway Plant response to the 30-day requirement of Nuclear Regulatory Commission (NRC) Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs," dated August 9, 2002. Portions of this response are based upon information developed by Electric Power Research Institute (EPRI) Material Reliability Program (MRP) for the industry (Ref. 16). The bulletin's "Required Information" is shown in bold.

## Requested Information

**(1) Within 30 days of the date of this bulletin:**

**A. PWR addressees who plan to supplement their inspection programs with non-visual NDE methods are requested to provide a summary discussion of the supplemental inspections to be implemented. The summary discussion should include EDY, methods, scope, coverage, frequencies, qualification requirements, and acceptance criteria.**

**B. PWR addressees who do not plan to supplement their inspection programs with non-visual NDE methods are requested to provide a justification for continued reliance on visual examinations as the primary method to detect degradation (i.e., cracking, leakage, or wastage). In your justification, include a discussion that addresses the reliability and effectiveness of the inspections to ensure that all regulatory and technical specification requirements are met during the operating cycle, and that addresses the six concerns identified in the Discussion Section of this bulletin. Also, include in your justification a discussion of your basis for concluding that unacceptable vessel head wastage will not occur between inspection cycles that rely on qualified visual inspections. You should provide all applicable data to support your understanding of the wastage phenomenon and wastage rates.**

## Required Information

**In accordance with 10 CFR 50.54(f), PWR addressees are required to submit written responses to this bulletin. There are two options available to the addressees:**

**(1) Addressees may choose to submit written responses providing the information requested above within the requested time periods**

## Response

Callaway Plant is categorized as having low susceptibility to primary water stress corrosion cracking (PWSCC) using the industry model developed by EPRI MRP. Callaway Plant has determined the accrued Effective Degradation Years (EDY) for Callaway Plant in accordance with EPRI Materials Reliability Program (MRP) report MRP-48 (Equation 2.2) (Ref. 1). As of the end of the current cycle, October 23, 2002, Callaway Plant's accrued EDY will be approximately 2.5. The accrual rate is 0.16 EDY per effective full power year.

Callaway Plant is committed to completing a bare metal visual inspection of the reactor pressure vessel (RPV) head during Refueling Outage #12, which begins in October 2002. 100% of the carbon steel surface area of the RPV head will be visually examined. Additionally, 100% of the interface areas between the RPV head penetrations and the carbon steel on top of the head will be visually examined.

An industry inspection plan has been developed for PWR power plants by EPRI MRP (Ref. 2). Callaway Plant will begin implementing the MRP inspection plan recommendations for low susceptibility plants by conducting a MRP inspection plan "supplemental visual examination" in Refueling Outage #14, currently scheduled for Fall 2005. The bare metal visual inspection scheduled for Refueling Outage #12, and the MRP "supplemental visual examination" meet the basic requirements of both the MRP inspection plan and the NRC's "Example Supplemental Inspection" plan for two operating cycles following the current operating cycle. Implementation of the MRP inspection plan is also consistent with the inspection commitments made in Callaway Plant's response to Bulletin 2002-01 (References 13, 14, and 15).

In addition to inspections during refueling outages, Callaway Plant's boric acid corrosion program, and other administrative programs, monitor, evaluate and predict plant conditions that may indicate potential reactor coolant system (RCS) leaks, including leaks from the RPV head penetration nozzles.

Industry inspections, tests and analyses are ongoing that continue to validate the MRP model. Based upon good agreement between industry experience and the MRP model to date, Callaway Plant believes that following the MRP recommended inspection plan provides adequate assurance that the structural integrity of the control rod drive mechanism (CRDM) penetration nozzles and the RPV head will be maintained. Callaway Plant continues to monitor industry events relative to these issues. If future events, analyses, tests or inspections warrant, Callaway Plant will take the actions necessary to maintain adequate assurance of RPV head and penetration nozzle structural integrity. These actions could include additional types and/or frequencies of inspections.

Callaway Plant has reviewed its response to NRC Bulletin 2002-01 (References 13, 14, and 15) relative to the applicable regulatory requirements discussed in Bulletin 2002-02. Callaway Plant's response to Bulletin 2002-01 remains valid relative to continued conformance to applicable regulatory requirements.

Implementation of the MRP inspection plan as well as continued implementation of administrative controls associated with inspection activities and correction of identified issues assures continued compliance with the regulatory requirements described in NRC Bulletin 2002-02.

Callaway Plant provides the following additional information as justification for continued reliance on visual examinations as the primary method to detect degradation in the RPV head. Included are discussions on the reliability and effectiveness of visual examinations as they relate to the six concerns cited in Bulletin 2002-02 and the basis for concluding that unacceptable wastage will not occur between examination cycles.

**Concern 1:** Circumferential cracking of CRDM nozzles was identified by the presence of relatively small amounts of boric acid deposits. This finding increases the need for more effective visual and non-visual NDE inspection methods to detect the presence of degradation in CRDM nozzles before nozzle integrity is compromised.

**Response:** Since the initial discovery of circumferential cracks above the J-groove weld in 2001, visual inspection techniques and approaches employed have dramatically improved. Non-visual examination techniques continue to evolve to more effectively examine the penetration tube and associated welds for evidence of cracks. Nothing in the recent events at Davis-Besse has altered the fundamental inspection capability requirements previously established as necessary to identify the presence of PWSCC and potential associated wastage. The effectiveness of inspection techniques continues to be evaluated and improved.

EPRI MRP has published detailed guidance for performing visual examinations of RPV heads (Ref. 3). A utility workshop was also conducted to discuss this guidance and lessons learned from recent field experience (including Davis-Besse). Future RPV head bare metal visual inspections at Callaway Plant will be performed and documented in accordance with written procedures and will include acceptance criteria that will be consistent with the guidance of the MRP inspection plan. Evaluations and corrective actions are conducted and documented in accordance with station administrative controls.

In order for outside diameter (OD) circumferential cracks above the J-groove weld to initiate and grow, a leak path must first be established to the CRDM annulus region from the inner wetted surface of the RPV head. If primary water does not leak to the annulus region, the environment does not exist to cause circumferential OD cracking. Axial cracks in the CRDM nozzles or cracks in J-groove welds must first initiate and grow through wall. Experience has shown that through wall axial cracks will result in observable leakage at the base of the penetration on the topside surface of the RPV head, even with penetration nozzle interference fits. Alloy 600 steam generator drain pipes at Shearon Harris (1988) and pressurizer instrument nozzles at Nogent 1 and Cattenom 2 (1989) were all roll expanded but still developed leaks during operation (Ref. 4). Plant specific top head gap analyses have been performed for a large number of plants, with nozzle initial interference fits ranging from 0 to 0.0034 inches. These analyses have confirmed the presence of a physical leak path in essentially all nozzles under normal operating pressure and temperature conditions (Ref. 4).

Visual inspections of the reactor coolant system pressure boundary have been proven to be an effective method for identifying leakage from PWSCC cracks in Alloy 600 base metal and Alloy 82/182 weld metal. Specifically, visual inspections have detected leaks in RPV head CRDM nozzles, RPV head thermocouple nozzles, pressurizer heater sleeves, pressurizer instrument nozzles, hot leg instrument nozzles, steam generator drain lines, a RPV hot leg nozzle weld, a power operated relief valve safe end and a pressurizer man-way diaphragm plate (Ref. 5). To date, no leaking CRDM nozzles have been discovered by non-visual NDE examinations except for the three nozzles at Davis-Besse. Leakage would have been detected visually at Davis-Besse had there been good access for visual inspections and the head cleaned of pre-existing boric acid deposits from other sources (Ref. 4, Ref. 9).

Finally, as described under Concern 3 below, detailed probabilistic fracture mechanics (PFM) analyses have been performed to demonstrate the effectiveness of visual inspections above the RPV head in protecting the CRDM nozzles against failure due to circumferential cracking

(Ref. 6). Even though the above discussion illustrates that visual inspections performed in accordance with MRP recommendations have a high probability of detecting through-wall leakage, a very low probability of detection was assumed in the PFM analyses. The PFM analyses assume only a 60% probability that leakage will be detected if a CRDM nozzle is leaking at the time a visual inspection is performed. Furthermore, if a nozzle has been inspected previously, and leakage was missed, subsequent visual inspections are assumed to have only a 12% probability of detecting the leak. Even with these conservative assumptions relative to probability of detection, the PFM analyses show that visual inspection above the RPV head every outage reduces the probability of a nozzle ejection to an acceptable level for plants with 18 or more EDY. Visual inspections of plants with fewer than 18 EDY in accordance with the MRP Inspection Plan will significantly reduce the probability of nozzle ejection.

In summary, small amounts of leakage from RPV nozzle penetrations can be detected by visual examination from above the RPV head and it has been shown that timely detection and repair of leakage will ensure the structural integrity of the RPV head penetrations with respect to circumferential cracking.

**Concern 2:** Cracking of 82/182 weld metal has been identified in CRDM nozzle J-groove welds for the first time and can precede cracking of the base metal. This finding raises concerns because examination of weld metal material is more difficult than base metal.

**Response:** Cracks in the J-groove weld do not pose an increased risk regarding nozzle ejection as compared to penetration base metal cracks. J-groove weld cracks that initiate and grow through-wall will leak the same as cracks in the penetration base metal. Therefore, weld cracks pose a similar risk as cracks in the base material and subsequent leakage is equally detectable by visual examination. Although higher crack growth rates have been observed in laboratory testing of weld metal, the industry model of time-to-leakage includes plants that have had weld metal cracking as well as base metal cracking. The visual examination frequencies from the MRP Inspection Plan (Ref. 2) have been conservatively established based on the risk informed analyses considering leakage due to both weld metal and base metal cracking.

**Concern 3:** Through-wall circumferential cracking from the outside diameter of the CRDM nozzle has been identified for the first time. This raises concerns about the potential for failure of CRDM nozzles and control rod ejection, causing a LOCA.

**Response:** Probabilistic fracture mechanics (PFM) analyses using a Monte-Carlo simulation algorithm were performed to estimate the probability of nozzle failure and control rod ejection due to through wall circumferential cracking (Ref. 6). The PFM analyses conservatively assume that, once a leak path has extended to the annulus region, an OD circumferential crack develops instantaneously, with a length encompassing 30° of the nozzle circumference. Fracture mechanics crack growth calculations are then performed for this initially assumed crack, using material crack growth rate data from EPRI Report MRP-55 (Ref. 7). The parameters used in the PFM model were benchmarked against the most severe cracking found to date in the industry (B&W Plants) and produced results that are in agreement with experience to date. The analyses were used to determine probability of nozzle failure versus effective full power years (EFPY) for various head operating temperatures. Analyses were then performed to estimate the effect of visual and non-visual (NDE) inspections of the plants in the highest susceptibility category, using the conservative assumption discussed above (see Concern #1 response) for probability of leakage detection by visual inspection. These analyses demonstrate that performing visual inspections significantly reduces the probability of nozzle failure, and that performing such examinations on a regular basis (in accordance with the inspection schedule prescribed in the MRP inspection plan) effectively maintains the probability of nozzle failure at an acceptably low level indefinitely.

In the extremely unlikely event that nozzle failure and rod ejection were to occur due to an undetected circumferential crack, an acceptable margin of safety to the public would still be maintained (Ref. 8). The consequences of such an event are similar to that of a small-break LOCA, which is a design-basis event. The probability of core damage, given a nozzle failure (assuming that failure leads to ejection of the nozzle from the head), is approximately $4 \times 10^{-3}$ for Callaway Plant. The PFM analyses demonstrate that periodic visual inspections are capable of maintaining the probability of nozzle failure due to circumferential cracking less than $1 \times 10^{-4}$. Therefore, the PFM analyses demonstrate that the resulting incremental change in core damage frequency, due to RPV head penetration nozzle cracking, can be maintained at less than $1 \times 10^{-6}$ (i.e., $4 \times 10^{-3}$ times $1 \times 10^{-4}$ equals $4 \times 10^{-7}$) per plant year, through a program of periodic visual examinations performed in accordance with the MRP inspection plan. This result is consistent with NRC Regulatory Guide 1.174 which defines an acceptable change in core damage frequency ($1 \times 10^{-6}$ per plant year) for changes in plant design parameters, technical specifications, etc.

**Concern 4**: The environment in the CRDM housing/RPV head annulus will likely be more aggressive after any through-wall leakage because potentially highly concentrated borated primary water may become oxygenated. This raises concerns about the technical basis for current crack growth rate models.

**Response:** The MRP panel of international experts on stress corrosion cracking (SSC) (including representatives from ANL/NRC Research), prior to the Davis-Besse incident, gave extensive consideration to the likely environment in the annulus between a leaking CRDM nozzle and the RPV head and revisited this issue subsequent to the Davis-Besse incident (Ref. 7). When revisited, the relevant arguments remain valid for leak rates that are less than 1 liter/hour or 0.004 gpm, which plant experience has shown to be the usual case. The conclusions were:

1. An oxygenated crevice environment is highly unlikely because:
    - Back diffusion of oxygen is too low compared to counterflow of escaping steam (two independent assessments based on molecular diffusion models were examined).
    - Oxygen consumption by the metal walls would further reduce its concentration.
    - Presence of hydrogen from leaking water and diffusion through the upper head results in a reducing environment.
    - Even if the concentration of hydrogen was depleted by local boiling, coupling between low alloy steel and Alloy 600 would keep the electrochemical potential low.
    - Corrosion potential will be close to the Ni/NiO equilibrium, resulting in PWSCC susceptibility similar to normal primary water.
2. The most likely crevice environments are either hydrogenated steam or PWR primary water within normal chemistry specifications and both would result in similar, i.e. non-accelerated, susceptibility of the Alloy 600 penetration material to PWSCC.
3. If the boiling interface happens to be close to the topside of the J-weld, itself a low

probability occurrence, concentration of PWR primary water solutes, lithium hydroxide and boric acid, can in principle occur. Of most concern here would be the accelerating effect of elevated pH on SCC, but calculations and experiments show that any changes are expected to be small, in part because of the buffering effects of precipitates. A factor of 2x on the crack growth rate (CGR) conservatively covers possible acceleration of PWSCC, even up to a high-temperature pH of around 9.

For larger leakage rates, which could lead to local cooling of the head, concentration of boric acid, and development of a sizeable wastage cavity adjacent to the penetration, the above arguments no longer directly apply. However, limited data (Berge et al., 1997) on SCC in concentrated boric acid solutions indicate that

- Alloy 600 is very resistant to transgranular SCC (material design basis).
- High levels of oxygen and chloride are necessary for intergranular cracking to occur at all.
- The effects are then worse at intermediate temperatures, suggesting that the mechanism is different from PWSCC.

The above considerations show that there is no basis for assuming that any post-leakage, crevice environment in the CRDM housing/RPV head annulus would be significantly more aggressive with regard to SCC of the Alloy 600 penetration material than normal PWR primary water, irrespective of the assumed leakage rate and/or annulus geometry. The current industry model (Ref. 7), which includes a factor of 2x on CGR to cover residual uncertainty in the composition of the annulus environment, remains valid.

**Concern 5**: The presence of boron deposits or residue on the RPV head, due to leakage from mechanical joints, could mask pressure boundary leakage. This raises concerns that a through-wall crack may go undetected for years.

**Response**: The experience at Davis-Besse has clearly demonstrated that effective visual inspection for leakage from CRDM nozzle and weld PWSCC requires unobstructed inspection access and that the RPV head surface must be free of pre-existing boric acid deposits. Accumulations of debris and boric acid deposits from other sources can interfere with a determination as to the presence or absence of boric acid deposits extruding from the tube-to-head annulus. Therefore, to effectively perform a visual examination of the RPV head outer surface for penetration leakage, such deposits and debris accumulations must be carefully inspected, removed, and the area re-inspected for corrosion.

Each inspection at Callaway Plant is conducted in accordance with administrative controls that include removal of any boric acid that would interfere with determining the source or the potential effects of the boric acid. These administrative controls are consistent with the visual inspection guidance contained in the MRP inspection plan and will preclude the condition of a through-wall crack remaining undetected for years.

**Concern 6:** The causative conditions surrounding the degradation of the RPV head at Davis-Besse have not been definitively determined. The staff is unaware of any data applicable to the geometries of interest that support accurate predictions of corrosion mechanisms and rates.

**Response:** The causes of the Davis-Besse degradation are sufficiently well known to avoid significant wastage. The root cause evaluation performed by the utility (Ref. 9) clearly identifies the root cause as PWSCC of CRDM nozzles followed by boric acid corrosion. The large extent of degradation has been attributed to failure of the utility to address evidence that had been accumulating over a five year period of time (Figure 26 of Ref. 9).

Visual inspection guidelines have been provided (Ref. 3) to ensure that conditions approaching that which existed at Davis-Besse will not occur. A workshop was conducted to thoroughly review industry experience, regulatory requirements, leakage detection, and analytical work performed to understand the causes of high wastage rates (Ref. 10).

Subsequent to significant wastage being discovered on the Davis-Besse RPV head, the industry has performed analytical work to determine how a small leak such as seen at several plants can progress to the significant amounts of wastage discovered at Davis-Besse. This work is referenced within the basis for the MRP Inspection Plan (Ref. 11) and was previously presented to the NRC (Ref. 12).

The analytical work shows that the corrosion rate is a strong function of the leakage rate. Finite element thermal analyses show that leak rates must reach approximately 0.1 gpm for there to be sufficient cooling of the RPV top head surface to support concentrated liquid boric acid that will produce high corrosion rates. The leak rate is in turn a strong function of the crack length. The effect of crack length above the J-groove weld on crack opening displacement and area has been confirmed by finite element modeling of nozzles including the effects of welding residual stresses and axial cracks. Leak rates have been calculated using crack opening displacements and areas determined by the finite element analyses and leak rate models based on PWSCC cracks in steam generator tubes.

Cracks that just reach the annulus through the base metal or weld metal will result in small leaks such as those that produced small volumes of boric acid deposits on several vessel heads at locations where the CRDM nozzles penetrate the RPV head outside surface. These leaks are typically on the order of $10^{-6}$ to $10^{-4}$ gpm. There is no reported industry experience where any of these leaks resulted in significant corrosion. A leak rate of $10^{-3}$ gpm will result in the release of about 500 $in^3$ of boric acid deposits in an 18-month operating cycle, which will be detectable by visual inspections.

The time for a crack to grow from a length that will produce a leak rate of $10^{-3}$ gpm to a length that will produce a leak rate of 0.1 gpm has been estimated by deterministic analyses based on the MRP crack growth models to be 1.7 years for plants with 602°F head temperatures. Probabilistic analyses show that there is less than a $1\times10^{-3}$ probability that corrosion will proceed to the point that the inside surface cladding of the head would be uncovered over a significant area before the wastage would be detected by supplemental visual inspections as required under the MRP inspection plan. During the transition from leak rates of $10^{-3}$ gpm to 0.1 gpm, loss of material will be by relatively slow processes (Ref. 11).

The ability to detect leakage prior to the risk of structural failure is illustrated by Figure 26 of the Davis-Besse root cause analysis report (Ref. 9). There was visual evidence of boric acid deposits on the vessel head for five years prior to the degradation being detected. Guidance provided in the MRP inspection plan would not permit these conditions to exist without determining the source of the leak, including nondestructive examinations if necessary.

Therefore, while the exact timing of the event progression at Davis-Besse cannot be definitively established, the probable durations can be predicted with sufficient certainty to conclude that periodic visual inspections can ensure continued structural integrity of the RCS pressure boundary.

**(2) Within 30 days after plant restart following the next inspection of the RPV head and VHP nozzles to identify the presence of any degradation, all PWR addressees are requested to provide:**

**A. the inspection scope and results, including the location, size, extent, and nature of any degradation (e.g., cracking, leakage, and wastage) that was detected; details of the NDE used (i.e., method, number, type, and frequency of transducers or transducer packages, essential variables, equipment, procedure and personnel qualification requirements, including personnel pass/fail criteria); and criteria used to determine whether an indication, "shadow," or "backwall anomaly" is acceptable or rejectable.**

**B. the corrective actions taken and the root cause determinations for any degradation found.**

## Response

Within 30 days after plant restart following the next inspection of the RPV head, Callaway Plant has previously committed to provide the inspection scope, results, the corrective actions taken, and the root cause determinations for any degradation found (Ref. 13).

## REFERENCES

1. *PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48),* EPRI, Palo Alto, CA, 2001. 1006284.
2. EPRI Document MRP-75, Technical Report 1007337, "PWR Reactor Pressure Vessel (RPV) Upper Head Penetrations Inspection Plan (MRP-75), Revision 1", September 2002.
3. EPRI Technical Report 1006899, "Visual Examination for Leakage of PWR Reactor Head Penetrations on Top of the RPV Head: Revision 1", March 2002.
4. Appendix B of EPRI Document MRP-75, Technical Report 1007337, "Probability of Detecting Leaks in RPV Top Head Nozzles," September 2002.
5. EPRI TR-103696, "PWSCC of Alloy 600 Materials in PWR Primary System Penetrations", July 1994.
6. Appendix A of EPRI Document MRP-75, Technical Report 1007337, "Technical Basis for CRDM Top Head Penetration Inspection Plan," September 2002.
7. EPRI Document MRP-55, "Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Thick-Wall Alloy 600 Material," July 2002.
8. Walton Jensen, NRC, Reactor Systems Branch, Division of Systems Safety and Analysis (DSSA), Sensitivity Study of PWR Reactor Vessel Breaks, memo to Gary Holahan, NRC, DSSA, May 10, 2002.
9. Davis-Besse Nuclear Power Station Report CR2002-0891, "Root Cause Analysis Report – Significant Degradation of the Reactor Pressure Vessel Head," April 2002.
10. Proceedings: EPRI Boric Acid Corrosion Workshop, July 25–26, 2002, Baltimore, Maryland, to be published by EPRI.
11. Appendix C of EPRI Document MRP-75, Technical Report 1006337, "Supplemental Visual Inspection Intervals to Ensure RPV Closure Head Structural Integrity," September 2002.
12. Glenn White, Chuck Marks and Steve Hunt, Technical Assessment of Davis-Besse Degradation, Presentation to NRC Technical Staff, May 22, 2002.
13. ULNRC-4630, dated April 1, 2002, from Ronald D. Affolter, Callaway Plant to USNRC.
14. ULNRC-4663, dated May 17, 2002, from John D. Blosser, Callaway Plant to USNRC.
15. ULNRC-4668, dated May 23, 2002, from John D. Blosser, Callaway Plant to USNRC.
16. EPRI Letter MRP 2002-090, "Industry Material for Use in Responding to NRC Bulletin 2002-02", from Leslie Hartz, Chair, MRP Senior Representatives, August 22, 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 |
|---|---|
| None due to this document. | |
| | |