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December 20, 2002

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

Ladies and Gentlemen: ULNRC-04788

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
RESPONSE TO INFORMATION REQUESTED 30 DAYS AFTER THE NEXT REFUELING OUTAGE BY NRC BULLETINS 2001-01, 2002-01, AND 2002-02

Ref: 1. ULNRC-04519, dated August 31, 2001
2. ULNRC-04630, dated April 1, 2002
3. ULNRC-04731, dated September 11, 2002

In the referenced letters Callaway committed to providing the results of their reactor pressure vessel head inspection within 30 days after plant startup following the next refueling outage. On November 26, 2002, Callaway Plant completed its 12th refueling outage. Attached is our response to the "30-day following restart questions" contained in Bulletins 2001-01 "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles", 2002-01 "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity", and 2002-02 "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs."

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

Very truly yours,

David Shafer
for John D. Blosser
Manager, Regulatory Affairs

BFH/mlo

Attachments: I – Affidavit
II – Response to information requested 30 days after next refueling outage by NRC Bulletins 2001-01, 2002-01, and 2002-02
III– List of Commitments

A088
A095
A096

STATE OF MISSOURI)
) S S
CITY OF ST. LOUIS)

David Shafer, of lawful age, being first duly sworn upon oath says that he is Superintendent Licensing, 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 David Shafer
David Shafer
Superintendent Licensing
Regulatory Affairs

SUBSCRIBED and sworn to before me this 20th day of DECEMBER, 2002.

Melissa L. Orr

MELISSA L. ORR
Notary Public - Notary Seal
STATE OF MISSOURI
City of St. Louis
My Commission Expires: June 23, 2003

cc: U. S. Nuclear Regulatory Commission (Original and 1 copy)
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**RESPONSE TO INFORMATION REQUESTED
30 DAYS AFTER NEXT REFUELING OUTAGE BY
NRC BULLETINS 2001-01, 2002-01, AND 2002-02**

Below is the Callaway Plant response to the 30-day following restart questions as asked in Bulletins 2001-01 "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles", 2002-01 "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity", and 2002-02 "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs." The "Requested Information" is shown in bold.

Bulletin 2001-01 requested information:

5. Addressees are requested to provide the following information within 30 days after plant restart following the next refueling outage:

a. a description of the extent of VHP nozzle leakage and cracking detected at your plant, including the number, location, size, and nature of each crack detected;

b. if cracking is identified, a description of the inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions you have taken to satisfy applicable regulatory requirements. This information is requested only if there are any changes from prior information submitted in accordance with this bulletin

a. No VHP nozzle leakage or cracking was detected during the Refuel 12 inspection of the RPV head.

b. Not applicable, no cracking was identified.

Bulletin 2002-01 requested information:

2. Within 30 days after plant restart following the next inspection of the reactor pressure vessel head to identify any degradation, all PWR addressees are required to submit to the NRC the following information:

A. the inspection scope (if different than that provided in response to Item 1.D.) and results, including the location, size, and nature of any degradation detected,

B. the corrective actions taken and the root cause of the degradation.

A. The inspection scope did not change (Reactor Pressure Vessel Bare Metal Visual Examination). No degradation was identified.

B. Not applicable, no degradation was identified.

Bulletin 2002-02 requested information

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.

Callaway response:

Head Inspection Scope:

Callaway Plant performed a 100% bare metal visual examination during Refuel 12 (October/November 2002). The bare metal visual examination identified no indication of Reactor Coolant System (RCS) pressure boundary leakage of the Vessel Head Penetration (VHP) nozzles, associated J-Groove Welds, or through the Reactor Pressure Vessel (RPV) head. No degradation of the RPV head carbon steel material was identified.

The head inspection at Callaway was performed with two robotic crawlers and video probes. The robotic crawlers accessed the upper tier of the insulation and examined the majority of the VHP nozzles. Those quadrants of the nozzles that could not be examined by the robotic crawler due to their proximity to the shroud and those nozzles that were under the lower tier of the insulation were examined via a manual video probe.

The visual examination was performed by personnel certified in accordance with ANSI/ASNT CP-189, 1995 Edition.

Head Inspection Results:

All penetration nozzles were acceptable. No degradation of the Reactor Pressure Vessel Head was identified. No evidence of pressure boundary leakage through the RPV head, the VHP nozzles or the VHP nozzles j-groove welds was identified.

Ten penetrations were deemed to require further evaluation in accordance with QCP-ZZ-05049, RPV Head Bare Metal Examination Accumulation Evaluation (evaluation flow chart attached). These nozzles were:

VHP	COMMENTS
21	Debris
27	Debris
28	Debris, dye penetrant developer
30	Debris, discoloration
40	Debris
46	Rusted Debris, boron from head vent valve leakage RF11
52	Rusted Debris, boron from head vent valve leakage RF11
58	Rusted Debris, boron from head vent valve leakage RF11
63	Rusted Debris, boron from head vent valve leakage RF11
76	Rusted Debris, boron from head vent valve leakage RF11

None of the observations indicated any leakage through the head, head penetrations or the j-groove weld. No vessel head wastage was observed. Although the findings are problematic from a cleanliness, Foreign Material Exclusion (FME) program and general station expectation standpoint, there were no findings that would indicate that there is any degradation of the carbon steel RPV head or degradation or cracking in the Alloy 600 RPV penetrations or the Alloy 82/182 J-groove welds. Further information regarding the above findings is provided below.

Discussion of debris:

The outside surface of the reactor pressure vessel head was found to be covered by a light layer of debris. This debris interfered with the visual examination of the interface between the vessel head penetration nozzles and the RPV. The debris was unacceptable from a station housekeeping standpoint and was viewed as a possible FME issue when placing and removing the head. The debris was of a ferritic (carbon steel) nature as evidenced by the color and alignment of the debris. It appears to be filings left over from construction activities. The filings were standing up as if due to residual magnetism (due probably to the Control Rod Drive Mechanism (CRDM) coils). Because of the response of the residue to the magnetic field and the fact that it rusted when exposed to water in Refuel 11 (discussion below) it can be concluded that the filings are not from stainless steel or Inconel origin.

The filings were evenly distributed over the head surface. At the uphill side of VHP nozzles, the filings accumulated (due to sliding down the domed surface)

into a crescent shape. High side deposits were greater on the peripheral nozzles due to the greater slope of the domed surface. Because of the magnetic nature of the debris, and the evenly distributed nature of it, it was concluded that its origin was from construction activities on the shroud superstructure prior to the installation of the insulation.

The conclusion that the debris is an artifact from construction activities is supported by several facts. First, the insulation package is a boundary that restricts egress of foreign materials. The only access that exists during operation is around the shroud bottom where there is a small gap (approximately 2"). This gap is covered during normal operations by the insulation on the outside of the shroud. The insulation inside the shroud fits tightly to the shroud cylinder. The penetrations of the CRDM through the insulation are sealed by convection seal rings, which isolate the air below the insulation from that above the insulation.

The only activity that could have resulted in deposition of carbon steel filings during the period prior to insulation installation was construction of the support steel of the shroud and superstructure up to the CRDM missile shield.

Secondly, the dye penetrant developer (see below) that ran down penetration 28 entombed the debris at the base of the penetration. This ages the debris at least to the 1992 era. By the pristine white nature of the developer residue (nothing on top of developer), it is clear that this is not gradual deposition that is going on at this time in plant life.

In addition to the filings, there were various pieces of glass on the head that appeared to be due to broken incandescent lights. Incandescent lights of this type were utilized during the Canopy Seal weld repairs (Refuel 5). One or more may have been broken during that time (they were lowered down into the Canopy seal area to provide illumination for the work that was performed remotely).

The debris was collected and shipped to a lab for chemical analysis and the results will be reported in a follow-up letter within 60 days following receipt of results. Visual observation of the collected debris confirmed its ferritic nature.

Discussion of rusted debris:

In the North quadrant of the head, evidence of the head vent valve leakage identified during Refuel 11 (and reported in ULNRC-4630, Response to NRC Bulletin 2002-01) was encountered. It was identified by the boric acid streaking coming down the VHP nozzles, as well as the superstructure and insulation panels. Because of the ferritic filings (see above), the high side deposits were rusted as well as the debris on the general surface of the head in this quadrant. The rust was limited to the filings and filing residue. The RPV Head was intact and not rusted.

All of the rust is located in the area underneath the discharge of the Reactor Head Vent Valves. During Refuel 11, the vent valves were identified as leaking. Leakage from this source during a cycle (at normal operating pressure and temperature) would not have resulted in wetting of the head, as temperatures are too high to allow liquid to reach the head surface. The leakage identified during Refuel 11 (which was leaking following cooldown) did result in borated water reaching the head, as indicated in Callaway's response to Bulletin 2002-01. The filings that covered the head, and concentrated on the high side of the nozzles readily rusted in the presence of the borated water due to high surface area and no protective coating.

No degradation of the head due to this leakage was identified. The effects of the rust on the head is therefore cosmetic in nature. There were concerns, however, related to the rust and debris masking valid indications of leakage through the head. It was determined by the examiners that the rust and debris was not of such a nature or size as to mask leakage.

This conclusion was based on the predictable deposition patterns of the debris coupled with its uniform magnetically influenced alignment which provided assurance that any disturbance of these patterns due to effluent from the tube/head interface area would have been immediately apparent. Additionally, the air flow rates used to move the debris during the examination would not be likely to disturb boric acid deposits while the non adhered debris was easily dislodged.

Discussion of dye penetrant developer

Several VHP nozzles had dye penetrant developer residue running down the nozzle from above. This residue was left from Canopy Seal weld activities in Refuel 5 (as reported in ULNRC-4630). The developer had run down and encapsulated high side debris; obstructing the VHP to RPV head interface for one penetration (Penetration 28). The robotic crawler successfully removed the developer from the interface and the examiners determined that no evidence of leakage through the interface existed.

Evaluation of the long-term effect of dye penetrant developer on the VHP nozzles and RPV head was performed by Request for Resolution (RFR) 22477A. Evaluation indicated that there were no concerns with the presence of this developer on the VHP nozzle.

Reactor Vessel Head cleaning:

The entire RPV head surface was cleaned using service air. Additional cleaning was performed at nozzle locations that had heavy deposits of rusted debris. Cleaning was performed at these locations using service air and mechanical means such as scraping or brushing. Deposits on the RPV head were easily removed after being loosened as described above. The debris was collected at

the RPV head flange surface. The debris was then vacuumed up from the flange into a HEPA-filter type vacuum. The total volume of debris collected was less than 0.125 ft^3. VHP nozzle 28 (which had the developer flows down to the nozzle/head interface) was cleaned to the extent necessary to inspect the interface. It was decided not to perform water type cleaning because of concerns with rust formation at the RPV/VHP interface.

As left videos of all cleaned penetrations were made by the robotic crawlers or video probe, as applicable. This footage can be used during subsequent bare metal visual inspections as a baseline.

Evaluation of the inspection results indicate clearly that there is no evidence of leakage through the RCS pressure boundary of the RPV head, the VHP nozzles or their associated j-groove welds. Further, there is no evidence to suggest that any degradation of the carbon steel RPV head has or is occurring. One hundred percent of the Bare Metal of the RPV head was accessed and inspected in making this determination.

Conclusion:

There is no wastage of the RPV head. There is no evidence of cracking in the RPV penetrations or their welds as identified at various high susceptibility plants.

There was debris on the head, apparently dating from construction. This debris was exacerbated in the North quadrant of the head by Head Vent Valve leakage identified in Refuel 11. The debris and the subsequent rusting of the debris in the N-NW quadrant did not mask leakages through the RCS pressure boundary of the RPV head, nor was it evidence of such leakage.

References:

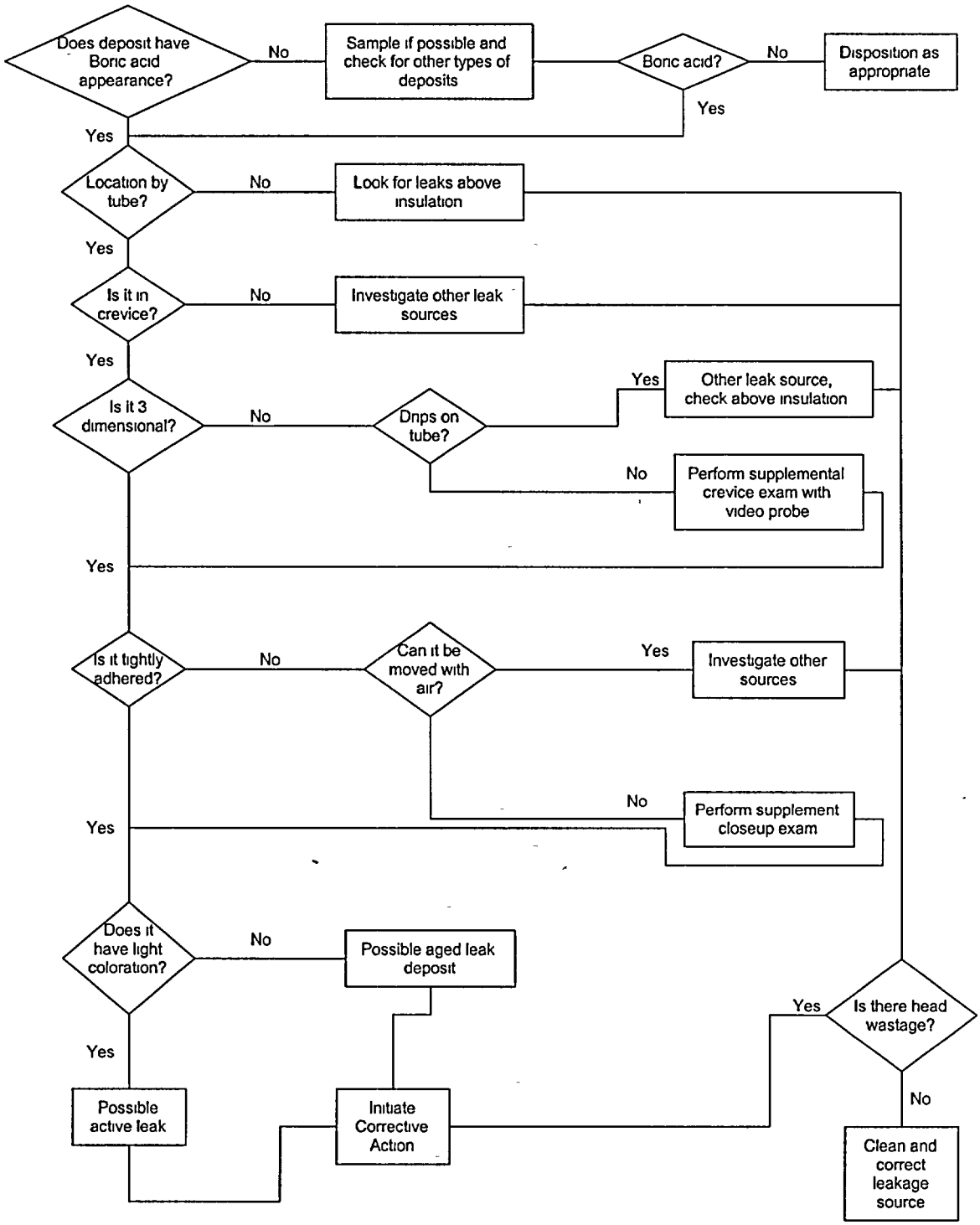
ULNRC-4519, Response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles."

ULNRC-4521, Correction to Response to NRC Bulletin 2001-01

ULNRC-4630, Response to NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity."

ULNRC-4731, Response to NRC Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs."

Evaluation Flow Chart from QCP-ZZ-05049



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
Callaway Plant will provide a follow-up letter summarizing chemical analysis.	Within 60 days following receipt of chemical analysis.