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August 31, 2001

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington D.C. 20555

Subject: Catawba Nuclear Station Units 1 & 2
Docket Nos. 50 -413, 414
McGuire Nuclear Station Units 1 & 2
Docket Nos. 50 -369, 370
Response to NRC Bulletin 2001-01:
Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles

Pursuant to 10 CFR 50.54(f), this letter provides Duke Energy Corporation's (Duke's) response to NRC Bulletin 2001-01 for the McGuire and Catawba Nuclear Sites. This bulletin requested plant-specific information as a result of NRC staff concerns regarding recent discoveries of cracked and leaking Alloy 600 reactor pressure vessel head penetration (VHP) nozzles, including Control Rod Drive Mechanism (CRDM) type penetrations, Auxiliary Head Adaptor and Head Vent penetrations.

McGuire and Catawba's susceptibility to Primary Water Stress Corrosion Cracking (PWSCC) was predicated on the development by NEI of a susceptibility ranking model that relates the operating conditions (in particular the operating temperature and time) for each plant to the plant's relative susceptibility to PWSCC. From the results of the susceptibility ranking model, the NRC has grouped the population of Pressurized Water Reactors (PWR) into four categories. Category I encompasses units that have identified head penetration cracking, Category II encompasses

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units with high susceptibility to PWSCC, evaluated to be less than five years Effective Full Power Years (EFPY) of Oconee Unit 3 conditions, Category III encompasses units with moderate susceptibility to PWSCC, evaluated to be between five and thirty EFPY of Oconee Unit 3 conditions and Category IV encompasses units with low susceptibility to PWSCC, balance of PWRs. McGuire Units 1 and 2, and Catawba Units 1 and 2 are in Category IV.

Because Catawba and McGuire have a low susceptibility to PWSCC, they are only required to respond to item #1 of the requested information. The response for items 1a, and 1b is provided in report, EPRI Report TP-1006284,[1], which was provided to the NRC by NEI letter, dated, August 21, 2001. Information requested for items 1c, 1d and 1e for the Catawba and McGuire Nuclear sites is provided in Enclosure I and II, respectively.

Additionally, if VHP nozzle leakage and cracking is detected through normal outage maintenance or testing activities in the next refueling outage, within 30 days after plant restart, McGuire and Catawba will provide to the NRC a description of the extent of VHP nozzle leakage and any cracking detected.

I declare under penalty of perjury that these statements are true and correct to the best of my knowledge.

If you have questions or need additional information, please contact Allison Jones-Young at (704) 382-3154.

Very truly yours,

M. S. Tuckman

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ENCLOSURES

[1] PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), EPRI, Palo Alto, CA: 2001. 1006284

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ENCLOSURE I
CATAWBA NUCLEAR STATION'S RESPONSE
Response to NRC Bulletin 2001-01

REQUESTED ACTION:

1. **All addresses are requested to provide the following information:**
   a. **the plant specific susceptibility ranking for your plant(s) (including all data used to determine each ranking) using the PWSCC susceptibility model described in Appendix B to the MRP-44, Part 2, report;**
   b. **a description of the VHP nozzles in you plant(s), including the number, type, inside and outside diameter, materials of construction, and the minimum distance between VHP nozzles;**

Response:

By letter dated, August 21, 2001, Nuclear Energy Institute (NEI) submitted report, EPRI Report TP-1006284,[2] on behalf of the industry to the NRC. This report provided an industry response to information requested in Items 1a, and 1b of Bulletin 2001-01. Catawba Units 1 and 2 responses for 1c, 1d and 1e are contained in this report.

1.c a description of the RPV head insulation type and configuration;

Response:

Transco sectional reflective metal insulation is installed at Catawba. It is positioned such that it comes vertically up on the inside of the shroud where the CRDM ductwork ports are located and horizontally over the top of the dome. It fits tightly in sections between the CRDM nozzles.

1.d a description of the VHP nozzle and RPV head inspections (type, scope, qualification requirements, and acceptance criteria) that have

[2] PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), EPRI, Palo Alto, CA: 2001. 1006284

been performed at your plant(s) in the past 4 years, and the findings. Include a description of any limitations (insulation or other impediments) to accessibility of the bare metal of the RPV head for visual examinations;

Response:
There were no visual inspections of the bare metal of the RPV head underneath the insulation in the area of the VHP nozzles performed at Catawba, Units 1 and 2 in the past 4 years. Boric acid walk-downs and Visual VT-2 examinations are performed each outage. Leakage has not been identified from any VHP nozzles.

Transco sectional reflective metal insulation is installed at Catawba. It is positioned such that it comes vertically up on the inside of the shroud where the CRDM ductwork ports are located and horizontally over the top of the dome. It fits tightly in sections between the CRDM nozzles. Once each ten year ISI interval the mirror insulation is removed and the top of the head is visually inspected.

1.e **a description of the configuration of the missile shield, the CRDM housings and their support/restraint system, and all components, structures, and cabling from the top of the RPV head up to the missile shield. Include the elevations of these items relative to the bottom of the missile shield.**

Response:
The general arrangement for the missile shield and the reactor vessel head support structure are approximately the same for Catawba and McGuire. The horizontal missile shields consist of 5 sections centered over the reactor vessel that are 3 feet thick. The approximate vertical distances from the bottom of the missile shield to various locations are given in Table 1. A schematic of the reactor vessel head service structure and the missile shield are shown in Figure 1.

Table 1 Distances from bottom of horizontal Missile Shield

Location	Approximate Distance Down from Bottom of Vertical Missile Shield (± 4″)
Top of eye bolt on CRDM housing	5′ + 0″
Top of seismic support Plate	5′ + 8″
Seat between CRDM housing and CRDM penetration	23′ + 3″
Top of reactor vessel head	24′ + 7″

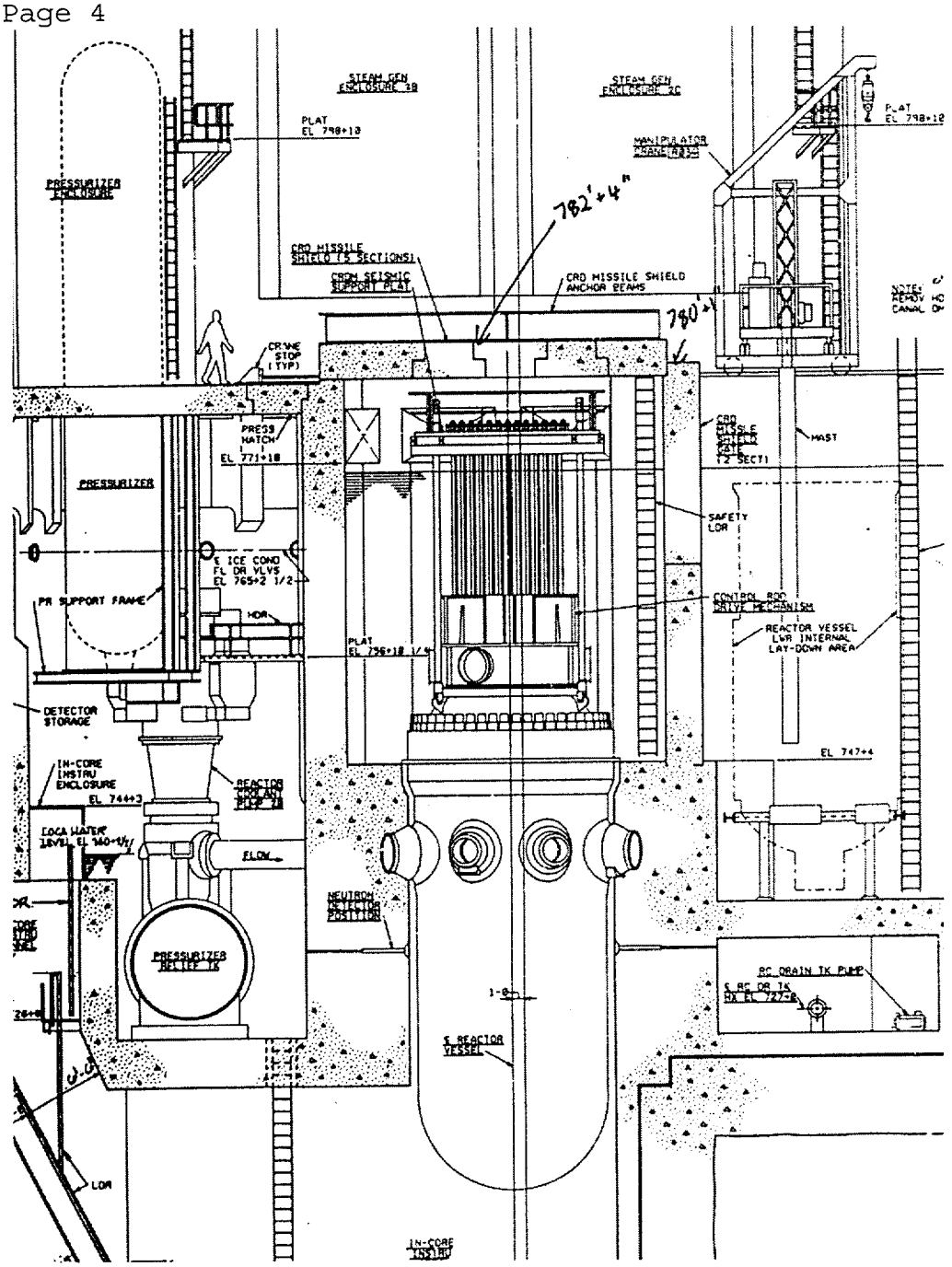

Figure 1 Schematic showing the position of the missile shield relative to the RV head service structure.

ENCLOSURE II
McGuire NUCLEAR STATION'S RESPONSE
Response to NRC Bulletin 2001-01

REQUESTED ACTION:

1. **All addresses are requested to provide the following information:**
   a. **the plant specific susceptibility ranking for your plant(s) (including all data used to determine each ranking) using the PWSCC susceptibility model described in Appendix B to the MRP-44, Part 2, report;**
   b. **a description of the VHP nozzles in you plant(s), including the number, type, inside and outside diameter, materials of construction, and the minimum distance between VHP nozzles;**

Response:

By letter dated, August 21, 2001, Nuclear Energy Institute (NEI) submitted report, EPRI Report TP-1006284,[3] on behalf of the industry to the NRC. This report provided an industry response to information requested in Items 1a, 1b, and 1c of Bulletin 2001-01. The McGuire Units 1 and 2 responses for 1d and 1e are contained in this report.

1.c a description of the RPV head insulation type and configuration;

Response:

McGuire has reflective metal insulation installed on top of the head. The arrangement of the insulation is such that it comes vertically up on the inside of the shroud where the CRDM ductwork ports are located and horizontally over the top of the dome.

[3] PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), EPRI, Palo Alto, CA: 2001. 1006284

1.d a description of the VHP nozzle and RPV head inspections (type, scope, qualification requirements, and acceptance criteria) that have been performed at your plant(s) in the past 4 years, and the findings. Include a description of any limitations (insulation or other impediments) to accessibility of the bare metal of the RPV head for visual examinations;

Response:
McGuire performed limited visual inspection of the CRDM nozzle on the Unit 1 Reactor Vessel (RPV) head in March 2001. At several accessible locations on the periphery a boroscope was pushed through seams in the insulation and the Control Rod Drive Mechanism (CRDM) penetrations to gain access to the RPV head surface. There were no indications of leakage through the penetrations and the head was clear of any boric acid deposits. Boric acid walk-downs and VT-2 examinations in accordance with ASME Section XI are performed each outage. Leakage has not been identified from any VHP nozzles.

McGuire has reflective metal insulation installed on top of the head. The arrangement of the insulation is such that it comes vertically up on the inside of the shroud where the CRDM ductwork ports are located and horizontally over the top of the dome.

1.e A description of the configuration of the missile shield, the CRDM housings and their support/restraint system, and all components, structures, and cabling from the top of the RPV head up to the missile shield. Include the elevations of these items relative to the bottom of the missile shield.

Response:
The general arrangement for the missile shield and the reactor vessel head support structure are approximately the same for Catawba and McGuire. The horizontal missile shields consist of 5 sections centered over the reactor vessel that are 3 feet thick. The approximate vertical distances from the bottom of the missile shield to various locations are given in Table 1. A

schematic of the reactor vessel head service structure and the missile shield are shown in Figure 1.

Table 1 Distances from bottom of horizontal Missile Shield

Location	Approximate Distance Down from Bottom of Vertical Missile Shield (± 4)
Top of eye bolt on CRDM housing	5′ + 0″
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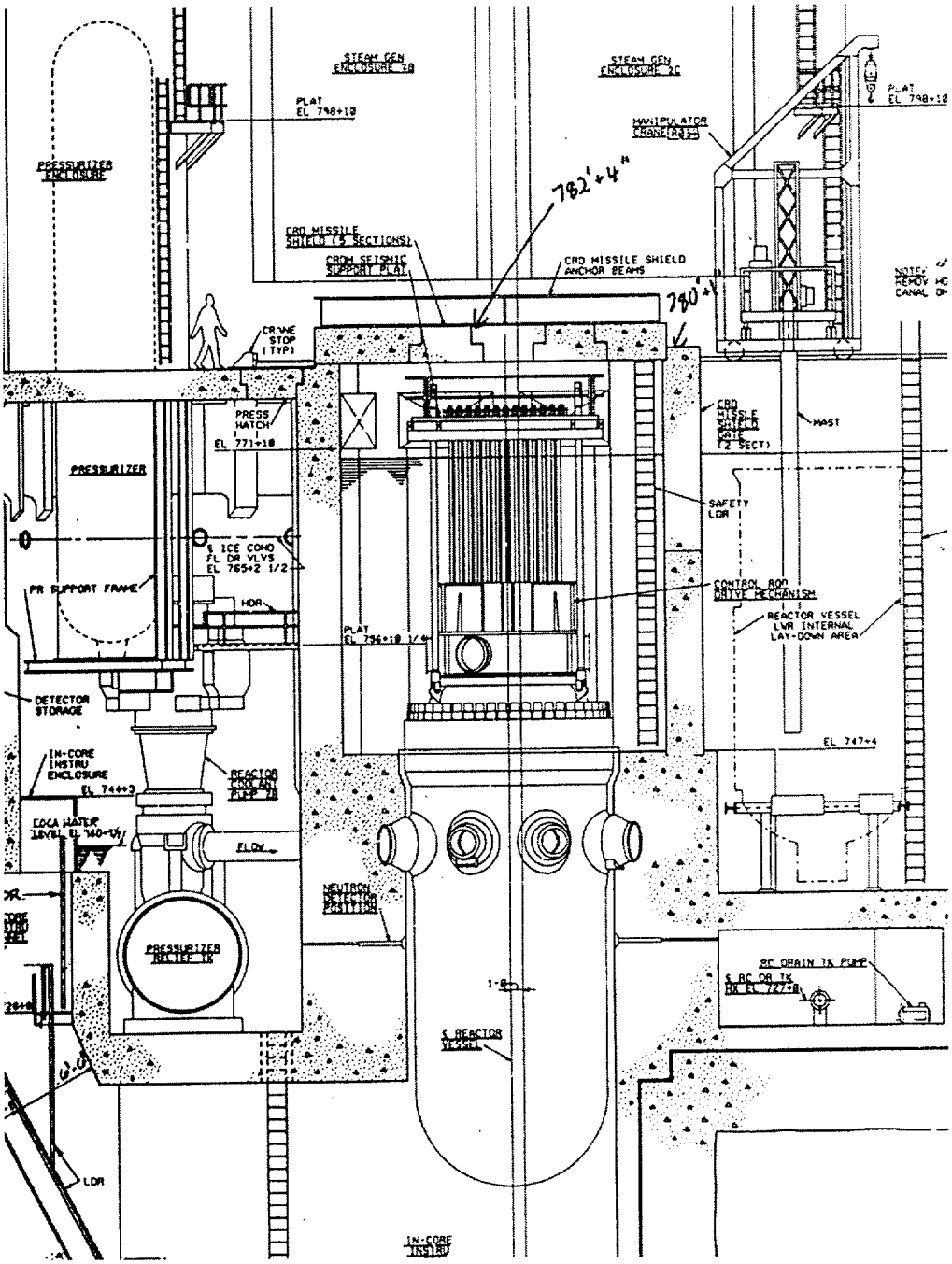

Figure 1 Schematic showing the position of the missile shield relative to the RV head service structure.