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Constellation Energy Group

Nine Mile Point
Nuclear Station

March 6, 2003
NMP2L 2086

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Nine Mile Point Unit 2
Docket No. 50-410
Facility Operating License NPF-69

Response to NRC Request for Additional Information Regarding High Pressure Core Spray Nozzle Safe-End Extension Weld (KC-32)
TAC No. MB4869

Gentlemen:

On May 21, 2002, the NRC staff transmitted by e-mail a list of questions regarding the High Pressure Core Spray (HPCS) nozzle safe-end extension weld (KC-32). A subsequent telephone conference was held on May 29, 2002 between NRC and Nine Mile Point Nuclear Station, LLC (NMPNS) staff representatives to discuss the questions and disposition the corresponding issues and responses. Following the telephone conference, the NRC staff issued a Request for Additional Information (RAI) by letter dated June 5, 2002. The Attachment to this letter contains the NRC questions and the NMPNS responses.

Sincerely,

Bruce S. Montgomery
Manager Engineering Services

BSM/DEV/jm

Attachment

A001

cc: Mr. H. J. Miller, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
Mr. P. S. Tam, Senior Project Manager, NRR (2 copies)

## ATTACHMENT

## NINE MILE POINT UNIT 2
## RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING HIGH PRESSURE CORE SPRAY (HPCS) NOZZLE SAFE-END EXTENSION WELD (KC-32)

Reference: NRC Letter to Nine Mile Point Nuclear Station, LLC (NMPNS) dated June 5, 2002

***RAI (1)***

*Provide the results of ultrasonic testing (UT) performed in the spring 2002 refueling outage on weld KC-32, and compare the results with those of the previous post-MSIP [mechanical stress improvement process] inspections.*

**Response**

Table 1 provides the results of UT performed during refueling outage number 8 (RFO-8) in the spring of 2002, as well as the results of UT performed during previous post-MSIP inspections. The inspection results obtained during RFO-8 are consistent with the evaluation contained in the NRC letter to Mr. K. S. Grewal dated May 5, 2000; i.e., that there have been no significant changes or trends in the UT measurements of the flaw size that would indicate a developing problem.

***RAI (2)***

*Describe the UT equipment and procedures used in the inspection of weld KC-32 in the 2002 refueling outage, and identify the differences with those used in previous inspections. If different equipment and procedures were used, discuss their impact on the results of flaw size measurements.*

**Response**

The RFO-8 inspection (April 2002) was performed utilizing different inspection tooling than was used in previous inspections. Westinghouse personnel, equipment, and procedures were used for the RFO-8 inspection, whereas General Electric personnel, equipment, and procedures were used for the inspections performed prior to RFO-8. As noted in the response to RAI (1) above, the RFO-8 inspection results are consistent with the evaluation contained in the NRC letter to Mr. K. S. Grewal dated May 5, 2000; i.e., that there have been no significant changes or trends in the UT measurements of the flaw size that would indicate a developing problem.

*RAI (3)*

*For comparison purposes, provide information on the following items pertaining to the UT inspections performed on weld K-32 after implementation of MSIP.*

*(a) UT measurement uncertainties associated with the reported flaw length and depth during each post-MSIP inspection.*

**Response**

See the response to Question 3 in the Attachment to Niagara Mohawk Power Corporation (NMPC) letter NMP2L 1951 dated April 7, 2000. Since the inspection techniques utilized for the RFO-8 inspections were similarly qualified (as discussed in the response to Item (b) below), the discussion provided in the referenced letter remains applicable.

*(b) UT qualification requirements of the procedures/equipment/personnel that were used in the inspection of weld KC-32 during each post-MSIP inspection.*

**Response**

Through RFO-4, the inspections were performed using Electric Power Research Institute (EPRI)-qualified procedures, equipment, and personnel. The RFO-6 and RFO-8 inspection procedures, equipment, and personnel were qualified to the EPRI Performance Demonstration Initiative (PDI) standard.

*(c) During each post-MSIP UT inspection, clarify whether the spring hanger for pipe support near weld KC-32 was pinned and describe the weight of shielding lead that were placed on the HPCS piping.*

**Response**

Spring Hanger Pinning: Since application of the MSIP, with the exception of the 1992 inspection, direction was given to not pin the spring hanger near weld KC-32 during installation of the lead shielding and performance of the UT inspections.

Weight of Shielding: The weight of shielding lead placed on the HPCS piping during each UT inspection cannot be determined with certainty; however, similar amounts have been used during the various examinations. The HPCS piping has been analytically qualified for a shielding lead weight of 90 lbs/ft applied to the piping and inline valves from the reactor pressure vessel nozzle to 4 feet upstream of containment isolation valve 2CSH*AOV108 (a total shielding weight of approximately 2,200 lbs). Administrative controls assure that the weight of shielding lead installed does not exceed the analytically qualified weight.

***RAI (3) (Cont'd)***

*(d) An estimation of upper bound compressive stresses on the flaw in weld KC-32 resulting from the weight of shielding lead with unpinned spring hangers, and the potential impact to the results of UT inspection due to these compressive stresses. Specifically, discuss the differences in resulting compressive stresses between pinned and un-pinned spring hanger configurations.*

**Response**

The stress at the nozzle-to-pipe connection due to the application of shielding lead (in the amount identified in the response to RAI (3), Item (c) above) is as follows:

- Deadweight with spring hanger pinned: 1,155 psi
- Deadweight with spring hanger unpinned: 1,395 psi

These results demonstrate that the difference in the deadweight stress due to the shielding lead with the spring hanger pinned versus unpinned is small. In both cases, the flaw area will be in compression. For comparison, the calculated stress for the American Society of Mechanical Engineers (ASME) Section III, Equation 9 load combination (normal/upset, including pressure, deadweight, and earthquake inertia loads, with the spring hanger unpinned) is 9,642 psi, versus the allowable value of 30,000 psi (1.5 $S_m$).

NMPNS concludes that the weight of shielding lead will not have a significant effect on the flaw size or the ability to detect and size the flaw using UT techniques, since:

1. The additional compressive forces imposed at the flaw location by the weight of shielding lead are of low magnitude (with the spring hanger either pinned or unpinned);

2. The flaw has remained detectable using techniques and tooling that have been qualified to a common standard; and

3. There have been no significant changes or trends in the UT measurements of the flaw size that would indicate a developing problem.

***RAI (4)***

*Describe the design basis fatigue usage factor limit for the HPCS system. In addition, provide information pertaining to the thermal stratification stress of the HPCS piping adjoining the reactor pressure vessel nozzle, if any. Furthermore, describe how this thermal stratification stress is considered in the crack evaluation.*

**Response**

Fatigue Usage Factor: The design basis cumulative usage factor (CUF) limit for the HPCS piping and nozzle is 1.0, in accordance with the ASME Code, Section III, Division 1, Subsection NB.

Thermal Stratification: Thermal stratification is caused by cold water flowing at the bottom of the pipe while the top of the pipe is exposed to hot temperatures. The HPCS system design criteria did not anticipate or require that thermal stratification be considered. NMPNS has confirmed by analysis that the differential water temperature between the top and bottom of the piping adjoining the reactor pressure vessel nozzle is small (a few degrees). Thus, thermal stratification stresses need not be considered in the fatigue evaluation.

## TABLE 1

## WELD KC-32 INSPECTION (UT) RESULTS

| Inspection | Length (% of Internal Circumference) | | Depth (% of Wall Thickness) |
|---|---|---|---|
| Post-MSIP (RFO-1, December 1990) | 3.40" (1) (11.3%) | | 0.35" (4) (41%) |
| Midcycle (August 1991) | 3.3" (1) (10.9%) | | 0.32" (4) (38%) |
| RFO-2 (April 1992) | 2.6" Automated (1) (8.6%) | 3.3" Manual (10.9%) | 0.25" (4) (29%) |
| RFO-3 (October 1993) | 2.5" Automated (1) (8.3%) | 3.0" Manual (9.9%) | 0.25" (4) (29%) |
| RFO-4 (May 1995) | 2.5" Automated (1) (8.3%) | 3.0" Manual (9.9%) | 0.30" (4) (35%) |
| RFO-6 (May 1998) | 3.2" Automated (2) (10.6%) | N/A | 0.30" (2) (35%) |
| RFO-8 (April 2002) | 2.7" Automated (3) (8.9%) | N/A | 0.25" (3) (29%) |

(1) General Electric (GE) Smart automated 45° shear wave with manual "re-looks" to determine length
(2) GE "Smart 2000" automated system
(3) Westinghouse "Intraspect" automated system
(4) Depth sizing performed manually