CENTERIOR ENERGY

PERRY NUCLEAR POWER PLANT
10 CENTER ROAD
PERRY, OHIO 44081
(216) 259-3737

Mail Address
P.O. BOX 97
PERRY, OHIO 44081

Michael D. Lyster
VICE PRESIDENT - NUCLEAR

March 4, 1992
PY-CEI/NRR-1463 L

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

Perry Nuclear Power Plant
Docket No. 50-440
Feedwater Nozzle Weld
Indications (TAC No. 81879)

Gentlemen:

During the upcoming Perry Nuclear Power Plant (PNPP) refueling outage, the two feedwater nozzles that contain crack indications will be inspected and evaluated, and NRC approval will be required prior to plant startup as noted in the September 12, 1991 NRC letter that documented Staff review of operation through the third cycle. Several activities have been completed to date, in order to simplify and expedite the onsite Engineering reviews which will be performed during the outage, and also to simplify the NRC review and approval process.

The first of these activities was the preparation for, and conduct of, a meeting with the NRC Staff on December 5, 1991. This meeting was held to discuss the various scenarios that could occur during the refueling outage based on the observed size of the indications at that time [inspections are scheduled to be performed in mid-April, during Refuel Outage 3 (RFO-3)], including the resultant activities that would likely be taken for each scenario.

The second activity was completed as a result of a commitment made during the NRC meeting. A Summary Technical Report entitled "Evaluation Of Flaw Indication(s) In The Perry Feedwater Nozzle To Safe-End Welds Extrapolated Beyond RFO-3" has been prepared, which presents the results of Engineering evaluations on potential future growth of various postulated initial crack sizes that might be observed during RFO-3 inspections. This Summary Technical Report is provided as Enclosure 1 for NRC information, and the PNPP positions are briefly summarized in this letter.

It is anticipated that the information provided herein will aid NRC review of the case-specific submittal that will be made by PNPP during RFO-3, following receipt of the inservice inspection results of the welds containing crack indications.

A001
1/1

Different technical evaluations will be performed depending on what region of the "flaw-depth versus flaw-length plot" that the crack indications are determined to lie within. First, as noted in Attachment 1 to the Summary Technical Report, the Mechanical Stress Improvement Process has been analytically shown to place the inner 50% of the pipe wall into compression for the complete circumference, i.e. 100% of the circumference. Attachment 1 to the Summary Technical Report was prepared by the MSIP vendor, AEA O'Donnell Inc. (for the Cleveland Electric Illuminating Company). In order to provide conservatism and account for the possibility of inaccuracies in flaw sizing capabilities, Attachment 1 proposes that within the more restrictive region of <40% flaw depth and <33% flaw length (circumferential), that credit be give for MSIP mitigation of any flaws such that flaws in this region will not be expected to subsequently grow. It is recognized that, in Generic Letter 88-01 and NUREG 0313, NRC has only to-date recognized a region bounded by 30% depth and 10% circumference for complete mitigation of flaws by MSIP. Although the Cleveland Electric Illuminating Company (CEI) agrees with the basis for the region proposed by AEA O'Donnell, Inc. for crack mitigation and believes that there is no technical basis for the smaller NUREG-0313 region, CEI proposes to utilize a more conservative region (than the 40%/33%), bounded by 30% depth and 25% circumference, for crack mitigation credit.

Therefore, if field inspections during RFO3 determine that the crack size is within this 30% depth/25% circumference region, the case-specific evaluation which will be submitted to NRC will note that the crack indication has been placed into compression and that no further growth will occur. Crack growth calculations will therefore need not be included as part of a case-specific evaluation for welds within this envelope. CEI will continue to classify any welds containing crack indications outside of the 30%/10% region but within the 30%/25% region as G.L. 88-01 Table 1 Category F welds as discussed in Item 3 of the Staff Position on Inspection Schedules, unless they can be upgraded to Category E based on 4 successive examinations performed during upcoming refueling outages. The first of the 4 subsequent inspections would be performed during Refuel Outage 4 for this scenario.

For the scenarios in which the field inspections determine that the crack size is outside of the 30% depth/25% circumference region, no credit of any kind will be taken for MSIP compressive forces, or for the compressive forces that result from the as-welded residual stress profile for areas of the weld greater than 20% depth (see Figure 3 of NUREG-0313, Rev. 2, Appendix A "Crack Growth Calculations"). Therefore, the case-specific evaluation that will be submitted during the refueling outage will discuss the crack growth calculations that have been performed, and will provide conclusions as to the number of plant operating hours that are acceptable prior to the next inspection (in no case will the next inspection occur later than during the next refueling outage). The crack growth calculations will be performed using the methodology described in the enclosed Summary Technical Report. These methods are consistent with those described in Appendix A of NUREG-0313 in that they recognize the fundamental concept that the crack growth rate of a material is a function of the applied stress intensity factor (KI). The calculations

determine the growth rate using the Alloy 182 Crack Growth Rate Stress Dependency data from EPRI Project #RP 1930-1, and for conservatism, they neglect the as-welded residual stress profile of the weld. The Summary Technical Report provides examples of the number of plant operating hours that may occur before an inspection is required (for various initial flaw sizes) without exceedance of the ASME Code acceptance criteria.

Also provided within the Report are the results of calculations performed utilizing the constant crack growth rate that was discussed by the NRC in their review of plant operation for the third operating cycle, 5.0E-05 inches/hour. This information is provided primarily for comparison purposes, as CEI believes that this assumed growth rate is greater than would be experienced for the PNPP-specific conditions of nozzle stress and water chemistry.

It should be noted that the flaw evaluation which will be performed during the refueling outage and submitted for NRC review and approval, will include the effects of snubber optimization efforts that are being implemented during the third refueling outage. As discussed in letter PY-CEI/NRR-1374L dated October 18, 1991, the evaluation will serve as the case-specific evaluation required by PNPP's commitment to Regulatory Guide 1.84, as it discusses Code Case N-411-1 Condition No. 5. This position was also discussed at the December 5, 1991 meeting with the NRC Staff and is addressed in the enclosed Summary Technical Report.

If you have any questions, please feel free to call.

Sincerely,

Michael D. Lyster

MDL:BSF:ss

cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III