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Fred Dacimo
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August 29, 2003

Re: Indian Point Unit No. 3
Docket No. 50-286
NL-03-140

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: **Reply to Request for Additional Information**
Regarding NRC Order EA-03-009 Relaxation Request (TAC MB8163)

Reference:

1) Entergy letter to NRC (NL-03-054), "NRC Order EA-03-009 Relaxation Request Regarding Inspection of Reactor Pressure Vessel Head Nozzles," dated March 27, 2003

2) NRC letter to Entergy, "Request for Additional Information Regarding Relaxation from Order Establishing Interim Inspection Requirements of Reactor Vessel Heads," dated May 29, 2003

Dear Sir:

This letter provides additional information requested by the NRC regarding the relaxation request submitted by Entergy Nuclear Operations, Inc (Entergy) in Reference 1, pertaining to the inspection requirements established in NRC Order EA-03-009. The requested relaxation involves inspection of the bottom portion of the nozzles, which are threaded for installation of guide funnels. The NRC requested additional information in Reference 2.

The requested information is provided in Attachment 1 and a revision to the relaxation request is provided in Attachment 2. The relaxation request has been revised to incorporate the requested information and to clarify that the proposed alternative inspection would be applicable with the plant in either the moderate or high category. Entergy successfully completed a bare metal visual examination of the reactor vessel head during refueling outage 3R12 in April 2003, based on the Order requirements for a moderate category plant. Entergy also performed supplemental non-destructive examination of approximately one-half of the penetration nozzles. The next inspection, due during refueling outage 3R13 (Spring 2005), will be based on either moderate or high category requirements depending on analysis results that will be prepared in 2004.

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There are no new commitments identified in this letter. If you have any questions or require additional information, please contact Mr. Kevin Kingsley at 914-734-5581.

Sincerely,

Fred R. Dacimo
Vice President, Operations
Indian Point Energy Center

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ATTACHMENT 1 TO NL-03-140

RESPONSE TO NRC QUESTIONS REGARDING

NRC ORDER EA-03-009 RELAXATION REQUEST

PERTAINING TO INSPECTION OF THREADED REGION OF NOZZLES

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

The following questions were issued by NRC in a letter to Entergy dated May 29, 2003:

Question 1:

The licensee stated that a structural evaluation was performed for the IP3 nozzles.

Provide the applicable technical data (i.e., operating stress levels, crack growth analysis, hoop stresses, etc) which supports the conclusion that the area in the threaded region is insignificant.

Response:

The structural evaluation for Indian Point 3 consists of a crack growth analysis using the methods of MRP-55 for crack growth caused by primary water stress corrosion cracking at a head temperature of 592 degrees F. The nozzle is an open-ended tube so that the operating pressure and temperature are essentially the same at both the inside and outside surface of the tube. Therefore the operating stress levels are negligible for this case. For purposes of this analysis, a conservatively high hoop stress of 30 ksi is assumed. An initial hypothetical flaw is assumed to exist with a worst-case orientation (axial) and flaw growth occurs in a single direction toward the J-groove weld. Because the location of the hypothetical flaw is in the threaded region, at least 0.96 inches from the J-groove weld, the weld residual stresses are also negligible. The analysis concludes that crack growth in a 4-year operating period is approximately 0.54 inches, well within the minimum dimension of 0.96 inches to the closest point of the J-groove weld. Refer to Figure 1 in the relaxation request for the location of these dimensions on the penetration nozzles.

The relaxation request has been updated (Attachment 2) to reflect the above analysis results. The prior version of the relaxation request used a similar analysis but with a higher assumed hoop stress which was more typical for the J-groove area where weld residual stresses would be present.

Question 2:

The licensee stated that if cracking is detected above the threaded region, and extends into the threaded area, other nondestructive examination (NDE) methods would be used to determine the extent of cracking.

Identify the particular NDE methods that would be utilized, and provide the justification why this additional NDE would not be proposed / performed as an alternative to the requirements in the Order.

Response:

The inspection preformed during Refueling Outage 3R12 in April 2003 consisted of a bare metal visual examination (in accordance with the Order) and additional supplemental ultrasonic (UT) and eddy current (ECT) examinations of 41 of 78 nozzles. A summary description of the

inspection methods and results was provided in Entergy's letter to NRC, NL-03-098, dated June 12, 2003. As a result of this inspection, Entergy gained experience with ECT techniques that could be used to inspect at least a portion of the threaded region if UT results indicate the need for additional inspection. A single probe assembly was used that contained a pair of transducers for the UT examination and an eddy current coil for the ECT examination. The axial coverage with this probe assembly extended from at least 2 inches above the J-groove weld to approximately 0.75 inches from the bottom of the nozzle with UT and to approximately 0.25 inches from the bottom of the nozzle with ECT. Meaningful UT data below approximately 0.75 inches was limited by signal dispersion in the threaded region. Meaningful ECT data below approximately 0.25 inches was limited because the eddy current coil tends to loose contact with the examination surface as it reaches the lead-in chamfer region. The remaining 37 nozzles were not inspected with supplemental UT / ECT techniques because of access limitations with the inspection probe.

Entergy is investigating the use of a different probe design to improve accessibility to nozzles during the next inspection due in the Spring 2005 refueling outage. A primary objective in using a different probe is to successfully access nozzles that were difficult to access during 3R12. Although ECT capability will be maintained available to support the inspection, the configuration may not be a single probe assembly with both UT and ECT capability. The crack-growth analysis demonstrates that UT of the region extending at least to the top of the threaded region provides an acceptable level of quality and safety. The additional time and resources required to collect and analyze ECT data and resolve potential access limitations is not warranted.

ATTACHMENT 2 TO NL-03-140

NRC ORDER EA-03-009 RELAXATION REQUEST, REVISION 1

PERTAINING TO INSPECTION OF THREADED REGION OF NOZZLES

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

RELAXATION REQUEST REGARDING ULTRASONIC TESTING OF REACTOR PRESSURE VESSEL HEAD NOZZLES IN ACCORDANCE WITH NRC ORDER EA-03-009, SECTION IV. F. (REVISION 1)

A. ASME COMPONENTS AFFECTED

Component Number: B4.12

Description: Reactor Pressure Vessel Head Penetration Nozzles (78)

Code Class: 1

B. REQUIREMENTS OF US NRC ORDER EA-03-009

For those plants in the moderate and high categories, required inspections involve bare metal visual examination of the RPV head surface and non-destructive examination of RPV head penetration nozzles. In both cases [Section IV.C (1)(b)(i) for high category and Section IV.C (2)(b)(i) for moderate category], the non-destructive examination involves the following:

(b) Either:

(i) Ultrasonic testing of each RPV head penetration nozzle (i.e., nozzle base material) **from two (2) inches above the J-groove weld to the bottom of the nozzle** and an assessment to determine if leakage has occurred into the interference fit zone,

OR

(ii) Eddy current testing or dye penetrant testing of the wetted surface of each J-Groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.

C. REASON FOR RELAXATION REQUEST

During refueling outage 3R12 in April 2003, Entergy met the inspection requirements of the Order for a moderate category plant based on a bare metal visual examination of the RPV head surface. Entergy also performed supplemental non-destructive examination of approximately one-half of the RPV head penetration nozzles. The inspection requirements for the next refueling outage (3R13, Spring 2005) will be based on the moderate or high category. In either

case, non-destructive examination of the RPV head penetration nozzles is required by the Order. However, the bottom 0.75 inches of the nozzles are designed with a threaded region to accommodate the installation of guide funnels (Figure 1). Based on experience gained during the inspection in 3R12, meaningful ultrasonic test data cannot be obtained in this region, due to dispersion of the ultrasonic test signal. Therefore, the relaxation request is needed to support a non-destructive examination of the RPV nozzles based on use of ultrasonic test methods.

D. PROPOSED ALTERNATIVE

Entergy will perform ultrasonic testing of each RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld and extending down the nozzle to the top of the threaded region, which is approximately 0.75 inches above the bottom of the nozzle.

E. JUSTIFICATION

The ultrasonic testing will extend from two (2) inches above the J-groove weld to the top of the threaded region at the bottom of the penetration nozzle. The axial dimension from the bottom portion of the J-weld (at the lowest point) to the top of the threaded region ranges from 0.96 inches to 1.4 inches, depending on the radial location of the nozzle. This coverage provides an acceptable level of quality and safety because:

- It encompasses the weld heat-affected zone (HAZ), which is the area most susceptible to primary water stress corrosion cracking (PWSCC).

- The stresses in the unexamined region are low and a crack in this region does not affect structural integrity of the reactor pressure vessel head, because the nozzle is not part of the reactor coolant pressure boundary at that location.

- A conservative analysis for the IP3 nozzles shows that the crack growth over a 4-year operating period would be approximately 0.54 inches. An undetected crack at the most limiting location (at the top end of the threaded region) would have to propagate 0.96 inches in the most limiting nozzles in order to reach the J-groove weld. Since the inspection frequency for IP3 would be at least every other refueling outage (nominally every 4 years) for a moderate category classification, an undetected crack in the threaded region would not propagate to the J-groove weld prior to the next inspection interval. The inspection program with a high category classification would require a more frequent inspection, every refueling outage.

- If cracking is detected above the threaded region, and extending into this area, then other NDE test methods would be used to determine the extent of cracking.

F. DURATION OF RELAXATION

Entergy requests relaxation of this requirement beginning with inspections completed during 3R12 and for all subsequent inspection periods where ultrasonic examination techniques are used to inspect the RPV head penetration nozzle.

G. ATTACHMENTS TO RELAXATION REQUEST

Figure 1, IP3 Penetration Nozzles - Head Nozzle Weld Area

H. REFERENCES

1. NRC Letter dated February 11, 2003, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," from Samuel J. Collins (NRC) to all Pressurized Water Reactor Licensees, dated February 11, 2003.

2. Entergy letter to NRC, NL-03-054; "NRC Order EA-03-009 Relaxation Request Regarding Inspection of Reactor Pressure Vessel Head Nozzles", dated March 27, 2003.

3. NRC letter to Entergy, "Request for Additional Information Regarding Relaxation from Order Establishing Interim Inspection Requirements of Reactor Vessel Heads, dated May 29, 2003.

4. MRP-55, Rev. 1, "Materials Reliability Program, Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Thick-Wall Alloy 600 Materials, November 2002.

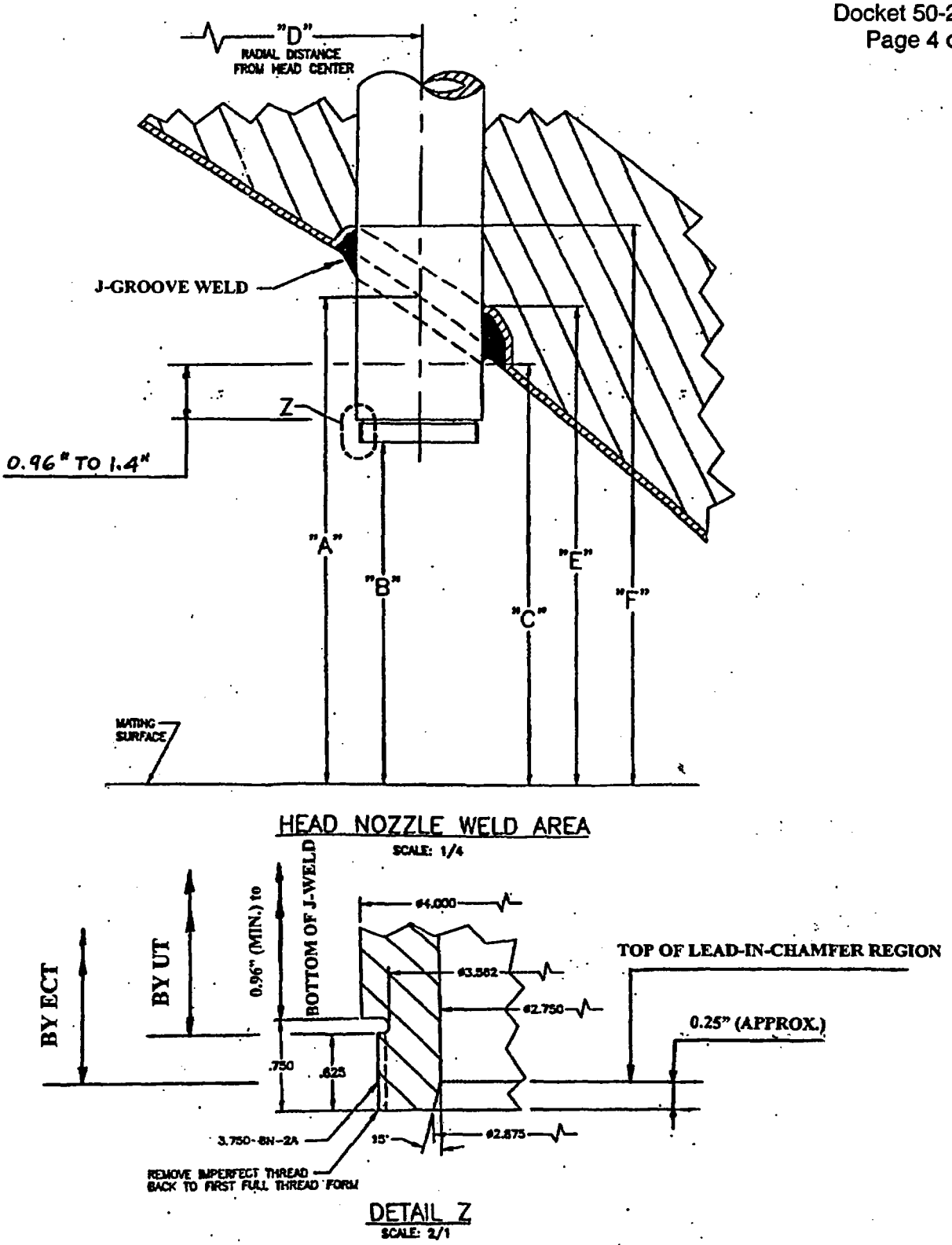

FIGURE 1
IP3 PENETRATION NOZZLES
HEAD NOZZLE WELD AREA