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INDIANA MICHIGAN POWER

October 27, 2004

AEP:NRC:4055-03
10 CFR 50.55a

Docket Nos. 50-315
50-316

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

Donald C. Cook Nuclear Plant Units 1 and 2
REVISION TO PROPOSED ALTERNATIVE TO
REPAIR REQUIREMENTS OF
SECTION XI OF THE AMERICAN SOCIETY OF
MECHANICAL ENGINEERS CODE FOR
UNIT 1 AND UNIT 2 REACTOR VESSEL HEAD PENETRATIONS

References:

1) Revised Nuclear Regulatory Commission (NRC) Order EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 20, 2004 [Accession No. ML040220181].

2) Letter from D. P. Fadel, Indiana Michigan Power Company (I&M), to U. S. NRC Document Control Desk, "Proposed Alternative to Repair Requirements of Section XI of the American Society of Mechanical Engineers Code for Unit 1 and Unit 2 Reactor Vessel Head Penetrations," AEP:NRC:4055-02, dated October 22, 2004.

3) Westinghouse WCAP-15987-P, Revision 2-P-A, "Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations," dated December 2003.

This letter transmits a revision to a proposed alternative to the repair requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code).

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I&M is performing inspections of reactor vessel head penetrations as required by the First Revised NRC Order EA-03-009, (Reference 1). In Reference 2, I&M proposed to use the NRC-approved embedded flaw repair process described in WCAP-15987-P (Reference 3) for repairs to the reactor pressure vessel head penetrations and/or the attachment welds, as an alternative to repair requirements in the ASME Code. The proposed alternative included an exception, for Unit 2 Penetrations 74 and 75, to the post-repair inspection requirements in the WCAP. I&M subsequently determined that the exception is needed only for Unit 2 Penetration 75. I&M has revised the proposed alternative accordingly. The revised proposed alternative is presented in the attachment to this letter.

I&M requests approval of the revised proposed alternative by October 28, 2004, to support the current Unit 2 outage schedule. There are no new commitments identified in this letter. Should you have any questions, please contact Mr. John A. Zwolinski, Director of Safety Assurance, at (269) 466-2428.

Sincerely,

Daniel P. Fadel
Vice President of Engineering

JRW/jen

Attachment:

Relief Request 2004-ISIR-14

c: J. L. Caldwell – NRC Region III
K. D. Curry – AEP Ft. Wayne, w/o attachment
J. T. King – MPSC, w/o attachment
C. F. Lyon – NRC Washington DC
MDEQ – WHMD/HWRPS, w/o attachment
NRC Resident Inspector

ATTACHMENT TO AEP:NRC:4055-03

10 CFR 50.55a Relief Request 2004-ISIR-14, Revision 1

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(i): Alternative Provides Acceptable Level of Quality and Safety

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Component(s) Affected

Donald C. Cook Nuclear Plant (CNP) Unit 1 and Unit 2 reactor pressure vessel head penetration (VHP) nozzles and J-groove welds (80 penetrations in Unit 1, 79 penetrations in Unit 2).

2. Applicable Code Edition and Addenda

1989 Edition, no addenda, of the ASME Code

3. Applicable ASME Code Requirement

The 1989 edition of the ASME Code Section XI, IWA-4120(a), states:

> Repairs shall be performed in accordance with the Owner's Design Specification and the original Construction Code of the component or system. Later Editions and Addenda of the Construction Code or of Section III, either in their entirety or portions thereof, and Code Cases may be used.

In accordance with IWA-4120(a), Indiana Michigan Power Company (I&M) will follow the applicable requirements of the 1989 Edition of ASME Code Section III, in conjunction with the proposed alternatives as described in Section 5, for reactor vessel head penetration repairs.

Base Metal Defect Repairs

ASME Code Section III, NB-4131, states that defects in base metals, such as the VHP nozzles, may be eliminated or repaired by welding, provided the defects are removed, repaired, and examined in accordance with the requirements of NB-2500.

ASME Code Section III, NB-2538, addresses elimination of base material surface defects and specifies defects are to be removed by grinding or machining. Defect removal must be verified by a magnetic particle or liquid penetrant examination using acceptance criteria of NB-2545 or NB-2546. If the removal process reduces the section thickness below the NB-3000 design thickness, then repair welding per NB-2539 is to be performed.

ASME Code Section III, NB-2539.1, addresses removal of defects and requires defects be removed or reduced to an acceptable size by suitable mechanical or thermal methods.

ASME Code Section III, NB-2539.4, provides the rules for examination of the base material repair welds and specifies they shall be examined by the magnetic particle or liquid penetrant methods with acceptance criteria per NB-2545 and NB-2546. Additionally, if the depth of the repair cavity exceeds the lesser of 3/8 inch or 10 percent of the section thickness, the repair weld shall be examined by the radiographic method using the acceptance criteria of NB-5320.

Weld Metal Defect Repairs

ASME Code Section III, NB-4451, states defects in weld metal shall be eliminated and, when necessary, repaired per NB-4452 and NB-4453.

ASME Code Section III, NB-4452, addresses elimination of weld metal surface defects and specifies defects are to be removed by grinding or machining. Defect removal must be verified by a magnetic particle or liquid penetrant examination using acceptance criteria of NB-5340 or NB-5350. If the removal process reduces the section thickness below the NB-3000 design thickness, then repair welding per NB-4453 is to be performed.

ASME Code Section III, NB-4453.1, addresses removal of defects in welds and requires the defect removal be verified with magnetic particle or liquid penetrant examinations using acceptance criteria of NB-5340 or NB-5350, or in the case of partial penetration welds where the entire thickness of the weld is removed, and only a visual examination is required.

4. Reason for Request

I&M is conducting inspections of the VHP nozzles and J-groove welds as specified in the Nuclear Regulatory Commission (NRC) First Revised Order EA-03-009 (Reference 1). I&M is requesting relief from the above requirements described in Section 3 to allow use of the proposed alternative described in Section 5 for repairing flaws and indications in the nozzles and welds.

5. Proposed Alternative and Basis for Use

Proposed Alternative

Design, implementation of repairs, and inspections will be consistent with the embedded flaw repair process described in References 2 and 3. The embedded flaw repair overlay welds on the penetration J-groove welds will consist of a minimum of three deposited layers. The embedded flaw repair overlay welds on the inside diameter (ID) and the outside diameter (OD) of the penetration tube material will consist of a minimum of two deposited layers of weld, consistent with References 2 and 3, to minimize welding-induced residual stresses and material distortion. In the case of repairs on the ID surface, the two-layer approach results in a reduced inlay excavation depth.

I&M proposes one exception to the post-repair inspection process described in Reference 2. The section titled "Sequence and Summary of WCAP Approval" immediately following the signature page in Reference 2 requires that, following an embedded flaw repair of the J-groove weld, an ultrasonic inspection be performed from the nozzle ID, looking at the triple point to detect flaw growth and/or a leak path. I&M proposes that, following an embedded flaw repair of the J-groove weld on Unit 2 Penetration 75, the post repair ultrasonic inspection from the nozzle ID looking at the triple points be performed to the maximum extent possible.

The basis for use of the embedded flaw repair process and the basis for the exception to post-repair inspection requirements for Unit 2 Penetration 75 is provided below.

Basis for Use of Embedded Flaw Repair Process

In the NRC Safety Evaluation incorporated in Reference 2, the NRC staff concluded that, subject to the specified conditions and limitations, the embedded flaw repair process described in WCAP-15987-P provides an acceptable level of quality and safety. The staff also concluded that the WCAP is acceptable for referencing in licensing applications. I&M has confirmed that CNP Unit 1 and Unit 2 meet the criteria for application of the embedded flaw repair process stated in Appendix C to Reference 2.

In both the ID and OD overlay repair welds, the proposed substitute examination methods have been previously demonstrated to be adequate for flaw detection and sizing as shown in Reference 3.

The embedded flaw repair process is considered a permanent repair that will last through the useful life of the reactor pressure vessel head. As long as an identified indication or a primary water stress corrosion cracking (PWSCC) flaw remains isolated from the primary water environment, the only known mechanism for any further potential propagation is fatigue. The calculated fatigue usage in this region is very low, because the reactor vessel head region is isolated from the transients that affect the hot leg or cold leg piping.

The thickness of the weld used to embed the flaw has been set to provide a permanent embedment of the flaw. The embedded flaw process imparts less residual stress than weld repair following the complete removal of the flaw.

Since Alloy 52/152 (690) weldment is considered highly resistant to PWSCC, a new PWSCC crack is not expected to initiate and grow through the Alloy 52/152 overlay to reconnect the primary water environment with the embedded flaw. The resistance of the Alloy 690 material and its associated welds, Alloys 52 and 152, has been demonstrated by laboratory testing in which no cracking was observed in simulated pressurized water reactor environments, and in approximately 10 years of operational service in steam generator tubes where no PWSCC has been found.

Therefore, the embedded flaw repair process is considered to be an alternative to ASME Code requirements that provides an acceptable level of quality and safety, as required by 10 CFR 50.55a(a)(3)(i).

Basis For Exception to Post Repair Inspection Requirements for Unit 2 Penetration 75

Flaws on the nozzle ID of Unit 2 Penetration 75 were repaired in 1996. The repair was effected by excavating a rectangular section of the ID surface to remove the flaws. The excavated area on Penetration 75 was partially refilled with weld deposit. The excavated area on Penetration 75 cannot be ultrasonically inspected because the rough weld surface causes the ultrasonic probe to lose sonic coupling.

Unit 2 Penetration 75 was inspected during the current refueling outage in accordance with First Revised NRC Order EA-03-009 (Reference 1) by using a combination of surface and ultrasonic inspections as specified in Section IV.C(5)(b)(iii) of the order. As shown on Sketch 1, these inspections included a surface examination, using liquid penetrant, of the entire J-groove weld on Penetration 75. These examinations identified a 1/4-inch rounded indication on the J-groove weld for Penetration 75. Based on its shape, I&M considers that the indication is not likely to be service induced.

If approved, I&M intends to use the embedded flaw repair process described in Reference 2 and Reference 3 to repair the indication on the J-groove weld for Unit 2 Penetration 75. Reference 2 requires that, following an embedded flaw repair of the J-groove weld, an ultrasonic inspection be performed from the nozzle ID, looking at the triple point to detect flaw growth and/or a leak path. However, as noted above, the existing excavated area on the ID of Unit 2 Penetration 75 cannot be ultrasonically examined. Consequently, approximately 91 percent of the total triple point on Penetration 75 is inspectable. Although the triple point is not entirely inspectable, the overlay weld would extend beyond the existing J-groove weld, providing a barrier to a leak path through the triple point. As required by Reference 2, the entire overlay weld will undergo surface examination as shown on Sketch 2. Additionally, the periodic inspections performed in accordance with the First Revised NRC Order EA-03-009 will continue to provide a mechanism for monitoring the leak path. Therefore, I&M considers that, following an embedded flaw repair of the J-groove weld on Unit 2 Penetration 75, an ultrasonic inspection performed from the nozzle ID, looking at the triple point to the maximum extent possible provides an acceptable level of quality and safety, as required by 10 CFR 50.55a(a)(3)(i).

6. Duration of Proposed Alternative

The proposed alternative would be effective for the remainder of the third ten-year inservice inspection intervals for CNP Unit 1 and Unit 2.

7. Precedents

The NRC has approved the embedded flaw repair process described in Reference 2 for Indian Point Nuclear Generating Units 2 and 3 (Reference 5), and for San Onofre Nuclear Generating Station Units 2 and 3 (Reference 6).

8. References

1. First Revised NRC Order EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 20, 2004 [Accession No. ML040220181].

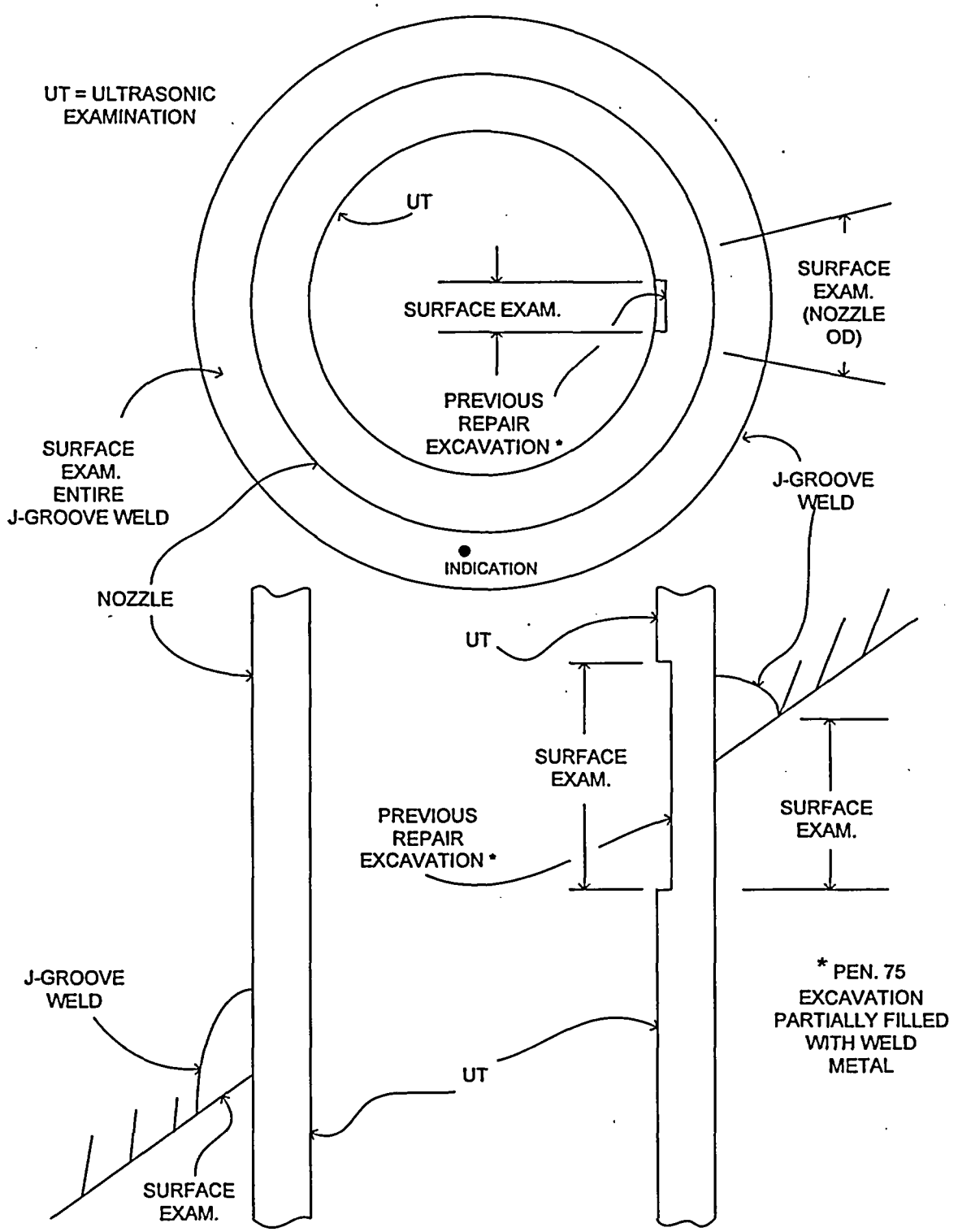
2. Westinghouse WCAP-15987-P, Revision 2-P-A, "Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations," dated December 2003.

3. Letter from J. S. Galembush, Westinghouse, to Terrence Chan and Bryan Benney, NRC, LTR-NRC-03-61, "Inspection of Embedded Flaw Repair of a J-groove Weld," dated October 1, 2003 [Accession No. ML032810457].

4. Letter from H. N. Berkow, NRC, to H. A. Sepp, Westinghouse; "Acceptance for Referencing - Topical Report WCAP-15987-P, Revision 2, Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations," (TAC No. MB8997)," dated July 3, 2003 [Accession No. ML031840237].

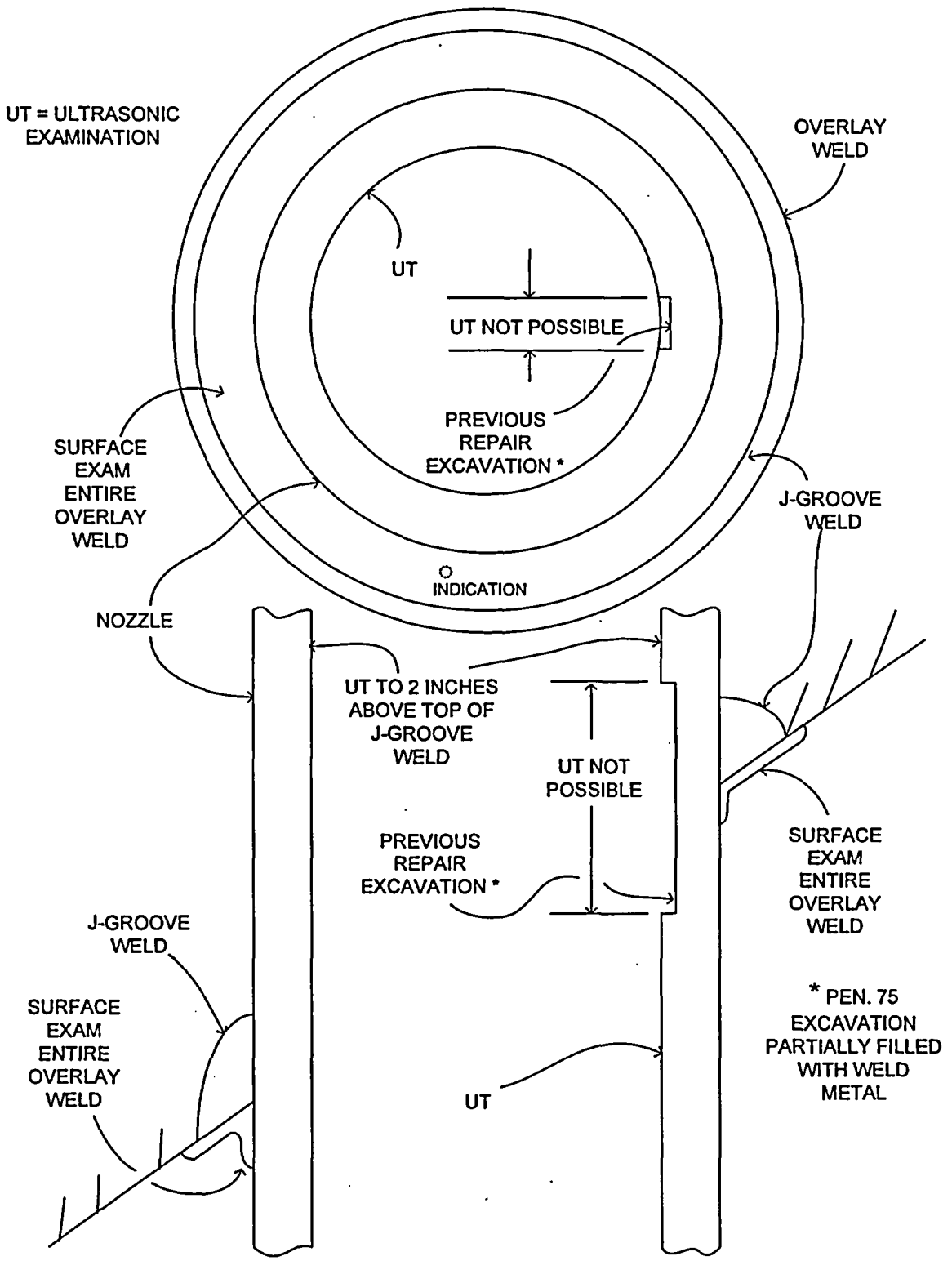
5. Letter from R. J. Laufer, NRC, to M. R. Kansler, Entergy Nuclear Operations, "Relief Request Nos. 62 and 3-32, Indian Point Nuclear Generating Unit No. 2 and No. 3 (TAC Nos. MC3281 and MC3282)," dated October 5, 2004 [Accession No. ML042520392].

6. Letter from S. Dembek, NRC, to A. E. Scherer, Southern California Edison Company, "San Onofre Nuclear Generating Station, Units 2 and 3, Inservice Inspection Program Relief Request ISI-3-8, Embedded Flaw Repair Process (TAC Nos. MC1470 and MC1471)," dated May 5, 2004 [Accession No. ML041260459].



SKETCH 1

UNIT 2 PEN. 75 INSPECTION PER FIRST REVISED ORDER EA-03-009



SKETCH 2

UNIT 2 PEN. 75 POST-REPAIR INSPECTION PER RELIEF REQUEST