Entergy Nuclear Northeast
Indian Point Energy Center
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Buchanan, NY 10511-0249

Robert Walpole
Licensing Manager
Tel (914) 734-6710

October 10, 2007

Re: Indian Point Unit 3
Docket 50-286

NL-07-123

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: **Response to Third Request for Additional Information Regarding Relief Request 3-43 for Temporary Repair to Service Water Pipe**

Reference:
1. Entergy letter NL-07-118 dated September 27, 2007 regarding Relief Request 3-43 for Temporary Repair to Service Water Pipe
2. Entergy letter NL-07-120 dated October 3, 2007 regarding Response to Request for Additional Information for Relief Request RR 3-43.
3. Entergy letter NL-07-121 dated October 5, 2007 regarding Response to Second Request for Additional Information for Relief Request RR 3-43.

Dear Sir or Madam:

Entergy Nuclear Operations, Inc (Entergy) requested relief (Reference 1) in accordance with 10 CFR 50.55a(a)(3)(i) for a temporary non-code repair to an ASME Code Class 3 piping elbow in the Indian Point 3 (IP3) Service Water System. Entergy provided additional information regarding this request (References 2 and 3). Entergy agreed on October 10, 2007 to provide additional information to support this request which is summarized in Attachment 1. Based on this additional information, Entergy is providing Revision 2 of the Relief Request 3-43 in Attachment 2.

There are no new commitments being made in this submittal. If you have any questions or require additional information, please contact Mr. Robert Walpole, Manager, Licensing at (914) 734-6710.

Sincerely,

Robert Walpole
Licensing Manager
Indian Point Energy Center

cc: next page

A047
NRR

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
Mr. Samuel J. Collins, Regional Administrator, NRC Region 1
NRC Resident Inspector, IP3
Mr. Paul D. Tonko, President NYSERDA
Mr. Paul Eddy, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-07-123

REPLY TO THIRD REQUEST FOR ADDITIONAL INFORMATION REGARDING INDIAN POINT 3 RELIEF REQUEST 3-43 FOR TEMPORARY NON-CODE REPAIR TO SERVICE WATER PIPING

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

SUMMARY OF ADDITIONAL INFORMATION

The following summarizes the additional information being provided in this transmittal regarding IP3 Relief Request 3-43, based on information exchanged with the NRC staff on October 10, 2007. The revised relief request is provided in Attachment 2.

1. In Attachment 2 to the licensee's letter dated October 3, 2007, item 4 of Repair Monitoring stated in part that the UTs will be performed monthly for the first quarter and if no unexpected degradation is identified, UTs will then be performed quarterly for the balance of the duration of this relief request. Provide details regarding what constitute unexpected degradation.

   Response: Entergy will perform volumetric examinations (i.e. UT) of the repair plate, attaching weld and surrounding base material (i.e. elbow). An average corrosion rate will be calculated based on the point to point comparison between the current and the previous inspections. If this average corrosion rate exceeds the predicted corrosion rate (i.e. 0.012" per year) then the inspection frequency will remain monthly otherwise, the inspection frequency will be performed on a quarterly basis through the remainder of the current operating cycle.

2. Provide details regarding what inspection results would require additional corrective actions such as increased frequency of UT monitoring, additional repair or elbow replacement.

   Response: The inspection results discussed in item (1) above will be evaluated as required by ASME Code Case N-513-1 to ensure that the structural margins required by the Code Case are maintained through the remainder of the current operating cycle. If the results of the monitoring program indicate that the structural margins required by the Code Case will be exceeded prior to the end of the current fuel cycle, Entergy will implement additional repair and/or replacement activities prior to reaching the limits of the Code Case. These repair and/or replacement activities will be consistent either with (1) the requirements of this relief request or (2) the requirements of the ASME Section XI, sub-section IWA-4000. NRC approval will be requested prior to the performance of any additional non-code repair.

ATTACHMENT 2 TO NL-07-123

INDIAN POINT 3 RELIEF REQUEST 3-43, REVISION 2 REGARDING TEMPORARY NON-CODE REPAIR TO SERVICE WATER PIPING

(Supersedes Revision 1 from Entergy letter NL-07-120 dated October 3, 2007)

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
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Proposed Alternative in accordance with 10 CFR 50.55a (a)(3)(i)

Alternative Provides Acceptable Level of Quality and Safety

A. ASME Code Component Affected

18" Service Water supply line number 408 to the Containment Fan Cooler Units (FCU). This line is one of two lines which supplies Hudson River water to the FCUs which are used to remove containment heat during normal plant operation and following a design basis accident.

B. Applicable Code Edition and Addenda

The applicable Code of Record for the current 10 year inservice inspection interval is the ASME Section XI Code, 1989 Edition with no Addenda. However, for Repair and Replacement activities, Entergy has requested and the NRC has approved (Reference 1) the use of subsection IWA-4000 of the ASME Section XI, 2001 Edition through the 2003 Addenda.

The affected portion of the service water piping was designed and constructed in accordance with the requirements of the USAS B31.1.0, 1967 Edition of the Power Piping Code.

C. Applicable Code Requirement

IWA-4422.1 requires that defects be removed or reduced to an acceptable size prior to implementing a repair or replacement in accordance with the requirements of IWA-4000. Since the current through-wall defects are beyond the acceptance criteria of IWD-3000 and removal is not practical without system depressurization, the proposed repair method would not be consistent with IWA-4422.1.

D. Reason for Request

On September 18, 2007 a Nuclear Plant Operator conducting a routine plant walkdown noted minor leakage of approximately 5 drops per minute in one of the two cement-lined 18" diameter, 0.375" nominal thickness service water supply lines for the containment fan cooler units. As a result of this leak a volumetric examination of the surrounding area was performed and the results were evaluated (IP-CALC-07-00083) against the requirements of ASME Code Case N-513-1. Although this evaluation confirmed that the affected piping remains within the requirements of Code Case N-513-1, the calculated corrosion rate does not support continued structural integrity through the remainder of the current operating cycle.

A weld repair/replacement fully compliant with the requirements of IWA-4000 is not practical. The affected piping section would need to be removed from service which would result in 3 FCUs inoperable. Indian Point 3 Technical Specification 3.6.6 does not have a Condition Statement for that configuration.

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Entergy has evaluated alternative options for repairing this degraded area including weld overlay using ASME Code Case N-661 or an approach using a welded reinforcing plate. The weld overlay based on Code Case N-661 does not have a high probability of success due to the risk of "burn-through" in small areas where the remaining pipe thickness is insufficient to deposit weld metal. To protect against "burn-through" as shown in EPRI testing, a modified approach for weld overlay may be possible by placing a small intermediate plate over the localized area subject to "burn-through" and then the weld overlay could be applied over that plate. Both the reinforcing plate option and the overlay-with-intermediate-plate option could be designed to adequately restore the required structural margin for the remainder of the current operating cycle. The welded reinforcing plate is the preferred option because less welding will result in lower residual shrinkage stresses. Therefore the balance of the discussion provided in this relief request is directed at describing the welded reinforcing plate approach.

E. Proposed Alternative and Basis for Use

As discussed above, IWA-4422.1 requires that a defect be removed prior to implementing an IWA-4000 repair. However, this is not practical for the reason described in Section D regarding Technical Specification 3.6.6 for the FCUs. The preferred alternative proposed under this relief request would install a reinforcing plate over the degraded area to allow the attachment welding (Figure A) to be located in an area with minimal degradation therefore ensuring a structurally sound load path while minimizing the risk of "burn-through" and increased leakage.

The design will also ensure that the configuration of the repair will allow continued monitoring of the region by volumetric examination to ensure that future degradation will not adversely impact the structural capability of the repaired section.

1. Materials and Installation

   The material of the component to be repaired is concrete lined Carbon Steel, A-234, Grade WPB. The proposed reinforcing material to be installed is ASTM A-234, Grade WPB/A-106 or equivalent carbon steel material with an ASME Code stress allowable of 15,000 psi. The welding process to be used in this repair is SMAW with a Carbon Steel, 7018 weld wire. The reinforcing material would either be plate stock rolled to fit the contour of the affected repair area or a section from pipe will be used to fit the contour. The gap between the repair area and the reinforcing material will be controlled by procedure.

   The welding will be performed per the requirements of ASME Section XI using qualified welders and the weld procedure will be qualified in accordance with ASME Section IX. The weld procedure specifies 50 ^{O}F pre-heat for welds less than ¾ inch thickness and no post weld heat treatment required for P-1 materials less than ¾ inch thick.

2. Design Parameters

   The welded plate/weld repair option will be designed and installed consistent with the original USAS B31.1.0, 1967 Edition of the Power Piping Code requirements for a reinforcing plate (paragraph 104.3). A structural evaluation (IP-CALC-07-00209) has

been performed to ensure that the resulting stresses in the piping, the plate and the attaching welds do not exceed the allowable stresses of the USAS B31.1.0 Code, 1967 Edition. The repair material will be carbon steel or pipe equivalent to the existing pipe material with allowable stress of S = 15,000 psi. The Code Case N-513-1 evaluation used the required factors of safety of 2.77 for the normal / upset condition and 1.39 for the emergency / faulted condition.

For purposes of this repair design and monitoring, Entergy will assume that the cement lining is no longer present in the area of the planned repair so that the corrosion rate for unprotected carbon steel will be applied.

3. Non Destructive Examinations

The area to be repaired has been characterized by performing straight beam UT mapping (Report IP3-UT-07-110) of the region to bound the degraded area and to ensure that the welds for repair are located in areas of sound base metal. At least ½ inch of the weld for attaching the reinforcing plate to the elbow will be performed in an area of average wall thickness exceeding 0.18 inches to ensure a structurally sound load path around the perimeter of the repair area.

NDE of this area was also performed in March 2007 (Report IP3-UT-07-049) when a through-wall flaw was discovered during startup from refueling outage 3R14. Plant conditions at that time allowed for a weld repair consistent with ASME IWA-4422.1, so that a relief request was not needed. Four areas with thickness readings less than 0.110 inches were excavated and weld repaired in accordance with the requirements of ASME Section XI. Corrective action at that time also included developing plans for replacing this elbow at the next refueling outage (3R15, Spring 2009).

The pipe wall was repaired to a minimum wall thickness needed to support operation until the next refueling outage, based on nominal corrosion rate assumptions. The typical unprotected metal corrosion rate for service water crevice corrosion observed at Indian point is 0.024 inches per two year cycle (0.012 inches per year). This is based on the wear rates observed and calculated for the evaluation of previous service water piping degradations. However, corrosion rates could be higher in localized areas.

The location of the March 2007 repair with respect to the current area of interest is adjacent to grid location H6 as shown on the UT map in IP3-UT-07-110. A final assessment of why a new through-wall leak developed near the area of the prior repair has not been completed at this time. Further characterization of the degradation in this elbow will be accomplished when the component is replaced.

Prior to shutdown for 3R13 (March 2005) radiography of this elbow as part of the Generic Letter 89-13 Corrosion Monitoring Program identified an area of interest on the opposite side of the elbow from the current flaw. Localized UT performed during 3R13 identified a 0.25-inch diameter area in the weld with a thickness less than 0.135 inches. An ASME Section XI repair was implemented prior to startup from that outage. There is no historical UT data resulting from the March 2005 repair for the current area of interest.

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NDE inspections for the extent-of-condition review will also be performed as stated in section E.5. NDE related to the repair and inservice monitoring is discussed in Section E.4.

4. Repair Monitoring

During installation of the reinforcing plate, welds will be examined, consistent with the requirements described in Code Case N-661. This includes performing a surface examination of the area to be welded, a surface examination (dye penetrant or magnetic particle) after the first weld pass and a final surface examination of the completed weld.

Inservice monitoring of the repair will be accomplished by applying a 1-inch by 1-inch grid over the area which will cover the reinforcing plate and the flat portion of the attaching weld (refer to Figure A). The intersection points in the grid will be inspected using straight beam UT. An initial baseline UT will be performed after installing the repair. Subsequent UTs will then be performed to verify that the structural requirements of the original construction code are maintained through the remainder of the current operating cycle. The UTs will be performed monthly for the first quarter and if no unexpected degradation is identified, UTs will then be performed quarterly for the balance of the duration of this relief request. To determine unexpected degradation, UT of the repair plate, attaching weld and surrounding base material (i.e. elbow) will be performed and an average corrosion rate will be calculated based on the point to point comparison between the current and the previous inspections. If this average corrosion rate exceeds the predicted corrosion rate (i.e. 0.012" per year) it will be considered unexpected.

The inspection results discussed above will be evaluated as required by ASME Code Case N-513-1 to ensure that the structural margins required by the Code Case are maintained through the remainder of the current operating cycle. If the results of the monitoring program indicate that the structural margins required by the Code Case will be exceeded prior to the end of the current fuel cycle, Entergy will implement additional repair and/or replacement activities prior to reaching the limits of the Code Case. These repair and/or replacement activities will be consistent either with (1) the requirements of this relief request or (2) the requirements of the ASME Section XI, sub-section IWA-4000. NRC approval will be requested prior to the performance of any additional non-code repair.

Also, routine walkdowns will be performed by Nuclear Plant Operators at least daily. This piping is not insulated and is accessible for visual inspection.

5. Degradation mechanism

Based on the location of the defect and based on the UT inspections of the degraded area, Entergy concludes that this was likely caused by degradation of the protective concrete lining directly under the degraded area which allowed brackish water from the Hudson River to contact the unprotected carbon steel piping resulting in localized corrosion. The degradation of the concrete lining was likely caused by the high flow

velocities and turbulence from the valve located just upstream of the degraded area. Further evaluation of the degradation mechanism will be performed during the next outage as stated in Section F, when the elbow can be removed and replaced.

Entergy will perform augmented inspections, as required by Code Case N-513-1, for the extent-of-condition evaluation. The inspections will be at 5 locations selected as most susceptible to the degradation mechanism suspected at this time. Parameters to be considered for selection of the augmented inspection locations will include system operating conditions, proximity of upstream valves, and years of service.

6. Applicable Loads

The repair will be designed to accommodate all appropriate deadweight, pressure, and seismic loads. Since the system is a moderate energy system which operates at a low temperature, differential thermal expansion between the repair plate and the repaired component is not a concern.

F. Duration of Proposed Alternative

The duration of the temporary repair is limited until the next scheduled outage exceeding 30 days, but no later than the next refueling outage currently scheduled for the Spring of 2009.

G. References

1. NRC Safety Evaluation dated April 24, 2007 for Relief Request 3-42 (ML070880358).

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FIGURE A