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SOUTHERN COMPANY

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Edwin I. Hatch Nuclear Plant-Unit 1
HNP-ISI-ALT-10, Version 1
Temporary Non-Code Repair of Service Water Piping

Ladies and Gentlemen:

Pursuant to 10 CFR 50.55a(a)(3)(ii), Southern Nuclear Operating Company (SNC) hereby requests NRC approval of enclosed Alternative HNP-ISI-ALT-10, which proposes a temporary non-code repair to a leak occurring in the HNP-Unit 1 Service Water System. An operability evaluation concluded that system operability is maintained, even with an assumed larger leak. As discussed in the enclosure, the proposed non-code repair meets most of the requirements for a "full code repair"; however, to perform a repair/replacement activity, IWA-4412 of the 2001 Edition of the ASME Section XI with Addenda thru 2003, requires that "defect removal shall be accomplished in accordance with the requirements of IWA-4420." Removing the defect would require that the system be taken out of service, necessitating a plant shutdown. In order to avoid a shutdown, SNC proposes to leave the flaw in service and effect a temporary non-code repair requiring NRC approval. If approved, the non-code repair would remain in place until the next refueling outage or until the next cold shutdown judged to be of sufficient time to perform the repair/replacement activity; whichever occurs first.

The details of the proposed alternative are contained in the enclosure to this letter. An expeditious approval is requested to allow the temporary non-code repair to proceed.

This letter contains no NRC commitments. If you have any questions, please contact Jack Stringfellow at (205) 992-7037.

Respectfully submitted,

Mark J Ajluni

M. J. Ajluni
Nuclear Licensing Director

MJA/PAH/lac

Enclosure: HNP-ISI-Alt-10, Version 1, Temporary Non-Code Repair of Service Water Piping

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Hatch Nuclear Plant – Unit 1

Enclosure

Alternative HNP-ISI-ALT-10
Temporary Non-Code Repair of Service Water Piping

Enclosure
Alternative HNP-ISI-ALT-10, Temporary Non-Code Repair of Service Water Piping

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UNIT: Hatch Unit 1

COMPONENT: 30-inch Nominal Pipe Size (NPS) carbon steel 90^0 elbow with a nominal wall thickness of 0.375".

SYSTEM: Plant Service Water (PSW)

ASME CODE CLASS: The PSW system was built to the requirements of ANSI B31.1, Power Piping Code. The portion of PSW containing this elbow is treated as Class 3 for Section XI purposes.

FUNCTION: This elbow is located on the 30" dilution line upstream of the isolation valve and is physically located in the PSW valve pit in the river intake structure. This line provides dilution water, when required, but it is normally stagnant. The only safety function is the pressure-boundary function for plant service water cooling.

CODE REQUIREMENT: A leak in the elbow was detected on July 7, 2010, by operations personnel during a shift walk down. To perform a repair/replacement activity, IWA-4412 of the 2001 Edition of ASME Section XI with Addenda through 2003 requires that "defect removal shall be accomplished in accordance with the requirements of IWA-4420". The defect will not be removed during the PSW system operation because of the significant increase in the leak rate that would be incurred by removal of the degraded material. Therefore, a modification is proposed which is considered a 'temporary non-code repair", necessitating the need for this alternative. See the Proposed Temporary Non-Code Repair section of this alternative for more details.

ALTERNATIVE REQUIREMENT: In lieu of performing an ASME Code compliant repair, Southern Nuclear Operating Company (SNC) is implementing the alternative requirements of NRC Generic Letter (GL) 90-05 until the next refueling outage or until the next cold shutdown judged to be of sufficient time to perform the repair/replacement, whichever occurs first. Compliance with the specified requirements of the Section XI Code would result in hardship without a compensating increase in the level of quality and safety; therefore, approval of this alternative per 10 CFR 50.55a(a)(3)(ii) should be granted.

POSITIVE FLAW DETECTION DURING PLANT OPERATION:

On July 7, 2010, a through-wall leak was discovered in the PSW system. The initial leakage is documented in Hatch Condition Report #2010108598.

HARDSHIP OF REPAIR:

PSW supplies cooling water to both non-safety related Balance of Plant (BOP) components and safety-related components. The BOP components are isolated in case of an accident. The BOP heat load is much higher than that required of safety-related components. Performing an ASME Code repair of this location would require that Division II of PSW be shutdown. With a division of PSW out-of-service, Technical Specification (TS) 3.7.2 Condition E requires that the PSW subsystem be restored to Operable status within 72 hours. However, considering the magnitude of the BOP heat load, it is predicted that removal of a division from cooling service for the time required to make the repair would force a plant shutdown before the end of the 72 hours. Shutting the plant down to perform a Code repair versus using the proposed temporary non-code repair is considered by SNC to be a hardship.

DEGRADATION MECHANISM:

The cause of the leak is postulated to be localized pitting, possibly due to Microbiologically Influenced Corrosion (MIC) attack. MIC is the prime suspect due to the stagnant conditions in this section of piping. MIC indications have previously occurred in other stagnant lines at Hatch throughout the plant life.

FLAW SIZING:

Detailed UT measurements were obtained around the area of the leak to better understand the scope of the degradation (See Figure 1). The measurements were taken in approximately 3/4" radial intervals from the center of the leak. The measurements showed that at 3/4" away from the leak, the wall thickness was found to average 0.06" thick. At 1.5" from the center of the hole, the wall thickness was found to average 0.26" thick, which is above the allowable minimum wall thickness of 0.179 (calculated based on the design pressure). The diameter of the hole is approximately ¼".

The wall thickness returned to a nominal wall thickness of 0.375" (or greater) at a radial distance of approximately 3" from the center of the leak. The measurements showed that the degraded area appeared to extend uniformly in a radial pattern from the center of the leak, resulting in a cone shaped defect.

Additional UT measurements were taken on the elbow to determine if there were other areas of significant degradation. Sufficient scanning

(along the axis of the elbow and around the elbow) was performed to provide reasonable assurance that there are not any additional significantly degraded areas in the elbow. One low spot near the elbow-to-pipe weld was measured as 0.177", which is just below the allowable minimum wall thickness of 0.179". Additional readings were taken circumferentially around this low spot and all measurements returned to greater than 0.4" within 1" of the low spot. This low spot is acceptable because the 0.179" allowable minimum wall thickness was conservatively calculated using the design pressure of 180 psi while the maximum operating pressure is only 140 psi. Using 140 psi, the required minimum thickness was calculated as 0.14" thick. Therefore, the low spot is not required to have a specific flaw evaluation.

EVALUATION APPROACH AND RESULTS:

Because the PSW is functioning in an operable but degraded condition, the following issues were addressed to ensure that there is no harm to plant safety or public health. Once the proposed temporary non-code repair is made any potential adverse effects due to leakage would be mitigated.

- Flaw Evaluation: A flaw evaluation was conducted in accordance with Section 3.0 of Code Case N-513-2 to evaluate the leak. The use of Code Case N-513-2 is technically acceptable because this 30" elbow is considered as a bent pipe. The Code Case N-513-2 flaw evaluation determined that structural integrity is being maintained. Additionally, the requirements of Generic Letter 90-05 using the through-wall method for flaw evaluation were evaluated as acceptable.

- Stress Analysis: The added weight of the branch connection (See Proposed Temporary Non-Code Repair below) was reviewed, and it did not impact the stress analysis calculations.

- Flow Diversion: The most conservative method for determining leakage is to assume a hole wherever the measurements were below the minimum wall thickness. This assumption resulted in an evaluation of a postulated 3" diameter hole in the elbow. A loss of inventory from a 3" diameter hole in Division II of the PSW system was then evaluated against the design flows to safety-related components during a LOCA using the PROTO-FLO model (2007 benchmark update). The results of this evaluation showed that with a 3" diameter hole in the 30" line, that all safety-related components would receive adequate PSW flow during a LOCA. Therefore, with the worst case leak due to loss of material from the existing location, the PSW system would still be capable of providing the required cooling to all components.

- Spraying: The location that the leak is spraying on was considered for impact on other components. The leak is currently spraying on a section of concrete wall with no other exposed components in the adjacent area. This shows that there would be no impact to other components due to a direct spray of water from the flaw. This information provides reasonable expectation that this condition would not affect ability of the PSW systems, or other components located in the valve pit, to perform as designed.

- Flooding: With respect to the potential for flooding due to excessive leakage into the valve pit, the FSAR section indicates that the valve pit is below the maximum theoretical flood level such that the automatic backwash feature of the PSW strainers may not be available in the event of a flood. However, the FSAR states, "The strainer is designed so that, even without backwashing and assuming a 90% clogging of the strainers, the strainer differential pressure is not >3 psid and the system flow is not retarded." This provides reasonable assurance that the components in the valve pit would be capable of performing the necessary design functions in the event of flooding. Therefore, the amount of leakage into the pit, and/or the ability of the non-safety sump pumps to remove the water do not affect the operability determination of the PSW system.

- Flaw Growth Rate: As stated previously, the cause of the degradation is believed to be MIC related. Degradation from MIC is a slow process that does not produce rapid degradation of the piping. This leads to the assumption that if further degradation were to occur on this area of the 30" elbow, it would be minimal and gradual with respect to the time frame for the next opportunity for piping repair (next refueling outage or until the next cold shutdown of sufficient time to perform the repair/replacement). This assumption is further justified by the fact that the piping with the degradation is original plant piping, and has been in service for approximately 35 years. This type of slow degradation provides reasonable assurance that the calculations and evaluations associated with the current degradation would remain valid until a Code repair/replacement is performed.

Based on the above discussion, SNC has determined that the structural integrity of the PSW piping at this location is being maintained and will continue to be maintained until a Code repair/replacement is performed.

AUGMENTED EXAMINATIONS: The piping containing the leak is moderate energy piping and located in a section of Division II PSW that does not normally experience flow; therefore, five other similar Unit-1 locations were chosen for the augmented volumetric examinations per GL 90-05. These five locations will be examined within 15 days of the discovery of the leak as specified

by GL 90-05. Gridding of the components will be performed per Hatch Plant Service Water Inspection Procedure 42IT-TET-012-1 which defines grid patterns based on the size of the component. If any flaw is detected with a thickness less than the allowable minimum wall thickness, the scope expansion requirements of GL 90-05 will be met. These initial five locations are:

1. Division II of PSW - A 30" elbow located upstream of the leaking elbow.
2. Division II of PSW - A 30" elbow located downstream of the leaking elbow.
3. Division II of PSW - A 12" elbow located on a stagnant line.
4. Division I of PSW - A 30" elbow located on the other division which is equivalent to the leaking elbow.
5. Division I of PSW - A 12" elbow located on a stagnant line.

PROPOSED TEMPORARY NON-CODE REPAIR:

Several repair/replacement activities were evaluated and it is proposed that a branch connection modification be made to encapsulate the leak. This proposed modification will be made per the Code requirements of ANSI B31.1 and would be considered a "Code repair". However, the defect will not be removed because of the significant increase in the leak rate that would be incurred by removal of the degraded material during PSW system operation. Therefore, this modification is considered as a 'temporary non-code repair".

SNC intends to encapsulate the leak by welding a 6" Nominal Pipe Size (NPS) branch connection over the hole, as shown in Figures 1 and 2, using the design and examination requirements of ANSI B31.1, 2007 Edition. A 6" NPS branch connection was selected because as shown in Figure 1, it will be welded over material with a remaining thickness well above the minimum wall thickness of 0.179". The degraded material around the hole cannot be removed with the system in operation; therefore, the "defect" will be left in place. As a result, this cannot be considered as a Section XI Code repair.

Welding of this P-No. 1 material will be performed in accordance with Welding Procedure Specification S-1:1-O-1 Revision 1. The referenced Section IX editions for this specification are 1983 Edition with 1985 Addenda and 1989 Edition with 1999 Addenda. This specification requires a 60^0F minimum preheat which is currently met due to heating affect of the ambient water temperature in the elbow which is in excess of 85^0 F. The procedure does not require a post-weld heat treatment

because the nominal thickness of the materials is exempt from postweld heat treatment in the construction code.

The welding of the branch connection to the 30" pipe will utilize a full-penetration weld. With a leak in the elbow, SNC is aware of issues with keeping the weld dry. However, engineering judgment indicates that with the 6" branch connection roughly centered over the leak, the leakage should pass through the branch connection in a stream without wetting the weld area. If water spray at the weld is determined to be a problem, compensatory actions (e.g., plugs, temporarily installed flow diverters) will be evaluated and used as necessary in order to produce a satisfactory weld.

The welding is to be performed with water in the line and with the system pressurized to approximately 120 psig. SNC believes that this will not create any problems based on the following factors.

- Welding with water in a pipe is performed frequently in the industry and, as discussed above, the water temperature meets the 60^0 F minimum preheat.

- Welding will be performed on elbow base material that is approximately the nominal wall thickness or thicker. The measurements noted in Figure 1 indicate that the welding will be performed on thicknesses ranging from 0.371" to 0.459" thick.

- With the water in the system acting as a heat sink, the resulting heat affected zone of the elbow base material caused by the welding should be relatively shallow.

- Since only the inner 0.179" of the base material is required for pressure containment, welding on 0.371" thick to 0.459" thick base material would not be expected to encroach upon the code-required minimum wall thickness and should have no impact on the load bearing capability of the elbow during the welding process.

The completed welds will be visually examined per Hatch Procedure 45QC-INS-004-0 to the acceptance criteria found in the 2007 Edition of ASME B31.1. This procedure provides inspection instructions for performing visual examination of welds in piping, component, and pressure vessels using the direct and remote visual examination methods. The procedure outlines the requirements for performing, evaluating, and recording visual examination results. Any unacceptable indications will be repaired per the requirements of ASME B31.1.

Additionally, a liquid penetrant examination will be performed in accordance SNC procedure NMP-ES-024-301. The examination will be performed no less than 48 hours after completion of the weld to ensure

no delayed cracking occurs. (This examination is consistent with the requirements for weld overlay repair examinations made on P-No. 1 material using ASME Code Case N-661, which has been accepted for use in Regulatory Guide 1.147). NMP-ES-024-301 provides techniques and acceptance criteria to be used for the performance of Liquid Penetrant Examinations at Plant Hatch, Farley, and Vogtle Nuclear Plants. Indications will be evaluated per the following procedural acceptance criteria:

1. Relevant indications are indications which result from imperfections. Only indications with major dimensions greater than 1/16 inch shall be considered relevant imperfections.

2. Imperfections producing the following indications are unacceptable:

    - Any cracks or linear indications.

    - Rounded indications with dimensions greater than 3/16 inch.

    - Four or more rounded indications in a line separated by 1/16 inch or less edge-to-edge.

    - Ten or more rounded indications in any six square inch area with the major dimension of this area not to exceed six inches with the dimension taken in the most unfavorable location relative to the indications being evaluated.

An operating system VT-2 pressure test will then be performed as required by IWA-4540 of the Section XI Code.

GL 90-05 ACTION PLAN:

The following actions will be performed by SNC for this component until the proposed temporary non-code repair is performed:

- Site personnel will perform daily rounds to identify further degradation of the affected area as evidenced by a significant increase in the leakage rate. If a significant increase in leakage is detected an ultrasonic examination will be performed to assure that the criteria used to evaluate the structural integrity remains valid.

- The area will be ultrasonically examined on a 30 day frequency to assure that unexpected degradation is not occurring and that the structural integrity of the elbow is being maintained.

The following actions will be subsequently performed by SNC in the time period after the temporary non-code repair is made until the ASME Section XI repair/replacement is performed: An ASME Section XI repair/replacement will be performed before the completion of the Hatch Unit 1 1R25 refueling outage or during the next cold shutdown judged to be of sufficient time to perform the repair/replacement, whichever occurs first. The 1R25 outage is scheduled to begin in February 2012.

- Site personnel will perform daily rounds to identify any signs that additional degradation is occurring.
- The area around the encapsulation will be ultrasonically examined on a 30 day frequency to assure that degradation outside of the encapsulated area is not occurring and that the structural integrity of the elbow is being maintained.

STATUS: This temporary non-code repair alternative is awaiting NRC approval.

ALTERNATIVE DURATION This alternative will remain in effect until an ASME Section XI Code repair/replacement is performed during the Hatch Unit 1 1R25 refueling outage or until the next cold shutdown of sufficient time to perform the repair/replacement, whichever occurs first.

Figure 1

Thicknesses Around the Leaking Hole

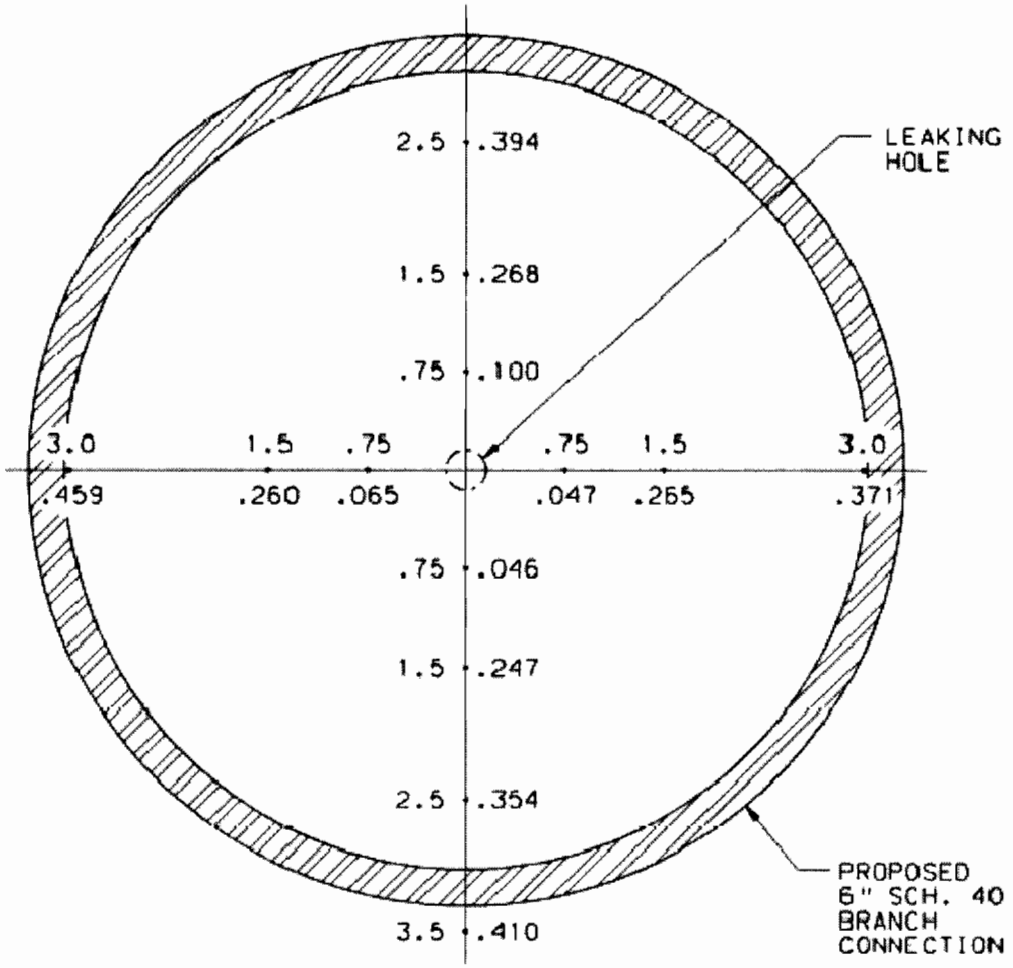

Figure 2

Proposed Non-Code Temporary Repair