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October 5, 1992

Docket No. 50-352

License No. NPF-39

NUCLEAR SERVICES DEPARTMENT

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Limerick Generating Station, Unit 1
Relief Request for the Corrosion Monitoring
System for Residual Heat Removal Heat Exchanger

Gentlemen:

Attached for review and approval is Relief Request No. RR-16 for the Limerick Generating Station (LGS), Unit 1, American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Section III, Class 3 Residual Heat Removal Service Water (RHRSW) System modification that adds a corrosion monitoring system to the "B" Residual Heat Removal (RHR) heat exchanger. This modification is currently in place and will initiate operation during the LGS Unit 1 fifth operating cycle.

The corrosion monitoring system was required because during the Unit 1 fourth refueling outage inspection of the "B" RHR heat exchanger, pitting on the tube inside diameter was revealed (i.e., the tube inside diameter is subjected to RHRSW flow). To assure that the tubes in the heat exchanger maintain 3 mils of metal at the deepest pit, a corrosion monitoring system was installed in the RHRSW System. The installation of this system took place during the outage. Because of the short length of time from discovery of this problem until unit restart, procurement of the material to meet ASME Code, Section III, Class 3 requirements was not possible.

Accordingly, we are requesting relief from certain provisions of the Code for portions of the corrosion monitoring system. A detailed description of the modification is included in the attached relief request.

We would like to have an expeditious review of this relief request because, until this relief request is approved, the corrosion monitoring system will be operated in the manual mode in order to comply with applicable requirements. Once this relief request is approved, operation of this corrosion monitoring system will be changed to the automatic mode.

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If you have any questions or require additional information, please do not hesitate to contact us.

Very truly yours,

G. J. Beck, Manager
Licensing Section

Attachment

cc: T. T. Martin, Administrator, Region I, USNRC w/ attachment
T. J. Kenny, USNRC Senior Resident Inspector, LGS w/ attachment

RELIEF REQUEST NO. RR-16

I. IDENTIFICATION OF COMPONENTS

Limerick Generating Station (LGS), Unit 1, ASME Code Class 3 Residual Heat Removal Service Water (RHRSW) System modification for corrosion monitoring of the 'B' Residual Heat Removal (RHR) heat exchanger.

Analysis of the results of eddy current testing performed after disassembly and hydrolazing of the Unit 1 'B' RHR Heat Exchanger (1BE205) during the fourth Unit 1 refueling outage showed indications of pitting on the tube inside diameters. Identified corrective actions required installation of a corrosion monitoring system for the "B" RHR heat exchanger. This corrosion monitoring system will expose specimens of 304L stainless steel tubing material to similar water chemistry and temperatures that will be experienced by the "B" RHR heat exchanger. Specimens will have pre-machined defects (i.e., pits) of different depths. Actual tubes extracted from the "A" RHR heat exchanger will also be used as specimens. Periodic examination of specimens will provide a partial means to predict the actual corrosion rate and thus assess "B" RHR heat exchanger tube integrity, to assure that at least 3 mils of metal is always present in the bottom of the deepest pit. This capability will provide information which is essential to support the continued operability of the Unit 1 'B' RHR heat exchanger.

II. CODE REQUIREMENTS FROM WHICH RELIEF IS REQUESTED

ASME Code, Section XI, 1986 Edition, subparagraph IWA-7210a requires replacements (i.e., modifications) to meet the requirements of the edition of the construction code to which the original component or part was constructed,...

LGS Updated Final Safety Analysis Report (UFSAR) Table 3.2-1 specifies the original construction code, for the portion of the RHRSW system in which the corrosion monitoring system is being installed, as ASME Code, Section III, Class 3, for pipe, valves, and pumps. ASME Code, Section III, Class 3, in turn, requires Certified Material Test Reports for all construction materials.

For the portion of the modification for the corrosion monitoring system specified in section IV of this request, which contains RHR Service Water, relief is requested from meeting the material requirements of ASME Code, Section III, Class 3.

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III. BASIS FOR RELIEF

Since the RHRSW system at LGS Unit 1 was constructed to the requirements of ASME Code, Section III, Class 3 rules; repairs, replacements or modifications connecting to this system are required to be constructed in accordance with the same construction code. Because of pitting found in the Unit 1 RHR heat exchanger tubes, installation of the corrosion monitoring system is required to support operation of LGS Unit 1 over the next fuel cycle. Since the pitting was determined to result from the deposition of manganese on the heat exchanger tubing which is a function of operating history, installation of this corrosion monitor was required in a very short time frame due to the startup of Unit 1 on July 9, 1992. Given a very short time period for design/construction (approximately 10 weeks), material availability has precluded the ability to procure all construction materials and components to ASME Code, Section III, Class 3 requirements. Therefore an alternate design/construction approach is required.

IV. ALTERNATE PROVISIONS

This modification is designed to operate for only the next fuel cycle, or approximately 24 months.

The only safety related function which this modification must perform is to maintain an intact pressure boundary as part of the RHRSW System.

ASME Code required material will be used for the portions of the inlet and outlet piping of the corrosion monitoring system directly connected to the RHRSW system, extending to single valves capable of automatic closure. Material availability precluded the ability to purchase a second ASME Code, Section III, Class 3 valve for the inlet and outlet lines.

The inlet isolation valves will automatically close when the pressure inside the monitoring system exceeds a predetermined value based on a postulated RHR heat exchanger tube rupture, or on loss of air and/or power to the valve operators. The outlet lines are provided with check valves which will also close as a result of reverse differential pressure between the corrosion monitor and the RHR heat exchanger.

The high pressure actuation signal, however, will not be Class 1E qualified, since the pressure separation function served by these valves is not safety-related. Additionally, commercial grade manual isolation valves will be provided to allow for isolation between high and low pressure piping classes. Also the low pressure piping will be provided with a safety relief valve sized to handle the design basis RHR heat exchanger tube leakage.

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Additionally the specimen holder will be constructed in accordance with the ASME Code Section VIII, using ASME Code required materials.

Commercial grade materials will be used in place of ASME Code materials for the remainder of the RHRSW corrosion monitoring system.

The commercial grade portion of the corrosion monitoring system connected to the RHRSW system will be designed in accordance with ANSI Standard B31.1 for conditions which bound all operating modes of the RHRSW system with the exception of a postulated failure of an RHR Heat Exchanger tube for which automatic isolation and overpressure protection is provided as described above.

The commercial grade portion of the system is designed to isolate under Loss of Coolant Accident (LOCA) conditions with single valve isolation provided by fail-closed air operated valves. However, this isolation function is not required, since the design of the commercial grade portion of the system would accommodate post LOCA conditions and the portion of the RHRSW System flow bypassing the RHR heat exchanger through the corrosion monitoring system is sufficiently small that the operation of the RHR heat exchanger will not be degraded.

Additionally, the commercial grade portion of the corrosion monitoring system will be subjected to material requirements similar to the requirements of the ASME Code, Section III, Class 3 portions of the system.

Chemical and hardness tests will be performed on all materials where Certified Material Test Reports are not available and Certificates of Compliance will be prepared to the appropriate ASTM material specification. Where practicable, tensile tests will also be performed on material samples and Certified Material Test Reports will be prepared.

All field welds in the RHRSW portion of the corrosion monitoring system will be subjected to the same Nondestructive Examination (NDE) requirements as similar welds in the ASME Code, Section III, Class 3 portion of the RHRSW system. All field welding will use qualified filler metal and be subjected to the same quality requirements as the ASME Code Section III, Class 3 welds in the RHRSW system. All piping and components in the RHRSW portion of the corrosion monitoring system will also be subjected to hydrostatic testing in accordance with ASME Code, Section III, Class 3.

Additionally, all RHRSW piping and components will be required to meet the reduced ASME Code specified stress allowables for Seismic Category I piping, and will be supported to Seismic Category I requirements.

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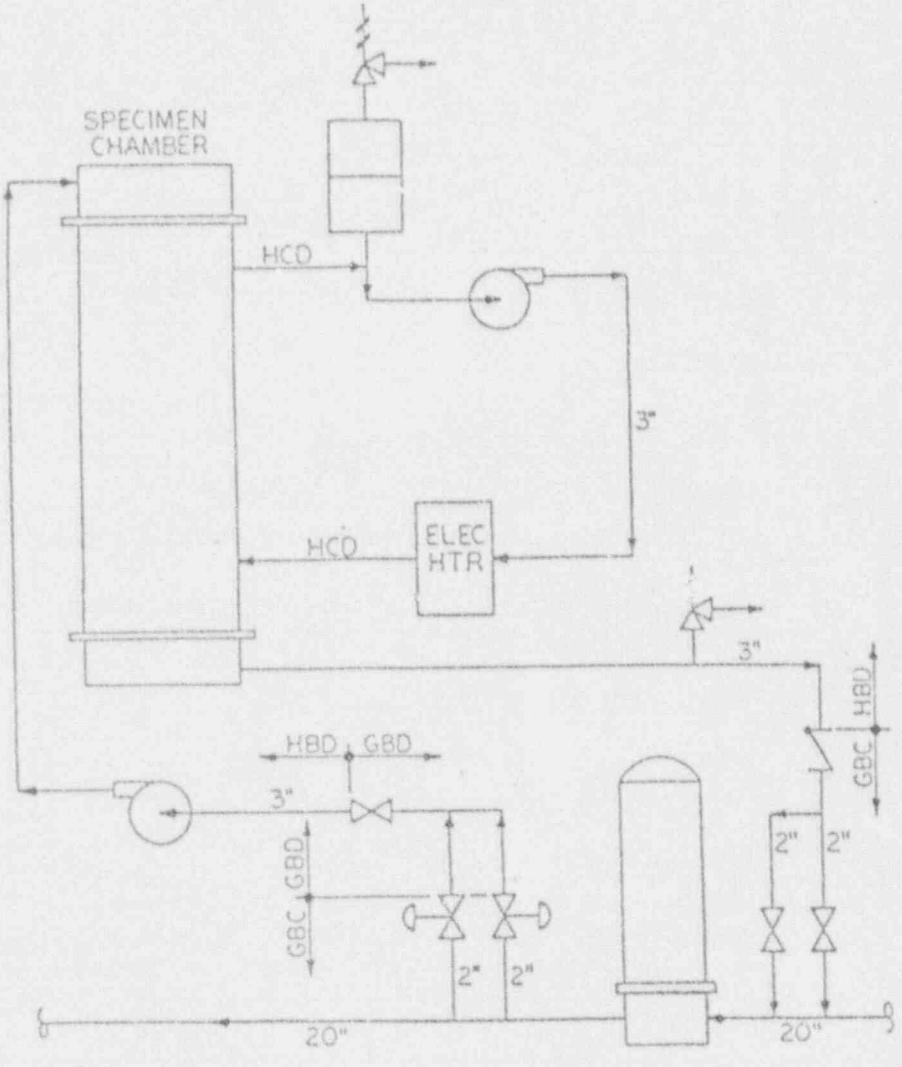
Finally, all design considerations for safety related piping and components (i.e., High Energy Line Break/ Moderate Energy Line Break, flooding protection, missile protection, fire protection, etc.) will be addressed for the RHRSW portion of the corrosion monitoring system as required, and plant operating procedures will be revised accordingly.

Schematic Diagram Of Corrosion Monitoring System, Loop 'B'



NOTES:

GBC, GBD & HBD - SEISMIC CATEGORY I
HCD - SEISMIC CATEGORY IIA