



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REQUEST FOR SCHEDULE RELIEF FROM COMMITMENT TO PERFORM PIPING
STRESS IMPROVEMENT
GPU NUCLEAR CORPORATION
OYSTER CREEK NUCLEAR GENERATING STATION
DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated April 21, 1992, GPU Nuclear Corporation, the licensee, requested deferral from a previous schedule commitment to perform pipe stress improvement to the Isolation Condenser (IC) piping at Oyster Creek. This work is currently committed for refueling outage 14. The relief request proposes deferral of this work to refueling outage 15, 2 years later.

The planned residual stress improvement treatment is a mitigating action designed to enhance the resistance of the newly replaced (during refueling outage 13) type 316 pipe to intergranular stress corrosion cracking (IGSCC). This action is to be performed in order to resolve an open issue under Systematic Evaluation Program Topic III-5.8, "Pipe Break Outside Containment." Consistent with NRC guidance, the licensee planned to implement residual stress improvement treatment to applicable weldments within 2 years of service. To meet this schedule, the stress improvement work would have to be completed during refueling outage 14.

The IC piping consists of various sizes (up to 14 inches diameter) of nuclear grade type 316 stainless steel. Portions of these lines are located outside of containment and are without isolation valves.

In requesting schedule relief, the licensee cites mitigating actions that have been performed to prolong the life of the newly replaced IC System pipe against the effects of IGSCC. The base material (type 316 nuclear grade) has improved IGSCC resistance due to reduced carbon content (compared to the original type 316). The welds were performed using techniques designed to minimize sensitization of the weld heat affected zone and reduce residual stress. Since 1985, reactor water chemistry controls have been tightened to provide additional margin against the occurrence of IGSCC.

2.0 DISCUSSION

In requesting the schedule relief, the licensee has provided evidence and arguments that IGSCC reducing measures have been made to the subject piping outside containment. The staff requires an IGSCC reduction program to incorporate two mitigating measures in order to be credited as being

effective. Mitigation measures for IGSCC fall into three categories: metallurgical (material selection and processing), environmental (water chemistry), and stress improvement. Effective changes within two of the categories is thus required in order to be considered acceptable by the staff.

In replacing the originally installed type 316 pipe with nuclear grade type 316 stainless, the licensee has made an improvement in IGSCC resistance of the pipe base material. Similarly, the welds have been improved by imposing low heat input, which minimizes sensitization of the base material and reduces residual welding stress. By making these metallurgical improvements, the licensee has accomplished one of two required mitigating measures.

Two choices are left for the second mitigating measure: changing the environmental chemistry, or removing the tensile stress on the pipe inside diameter (I.D.). The licensee has chosen to request schedule relief for the stress improvement option. Consequently, more stringent water chemistry limits were cited by the licensee as an additional IGSCC mitigation measure. This option is proposed as a temporary measure, until such time that the residual stress improvement process is executed.

The staff finds improved water chemistry to be a prudent goal, but cannot support the contention that it is a certainty in all operating situations. Steam cycle water chemistry is susceptible to numerous operational variables which would adversely affect the system's chemical parameters. This is especially true during unit start-up when the piping in question is designed to be operational. After start-up the piping in question has little or no flow, and thus may not have a water chemistry representative of the active flow path. Because of this uncertainty, the water chemistry control cannot be considered as an effective IGSCC mitigation measure for the piping in question.

It is the staff's position that IGSCC mitigation measures must be made prior to the onset of operationally induced crack initiation. Due to the uncertainty of crack initiation incubation times, it is prudent to apply effective measures at the earliest opportunity. Avoidance of crack initiation is a key element in an effective IGSCC mitigation program. Because the water chemistry controls may not be effective for the piping in question as described above, the staff finds that any further scheduler delay in the stress improvement process is undesirable.

Further, the piping configuration does not fully comply with the General Design Criteria for system isolation. The improvements that have been implemented to improve system safety should be completed in a timely manner, thus reducing the possibility for a break in the system.

During the course of this review, the staff requested the licensee to submit the outage plan worklist (14R OUTAGE SCOPE). Review of the outage workscope did not provide any additional compelling justification for schedule relief.

3.0 CONCLUSION

The staff finds that the licensee has not provided two acceptable IGSCC mitigation measures. The licensee must therefore implement the stress improvement treatment in accordance with the previous schedule commitment. The stress improvement treatment must therefore be accomplished before the completion of refueling outage 14.

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Dated: July 8, 1992