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Docket No. 50-320

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July 16, 1986
NRC/TMI 86-070

Docket No. 50-320

Mr. F. R. Standerfer
Vice President/Director, TMI-2
GPU Nuclear Corporation
P. O. Box 480
Middletown, PA 17057

Dear Mr. Standerfer:

Subject: Safety Evaluation Report (SER) for Extended Core Stratification
Sample Acquisition

The Nuclear Regulatory Commission (NRC) staff has reviewed your June 23, 1986 Safety Evaluation Report (SER) for Extended Core Stratification Sample Acquisition and the additional information provided in your July 11, 1986 letter. As stated in the enclosed safety evaluation issued by the staff, we conclude that the proposed activities can be accomplished without significant risk to the health and safety of the public provided that they are in accordance with the limitations stated in your SER and supporting information. This activity falls within the scope of activities previously considered in the Programmatic Environmental Impact Statement.

We therefore approve the operation of the system to obtain a sample at core location K-9 as described in your SER contingent upon the submittal of the related procedures subject to Technical Specification 6.8.2. These procedures shall incorporate the following limitations while drilling below the lower flow distributor plate and for one hour afterward.

1. An alarmed water level instrument for the internals indexing fixture (IIF)/reactor vessel shall be operable.
2. The IIF/reactor vessel water level shall be read and logged every 15 minutes.
3. The BWST shall be maintained at a minimum of 445,000 gallons and 4950 ppm B.
4. The reactor building sump shall be limited to a maximum of 70,000 gallons of water with a minimum concentration of 1700 ppm B.
5. Drill torque shall be limited to 1000 inch-pounds in excess of that necessary to overcome frictional losses. These losses are to be determined prior to drilling below the lower flow distributor.
6. Weight on bit shall be limited to 9000 pounds.

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7. Drill string length and position in the drilling rig assuming the maximum allowable tolerances shall not be capable of extending below the 291'2" elevation with the megalo head full down.

Sincerely,

ORIGINAL SIGNED BY:
William D. Travers

William D. Travers
Director
TMI-2 Cleanup Project Directorate

Enclosure: As stated

cc: T. F. Demmitt
R. E. Rogan
S. Levin
W. H. Linton
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EXTENDED CORE STRATIFICATION SAMPLE ACQUISITION

SAFETY EVALUATION

INTRODUCTION

The Core Stratification Sample Acquisition Safety Evaluation Reports (SER) revision 1, (reference 1), revision 3 (reference 2) and revision 4 (reference 3) have been reviewed and approved by the NRC staff (references 4, 5, and 6). GPUN submitted a request to extend core sample acquisition activities in a letter with an attached safety evaluation report dated June 23, 1986. GPUN supplied additional supporting information in a letter dated July 11, 1986. The purpose of this activity is to obtain a drilled core sample of the relocated core material in the lower reactor vessel head, below the lower flow distributor.

EVALUATION

Pyrophoricity, criticality, and mechanical forces transmitted to the reactor vessel and internals are bounded by the previous NRC safety evaluation in reference 4. The proposed activity presents the potential for reactor coolant system (RCS) leakage due to damage to incore instrument penetrations. Also, the drill bit travel is at a greater depth than previously analyzed by the NRC in references 4, 5, and 6.

Below the flow distributor, drilling forces may be transmitted to incore instrument penetrations. If the penetration welds are in an "as-built" condition they can withstand the maximum drilling forces associated with the operations of the drilling rig. However, there is potential that the welds at the base of the incore instrument penetrations have been degraded as a result of the March 1979 accident. Staff review confirms the licensee's analysis that an incore instrument penetration exposed to extreme accident temperature would melt before the weld at its base. This is due to the penetrations being immersed in hot core material while the base weld was contiguous with the vessel wall which acted as a heat sink. Thus bending moments could not be transmitted through a penetration to a degraded weld. A degraded weld with a penetration stub could, however, be subject to some torque and axial loadings. The staff calculated that if weld melting occurred a minimum weld thickness of .034 inch must remain based on a temperature of 1800°F at the lower portion of the weld. In that the temperature chosen was conservative it is very likely that the remaining weld would be substantially larger. Such remaining weld thickness is sufficient to sustain axial and torsional loadings in excess of that imparted by the drilling operation without damage provided that drill rig weight on bit is limited to 9000 pounds and drill torque is limited to 1000 inch-pounds.

While the analysis indicated that the core drilling can be accomplished without adverse affect on the instrument penetration integrity, the staff has also evaluated the licensee's capability to mitigate an RCS leak caused by a total failure of an instrument penetration including discharge of the incore

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instrument guide tube. The staff has concluded that the licensee has the capability to promptly detect a failed penetration and to main RCS level at or above the reactor vessel until long term recirculation of borated water from the reactor building sump is in effect. Certain administratively controlled limitations must be in effect to assure these capabilities. They include:

1. An operable water level alarm on the internals indexing fixture (IIF)/reactor vessel.
2. Periodic (15 min.) readings of the IIF/reactor vessel water level.
3. Maintaining borated water storage tank (BHST) inventory at a minimum of 445,000 gallons and 4950 ppm B.
4. Maintaining the reactor building sump at a maximum volume of 70,000 gallons with a minimum boron concentration of 1700 ppm B.

In order to assure that the drill bit will not contact the lower vessel head during this operation, the licensee has committed to a program of measurements on drill string length and verification of drill string coupling. Each drill string length is verified to be within 1" of nominal and each coupling is verified within 1". The limitation on drill depth is such that if all the maximum allowable tolerances on lengths and coupling were added that the drill string would be at least 3" from the inside of the lower vessel head.

CONCLUSION

The staff has examined and evaluated the potential risks associated with the Extended Core Stratification Sample Acquisition Program, and determined that pyrophoricity, criticality, and mechanical force considerations regarding the reactor vessel and internals do not differ from those previously reviewed and approved. The licensee's program to assure that the drill does not adversely affect reactor vessel integrity is acceptable. The staff has also concluded that the drilling operation will not cause significant risk of a failure of the incore instrument penetrations and that the licensee has the capability to detect and mitigate a failure, if it did occur. We therefore conclude that Extended Core Stratification Sample Acquisition Activities can be implemented without significant risk to the health and safety of the public.

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REFERENCES

1. GPUN letter with attached SER from F. R. Standerfer, 4410-85-L-0147, to B. J. Snyder dated August 30, 1985.
2. GPUN letter with attached SER from F. R. Standerfer, 4410-85-L-0248, to W. D. Travers dated December 31, 1985.
3. GPUN letter with attached SER from F. R. Standerfer, 4410-86-L0101, to W. D. Travers dated June 11, 1986.
4. NRC letter with attached Safety Evaluation NRC/TMI 86-041, W. D. Travers to F. R. Standerfer dated May 5, 1986.
5. NRC letter with attached Safety Evaluation NRC/TMI 86-052, W. D. Travers to F. R. Standerfer dated May 28, 1986.
6. NRC letter with attached Safety Evaluation NRC/TMI 86-058, W. D. Travers to F. R. Standerfer dated June 19, 1986.
7. GPUN letter with attached SER from F. R. Standerfer, 4410-86-L-0091, to W. D. Travers dated June 23, 1986.
8. GPUN letter from F. R. Standerfer, 4410-86-L-0122, to W. D. Travers dated July 11, 1986.

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