

December 1, 1988

Docket No. 50-320

Mr. M. B. Roche
Vice President/Director, TMI-2
GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057

Dear Mr. Roche:

SUBJECT: THREE MILE ISLAND NUCLEAR STATION, UNIT 2 - LOWER CORE
SUPPORT AND LOWER HEAD DEFUELING (TAC 67857)

The Nuclear Regulatory Commission staff has reviewed your June 6, 1988, submittal pertaining to the defueling of the Lower Core Support Assembly (LCSA) and Lower Head (LH) as well as subsequent supporting submittals. 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 submittals and in the staff's Safety Evaluations. The elliptical flow distributor shall be left intact outward of the mid-line of the "P" row of fuel assemblies to protect the portion of the lower head immediately below from potential load impacts. If visual inspection verifies that the lower head in this area is undamaged or that erosion is less than 1/2 inch in depth, this restriction is removed.

Defueling of the LCSA and LH falls within the scope of activities previously considered in the "Programmatic Environmental Impact Statement." We, therefore, approve the defueling of the LCSA and LH as described in your Safety Evaluation Report subject to the limitations discussed above.

Sincerely,
original signe by Lee Bettenhausen for

John F. Stolz, Director
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Enclosure:
As stated

cc: See next page

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Three Mile Island Nuclear Station
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UNITED STATES
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WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

LOWER CORE SUPPORT ASSEMBLY DEFUELING

GPU NUCLEAR CORPORATION

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 2

DOCKET NO. 50-320

INTRODUCTION

GPU Nuclear Corporation (GPUN the licensee) submitted for NRC review and approval a Safety Evaluation Report (SER) for the Lower Core Support Assembly (LCSA) and Lower Head (LH) defueling in references 1 and 2. The use of the core bore machine, automatic cutting equipment system (including plasma arc), cavitating water jet, and other previously approved tools and equipment are included in this safety evaluation (references 3 and 4). The staff's review also considered the additional information supplied by the licensee in reference 5.

The staff has previously reviewed a progressive series of submittals from GPUN regarding the TMI-2 defueling. Most of the equipment, techniques, and safety issues in the subject SER have been previously reviewed. The principal consideration involved in the current SER is the removal of a portion of the elliptical flow distributor. This presents the potential for interaction of defueling equipment and dropped loads with the incore instrument penetrations and lower reactor vessel head.

EVALUATION

Observations made to date have shown little damage to the incore instrument penetrations (IIP) and none to the lower head (LH). Since many of the IIP's and much of the LH is hidden under core debris, the potential for damage cannot be precluded. Thus, the potential area of interaction may be intact or partially degraded. In addition, adequate forces could be generated from defueling equipment or a dropped load to shear an intact IIP if applied horizontally or obliquely. The potential for damage to and thinning of the LH due to jet impingement and ablation by molten material during the TMI-2 accident is limited to the area beneath fuel assemblies R6 and R7 and the area outside the core baffle plates.

In the unlikely event of a complete shear of an IIP, an annular gap would exist between the incore instrument string and the LH. The maximum leakage through this annular gap would be 0.4 gpm per sheared IIP. This is well within the licensee's capability to make up water to the Reactor Coolant System (RCS) using gravity feed or pumping. If an unspecified mechanism provided adequate force to push the instrument string through the LH, a one-inch diameter hole and 120 gpm leak could result. Active pumping of borated water would be required to maintain the reactor vessel level. Maintaining reactor vessel level would not be required to maintain subcriticality or to protect

the health and safety of the public. However, radiation and airborne activity could limit access to the reactor building and fuel debris could be flushed to the reactor vessel cavity.

The staff has evaluated the potential for criticality in the reactor vessel cavity and sump under these conditions. The licensee's analysis that 2950 ppm boron in the water in the cavity will maintain sub-criticality with K_{eff} less than 0.99. The staff finds this analysis to be conservative with K_{eff} likely to be significantly less than 0.99. The licensee's method of initial boration and weekly sampling of the water in the reactor vessel cavity is acceptable to the staff. Fuel particle size and total mass are kept within the bounds analyzed by GPUN and the NRC staff by restricting activities near the area of potential ablation of the LH. This precludes the creation of a potential leakage path larger than one-inch. It is unlikely that significant damage to the LH actually occurred. After this can be confirmed visually, these restrictions need not apply.

CONCLUSIONS

The staff has reviewed and evaluated the proposed activities associated with the defueling of the LCSA and LH. The staff concludes 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 submittals and the limitations for this safety evaluation. This activity falls within the scope of activities previously considered in the "Programmatic Environmental Impact Statement."

REFERENCES

1. GPUN letter, 4410-88-L-006/0253P, F. R. Standerfer to NRC Document Control Desk, Lower Core Support Assembly and Lower Head Defueling, dated June 6, 1988.
2. GPUN letter, 4410-88-L-0100/0253P, F. R. Standerfer to NRC Document Control Desk, Lower Core Support Assembly and Lower Head Defueling (Revision 1), dated June 27, 1988.
3. NRC letter, NRC/TMI 88-003, W. D. Travers to F. R. Standerfer, GPUN, re Use of Core Bore Machine for Dismantling the Lower Core Support Assembly, dated January 8, 1988.
4. NRC letter, J. F. Stolz to F. R. Standerfer, GPUN, Three Mile Island Nuclear Station, Unit No. 2, Lower Core Support Assembly Defueling (TAC 64632), dated April 1, 1988.
5. GPUN letter, 4410-88-L-0137/0414P, F. R. Standerfer to NRC Document Control Desk, Safety Evaluation Report for Completion of Lower Core Support Assembly/Lower Head Defueling, dated September 9, 1988.
6. GPUN letter, 4410-88-L-0005/0067P, F. R. Standerfer to NRC Document Control Desk, Safety Evaluation Report for Lower Core Support Assembly Defueling, dated January 18, 1988.

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Dated: December 1, 1988