GPU Nuclear

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December 2, 1987
4410-87-L-0180/0274P

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Dear Sirs:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Safety Evaluation Report for Use of Non-Borated Water
in the Canister Loading Decontamination System

Attached for NRC TMICPD review and approval is a Safety Evaluation Report (SER) for Use of Non-Borated Water in the Canister Loading Decontamination (CLD) System. Use of non-borated water in the CLD system is currently prohibited in the Canister Handling and Preparation for Shipment (CHAPS) SER, Section 2.4, "Transfer of Canisters."

The proposed SER will provide the capability to stabilize the boron concentration in the Fuel Transfer Canal/Spent Fuel Pool. As described in the attached SER, controls will be implemented to maintain subcriticality and to prevent boron dilution.

An update to the CHAPS SER will be submitted under separate cover to incorporate the proposed modification, if approved by the NRC.

Per the requirements of 10 CFR 170, an application fee of $150.00 is enclosed.

Sincerely,

F. R. Standerfer
Director, TMI-2

RDW/eml





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REC'D W/CHECK
#008505

Attachment

Enclosed: GPU Nuclear Corp. Check No. 008505

cc: Regional Administrator, Region 1 - W. T. Russell
Director, TMI-2 Cleanup Project Directorate - Dr. W. D. Travers

GPU Nuclear

# SAFETY ANALYSIS

SA # 4240-3257-87-0169

Rev. # 0

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## TITLE

USE OF NON-BORATED WATER IN THE

CANISTER LOADING DECONTAMINATION SYSTEM



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APPROVAL

Mgr. Eng. Section F. R. Buchanan Date 12/1/87 Vice Pres. Ops Director per Telecon Date 12/2/87

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FORM 4000-ENG-7310.09-1 (5/83)

# USE OF NON-BORATED WATER IN THE CANISTER LOADING DECONTAMINATION SYSTEM

## 1.0 PURPOSE AND SCOPE

This evaluation addresses the modification to the Canister Loading Decontamination (CLD) System to allow use of non-borated water for canister decontamination prior to shipment. The purpose of this modification is to provide the capability to stabilize the Fuel Transfer Canal (FTC)/Spent Fuel Pool (SFP) boron concentration. Boron concentration in the fuel pool has been increasing due to borated water additions and evaporation.

The Canister Handling and Preparation for Shipment (CHAPS) Safety Evaluation Report (SER) requires that the CLD System utilize demineralized water that has been borated to a minimum boron concentration of 4350 ppm. In addition, the Boron Hazards Analysis (BHA) requires that non-borated or less than 4350 ppm borated water sources be excluded from use in systems, such as the FTC/SFP, which could communicate with the Reactor Coolant System (RCS).

## 2.0 SYSTEM MODIFICATIONS

The proposed modification utilizes the Borated Water Batching Tank (SPC-T-5) as a non-borated, hot water source for canister decontamination. SPC-T-5 was originally installed as part of the Standby Reactor Coolant Pressure Control System and is presently used as a mixing tank to provide borated water for various plant uses. When used for canister decontamination, the SPC-T-5 drain line will be connected to the suction side of a positive displacement pump. The discharge of this positive displacement pump will be routed via hose to the CLD System and connected to the system at CLD-VD11. To accomplish this connection, quick disconnects will be added to the line upstream of CLD-VD11. In addition, this modification will isolate the CLD System from the Defueling Water Cleanup System (DWCS) by cutting and capping lines to ensure that the CLD System does not communicate with the DWCS.

The CLD System is contained within areas that have controlled ventilation and area isolation capability. This limits the environmental impact of the system during normal system operations, shutdown, or postulated accident conditions.

## 3.0 BORON DILUTION

Since the CLD System could communicate with the RCS via the DWCS, the approach identified in the BHA for prevention of deboration will be required for operation of the CLD System using non-borated water. Thus, physical isolation will be provided between the CLD and DWC Systems when using non-borated water. This physical isolation consists of cutting and capping all lines associated with the CLD System that tie-in to DWCS, thereby eliminating the possibility of non-borated water from the CLD System being inadvertently introduced into the RCS. Additionally, the potential for inadvertent hose connections will be minimized by existing administrative controls and physical walkdown prior to system operation.

During canister decontamination using non-borated water, a localized deboration of the SFP will occur in the vicinity of the cask loading station. The only credible means of obtaining a critical mass of fuel in this location during canister decontamination would be the result of a canister drop while lifting a canister from the cask loading station into the Fuel Transfer Cask. The results of a canister drop during Fuel Transfer Cask loading is analyzed in the CHAPS SER, Section 6.1, "Heavy Load Handling." This analysis states that if the canister and grapple were to drop while lifting a canister into the FTC, the canister would fall back into the loading station canister guides and no unacceptable consequences to the equipment would occur. Furthermore, the drop height when the canister is in the full up position in the FTC is less than the designed drop limits for the canister. Therefore, should a canister drop occur in this position, the canister will remain intact and fuel debris and poison material will remain in a stable configuration within the canister.

## 4.0 CRITICALITY CONTROL

Subcriticality is ensured by establishing the Technical Specification required boron concentration during the defueling process and ensuring that this is maintained by monitoring the boron concentration and inventory levels and by isolating potential deboration pathways. The boron concentration and inventory level of the FTC/SFP will be monitored in accordance with approved procedures to ensure that Technical Specification limits for boron concentration and inventory level are satisfied. Additionally, subcriticality is also maintained by the canister engineered safeguards and their storage arrays.

## 5.0 10 CFR 50.59 EVALUATION

It is concluded, based on the evaluations presented in this safety analysis, that the proposed modification to the Canister Loading Decontamination System may be implemented without undue risk to the health and safety of the public.

10 CFR 50.59 permits the holder of an operating license to make changes to the facility or perform a test or experiment, provided the change, test, or experiment is determined not to be an unreviewed safety question and does not involve a modification to the Plant Technical Specifications.

A proposed change involves an unreviewed safety question if:

a. The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or

b. The possibility for an accident or malfunction of a different type than any evaluated previously in a safety analysis report may be created; or

c. The margin of safety, as defined in the basis for any Technical Specifications, is reduced.

The BHA identifies methods of isolating the RCS which provide a high degree of assurance that a dilution event will not occur. One of these methods is to provide physical isolation between the RCS and less than 4350 ppm borated water sources. To ensure compliance with the BHA, physical isolation will be provided between CLD and DWC Systems when non-borated water is utilized in the CLD System. Furthermore, the NRC Amendment of Order dated April 23, 1985, recognized that maintaining the required boron concentration in the RCS, FTC, and SFP minimizes the potential for boron dilution of any of these water volumes in the event that these water sources communicate due to a leak or valve misalignment.

In addition, the consequences of a canister drop while raising the canister into the FTC during decontamination has been analyzed and determined to result in no unacceptable consequences.

Subcriticality is ensured by establishing the Technical Specification required boron concentration during the defueling process and ensuring that this concentration is maintained by monitoring the boron concentration and inventory levels and by isolating potential deboration pathways. Additionally, subcriticality is also maintained by the canister engineered safeguards.

Based on the above analysis, GPU Nuclear concludes that the proposed change does not increase the probability of occurrence or the consequences of an accident or malfunction of a different type than any addressed in a previous NRC-approved safety evaluation.

Technical Specification safety margins at TMI-2 are concerned with criticality control and prevention of further core damage due to overheating. As demonstrated by this safety analysis, Technical Specification safety margins will be maintained throughout the decontamination process. Thus, the proposed change does not reduce the margin of safety as defined in the basis for any Technical Specifications.

Based on the above analysis, GPU Nuclear concludes that the proposed modified configuration of the Canister Loading Decontamination System does not constitute an unreviewed safety question as defined by 10 CFR 50.59.