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4410-87-L-0078 Document ID 0135P

May 26, 1987

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 Canister Handling and Preparation for Shipment Safety Evaluation Report, Revision 5

Attached for your review and approval is Revision 5 to the Safety Evaluation Report (SER) for Canister Handling and Preparation for Shipment (CHAPS). Only those SER pages which are affected by this change are attached. The proposed changes are described below:

Section 2.3.1, "Verification of Canister Integrity," has been revised to delete an existing redundancy between the first and second paragraphs regarding canister dewatering and weighing. This revision, in part, deletes the minimum two (2) week holding time requirement for verification of canister integrity since it is not a valid criterion for determining canister integrity. Rather, this requirement was established to aid in verification of catalyst function using pressure indication (an alternate verification method) as described in Section 2.3.2. A minimum holding time of five (5) minutes, as specified in the second paragraph of Section 2.3.1, is sufficient to provide positive indication of loss of canister integrity.

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- Section 2.3.2, "Verification of Catalyst Function," has been revised to delete the estimated holding time for sampling canisters (i.e., 2 to 4 weeks) to determine hydrogen and oxygen gas appearance rates following dewatering. The statement of estimated holding time is unnecessary and could lead to some confusion. The actual holding time, prior to gas sampling, is dependent on the schedular requirements for fuel shipping. The gas sampling results are used to determine an allowable storage time prior to canister shipment as further described in Section 2.3.2.
- Section 3.2 also has been revised to delete the 5% restriction on the number of canisters which can weigh up to 5% more than the prescribed limit of 2800 lbs. (i.e. 2940 lbs.). Based on discussions with EG&G, GPU Nuclear believes that the 5% restriction on the number of canisters which exceed 2800 lbs. is unnecessary provided that the 5% excess weight restriction is absolute. GPU Nuclear will take every appropriate action to minimize the number of canisters which exceed 2800 lbs. in weight and will ensure that no canister weighing greater than 2940 lbs. is shipped.

GPU Nuclear requests that NRC review of proposed Revision 5 to the CHAPS SER be conducted concurrent with review of Revision 4 to the subject SER which was transmitted via GPU Nuclear letter 4410-87-L-0037 dated April 2, 1987.

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

Sincerely,

F. R. Standerfer Director, TMI-2

FRS/RDW/eml

Attachment

Enclosed: GPU Nuclear Corp. Check No. 004828

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

SAFETY ANALYSIS

GPU Nuclear

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SA . 4350-3256-85-1

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TILE

SAFETY EVALUATION REPORT

FOR

CANISTER HANDLING AND PREPARATION

FOR SHIPMENT

Originator Richard Theffard Date 5/11/87

CONCURRENCE

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			of 39		
Rev.	- SUMMARY OF CHANGE	Аррі	roval	· Da t	
G	Issued for use.	eran. Villeta		12/8	
1	Revised to incorporate site comments: added reference to SAR for transportation of core debris, revised canister monitoring and integrity verification section, noted the FHB crane modifications, and revised section on seismic design.			1/8	
2	Revised commitment pertaining to closing of FHB missile shield door, corrected lowering speeds for canister from transfer cask.			2/8	
3	Revised to incorporate more detail on canister and shield plug lifting systems, provide more detail on canister dewatering, increase discussion on heavy load drops, add detail on railcar jacking system, and add discussion on truck bay fire hazards.			5/8	
4	Revised to reflect the pressure in a "worst-case" canister "ready for shipment" following a one-year buildup pf radiolytic gases and the canister dewatering criterion for determining the dewatered canister void volume.			4/8	
5	Revised Section 2.3.1 to delete redundancy regarding canister dewatering and weighing. Revised Section 2.3.2 to delete the estimated holding time for canisters and revise Section 3.2 to delete the 5% restriction on the number of canisters weighing greater than 2800 pounds.			578	
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The NuPac 125-B Shipping Cask, mounted on a skid which is mounted on an eight axle flat bed railcar, is brought onto the site on the existing rail lines to a point outside the security fence protective area. The cask protective coverings (tarp, sunshleld and overpacks) are removed at this point. The overpacks weigh approximately 11,700 pounds each and the sunshleld weighs approximately 500 pounds.

The floor support brackets for the skid and the CUS are installed. With the rail moat bridge installed, the railcar with the skid/cask assembly is rolled into the truck bay and aligned with the CUS. To accomplish north-south alignment of the skid lift lugs to the CUS clevises the railcar may be jacked from one side to tilt the lift lugs into alignment. The jacking will cause tilting by compressing and relieving railcar springs and will not lift the railcar wheels off the tracks. The railcar may extend into the exclusion zone, but nc part of the skid/cask assembly will extend over the exclusion zone. The skid/cask assembly is disconnected from the railcar and connected to the CUS which lifts the assembly from the railcar. The railcar is removed from the building and the assembly lowered onto the skid floor support brackets. When the skid/cask assembly is in place the CUS is removed and staged on the 305'-1" elevation of the truck bay. A saddle is attached to the cask trunnions. The cask hydraulic lifting assembly is attached to the skid and saddle and uprights the cask. A limit switch trips the hydraulic lift assembly when the cask is level. Ratchet binders and screw jacks are used to connect the saddle to the jib crane support platform. The hydraulic lifting assembly is then de-energized. The hydraulic lifting assembly may remain in place until the cask is lowered to the horizontal position.

The 5,200 pound secondary containment vessel lid and the 3,000 pound primary containment vessel lid will be removed and stored in their respective truck bay storage stands using the FHB crane auxiliary hoist. The shipping cask loading collar (SCLC) which weighs approximately 36,000 pounds will be lifted from its storage stand and placed on top of the shipping cask by the FHB 110 ton crane. The system will then be ready to begin the sequence of operations to load defueling canisters.

2.3 Preparation of Canisters

2.3.1 Verification of Canister Integrity

Canister integrity is initially verified by weighing the canister before and after storage in fuel pool 'A' to detect water inleakage. Each canister is weighed by the FHB canister handling bridge (CHB) after initial canister dewatering.

Prior to shipping, canister integrity is verified by two methods. Following the dewatering and filling with cover gas at the dewatering station, the canister relief valves are removed and the canister is capped and observed for bubbles for a minimum of 5 minutes. The acceptance criteria is "No Visible Bubbles." Also, when the dewatered canister is moved to the FHB racks prior to shipping, the weight is recorded. This weight is compared to the weight when the canister is moved to the loading station just prior to shipment. These weights must agree within instrument repeatability.

Any canisters whose integrity cannot be verified will be treated as 'damaged' canisters. Procedures to repair these damaged canisters will be developed and implemented on a case by case basis.

2.3.2 Verification of Catalyst Function

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Prior to shipment each canister will be monitored for gas control. Canisters may be sampled for the presence of hydrogen and oxygen to determine gas appearance rates. If it is decided to sample a canister, the sampling will take place after the dewatering and following an adequate holding period. The dewatering will occur either in the vessel or at the dewatering station. Following the dewatering, the canister is brought to the FHB racks where they will remain until they are sampled. The period of time that they are allowed to sit will be determined by sampling each type of canister several times. This will determine optimum holding times and general gas appearance rates.

Following the holding period, the canister may be returned to the dewatering station where the sampling is performed or it may be sampled at its rack location. An evacuated 150 cc to 300 cc sample vessel is connected to a long-handled 1/4" Hansen connection tool. The sample vessel is then connected, via the long handled tool, to the 1/4" purge inlet connection on the canister, the sample is obtained by opening a remote valve connected to the vessel, and the vessel is then retrieved. The volume of the sample will ensure that the Hansen connection on the canister is purged as well as obtaining a part of the top volume of the canister. This will be a conservative sample since, if there is stratification of the gases, released hydrogen will tend to migrate to the top of the canister.

After the sample is taken, the canister may be dewatered again. The argon cover gas pressure is checked and brought to approximately 2 atmospheres, any remaining relief valves are removed, and the canister purge and drain lines are capped. The canister is then taken back to the racks, after performing the bubble test for canister integrity and weighing the dewatered canister as described in Section 2.3.1. The canister is lifted into, and lowered from, the FTC by an integral canister lifting system.

The lifting system consists of the following components:

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- a 3,000 pound rated capacity hoist designed in accordance with ANSI B30.16, (i.e., safety factor of 5 to ultimate strength for load bearing parts),
- reeving box, consisting of load bearing parts designed for 3,500 pounds with safety factors of 6 to yield and 10 to ultimate strength, and
- o grapple assembly, consisting of a 3,500 pound rated capacity center point grapple with safety factors of 3 to yield and 5 to ultimate strength, a grapple connector designed at 3,500 pounds with safety factors of 6 to yield and 10 to ultimate strength, and a non-load bearing grapple alignment guide. The grapple is the same as the grapple used in the canister transfer shield, and is also discussed in Reference 2.

The FTC canister lifting system is configured with four part reeving and an equalizer such that the hoist will be subjected to only one half of the total load of the grapple assembly and canister. In general, the maximum weight of a defueling canister that will be lifted by the lifting system is 2,800 pounds. The weight of the grapple assembly is less than 200 pounds. Since the holst will only be subjected to one half of the combined weight of the canister and grapple assembly, the holst will be subjected to a load of less than 1,500 pounds. Thus, in general, the holst can be considered to have a safety factor of 10 to ultimate strength. There is the possibility, however, that canisters may weigh up to 5 percent above 2,800 pounds (i.e., 2,940 pounds). For these canisters, the holst can be considered to have a safety factor of 9.55 to ultimate strength. In addition, the canister lifting system has been tested with loads up to 4,500 pounds by the Fĩc vendor and will be tested on-site with a load of at least 3000 pounds.

After being fully withdrawn into the FTC, the canister is held by the canister lifting system, and the bottom door is closed. Indication of the door being closed is provided by limit switches and canister position is given by a height encoder.

The bottom door is designed to withstand a canister drop from within the FTC and, thereby, provide a redundant line of defense against a canister drop out of the FTC during transport. The bottom door is designed to fail "as-is" and is disconnected from its power source during transport. For these reasons the FTC is considered to be "single-failure-proof" with respect to a canister drop during transport. The FTC is not single failure proof while canisters are being raised or lowered. The consequences of a canister drop during this period are discussed in sections 5.2.2 and 6.1.

The lifting device for the FTC and its connection points to the FHB crane are designed to safety factors of 6 to yield and 10 to ultimate for a single attachment point based on the approximate design load of 22.8 tons (includes static load plus 15 percent for dynamic load).