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Octoper 17, 1985

TMI Program Uffice Attn: Dr. B. J. Snyder Program Director US Nuclear Regulatory Commission Wasnington, DC 20555

Dear Dr. Snyder:

Three Mile Island Nuclear Station, Unit 2 (TMI-2) Uperating License No. UPR-73 Docket No. 50-320 Relocation of Missile Snields

Attached for your review and approval is a Safety Evaluation Report (SER) for relocating the R2 and R4 missile shields from the B D-ring to the A D-ring. Movement of the missile shields is required to allow access into the B D-ring for ex-vessel fuel characterization. The SER concludes that the proposed relocation can be accomplished without undue risk to the health and safety of the public.

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

Sincerely.

F. R. Standerfer Vice President/Director, TMI-2

FRS/R8S/eml

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PDR

Attachment

cc: Deputy Program Director - TM1 Program Uffice, Dr. W. D. Travers

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

## SAFETY ANALYSIS

4340-31	00-85-01	156
	Rev	0
	Page _	1
	of _	6

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SAFETY EVALUATION SUMMARY FOR THE RELOCATION OF MISSILE SHIELDS

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## SAFETY EVALUATION SUMMARY FOR THE RELOCATION OF MISSILE SHIELDS

This safety evaluation addresses the relocation of the 40 ton R2 and R4 missile shields from their existing locations on the 'B' D-ring to the 'A' D-ring. The handling and postulated dropping of these missile shields and their associated . support steel raises the safety issue of potential loss of structural integrity of the reactor coolant system due to a load drop in the 'A' D-ring resulting in damage to the in-core instrument tubes. This issue has been reviewed and it has been concluded that the missile shields can be relocated without undue risk to the health and safety of the public. The bases for this conclusion are presented below.

This activity will be accomplished using the polar crane main or auxiliary hoist as appropriate based on weight restrictions. Vertical lifts will be accomplished using the bridge and trolley of the polar crane as shown on the load path diagram accompanying this safety evaluation (see figure 1). The polar crane main hoist has been successfully load tested and qualified for loads well in excess of the weight of the missile shields and their supports (170 tons vs approximately 40 tons). The polar crane auxiliary hoist has been successfully load tested for its design capacity load rating of 25 tons and would handle loads less than 2 tons to accomplish this planned activity. Nevertheless, evaluations have been conducted into points of issue which must be addressed due to the unique configuration of TMI-2 in order to demonstrate the defense-in-depth provided for even straightforward evolutions.

The "Safety Evaluation Report for Heavy Load Handling Inside Containment," Revision 2, August 1985 (Heavy Load Handling SER) identifies the area north of the east-west centerline of the 'A' once through steam generator (OTSG) in the 'A' D-ring as a heavy load handling exclusion area. In order to locate the missile shields south of the 'A' OTSG centerline, two steel shapes that were used as part of the polar crane load test assembly will be relocated from the 'B' D-ring to the 'A' D-ring. These steel shapes are two (2) W30X173 beams which weigh approximately 3900 pounds each and will span across (4) of the eight W24X100 RC pump support beams currently in place on the 'A' D-ring and act as supports for the missile shields as shown on figure 2. The reserve capacity of each W24X100 beam is at least 1.6 kips per foot which has been verified by analysis to be adequate to support the dead load of missile shields R-2, R-4 and their associated support steel spacers.

The steel shapes which will act as supports for the missile shields will not create any unsafe plant conditions as they will be handled within the limitations set forth in the Heavy Load Handling SER for all movement except for their final placement. The relocation of the steel shapes (W30X173) in their final location will require a portion of the support steel to be handled north of the 'A' OTSG centerline, which as stated above, is outside the analyzed load path for the Heavy Load Handling SER. This overhanging portion of the steel shapes will be moved north of the 'A' OTSG centerline parallel to the containment north-south centerline, and over the D-ring walls. The shapes will then be moved east or west (as appropriate) to their final placement. The steel supports will be set in place using rigging certified to ANSI B30.9 and therefore, each sling has an inherent safety factor of at least 5. Additionally, prior to moving the wide flanges into the unanalyzed portion of the 'A' D-ring, each wide flange (W30X173) will be attached to a reactor coolant support beam via a sling and shackle with a safe working load in excess of the weight of the missile shield supports.

This sling will also be certified to ANSI B30.9 and both sling and shackle will have a safety factor of at least 5 to the ultimate strength of the material. Following final placement of the steel shapes, they will be clamped to the existing R. C. pump support beams prior to the rigging being detached.

In the unlikely event of a load drop, the wide flange will fall onto the reactor coolant support beams. Gross structural failure of the reactor coolant pump support beam or the D-ring wall due to a 3900 lb. load drop is not considered credible. Should the wide flange orient itself in such a way as to rotate off the reactor coolant pump support beams, the sling and shackle arrangement will prevent the wide flange from falling into the 'A' D-ring. Since lift heights will be limited and the rigging utilized will be certified to ANSI B30.9, load movements in this area can be handled safely.

The movement of the missile shields will not create any unsafe plant conditions as they will be handled within the limitations set forth in the Heavy Load Handling SER for all movement. The relocation of R2 and R4 will be conducted in a safe manner as minimum load lift heights will be used at all times and the rigging to be used will be that previously used to stage the missile shields prior to the polar crane main and auxiliary hoist load tests.

The likelihood of a dropped load is considered small based on the comparisons of the rated capacities of the handling equipment employed to the weights of the loads being handled, and the use of rigging that exceed a factor of safety of five. The likelihood of impacting the incore instrument tubes located at approximately the 282' elevation in the north-east corner of the 'A' D-ring is also considered small based on the amount of intervening structures which would obstruct the path and dissipate the kinetic energy of a dropped load. Coupling the low likelihood of a dropped load with the low likelihood of the dropped load impacting the incore instrument tubes yields to the conclusion that the planned activities associated with the relocation of the missile shields would not compromise the integrity of the incore instrument tubes. However, should a load be dropped and cause failure of the incore instrument tubes a sump recirculation system is available to make-up a water loss from the reactor vessel of up to 400 gpm (Technical Specification Change Request Number 46, 4410-B4-L-0154, November, 1984). If water loss should exceed 400 gpm, the consequences would be bounded by the "Safety Evaluation Justifying the Non-Seismic Design of TMI-2 'Post-Accident' System," Revision 0 (4410-85-L-077, April 1985).

The final potential concern would be the drop of structural components or the missile shields onto non-borated water sources within the load path. These non-borated water sources within the load path boundary will be isolated during performance of lifting and handling activities and the safety concerns associated with rupturing these lines have been eliminated.

In summary, it is concluded that the relocation of the missile shields to the 'A' D-ring will not present undue risk to the health and safety of the public.



Figure 2 Page 1 of 2



Figure 2 Page 2 of 2



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