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Docket No. 50-346

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December 16, 1983

Director of Nuclear Reactor Regulation  
Attention: Mr. John F. Stolz  
Operating Reactor Branch No. 4  
Division of Operating Reactors  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Stolz:

This is in response to Mr. D. G. Eisenhower's letter dated December 22, 1980 (Log No. 648) concerning "Control of Heavy Loads at Nuclear Power Plants", NUREG-0612. Attached is Toledo Edison's response to Section 5.1.1(4) for the Missile Shield Lifting Harness. The Lifting Harness was evaluated against ANSI N14.6-1978 and the results are contained in the attachment for the Davis-Besse Nuclear Power Station Unit No. 1.

Very truly yours,

RPC:GAB:lah  
attachment

cc: DB-1 NRC Resident Inspector

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## STRUCTURAL EVALUATION OF THE MISSILE SHIELD LIFTING HARNESS

On May 2 and 6, 1983, the Toledo Edison Company provided responses to open items concerning the Control of Heavy Loads at Nuclear Power Plants (NUREG-0612) which were identified in Technical Evaluation Reports (TER) transmitted by the NRC on September 23, 1982 and October 6, 1983. In our May 2 submittal, we indicated that the missile shield lifting harness could not be evaluated at that time because certain physical information was required and the device was inaccessible during power operation. In August, during our scheduled refueling outage we were able to obtain the necessary information. Accordingly, we have completed the structural evaluation. The results of our evaluation are summarized in Table I.

The missile shield lifting harness is composed of three principal parts: side plates, pins, and slings/apurtenances (sketch attached). The missile shields are each lifted at six points by slings which are looped around two 3-inch diameter pins within the device (three slings to each pin). A third, 6 $\frac{1}{4}$ -inch diameter pin serves as the pick point for the polar crane hook. The load is distributed from each of the smaller pins to the larger pin through two 1-inch side plates which are spaced approximately 10 inches apart by two internal spreader plates. The 1-inch side plates have an equilateral triangular geometry with approximately 25-inch principal dimensions.

The design criteria documented in ANSI N14.6-1978 specify that the factor of safety for yield strength and ultimate strength be greater than or equal to 3 and 5, respectively. All parts of the missile shield lifting harness have been found to meet these criteria with the exception of two 3-inch diameter pins and a portion of the 1-inch side plates in the vicinity of these pins. The pins will be replaced with a material having higher strength properties so that the ANSI N14.6-1978 strength requirements are met. We are currently addressing this with potential suppliers.

The 1-inch side plates meet the ANSI N14.6-1978 yield strength criterion; however, just miss the ultimate strength criterion by 3.4 percent (i.e., factor of safety 4.83 versus 5.0) for combined bending and tension. In physical terms, the computed stresses leading to the 4.83 factor of safety are local and expected to be redistributed within the plate. Due to conservatism in the analysis and the small deviation from the acceptance criteria, we feel no modification of the missile shield lifting harness side plates is required.

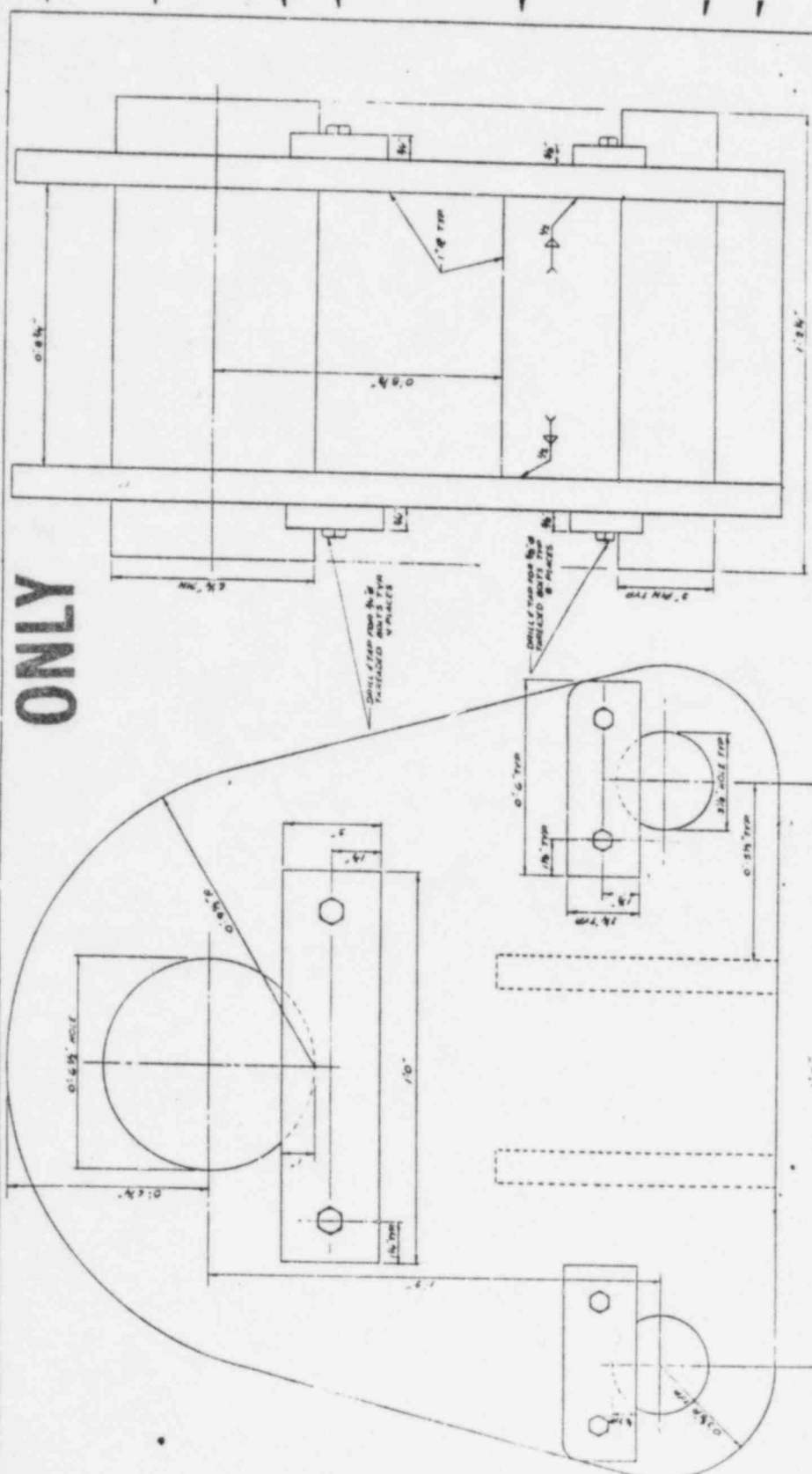
In summary, we find that the modified missile shield lifting harness will meet the intent of ANSI N14.6-1978.

TABLE 1  
SUMMARY OF FACTORS OF SAFETY  
MISSILE SHIELD LIFTING HARNESS

ITEM	MATERIAL	YIELD STRENGTH	ULTIMATE STRENGTH	FACTOR OF SAFETY*	
				AGAINST YIELD	AGAINST ULTIMATE
<u>6½" Diameter Pin</u>	C-1018	30,000 psi	60,000 psi	8.37 34.38	16.75 68.76
- Shear					
- Bending					
<u>3" Diameter Pin</u>	C-1018	30,000 psi	60,000 psi	3.52 1.43	7.04 2.87
- Shear					
- Bending					
<u>1" Plate</u>	A-36	36,000 psi	58,000 psi		
- 6½" Pin				4.84 5.74	7.80 9.24
- Tear Out					
- Tension					
- 3" Pin				4.59 6.20 3.00	7.39 10.00 4.83
- Tear Out					
- Tension					
- Tension & Bending					
<u>1½" Cable Slings</u>	IWRC				
- Tension			55.5 Tons		6.37
			53.5 Tons		6.14
<u>1½" Turnbuckles</u>			85.0 Tons		9.75
<u>1½" Shackles</u>				3.0	5.0
ALLOWABLE FACTOR OF SAFETY					

\*Based upon 101% of static load

## FOR



TO BE USED WITH THE CABLE  
CONDUITS & FITTINGS  
ALL MATERIAL TO BE TESTED &  
CERTIFIED

DATE	10/17/78	TIME	15:00
NAME	DAVIS BESE		
CONTAINMENT	CONTAINMENT BESE		
REMARKS	FROGG, FWD MISSILE 3-710 3-405		
STATUS	YES - BENTLEY & BROS CO.		
REMARKS	BENTLEY, BROS		
DATE	10/17/78	TIME	15:00