TOLEDO EDISON

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Docket No. 50-346

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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 letter is in response to your letter dated September 23, 1982 (Log No. 1097) concerning Control of Heavy Loads at Nuclear Power Plants (NUREG-0612) Technical Evaluation Report (TER). Toledo Edison has previously submitted information on some open items (January 31, 1983 Serial No. 906) contained in the TER for the Davis-Besse Nuclear Power Station Unit No. 1.

The attachment to this submittal contains a partial response to the remaining open items identified in the TER. The items responded to are dynamic load effects and inservice inspection and examination frequency. The safe load paths open item is currently under review and will be submitted by May 10, 1983.

The evaluation of the Missile Shield Lifting Harness as requested by NUREG-0612 cannot be completed at this time. The device is stored in the Reactor Containment and thus is inaccessible during power operation. When the plant is shutdown for an outage of at least 2 weeks and containment is open for general access, then a physical evaluation can be performed. Upon completion of the requested evaluation a submittal will be made.

Toledo Edison will submit the results of Phase II evaluations by June 1, 1983.

Very truly yours,

A033

R P Crouse / TDM

RPC:GAB:lah
attachment

cc: DB-1 NRC Resident Inspector

QUESTION: "2. Provide additional information and evidence to justify Exception 2."

RESPONSE: The following special lifting devices were identified in our February 1, 1982 submittal to the NRC which addressed our response to NUREG-0612 6-month issues:

1. The Head and Internals Handling Fixture with extension for attachment to the crane hook;
2. Turnbuckle Pendants and Head Lifting Pendants for attaching the reactor pressure vessel head to the handling fixture of item (1) above;
3. Internals Handling Adapter, Pendants, and Spreader Ring for attachment of the reactor internal plenum assembly to the handling fixture of item (1) above, and
4. Internals Indexing Fixture Pendants for attaching the internals indexing fixture to the handling fixture of item (1) above;
5. Missile Shield Lifting Harness.

With the exception of the missile shield lifting harness which is under evaluation (reference response to question 1 above), these devices were found to meet the intent of ANSI N14.6-1978.

ANSI N14.6 was developed to be applicable "for special lifting devices for shipping containers weighting 10,000 pounds or more for nuclear materials," most notably lifting devices for casks. The service environment for lifting devices such as casks is different and generally more severe than the service environment for the Davis-Besse lifting devices. Accordingly, it is our position that a less restrictive inservice inspection program is warranted to assure continued serviceability for the Davis-Besse lifting devices than that which is specified in ANSI N14.6. We propose that the full set of inspections identified in Tables 11 through 15 of our February 1, 1982 submittal be completed on a five-year interval. Additionally, we plan to complete the identified visual examinations prior to each usage of the lifting devices which corresponds to refueling intervals. This inspection program is judged to be equivalent to the intent of ANSI N14.6 and to provide sufficient periodic inspection and examination to identify wear or degradation that could potentially reduce design safety margins.

The bases for our proposed inservice inspection program are as follows:

- Frequency of Usage

  Since the lifting devices identified for Davis-Besse are typically used on an annual basis to support refueling operations, the frequency of use is considerably less than that of the special lifting devices for which ANSI N14.6 was developed. Special lifting devices for items such as casks are potentially used between 50 to 100 times annually. The reduced frequency of use limits the number of stress cycles to which the Davis-Besse devices are subjected and, in turn, the cumulative usage factor and the potential for abuse and damage.

- Controlled Environment

  The Davis-Besse lifting devices are stored inside the containment building in a dry, chemical free environment. The internals handling adapter, pendants and spreader ring are the only lifting devices that are wetted during refueling operations; however, the refueling canal borated water to which these devices are subjected is of good quality because it commutes with the reactor coolant water during refueling. After each exposure to borated water, these wetted devices are rinsed with demineralized water to remove any boron contamination. All lifting devices are inspected for cleanliness and cleaned in accordance with prescribed procedures prior to each use. On the contrary, the lifting devices for items such as casks for which ANSI N14.6 was developed are subjected to harsh environments that may include rain, road dust, road salt, and other potentially deliterious materials, as well as greater abuse since they are transported on open truck flatbeds. Furthermore, as part of normal service, casks and their lifting devices must be decontaminated, which requires the use of various acidic and caustic solutions. The absence of potentially corrosive compounds and solutions lessens the likelihood of environmental service related damage to the Davis-Besse lifting devices.

- Handling

The Davis-Besse polar crane is equipped with a Revere digital weight indicator and limiter, providing the capability to limit the maximum load lifted and, therefore, imparted to the lifting devices. This load cell gives a digital readout to the crane operator at the controller, and also terminates hoisting automatically and alarms if the upper limit set-point is reached. The use of such a device is beyond the requirements of CMAA or ANSI, and significantly reduces the likelihood of damage to the crane or lifting devices due to an overload.

- Materials/Margins of Safety

The identified lifting devices are constructed of materials that exhibit ductile behavior under the service conditions. Load bearing, higher strength components are not prestressed and, therefore, are not subject to potential modes of failure associated with mechanisms such as stress corrosion cracking.

As previously indicated in our February 1, 1982 submittal, the load bearing components of the Davis-Besse lifting devices were found to meet the stress design factors of Sections 3.2.1.1 and 3.2.1.2 of ANSI N14.6-1978. The actual structural margins of safety are generally significantly higher than the stated minimums required by these sections of the ANSI N14.6 Standard due to the following points:

- Standard structural sections, turnbuckles, and other "off-the-shelf" items have been incorporated into the design. Typically, these items are of greater section size than is required to meet the ANSI N14.6 design factor-of-safety requirements. This situation exists simply due to the fact that the items are the next available size that exceeds the minimum requirements or that is dimensionally compatible within the design.

- Generally, only a few structural members are controlling in meeting the minimum required factor-of-safety. Most other structural members have significantly higher factors-of-safety.

- The computed factors-of-safety are based upon minimum ASME or ASTM material properties. Actual material properties exceed these minimums. For example, data from 3,974 mill tests representing 33,000 tons of structural steel indicated that average strength properties exceed the specified minimum strength by approximately 25 percent. (ref: TM5-856-2, "Design of Structures to Resist the Effects of Atomic Weapons - Strength of Materials and Structural Elements," Dept. of the Army, August 1965.) Thus, the factor-of-safety would be expected to be higher than stated in direct proportion to this higher material strength.

  Therefore, the design margins are conservatively stated, resulting in service stress conditions that are relatively small percentages of the yield strength and even smaller percentages of the ultimate strength. Under these stress conditions, the potential for fracture, yielding or other deleterious damage mechanisms is significantly low.

In conclusion, we have determined that our program of visual inspection and examination prior to each use is sufficient to uncover potential damage to the lifting devices. While we believe the service conditions are relatively mild and that our operating procedures provide even greater assurance that heavy loads will be handled in a safe manner, minimizing the potential for damage of the lifting devices, we have commited to a more comprehensive 5-year dimensional and nondestructive examination program. This program will confirm quantitatively that design margins of safety have not been compromised due to potential service related mechanisms of degradation.

QUESTION: "Davis-Besse Unit I partially complies with Guideline 5. To fully comply, the Licensee should verify that (a) selection of slings includes consideration of the maximum dynamic loads, (b) slings are suitably marked, and (c) slings restricted in use to only certain cranes are clearly marked to so indicate."

RESPONSE: Dynamic load factors have been considered and found to have an insignificant effect on the safety margins established by the sling selection requirements of ANSI B30.9-1971 to which we are in compliance.

Slings are selected to have a minimum factor of safety of five. On a comparative basis, the maximum conservatively derived dynamic load effect on slings is of the order 1 to 8 percent of the carried load. This corresponds to an apparent reduction of the minimum factor-of-safety (computed on the basis of the static load) of approximately 0.2 to 1.6 percent. At such low percentages, the factor-of-safety requirement of five is not expected to be compromised in consideration of factors related to size selection of slings, actual material properties, conservatively derived load weights, and aspects of the dynamics of hoist operation.

We have completed a quantitative analysis for the polar crane (main and auxiliary hoists), intake gantry crane, and the spent fuel cask crane (main and auxiliary hoists) to determine the maximum dynamic load that could potentially be impacted to slings or other lifting devices due to the dynamics of hoist operation. Our analysis assumes that the maximum dynamic load will occur upon lowering the load as the holding brakes are applied on a postulated loss of power to the holding brakes. Our analysis also conservatively assumed that although power is lost to the holding brakes, power is still available to the load brake causing a combined deceleration torque due to both the load and holding brakes (unlikely, but possible due to certain control system failures). We have conservatively ignored the effects of cable stretching and rotational inertia of gears in the gear train. To obtain maximum deceleration rates, no-load conditions were used. The results of our analysis are summarized as follows:

Crane (Hoist)	Rated Load Capacity (tons)	Maximum Hoist Speed (ft/min)	Dynamic Load (g)
Polar (main)	180	5.1	.01
Polar (auxiliary)	25	18.2	.05
Intake Gantry	15	20.9	.07
Spent Fuel Cask (main)	140	6.2	.01
Spent Fuel Cask (auxiliary)	20	15.2	.08

In conclusion, we have determined that dynamic loads applied to slings are sufficiently small that they need not be considered in selecting slings for these cranes.

Since the hoist for the component cooling water pump monorail is a manually operated hoist acting against a mechanical friction-disk type brake, slings and loads handled by this hoist will not experience appreciable dynamic loads. As with the cranes discussed above, these loads need not be considerd in selecting slings for the component cooling water pump monorail.

The hoists to be installed on the four new equipment jib cranes have not yet been procured. When these are selected, Toledo Edison will assure that maximum dynamic loads are not significant, or that a factor to account for dynamic loads is used in sling selection if dynamic loads are found to be large (i.e., greater than 20%).