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October 15, 1982
EF2 - 60,134

Mr. L. L. Kintner
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Licensing
Washington, D. C. 20555

Dear Mr. Kintner:

References: (1) Enrico Fermi Atomic Power Plant, Unit 2
NRC Docket No. 50-341
(2) Letter NRC to Detroit Edison,
"Control of Heavy Loads at Fermi 2"
(NUREG-0612)
(3) Letter Detroit Edison to NRC, "Control
of Heavy Loads Over or in Proximity to
Irradiated Fuel", EF2-57,432, 6/3/82

Subject: Control of Heavy Loads

The Reference 2 NRC letter enclosed a draft report providing an evaluation of Detroit Edison's response on heavy loads (Reference 3). On September 2nd a conference call was held between Detroit Edison, yourself, and your consultants from EG&G Idaho on the report. This letter responds to the action items given to Detroit Edison as a consequence of that call. Resolution of these items is provided by making page changes to our Reference 3 submittal.

The enclosed table gives a cross-reference between the appropriate item in your Reference 2 report, the action item derived based on the conference call, and the page change intended to resolve the comment. Some additional page changes to our report are also enclosed to correct typos and reflect design evolution. The page changes are attached as Enclosure 1.

Should you have any further questions, please contact Mr. L. E. Schuerman, (313) 649-7562.

Sincerely,

Harry Tauber

Aperture Card Dist

Enclosures

cc: F. Clemenson
B. Little
T. H. Stickley

B030
1/40 Encls
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# TABLE 1

Cross-Reference between NRC Reference 2 Report and DECO Page Change to Reference 3

| Page of Reference 2 Applicable | Comment Based on 9/2/82 Conference Call | Page Change to Reference 3 Applicable |
|---|---|---|
| 4 | NRC can't verify list of hoists. Commitment is desired that future hoists will meet 0612 | 2.1.1-2, 2.1.3-18 |
| 7, 8 | Anticipated load handling procedures will be written prior to OL. Unanticipated load handling procedures will be written prior to the handling. The procedures will meet 0612. | 2.1.3.4, 2.1.3-7, 2.1.3-8, Table 2.1.3.c |
| 8 | The alternatives to floor lines should be identified. It was finally agreed that DECo will 1) paint exclusion areas 2) by procedure walk down the load paths to insure they're free of obstruction and 3) for significant loads, will place temporary markers for the load path. | 2.1.3-4, 2.1.3-4a, 2.1.3-7, 2.1.3-7a<br>See Note 1 |
| 10 | NRC desired that training and certification requirements be more specifically stated for the crane and that appropriate industry standards be met for other devices. Operators should also be trained prior to actual operation. | 2.1.3-19 |
| 11 | NRC desires to know when DECo plans to respond on Special Lifting Devices and what will be done if there are problems. | 2.1.3-15, 2.3.2-70, 2.3.2-70a, 2.3.2-73 |

| Page of Reference 2 Applicable | Comment Based on 9/2/82 Conference Call | Page Change to Reference 3 Applicable |
|---|---|---|
| 12 | NRC desires statements to be revised to show how special slings and non-controlled construction slings will be prevented from being mixed up. Also, dynamic loads is desired to be addressed. | 2.1.3-16 |
| 17 | NRC desires that DECo address the interim measures (NUREG-0612, Article 5.3) in case all final guidelines of NUREG-0612 can't be implemented by fuel load. | See addendum I to the table |

Notes:

1. Painted lines are provided instead of temporary markers as was originally discussed in the phone call.

## Addendum 1 to Table 1

Interim Measure
From Section 5.3
of NUREG-0612

(1) Restriction of Heavy Loads Over the Fuel Pool

As described in Section 2.1.3.f of Reference 3, the Reactor Building Main Crane is single-failure proof. Section 2.2.4.a describes the load limit application and plant technical specification requirements that prohibit heavy loads, handled by the non-single failure auxiliary hoist, from being handled over the spent fuel pool. All of the protective devices, procedures and technical specifications described in Section 2.2.4.a needed to satisfy this interim action will be implemented prior to fuel load.

(2) Definition of Safe Load Paths

This action has been completed as reported under Sections 2.1.3.a and b of Reference 3, and the revised pages to these sections included in the attachments to this letter.

(3) Load Handling Procedures

Edison has committed to complete their written procedures prior to criticality defined under the attached revisions to Sections 2.1.3.a, b and c of Reference 3.

(4) Training and Qualification of Operators

The operator training and qualification program as described in the attached revised pages to Section 2.1.3.g, commits to having this program established prior to fuel load with operator training initiated prior to criticality. The intent is to have each operator's training and qualification completed prior to his involvement with any post criticality heavy load handling event.

(5) Crane Inspection, Testing and Maintenance

Edison has committed to an inspection, testing and maintenance program in accordance with the NUREG-0612 guidelines. Written procedures covering this program will be completed prior to fuel load as explained under Section 2.1.3.e of Reference 3.

(6) Review of Procedures, Equipment and Personnel Qualification for Critical Load Handling over the Reactor

1. Written Procedures

Written procedures covering the handling of critical loads over the reactor will include explicit instructions on rigging and movement of loads as described in Section 2.1.3.b and c of Reference 3. These procedures will be completed prior to criticality to meet this interim action.

2.& 3. Visual inspection of cranes, slings and lifting devices, and appropriate repair and replacement of defective components

A complete visual inspection of the reactor building crane, and those slings and lifting devices used for reactor reassembly will be performed prior to reactor assembly after the initial fuel load . Any detected flaws or defects will be corrected before any heavy load handling is attempted where these identified deficiencies could potentially cause a load drop.

4. Operator Qualification

A formal training and qualification program for crane and hoist operators will be established prior to fuel load. All post criticality heavy load hoisting functions in close proximity to critical system or spent fuel will be handled only by operators trained and qualified under this program. See Section 2.1.3.g of Reference 3 (revised pages attached to this letter).

Table 2.1.1

## OVERHEAD HOISTS CAPABLE OF HANDLING LOADS OVER SPENT FUEL OR SHUTDOWN SAFETY SYSTEM COMPONENTS

| Hoist | Hoist Identification Number | Type | Capacity | Hoist Location |
|---|---|---|---|---|
| Reactor Bldg Crain Main Hoist | T3100E002 | (1) | 125 Ton | RB-5th Fl. |
| Reactor Bldg Crane Aux. Hoist | T3100E002 | (1) | 5 Ton | RB-5th Fl. |
| N&S Torus Hatch Hoists | T3100E032&3 | (2) | 5 Tn/Ea | RB-1st Fl. |
| HPCI Hoist | T3100E030 | (2) | 12 Ton | AB-1st Fl. |
| RCIC Hoist | T3100E031 | (2) | 10 Ton | RB-1st Fl. |
| RHR Pumps-Div.I Basement Hoist | T3100E024 | (2) | 16 Ton | RB-Basement |
| RHR Pumps-Div.II Basement Hoist | T3100F025 | (2) | 16 Ton | RB-Basement |
| RHR Pumps-Div.I 1st Floor Hoist | T3100E026 | (2) | 16 Ton | RB-1st Fl. |
| RHR Pumps-Div.II 1st Floor Hoist | T3100E027 | (2) | 16 Ton | RB-1st Fl. |
| N&S Recirc. Pump Hoists | T3100E015A&16A | (2) | 25 Tn/Ea | RB-1st Fl. |
| MG Sets, N, C. & S Hoists | T3100E035, 6&7 | (2) | 12 Tn/Ea | RB-4th Fl. |
| MG Set Fluid Drive N&S Hoist | T3100E038&9 | (2) | 20 Tn/Ea | RB-4th Fl. |
| CRD Repair Hoist | T3100E019 | (2) | 3 Ton | RB-3rd Fl. |
| Core Spray Div. I Hoist | T3100E028 | (2) | 16 Ton | RB-1st Fl. |
| Core Spray Div. II Hoist | T3100E029 | (2) | 16 Ton | RB-1st Fl. |
| Diesel Gen. Div. I N&S Hoist* | | (2) | 2 Tn/Ea | RHR-Gr. Fl. |
| Diesel Gen. Div. II N&S Hoist* | | (2) | 2 Tn/Ea | RHR-Gr. Fl. |
| Diesel Gen. Motor Control Cent. Div. I N&S Hoists* | | (2) | 4 Tn/Ea | RHR-Up. Fl. |
| Diesel Gen. Motor Control Cent. Div. I* | | (2) | 4 Tn/Ea | RHR-Up. Fl. |
| Ventilation Equip. Rm. Hoist* | | (2) | 8 Ton | AB-5th Fl. |
| Refueling Platform Monorail Hoist | F1500E006 | (2) | ½ Ton | RB-5th Fl. |
| Refueling Platform Aux. Hoist | F1500E005 | (2) | ½ Ton | RB-5th Fl. |
| Refueling Platform Main Hoist | F1500E004 | (2) | 1 Ton | RB-5th Fl. |
| Refueling Platofrm Hand Winch | F1100E021 | (2) | 1 Ton | RB-5th Fl. |
| CRD Handling Cart Service Crane | F1100E022 | (2) | 1 Ton | RB-3rd Fl. |
| New Fuel Transfer Hoist | F1100E023 | (2) | 1 Ton | RB-5th Fl. |
| Fuel Channeling Crane | F1100E024 | (3) | 250 Lb. | RB-5th Fl. |
| Fuel Pool Jib Crane | F1100E021 | | 1 Ton | RB-5th Fl. (1) |
| NE Equipment Hatch Hoist* | | (2) | 12 Ton | RB-1st Fl. |

(1) Overhead Traveling Crane
(2) Monorail Hoist
(3) Portable Hydraulic Floor Crane

RB-Reactor Building
AB-Auxiliary Building
RHR-RHR Building (1)

* These hoists have not yet been specified for purchase, although the trolley support for these hoist locations has been installed. The specified design of these hoists will include conformance with ANSI B30.16 criteria for "Overhead Hoists". (1)

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Table 2.1.2

OVERHEAD HOISTS EXEMPT FROM FURTHER ANALYSIS
BECAUSE THEY CANNOT HANDLE HEAVY LOADS OVER
SPENT FUEL OR SHUTDOWN SAFETY SYSTEM COMPONENTS

A. Hoists incapable of handling heavy loads over 2000 lbs.

| Hoist | Rated Capacity | Hoist Location | |
|---|---|---|---|
| Fuel Channeling Crane | 250 lbs. | Reactor Bldg.-5th Fl. | (1) |
| Refueling Platform Monorail Hoist | 1000 lbs. | Reactor Bldg.-5th Fl. | |
| Refueling Platform Aux. Hoist | 1000 lbs. | Reactor Bldg.-5th Fl. | |
| Refueling Platform Main Hoist | 2000 lbs. | Reactor Bldg.-5th Fl. | |
| Refueling Platform Hand Winch | 2000 lbs. | Reactor Bldg.-5th Fl. | |
| Fuel Pool Jib Crane | 2000 lbs. | Reactor Bldg.-5th Fl. | |
| CRD Handling Cart Service Crane | 2000 lbs. | Reactor Bldg.-3rd Fl. | |
| New Fuel Transfer Hoist | 2000 lbs. | Reactor Bldg.-5th Fl. | |

B. Hoists incapable of handling loads over safety shutdown system components.

| | | | |
|---|---|---|---|
| Floor Drain Sump Cover Hoist (2) | 5 Ton/ea. | Reactor Bldg-Sub Base. | (1) |
| Equipment Drain Sump Cover Hoists (2) | 5 Ton/ea. | Reactor Bldg-Sub Base. | |

All cranes and hoists located in the following buildings that do not contain safety equipment needed for safe unit shutdown.

- Turbine Building
- Radwaste Building
- Office Service Building
- Auxiliary Boiler Building
- General Service Water Building
- Circulating Water Pump House
- Warehouse No. 19

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Figure 1 shows the laydown location for major components during a reactor refueling. Figure 2 is a composite drawing showing the floor area exposed to all heavy loads handled during refueling, and movement of the Spent Fuel Cask prior to and after refueling.

Figures 3 through 11 show the load travel path for each heavy load lift performed during refueling. Figure 3 shows the load path for the movement of the reactor pressure vessel service platform and support tracks from their permanent storage location just north of the equipment hatch during normal operation to temporary placement just east of the stud tensioner. Figure 4 shows the load paths for movements of the six Reactor Shield Plugs. After all of the Reactor Shield Plugs have been moved, the Reactor Pressure Vessel Service Platform is moved back to its new storage location and is placed on top of the Shield Plugs that have also been moved into this location. Figure 5 depicts the load travel paths of the Storage Pool Slot Plugs to and from the southeast quadrant of the refueling floor. Figure 6 shows the load travel paths of the Fuel Pool Slot Plugs to and from the northwest corner of the refueling floor, the equipment pool and fuel pool gate travel paths within the pools, and the refueling bridge travel path from just west of the drywell. After all of the removable plugs have been placed into their laydown location, (1) the Head Strongback is then attached to the Reactor Building Crane Main Hoist and the Drywell Head. Figure 7 shows the

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The systematic placement of heavy loads handled for refueling was determined by the refueling procedure sequence of events and the travel limitations of the Reactor Building Crane, with consideration for safety system components located below the fueling floor.

Because of the high strength integrity of the fueling floor (fifth floor) due to its heavily reinforced, 24-inch thick construction, very little added strength is achieved along the building column lines. However, travel paths along these column lines have been established where it is practicable, to keep the travel and placement as simple as possible, so as not to confuse operators and supervisors. The established travel paths (shown in Figures 3-12) will be included in specific maintenance procedures developed prior to criticality with the exception of the procedure for the spent fuel cask which will be developed prior to handling after criticality. An initial step in the procedures will require the person responsible for performing the lift to verify the safe load path is free of obstructions that would interfere with the movement of the load. Because of the high strength integrity of the fueling floor at all locations and the separation of redundant safety systems located below the fueling floor, deviations from the travel paths shown in Figure 3 through 12 do not notably increase the consequences (1)

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of any potential accidents as long as these deviations do not traverse over the Reactor, Fuel Storage Pool and Equipment Hatch areas. Therefore, the placement of painted travel path lines for all heavy loads offers very little advantage and could cause confusion. However, painted barrier lines and signs will be established around the Reactor, Fuel Pool, and Equipment Hatch areas. Additionally, painted travel paths will be provided for the five major loads handled over the 5th floor deck. These include the Reactor Shield Plugs, Reactor Vessel Head, Drywell Head, Spent Fuel Cask and the Equipment Storage Pool Slot Plugs. (1)

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2.1.3.b A discussion of measures taken to ensure that load-handling operations remain within safe load paths, including procedures, if any, for deviation from these paths.

RESPONSE: Prior to handling heavy loads over or near spent fuel or safe shutdown equipment, load paths shall be identified in specific maintenance procedures or in an attachment to the maintenance order/work package required to perform the particular maintenance task. Procedures which control the operation of plant hoists and lifting devices shall establish the guidelines required for the identification and approval of any heavy load paths not identified in specific maintenance procedures. When heavy loads are being handled by the (1) Reactor Building Overhead Crane or portable hoists, the load paths will be verified as free of obstructions prior to initial movement of the load. Additionally, an individual other than the crane operator will monitor the movement of the load along the travel path. These requirements will be included in the procedure for controlling operation of the Reactor Building Crane (No. 32.000.07) and in the procedure for operation of portable hoists (No. 32.000.12).

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When heavy loads are being handled by use of monorail hoists, the load path will be verified as being free of obstructions by the operator prior to initial movement of the load. This requirement will be included in the procedure for the operation of monorail hoists (No. 32.000.08). Since the travel path associated with a monorail is fixed, additional effort is not required to monitor load travel for deviation from the specified path.

If the need should arise to deviate from a load path identified in a specific maintenance procedure, a procedural change will be required. Plant administrative procedure entitled "Procedure Preparation, Review, Approval, Change, Revision, Cancellation and Distribution" (No. 12.000.07) describes in detail the procedure revision process. Procedures which control the operation of plant hoists and lifting devices shall establish the process for deviation from any heavy load paths previously identified in an attachment to the maintenance order or work package. (1)

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2.1.3.c A tabulation of heavy loads to be handled by each crane which includes the load identification, load weight, its designated lifting device, and verification that handling of such load is governed by a written procedure containing, as a minimum, the information identified in NUREG-0612, Secion 5.1.1(2).

RESPONSE: The attached Table 2.1.3.c provides a list of heavy loads that will be carried by each crane along with any designated lifting devices. In order to control future heavy loads to be handled over or near spent fuel or required safe shutdown equipment, the procedures governing the operation of the Reactor Building Crane, Monorails, and Portable Hoists will require the guidelines of NUREG-0612 be invoked by either specific maintenance procedures or by attachment to maintenance orders/work packages prior to movement of heavy loads in these areas. (1)

Of the seventeen (17) procedures listed in Table 2.1.3.c, sixteen (16) have been written and approved; however, some revisions are needed to incorporate additional commitments contained in this revision.

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Table 2.1.3.c

TABULATION OF HEAVY LOADS OVERHEAD HOIST;
REACTOR BUILDING CRANE MAIN HOIST AREA;
REACTOR BUILDING FIFTH FLOOR

| | LOAD | LOAD WEIGHT | LIFTING DEVICE | WRITTEN PROCEDURE | |
|---|---|---|---|---|---|
| 1. | Drywell Head (T2301A001A) | 67 Ton | Head Strongback (F1300E009) | Maintenance Procedure No. 35.000.81 | (1) |
| 2. | Reactor Shield Plugs (6) | 100 Ton/Ea | 3-Leg Sling, + | Maintenance Procedure No. 35.000.80 | |
| 3. | Reactor Pressure Vessel Service Platform (F1300E010) | 6 Ton | Service Platform Lifting Device (CEX-33240A) | Maintenance Procedure No. 35.000.74 | |
| 4. | Vessel Head Insulation (B1151H001) | 5 Ton | Spreader Beam, + | Maintenance Procedure No. 35.000.121 | |
| 5. | Reactor Pressure Vessel Head | 81 Ton | Head Strongback (F1300E009) | Maintenance Procedure No. 35.000.83 | |
| 6. | Reactor Pressure Vessel Head Strongback (F1300E009) | 5 Ton | Connects directly to Main Hoist Hook | Maintenance Procedure No. 35.000.83 | |
| 7. | Storage Pool Slot Plugs (4) | 43 Ton/Ea | 2-Leg Sling, + | Maintenance Procedure No. 35.000.115 | |
| 8. | Fuel Pool Slot Plugs (4) | 9 Ton/Ea | 1-Leg Sling, + | Maintenance Procedure No. 35.000.113 | |
| 9. | Stud Tensioner (F1300E007) | 6 Ton | Connects directly to Main Hoist Hook | Maintenance Procedure No. 35.000.82 | |
| 10. | Steam Dryer (B1107D041) | 42 Ton | Dryer/Separator Sling (F1300E008) | Maintenance Procedure No. 35.000.84 | |
| 11. | Steam Separator (B1112D002) | 73 Ton | Dryer/Separator Sling (F1300E008) | Maintenance Procedure No. 35.000.85 | |
| 12. | Storage Pool Gate | 14 Ton | 2-Leg Sling, + | Maintenance Procedure No. 35.000.116 | |
| 13. | Fuel Pool Gates (A & B) | 4.3 Ton & 2.5 Ton | 2-Leg Sling, + | Maintenance Procedure No. 35.000.89 | |

+ Not Yet Purchased

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Table 2.1.3.c (Cont'd)

| LOAD | LOAD WEIGHT | LIFTING DEVICE | WRITTEN PROCEDURE |
|---|---|---|---|
| 14. Crane load Block | 5 Ton | None | |
| 15. Spent Fuel Cask (F1600E001) | 100 Ton | Redundant Cask Slings | Maintenance Procedure No. * |
| 16. Concrete Floor Hatch (E½-10 column location) | 5 Ton | 4-Leg Sling, + | Maintenance Procedure No. * |
| 17. RWCU Demin Floor Plug | 14 Ton | 4-Leg Sling, + | Maintenance Procedure No. * |
| 18. Equipment Hatch Plugs | 17 Ton | 4-Leg Sling, + | Maintenance Procedure No. 35.000.117 |
| 19. Debris Shipping Cask | * | + | Maintenance Procedure No. * |
| 20. Fuel Storage Racks | * | + | Maintenance Procedure No. * |
| 21. Refueling Bridge (T2502D001) | 14 Ton | 4-Leg Sling, + | Maintenance Procedure No. 35.000.87 |
| 22. Dryer/Separator Sling (F1300E008) | 2.4 Ton | Attaches directly to Main Hook | Maintenance Procedure No. 35.000.84 and 85 |
| 23. Vessel Head Insulation Spreader Beam | 1.2 Ton | Attaches directly to Main Hook | Maintenance Procedure No. 35.000.121 (1) |

TABULATION OF HEAVY LOADS

OVERHEAD HOIST: REACTOR BUILDING AUXILIARY HOIST (5 TON)
AREA: REACTOR BULDING FIFTH FLOOR

| LOAD | LOAD WEIGHT | LIFTING DEVICE | WRITTEN PROCEDURE |
|---|---|---|---|
| 1. Maintenance Tools | 5 Ton | *, + | Maintenance Procedure No. 32.000.07 (1) |
| 2. Lifting Fixtures | 5 Ton | *, + | Maintenance Procedure No. 32.000.07 (1) |
| 3. New Fuel Vault Plugs | 2½ Ton | 4-Leg Sling, + | Maintenance Procedure No. 35.000.118 |

* To Be Determined Later
+ Not Yet Purchased
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Table 2.1.3.c (Cont'd)

TABULATION OF HEAVY LOADS

| | LOAD | LOAD WEIGHT | LIFTING DEVICE | WRITTEN PROCEDURE |
|---|---|---|---|---|
| | OVERHEAD HOIST: CORE SPRAY DIVISION 1 AND 2 HOISTS (2 16-TON)<br>AREA: REACTOR BUILDING FIRST FLOOR | | | |
| 1. | Core Spray First Floor Hatch (2) | 8½ Ton | *, + | Maintenance Procedure No. 32.000.08 |
| 2. | Core Spray Basement Floor Hatch (2) | 8½ Ton | *, + | Maintenance Procedure No. 32.000.08 |
| 3. | Core Spray Pump Motors (4) E2101C00A-D | Ton | *, + | Maintenance Procedure No. 32.000.08 |
| | OVERHEAD HOIST: NE EQUIPMENT DOOR HOIST (12 TON)<br>AREA: REACTOR BUILDING FIRST FLOOR | | | |
| | NE Equipment Door T2301A001B | 11.3 Ton | * | Maintenance Procedure No. 35.000.11 (1) |
| | OVERHEAD HOIST: DIESEL GENERATOR MOTOR CONTROL CENTER DIVISION 1 AND 2 (4 4-TON)<br>AREA: RHR BUILDING UPPER FLOOR | | | |
| | * | * | *, + | Maintenance Procedure No. 32.000.08 |
| | OVERHEAD HOIST: DIESEL GENERATOR NORTH AND SOUTH DIVISION 1 AND 2 HOISTS (4 2-TON)<br>AREA: RHR BUILDING GRADE FLOOR | | | |
| | Diesel Generator Components (i.e. cylinders, cylinder liners) | * | *, + | Maintenance Procedure No. 32.000.08 |
| | OVERHEAD HOIST: VENTILATION EQUIPMENT HOIST (8-TON)<br>AREA: AUXILIARY BUILDING | | | |
| | * | * | *, + | Maintenance Procedure No. 32.000.08 |

* To Be Determined Later
\+ Not Yet Purchased
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2.1.3.d Verification that lifting devices identified in 2.1.3.c, above, comply with the requirements of ANSI N14.6-1978, or ANSI B30.9-1971 as appropriate. For lifting devices where these standards, as supplemented by NUREG 0612, Section 5.1.1(4) or 5.1.1(5), are not met, describe any proposed alternatives and demonstrate their equivalency in terms of load-handling reliability.

RESPONSE: To date, there are only three lifting devices provided for the handling of heavy loads that would fall within the guidelines of ANSI N14.6-1978, as defined in NUREG-0612. These are the RPV Head Strongback, the Dryer/Separator lifting device, and the Vessel Head Insulation Spreader Beam. A design review by General Electric finds that the RPV Head Strongback and Dryer/Separator lifting device do meet the design strength criteria of Section 3.2 of ANSI N14.6-1978, taking into account the combined static and dynamic load forces. However, certain components in these lifting devices do not meet the additional strength criteria of Section 6.2 for single failure proof systems. Although General Electric recommendations do not find it practical to modify all of these components to meet this criteria, this is still being reviewed by Edison. Action determined by this review on any possible modifications or additional analyses will be initiated prior to fuel load and will be completed prior to the use of these devices after initial criticality. (1)

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The Vessel Head Insulation Spreader Beam is being designed to achieve compliance with the ANSI N14.6 strength criteria for combined static and dynamic load forces. The Spent Fuel Cask handling system is accepted as single-failure-proof and is addressed in detail in the Enrico Fermi FSAR, Section 9.1.4.2.1. (1)

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All other special lifting devices and slings will be purchased to ensure that the requirements of ANSI N14.6-1978 and ANSI B30.9-1971 are satisfied. Existing slings used for construction will not be retained for handling of heavy loads around critical equipment after the plant is operational.

The requirements of the stress design factor will include the maximum static and dynamic loads as defined by NUREG-0612. Any single-failure-proof handling systems will also meet the requirements of NUREG-0612, Section 5.1.6.

All slings that fall within the concerns of NUREG-0612 will be clearly marked to identify their qualification for that application. This includes a load rating accounting for static and dynamic loads for hoist speeds up to 30 ft/min for these slings, as well as any information which might restrict certain specific slings to specific hoist/load applications. (1)

2.1.3.e Verification that ANSI B30.2-1976, Chapter 2-2, has been invoked with respect to crane inspection, testing, and maintenance. Where any exception is taken to this standard, sufficient information should be provided to demonstrate the equivalency of proposed alternatives.

RESPONSE: For the Reactor Building Crane, Main and Auxiliary Hoists, crane inspection, testing, and Maintenance Procedures will comply with the guidelines in ANSI B30.2-1976, Chapter 2-2. Should any deviations from this standard be required, they will be equivalent to

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the requirements of ANSI B30.2-1976. The requirements of this standard will be incorporated into the Reactor Building Crane General Maintenance Procedures Nos. 35.000.120 and 34.000.43. These procedures will be written prior to fuel load. (1)

For all other overhead hoists listed in Table 2.1.1, inspection, testing, and maintenance procedures will comply with ANSI B30.16-1973, Chapters 1.2 and 2.2.

2.1.3.f Verification that crane design complies with the guidelines of CMAA Specification 70 and Chapters 2-1 of ANSI B30.2-1976, including the demonstration of equivalency of actual design requirements for instances where specific compliance with these standards is not provided.

RESPONSE: The reactor building main crane is the only single-failure-proof crane at the plant site. The Enrico Fermi 2 Atomic Power Station FSAR, Section 9.1.4.2.1, describes the single failure proof design features incorporated in the 125 ton crane.

The Fermi 2 Reactor Building Crane was designed under the EOCI #61 "Specifications for Electric Traveling Cranes".

However, additional, upgraded criteria included in the later CMAA #70-1976 specification was already a part of the manufacturer's design practices. The following identifies these criteria and provides the

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results of Edison's analysis verifying the Fermi 2 crane's conformance with this criteria.

For all other overhead hoists listed in Table 2.1.1, CMAA #70 and ANSI B30.2 are not the applicable standards for these hoists. ANSI B30.16-1973 is the applicable standard. The recirculating pump hoists design does conform to this standard. The remaining hoists, which are not yet purchased, have been specified to conform to ANSI B30.16.

These hoists and any other future cranes or hoists that fall within the concerns of NUREG-0612 will meet the design guidelines of NUREG-0612. (1)

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2.1.3.g Exceptions, if any, taken to ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

RESPONSE: Operator training, qualification, and conduct will be in compliance with the requirements of ANSI B30.2-1976 for operation of overhead traveling cranes. Operators of various types of cranes will be trained and qualified to the appropriate standard for the specific type of equipment to be used. Records of personnel training and qualification will be retained. This (1)
training program will be administered by the Nuclear Operations Training Group. The training program will be implemented prior to fuel load and those individuals operating cranes/hoists will be qualified prior to involvement with any post-criticality heavy load handling event.

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TABLE 2.2.1

HOISTS OPERATING OVER
SPENT FUEL OR THE REACTOR VESSEL

| Hoist Number | Hoist | Type | Rated Capacity |
|---|---|---|---|
| T3100E002 | Reactor Bldg. Crane Main Hoist | Traveling Overhead | 125 Ton |
| | Aux. Hoist | Hoists | 5 Ton * |
| F1500E004 | Refueling Platform Main Hoist | Traveling Overhead | 2000 lbs. |
| F1500E005 | Refueling Platform Aux Hoist | Hoists | 1000 lbs. |
| F1500E006 | Refueling Platform Monorail Hoist | Traveling Monorail Hoists | 1000 lbs. |
| | Refueling Platform Hand winch | Fixed Manual Winch | 2000 lbs. |
| F1100E020 | Channel Handling Boom | Boom Trolley Hoist | 200 lbs. |
| F1100E021 | Fuel Pool Jib Crane | Boom Hoist | 2000 lbs. |
| F1100E023 | New Fuel Transfer Hoist | Traveling Boom Hoist | 2000 lbs. |
| F1160E024 | Fuel Channeling Crane | Portable Floor Crane | 250 lbs. (1) |

* Restricted to 1500 lbs. when traveling over spent fuel.

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TABLE 2.2.2

OVERHEAD HOISTS EXEMPT FROM FURTHER ANALYSIS BECAUSE THEY CANNOT HANDLE HEAVY LOADS OVER SPENT FUEL OR THE REACTOR VESSEL

A. Hoists Incapable of Handling Heavy Loads Over 2000 lbs.

| Hoist | Rated Capacity | Hoist Location |
|---|---|---|
| Refueling Platform Monorail Hoist | 1000 lbs. | Reactor Bldg.-5th Fl. |
| Refueling Platform Aux. Hoist | 1000 lbs. | Reactor Bldg.-5th Fl. |
| Refueling Platform Main Hoist | 2000 lbs. | Reactor Bldg.-5th Fl. |
| Refueling Platform Hand Winch | 2000 lbs. | Reactor Bldg.-5th Fl. |
| Fuel Pool Jib Crane | 2000 lbs. | Reactor Bldg.-5th Fl. |
| Channel Handling Boom Hoist | 200 lbs. | Reactor Bldg.-5th Fl. |
| New Fuel Transfer Hoist | 2000 lbs. | Reactor Bldg.-5th Fl. |
| Fuel Channeling Crane | 250 lbs. | Reactor Bldg.-5th Fl. (1) |

(1) Revised 10/10/82

TABLE 2.3.2 ENRICO FERMI UNIT 2 HEAVY LOAD HANDLING: LOAD/AREA IMPACT MATRIX

HOIST: REACTOR BUILDING CRANE MAIN HOIST - T3100E002

| LOCATION | BUILDING: REACTOR BUILDING | | | | | |
|---|---|---|---|---|---|---|
| IMPACT AREA / LOADS | ALONG BUILDING COORDINATE LINE B<br>FROM COORDINATE LINE 13 TO 15 1/3 | | | ALONG BUILDING COORDINATE LINE ____<br>FROM COORDINATE LINE ____ TO ____ | | |
| | FLOOR/ELEV. | SAFETY RELATED EQUIPMENT | HAZARD ELIM. CATEGORY | FLOOR/ELEV. | SAFETY RELATED EQUIPMENT | HAZARD ELIM. CATEGORY |
| 1. Drywell Head T2301A001A (67 Ton) (1) | Subbasement 540' - 0" | 1. Div 1 RHR Piping | b,e | | | |
| | | 2. Div 1 EECW Piping | b,e | | | |
| | | 3. Torus | c,e | | | |
| | Basement 562' - 0" | 1. Div 1 EECW Piping | b,e | | | |
| | | 2. Div 1 RHR Piping | b,e | | | |
| | | 3. RCIC Turbine Exhaust Piping | b,c,e | | | |
| | | 4. HPCI Turbine Exhaust Piping | b,c,e | | | |
| | | 5. Div 1 RHR Service Water Piping | b,e | | | |

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TABLE 2.3.2 ENRICO FERMI UNIT 2 HEAVY LOAD HANDLING: LOAD/AREA IMPACT MATRIX

HOIST: REACTOR BUILDING CRANE MAIN HOIST - T3100E002

| LOCATION | BUILDING: REACTOR BUILDING | | | | | |
|---|---|---|---|---|---|---|
| IMPACT AREA / LOADS | ALONG BUILDING COORDINATE LINE B<br>FROM COORDINATE LINE 13 TO 15½ | | | ALONG BUILDING COORDINATE LINE ____<br>FROM COORDINATE LINE ____ TO ____ | | |
| | FLOOR/ELEV. | SAFETY RELATED EQUIPMENT | HAZARD ELIM. CATEGORY | FLOOR/ELEV. | SAFETY RELATED EQUIPMENT | HAZARD ELIM. CATEGORY |
| 1. Drywell Head T2301A001A (67 Ton) (1) | Basement 562' - 0" | Div 1 Cable Trays*<br>1P-009 1C-008<br>1C-009<br>1P-011 1C-100<br>1C-001 1K-004<br>1C-002 1K-008<br>1K-032 | b,e | | | |

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*See Cable Tray Index

TABLE 2.3.2 ENRICO FERMI UNIT 2 HEAVY LOAD HANDLING: LOAD/AREA IMPACT MATRIX

HOIST: REACTOR BUILDING CRANE MAIN HOIST - T3100E002

| LOCATION | BUILDING: REACTOR BUILDING | | | | | |
|---|---|---|---|---|---|---|
| IMPACT AREA / LOADS | ALONG BUILDING COORDINATE LINE B<br>FROM COORDINATE LINE 13 TO 15 1/3 | | | ALONG BUILDING COORDINATE LINE ____<br>FROM COORDINATE LINE ____ TO ____ | | |
| | FLOOR/ELEV. | SAFETY RELATED EQUIPMENT | HAZARD ELIM. CATEGORY | FLOOR/ELEV. | SAFETY RELATED EQUIPMENT | HAZARD ELIM. CATEGORY |
| 1. Drywell Head T2301A001A (67 Ton) (1) | First Floor 583' - 6" | 1. Div 1 RHR Piping | b,e | | | |
| | | Div 1 Cable Trays* 1P-032 1C-046 1P-033 1K-038 | b,e | | | |
| | | Div 2 Cable Trays* 2C-089 | e,c | | | |
| | Second Floor 613' - 6" | 1. Div 1 Core Spray Piping | b,e | | | |
| | | 2. Div 1 EECW Supply and Return Piping | b,e | | | |

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*See Cable Tray Index

TABLE 2.3.2 ENRICO FERMI UNIT 2 HEAVY LOAD HANDLING: LOAD/AREA IMPACT MATRIX

HOIST: NE EQUIPMENT DOOR HOIST - (12 TON)

LOCATION BUILDING: REACTOR BUILDING - FIRST FLOOR

| LOADS \ IMPACT AREA | ALONG A LINE FROM BUILDING COORDINATES E¼, 12-3/4 to D½, 13-3/4 | | | | | |
|---|---|---|---|---|---|---|
| | FLOOR/ELEVATION | SAFETY RELATED EQUIPMENT | HAZARD ELIMINATION CATAGORY | FLOOR ELEVATION | SAFETY RELATED EQUIPMENT | HAZARD EQUIPMENT CATAGORY |
| NE EQUIPMENT DOOR | BASEMENT | DISCHARGE LINES FROM ADS-SRV V22-2071 AND NON-ADS-SRV V22-2030 | * C | | | - |

* STILL UNDER REVIEW

The handling of the unloaded Vessel Head Insulation Spreader Beam, which is connected directly to the Reactor Building Crane Main Hook, meets single failure proof criteria during movement of the Spreader Beam from its storage location to the drywell.

Items No. 5 and 6 Reactor Pressure Vessel Head Strongback and Reactor Pressure Vessel Head

The Reactor Pressure Vessel Head is removed only during cold shutdown conditions and only with its special lifing device, the Reactor Pressure Vessel Head Strongback. The Torus is not required to maintain cold shutdown and sufficient redundancy exists such that a postulated load drop will not cause the loss of other safety functions. Additionally, load/floor analysis demonstrates that a load drop will not damage any safety-related equipment away from the Reactor Vessel, if the RPV Head is not carried more than 4 feet above the floor along its travel path and laydown area. Maintenance Procedure No. 35.000.83 shall include this limitation in its specifications.

The handling of the RPV Head over the Reactor Vessel meets the criteria of NUREG-0612, Section 5.1.6 for single failure proof handling systems, with the following comments: (1)

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1. General Electric has stated that the RPV Head Lifting lugs do meet the criteria of NUREG-0612, Section 5.1.6(3). However, Edison review and acceptance of this analysis is still ongoing

2. General Electric, however, has stated that the RPV head strongback lifting device has several components that do not meet the additional design strength criteria of ANSI N14.6, Section 6.2. Although some of these components can be modified to meet this criteria, General Electric recommendations find this to be impractical for all of these components. This is also still under Edison review. (1)

As stated in Section 2.1.3.d, action determined by this review on any possible modifications or additional analyses will be initiated prior to fuel load and will be completed prior to the first post critical use of these devices.

The direct redundant attachment of the Strongback to the Reactor Building Crane Main Hook, has sufficient strength to meet single failure proof guidelines whenever this lifting device is carried unloaded from its storage location to the Drywell area, or RPV Head or Drywell Head Laydown Locations.

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Additionally, safety-related system redundancy precludes any system from performing its safety-related function when these loads could possibly be dropped.

General Electric has stated that the strength allowances used for the design of the Dryer/Separator lifting device does not allow for adequate strength to meet ANSI N14.6-1978, Section 6.2 criteria for maximum combined static and dynamic load forces during handling of the separator in air. General Electric currently does not recommend any practical method to upgrade this lifting device to meet Section 6.2 additional strength or dual load path criteria. However, General Electric's findings have not taken into consideration that the separator is underwater while it is handled over the reactor. This is undergoing further review. (1)

Action determined by this review on additional analysis or any practical modifications will be initiated prior to fuel load and will be completed prior to post-criticality handling of the Dryer/Separator.

Item No. 12 Storage Pool Gate

Movement of the 14 ton Storage Pool Gate during a refueling outage is from its operating location to a location within the Storage Pool, where it will be

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secured to the side of the pool. ESF systems located below the Storage Pool have sufficient redundancy and separation to preclude the complete loss of a system due to a potential load drop.

Item No. 13 Fuel Pool Gates A & B

Movement of the Fuel Pool Gates during a refueling outage is from their operating location to their storage location along the same (south) wall of the Fuel Storage Pool, where the gates are to be secured to the wall. Analysis of the Fuel Pool floor structure finds that it can withstand a potential Fuel Pool Gate drop from a hieght of 17 feet above the Pool Floor.

Further analysis is continuing to verify that there will be adequate fuel rack protection against the possibility of a fallen gate toppling against the racks after it has fallen to the pool floor.

Item No. 15 Spent Fuel Cask

Handling/hoisting procedures and administrative controls for the Spent Fuel Cask are described in the Enrico Fermi 2 Final Safety Analysis Report, Section 9.1. The likelihood of a handling system failure for this load has been demonstrated and accepted as being extremely small.

Items No. 16 and 17 Concrete Floor Hatch (Co. E½-10½ and the RWCU Demineralizer Concrete Floor Plugs

The concrete floor hatch located at building coordinates E½-10½ will be handled by the auxiliary hoist. The RWCU demineralizer concrete floor plugs are outside the coverage area of the Reactor Building Hoists and methods to lift these heavy loads are still under investigation. Additional hoisting equipment and the maintenance procedure covering the use of this equipment will be in accordance with the NUREG-0612 guidelines and will be implemented prior to the handling of these plugs after initial operation. (1)

Item No. 18 Equipment Hatch Plugs

The Equipment Hatch Plugs will be placed in the immediate vicinity of the Equipment Hatch opening whenever the hatch is to be opened for access. The handling of these plugs is still under study. This study and any potential modifications will be completed prior to the handling of these plugs after initial operation.



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L. DIESEL GENERATOR HOISTS AND
DIESEL GENERATOR MOTOR CONTROL CENTER HOISTS

The diesel generator hoists and diesel generator motor control center hoists are used during corrective and maintenance procedures on the diesel generators. The accidental dropping of a diesel engine component will have no effect upon any other system required for safe shutdown or decay heat removal.

M. VENTILATION EQUIPMENT HOIST

The Ventilation Equipment Hoist is an 8-ton overhead hoist used for corrective and preventive maintenance on various ventilation components. There is adequate floor strength to withstand an inadvertant load drop up to 10 tons, from the fifth floor to the third floor without impacting critical systems below the third floor. Maintenance Procedure No. 32.000.08 will specify this load limit for all lifts except those incurred during cold shutdown. Deviations from this specification will require formal approval in accordance with the procedure described in the response to Section 2.1.3.b.

N. NE EQUIPMENT HATCH HOIST

The Equipment Hatch Hoist is a 12-ton monorail hoist used exclusively to move the NE Equipment Hatch to one side of the drywell NE Equipment access opening. This is to be performed during shutdowns whenever large equipment is to be moved to or from the drywell (i.e. N. recirculation pump motor).

The only safety-related equipment located under the monorail travel path of this hoist are the discharge pipes from ADS safety relief valve V22-2071 and NON-ADS safety relief valve V22-2070. The handling of the NE equipment hatch will not take place whenever the availability of these valves is required for reactor protection. (1)

The methods and written procedures covering the handling of this hatch will be completed prior to post criticality.

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III. RESULTS

Results are summarized below:

| DESCRIPTION OF HEAVY LOAD | WEIGHT OF HEAVY LOAD | THICKNESS OF IMPACTED SLAB | MAXIMUM DROP HEIGHT |
|---|---|---|---|
| Reactor Shield Plugs | 100 T/ea | 24" | 5'-0" |
| Fuel Pool Slot Plugs | 9 T/ea | 24" | 12'-0" |
| Drywell Head | 67 Ton | 24" | 5'-6" (1) |
| Vessel Head Insulation | 5 Ton | 24" | 12'-0" |
| RPV Head | 81 Ton | 24" | 4'-0" |
| Steam Dryer | 42 Ton | 42" | 12'-0" |
| Steam Separator | 73 Ton | 42" | 9'-0" |
| RPV Strongback | 5 Ton | 24" | 12'-0" |
| RPV Service Platform | 6 Ton | 24" | 12'-0" |
| CRD Transfer Cask | 2 Ton | 30" | 20'-0" |
| Stud Tensioner | 6 Ton | 24" | 12'-0" |
| Fuel Pool Gates | 4.3T&2.5T | 72" | 17'-0" |
| Storage Pool Slot Plugs | 43 T/ea | 24" | 5'-4" |
| Recirculation Pump Hoist (outside primary containment) | 25 Ton | | 1'-0" |

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