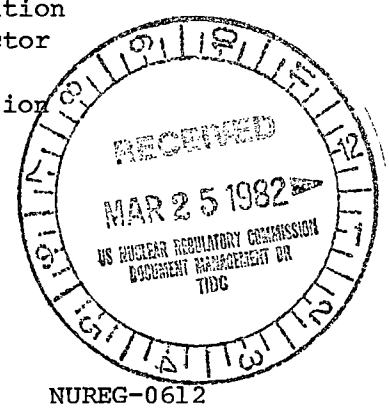
VIRGINIA ELECTRIC AND POWER COMPA
RICHMOND, VIRGINIA 23261

R. H. LEASBURG
VICE PRESIDENT
NUCLEAR OPERATIONS

March 22, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. D. G. Eisenhut, Director
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555



Serial No. 171
PSE&C/WSM: jdm
Docket Nos. 50-280
50-281
50-338
50-339
License Nos. DPR-32
DPR-37
NPF-4
NPF-7

Dear Mr. Eisenhut:

NUREG-0612
CONTROL OF HEAVY LOADS
SURRY POWER STATION UNITS 1 AND 2
NORTH ANNA POWER STATION UNITS 1 AND 2

In accordance with letters 388 and 388A, Vepco to Harold R. Denton, dated July 1, 1981 and September 30, 1981 respectively, Vepco is providing the nine month response to the NRC letter dated December 22, 1980 on NUREG-0612 "Control of Heavy Loads at Nuclear Power Plants" for North Anna Power Station Units 1 and 2 and Surry Power Station Units 1 and 2.

Westinghouse Electric Corporation is in the process of performing a reactor vessel head drop analysis for North Anna Units 1 and 2 and Surry Units 1 and 2. The results of this analysis will be submitted at a later date.

As stated in our six month responses, Vepco has requested a proposal from Westinghouse Electric Corporation to verify conformance of the reactor vessel head lifting rigs, reactor vessel internals lifting rigs, load cells, and reactor coolant pump motor lifting rigs at Surry Units 1 and 2 and North Anna Units 1 and 2 with ANSI N14.6-1978 as supplemented by NUREG-0612, Section 5.1.1.(4). The results of these analyses will be submitted at a later date.

The new fuel container lifting rig at Surry Power Station is currently under review for compliance with NUREG-0612. The results of this analysis will be submitted upon completion.

As stated in our letter 688, dated December 22, 1981, the six month response for Surry Power Station requires final editing. The safe load path sketches are currently being redrafted and will be forwarded to you upon completion.

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Should you have any questions, please advise.

Very truly yours,

R. H. Leasburg

Enclosures

cc: Mr. J. P. O'Reilly - NRC Region II

Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing

Mr. Robert A. Clark, Chief
Operating Reactors Branch No. 3
Division of Licensing

DOCKET NO. 50-280/281...VEPCO..SURRY 1 and 2

NINE MONTH REPORT NUREG-0612
CONTROL OF HEAVY LOADS

Rec'd w/ltr 3/22/82...8203260142

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NINE MONTH REPORT
NUREG - 0612
CONTROL OF HEAVY LOADS
SURRY POWER STATION - UNITS 1 & 2
VIRGINIA ELECTRIC AND POWER COMPANY

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INTRODUCTION

In accordance with letters 388 and 388A, Vepco to Harold R. Denton, dated July 1, 1981 and September 30, 1981 respectively, Vepco is providing the nine month report on NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" for Surry Power Station - Units 1 & 2.

This nine month report is structured in direct response to the information requested in Sections 2.2, 2.3, and 2.4 of Enclosure 3 of the NRC letter, dated December 22, 1980, concerning control of heavy loads. Also included in this report is supplemental information to Section 2.1.3f of Vepco's Six Month Report previously submitted.

The following sections are numbered to correspond to the information as requested in Enclosure 3 of the NRC letter dated December 22, 1980.

2.2 SPECIFIC REQUIREMENTS FOR OVERHEAD HANDLING SYSTEMS OPERATING IN THE VICINITY OF FUEL STORAGE POOLS

2.2.1 Identify by name, type, capacity, and equipment designator, any cranes physically capable (i.e., ignoring interlocks, moveable mechanical stops, or operating procedures) of carrying loads which could, if dropped, land or fall into the spent fuel pool.

RESPONSE

Name: Fuel Building Trolley
Type: Electric Overhead
Top Running Trolley
Capacity: 125 Tons & 10 Tons
Equipment Designation: 1-CR-15

Name: Motor Driven Platform & Hoists
Type: Single Girder Electric Traveling Gantry
Capacity: 2 - 2 Tons (each)
Equipment Designation: 1-FH-13

2.2.2 Justify the exclusion of any cranes in this area from the above category by verifying that they are incapable of carrying heavy loads or are permanently prevented from movement of the hook centerline closer than 15 feet to the pool boundary, or by providing a suitable analysis demonstrating that for any failure mode, no heavy load can fall into the fuel-storage pool.

RESPONSE The new fuel crane (1-CR-20, 1-CR-23, & 1-CR-24) is excluded since this crane is not capable of moving its hook centerline closer than 15 feet to the spent fuel pool boundary. The new fuel crane has three equipment I.D. numbers due to its particular design.

2.2.3 Identify any cranes listed in 2.2-1, above, which you have evaluated as having sufficient design features to make the likelihood of a load drop extremely small for all loads to be carried and the basis for this evaluation (i.e., complete compliance with NUREG 0612, Section 5.1.6 or partial compliance supplemented by suitable alternative or additional design features). For each crane so evaluated, provide the load-handling-system (i.e., crane-load-combination) information specified in Attachment 1.

RESPONSE The fuel building trolley and the motor driven platform and hoists are not single failure proof cranes.

2.2.4 For cranes identified in 2.2-1, above, not categorized according to 2.2-3, demonstrate that the criteria of NUREG 0612, Section 5.1, are satisfied. Compliance with Criterion IV will be demonstrated in response to Section 2.4 of this request. With respect to Criteria I through III, provide a discussion of your evaluation of crane operation in the spent fuel area and your determination of compliance.

RESPONSE Alternative 4 of NUREG 0612, Section 5.1.2 has been selected for discussion of the cranes list in Section 2.2.1 above.

The fuel building trolley (1-CR-15) does not carry any heavy loads, including the spent fuel cask, over any stored spent fuel. The fuel building trolley moves only in a north-south direction over an area at one end of the fuel pit. A built-up pad of energy absorbing material is located over the base of the fuel pit in the area where the spent fuel cask is loaded. This built-up pad was designed to reduce the consequences of a spent fuel cask drop, such that structural damage to the reinforced concrete fuel pit structure, including cracking, will not occur. Therefore, significant leakage of fuel pit water through the concrete structure will not occur. The consequences of a dropped fuel cask into the fuel pool was addressed in the Surry Final Safety Analysis Report as part of the original plant design and licensing. However, Surry Technical Specification 3.10 prohibits movement of a spent fuel cask into the Fuel Building until such time as the NRC has reviewed and approved the spent fuel cask drop evaluation. Upon resolution of this issue, compliance with NUREG 0612 shall be determined.

The motor driven platform and hoists (1-FH-13) does not carry any heavy loads, including the transfer canal door, over any stored spent fuel. The motor driven platform spans the spent fuel pit and may be maneuvered over any part of the fuel building area. However, Surry Technical Specification 3.10 prohibits the movement of heavy loads exceeding 110 percent of the weight of a fuel assembly (not including fuel handling tool) over spent fuel.

2.2.4 RESPONSE-(cont'd.)

The only "heavy load" handled by the motor driven platform and hoists are the transfer canal doors. The movement of the tranfer canal doors are administratively controlled through Surry Technical Specification 3.10 and Surry Operating Procedure 4.18. Through the use of these adminstrative controls, the consequences of a load drop are within the acceptance criteria of NUREG 0612.

2.3 SPECIFIC REQUIREMENTS OF OVERHEAD HANDLING SYSTEMS OPERATING IN THE CONTAINMENT

2.3.1 Identify by name, type, capacity, and equipment designator, any cranes physically capable (i.e., taking no credit for any interlocks or operating procedures) of carrying heavy loads over the reactor vessel.

RESPONSE: Name: Reactor Containment Polar Cranes
Type: Electric Overhead Circular Traveling Top Running Double Girder Crane
Capacity: Trolley No. 1 main hook 125 tons
aux. hook 15 tons
Trolley No. 2 main hook 125 tons

Equipment Designator: 1-CR-1 (Unit 1) & 2-CR-1 (Unit 2)

2.3.2 Justify the exclusion of any cranes in this area from the above category by verifying that they are incapable of carrying heavy loads, or are permanently prevented from the movement of any load either directly over the reactor vessel or to such a location where in the event of any load-handling-system failure, the load may land in or on the reactor vessel.

RESPONSE The reactor cavity manipulator cranes (1-CR-5 and 2-CR-5) are excluded in this area since the maximum loads lifted by these cranes are not classified as "heavy loads".

The neutron detector carriages (1-CR-16 and 2-CR-16) do not have the load handling capability to lift a "heavy load" and therefore excluded.

The reactor containment annulus monorails (1-CR-19 and 2-CR-19) and the reactor containment jib cranes (one per unit) are excluded since they are incapable of carrying heavy loads either directly over the reactor vessel or to a location where in the event of any load-handling-system failure, the load may land in or on the reactor vessel.

2.3.3 Identify any cranes listed in 2.3-1, above, which you have evaluated as having sufficient design features to make the likelihood of a load drop extremely small for all loads to be carried and the basis for this evaluation (i.e., complete compliance with NUREG 0612, Section 5.1.6, or partial compliance supplemented by suitable alternative or additional design features). For each crane so evaluated, provide the load-handling-systems (i.e., crane-load-combination) information specified in Attachment 1.

RESPONSE The reactor containment polar cranes are not single failure proof cranes.

2.3.4 For cranes identified in 2.3-1, above, not categorized according to 2.3-3, demonstrate that the evaluation criteria of NUREG 0612, Section 5.1, are satisfied. Compliance with Criterion IV will be demonstrated in your response to Section 2.4 of this request. With respect to Criteria I through III, provide a discussion of your evaluation of crane operation in the containment and your determination of compliance.

RESPONSE The reactor containment polar cranes are of the polar configuration and are supported on the circular crane walls. The polar cranes main hooks have access to the entire area within the crane walls. The polar cranes auxiliary hooks have access to the area inside and outside the crane walls. The movement of the polar cranes are not restricted by mechanical stops or electrical interlocks. However, the operations of the cranes are adminstratively controlled by Technical Specification 3.10 to prevent handling heavy loads over the reactor vessel when there is fuel in the vessel, unless the load lift is specifically required for refueling operations.

The effects of load drops on the reactor vessel shall be performed by Westinghouse. Results of these analyses shall be submitted at a later date. Load drops which are not on or into the reactor vessel have no radiological consequences as outlined in evaluation criteria I through III. Therefore for load drops which do not impact the reactor vessel, criteria I through III are satisfied.

2.4 SPECIFIC REQUIREMENTS FOR OVERHEAD HANDLING SYSTEMS OPERATING IN PLANT AREAS CONTAINING EQUIPMENT REQUIRED FOR REACTOR SHUTDOWN, CORE DECAY HEAT REMOVAL, OR SPENT FUEL COOLING

2.4.1 Identify any cranes in 2.1-1, above, which you have evaluated as having sufficient design features to make the likelihood of a load drop extremely small for all loads to be carried and the basis for this evaluation (i.e., complete compliance with NUREG 0612, Section 5.1.6, or partial compliance supplemented by suitable alternative or additional design features). For each crane so evaluated, provide the load-handling-system (i.e., crane-load-combination) information specified in Attachment 1.

RESPONSE None of the cranes identified in 2.1-1 are single failure proof cranes.

2.4.2 For any cranes identified in 2.1-1 not designated as single-failure-proof in 2.4-1, a comprehensive hazard evaluation should be provided.

RESPONSE See attached Table I, "Load/Impact Area Data".

All load drops postulated inside the reactor containment buildings are postulated to occur at "hot standby" plant conditions or lower. Cranes within the reactor buildings are not normally used during power generating plant conditions.

Credit for the operability of the Chemical and Volume Control System is taken for any postulated load drops within the reactor containment. Technical Specification 3.2 requires that when fuel is in a reactor, there shall be at least one flow path to the core for boric acid injection. The minimum capability shall be equivalent to that supplied from the refueling water storage tank.

The effects of postulated load drops onto the reactor vessel shall be submitted at a later date. Vepco has contacted Westinghouse to perform a reactor vessel head drop analysis.

2.1.3.f Verification that crane design complies with the guidelines of CMAA Specification 70 and Chapter 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: CMAA Specification 70 and ANSI B30.2-1976 apply to the reactor containment polar cranes (1/2-CR-1), fuel building trolley (1-CR-15) and the new fuel crane (1-CR-20, 1-CR-23, & 1-CR-24). These cranes were designed and fabricated, prior to the issuance of the above referenced standards, in accordance with Electric Overhead Crane Institute, Inc. - Specification #61. The differences between these two specifications are addressed below with respect to these cranes.

1. Impact Allowance
CMAA-70, Article 3.3.2.1.1.3 requires that crane design calculations include an impact allowance of 0.5% of the load per foot per minute of hoisting speed but not less than 15%. EOCI-61 specifies only a minimum allowance of 15%. Therefore, for cranes with hoist speeds in excess of 30 feet per minute, it is possible that the impact allowance applied under EOCI-61 will be less than that required by CMAA-70. All of the above cranes have hoist speeds below 30 fpm with the exception of the auxiliary hoist for the reactor containment polar crane, which has a hoist speed of 42 fpm. However, the impact allowance criteria is only applicable to the design of the girders themselves, for which the main hoist is the governing factor for impact allowance.

2. Torsional Forces

CMAA-70, Article 3.3.2.1.3 requires that twisting moments due to overhanging loads and lateral forces acting eccentric to the horizontal neutral axis of a girder be calculated on the basis of the distance between the center of gravity of the load or force center line, and the girder shear center measured normal to the force vector. EOCI-61 states that such moments are to be calculated with reference to the girder center of gravity. For girder sections symmetrical about each principal central axis, such as box sections or I-beam girders, used in these cranes, the shear center coincides with the centroid of the girder section and there is no difference between the two requirements. These cranes use symmetrical box section girders in their construction, thereby complying with the above article.

3. Bending Stress

CMAA-70, Article 3.3.2.2 requires that bending stress calculations include a wind load of 5 pounds per square foot in design stress calculations based on the sum of dead and live loads. The reactor containment polar crane and the fuel building trolley were both designed to be operated in 35 mph winds and to withstand 90 mph winds when not in use. The new fuel crane has been designed for outdoor duty and storage, in accordance with EOCI-61 requirements for wind loading, which specifies a design wind load force of 10 pounds per square foot of projected crane area. Also, in the area where a load drop could result in damage to any system required for plant shutdown or decay heat removal, the new fuel crane is not subject to wind loading.

4. Longitudinal Stiffeners

CMAA-70, Article 3.3.3.1 specifies (1) the maximum allowable web depth/thickness (h/t) ratio for box girders using longitudinal stiffeners and (2) requirements concerning the location and minimum moment of inertia for such stiffeners. EOCI-61 allows the use of longitudinal stiffeners but provides no similar guidance. Longitudinal stiffeners have been supplied on the only applicable box girder, that for the reactor containment polar crane, as indicated below, complying with all requirements of CMAA-70:

$\frac{h/t}{197}$	$\frac{C(K+1)\sqrt{17.6/f_c}}{324}$	$\frac{M}{376}$	No. of Stf. by CMMA-70	No. Stf. Provided
			1	2

Note that the most conservative approach has been used for a symmetrical girder, which is the case where the maximum stresses are assumed to equal the basic allowable stresses. Using this approach the $C(K+1)\sqrt{17.6/f_c}$ equation governing the longitudinal web plate stiffeners reduces to 2C, which is the smallest possible value for this equation.

5. Allowable Compressive Stress

CMAA-70, Article 3.3.3.1.3 identifies allowable compressive stresses to be approximately 50% of yield strength of the recommended structural material (A-36) for girders, where the ratio of the distance between web plates to the thickness of the top cover plate (b/c ratio) is less than or equal to 38. On the reactor containment polar crane box girder, the b/c ratio equals 17, complying with the CMAA-70 Article.

6. Fatigue Considerations

CMAA-70, Article 3.3.3.1.3 provides substantial guidance with respect to fatigue failure by indicating allowable stress ranges for various structural members in joints under repeated loads. EOCI-61 does not address fatigure failure. However, these cranes will perform only a limited number of lifts (much less than 20,000) throughout the life of the plant; therefore fatigue failure is unlikely.

7. Hoist Rope Requirements

CMAA-70, Article 4.2.1 requires that the capacity load plus the bottom block, divided by the number of parts of rope, not exceed 20% of the published rope breaking strength. EOCI-61 requires that the rated capacity load divided by the number of parts of rope not exceed 20% of the published rope breaking strength. The fuel building trolley and the main hoists of the reactor containment polar crane meet the requirements of this CMAA-70 article. The auxiliary hoist on the polar crane and the new fuel crane hoist were designed in accordance with EOCI-61.

8. Drum Design

CMAA-70, Article 4.4.1 requires that the drum be designed to withstand combined crushing and bending loads. EOCI-61 requires only that the drum be designed to withstand maximum load bending and crushing loads with no stipulation that these loads be combined. The drum designs of the cranes were based upon the combination of crushing and bending loads thereby complying with the requirements of CMAA-70.

9. Drum Groove Design

CMAA-70, Article 4.4.3 provides recommended drum groove depth and pitch. These cranes were designed in accordance with EOCI-61. The CMAA-70 article represents a codification of the same good engineering practice that would have been used in the cranes built to EOCI-61 specifications.

10. Gear Design

CMAA-70, Article 4.5 requires that gearing horsepower ratings be based on certain American Gear Manufacturers Association (AGMA) standards and provides a method for determining allowable horsepower. EOCI-61 provides no similar guidance. However, the gear horsepower ratings of and design allowable horsepower for these cranes were based upon the AGMA standards referenced in the CMAA-70 article.

11. Bridge Brake Design

CMAA-70, Article 4.7.2.2 requires that bridge brakes, for cranes with cab control and the cab on the trolley, be rated at least 75% of bridge motor torque. EOCI-61 requires a brake rating of 50% of bridge motor torque for similar configurations. The control station arrangement with the cab located on the trolley was not provided for the following cranes as indicated below:

	Control Station Locations
Fuel Building Trolley	Cab on trolley - no bridge is provided
Reactor Cont. Polar Cranes	Cab mounted on bridge
New Fuel Crane	Bridge motion controlled from a pendant pushbutton station

12. Hoist Brake Design

CMAA-70, Article 4.7.4.2 requires that hoist holding brakes, when used with a method of control braking other than mechanical, have torque ratings no less than 125% of the hoist motor torque. EOCI-61 requires a hoist holding brake torque rating of no less than 100% of the hoist motor torque without regard to the type of control brake employed. The reactor containment polar crane and the fuel building trolley have three hoist holding brakes, an eddy current brake and 2 double shoe load brakes, with a minimum torque rating of 150% of the hoist motor torque. The new fuel crane was designed in accordance with EOCI-61, and was furnished with mechanical load brakes and electric motor brakes.

13. Bumpers and Stops

CMAA-70, Article 4.12 provides substantial guidance for the design and installation of bridge and trolley bumpers and stops for cranes which operate near the ends of bridge and trolley travel. This guidance is not provided in EOCI-61. However, bumpers are provided for the bridge and trolley of the following cranes as indicated below:

	Bridge Bumpers	Trolley Bumpers
Polar Crane	None provided, crane operates on circular runway	Spring
Fuel Bldg. Trolley	N/A	Spring
New Fuel Crane	Rubber	Polyurethane

14. Static Control Systems
CMAA-70, Article 5.4.6 provides substantial guidance for the use of static control systems. EOCI-61 provides guidance for magnetic control systems only. These cranes are equipped with magnetic type motor controls, so this article is not applicable.

15 Restart Protection
CMAA-70, Article 5.6.2 requires that cranes not equipped with spring-return controllers or momentary contact push buttons be provided with a device that will disconnect all motors upon power failure and will not permit any motor to be restarted until the controller handle is brought to the "OFF" position. Since all these cranes were designed with motor controllers of the "dead-man" type with spring returns to the "OFF" position, this article is not applicable.

16. Material Requirement
CMAA-70, Article 3.1 requires ASTM A36 structural steel. All of these cranes were designed with this material.

The reactor containment annulus monorails (1/2-CR-19), the 6 and 10 ton monorail systems (1-CR-8 & 1-CR-8A), the decontamination building crane (1-CR-25 & 1-CR-22), new fuel crane (1-CR-20, 1-CR-23 & 1-CR-24), and the motor driven platform and hoists (1-FH-13) were designed in accordance with EOCI-61. These cranes and monorials meet the requirements of ANSI B30.11 and ANSI B30.16.

TA[redacted]

LOAD/IMPACT AREA DATA

IDENTIFICATION: Reactor Containment Polar Crane (1-CR-1)
LOCATION: Unit 1 Reactor Containment, El. 103' - 1 1/2" (Top of bridge)

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Reactor Vessel Head with Lifting Rig	122.5	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-5)	Note 6 Note 2 & 7
Reactor Upper Internals with Lifting Rig	52.0	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-5)	Note 6 Note 2 & 7
Reactor Cavity Inner Seal Ring	12.2	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-5)	Note 6 Note 2 & 7
CRDM Missile Shield	36.5	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-5)	Note 6 Note 2 & 7
Stud Carriers (Full)	3.6	Refueling Cavity Structure Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-5)	Note 2 & 7 Note 2 & 7
Reactor Coolant Pump Motor with Sling	41.0	Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-5,6,&7)	Note 2 & 7
Operating Floor Removable Plugs	13.0 (Max)	Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-5)	Note 2 & 7
Octagonal Floor Plug	31.5	No identified safe shutdown or decay heat removal equipment below load path	Containment (See 13930.12-MSK-6)	Note 3

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Reactor Containment Polar Crane (1-CR-1)
LOCATION: Unit 1 Reactor Containment, El. 103' - 1 1/2" (Top of bridge)

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Polar Crane - Bottom Block & Hook	2.4	No safe shutdown or decay heat removal equipment below limit switch testing location	Containment	Note 3 & 8
Containment Recirc. Spray Cooler	23.7	Recirc. Spray & Component cooling piping Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-5 thru 8)	Note 2 Note 2 & 7
Regenerative Heat Exchanger	2.4	Chemical & Volume Control Piping	Containment (See 13930.12-MSK-7)	Note 2 & 7
Residual Heat Removal Exchanger	12.8	RHR and Component Cooling Piping	Containment (See 13930.12-MSK-7)	Note 2
Residual Heat Removal Pump Motor	2.4	RHR and Component Cooling Piping	Containment (See 13930.12-MSK-7)	Note 2

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Reactor Containment Polar Crane (2-CR-1)
LOCATION: Unit 2 Reactor Containment, El. 103' - 1 1/2" (Top of bridge)

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Reactor Vessel Head with Lifting Rig	122.5	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-1)	Note 6 Note 2 & 7
Reactor Upper Internals with Lifting Rig	52.0	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-1)	Note 6 Note 2 & 7
Reactor Cavity Inner Seal Ring	12.2	Reactor Vessel Refueling Cavity Structure RHR Heat Exchanger	Containment (See 13930.12-MSK-1&3)	Note 6 Note 2 & 7 Note 2
CRDM Missile Shield	36.5	Reactor Vessel Refueling Cavity Structure	Containment (See 13930.12-MSK-1)	Note 6 Note 2 & 7
Stud Carriers (Full)	3.6	Refueling Cavity Structure Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-1)	Note 2 & 7 Note 2 & 7
Reactor Coolant Pump Motor with Sling	41.0	Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-1)	Note 2 & 7
Operating Floor Removable Plugs	13.0 (Max)	Reactor Coolant Pressure Boundary RHR System Boundary	Containment (See 13930.12-MSK-1&3)	Note 2 & 7 Note 2
Octagonal Floor Plug	31.5	RHR System Boundary Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-1&3)	Note 2 Note 2 & 7

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Reactor Containment Polar Crane (2-CR-1)
LOCATION: Unit 2 Reactor Containment, El. 103' - 1 1/2" (Top of bridge)

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Polar Crane - Bottom Block & Hook	2.4	No safe shutdown or decay heat removal equipment below limit switch testing location	Containment	Note 8
Containment Recirc. Spray Cooler	23.7	Recirc. Spray & Component Piping Piping Chemical & Volume Control Piping Safety Injection Piping	Containment (See 13930.12-MSK-2 thru 4)	Note 2 Note 2 Note 2
Regenerative Heat Exchanger	2.4	Chemical & Volume Control Piping	Containment (See 13930.12-MSK-3)	Note 2
Residual Heat Removal Exchanger	12.8	RHR Component Cooling Piping	Containment (See 13930.12-MSK-3)	Note 2
Residual Heat Removal Pump Motor	2.4	RHR and Component Cooling Piping	Containment (See 13930.12-MSK-3)	Note 2

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Reactor Containment Annulus Monorail (1-CR-19 & 2-CR-19)
LOCATION: Unit 1 & Unit 2 Reactor Containments, El. 78'-10"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Undefined	5.0 (Max.)	Safe shutdown and decay heat removal equipment in annulus area	Containment (See 13930.12-MSK-1&5)	Note 2

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Reactor Containment Jib Cranes
LOCATION: Unit 1 & Unit 2 Reactor Containments, El. 86'-0"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Undefined	8.0 (Max.)	Reactor Coolant Pressure Boundary	Containment (See 13930.12-MSK-1&5)	Note 2 & 7

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: New Fuel Crane (1-CR-20, 1-CR-23, 1-CR-24)
LOCATION: Fuel Building & Yard, El. 44'-8"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
New Fuel Container (Full)	3.3	Spent Fuel Pit Pumps Motor Control Centers	Fuel Bldg. (See 13930.12-MSK-9&10)	Note 3 & 9
		Spent Fuel Pit Pump		Note 2,3 & 9
		Fuel Pit Cooler		Note 2,3 & 9
Removable Slabs	1.0	Spent Fuel Pit Pumps Motor Control Center	Fuel Bldg (See 13930.12-MSK-9)	Note 3 & 9

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Motor Driven Platform & Hoists (1-FH-13)
LOCATION: Fuel Building & Yard, El. 47'-9 1/2"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Fuel Pool Gate	1.8	Spent Fuel Pool	Fuel Bldg. (See 13930.12-MSK-10)	Note 3 & 10

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Fuel Building Trolley (1-CR-15)
LOCATION: Fuel Building, Decontamination Building, and Yard, El. 81'-4"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Spent Fuel Shipping Cask	125.0 (Max.)	Spent Fuel Pool	Fuel Bldg. (See 13930.12-MSK-10)	Note 11
		Fuel Pit Cooling System Piping		Note 3 & 9
Fuel Building Trolley - Bottom Block & Hook	2.4	No safe shutdown or decay heat removal equipment below limit switch testing location	Fuel Bldg. (See 13930.12-MSK-10)	Note 8
Spent Resin Shipping Container & Cask	3.7	No safe shutdown or decay heat removal equipment under load path	Decon. Bldg. (See 13930.12-MSK-11)	Note 3
Irradiated Specimen Shipping Cask	11.3	Spent Fuel Pool	Fuel Bldg. (See 13930.12-MSK-10)	Note 11

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Decontamination Building Crane, (1-CR-25, 1-CR-22)
LOCATION: Decontamination Building, El. 43'-4"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Undefined	5.0 (Max.)	No safe shutdown or decay heat removal equipment under load path Spent Fuel Shipping Container	Decon. Bldg. (See 13930.12-MSK-11)	Note 3 Note 12

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: 10 Ton Monorail Sytem (1-CR-84)
LOCATION: Auxiliary Building, El. 40'-7 3/4"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Removable Slabs	8.5 (Max.)	Seal Water Heat Exchangers and Non-Regen. Heat Exchangers	Aux. Bldg. (See 13930.12-MSK-12)	Note 3 & 13
		Chemical & Volume Control Piping		Note 2
		Chilled Component Cooling Exchanger & Piping		Note 2
Undefined Loads	8.5 (Max.)	Same as removable slabs above	Aux. Bldg. (See 13930.12-MSK-12)	Note 2, 3, 13, 14

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: 6 Ton Monorail Sytem (1-CR-8)
LOCATION: Auxiliary Building, El. 22'-1"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Component Cooling Water Pump	2.7	Component Cooling Piping	Aux. Bldg. (See 13930.12-MSK-13)	Note 2
Component Cooling Water Pump-Motor	3.2	Component Cooling Piping	Aux. Bldg. (See 13930.12-MSK-13)	Note 2
Charging Pump	1.3	Chemical & Vol. Control Piping & Comp. Cooling Piping	Aux. Bldg. (See 13930.12-MSK-13)	Note 2
Charging Pump-Motor	2.1	Chemical & Vol. Control Piping & Comp. Cooling Piping	Aux. Bldg. (See 13930.12-MSK-13)	Note 2
Removable Slabs	4.5 (Max.)	Unit 1 Charging Pump Discharge Heads Piping - 4"-CH-89-1503 & 4"-CH-80-1503	Aux. Bldg. El. 2'-0"	Note 2
		Unit 1 Safety Injection Piping - 10"-SI-6-153, 8"-SI-14-153, & 8"-SI-92-153	Aux. Bldg. El. 2'-0"	Note 2
		Unit 2 Charging Pump Discharge Headers Piping - 4"-CH-389-1503 4"-CH-380-1503	Aux. Bldg. El. 2'-0"	Note 2
		Unit 2 Safety Injection Piping 10"-SI-206-153, 8"-SI-214-153, & 8"-SI-292-153	Aux. Bldg. El. 2'-0"	Note 2

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: 6 Ton Monorail Sytem (1-CR-8)
LOCATION: Auxiliary Building, El. 22'-1"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Removable Slabs	4.5 (Max.)	Charging Pump Seal Cooler Surge Tank (1-CC-TK-3 or 2-CC-TK-3)	Aux. Bldg. El. 2'-0"	Note 2
		Service water piping to charging pump intermediate seal coolers (2-WS-71-136, 2-WS-73-136, 2-WS-173-136, 2-WS-171-136)	Aux. Bldg. El. 2'-0"	Note 2,5 & 14
		Component Cooling Piping to Fuel Pit Coolers (10"-CC-67-121 & 10"-CC-70-121)	Aux. Bldg. El. 2'-0"	Note 2,5 & 14
Undefined Loads	4.5 (Max.)	Same as removable slabs above	Aux. Bldg. El. 2'-0"	Note 2,5 & 14

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Unit #1 Switchgear Room Monorail
LOCATION: Service Building, El. 53'-6"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Motor-Generator Set-Motor	2.0 (Max.)	Misc. Cables & Conduits	Service Bldg. (See 13930.12-MSK-14)	Note 2
		Control Room Roof		Note 5 & 15

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Filter Cartridge Removal Monorail
LOCATION: Auxiliary Building, El. 23'-0"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Undefined	2.0 (Max.)	Reactor coolant pump seal water injection filter and associated piping	Aux. Bldg. (See 13930.12-MSK-13)	Note 2,3 & 13

TABLE I (cont'd)

LOAD/IMPACT AREA DATA

IDENTIFICATION: Emergency Diesel Generator Room Monorails
LOCATION: Service Building, El. 27'-0"

LOAD	LOAD WEIGHT (TONS)	EQUIPMENT IMPACTED BY A LOAD DROP	LOCATION (SEE NOTE 17)	HAZARD ELIMINATION CATEGORY (SEE NOTES ON PAGE 17)
Diesel-Generator Parts	10 (Max.)	Emergency Diesel Generator	Service. Bldg. El. 27'-0"	Note 2 & 16

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

NOTES: HAZARD ELIMINATION CATEGORIES EXPLANATIONS

1) Crane travel for this area/load combination probibited by electrical interlocks or mechanical stops.

2) System redundancy and separation precludes loss of capability of system to perform its safe shutdown or decay heat removal function following this load drop in this area.

3) Site-specific considerations eliminate the need to consider load/equipment combination.

4) Likelihood of handling system failure for this load is extremely small (i.e. section 5.1.6 NUREG 0612 satisfied).

5) Analysis demonstrates that crane failure and load drop will not damage safe shutdown or decay heat removal. equipment.

6) Results of analysis to be supplied later. Vepco has requested Westinghouse to analyze load drops onto the reactor vessel. Postulated load drops into the reactor vessel shall not be addressed. Westinghouse has never performed any previous analyses of heavy load drops into the reactor vessel.

7) Load drops which damage the refueling cavity structure or reactor coolant pressure boundary do not prevent decay heat removal by alternate systems available for operation if required, i.e. RHR system, Safety Injection System or Chemical & Volume Control System.

8) The crane limit switch testing location shall be administratively controlled.

9) The spent fuel storage rack configuration is designed to remain subcritical under unborated water conditions. Temporary make-up to the spent fuel pool using unborated water, while repairs are made to damaged equipment, will maintain spent fuel cooling and shielding.

10) Surry Technical Specification 3.10 and Surry Operating Procedure 4.18 provide adminstrative controls to ensure safe movement of the spent fuel pool gates.

TABLE I (cont'd.)

LOAD/IMPACT AREA DATA

NOTES: HAZARD ELIMINATION CATEGORIES EXPLANATIONS - (cont'd.)

11) Surry Technical Specification 3.10 prohibits movement of a spent fuel cask into the Fuel Building until such time as the NRC has reviewed and approved the spent fuel cask drop evaluation. Upon resolution of this issue, compliance with NUREG 0612 shall be determined. Resolution of the spent fuel cask drop evaluation shall also be applicable for the irradiated speciment shipping cask.

12) A postulated load drop from the Decon. Bldg. Crane may impact and strike a spent fuel shipping container due to load swing. The spent fuel shipping container is closed prior to its movement into the Decon. Building so that any possible spillage of its contents is a remote possibility.

13) As addressed in FSAR Section 9.1.3.5, a postulated loss of all seal water injection flow does not affect the operability of reactor coolant pumps if component cooling water is available. Since a postulated load drop does not affect the component cooling system, the consequences of a load drop are acceptable per NUREG 0612.

14) Load carrying height restrictions shall be adminstratively controlled. A one foot maximum load carry height restriction shall be imposed on all lifting operations in the Auxiliary Building on elevations 27'-6" and 13'-0".

15) The control room roof is designed to withstand a tornado generated missile. The kinetic energy developed from a postulated load drop is significantly less than the kinetic energy developed by a tornado generated missile. Therefore, the postulated load drop is within the acceptance criteria of NUREG 0612.

16) Two 5 ton capacity monorails are located in each Emergency Diesel Generator Room for maintenance purposes. No permanently attached hoist or trolley is mounted on either monorail under normal conditions. A postulated load drop would impact the diesel generator under repair. Redundant diesel generators, located in separate rooms are available to perform their functions.

17) Sketches referenced were provided in Vepco's Six Month Report concerning "Control of Heavy Loads."