DOCKET NO. 50-460

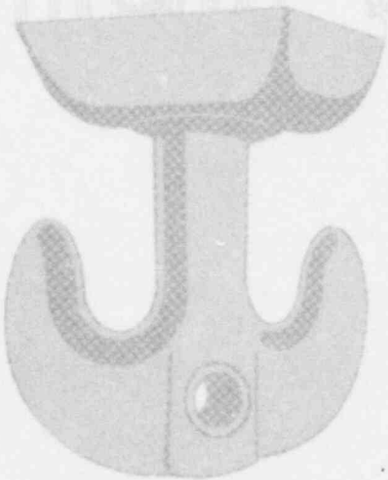
CONTROL OF HEAVY LOADS

NUREG - 0612

Response to NRC Request
for
Additional Information

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

Nuclear Project No. 1



Prepared by

UNITED ENGINEERS & CONSTRUCTORS INC.
30 South 17th Street Philadelphia, Pa 19101

A Raytheon Company

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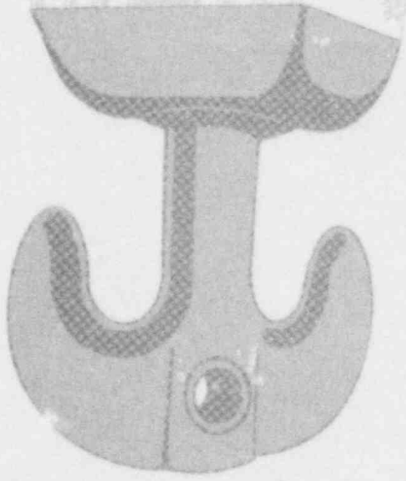

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Washington Public Power Supply System
P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509) 372-5000

Docket No. 50-460

May 6, 1982
GO1-82-0181

Ms. E.G. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

Subject: NUCLEAR PROJECT NO. 1
RESPONSE TO NUREG-0612

Reference: NRC ltr. to All Licensees of Operating Plants & Applicants for Operating Licenses & Holders of Construction Permits, dated 12/22/80, subject, Control of Heavy Loads

In the reference the Staff requested that the WNP-1 Project review the controls for the handling of heavy loads to determine the extent to which the Staff's guidelines, included with the reference, are presently satisfied at WNP-1. The reference also requested that the Project identify the changes and modifications that would be required in order to fully satisfy the guidelines.

The attached report titled, "Control of Heavy Loads NUREG-0612", is our response to these requests.

GD Bouchey

G. D. Bouchey, Deputy Director
Safety and Security (370)

GDB:AGH:pp

attachment

cc: CR Bryant, BPA (399)
RW Hernan, NRC
AD Toth, NRC
FDCC (899)

STATE OF WASHINGTON)
) ss
COUNTY OF BENTON)

Subject: Response to NUREG-0612

I G. D. BOUCHEY, being duly sworn, subscribe to and say that I am the Deputy Director, Safety and Security, for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that I have full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information and belief the statements made in it are true.

DATED May 6, 1982

G. D. BOUCHEY
G. D. BOUCHEY, Deputy Director
Safety & Security

On this day personally appeared before me G. D. BOUCHEY to me known to be the individual who executed the foregoing instrument and acknowledged that he signed the same as his free act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and seal this 6 day of May, 1982.

LS

S. R. Michaels
Notary Public in and for the
State of Washington

Residing at 2551 Saint Ct
Richland, Wa.
Dec. 85

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

December 22, 1980

TO ALL LICENSEES OF OPERATING PLANTS AND
APPLICANTS FOR OPERATING LICENSES AND
HOLDERS OF CONSTRUCTION PERMITS*

Gentlemen:

Subject: Control of Heavy Loads

In January 1978, the NRC published NUREG-0410 entitled, "NRC Program for the Resolution of Generic Issues Related to Nuclear Power Plants - Report to Congress." As part of this program, the Task Action Plan for Unresolved Safety Issue Task No. A-36, "Control of Heavy Loads Near Spent Fuel," was issued.

We have completed our review of load handling operations at nuclear power plants. A report describing the results of this review has been issued as NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants - Resolution of TAP A-36." This report contains several recommendations to be implemented by all licensees and applicants to ensure the safe handling of heavy loads.

The purpose of this letter is to request that you review your controls for the handling of heavy loads to determine the extent to which the guidelines of Enclosure 1 are presently satisfied at your facility, and to identify the changes and modifications that would be required in order to fully satisfy these guidelines.

To expedite your compliance with this request, we have enclosed the following:

NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" (Enclosure 1).

Staff Position - Interim Actions for Control of Heavy Loads (Enclosure 2).

Request for Additional Information on Control of Heavy Loads (Enclosure 3).

*With the exception of licensees for Indian Point 2 and 3, Zion 1 and 2 and Three Mile Island 1 (These were previously sent a letter)

You are requested to implement the interim actions described in Enclosure 2 as soon as possible but no later than 90 days from the date of this letter.

In order to enable the NRC to determine whether operating licenses should be modified (10 CFR 50.54(f)), operating reactor licensees are requested to provide the following:

1. Submit a report documenting the results of your review and the required changes and modifications. This report should include the information identified in Sections 2.1 through 2.4 of Enclosure 3, on how the guidelines of NUREG-0612 will be satisfied. This report should be submitted in two parts according to the following schedule:

   - Submit the Section 2.1 information within six months from the date of this letter.

   - Submit the Sections 2.2, 2.3 and 2.4 information within nine months.

2. Furnish confirmation within six months that implementation of those changes and modifications you find are necessary will commence as soon as possible without waiting on staff review, so that all such changes, beyond the above interim actions, will be completed within two years of submittal of Section 2.4 for the above report.

3. Furnish justification within six months for any changes or modifications that would be required to fully satisfy the guidelines of Enclosure 1 which you believe are not necessary.

The criteria in NUREG-0612 are also applicable to applicants for operating licenses. Such applicants are expected to provide the information requested by item 1 above and to meet the same schedule of implementation as indicated in 2 above. Any item for which the implementation date is prior to the expected date of issuance of an operating license will be considered to be a prerequisite to obtaining that license.

For any date that cannot be met, furnish a proposed revised date, justification for the delay, and any planned compensating safety actions during the interim.

This request for information was approved by GAO under a blanket clearance number R0072 which expires November 30, 1983. Comments on burden and duplication may be directed to the U.S. General Accounting Office, Regulatory Reports Review, Room 5106, 441 G Street, N.W., Washington, D.C. 20548.

Sincerely,

Darrell G. Eisenhut, Director
Division of Licensing

Enclosures:
1. NUREG-0612
2. Staff Position
3. Request for Additional Information

cc: w/o Enclosure (1)
Service List

SUMMARY

The following report is in response to an NRC request dated December 22, 1980 concerning the "Control of Heavy Load" at Nuclear Power Plants. The report provides the Supply Systems review of controls for the handling of heavy loads to determine the extent to which the guidelines of NUREG 0612 are satisfied for WNP-1. The report also identifies changes and modifications that are being implemented to satisfy the NUREG 0612 guidelines.

The 12/22/80 letter requested submittal of a report documenting the results of the review and required changes. This requested information was to be submitted in two (2) parts; Section 2.1 first, and Sections 2.2 through 2.4 three months later. Since WNP-1 is currently under construction, the requested information has been consolidated into this one report.

The report is structured such that each question is stated in quotations and followed by a response to the question. Tables drawings and attachments referenced in the responses are included, to assist in substantiating the results of the review.

The Supply System considers the load handling systems and lifting apparatus, discussed herein, to be in compliance with the intent of NUREG 0612. The report reflects the results of a comprehensive review of the items summarized below.

1. Evaluation of Cranes - The Cask Handling crane is in the process of being upgraded to single failure proof. The remainder of the load handling systems identified in Table 3-1 emphasize utilization of increased safety factors and the ability of the floor slabs under the load handling system to sustain a load drop.

2. Load Paths - Load paths have been developed for the crane load combinations identified in Table 3-1 and are identified on the load path drawings attached to this report.

3. Procedures - Plant operating and maintenance procedures are currently in the process of being written. These procedures will reflect the requirements of NUREG 0612 as discussed herein. All procedures required for handling heavy loads will be placed into effect upon completion and are scheduled to be implemented at least three (3) months prior to fuel load.

4. Training - The Supply System concurs with the training requirements identified in NUREG 0612 and is in the process of developing a comprehensive training program as discussed herein.

5. Modifications - The Control of Heavy Loads Analysis as well as other separate analyses have resulted in several changes/modifications which improve load handling system reliability. The following changes/modifications are currently in the process of being implemented.

   a) Upgrade Cask Handling Crane MHS-CRN-2 to single failure proof.

   b) Reinforce floor slabs in two (2) areas under Filter Maintenance Monorail RSW-MRH-1 to sustain load drop.

   c) "DELETED"

   d) Reinforce floor slabs in solid waste handling areas. Floor slabs to be capable of sustaining a fully loaded waste container or waste cask load drop as required.

   e) Modify lifting lugs on control rod drive service structure to provide capability of retaining the reactor vessel head load during an SSE.

   f) Relocate GSB equipment hatch monorail MHS-MRH-5 to reduce height above floor slab. Floor slab will then be able to sustain a load drop of heaviest anticipated load.

6. Exceptions - The Supply System has taken exception to several requirements contained in NUREG 0612. These exceptions and alternate requirements are discussed in this report. The exceptions taken do not reduce the reliability of load handling operations identified herein.

1226R
ds

2.1 GENERAL REQUIREMENTS FOR OVERHEAD HANDLING SYSTEMS

"NUREG 0612, Section 5.1.1 identifies several general guidelines related to the design and operation of overhead load-handling systems in the areas where spent fuel is stored, in the vicinity of the reactor core, and in other areas of the plant where a load drop could result in damage to equipment required for safe shutdown or decay heat removal. Information provided in response to this section should identify the extent of potentially hazardous load handling operations at a site and the extent of conformance to appropriate load-handling guidance."

Request 2.1-1

"Report the results of your review of plant arrangements to identify all overhead handling systems from which a load drop may result in damage to any system required for plant shutdown or decay heat removal (taking no credit for any interlocks, technical specifications, operating procedures, or detailed structural analysis.)"

Response to 2.1-1

The overhead handling systems identified during the plant review, from which a load drop could result in damage to spent fuel, plant shutdown systems, or decay heat removal systems are listed below, by structure.

Containment:

Tag No.	Equipment Name	Capacity
MHS CRN-4	Polar Crane	530 Ton Main 25 Ton Auxil. 10 Ton Annul.
MHS CRN-6	Reactor Bldg. Jib Crane	1 Ton
MHS CRN-14	Reactor Bldg. Jib Crane	1 Ton
	CRD Serv. Structure Monorail Hoists (4)	2 Tons Each

General Services Building:

Tag No.	Equipment Name	Capacity
MHS CRN-1	New Fuel Unpacking & Inspection Crane	10 Tons
MHS CRN-2	Cask Handling Crane	105 Tons Main Auxil. 10 Tons (2)
MHS CRN-3	Radioactive Mainten. & Test Facil. Crane	25 Tons
MHS CRN-10	Gamma Scan Facility Jib Crane	2 Tons
MHS CRN-16	Machine Shop Bridge Crane	5 Tons
MHS MRH-2	Decontamination Rm. Monorail Hoist	3 Tons
MHS MRH-5	GSB Equipment Hatch Monorail Hoist	5 Tons
MHS MRH-9	Tank Rm. Monorail Hoist	2 Tons
MHS MRH-10	Diesel Service Hoist (Portable)	5 Tons
MHS MRH-15	Safeguards Area Monorail Hoist	2 Tons
MHS MRH-18	Machine Shop Monorail Hoist	5 Tons
MHS MRH-19	Equipment Mainten.	5 Tons
MHS MRH-20	Equipment Mainten.	5 Tons
RSW CRN-1	Solid Waste Handling Crane	6 Tons
RSW MRH-1	Filter Mainten. Monorail	7.5 Tons

Request 2.1-2

"Justify the exclusion of any overhead handling system from the above category by verifying that there is sufficient physical separation from any load impact point and any safety-related component to permit a determination, by inspection, that no heavy load drop can result in damage to any system or component required for plant shutdown or decay heat removal."

Response to 2.1-2

The following overhead handling systems have been excluded from 2.1-1 above, since they will not carry heavy loads over equipment required for plant shutdown, decay heat removal, or spent fuel.

Containment:

Tag No.	Equipment Name	Capacity
MHS CRN-5	Fuel Transfer Tube Crane	5 Tons
MHS CRN-15	Equipment Hatch Service Jib	5 Tons
FHS BRG-1	Main Fuel Handling Bridge	3 Tons 2 Tons Auxil.

General Services Building:

Tag No.	Equipment Name	Capacity
FHS BRG-2	Fuel Storage Handling Bridge	3 Tons 2 Tons Auxil.
MHS CRN-7	Diesel Generator Jib Crane	3 Tons
MHS MRH-4	GSB Equipment Hatch Monorail Hoist	5 Tons
MHS MRH-6	GSB Equipment Hatch Monorail Hoist	5 Tons
MHS MRH-7	GSB Equipment Hatch Monorail Hoist	5 Tons
MHS MRH-17	Incore Monitoring System Monorail	6 Tons
MHS MRH-23	Radwaste Compressor Serv. Monorail Hoist	3 Tons
MHS MRH-24	FWA Pump Monorail Hoist	3 Metric Tons

Turbine Building:

Tag No.	Equipment Name	Capacity
MHS CRN-11	Heater Bay Crane	25 Tons
MHS CRN-12	Heater Bay Crane	125 Tons Main 15 Tons Auxil.
MHS CRN-13	Turbine Bldg. Crane	250 Tons Main 45 Tons Auxil.
MHS MRH-3	Load Break Switch Monorail Hoist	5 Tons
MHS MRH-12	Condenser Vacuum Pump Gantry Hoist	5 Tons
MHS MRH 21	Condensate Polishing Monorail Hoist	5 Tons

Spray Pond:

Tag No.	Equipment Name	Capacity
MHS MRH-16	Stop Log Monorail Hoist	3 Tons
MHS MRH-22	Screen Removal Monorail Hoist	2 Tons

Circulating Water Pump House:

Tag No.	Equipment Name	Capacity
MHS CRN-8	Circ. Water & Fire Pump Crane	20 Tons Main 5 Tons Auxil.

Others:

Tag No.	Equipment Name	Capacity
MHS MRH-13	Portable Gantry Hoist	5 Tons
MHS MRH-14	Portable Gantry Hoist	5 Tons
	Bulk Chlorine Monorail Hoist	2 Tons
	Cooling Tower Gantries (3)	2,500 lbs.
	Cooling Tower Davits (3)	2,500 lbs.

Request 2.1-3

"With respect to the design and operation of heavy-load-handling systems in the containment and the spent-fuel-pool area, and those load-handling systems identified in 2.1-1 above, provide your evaluation concerning compliance with the guidelines of NUREG 0612, Section 5.1.1. The following specific information should be included in your reply:"

Response to 2.1-3 Summary

The Supply System's Nuclear Unit WNP-1 will be in full compliance with, NUREG-0612, Section 5.1.1 prior to fuel loading with two exceptions. They are:

1. Section 5.1.1(1) of NUREG-0612, "Safe Load Paths" - requires that load paths should be "clearly marked on the floor in the area where the load is to be handled."

   Comment: Safe load paths have been defined on the drawings referenced in Response 2.1-3a. Loads will be moved by the safest and shortest paths, in accordance with the load path drawings and written procedures. Due to the number of paths and their configurations (particularly in the Containment), it is felt that marked load paths generally will not contribute to ensuring the safe handling of loads and infact may detract from safety through potential confusion of operation personnel. Therefore, with the exception of the Radioactive Maintenance and Test Facility Crane (MHS-CRN-3), load paths will not be marked.

2. Section 5.1.1(4) requires that "Special lifting devices should satisfy the guidelines of ANSI N14.6 1978 'Standard for Special Devices for Shipping Containers Weighing 10,000 pounds (4,500Kg) or more for Nuclear Materials'. This standard should apply to all special lifting devices which carry heavy loads in areas as defined above."

   Comment: The lifting devices identified in Table 3-1, although not specifically designed to ANSI N14.6 1978, generally satisfies the requirements of this standard. The Supply System takes exception to the testing and inspection requirements of ANSI N14.6 1978. Further discussion regarding our exception and alternate methods is located in Response 2.1-3d.

Request 2.1-3a

"Drawings or sketches sufficient to clearly identify the location of safe load paths, spent fuel, and safety-related equipment".

Response to 2.1-3a

The drawings listed below identify safe load paths for loads identified in Response 2.1-3a, above. Specific load paths have been developed for those loads that, if dropped, could cause damage to spent fuel and/or safe shutdown equipment. Where floor slabs, determined through analysis to be capable of sustaining a load drop, separate the load from equipment required for safe shutdown, decay heat removal, or spent fuel cooling, the load handling systems are not restricted to specific load paths and are permitted to operate within their full travel parameters if there are no other restricting conditions. One floor slab has been identified which will not sustain a load drop from an elevation of 1 foot above the floor, for the maximum anticipated load (MHS-CRN-3 Radioactive Equipment Maintenance and Test Facility Crane). This problem has been eliminated through administrative controls by marking specific load paths on the floor over structural floor members that will sustain a load drop. A more detailed discussion will be provided in Section 2.4.

Drawing No.	Title
805704 -	Containment Building Control of Heavy Loads - Elev. 479'-0" Safe Load Paths for MHS-CRN-4
805705	Containment Building Control of Heavy Loads - Elev. 479'-0" Safe Load Paths for MHS-CRN-4 Sheet 2 of 3
805706	Containment Building Control of Heavy Loads - Elev. 479'-0" Safe Load Paths for MHS-CRN-4 Sheet 3 of 3
805707	GSB Fuel Storage Area Control of Heavy Loads - Elev. 479'-0" Safe Load Paths for MHS-MRH-9 & MHS-CRN-1, -2, & -3
805708	GSB Safeguards Area Control of Heavy Loads - Elev. 495'-0" Safe Load Paths for MHS-MRH-15, -19, & -20

Drawing No.	Title
805709	GSB Diesel Generator Area Control of Heavy Loads - Elev. 395'-0" Safe Load Paths for MHS-MRH-10
805710	GSB Filter Area Control of Heavy Loads - Elev. 455'-0" Safe Load Paths for RSW-MRH-1
805711	GSB Safeguards Area Control of Heavy Loads - Elev. 433'-0" Safe Load Paths for MHS-MRH-5 & MHS-CRN-10
805712	GSB Mechanical Machine Shop Control of Heavy Loads - Elev. 455'-0" Safe Load Paths for MHS-CRN-16 & MHS-MRH-18
805713	GSB Solid Waste Handling Area Control of Heavy Loads - Elev. 455'-0" Safe Load Paths for RSW-CRN-1
805714	GSB Decontamination Room Control of Heavy Loads - Elev. 479'-0" Safe Load Paths for MHS-MRH-2

Request 2.1-3b

"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 2.1-3b

The safe load paths identified on the drawings listed in our response to 2.1-3a, above, will be referenced in plant operating and maintenance procedures. These procedures will be available three (3) months prior to fuel load. The load path drawings that are to be attached to the procedures will be manageable in size (approximately 11" x 17"). It is premature to identify procedures by specific number; however, Table 3-1 "Tabulation of Heavy Loads", identifies whether a specific procedure or general handling procedure will be provided. The procedures will refer maintenance and operations personnel to applicable load path drawings. The load paths follow the safest and shortest routes with consideration given to maintaining safe distances from spent fuel and safe shutdown equipment. The "general" handling procedure will be utilized during maintenance periods for handling heavy loads that do not normally have specific procedures for movement of a load with a load handling system.

During crane operator training and requalification, crane operators will be instructed regarding safe load paths, load heights, and as discussed in 2.1-3g.

Work efforts and load handling operations will be performed in accordance with written approved procedures by trained and experienced personnel under the supervision of competent foremen. Prior to initiating the work activities in the procedure, foremen will critique the procedure with the work crew, to ensure each one knows the correct methods to be followed. To summarize, loads will be handled along established safe load paths under the control of qualified and experienced personnel in accordance with written and approved procedures. Deviation from the safe load paths will require approval of the Plant Safety Review Committee.

Request 2.1-3c

"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 the handling of such a load is governed by a written procedure containing, as a minimum, the information identified in NUREG-0612, Section 5.1.1(2)".

Response to 2.1-3c

Table 3-1, "Tabulation of Heavy Loads", lists by crane the loads normally handled by the load handling devices identified in Response to 2.1-1, above. Included in the table are load weights, designated lifting devices, applicable load path drawings, and reference drawings. As discussed in response to 2.1-3b, above, specific procedures will be available three (3) months prior to fuel load. Table 3-1 identifies whether a special procedure or general handling procedure will be provided. Specific procedures provide detailed step by step instruction, including identification of required equipment, inspections, responsibility precautions, and referenced load paths. The general procedure will govern movement and handling of heavy loads where no specific procedure is required. The general procedure will address responsibility, precautions, inspection requirements, references, safe rigging practices, and identify safe load paths for all heavy loads listed in Table 3-1. The procedures will meet the requirements of NUREG-0612, Section 5.1.1(2).

Request 2.1-3d

"Verification that lifting devices identified in 2.1.3c, 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 2.1-3d

Special Lifting Devices

a. Polar Crane Lifting Beam and Tongue
b. Polar Crane Lifting Extension
c. Tripod Handling Fixture
d. Head and Internal Handling Extension Assembly
e. Internal Handling Adapter Assembly
f. Solid Waste Container Lift Rig
g. Spent Fuel Shipping Cask Yoke

The "special lifting devices" identified in Table 3-1 and above, with the exception of Item "g" (Spent Fuel Shipping Cask Yoke), have not been specifically designed to ANSI N14.6 1978. However, with the exception of the Solid Waste Container lifting rig, the "special lifting devices" meet the intent of ANSI N14.6 1978, including the supplemental requirements identified in NUREG-0612, Section 5.1.1(4), Each of the Special Lifting devices are discussed below.

a. Polar Crane Lifting Beam and Tongue - has a design rated load (DRL) of 520 tons. The safety factor of 5 for normal operating conditions is based on ultimate strength. The Polar Crane and Lifting Beam Assembly have been designed to retain the Reactor Vessel Head Load of 220 tons during an SSE. Since the heaviest load to be handled is 220 tons, the safety factor for the crane and lifting beam assembly increases to 10.2 when considering a static load of 220 tons and 15% for impact loading. Therefore, this segment of the load handling equipment meets the requirements of ANSI N14.6 1978.

b. Polar Crane Lifting Extension

c. Tripod

d. Head and Internal Handling Extension Assembly

e. Internal Handling Adapter Assembly

The rigging arrangement for handling the Reactor Vessel Head Assembly has been designed to retain the load during an SSE. The allowable stress criteria for an SSE condition is 90% of yield.

Each lifting device (a-e) has been designed with a minimum safety factor of 5, based on ultimate strength. The DRL includes the static load plus 15% for dynamic loading.

The various loads handled by b, c, d, & e above, are discussed below:

(1) Plenum Assembly - The rigging configuration used to handle the Plenum Assembly (see Table 3-1) provides a safety factor of 13.5 which meets the requirements of ANSI N14.6, Section 6.2.1 design criteria.

(2) Core Support - Since the fuel is removed from the core support to the spent fuel storage pool, prior to handling the core support, the possibility of damage to the fuel is eliminated. The safety factor during this operation is 6.0 based on ultimate strength when considering the static load of 180 tons and 15% for impact loads.

(3) Reactor Vessel Head Assembly - As previously stated the crane and rigging apparatus have been designed to retain the head load during an SSE event. In addition a head load drop analysis without a concurrent SSE has been performed. The results indicate that a head load drop of 5' over the Reactor Vessel and the load at maximum height along the remainder of the load path would be acceptable in terms of core cooling and would not result in damage to fuel. However due to the severe structural damage that would result from a load drop over the internal storage area & head laydown area it was advisable to design the crane & rigging apparatus with increased safety factors to retain the head load during an SSE. The head drop analysis is provided in Section 9.1 subsection 9.1.4.3.9, "Containment Polar Crane" of the FSAR.

f. Solid Waste Container Lift Rig - has been designed with a safety factor of 5, based on ultimate strength. The DRL considers static load plus 15% for impact loading. In the unlikely event of a load drop, the floor slabs in the areas where the solid waste container is handled, will sustain the load drop without damage to any safe-shutdown decay heat removal or spent fuel pool cooling equipment.

g. Spent Fuel Shipping Cask Yoke - will be of redundant design and conforms to ANSI N14.6 1978. Inspection will be in accordance with ANSI N14.65 1978, Section 5.3. Since the Cask Handling Crane is single failure-proof and the lifting device is redundant, a load drop is not considered credible.

Special Lifting Tools

a. Stud Handling Tool
b. New Fuel Handling Tool
c. CRDM and Lead Screw Lifting Tools

The special lifting tools listed above do not handle heavy loads and are, therefore, excluded from this analysis for handling of heavy loads.

Special Lifting Slings

a. Stud Tensioner Sling
b. Irradiated Incore Instrument Transfer Cask Sling

The special lifting slings listed above, and all other slings used to handle heavy loads, will meet or exceed the requirements of ANSI B30.9 1971. All slings will maintain a minimum safety factor of 5. The rated load when selecting sling size will be the sum of the static load and dynamic load or greater. The dynamic load being the greater of 15% of the static load or 5% for every foot/minute of hook speed. The Supply System takes no exception to the requirements of ANSI B30.9 or Section 5.1.1(5) of NUREG-0612.

Summary:

The above described "Special Lifting Devices" have been designed in accordance with accepted industry standards and good engineering practices. Most of the lifting devices, as discussed above, meet the intent of ANSI N14.6 1978. However, the Supply System takes exception to imposing ANSI N14.6 1978 requirements on all special lifting devices for the following reasons, and provides the equivalent alternative, described herein, which will be placed into effect prior to fuel loading.

(1) Test/Inspection requirements contained in ANSI N14.6 1978 are not practical, since the special lifting devices are generally used only once per year during refueling operations.

(2) Removal of protective coatings, on an annual basis, for NDE examination of infrequently used lifting devices presents unnecessary personnel exposure to airborne contamination and radiation. Yearly NDE of infrequently used special lifting devices will not significantly increase load handling reliability.

(3) Special lifting devices are stored and used indoors, in protected areas, away from adverse environmental conditions and physical abuse that could have detrimental effects on the integrity and reliability of the special lifting devices.

Equivalent Alternative

Inspection/Test - The Supply System is cognizant of its responsibility to ensure that load handling operations do not jeopardize the integrity of the plant or affect ability to maintain safe shutdown. The inspection program, discussed herein, provides an important segment of an overall plan for ensuring safe and reliable load handling operations.

Special lifting devices will receive a thorough visual examination prior to each use and an annual documented 5X magnification visual examination. A non-destruction examination (NDE) will be performed once every five (5) years, or upon determination of deficiencies from the 5X magnification inspection.

Safety Factor - The special lifting devices required for handling the Reactor Vessel Head and Reactor Internals, as discussed previously, have increased safety factors in excess of 10, or have been designed to retain the load during an SSE. The use frequency, environmental conditions, inspection requirements, and other segments of the program for safe handling of heavy loads such as operator training, equipment maintenance, and use of safe load paths provide reasonable and acceptable assurance that failure of special lifting devices will not occur.

Request 2.1-3e

"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 to 2.1-3e

The crane inspection testing and maintenance program to be implemented on WNP-1 will be in accordance with ANSI B30.2, Chapter 2-2, as well as other standards such as the Occupational Safety and Health Standards, Section 179 29 CFR, Part 1910 and ANSI B30.10 Hooks. The various written procedures which will implement the requirements of the above referenced standards and regulation will be placed into effect at least three (3) months prior to receipt of fuel. The Supply System takes no exception to the requirements of ANSI B30.2, Chapter 2-2.

The procedures for implementing the above requirements will be reviewed during crane operator training, to familiarize the operators with the requirements contained therein. Maintenance personnel responsible for performing inspection testing and maintenance will also be instructed regarding the requirements of the procedures.

Requst 2.1-3f

"Verify that crane design complies with the guidelines of CMMA Specification 74 and Chapter 2-1 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 to 2.1-3f

Cranes - All cranes identified in Table 3-1, except the Solid Waste Handling Crane (RSW-CRN-1) have been designed in accordance to the guidelines of CMAA Spec 70 and ANSI B30.2 1967. A comparison of design standard revisions from B30.2 1967 and B30.2 1976, and United Engineers & Constructors Inc. Crane Specifications #9779-031 & -032, indicates the cranes and hoists identified in Table 3-1 comply with the requirements of ANSI B30.2 1976. The solid waste handling crane (RSW-CRN-1) was designed in accordance with CMAA Specification 70; however, no specific requirements were referenced in the United Engineers & Constructors Inc. Specification 9779-019 to ANSI B30.2. A review of the specification and crane design features, however, verifies that the crane meets the requirements of ANSI B30.2 1976.

Monorail/Hoists - The miscellaneous hoists and monorails identified in Table 3-1 have been designed to the requirements of ANSI B30.2 1967 and CMAA Specification 70, except the Filter Maintenance Monorail Hoist, which was designed to ANSI B30.16 Overhead Hoists (underlying) and CMAA Specification 70.

Request 2.1-3g

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

Response to 2.1-3g

No exception is taken to implementing the requirements for crane operator training, qualification, and conduct as contained in ANSI B30.2 1976. Operator training and qualification is considered to be one of the most important segments in our overall program for ensuring the safe handling of loads at WNP-1.

Crane operators will be required to receive classroom instruction and gain practical operating experience, under the direction of other qualified operators, for each crane on which they are to be come qualified. In addition to a physical examination by a medical doctor, each crane operator trainee will be required to pass a written examination. Crane operators will be required to requalify every three years except that if an operator does not operate a specific crane during any one year period, requalification is required. All crane operators will be signalmen and all signalmen will be crane operators, except under conditions where the foreman (or higher authority) authorizes the use of a knowledgeable non-operator as a signalman.

The crane operator training program currently under development will consist of:

Classroom Instructions

a. Crane theory

b. Crane safety

c. Rigging theory and techniques

d. Familiarization of design features and operating characteristics for the specific crane on which the trainee is to be certified

e. Review of general procedure for operation, testing and inspection of cranes

f. Review of other procedures pertaining to cranes

g. Review and discussion of safe load path drawings

Practical Instruction - Operator trainees will receive practical "hands on" training, including actual (but non-critical) material handling. Practical training will continue until the trainee can demonstrate competent operation of the crane.

Testing - In addition to the practical test, the crane operator trainee will be required to obtain a grade of 70%, or higher, on a written examination of classroom instruction subjects.

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

"NUREG 0612, Section 5.1.2, provides guidelines concerning the design and operation of load-handling systems in the vicinity of stored, spent fuel. Information provided in response to this section should demonstrate that adequate measures have been taken to insure that in this area, either the likelihood of a load drop which might damage spent fuel is extremely small, or that the estimated consequences of such a drop will not exceed the limits set by the evaluation criteria of NUREG 0612, Section 5.1, criteria I thru III."

Request 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 to 2.2.1:

CRANE	NUMBER	MANUFACTURER:	TYPE	CAPACITY
Fuel Storage Fuel Handling Bridge	FHS-BRG-2	Stearns Rogers	Bridge (and hoist)	3 Tons 2 Tons

Request 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 made, no heavy load can fall into the fuel storage pool."

Response to 2.2.2:

CRANE	NUMBER	MANUFACTURER:	TYPE	CAPACITY
Fuel Storage Fuel Handling Bridge	FHS-BRG-2	Stearns Rogers	Bridge (and hoist)	3 Tons 2 Tons

The fuel handling bridge (FHS-BRG-2) does not handle heavy loads and therefore can be excluded from the cranes identified in our response to 2.2.1 above.

Comment & Discussion:

The New Fuel Unpacking and Inspection Crane and the Cask Handling Crane operate adjacent to the Spent Fuel storage pool, but are not physically capable of handling loads over the spent fuel. The following discussion is provided to help eliminate any questions that may develop during the review process regarding the interrelationship of these load handling systems and the spent fuel storage pool. WNP1 has been designed to eliminate the handling of heavy loads over the spent fuel pool to reduce the potential for damage to spent fuel.

a. The New Fuel Unpacking and Inspection Crane is designed to provide safe, efficient handling of new fuel shipping containers and new fuel assemblies. It is a traveling overhead crane with a main hoist, rated capacity of 10 tons designed for CMAA (Crane Manufacturers Association of America), Class A-1 service, is not equipped with an auxiliary hoist, and is limited by the design of the facility to operation over the new fuel transfer canal. The crane is designed to resist all vertical, lateral and torsional forces combined as specified in CMAA Spec 70. Although the crane is not classified Seismic Category I, it is designed to resist SSE seismic forces to the extent that when unloaded, there will be no structural failure that could result in missile generation in the event of an SSE. Restraints are provided on the bridge trucks and trolley to prevent displacement in the event of an earthquake. The new fuel unpacking and inspection crane design utilized a dynamic model analysis with linear elastic lumped mass models and the MRI/Stardyne Computor program to determine internal stresses and wheel loads during the OBE & SSE. The new fuel receiving and storage area has been analyzed for the drop of a new fuel shipping container. The rail car area slab can withstand a thirty (30) foot drop, and the inspection and storage area can withstand a two foot (2') drop. Additional protection from a load drop is provided by the conservative design of the crane. Safety factors are in accordance with the requirements of CMAA Spec. 70 and based on a 20,000 lb design rated load. The magnitude of the new fuel shipping container and new fuel assembly loads increase these safety factors considerably.

The controls for the new fuel unpacking and inspection area crane are AC static stepless used with AC-wound rotor motors. These controls provide precise control of bridge and trolley motion to within 1/2 inch, and hoist motions to within 1/8 inch under all load conditions. These controls are designed for full load operation at the following speeds:

Hoist	FPM (fast/slow)	15/2
Trolley	FPM (fast/slow)	20/2
Bridge	FPM (fast/slow)	50/2

The new fuel unpacking and inspection area crane is capable of sustaining these slow speeds for extended periods of operation. This is accomplished by the controls for the trolley and hoist and by a microdrive on the bridge. All motions are controlled by spring loaded, return-to-off switches such that positive operator action is required to initiate and sustain crane motion.

The new fuel unpacking and inspection area crane hoist is equipped with eddy current load braking and two DC magnetic holding brakes, each rated at 150% of full load requirements. All brakes set on loss of power. The hoist drum is fabricated of centrifugal cast steel and designed to withstand the maximum combination of bending and crushing stress. The pitch diameter of the drum is 24 times the diameter of the rope.

Limit switches are provided to perform the functions listed below and are wired such that they will stop the drive but then allow operation in the opposite direction to back out of the limit switch

(1) The hoist drum contains a geared limit switch for upper and lower hoist limits. A separate set of contacts are provided for each function.

(2) The hoist cable is equipped with a weighted block type limit switch for upper hoist limit.

(3) The bridge rails are equipped with paddle limit switches for over-travel in both directions.

(4) The trolley rails are equipped with paddle limit switches for over-travel in both directions. These may be overriden or used as described in (5) below.

(5) The trolley rails are also equipped with paddle limit switches for rail stop approach. They are located 9" from each rail stop and actuate a warning light on the pendant. This is to allow the trolley to be brought to the rail stop.

The crane is also equipped with a remote reading load cell which provides the operator with continuous load indication from 0 to 100% of design rated capacity. The load cell is provided with an adjustable alarm and motor stop feature to stop upward motion at a set load.

The use of the new fuel unpacking and inspection area crane is controlled administratively to limit its use to new fuel handling and occasional periodic maintenance as required. During maintenance operations no heavy loads will be carried over the new fuel storage vault. Except for emergency maintenance, the cranes use during refueling is limited to loading new fuel assemblies into the new fuel elevator.

b. The Spent Fuel Cask Handling Crane is designed to provide a safe reliable means of transporting the spent fuel cask in the GSB. The crane is classified as non-seismic category I, to the extent that it may not remain functional during and after an earthquake. It is, however, designed, whether loaded (with 105 ton spent fuel cask) or unloaded to remain structurally intact and not generate any missiles or damage any safety-related structure or component during an OBE or an SSE. The cask handling crane is designed to be single failure proof. The hook is single failure proof by utilizing an outer hollow sister hook and an inner sister hook, each separately attached to the load block. If one hook fails, the other hook is capable of handling the full load.

The single failure proof wire rope system consists of two balanced reeving systems using two individual wire ropes. Each system is reeved to both sides of the load block and the upper block, thereby ensuring no swinging or rotation of the load block if one rope fails. With both reeving systems intact, the rope safety factor is 10.

The hoisting machinery is also single failure proof. There are two gear trains on the drum, a driving gear mounted on one end and an idler gear mounted on the other end. The driving gear has two brakes and the idler has one brake and provisions to apply an additional backup brake. The idler brake will be applied and hold the load if a failure occurs in the driving gear train. Then one brake would be removed from the driving gear and applied as a backup brake for the idler gear train.

Sudden load drop due to drum bearing, drum shift or bearing support failure will be prevented by enveloping the hub at each end of the drum by a structural support upon which the hub will rest if any of the failures mentioned above would occur. This structural support will also ensure that the drum gear will not disengage from the drum pinion.

Two-blocking will be prevented by dual limit switches.

The cask handling crane is equipped with interlocks as described in items (1); (2); (4); and (5) above, for the new fuel unpacking and inspection crane. In addition, the trolley rails will be equipped with interlocks as follows:

(1) Electrical interlocks will be provided to prevent the inadvertent movement of the crane over the deep portion of the pit while a load is on the main hook. Actions from two operators will be required in order to allow bridge motion in this eastern end of the crane runway, and to keep height of the cask no more than 30' above bottom of pit.

(2) The trolley rails in both directions are equipped with redundant cam switches to allow crane operation only in the slow speed mode. These are located approximately 15 feet from the end of the runway.

The crane is also equipped with a remote reading load cell which provides the operator with continuous load identification from 0 to 100% of design rated capacity. The load cell is provided with an adjustable alarm and motor stop feature to stop upward motion at a set load.

The cask loading and fuel transfer canal areas are separated from the fuel storage area by reinforced concrete walls. Gate openings in these walls permit movement of fuel from the spent fuel storage area to the cask load area and from the fuel transfer canal to the spent fuel storage area. The lowest point of the gate openings (sills) are above the top of the fuel in the storage racks. The gate at the appropriate end of the pool is in the closed position whenever the cask or any other heavy loads are being handled over the cask loading or intermediate position areas or whenever lifting and/or handling operations are being performed over the fuel transfer canal, other than those normally required as a part of the fuel transfer cycle. With this arrangement, a cask drop or any other lifting and handling accident anywhere under the two overhead bridge cranes in the fuel storage area that could cause water loss from the cask loading pool or the fuel transfer canal to the extent that all water was lost from these two areas would not cause a significant loss of water from the spent fuel pool.

Request 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 I."

Response to 2.2.3:

Only one (1) crane was listed in the response to 2.2.1. This crane was then excluded in the 2.2.2 response since it did not carry heavy loads.

Request 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.

This response should include the following information for each crane."

Response to 2.2.4:

Refer to Response 2.2.3.

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2.3 SPECIFIC REQUIREMENTS OF OVERHEAD HANDLING SYSTEMS OPERATING IN THE CONTAINMENT

"NUREG 0612 Section 5.1.3 provides guidelines concerning the design and operation of load-handling systems in the vicinity of the reactor core. Information provided in response to this section should be sufficient to demonstrate that adequate measures have been taken to ensure that in this area, either the likelihood of a load drop which might damage spent fuel is extremely small, or that the estimated consequences of such a drop will not exceed the limits set by the evaluation criteria of NUREG 0612, Section 5.1, Criteria I through III"

Request 2.3.1:

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

Response to 2.3.1:

CRANE	NUMBER	TYPE	CAPACITY
Polar Crane	MHS-CRN-4	Revolving Overhead Bridge	520 Ton-Main 25 Ton- Aux
Reactor Building Jib Crane	MHS-CRN-6 MHS-CRN-14	JIB	1 Ton
Main Fuel Handling Bridge	FHS-BRG-1	Traveling Bridge	3 Ton 2 Ton Aux Hoist
CRD Service Structure Monorail Hoist	None	Monorail	2 Ton Ea. (4)

Request 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 to 2.3.2:

The following load-handling systems identified in 2.3.1 above have been excluded. The discussions below provide justification for their exclusion

CRANE	NUMBER	TYPE	CAPACITY
Reactor Building Jib Cranes	MHS-CRN-6 MHS-CRN-14	JIB	1 Ton

The jib cranes as indicated in Table 3-1 do not handle heavy loads. They have been designed primarily for handling the CRD lead screw installation and removal tool and other light loads such as R.V. Head insulation.

CRANE	NUMBER	TYPE	CAPACITY
Main Fuel Handling Bridge	FHS-BRG-1	Traveling Bridge	Mast 3 Ton Aux. Hoist 2 Ton

The main fuel handling bridge does not handle heavy loads. The 3 ton capacity mast is used to handle fuel and control rod assemblies. The 2 ton auxiliary hoist is used for handling special tools and handling equipment, none of which weigh more than the weight of a fuel element and its handling tool.

Request 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 system (i.e., crane-load-combination information specified in Attachment 1.)"

Response to 2.3.3:

CRANE	Containment Polar Crane
NUMBER	MHS-CRN-4
DRL	520 Tons
MCL	220 Tons
MANUFACTURER	P&H

The following evaluation is a "point-by-point' comparison of the Containment Polar Crane design, fabrication, inspection, testing and operations characterics to the requirements delineated in NUREG-0554. Where the design features do not conform to those of NUREG-0554, alternatives are presented along with an explanation to demonstrate their equivalency and/or adequacy. Table 3-3 provides a summary of the comparison.

NUREG 0554 - "Single Failure Proof Cranes":

Section 2.2 Maximum Critical Load -

Requirement: The Design Rated Load (DRL) should be at least 15% greater than the Maximum Critical Load (MCL)

Actual: The DRL is 235% greater than the MCL and is considered an important factor in proving the Polar Cranes adequacy.

Section 2.3, Operation Environment -

Requirement: Operating environment including minimum and maximum pressure, maximum rate of pressure increase, temperature, humidity and emergency corrosive or hazardous conditions should be specified as well as proper venting and drainage requirements to avoid collapse and standing water.

Crane design complies with this section of NUREG 0554.

Actual: United Engineers & Constructors Inc. Specification 9779-031 provided information required in this section and is as follows:

Design Temerature Min	+ 15°F
Design temperature, Max.	+115°F
Pressure Change	62 PSI in 10 seconds
Wind Loading	36 lbs. per S.F.
Spray Solution	pH 9.0-10.5
Boron	2200 PPM
Boron PH (Min)	PH 3
Sodium Hydroxide	.25 Molar

Section 2.4, Material Properties -

Requirement: Material testing for brittle fracture per ASTM E-208 (drop weight test or ASTM A-380 Charpy).. Minimum operation temperatures on drop weight test should be obtained from paragraph NC2300 of Section III ASME Code or for Charpy test from paragraph ND2300 of Section III of the ASME Code

or

Cold proof load tested.

NUREG 0554, "Single Failure Proof Cranes" (cont'd):

Actual: Material testing for brittle fracture was in accordance with or met the above requirements and as listed below:

1. Only plates in excess of 5/8" were considered for brittle fracture.

2. Only hooks and structural load bearing members in tension when loaded, were considered for brittle fracture requirements.

3. Charpy V notch test temperature was 0^{o}.

4. Acceptance criteria was per ASME III, NF-2300 which is 15 mils lateral expansion on plates less than 1" thick and 25 mils on plates greater than 1" thick.

5. Weld impact tests were conducted in accordance with Article T-2, ASME Section VIII Division 2.

Section 2.5, Seismic Design -

Requirements: Cranes should be designed to retain load during an SSE and remain on their respective runway with wheels prevented from leaving the tracks during the seismic event. Design should also be in accordance with regulatory position 2 of Reg. Guide 1.29, Seismic Design Classification.

The above requirements are met.

Actual: The polar crane when loaded with the reactor vessel head (220 Ton MCL) and the load equalizing beam (10 tons) is designed to retain the load during an SSE, to remain on the crane rail and generate no missiles.

The stress limits for OBE and SSE conditions are 62% and 90% respectively, of the minimum yield stress per ASTM material specification. Earthquake restraints are provided on the bridge and trolley to prevent displacement under seismic loadings. The bridge restraints are manually positioned against the crane wall to preclude sliding of the crane in the direction of the bridge girder.

NUREG 0554, "Single Failure Proof Cranes" (cont'd):

The Polar Crane design utilized a dynamic model analysis with linear elastic lumped mass models and the MRI/Stardyne computer program to determine internal stress and wheel loads during an OBE and SSE.

The seismic analysis considered hook height as a variable in combination with the trolley at center span and 35.5 ft. from center span to result in maximum applied stresses to structural members of the crane (direct bending and shear). Both trolleys and the equalizer beam were used. For purposes of analysis the minimum hook height considered was elevation 497' and the maximum was elevation 555'.

A non-linear time history analysis of the Polar Crane wire ropes under a lifted load (220 T) as a result of a vertical response due to an SSE was conducted. The time history analysis used a simplified crane model with a non-linear spring element representing the hoist ropes and included a comparison with a model analysis of the simplified model with a linear spring element using simplified response spectra. The results of the analysis demonstrated that stress levels do no exceed 90% of minimum yield stress. The wire rope safety factory being greater than 5 to 1.

Section 2.6, Lamellar Tearing -

Requirement: NDE of all weld joints whose failure could result in the drop of a critical load.

These requirements are met.

Actual: United Engineers & Constructors Specification 9779-31, Section 14.A paragraph 3.8 required the crane supplier (P&H) to NDE 100% of all major load bearing welds. Radiographic examination of girder top and bottom coverplate butt welds was conducted in accordance with AWS D1.1. Magnetic Particle inspection was performed in accordance with P&H procedures on 100% of remaining major load carrying welds as identified in Section 14.a pargraph 3.8.2a specification 9779-31.

NUREG 0554, Single Failure Proof Cranes" (cont'd):

Section 2.7, Structural Fatigue -

Requirement: Construction usage should be added to expected cyclic loading for permanent plant operation when performing fatigue evaluation. A fatigue evaluation should be considered for critical load-bearing structures and components of the crane handling system

These requirements are met.

Actual: Construction usage was identified in the Engineers specification and therefore was considered by the crane manufacturer in order to assure placement of the crane into the proper classification. The Polar Crane was manufactured in accordance with CMAA Specification 70. Allowable stress factors for the Polar Crane are in acordance with Table 3.3.3.1.3-1 which takes into consideration the number of loading cycles. The Polar Crane is classified A1 (Standby Service) and meets the requirements of NUREG 0554 Section 2.7

Section 2.8, Welding Procedures -

Requirement: Post weld heat treatment of welds identified in Section 2.6 shall be in accordance with subarticle 3.9 of AWS D1.1 Structural Welding Code.

Actual: Welding was performed in accordance with AWS D1.1

Section 3.0, Safety Features -

3.2 Auxiliary System

Requirement: Auxiliary hoisting systems employed to lift or assist in handling critical load should be single failure-proof.

NUREG 0554, Single Failure Proof Cranes" (cont'd):

Actual: The auxiliary hoist is not single failure proof; however, the Supply System considers the auxiliary hoist to have sufficient safety features to adequately guard against a load drop. The auxiliary hoist is equipped with dual upper limit switches to prevent two-blocking. The loads identified in Table 3-1 do not exceed 50% of the auxiliary hoists rated capacity and therefore increases the Safety Factor to 10 or greater. The Preventive Maintenance Program and Inspection Procedures to be performed will identify any deterioration of the lifting equipment and allow for repairs prior to component failure.

3.3 Electric Control Systems

Requirements: Provide fail safe controls and limiting devices such that when disorders due to inadvertant operator action, component malfunction or disarrangement of subsystem control functions occur singly or in combination during load handling; disorders will not prevent the handling system from stopping and holding the load.

Actual: The Polar Crane is controlled from the operating floor by either radio control or a pushbutton pendant station attached to the crane. All buttons or levers are spring loaded return-to-off switches so that positive operator action is required to initiate and sustain any crane motion. The controllers are equipped with a Start-Stop-Button. The Stop button may be used during an emergency to stop the crane should it become necessary.

NUREG 0554, "Single Failure Proof Cranes" (cont'd):

3.4 Emergency Repairs

Requirement: Means should be provided for repairing, adjusting or replacing the failed component(s) or subsystem (s) when failure of an active component or subsystem has occured and the load is supported and retained in the safe (temporary) position with the handling system immobile; or a means provided for safely transferring the immobilized hoisting system with its load to a safe laydown area that has been designed to accept the load while repairs are being made.

Actual: Polar Crane design complies with this requirement. Depending on failure, repairs can be made in place while load is safely suspended or load may be manually transferred to a safe laydown area that will accept the load while repairs are being made.

Section 4.1, Reeving System -

Requirement:

1. Dual reeving system each providing separate load balance on the head and load blocks through a configuration of ropes and rope equalizers.

2. Rope sizing should include effects of impact loads, acceleration and emergency stops. Maximum load (including static and inertia forces) on each individual wire rope in the dual reeving system with the MCL attached should not exceed 10% of manufacturers published breaking strength.

3. Maximum fleet angle from drum to lead sheeve in the load block or between individual sheaves should not exceed ($3\ 1/2^{0}$) at any one point during hoisting except that for the last 1M of maximum lift elevation the fleet angle may increase slightly. Use of reverse bends should be limited.

4. Pitch diameter of running sheaves should be selected in accordance with CMAA Specification 70.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

Actual

1. The Polar Crane is equipped with a dual trolley and utilizes a double drum reeving system and Two (2) separate ropes are reeved through upper and lower sheaves to an equalizing beam contained in a retaining structure which will retain sheave in case of pin failure.

2. Ropes have been sized to include effects of impact loads, acceleration and emergency stops. The maximum load on each of the individual wire ropes in the dual reeving system when loaded with the MCL does not exceed 10% of the manufacturers published breaking strength

3. The main hoist train reeving system is 32 parts of 1-3/8" diameter 6 x 37 extra flexible improved plow steel IWRC.

4. The reeving is designed such that the fleet angle relative to the drum and sheaves does not exceed 5^0 during any operating condition. Reverse bonds have been kept to a minimum to reduce rope fatigue.

5. The Polar Crane has been designed in accordance with CMAA Specification 70. Pitch diameter of all sheaves is at least 24 times the rope diameter.

4.2 Drum Support -

Requirement: Load hoisting drum should be provided with structural and mechanical safety devices to limit the drop of the drum and thereby prevent it from disengaging from its holding brake system if the drum shaft bearings were to fail or fracture.

Actual: Each main hoist drum contains a gear at each end which is driven by a separate gear case equipped with one of the two DC holding brakes. Machined structural seats are provided and located such that a drum shaft, bearing or bearing bracket failure will not result in complete separation of both drum gears or pinions.

NUREG 0554, "Single Failure Proof Cranes:

4.3 Head and Load Blocks -

Requirements:

1. Head and load blocks should be designed to maintain vertical load balance about the center of lift from load block through head block and have a dual reeving system.

2. Load block assembly should be provided with two load-attaching points such that each attachment point will be able to support a load of three (3) times the (static and dynamic) load being handled without permanent deformation of load block assembly.

3 The individual component parts of the vetical hoisting system which include the head block, rope, reeving system, load block and dual attaching devices should each be designed to support a static load of 200% of the MCL.

4. Load blocks should be N.D. Examined by surface and volumetric techniques, documented and recorded.

Actual:

1. The dual Trolley and double drum reeving system is designed to maintain a vertical load balance through the center of lift from load block through head block.

2. The load block is not designed for two (2) load attachment points per the above requirement. The main load hook is designed with a S.F of five (5) based on a 520 ton DRL. The MCL is 220 tons therefore the safety factor is increased to 10.7 when allowing 15% for possible impact loading.

3. The Polar Crane DRL is 520 tons. The MCL is 220 tons which is less than 1/2 of the DRL therefore the crane is in compliance with this requirement.

4. Crane hooks will be NC examined in accordance with ANSI B30.10-1975. This inspection will be performed in accordance with an established written plant procedure.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

4.4 Hoisting Speed -

Requirement: Maximum hoisting speed for critical load should be limited to that given in the slow column on Figure 70-6 of CMAA Specification 70.

Actual: The Polar Crane hoist speeds comply with the limits given in the slow column of Figure 70-6 of CMAA Specification 70.

4.5 Design Against Two-Blocking -

Requirement:

1. Provide means within the reeving system located on the head or load block combinations to absorb or control the kinetic energy of rotating machinery during two blocking or

2. Provide two (2) independent travel limit devices of different design and activated by separate mechanical means. The protective control system for load handling should consist of load cell system in the drive train or motor current sensing.

Actual: The Polar Crane is equipped with dual limit switches which are independent and of different design to prevent two blocking. Each hoist drum contains a geared limit switch for upper and lower hoist limit and each hoist cable is equipped with a weighted block type limit switch for upper hoist limit. A load cell provides remote reading load indication from 0 to 100% of design capacity and is equipped with an adjustable alarm and motor stop feature to stop upward motion at a set load and provides (main hoist only) a loaded signal for the redundant interlock system associated with load height and the missile shield.

4.6 Lifting Devices -

Requirement: Lifting devices and/or lift beam yokes, trunion type hooks, slings, toggles and clevises should be conservatively designed with dual or auxiliary device combinations. Each device should be selected to support a load of three (3) times the load (static and dynamic) being handled without permanent deformation.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

Actual: Special lifting devices associated with the polar crane for R.V. head and internal handling are not redundant. However they have been designed to withstand and OBE or an SSE without exceeding allowable stresses when laden with the RV head and attachments. Since this arrangement is not single failure proof a load drop analysis was performed. The results were that a head load drop of 5' would be acceptable in terms of core cooling and would not result in damage to spent fuel. Detail of this analysis can be found in the FSAR Section 9.1 subsection 9.1.4.3.9. Slings used for handling equipment will provide redundant load points to allow for single lift point failure and/or utilize a SF of 10 or greater.

4.7 Wire Rope Protection -

Requirement: If side loads cannot be avoided the reeving system should be equipped with a guard that would keep the wire rope properly located in the grooves of the drums.

Actual: Although side loads are not expected to occur the devices are equipped with guards to assist in keeping ropes in place.

4.8 Machinery Alignment -

Requirement: Where gear trains are interposed between the holding brakes and the hoisting drum these gear trains should be single failure proof and should be of dual design.

Actual: Each main hoist drum contains a gear at each end which is driven by a separate gear case equipped with a DC holding brake. As previously stated machined structural seats are provided to prevent disengaging of the gearing should a bearing or bearing pedestal fail.

4.9 Hoist Braking System -

Requirements:

1. Each hoist brake should have a minimum capacity of 125% of the torque developed during the hoisting operation.

2. Mimimun hoisting braking system should include one power control braking system and two (2) holding brakes.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

3. Holding brake system should be single failure proof.

4. Manual operations of hoisting brakes during emergency conditions should be included in crane design.

Actual: 1&2. Each of the two main hoist trains and the auxiliary hoist train are equipped with regenerative load braking and two DC magnetic holding brakes which set on loss of power and are each rated at 150% of full load requirements.

3. The Polar Crane conforms to this requirement.

4. The load may be manually lowered during an emergency. A special procedure will be written for manually lowering the load.

Section 5, Bridge and Trolley -

5.1 Braking Capacity

Requirements:

1. The maximum torque capability of the driving motor and gear reducer for trolley and bridge motion should not exceed the capability of the gear train and brakes to stop the trolley or bridge from maximum speed with the DRL attached.

2. Brakes should be mechanically tripped to the "on" or "holding' position in the event of a malfunction in the power supply or an over speed condition.

3. Opposite-drive wheels on bridge or trolley that support bridge or trolley on their runways should be matched and have identical diameters.

4. Trolley and Bridge speeds should be limited per Spec CMAA #70.

Actual: Braking Capacity and System complies with the above requirements and are in accordance with CMAA Spec 70.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

5.2 Safety Stops -

Requirements:

1. Limiting devices should be provided to control or prevent overtravel and overspeed of the trolley and bridge. Buffers for bridge and trolley travel should be at the end of the rails.

2. Safety devices such as limit type switches should be provided for malfunction and inadvertent operator action or failure and should be in addition to and separate from the limiting means or control devices.

Actual: The trolley rails are equipped with paddle limit switches for overtravel in both directions. The trolley rails are also equipped with paddle limit switches for rail stop approach and actuate a warning light on the pendant. This is to allow the trolley to be brought to the rail stop. Since the polar crane is capable of 360^{0} rotation, no bridge travel limits are required. The trolley and bridge are equipped with overspeed protection devices.

Section 6, Drivers and Controls -

6.1 Driver Section

Requirements: Maximum torque capability of electric motor drive for hoisting should not exceed the rating or capability of components required to hoist the MCL at maximum design speed.

Actual: The electric motors were selected in accordance with the requirements established in CMAA Spec 70 and generally conform to the requirments of this section.

6.2 Driver Control Systems -

Requirements: If crane is used to lift spent fuel assemblies, the control system should be adaptable to include interlocks that will prevent trolley and bridge movements while the load is being hoisted free of the reactor vessel or storage rack.

Actual: Polar Crane does not handle spent fuel elements.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

6.3 Malfunction Protection -

Requirement:

1. Means should be provided in the motor control circuits to sense and respond to such items as excessive electric current, excessive motor temperature, overspeed, overload and overtravel.

2. Controls should be provided to absorb kinetic energy of the rotating machinery and stop the hoisting movement reliably and safely if one rope or one of the dual systems should fail or if overloading or an overspeed condition should occur.

Actual: Review of the Polar Crane Motor Control design confirms that the above requirements have been designed into the control circuitry.

6.4 Slow Speed Drives -

Requirements: If jogging or plugging is to be used the control circuit should include features to prevent abrupt change in motion. Drift point in the electric power system when provided for bridge or trolley movement should be provided for only the lowest operating speeds.

Actual: The Polar Crane is equipped with an electrotorque 100 solid state totally adjustable voltage control for the hoist and static stepless reversing plugging control for the bridge and trolley service. These systems are considered adequate to protect against abrupt change in motion. Drift Point requirement identified above are satisfied by this type of control. It should be noted, however, that proper operator training will eliminate abrupt changes in motion which cause load swings, therfore, the Supply System has placed considerable emphasis on proper training of crane operators.

6.5 Safety Devices -

Requirements: Safety devices such as limit type switches provided for malfunction, inadvertent operator action or failure should be in addition to and seperate from the limiting means on control devices provided for operator.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

Actual: The Polar Crane complies with the requirements. Limit switches as discussed previously are separate from normal control functions provided for operation.

6.6 Control Station -

Requirement: Defines preferred location of operation control system.

Actual: The Polar Crane is equipped with both pendant control and a radio operated remote station. Emergency operation is available by manual operation for lowering and traversing the load

Section 7, Installation Instructions -

7.1 General

Requirement: Installation instructions should be provided by the manufacturers.

Actual: Complete installation instructions were provided by the manufacturer as well as technical representation provided to assist in crane erection and checkout.

7.2 Construction and Operating Periods

Requirement:

1. Construction and operation requirements should be defined separately.
2. At end of construction period the crane should be modified as needed for performance requirements of the Nuclear Power Plant operating service.
3. After construction use the crane should be thoroughly inspected by NDE and load tested for the operating phase.
4. NDE extent and acceptance criteria should be defined in the design specification.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

5. If allowable stress limits are to be exceeded during construction, added inspection supplementing that described in Section 2.6 should be specified and developed.

6. During and after installation of the crane, the proper assembly of electrical and structural components should be verified.

7. Integrity of control operating and safety system should be verified.

Actual:

1. Construction and operating requirements were defined in the Engineers Specifications.

2. Modification of the Polar Crane is not required.

3. The Polar Crane will be thoroughly inspected and refurbished to restore the crane to its original new condition. The crane will be reload tested if major modification or repairs are required.

4. NDE extent and criteria were not defined in the specification for removal from construction phase to plant operation phase. These will be defined in a written procedure prior to use of the crane in the plant operation phase.

5. Allowable stress limits will not be exceeded.

6. Proper assembly of electrical, structural and mechanical components was verified.

7. Integrity of control and operating & safety system were verified during crane checkout and load test.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

Section 8, Testing and Preventative Maintenance -

8.1 General

Requirements:

1. Make complete check of all crane's mechanical and electrical systems.

2. Maintain records of checking and testing.

8.2 Static and Dynamic Load Test

Requirements:

1. Perform static and dynamic load test.

Actual: 8.1 & 8.2 The Polar Crane was thoroughly inspected and checked out prior to testing and the records are maintained on site in the Q.A. File. A static and dynamic load test of the crane's DRL was performed in accordance with ANSI B30.2

8.3 Two-Block Test

Requirement:

1. When equipped with an energy-controlling device between the load and head block, the complete hoisting machinery should be allowed to two block. The test should be conducted at slow speed without load.

2. Crane should be tested for load hangup.

Actual: The Polar Crane upper point limit switches were checked out to verify proper functioning during crane check and load test. Since the crane is not equipped with an energy controlling device the crane was not allowed to actually "two block". The crane is equipped with a load cell which indicates loads from 0 to 100% of DRL to prevent load hangup and is provided with an adjustable alarm and motor stop feature to stop upward motion at a set load.

NUREG 0554, "Single Failure Proof Cranes (cont'd):

8.4 Operational Tests

Requirement: Operational test should be performed to verify proper functioning of limit switches and ability to perform as designed.

Actual: Operational tests and inspections were performed in accordance with ANSI B30.2.

8.5 Maintenance

Requirements: Performance of maintenance, marking of MCL rating.

Actual: The Polar Crane as well as all other cranes are subject to a periodic inspection and maintenance program as outlined in this report. The maintenance and testing program is considered an extermely important part of safe load handling. The DRL is marked on the crane.

Section 9, Operating Manual -

Requirements: Manufacturer provide operating manual.

Actual: P&H provided a crane manual which provides information for checking, testing, operating and maintaining the Polar Crane.

Section 10, Quality Assurance -

Requirements: Quality Assurance program for design fabrications installation, testing, operation.

Actual: The Supply System is in compliance with this requirement.

The following discussion's provide an evaluation of the lifting devices and attachment points with respect to the requirements of NUREG 0612 Section 5.1.6 as requested in attachment 1 of the December 22, 1980 NRC letter.

Lifting Device Evaluation -

Stud Tensioner Sling

This sling has a design safety factor of 5. Failure of one of the 3 legs would reduce the safety factor and result in an uncontrolled movement of the load but not a load drop. The load path of the stud tensioner does not pass over equipment required for safe shutdown and could not cause damage to spent fuel since the R.V. Head is on the R.V. during handling of the stud tensioner.

RCP Motor and Pump Assembly Slings

The sling assembly for handling the RCP motor and pump assembly consists of 4 legs and will maintain a safety factor of 10.

Internal Indexing Fixture Lifting Assembly

Consists of the tripod and 3 pendents. The indexing fixture attaches at 3 points. Although failure of the spreader ring or lift point could result in a load drop, the indexing fixture would not cause damage to fuel or safe shutdown equipment since its diameter is larger than the opening of the Reactor Vessel.

Stud Rack Lift Sling

Four (4) leg sling assembly. Safety factor will be maintained at 10 or greater.

Irradiated Incore Instrument Transfer Cask Sling

Four (4) leg sling assembly. Safety factor will be 10 or greater.

Core Flood Tank Plug Sling

Should the core flood tank removal plug require handling, a 4 leg sling assembly will be used. The safety factor will be maintained at 10 or greater.

Miscellaneous Equipment Slings

Miscellaneous equipment will be handled by standard lifting apparatus. The lifting apparatus will maintain a safety factor of 10 and whenever possible utilize redundant lifting arrangements.

Inservice Inspection Tool

The inservice inspection tool is handled by a four (4) leg sling assembly which will maintain a safety factor of 10. Failure of a single leg or attachment point will not result in a load drop.

Polar Crane Special Lifting Devices

P.C. Lift Beam Assembly

P.C. Lift Extension

Tripod

Head and Internal Handling Extension Assembly

Internal Handling Adapter

Spreader Ring Assembly.

1. The above special lifting devices are designed to retain the RV Head load (220 tons-MCL) and the plenum during an SSE.

2. Inspection of the special lifting devices will be in accordance with the program discussed in response to 2.1-3d.

3. A head drop analysis was performed and verified in verification that damage would not occur to fuel and/or that equipment damaged by a drop would not affect the plants ability to maintain safe shutdown. Details of the drop analysis may be found in sub-section 9.1.4.3.9 of the FSAR..

Attachment Points

R.V. Head and Plenum

Attachment points for the head and plenum are capable of retaining the load during an SSE.

Stud Tensioner

Failure of a single attachment point would result in an uncontrolled movement of the load but not necessarily a load drop. In the unlikely event of a load drop however damage would not occur to fuel or safe shut down equipment.

RCP Motor and Pump Assembly

Each of the above has four (4) lift points. Failure of a single lift point would result in transfer of the load of two (2) points and reduce the safety factor to 2.5. This is considered adequate since the equipment would be immediately set down and not moved until repairs were made to the failed lift point.

Internal Indexing Fixture

The 3 point lifting configuration has a safety factor of 5. Failure of a lift point could result in a load drop however due to the indexing fixture configuration and the R.V. configuration during handling operations the indexing fixture would not cause damage to spent fuel or safe shutdown equipment.

Stud Rack

Is provided with four (4) lift points. Failure of one attachment point would result in transfer of the load of two (2) points and a reduction of the safety factor to 2.5 (assuming the rack is full). Normally only two R.V. studs or guide studs will be in the rack.

Irradiated Incore Instrument Transfer Cask

Has a four lift lug arrangement. Failure of one attachment point would result in transfer of the load to two (2) points and a reduction of the safety factor to 2.5. Transfer cask load handling operations would be terminated until the attachment point was repaired.

Inservice Inspection Tool

The tool has four (4) lift attachment points. Failure of a single attachment point would result in transfer of the load to two (2) points and a reduction of the safety factor by 50%. A load drop would not occur.

Request 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 1V will be demonstrated in your response to Section 2.4 of this report. With respect to Criteria I through III provide a discussion of your evaluation of crane operation in the containment and your determination of compliance. This response should include the following information for each crane:

a. Where reliance is placed on the installation and use of electrical interlocks or mechanical stops, indicate the circumstances under which these protective devices can be removed or bypassed and the administrative procedures invoked to ensure proper authorization of such action. Discuss any related or proposed technical specification concerning the bypassing of such interlocks.

b. Where reliance is placed on other site-specific considerations (e.g., refueling sequencing) provide present or proposed technical specifications and discuss administrative or physical controls provided to ensure the continued validity of such considerations.

c. Analyses performed to demonstrate compliance with Criteria I through III should conform with the guidelines of NUREG 0612. Appendix A. Justify any exception taken to these guidelines, and provide the specific information requested in Attachment 2,3, or 4, as appropriate for each analysis performed.

Response to 2.3.4:

CRD Service Structure Monorail Hoist -

The CRD Service Structure Monorail consists of a single circular monorail beam mounted under the upper portion of the service structure and four (4) 2 ton capacity manual hoists. This monorail is used to handle studs, stud tensioner and seal plate assembly as identified in Table 3-1.

The CRD monorail is used only when the R.V. Head is in place over the R.V. The loads handled (if dropped) could not possibly cause damage to fuel. Since the monorail is attached to the service structure the monorail is removed with the R.V. Head when it is removed thereby removing any possibility of handling a load over the open Reactor Vessel

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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 pool cooling.

"NUREG 0612, Section 5.1.5 provides guidelines concerning the design and operation of load-handling systems in the vicinity of equipment or components required for safe reactor shutdown and decay heat removal. Information provided in response to this section should be sufficient to demonstrate that adequate measures have been taken to ensure that in these areas, either the likelihood of a load drop which might prevent safe reactor shutdown or prohibit continued decay heat removal is extremely small, or that damage to such equipment from load drops will be limited in order not to result in the loss of these safety related functions. Cranes which must be evaluated in this section have been previously identified in your response to 2.1-1 and their loads in your response to 2.1-3C."

Request 2.4-1:

"Identify any cranes listed 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 feautures). For each crane so evaluated, provide the load-handling-system (i.e, crane-load-combination) information specified in Attachment 1'.

Response to 2.4-1:

The cask handling crane (MSH-CRN-2) and the Polar Crane (MHS-CRN-4) have been evaluated to have sufficient design feautes which make the likelihood of a load drop extremely small for all loads carried. The Cask Crane is single failure proof and has been discussed in our response to 2.2 Comment & Discussion, Paragraph 2. The Polar Crane was discussed in detail in our response to 2.3-3.

Request 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 which includes the following information":

2.4-2(a): "The presentation in a matrix format of all heavy loads and potential impact areas where damage might occur to safety-related equipment. Heavy loads identification should include designation and weight or cross reference to information provided in 2.1-2-C. Impact areas should be identified by construction zones and elevations or by some other method such that the impact area can be located on the plant general arrangement drawings."

Response to 2.4-2(a):

Table 3-2 (Sheets 1 - 21) provides the load/impact matrices for cranes identified in Response 2.1-1 which have not been designated as single-failure-proof.

Also included are Attachments A-D which provide the results of a comprehensive safeguard evaluation for electrical, HVAC, Piping and equipment that were used to identify safety related equipment under or adjacent to load handling systems.

Table 3-2a is an index of crane load combinations and hazard elimination categories which have been identified for each crane load combination.

Request 2.4-2b:

"For each interaction identified, indicate which of the load and impact area combinations can be eliminated because of separation and redundancy of safety-related equipment, mechanical stop and/or electrical interlocks, or other site specific considerations Elimination on the basis of the aforementioned considerations should be supplemented by the following specific information".

1) "For load/target combinations eliminated because of separation and redundancy of safety-related equipment, discuss the basis for determining that load drops will not affect continued system operation (i.e., the ability of the system to perform its safety-related function)."

2) "Where mechanical stops or electrical interlocks are to be provided present details showing the areas where crane travel will be prohibited. Additionally, provide a discussion concerning the procedures that are to be used for authorizing the bypassing of interlocks or removable stops, for verifying that interlocks are functional prior to crane use, and for verifying that interlocks are restored to operability after operations which require bypassing have been completed."

3) "Where load/target combinations are eliminated on the basis of other site specific considerations (e.g., maintenance sequencing), provide present and/or proposed technical specifications and discuss administrative procedures or physical constraints invoked to ensure the continued validity of such considerations."

Response to 2.4-2b:

Load target combinations eliminated because of separation and/or redundancy of safety-related equipment are as follows:

a) Diesel Service Hoist MHS-MRH-10

Miscellaneous Loads
to 7130 lbs.

The diesel generators are separated from each other by a reinforced concrete wall. Since the portable gantry cranes are used only during maintenance periods to service a diesel generator (only one Diesel Generator will be taken out of service at a time), these crane/load combinations have been eliminated as potential hazards. The diesel generator remaining in service provides system redundancy.

Response to 2.4-2b:

b) Safe guards Area Monorail Hoist MHS-MRH-15

DHR encapsulation vessel
DHR Valve
CSS encapsulation vessel
CSS Valve

This monorial/hoist services the "A" train encapsulation vessels and valves for the CSS and DHR system. A completely redundant "B" train is isolated from "A" train by a reinforced concrete wall and approximately 20'.

c) Equipment Maintenance Monorial MHS-MRH-19

CSS Pump & Motor 1A
DHR Pump & Motor 1A

This monorail services the "A" train pumps for the CSS & DHR system. A completely redundant "B" train is isolated from the "A" train by two (2) reinfoced concrete walls and a distance of approximately 40'. In the unlikely event of a load drop from this load handling system, the redundant system would remain functional.

d) Equipment Maintenance Monorial MHS-MRH-20

CSS Pump & Motor 2B
DHR Pump & Motor 2B

Same as c) above.

Request 2.4-2c:

"For interactions not eliminated by the analysis of 2.4-2b, above, identify any handling systems for specific loads which you have evaluated as having sufficient design features to make the likelihood of a load drop extremely small 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 feautures). For each crane so evaluated, provide the load-handling-system (i.e., crane-load-combination) information specified in Attachment 1".

Response to 2.4-2c:

The interactions eliminated by hazard category d) (i.e. Section 5.1.6, NUREG 0612 satisfied) are discussed below:

a) Tank Room Monorail Hoist MHS-MRH-9

The Tank Room Monorail hoist is a 2 ton capacity "ACECO" hand operated chain hoist equipped with a manual chain geared trolley. The hoist is used to assist in maintenance and movement of equipment. During non use periods the hoist will be physically secured. The hoist chain breaking strength has a minimum safety factor of 6. The DRL includes a 25% design impact factor. The maximum load (DHR Valve - 2200 lbs) is approximately one half of the hoists DRL of two (2) tons. Rigging configuration per administrative controls require that slings and rigging apparatus provide a safety factor of 10 or greater and that rigging configurations be redundant (i.e., 4 leg sling or 2 slings for single point lift).

Based on the above conditions this hoist is considered to satisfy the requirements of NUREG 0612 Section 5.1.6. In addition it should be noted that this load handling system and rigging apparatus is subject to inspection, testing and maintenance requirements as discussed previously in this report. Maintenance personnel will be instructed regarding proper chain hoist use and rigging techniques.

b) Polar Crane - MSH-CRN-4

The Polar Crane as previously discussed in respone to 2.3-3 has been evaluated as having sufficient design features to make the likelihood of a load drop extremely small. The response to 2.3-3 provides a thorough evaluation of the P.C. handling system to the requirements delineated in NUREG 0554 Single Failure Proof Cranes. Where alternatives to NUREG 0554 requirements have been presented, discussions were provided to demonstrate equivalency. Lifting devices and interfacing lift points for the load combinations identified in Table 3-1 were also discussed in our response to 2.3-3.

Request 2.4-d:

"For interactions not eliminated in 2.4-2-b or 2.4-2-c, above, demonstrate using proper analysis that damage would not preclude operation of sufficient equipment to allow the system to perform its safety function following a load drop (NUREG 0612 Section 5.1, Criterion IV). For each analysis so conducted the following information should be provided:

a) An indication of whether or not, for the specific load being investigated, the overhead crane-handling system is designed and constructed such that the hoisting system will retain its load in the event of seismic accelerations equivalent to those of a safe shutdown earthquake (SSE).

b) The basis for any exceptions taken to the analytical guidelines of NUREG-0612, Apendix A.

c) The information requested in Attachment 4".

Response to 2.4-d:

Analysis of the interactions not eliminated in 2.4-2-b and 2.4-2-c above indicates that damage will not preclude operation of equipment required for safe-shutdown.

The following tables are provided to aid in demonstrating that damage will not eliminate safe shutdown capability.

Table:

3-2 - "Load Impact Area Matrix"

3-2a - "Hazard Elimination Index"

3-2b - "Plant Structure Analysis Summary"

Table 3-2b provides the information requested in 2.4-d, Para. (1) and (3). Tables 3-2 and 3-2a provide details of load impact areas and a summary of the hazard elimination category for each load/combination identified in Table 3-1.

An exception has been taken to appendix "A" General Consideration, Para. (3) of NUREG 0612. Load drops have only been considered along designated load paths that have been identified previously in the report.

Two load handling systems are affected by this exception, the Polar Crane and the Radioactive Maintenance and Test Facility Crane. The Polar Crane has been designed to retain its load during an SSE. The loads involved are considerably less than the DRL and/or MCL. Standard lifting apparatus will maintain a safety factor of 10 or greater and wherever possible utilize redundant lifting arrangements. The Radioactive Maintenance and Test Facility Crane loads (above elev. 479') are also less than one half (1/2) the DRL and will maintain a safety factor of 10 or greater on lifting apparatus. The crane is restricted to a maximum lifting capacity of 9500 lbs. above elev. 479'. The heaviest anticipated load is 7750 lbs. Safe load paths will be marked on the floor as shown on drawing #805707 (attached) These restrictions will be marked in conspicuous locations on the walls and columns above elev. 479'.

Operators for the above cranes will be throughly trained on the above cranes in accordance with the guidelines discussed in our response to 2.1-3.

As requested in Attachment 4 paragraph 2 "Method of Analysis", the method of analysis used to demonstrate sufficient load carrying capability for floor slabs is provided as follows:

METHOD OF ANALYSIS

System — G.S.B. - Floor Slabs

Subject — Effect of load drops

Design Classification — Category I

Problem Statement - Verify whether the floors will withstand the impulse load generated due to various load drops.

a) Design Criteria

1) Interaction between disciplines identified worst case loads

2) GSB floor loading diagrams

3) Extract structural seismic accelerations for OBE or SSE condition from In Structure Seismic Response Spectra for Category I Structures Volume I

b) Design Procedures

1) Structural Steel Properties

Obtain stiffness $k = \frac{48\,EI}{L^3}$ lbs./in.

Where E = Modulus of elasticity of steel (lbs./in.^{2})

I - Moment of inertia of composite steel beam or beam only, depending on whether beam is composite or non-composite (inches ^{4})

L - Span (inches)

Obtain equivalent mass, Meq = 0.49M (reference 2)

Where $M = \frac{W \text{ lbs.}}{g} \quad \frac{\text{Sec.}^2}{\text{in.}}$

Determine Period, $T = 2\pi \sqrt{\frac{Meq}{k}}$ (Sec.)

2) Concrete Properties

$T = \frac{2\pi}{w}$

Where $w = \frac{\lambda}{a^2} \frac{D}{P}$ and $\lambda = \pi^2 \sqrt{\frac{k}{N}}$

D = Flexural rigidity of slab (lbs./in. $= \frac{ELa}{1-\nu^2}$

(ref.: 6)

E = Modules of elasticity of concrete (lbs./Sec.^{2})

ν = Poisons ratio = 0.17 (ref-1)

Ia = Average of cracked and uncracked moment of inertia

A = Shortest span length of concrete panel

K and N are frequency co-efficients, based on boundary conditions of the section of slab under consideration derived from Reference 6.

P = Mass density per unit of plate (lbs./sec.^{2}/in.^{3})

3) Equivalent Static Load

Evaluate impulsive load (F) generated by application of Williamson and Alvy equation (Reference 3).

$$F = \frac{2\pi WV}{gT}\sqrt{\frac{1}{2\mu - 1}}$$

W = Weight of drop load (lbs. or kips)

V = Velocity of drop load at impact (ft./sec.)

T = Natural period of vibration (sec.)

μ = Ductility ratio

= 10 for steel (Reference 8)

= 1 for concrete (Reference 4)

4) Stress Verification

Verify flexural and shear stresses of the structural elements by application of equivalent static load generated together with any other additional loads at critical sections.

c) Design Assumptions

1) For steel beams, when adequate number of shear studs are provided, composite action is considered.

2) For steel beams, flexural stresses are evaluated on the basis that impulse loads are generated due to a "drop load" at mid span, together with any other additional loads located in such a manner to provide worst effect.

3) Shear stresses are evaluated by the application of above equivalent static load close to the support beam, together with any other additional loads located in such a manner to provide worst effect.

4) The maximum allowable punching shear of concrete (Pv) is based on the value evaluated from the equation below:

$P_v = 4\sqrt{f'_c}\ \phi\ b_o d$ (ACI--318 Reference 7)

d = effective depth in inches

ϕ = capacity reduction factor

f'_c = 3000 PSI

b_o = periphery of critical section

d) References

1) "Structural Analysis and Design of Nuclear Plant Facilities", ASCE Draft 1976.

2) "Introduction to Structural Dynamics", by Biggs.

3) R. Williamson and R. Alvy, "Impact Effect of Fragments Striking Structural Elements".

4) ACI-349.

5) FSAR - WNP 1. - Sub Section 3.5.3.2

6) "Vibration of Plates", Arthur W. Leissa.

7) ACI-318.

8) "Standard Review Plan", dated July 1981. - Section 3.5.3 Appendix A.

The Supply System considers the load handling systems and load/combinations, identified herein, provide more than adequate assurance that a load drop is extremely unlikely or that, in the event of a load drop, safety-related equipment or spent fuel will not be damaged or unable to perform its safety functions. The load system design and operating requirements identified herein provide reasonable assurance that a load drop will not occur.

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TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
Polar Crane	Special Handling Fixtures					
MHS-CRN-4 P&H	(A) Tripod Handling Fixture	14,200 lbs.	Polar Crane & Lifting Extension	805705	Specific	FP-50524
530 Ton Main 25 Ton Auxil. 10 Ton Outrig.	(B) Head & Internal Handling Exten. Ass'bly.	5,900 lbs.	A, D, & E	805705	Specific	FP-50523
	(C) Internal Handling Adapter Ass'bly.	3,300 lbs.	A, D, & E	805705	Specific	FP-50520
	(D) Polar Crane Lift, Beam Ass'bly. & *Tongue (520 Ton)	47,960 lbs. 5,036 lbs.	Polar Crane	805704	Specific	FP-51761 FP-51727
	(E) Polar Crane Lifting Extension	13,000 lbs.	Polar Crane & D	805705	Specific	9779-F-805700
	(F) Spreader Ring Assembly	500 lbs.	A, B, C, D, & E	805705	Specific	FP-52050
	Reactor Vessel Head & Service Structure	220 tons	A, B, D, & E above	805706	Specific	
	Plenum Assembly	159,000 lbs.	A, B, C, D, E, & F above	805706	Specific	FP-50282
	Core Support	180 tons	A, B, C, D, E, & F above	805706	Specific	FP-50282
	Reactor Vessel Stud, Nut & Washer Ass'bly.	800 lbs.	Aux. Hook & Stud Handling Tool	Not req'd.	Specific	FP-50280
	Stud Rack (Full)	8,400 lbs. (See Note 3)	Aux. Hook & Slings	805704	Specific	FP-50233 FP-53389

(*) - Part of P.C. Lift Beam Assembly Weight.

TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
	Guide Studs	600 lbs.	Aux. Hook & Stud Handling Tool	Not req'd.	Specific	FP-50280 FP-50305
	Stud Tensioner	2,200 lbs.	Aux. Hook & Stud Tensioner Sling	805704	Specific	FP-50280 FP-50305
	Reactor Coolant Pumps					
	Motor	106,000 lbs.	P.C. Main Hook & Slings (See Note 3)	805705	Specific	FP-50125
	Pump Ass'bly.	120,000 lbs.	P.C. Main Hook & Slings (See Note 3)	805705	Specific	
	Internal Indexing Fixture	14,000 lbs.	Main Hook with tripod and pendents	805705	Specific	FP-50521 FP-52052
	In-Service Inspection Tool (ARIS)	15.76 tons	P.C. (See Note 6)	(See Note 6)	Specific	
	R.V. Head Insulation (In-Rack)	Less than 1,500 lbs.	Aux. Hook & Slings (See Note 3)	Not req'd.	General/Specific	FP-52326 FP-51016
	Upper S/G Manway Cover	Less than 1,500 lbs.	Aux. Hook & Slings (See Note 3)	Not req'd.	General/Specific	
	Reactor Coolant Pump Storage Stand	16,500 lbs.	Aux. Hook & Slings (See Note 3)	805704	General	FP-50589

TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
	Irradiated Incore Instrument Transfer Cask	10,000 lbs.	Aux. Hook, Special Sling (See Note 3)	805706	Specific	FP-50764 FP-50442
	Cable Drawbridge Fans & Duct	771 lbs.	Slings	Not req'd.	Specific/General	FP-60940 thru FP-60943
	Core Flood Tank Removal Plug	14,000 lbs.	Slings (See Notes 3 & 7)	805704	Specific/General	
	Miscellaneous Containment Equip. from Annulus Area (heaviest load)	1,750 lbs.	Slings (See Note 3)	805704	General	N/A
Reactor Bldg. Jib Cranes 1 Ton	CRD Lead Screw Installation & Removal Tool	225 lbs.	Jib Crane Hook	Not req'd.	Specific	
	CRD Lead Screw	135 lbs.	Lifting Tool	Not req'd.	Specific	
MHS-CRN-6 MHS-CRN-14	CRDM (Complete)	525 lbs.	Lifting Tool	Not req'd.	Specific	FP-50331 FP-50305 FP-50280
Main Fuel Handling Bridge 3 Ton Capacity FHS-BRG-1 Aux. Hoist - 2 Ton	Various Refueling Tools	Less than 600 lbs.	Special Slings	N/A	Specific	FP-50033
	New & Spent Fuel	1,530 lbs.	Special Tools	N/A	Specific	

TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
CRD Service Structure Monorail-Hoists (4) 2 ton capacity each	Stud Tensioner	2,200 lbs.	Hoist & special sling	805706	Specific	FP-50280
	R.V. Head Stud, Nut, & Washer Ass'bly.	800 lbs.	Hoist & Stud Handling Tool	Not req'd.	Specific	FP-50280
	Seal Plate Ass'bly.	15,800 lbs.	Hoist Hook & Special Sling (all 4 hoists) (See Note 3)	805706 (See Note 8)	Specific	FP-50305 FP-50318 FP-50765
Fuel Storage Fuel Handling Bridge 3 Ton Capacity FHS-BRG-2 2 Ton Aux. Hoist	Various Refueling Tools	Less than 600 lbs.	Special Slings & Handling Tools	N/A	Specific	
	Spent Fuel	1,530 lbs.	Special Tool	N/A	Specific	
New Fuel Unpacking & Inspection Crane MHS-CRN-1 10 Ton Capacity	New Fuel Shipping Containers	7,000 lbs.	Special Slings (See Note 3)	805707	Specific	
	Equipment Hatches	700 lbs.	Slings	805707	General	
	New Fuel	1,530 lbs.	New Fuel Handling Tool		Specific	FP-50769 FP-51451 FP-50775
	DHR Pumps	5,100 lbs.	Slings] (See Note 3)	805707	General	
	Motors	5,000 lbs.	Slings]	805707	General	FP-50187
	CSS Pumps	2,860 lbs.	Slings]	805707	General	FP-51237
	Motors	4,600 lbs.	Slings]	805707	General	
Cask Handling Crane MHS-CRN-2 105 Ton Main 10 Ton Aux.	Spent Fuel Cask	105 tons	Redundant Lifting Device	805707	Specific	

TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
Radioactive Maintenance & Test Facility Crane - 25 Ton MHS-CRN-3	Waste Cask	32,500 lbs.	4 Leg Sling Ass'bly. 6 x 37 IWRC 1-1/4" diam. Improved Plow Steel	805707	Specific	FP-52292
	Condenser Vacuum Pump	7,600 lbs.	Slings (See Note 3)	805707	General	FP-20393
	Aux. Feedwater Pump	5,700 lbs.	Slings (See Note 3)	805707	General	FP-20395
	MUS Pump	7,750 lbs.	Slings (See Note 3)	805707	General	FP-50186
	DHR Valve 1A	2,200 lbs.	Slings (See Note 3)	805707	General	FP-50884
Gamma Scan Facility Jib Crane MHS-CRN-10 2 Ton Capacity	Gamma Scan Lead Plug	750 lbs.	Sling (See Note 3)	805711	Specific	
Machine Shop Bridge Crane MHS-CRN-16 5 Ton Capacity	Various Heavy Loads To	5 tons	Slings (See Note 3)	805712	General	
Decontamination Room Monorail MHS-MRH-2 3 Ton Capacity	R.C. Pump Impeller (heaviest load) Fuel Handling Tools Hand Tools CRDM Components Valve Components Periscopes & Borescopes Makeup Pump Rotating Assembly	1,730 lbs.	Slings (See Note 3)	805714	General	

TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
G.S.B. Equip. Hatch Monorail MHS-MRH-5 5 Ton Capacity	DHR Pump	5,100 lbs.	Slings (See Note 3)	805711	General	FP-50187
	Motor	5,000 lbs.	Slings (See Note 3)	805711	General	
	CSS Pump	2,860 lbs.	Slings (See Note 3)	805711	General	FP-51237
	Motor	4,600 lbs.	Slings (See Note 3)	805711	General	
	CTMT Spray Heat Exchanger Head	3,500 lbs.	Slings (See Note 3)	805711	Specific/General	FP-50493
Tank Room Monorail Hoist MHS-MRH-9 2 Ton Capacity	DHR Valves (heaviest lift)	2,200 lbs.	Slings (See Note 3)	805707	General	FP-50883
Diesel Service Hoist MHS-MRH-10 5 Ton Capacity	Miscellaneous Diesel Components (heaviest lift) Jacket Water Cooler	7,130 lbs.	Slings (See Note 3)	805709	Specific/General	
Safeguards Area Monorail Hoist MHS-MRH-15 2 Ton Capacity	DHR & CSS Encapsulation Vessels (partial)	3,787 lbs.	Slings (See Note 3)	805708	Specific	FP-51044
	DHR & CSS Valve	2,200 lbs.	Slings (See Note 3)	805708	Specific	FP-50884
Machine Shop Monorail Hoist MHS-MRH-18 5 Ton Capacity	Miscellaneous Equipment Loads To	7,730 lbs.	Slings (See Note 3)	805712	General	
Equipment Maintenance MHS-MRH-19 5 Ton Capacity	CSS Pump 1A	2,860 lbs.	Slings (See Note 3)	805708	Specific/General	FP-51237
	Motor	4,600 lbs.	Slings (See Note 3)	805708	Specific/General	
	DHR Pump 1A	5,100 lbs.	Slings (See Note 3)	805708	Specific/General	FP-50187
	Motor	5,000 lbs.	Slings (See Note 3)	805708	Specific/General	

CONTROL OF HEAVY LOADS
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TABLE 3-1
TABULATION OF HEAVY LOADS
FOR
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT - WNP 1

CRANE	LOAD IDENTIFICATION	WEIGHT	LIFTING DEVICE	LOAD PATH DRAWING	PROCEDURE	REFERENCE DRAWING(S)
Equipment Maintenance MHS-MRH-20 5 Ton Capacity	CSS Pump 2B	2,860 lbs.	Slings (See Note 3)	805708	Specific/General	FP-51237
	Motor	4,600 lbs.	Slings (See Note 3)	805708	Specific/General	
	DHR Pump 2B	5,100 lbs.	Slings (See Note 3)	805708	Specific/General	FP-50187
	Motor	5,000 lbs.	Slings (See Note 3)	805708	Specific/General	
Solid Waste Handling Crane RSW-CRN-1 6 Ton Capacity	Lift Rig (electr. operated)	1,300 lbs.		805713	Specific	FP-55206
	100 cu. ft. Waste Container	10,500 lbs.	Lift Rig	805713		
Filter Maintenance Monorail RSW-MRH-1 7.5 Ton Capacity	Spent Filter Transfer Cask	11,000 lbs.	Crane Hook	805710	Specific	FP-51649 & Filter Changing Method for Filter Handling System - Protective Packaging Inc. PPIR-01-017

NOTES:

1. In addition to Load Path Drawings, see Dwg. 9779-S-805009 "Containment General Arrangement Laydown & Storage".

2. Sling sizes will vary according to Rigging Configuration. Site personnel determine Rigging Configuration. A minimum safety factor of 5 shall be maintained.

3. Rigging apparatus shall be sized to maintain a safety factor of 10.

4. All general use wire rope slings are to be of IWRC improved plow steel construction or equal, with swaged fittings.

5. Procedures:

   Specific - Critical load handling operations requiring unique procedures, which provide detailed instructions that govern the movement & handling of critical loads or performance of complex tasks, requiring greater details to ensure proper results & safe handling of loads.

   General - Governs all crane & load handling operations not requiring a "specific" procedure, and serves as a base or reference document for specific procedures. The "Crane Safety Manual" could be used as the general procedure.

6. Load paths & attachment method to be determined prior to use, and approved by the Plant Safety Review Committee. Details are not available at this time.

7. Lifting lugs for the Core Flood Tank removal plugs have not been designed. Should it become necessary to remove a plug, a four (4) point lift lug arrangement will be designed and installed. The lifting lugs & slings will maintain a safety factor of 10, or greater when considering static & dynamic loads (including allowance for resistance loading, applied due to tight fit of plug).

8. This load is only handled when RV head is on the RV. Load travels vertically only, and is not handled over safety-related equipment.

9. The polar crane will not normally be available for use during actual handling of fuel assemblies.

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: CRD Service Structure Monorail Hoist

Date: 02/24/82

LOCATION	BUILDING: Containment		
IMPACT AREA / LOADS	Zone: Column Line Reactor Head Area Column Line Elev. 450'		
	Elevation	Safety Related Equipment	Hazard Elimination Category
1) Stud Tensioners (2200 lbs)	453'	RV Head	e
2) Seal Plate Assembly (15,800 lbs)	450'	RV Head	e

Comment: 1. In the unlikely event of a load drop, damage would not occur to spent fuel &/or safeshutdown equipment. Hoists are only in use when R.V. Head is in position on the R.V. or head Storage Stand.

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: New Fuel Unpacking & Inspection Crane MHS-CRN-1 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line 9.2-11; Column Line P-W; Elev. 479'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
3) New fuel shipping Containers (7000 lbs)	479'	Not examined floor can sustain a load drop	e
4) DHR Pumps (5100 lbs)	479'	Not examined floor can sustain a load drop	e
5) DHR Motors (5,000 lbs)	479'	Not examined floor can sustain a load drop	e
6) CSS Pumps (2860 lbs)	479'	Not examined floor can sustain a load drop	e
7) CSS Motors (4600 lbs)	479'	Not examined floor can sustain a load drop	e

NOTE: Floor slab has been analized and will sustain a load drop of maximum anticipated load. Crane is administratively restricted from carrying heavy loads over New Fuel Storage Pool. Refer to response 2.2 comment and discussion (1)

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Radioactive Maintenance & Test Facility CRANE MHS-CRN-3 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line P-W Elev. 479' 455'; Column Line 4-5.5 Elev. 451'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
8) Waste Cask 32,500 lbs	451' 455	Not examined floor can sustain a load drop	e see note 3
9) Condenser Vacuum Pump (7,600 lbs)	479	FWA-PMP-1A,2B (el 395(FPC-HX-1,2 (el 433) FPC-PMP-3A,4B (el 433') NSW-TK-1A,2B (el 455')	e see note 1 & 2
10) AUX.FEEDWATER Pump (5700 lbs)	479	FWA-PMP-1A,2B (el. 395) FPC-HX 1,2 (el 433) FPC-PMP-3A,4B (el 433') NSW-TK-1A,2B (el 455')	e see note 1 & 2
11) MUS Pump (7750 lbs)	479	FWA-PMP-1A,2B (el 395) FPC-HX-1,2 (el 433) FPC-PMP-3A,4B (el 433') NSW-TK-1A,2B (el 455')	e see note 1 & 2
12) DHR Valve 1A (2200 lbs)	479	FWA-PMP-1A,2B (el 395) FPC-HX-1,2 (el 433) FPC-PMP-3A,4B (el 433') NSW-TK-1A,2B (el 455')	e see note 1 & 2

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Radioactive Maintenance & Test Facility CRANE MHS-CRN-3 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

Zone: Column Line P-W, Column Line 4-5.5, Elev. 479'

LOADS \ IMPACT AREA	Elevation	Safety Related Equipment	Hazard Elimination Category

NOTE: (1) Floor elev 479 can sustain a load drop of 9500 lbs over structural steel only. Floor slab will be marked with load paths for handling loads over 2000 lbs per Load Path drawing 9779-F-805707. Crane will be administratively controlled by strict operating procedures to assure loads greater than 2000 lbs remain over structural steel.

(2) Crane capacity of 25 tons is restricted to waste Cask Handling Area. Loads in excess of 9500 lbs are prohibited from being handled above elevation 479'. Signs are to be placed in conspicuous areas at elevation 479' restricting loads to 9500 lbs above elev. 479 and crane operator training will stress this limit. Load path drawing also identifies this restriction.

(3) Floor slab can sustain a waste cask load drop

(4) Loads 9-12 are less than ½ of the cranes DRL. Rigging apparatus will maintain a S.F. of 10 or greater.

(5) No restrictions are placed on the crane for handling loads below 479' less than 32.5K. Load height above floor slabs shall be maintained as low as practical as defined by plant crane operator training.

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Machine Shop Bridge Crane MHS-CRN-16 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line A-C, Column Line 3-4, Elev. 455'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
13) Various Loads to (7750 lbs)	455	Floor slab can sustain a load drop	e

NOTE: For loads with dimensions less than 18" x 26" maximum limit is 7.5K

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT [illegible] 1

CRANE: Decontamination Room Monorail MHS-MRH-2 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line H-M, Column Line 5-6, Elev. 455'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
14) R.C. Pump Impeller Fuel Handling Tools Hand Tools CRDM Components Valve Components Periscopes Borescopes Make Up Pump-Rotating Assembly (Heaviest Load 1730 lbs)	421'	Boric acid Addition. Tank-BRS-TK-10 MUSPump-4 Coreflood Tank Makeup Pump	e see note 1

Note:

1. Floor slab at elevation 479 will sustain a load drop. It is also noted that crane safety factor is 15 for heaviest load and the rigging apparatus is required to maintain a SF of 10 or greater.

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: GSB Equipment Hatch Monorail MHS-MRH-5

Date: 02/24/82

LOCATION

BUILDING: General Service Building

IMPACT AREA / LOADS

Zone: Column Line Ra-S
Column Line 7.0-10
Elev. 433'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
15) DHR Pump (5100 lbs)	395	Decay Heat Removal. Cooler DHR-HX-2-B	e
16) DHR Motor (5000, lbs)	395	Decay Heat Removal. Cooler DHR-HX-2-B	e
17) CSS Pump (2860 lbs)	395	Decay Heat Removal. Cooler DHR-HX-2-B	e
18) CSS Motor (4600 lbs)	395	Decay Heat Removal. Cooler DHR-HX-2-B	e
19) CTMT Spray Heat Exchanger Head (3500 lbs)	395	Decay Heat Removal. Cooler DHR-HX-2-B	e

NOTE: Floor slab at elevation 433 will sustain a load drop, based on revised monorail and reduced drop height to 5'. Maximum anticipated load is ½ of Cranes DRL and Rigging apparatus will maintain a SF of 10.

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Tank Room Monorail Hoist MHS-MRH-9 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line 4-11, Column Line W, Elev. 449'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
20) DHR Valves (2200 lbs)	449'	DHR-Piping CSS Piping Trains A & B	d see note

NOTE: Failure of load handling system is extermely unlikely. The heaviest load handled is approximately one half (½) the DRL of the monorail/hoist. Rigging configurations per administrative controls require sling configurations that are redundant and provide a safety factor of 10 or greater.

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Diesel Service Hoist MHS-MRH-10 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

LOADS \ IMPACT AREA	Zone: Column Line Diesel A E-F 1-4; Diesel B G-H 1-4 Elev. 428'-6"		
	Elevation	Safety Related Equipment	Hazard Elimination Category
21) Miscelleneous Diesel Components-Heaviest Lift-Jacket Water Cooler (7130 lbs)	406'	Diesel Generator "A" & "B"	b

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Safe Guards Area Monorail Hoist MHS-MRH-15 | Date: 02/24/82

LOCATION | BUILDING: Safe Guards Area

IMPACT AREA / LOADS | Zone: Column Line Safe Guard Area U-W, Column Line 11, Elev. 395'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
22) DHR Encapsulation Vessel (partial) (3787 lbs)	395'	DHR and CSS Piping	b
23) CSS Encapsulation Vessel (Partial) (3787 lbs)	395'	DHR and CSS Piping	b
24) DHR Valve (2200 lbs)	395'	DHR & CSS Piping	b
25) CSS Valve (2200 lbs)	395'	DHR and CSS Piping	b

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Machine Shop Monorial Hoist MHS-MRH-18

Date: 02/24/82

LOCATION	BUILDING: General Service Building		
IMPACT AREA / LOADS	Zone: Column Line 1-3, Column Line A-C, Elev. 455'		
	Elevation	Safety Related Equipment	Hazard Elimination Category
26) Miscellaneous Equipment (7,750 lbs)	455	Floor Slab can sustain a load drop	e

NOTE: For loads with dimensions less than 18" x 26" maximum limit is 7.5K

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Equipment Maintenance Monorail MHS-MRH-19 | Date: 2/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line 6.5-9, Column Line T, Elev. 395'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
27) CSS Pump 1A (2860 lbs) motor (4600 lbs)	395	DHR Pump 1A	b
28) DHR Pump 1A (5100 lbs) Motor (5000 lbs)	395	CSS Pump 1A	b

Note: It should also be noted that the maximum anticipated lift is approximately one half (½) of the DRL, which results in a safety factor of approximately 10 and that Rigging apparatus will maintain a Safety factor of 10 or greater

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Equipment Maintenance Monorail MHS-MRH-20 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line 6.5-9 Column Line Q Elev. 395'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
29) CSS Pump 2B (2860 lbs) motor (4600 lbs)	395	DHR Pump 2B	b
30 DHR Pump 2B (5100 lbs) motor (5000 lbs)	395	CSS Pump 2B	b

It should be noted that the maximum anticipated lift is approximately one half (½) of the DRL, which results in a safety factor of approximately 10. Rigging apparatus will maintain a safety factor of 10 or greater.

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Solid Waste Handling Crane RSW-CRN-1 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

Zone: Column Line 3-4
Column Line P-U
Elev. 455'

LOADS / IMPACT AREA	Elevation	Safety Related Equipment	Hazard Elimination Category
31) 100 cu ft Waste Container (10,500 lbs) (1,300 lbs) Lift Rig 11,800 lbs	421	Shutdown cooling water heat exchanger NSW-HX-1-A Component Cooling water heat exchanger CCW-HX-1-A	e see note
	339'	Make Up Pumps MUS-PMP-3-C MUS-PMP-2-B	e see note

NOTE: Floor slab at elevation 455' will be capable of sustaining a load drop of a filled 100 cu. ft. waste container which is the heaviest load handled in this area. Floor slab to be upgraded to sustain a loaded waste container drop.

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Filter Maintenance Monorail RSW-MRH-1 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line 4-9, Column Line L-P, Elev. 455'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
32) Spent filter transfer Cask (11,000 lbs)	421	Boric Acid addition tank	e see note
	439'6	Boric Acid storage tank MUS,DAR,RLW BES RVD Trains A & B	e see note
	455	MUS filters	e

NOTE: Floor slab along entire monorail travel path and roof slab over filters will be capable of sustaining an 11,000 lb. filter transfer cask load drop upon completion of modifications identified in summary. The hatch area for each MUS filter and area between hatches will not sustain a load drop, however, the crane is considered to have adequate safety factor (6.8) and the frequency of handling the MUS filters (monthly) reduces the probability of a load drop in the MUS Filter Hatch area.

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Reactor Building Jib Cranes MHS-CRN 6 & 14 | Date: 02/24/82

LOCATION | BUILDING: Containment

IMPACT AREA / LOADS | Zone: Column Line S/G Shield Walls Column Line Elev. 517'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
33) The loads carried by these cranes are not classified as heavy loads.			

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Fuel Handling Bridge FHS-BRG-1			Date: 02/24/82
LOCATION	BUILDING: Containment		
IMPACT AREA / LOADS	Zone: Column Line Refueling Canal Column Line Elev. 479'		
	Elevation	Safety Related Equipment	Hazard Elimination Category
34) The loads carried by this crane are not classified as a heavy load.			

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Fuel Storage Fuel Handling Bridge FHS-BRG-2 | Date: 02/24/82

LOCATION | BUILDING: General Service Building

IMPACT AREA / LOADS | Zone: Column Line 5-10, Column Line P-R, Elev. 479'

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
35) The loads carried by this crane are not classifeid as heavy loads.			

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Gamma Scan Facility Jib Crane MHS-CRN-10 | Date: 02/24/82

LOCATION / IMPACT AREA / LOADS	BUILDING: General Service Building Zone: Column Line Ra- Column Line 7-10 Elev. 433'		
	Elevation	Safety Related Equipment	Hazard Elimination Category
36) The loads carried by this crane are not classified as heavy loads.			

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LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Polar Crane MHS-CRN-4

Date: 02/24/82

LOCATION

BUILDING: Containment

IMPACT AREA / LOADS

Zone: Column Line
Column Line

Refer to load path drawings 805704, 805705, 805706

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
37) Tripod Handling Fixture (14,200 lbs)	el 479'	R.V.	d
38) Head & Internal Handling Extension assembly (5900 lbs	el 479'	R.V	d
39) Internal Handling adapter assembly (3,300 lbs)	el 479'	R.V	d
40) Polar Crane lift beam assembly and tongue (47,960 lbs)	el 479	R.V	d
41) Polar Crane lifting extension (13,000 lbs)	el 479	R.V	d
42) Spreader Ring assembly (500 lbs)	el 479	R.V	d
43) R.V. Head & Service Structure (220 Tons)	el 450'	R.V DHR CFS	d&b
44) Plenum Assembly (159,000 lbs)	el 450'	R.V	d
45) Core Support (180 tons)	el 450'	R.V	d

CONTROL OF HEAVY LOADS NUREG 0612

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Polar Crane MHS-CRN-4 | Date: 02/24/82

LOCATION | BUILDING: Containment

IMPACT AREA / LOADS | Zone: Column Line refer to load path drawings 805704, 805705, Column Line 805706

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
46) Stud Rack - (8400 lbs)	479'	R.V	d & e
47) Stud Tensioner (2200 lbs)	479'	R.V	d & e
48) Reactor Coolant Pump Motor (106,000 lbs)	435'	DHR CFS RC	d
49) Reactor Coolant Pump Assembly (120,000 lbs)	435'	DHR CFS RC	d
50) Internal Indexing Fixture (14,000 lbs)	432'	R.V	d & e
51) Inservice Inspection tool (15.76 Tons)	479	R.V	d & e
52) Reactor Coolant Pump Storage Stand (16,500 lbs)	479	-	d & e
53) Irradiated Incore Instrument Transfer Cask 10,000 lbs	479	RC CFS DHR	d

LOAD/IMPACT AREA MATRIX
TABLE 3-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE: Polar Crane MHS-CRN-4 | Date: 02/24/82

LOCATION | BUILDING: Containment

IMPACT AREA / LOADS | Zone: Column Line / Column Line Refer to load Path drawings 805704, 805705,805706

LOADS	Elevation	Safety Related Equipment	Hazard Elimination Category
54) Core flood tank removal plug (14,000 lbs)	479	CFS RV	d
55) Misc Equipment From Annulus Area (1750 lbs)	Annulus area all elevations	-	d

Control of Heavy Loads
NUREG 0612

HAZARD ELIMINATION INDEX
TABLE 3-2a

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE/LOAD	Load No.	Hazard Elimination Category a	b	c	d	e
CRD Service Structure Monorail Hoist						
Stud Tensioners	1					X
Seal Plate Assembly	2					X
New Fuel Unpacking & Insp. Crane MHS-CRN-1						
New Fuel Shipping Cont	3					X
DHR Pumps	4					X
DHR Motors	5					X
CSS Pumps	6					X
CSS Motors	7					X
Radioactive Maintenance & Test Facility Crane MHS-CRN-3						
Waste Cask	8					X
Condenser Vacuum Pump	9				X	X
Aux. Feedwater Pump	10				X	X
MUS Pump	11				X	X
DHR Valve 1A	12				X	X
Machine Shop Bridge Crane MHS-CRN-16						
Various Loads	13					X
Decon. Room Monorail MHS-MRH-2						
Heaviest Load	14					X
GSB Equipment Hatch Monorail MHS-MRH-5						
DHR Pump	15					X
DHR Pump Motor	16					X
CSS Pump	17					X
CSS Pump Motor	18					X
CTMT Spray Heat Exch Head	19					X
Tank Room Monorail Hoist MHS-MRH-9						
DHR Valves	20				X	
Diesel Service Hoist MHS-MRH-10						
Misc. Diesel Components	21		X			
Safe Guards Area Monorail Hoist MHS-MRH-15						
DHR Encapsul. Valve	22		X			
CSS Encapsul. Valve	23		X			
DHR Valve	24		X			
CSS Valve	25		X			
Machine Shop Monorail Hoist MHS-MRH-18						
Misc. Equipment	26					X

CRANE/LOAD	Load No.	Hazard Elimination Category a	b	c	d	e
Equipment Maintenance Monorail MHS-MRH-19						
CSS Pump Motor 1A	27		X			
DHR Pump Motor 1A	28		X			
Equipment Maintenance Monorail MHS-MRH-20						
CSS Pump Motor 2B	29		X			
DHR Pump Motor 2B	30		X			
Solid Waste Handling Crane RSW-CRN-1						
100 Cu.ft. Waste Cont	31					X
Filter Maintenance Monorail RSW-MRH-1						
Spent Filter Transfer Cask	32					X
Reactor Bldg. Jib Cranes MHS-CRN 6 & 14						
No Heavy Loads	33	--	N	/	A-	--
Fuel Handling Bridge FHS-BRG-1						
No Heavy Loads	34	--	N	/	A-	--
Fuel Storage Fuel Handling Bridge FHS-BRG-2						
No Heavy Loads	35	--	N	/	A-	--
Gama Scan Facility Jib Crane MHS-CRN-10						
No Heavy Loads	36	--	N	/	A-	--
Polar Crane MHS-CRN-4						
Tripod	37				X	
Head & Int. Handling Ext.	38				X	
Internal Handling Adapter	39				X	
P.C. Lift Beam Assy	40				X	
P.C. Lifting Extens.	41				X	
Spreader Ring Assy.	42				X	
R.V. Head & Serv. Struct.	43		X		X	
Plenum Assembly	44				X	
Core Support	45				X	
Stud Rack	46				X	
Stud Tensioner	47				X	
R.C.P. Motor	48				X	
R.C.P. Assembly	49				X	
Internal Indexing Fxt	50				X	X
Inservice Insp. Tool	51				X	
R.C.P. Storage Stand	52				X	X
Irradiated Incore Instr. Transfer Cask	53				X	
Core Flood Tank Removal Plug	54				X	
Misc Equip Annulus Ar	55				X	

HAZARD ELIMINATION CATEGORIES

a. Crane travel for this area/load combination prohibited by electrical interlocks or mechanical stops.

b. System redundancy and separation precludes loss of capability of system to perform its safety-related function following this load drop in this area.

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

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

e. Analysis demonstrates that crane failure and load drop will not damage safety-related equipment.

Control of Heavy Loads
NUREG 0612

PLANT STRUCTURE ANALYSIS
SUMMARY SHEET

TABLE 3-2b

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE/ LOAD	Load Impact Matrix Number	Load Handling System Designed to Retain Load During an SSE	Load Weight	Impact Area (s)	Drop Height	Slab Thickness	Drag Forces	Results of Slab Analysis R=Slab Sustains Load Drop F=Slab Fails		Material Properties Steel - A36 Conc.-f'c=3000 PSI
								R	F	Comments
CRD Service Structure Monorail Hoist										
Stud Tensioners	1	No	2.2K	Refueling Canal	3'-30"	3'-5'	None	X		
Seal Plate Assembly	2	No	15.8K	R.V.	3'	N/A	None	X		
New Fuel Unpacking & Inspection Crane MHS-CRN-1										
New Fuel Shipping Con	3	No	7K	9.2-11 Ra-W	2'	1'-6"	None	X		
DHR Pumps	4	No	5.1K	9.2-11 Ra-W	2'	1'-6"	None	X		
DHR Motors	5	No	5.0K	9.2-11 Ra-W	2'	1'-6"	None	X		
CSS Pumps	6	No	2.86K	9.2-11 Ra-W	2'	1'-6"	None	X		
CSS Motors	7	No	4.6K	9.2-11 Ra-W	2'	1'-6"	None	X		
Radioactive Maintenance & Test Facility Crane MHS-CRN-3										
Waste Cask	8	No	32.5K	T-W 4-5.5	1'	1'-6"	None	X		Load Paths are administratively restricted per. load path drawing, 805707
Condenser Vacuum Pump	9	No	7.6K	P-W 4-5.5	1'	1'-6"	None	X		" "
Aux Feedwater Pump	10	No	5.7K	P-W 4-5.5	1'	1'-6"	None	X		" "
MUS Pump	11	No	7.75K	P-W 4-5.5	1'	1'-6"	None	X		" "
DHR Valve 1A	12	No	2.2K	P-W 4-5.5	1'	1'-6"	None	X		" "
Machine Shop Bridge Crane MHS-CRN-16										
Various Loads	13	No	10K	A-C 3-4	1'	1'-6"	None	X		See note on Table 3-2, Pg 4 of 21
Decon. Room Monorail MHS-MRH-2										
Various Loads	14	No	1.73K	H-M 5-6	58"	1'-0"	None	X		

Control of Heavy Loads
NUREG 0612

PLANT STRUCTURE ANALYSIS
SUMMARY SHEET

TABLE 3-2b

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

CRANE/ LOAD	Load Impact Matrix Number	Load Handling System Designed to Retain Load During an SSE	Load Weight	Impact Area (s)	Drop Height	Slab Thickness	Drag Forces	Results of Slab Analysis R=Slab Sustains Load Drop F=Slab Fails		Material Properties Steel - A36 Conc.-f'c=3000 PSI
								R	F	Comments
GSB Equipment Hatch Monorail MHS-MRH-5 DHR Pump	15	No	5.1K	7-10 Ra-S	5'	1'-0"	None	X		Monorail relocated to reduce drop height below 5'
DHR Pump Motor	16	No	5.0K	7-10 Ra-S	5'	1'-0"	None	X		" "
CSS Pump	17	No	2.86K	7-10 Ra-S	5'	1'-0"	None	X		" "
CSS Pump Motor	18	No	4.6K	7-10 Ra-S	5'	1'-0"	None	X		" "
CTMT Spray Ht. Ex. Head	19	No	3.5K	7-10 Ra-S	5'	1'-0"	None	X		" "
Machine Shop Monorail MHS-MRH-18 Misc. Equipment	26	No	7.75K	A-C 1-3	1'	1'-6"	None	X		See note on Table 3-2, Page 10 of 21
Solid Waste Handling Crane RSW-CRN-1 100 Cu.Ft. Waste Cont.	31	No	11.8K	P-U 3-4	6'-6" to 8'-2"	1'-6"	None	X		Floor slab upgraded to sustain load drop
Filter Maintenance Monorail - RSW-MRH-1 Spent Filter Transfer Cask	32	No	11.0K	L-M, 5-8.5	1'-0"	2'-6"		X		Floor slabs upgraded to sustain load drop
				L-M, 8.5-9	5'-3"	2'-6"		X		
				M-Ma, 6.5-7	10'-0"	2'-0"	None	X		
				Ma-P 6.5-7	1'-0"	2'-0"		X		
Polar Crane MHS-CRN-4 Internal Indexing Fixture	50	Yes	14K	Refueling Canal RCB	1'-24"	3'-6'	None	X		
RCP Storage Stand	52	Yes	16.5K	18-1 RCB	1'	2'-6"	None	X		

Control of Heavy Loads NUREG 0612

COMPARISON SUMMARY
POLAR CRANE VS NUREG 0554

Table 3-3

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

Requirement / Extent of Compliance	Full Compliance	Complies with Intent Alternative Design Features	Does Not Comply
2.1 Construction and Operating Periods	X		
2.2 Maximum Critical Load	X		
2.3 Operating Environment	X		
2.4 Material Properties	X		
2.5 Seismic Design	X		
2.6 Lamellar Tearing	X		
2.7 Structural Fatigue	X		
2.8 Welding Procedures	X		
3.0 Safety Features			
3.1 General	X		
3.2 Auxiliary Systems		X	
3.3 Electric Control Systems	X		
3.4 Emergency Repairs	X		
4.1 Reeving System		X	
4.2 Drum Support	X		
4.3 Head & Load Blocks		X	
4.4 Hoisting Speed	X		
4.5 Design Against Two Blocking	X		
4.6 Lifting Devices		X	
4.7 Wire Rope Protection	X		
4.8 Machinery Alignment	X		
4.9 Hoist Braking System	X		
5.0 Bridge & Trolley			
5.1 Braking Capacity	X		
5.2 Safety Stops	X		
6.0 Drivers & Controls			
6.1 Driver Selection	X		
6.2 Driver Control Systems	X		
6.3 Malfunction Protection	X		
6.4 Slow Speed Drives		X	
6.5 Safety Devices	X		
6.6 Control Station		X	

Control of Heavy Loads NUREG 0612

COMPARISON SUMMARY
POLAR CRANE VS NUREG 0554

Table 3-3

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
UNIT WNP 1

Requirement \ Extent of Compliance	Full Compliance	Complies with Intent Alternative Design Features	Does Not Comply
7.0 Installation Instructions			
7.1 General	X		
7.2 Construction & Operating Periods	X		
8.0 Testing & Preventive Maintenance			
8.1 General	X		
8.2 Static & Dynamic Load Test	X		
8.3 Two Block Test		X	
8.4 Operational Tests	X		
8.5 Maintenance		X	
9.0 Operating Manual	X		
10.0 Quality Assurance	X		

Requirement \ Extent of Compliance	Full Compliance	Complies with Intent Alternative Design Features	Does Not Comply

ATTACHMENT A

NUREG 612 CONDUIT & CABLE TRAY REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
1.	MHS-CRN-1	New Fuel Unpacking & Inspection Crane	GSB P-W, 9.2-11		Not examined - floor can sustain a load drop. Ref. ASB-0171
2.	MHS-CRN-2	Cask Handling Crane	GSB P-W, 5.5-6.5		Not examined - single failure-proof crane. Rev. Spec #32, Rev. 22.
3.	MHS-CRN-3	Radioactive Maintenance & Test Facility Crane	GSB [illegible] 4-5.5		Not examined - see remarks for this crane under equipment review table 3-2 page 3a.
4a.	MHS-CRN-4	Polar Crane	CTMT		Not examined - excluded by design.
4b.	MHS-CRN-4	Polar Crane Auxil. Hoist	CTMT	303607, 303608, 303614, 303615, 303621, 303622, 303628 & 303629	See Note #1.
4c.	MHS-CRN-4	Polar Crane CTMT Annulus Hoist	CTMT		Not examined - excluded by intended use. Hoist operates over equipment hatch (elev. 479') in CTMT during refueling.
5.	FHS-RMS-1	Reactor Missile Shield	CTMT		Designed to retain RV head (220 Ton). Will generate no missiles during SSE.
6.	MHS-CRN-6	Reactor Area Jib Crane	CTMT		Not examined - crane does not lift heavy load.
7.	MHS-CRN-14	Reactor Area Jib Crane	CTMT		Not examined - crane does not lift heavy load.
8.	MHS-CRN-5	Fuel Transfer Tube Crane	CTMT	303606, 303607, 303611 & 303614	See Note #1.
9.	MHS-CRN-15	Equipment Hatch Service Jib	CTMT		No electrical equipment in annulus.
				303608	Inside annulus: -OCM1VA to CCW-PT-1340, Train A, outlet CCW for MUS-HX-1.
				303608	-OCQ1VB to CCW-PT-1336, Train B, outlet CCW for MUS-HX-2.
10.	MHS-MRH-24	FWA Pump Monorail Hoist	GSB T-W, 4-6.5	303309	No cable trays.
				303309	No conduits other than same train.

Note 1: Both Train A & Train B, safety-related cable trays, and/or conduits do not exist below this crane.

Note 2: No safety-related cable trays/conduits in this building.

NUREG 612 CONDUIT & CABLE TRAY REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
11.	MHS-MRS-23	Radwaste Compressor Service Monorail Hoist	GSB P-R, 3-4		Not examined - crane does not lift heavy load.
12.	MHS-MRH-2	Decontamination Room Monorail Hoist	GSB H-M, 5-6		Not examined - see remarks for this crane under HVAC equipment review table.
13.	MHS-CRN-16	Machine Shop Bridge Crane	GSB A-D, 3-4		Not examined - see remarks for this crane under HVAC equipment review table.
14.	CRDSS-MRH	CRD Service Structure MRH	CTMT	303607, 303608, 303614, 303615, 303621 & 303622	See Note #1.
15.	MHS-MRH-3	Load Break Switch Monorail Hoist	Turbine Bldg.		See Note #2.
16.	MHS-CRN-7	Diesel Generator Jib Crane	GSB D-E, 3-4		Not examined - crane does not lift heavy load.
17.	MHS-CRN-10	Gamma Scan Facility Jib Crane	GSB Ra-S, 8-10		Not examined - crane does not lift heavy load.
18.	MHS-MRH-5	GSB Equipment Hatch Monorail Hoist	GSB Ra-S, 7.0-10	303309 303318	Train B conduits & Train A cable trays at elev. 395'. Train B conduits at elev. 433'.
19.	MHS-MRH-4	GSB Equipment Hatch Monorail Hoist	GSB G-H, 5-6	303306, 303315, & 303328	See Note #1.
20.	MHS-MRH-21	Condensate Polishing Monorail Hoist	Water Treatment Bldg.		See Note #2.
21.	MHS-MRH-9	Tank Room Monorail Hoist	Tank Rm., GSB	303915	See Note #1.
22.	MHS-MRH-15	Safeguards Area Monorail Hoist	Safeguards Area, GSB	303606 & 303611	A&B channel conduit can be damaged by a load drop, but only DHR Train A (safety-related) will be affected.
23.	MHS-MRH-6	GSB Equipment Hatch, MRH	GSB T-U, 9.2-10	303318 & 303343	See Note #1.
24.	MHS-MRH-7	GSB Equipment Hatch, MRH	GSB U-W, 11-11.5	303343	See Note #1.

Note 1: Both Train A & Train B, safety-related cable trays, and/or conduits do not exist below this crane.

Note 2: No safety-related cable trays/conduits in this building.

NUREG 612 CONDUIT & CABLE TRAY REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
25.	MHS-MRH-16	Stop Log Monorail Hoist	Outside Spray Pond Pump House		See Note #2.
26.	MHS-MRH-18	Machine Shop Monorail Hoist	GSB A-C, 1-3		Not examined - see remarks under HVAC review table.
27.	MHS-MRH-17	IMS-MRH	CTMT		No electrical equipment inside crane wall.
				303621	In annulus: -At elev. 454', channel A & X cable trays
				303614	-At elev. 435', Trains A&B conduit, channel B cable trays.
				303607	-At elev. 405', Train A&B conduit.
28.	MHS-MRH-19	Equipment Maintenance	GSB T-V, 6.5-10	303309	See Note #1.
29.	MHS-MRH-20	Equipment Maintenance	GSB P-R, 6.5-9.2	303309	See Note #1.
30.	MHS-MRH-22	Screen Removal	Spray Pond Pump House		See Note #2.
31.	MHS-MRH-10	Diesel Service Hoist	GSB E-F, 1-4	303303, 303307, & 303316	See Note #1.
32.	MHS-CRN-8	Circulating Water & Fire Pump Crane	Circ. Water Pump House		See Note #2.
33.	MHS-CRN-11	Heater Bay Crane (Unit #4)	Turbine Bldg. E-A, 1-15		See Note #2.
34.	MHS-CRN-12	Heater Bay Crane (Unit #1)	Turbine Bldg. E-A, 1-15		See Note #2.
35.	MHS-CRN-13	Turbine Building Crane	Turbine Bldg. S-E, 1-15		See Note #2.
36.	FHS-BRG-2	Fuel Storage Handling Bridge	GSB P-Ra, 5-1'	303318 & 303343	See Note #1.
37.	FHS-BRG-1	Main Fuel Handling Bridge	CTMT	303607, 303608, 303614, 303615, 303621, 303623, 303628 & 303629	See Note #1.

Note 1: Both Train A & Train B, safety-related cable trays, and/or conduits do not exist below this crane.

Note 2: No safety-related cable trays/conduits in this building.

NUREG 612 CONDUIT & CABLE TRAY REVIEW

ITEM NO	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
38.	RSW-CRN-1	Solid Waste Handling Crane	GSB R-U, 3-4		Not examined - floor can sustain a load drop. Ref. 4SB-0218 & ANA-026?.
39.	RSW-MRH-1	Filter Maintenance Monorail	GSB K-P, 4-9	303306 303315	Conduit 21QIVA, elev. 395', feeds CSS-V14B & DHR-V8B. Conduit 3CL!SB, elev. 421'.
40.	MHS-MRH-13	Portable Gantry Hoist	GSB R-S, 3-4	303308	See Note #1.
41.	MHS-MRH-14	Portable Gantry Hoist	GSB Q-R, 4-4.5	303309	See Note #1.
42.	MHS-MRH-12	Condenser Vacuum Pump Gantry Hoist	Turbine Bldg.		See Note #2.

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ds

Note 1: Both Train A & Train B, safety-related cable trays, and/or conduits do not exist below this crane.

Note 2: No safety-related cable trays/conduits in this building.

ATTACHMENT B

NUREG 612 HVAC REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	HVAC SYSTEM	REFERENCE DRAWING	REMARKS
1.	MHS-CRN-1	New Fuel Unpacking & Inspection Crane	GSB P-W, 9.2-11	HSG	604309 604316	Duct elev. 399'-0". Duct elev. 421'-0".
2.	MHS-CRN-2	Cask Handling Crane	GSB P-W, 5.5-6.5	HSG	604309	Duct elev. 399'-0".
3.	MHS-CRN-3	Radioactive Maintenance & Test Facility Crane	GSB P-W, 4-5.5	HSG	604309	Duct elev. 399'-0".
4a.	MHS-CRN-4	Polar Crane	CTMT			Not examined - excluded by design.
4b.	MHS-CRN-4	Polar Crane Auxil. Hoist	CTMT		604371, 604368, 604369 & 604370	See Note #1.
4c.	MHS-CRN-4	Polar Crane CTMT Annulus Hoist	CTMT			Not examined - excluded by intended use. Hoist operates over equipment hatch (elev. 479'-0") in CTMT during refueling.
5.	FHS-RMS-1	Reactor Missile Shield	CTMT			Not examined - designed to retain RV head (220 Ton). Will generate no missiles during SSE.
6.	MHS-CRN-6	Reactor Area Jib Crane	CTMT			Not examined - crane does not lift heavy load.
7.	MHS-CRN-14	Reactor Area Jib Crane	CTMT			Not examined - crane does not lift heavy load.
8.	MHS-CRN-5	Fuel Transfer Tube Crane	CTMT		604362 & 604316	See Note #1.
9.	MHS-CRN-15	Equipment Hatch Service Jib	CTMT	CFC	604368	No equipment in annulus. CFC-AHU-3 (there are four (4) units, but only one (1) is necessary).
10.	MHS-MRH-24	FWA Pump Monorail Hoist	GSB T-W, 4-6.5		604309	See Note #1.

Note 1: No safety-related HVAC equipment or ducts below this crane.

Note 2: Safety-related HVAC equipment and ducts do not exist in this building.

ATTACHMENT B (cont'd)

NUREG 612 HVAC REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	HVAC SYSTEM	REFERENCE DRAWING	REMARKS
11.	MHS-MRS-23	Radwaste Compressor Service Monorail Hoist	GSB P-R, 3-4	HCA	604354	Duct elev. 399'-0".
12.	MHS-MRH-2	Decontamination Room Monorail Hoist	GSB H-M, 5-6		604593, 604322, 604315 & 604308	See Note #1.
13.	MHS-CRN-16	Machine Shop Bridge Crane	GSB A-D, 3-4	HSC	604556 604559 604591	Duct & fan elev. 428'-6". Duct & fan elev. 447'-6". Duct & fan elev. 399'-0".
				HCL	604591	Duct & fan elev. 399'-0".
14.	CRDSS-MRH	CRD Service Structure MRH	CTMT		604370, 604369, & 604368	See Note #1.
15.	MHS-MRH-3	Load Break Switch Monorail Hoist	Turbine Bldg.			See Note #2.
16.	MHS-CRN-7	Diesel Generator Jib Crane	GSB D-E, 3-4		604577	See Note #1.
17.	MHS-CRN-10	Gamma Scan Facility Jib Crane	GSB Ra-S, 8-10	HSG	604309	Duct elev. 395'-0".
18.	MHS-MRH-5	GSB Equipment Hatch Monorail Hoist	GSB Ra-S, 6.5-10		604316 & 604309	See Note #1.
19.	MHS-MRH-4	GSB Equipment Hatch Monorail Hoist	GSB G-H, 5-6		604322, 604315, & 604308	See Note #1.
20.	MHS-MRH-21	Condensate Polishing Monorail Hoist	Water Treatment Bldg.			See Note #2.
21.	MHS-MRH-9	Tank Room Monorail Hoist	Tank Rm., GSB	MER	604408	Ducts & fans elev. 509'-0" & 513'-0".
22.	MHS-MRH-15	Safeguards Area Monorail Hoist	Safeguards Area, GSB		604316 & 604309	See Note #1.
23.	MHS-MRH-6	GSB Equipment Hatch, MRH	GSB T-U, 9.2-10		604316 & 604309	See Note #1.
24.	MHS-MRH-7	GSB Equipment Hatch, MRH	GSB U-W, 11-11.5		604316 & 604309	See Note #1.

Note 1: No safety-related HVAC equipment or ducts below this crane.

Note 2: Safety-related HVAC equipment and ducts do not exist in this building.

NUREG 612 HVAC REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	HVAC SYSTEM	REFERENCE DRAWING	REMARKS
25.	MHS-MRH-16	Stop Log Monorail Hoist	Outside Spray Pond Pump House			See Note #2.
26.	MHS-MRH-18	Machine Shop Monorail Hoist	GSB A-C, 1-3	HCL	604556 & 604559	HCL emergency outside air ducts - elev. 428'-6".
					604555 & 604590	HCL A.H. units duct - elev. 399'-0".
				ACT	604555 & 604590	ACT units elev. 399'-0".
27.	MHS-MRH-17	IMS-MRH	CTMT		604370, 604369, & 604368	See Note #1.
28.	MHS-MRH-19	Equipment Maintenance	GSB T-V, 6.5-10		604309	See Note #1.
29.	MHS-MRH-20	Equipment Maintenance	GSB P-R, 6.5-9.2		604309	See Note #1.
30.	MHS-MRH-22	Screen Removal	Spray Pond Pump House			See Note #2.
31.	MHS-MRH-10	Diesel Service Hoist	GSB E-F, 1-4		604577	See Note #1.
32.	MHS-CRN-8	Circulating Water & Fire Pump Crane	Circ. Water Pump House			See Note #2.
33.	MHS-CRN-11	Heater Bay Crane (Unit #4)	Turbine Bldg. E-A, 1-15			See Note #2.
34.	MHS-CRN-12	Heater Bay Crane (Unit #1)	Turbine Bldg. E-A, 1-15			See Note #2.
35.	MHS-CRN-13	Turbine Building Crane	Turbine Bldg. S-E, 1-15			See Note #2.
36.	FHS-BRG-2	Fuel Storage Handling Bridge	GSB P-Ra, 5-11	HS?	604309	Ducts elev. 399'-0".
37.	FHS-BRG-1	Main Fuel Handling Bridge	CTMT		604370, 604369, & 604368	See Note #1.

Note 1: No safety-related HVAC equipment or ducts below this crane.

Note 2: Safety-related HVAC equipment and ducts do not exist in this building.

NUREG 612 HVAC REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	HVAC SYSTEM	REFERENCE DRAWING	REMARKS
38.	RSW-CRN-1	Solid Waste Handling Crane	GSB P-U, 3-4	HCA	604354	Ducts elev. 399'-0"
39.	RSW-MRH-1	Filter Maintenance Monorail	GSB K-P, 4-9		604322, 604315 & 604308	See Note #1.
40.	MHS-MRH-13	Portable Gantry Hoist	GSB R-S, 3-4		604354	See Note #1.
41.	MHS-MRH-14	Portable Gantry Hoist	GSB Q-R, 4-4.5		604309	See Note #1.
42.	MHS-MRH-12	Condenser Vacuum Pump Gantry Hoist	Turbine Bldg.			See Note #2.

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Note 1: No safety-related HVAC equipment or ducts below this crane.

Note 2: Safety-related HVAC equipment and ducts do not exist in this building.

ATTACHMENT C

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
1.	MHS-CRN-1	New Fuel Unpacking & Inspection Crane	GSB P-W, 9.2-11	479'-0"	DWD, PSA, FHS	805214	
					DWD, PSA, IAS	805180	
					IAC	805181	Train A
				451'-0"	DWD, PSA	805180	
				433'-0"	DWD, PSA, RVD	805177	
					IAS, FPC	805177	
					IAC, NSW	805177	Trains A & B
					CSS	805356	Trains A & B
					DHR	805356	Train A
					PSA, DWD, IAC	805356	
				411'-0"	DHR, CSS	805211	Train B
					RVD, DWD, PSA, FPC	805211	
					DHR, IAC, CSS	805178	Trains A & B
					DWD, RVD, PSA	805178	
					FWA, MUS	805178	
					IAC, DHR, NSW	805355	Train A
					CSS	805355	Trains A & B
					FWA, DWD, PSA, RVD	805355	
				395'-0"	NSW, CSS, DHR	805355	Train A
					PSA, DWD, FWA, RVD	805355	
					NSW, CSS	805210	Train B
					DHR	805210	Trains A & B
					MUS, RVD, PSA	805210	
					DWD, FPC	805210	
					DHR	805176	Trains A & B
					CSS	805176	Train B
					RVD, MUS, FWA	805176	
					PSA, DWD	805176	
2.	MHS-CRN-2	Cask Handling Crane	GSB P-W, 5.5-6.5	479'-0"	DCN	805179	
					PSA	805214	
				454'-0"	CCW, DWD, PSA, RVD, IAS	805167	
					IAC	805167	Train A
					DCN, FPC	805190	
				433'-0"	FPC, DCN, DWD	805189	
					CCW, DWD, PSA, RVD	805166	
					CSS, DHR, IAC	805166	Train B
					PGS, DWD, CSS, CCW	805346	
					NSW	805346	Train A
				411'-0"	IAC	805165	Trains A & B
					DHR	805165	Train A
					IAS, FWA, CNR, HPR, MSS	805165	
					PSA, DWD, MUS, RVD	805165	
					NSW	805188	Train B
					DCN, FPC, DWD, PSA	805188	
					CCW, HPR, FWA, MSS	805345	
				395'-0"	HPR, MSS, CCW, FWA	805307	
					RVD, CNR	805307	
					DCN, RLW, FPC, RVD	805187	
					DWD, HPR, PSA, FWA	805164	
					MSS, RVD	805164	

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
3.	MHS-CRN-3	Radioactive Maintenance & Test Facility Crane	GSB	479'-0"	DWD, PSA, FPC	805179	
			P-S, 4-5.5	454'-0"	CCW, DMW, FPC, MUS	805167	
					PGS, RVD, IAS, DWD, PSA	805167	
					NSW	805167	Train A
					IAC	805167	Trains A & B
					NSW, IAC	805190	Trains A & B
					PGS, RVD, MUS, FPC, CCW	805190	
					DMW, DWD, PSA, IAS	805190	
				433'-0"	NSW	805189	Trains A & B
					DHR	805189	Train A
					FPC, CCW, PSA, DWD, DMW	805189	
					PGS, DCN, RLW, MUS	805189	
					NSW	805166	Train A
					DHR	805166	Train B
					RVD, MUS, PGS, FPC, DMW	805166	
					CSS, CCW, IAS	805166	
					CSS, DHR	805346	Train B
					PGS, FWA, DMW, FPC	805346	
					MUS, RVD	805346	
					NSW	805346	Train A
				411'-0"	IAC	805165	Trains A & B
					NSW, DHR	805165	Train A
					PSA, DWD, CSS, MUS, FPC	805165	
					HPR, CNR, MSS, RVD	805165	
					CSS, DMW, CCW, PGS, MUS	805188	
					CNR, PSA, IAS, MSS, HPR	805188	
					FPC, RVD	805188	
					NSW, IAC	805188	Trains A & B
					DHR	805188	Train A
					FWA, CSS, MSS	805346	
				395'-0"	FWA, MSS	805307	
					FPC, DWD, PSA	805187	
					CSS, RVD	805187	
					DWD, PSA, HPR, FPC, RVD	805164	
4a.	MHS-CRN-4	Polar Crane (265/530 Tons)	CTMT				Not examined - excluded by design.
4b.	MHS-CRN-4	Polar Crane Auxiliary Hoist (25 Tons)	CTMT	454'-0"	MSS, FWS	805332	
				445'-0"	MSS, FWS	805331	
				435'-0"	HPR, SGC	805330	
				418'-0"	MUS, FWA, FPC, LMS	805329	
					SGC, CCW	805329	
				405'-0"	MUS, CFS	805328	
4c.	MHS-CRN-4	Polar Crane CTMT Annulus Auxil. Hoist	CTMT				Not examined - excluded by intended use. Hoist operates over equip't. hatch (elev. 479') in CTMT during refueling.

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
5.	FHS-RMS-1	Missile Shield	CTMT				Designed to retain RV head. Will generate no missiles during SSE.
6.	MHS-CRN-6	Reactor Area Jib Crane	CTMT				Not examined - crane does not lift heavy load.
7.	MHS-CRN-14	Reactor Area Jib Crane	CTMT				Not examined - crane does not lift heavy load.
8.	MHS-CRN-5	Fuel Transfer Tube Crane	CTMT	418'-0"	FPC, CCW, DFR, NBS, PGS	805151	
					NBS, MSS, PGS	805121	
					DHR	805121	Train B
					PSA, DWD	805465	
				405'-0"	FPC, DFR, MSS	805150	
					DFR, MSS, CCW	805120	
					DHR	805120	Train B
9.	MHS-CRN-15	Equipment Hatch Service Jib	CTMT	405'-0"	CCW	805135	
					MUS	805328	
				418'-0"	CCW, MUS, CFS	805136	
				435'-0"	CCW, MUS	805137	
				445'-0"	CCW, MUS	805331	
				454'-0"	MSS, FWS, CCW	805332	
10.	MHS-MRH-24	FWA Pump Monorail Hoist	GSB T-W, 4-6.5	395'-0"	DWD	805164	
					FWA, RVD, MSS	805307	
11.	MHS-MRH-23	Radwaste Compressor Service MRH	GSB R-P, 3-4	485'-0"	RSW, DWD, CCW, PSA, RGW	805385	
					RSW, CCW, RVD	805375	
				479'-0"	CCW, RGW, RSW, DWD, PSA	805381	
					RSW	805374	
				461'-0"	RSW, PSA	805384	
					RSW	805373	
				455'-0"	RSW, PSA, DWD	805380	
				438'-3"	CCW	805362	
					NSW	805362	Trains A & B
					CCW	805367	
					NSW	805367	Trains A & B
				421'-0"	CCW	805361	
					NSW	805361	Trains A & B
					CCW	805366	
					NSW	805366	Trains A & B
				399'-0"	MUS	805360	
					IAC	805360	Train B
					MUS, CSS	805365	
					NSW	805365	Trains A & B

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
12.	MHS-MRH-2	Decontamination Room Monorail Hoist	GSB H-M, 5-6	479'-0"	PSA, DWD, DCN, RVD	805226	
				455' 0"	PSA, DWD, BRS, DCN	805224	
					IAS, RVD, MUS	805224	
					IAC	805224	Train A
				439'-6"	DHR	805223	Trains A & B
					FPC, RSW, MUS, RVD	805223	
					BRS, RLW	805223	
				444'-0"	MUS, BRS, DFR, DCN, RSW	805095	
				421'-0"	MUS, BRS, PSA, DWD	805222	
					IAS, NBS, RVD	805222	
				411'-0"	NBS, MSS, CNR, PGS, DWD	805221	
					IAS, DMW, RSW, CCW, RLW	805221	
					IAC	805221	Train A
				395'-0"	NBS, DWD	805220	
13.	MHS-CRN-16	Machine Shop Bridge Crane	GSB A-D, 3-4	395'-0"	IAC	805690	Trains A & B
					IAS, PSA	805690	
14.	CRDSS-MRH	CRD Service Structure MRH	CTMT				No safety-related piping below this crane.
15.	MHS-MRH-3	Load Break Switch Monorail Hoist	Turbine Bldg.				No safety-related piping in TGB.
16.	MHS-CRN-7	Diesel Generator Jib Crane	GSB D-E, 3-4				No piping below this crane.
17.	MHS-CRN-10	Gamma Scan Facility Jib Crane	GSB Ra-S, 8-10	433'-0"	FPC	805177	
					NSW	805177	Train B
					FPC	805189	
					NSW	805189	Train B
				411'-0"	DHR	805211	
					CSS	8052 1	Train B
					DHR, CSS, NSW	805188	Train B
				395'-0"	NSW	805210	Train B
					NSW	805187	Train B
18.	MHS-MRH-5	GSB Equipment Hatch MRH	GSB Ra-S, 6.5-10	433'-0"	DWD, PSA	805166	
					CSS, NSW, IAC	805166	Train B
					PSA, DWD	805177	
					IAC	805177	Trains A & B
				411'-0"	DHR	805165	Train B
					FWA	805165	
					CSS, DHR, IAC	805178	Train B
					DWD, PSA, FWA	805178	
				395'-0"	DHR	805164	Trains A & B
					FWA	805164	
					FWA	805176	

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
19.	MHS-MRH-4	GSB Equipment Hatch MRH	GSB C-H, 5-6	479'-0"	PSA, IAS, DWD	805252	
					NSW	805252	Train B
					IAC	805252	Train A
				455'-0"	PSA, IAS, DWD, BRS	805251	
					IAC	805251	Train A
				411'-0"	DWD, PSA, IAS	805249	
					IAC	805249	Train A
20.	MHS-MRH-21	Condensate Polishing Monorail Hoist	Water Treatment Bldg.				No safety-related piping in the Water Treatment Bldg.
21.	MHS-MRH-9	Tank Room Monorail Hoist	Tank Room GSB	451'-0"	DHR, CSS	805431	Trains A & B
					PSA, DWD	805304	
					DHR, CSS	805304	Trains A & B
					FWA, MUS, FPC, CNM, RVD	805300	
					DWD, DMW	805300	
22.	MHS-MRH-15	Safeguards Area Monorail Hoist	Safeguards Area, GSB	411'-0"	DWD, PSA	805426	
					CSS, IAC	805426	Train A
					DHR	805426	Trains A & B
				399'-0"	CSS, DHR	805425	Train A
23.	MHS-MRH-6	GSB Equipment Hatch MRH	GSB T-U, 9.2-10	433'-0"	NSW	805177	Train A
					DWD, PSA	805177	
				411'-0"	DHR	805178	Train A
				399'-0"	CSS, DHR	805176	Train A
					RVD	805176	
24.	MHS-MRH-7	Diesel Generator Jib Crane	GSB D-E, 3-4	411'-0"	CSS, DHR	805355	Train A
				395'-0"	DHR	805355	Train A
					RVD	805355	
25.	MHS-MRH-16	Stop Log Monorail Hoist	Outside Spray Pond Pump Hse.				No piping below this crane.
26.	MHS-MRH-18	Machine Shop Monorail Hoist	GSB A-C, 1-3	395'-0"	IAC	805690	Train A
					IAS, PSA	805690	

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
27.	MHS-MRH-17	IMS-MRH	CTMT	454'-0"	DWD, PSA	805467	
					CCW	805154	
				445'-0"	DWD, PSA	805466	
					CCW	805153	
				435'-0"	DWD, PSA	805466	
					DHR	805152	Trains A & B
					DFR	805152	
				418'-0"	CCW, PGS, FWA, DFR	805151	
					FPC, NBS	805151	
					DHR	805151	Trains A & B
					DWD, PSA	805465	
				405'-0"	MSS, PGS, RCS, DFR, CCW	805150	
					DWD, PSA	805465	
28.	MHS-MRH-19	Equipment Maintenance	GSB T-V, 6.5-10	411'-0"	DHR	805165	Train A
					CSS	805165	Train B
				395'-0"	DHR, CSS, NSW	815164	Train A
					RVD	805176	
29.	MHS-MRH-20	Equipment Maintenance	GSB P-R, 6.5-9.2	411'-0"	DWD, PSA, FPC	805188	
				395'-0"	DHR, NSW, CSS	805187	Train B
					FPC, RVD	805187	
30.	MHS-MRH-22	Screen Removal MRH	Spray Pond Pump Hse.				No piping below this crane.
31.	MHS-MRH-10	Diesel Service Hoist	GSB E-F, 1-4	406'-0"	DIE, PSA, DSA, DLO	202734	
					DIE, DLO, PSA, DSA	202737	
					NSW	202737	Train A
				399'-0"	DWD, DFO, DSA, DLO	202735	
					NSW	202735	Train B
					IAC, NSW	202738	Train A
					DWD, IAS, DSA, DFO, DLO	202738	
32.	MHS-CRN-8	Circulating Water & Fire Pump Crane	Circ. Water Pump Hse.				No safety-related piping in Circ. Water Pump House.
33.	MHS-CRN-11	Heater Bay Crane (Unit #4)	Turbine Bldg. E-A, 1-15				No safety-related piping in TGB.
34.	MHS-CRN-12	Heater Bay Crane (Unit #1)	Turbine Bldg. E-A, 1-15				No safety-related piping in TGB.
35.	MHS-CRN-13	Turbine Building Crane	Turbine Bldg. S-E, 1-15				No safety-related piping in TGB.

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
36.	FHS-BRG-2	Fuel Storage Handling Bridge	GSB P-Ra, 5-11	479'-0"	FHS, PSA	805214	
				454'-0"	FPC	805190	
				433'-0"	FPC	805177	
				411'-0"	FPC, DCN, DWD, PSA, RVD	805188	
					CSS, NSW, DHR	805188	Train B
					DHR	805211	Train B
					RVD, DWD, PSA	805211	
				395'-0"	DCN, FPC, RLW, MUS, RVD	805187	
					DWD, PSA, MUS	805187	
					CSS, NSW	805187	Train B
					DHR	805187	Trains A & B
37.	FHS-BRG-1	Main Fuel Handling Bridge	CTMT				Not examined - does not make heavy lift.
38.	RSW-CRN-1	Solid Waste Handling Crane	GSB P-U, 3-4	461'-0"	DWD, PSA, RSW	805384	
				455'-0"	DWD, PSA, RSW	805380	
				438'-0"	NSW	805362	Trains A & B
					CCW	805362	
				421'-0"	NSW	805361	Trains A & B
					CCW	805361	
					IAC	805361	Train A
				399'-0"	NSW	805360	Train A
					IAC	805360	Trains A & B
					CSS, MUS, DWD, PSA	805360	
39.	RSW-MRH-1	Filter Maintenance Monorail	GSB K-P, 4-9	455'-0"	BRS, FPC, RVD	805501	
					DCN, PGS, GHS, FPC	805224	
				444'-0"	RSW, MUS, RLW, RVD	805095	
					FPC, DCN, BRS, DFR	805095	
					DHR	805095	Train A
					MUS, BRS, FPC	805096	
				439'-6"	RLW, BRS, RSW, MUS, RVD	805223	
					DHR	805223	Trains A & B
					RVD, RSW, MUS, BRS	805238	
					DHR	805238	Trains A & B
				421'-0"	IAS, PSA, DWD, BRS, NBS	805222	
					BRS, NBS, CCW	805237	
				411'-0"	PGS, NBS, RVD, DWD	805221	
					RLW, MSS, CCW, RSW	805221	
					IAS, PSA, DMW, CNR, HPR	805221	
					NSW	805221	Train A
					IAC	805221	Trains A & B
					PGS, NBS, IAS, DWD	805236	
					DMW, RSW, CNR, CCW, MSS	805236	
					IAC	805236	Train A
				395'-0"	HPR, RVD, NBS, CCW	805220	
					BRS, CCW	805235	

NUREG 612 PIPING REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	ELEVATION	PIPING SYSTEMS	REFERENCE DRAWING	REMARKS
40.	MHS-MRH-13	Portable Gantry Hoist	GSB R-S, 3-4				No piping below this crane.
41.	MHS-MRH-14	Portable Gantry Hoist	GSB Q-R, 4-4.5				No piping below this crane.
42.	MHS-MRH-12	Condenser Vacuum Pump Gantry Hoist	Turbine Bldg.				No piping below this crane.

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ATTACHMENT D

NUREG 612 SAFETY-RELATED EQUIPMENT REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
1.	MHS-CRN-1	New Fuel Unpacking & Inspection Crane	GSB P-W, 9.2-11	805010, 805413, & 805412	Not examined - floor can sustain a load drop. Re: ASB-0171.
2.	MHS-CRN-2	Cask Handling Crane	GSB P-W, 5.5-6.5	805010 & 805417	Not examined - single failure-proof crane. Re: Spec 31, Rev. 22.
3.	MHS-CRN-3	Radioactive Maintenance & Test Facility Crane	GSB P-W, 4-5.5	805417 805107	FWA-PMP-1A, 2B (Elev. 395') FPC-HX-1, 2 (Elev. 433') FPC-PMP-3A, 4B (Elev. 433') NSW-TK-1A, 2B (Elev. 455').
4a.	MHS-CRN-4	Polar Crane	CTMT		Not examined - excluded by design.
4b.	MHS-CRN-4	Polar Crane Auxil. Hoist	CTMT	805003, 805002, 805001, & 805000	See Note #1.
4c.	MHS-CRN-4	Polar Crane CTMT Annulus Hoist	CTMT		Not examined - excluded by intended use. Hoist operates over equipment hatch (elev. 479') during refueling.
5.	FHS-RMS-1	Reactor Missile Shield	CTMT		Designed to retain RV head (220 Ton). Will generate no missiles during SSE.
6.	MHS-CRN-6	Reactor Area Jib Crane	CTMT		Not examined - crane does not lift heavy load.
7.	MHS-CRN-14	Reactor Area Jib Crane	CTMT		Not examined - crane does not lift heavy load.
8.	MHS-CRN-5	Fuel Transfer Tube Crane	CTMT	805001 & 805000	See Note #1.
9.	MHS-CRN-15	Equipment Hatch Service Jib	CTMT	805000, 805001, 805002, & 805003	See Note #1.
10.	MHS-MRH-24	FWA Pump Monorail Hoist	GSB T-W, 4-6.5	805417	See Note #1.
11.	MHS-MRS-23	Radwaste Compressor Service Monorail Hoist	GSB P-R, 3-4	805025	Hoist does not lift heavy loads.
12	MHS-MRH-2	Decontamination Room Monorail Hoist	GSB H-M, 5-6	805018	Load drop is acceptable - see ASB-0294.

Note 1: - There is not any safety-related equipment below this crane.

Note 2: - Safety-related equipment does not exist in this building.

NUREG 612 SAFETY-RELATED EQUIPMENT REVIEW

ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
13.	MHS-CRN-16	Machine Shop Bridge Crane	GSB A-D, 3-4		Load drop is acceptable.
14.	CRDSS-MRH	CRD Service Structure MRH	CTMT		See Note #1.
15.	MHS-MRH-3	Load Break Switch Monorail Hoist	Turbine Bldg.		See Note #2.
16.	MHS-CRN-7	Diesel Generator Jib Crane	GSB D-E, 3-4		Not examined - crane does not lift heavy load.
17.	MHS-CRN-10	Gamma Scan Facility Jib Crane	GSB Ra-S, 8-10		Not examined - crane does not lift heavy load.
18.	MHS-MRH-5	GSB Equipment Hatch Monorail Hoist	GSB Ra-S, 6.5-10	805412, 303309, & 303318	DHR Trains A & B.
19.	MHS-MRH-4	GSB Equipment Hatch Monorail Hoist	GSB G-H, 5-6	805019, 805018, 805017, & 805016	See Note #1.
20.	MHS-MRH-21	Condensate Polishing Monorail Hoist	Water Treatment Bldg.		See Note #2.
21.	MHS-MRH-9	Tank Room Monorail Hoist	Tank Rm., GSB	805431	See Note #1.
22.	MHS-MRH-15	Safeguards Area Monorail Hoist	Safeguards Area, GSB	805412	See Note #1.
23.	MHS-MRH-6	GSB Equipment Hatch, MRH	GSB T-U, 9.2-10	805413 & 805412	See Note #1.
24.	MHS-MRH-7	GSB Equipment Hatch, MRH	GSB U-W, 11-11.5	805413 & 805412	See Note #1.
25.	MHS-MRH-16	Stop Log Monorail Hoist	Outside Spray Pond Pump House		See Note #2.
26.	MHS-MRH-18	Machine Shop Monorail Hoist	GSB A-C, 1-3		Load drop is acceptable - see ASB-0294.
27.	MHS-MRH-17	IMS-MRH	CTMT	805003, 805002, 805001, & 805000 & 805001	See Note #1.

Note 1: - There is not any safety-related equipment below this crane.

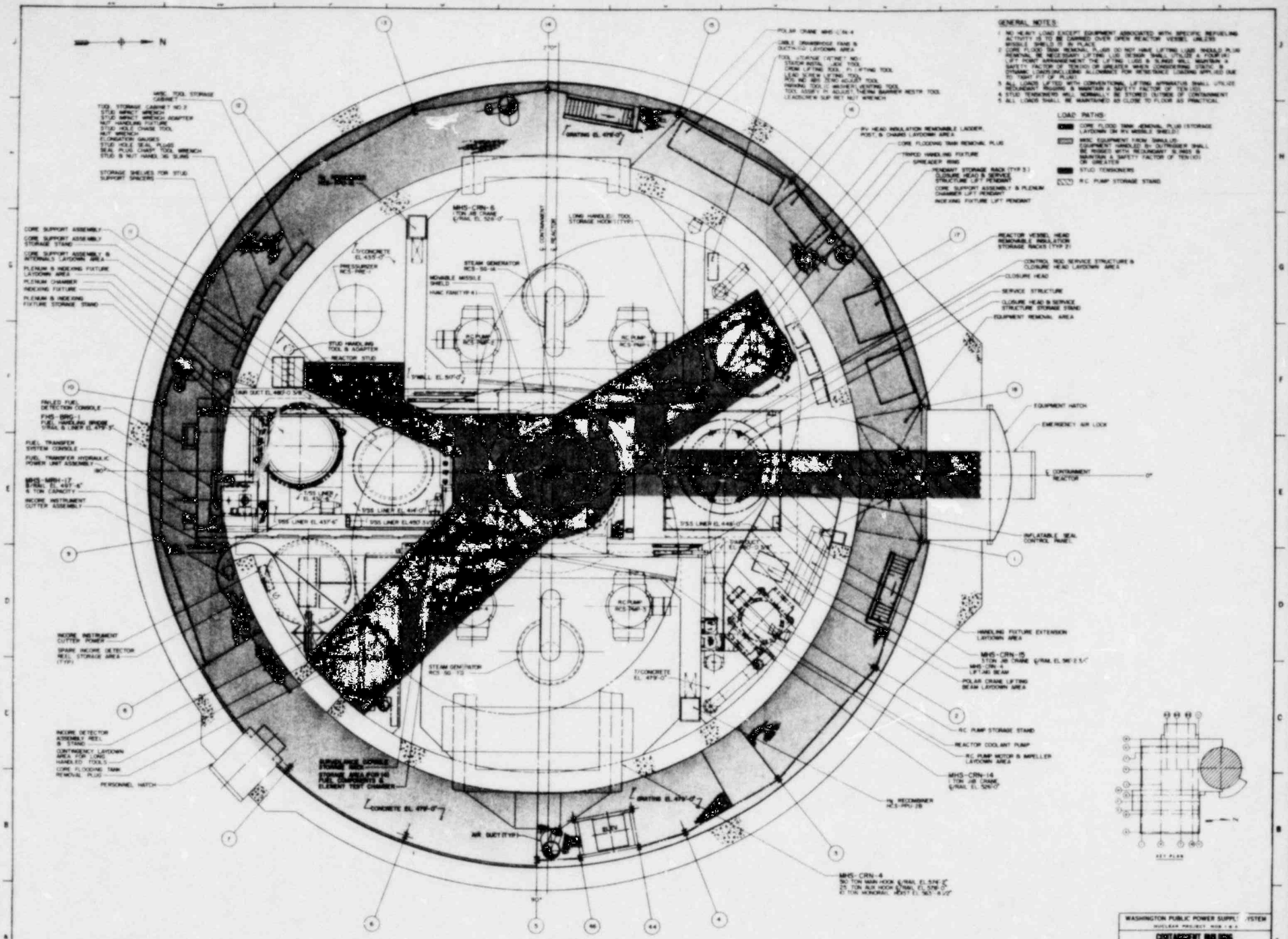
Note 2: - Safety-related equipment does not exist in this building.

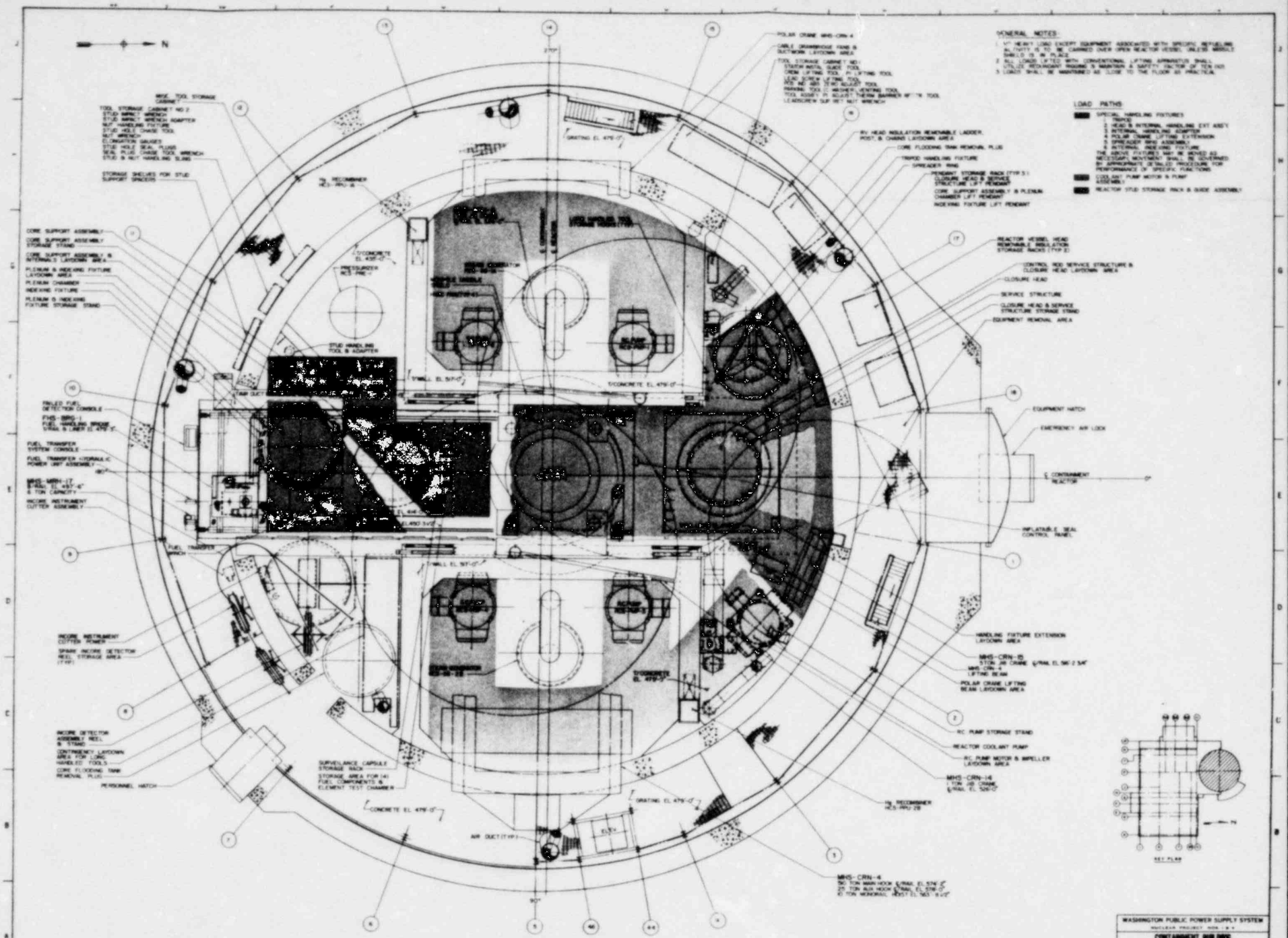
NUREG 612 SAFETY-RELATED EQUIPMENT REVIEW

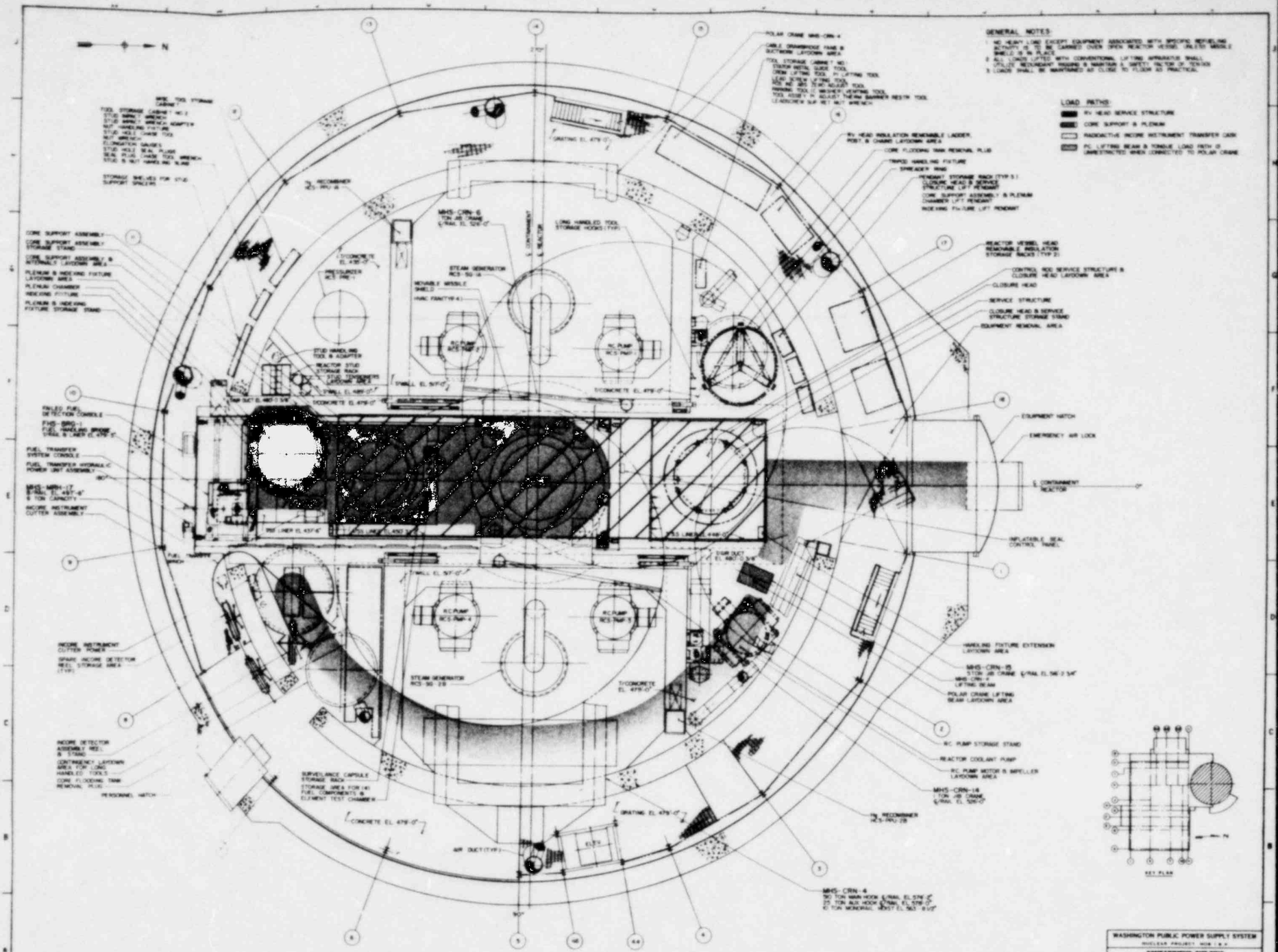
ITEM NO.	EQUIPMENT NUMBER	EQUIPMENT NAME	AREA CONSIDERED	REFERENCE DRAWING	REMARKS
28.	MHS-MRH-19	Ecuipment Maintenance	GSB T-V, 6.5-10	805412	See Note #1.
29.	MHS-MRH-20	Equipment Maintenance	GSB P-R, 6.5-9.2	805412	See Note #1.
30.	MHS-MRH-22	Screen Removal	Spray Pond Pump House		See Note #2.
31.	MHS-MRH-10	Diesel Service Hoist	GSB E-F, 1-4	202521 & 202520	See Note #1.
32.	MHS-CRN-8	Circulating Water & Fire Pump Crane	Circ. Water Pump House		See Note #2.
33.	MHS-CRN-11	Heater Bay Crane (Unit #4)	Turbine Bldg. E-A, 1-15		See Note #2.
34.	MHS-CRN-12	Heater Bay Crane (Unit #1)	Turbine Bldg. E-A, 1-15		See Note #2.
35.	MHS-CRN-13	Turbine Building Crane	Turbine Bldg. S-E, 1-15		See Note #2.
36.	FHS-BRG-2	Fuel Storage Handling Bridge	GSB P-Ra, 5-11		Not examined - crane does not lift heavy load.
37.	FHS-BRG-1	Main Fuel Handling Bridge	CTMT		Not examined - crane does not lift heavy load.
38.	RSW-CRN-1	Solid Waste Handling Crane	GSB P-U, 3-4	805025	Load drop is acceptable.
39.	RSW-MRH-1	Filter Maintenance Monorail	GSB K-P, 4-9	805018	BRS-TK-3, 4 BRS-PMP-5A, 6B - feed to all 4 seal injection lines.
40.	MHS-MRH-13	Portable Gantry Hoist	GSB R-S, 3-4	805025	See Note #1.
41.	MHS-MRH-14	Portable Gantry Hoist	GSB Q-R, 4-4.5	805417	See Note #1.
42.	MHS-MRH-12	Condenser Vacuum Pump Gantry Hoist	Turbine Bldg.		See Note #2.

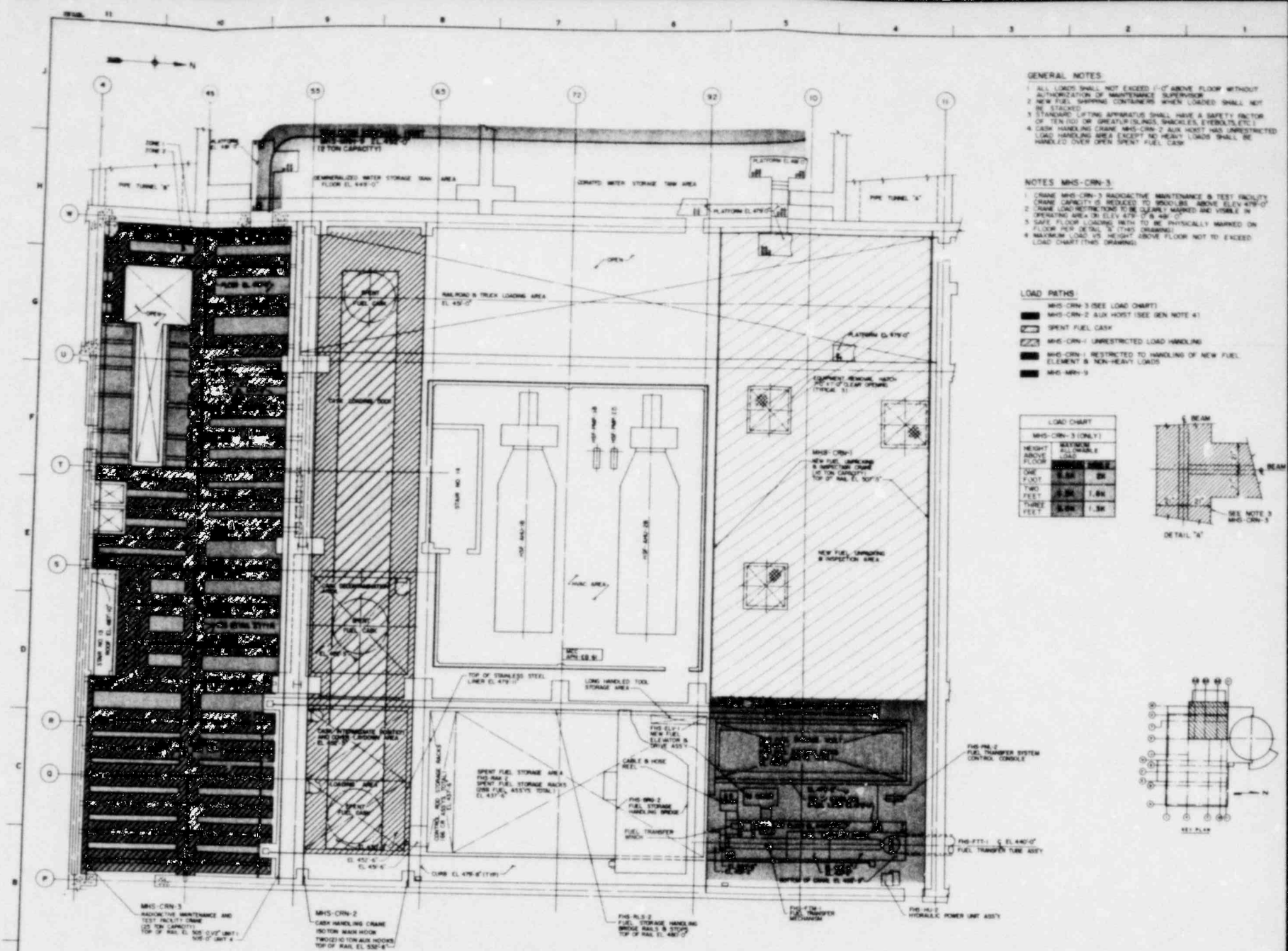
Note 1: - There is not any safety-related equipment below this crane.

Note 2: - Safety-related equipment does not exist in this building.


GENERAL NOTES
LOAD PATHS
PLAN AT EL 479'-0"
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
CONTAINMENT BUILDING
CONTROL OF HEAVY LOADS - EL 479'-0"
SAFE LOAD PATHS FOR MHS-CRN-4
SHEET 1 OF 3
8779-F-885784


GENERAL NOTES:
LOAD PATHS
PLAN AT EL 479'-0"
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
CONTAINMENT BUILDING
CONTROL OF HEAVY LOADS - EL 479'-0"
SAFE LOAD PATHS FOR MHS-CRN-4
SHEET 2 OF 3
9779-F-805705


GENERAL NOTES:
LOAD PATHS:
PLAN AT EL 479'-0"
KEY PLAN
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
CONTAINMENT BUILDING
CONTROL OF HEAVY LOADS - EL 479' 0"
SAFE LOAD PATHS FOR MHS-CRN-4
SHEET 3 OF 3
9779-F-885786

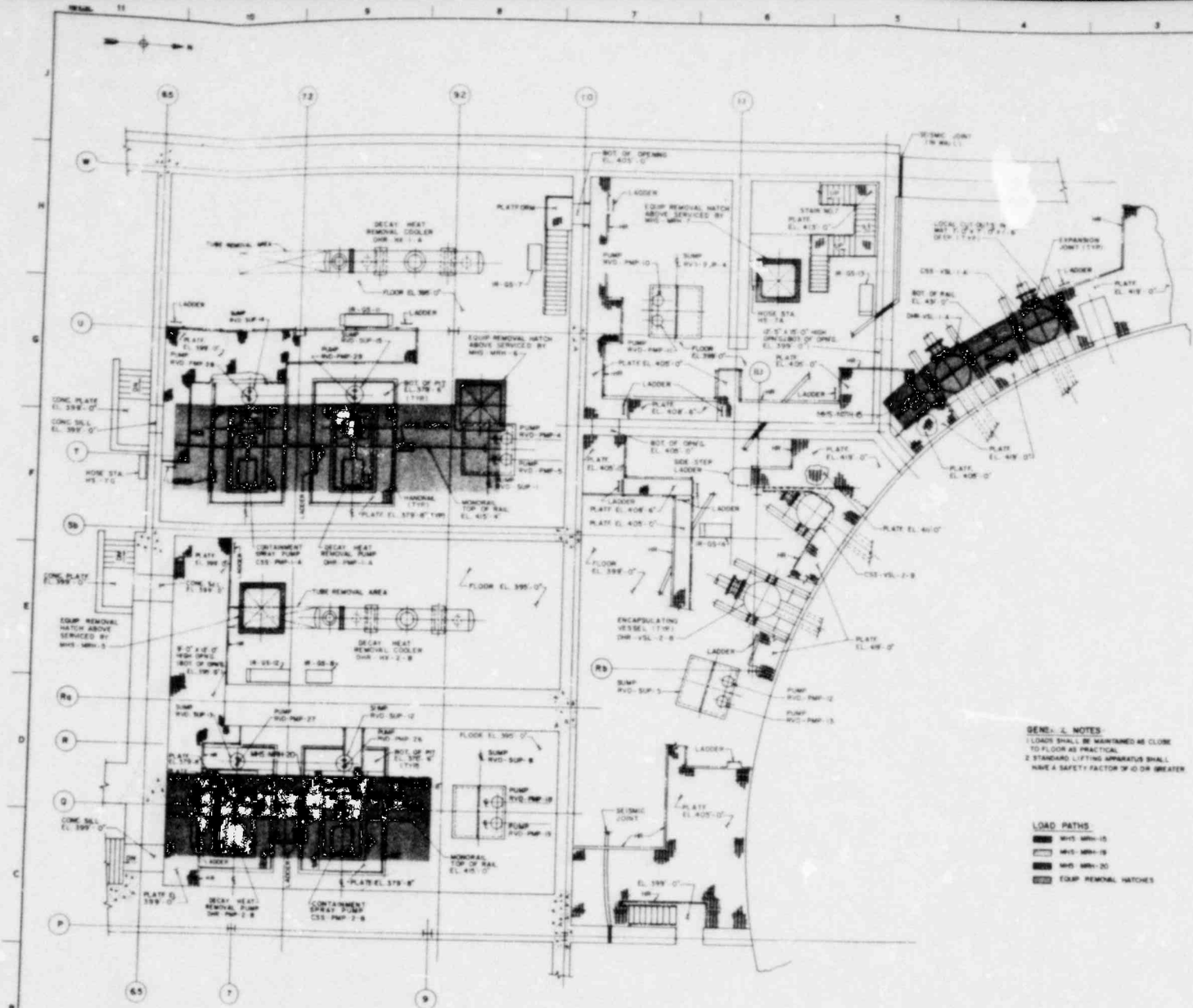


WASHINGTON PUBLIC POWER SUPPLY SYSTEM

NUCLEAR PROJECT NOS. 1 & 4

F.S.B. - FUEL STORAGE AREA
CONTROL OF HEAVY LOADS - EL. 479'-0"
SAFE LOAD PATHS FOR MHS-MRH-9,
MHS-CRN-1, 2 AND 3

9779-F-005707



PLAN AT EL. 395'-0"

EQUIPMENT MONORAIL HOISTS

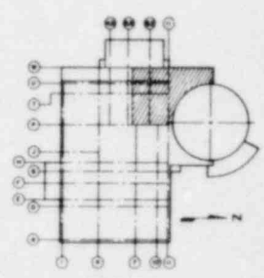
MHS-MRH-15
MHS-MRH-19
MHS-MRH-20

GENERAL NOTES

1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.
2. STANDARD LIFTING APPARATUS SHALL HAVE A SAFETY FACTOR OF 10 OR GREATER.

LOAD PATHS

- MHS-MRH-15
- MHS-MRH-19
- MHS-MRH-20
- EQUIP REMOVAL HATCHES



KEY PLAN

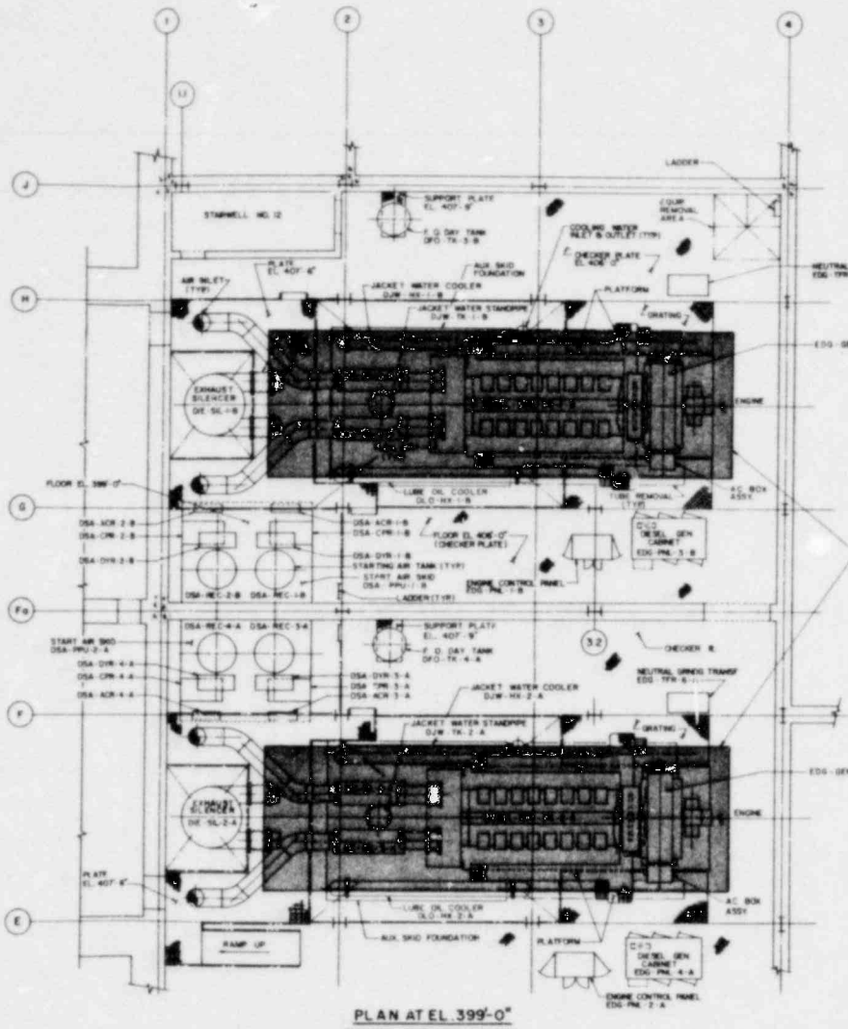
WASHINGTON PUBLIC POWER SUPPLY SYSTEM

NUCLEAR PROJECT NOS. 1 & 4

G.S.B. - SAFEGUARDS AREA
CONTROL OF HEAVY LOADS - EL. 395' 0"
SAFE LOAD PATHS FOR MHS-MRH-15, 19 AND 20

United engineers

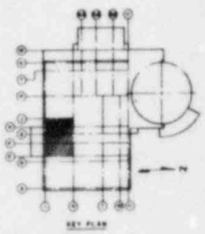
9779-F-805708



PLAN AT EL 399'-0"
DIESEL SERVICE HOISTS
MHS-MRH-10

GENERAL NOTES:

1. STANDARD LIFTING APPARATUS SHALL HAVE A SAFETY FACTOR OF 10 OR GREATER
2. LOAD SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL



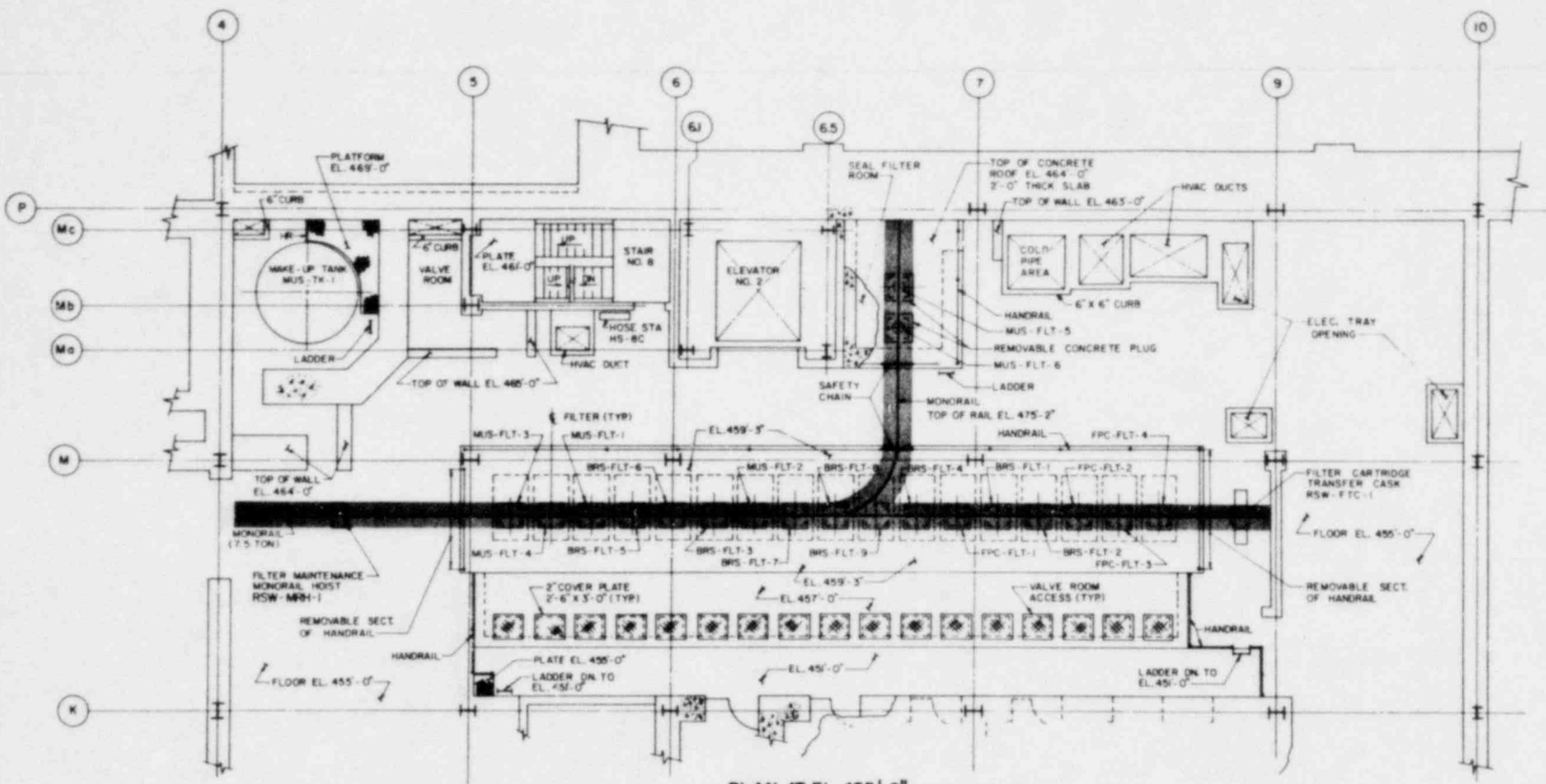
KEY PLAN

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NOS. 1 & 4

G.S.B. - DIESEL GENERATOR AREA
CONTROL OF HEAVY LOADS - EL. 399'-0"
SAFE LOAD PATHS FOR MHS-MRH-10

Wilbur engineers

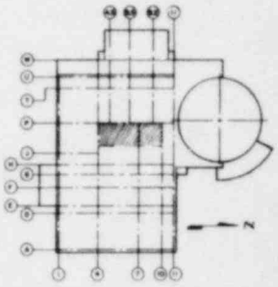
9779-F-005709



PLAN AT EL. 455'-0"
MONORAIL RSW-MRH-1

GENERAL NOTES

1. STANDARD LIFTING APPARATUS SHALL HAVE A SAFETY FACTOR OF TEN (10) OR GREATER
2. LOAD SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL



KEY PLAN

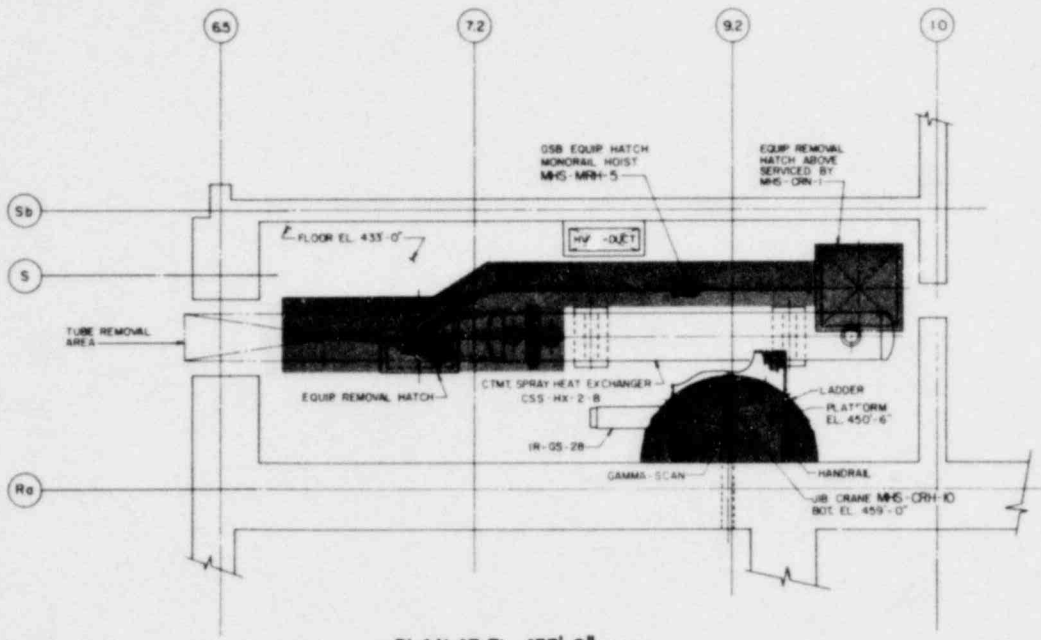
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NOS. 1 & 4

G.S.B. - FILTER AREA
CONTROL OF HEAVY LOADS - EL. 455'-0"
SAFE LOAD PATHS FOR RSW-MRH-1

united engineers

9779-D-805710

10 9 8 7 6 5 4 3 2 1



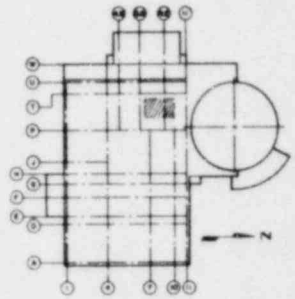
PLAN AT EL. 433'-0"
GAMMA SCAN FACILITY
JIB CRANE MHS-CRN-10
HATCH MONORAIL MHS-MRH-5

GENERAL NOTES:

1. STANDARD LIFTING APPARATUS SHALL HAVE A SAFETY FACTOR OF 10 OR GREATER.
2. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.
3. MAXIMUM LOAD HEIGHT ABOVE FLOOR IS 5 FEET.

LOAD PATHS:

- MHS-CRN-10
- MHS-MRH-5



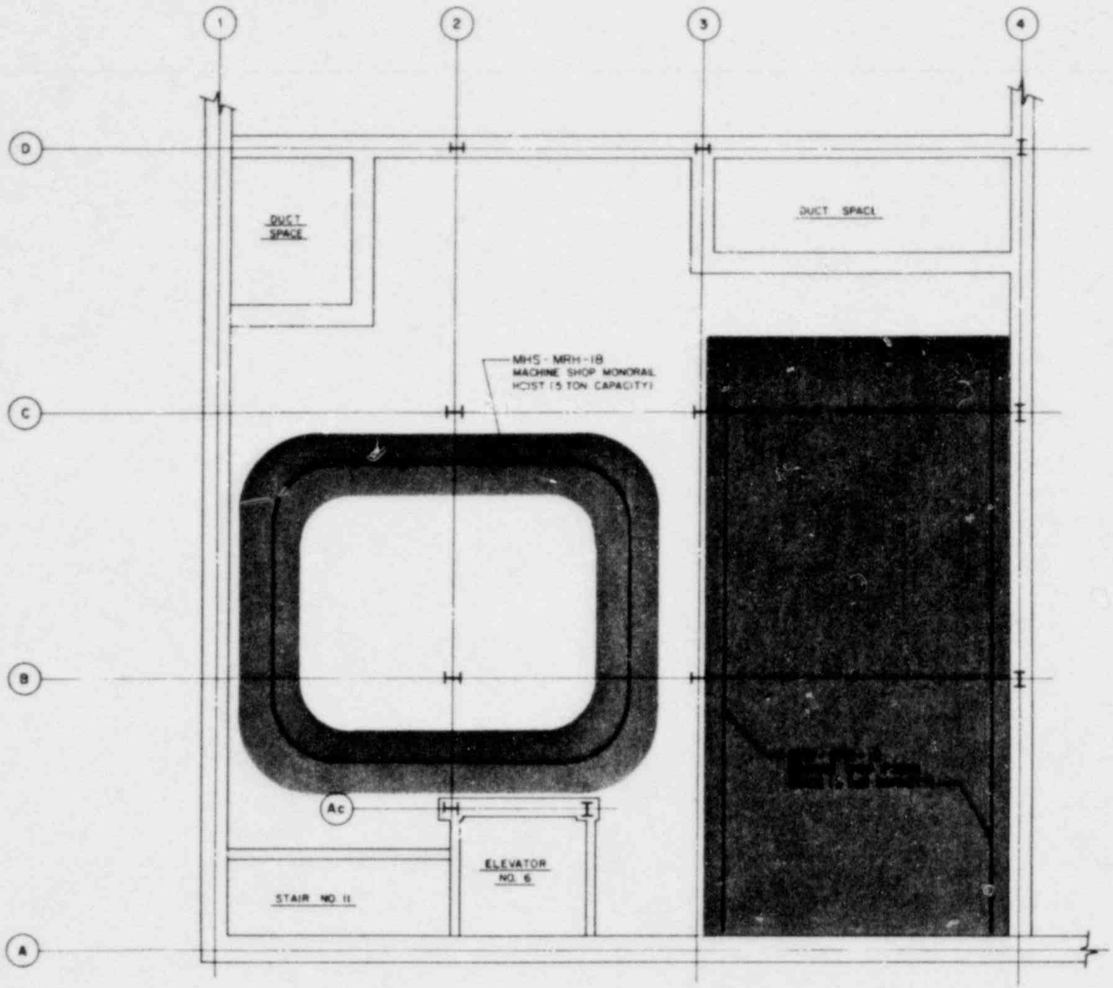
KEY PLAN

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO. 1 & 4

G.S.B. - SAFEGUARDS AREA
CONTROL OF HEAVY LOADS - EL. 433'-0"
SAFE LOAD PATHS FOR MHS-MRH-5 AND MHS-CRN-10

united engineers

9779-D-80571



PLAN AT EL 455'-0"

MACHINE SHOP BRIDGE CRANE, MHS-CRN-16

MACHINE SHOP MONORAIL HOIST, MHS-MRH-18

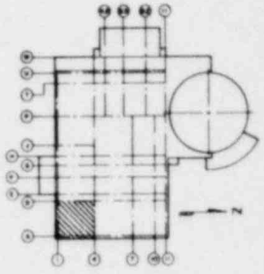
GENERAL NOTES:

1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.

LOAD PATHS:

MHS-CRN-16

MHS-MRH-18



KEY PLAN

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

NUCLEAR PROJECT NOS. 1 & 4

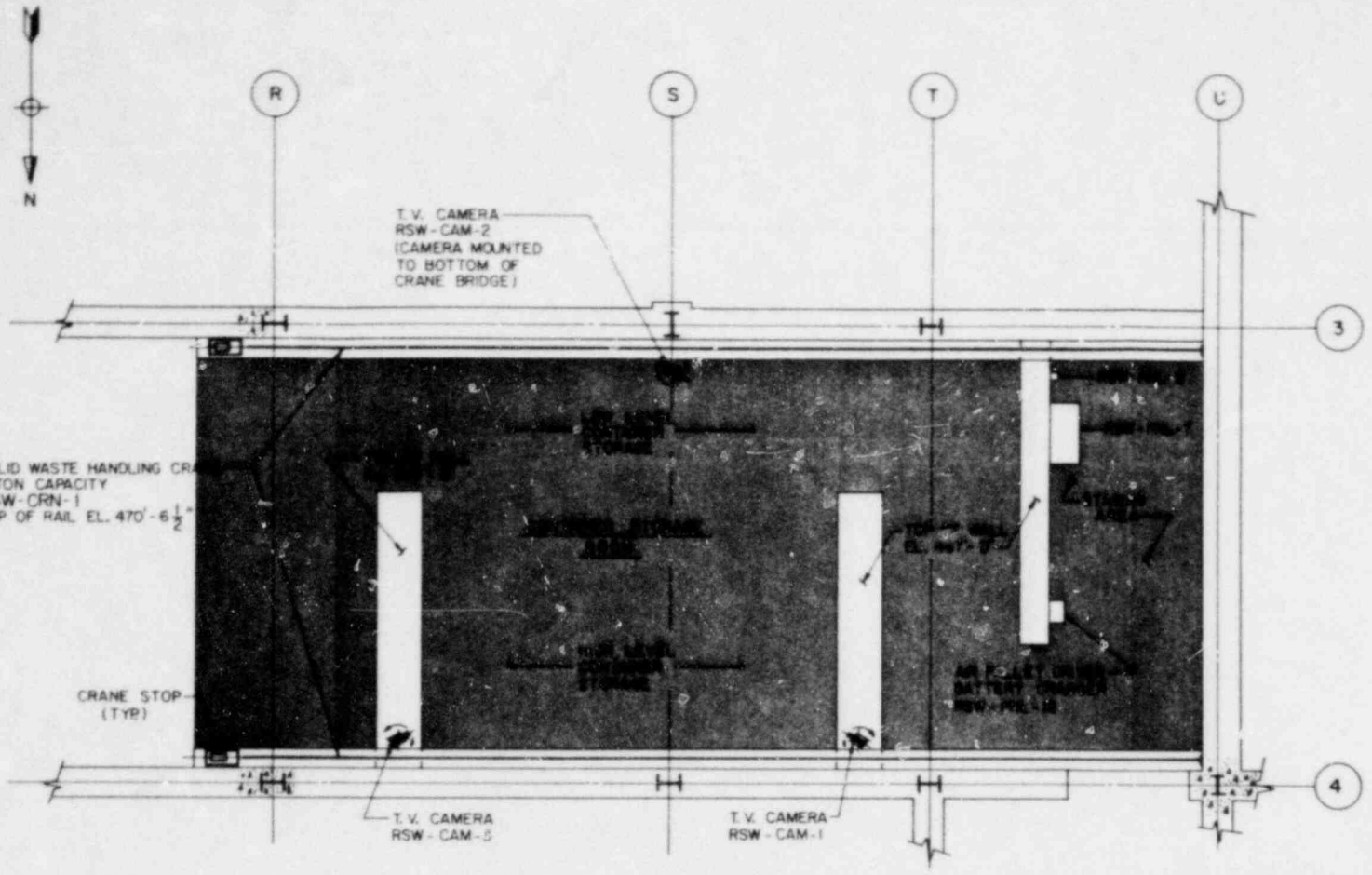
G.S.B. - MECHANICAL MACHINE SHOP

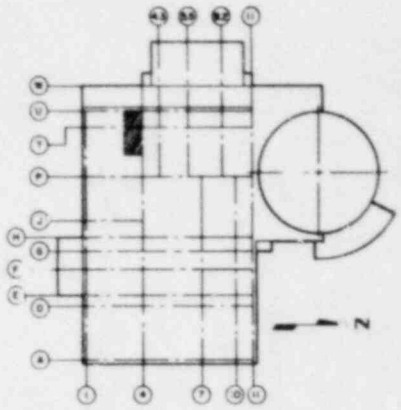
CONTROL OF HEAVY LOADS - EL. 455'-0"

SAFE LOAD PATHS FOR MHS-CRN-16 AND MHS-MRH-18

united engineers

9779-D-805712





KEY PLAN

PLAN AT EL. 455'-0"

SOLID WASTE HANDLING CRANE RSW-CRN-1

GENERAL NOTES:

1. LOAD TO BE MAINTAINED AS CLOSE TO FLOOR AS POSSIBLE.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NOS. 1 & 4

G.S.B. - SOLID WASTE HANDLING AREA
CONTROL OF HEAVY LOADS - EL. 455'-0"
SAFE LOAD PATHS FOR RSW-CRN-1

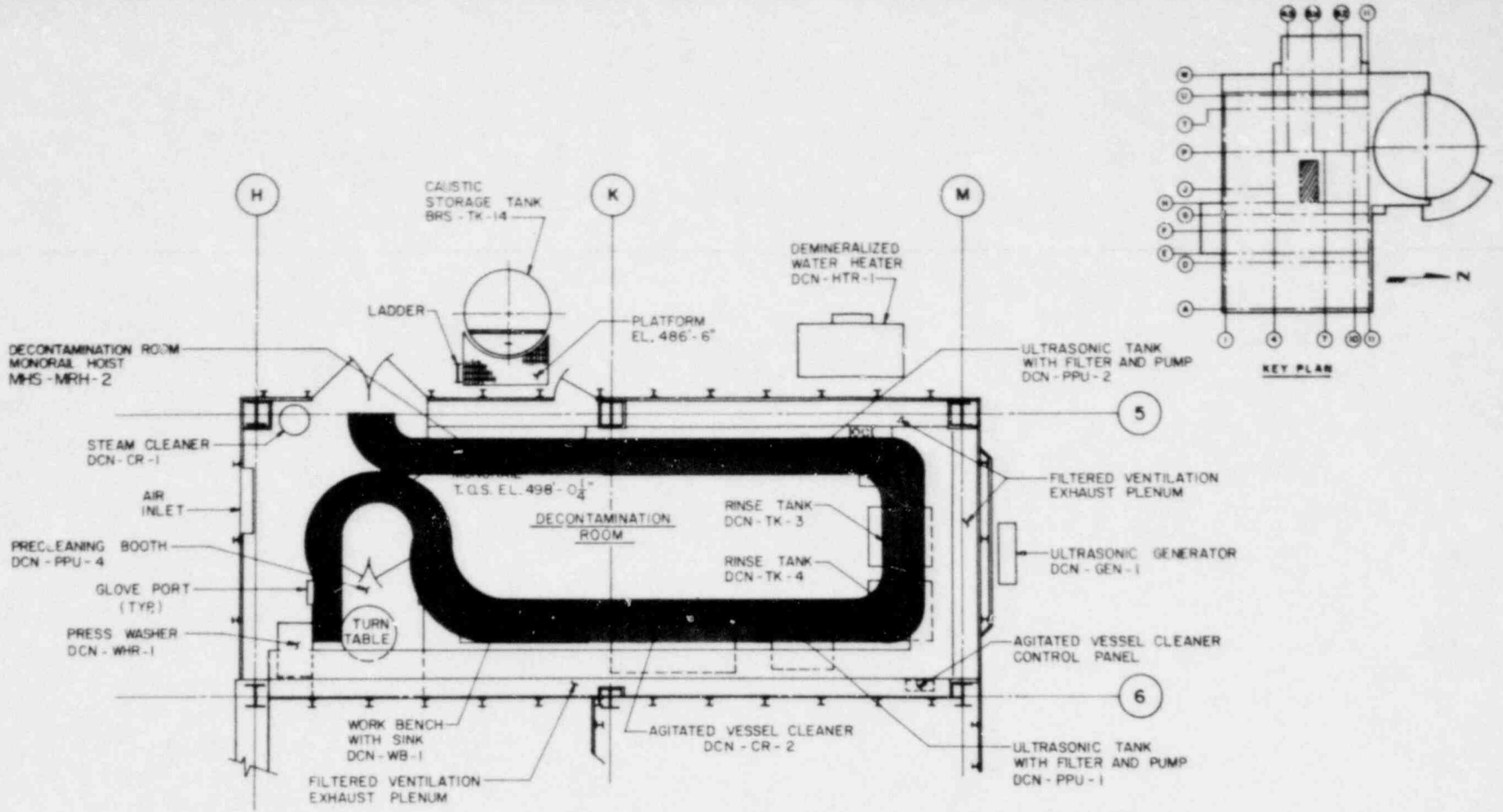
united engineers & constructors inc.

SCALE:

9779-C-805713

E D C B A

6 5 4 3 2 1



PLAN AT EL. 479'-0"

MONORAIL MHS - MRH-2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM NUCLEAR PROJECT NOS. 1 & 4	
G.S.B. - DECONTAMINATION ROOM CONTROL OF HEAVY LOADS - EL. 479'-0" SAFE LOAD PATHS FOR MHS-MRH-2 united engineers & constructors inc.	
SCALE:	9779-C-905714

6 5 4 3 2 1

E D C B A