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SUBJECT: Forwards supplemental response to NUREG-0612, "Control of Heavy Loads," Revision 1 to close out SER outstanding Issue 30.

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Washington Public Power Supply System
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Docket No. 50-397

October 4, 1982
G02-82-824

Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Schwencer:

Subject: NUCLEAR PROJECT NO. 2
RESPONSE TO NUREG-0612, CONTROL OF
HEAVY LOADS, REVISION 1; SUBMITTAL OF

Reference:
a) Letter, G.D. Bouchey (SS) to A. Schwencer (NRC), "Response to NUREG-0612, Control of Heavy Loads", dated January 13, 1982

b) Report, "Control of Heavy Loads of Nuclear Power Plants", Washington Nuclear Project No. 2, Docket No. 05000397, Author: B.W. Dixon, E.G.C., Idaho

The review of reference (a) reported in reference (b), requested supplemental information be provided to allow closure of Outstanding Issue No. 30, "Heavy Load Handling System" of Supplement No. 1 to the WNP-2 Safety Evaluation Report. Enclosed are sixty (60) copies of Revision 1 to the WNP-2 response to NUREG-0612.

With submittal of this revision the Supply System considers Outstanding Issue No. 30 of Supplement No. 1 to the WNP-2 SER, to be closed.

Very truly yours,

G. D. Bouchey
Manager, Nuclear Safety and Licensing

PLP/jca
Enclosure

cc: R Auluck - NRC
WS Chin - BPA
R Feil - NRC Site

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WNP-2
CONTROL OF HEAVY LOADS

8210190576

Revision 1

REFERENCE: a) Letter, D.C. Eisenhut to All Licensees, et al, "Control of Heavy Loads", dated December 22, 1980

b) Report, "Control of Heavy Loads of Nuclear Power Plants", Washington Nuclear Project No. 2, Docket No. 05000397, Author: B.W. Dixon, EGG, Idaho

The following are the WNP-2 responses to the request for information made in Enclosure 3 to reference (a) with supplemental information as requested in reference (b).

2.1.1 Note: The numbers in the left hand column refer to sections of Enclosure 3 Reference (a).

- Table I (Attachment 1) provides a listing of all overhead handling equipment with the potential to damage systems required for plant shutdown or decay heat removal and equipment capable of transporting a heavy load over or near spent fuel.

2.1.2 Scope

"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). Justify the exclusion of any overhead handling system from your list 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."

- The following cranes listed in Table I can be excluded for the following reasons:

MT-HOI-36

This hoist is a short spur monorail inside containment and is dedicated to handling reactor recirculation flow control valve internals. It can only be used when the reactor is shutdown and the containment is open. It does not pass over the RHR return suction lines, the RHR supply lines or other safe shutdown equiment. See "Reactor Building Elevation 522'".

MT-HOI-13

This hoist is inside containment and is used for working on the four (4) inboard main steam containment isolation valves. It will only be used when the reactor is shutdown and containment is opened for maintenance work. These monorails and the hoist do not pass over either the RHR system or return lines or other safe shutdown equipment. See "Reactor Building Elevation 501'".

MT-CRA-1

The Turbine Building Crane has the potential for damaging the high pressure turbine governor valves with their associated fast closure reactor shutdown switches. Procedural control consisting of a warning NOTICE posted in the crane cab will restrict loads to provide a safety factor of 10 when travelling over turbines when the turbines are in use. In addition, the RPS turbine control valve fast closure logic is "de-energized to trip" such that failure of the shutdown switches would produce a reactor scram.

MT-HOI-19A, B, C

Used for removing and reinstalling main steam relief valves (maximum weight 4,000#), crosses over the 14" RHR loop B - return to RPV at Azimuth 170°. The RHR line is approximately 18 feet under the valve passage and is protected by steel grating (1 1/2" deep 3/16 bars spaced 1 1/8" apart) supported on a 4' rectangle of 8" and 14" deep I beams. The RHR line is a 7' Radius bend at this location making a direct blow almost impossible even if the grating were penetrated. This coupled with the existance of an alternate shutdown cooling system (RHR Loop A) which does not pass under the relief valve monorail provide ample assurance that shutdown cooling capability will not be compromised by a potential drop of a heavy load.

This monorail system also passes over the Standby Liquid Control (SLC) supply line. The SLC system is not required during shutdowns when all control rods are fully inserted. The procedure for relief valve handling will stipulate that all rods must be inserted before carrying relief valves over this SLC line.

MT-HOI-16

This hoist is inside containment and is used to remove and reinstall the reactor recirculation motor and pump internals. The RRC-P-1A components cross over the single 20" RHR shutdown cooling suction line (Elevation 509') from azimath 145° to 195°. This 20" line lies below the 512' grating and support structure. Because of its physical size the 30 ton pump motor cannot be hoisted more than 6" above the 512' grating level. If the pump motor were to drop, the structural steel framework at Elevation 512' would preclude damage to the 20" RHR suction line. As a backup, the RHR system has an alternate shutdown cooling path should this shutdown cooling line become inoperable.

RHR Monorails

These monorails are 14 feet outside the spent fuel pool at the nearest point of approach. To help assure that a dropped load could not topple into the spent fuel pool, the refueling bridge will be stationed over the extreme west end of the pool during any use of these monorails.

2.1.3 Safe Load Paths (Guideline 1, NUREG-0612, Article 5.1.1(1))

a,b,c "Safe load paths should be defined for the movement of heavy loads to minimize the potential for heavy loads, if dropped, to impact irradiated fuel in the reactor vessel and in the spent fuel pool, or to impact safe shutdown equipment. The path should follow, to the extent practical, structural floor members, beams, etc., such that if the load is dropped, the structure is more likely to withstand the impact. These load paths should be defined in procedures, shown on equipment layout drawings, and clearly marked on the floor in the area where the load is to be handled. Deviations from defined load paths should require written alternative procedures approved by the plant safety review committee."

(a) • Load paths for these heavy loads are shown on the reactor building elevation plan drawings. (Enclosure 2)

- These load paths will be included in the procedures required for maintenance and handling of the equipment listed.

(b) • The primary control for assuring that load handling operations remain within safe load paths is procedural. The person in charge of lifts shall walk through the load path prior to a lift and insure that proper clearance exists for making the lift. Temporary marking of load paths will be utilized when it will assist in assuring that the safe-load path is followed.

(c) • Table I lists the load handling system with the heaviest loads handled. (Note: Heavy loads applies to all loads exceeding the weight of a fuel bundle and its handling equiment, i.e., 1,200 pounds.)

2.1.3.c Load Handling Procedures (Guideline 2, NUREG-0612, Article 5.1.1(2))

"Procedures should be developed to cover load handling operations for heavy loads that are or could be handled over or in proximity to irradiated fuel or safe shutdown equipment. At a minimum procedures should cover handling of those loads listed in Table 3-1 of NUREG-0612. These procedures should include: identification of required equipment; inspections and acceptance criteria required before movement of load; the steps and proper sequence to be followed in handling the load; defining the safe path; and other precautions."

• Written procedures will be provided for handling all "heavy loads" as defined in NUREG-0612 before the equipment is placed in service. Normally these procedures will be part of the overall procedure for equipment handling or overhaul. The following is a list of procedures identified to date that will require load handling controls:

Procedure #	Procedure Title	Approval Status
10.3.2	Shield Plug and Gate Removal and Replacement	A-12/17/81
10.3.3	Drywell Head Removal and Replacement	A-12/17/81
10.3.4	Reactor Vessel Head Insulation Removal and Replacement	To Be Written
10.3.5	Reactor Vessel Head Removal and Replacement	A-12/17/81
10.3.6	Reactor Vessel Steam Dryer and Moisture Separator Removal/Replacement	A-12/17/81
10.3.7	Vessel Service Platform Installation/Removal	A-12/17/81

Procedure #	Procedure Title	Approval Status
10.3.8	In-Vessel Rack Installation and Removal	A-12/17/81
10.3.9	Fuel Cask Handling	To Be Written
10.6.1	HPCS Pump Removal/Overhaul and Reinstallation	A-07/23/81
10.6.2	LPCS and RHR Pump Removal/Overhaul & Installation	A-04/29/81
10.7.1	RCIC Turbine Removal/Replacement and Rigging	A-06/04/81
10.9.4	Reactor Recirc Pump Motor Removal and Replacement	To Be Written
10.16.1	Standby Service Water Pump Overhaul	03/30/81
10.17.1	Main Steam Relief Valve Removal and Replacement	To Be Written
10.17.3	Main Steam Isolation Valve Overhaul	To Be Written
	Main Steam Turbine Rigging and Hoisting - Vendor Manual CVI-2-01-00-113, Tab 37 and 38	
	Main Generator Rigging and Hoisting - Vendor Manual CVI-2-01-00-141, Drawing 1114F90-3	

The following statement will be added to load handling procedures to provide for changing a load path when such change is essential:

- "Any deviation from the prescribed load path shall be marked upon the load path drawing and shall be reviewed and approved by the Shift Manager or his designee in writing before proceeding with the lift. Documentation and Plant Operating Committee approval shall be handled in accordance with PPM 1.2.4."

This note will not be added for monorail systems since there is only one path of travel.

Enclosure (3), PPM 10.3.5, "Reactor Vessel Head Removal and Replacement"; and (4), PPM 10.6.1, "HPCS Pump Removal, Overhaul and Reinstallation" represent typical maintenance tasks involving "heavy load" handling.

2.1.3(g) Crane Operator Training (Guideline 3, NUREG-0612, Article 5.1.1(3))

"Crane operators should be trained, qualified and conduct themselves in accordance with Chapter 2-3 of ANSI B30.2-1976, 'Overhead and Gantry Cranes' (6)."

- There are no exceptions taken to ANSI B30.2-1976 with respect to operator training, qualification and conduct. Per plant procedures, this type of training is documented and records of such training are maintained "current" by the training staff. Recertification is required every three (3) years unless the operator has not operated the crane during the year and in that case the operator must be recertified before operating the unit.

2.1.3(d) Special Lifting Devices (Guideline 4, NUREG-0612, Article 5.1.1(4))

"Special lifting devices should satisfy the guidelines of ANSI N14.6-1978, 'Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials' (7). This standard should apply to all special lifting devices which carry heavy loads in areas as defined above. For operating plants certain inspections and load tests may be accepted in lieu of certain material requirements in the standard. In addition, the stress design factor stated in Section 3.2.1.1 of ANSI N14.6 should be based on the combined maximum static and dynamic loads that could be imparted on the handling device based on char-

dynamic loads that could be imparted on the handling device based on characteristics of the crane which will be used. This is in lieu of the guideline in Section 3.2.1.1 of ANSI N14.6 which bases the stress design factor on only the weight (static load) of the load and of the intervening components of the special handling device."

- The following is a listing of all special lifting devices:

Device	Loads Lifted	Drawing No.
Dryer/Separator Sling (NSSS-EQ-14)	Steam Dryer (40 tons)	GE-767E438P001
	Moisture Separator (73 tons)	
RPV Head Strongback (NSSE-EQ-15)	RPV Head (94 tons)	GE-767E187P001
	Drywell Head (52 tons)	
	Insulation Space Frame (25 tons)	
Service Platform Sling (NSSE-EQ-39)	Service Platform (6 tons)	GE-117C4530P1
RRC Motor Strongback	RRC Pump Motor (30 tons)	GE-145C6465
Fuel Cask	Not designed to purchase to date, but will conform to ANSI N14-6 and NUREG-0612	
Stud Tensioner Handling Frame	4 Stud Tensioners (total weight 2½ tons)	

The Head Strongback, the Dryer/Separator Sling, the Stud Tensioner Carrousel, and the Service Platform Sling conform to ANSI N14.6-1978 and Section 5.1.1(4) of NUREG-0612. The reference lifting devices are designed to be capable of lifting five (5) times the static load without exceeding the ultimate strength of the material. Structural members also meet the requirements of not exceeding the yield strength with three (3) times the static load applied. The Head Strongback and Dryer/Separator Sling hook boxes will be modified to provide attachment to the eye hook as well as the sister hook. These devices all attach to the load at four (4) points, thus a single failure will not result in an uncontrolled drop. Because of the slow speed of the main hoist and the attendant low acceleration/deceleration, the dynamic loads are calculated to be less than 2%. This was verified by actual load tests while monitoring load cell readings.

The RRC Motor Strongback is not a "single failure" proof lifting device. It was designed with a safety factor of 5 versus static load. As stated in the original response to NUREG-0612 under MT-HOI-16, "This hoist is inside containment and is used to remove and reinstall the reactor recirculation motor and pump internals. The RRC-P-1A components cross over the single 20" RHR shutdown cooling suction line (Elevation 509') from azimuth 145^0 to 195^0. This 20" line lies below the 512' grating and support structure. Because of its physical size the 30 ton pump motor cannot be hoisted more than 6" above the 512' grating level. If the pump motor were to drop, the structural steel framework at Elevation 512' would preclude damage to the 20" RHR suction line. As a backup, the RHR system has an alternate shutdown cooling path using the SRV discharge lines to transfer heat to the suppression pool should this shutdown cooling line become inoperable."

2.1.3(d) Lifting Devices (Not Specially Designed) (Guideline 5, NUREG-0612, Article 5.1.1(5))

"Lifting devices that are not specially designed should be installed and used in accordance with the guidelines of ANSI B30.9-1971, 'Slings' (8). However, in selecting the proper sling, the load used should be the sum of the static and maximum dynamic load. The rating identified on the sling should be in terms of the 'static load' which produces the maximum static and dynamic load. Where this restricts slings to use on only certain cranes, the slings should be clearly marked as to the cranes with which they may be used."

- The following is the listing requested. These slings comply with Table 7 of ANSI B30.9 and include a 15% allowance for dynamic loads. Slings will be tagged to show test dates and rated capacity: (Note: Hoisting speeds for all of these hoists is less than 30 fpm.)

Hoist	Heavy Load Description	Max Weight Tons	Slings to be Used
MT-HOI-10	HPCS Pump	16.5	2-1¼" Dia.-6X37 ips
MT-HOI-19C	Main Steam Relief Valve	2	2-½" Dia.-6X19 ips
MT-CRA-6A,6B	Standby Service Water Pump Motor	7 7.5	2-1" Dia.-6X19 ips
MT-CRA-2	Vessel Cavity Shield Plugs	108	NSSE-EQ-40:4 chokers rated 39.6 ton safe working load each a 5:1 safety factor
	Dryer Separator		2" Dia.-6X36XIPI WRC
	Storage Plugs Top Plug	60	4-13/4" Dia.-6X37
	Dry-Separator		
	Storage Plugs-Bottom 3	37	2-2" Dia.-6X37 ips
	Fueling Slot Plugs	8	2-1" Dia.-6X19 ips
	Cattle Chute	11	4-3/4" Dia.-6X19 ips
	In-Vessel Stud Rack	600#	2-3/8" Dia.-6X19 ips
MT-CRA-9A,9B	Fuel Handling Jib. Crane		Designed for light loads only. Load limit 1000 lbs.
MT-CRA-11	Service Platform Channel Handling Boom - Jib. Crane		Designed for light loads only. Load limit 1000 lbs.
MT-HOI-18	Pipe Tunnel Hatch	7	2-1" Dia.-6X19 ips
MT-HOI-13	Inboard Main Steam Isolation Valves	2	2-½" Dia.-6X19 ips
MT-HOI-19A-19B	Main Steam Relief Valves	2	2-½" Dia.-6X19 ips
MT-HOI-36	RRC Flow Control Valve Internals	2	2-½" Dia.-6X19 ips
MT-HOI-6	RHR Pumps A and B	5	2-3/4" Dia.-6X19 ips
MT-HOI-8	RHR Pump C	5	2-3/4" Dia.-6X19 ips
MT-HOI-7	RCIC Pump	3	2-5/8" Dia.-6X19 ips
MT-HOI-9	LPCS Pump Motor	5	2-3/4" Dia.-6X19 ips

Hoist	Heavy Load Description	Max Weigth Tons	Slings to be Used
MT-CRA-1	Generator Rotor	181	T11 - 8-1" wire ropes inter-woven - 2 slings of 2 parts each
	HP Turbine Rotor	58	3-Turnbuckle-Style #397A676001
	HP Cylinder	75	2-Sling 2X168-Style #398A399001 2-Sling 1.50X258-Style #874C62202 1-Sling 1.50X180-Style #874C62203 3-Sling 2.75-Style #398A726001 1-Sling 1.50X258-Style #874C62202
	L.P. Rotor	99	4-Turnbuckle 2.75-Style #270A10H1
	L.P. Cover/inner #1	25	2-Sling 2.00X168-Style #623C68266
	L.P. Cylinder Cover/inner #2	50	2-Sling 1.50X84-Style #874C645012
	L.P. Cylinder Cover/outer #2	66	2-Sling 1.50X144-Style #874C64501 2-Sling Assembly-Style #870C654A0 4-Shackle 1.75-Style #460B139015 4-Shackle 2.50-Style #460B139018

Note: Slings and sling assemblies used with MT-CRA-1 were provided by Westinghouse Company and are only used with the Turbine Shutdown. In this mode their failure could not affect nuclear safety.

2.1.3(e) Cranes (Inspection, Testing, and Maintenance) (Guideline 6, NUREG-0612, Article 5.1.1(6))

"The crane should be inspected, tested, and maintained in accordance with Chapter 2-2 of ANSI B30.2-1976, 'Overhead and Gantry Cranes', with the exception that tests and inspections should be performed prior to use where it is not practical to meet the frequencies of ANSI B30.2 for periodic inspection and test, or where frequency of crane use is less than the specified inspection and test frequency (e.g., the polar crane inside a PWR containment may only be used every 12 to 18 months during refueling operations, and is generally not accessible during power operation. ANSI B30.2, however, calls for certain inspections to be performed daily or monthly. For such cranes having limited usage, the inspections, test, and maintenance should be performed prior to their use)."

- Plant Procedure 10.4.1 (Enclosure 5) lists the inspection requirements for plant cranes. This procedure will be modified as noted to assure full compliance with ANSI B30.2, Chapter 2-2.

2.1.3(f) Crane Design (Guideline 7, NUREG-0612, Article 5.1.1(7))

"The crane should be designed to meet the applicable criteria and guidelines of Chapter 2-1 of ANSI B30.2-1976, 'Overhead and Gantry Cranes', and of CMAA-70, 'Specification for Electric Overhead Traveling Cranes' (9). An alternative to a specification in ANSI B30.2 or CMAA-70 may be accepted in lieu of specific compliance if the intent of the specification is satisfied."

- The Reactor Building crane was built to CMAA Specification #70, it conforms to ANSI B30.2, Chapter 2-1 (and was just tested to verify this conformance) and is in compliance with NUREG-0554 (as interpreted at the time of purchase). See Enclosure 6, IOM B.A. Holmberg to JW Hedges, "Single Failure Proof Reactor Building Crane", dated November 2, 1981, and the Whiting Bid Proposal (Enclosure 7).

  The remaining cranes were built to CMAA Specification #70 and meet the applicable criteria of ANSI B30.2.0, Chapter 2-1. The hoists were built to CMAA Specification #70 and meet the applicable criteria of ANSI B30.16.

2.2.1 Four (4) cranes are physically capable of carrying loads over spent fuel in the storage pool or reactor vessel:

MT-CRA-2	- Reactor Building Crane
MT-CRA-9A, 9B	- Refueling Platform/Service Platform Jib Crane
MT-CRA-11	- Channel Handling Boom

2.2.2 The Refueling Platform/Service Platform Jib Crane (MT-CRA-9A,9B) are provided with load limiting devices that limit the load to 1200 lbs.

The Channel Handling Boom (MT-CRA-11) is only designed for 200 pound loads. On this basis, these three (3) cranes should be excluded from the criteria of 2.2.1.

2.2.3 The Reactor Building Crane (MT-CRA-2) main hoist meets the requirements for a "Single failure proof crane" as per NUREG-0612, Appendix C. See Enclosure 3 - IOM "Single Failure Proof Reactor Building Crane" - B.A. Holmberg to J.W. Hedges, dated November 2, 1981, and the Whiting Bid proposal (Enclosure 6).

The auxiliary hoist will be derated to 7½ tons maximum versus 15 tons design rating for handling heavy loads over the spent fuel pool or open vessel cavity thus doubling the design safety factor. In addition, travel of the Reactor Building Crane is limited for the main and auxiliary hooks as shown in the area over the spent fuel pool (Reactor Building Elevation 606'-10½).

2.3.2.b The following list of cranes and hoists were installed to permit maintenance of a specific piece of equipment. These lifting devices do not meet the requirements of NUREG-0612 and it is not considered economically practical to modify them to meet these requirements. They will be locked out in a safe position and not placed in use until the equipment they service has been declared inoperable per the Plant Technical Specifications.

MT-HOI-6	Services RHR Pumps A and B
MT-HOI-7	Services RCIC Pump and Turbine
MT-HOI-8	Services RHR Pump C
MT-HOI-9	Services LPCS Pumps
MT-HOI-10	Services HPCS Pumps
MT-CRA-6A & 6B	Services Standby Service Water Pumps, 1A and 1B
MT-HOI-18	Services Outboard Main Steam Isolation Valves

TABLE 1

OVERHEAD HANDLING SYSTEMS AND HEAVIEST LOAD HANDLED

Hoist or Crane	Design Rating (tons)	Heavy Load Hoisted	Weight of Heavy Load (tons)
MT-HOI-19A & B	2	Main Steam Relief Valve	2 (max)
MT-HOI-36	4	Recirc Flow Control Valve Internals	2
MT-HOI-6	6	RHR Pump A or B -	5
		RHR Pump Motor	3.5
MT-HOI-8	6	RHR Pump C	5
		RHR Pump Motor	3.5
MT-HOI-7	5	RCIC Pump	3
		RCIC Turbine	2.5
MT-HOI-9	7	LPCS Pump	4
		LPCS Pump Motor	5
MT-HOI-10	20	HPCS Pump	16.5
		HPCS Pump Motor	10
MT-HOI-19C	2	Main Steam Relief Valves	2 (max)
MT-CRA-6A, 6B	8	Standby Service Water Pump	7
		Standby Service Water Motor	7.5
MT-CRA-2	125/15	Vessel Cavity Shield Plugs	111
		Dryer Separator Top Storage Plugs	60
		Dryer Separate Bottom 3 Storage Plugs	37
		Fueling Slot Plugs	8
		Drywell Head	52
		Insulation Head	25
		RPV Head	93
		"Cattle Chute"	15
		Vessel Service Platform	6
		RPV Steam Dryer	40
		RPV Moisture Separator	73
		Fuel Cask. (Est.)	100
		Load Block (Est.)	8
MT-CRA-1	200/25	Generator Rotor	181
		H.P. Turbine Rotor	58
		H.P. Cylinder	75
		L.P. Rotor	99
		L.P. Cover/inner #1	25
		L.P. Cylinder Cover/inner #2	50
		L.P. Cylinder Cover/outer	66
		Load Block (Est.)	4
MT-CRA-9A, 9B	0.6	Fuel Bundle	680 lbs.
MT-CRA-11	0.1	Fuel Channels	200 lbs. (max)
MT-HOI-18	8	Pipe Tunnel Hatch Covers	7
		Main Steam Isolation Valve Internals	2
MT-HOI-13	8	Main Steam Isolation Valve Internals	2
RHR HX Monorail	20	RHR Heat Exchanger	20 (max)

ENCLOSURE 1

ANALYSIS OF RADIOLOGICAL RELEASES

Section 15.7.4 of the WNP-2 Final Safety Analysis Report discusses "Fuel Handling Accident". The modified Table 2.1-2 shown below compares WNP-2 assumptions with those provided in Attachment 7.

TABLE 2.1-2

HEAVY LOAD DROP ACCIDENT ASSUMPTIONS

	Reactor Type	PWR and BWR	WNP-2 Values
	Power Level (Mwt)	3,000	3,323
0-2 hour	X/Q (Exclusion area boundary), sec/M^3	1.0×10^{-3} 1/	$1. \times 10^{-3}$
0-2 hour	X/Q LPZ, sec/M^3	1.0×10^{-4} 1/	$1. \times 10^{-4}$
	Peaking Factor	1.2 2/	
	No. of Assemblies in Core	193(PWR), 760(BWR)	764
	Pool Water Decontamination Factor	100 3/ (for radio-active iodines)	
	Filter Efficiency %:		
	Elemental Iodine	95% 4/	
	Organic Iodine	95%	
	Cooling Time (hours)	100 or greater	24 Hours

1/ Based on 5% worst meteorological conditions.

2/ Value is 1.2 for greater than one damaged fuel assembly. For a single assembly the values are 1.65 and 1.5 for PWRs and BWRs, respectively,

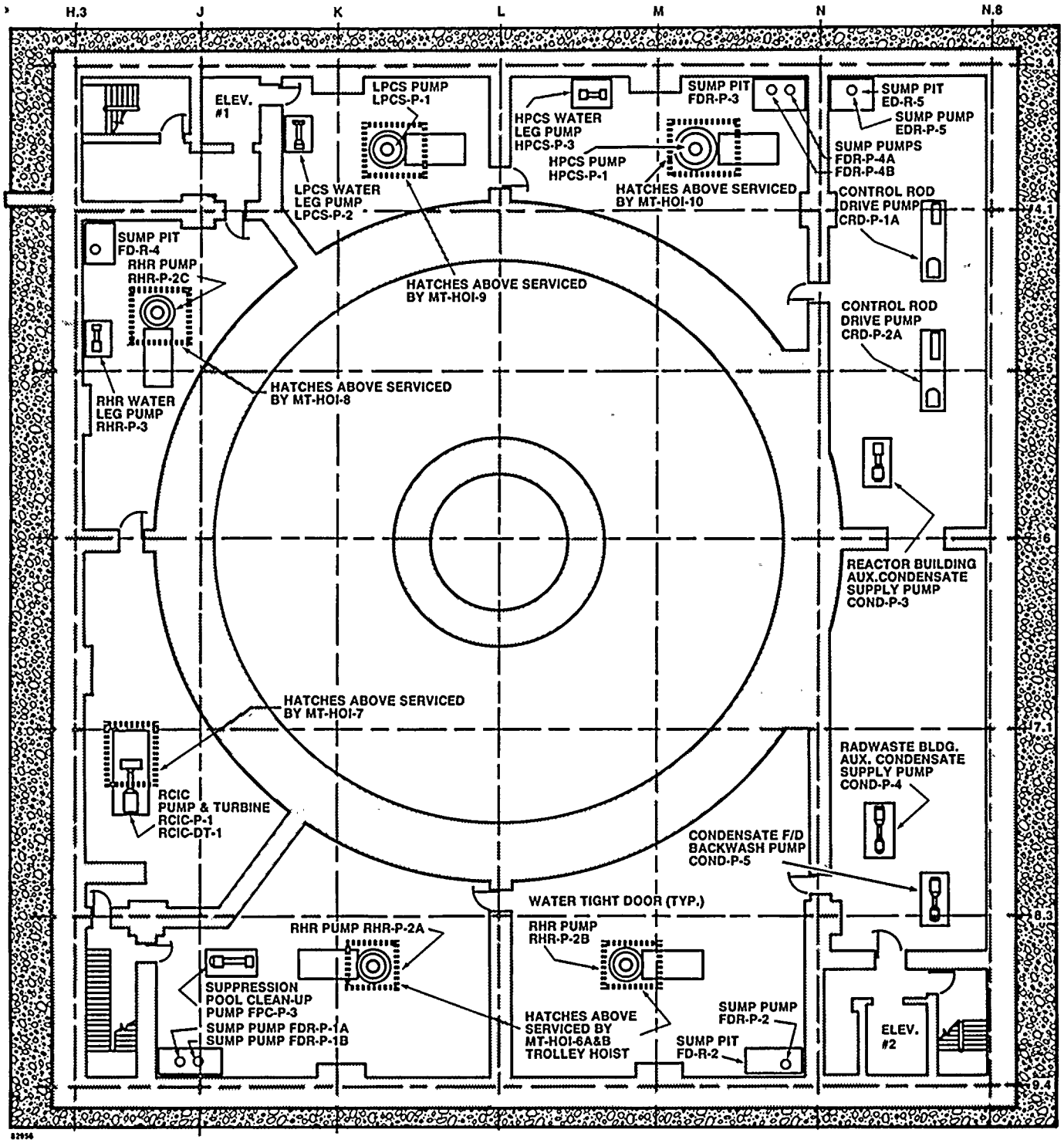
3/ See Reg. Guide 1.25

4/ See Reg. Guide 1.52

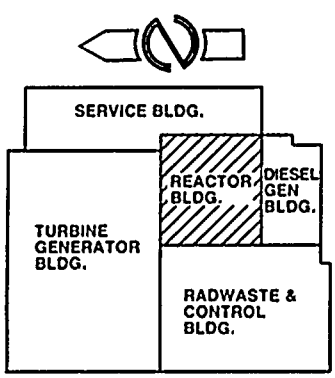
NOTE: With the exception of power level WNP-2 is more conservative than the assumptions shown in Table 2.1-2.

CRITICALITY ANALYSIS

Section 9.1.2.3 of the WNP-2 Final Safety Analysis Report discusses criticality control as it is associated with spent fuel storage. Technical Specification Sections 3/4.9.6 "Refueling Plantform Operability" and 3/4.9.7 "Crane Travel - Spent Fuel Storage Pool" provides limiting conditions for operation to limit loads moved over the spent fuel pool to stay within the bounds of the FSAR Criticality Analysis.



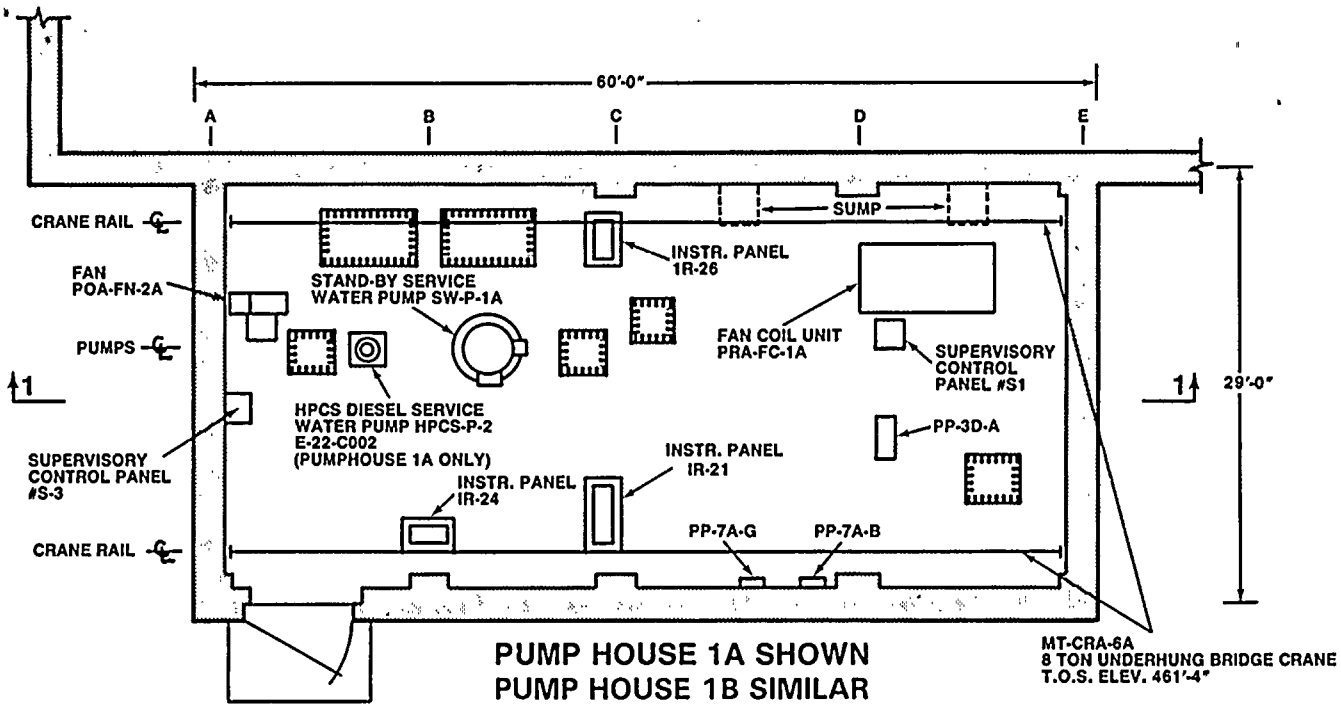
HATCH



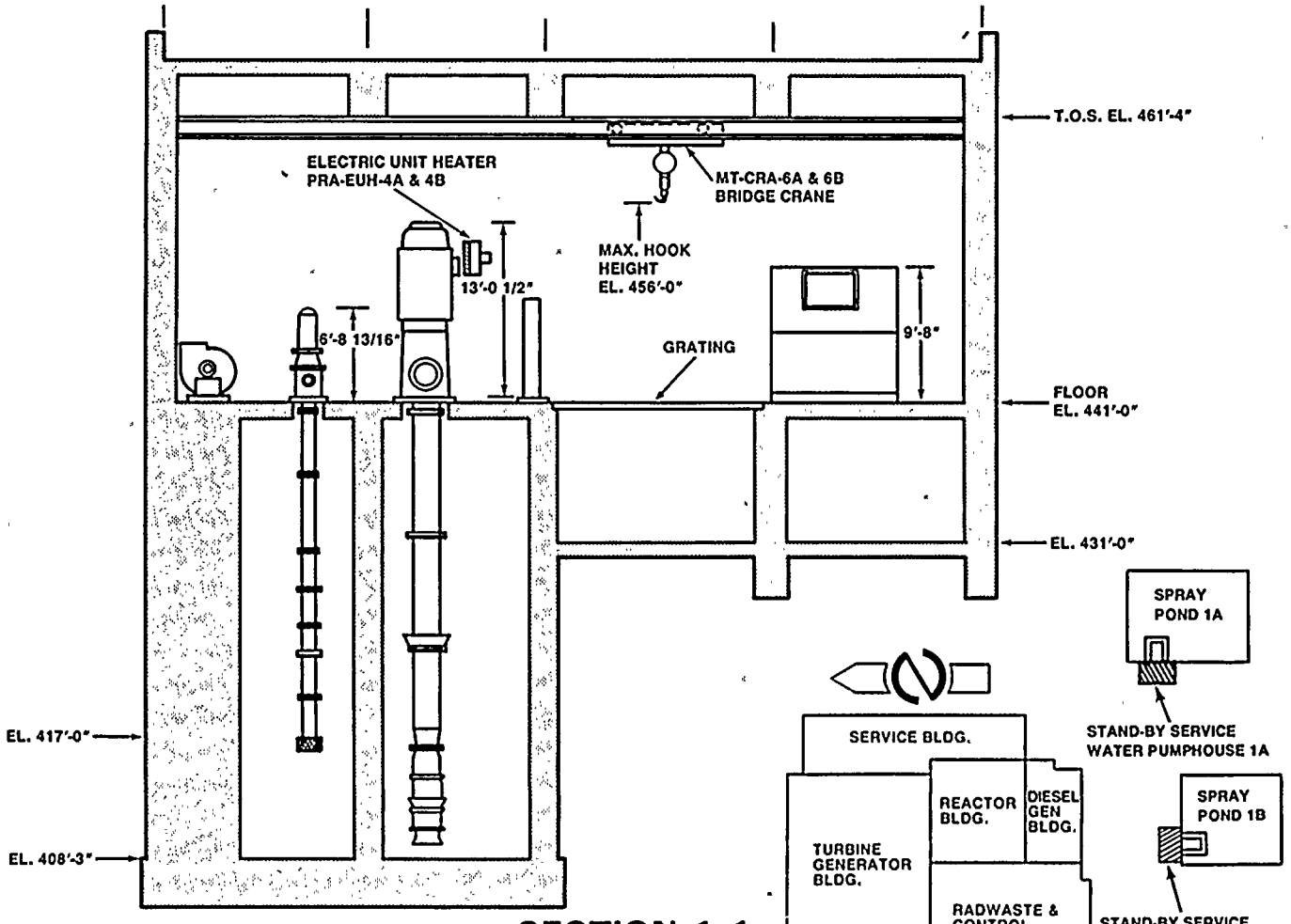
WNP-2
REACTOR BLDG
ELEV 422′-3″

WASHINGTON PUBLIC POWER
SUPPLY SYSTEM

ENCLOSURE 2



PUMP HOUSE 1A SHOWN
PUMP HOUSE 1B SIMILAR



SECTION 1-1

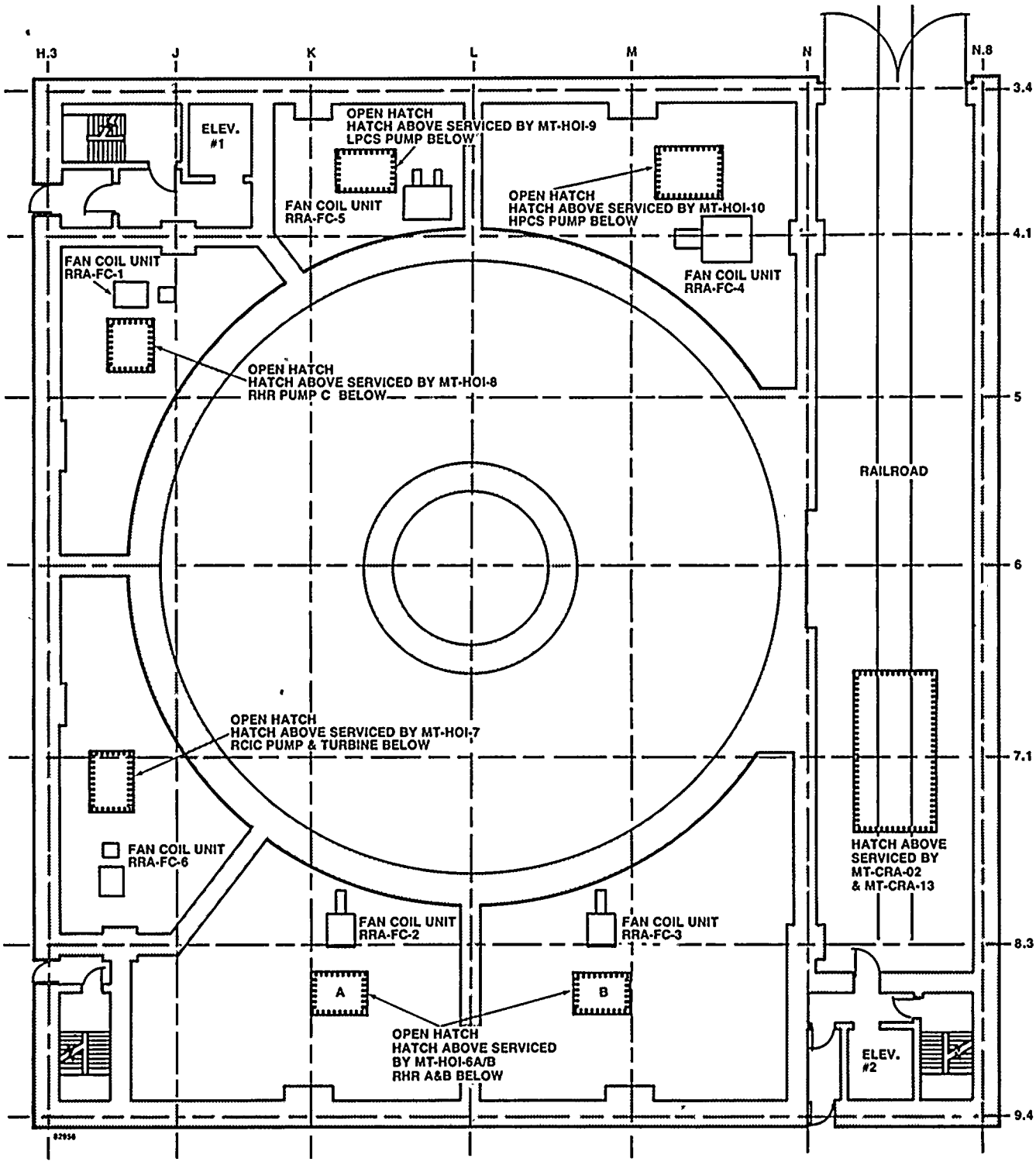
GENERAL NOTES:
1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.

COVERED HATCH

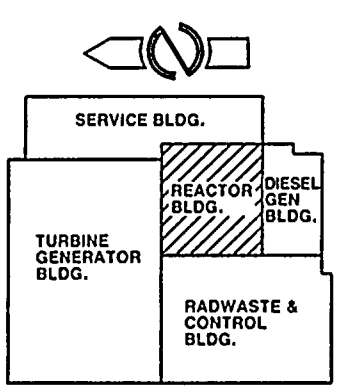
LOAD PATHS:
MT-CRA-6A,B

WNP-2
PUMP HOUSE 1A/B
EL. 441'-0"

WASHINGTON PUBLIC POWER
SUPPLY SYSTEM



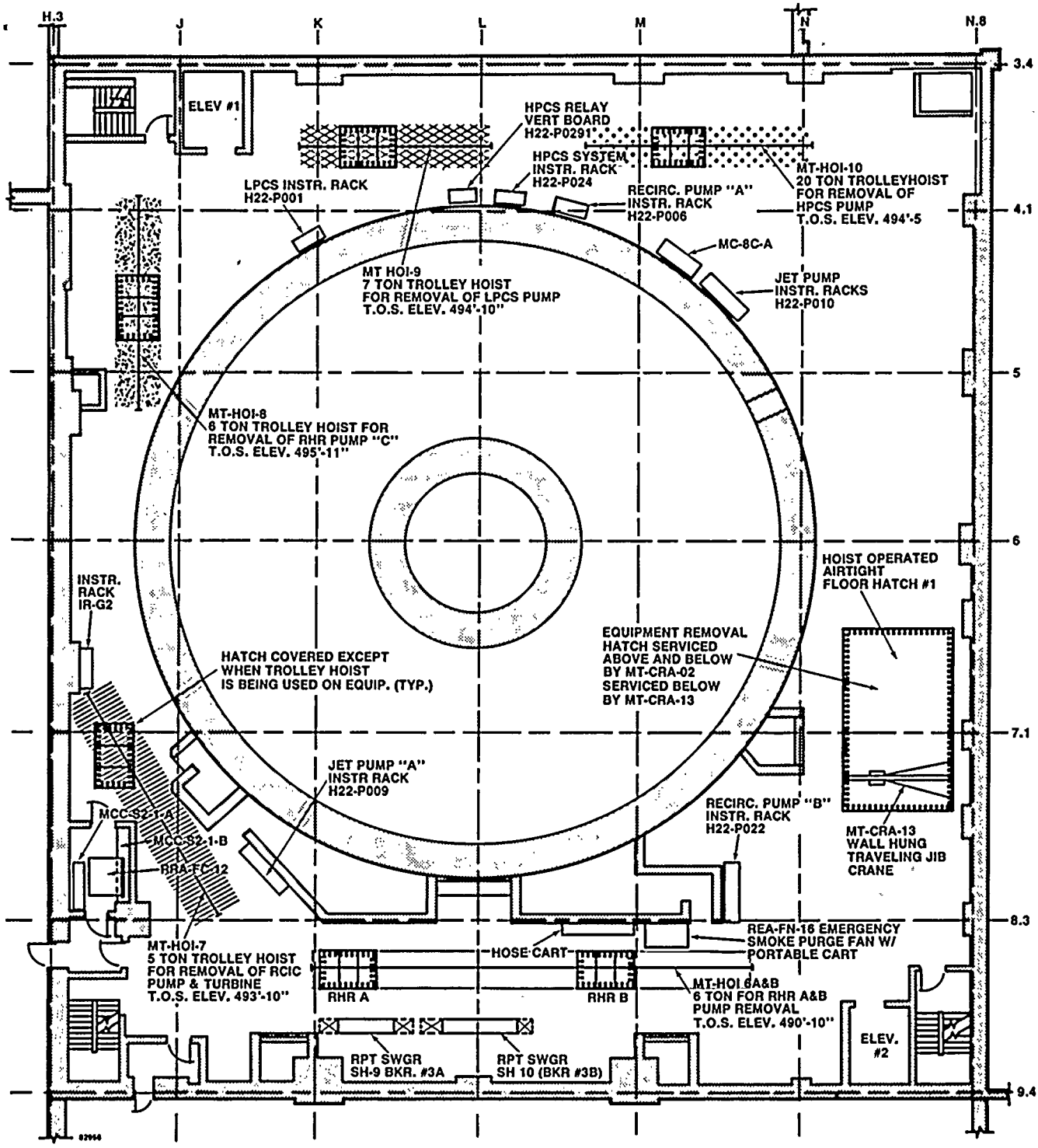
HATCH



WNP-2

REACTOR BLDG. ELEV 441′-0″ & 444′-0″

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



GENERAL NOTES:
1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.

HATCH

LOAD PATHS:

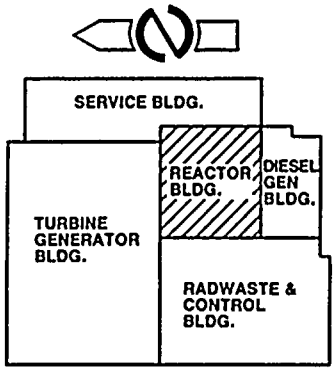
MT-HOI-6A & B

MT-HOI-7

MT-HOI-8

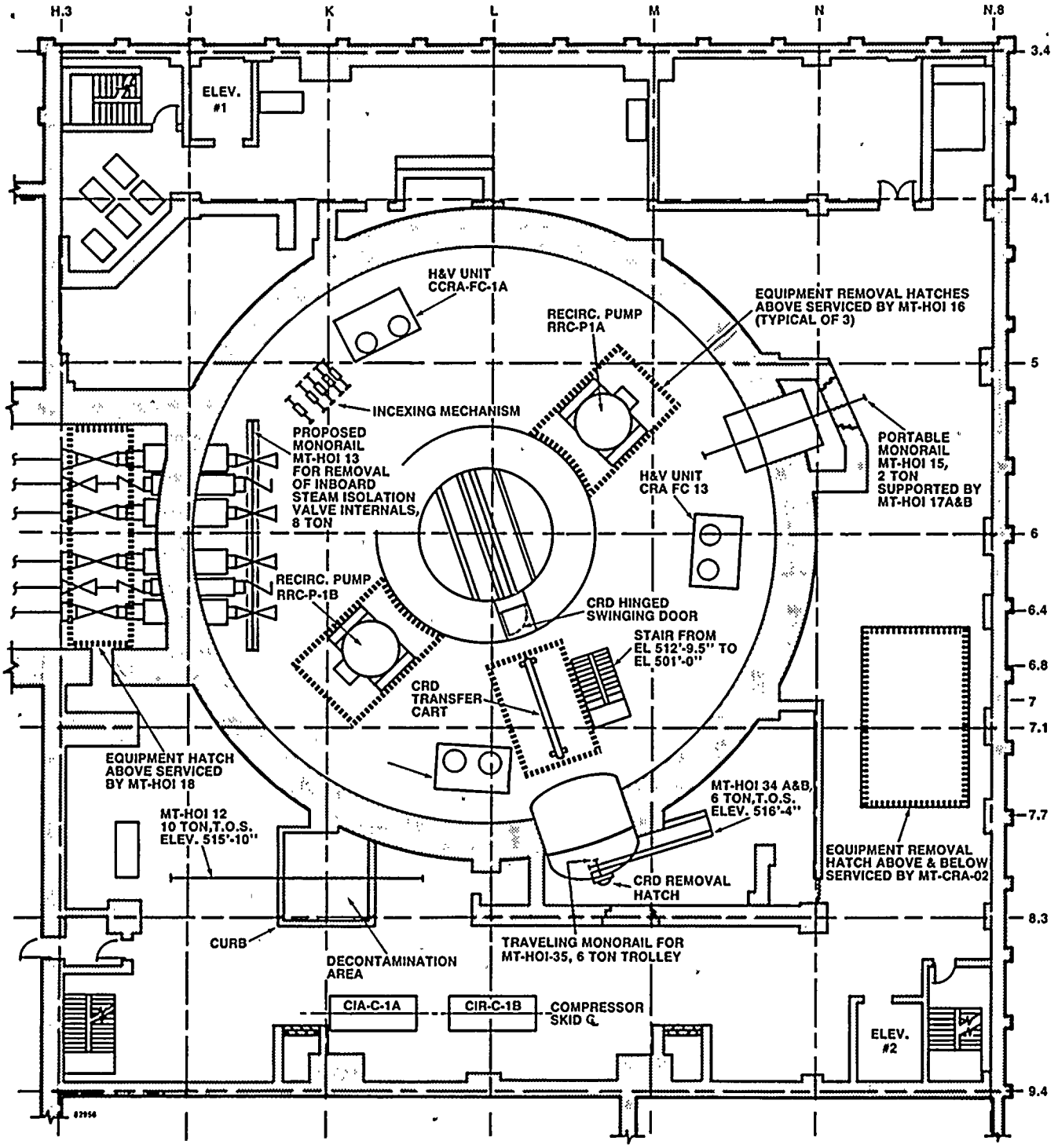
MT-HOI-9

MT-HOI-10



WNP-2
REACTOR BLDG ELEV 471'-0"

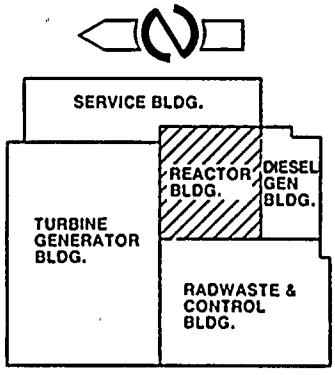
WASHINGTON PUBLIC POWER SUPPLY SYSTEM



GENERAL NOTES:
1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.

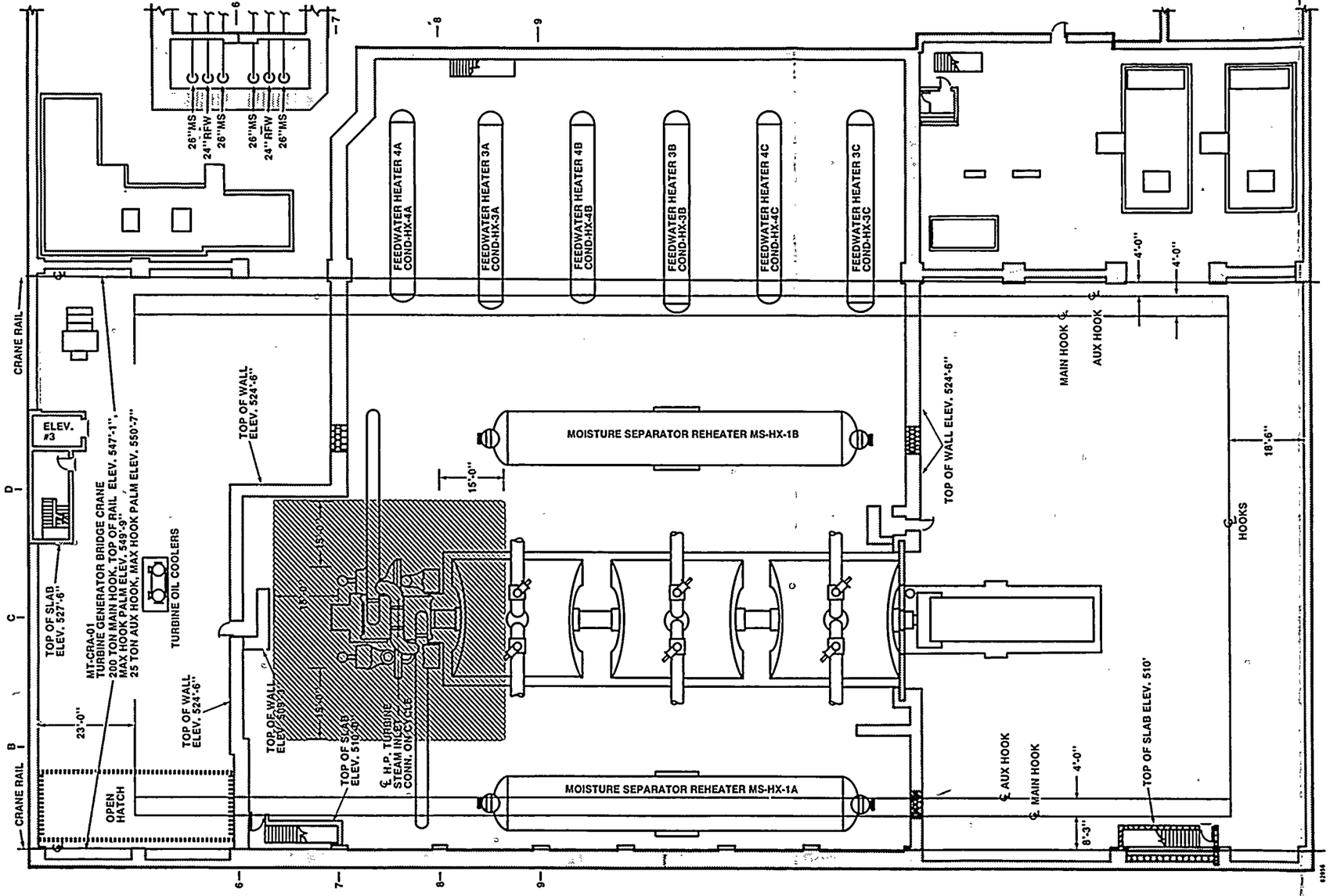
HATCH

LOAD PATHS:
MT-HOI-13



WNP-2
REACTOR BLDG. ELEV 501'-0"

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



GENERAL NOTES:

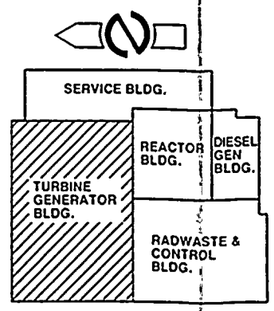
LOADS SHALL BE MAINTAINED AS CLOSE TO THE FLOOR AS PRACTICAL.

HATCH

LOAD PATHS:

MT-CRA-01 RESTRICTED TO 100^{T} LOADS STANDARD LIFTING APPARATUS SHALL HAVE FACTOR OF SAFETY OF 10 WHEN PLANT IS OPERATING

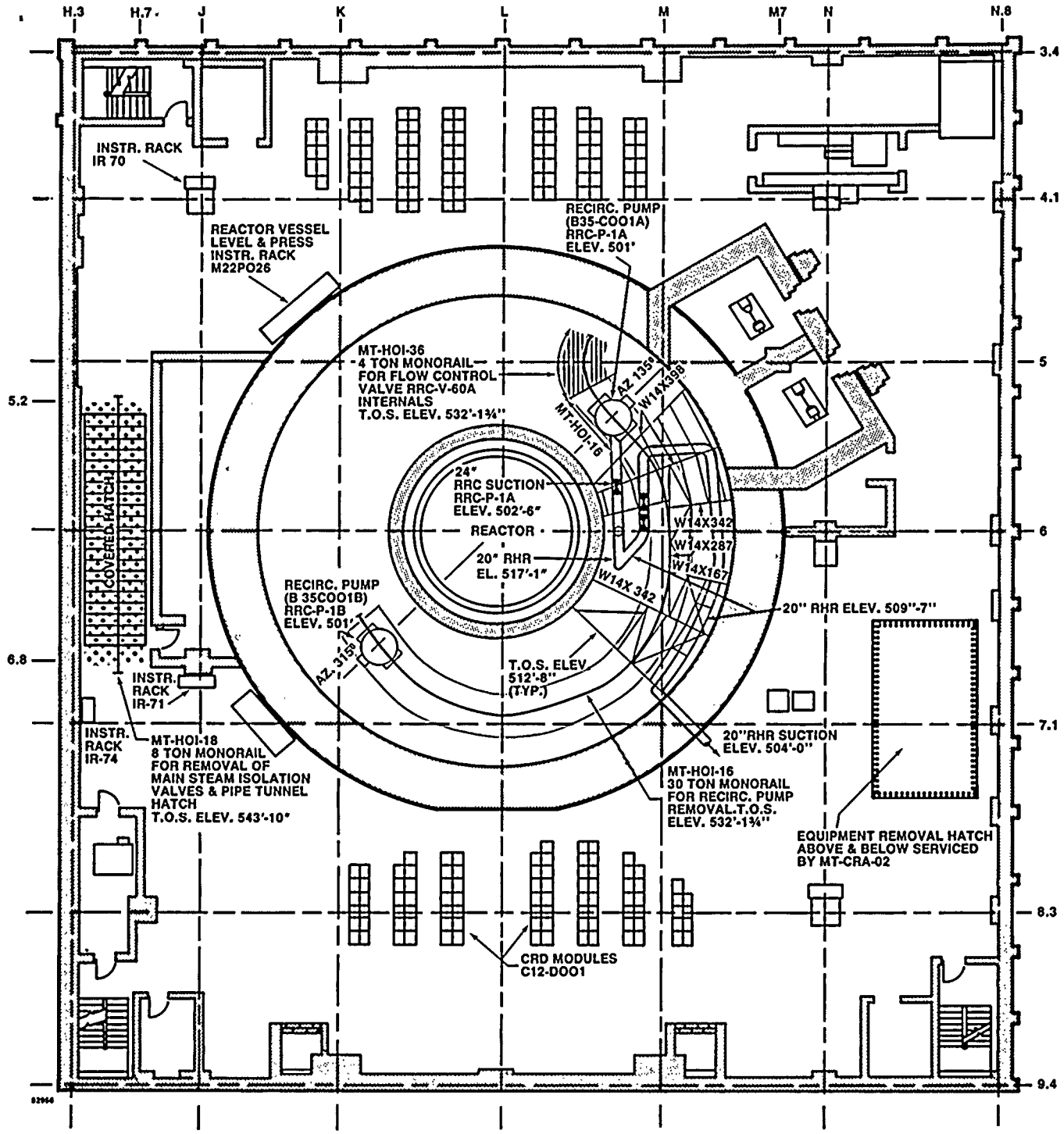
MT-CRA-01



WNP-2

TURBINE GENERATOR BLDG. ELEV 501'-0"

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



GENERAL NOTES:
1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.

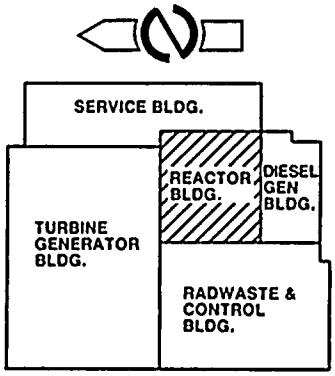
HATCH

LOAD PATHS:

MT-HOI-16

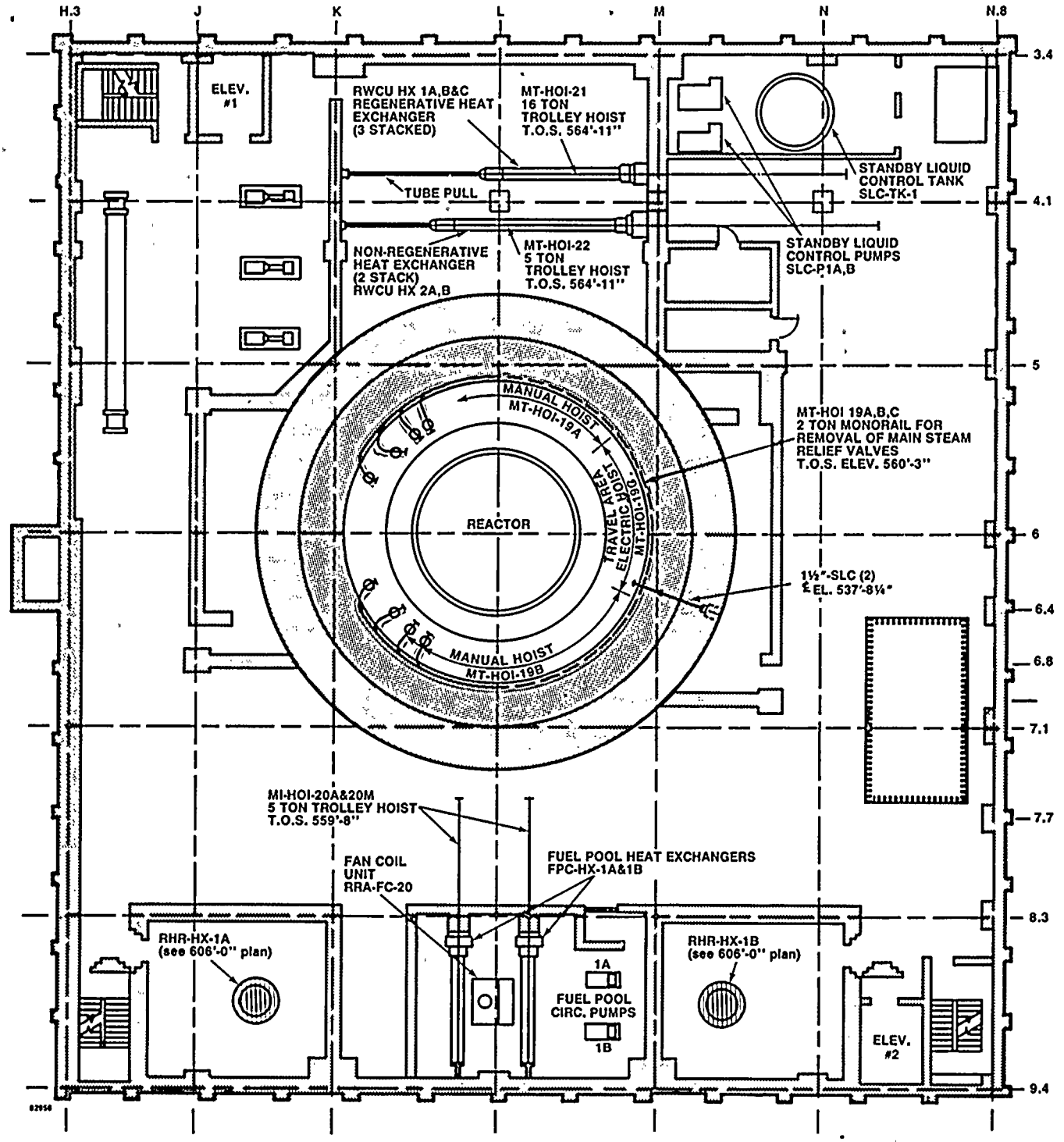
MT-HOI-18

MT-HOI-36



WNP-2
REACTOR BLDG ELEV. 522'-0"

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



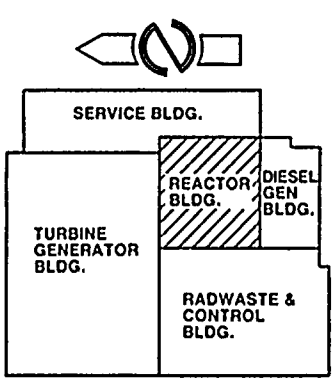
GENERAL NOTES:
1. LOADS SHALL BE MAINTAINED AS CLOSE TO FLOOR AS PRACTICAL.

HATCH

LOAD PATHS:

MT HOI 19.A,B,C.

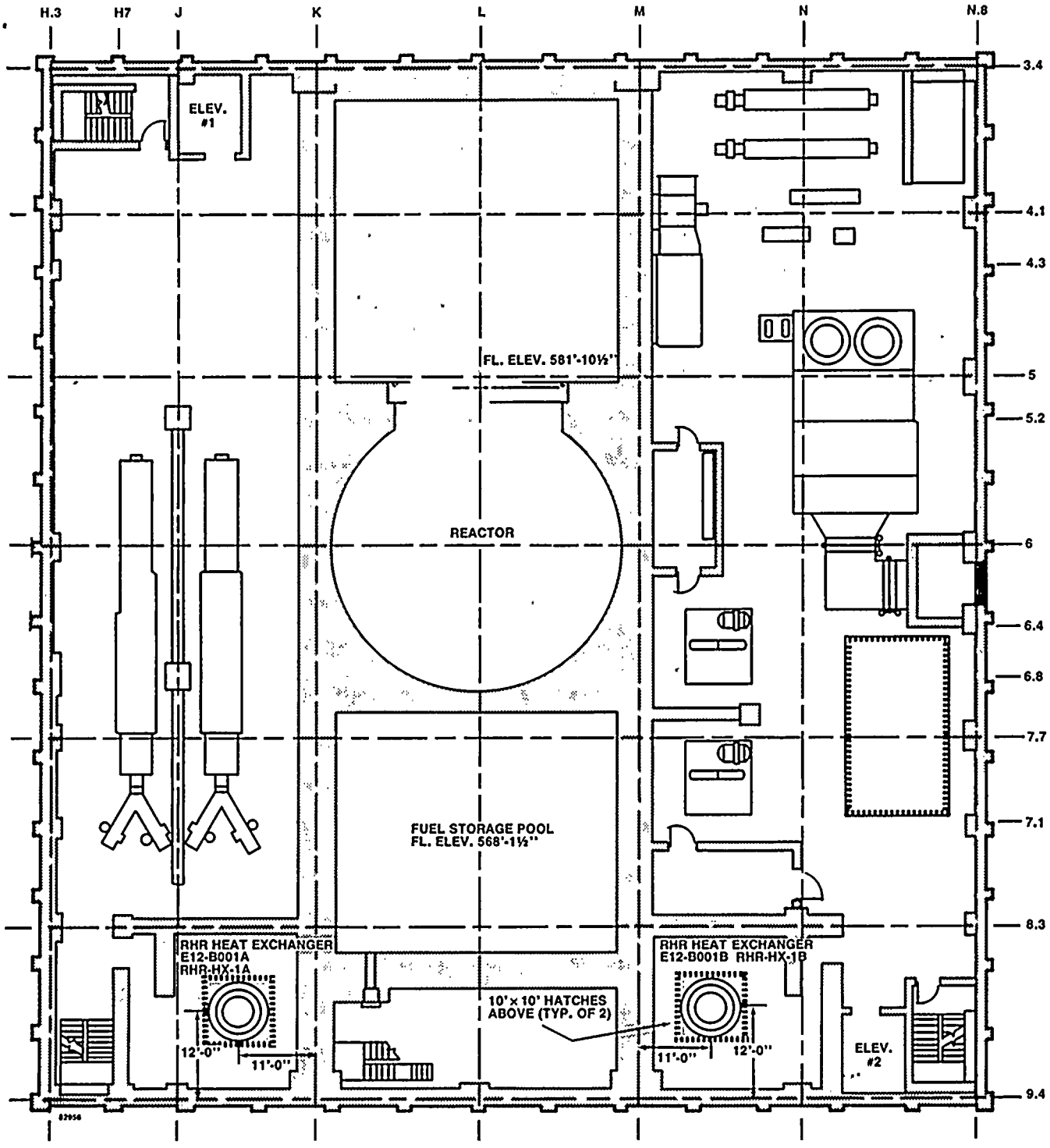
SERVICED BY RHR HX MONORAIL SEE 606' PLAN



WNP-2

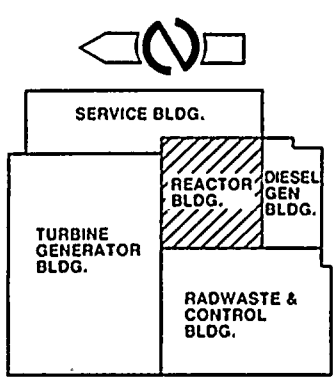
REACTOR BLDG ELEV 548'-0"

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



HATCH

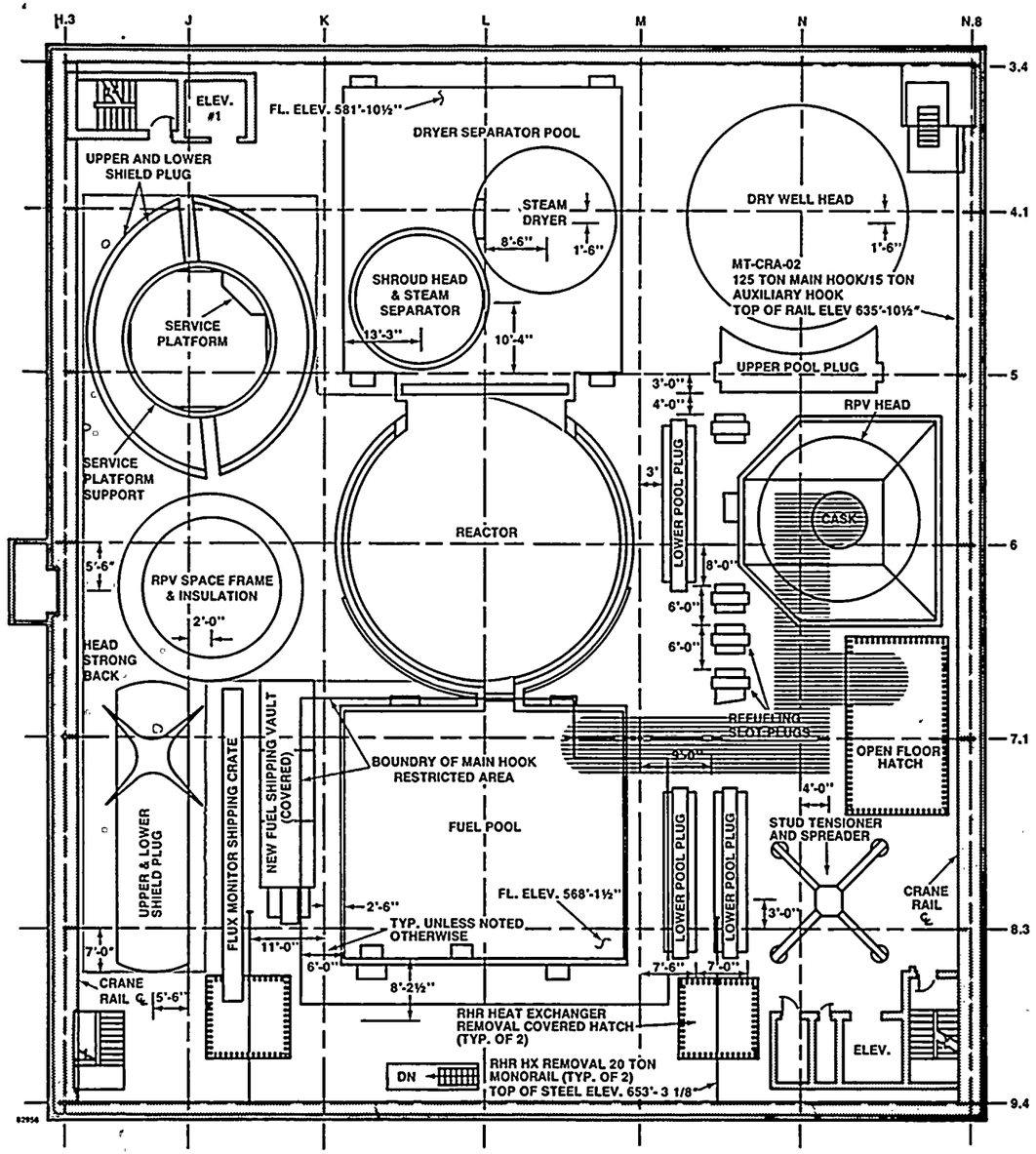
LOAD PATHS:
RHR HEAT EXCHANGER
SERVICED BY
MONORAIL FROM ABOVE



WNP-2

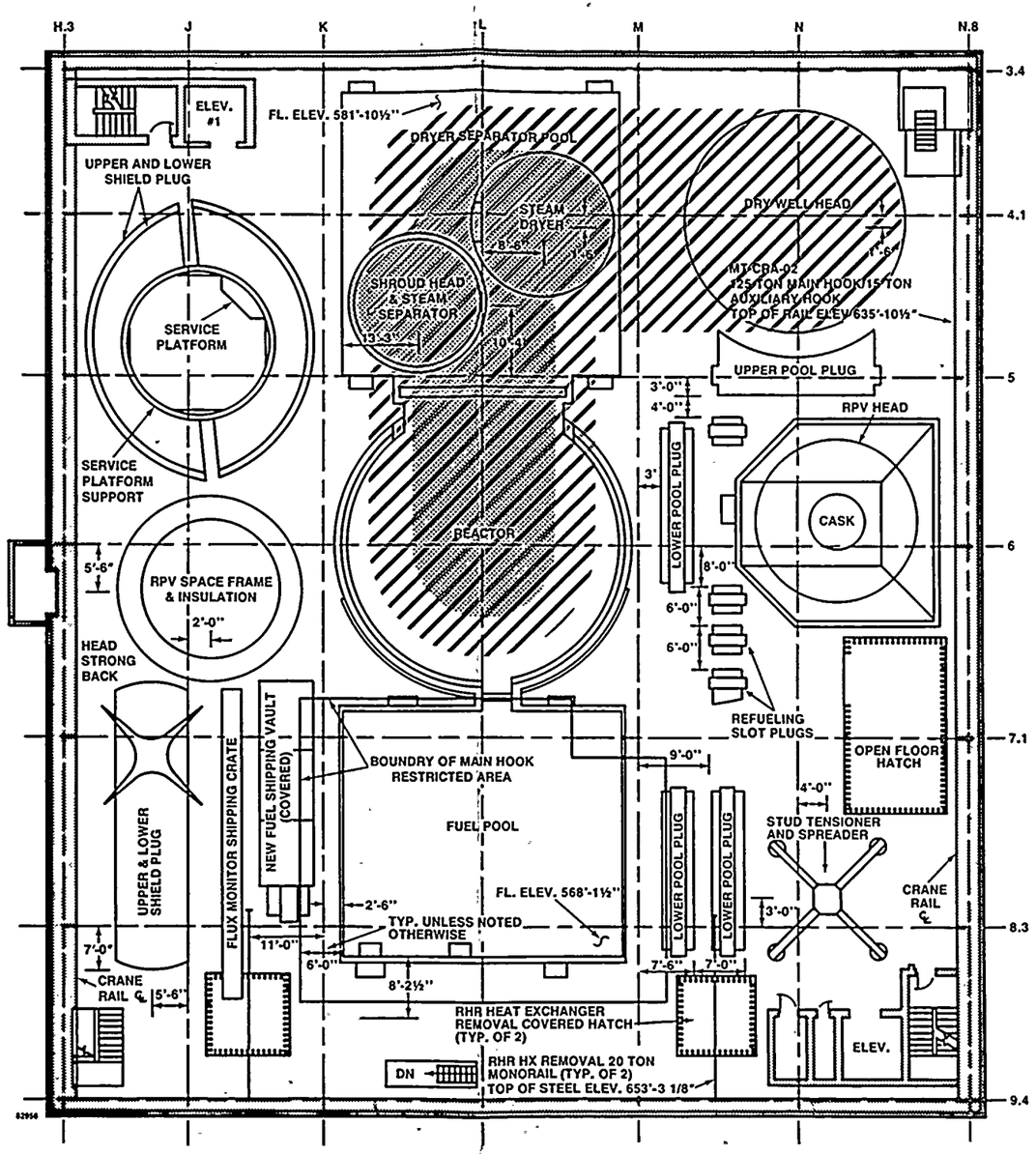
REACTOR BLDG ELEV. 572'-0"

WASHINGTON PUBLIC POWER
SUPPLY SYSTEM



GENERAL NOTES:

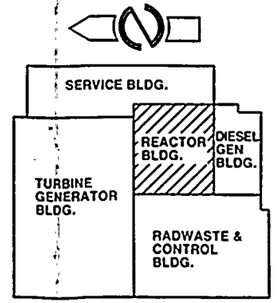
1. NO HEAVY LOAD EXCEPT EQUIPMENT ASSOCIATED WITH SPECIFIC REFUELING ACTIVITY IS TO BE CARRIED OVER OPEN REACTOR VESSEL.
2. ALL LOADS OTHER THAN SHIELD PLUGS, LIFTED WITH CONVENTIONAL LIFTING APPARATUS SHALL UTILIZE REDUNDANT RIGGING OR MAINTAIN A SAFETY FACTOR OF TEN (10). SHIELD PLUGS WILL ONLY BE MOVED WHEN REACTOR HEAD, RPV SPACE FRAME & DRYWELL HEAD ARE IN PLACE OVER THE REACTOR WITH A LIFTING APPARTUS FACTOR OF SAFETY OF 5 MAINTAINED.
3. LOADS SHALL BE MAINTAINED AS CLOSE TO THE FLOOR AS PRACTICAL.
4. PLACE REFUELING PLATFORM OVER WEST END OF FUEL POOL BEFORE MOVEMENT OF RHR Hx.
5. THE HEAD STRONG BACK AND STUD TENSIONER AND SPREADER MAY BE MOVED AS NECESSARY, MOVEMENT SHALL BE GOVERNED BY APPROPRIATE DETAILED PROCEDURE FOR PERFORMANCE OF SPECIFIC FUNCTIONS.



HATCH

LOAD PATHS:

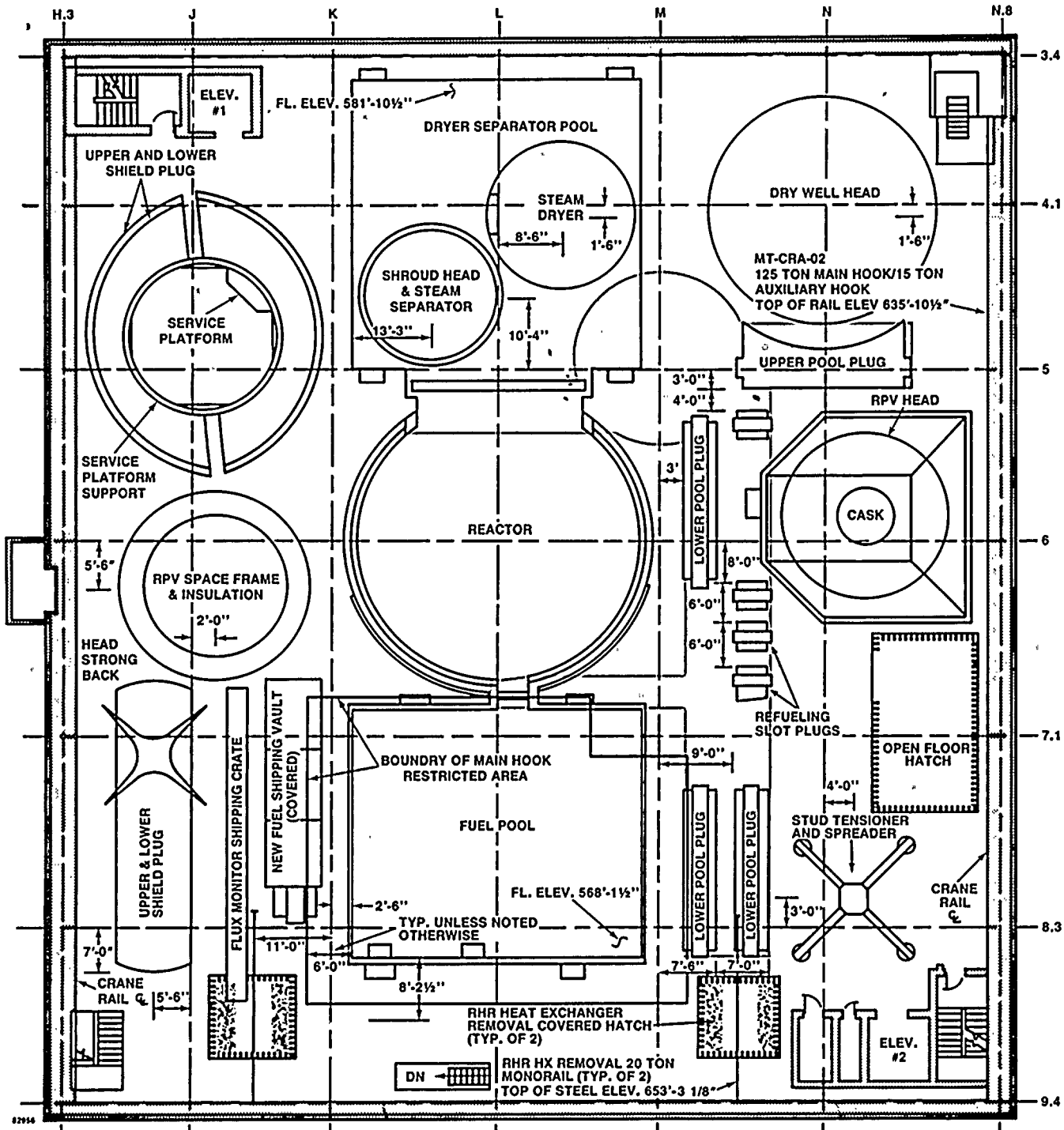
- SERVICE PLATFORM, LOWER & UPPER SHIELD PLUGS, RPV SPACE FRAME & INSULATION
- SPENT FUEL CASK
- DRYWELL HEAD
- STEAM DRYER, SHROUD HEAD & STEAM SEPARATOR



WNP-2

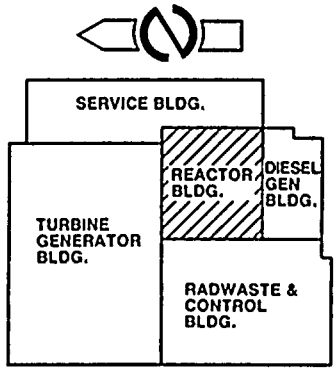
REACTOR BLDG ELEV 606'-10½"

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



GENERAL NOTES:

1. NO HEAVY LOAD EXCEPT EQUIPMENT ASSOCIATED WITH SPECIFIC REFUELING ACTIVITY IS TO BE CARRIED OVER OPEN REACTOR VESSEL.
2. ALL LOADS LIFTED WITH CONVENTIONAL LIFTING APPARATUS SHALL UTILIZE REDUNDANT RIGGING OR MAINTAIN A SAFETY FACTOR OF TEN (10).
3. LOADS SHALL BE MAINTAINED AS CLOSE TO THE FLOOR AS PRACTICAL.
4. PLACE REFUELING PLATFORM OVER WEST END OF FUEL POOL BEFORE MOVEMENT OF RHR HX.
5. THE HEAD STRONG BACK AND STUD TENSIONER AND SPREADER MAY BE MOVED AS NECESSARY. MOVEMENT SHALL BE GOVERNED BY APPROPRIATE DETAILED PROCEDURE FOR PERFORMANCE OF SPECIFIC FUNCTIONS.



WNP-2
REACTOR BLDG
ELEV 606'-10½"

WASHINGTON PUBLIC POWER
SUPPLY SYSTEM