Northern States Power Company

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August 31, 1981

Director of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 50-282 License No. DPR-42
50-306 DPR-60

Control of Heavy Loads

Attached is the response to Section 2.1 of Enclosure 3 of Mr Eisenhut's letter dated December 22, 1980, titled "Control of Heavy Loads." This was first requested to be submitted six months following the date of the above mentioned letter. NSP's letters dated April 2, 1981 and July 15, 1981 identified delays in making this submittal.

The response to Section 2.2 through 2.4 (the nine month response) has a target submittal date of November 30, 1981. Should there be any changes in this target date we will notify you.

L. O. Mayer

L O Mayer, PE
Manager of Nuclear Support Services

LOM/TMP/bd

Attachment

cc: J G Keppler
G Charnoff
NRC Resident Inspector

A033
S1/1

CONTROL OF HEAVY LOADS

NRC GENERIC LETTER 81-07

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

AUGUST 31, 1981

RESPONSE TO REQUEST FOR
INFORMATION IN SECTION 2.1
GENERIC LETTER 81-07

ITEM 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:

The overhead handling systems which fall into this category are listed below with their locations and capacities.

Handling System	Capacity Main (Aux)	Location
Turbine Building Crane	120 (25) ton	Turbine Building
Auxiliary Building Crane	125 (25) ton	Aux Bldg/Fuel Storage Bldg
Polar Cranes	230 (20) ton	Containment

These cranes are further discussed in the response to Item 3.

ITEM 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:

A. #12 & #22 Diesel Cooling Water Pump Trolleys:

The function of the trolley is to assist in dismantling the diesel cooling water pumps. The crane lifts small diesel engine parts of various sizes, typically weighing less than 500 lbs.

Cooling water pumps #12 and #22 are redundant for each other and are located in two rooms separated by a concrete wall. Various safety related equipment, such as cable, conduits, trays, etc., serving pump #12 are within the crane load zone serving #12 pump. Hence, any accidental damage to this pump will not jeopardize the operation of #22 diesel cooling water pump. Similarly, any accident related to the trolley serving #22 pump will not affect operation of #12 cooling water pump.

The use of a particular trolley is initiated only after the associated diesel cooling water pump has been removed from service in accordance with the Technical Specifications.

B. D-1 & D-2 Diesel Generator Trolleys:

The function of the trolley is to assist in dismantling the diesel generators. It handles various engine components typically weighing 1000 lbs. or less.

The emergency diesel generator D-1 and D-2 are located in two separate rooms. The monorails serve each individual generator in a separate room and thus, cannot cause accidental damage to both generators. All cables, conduits, trays, air compressors, solenoid valves, control dampers, etc., for each diesel generator are located such that no single crane accident will render both diesel generators inoperable.

Use of the trolleys is initiated only when the diesel generator has been removed from service in accordance with the Technical Specifications.

C. Six Ton Trolley above Residual Heat Removal Pit Covers:

The six ton trolley is used primarily for maintenance of the RHR pumps located in the RHR pits. The trolley is used to lift the motor, pump and RHR pit shield block, weighing anywhere from 2000 pounds to 7500 pounds.

Two pumps are provided for each unit. The pumps are redundant to one another. A load drop accident from the trolley in this area will not render both pumps inoperable. The controls for the RHR pumps are located at the opposite ends of the monorail and hence a single accident will not affect operability of both pumps.

The trolley will be operated, to service one pump, only after assuring the pump has been removed from service in accordance with the Technical Specifications.

The physical separation between the two pits is small. It is conceivable, though unlikely, that the RHR pit component cooling piping and valves servicing both pumps may be damaged. A mechanical travel limit stop will be placed on the monorail to assure no accidental damage to the equipment serving the operable unit may occur while servicing the redundant equipment.

D. One Ton Trolley above MSIVs:

The trolleys are used only for maintenance of the main steam isolation valves. Use of these trolleys is permitted only when the affected system is out of service. Therefore, these trolleys are excluded.

E. Trolley Between Main Steam and Feedwater Lines:

This trolley is used, as is the case of the previous trolley, when the affected system is out of service for maintenance of valves in the main steam or feedwater piping. Therefore, this trolley is excluded.

F. One Trolley - 30" Main Steam Relief Headers:

The trolley is used only for maintenance of the main steam safety valves, and will not be operated until the equipment has been removed from service.

G. Filter Room Crane:

The function of this crane is to assist in the replacement of filter elements in various CVCS filters. The piping and filters located in the filter room are not required for plant shutdown or decay heat removal.

H. One Ton Trolley above the Aux Building General Exhaust Fan:

The trolley is used for the removal of the Auxiliary Building General Exhaust Fan weighing approximately 1900 lbs. Atmospheric Steam Dump Valve CV-31085 is approximately 3 feet away from the centerline of the monorail. Conceivably, it may be damaged under a load drop accident and impair operability of the valve. However, redundant valves are capable of performing its function. All conduits within the load carrying zone of the trolley belong to A-train. The redundant B-train would not be affected in case of a load drop accident. The trolley is therefore excluded on the basis of redundancy.

I. Three Ton - New Fuel Handling Crane:

The crane is used in the receiving and the handling of new fuel. It is not located in the vicinity of safeguards equipment. A load drop from this crane can not result in damage to any system or component required for shutdown or decay heat removal.

J. Manipulator Cranes:

The cranes are used for refueling operations. The cranes handle only a single fuel element and the accident analysis related to them is covered in Section 9.5 and 14.2.1 of the FSAR. The crane has a multitude of safety features and interlocks to prevent accidental load drops. A load drop from this crane can not damage any system or component required for shutdown or decay heat removal.

K. Spent Fuel Crane:

The spent fuel crane is used for handling of new and spent fuel assemblies (by means of a long handled tool suspended from a hoist), divider gates, and pool covers. The hoist travel and tool length are designed to limit maximum lift of a fuel assembly to a safe shielding depth.

The spent fuel storage facility is a contained structure, designed so that in case of a dropped fuel element accident, any accidental release of radioactivity to the atmosphere is monitored and will not exceed the guidelines of 10CRF100. Normal and special ventilation systems are provided for the fuel pool enclosures.

In addition to the procedures for fuel handling and divider gates, detailed written procedures exist for lifting the pool covers by the crane (not higher than 6"). Dropping of the cover (due to crane failure) into the pool is precluded by the limitation of the physical overhang of the cranes, i.e. 18" (approx.) on one side and 8" (approx.) on the other side of the pool.

Other than possible damage to fuel, no other safety related systems will be involved in the event of a spent fuel crane failure. The fuel handling system is discussed at length in Section 9.0 of the FSAR.

ITEM 3:

With respect to the design and operation of heavy-load-handling systems in the reactor building 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:

Item 3 a. Drawings or sketches sufficient to clearly identify the location of safe load paths, spent fuel, and safety-related equipment.

Item 3 b. A discussion of measures taken to ensure that load-handling operations remain within safe load paths, including procedures, if any, for deviation from these paths.

RESPONSE:

Drawings are attached which identify locations of the cranes, safe load paths and safety related equipment. The cranes which fall into this category are:

1. Turbine Building Cranes (2)
2. Containment Polar Cranes (1 Per Unit)
3. Auxiliary Building Crane (1)

Each of these cranes are discussed here in detail.

A. Turbine Building Crane:

The turbine building cranes are generally used for the maintenance of turbine-generators and will carry the heavy loads identified in Item 3.C below.

There is no safeguard equipment on the turbine floor itself. However, 4.16KV switchgear are located in a Class I aisle between column rows 8 and 10 below the operating floor. A load drop accident which may perforate the 18 inch thick concrete floor or cause excessive scabbing could potentially damage the buses.

Safeguards bus 15 is redundant to bus 16 and similarly bus 25 is redundant to bus 26. Unit 1 buses are located to the east of column row 9 and unit 2 buses are located to the west of column row 9. Each units buses are separated by a 12 inch thick concrete wall which reaches to the ceiling. Two 3′ x 3′ columns are also provided along column row 4 to support the operating floor. Unit 1 and Unit 2 redundant buses are separated by block walls. The block walls do not extend up to the ceiling.

Based on the physical separation of the buses, a load drop accident is very unlikely to damage both redundant systems. Also, the crane has been modified by addition of redundant limit switches to prevent "two block" accidents.

A heavy load drop on pressurized main steam or feedwater piping could result in a pipe rupture in a location not postu-

lated by the pipe rupture analysis performed for Prairie Island and detailed in the FSAR . Further analysis will be done and the outcome reported in the next submittal.

Additionally, the area of the Turbine Building operating floor above the safeguards 4.16KV switchgear has been marked as a heavy load exclusion area. Carrying of heavy loads above this area will require a specific procedure.

B. Auxiliary Building Crane:

The crane is designed primarily for receiving new fuel, or handling the spent fuel shipping cask in the spent fuel pool. The crane is also used to lift heat exchanger hatches, tube bundles and in-service inspection tools.

The safeguard equipment that is located within the travel path of the crane includes:

a. Boric Acid Storage Tanks (BAST)

b. Spent fuel pool for the storage of spent fuel, new fuel, and the shipping cask for the spent fuel.

The Boric Acid Storage Tanks are located in a Class I room below the 755′ elev. floor. A load drop accident which may perforate the 12" thick concrete floor or cause excessive scabbing could potentially damage the tanks. However, the location of the BAST rooms are out of the areas where heavy loads are carried.

Additionally, the Seal Water Heat Exchangers and Letdown Heater Exchangers are located below removable shield blocks at elev. 735'. The only heavy loads in this area are the removable shield blocks (16,000 lbs.) or the heat exchangers themselves. The removable blocks are only removed to service the heat exchangers and can only be done when the equipment is out of service. Furthermore, neither heat exchanger is required for safe shutdown of the plant or for decay heat removal.

Spent Fuel Pool

The fuel pool enclosure is a Class I reinforced concrete building with 12 to 18 inch thick walls and roof, which is integrally connected to the fuel pool structure. The fuel pool enclosure which covers both new and spent fuel storage facilities is completely contained in the Auxiliary Building and is beneath the Aux. Bldg. Crane. Normal and special ventilation systems are provided for the fuel pool. The fuel pool enclosure is provided with crane access slots and equipment handling doors which physically limits the area of spent fuel pool over which fuel shipping casks or heavy objects can be moved. Administrative procedures prohibit the movement of heavy objects, except as allowed in the Technical Specifications, when fuel is stored in this area.

There are no routine operations which require opening of the access slots. Furthermore the Aux. Bldg. crane does not have room above the enclosure to carry any significant loads and hence, load drop on the roof is not possible.

The Aux. Bldg. Crane is also used in the handling of new fuel shipping containers. The areas where these are handled are not in the vicinity of safety related equipment. Also, fuel assemblies do not qualify as heavy loads as defined in NUREG-0612 and movement of new fuel assemblies does not require movement over spent fuel in the pit.

The spent fuel storage capacity of the spent fuel pool has been increased. This increased capacity provides storage space for all spent fuel until approximately 1989 (with full core reserve). Accordingly, no spent fuel cask handling operations are planned or anticipated until that time. Further evaluation will continue.

C. Containment Polar Cranes:

The containment polar crane is used for handling of missile shields, reactor vessel head, upper and lower internals, in-service inspection tools reactor coolant pump components and pressurizer safety valves.

The crane can operate in the Reactor Building under the conditions as described in the following excerpt from the Prairie Island Procedure D58 "Control of Heavy Loads."

a. With the reactor head removed, the Reactor Building crane, main or auxiliary, load blocks with attached loads greater than 2100 pounds shall not be moved within 15 horizontal feet of the irradiated fuel without specific written procedures.

b. With the pressurizer missile shield removed, the Reactor Building crane load blocks with attached loads greater than 4 tons shall not be moved over the open pressurizer vault.

The residual heat piping is protected from heavy load drop hazards by structural members of overhead floor levels; therefore, heavy loads may be moved over the reactor coolant pump vaults without administrative control.

Safe shutdown equipment is that equipment required for continued decay heat removal and for maintaining the plant shutdown. The steam generators and/or residual heat removal systems are required per T.S.3.1. Since no single load can be carried over both steam generators, the auxiliary feedwater, main feedwater and steam piping in containment is considered part of the safe load path.

With the reactor coolant system temperature above cold shutdown, the Containment Building polar crane will not be used for moving loads witnout specific written procedures.

END OF D58 EXCERPT

Further investigation with regard to the consequences of an accidental load drop will be addressed in a nine month report.

Item 3 c. A tabulation of heavy loads to be handled by each crane which includes the load identification, load weight, its designated lifting device, and verification that the handling of such load is governed by a written procedure containing, as a minimum, the information identified in NUREG 0612, Section 5.1.1(2).

RESPONSE:

See Table I

Item 3 d. Verification that lifting devices identified in 2.1. 3-c, above, comply with the requirements of ANSI N14. 6-1978, or ANSI 330.9-1971 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:

Slings:

The slings used with these cranes comply with design and inspection requirements of ANSI B30.9, 1971. As discussed in plant procedure D58 "Control of Heavy Loads", the slings will have a minimum factor of safety of five (5) and the rated capacities of the slings shall be taken as those listed in tables 3 thru 14 of ANSI B30.9.

The slings shall be visually inspected each day that they are used. The conditions of their replacement and/or repairs comply with requirements of section 9.2.8 of ANSI B30.9.

The operation of the cranes are controlled by administrative procedures which include inspections for safe operating practices with wire slings, which are compatible to ANSI B30.9, 1971.

Special Lifting Devices:

The special devices for lifting heavy loads in the plant consist of:

a. Turbine Spreader Assembly

b. Upper Internals Lifting Rig

c. Reactor Head Lifting Rig

The above devices were manufactured as specific tools for servicing a particular component. The devices are not used to carry objects heavier than their designed function loads. These devices were designed by Westinghouse prior to the existence of ANSI N14.6-1978. Documentation is not available at this time for review and comparison against the standard. Additional work will be done in this area and will be furnished with the nine month report. Additionally, the special lifting devices are inspected prior to use in their intended function and per the specific equipment handling procedure in accordance with ANSI N14.6-1978.

Item 3 e. Verification that ANSI B30.2-1976, Chapter 2-2, has been invoked with respect to crane inspection, testing, and maintenance. Where any exception is taken to this standard, sufficient information should be provided to demonstrate the equivalency of proposed alternatives.

RESPONSE:

Procedures for inspection, testing and maintenance of the cranes are in use that satisfies the criteria of ANSI B30.2-1976, Chapter 2-2. No exceptions to the standard are taken.

Item 3 f. Verification that crane design complies with the guidelines of CMAA Specification 70 and Chapter 2-1 of ANSI B30.2-1976, including the demonstration of equivalency of actual design requirements for instance where specific compliance with these standards is not provided.

RESPONSE:

Major cranes and hoists for Prairie Island Plant Units 1 and 2; e.g. 120 Ton cranes for Turbine Building, 125 Ton fuel handling crane in the Auxiliary Building and 230 Ton polar

cranes in the Reactor Buildings, were purchased from Whiting Corporation of Illinois in the late sixties. The specification against which these cranes were purchased predates CMAA Specifications #70. However, the cranes were qualified against EOCI Specification #61, which is superceded by CMAA Specification #70. The other codes and standards invoked by the crane specification include:

American Society for Testing and Materials Standard Specification	(ASTM)
American Institute of Steel Construction Specification	(AISC)
American Welding Society Standards	(AWS)
National Electrical Manufacturer's Association	(NEMA)
National Electrical Code	(NEC)

A comparison of EOCI #61 with CMAA #70 was prepared by Whiting Corporation. The comparison covers each article of CMAA #70 specification with the corresponding article of EOCI #61 specification and brings out the deficiencies that may exist in the cranes designed per EOCI #61 if it were to meet CMAA #70.

CMAA #70 specifications addresses the design loads for the footwalks and the construction features of the cabs. NSP's experience with both, footwalks and cabs, have been satisfactory.

The CMAA #70 also has introduced new criteria for some systems, e.g., criteria for drum grooves and gearing design, criteria for torque ratings of hoist holding brakes,

squirrel cage motors, rated motor voltage, crane controls including remote controls, etc. The torque requirements for bridge brake with cab on trolley has increased from EOCI's 50% motor torque to 75% motor torque. In summary, a comparison of technical specifications for the cranes with CMAA specifications was made. From the review it was concluded that the specifications for major crane are in agreement for the following:

a) Rated Motor Voltage
b) Squirrel Cage Motor Design
c) Specification for Remote Control
d) Classification of Resistors
e) Means for Disconnecting
f) Overload of AC Motors
g) Criteria for Floor Operated Pendant Pushbutton Stations
h) Runway Voltage Drop Criteria

A careful review indicates that the structural strength of the cranes manufactured in accordance with either of the two specifications will have the same factors of safety with respect to material properties, although the two codes specify two different materials. The cranes have been used to lift the heaviest loads in the plant that they were designed to carry without any structural problems. The impact loads and lateral load requirements as per EOCI and CMAA specifications for the cranes in question are equivalent.

The smaller cranes and hoists (2 to 15 ton capacity) were bought from several reputable crane manufacturers including R.W. Roberts, ACCO, Dresser Industries and Harnischfeger (P&H). These load handling systems were also purchased against the plant design specifications which reference EOCI #61 specifications. The cranes are considered satisfactory.

A comparison of Chapter 2-1 ANSI B30.2.0-1967 edition was made with the corresponding chapter in 1976 edition to review if the cranes which were built in compliance to 1967 edition will meet the spirit of 1976 specifications. It is concluded that the changes introduced in 1976 edition would not have significantly affected cranes bought against 1967 specifications.

Item 3 g. Exceptions, if any, taken to ANSI B30.2-1976 with respect to operator training, qualification, and conduct.

RESPONSE:

No exceptions to the guidance in ANSI B30.2-1976 are taken.

SUMMARY

A six month response to Generic Letter 81-07 "Control of Heavy Loads" is presented. The report has identified the cranes at the Prairie Island Nuclear Generating Plant, their primary functions, the loads handled by the cranes and the safeguard equipment in the vicinity of these cranes.

Consequence analyses for accidental load drops of cranes were performed based on the criteria presented in the FSAR and Technical Specifications of the plant. Accidental load drops from certain

heavy load handling systems were identified as inconsequential whereas for the other systems specific constraints, such as verification of the operability of redundant systems, were established. For cranes such as the Turbine Building cranes, the Auxiliary Building cranes and the Reactor Building polar cranes, it was decided to introduce limit switches to prevent a "two block" accident. For monorails of six ton trolley hoist for removal of residual heat components need for a limit stop to restrict the horizontal travel of the trolley was established.

The definition of safe load paths in the Turbine Building and in the Reactor Building are based on the assumptions regarding the strength of the structural members which may be impacted by an accidental load drop. The strength of these members will be verified.

Consequence analyses, including verification that no loss of borated water covering the fuel will occur due to an accidental drop of missile shield, reactor vessel heat, etc., in the Reactor Building will be undertaken. The consequence analysis will verify that the release of radioactivity to the environment are not in excess of those permitted by 10 CFR 100.

Additional investigation into the design of the special handling devices provided by Westinghouse will be undertaken to verify their adequacy.

NSP has not acquired a spent fuel cask for the Prairie Island Nuclear Plant. Prior to the handling of the cask an accidental load drop analysis and its consequences will be studied, or

the auxiliary building crane will be modified to be single-failure proof.

Implementations of procedural controls for the use of the cranes identified by the study will be initiated. Physical modifications of the cranes, will be deferred until investigation of alternatives such as strengthening of the structural members or relocation of safeguard equipment, etc., are fully considered.

TABLE 1

SYSTEM	LOAD(S) HANDLED	WEIGHT	DESIGNATED LIFTING DEVICE	PROCEDURE YES/NO
Turbine Building Crane	1) HP Cover	81,700 lbs.	Load Spreader & Slings	NOTE 1
	2) LP#1 Outer Casing	122,300 lbs.	Load Spreader & Slings	NOTE 1
	3) LP#2 Outer Casing	122,300 lbs.	Load Spreader & Slings	NOTE 1
	4) LP#1 Inner Cyl. #1	50,000 lbs.	Load Spreader & Slings	NOTE 1
	5) LP#2 Inner Cyl. #1	50,000 lbs.	Load Spreader & Slings	NOTE 1
	6) LP#1 Inner Cyl. #2	90,000 lbs.	Load Spreader & Slings	NOTE 1
	7) LP#2 Inner Cyl. #2	90,000 lbs.	Load Spreader & Slings	NOTE 1
	8) HP Rotor	70,000 lbs.	Load Spreader & Slings	NOTE 1
	9) LP Rotor	160,000 lbs.	Load Spreader & Slings	NOTE 1
	10) Condensate Pump &	18,600 (pump)	Slings	NOTE 1
	11) Motor	12,000 (motor)	Slings	NOTE 1
	12) Vertical Cooling Water	6,400 (motor)	Slings	NOTE 1
	13) Pumps	14,670 (pump)	Slings	NOTE 1
	Smaller Turbine Parts Valves, etc.	Various		
	14) Spare Rotor Stands	12,500 lbs.	Slings	NOTE 1
	15) Generator Rotor	246,000 lbs.	Load Spreader & Slings	NOTE 1
	16) Load Block	7,000 lbs.	N.A.	
Auxiliary Building Crane	1) New Fuel Shipping Containers	6,600 lbs.	Slings	Yes
	2) Heat Exchanger Removal Hatches	16,600 lbs.	Slings	No*
	3) Heat Exchanger Bundles	1,100 lbs. (Seal water)	Slings	No*
		1,900 lbs. (let-down)		
	4) Load Block	7,000 lbs.	N.A.	N.A.

TABLE 1 (CONT.)

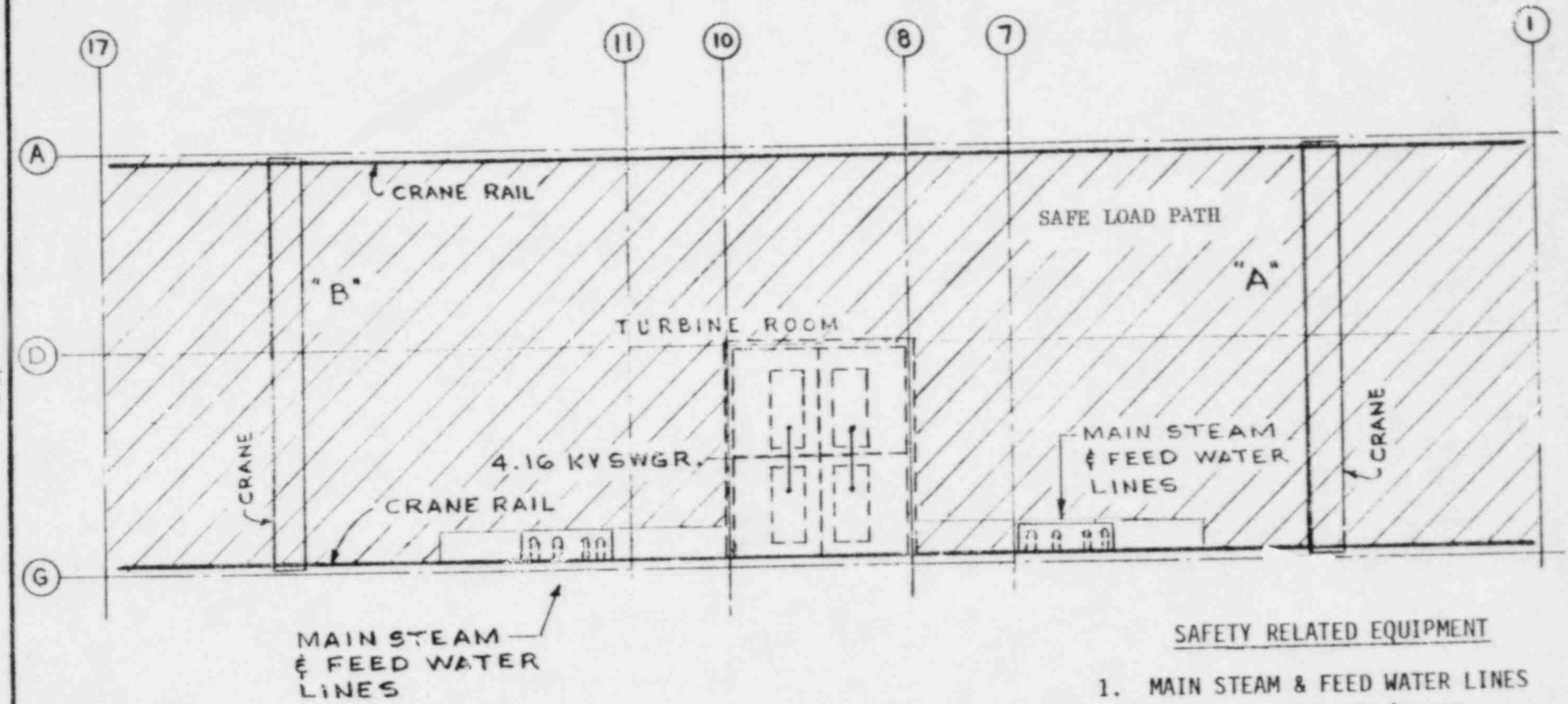
SYSTEM	LOAD(S) HANDLED	WEIGHT	DESIGNATED LIFTING DEVICE	PROCEDURE YES/NO
Containment Polar Cranes	1) Missile Shields			
	a) Reactor	56,200 lbs.	Vessel Head Spreader Assembly	Yes
	b) Pressurizer	40,500 lbs.	and Slings	Yes
	2) Vessel Head	80,925 lbs.	Vessel Head Lifting Device	Yes
	3) Upper & Lower Internals	50,000 lbs.	Internals Lifting Rig	Yes
		171,500 lbs.		
	4) Vessel Studs (In handling box)	7,200 lbs.	Slings	No
	5) In-Service Insp. Tool	4,000 lbs.	Slings	No*
	6) Reactor Coolant Pump		Slings	No
	a) Motor	79,500 lbs.	Slings	
	b) Pump	55,200 lbs.	Slings	
	c) Fly Wheel	13,200 lbs.	Slings	
	7) Load Blocks	15,000 lbs.	N.A.	N.A.

*Procedures will be written prior to handling of these loads and will take into consideration circumstances present at the time.

NOTE 1: No specific procedures are in place for handling turbine/generator components. However, procedures will be generated prior to carrying the above listed heavy loads (except load block) over the safeguards aisle.

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

TURBINE BUILDING CRANES F-A F-B



SAFETY RELATED EQUIPMENT

1. MAIN STEAM & FEED WATER LINES
2. 4.16 KV SWITCHGEAR (BELOW)
   (BELOW ON MEZZ. FLOOR)

PLAN AT EL. 735'-0

(REF. DWG. NO. NF-39206 & NF-39207)

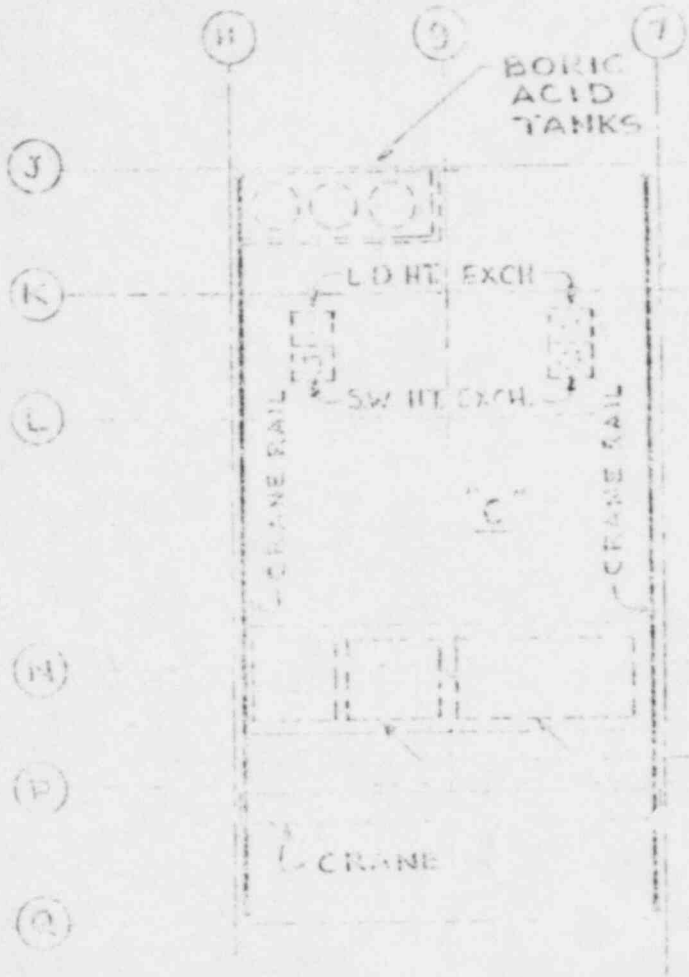
N

FLUOR POWER SERVICES, INC.	
PREPARED BY - O.R	PROJ. NO 21-7450-292
CHECKED BY - L.G.	SK-16

(37)

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

AUX. BUILDING CRANE F-C



SAFE LOAD PATHS ARE ALL AREAS EXCEPT OVER THE BORIC ACID TANKS AND EXCEPT AS SPECIFIED IN THE TECHNICAL SPECIFICATIONS CONCERNING STORAGE OF SPENT FUEL

SAFETY RELATED EQUIPMENT

1. BORIC ACID TANK
2. LETDOWN HEAT EXCHANGERS
3. SEAL WATER HEAT EXCHANGERS
4. SPENT FUEL POOL

PLAN AT EL. 155-0

(REF. DWG. NO. 10-5700)

N

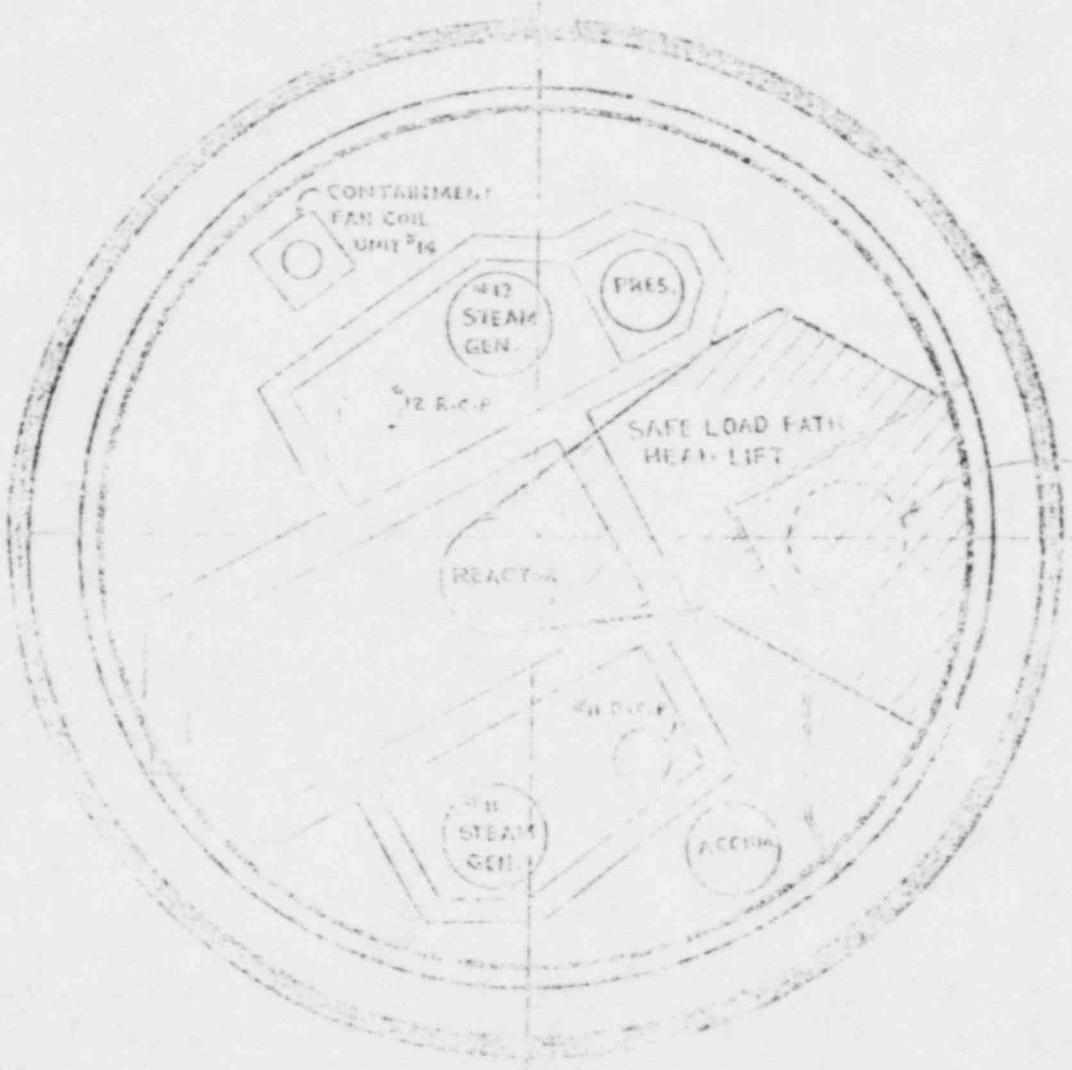
WISCONSIN POWER SERVICE, INC.

CHECKED BY

SK-17

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

CONTAINMENT POLAR CRANE F-D



PLAN AT EL.
(REF. DWG. NO. NE-192)

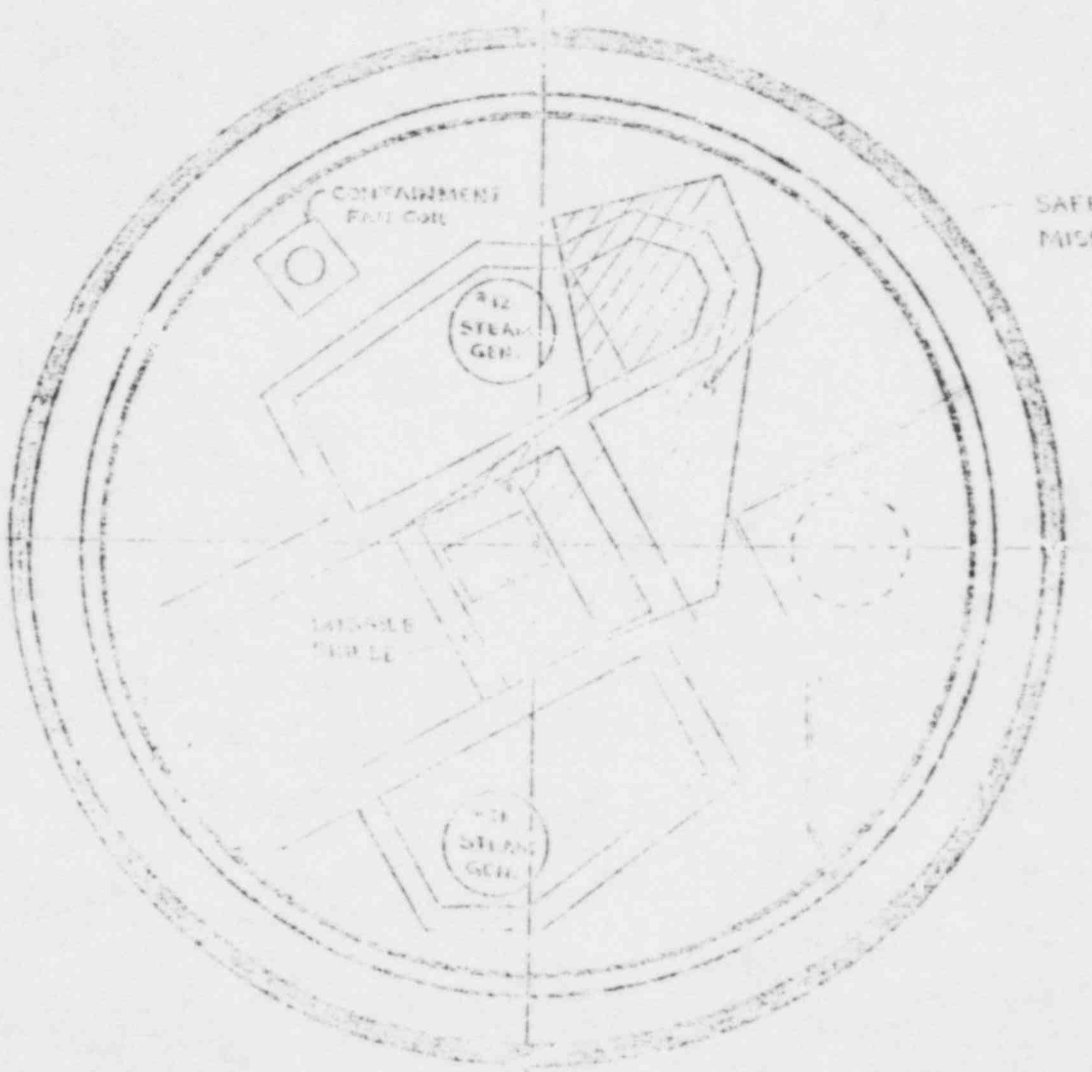
SAFETY RELATED EQUIPMENT

1. RESIDUAL HEAT PUMPS & PIPING
2. REACTOR COOLANT PUMPS
3. STEAM GENERATORS
4. AUXILIARY FEED WATER PIPING
5. MAIN FEED WATER PIPING
6. MAIN STEAM PIPING
7. HOW & SPRAY DUCT

FLUOR POWER SERVICES, INC.	
PREPARED BY: O.D.	PROJ. NO. 7456-292
CHECKED BY: L.G.	SK-19 A.1

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

CONTAINMENT POLAR CRANE F-D



SAFETY RELATED EQUIPMENT

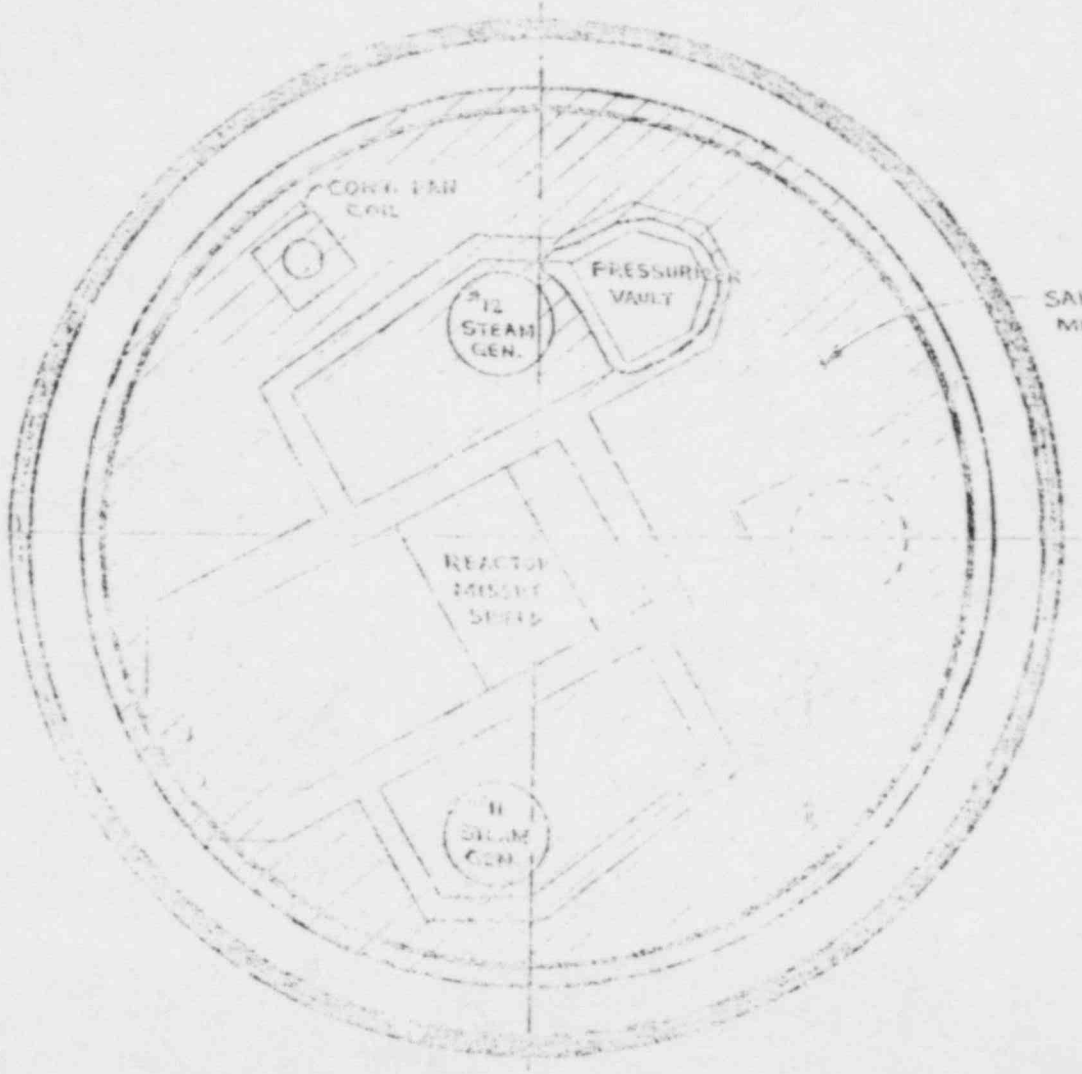
1. RESIDUAL HEAT PUMPS & PIPING
2. REACTOR COOLANT PUMPS
3. STEAM GENERATOR
4. AUXILIARY FEED WATER PIPING
5. MAIN FEED WATER PIPING
6. MAIN STEAM PIPING
7. NEW & SPENT FUEL

PLAN AT EL.
(REF. DWG. No. NF-39)

FLUOR POWER SERVICES, INC.	
PREPARED BY: G R	PROJ. NO. 21-7490-298
CHECKED BY: L G	SK-18B1

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

CONTAINMENT POLAR CRANE F-D



SAFE LOAD PATH WITH PRESSURIZER MISSILE SHIELD REMOVED

SAFETY RELATED EQUIPMENT

1. RESIDUAL HEAT PUMPS & PIPING
2. REACTOR COOLANT PUMPS
3. STEAM GENERATORS
4. AUXILIARY FEED WATER PIPING
5. MAIN FEED WATER PIPING
6. MAIN STEAM PIPING
7. NEW & SPENT FUEL

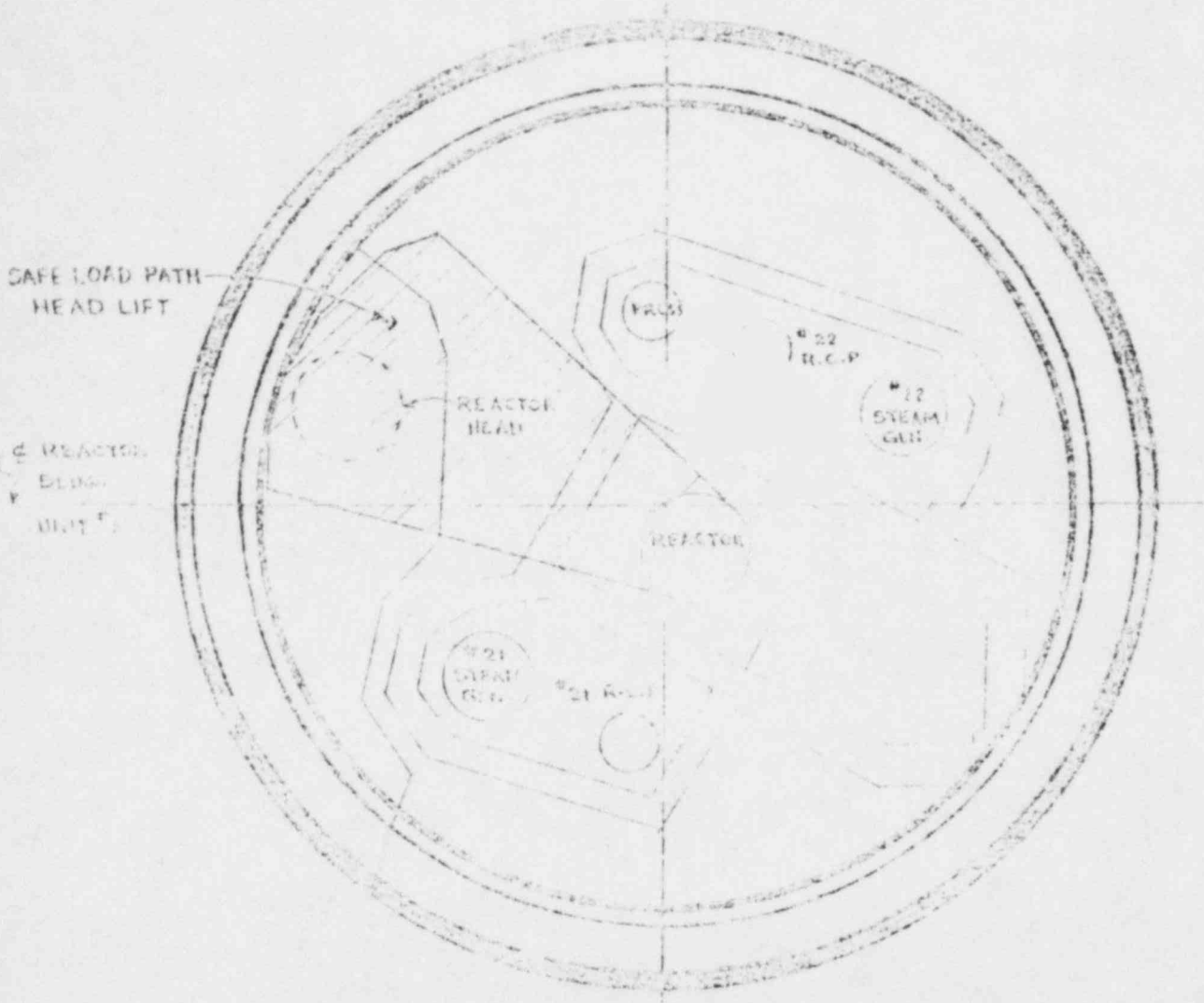
PLAN AT EL.
(REF. DWG. NO. RF-3X2)

N

FLUOR POWER SERVICES, INC.	
PREPARED BY: G.R	DWG. NO. 21-7650-232
CHECKED BY: [illegible]	SK-1901

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

CONTAINMENT POLAR CRANE F-E



PLAN AT EL.
(REF. DWG. NO. NH-35?)

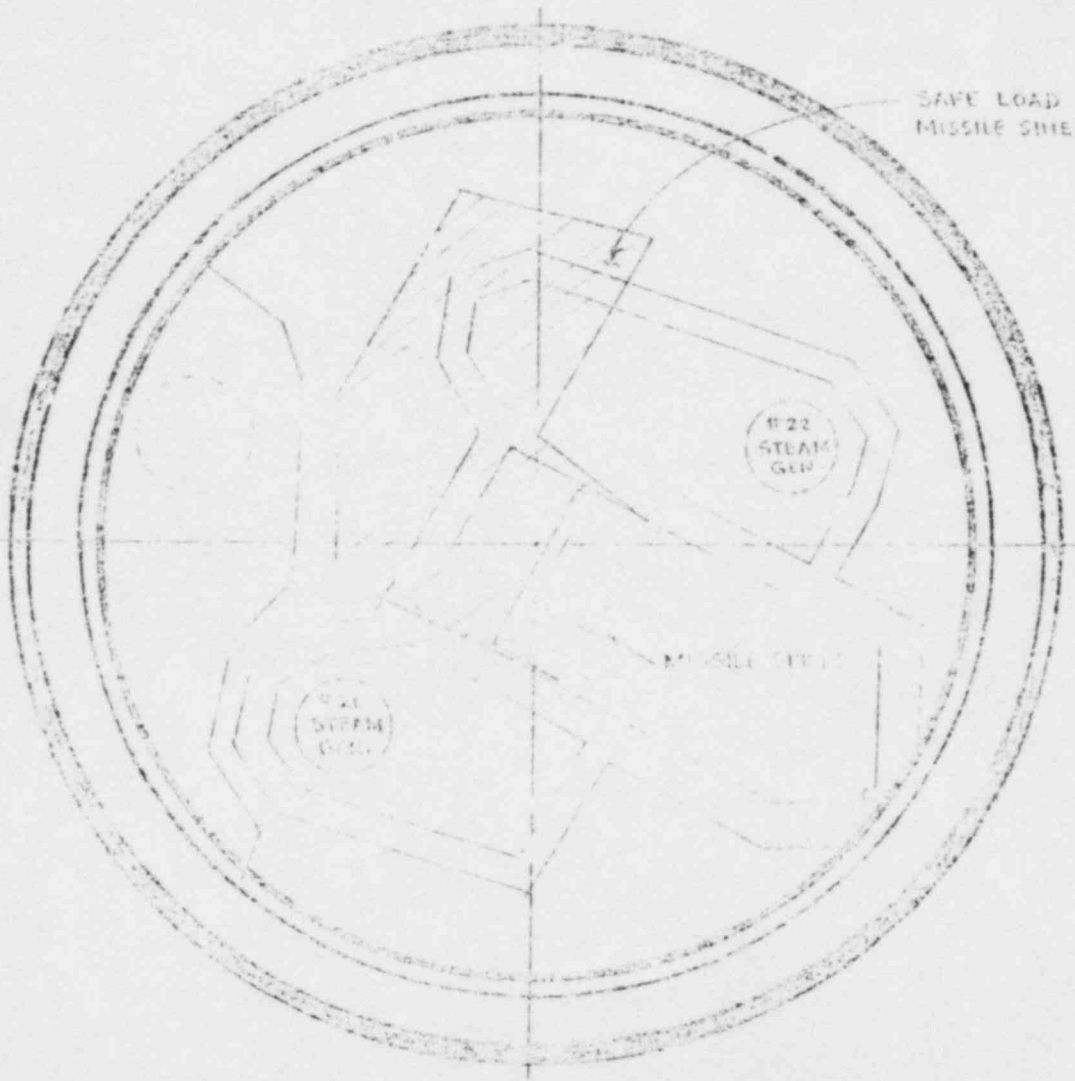
SAFETY RELATED EQUIPMENT

1. RESIDUAL HEAT PUMPS & PIPING
2. REACTOR COOLANT PUMPS
3. STEAM GENERATOR
4. AUXILIARY FEED WATER PIPING
5. MAIN FEED WATER PIPING
6. MAIN STEAM PIPING
7. NEW & SPENT FUEL

FRAMATOME POWER SERVICES, INC.	
PREPARED BY:- O.R	PROJ. NO 21-7333-202
CHECKED BY L.A.	SK-18A2

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

CONTAINMENT POLAR CRANE F-E



PLAN AT EL.
(REF. DWG. NO. NF-392)

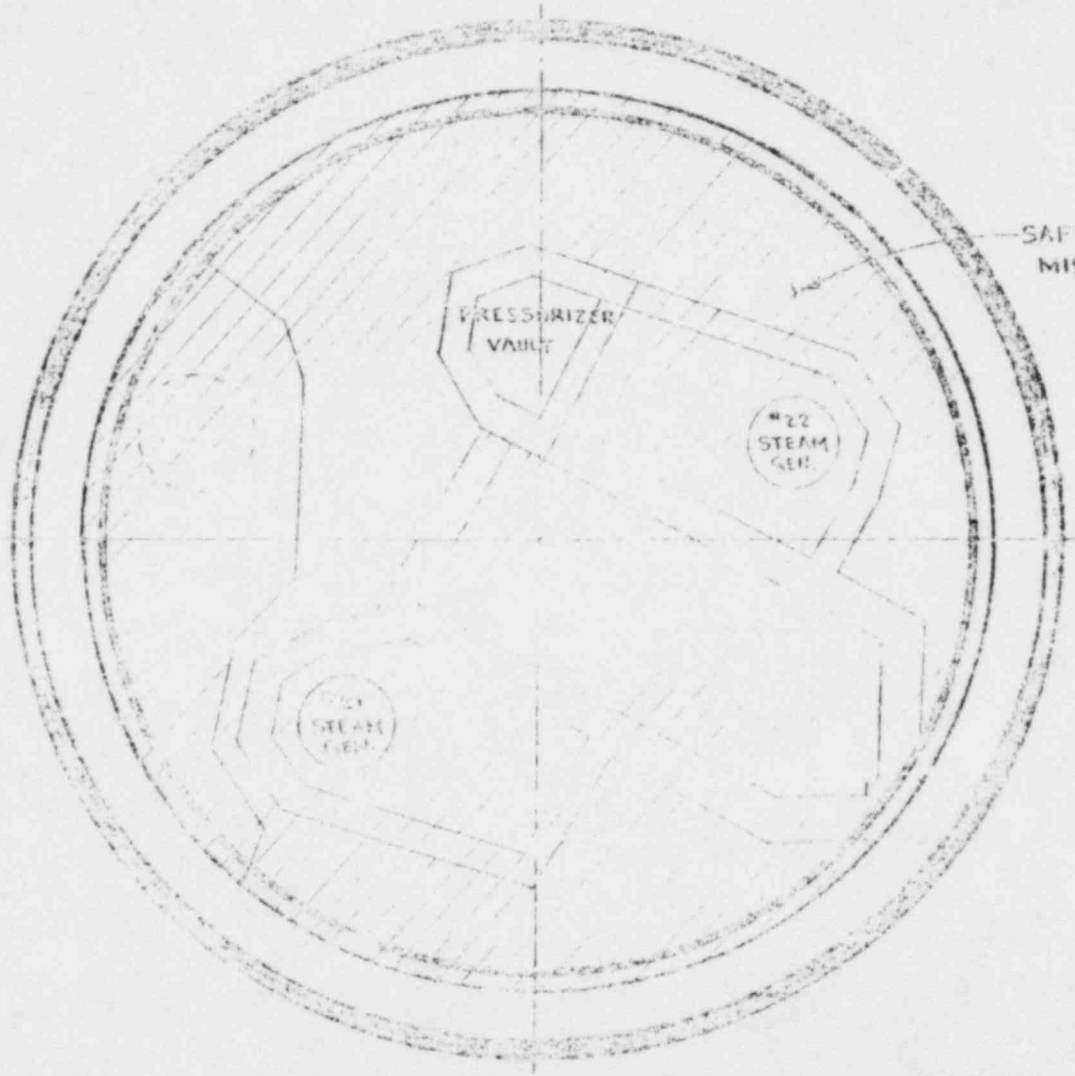
SAFETY RELATED EQUIPMENT

1. RESIDUAL HEAT PUMPS & PIPING
2. REACTOR COOLANT PUMPS
3. STEAM GENERATORS
4. AUXILIARY FEED WATER PIPING
5. MAIN FEED WATER PIPING
6. MAIN STEAM PIPING
7. NEW & SPENT FUEL

UNION POWER SERVICES, INC.	
PREPARED BY: O.R.	PROJECT NO. 21-7650-298
CHECKED BY: E.G.	SK-18B2

CONTROL OF HEAVY LOADS - OVERHEAD HANDLING SYSTEM

CONTAINMENT POLAR CRANE F-E



SAFE LOAD PATH WITH PRESSURIZER MISSILE SHIELD REMOVED

PLAN AT EL.
(REF. DWG. NO. NI-392)

SAFETY RELATED EQUIPMENT

1. RESIDUAL HEAT PUMPS & PIPING
2. REACTOR COOLANT PUMPS
3. STEAM GENERATORS
4. AUXILIARY FEED WATER PIPING
5. MAIN FEED WATER PIPING
6. MAIN STEAM PIPING
7. NEW & SPENT FUEL

BECHTEL POWER SERVICES, INC.	
PREPARED BY: O.N	PROJ NO: 21-7650-292
CHECKED BY: L.S	SK-1802