MISSISSIPPI POWER & LIGHT COMPANY
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November 23, 1981

RECEIVED DEC 8 198 U.S. NUCLEAR REGULATORY COMMISSION

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

Attention: Mr. Darrel G. Eisenhut, Director

Dear Mr. Eisenhut:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
File 0260/16360
Control of Heavy Loads
AECM-81/427

Your letter dated December 22, 1980 requested a review of the controls for handling heavy loads at Grand Gulf Nuclear Station (GGNS), the implementation of certain recommendations regarding these controls prior to operation, and the submittal of information to demonstrate that the recommendations have been implemented. This information was to be submitted in two installments. Mississippi Power & Light Company (MP&L) has conducted the first phase of the requested review of the GGNS facility. The enclosed information describes the results of this review. The information is enclosed as responses to the items in Section 2.1 of Enclosure 3 to your December 22, 1980 letter.

With regard to the implementation of interim actions, MP&L has developed the required changes to procedures to satisfy the NRC staff positions. These changes will receive necessary reviews and approvals and will be implemented prior to fuel loading at GGNS.

Your letter of December 22, 1980 also requested information regarding the implementation of design changes. The information requested involved (1) confirmation that such changes would be implemented as soon as possible and (2) justification for any changes not believed to be necessary. No design changes have been identified as yet. If design changes are identified in the next phase, we will provide the requested information. The next phase will consist of providing responses to the additional information requested to

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address the applicable items in Sections 2.2, 2.3, and 2.4 of Enclosure 3 to your December 22, 1980 letter. This information will be provided by March 1, 1981.

Yours truly

L. F. Dale
Manager of Nuclear Services

PJR/JDR:nll
Attachment

cc: Mr. N. L. Stampley
Mr. R. B. McGehee
Mr. T. B. Conner
Mr. G. B. Taylor

Mr. Victor Stello, Jr., Director
Officer of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

RESPONSES TO REQUESTS
FOR
INFORMATION IN SECTION 2.1
OF ENCLOSURE 3 TO DECEMBER 22, 1980
LETTER FROM D. EISENHUT

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 fixed overhead handling systems for which a load drop could result in damage to safe shutdown equipment or could impact irradiated fuel at Grand Gulf are listed below:

TABLE 1

HANDLING SYSTEM	CAPACITY (Tons)	LOCATION
Containment Polar Crane/Aux Hoist	125/35	Containment
Spent Fuel Cask Crane	150	Aux. Bldg.
New Fuel Bridge Crane	5	Aux. Bldg.
Monorail for LPCS & RHR "C" Hatches	10	Aux. Bldg. (el. 139')

POLAR CRANE

The containment is served by an Overhead Polar Crane, manufactured by Harnischfeger P&H, with a main hoist capacity of 125 tons and an auxiliary hoist capacity of 35 tons. It is discussed in FSAR Section 9.1.4.2.2.1. Evaluation of the crane design to the criteria in NUREG 0612 is discussed in the response to Item 3.f. The Crane is designed as seismic Category I equipment. It consists of two crane girders and a trolley and can be controlled from both a pendant at El. 117'-4" and a cab. The circular runway supporting the crane girders is attached to the containment walls at elevation 235'-0" and provides for 360° rotation of the crane girders (see Figure 6).

The Polar Crane is used to move all of the major reactor components (reactor vessel head, shroud head and separator, and dryer assembly). Its range of travel includes the entire refueling deck (208' elevation) with loads being handled over or in the vicinity of the reactor core, the in-containment fuel storage racks, and the equipment hatch located in the northwest quadrant of the containment.

SPENT FUEL CASK CRANE

The Spent Fuel Cask Crane is a bridge-type single trolley crane, supported by reinforced concrete columns, which spans the width of the fuel handling area. The crane was manufactured by Whiting Corporation in accordance with specifications for electric overhead traveling Class A1 cranes, CMAA-70, and has a capacity of 150 tons. The crane is designed to handle a fuel shipping cask weighing approximately 125 tons. The Spent Fuel Cask Crane is discussed in FSAR Section 9.1.4.2.2.2.

The primary purpose of the Spent Fuel Cask Crane is to facilitate onsite handling of the fuel cask. The area of service for this crane in the north end of the fuel handling area, which includes the cask handling hatch, the cask storage pool, and the cask washdown area at the 208' elevation in the northwest corner of the Auxiliary Building (see Figure 6). The cask crane may also be used to lower a recirculation pump motor or HPCS motor down through the Spent Fuel Cask Handling Hatch from the 166'el to the railroad track bay at the 135'el.

The cask crane rails do not extend over any portion of the spent fuel pool; thus, the cask cannot be transported over the spent fuel storage racks. The crane lift system has a dual load path design, with the exception of the main drum wire failure of which is not considered credible), so that no single component failure will result in a cask drop. The Grand Gulf FSAR Appendix 3A provides a comparison of this crane to the criteria in Regulatory Guide 1.104. Because this crane has been designed to "Single Failure Proof Criteria," a cask drop is not required to be analyzed. However, to preserve the designed in load handling reliability of the Spent Fuel Cask Crane procedural controls for inspection, testing, maintenance, and operator qualifications have been addressed for this crane.

NEW FUEL BRIDGE CRANE

The New Fuel Bridge Crane, manufactured by Harnischfeger P&H, is the general service crane in the fuel handling area with a range that includes the entire fuel handling area at the 208' elevation of the Auxiliary Building (see Figure 6). It is a 5-ton capacity crane controlled by an operator on the floor. The New Fuel Bridge Crane is discussed in FSAR Section 9.1.4.2.2.3.

The crane's principal function is the handling of new fuel from the time it arrives onsite until it is placed in the fuel preparation machine. It is also used for handling miscellaneous loads in the fuel storage pool area, including various small loads over the spent fuel pool, and for handling smaller plant equipment (less than 5 tons) when being brought into or removed from the plant. The crane rails run below the Spent Fuel Cask Crane rails and above the fuel handling area platform rails. They are supported by reinforced concrete columns and wall supports. The crane and its supporting structures comply with seismic Category I requirements.

MONORAIL FOR LPCS & RHR "C" HATCHES

The monorail system for the LPCS and RHR "C" hatches is used to remove and replace hatches at the 139' and 119' elevations to provide access to the LPCS and

RHR "C" pump rooms at the 93' elevation. It is also used for removal and reinstallation of major components in the LPCS and RHR "C" rooms. The hoist was manufactured by Eaton Corporation, Yale Cranes and Hoists Division, and has a 10-ton capacity.

The LPCS and RHR "C" hatches would only be moved for servicing the LPCS or RHR "C" systems when such systems are out of service. However, certain cable trays and conduit at the 119' elevation are located in proximity to the hatch openings and could be impacted if a hatch cover or piece of equipment were dropped. These cable trays and conduit contain cables serving the LPCS system and the remote shutdown panel.

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 core decay heat removal.

RESPONSE: Monorails, hoists, and cranes in the Turbine Building and Radwaste Building have been excluded on the basis that no safe shutdown equipment is located in these areas. Although this plant contains a large number of monorails and hoists in the Auxiliary and Containment Buildings that were installed to facilitate maintenance, the handling systems were located so as to minimize the potential for damaging plant equipment when they are used. In general, plant equipment and cabling is well separated from locations where heavy loads would be handled. The review of plant handling systems, plant arrangements, and location of safe shutdown equipment found that the monorail, hoist, and crane systems listed in Table 2 can be excluded from further detailed consideration for the reasons described below. These handling systems are highlighted on Figures 1-7.

TABLE 2
MONORAILS, HOISTS AND CRANES
EXCLUDED FROM FURTHER CONSIDERATION

HANDLING SYSTEM	CAPACITY (Tons)	LOCATION
Component Cooling Water Pump Monorail	2	Aux. Bldg. 93'
Floor Drain Transfer Pumps Monorail	3	Aux. Bldg. 93'
Control Rod Drive Pump Monorails (2)	5	Aux. Bldg. 93'
Control Bldg. Hot Machine Shop Monorail	15	Control Bldg. 93'
Control Rod Drive Removal Hoist	10	Containment 93'
HPCS Hatch/Equipment Monorail	25	Aux. Bldg. 113'
RCIC Hatch Monorails	5	Aux. Bldg. 113'
Chilled Water Pump Monorail	2	Aux. Bldg. 134'

TABLE 2 (continued)

HANDLING SYSTEM	CAPACITY (Tons)	LOCATION
RHR "A" Hatch & Equipment Monorail	10	Aux. Bldg. 139'
RHR "B" Hatch & Equipment Monorail	10	Aux. Bldg. 139'
Main Steam Tunnel Crane	12	Aux. Bldg. 139'
Railroad Bay Monorail	5	Aux. Bldg. 139'
Fuel Pool Cooling & Cleanup Pump Monorails (2)	5	Aux. Bldg. 166'
Control Rod Drive Repair Room Monorail	½	Aux. Bldg. 166'
Spent Fuel Cask Hatch Monorail	10	Aux. Bldg. 166'
Containment Cooler Monorail	2	Containment 166'
Valve Handling Crane	12	Containment 166'
Spent Fuel Pool Cooling Heat Exchanger Monorail	7½	Aux. Bldg. 185'
Jib Cranes	½	Containment and Aux. Bldg. 208'
Diesel Generator Cranes (2)	6	Diesel Generator Bldg.
Standby Service Water Pump House Monorails (2)	12	Standby Service Water Pump Houses

The Component Cooling Water Pump Monorail is a 2-ton structure passing over component cooling water pumps A, B, and C at an elevation of 93'. The pumps are not required for safe shutdown loads. They are, therefore, exempt from NUREG 0612 requirements.

The Floor Drain Transfer Pump Monorail is located in the auxiliary building at the 93' elevation. NUREG 0612 criteria are not applicable to this monorail since transfer pumps are not required for safe shutdown. No safety-related equipment is located in the transfer pump area.

Two Control Rod Drive (CRD) Monorails pass over CRD pumps A and B at the 93' elevation. One monorail is located over each pump and is used only to service its associated pump when out of service. A load drop from a monorail hoist would not impact the adjacent pump due to the pumps' physical separation. Therefore, a load drop will not render operable safe shutdown equipment inoperable.

A monorail runs the width of the Control Building Hot Machine Shop at elevation 93'. There is no safe shutdown equipment in the area. Thus, NUREG 0612 criteria are not applicable.

The Control Rod Drive (CRD) Removal Hoist is located below the reactor vessel at an elevation of 93' and is only used to transport CRDs from below the vessel during maintenance. A load drop would not impact any safe shutdown equipment.

At 113' elevation in the Auxiliary Building, a 25-ton monorail is located above the HCPS Pump Removal Hatch. HPCS is required for response to certain design basis events. These design basis events are not required to be postulated in conjunction with a load drop. HPCS is not required, however, for achieving safe shutdown. Reactor inventory can be maintained during plant shutdown operations by RCIC pumps, CRD pumps, or RHR with ADS. No safe shutdown equipment is located in the HPCS room (el. 93'). Certain electrical cabling, motor control centers, and 6.9-Kv switchgear are located at the 113' elevation where the HPCS monorail is located. However, this equipment is well separated from the monorail and could not be impacted by movement or by dropping of hatch covers or HPCS equipment.

The three Reactor Core Isolation Cooling (RCIC) Hatch Monorails (Auxiliary Building el. 113') are also excluded from further consideration. The hoists attached to the monorails would only be used for servicing the RCIC system when the system has been removed from service for maintenance. Improper movement of the hatches to allow access to the room containing RCIC equipment could allow cabling and conduit to be impacted. However, the only cabling that could be affected is associated with leak detection systems and balance-of-plant equipment not required for safe shutdown.

A 2-ton monorail passes over the two primary Plant Chilled Water Pumps and the two secondary chilled water pumps at the 134' elevation. Neither the primary nor the secondary pumps are required for safe shutdown. No safe shutdown cabling or equipment is located in the vicinity of the monorail.

Removal of the Residual Heat Removal (RHR) Pump A hatch is performed with the 10-ton monorail which passes over the hatch at the 139' elevation. The hatch would be removed to provide access to the RHR A room for equipment removal and replace-ment. Thus, the monorail would only be used to service the RHR A system when that system is already inoperable. A load drop could impact conduit at the 119' level below the hatch, but this conduit is associated with balance-of-plant equipment and would not affect safe shutdown equipment.

Likewise, a 10-ton monorail is located over RHR Pump B hatch. Again, the monorail would only be used when the RHR system is out of service. No other equipment would be affected by a load drop in this area.

The Main Steam Tunnel Crane, a 12-ton capacity hoist located in the Auxiliary Building at an elevation of 133'/139', is used for servicing isolation valves in the main steam tunnel area, but only when the unit is shut down and in RHR cooling. Feedwater lines which would be used for RHR return to the vessel in the shutdown cooling mode are located below the main steam lines and would not be impacted by a load drop during isolation valve servicing. For these reasons, this hoist is excluded from NUREG 0612 requirements.

The 5-ton Railroad Bay Monorail is used to transfer smaller equipment from the auxiliary building to the railroad bay. There is no safe shutdown equipment in the railroad bay or in proximity to that portion of the monorail inside the auxiliary building.

Two Fuel Pool Cooling and Cleanup Pump Monorails are located at the 166' elevation. These pumps provide cooling for decay heat removal for the spent fuel pools. The

RHR pumps can also perform this function when the reactor is shut down. Separate monorails are located over each pump. Since the pumps are separated by 10 feet of open floor space, a load drop from one of the monorails would not render the other pump inoperable.

The Control Rod Drive (CRD) Repair Room Monorail at an elevation of 166' is located well away from safe shutdown equipment or cabling. There is no safety-related cabling or equipment in this area and thus this monorail may be excluded from consideration.

No safety-related or safe shutdown equipment or cabling is located beneath or in close proximity to the 10-ton Spent Fuel Cask Hatch Monorail. A load drop would therefore not affect the safe shutdown of the plant.

The Containment Cooler Monorail is located over three containment coolers at an elevation of 166' and is used for coil removal and replacement. The containment air coolers are not required for safe shutdown of the plant or to maintain Class IE equipment in containment within the temperature range for which it is qualified to operate. Since there is no safe shutdown equipment located beneath or in proximity to the monorail, this monorail may be excluded from consideration.

Another handling system which can be excluded from further consideration is the 12-ton capacity Valve Handling Crane located in the containment drywell at an elevation of 166'. The crane would be used only when the reactor is shut down and on long-term decay heat removal. In this mode, the critical safety function is maintaining operability of the RHR system and related instrumentation, such as vessel level. Instrument lines for vessel level as well as the RHR suction and return lines, are located below this crane; however, the RHR lines are located below the main steam lines and would not be impacted by a load drop from this crane. Instrument lines are routed in four quadrants so that a load drop would at most affect one channel, leaving three remaining operable channels. For the above reasons, the Valve Handling Crane may be excluded from consideration.

The Spent Fuel Pool Cooling Heat Exchanger Monorail may be excluded from consideration because there is no safe shutdown equipment below or in proximity to this monorail. The monorail only operates at one end of the fuel pool coolers and cannot carry a load over the coolers.

The Jib Crane in the containment may be positioned at any of three different locations along the west side of refueling canal and is used for handling smaller loads in this area near the in-containment fuel storage racks. The Jib Crane in the auxiliary building may be positioned at any of four locations along the spent fuel pool. These jib cranes are used for handling channel assemblies, control rods, guide tubes, and other loads that are lighter than a fuel assembly plus its handling tool (approximately 750 lbs.). They are not intended for handling loads greater than 1,000 lbs. To assure that these handling systems do not handle any loads greater than 750 lbs., an addition to the Grand Gulf technical specifications is proposed that will prohibit handling of loads greater than 750 lbs. with this jib crane. The proposed technical specification is attached.

Separate small cranes (6-ton capacity) are located above each Diesel Generator Unit to assist in servicing these units. The cranes are only used when the diesel has been removed from service and requires some maintenance or repair. Since the only equipment in a diesel generator compartment is associated with that diesel, a load drop from one of these cranes would therefore not cause operable safe shutdown equipment to become inoperable.

Finally, the monorails for the Standby Service Water Pump Houses are used for removing roof hatches to provide access for removal of standby service water pumps or motors. Two pump houses are provided, each containing pumps for only one safety division. The monorails would only be used for servicing equipment that is removed from service for maintenance or repair. Therefore, a load drop from one of these monorails would not cause operable safe shutdown equipment to become inoperable.

ITEM 3: With respect to the design and operation of heavy load-handling systems in the containment and spent-fuel-pool area and those load-handling systems identified in 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 and sketches sufficient to clearly identify the location of safe load paths, spent fuel, and safety-related equipment.

With regard to the four handling systems identified in the response to Item 1. above, there are many different load handling situations encountered. Defining safe load paths in the manner described in NUREG 0612, Section 5.1.1(i), is neither required nor prudent for every situation. To do so would unnecessarily restrict plant operation and maintenance activities. To address this problem, the possible load handling situations that could be encountered have been identified in Table 3 below. Each load handling situation has been assigned a safety class designation, roughly in order of safety significance. Safe load path and load handling procedural requirements have been defined for each safety class.

TABLE 3

LOAD SAFETY CLASSES AND SAFE LOAD PATH ACTIONS

Heavy Load[1] Handling Situation	Safe Load Path/Procedural Actions Required
Safety Class 1. Load must be carried directly over (i.e., there are no intervening structures such as floors) spent fuel, the reactor vessel or safe shutdown equipment.	1. Procedurally limit time and height load is carried over the area of concern.

TABLE 3 (continued)

Heavy Load[1] Handling Situation	Safe Load Path/Procedural Actions Required
Safety Class 2. Load could be carried directly over spent fuel, the reactor vessel, or safe shutdown equipment, i.e., load can be handled during the time when spent fuel or the reactor vessel is exposed or safe shutdown equipment is required to be operable and there are no physical means (such as interlocks or mechanical stops) available to restrict load movement over these objects.	2. Procedurally define an area over which loads shall not be carried so that if load is dropped, it will not result in damage to spent fuel or operable safe shutdown equipment or compromise reactor vessel integrity.
Safety Class 3. Load can be carried over spent fuel or safe shutdown equpment, but the fuel or equipment is not directly exposed to the load drop, i.e., intervening structures such as floors provide some protection.	3. See 3A and 3B.
Safety Class 3A. Preliminary evaluation indicates that intervening structures will protect spent fuel or safe shutdown equipment.	3A. No load travel path is required at this time. General precautions limiting load travel height is prudent.
Safety Class 3B. Preliminary evaluation can not conclusively demonstrate that intervening structures will protect fuel or safe shutdown equipment.	3B. Define safe load paths that follow, to the extent practical, structural floor members. Limit load travel height to minimum height practical.
Safety Chass 4. Load cannot be carried over spent fuel or over safe shutdown equipment when such equipment is required to be operable, i.e, design or operational limitations prohibit movement.	4. No safe load path required.

1 A heavy load is defined as a load that is greater than the weight of a channeled fuel assembly.

Each of the heavy loads listed in the response to Item 3.c has been assigned to one or more safety classes (see Tables 4-7). In some cases, more than one safety class assignment is required because more than one of the load handling situations described in Table 3 could be encountered when handling the load.

For each of the heavy loads listed in the response to Item 3.c, the safe load path/procedural requirements corresponding to the assigned safety class have been added to the appropriate plant procedures. When more than one safety class assignment was made for a particular load, the safe load path/procedural requirements of all safety class assignments were included in the procedures.

The loads of principal concern are those that have been assigned to Safety Classes 1, 2, or 3B. The actions taken to address each of these loads are summarized below for each of the handling systems listed in the response to Item 1.

POLAR CRANE

Safety Class 1 Loads - The Safety Class 1 loads of principal interest because of their weight are the Steam Dryer, the Shroud Head/Steam Separator, and the Drywell Head. They have been assigned Safety Class 1 because they must be carried directly over the reactor vessel during reactor assembly and disassembly operations. The general arrangement of the containment operating deck is indicated in Figure 6. With regard to these lifts, steps have been included in their handling procedures that minimize both the time and height that these loads are carried directly over the vessel.

Safety Class 2 Loads - A number of the loads listed in Table 4 have been assigned to Safety Class 2. This is because there are no physical or design restrictions that prevent them from being carried over the reactor vessel or the in-containment fuel storage racks. A procedural restriction has been included in the appropriate plant procedures, that prohibits movement of these loads over the reactor vessel when spent fuel is in the vessel or over the in-containment fuel storage racks. A prohibition for carrying loads over the in-containment storage racks is also included in Tech Spec. 3/4.9.7 (attached).

Safety Class 3 Loads - The principal concern with Safety Class 3 loads in containment is the potential for impacting equipment required to maintain shutdown that is located below the operating deck. There are 2 general areas of concern. The first is made up of those areas that could be subjected to drops of the heavier loads, i.e., Loads 1-4 in Table 4 (see Figure 6 for the storage locations of these loads.)

The travel paths of these loads to their storage locations are very direct and very limited in the extent of travel over floor structures. Accordingly, detailed travel paths are not required. However, to address the issue of dropping these loads on floor structures, the plant procedures governing lifting of these loads include steps that minimize the height that the load is carried over the floor structures. In addition, match marks have been permanently affixed to the crane rails, trolley and end trucks to assure proper alignment of the crane during these lifts. Use of the match marks will assure that the most direct and unobstructured path is taken to and from the storage locations.

The second area of concern is the grating in the southeast quadrant of the operating deck (see Figure 6). RHR piping required for core and containment pool cooling during certain modes of operation is exposed under this grating. Loads 10, 11 & 12 have been assigned to Safety Class 3B on the basis that they could be moved over this grating area. To address this concern, a prohibition has been included in the appropriate plant procedures that prevents movement of these loads over the grating area when the RHR system is in the pool cooling mode of operation.

SPENT FUEL CASK CRANE

The discussion regarding the Spent Fuel Cask Crane in Item I indicated that this crane has been designed to "Single Failure Proof Critiera." Further, the crane rails do not extend over any portion of the Spent Fuel Pool. Administrative controls limit the cask (the principal load of interest) from being raised more than 6 inches above the operating floor and redundant limit switches prevent the cask from being raised more than one foot.

Because the design of the "Spent Fuel Cask Crane" provides substantial load handling reliability, detailed safe load paths were not judged to be required and therefore none are proposed here. Nonetheless, prior to undertaking any cask handling operations, detailed handling procedures will be developed taking into consideration the guidelines of NUREG 0612.

NEW FUEL BRIDGE CRANE

The concern with the New Fuel Bridge Crane is the possibility of carrying loads over spent fuel in the spent fuel pool. There are no physical or design restrictions that prevent this crane from moving over the pool. Accordingly, all of the heavy loads listed in Table 6 for this crane have been assigned to Safety Class 2. To address this concern, proposed Technical Specification 3/4.9.7 (attached) prohibits loads in excess of 750 lbs. from being carried over irradiated fuel in the spent fuel pool. Further, the plant procedure governing operation of the New Fuel Bridge Crane includes precautions and guidance related to meeting this Technical Specification.

MONORAIL/HOIST FOR LPCS AND RHR"C" HATCHES

The safety concern posed by this handling system is described in the response to Item I as the potential for dropping a hatch cover or heavy piece of equipment onto cabling at the 119' elevation. To address this safety concern, the plant procedure governing lifts by this monorail/hoist system includes precautions to hoist operators that alert them to the concern and direct them to take extreme care to avoid impacting the cabling.

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: As indicated in the response to Item 3.a above, measures have been included in a number of plant procedures utilized in performing the heavy lifts identified in the response to Item 3.c. Each such heavy lift will be supervised by a designated individual who will be responsible for enforcing the procedural requirements. Any deviation from these requirements will require the prior approval of the Operations Superintendent.

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

RESPONSE: The requested information is provided in Tables 4 through 7 below:

TABLE 4
POLAR CRANE HEAVY LOADS[1]

	LOAD	SAFETY CLASS	APPROX. WEIGHT (TONS)	APPLICABLE LIFT PROCEDURES[9]	LIFTING EQUIPMENT
1.	Reactor Pressure Vessel Head (RPV)	1/3B	117	07-S-14-184[2]	Head Strongback Carousel
2.	Steam Dryer	1/2/3B	40	7/	Dryer & Separator Strongback
3.	Shroud Head/ Steam Separator	1/3B	68	07-S-14-186[3]	Dryer & Separator Strongback
4.	Drywell Head	1/3B	61.5	07-S-14-182[5]	Drywell Head Lifting Frame
5.	Portable Refueling Shield	2/3A	12	07-S-14-187[4]	Shackles & Slings
6.	RPV Head Insulation with Support Structure	1/3A	10.5	8/	Drywell Head Lifting Frame
7.	Reactor Well/Steam Dryer Storage Area Gate	2/3A	3.5	07-S-14-189[6]	Shackles & Slings
8.	Upper Containment Fuel Pool/Transfer Pool Gate	2/3A	3.5	07-S-14-189[6]	Slings & Shackles
9.	Load Block	2/3B	5.6(M) 1(Aux).	9/	N/A

TABLE 4

(continued)

	LOAD	SAFETY CLASS	APPROX. WEIGHT (TONS)	APPLICABLE LIFT PROCEDURES[9]	LIFTING EQUIPMENT
10.	RWCU Regenerative HX Hatches (2)	2/3B	15	9/	Shackles and Slings
11.	RWCU Non-Regenerative HX Hatches (3)	2/3B	15-17	9/	Shackles and Slings
12.	RWCU Filter Demineralizer Hatches (2)	2/3B	20	9/	Shackles and Slings

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1. A heavy load is defined as a weight exceeding the weight of a channeled fuel assembly and its associated handling tool (approximately 1140 lbs.)

2. General Maintenance Instruction, 07-S-14-184, "Installation and Removal of the Reactor Vessel Head, Safety Related."

3. General Maintenance Instruction, 07-S-14-186, "Installation and Removal of the Reactor Moisture Separator, Non-Safety Related."

4. General Maintenance Instruction, 07-S-14-187, "Installation and Removal of the Portable Refueling Shield (Cattle Chute), Non-Safety Related."

5. General Maintenance Instruction, 07-S-14-182, "Installation and Removal of the Drywell Head, Non-Safety Related."

6. General Maintenance Instructions, 07-S-14-189, "Installation and Removal of the Fuel Pool and Canal Gates, Non-Safety Related."

7. A maintenance instruction for the installation and removal of the steam dryer has not yet been prepared. When an instruction is prepared, it will include the necessary detail, precautions, etc. to adequately address the requirements of NUREG 0612.

8. As with the steam dryer (addressed above), no maintenance instruction for the installation and removal of the Reactor Vessel Insulation Assembly has yet been prepared. The same conditions for procedure development and content apply as for the steam dryer (Note 7).

9. The Maintenance Instruction for Polar Crane Operation in general is applicable to all loads. In addition, it governs the lifts of all loads listed in this table that do not have special lift procedures designated.

TABLE 5

SPENT FUEL CASK CRANE HEAVY LOADS

	LOAD	SAFETY CLASS	APPROX. WEIGHT (TONS	APPLICABLE LIFT PROCEDURES	LIFTING EQUIPMENT
1.	Spent Fuel Cask	N/A	125	1/	Dual Load Path Cask Lifting System
2.	Recirc. Pump Motor	N/A	30	1/	Slings & Shackles
3.	HPCS Pump Motor	N/A	18	1/	Slings & Shackles

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1. Detailed lift procedures have not yet been developed for the Spent Fuel Cask Crane. Such procedures will be developed, but are not required to meet the guidelines of NUREG 0612 for this "single failure proof" handling system.

TABLE 6

NEW FUEL BRIDGE CRANE HEAVY LOADS

	LOAD	SAFETY CLASS	APPROX. WEIGHT TONS	APPLICABLE OPERATING PROCEDURES	LIFTING EQUIPMENT
1.	New Fuel Shipping Containers	2	1.5	1/	Slings & Shackles
2.	Fuel Pool & Clean Up Filter Demineralization Hatch (2)	2	3	1/	Slings & Shackles
3.	Spent Fuel Canal Gate	2	3.5	1/	Slings & Shackles

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1. The Maintenance Instruction for New Fuel Bridge Crane Operation is applicable to all lifts.

TABLE 7

LPCS & RHR PUMP "C" EQUIPMENT AND HATCH HOIST HEAVY LOADS

	LOAD	SAFETY CLASS	APPROX. WEIGHT (POUNDS)	APPLICABLE PROCEDURES	LIFTING EQUIPMENT
1.	Hatch Cover (2)	2	9,000	1/	Slings & Shackles
2.	RHR Pump	2	16,000	1/	Slings & Shackles
3.	RHR Motor	2	7,600	1/	Slings & Shackles
4.	LPCS Pump	2	20,000	1/	Slings & Shackles
5.	LPCS Motor	2	17,000	1/	Slings & Shackles
6.	LPCS Lower Shell	2	17,000	1/	Slings & Shackles

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1. Proposed Maintenance Instruction for the LPCS/RHR "C" Hatch Hoist is applicable to all lifts.

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 B30.9-1971 as appropriate. For lifting devices where these standards, as supplemented by NUREG 0612, Sections 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: With regard to special lifting devices, there are three identified in Item 3.c. above that are used to handle heavy loads in the containment. These special lifting devices are:

1) Head Strongback Carousel
2) Dryer/Separator Strongback
3) Drywell Head Lifting Frame (Strongback)

A description of each of these devices and the plant function or operations in which these devices are used is contained in the following paragraphs:

(1) <u>Head Strongback Carousel</u> (Figure 8)

The head strongback carousel combines the functions of stud tensioning and relaxation, nut and washer handling and storage, and reactor vessel head transport. The strongback frame is a cruciform structure of box beams with four intermediate radial beams which together provide an eight-point support for the carousel track. A lift box is welded to the top of the frame and carries two lift pins for attaching the frame to the crane hook. Four laterally braced support legs extend vertically down from the box beam support arms to the reactor vessel head lifting lugs. Eight slings are attached at the ends of the support arms and intermediate radial beams to carry the nut tray storage ring.

Each of the four vertical supports consists of a tubular assembly comprising a support pipe, lifting clevis, and two brace arms which are bolted to the frame. The lifting clevis rod is housed within the support pipe and extends through sleeves in the frame arms where it is secured by a backing plate and nut. A threaded tube in the lower end of the support pipe provides an adjustable extension.

(2) Dryer and Separator Strongback (Figure 9)

The dryer and separator strongback is used during refueling or reactor servicing operations to remove and install the steam dryer and the shroud-head and steam separator. The strongback is also used to remove and install the auxiliary platform components which include the vessel platform and vessel platform polar track.

The dryer and separator strongback consists of a frame which is made of four quadrangular steel beams aligned to intersect at a central hook box. The beams are flanged at the bottom and welded to top and bottom support plates. The top plate has a cut-out for the crane sister hook. The ends of the tapered beam are fitted with lift sockets for remote engagement of socket pins to the lifting eyes of the dryer and the separator. There are two separate compartments in each lift socket: the outer compartment for dryer engagement and the inner compartment for separator engagement. The socket pins are actuated by double-acting air cylinders which are mounted at the ends of the beams.

A lifting eye is also provided at the end of each beam to connect four single-legged slings that are used to lift the vessel platform polar track. Lifting eyes are provided on the braces between each pair of support beams for attaching lifting cables to lift the vessel platform. Separate wire rope cable slings are used for the vessel platform and the platform polar track.

(3) Drywell Head Lifting Frame (Figure 10)

The drywell head lifting frame (or strongback) is used to lift the drywell head and the head insulation support structure.

The lifting frame consists of a cruciform I-Beam structure with four radial arms which are fitted with lifting lugs at the outer end of the arms. A plate structure is bolted to the top surface of the lifting arms and carries the crane hook pins.

The three devices described above were evaluated against ANSI N14.6-1978. For the reasons listed below, the detailed comparison of the devices to ANSI N14.6 was limited to Sections 3.2 and 5 of the standard.

1) ANSI N14.6-1978 was written for special lifting devices for shipping containers for nuclear materials. The devices described above were designed and fabricated prior to a decision by NRC to apply this standard to other types of special lifting devices. Accordingly, ANSI N14.6-1978 was not specifically applied in the design and fabrication of these devices. In this regard, there are a number of sections in the standard that are difficult to apply in retrospect. These sections are the sections entitled, Designer's Responsibilities (Section 3.1); Design Considerations (Section 3.3); Fabricator's Responsibilities (Section 4.1); Inspector's Responsibilities (Section 4.2); and Fabrication Considerations (Section 4.3). Because documentation is not available to assure that all subparts of these sections were met, they have not been addressed item by item for the purpose of identifying and justifying exceptions. However, information on drawings and in

letters indicate that sound engineering practices were placed on the fabricator and inspector by the designer for the purpose of assuring that the designer's intent was accomplished. On this basis, there is reasonable assurance that the intent of the sections of the standard listed above was, in fact, accomplished in the design, fabrication, inspection, and testing of these devices.

2) Section 1.0, Scope; Section 2.0, Definitions; Section 3.4, Design Considerations to Minimize Decontmination Efforts in Special Lifting Device Use; Section 3.5, Coatings; and Section 3.6, Lubricants are not pertinent to load-handling reliability of the devices and, therefore, have not been addressed for purpose of identifying and justifying exceptions.

3) Section 6, Special Lifting Devices for Critical Loads, is applicable to critical loads. A critical load is defined in the standard as:

> "Any lifted load whose uncontrolled movement or release could adversely affect any safety related system when such system is required for unit safety or could result in potential offsite exposure comparable to the guideline exposures outlined in <u>Code of Federal Regulations</u>, Title 10, Part 100."

None of the loads lifted by the devices identified above have as yet been determined to be a critical load. Such a determination would require an analysis of the consequences of various load drop scenarios. Since such analyses are not required to be performed until the final report to the NRC, it is premature to designate certain loads as critical loads and, accordingly, to apply Section 6 of ANSI N14.6-1978 to their designated lifting devices.

ANSI N14.6 - Section 3.2

Section 3.2 of ANSI N14.6-1978 establishes design criteria for special lifting devices. Specifically, it establishes (1) stress design factors for load-bearing members and (2) requirements to assure that materials used in load-bearing members have adequate toughness.

Stress Design Factors — The Head Strongback Carousel and Dryer/Separator Strongback were designed with stress design factors consistent with ANSI N14.6, Section 3.2. The Drywell Head Lifting Frame was designed to AISC criteria which resulted in lower design factors being realized than required by ANSI N14.6. However, based on conservative load criteria used in the design of the lifting frame, the resulting design factors are consistent with those generally required for safety related items.

Fracture Toughness Considerations — The materials utilized to fabricate the load bearing components in each of the lifting devices have been evaluated in terms of their fracture toughness properties. All materials have been determined to possess adequate resistance to brittle fracture with the possible exception of A-53 utilized for the vertical supports and bracing in the RV Head Strongback. Therefore, to assure that brittle failure of these load bearing components is remote, periodic inspections shall be performed for these components. Therefore, MP&L is taking appropriate actions to assure that the possibility of brittle failure of these load bearing components is extremely remote.

ANSI N14.6 - Section 5

A program for inspection, testing, and maintenance of the devices will be established that meets the provisions of ANSI N14.6-1978, Section 5 with the following four exceptions.

Exception 1: Plant procedures will not specify a visual inspection by maintenance or other nonoperating personnel at intervals of three months or less as required by Section 5.3.7 of ANSI N14.6-1978. Between periods of usage, these devices are stored in a specific location under controlled environment and are not subjected to any other usage except the dedicated and specific usage mentioned in the description of the devices. Procedures have been revised so that the devices are inspected by qualified personnel prior to each usage and a thorough testing and nondestructive examination is performed annually. Based on the controlled storage, dedicated single usage, and the complete inspection schedule, the equivalency of Section 5.3.7 is demonstrated.

Exception 2: Section 5.3.3 of ANSI N14.6-1978 requires that special lifting devices be load tested according to Section 5.2.1 to 150% of maximum load following any incident in which any load-bearing component may have been subjected to stresses substantially in excess of those for which it was qualified by previous testing, or following an incident that may have caused permanent distortion of load-bearing parts. Since distortion may already have occurred or since defects may have already developed due to the overstressed condition, it seems more prudent and practical to perform the dimensional examinations for deformation and the nondestructive examinations for defects to determine whether the device is still acceptable for use rather than to subject the device to 150% load testing. If defects or deformation are detected, then the device shall be repaired or modified and then tested to 150% load followed by examination for defects or deformation. This alternative achieves the same objective as Section 5.3.3 of the standard.

Exception 3: The lifting devices were subjected to proof load tests of 125% of rated load as compared to 150% required by Section 5.2.1 of ANSI N14.6-1978. Following the proof tests, all load bearing welds were subjected to NDE. The potential for overloading these devices is extremely remote because the devices are dedicated to one or two specific loads thorughout their service life. In addition, they will receive thorough periodic examinations and, if damaged or repaired, will be subjected to a 150% load test before being returned to service as required by ANSI N14.6. For these reasons, the 125% initial proof test is judged to be adequate.

Exception 4: Several components of the lifting devices will be subjected to NDE and dimensional inspections on intervals longer than those required by Section 5.3.1(2) of ANSI N14.6-1978. These are those components that require disassembly or removal of paint. They will be inspected on a 5-year interval because they are difficult and time consuming inspections that are not judged to be justified on a shorter interval based on the very limited and dedicated use of these devices.

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: The procedures for inspection, testing, and maintenance of the three overhead cranes identified in the response to Item I (Containment Polar Crane, New Fuel Bridge Crane and Spent Fuel Cask Crane) are contained in a number of maintenance procedures and instructions. The procedures and instructions have been reviewed and compared to ANSI B30.2-1976, Chapter 2-2. Based on this review, some additions were made to these procedures and instructions. With these additions, the criteria of ANSI B30.2-1976, Chapter 2-2, are satisfied. No exceptions to the standard are taken.

ANSI B30.2-1976, Chapter 2-2 is not directly applicable to the inspection, testing, and maintenance of the LPCS/RHR "C" Hatch Monorail/Hoist System. These activities for this hoist system are, however, covered extensively by plant procedures. These procedures have been prepared following the guidelines of ANSI B30.16-1973, Section 16-2.2.

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 instances where specific compliance with these standards is not provided.

RESPONSE: The overhead cranes listed in response to Item 1 are the Containment Polar Crane, the Spent Fuel Cask Crane, and the New Fuel Bridge Crane. The Bechtel design specifications for the Polar and New Fuel Bridge Crane were compared to the 1975 revision of CMAA-70 and to the additional safety requirements of ANSI B30.2-1976, Section 2-1. A similar comparison for the Spent Fuel Cask Crane is not required for the reasons presented in the response to Item 1.

Based on these comparisons, we find that the Containment Polar Crane and the New Fuel Bridge Crane comply with the guidelines of CMAA-70-1975 and ANSI B30.2-1976, with one minor exception in regard to welding.

The Bechtel specifications place no additional requirements on welding other than the requirement of CMAA-70, which in turn references AWS D14.1 for welding, ANSI B30.2-1976 requires welding to be in accordance with AWS D1.1 as modified by D14.1. With the exception of requirements for storage of low hydrogen welding rods included in AWS D1.1, there are no significant differences between AWS D1.1 and AWS D14.1 that would affect load-handling reliability. Our review revealed that the manufacturer's (Harnischfeger) shop practices provided for control of low hydrogen rods even though AWS D1.1 was not used specifically. Therefore, the welding requirements in effect were equivalent to the requirements of ANSI B30.2.

With regard to the LPCS and RHR "C" Hatch/Monorail/Hoist System, the guidelines of CMAA-70 and ANSI B30.2-1976 are not directly applicable. However, the design of this monorail/hoist system does meet applicable industry standards as described below.

The 10-ton monorail system that serves the LPCS and RHR "C" rooms is a Yale-Eaton two-speed, double reeved, electric driven, wire rope hoist with a motorized monorail trolley. The criteria and specifications in ANSI B30.2, Chapter 2-1 and CMAA-70 are not applicable to a monorail hoist; however, other current industry standards do provide appropriate criteria for design of such hoists. These are ANSI B30.16, "Overhead Hoists-1973," and Hoist Manufacturers Institute Standard HMI 100-74, "Standard Specification for Electric Wire Rope Hoists." The LPCS/RHR "C" monorail hoist was designed by Yale-Eaton prior to the issuance of ANSI B30.16 and HMI 100-74. However, based on discussions with Yale-Eaton personnel, including their chief engineer, we have found that Yale-Eaton has compared the design of their hoists to the criteria in these standards and found that they meet or exceed the requirements of ANSI B30.16 and HMI 100-74. Based on this comparison, we believe that the design of the LPCS/RHR "C" monorail system satisfies the intent of NUREG 0612, Section 5.1.1(7) to have the handling system design comply with criteria in current standards.

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

RESPONSE: A new procedure for the qualification and training of overhead crane operators has been developed. This new procedure, Overhead Crane Operators Qualification/Training, and plant procedure 07-S-01-13, Control of Crane Operation taken together, meet the provisions of ANSI B30.2-1976, Chapter 2-3. These procedures include training, examination, experience, and physical requirements for crane operators as well as precautions and instructions to assure proper conduct of crane operation. In addition, required crane operator training includes, among other things, instruction in crane operator conduct, such as proper hand signals, testing of controls, limit devices, attaching the load, and moving the load. No exceptions to the guidance in ANSI B30.2-1976, Chapter 2-3 are taken.

With regard to the LPCS/RHR "C" Hatch Monorail/Hoist System, the provisions of ANSI B30.2-1976 are not directly applicable. Appropriate requirements, however, are included in plant procedures regarding the control and use of hoists. These procedures require that hoist operators be trained in hoist operation and certified as hoist operators by the Maintenance Superintendent.

PROPOSED TECHNICAL SPECIFICATION

3/4.9.7 CRANE TRAVEL-SPENT FUEL AND UPPER CONTAINMENT FUEL STORAGE POOLS

LIMITING CONDITION FOR OPERATION

3.9.7 Loads in excess of 1140 pounds shall be prohibited from travel over irradiated fuel assemblies in the spent fuel or upper containment fuel storage pool racks.

APPLICABILITY: With irradiated fuel assemblies in the spent fuel or upper containment fuel storage pool racks.

ACTION:

With the requirements of the above specification not satisfied, place the crane load in a safe condition. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.7 Loads, other than fuel assemblies or control rods, shall be verified to weigh less than or equal to 1140 pounds before travel over fuel assemblies in the spent fuel and upper containment fuel storage pools racks.

PROPOSED TECHNICAL SPECIFICATION

REFUELING OPERATIONS

3/4.9.13 JIB CRANE LOADING

LIMITING CONDITION FOR OPERATION

3.9.13 The jib crane shall be restricted to loads less than 1140 pounds

APPLICABILITY: With fuel assemblies in the upper containment fuel storage pool racks.

ACTION

With the requirements of the above specification not satisfied, place the crane load in a safe condition. The provisions of specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.13 Not Applicable

PROPOSED ADDITION TO
TECHNICAL SPECIFICATION BASES

REFUELING OPERATIONS

BASES

3/4.9.13 JIB CRANE LOADING

The restriction on maximum load for the jib crane ensures that in the event a load is dropped, 1) the activity release will be limited to that contained in a single fuel assembly, and 2) any possible distortion of fuel in the storage racks will not result in a critical array. This assumption is consistent with the activity release assumed in the accident analyses.

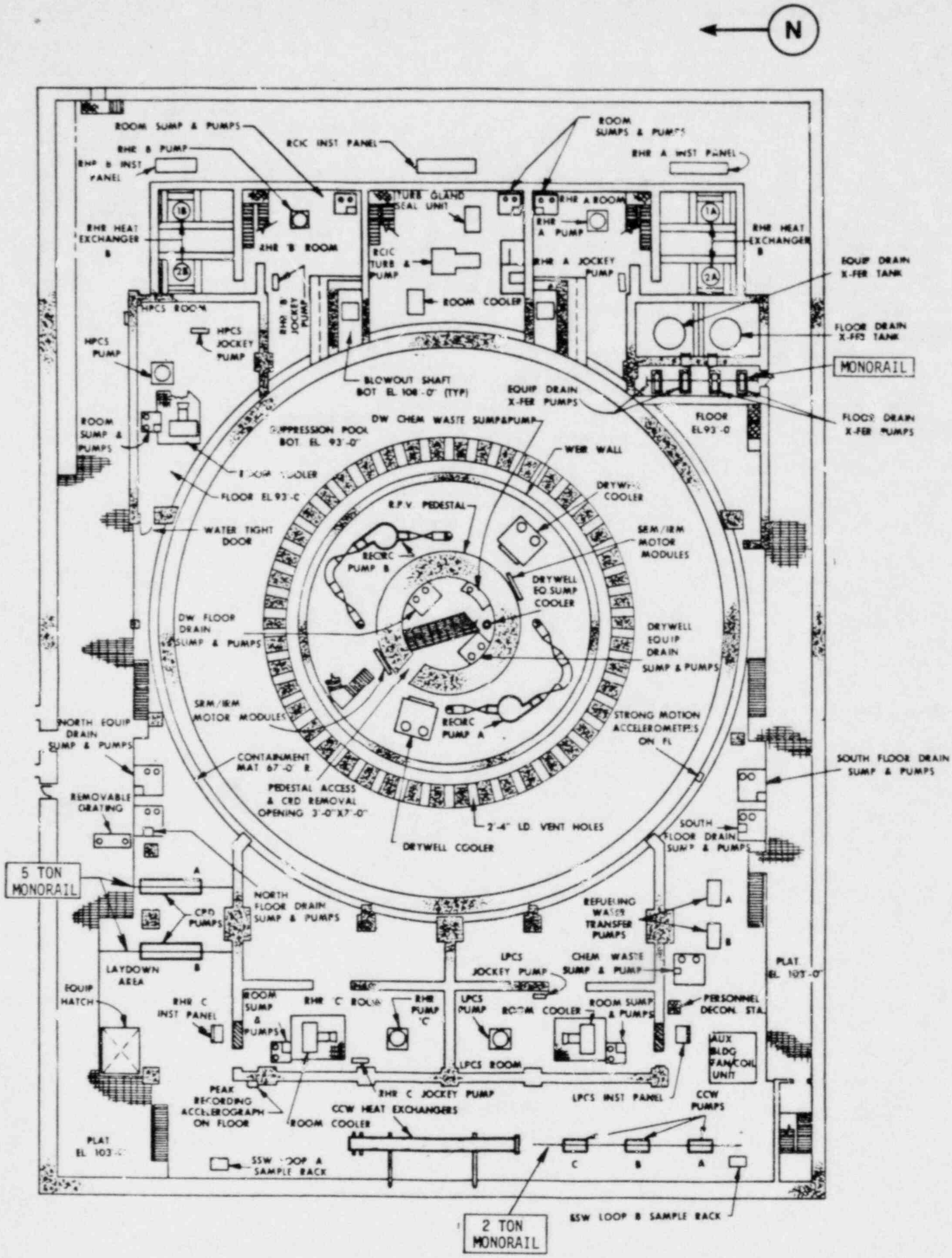


FIGURE 1

BLDG/CONTAINMENT ELEVATION 93' 0", 100' 9"

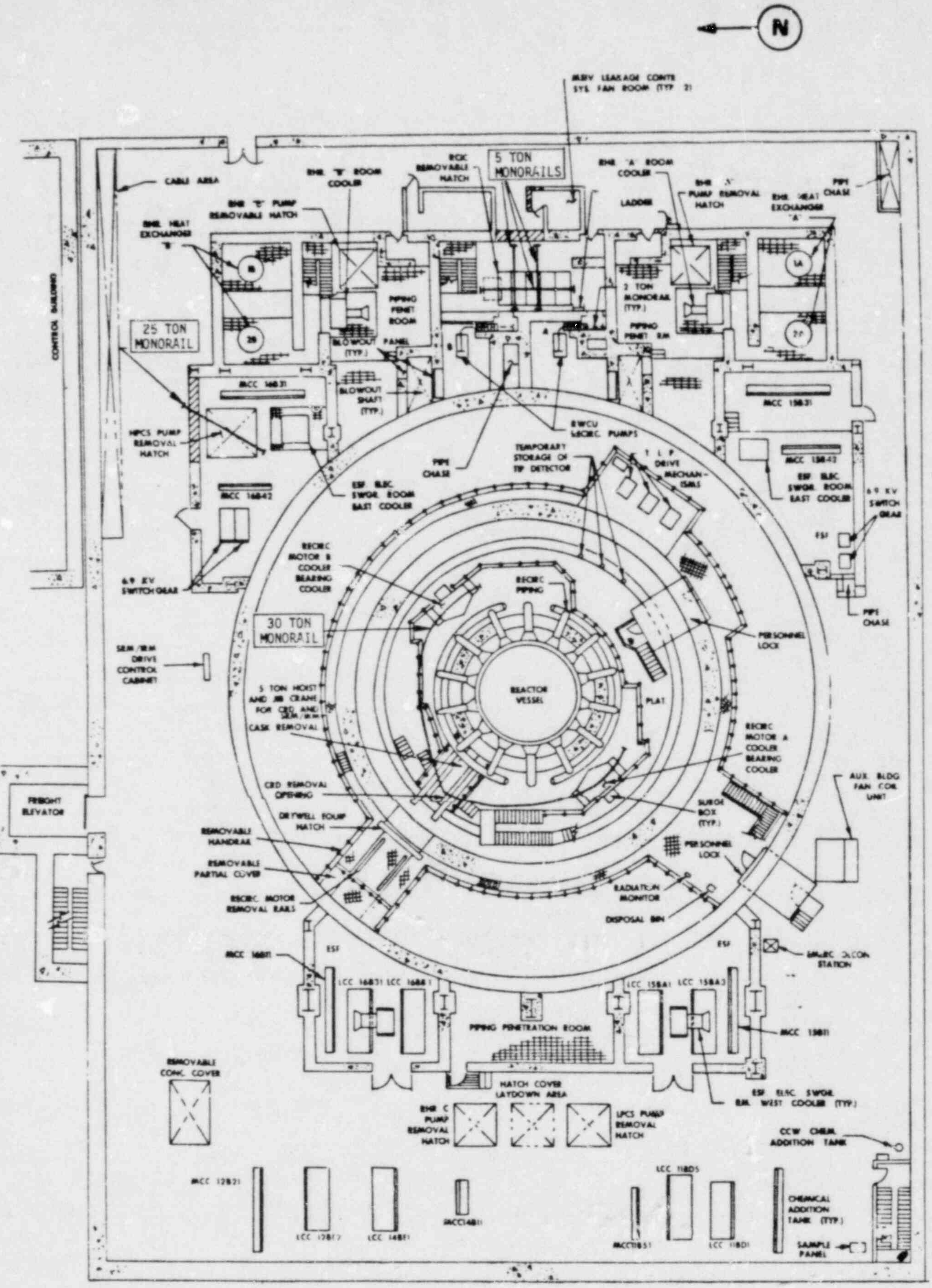


FIGURE 2

AUX BLDG/CONTAINMENT, ELEVATIONS 114' 6", 119' 0", 120' 10"

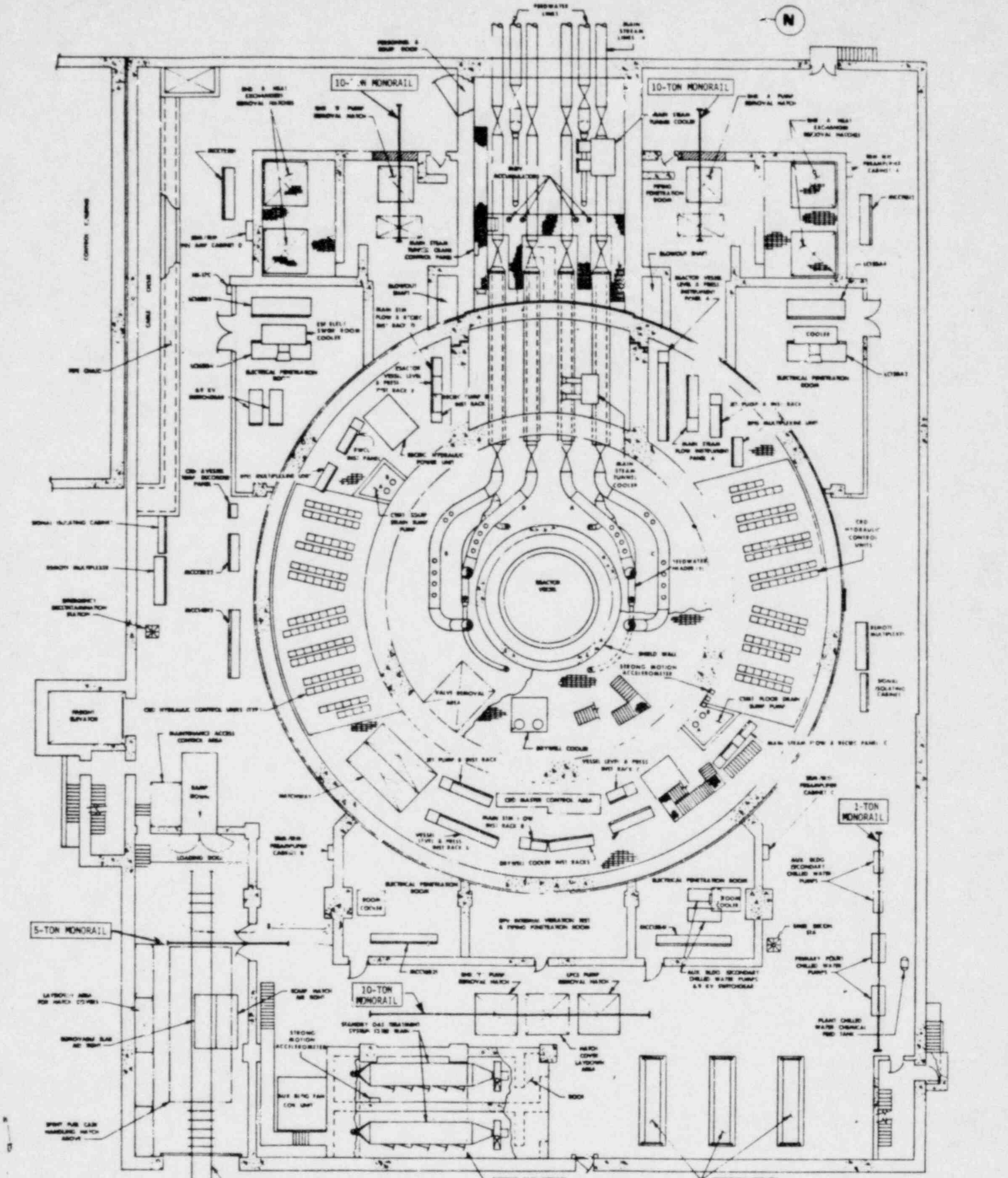


FIGURE 3

AUX BLDG/CONTAINMENT 135' 4", 139' 0", 147' 7"

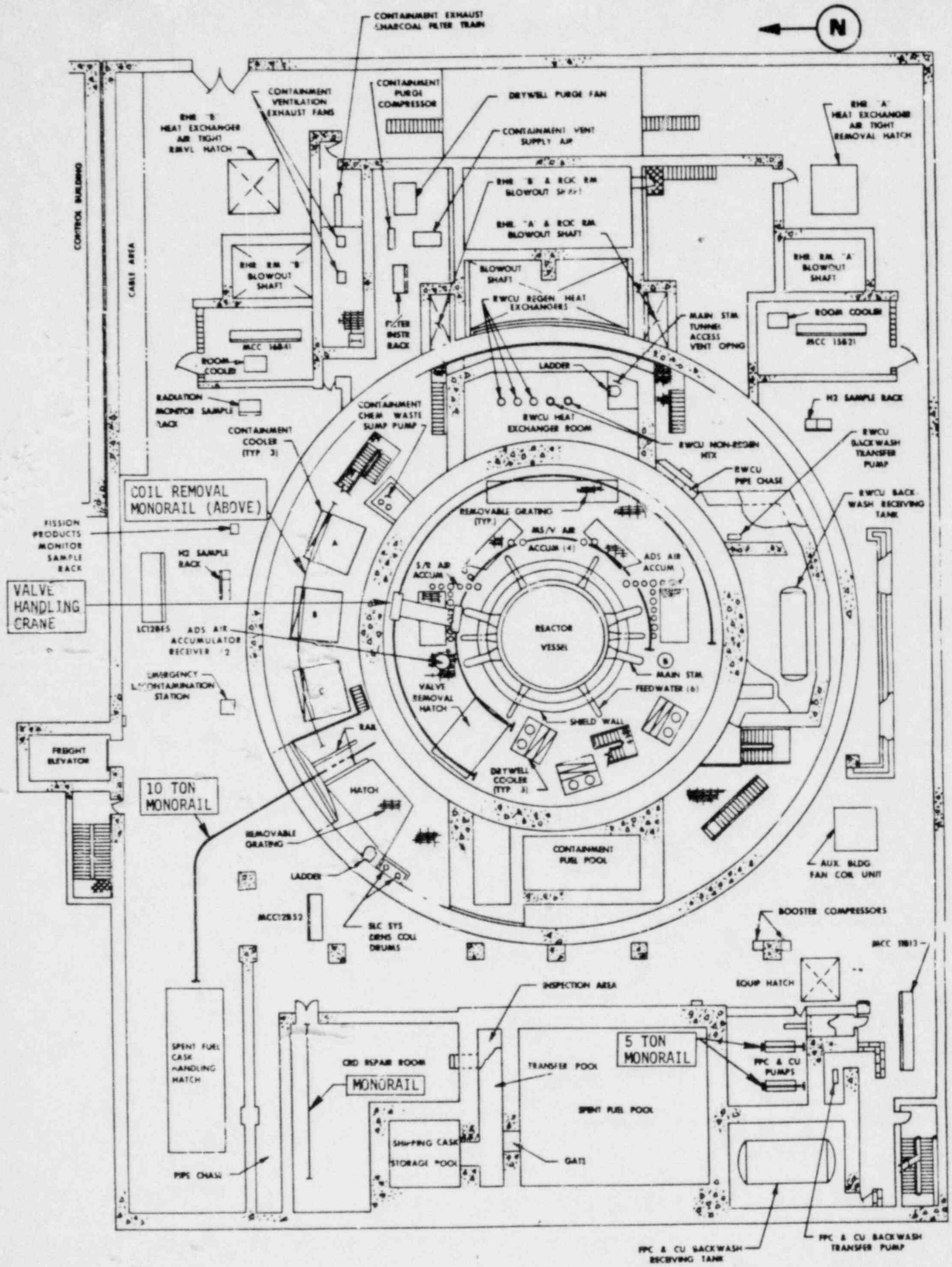


FIGURE 4
AUX BLDG/CONTAINMENT ELEVATION, ELEVATION 161' 10" & 166' 0"

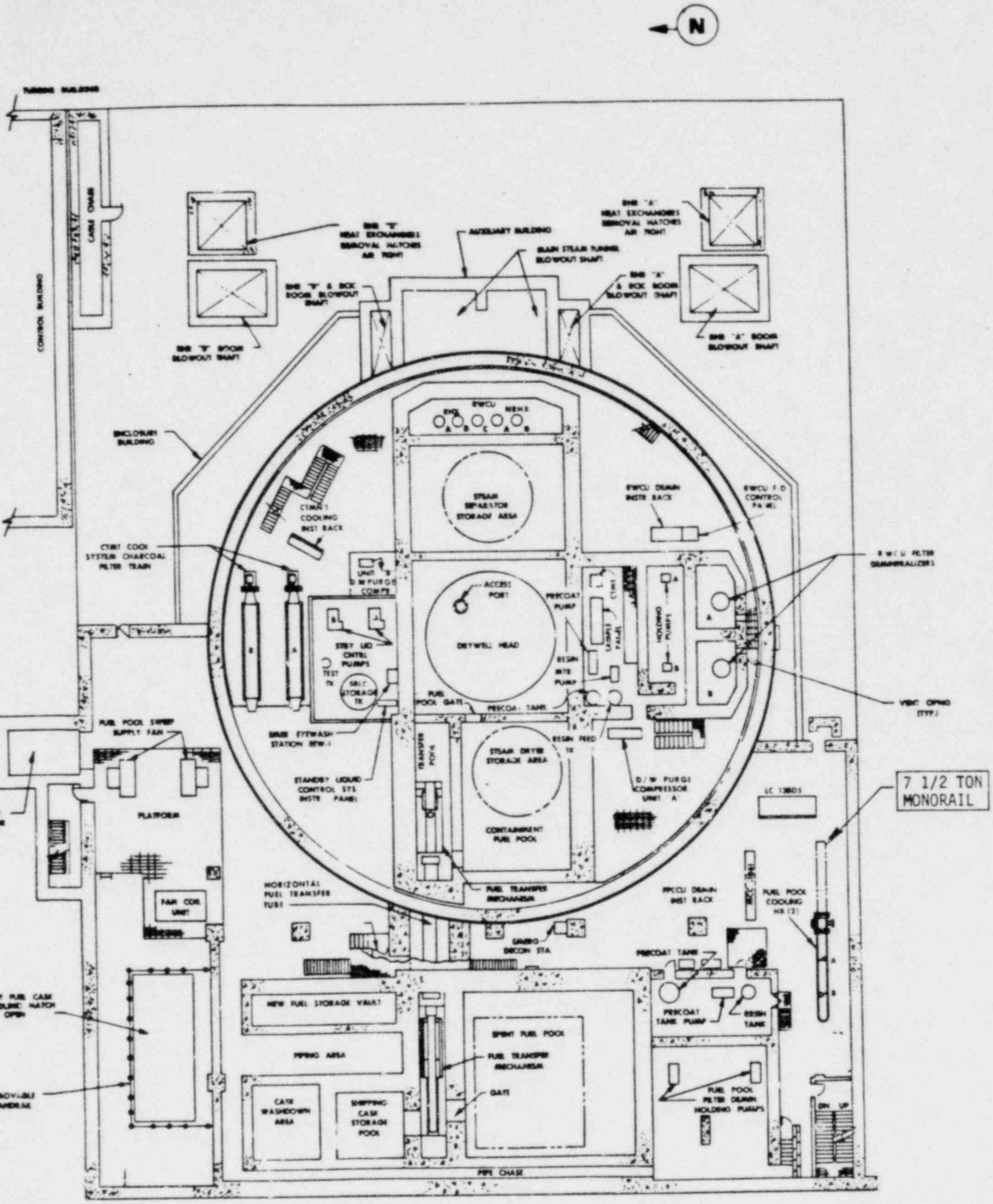


FIGURE 5

BLDG/CONTAINMENT, ELEVATION 184' 6" & 185' 0"

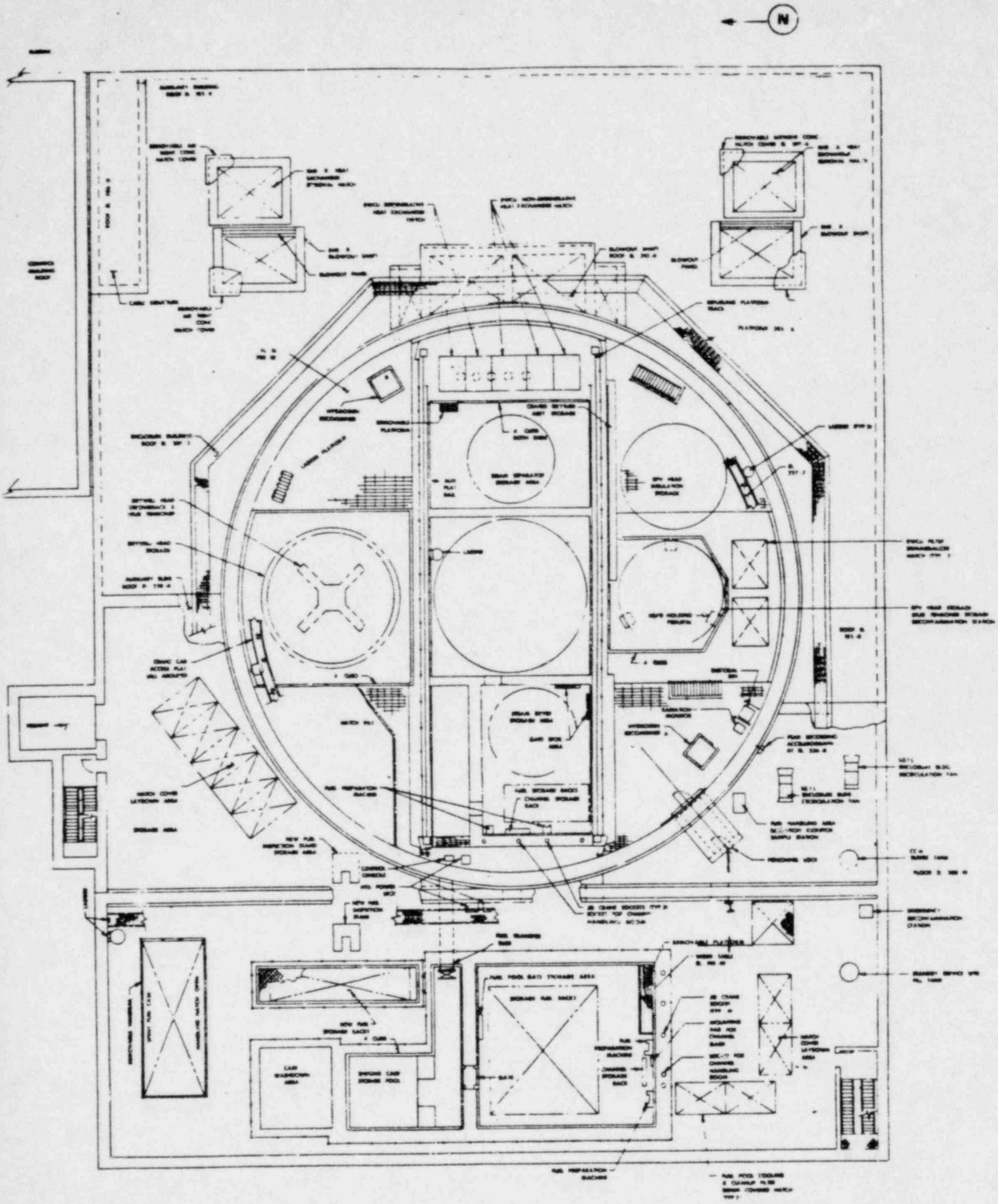
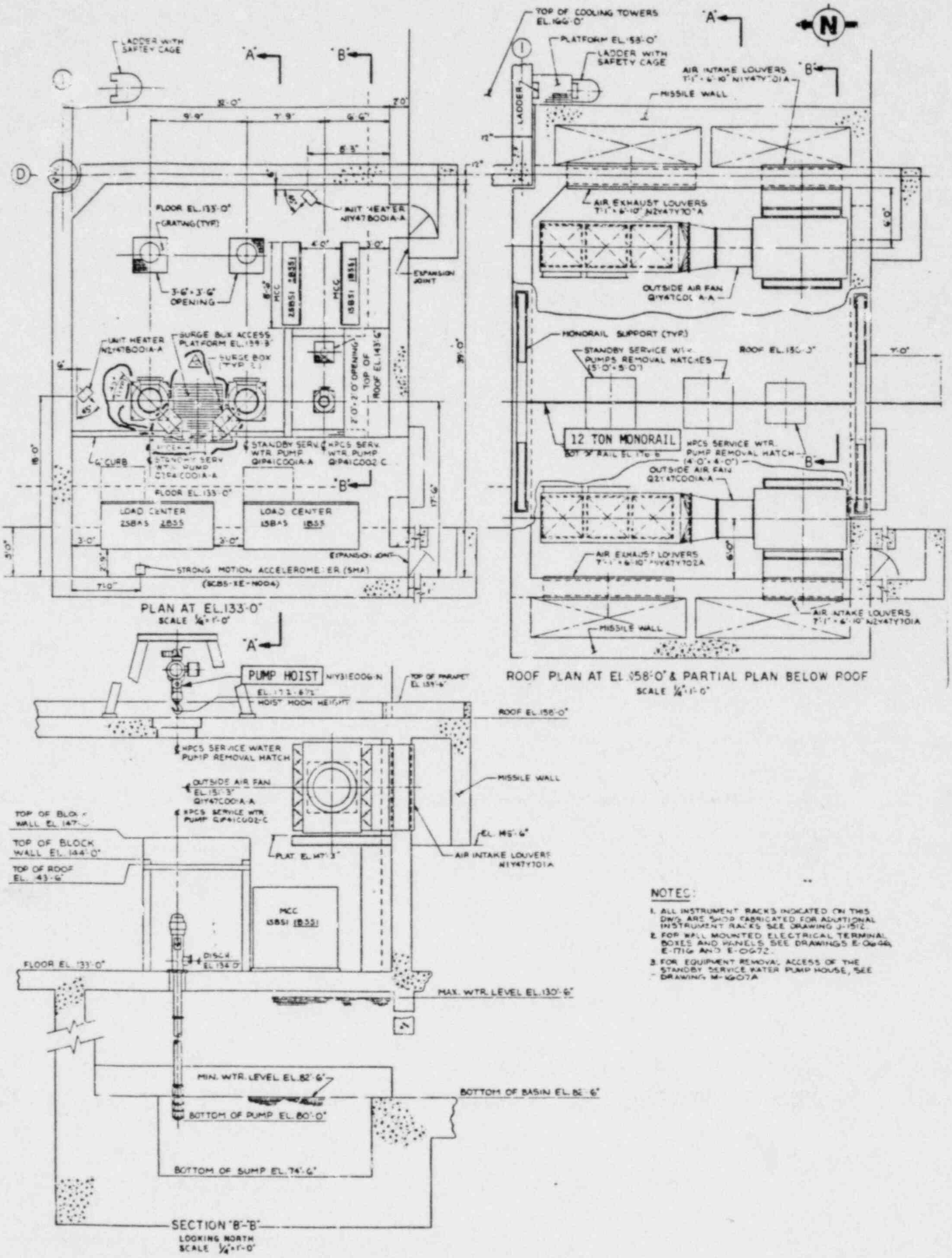


FIGURE 6

AUX BLDG/CONTAINMENT, ELEVATION 208'-10"



NOTES:

1. ALL INSTRUMENT RACKS INDICATED ON THIS DWG ARE SHOP FABRICATED. FOR ADDITIONAL INSTRUMENT RACKS SEE DRAWING J-1512.
2. FOR WALL MOUNTED ELECTRICAL TERMINAL BOXES AND PANELS, SEE DRAWINGS E-0646, E-1716 AND E-0672.
3. FOR EQUIPMENT REMOVAL ACCESS OF THE STANDBY SERVICE WATER PUMP HOUSE, SEE DRAWING M-1607A

FIGURE 7

STANDBY SERVICE WATER PUMP HOUSE

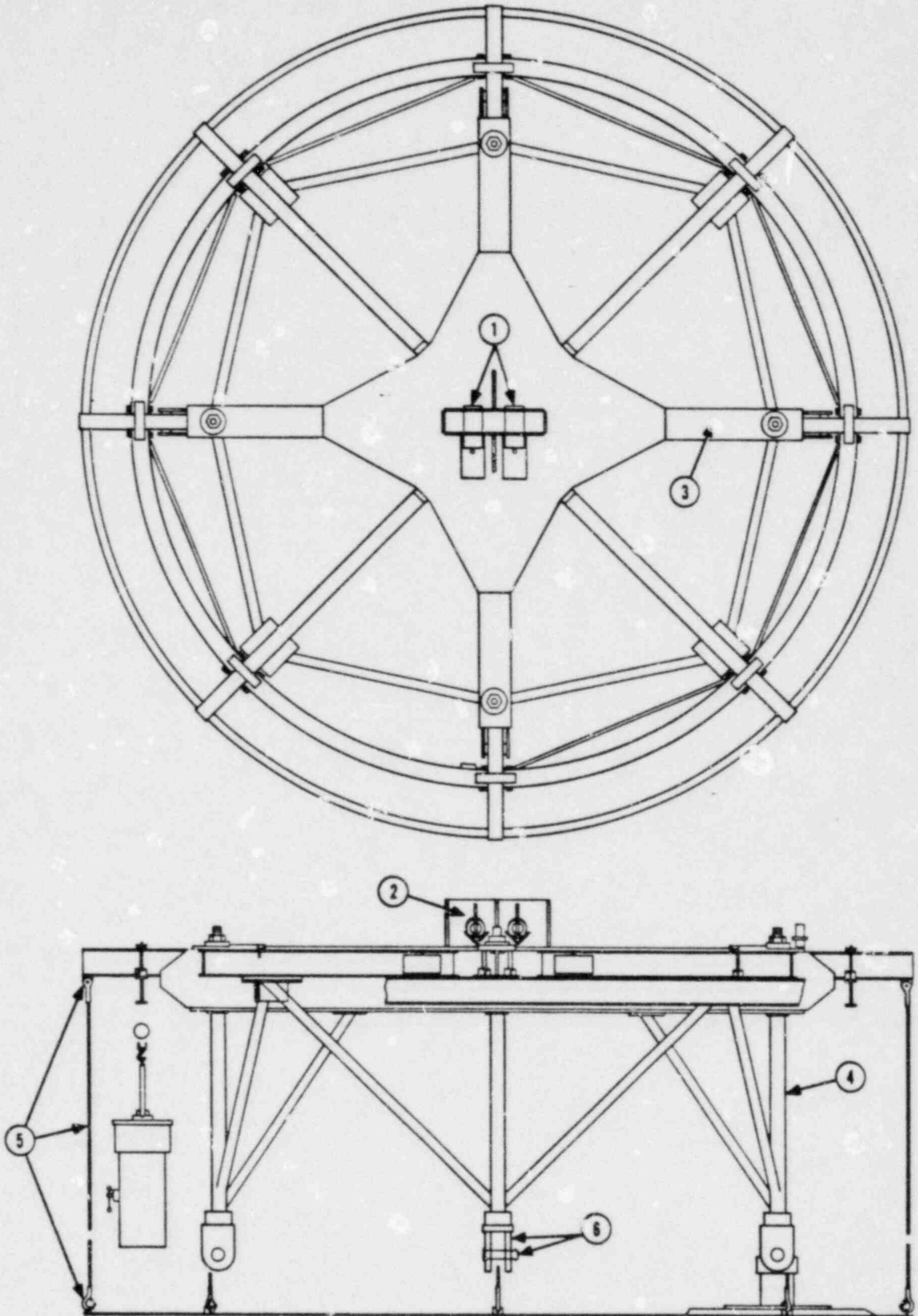


FIGURE 8
HEAD STRONGBACK CAROUSEL

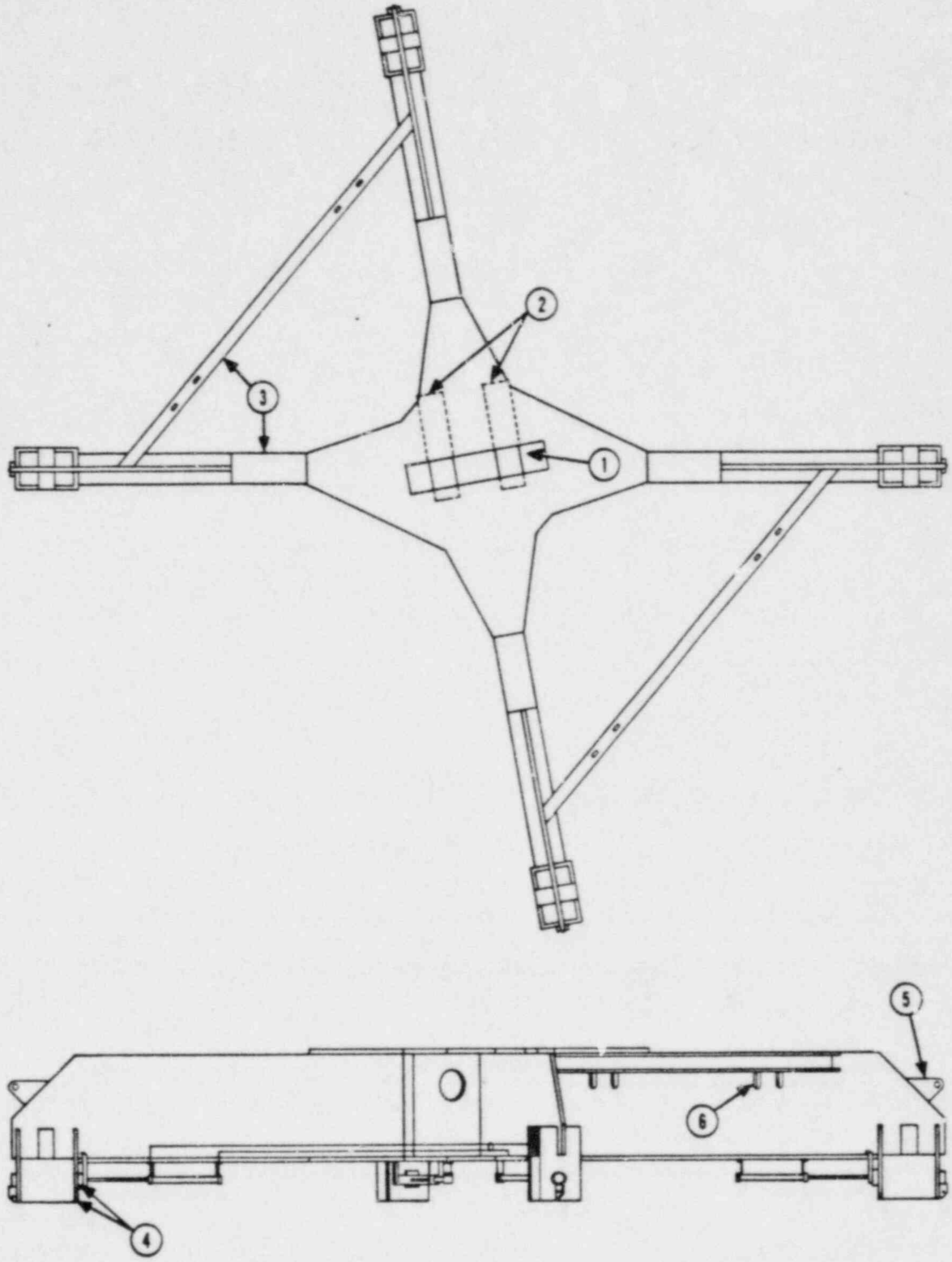
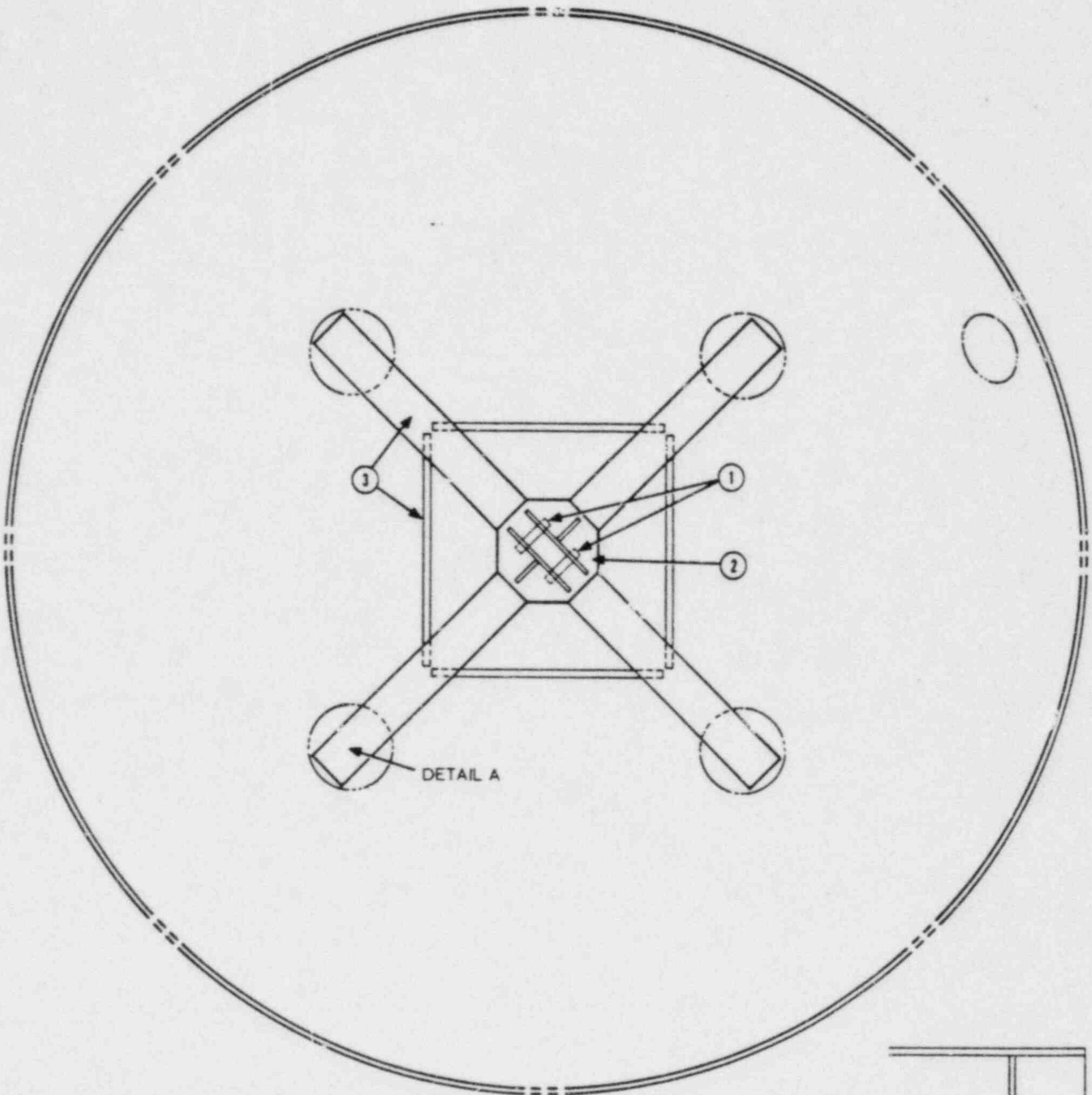
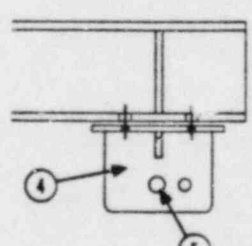


FIGURE 9

DRYER AND SEPARATOR STRONGBACK





DETAIL A

FIGURE 10

DRYWELL HEAD LIFTING FRAME