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RECIP.NAME RECIPIENT AFFILIATION
Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards Part 2 of response to NUREG-0612,Sections 2.2,2.3 & 2.4, "Specific Requirements for Overhead Handling Sys," per Generic Ltr 81-07.

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	MPA		1	0	NRR/DE/CEB	11	1	1
	NRR/DSI/AEB	26	1	1	NRR/DSI/ASB	27	1	1
	NRR/DSI/CPB	10	1	1	NRR/DSI/CSB	09	1	1
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ARIZONA PUBLIC SERVICE COMPANY

STA. _____ P.O. BOX 21666 - PHOENIX, ARIZONA 85036

October 20, 1981
ANPP-19200 - JMA/KEJ

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2 and 3
Dockets No's. STN 50-528/529/530
File: 81-056-026; G.1.10

Reference:

1) Letter from D. Eisenhut, NRC, to All Licensees of Operating Plants & Applicants for Operating Licensees & Holders of Construction Permits, dated December 22, 1980, Subject: Control of Heavy Loads

2) Letter from D. Eisenhut, NRC, to All Licensees of Operating Plants & Applicants for Operating Licenses & Holders of Construction Permits, dated February 3, 1981, Subject: Control of Heavy Loads (Generic Letter 81-07)

3) Letter from E. E. Van Brunt, Jr., APS, to Director of Nuclear Reactor Regulation, USNRC, dated June 25, 1981, Subject: Control of Heavy Loads

Dear Sir:

References (1) and (2) requested that all licensees of operating plants and applicants for operating licenses and holders of construction permits review their facilities for control of the handling of heavy loads to determine the extent to which the guidelines of NUREG-0612 are presently satisfied or will be satisfied before Operating License date.

Reference (3) provided Part 1 of our submittal which was titled "Control of Heavy Loads at the Palo Verde Nuclear Generating Station, Section 2.1, General Requirements for Overhead Handling Systems".

A copy of Part 2 of our submittal titled "Control of Heavy Loads at the Palo Verde Nuclear Generating Station, Sections 2.2, 2.3, 2.4, Specific Requirements for Overhead Handling Systmes" is enclosed. This completes our submittal of the requested information.

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1/1

If your staff has any questions regarding this submittal, please contact me as soon as possible.

Very truly yours,

JM Allen for

E. E. Van Brunt, Jr.
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVBJr/KEJ/sam
Attachments

cc: J. Kerrigan (w/a 4 copies)
P. Hourihan (w/a)
A. C. Gehr (w/a)
J. Wermiel (w/a)

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, John M. Allen, represent that I am Nuclear Engineering Manager of Arizona Public Service Company, that the foregoing document has been signed by me for Edwin E. Van Brunt, Jr., Vice President Nuclear Projects, on behalf of Arizona Public Service Company with full authority so to do, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

John M Allen

John M. Allen

Sworn to before me this 21st day of October, 1981.

Connie Lou Armstrong

Notary Public

My Commission expires:

June 24, 1983

PALO VERDE NUCLEAR GENERATING STATION

NUREG-0612 sections 2.2, 2.3, 2.4 specific requirements for overhead handling systems

ARIZONA PUBLIC SERVICE COMPANY
PROJECT MANAGER AND OPERATING AGENT

INTRODUCTION

This is the second portion of the Palo Verde Nuclear Generating Station NUREG-0612 evaluation and report addressing the United States Nuclear Regulatory Commission's letters of December 22, 1980 (1) and February 3, 1981 (2); and NUREG-0612 (3) dated July, 1980 all concerning control of heavy loads at nuclear power plants.

The first portion, submitted to the Director of Nuclear Reactor Regulation on June 25, 1981, (ANPP-18281) documented the evaluation of the PVNGS design with respect to Section 2.1 of Enclosure 3 of the Nuclear Regulatory Commission's December 22, 1980 letter. This portion completes the evaluation by documenting the design review conducted in regard to Sections 2.2, 2.3, and 2.4 of Enclosure 3 of the Nuclear Regulatory Commission's December 22, 1980 letter.

This report also references the C-E generic analysis of heavy loads over the reactor vessel provided to the Nuclear Regulatory Commission October 8, 1981 (C-E letter LD-81-069).

TABLE OF CONTENTS

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

2.2-1 NRC Position

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

PVNGS EVALUATION:

The following table identifies cranes which are physically capable (ignoring interlocks, stops or operating procedures) of carrying loads which could drop into the Spent Fuel Pool along with their type, capacity and equipment designation:

Table 2.2-1

Crane	Type	Capacity (Tons)	Equipment Designator
Fuel Building[(a)] Cask Handling Crane	Bridge Crane	150/15	1-M-ZFN-G01 2-M-ZFN-G01 3-M-ZFN-G01
Fuel Building New Fuel Handling Crane	Bridge Crane	10	1-M-ZFN-G02 2-M-ZFN-G02 3-M-ZFN-G02

Footnote:
(a) Has welded mechanical stop.

These cranes were selected in 2.1-3. The Fuel Building Cask Handling Crane handles spent fuel casks. The Fuel Building New Fuel Handling Crane handles new fuel assemblies and the spent fuel pool gates.

2.2-2 NRC Position

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

PVNGS Evaluation:

The following crane identified in 2.2-1 has been excluded from the category requirements of Section 2.2-1:

1. Fuel Building Cask Handling Crane

Justification

The Fuel Building cask handling crane is permanently prevented from moving the hook centerline closer than 11 feet to the pool boundary by a welded mechanical stop. See Figure 2.2-1. Along this line of closest approach, the crane hook is over the Cask Handling and Decontamination Pits. Both the cask handling and decontamination pits are below the operating deck surface of the spent fuel pool. The crane also incorporates an interlock that prevents raising the cask above the elevation of the operating deck surface. A load dropped by the Cask Handling Crane could not fall into the pool.

2.2-3 NRC Position

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

PVNGS Evaluation:

None of the cranes listed in 2.2-1 totally meet the single-failure-proof criteria as outlined in NUREG 0612, Section 5.1.6.

2.2-4 NRC Position

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

2.2-4-a. Which alternatives (e.g., 2, 3 or 4) from those identified in NUREG-0612, Section 5.1.2, have been selected.

PVNGS Evaluation:

Alternative 2 was selected for the following cranes identified in 2.2-1 and not categorized according to 2.2-3:

1. Fuel Building Cask Handling Crane.
2. Fuel Building New Fuel Handling Crane.

2.2-4-b. NRC Position

If Alternative 2 or 3 is selected, discuss the crane motion limitation imposed by electrical interlocks or mechanical stops and indicate the circumstances, if any, under which these protective devices may be bypassed or removed. Discuss any administrative procedures invoked to ensure proper authorization of bypass or removal, and provide any related or proposed technical specification (operational and surveillance) provided to ensure the operability of such electrical interlocks or mechanical stops.

PVNGS Evaluation:

Cask Handling Crane

The Cask Handling Crane carries the spent fuel shipping cask in the decontamination pit and loading pit areas. The crane cannot move to a position that brings the hook closer than 11 feet to the spent fuel storage pool, because there are permanent mechanical stops along the rail which will prevent the Cask Handling Crane from moving over the spent fuel pool.

The 11 foot distance noted above is less than the 15 foot distance identified in NUREG-0612. However, any loads carried up to this 11 foot line will be over the decontamination or loading pits. Figure 2.2-1 shows where the interlock areas are for this crane. The floor level in this area is well below the level of the operating deck surrounding the spent fuel pool. The crane also incorporates an interlock that prevents raising the cask above the elevation of the operating deck surface. Consequently, any load dropped along the line of closest approach of the hook would drop into these low areas and not be capable of falling into the spent fuel pool. The analysis of a drop of the spent fuel shipping cask in this area was transmitted to the Structural Engineering Branch by letter number ANPP-18763-JMA/WFQ dated August 26, 1981 (Van Brunt to Kerrigan). The results of this analysis show that the structural design of the Fuel Storage Building is adequate to withstand a drop of the shipping cask without damage to the stored spent fuel or spent fuel pool. If, at the time of design and procurement of a cask for use at PVNGS, the designed cask is not similar to the cask analyzed herein, APS will conduct a separate drop analysis on the newly designed cask. This analysis will be submitted to the NRC.

New Fuel Handling Crane

The New Fuel Handling Crane is a general service crane which will be used within the Fuel Storage Building. When the spent fuel storage pools are in use for spent fuel storage, interlocks will prevent the new fuel handling crane hook from operating within 15 feet of the edge of the spent fuel storage pool except in very specific instances noted below.

The New Fuel Handling Crane needs to operate within 15 feet of the spent fuel pool in two situations. These would include moving gates and moving new fuel. This crane will be used to lift the three gates, one separating the spent fuel pool from the transfer canal, one separating the spent fuel pool from the cask loading pit, and the gate separating

the decontamination pit from the cask loading pit. This crane will also move new fuel for the new fuel storage area into the transfer canal area within reach of the spent fuel handling machine which will then perform the remaining fuel handling activities. Interlocks on the New Fuel Handling Crane can be bypassed to permit access to the canal and gate areas, however, this bypass mode does not allow the crane to travel over the spent fuel storage areas. The areas where travel is restricted by interlocks are shown on Figures 2.2-1 and 2.4-1.

While the New Fuel Handling Crane is lifting new fuel into the canal area, the load being carried does not qualify as a heavy load. The bypass of the interlock for that purpose does not cause a hazard to the spent fuel area.

The new fuel crane will lift the gates which separate the pool areas and move them to the storage area. By activating the gate handling bypass, the crane can move into position to lift the gates. As the gate is lifted along the slotted gateway, a safety cable will be attached between the gate (at approximately 10 feet above its rest position) and the crane trolley. This cable will restrain the gate from descending low enough to reach the elevation of the stored spent fuel. The cable and attachments will be designed to withstand the drop of the gate from the highest elevation to which it could be lifted by the crane. The cable will not normally carry any load during gate transfer and the attachment points will be completely separate from the hoisting machinery. The sequence of operations will be to attach the hook, raise approximately 10 feet and attach the safety restraint cable. The gate will then be lifted the rest of the way out of the slotted gateway and carried from its point of use to its point of storage or vice versa, lowered into place, and then detached. The safety restraint cable will be removed after the gate is at least 15 feet away from the pool or after the midpoint of the gate is lowered below the operating floor elevation such that the gate cannot topple into the pool.

The use of bypassable interlocks to permit use of the New Fuel Handling Crane to lift heavy loads within 15 feet of the spent fuel storage area is necessary in order to manipulate the gates during fuel handling or maintenance activities. With the safety restraint cables in use as described above, the gates cannot come in contact with the spent fuel or the racks in the event the crane hoisting system fails completely and drops the gate at the maximum lift height directly over the fuel. In fact, even with the gate handling bypass activated for the gate lift activity, the crane hook will not be able to travel over the spent fuel. As shown on Figure 2.2-1, the new fuel handling crane, even when the gate handling bypass is in effect, will not be able to travel over the spent fuel storage area.

Administrative and Testing Requirements

The refueling director will control the bypass of the interlocks for the New Fuel Handling Crane. The interlock bypasses will be controlled by a key lock system to permit access to the canal and gate areas. The keys will be controlled by the refueling director and released only upon proper authorization.

The interlock boundaries will be tested before the interlocks are bypassed and after the interlocks are restored. The tests will be run without load on the crane hook.

2.2-4-c. NRC Position

Where reliance is placed on crane operational limitations with respect to the time of the storage of certain quantities of spent fuel at specific post-irradiation decay times, provide present and/or proposed technical specifications and discuss administrative or physical controls provided to ensure that these assumptions remain valid.

PVNGS Evaluation:

No reliance is placed on operational limitations with respect to time of fuel storage for any cranes considered in 2.2-1.

2.2-4-d. NRC Position

Where reliance is placed on the physical location of specific fuel modules at certain post-irradiation decay times, provide present and/or proposed technical specifications and discuss administrative or physical controls provided to ensure that these assumptions remain valid.

PVNGS Position

No reliance is placed on the physical location of specific fuel modules at certain post-irradiation decay times for any cranes considered in 2.2-1.

2.2-4-e. NRC Position

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

PVNGS Evaluation

For both the Fuel Building Cask Handling Crane and the Fuel Building New Fuel Handling Crane no exception is taken to the guidelines of NUREG-0612. Because the fuel is never contacted in any drop, Criteria I and II are met. As a restraint cable is affixed to the spent fuel gates prior to removal from the slotted gateway, a drop of the gate outside the gateway will not contact the bottom of either the load pit or the refueling canal. Accordingly, the pool integrity will not be breached. As the pit and canal walls are

qualified to maintain spent fuel pool integrity with the gates removed, a drop of the gate within the slotted gateway prior to connecting the restraint cable could not breach pool integrity even if the bottom of the gateway were damaged. No damage to the pool can occur since no heavy load crane passes over the pool. Therefore, Criteria III is met.

2.3 SPECIFIC REQUIRMENT OF OVERHEAD SYSTEM OPERATING IN THE CONTAINMENT

2.3-1 NRC Position

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

PVNGS Evaluation:

The following table identifies cranes which are physically capable (ignoring interlocks, stops or operating procedures) of carrying heavy loads over the reactor vessel along with their type, capacity and equipment designation.

TABLE 2.3-1

Crane	Type	Capacity (tons)	Equipment Designator
Containment Bldg Polar Crane	Polar Crane	225/35	1-M-ZCN-G01-Unit 1 2-M-ZCN-G01-Unit 2 3-M-ZCN-G01-Unit 3
Containment Bldg RCP Maintenance Jib Cranes	Jib Cranes	5	1-M-ZCN-G04A-Unit 1 1-M-ZCN-G04B-Unit 1 2-M-ZCN-G04A-Unit 2 2-M-ZCN-G04B-Unit 2 3-M-ZCN-G04A-Unit 3 3-M-ZCN-G04B-Unit 3

2.3-2 NRC Position

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

PVNGS Evaluation:

The following crane has been excluded from 2.3-1.

1. Containment Building RCP Maintenance Jib Cranes.

JUSTIFICATION

The Containment Building RCP Maintenance Jib Cranes will be prevented from carrying any loads directly over the reactor or to such a location where in the event of a load-handling-system failure, the laod may land in or on the reactor vessel.

The design will incorporate mechanical stops, installed as a procedural step prior to removal of the Upper Guide Structure and removed only after the Upper Guide Structure is reset in the vessel, that prevent the Jib Crane Trolley from passing over the reactor vessel. The trolley cannot be extended in this zone while the Upper Guide Structure is removed from the vessel and the fuel is exposed. The scope of the Jib Cranes is illustrated in Figure 2.3-1.

2.3-3 NRC Position

Identify any cranes listed in 2.3-1, above, which may have evaluated as having sufficient design features to make the likelihood of a load drop extremely small for all loads to be carried and the basis for this evaluation (i.e., complete compliance with NUREG-6012, Section 5.1.6, or partial compliance supplemented by suitable alternative or additional design features). For each so evaluated, provide the load-handling system (i.e., crane-load-combination) information specified in Attachment 1.

PVNGS Evaluation:

None of the cranes identified in 2.3-1 totally meet the single-failure-proof criteria as outlined in NUREG-0612, Section 5.1.6.

2.3-4 NRC Position

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

2.3-4-a Where reliance is placed on the installation and use of electrical interlocks or mechanical stops, indicate the circumstances under which these protective devices can be removed or bypassed and the adminstrative procedures invoked to ensure proper authorization of such action. Discuss any related or proposed technical specification concerning the bypassing of such interlocks.

PVNGS Evaluation:

To prevent loads from being carried over the open Reactor Vessel, the Polar Crane will be equipped with an interlock to prevent the trolley from moving within 15 feet of the Reactor Vessel. This interlock can be bypassed for removal and replacement of the Upper Guide Structure and Reactor Vessel Head and loads located in the area above the Head.

The only heavy load to be carried through this interlock after the head is removed and when fuel is present is the Upper Guide Structure. After the UGS is removed, the RV area interlock will not be bypassed until it is replaced. The movements of the UGS and the Head are evaluated in C-E's report, "Evaluation of RV Head Drop for the CE System 80 CESSAR NSSS" (submitted to the NRC October 8, 1981 as C-E letter LD-81-069).

The key to enable bypass of the RV interlock will be under the control of the refueling director. The bypass will be permitted only during refueling and will be controlled by procedure as well. When the Upper Guide Structure is removed from the RV and clears the area above the vessel, the interlock will be restored and bypass will not be permitted during normal refueling procedures until the Upper Guide Structure is to be replaced. The bypass of this interlock will be controlled by procedures and by keys under the control of the refueling director. Bypass will not be permitted if the Upper Guide Structure is removed while there is fuel in the vessel, except for removing or replacing the Upper Guide Structure.

Administrative and Testing Requirements

The refueling director will control the bypass of the interlocks for the polar crane. The keys will be controlled by the refueling director and released only upon proper authorization.

The interlocks boundaries will be tested before the interlocks are bypassed and after the interlocks are restored. The tests will be run without load on the crane hook.

The Jib Cranes will be prevented from carrying loads in the reactor vessel area by mechanical stops. The mechanical stops are detailed in 2.3-2. The refueling director will control the insertion and removal of the Jib Crane mechanical stops. Refer also the figure 2.3-1.

2.3-4-b NRC Position

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

PVNGS Evaluation:

Reliance is placed on site-specific considersation for the Containment Building Polar Crane only in the following area.

When Upper Guide Structure is removed the RV area interlock will be in force. Consequently no heavy load can be carried over the open vessel. There are, however, two loads listed for the Polar Crane which must be lifted over the open vessel. Those loads are the Internals Lift Rig and the Core Support Barrel. Movement of the Core Support Barrel is very unusual and will only be needed when all the fuel has been removed from the vessel. Consequently, the bypassing of the RV area interlock while the Upper Guide Structure is removed is only needed or allowed when there is no fuel in the vessel and thus no hazard to the fuel. Movement of the Upper Guide Structure is evaluated in the C-E Heavy Load Report.

2.3-4-c NRC Position

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

PVNGS Evaluation

For the Containment Building Bridge Crane and the Jib Cranes no exception is taken to the guidelines of NUREG-0612, Appendix A.

The Polar Crane meet Criteria I to III. The Combustion Engineering Head Drop Analysis covers compliance for all large loads less than 347,160 lbs.

The Containment Building RCP Maintenance Jib Cranes will be prevented from carrying loads over the vessel when fuel is exposed so Criteria I to III are automatically met.

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

2.4-1 NRC Position

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

PVNGS Evaluation:

None of the cranes identified in 2.1-1 totally meet the single-failure-proof criteria as outlined in NUREG 0612, Section 5.1.6.

2.4-2 NRC Position

For any cranes identified in 2.1-1 not designated as single-failure-proof in 2.4-1, a comprehensive hazard evaluation should be provided which includes the following information:

2.4-2-a The presentation in a matrix format of all heavy loads and potential impact areas where damage might occur to safety-related equipment. Heavy loads identification should include designation and weight or cross-reference to information provided in 2.1-3c. Impact areas should be identified by construction zones and elevations or by some other method such that the impact area can be located on the plant general arrangement drawings.

PVNGS Evaluation:

The following cranes were identified in 2.1-1 and not eliminated in 2.1-2 or 2.4-1:

1. Containment Building Polar Crane
2. Containment Building RCP Maintenance Jib Cranes
3. Fuel Building Spent Fuel Pool Cooling Pumps and Heat Exchanger Monorail Hoist

See Table 2.4-1 for matrix presentation of the information on loads and targets.

2.4-2-b NRC Position

For each interaction identified, indicate which of the load and impact area combinations can be eliminated because of separation and redundancy of safety-related equipment, mechanical stops and/or electrical interlocks, or other site-specific considerations.

PVNGS Evaluation

(Table 2.4-1 has a column titled elimination category. The entry in that column identifies the basis for elimination corresponding to the numbers below; i.e., (1) means elimination based on separation and redundency, (2) means elimination based on interlocks, (3) means elimination based on site specific considerations and (4) means elimination by analysis. Justification for each elimination is discussed in the appropriate paragraph:

NRC Position

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

PVNGS Evaluation:

Table 2.4-1 identifies the heavy load/impact area combinations which can be eliminated by separation and redundancy with a one (1) in the Elimination Category column.

TABLE 2.4-1

Crane	Load	Weight	Target	Elevation	Elimination Category
Containment Bldg. Polar Crane M-ZCN-G01	1. Incore Inst. Holddown Frame	2 Ton	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	2. RV Head Assembly	347,160 lbs.	Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	3. RV MST & Control Console	6 Tons 150 lbs.	Head - Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	4. Hydroset	5142 lbs.	Missile Shield - Vessel (E5*)	168 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	5. Upper Collecting Ring	30,500 lbs.	Lower Cooling - Ring Vessel (E5*)	140 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	6. RC Head Cooling Ring (lower)	7,200 lbs.	Insulation - Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	7. CEDM Cable Support Structure	25 Ton	Upper Collecting Ring- Vessel (E5*)	145 ft	4
			Reactor Piping (D,E5-6*)	100 ft	1,4
			Steam Generator (C5*, E5*)	168 ft	1,4
			RCP (C5*, C6*, E5*, E6*)	133 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	8. RV Missile Shield & CEDM Air Cooling Unit	180 Tons	CEDM Cable Support Struct. - Vessel (E5*)	150 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4

* From Drawing 13-P-ZCG-110, Revision 2 (Figure 2.3-1).

TABLE 2.4-1

Crane	Load	Weight	Target	Elevation	Elimination Category
1. (Continued)	9. Removable Slabs on Top of Pressurizer (3 sections)	27 Tons each	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	10. RCP (Motor)	118,500 lbs.	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Piping (D,E5-6*)	100 ft	1,4
			Steam Generator (C5*, E5*)	168 ft	1,4
			RCP (C5*, C6*, E5*, E6*)	133 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	11. RCP (Pump) (Rotating parts)	5,146 lbs	Reactor Vessel Zone (E5*)	140 ft	3
			Reactor Piping (D,E5-6*)	100 ft	1,3,4
			Steam Generator (C5*, E5*)	168 ft	1,2,4
			RCP (C5*, C6*, E5*, E6*)	133 ft	1,3,4
			Pressurizer (E7*)	140 ft	1,4
	12. Jib Cranes (Containment Maintenance)	6 Ton	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	13. CEA Change Platform	16 Ton	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	14. Refueling Machine Components (Maintenance)	Trolley 20,900 lbs	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	15. RV Head Stud Rack	3,520 lbs	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	16. Refueling Pool Seal Ring	26,000 lbs	Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4

* From Drawing 13-P-ZCG-110, Rev. 2 (Figure 2.3-1).

TABLE 2.4-1

Crane	Load	Weight	Target	Elevation	Elimination Category
1. (Continued)	17. Core Support Barrel Assembly	320,000 lbs	Vessel (E5*)	120 ft	3
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	18. Spreader Assembly	6 Tons	Head - Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	19. RV Head Insulation	10.2 Tons	Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	20. Upper Guide Structure Assembly	206,000 lbs	Vessel (E5*)	120 ft	3
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	21. Closure Head Lift Rig	47,675 lbs	Head - Vessel (E5*)	120 ft	4
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	22. Regenerative Heat Exchanger	3,400 lbs	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	23. Pre-Access Normal AFU's	3,937 lbs	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Piping (D,E5-6*)	100 ft	1,4
			Steam Generator (C5*, E5*)	168 ft	1,4
			RCP (C5*, C6*, E5*, E6*)	133 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	24. Internals Lift Rig	5,000 lbs	Vessel (E5*)	120 ft	3
			Reactor Pressure Boundary (D,E5-6*)	100 ft	1,4
			Pressurizer (E7*)	140 ft	1,4

* From Drawing 13-P-ZCG-110, Rev. 2 (Figure 2.3-1).

TABLE 2.4-1

Crane	Load	Weight	Target	Elevation	Elimination Category
1. (Continued)	25. RCP Seal Crane	6 Ton	Reactor Vessel Zone	140 ft	2
			Reactor Pressure Boundary	100 ft	1,4
			Pressurizer	140 ft	1,4
2. Containment Bldg. RCP Maintenance Jib Cranes M-ZCN-G04A M-ZCN-G04B	1. Reactor Coolant Pump (Pump) Maintenance	1.8 Tons	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Piping (D,E5-6*)	100 ft	1,4
			Steam Generator (C5*, E5*)	168 ft	1,4
			RCP (C5*, C6*, E5*, E6*)	133 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
	2. Reactor Coolant Pump (Motor) Maintenance	118,500 lbs.	Reactor Vessel Zone (E5*)	140 ft	2
			Reactor Piping (D,E 5-6*)	100 ft	1,4
			Steam Generator (C5*, E5*)	168 ft	1,4
			RCP (C5*, C6*, E5*, E6*)	133 ft	1,4
			Pressurizer (E7*)	140 ft	1,4
3. Fuel Bldg. Spent Fuel Pool Cooling Pumps & Heat Exchangers Monorail - M-ZFN-G03	1. Spent Fuel Pool Cooling Pumps	4,690 lbs.	Pumps (F3**) (B5**)	100 ft	1
			Piping (B3**) (B5-6**)	100 ft	1
			Heat Exchangers (B3**) (B5-6**)	100 ft	1
	2. Heat Exchangers	16,500 lbs.	Pumps (F3**) (B5**)	100 ft	1
			Piping (B5-6**)	100 ft	1
			Heat Exchangers (B3**) (B6**)	100 ft	1

* From Drawing 13-P-ZCG-110, Rev. 2 (Figure 2.3-1).
** From Drawing 13-P-ZFL-502, Rev. 2 (Figure 2.4-1)

Justification

a. Loads carried by the Polar or Jib Cranes during refueling which originate in the RV pressure boundary area can be eliminated from further consideration based on separation and redundancy.

   The hazard being considered is a drop in this area that causes a break in the Reactor Pressure Boundary and damaging or disabling the Shutdown Cooling System. This event will not have unacceptable consequences since the Safety Injection System will be functional to provide cooling to the core. These loads will not be lifted unless one train of the Safety Injection System is verified operational by the shift supervisor and refueling director. In this manner, the Safety Injection System provides redundancy for the Shutdown Cooling System one train of which could be disabled by drops from the Polar or Jib Cranes.

b. The Fuel Building Spent Fuel Pooling Cooling Pumps and Heat Exchanger Monorail Hoist can be eliminated from further consideration for all loads based on separation and redundancy of the equipment that could be damaged by a heavy load drop.

   The hazard being considered is that one SFPC train is unavailable due to maintenance and that as part of those maintenance activities the monorail fails, causing damage and disabling the remaining SFPC train. Although this is unlikely, the event will not have unacceptable consequences since the Shutdown Cooling System can be aligned to provide cooling to the Spent Fuel Pool. In this way the SDC provides redundancy for the operating SFPC system that could potentially suffer disabling damage from failure of the monorail in question.

NRC Position

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

PVNGS Evaluation

The following cranes utilize mechanical stops or electrical interlocks to limit crane travel in areas containing equipment required for reactor shutdown, or core decay heat removal.

1. Containment Building Bridge Crane

2. Containment Building Jib Cranes

The heavy load impact area combinations eliminated by interlocks are identified in Table 2.4-1 with a two (2) in The Elimination Category column.

Containment Building Polar Crane

The Polar Crane-Vessel Area Interlock, restricts movement over the Reactor Vessel. This interlock and the bypass provisions are described in 2.3-4.

Containment Building RCP Maintenance Jib Cranes

The Containment Building Jib Cranes are prevented from carrying loads in the Reactor Vessel area by mechanical stops when fuel is exposed as described in section 2.3-2.

Administrative and Testing Requirements

The following procedure will be used to authorize the bypass of the interlocks and to verify that the interlock is functional prior to and after use. Each interlock or stop will be tested before it is bypassed and after it is restored. The tests will be run without load on the hook.

Containment Building Polar Cranes

The key to enable bypass of the Polar Crane-Vessel Area Interlock will be under the control of the refueling director. The bypass will be permitted only during refueling and will be controlled by procedure as well. When the Upper Guide Structure is removed from the RV and clears the area above the vessel, the interlock will be restored and bypass will not be permitted during normal refueling procedures until the Upper Guide Structure is to be replaced. The bypass of this interlock will be controlled by procedures and by keys under the control of the refueling director. Bypass will not be permitted if the Upper Guide Structure is removed while there is fuel in the vessel, except for removing or replacing the Upper Guide Structure.

Containment Building RCP Maintenance Jib Cranes

The refueling director will control the insertion and removal of the Jib Crane mechanical stops.

NRC Position

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

PVNGS Evaluation

Table 2.4-1 identifies the heavy load/impact area combinations which can be eliminated on the basis of site-specific considerations with a three (3) in the Elimination Category column.

When maintenance is being performed on the Reactor Coolant Pump, the Reactor Coolant Piping is already open. A larger opening in that piping would not affect decay heat removal. The Reactor Coolant Pump will be prevented from passing over other components in the Steam Generator Compartment by Administrative procedures.

The lifts of the core support barrel and upper guide structure are covered in Section 2.3. The internals lift rig is only used for lifting these two components.

2.4-2-c NRC Position

For interactions not eliminated by the analysis of 2.4-2-b above, identify any handling systems for specific loads which you have evaluated as having sufficient design features to make the likelihood of a load drop extremely small and the basis for this evaluation (i.e., complete compliance with NUREG 0612, Section 5.1.6, or partial complince supplemented by suitable alternative or additional design features). For each crane so evaluated, provide the load-handling-system (i.e., crane-load-combination) information specified in Attachment 1.

PVNGS Evaluation

None of the handling systems identified in 2.1-1 and not eliminated in 2.1-2 or 2.4-2b totally meet single-failure-proof criteria.

2.4-2-d NRC Position

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

PVNGS Evaluation

Table 2.4-1 identifies the heavy load/impact area combinations which can be eliminated by analysis showing damage would not preclude operation of sufficient equipment to allow the system to perform its safety function following a load drop with a four (4) in the Elimination Category column.

The following drops are considered:

1. Drops on the RCP with the motor in place

2. Drops on Vessel Piping and the RCP without the motor in place.

3. Drops on the Steam Generator

4. Drops on the Pressurizer

5. Drop of the Vessel Head

6. Drops of up to 347,160 lbs above the Vessel Head

These events will not have unacceptable consequences since the Safety Injection System will be functional to provide cooling to the core. These loads will not be lifted unless one train of the Safety Injection System is verified operational by the shift supervisor and refueling director. In this manner, the Safety Injection System provides redundancy for the Shutdown Cooling System, one train of which could be disabled by drops form the Polar or Jib Cranes. As the drop is not postulated to occur until at least 100 hours after reactor shutdown (NUREG 0612), the Safety Injection System will provide adequate cooling since it has capacity to remove decay heat from a LOCA occuring at power.

NRC Position

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

PVNGS Evaluation

The Containment Building Polar Crane is designed and constructed such that the hoisting system will retain its load in the event of seismic accelerations equivalent to an SSE.

The Containment Building Jib Cranes are not designed and constructed such that the hoisting system will retain its load in the event of seismic accelerations equivalent to an SSE.

NRC Position

(2) The basis for any exceptions taken to the analytical guidelines of NUREG 0612, Appendix A.

PVNGS Evaluation

No exceptions were taken to the guidelines of NUREG 0612, Appendix A.

NRC Position

(3) The information requested in Attachment 4.

PVNGS Evaluation

The weight of heavy loads, impact area, and drop location are described in Table 2.4-1. The maximum palm elevation of the Polar Crane is 208'-0". The maximum palm elevation of the Jib Cranes is 171'-3". The evaluation described in 2.4-2d assumed that any drop would rupture the RCS. As the results of the evaluation are satisfactory, no mitigation credits were assumed.

LIST OF FIGURES

NEW FUEL HANDLING CRANE INTERLOCK REGION

FIGURE 2.4-1

FUEL BUILDING CRANE AND MONORAIL ORIENTATION

BECHTEL LOS ANGELES	FUEL BUILDING EQUIPMENT LOCATIONS SECTIONS
ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	SCALE 1"=10'-0" · JOB NO. 10407 · DRAWING NO. 13-P-ZFL-002 · REV 2

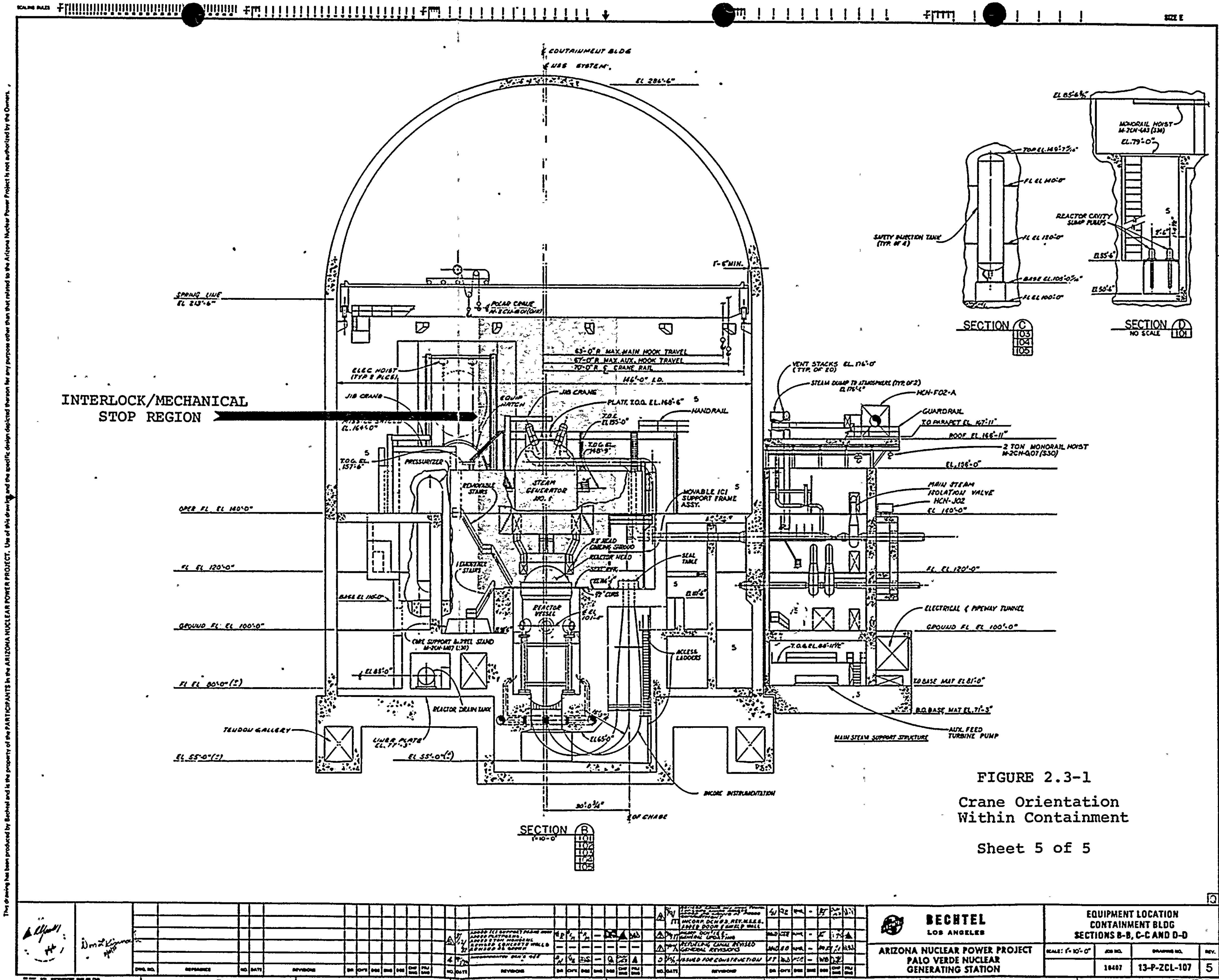
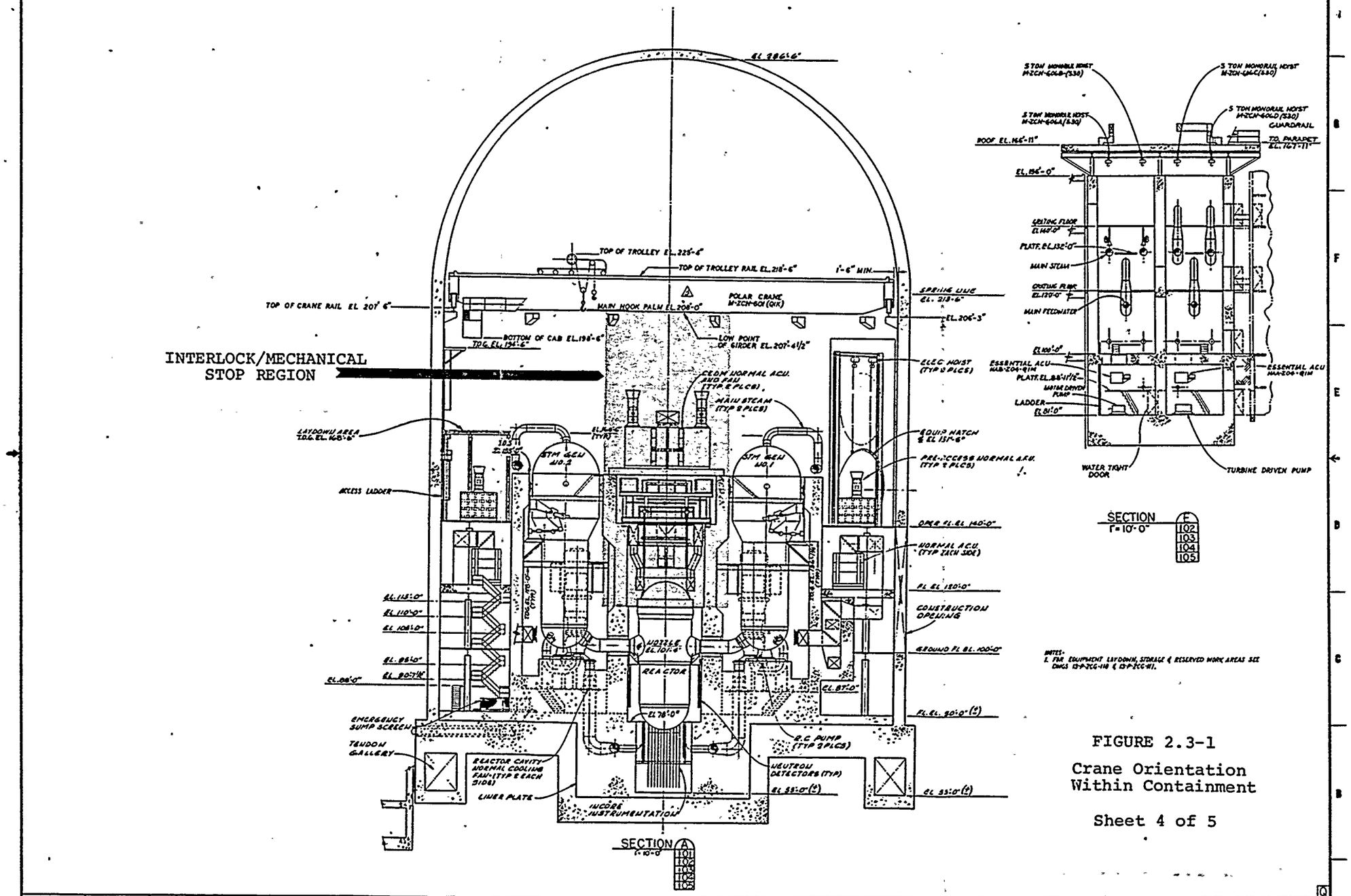


FIGURE 2.3-1

Crane Orientation
Within Containment

Sheet 5 of 5



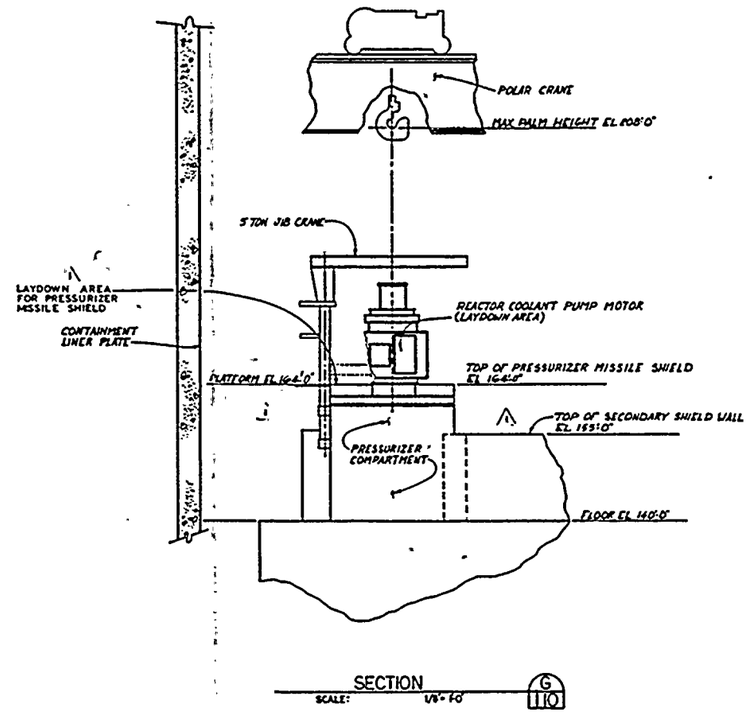
NOTES:
1. FOR EQUIPMENT LAYDOWN, STORAGE & RESERVED WORK AREAS SEE DWGS 13-P-ZCG-116 & 13-P-ZCG-117.

FIGURE 2.3-1

Crane Orientation Within Containment

Sheet 4 of 5

BECHTEL LOS ANGELES	ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	EQUIPMENT LOCATION CONTAINMENT BLDG SECTIONS A-A & E-E	
		SCALE 1"=10'-0"	JOB NO. 10487
			DRAWING NO. 13-P-ZCL-106
			REV 4



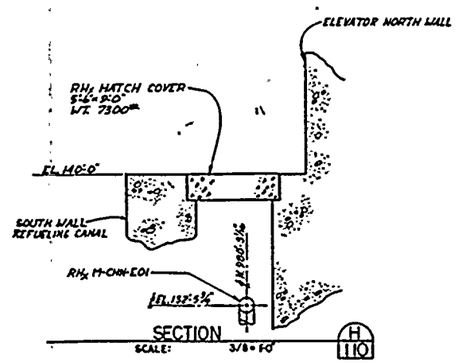
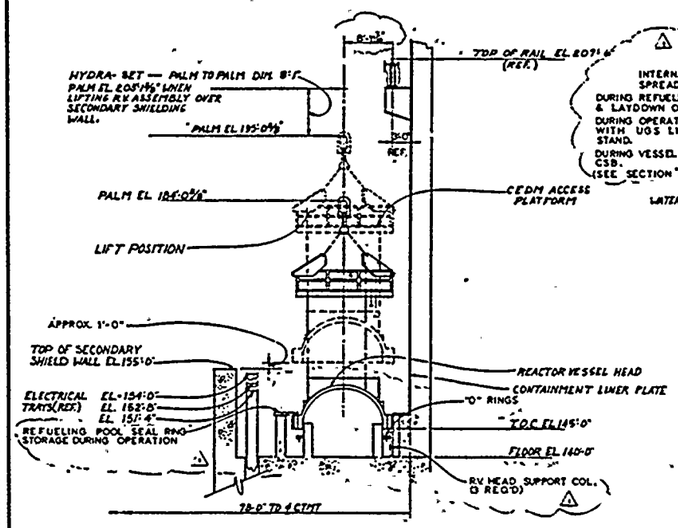


FIGURE 2.3-1

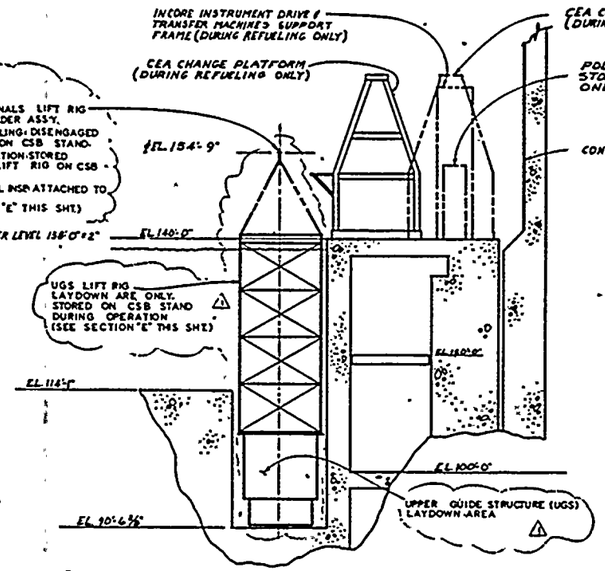
Crane Orientation
Within Containment

Sheet 3 of 5

BECHTEL LOS ANGELES	CONTAINMENT BUILDING EQUIPMENT LAYDOWN & STORAGE SECTIONS				
ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	SCALE	JOB NO.	DRAWING NO.	REV.
	AS NOTED	10407	13-P-ZCG-116	1



SECTION A 110



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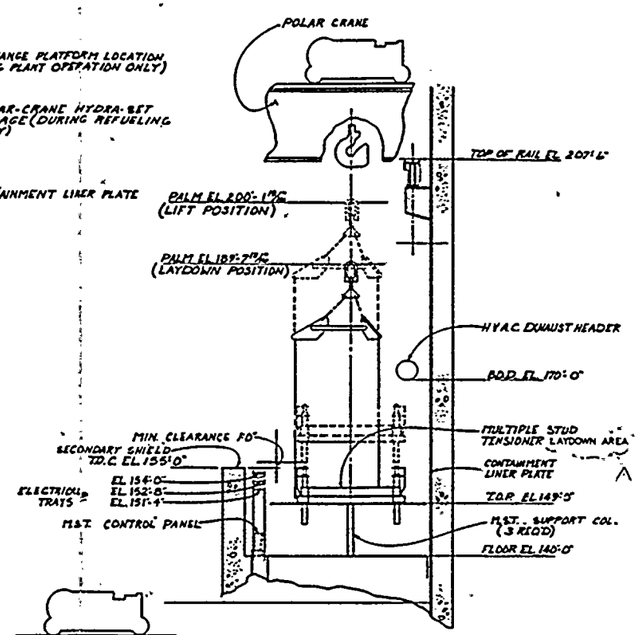

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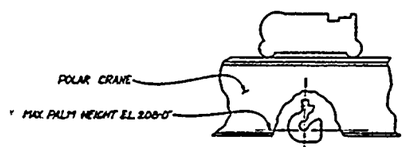

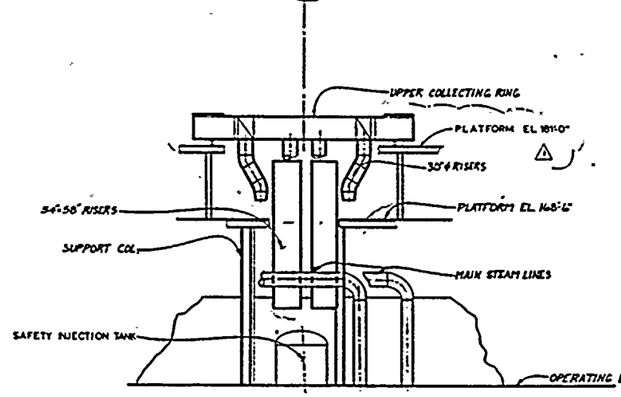

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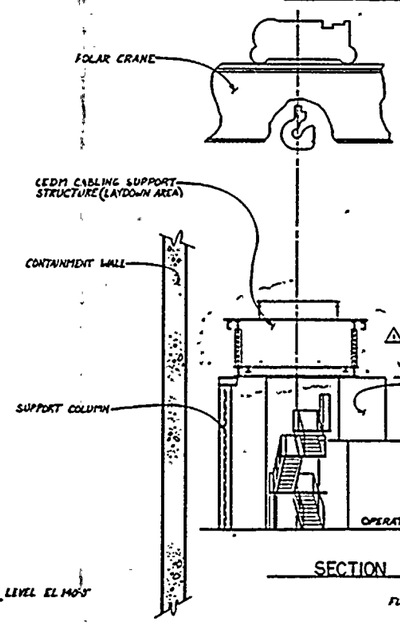

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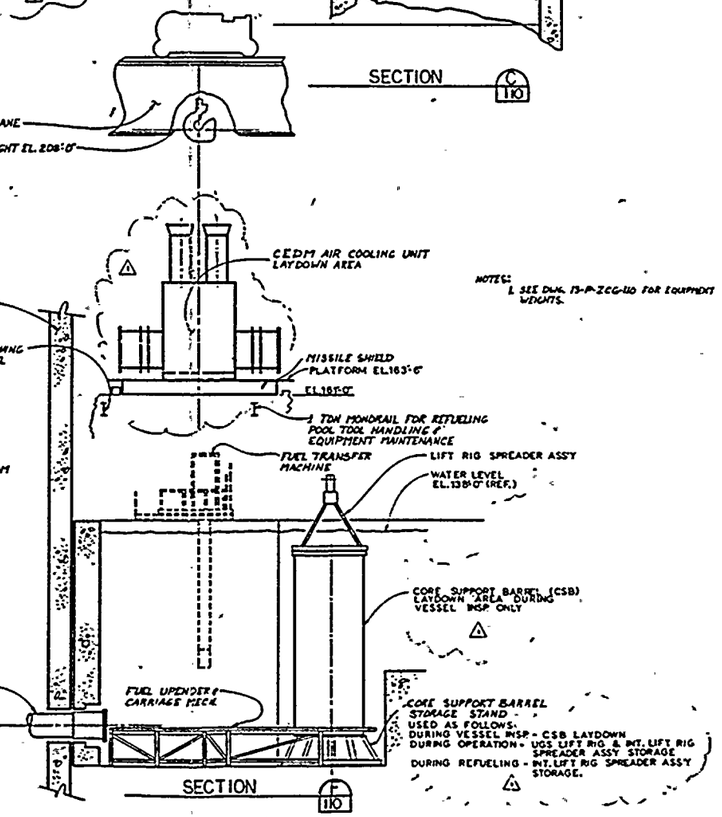


SECTION F 110

FIGURE 2.3-1
Crane Orientation Within Containment

Sheet 2 of 5.

BECHTEL LOS ANGELES	CONTAINMENT BUILDING EQUIPMENT LAYDOWN & STORAGE SECTIONS			
ARIZONA NUCLEAR POWER PROJECT PALO VERDE NUCLEAR GENERATING STATION	SCALE 1/8"=1'-0"	JOB NO. 10407	DRAWING NO. 13-P-ZCG-111	REV. 1

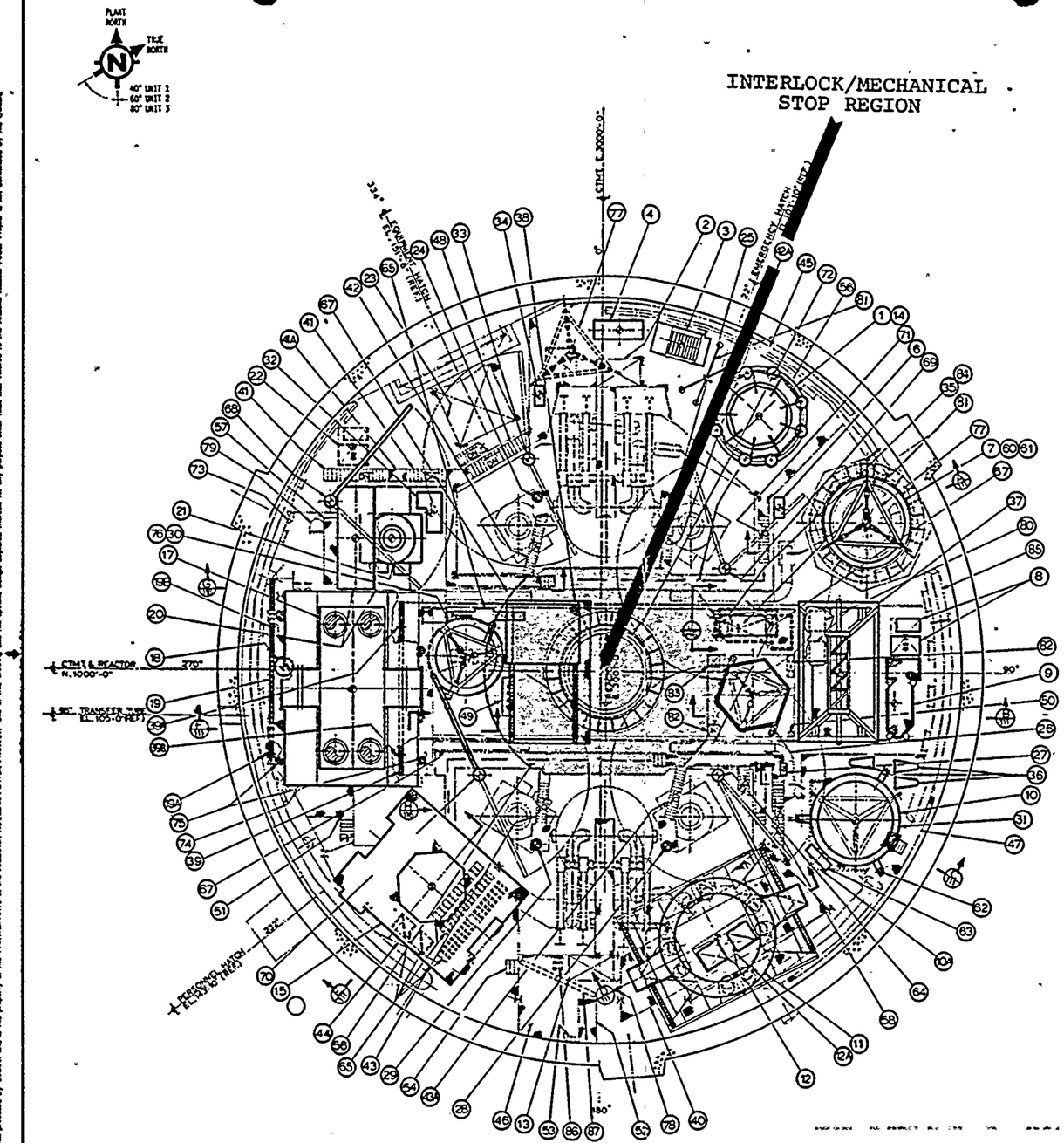


FIGURE 2.3-1

Crane Orientation Within Containment

Sheet 1 of 5

ITEM NO	NAME	DESCRIPTION	LOCATION NORTH COORD	LOCATION EAST COORD	ELEV	WEIGHT
1	RV HEAD INSULATION	RV HD INSUL. & LOWER COOLING RING WITH SUPPORT STAND	LATER	LATER	168'-8"	100 TON
2	MATCH	SIZE 7'-10"x 9'-3" FOR CTMT PREACCESS NORMAL AIR FILTRATION UNIT CARBON FILL HOPPER & FAN INSTALLATION	1058'-4"	3003'-4"	168'-8"	—
3	INCORE INST HOLD FRAME		1064'-8"	3015'-9"	168'-8"	2 TONS
4	CRANE	REACTOR COOLANT PUMP SEAL REMOVAL	1067'-0"	3003'-8"	168'-8"	1267.9#
5						
6	GUIDE STUDS					100 TON
7	RV HEAD ASS'Y		1029'-3"	3053'-7"	143'-8"	
8	HYDRA-SET	225 TON CAPACITY (STORAGE DURING REFUELING ONLY)	1007'-0"	3062'-0"	140'-0"	3442.9#
9	ICI SUPPORTING FRAME ASSY	LAYDOWN AREA DURING REFUELING				2026.9#
10	MULTIPLE STUD TENSIONER	FOR RV HEAD STUDS	971'-0"	3059'-8"	149'-0"	6 TONS
10A	CURBED DECON AREA	FOR RV HEAD STUDS & TOOLS			140'-0"	—
11	UPPER COLLECTING RING	4'-0"x 2'-8" CEDM COOLING DUCT	947'-8"	3023'-6"	181'-0"	
12	COOLING DUCT	58"x 54" CEDM DUCT RISERS				220 TON
12A	MATCH	SIZE 12'-10"x 6'-0" FOR STORAGE 58"x 54" CEDM DUCT RISERS	948'-8"	3025'-6"	168'-8"	—
13	MATCH	SIZE 8'-8"x 4'-3" FOR CTMT PREACCESS NORMAL AIR FILTRATION UNIT CARBON FILL HOPPER & FAN INSTALLATION	941'-7½"	2998'-8"	166'-0"	—
14	COOLING RING	REACTOR HEAD COOLING RING				24 TON
15	CEDM CABLE SUPPSTRUCT		953'-8"	2968'-8"	166'-0"	23 TON
16						
17	RV MISSILE SHIELD & CEDM AIR COOLING UNIT	LAYDOWN PLATFORM EL. 181'-0"	998'-0"	2922'-9"	154'-10"	170 TON
18	BLIND FLANGE	36" DIA TRANSFER TUBE BLIND FLANGE	1000'-6"	2936'-0"	140'-0"	2300.#
19	MONORAIL	36" DIA BLIND FLANGE REMOVAL	1000'-0"	2933'-9"	169'-0"	—
19A	2 TON CAP MONORAIL HOIST	TO SERVICE TRANSFER TUBE BLIND FLANGE		2933'-9"	168'-0"	1260.#
19B	" "			2933'-9"	169'-0"	"
20	REMOVABLE SLABS	TOTAL OF THREE SLABS ON TOP OF PRESSURIZER	1026'-0"	2949'-8"	169'-6"	—
21	PUMP MOTOR	REACTOR COOLANT PUMP MOTOR	1028'-0"	3027'-0"	164'-0"	198,500
22	HYDRA-SET	225 TON CAPACITY (STORAGE DURING OPERATION)	1047'-0"	2950'-0"	140'-0"	3442.9#
23	MATCH	SIZE 10'-5"x 9'-8" EQUIPMENT REMOVING			140'-0"	—
24	SECONDARY MANWAY COVER	STEAM GEN COVER	1034'-8"	2987'-3"	148'-9"	200 TON
25	SECONDARY MANWAY COVER	STEAM GEN COVER	1034'-0"	3041'-0"	148'-9"	200 TON
26	UPPER GUIDE STRUCTURE	LAYDOWN AREA DURING REFUELING ONLY	995'-6"	3030'-4"	180'-6"	306,000
27	CONTROL DESK	FOR MULTIPLE STUD TENSIONER	987'-0"	3037'-0"	140'-0"	—
28	SECONDARY MANWAY COVER	STEAM GEN COVER	962'-0"	3013'-9"	148'-9"	200 TON
29	SECONDARY MANWAY COVER	STEAM GEN COVER	996'-0"	3078'-3"	148'-9"	200 TON
30	CORE SUPPORT BARREL	LAYDOWN AREA DURING VESSEL INSP	997'-9"	3073'-3"	148'-6"	330,000
31	VST SUPPORT STAND	MULTIPLE STUD TENSIONER SUPPORT STAND				
32	MAINTENANCE TOOL	FOR REACTOR COOLANT PUMP MAINTENANCE	1031'-0"	2966'-0"	164'-0"	—
33	11B CRANE	5 TON CAP - TO SERVICE EQUIP INSIDE SEC SHIELD WALL	1041'-10"	2980'-7"		11,000
34	MAINTENANCE TOOL	FOR REFUELING EQUIPMENT MAINTENANCE	1054'-0"	2987'-6"	168'-8"	—
35	ICI SUPPORTING FRAME ASSY	LOCATION DURING OPERATION	1044'-0"	3059'-6"	140'-0"	13 TON
36	REACTOR DEVICES	MULTIPLE STUD TENSIONER'S ACCESSORY			149'-0"	—
37	C E A CHANGE PLATFORM	LOCATION DURING REFUELING ONLY	1055'-0"	2952'-0"		10 TONS
38	REFUELING MACHINE					
39	MONORAIL	TO SERVICE REFUELING POOL	1000'-0"	2960'-0"		
39A	1 TON CAP MONORAIL HOIST	TO SERVICE REFUELING CANAL EQUIPMENT		2960'-0"		1000.#
39B	" "			2960'-0"		"
40	LAYDOWN PLATFORM	FOR UPPER COLLECTING RING			181'-0"	
41	STAIRS	2'-6" WIDE STAIRS FROM PL EL 157'-6" TO PL EL 151'-4"				
41A	LANDING	2'-6" WIDE LANDING			151'-4"	
42	STAIRS	2'-0" WIDE STAIRS FROM PL EL 157'-6" TO PL EL 148'-9"				
42A	STAIRS	2'-0" WIDE STAIRS FROM PL EL 190'-0" TO PL EL 148'-9"				
43	STAIRS	2'-0" WIDE STAIRS FROM PL EL 190'-0" TO PL EL 148'-9"				
43A	STAIRS	2'-0" WIDE STAIRS FROM PL EL 157'-6" TO PL EL 148'-9"				
44	LAYDOWN PLATFORM	FOR CEDM CABLE SUPPORT STRUCTURE			168'-0"	
45	LAYDOWN PLATFORM				168'-8"	
46	PLATFORM				168'-8"	
47	LAYDOWN PLATFORM	FOR MULTIPLE STUD TENSIONER			149'-0"	
48	STAIRS	2'-6" WIDE STAIRS FROM PL EL 168'-8" TO PL EL 157'-6"				
49	FUEL RACK	NEW FUEL RACK				
50	CEA ELEVATOR	CEA ELEVATOR				
51	LAYDOWN PLATFORM	FOR RV MISSILE SHIELD & CEDM AIR COOLING UNIT			181'-6"	
52	PLATFORM	POLAR CRANE CAB ACCESS PLATFORM			196'-6"	
53	LADDER	ACCESS LADDER FROM EL 168'-6" TO EL 199'-1"				
54	STAIRS	2'-6" WIDE STAIRS FROM PL EL 168'-6" TO PL EL 166'-0"				
55						
56	TOP OF SECON SHIELD WALL				155'-0"	
57	PLATFORM	21'-7" WIDE PRESSURIZER MISSILE SHIELD PLATFORM			164'-0"	
58	LADDER	EMERGENCY VERTICAL LADDER				
59						
60	RV HEAD ASS'Y		1029'-3"	3053'-7"	143'-0"	330 TON
61	REFUELING POOL SEAL RING	LAYDOWN AREA DURING OPERATION			147'-6"	13 TON
62	SUPPORTING COLUMNS	TOTAL OF THREE COLUMNS TO SUPPORT ITEM 10				—
63	HYDRAULIC RESERVOIR	PERMANENTLY ATTACHED TO ITEM 10				—
64	11B CRANE	5 TON CAP - TO SERVICE EQUIP INSIDE SEC SHIELD WALL	975'-9"	3024'-0"		11,000#
65	REFUELING POOL STAIRS	FOR ACCESS TO BOTTOM OF REFUELING POOL				
66						
67	ELECTRICAL TRAYS					
68	11A CRANE	5 TON CAP - TO SERVICE EQUIP INSIDE PRESSURIZER COMP	1033'-0"	2945'-3"		11,000#
69	11B CRANE	5 TON CAP - TO SERVICE EQUIP INSIDE SEC SHIELD WALL	1033'-0"	3005'-0"		11,000#
70	11B CRANE	5 TON CAP - TO SERVICE EQUIP INSIDE SEC SHIELD WALL	1005'-0"	3076'-0"		11,000#
71	STAIRS	2'-0" WIDE STAIRS FROM PL EL 168'-8" TO PL EL 190'-0"				
72	REFUELING POOL SEAL RING	DURING REFUELING ONLY (SEE C.E. LETTER)	1000'-0"	3001'-0"		
73	LADDER	ACCESS LADDER FROM EL 140'-0" TO EL 190'-6"				
74	LADDER	ACCESS LADDER FROM EL 155'-0" TO EL 137'-6" 12 PLACES				
75	PLATFORM	RV MISSILE SHIELD PLATFORM			163'-0"	
76	INTERNALS LIFT RIG SPREADER ASSY	FOR LIFTING UGS & CSB	997'-2"	2973'-3"		8.9 TON
77	REACTOR HEAD SPREADER ASSEMBLY	FOR LIFTING RVHEAD ASSY, MULTIPLE STUD TENS. & REFUELING SEAL RING (STORAGE DURING OPERATION)	1062'-6"	2941'-3"	168'-6"	6 TON
78	LADDER	ACCESS LADDER FROM EL 168'-6" TO EL 181'-0"				
79	LADDER	ACCESS LADDER FROM EL 150'-6" TO EL 164'-0"				
80	RV SHORING STEEL TRUSION					
81	RV SUPPORT FRAMING LIFTING RIG					
82	TOOL STORAGE RACK					
83	CEA DISPOSAL CAN					
84	ICI HOLDING FRAME					
85	PLUG DUCT	REMOVABLE SECTION FOR HEAD LAYDOWN				
86	CABLE SUPPORT STRUCTURE	LIFTING RIG ASSEMBLY				
87	CEDM LIFTING RIG					

GEN NOTES

1. FOR SECTIONS SEE DWG. 13-P-ZCG-111 & DWG. 13-P-ZCG-110.
2. FOR ADDITIONAL STORAGE AREA USE CTMT FLOOR EL 80'-0" EQUIPMENT CAN BE RELOCATED TO OPERATING AREA BY USING EQUIP. MATCH (ITEM 23).
3. SPECIAL TOOL FOR CTMT PREACCESS NORMAL AIR FILTRATION UNIT CARBON FILL & DRAIN SYSTEM MAINTENANCE TO BE STORED OUTSIDE CTMT. (TYP. ALL UNITS).

LEGEND

- DESIGNATES WALKING AREAS ON TOP OF SECONDARY SHIELD WALL
- DESIGNATES EQUIPMENT LAYDOWN AREA DURING REFUELING
- DESIGNATES EQUIPMENT LAYDOWN AREA DURING OPERATION
- DESIGNATES PLATFORM OR GRATING
- DESIGNATES CENTER OF GRAVITY

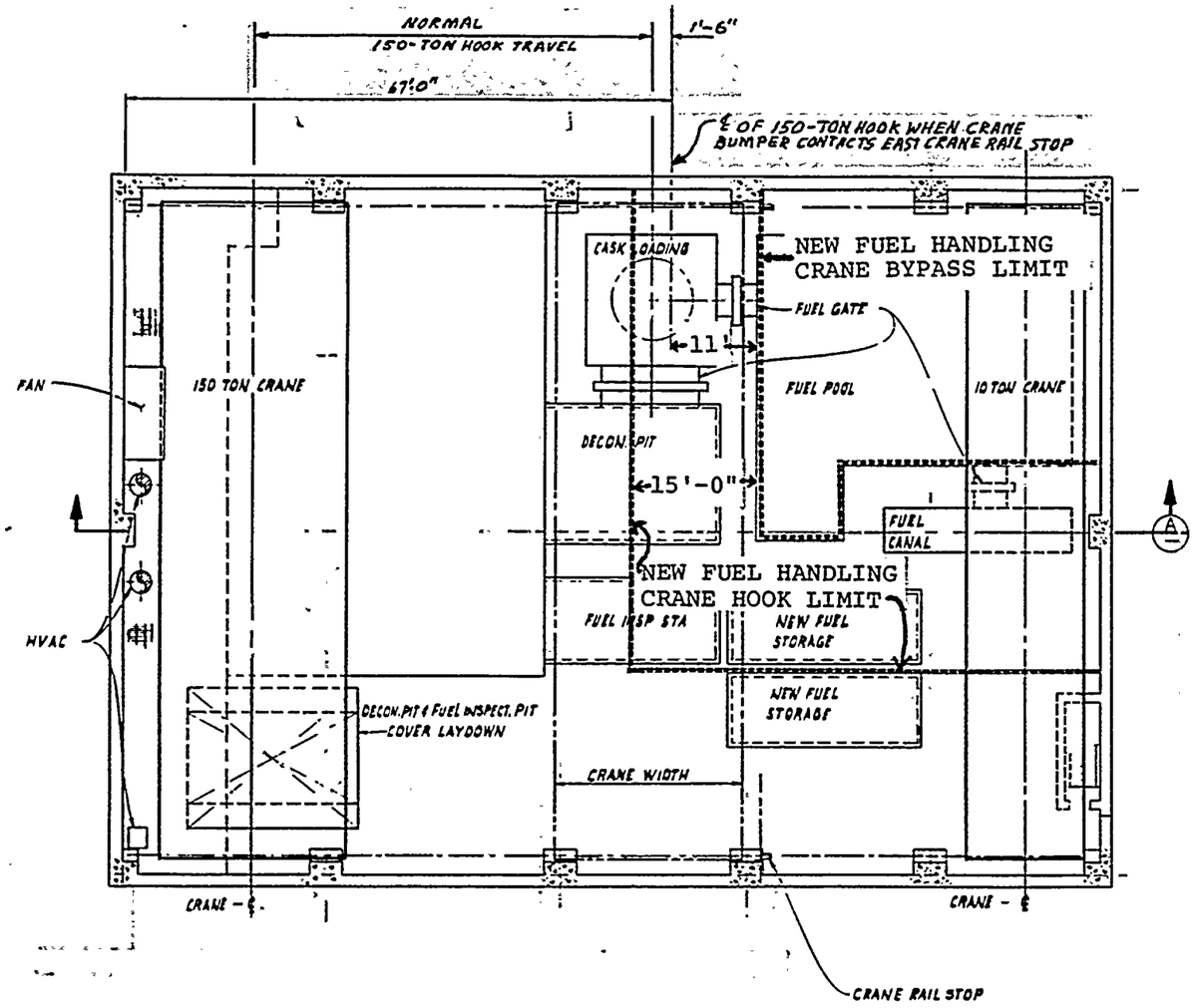
DWG. NO.	REFERENCE	NO.	DATE	REVISIONS	DR	CHK	DES	ENG	CHK ENG	PROJ ENG
		6								
		5								
		4								
		3								

BECHTEL LOS ANGELES

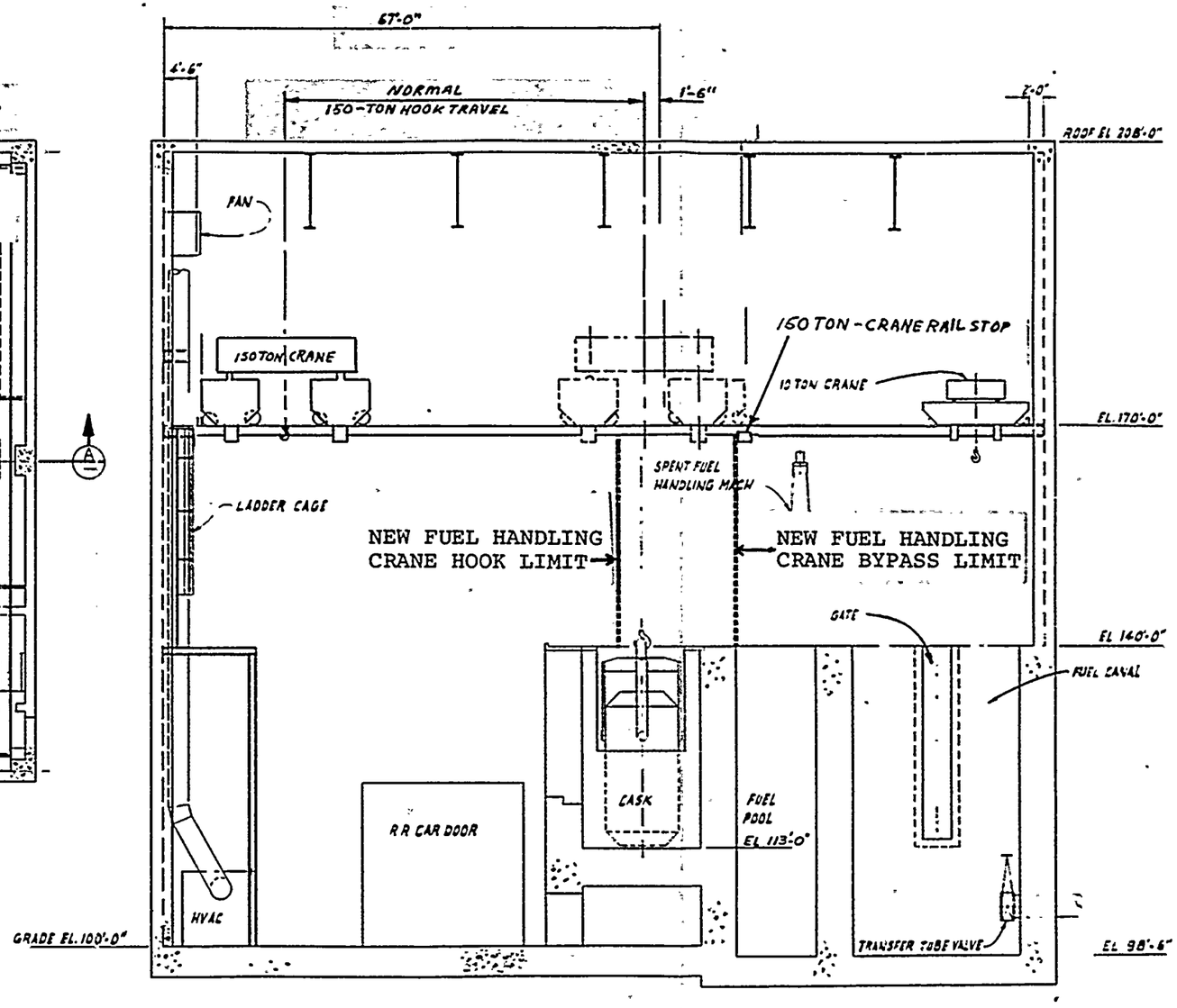
ARIZONA NUCLEAR POWER PROJECT
PALO VERDE NUCLEAR GENERATING STATION

CONTAINMENT BUILDING EQUIPMENT LAYDOWN & STORAGE PLAN ABOVE EL.140'-0"

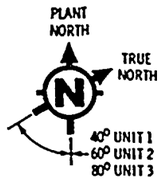
SCALE	JOB NO.	DRAWING NO.	REV.
1/8" = 1'-0"	10497	13-P-ZCG-110	2



PLAN



SECTION (A)



Palo Verde Nuclear Generating Station

FUEL BUILDING CRANE TRAVEL LIMITS

FIGURE 2.2-1