

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

October 9, 1978

Mr. Victor Stello, Jr., Director
Division of Operating Reactors
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 518
PO&M/DLB:scj
Docket Nos. 50-280
50-281
License Nos. DPR-32
DPR-37

SUBJECT: MOVEMENT OF HEAVY LOADS NEAR SPENT FUEL

Dear Mr. Stello:

This is in response to your letter of June 12, 1978 which requested information regarding the movement of heavy loads near spent fuel. The information requested for Surry Power Station Unit Nos. 1 and 2, is included in the attachments. Following is a list of the attachments.

Movement of Heavy Loads Near Spent Fuel,
Surry Power Station Unit Nos. 1 and 2 (9 pages)

Surry FSAR Drawings
FSAR Figure 15.1-3
FSAR Figure 15.1-4
FSAR Figure 15.1-5
FSAR Figure 15.1-6
FSAR Figure 15.1-7
FSAR Figure 15.1-8
FSAR Figure 15.1-9
FSAR Figure 15.1-14
FSAR Figure 15.1-15

Figure 1: Fuel Handling Tools

Figure 2: Irradiation Specimen Shipping Cask, Model BCL-4

Figure 3: Irradiation Specimen Shipping Cask, Model BM1-1

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VIRGINIA ELECTRIC AND POWER COMPANY TO Mr. Victor Stello, Jr., Director

PROCEDURES:

MMP-C-RC-039, Removal and Installation of Upper Internals
(7 pages with 1 page attachment)

MMP-C-RC-040, Installation and Removal of Head Lifting Rig
(3 pages with 1 page attachment)

OP-4.18 Movement of Transfer Canal Door
(3 pages)

Very truly yours,

C. M. Stallings

C. M. Stallings
Vice President-Power Supply
and Production Operations

Enclosures

MOVEMENT OF HEAVY LOADS NEAR SPENT FUEL

SURRY POWER STATION UNIT NOS. 1 AND 2

The following information is provided in response to a request from the Nuclear Regulatory Commission dated June 12, 1978.

Information Requested

1. Provide a diagram which illustrates the physical relation between the reactor core, the fuel transfer canal, the spent fuel storage pool and the set down, receiving or storage areas for any heavy loads moved on the refueling floor.

Response

Attached are the following diagrams from section 15 of the Surry FSAR.

1. Machine Location Reactor Containment, EL. 47'4", (FSAR Figure 15.1-3).
2. Machine Location Reactor Containment, EL. 18'4", (FSAR Figure 15.1-4).
3. Machine Location Reactor Containment, EL. 3'6", (FSAR Figure 15.1-5).
4. Machine Location Reactor Containment EL. 27'7", (FSAR Figure 15.1-6).
5. Machine Location Reactor Containment, Vertical Section Sheet 1, (FSAR Figure 15.1-7).
6. Machine Location Reactor Containment, Vertical Section Sheet 2, (FSAR Figure 15.1-8).
7. Machine Location Reactor Containment, Vertical Section Sheet 3, (FSAR Figure 15.1-9).
8. Fuel Building Arrangement, Sheet 1, (FSAR Figure 15.1-14).
9. Fuel Building Arrangement, Sheet 2, (FSAR Figure 15.1-15).

Note that the fuel building drawings do not reflect the installation of higher density spent fuel racks which was completed in the spring of 1978. Details of the new spent fuel storage racks were submitted in our Request for Operating License Amendment dated March 27, 1977 (Serial No. 186).

Information Requested

2. Provide a list of all objects that are required to be moved over the reactor core (during refueling), or the spent fuel storage pool. For each object listed, provide its approximate weight and size, a diagram of the movement path utilized (including carrying height) and the frequency of movement.

Response

Following is a list of objects which are moved over the reactor core or the spent fuel storage pool during refueling. The objects are listed in the approximate order in which their movement occurs during the refueling process. A general description of the refueling procedure is given in Section 9.12 of the Surry FSAR. The Surry units are currently on an 18 month refueling interval.

1. Reactor Vessel Head

The reactor vessel head is lifted by the containment polar crane. Its movement path includes a vertical rise of approximately 40 feet from its initial position, a horizontal movement of approximately 40 feet and a vertical descent of approximately 100 feet to the reactor head storage area. The movement path can be seen on FSAR Figures 15.1-7 and 15.1-3. The size and shape of the reactor vessel head is shown on FSAR Figure 15.1-7. The weight of the reactor vessel head is approximately 250,000 lbs.

2. Reactor Vessel Upper Internals

The reactor vessel upper internals are removed from the vessel by the polar crane and placed in the "Upper Internals Lifting Rig Storage Area". This involves a vertical lift of approximately 25 feet and a horizontal motion of approximately 15 feet. The reactor vessel upper internals weigh approximately 85,000 lbs. The upper internals are described in Section 3.0 of the Surry FSAR.

3. Fuel Handling Tools

A variety of fuel handling tools are used during the core alteration process in the containment or in the fuel building. In the containment, movement will be between core locations and/or the fuel upender and/or the RCC change fixture. The locations of these components are shown on FSAR Figures 15.1-4 and 15.1-7. In the fuel building, movement will be between the upender and/or fuel storage locations and/or the new fuel elevator. These tools and their approximate weights are listed below. Sketches of these tools are included in Figure 1.

1. Spent Fuel Assembly Handling Tool, 350 lbs.
2. Thimble Plug Handling Tool, 235 lbs.
3. Burnable Poison Rod Assembly Handling Tool, (two types): mechanically operated type, 610 lbs; air operated type, 800 lbs.

The greatest total weight carried over the fuel during the fuel handling process is as follows:

| | |
|--------------------------|-----------------|
| Fuel Assembly | 1470 lbs. |
| Spent Fuel Handling Tool | 350 lbs. |
| Rod Cluster | <u>150 lbs.</u> |
| Total Weight | 1970 lbs. |

In the containment, at the highest point during fuel movement, the bottom of the lifted fuel assembly will be approximately 18 feet above the top of the installed fuel assembly. In the fuel building, at the highest point during fuel movement, the bottom of the fuel assembly will be approximately 7 feet above the top of the stored fuel assemblies.

4. Reactor Irradiation Sample and Sample Handling Tool.

In accordance with our Reactor Vessel Radiation Surveillance Program, at approximately 10 year intervals, reactor irradiation sample assemblies are removed from the vessel for examination and testing. The sample assemblies are approximately 10 feet long, 1 1/4 inch square in cross section and weigh approximately 25 lbs. To remove the sample, a specimen handling basket is placed in the fuel upender in the fuel building. The upender is then transferred to the containment and placed in the upright position. The sample assembly is then removed from the vessel using the Irradiation Sample Handling Tool, and placed in the specimen basket. The specimen basket and irradiation sample are then returned to the fuel building for storage in the spent fuel racks. The irradiation sample will then be shipped for analysis. Weights of these components are as follows:

1. Irradiation Sample Assembly, 25 lbs.
 2. Specimen Handling Tool, 240 lbs.
 3. Specimen Handling Basket, 251 lbs.
5. Core Mapping Equipment

Following core alterations a T. V. camera and video-tape equipment are used to verify the proper location of fuel assemblies. The camera weighs approximately 10 lbs. and is suspended less than 1 foot above the fuel during the mapping process.

6. Irradiation Specimen Shipping Cask

The irradiation specimen is shipped to the test laboratory in a shipping cask provided by the laboratory. At the present time, the laboratory services and shipping casks are provided by the Battelle Memorial Institute. The casks used are model numbers BCL-4 and BMI-1. Sketches of these casks are included in Figures 2 and 3. The BCL-4 cask weighs approximately 13,000 lbs. The BMI-1 cask weighs approximately 22,550 lbs.

An irradiation sample shipping cask is never carried over spent fuel. It is lowered into the spent fuel shipping cask area of the spent fuel pit.

7. Transfer Canal Door

At the spent fuel pool end of each fuel transfer canal is a transfer canal door. These are marked "Gate" on FSAR Figure 15.1-14. The weight of the canal door is approximately 3800 lbs. Prior to refueling, the units transfer canal door is removed from the canal position and transferred either to the other units canal or to the gate storage position. This requires carrying the door over the southern most row of fuel storage positions. Administrative controls prohibit the movement of the door over spent fuel. Additionally the spent fuel positions will be utilized in such an order that the southern most row will be the last filled.

Information Requested

3. What are the dimensions and weights of the spent fuel casks that are or will be used at your facility?

Response

The spent fuel cask(s) which will be used to ship fuel from Surry Power Station have not been selected at this time.

Information Requested

4. Identify any heavy load or cask drop analyses performed to date for your facility. Provide a copy of all such analyses not previously submitted to the NRC staff.

Response

A spent fuel cask drop analysis has been performed for Surry Power Station by Nuclear Energy Services, Inc. (NES). However, the NES analysis is limited in scope and has not been completely reviewed or accepted by Vepco. For this reason, the results of the analysis are considered preliminary. Accordingly, no copy of the analysis has been enclosed. Where results of this analysis are referenced herein, they will be identified as preliminary.

Information Requested

5. Identify any heavy loads that are carried over equipment required for the safe shutdown of a plant that is operating at the time the load is moved. Identify what equipment could be affected in the event of a heavy load handling accident (piping, cabling, pumps, etc.) and discuss the feasibility of such an accident affecting this equipment. Describe the basis for your conclusions.

Response

Maintenance activities requiring the movement of heavy loads would generally occur only during the cold shutdown condition. At that time,

only the residual heat removal system is necessary to maintain the plant in a safe shutdown condition. Operation of the RHR system requires electrical power and the supply of component cooling water to the RHR heat exchangers. The possibility of a heavy load accident which would render the RHR system inoperable is negligible for the following reasons.

1. The locations of the residual heat removal system and other equipment are shown in the attached reactor containment machine location drawings. The location of the RHR system is most clearly shown on Figures 15.1-6 and 15.1-9.

Generally, a heavy load would be in motion for; (1) movement for access (as with removable slabs), (2) removal to an open area for ease of maintenance, or (3) removal from or entry to the containment via the equipment hatch. A review of the reactor containment machine location drawings will show that all postulated activities of this type for all components can be accomplished without carrying the load over the area of the RHR system.

2. As required by Surry Power Station Technical Specification, all maintenance activities which could affect reactor safety are proceduralized and reviewed by the Station Nuclear Safety and Operating Committee. This review ensures the consideration of all implications of the movement of a heavy load and the selection of a safe movement path.

Information Requested

6. If heavy loads are required to be carried over the spent fuel storage pool or fuel transfer canal at your facility, discuss the feasibility of a handling accident which could result in water leakage severe enough to uncover the spent fuel. Describe the basis for your conclusions.

Response

In addition to the items and movement paths listed in the response to item 2, the spent fuel shipping cask is moved over the east end of the spent fuel pool. The spent fuel shipping cask is not moved over spent fuel. It is lowered into the spent fuel shipping cask lay down area as shown on FSAR Figures 15.1-14 & 15. The NES study addressed the consequences of a cask drop accidents for a wide variety of casks. In the worst type of accident for the heaviest cask available, the report concluded that, "... there will be a moderate amount of local and overall damage to the spent fuel pool floor; however, there will not be any gross structural failure of the pool floor. Loss rate of pool water through the cracked concrete pool floor resting on a soil foundation is difficult to estimate, but it is expected that an adequate pool water level can be maintained with a modest makeup capability." As explained below in response to item 8, a substantial makeup capability exists. Thus, preliminary results for the heaviest cask, worst accidents are acceptable. Note that this conclusion is for the heaviest available cask, which is not necessarily the cask which will be used at Surry. The eventual selection of a spent fuel shipping cask will be based on numerous considerations including the results and implications of the NES study. The cask

selection will be such as to preclude a handling accident which could result in a water loss severe enough to uncover spent fuel. Accordingly, we conclude that a handling accident which could result in water leakage severe enough to uncover the spent fuel is not feasible.

Information Requested

7. Describe any design features of your facility which affect the potential for a heavy load handling accident involving spent fuel e.g., utilization of a single failure-proof crane.

Response

The following design features minimize the possibility of a heavy load handling accident involving spent fuel.

1. The spent fuel pit cooling and purification system components are located west of the fuel pool and at low levels in the fuel building. These components as well as new fuel containers are handled by the new fuel crane and monorail as shown in FSAR Figure 15.1-15. Therefore it will never be necessary to move these components over the stored spent fuel.
2. The motor driven platform is the only crane which travels over the spent fuel. The only objects which are carried by this crane are new and spent fuel, the irradiation sample basket and specimen, and the transfer canal door.
3. The 125 ton capacity spent fuel shipping cask crane is on its own trolley such that it cannot carry a heavy load directly over spent fuel.
4. The Spent Fuel Handling Crane was manufactured by Harnischfeger, Inc. It is a 125 ton capacity, seismic Class A, and meets Electric Overboard Crane Institute Specification No. 61. The crane capacity exceeds the weight of the heaviest cask considered by approximately 25%. A motor brake capable of holding 200 percent motor torque is provided. The brake will hold the load when the motor is deenergized.

Information Requested

8. Provide copies of all procedures currently in effect at your facility for the movement of heavy loads over the reactor core during refueling, the spent fuel storage pool, or equipment required for the safe shutdown of a plant that is operating at the time the move occurs.

Response

Enclosed are copies of the following procedures:

1. OP-4.18, Movement of Transfer Canal Door
2. MMP-C-RC-039, Removal and Reinstallation of Upper Internals
3. MMP-C-RC-040, Installation and Removal of Head Lifting Rig

A general refueling procedure is given in Section 9.12.5 of the Surry FSAR. The detailed refueling procedure is not included because it is of great length and, in regard to heavy loads, simply refers to the above listed procedures.

No procedures have been developed for the movement and use of the spent fuel shipping cask.

Information Requested

9. Discuss the degree to which your facility complies with the eight (8) regulatory positions delineated in Regulatory Guide 1.13 (Revision 1, December, 1975) regarding Spent Fuel Storage Facility Design Basis.

Response

A discussion of Surry Power Stations compliance with Regulatory Guide 1.13 follows, with responses numbered as in the Regulatory Guide, section C. Regulatory Position.

1. The spent fuel storage facility, including structures and equipment, is designed to category I seismic requirements.
2. As stated in Section 15.2 of the Surry FSAR, Table 15.2.1-1; the design criteria for the fuel building pool and structure are as follows.

The fuel building reinforced concrete structure is designed to withstand tornadic winds and horizontal missiles generated by tornadic winds. This design ensures that there will be no significant loss of watertight integrity due to tornadic winds or missiles generated by such winds and will prevent missiles generated by tornadic winds from contacting the fuel within the pool.

3. The motor driven platform is the only crane which travels directly over spent fuel. The motor driven platform and cranes are in use only during refueling operations. For this reason interlocks would serve no purpose. The spent fuel shipping cask crane is located such that, if the crane failed, the cask could tip over on stored fuel. As explained in the response to position 5 below, the cask tipping accident has been analyzed. Preliminary results of the cask tipping accident are discussed under item 5 on page 8.
4. The fuel building ventilation system provides heating to inhibit the build-up of condensation, high efficiency filtration to reduce the possibility of clouding of the spent fuel pit and an excess exhaust flow to maintain a negative pressure in the fuel building for inward leakage. Exhaust from the fuel building is through the common iodine filter bank of two filter assemblies, each consisting of roughing, absolute and charcoal filters. This nega-

tive pressure and filter arrangement limits the potential release of radioactive iodine and other radioactive materials. The design of the fuel building ventilation and filtration system is based on the assumption that the cladding of all the fuel rods in one fuel bundle might be breached. The inventory of radioactive materials available for leakage used for our analysis was developed prior to the adoption of Regulatory Guide 1.25. The assumptions used to derive the radioactive materials inventory for our analysis were more conservative than required by Regulatory Guide 1.25.

5. As discussed in our response to Information Request Items 2 and 3, there are no operational activities which require the movement of heavy loads over the stored spent fuel. Surry Technical Specifications prohibit the movement of heavy loads over spent fuel.

As shown in the drawings provided, the spent fuel cask handling crane is prevented by design from positioning a heavy load directly over spent fuel.

As explained in our response to Information Request Item 6, based on preliminary analyses, the Surry spent fuel pool can withstand, without leakage that could uncover the fuel, the impact of the heaviest load to be carried by the crane from the maximum height to which it can be lifted. The arrangement of the fuel building is such that, while the spent fuel cask cannot drop directly on the stored fuel, the cask could drop to the pool floor and then tip over to come in contact with the fuel. This type of incident was analyzed in the NES analysis. The preliminary analysis indicates that an accident of this type will cause some permanent damage to the fuel storage cell, however, the fuel storage rack will maintain its structural integrity.

6. All piping systems connected to the fuel storage pool are located such that a piping system leak can reduce the water level in the pool to only 4 ft. below normal since at that elevation the water level is below the pipe penetrations in the pool wall. This minimum water level ensures at least 20 ft. of water over stored fuel.
7. One level monitoring instrument is installed which audibly alarms in the main control room if the water level drops to approximately 6 inches below normal level. There is no local alarm. This instrument is not calibrated on a regular schedule.

A fuel building radiation monitor is installed which alarms in the main control room in the event of high radiation levels. Additionally, since the fuel building exhaust is through the ventilation vent system, a high activity in the fuel building would also activate an alarm on the Ventilation Vent Radiation Monitor. Neither of these radiation alarms activates any secondary function. However, since both monitors alarm in the main control room, the unit operator would take whatever corrective action is required, including, if necessary, adjustments in the ventilation and filtration flow paths. The radiation monitors are

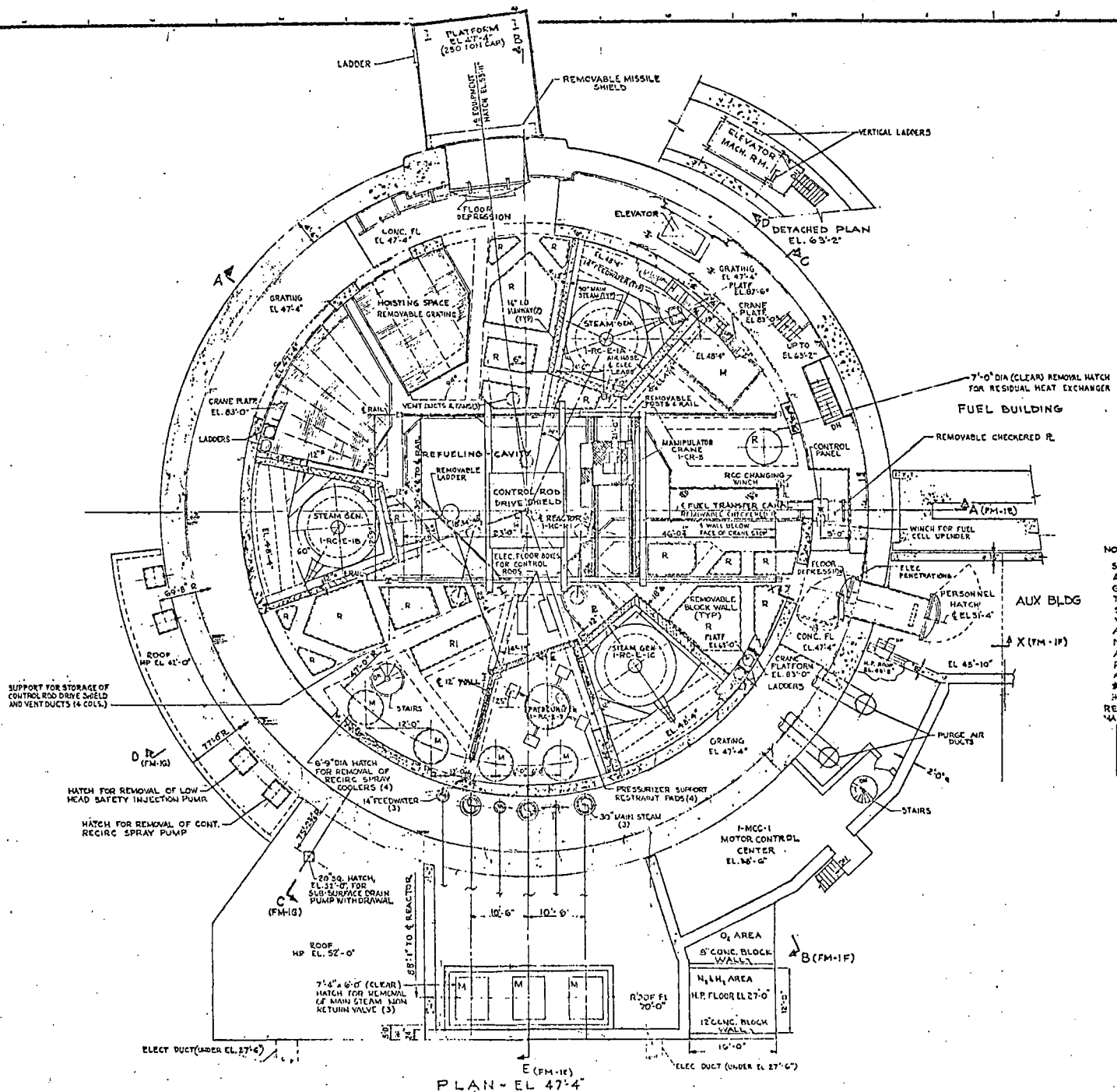
checked daily, functionally tested monthly and calibrated on a refueling interval.

8. The normal make-up to the spent fuel pool is from the primary grade water/boric acid blender on either unit. A separate 2" supply line is available directly from the primary grade water supply pumps discharge. In addition, the station fire system can also be used to supply the spent fuel pool. All of these supplies are of seismic Category 1 design. The estimated makeup rates for the three available supplies are as follows:

| | |
|----------------------|---------------|
| Normal Makeup | 100-150 gpm |
| Direct for PG System | 100-150 gpm |
| Fire System | 1500-2000 gpm |

As explained above, the preliminary cask drop analyses for the worst case accident indicates that some leakage would occur requiring a "moderate" makeup capability. The three available water supplies should be more than sufficient to maintain an adequate water level in the event of such leakage.

1148-FM-1A

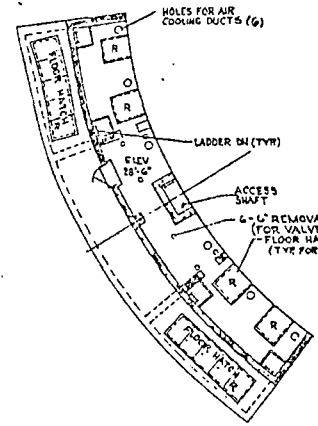


NOTES:
SCALE - 1/8" = 1'-0"
AREAS SHOWN THUS [] ARE REMOVABLE SLABS SET ON GRATINGS AND TO BE LEFT OFF DURING NORMAL OPERATION TO PROVIDE PRESSURE RELIEF AND VENTILATION SPACE. SLABS ARE TO BE STORED ON THE 1B-4 LEVEL IN THE NORTH WEST QUADRANT.
AREA SHOWN THUS [] ARE REMOVABLE SLABS FOR MAINTENANCE OR STOPPING.
ALL GRATING AT EL. 47'-4" TO BE REMOVABLE. PROVIDE REMOVABLE GLAZED RAIL AROUND CAVITY AND HOISTING SPACE.
DENOTES MINIMUM THICKNESS ALLOWED FOR RADIATION PROTECTIVE SHEET.
DENOTES MINIMUM THICKNESS ALLOWED FOR TORNADO MISSILE PROTECTIVE SHEET.
REFERENCE DRAWINGS:
MACH. LOC. REACTOR CONTAINMENT SH. 2 PLAN EL. 47'-4" FM-1A
SH. 3 EL. 47'-4" FM-1C
SH. 4 EL. 47'-4" FM-1D
SH. 5 SECT. A-S-1 EL. 47'-4" FM-1E
SH. 6 [] D. 8, XX, YY FM-1F
SH. 7 [] CC 400 FM-1B

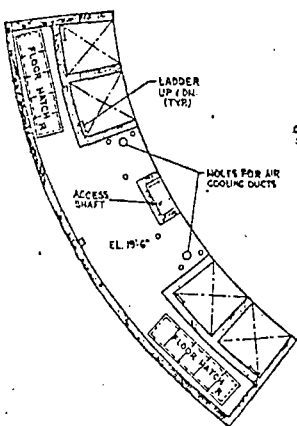
PLAN - EL. 47'-4"

MACHINE LOCATION
REACTOR CONTAINMENT
EL. 47'-4"
SURRY POWER STATION

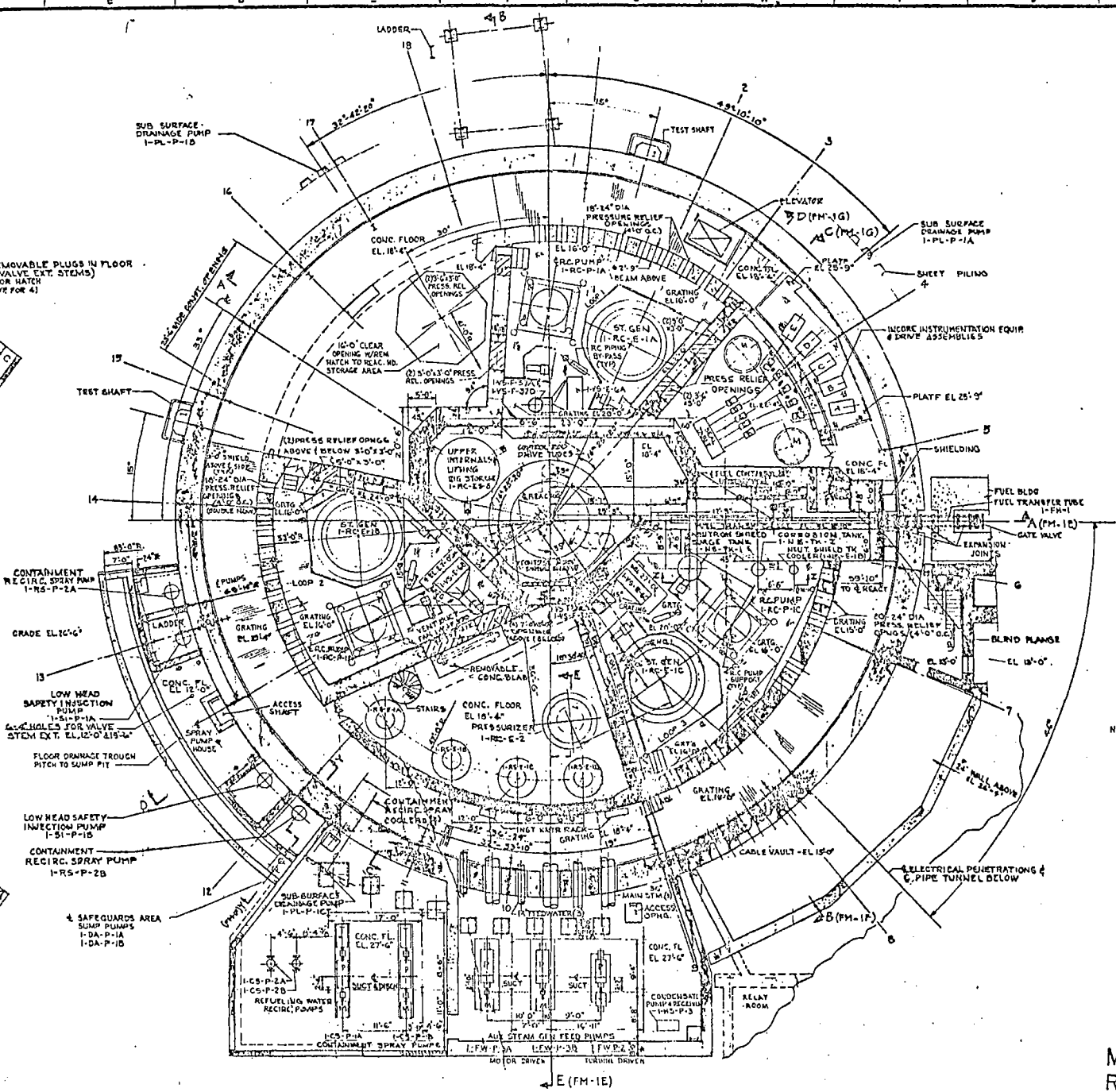
11448-FM-18



DETACHED PLAN
SPRAY PUMP HOUSE
EL. 28'-6"



DETACHED PLAN
SPRAY PUMP HOUSE
EL. 19'-6"



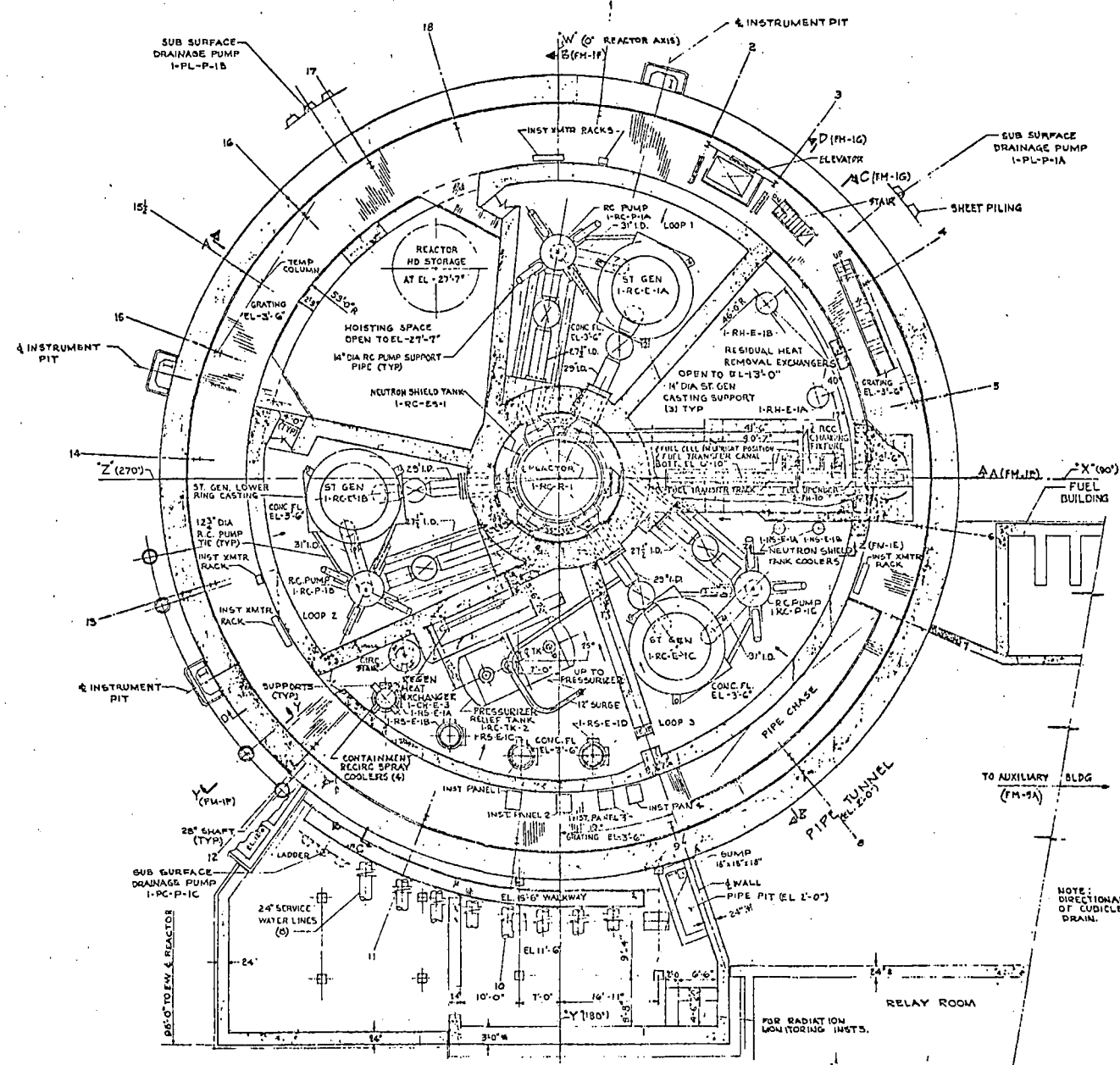
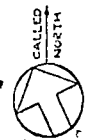
PLAN EL. 18'-4"

NOTE:
PRESSURE RELIEF OPENINGS IN "WALLS"
TO BE "SANDBAGGED" FOR RADIA-
TION PROTECTION, AND ARE INDICATED THUS

SCALE: 1/4" = 1'-0"
REFERENCE DWGS. & GENERAL NOTES - FM-1A.

MACHINE LOCATION
REACTOR CONTAINMENT
EL. 18'-4"
SURRY POWER STATION

11448-FM-1C

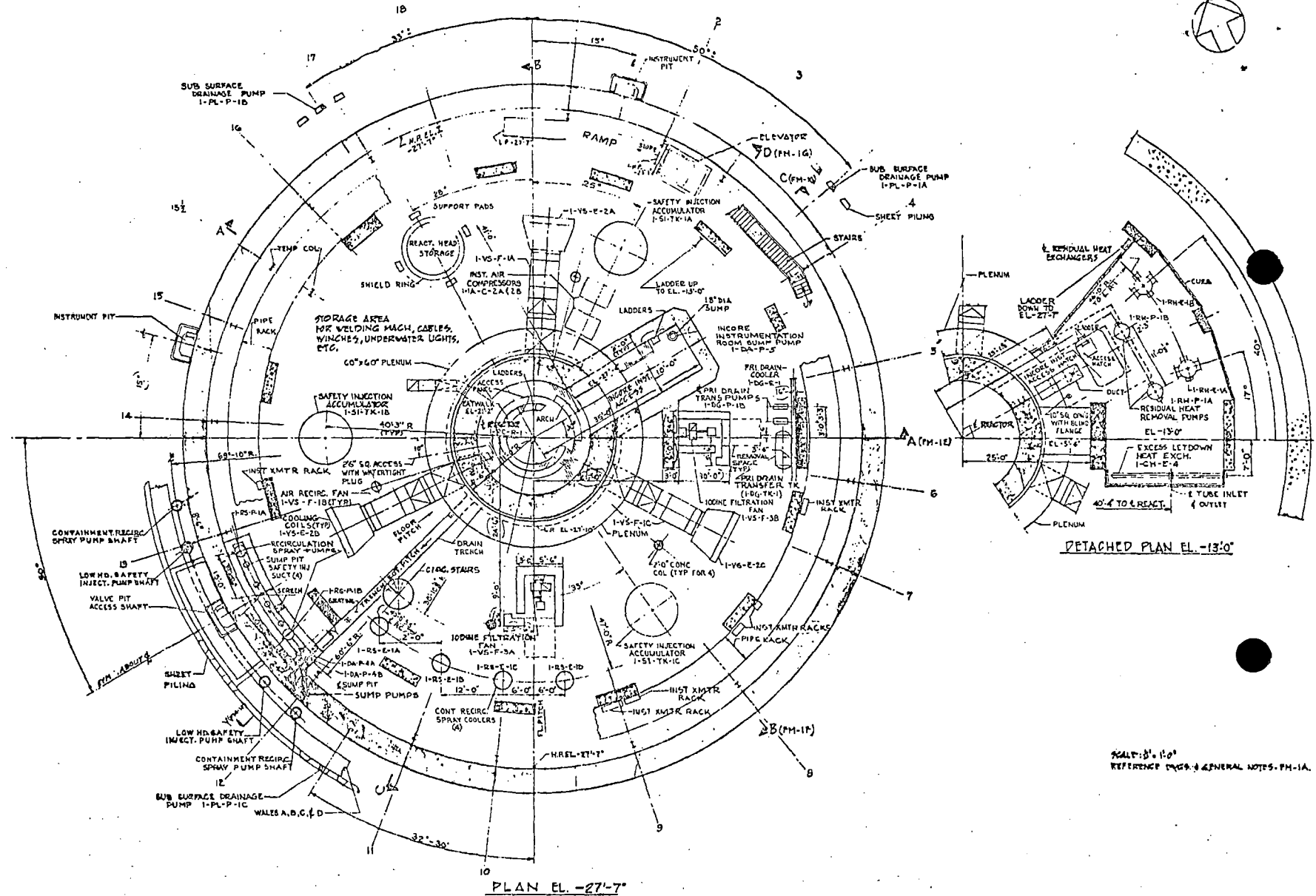


SCALE: 1/4" = 1'-0"
REFERENCE DWGS. & GENERAL NOTES - FM-1A.

NOTE: DIRECTIONAL ARROWS ON FLOOR OF CURBICLE INDICATE SLOPE TO DRAIN.

MACHINE LOCATION
REACTOR CONTAINMENT
EL. 3'-6"
SURRY POWER STATION

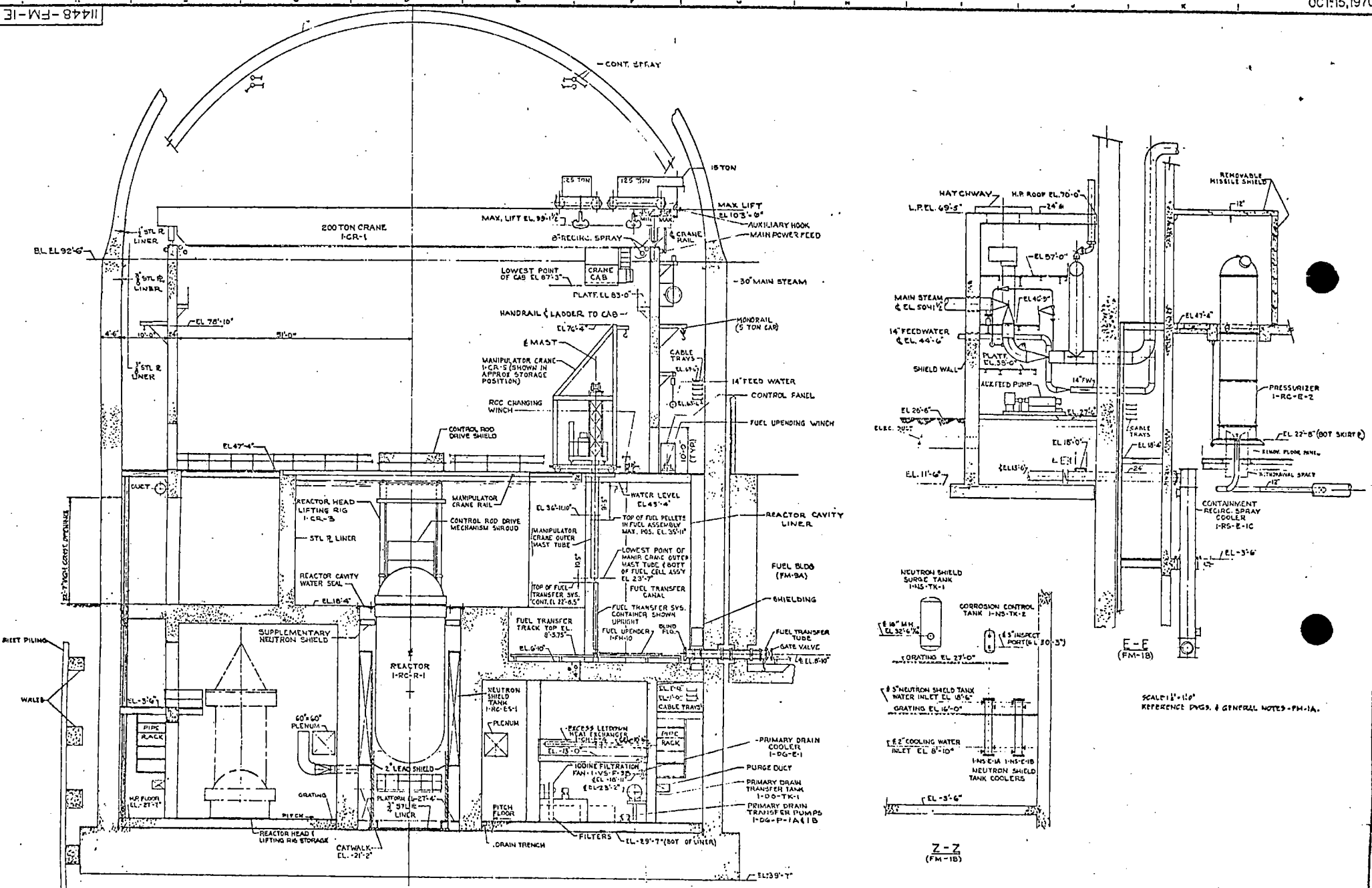
PLAN EL. -3'-6"



SCALE: 3" = 1'-0"
REFERENCE DRAWINGS: GENERAL NOTES, FM-1A.

MACHINE LOCATION
REACTOR CONTAINMENT
EL. 27'-7" SHEET 4
SURRY POWER STATION

11448-FM-1E

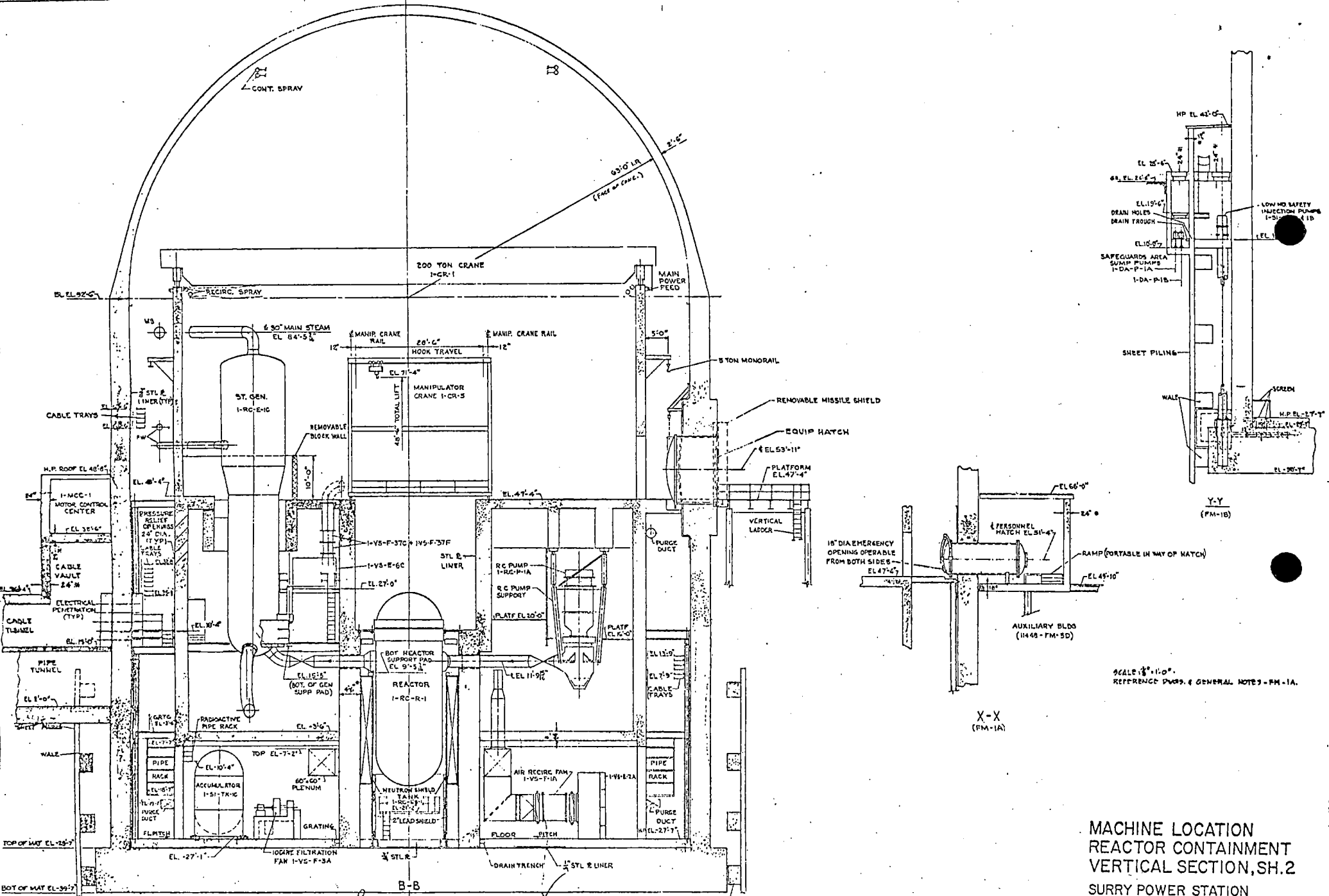


A-A
(FM-1A)

Z-Z
(FM-1B)

MACHINE LOCATION
REACTOR CONTAINMENT
VERTICAL SECTION, SH. I
SURRY POWER STATION

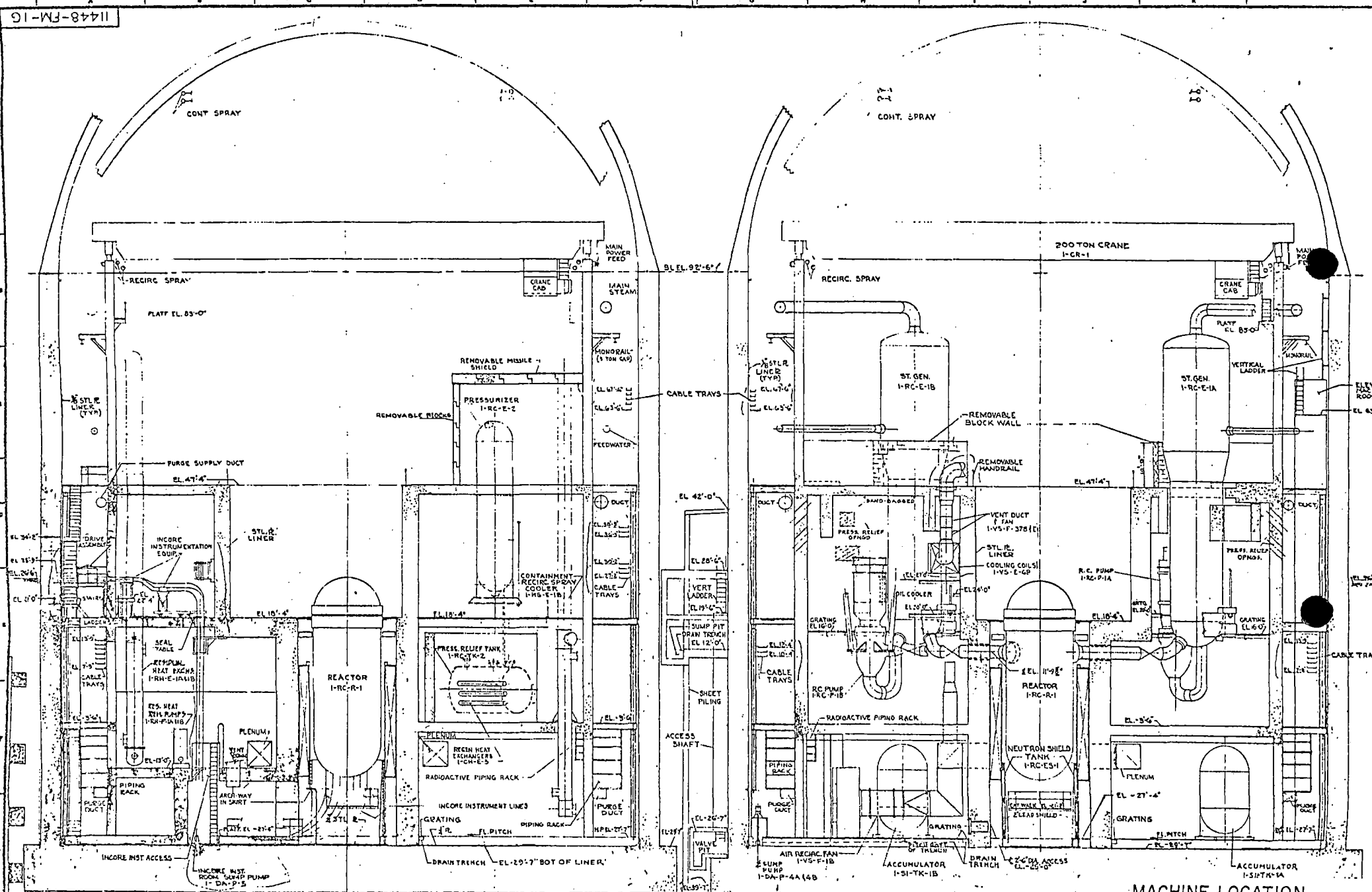
1148-FM-1F



SCALE 1/8" = 1'-0"
REFERENCE DWGS. & GENERAL NOTES - FM-1A.

MACHINE LOCATION
REACTOR CONTAINMENT
VERTICAL SECTION, SH. 2
SURRY POWER STATION

11448-FM-1G

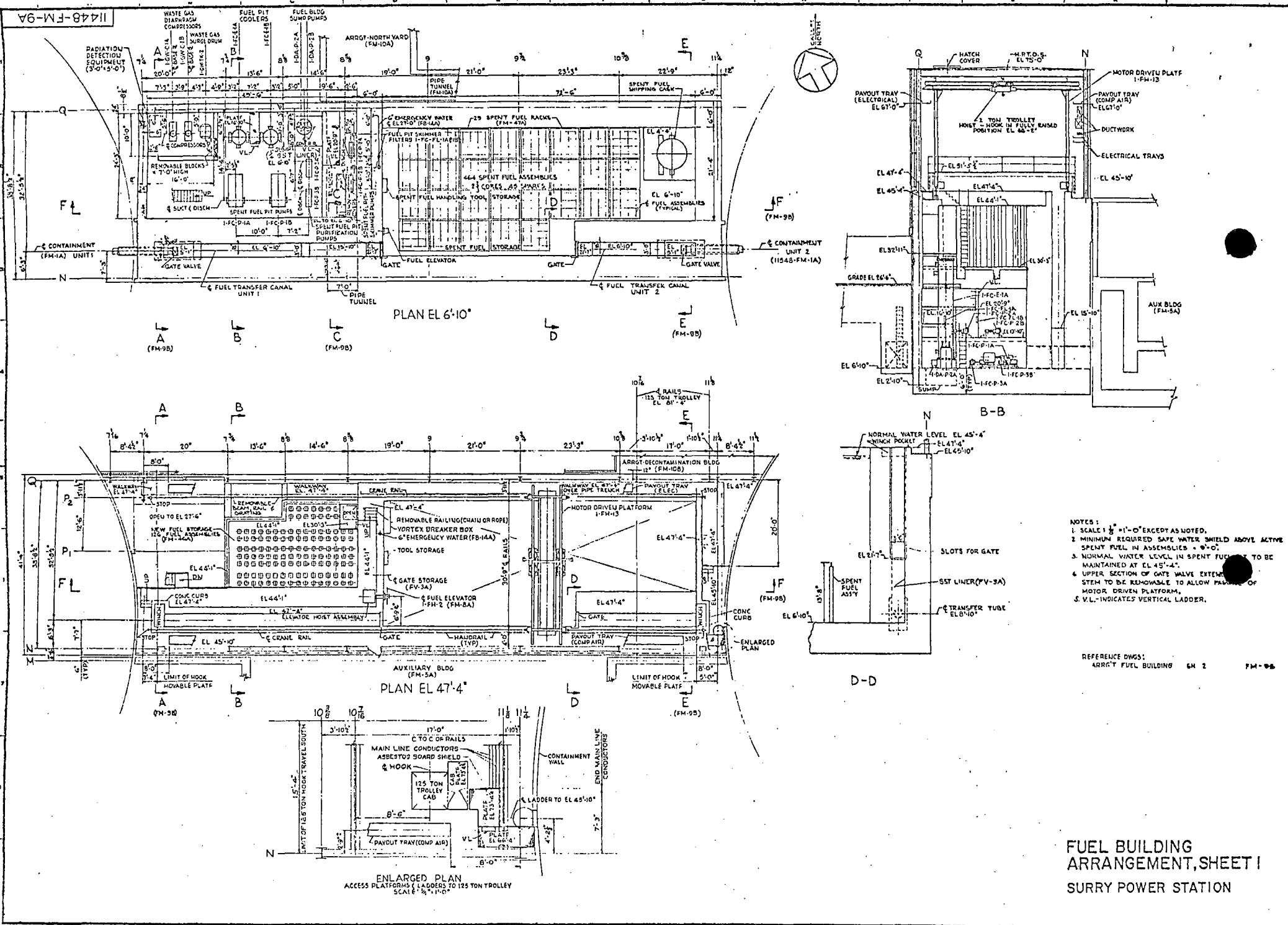


C-C
(FM-1A)

D-D
(FM-1B)

SCALE: 1/8" = 1'-0"
REFERENCE DWGS & GEN.
NOTES FM-1A

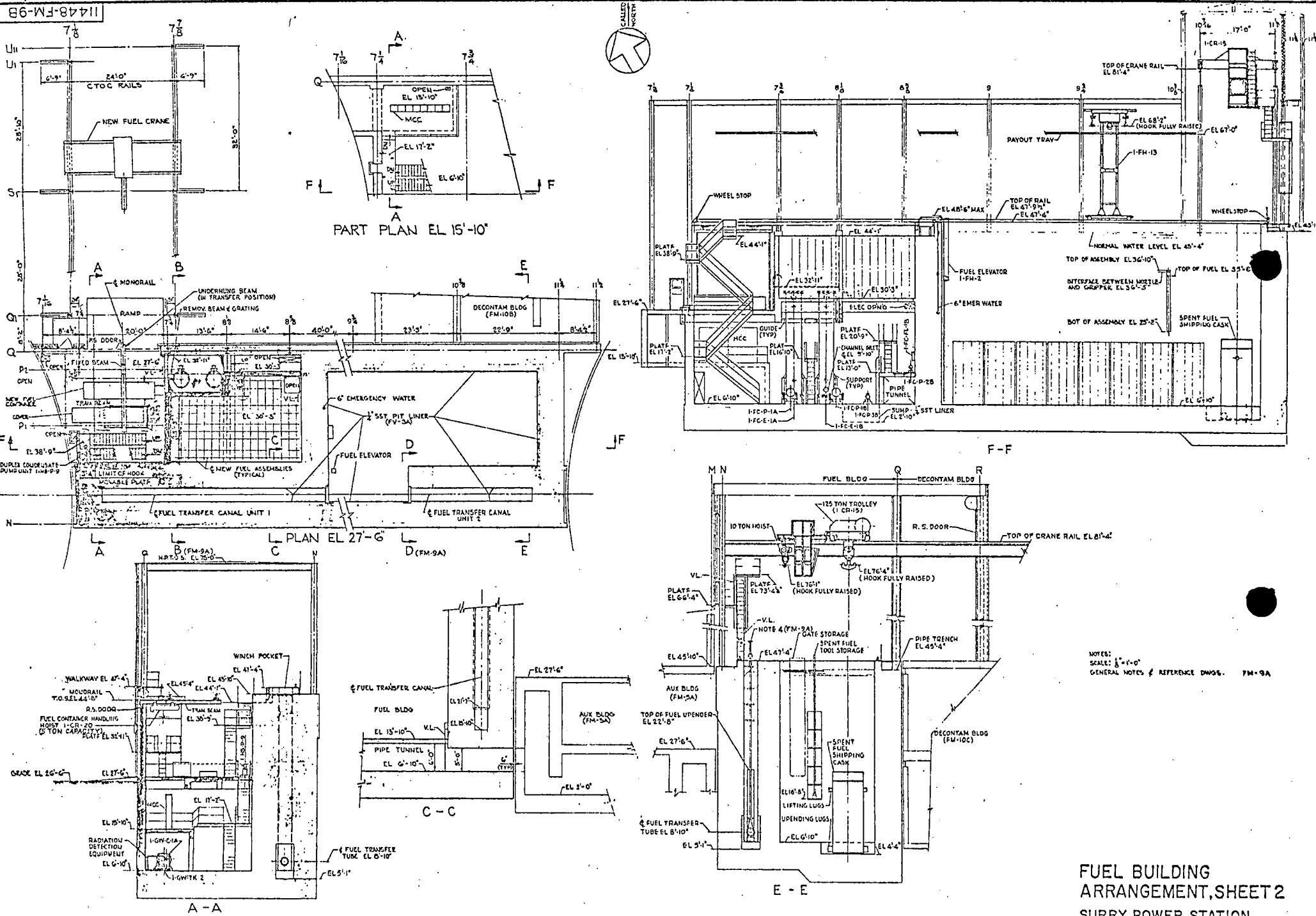
MACHINE LOCATION
REACTOR CONTAINMENT
VERTICAL SECTION-SH 3
SURRY POWER STATION



- NOTES:
1. SCALE 1/4" = 1'-0" EXCEPT AS NOTED.
 2. MINIMUM REQUIRED SAFE WATER SHIELD ABOVE ACTIVE SPENT FUEL IN ASSEMBLIES = 0'-0".
 3. NORMAL WATER LEVEL IN SPENT FUEL MUST BE MAINTAINED AT EL 45'-4".
 4. UPPER SECTION OF GATE VALVE EXTENDING STEAM TO BE REMOVABLE TO ALLOW PASSAGE OF MOTOR DRIVEN PLATFORM.
 5. V.L. INDICATES VERTICAL LADDER.

REFERENCE DWGS:
ARRCT FUEL BUILDING 6H 2 FM-9B

FUEL BUILDING
ARRANGEMENT SHEET I
SURRY POWER STATION

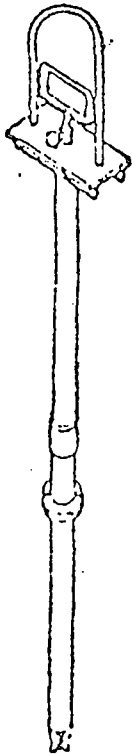


NOTES:
SCALE: 1/8" = 1'-0"
GENERAL NOTES & REFERENCE DWGS. FM-9A

FUEL BUILDING
ARRANGEMENT, SHEET 2
SURRY POWER STATION

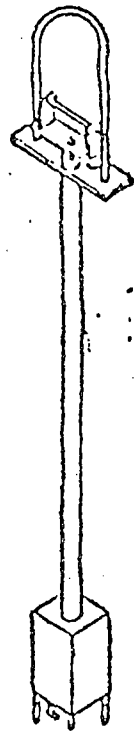
IRRADIATION SAMPLE
HANDLING TOOL.

42 FT LONG

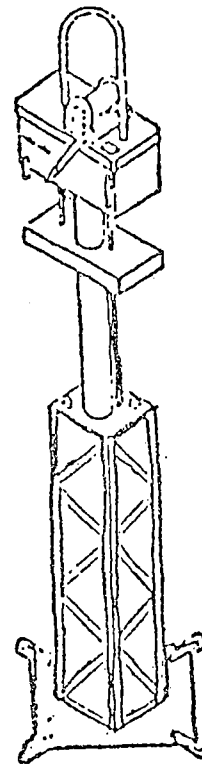


THIMBLE PLUG
HANDLING TOOL

29 FT LONG



BURNABLE POISON
ROD REMOVAL TOOL



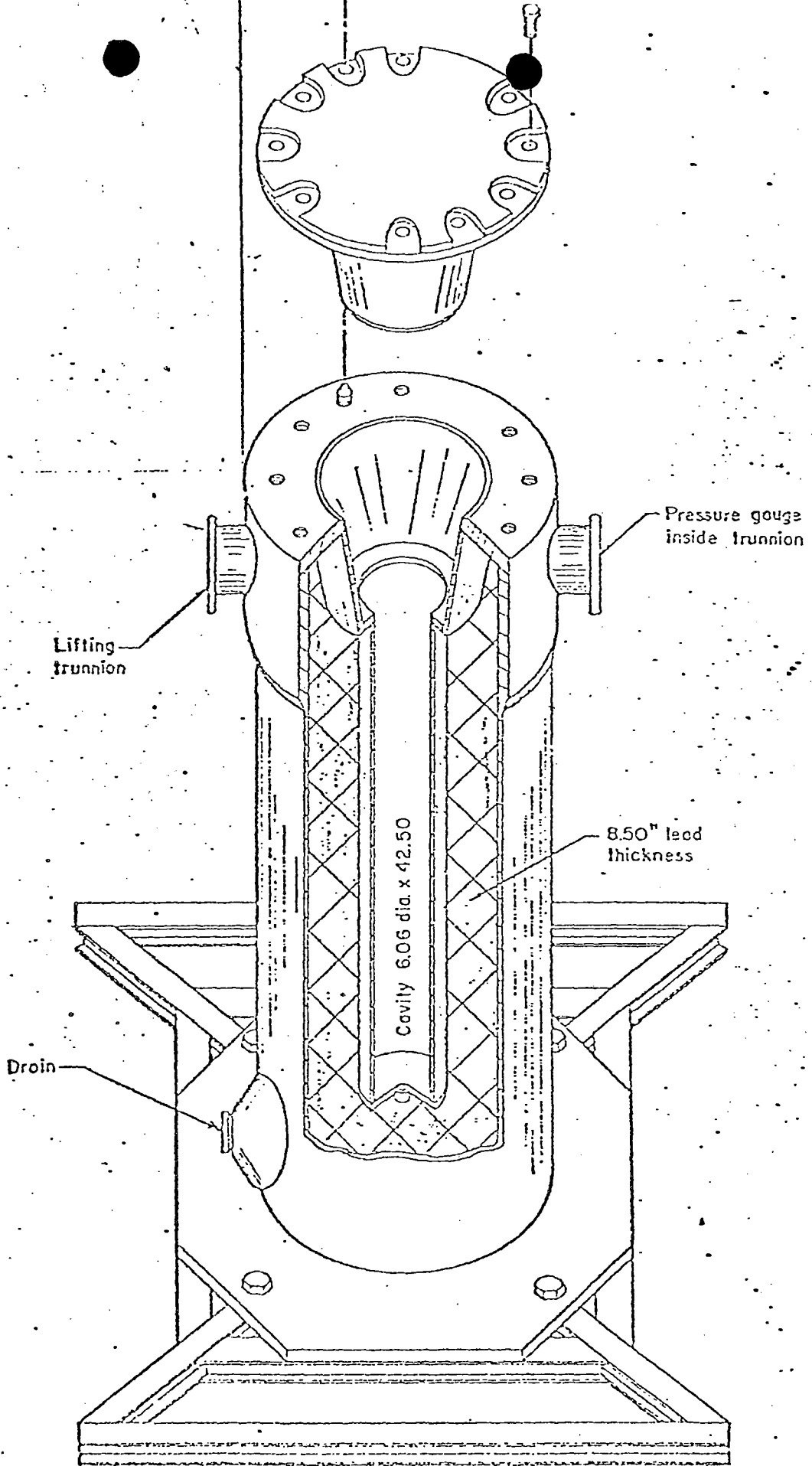
SPENT FUEL
ASSEMBLY
HANDLING TOOL

32 FT LONG



FIGURE 1

FUEL HANDLING TOOLS

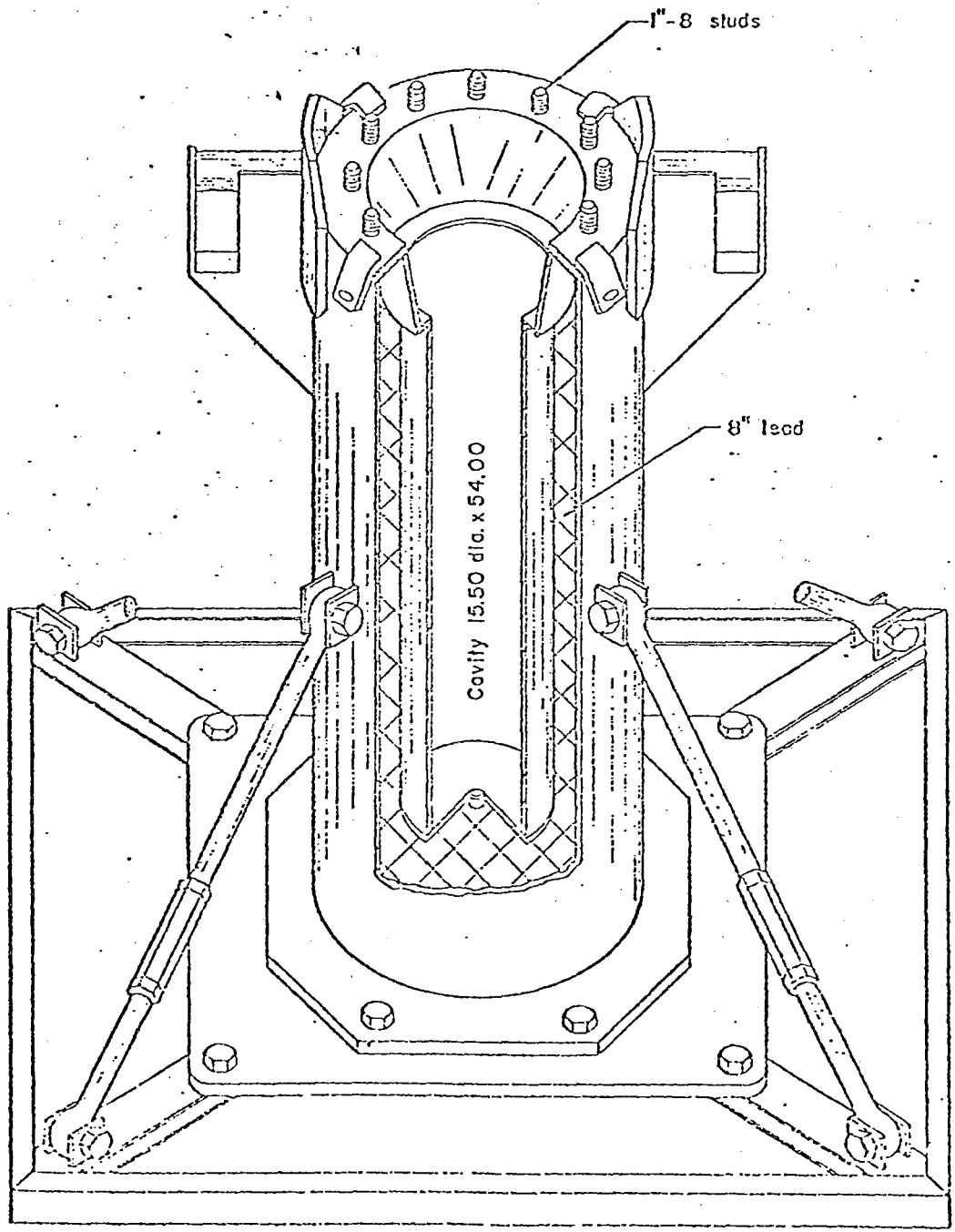


BATTELLE MEMORIAL INSTITUTE

BCL-4 Series

Radioactive Material Shipping Container

FIGURE 2



8-14

BATTELLE MEMORIAL INSTITUTE
 BMI-I Series
 Radioactive Material Shipping Container

FIGURE 3

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION

CORRECTIVE MAINTENANCE PROCEDURE
FOR
REMOVAL AND REINSTALLATION OF UPPER INTERNALS

INITIALS DATE

1.0 Purpose

1.1 The purpose of this procedure is to provide instructions for the removal and reinstallation of the upper internals.

2.0 References

- 2.1 W Drwg. 685J724 - Internals Lifting Rig - Ring Support.
- 2.2 W Drwg. 685J725 - Internals Lifting Rig - Spreader.
- 2.3 W Drwg. 685J726 - Internals Lifting Rig - Sling.
- 2.4 W Drwg. 685J727 - Internals Lifting Rig. - General Assy.

3.0 Initial Conditions

- 3.1 Reactor shall be in cold shutdown condition.
- 3.2 RCC element drive shafts unlatched.
- 3.3 Initiate a Maintenance Report.
- 3.4 Initiate a Radiation Work Permit.
- 3.5 The lifting rig has been cleaned and inspected.
- 3.6 Polar crane certification is valid.
- 3.7 Load cell certification is valid.
- 3.8 Notify QA Department.
- 3.9 Meet the requirements of Attachment 1, Part I.

4.0 Precautions

NOTE:-- A charged fire extinguisher must be at the scene of any welding, burning, or open flame heating operations. The Supervisor of the task should use his discretion and assign an additional attendant termed " a firewatch" if the above ignition sources are to be employed in or in close proximity to areas vital to plant and public safety.

4.0 Precautions (continued)

- 4.1 Comply with VEPCO Accident Prevention Manual.
- 4.2 Tools & equipment used must be kept clean.
- 4.3 Radiation levels at surface of water in refueling cavity must be continuously monitored.
- 4.4 The support ring pin brackets must be bolted in the lower set of holes.
- 4.5 Care must be exercised not to damage the load cell.

5.0 Instructions

- 5.1 Removal of upper internals.
 - 5.1.1 Install Measuring Device on manipulator crane bridge railing.
 - 5.1.2 Marchmark mounting device on manipulator crane bridge railing.
 - 5.1.3 Move manipulator crane over reactor vessel and mark exact bridge location on selsyn hammer _____ and pointer _____ or mark as appropriate on crane track.
 - 5.1.4 Lower measuring tape until plumb bob rests on upper internals package.
 - 5.1.5 Q.A. Hold - Record tape measure reading _____ Ft. _____ In.
 - 5.1.6 Return tape measure to full up position.
 - 5.1.7 Move manipulator crane away from reactor vessel.
 - 5.1.8 Remove measuring device from manipulator crane bridge railing.
 - 5.1.9 Connect the upper portion of the sling assembly, which includes the load cell, to the main crane hook of the polar crane by inserting the top pin through the sling assembly side plates and the hole provided in the hook.

(QA)

INITIALS DATE

5.0 Continued

5.1.10 Lower the upper portion of the sling over the rig, placing the lower load cell adaptor between the two lugs on the rig. Insert the connecting pin by use of the pull rod assembly which is attached to one of the top lugs. When the pin is properly positioned, tighten the lock nut.

5.1.11 Raise the rig carefully until it clears the upper internals storage stand, then proceed to the reactor vessel. Ensure that the path from the storage stand to the reactor vessel is clear.

5.1.12 Lower the rig over the reactor vessel guide studs until each of the lower tube assemblies are resting flush with the upper internals support plate and support ring pin brackets are properly positioned over the reactor vessel alignment pins.

5.1.13 Disconnect the upper portion of the sling assembly from the rig by removing the connecting pin with the aid of the pull rod assembly.

NOTE: The thread engagement of the torque tube assembly should be ~ 3". Both of the following threading operations should be done with care as the protective ring rods and torque tube assemblies are spring loaded.

5.1.14 Lower the mechanism handling tool over the protective ring connection rod, then disconnect the ring by rotating the tool in the counterclockwise direction until the rod is disengaged from the ring.

5.1.15 Raise the tool until it clears the protective ring rod, then lower the tool over the torque tube assembly. With a clockwise rotation of the tool, thread the torque tube assembly into the internals until a firm fit is obtained.

POS. 1 _____
POS. 2 _____
POS. 3 _____

POS. 1 _____
POS. 2 _____
POS. 3 _____

NITIALS DATE

5.0 Continued

5.1.16 When the preceding steps have been completed for each of three locations, install the upper portion of the sling assembly by placing the lower load cell adaptor between the top lugs on the rig and inserting the connecting pins. Tighten the lock nut on the pull rod assembly when the connecting pin has been properly positioned.

5.1.17 NOTE: The indicated load should not exceed the combined weight of the support structure and lifting device by more than 10% or a total of 104,000 lbs. During the removal and transporting of the internals, monitor the load cell at all times for a sudden load increase which would indicate an interference. If this occurs, cease operations, determine the cause then remedy before proceeding.

Slowly raise the internals from the reactor vessel until the guide stud brackets on the rig support ring are approximately twelve inches above the guide studs.

Record total load indicated on load cell _____.

5.1.18 Proceed with the internals to the upper internals storage stand. When the proper orientation of the rig with the stand guide studs is obtained, lower the internals onto the stand ensuring that they seat properly.

5.1.19 Disconnect the upper portion of the sling assembly by removing the connection pin with the pull rod assembly.

Job Completed By _____

Date _____

INITIALS DATE

5.2 Installation of Upper Internals

5.2.1 Connect the upper portion of the sling assembly, which includes the load cell, to the main crane hook by inserting the top in through the sling assembly side plates and the hole provided in the hook.

5.2.2 Position the upper portion of the lifting sling over the upper internals lifting rig. Attach to the lifting rig by inserting the connecting pin, using the pull rod assembly and tightening the lock nut.

5.2.3 Slowly raise the internals from the upper internals storage stand. Proceed with the internals to the reactor vessel. Ensure that the path from the storage stand to the reactor vessel is clear.

NOTE: During the transporting and installation of the internals, monitor the load cell at all times for a sudden load increase which would indicate an interference. If this occurs, cease operations, determine the cause then remedy before proceeding.

The indicated load should not exceed the combined weight of the support structure and lifting device by more than 10% or a total of 104,000 lbs.

5.2.4 Slowly lower the upper internals with lifting rig assembly over the guide studs and into the reactor vessel until the internals are seated.

5.2.5 Disconnect the upper portion of the sling assembly from the rig by removing the connecting pin with the aid of the pull rod assembly.

5.2.6 Lower the mechanism handling tool over the torque tube assembly. With a counterclockwise rotation of the tool, unthread the torque tube assembly from the tapped hole in the upper internals.

POS. 1 _____
POS. 2 _____
POS. 3 _____

INITIALS DATE

5.2 Continued

OS. 1 _____

OS. 2 _____

OS. 3 _____

5.2.7 Lower the mechanism handling tool over the protective ring connection rod, then connect the ring by rotating the tool in the clockwise direction until the rod is connected to the ring.

5.2.8 Attach the upper portion of the lifting sling to the lifting rig by inserting the connecting pin and tightening the lock nut.

5.2.9 Slowly raise the lifting rig from the reactor vessel.

NOTE: Observe the protective ring is being lifted. Observe the upper internals remain in position indicating complete disconnection. Verify with the load cell.

5.2.10 Raise the lifting rig clear of the guide studs and transport the lifting rig to the upper internals storage stand.

5.2.11 Disconnect the upper portion of the lifting sling by loosening the lock nut and connecting pin.

5.2.12 Transport the upper portion of the sling and the load cell to storage area.

5.2.13 Install measuring device within matchmarks on manipulator crane bridge railing.

5.2.14 Move manipulator crane to selsyn readings as noted in Step 5.1.3.

5.2.15 Lower measuring tape until plumb bob rests on upper internals package.

5.2.16 Q.A. HOLD - Record tape measure reading _____ Ft. _____ In.

(Q.A.)

This reading should be within $\pm \frac{1}{4}$ in. of the reading recorded in Step 5.1.5.

INITIALS/DATE

5.0 Instructions (continued)

_____/_____
_____/_____

5.2.17 Return tape to full position.

5.2.18 Remove measuring device from manipulator crane
bridge railing.

6.0 Post Maintenance Checkout

_____/_____

6.1 Clear Maintenance Report.

_____/_____

6.2 Clear Radiation Work Permit.

_____/_____

6.3 Meet the requirements of Attachment I, Part II.

Job Completed By: _____

Date: _____

APPROVED BY: *J. H. Brown*
Chairman, Station Nuclear Safety and
Operating Committee

DATE: *8/23/78*

RECOMMEND APPROVAL: *A. Long*

DATE: *8/23/78*

REVIEWED BY: *S. L. [Signature]*
QUALITY CONTROL ENGINEER

DATE: *8-23-78*

LIST OF EFFECTIVE REVISIONS

| SECTION | DATE |
|--------------|-------------|
| 1.0 | 12-15-76 |
| 2.0 | 12-15-76 |
| 3.0 | 12-15-76 |
| 4.0 | 12-15-76 |
| 5.0 | AUG 23 1978 |
| 6.0 | 12-15-76 |
| ATTACHMENT 1 | 05-19-77 |

ZONE I - Reactor Cavity (when Reactor Vessel is open or head is being removed).

PART I - Before starting and during the course of the job.

INITIALS

- A. Suitable trash containers, such as poly bags or metal containers are at the job site.
- B. Combustible materials have been removed from the area if burning or welding operations are to be performed.
- C. Clean and dirty areas for storage of materials have been set up.
- D. Accountability records (logs) for personnel and materials have been set up.
- E. The surrounding equipment is adequately protected.
- F. Installation of plugs, caps or tethering of tools shall be used to prevent foreign material from entering the system.
- G. Large items that will not be reused shall be removed or temporary storage provided.
- H. The housekeeping requirements shall be periodically checked by either First Line Supervision or Q.A..
- I. Provisions have been made for the draining or collection of Radioactive Fluids.

PART II - After the completion of the job.

INITIALS

- A. Insure removal of all material from the system prior to closing out the system.
- B. All unused materials have been removed.
- C. Equipment and tools have been removed. Use log to insure accountability of all tools and equipment.
- D. The trash collection containers have been removed.
- E. The Radioactive Fluid collection containers or draining equipment have been removed.
- F. The final job site clean up and/or decon has been performed.

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION

CORRECTIVE MAINTENANCE PROCEDURE
FOR
INSTALLATION AND REMOVAL OF HEAD LIFTING RIG

INITIALS DATE

1.0 Purpose

1.1 The purpose of this procedure is to provide instructions for the installation and removal of the head lifting rig sling.

2.0 References

- 2.1 W Drwg 685-J-548 - Head Lifting Rig - Sling.
- 2.2 W Drwg 685-J-545 - Head Lifting Rig - General Assy.

3.0 Initial Conditions

- 3.1 Reactor is at cold shutdown condition.
- 3.2 Lifting rig has been cleaned and inspected.
- 3.3 Initiate a Maintenance Report.
- 3.4 Initiate a Radiation Work Permit.
- 3.5 Notify Q.A. Department.
- 3.6 Meet the requirements of Attachment 1, Part I.

4.0 Precautions

NOTE: A charged fire extinguisher must be at the scene of any welding, burning or open flame heating operations. The Supervisor of the task should use his discretion and assign an additional attendant termed "a firewatch" if the above ignition sources are to be employed in or in close proximity to areas vital to plant or public safety.

- 4.1 Comply with VEPCO Accident Prevention Manual.

5.0 Instructions

5.1 Installation of head lifting sling.

5.1.1 Verify that 1½" jaw and jaw turnbuckles are attached to the legs of the tripod.

5.1.2 Attach the main hook of the polar crane to the tripod utilizing the load cell attachments.

5.1.3 Lift the tripod assembly and position it over the reactor vessel centerline using the polar crane.

5.1.4 Remove the cotter keys, jam nuts and pins from the tripod legs.

5.1.5 By raising/lowering with the polar crane, align the tripod legs with the head lifting lugs.

5.1.6 Insert pins, jam nuts, and cotter keys.

5.1.7 Release turnbuckles from tripod legs.

Job Completed BY: _____

Date: _____

5.2 Removal of the head lifting rig sling.

5.2.1 Attach 1½" jaw and jaw turnbuckles to the legs of the tripod with lockwell pins.

5.2.2 Remove cotter keys and jamnuts from the pins at the bottom of the tripod.

5.2.3 Jog the polar crane upward to take the slack out of the tripod and drive the pins out. At this point it may be necessary to adjust the turnbuckles to put outward pressure on the tripod legs in order to take the load off the pins and/or raise or lower the plant crane by jogging.

5.2.4 When the pins are removed operate the turnbuckles in conjunction with raising the tripod with the polar crane in order to clear the clevises from the support lug.

INITIAL DATE

5.0 Instructions (continued)

5.2.5 Move tripod to storage position.

5.2.6 Reinstall pins, jawnuts, and cotter keys on the tripod legs.

6.0 Post Maintenance Checkout

6.1 Clear Maintenance Report.

6.2 Clear Radiation Work Permit.

6.3 Meet the requirements of Attachment 1, Part II.

Job Completed By: _____

Date: _____

APPROVED BY: T.L. Bawa
Chairman, Station Nuclear Safety and
Operating Committee

DATE: 11/16/77

RECOMMEND APPROVAL: A. Payne

DATE: 11/16/77

REVIEWED BY: S. J. Remy
QUALITY ASSURANCE ENGINEER

DATE: 11/16/77

LIST OF EFFECTIVE REVISIONS

| SECTION | DATE |
|--------------|----------|
| 1.0 | 12-15-76 |
| 2.0 | 12-15-76 |
| 3.0 | 12-15-76 |
| 4.0 | 12-15-76 |
| 5.0 | 12-15-76 |
| 6.0 | 11-16-77 |
| ATTACHMENT 1 | 05-19-77 |

ZONE III - Fuel Building, Containment, Safety Related Work Areas.

PART I - Before starting and during the course of the job.

INITIALS

- _____ A. Suitable trash containers, such as poly bags or metal containers are at the job site.
- _____ B. Combustible materials have been removed from the area if burning or welding operations are to be performed.
- _____ C. Clean and dirty areas for storage of materials have been set up especially when working on Safety Related Systems.
- _____ D. Clear exterior surface of components free of foreign debris, especially Boric Acid Residue.
- _____ E. Establish accountability log for control of tools and equipment entering the clean area if a possibility exists that this material might inadvertently enter any system.
- _____ F. The surrounding equipment is adequately protected.
- _____ G. Installation of plugs, caps, or tethering of tools shall be used to prevent foreign material from entering systems.
- _____ H. The housekeeping requirements shall be periodically checked by either First Line Supervision or Q.A.

PART II - After the completion of the job.

INITIALS

- _____ A. Insure removal of all material from the system (tank, pipe, etc.) prior to closing out the system.
- _____ B. All unused materials have been removed.
- _____ C. Equipment and tools have been removed.
- _____ D. Insure accountability of all tools and equipment upon their removal by use of a log designated for that purpose.
- _____ E. The trash collection containers have been removed.
- _____ F. The final job site clean up and/or decon has been performed.

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION
UNIT NOS. 1 & 2

MOVEMENT OF TRANSFER CANAL DOOR

1.0 Purpose

To provide the necessary instructions for the movement of the Transfer Canal door in the Spent Fuel Pit.

2.0 Initial Conditions

2.1 Updated Spent Fuel Pit Map available.

3.0 Precautions and Limitations

3.1 T.S. - 3.10.A.10

A.....heavy loads exceeding 110 percent of the weight of a fuel assembly (not including fuel handling tool) shall not be moved over spent fuel,.....

INITIALS.

4.0 Instructions

_____ 4.1 Initial Conditions satisfied.

_____ 4.2 Precautions and limitations noted and satisfied.

_____ 4.3 Obtain an updated map of the Spent Fuel Pit.

_____ 4.4 Lay out a route for the movement of the Transfer Canal door.

NOTE: Move spent fuel within the SFP as necessary.

_____ 4.5 Using properly sized rigging equipment, raise & lower door a few inches to test hoist brakes.

_____ 4.6 Carefully move the Transfer Canal door along the predetermined path.

Completed By: _____

Date: _____

APPROVED BY: J. T. BannanChairman, Station Nuclear Safety and
Operating CommitteeDATE: 7/20/78RECOMMEND APPROVAL: J. W. JohnsonDATE: 7-18-78LIST OF EFFECTIVE REVISIONS

| SECTION | DATE |
|---------|---------|
| 1.0 | 7-20-78 |
| 2.0 | 7-20-78 |
| 3.0 | 7-20-78 |
| 4.0 | 7-20-78 |

REFERENCES

TECH SPECS