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PERRY NUCLEAR POWER PLANT UNIT 1

Application for License
For
Storage Only of Unirradiated
Reactor Fuel and Associated Radioactive Material

The Cleveland Electric Illuminating Company (CEI) for itself and on behalf of Duquesne Light Company, Ohio Edison Company, Pennsylvania Power Company, and the Toledo Edison Company, pursuant to Title 10, Code of Federal Regulations Parts 30, 40 and 70, hereby applies for a license to permit the receipt, possession, inspection, and storage of special nuclear material in the form of unirradiated nuclear fuel bundles, for the packaging of such fuel for delivery to a carrier, and for the receipt, possession, inspection and use of in-core detectors, operational sources and irradiated neutron detector storage cask as herein described for the Perry Nuclear Power Plant - Unit 1. The term of the license is requested to begin July 1, 1983 for the in-core detectors, operational source, fuel bundles and the irradiated neutron detector storage cask. It is requested that the license remain in effect until such time as it may be supplanted by an operating license.

FEE EXEMPT

1.0 GENERAL INFORMATION

a. Name of Applicants / Address of Applicants

Name of Applicants	Address of Applicants
Duquesne Light Company	435 Sixth Avenue Pittsburgh, Pennsylvania 15219
Ohio Edison Company	76 S. Main Street Akron, Ohio 43308
Pennsylvania Power Company	One East Washington Street New Castle, Pennsylvania 16103
The Cleveland Electric Illuminating Company	55 Public Square Cleveland, Ohio 44101
The Toledo Edison Company	300 Madison Avenue Toledo, Ohio 43652

b. Organization and Management of Applicants

Applicants are five corporations, Duquesne Light, Ohio Edison, Pennsylvania Power, Cleveland Electric Illuminating, and Toledo Edison organized and existing under the laws of the states in which they reside. Duquesne Light's principal office is located in Pittsburgh, Pennsylvania, Ohio Edison's principal office is located in Akron, Ohio, Pennsylanvia Power's principal office is located in New Castle, Pennsylvania, Cleveland Electric Illuminating's principal office is located in Cleveland, Ohio and Toledo Edison's principal office is located in Toledo, Ohio at the addresses stated previously.

Applicants are not owned, controlled or dominated by any alien, any foreign corporation, or any foreign government.

All of the applicants' principal officers and directors are citizens of the United States. Their names and addresses are as follows:

DUQUESNE LIGHT COMPANY

DIRECTORS

Name	Address
Henry G. Allyn, Jr.	Pittsburgh, Pennsylvania
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Charles M. Atkinson	Pittsburgh, Pennsylvania
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1.1 Reactor and Fuel

1.1.1 Identification of Reactor, Geographic Location, Docket

This application is submitted for Unit 1 of the Perry Nuclear Power Plant. The Perry Nuclear Power Plant uses a BWR-6 boiling water reactor (238 inch vessel) designed and supplied by the General Electric Company. Unit 1 will have a rated core thermal power level of 3579 MWT.

The plant is located in Lake County in northeast Ohio, along the southeastern shoreline of Lake Erie. It is located approximately 21 miles southwest of Ashtabula, Ohio, and 35 miles northeast of Cleveland, Ohio.

The Construction Permit was docketed in June, 1973 on NRC Docket Number 50-440. Construction Permit Number CPPR-148 was issued in May, 1977.

1.1.2 Fuel Assembly Description

Each fuel assembly consists of a fuel bundle and the channel which surrounds it (See Figure 1). The fuel bundle may or may not be channeled while in the storage racks.

The fuel channel enclosing the fuel bundle is fabricated from zircaloy-4. The channel is open at the bottom and makes a sliding seal fit against the finger springs that are attached to the lower tie plate. Two diagonally opposed gusset tabs are welded to the top of the channel. One of these tabs is fitted with a channel fastener assembly which attaches to a threaded hole on the upper tie plate casting to support the weight of the channel (See Figure 2).

The fuel bundle consists of sixty-two (62) fueled rods and two (2) water rods (See Figure 3). The rods are spaced and supported in a square 8x8 array by the upper and lower tie plates and by seven (7) fuel spacer grids of an egg crate design. Descriptions and dimensional data on the fuel bundle and lattice are as follows:

Fuel pellet diameter, in.	0.410
Cladding inner diameter, in.	0.419
Cladding outer diameter, in.	0.483
Cladding thickness, in.	0.032
Pellet cladding diametrical gap, in.	0.009
Rod to rod spacing, in.	0.153
Rod to channel spacing, in.	0.140
Rod to rod pitch, in.	0.636
Water rod outer diameter, in.	0.591
Water rod inner diameter, in.	0.531
Water rod thickness, in.	0.030

The cladding and water rod material are zircaloy-2. The fuel spacers are zircaloy-4 with inconel-X springs. Both upper and lower tie plates are fabricated from type 304 stainless steel castings. The UO_2 fuel pellet density is specified 94.16% of theoretical.

The total weight of an assembly is approximately 316 kilograms. The weight of a fuel bundle is approximately 272 kilograms.

A complete description of the fuel assemblies is contained in subsection 4.2.2 of the Perry Final Safety Analysis Report (FSAR) which is on file with the Commission.

1.1.3 Enrichment

There are three bundle types in the initial core of Perry Unit 1. They are composed of (1) natural enriched (0.711%) U-235, (2) low enriched (1.761% average) U-235, and (3) medium enriched (2.191% average) U-235, respectively.

The highest enrichments contained in each bundle type are (1) natural enriched bundle - 0.711% U-235, (2) low enriched bundle - 2.20% U-235, and (3) medium enriched bundle - 3.00% U-235. There is no U-233, Pu, depleted uranium, or thorium in the assemblies. The average initial core enrichment is 1.876% U-235.

The nominal fuel data for the 748 Perry Unit 1 initial core fuel bundles is as follows:

Number of Bundles	Enrichment (W/o U-235)	Uranium per Bundle (Kg)	U-235 per Bundle (Kg)	UO_2 per Bundle (Kg)
92	0.711	183.04	1.301	207.64
232	1.761	182.81	3.219	207.73
424	2.191	182.52	3.999	207.05

1.1.4 Total Fissionable Material

A license is requested for a maximum of 758 fuel bundles with a total contained U-235 content not to exceed 2602 Kg. The total weight of contained Uranium will not exceed 138,500 Kg. These totals consist of the 748 initial core fuel bundles plus an allowance for 10 spare bundles with peak enrichments no greater than 3.00% U-235.

There will be a total of 748 fuel bundles in the initial core. This total is composed of 92 natural enriched bundles, 232 low enriched bundles and 424 medium enriched bundles.

Natural uranium is contained in the 92 natural enriched bundles and also in the top 6" and bottom 6" of each rod in the low and medium enriched bundles. The total initial core weight of U-235 is approximately 2562 Kg. The total initial core weight of UO_2 is approximately 136,640 Kg.

1.2 Storage Conditions

The control and accounting for special nuclear materials is in accordance with ANSI N15.8-1974, "Nuclear Material Control Systems for Nuclear Power Plants."

1.2.1 Storage Locations

Fuel bundles or assemblies will be stored in the spent fuel storage racks in the Reactor Building, floor elevation 689'-6", or the spent fuel storage racks or new fuel vaults in the Fuel Handling Building, floor elevation 620-6". Descriptions and drawings of these areas are provided in the FSAR as referenced in Section 1.2.4. The relative locations of these areas are as shown in Figures 4 and 5.

Truckloads of fuel, consisting of 15 containers of two (2) bundles each, will be temporarily stored in the Fuel Handling Building during receipt, inspection and channeling of the bundles. The bundles will be stored in the metal shipping containers during this activity. If delays due to malfunctions of equipment or test or construction activities should occur, a maximum of 30 containers, or 60 bundles, could be stored in this area. If equipment malfunctions preclude the unloading of fuel, one trailer could be parked in the Fuel Handling Building. The 15 containers on the trailer would be included in the 30 container maximum note above. Criticality control is discussed in Sections 2.2.2 and 2.2.3.

Both the Fuel Handling Building and the Containment Building are secure, limited access areas controlled in accordance with the interim security plan.

1.2.2 Adjacent Area Activities

Consistent with the administrative controls and restrictions provided in the paragraphs below, no operations other than fuel and component inspection, handling, and storage will be performed in the "fuel storage and handling" area. Crane operations will be restricted such that no more than one channeled fuel assembly or equivalent weight per crane will be allowed over storage areas containing fuel. Loaded fuel shipping containers or properly designed overload test weights may be handled in these areas provided they are at no time suspended over the fuel assemblies in storage. Any non-fuel related activities which must be conducted in the fuel handling area will be reviewed and approved by the General Supervising Engineer, Technical Section, or his designee.

Any non-fuel activities in the "fuel storage and handling area", on elevation 620'-6" of the Fuel Handling Building will be restricted as follows during fuel handling:

a) No painting, grinding, sandblasting, or similar activites are allowed.

b) No overhead work is allowed.

c) No crane operations other than those required for fuel handling and inspection are allowed.

d) No construction or test activities which may adversely affect fire protection in the fuel handling area are allowed.

e) No food or beverages shall be brought into or consumed by any person in the fuel handling area. No smoking or other use of tobacco products will be allowed.

When fuel handling activities are not in progress, selected activities, such as those above, may be performed provided the fuel is protected and the activities are reviewed and approved by the General Supervising Engineer, Technical Section, or his designee.

A rigorous program of surveying the adjacent areas for radioactive surface contamination and area-borne contamination will be carried out. A baseline survey of an area far removed will be carried out at the same time to allow correction for fallout, etc.

Activities in other areas of the Fuel Handling Building, Intermediate Building and Containment Buildings need not be restricted during any of these periods. Such activities include construction and testing associated with completion or maintenance of the plant.

If fuel is stored in the Containment Fuel Storage Racks, the above restrictions will also apply to the El. 689' operating deck in the Containment Building.

1.2.3 Fuel Shipping Containers

The fuel bundles are shipped in a steel container (182 7/8" x 20 5/8" x 11 1/4") encased in a wooden shipping crate (206 3/4" x 29 3/4" x 31"). One (1) steel container is contained in each wooden shipping crate. Two (2) fuel bundles are contained in each steel container. The container and crate are described in General Electric Company drawing numbers 731E674 and 829E209, respectively. They are licensed with the NRC under Certificate of Compliance 4986.

1.2.4 Fuel Storage and Handling

1.2.4.1 New Fuel Storage Vaults

The design of the building containing the new fuel storage vault (new fuel storage facility) conforms to the guidelines of Regulatory Guide 1.13 thus assuring that any deleterious effects on fuel storage (fuel rack) integrity due to natural phenomena such as earthquakes, tornadoes, hurricanes, missiles and floods will be precluded.

Each of the new fuel storage vaults contains storage space for a maximum of 180 fuel assemblies for a combined storage of 360 fuel assemblies. Each vault contains 18 sets of castings, each capable of holding up to ten (10) fuel assemblies. Each set of castings is made up of three tiers which are positioned by fixed box beams. This arrangement maintains the fuel assemblies in a vertical position supported at the lower tie plate. Additional restraints are provided to restrict lateral movement.

The new fuel storage racks are made from aluminum. Materials used for construction are specified in accordance with the applicable ASTM specifications. The material choice is based on a consideration of the susceptibility of various metal combinations to electrochemical reaction. When considering the susceptibility of metals to galvanic corrosion, aluminum and stainless steel are relatively close together insofar as their coupled potential is concerned. The use of stainless steel fasteners in aluminum to avoid detrimental galvanic corrosion is a recommended practice and has been used successfully for many years by the aluminum industry.

The rack is designed to withstand an impact energy of 4,000 ft.-lbs. while maintaining the safety design basis. This impact energy could be generated by the vertical free fall of a fuel assembly from a height of six feet.

The storage rack is designed to withstand a pull-up force of 4,000 pounds and a horizontal force of 1,000 pounds. The racks are designed with lead outs to prevent sticking. However, in the event of a stuck fuel assembly, the lifting bail will yield at a pull-up force less than 1,000 pounds.

The storage rack is designed to withstand horizontal combined loads up to 222,000 pounds.

The new fuel storage racks are categorized as Safety Class 2 and Seismic Category I.

The fuel storage rack is designed to handle non-irradiated, low emission radioactive fuel assemblies. The expected radiation levels are well below the design levels.

The fuel storage rack is designed using non-combustible materials. Plant procedures and inspections assure that combustible materials are restricted from this area. Fire prevention by elimination of combustible materials and fluids is regarded as the prudent approach rather than fire accomodation and the need for fire suppressant materials which could inhibit or negate criticality control assurances. Therefore, fire accommodation is not considered a problem.

Each new fuel storage vault is surrounded by a four inch reinforced concrete curb. This curb is covered by a gasketed checker plate, and a 3-hour fire rated cover and steel grating when not receiving or discharging new fuel.

The racks are designed and constructed in accordance with the Quality Assurance requirements of 10CFR50, Appendix B.

A complete description of the New Fuel Storage Vault including design criteria is contained in subsection 9.1.1 of the Perry FSAR.

1.2.4.2 Spent Fuel Pool Storage - Fuel Handling Building

The spent fuel storage racks in the fuel handling building contain a storage space sufficient for 4020 fuel assemblies and are designed to withstand all credible static and dynamic loadings to prevent damage to the structure of the racks, and therefore the contained fuel, and to minimize distortion of the racks arrangement. The fuel storage racks in the fuel handling building use a neutron absorber to maintain subcriticality in a close packed geometric array.

The racks are designed to protect the fuel assemblies from excessive physical damage under normal or abnormal conditions.

The racks are constructed in accordance with the Quality Assurance Requirements of 10CFR50, Appendix B.

The densified rack design precludes the possibility of placing fuel elements within the array other than in the storage spaces provided.

The spent fuel storage racks are categorized as safety Class 2 and seismic Category I.

The spent fuel storage facility is designed in accordance with General Design Criteria 2, 3, and 4, and Regulatory Guides 1.13, 1.29, 1.102, and 1.117. This design precludes any deleterious effects on spent fuel rack integrity due to natural phenomena such as earthquakes, tornadoes, hurricanes, missiles and floods.

The first of two types of racks used (Figure 6) provides a 10 x 10 square array of storage spaces with a nominal 6.625 inch center-to-center spacing between them. The nominal center-to-center spacing between adjacent rows in adjacent racks is 9.375 inches. The second type rack provides a 7 x 10 array of spent fuel storage spaces (Figure 7) and a row of 5 multi-purpose storage cavities. Adjacent fuel storage spaces in the 7 x 10 part of the array are on a nominal 6.625 inch center-to-center spacing. The five multi-purpose storage cavities are on a nominal center-to-center spacing of 13.25 inches. Figure 8 shows a cross section through a fuel element stored in the corner of a rack.

The high density spent fuel racks (Figures 9-12) are of anodized aluminum construction. They consist of six basic components (refer to Figure 6):

a) Top grid casting.
b) Bottom grid casting.
c) Neutron absorber canisters (poison cans).
d) Side plates.
e) Corner angle clips.
f) Adjustable foot assembly.

The top and bottom grids are machined to accurately locate and support the fuel elements. The castings have pockets cast in every other cavity opening into which the neutron absorber canisters nest. With this arrangement, no structural loads are imposed on the neutron absorber canisters. The neutron absorber canister (poison can) consists of two concentric tubes with the neutron absorber plates located in the annular gap. The outer tube is folded into the inner tube at the ends and totally seal welded to isolate the neutron poison from the pool water. The grid structures are bolted and riveted together by four corner angles and four side shear panels. Large leveling screws are located at the module corners to adjust for variations in pool floor level.

The neutron absorber plates "Boral" TM consist of boron carbide in an aluminum composite matrix which is clad with aluminum sheets.

A 0.125 inch lead-in at the top of the rack provides guidance of the fuel assembly during insertion.

All fuel storage spaces will have sufficient internal clearance to limit insert and withdraw drag forces to less than 50 pounds.

The minimum clear space under the rack for water flow is 7.25 inches.

Six integral racks, consisting of 7 x 10 spaces for the storage of fuel, and five multi-purpose storage cavities are provided (see Figure 7). The multi-purpose storage cavities provide storage for defective fuel containers, guide tubes and control rods. They consist of aluminum tubing located between top and bottom module castings similar to the poison cans. The inside diameter (R) of these multi-purpose cavities is 11.5 inches and the outside diameter (S) is 12 inches.

The nominal module overall dimensions and weight are as follows:

Module Size	"A" (in.)	"B" (in.)	"C" (in.)	Dry Weight (lbs.)
10x10	181.375-182.875	68.875	68.875	11,500
7x10&5MP	181.375-182.875	68.875	62.250	10,200

The rack is designed to withstand a lifting force of 4,000 pounds applied to the top at any fuel bundle location. The racks are designed with lead outs to prevent sticking. However, in the event of a stuck fuel assembly, the lifting bail will yield at a pull-up force less than 1,000 pounds. Also, the rack is designed to withstand a horizontal force of 1,000 pounds applied to the top of the rack at any fuel bundle location and at a varying angle from 0° to 45° from the horizontal.

The rack is designed to withstand the impact of a fuel bundle dropped from 18 inches above the racks on the middle of the top casting, on the corner of the top casting or through an empty cavity on the bottom casting without exceeding allowable stress limits. Additionally, the rack is designed to withstand the impact of a fuel bundle dropped from seven feet above the rack on the middle of the largest top casting without causing rack deformation which would allow k_{eff} to exceed .95.

The spent fuel storage racks are designed to handle irradiated or unirradiated fuel assemblies. The expected radiation levels are well below the design levels.

If the spent fuel storage pools are not flooded, a fire retardant covering will be placed over fuel stored in the racks to prevent the entry of debris or fire suppressant materials.

A complete description of the spent fuel storage racks in the fuel handling building is contained in subsection 9.1.2 of the Perry FSAR.

1.2.4.3 Containment Fuel Storage

The containment fuel storage racks in the containment contain storage space sufficient for 25 percent, 190 fuel assemblies, of one full core of fuel assemblies and are designed to withstand all credible static and dynamic loadings to prevent damage to the structure of the racks, and therefore the contained fuel, and to minimize distortion of the racks arrangement.

The racks are designed to protect the fuel assemblies from excessive physical damage under normal or abnormal conditions.

The racks are constructed in accordance with the Quality Assurance Requirements of 10CFR50, Appendix B.

The rack arrangement is designed to prevent accidental insertion of fuel bundles between adjacent racks. The storage rack structure is so designed that the upper tie plate casting cannot be inserted below the top of the upper rack. This prevents any tendency of the fuel bundle jamming on insertion or removal from the rack.

The containment fuel storage racks are categorized as safety Class 2 and seismic Category I.

The containment fuel storage facilities are designed to seismic category I requirements to prevent earthquake damage to the stored fuel. The capability of the containment fuel storage facilities to prevent damage to the fuel racks due to flooding, tornadoes, hurricanes and missiles is discussed in FSAR Chapter 3.

There are three tiers of castings which are positioned by fixed-box beams and cruciforms. The lower casting supports the weight of the fuel assembly and restricts the lateral movement; the center and top casting restricts lateral movement only of the fuel assembly.

The spent fuel storage racks are made from aluminum. Materials used for construction are specified in accordance with the applicable ASTM specifications. The material choice is based on a consideration of the susceptibility of various metal combinations to electrochemical reaction. When considering the susceptibility of metals to galvanic corrosion, aluminum and stainless steel are relatively close together insofar as their coupled potential is concerned. The use of stainless steel fasteners in aluminum to avoid detrimental galvanic corrosion is a recommended practice and has been used successfully for many years by the aluminum industry.

The minimum center-to-center spacing for the fuel assembly between rows is 12 inches. The minimum center-to-center spacing within the rows is 7 inches. Fuel assembly placement between rows is not possible.

Lead-in and lead-out castings provide guidance of the fuel assembly during insertion or withdrawal.

The rack is designed to withstand the impact energy of 4,000 ft.-lbs. while maintaining the safety design basis. This impact energy could be generated by the vertical free-fall of a fuel assembly from the height of six feet.

The storage rack is designed to withstand the pull-up force of 4,000 pounds and a horizontal force of 1,000 pounds. There are no readily available forces in excess of 1,000 pounds. The racks are designed with lead-outs to prevent sticking. However, in the event of a stuck fuel assembly, the lifting bail will yield at a pull-up force less than 1,000 pounds.

The storage rack is designed to withstand horizontal combined loads up to 220,000 pounds, well in excess of expected loads.

The spent fuel storage racks are designed to handle irradiated or unirradiated fuel assemblies. The expected radiation levels are well below the design levels.

If the containment building fuel pool is not flooded, a fire retardant covering will be placed over fuel stored in the racks to prevent the entry of debris or fire suppressant materials whenever fuel handling is not underway.

A complete description of the fuel storage racks in containment is contained in subsection 9.1.2 of the Perry FSAR.

1.2.4.4 Fuel Handling System - Fuel Handling and Containment Buildings

All required fuel handling equipment will be pre-operationally tested for safe operation prior to its use for fuel handling activities. The fuel handling equipment and fuel bundles and assemblies are specifically designed for all fuel handling activities described in this application.

A complete description of the Fuel Handling System is contained in subsection 9.1.4 of the Perry FSAR.

1.2.4.5 Fuel Handling Activities

Upon arrival of a shipment of fuel from the Wilmington, North Carolina facility the following will normally take place:

1. Health Physics will perform a preliminary survey on the truck. Reactor Engineering will be notified of any unsatisfactory results identified by this and any subsequent surveys.

2. The shipment is then directed from the gate to the railroad bay in the Fuel Handling Building at Elevation 620'.

3. Maintenance will locate the truck and direct the removal of tarps and chains.

4. Health Physics will survey the wooden crates.

5. The shipment and shipping containers will be verified to comply with shipping papers presented by the carrier. Reactor Engineering is responsible for evaluation and resolution of discrepancies.

6. Upon proper acceptance of shipping papers and radiation surveys, the truck may be unloaded. If the shipping papers are incorrect, the truck may be unloaded, provided the containers are properly tagged and treated as nonconforming material.

After removal of the metal shipping containers from the wooden shipping crates, the containers will be laid down in the Fuel Handling Area, 620' elevation, of the Fuel Handling Building using the spent fuel cask crane. The fuel may now be readied for inspection, channeling, and storage or inspection and storage. All personnel involved in the inspection operation will be familiar with and adhere to all criticality procedures. Inspection, channeling, and storage will proceed in accordance with written procedures as follows:

1. Health Physics will survey the metal shipping containers.

2. Unpack fuel bundles from the metal shipping containers. Remove the polyethylene sleeves from the fuel bundles prior to inspection. After the polyethylene sleeve is removed, Health Physics will perform a swipe survey to ensure no external contamination is present. The sleeves will then be permanently discarded.

3. Move one bundle to the new fuel inspection stand and secure in place on the inspection stand. As desired, move second bundle from the shipping container and secure in place on the inspection stand. Two bundles may be secured on the inspection stand concurrently. Bundle movements will generally be made using the spent fuel cask crane.

4. The inspection will encompass the following categories:

   a. Visual examination.
   b. Removal of packing spacers.
   c. Dimensional check.
   d. Pin enrichment and location check (also gadolinia fuel pins).
   e. Clean all outside surfaces and verify cleanliness of all visible surfaces.

5. The inspected bundles may now be channeled and transported to the new fuel vault or the spent fuel storage pool. The inspected bundles may also be transported to the new fuel vault for storage prior to being channeled.

6. In addition to the fuel handling platform operator, an independent observer will verify the coordinates of the stored fuel in the new fuel vault or in the spent fuel storage pool.

7. The stored fuel in either the new fuel vault when the permanent covers are not in place, or the spent fuel storage pool when not flooded, will be covered by a fire retardant material to prevent possible inundation by low density fire extinguisher foam or water mist whenever fuel handling is not underway.

Should a defective new fuel bundle be found, the bundle will be clearly marked and segregated from all non-defective fuel bundles in the new fuel vault or the spent fuel storage pool.

1.2.4.6 Administrative Controls

The Plant Manager has overall responsibility for special nuclear materials (SNM) on the Perry Plant site. The General Supervising Engineer, Technical Section, is responsible for establishing the onsite fuel management program and ensuring that proper controls are applied to all SNM. Individual section supervisors will ensure that written procedures and instructions are developed and approved for all fuel handling activities for which they are responsible. Further, they are charged to ensure those activities are performed in accordance with those procedures and instructions.

A review program is established to insure that safety-related operating plant activities are conducted safely and in accordance with written procedures or instructions which have been reviewed and approved by established authorities. Review at the onsite plant operating level is the responsibility of the Plant Operations Review Committee (PORC). The permanent PORC members are:

a. Plant Manager
b. Superintendent, Plant Operations
c. General Supervisor, Operations
d. General Supervisor, Maintenance
e. General Supervising Engineer, Technical
f. General Supervising Engineer, Radiation Protection
g. Plant Health Physicist
h. Reactor Engineer.

Specific approval and authorization responsibilities will be given by the following personnel or their designated alternates:

a. <u>Approve fuel movement plans</u>

General Supervising Engineer, Technical Section
Reactor Engineer

b. Authorize and/or direct unloading, movement, storage and shipping of SNM

General Supervisor, Maintenance
Reactor Engineer
Operations Shift Supervisor
Operations Unit Supervisor

c. Approve radiation survey results

Plant Health Physicist
Reactor Engineer

d. Authorize and/or direct use of fuel handling equipment

General Supervisor, Maintenance
Operations Shift Supervisor
Operations Unit Supervisor

e. Authorize entry into limited access areas

Shift Supervisor
Security Supervisor
Plant Health Physicist

f. Approve fuel inspection results

General Supervisor, Maintenance
Reactor Engineer

g. SNM accountability

Reactor Engineer
General Supervising Engineer, Technical Section

1.2.5 Fire Protection System

1.2.5.1 General Description - Fuel Handling and Containment Buildings

The materials used in construction of the fuel storage area are concrete and steel. The fuel assemblies and fuel racks are constructed of non-flammable materials. Fire suppression equipment consists of manual water type hose stations and fire extinguishers. All ventilation ducts penetrating buildings are provided with three (3) hour rated fire dampers with standard 160°F fusible links. Ionization smoke detectors are provided in discharge ducts of the supply and exhaust fans. Upon detection of smoke, these detectors will initiate an alarm in the control room and also light an alarm on the HVAC panel.

The fire protection system is a common system serving the entire plant. The fire protection system consists of a water supply (Lake Erie) and distribution systems, carbon dioxide extinguishing system, Halon 1301 extinguishing systems, and a foam system. The permanent water supply system consists of two (2) 2500 gpm at 125 psig fire pumps; one electric driven and the backup, diesel engine driven; and one (1) 20 gpm at 125 psig jockey pump. Other fire protection equipment shall include fire water yard mains, hydrants, standpipes, hose stations, sprinklers, deluge water spray systems, smoke detectors, alarms, fire barriers, portable fire extinguishers, portable breathing apparatus, smoke and heat ventilation systems, and associated controls and appurtenances.

The fire-fighting water is taken from the Emergency Service Water Pump House basin and supplied to the fire water supply main.

The fire protection systems are designed to operate and/or fail without inducing failure of engineered safety features.

Ventilation systems, including smoke and heat removal systems, are discussed in detail in Section 9.4.2 of the Perry FSAR and Sections 2.0, 4.0, and 5.0 of the Perry Fire Protection Evaluation Report (FPER).

Perry Fire Protection Evaluation Report (FPER) drawings E-023-012 and E-023-025, which may be obtained from the NRC Chemical Engineering Branch, show the relative location of fire protection apparatus (i.e., hose stations, extinguishers, etc.) on the refueling floor in the Fuel Handling and Containment Buildings.

Construction of the Fire Protection System serving the fuel handling and storage areas will be completed prior to the receipt of unirradiated fuel. The Fire Protection System in these areas will also have successfully completed preoperational testing. No activities which may adversely affect the Fire Protection System in the fuel handling area will be allowed. During fuel handling and storage operations, the Senior Reactor Operator acting as Fire Brigade Leader is responsible for all activities regarding the Fire Protection System and implementation of the Station Fire Plan.

A complete description of the Fire Protection System is contained in subsection 9.5.1 of the Perry FSAR and the Perry Fire Protection Evaluation Report, (FPER).

1.3 Physical Protection

The quantity of U-235 in the fuel (contained in uranium enriched above natural uranium but less than 10% in the U-235 isotope) exceeds 10,000 grams and the fuel therefore is specified to be "special nuclear material of low strategic significance", in 10CFR72.2 (y) 3. Therefore the physical protection requirements given in 10CFR73.67 (f) will be addressed in the Interim Security Plan for protection of the unirradiated fuel bundles. As noted in 1.1.3 of this application the average initial core enrichment is 1.876% U-235. The highest enrichment contained in any bundle is 3.00% U-235.

1.4 Transfer of Special Nuclear Materials

1.4.1 Fuel Shipments

General Electric Company will be responsible for the shipment of fuel to the plant site from their Wilmington, N.C. facility. The fuel will be shipped in approved shipping containers. If for any reason fuel would have to be shipped back to the Wilmington facility from the plant, CEI will be responsible for the shipment.

1.4.2 Packaging of Fuel for Transportation

General Electric Company will be responsible for the packaging of fuel for shipment from the Wilmington facility to Perry. CEI will be responsible for the packaging of any fuel which is required to be returned to the GE Wilmington facility.

1.5 Financial Protection and Indemnity

Proof of financial protection will be provided to meet NRC requirements and will be forwarded at a later date.

2.0 HEALTH AND SAFETY

2.1 Radiation Control

2.1.1 Training and Experience

The technical qualifications for personnel with Radiation Protection responsibilities are described in Table 13.1-3 of the FSAR.

2.1.2 Contamination Monitoring

Administrative controls will be covered under the sections of the Perry Nuclear Power Plant Operations Manual which govern the plant Health Physics Program. These procedures include receipt surveys on new fuel, fuel inspection surveys, storage and handling of radioactive material, personnel monitoring, establishing and posting controlled areas, operation of portable survey instruments, Radiation Work Permits, and others.

Contamination controls as described in the above will be provided by requiring Radiation Work Permits to control work and access to the fuel handling and storage area.

Monitoring stations for radioactive contamination are to be on the "clean" side of the control points that are to be established at the exits from Controlled Areas in the Fuel Handling Building and Containment.

Procedures for Radiation Protection are discussed in Section 12.5.3 of the FSAR. Health Physics facilities and equipment are described in Section 12.5.2 of the FSAR.

Radiation survey inspections of the loaded shipping crates will be performed upon receipt.

2.1.3 Portable survey instrumentation will be calibrated at three (3) month intervals using either approved plant procedures and National Bureau of Standards (NBS) traceable calibration sources or a contracted calibration service which has been evaluated and placed on the Qualified Suppliers List for safety-related services.

Multi-channel analyzers will be calibrated at six (6) month intervals and all other laboratory instrumentation will be calibrated at three (3) month intervals using NBS traceable calibration sources. Functional checks will be performed daily or prior to use to ensure that the instrument is operating properly and remains in calibration.

Additional detail on the frequencies and methods of calibration of instruments is discussed in Section 12.5.2.3 of the FSAR.

2.2 Nuclear Criticality Safety

2.2.1 Personnel and Training

The Reactor Engineer is responsible for criticality safety-related to fuel handling and storage operations. Safety is ensured through a combination of engineered safeguards and written procedures. Training is conducted to ensure that Reactor Engineering personnel are thoroughly familiar with these design features and procedures. Qualifications of Reactor Engineering personnel are in accordance with Regulatory Guide 1.8 as described in FSAR Table 1.8-1. The Reactor Engineer and the Training Supervisor are responsible for developing and implementing the criticality training program.

2.2.2 Storage of Loaded Shipping Containers

The fuel bundles may be stored in their steel shipping containers. If they are stored in this way, the shipping containers will be stored in no more active array than they were during shipping. The containers may be stacked no more than 3 containers high. The shipping containers will be located in limited access areas according to the Interim Security Plan submitted under separate cover.

2.2.3 Nuclear Safety of Storage Location

2.2.3.1 Criticality Control New Fuel Vaults

The calculations of k_{eff} are based upon the geometric arrangements of the fuel array and subcriticality does not depend upon the presence of neutron absorbing materials. The arrangement of fuel assemblies in the fuel storage racks results in k_{eff} below 0.95 in a dry condition or completely flooded with water which has a density of 1 g per cc. To meet the requirements of General Design Criterion 62, geometrically-safe configurations of fuel stored in the new fuel array are employed to assure that k_{eff} will not exceed 0.95 if fuel is stored in the dry condition or if the abnormal condition of flooding (water with a density of 1 g/cc) occurs. In the dry condition, k_{eff} is maintained equal to or less than 0.95 due to under moderation. In the flooded condition, the geometry of the fuel storage array assures the k_{eff} will remain equal to or less than 0.95 due to overmoderation. The floor of each vault is sloped to a drain at the low point to drain any water that may be introduced. The design of the fuel, racks, and vault ensures that water will not be retained in or around a channeled or unchanneled fuel bundle should the vault be flooded and drained.

The new fuel storage racks are designed to store the fuel assemblies in an array which is sufficient to maintain a k_{eff} of 0.95 or less in the normal dry condition or abnormal completely water flooded condition. The racks are not designed to maintain a k_{eff} of 0.98 or less under optimum moderation (foam, small droplets, spray or fogging). The condition of optimum moderation is precluded since the new fuel storage vault is provided with solid watertight cover. Administrative controls will be used to preclude entry of sources of optimum moderation into the new fuel storage area during movement of fuel, thereby significantly reducing the probability of such a condition. In addition, the floor of the vault is sloped to a drain to remove any water introduced into the vault. The racks themselves are designed to preclude the inadvertent placement of a fuel assembly in other than the prescribed spacing. The requirements of General Design Criterion 62, "Prevention of Criticality in Fuel Storage and Handling" are satisfied.

No limitation is placed on the size of the new fuel storage array from a criticality standpoint since all calculations are performed on an infinite array basis. The new fuel storage area therefore accommodates fuel from a multi-unit facility with no safety implications. All handling conditions remain the same and there is no compromise of any safety considerations.

No credit is taken for burnable poisons which may be contained in any fuel bundle.

The minimum center-to-center spacing for the fuel assembly between rows is 12 inches. The minimum center-to-center spacing with the rows is 7 inches. Fuel assembly placement between rows is not possible.

A safety evaluation of the New Fuel Vault storage area is provided in subsection 9.1.1.3 of the Perry FSAR.

2.2.3.2 Criticality Control Spent Fuel Pool

The design of the densified spent fuel storage racks provides for a subcritical multiplication factor (k_{eff}) for both normal and abnormal storage conditions. For normal and abnormal conditions, k_{eff} is equal to or less than 0.95. Normal conditions exist when the fuel storage racks are located in the pool and are covered with a normal depth of water (about 28 feet above the stored fuel) for radiation shielding and with the maximum number of fuel assemblies or bundles in their design storage position. An abnormal condition may result from accidental dropping of a fuel assembly such that the assembly comes to rest across the tops of the rack array. To meet the requirements of General Design Criterion 62, geometrically safe configurations of fuel stored in the spent fuel array are employed to assure that k_{eff} does not exceed 0.95 under all normal and abnormal storage conditions.

The spent fuel storage array is such that k_{eff} is less than 0.95 due to the presence of neutron absorber sealed in the rack structure. The design of the fuel, racks, and pools ensures that water will not be retained around an assembly when the pools are flooded and then drained.

The racks are designed to maintain a minimum fuel spacing of 6.625 inches (center-to-center) within a rack module and 9.375 inches (center-to-center) between adjacent rows in adjacent racks.

Neutron poison is used in the spent fuel racks. No credit is taken for burnable poisons which may be contained in any fuel bundles.

A safety evaluation of the Spent Fuel Pool and Containment Pool storage areas is provided in subsection 9.1.2.3 of the Perry FSAR.

Each fuel movement is required by procedure to be confirmed by an independent observer before the movement is considered complete.

2.2.3.3 Criticality Control - Containment Fuel Storage Racks

The containment fuel storage racks are designed to handle irradiated fuel assemblies and would normally be covered with about 27 foot of water above the fuel to provide sufficient shielding. However, for the initial core loading, fresh assemblies may be temporarily stored dry in the racks.

The design of the containment fuel storage racks provides for a subcritical multiplication factor (k_{eff}) for both normal and abnormal storage conditions. For normal and abnormal conditions, k_{eff} is equal to or less than 0.95. Normal conditions exist when the fuel storage racks are located in the pool and are covered with a normal depth of water (about 27 feet above the stored fuel) for radiation shielding and with the maximum number of fuel assemblies or bundles in their design storage position. An abnormal condition may result from accidental dropping of equipment or damage caused by the horizontal movement of fuel handling equipment without first disengaging the fuel from the hoisting equipment. To meet the requirements of General Design Criterion 62, geometrically safe configurations of fuel stored in the spent fuel array are employed to assure that k_{eff} does not exceed 0.95 under all normal and abnormal storage conditions.

The geometry of the spent fuel storage array is such that k_{eff} is less than 0.95 due to overmoderation. The design of the fuel, racks, and pools ensures that water will not be retained around an assembly when the pools are flooded and then drained.

Analysis shows that the possibility exists that under optimum conditions of fuel geometry and moderation a critical assembly could conceivably result from water mists from fire fogging nozzles, fire sprinklers, or from fire suppression foams. Fire fogging nozzles, sprinklers, and foams will be excluded from the fuel handling areas in the containment if fuel is stored dry in these racks. In each containment spray system line a single valve shall be closed and the breaker for that valve's motor operator shall be racked out in order to prevent inadvertant initiation of this system, if fuel is stored dry in these racks.

The rack holddown bolt spacing is such as to maintain minimum spacing of adjacent racks for geometric reactivity control. The racks are designed to maintain a minimum fuel spacing of 7 inches (center-to-center) within a rack and 12 inches (center-to-center) from rack to rack.

No neutron poison is used in the spent fuel pool or racks. No credit is taken for burnable poisons which may be contained in any fuel bundles.

A safety evaluation of the containment fuel storage areas is provided in subsection 9.1.2.3 of the Perry FSAR.

Each fuel movement is required by procedure to be confirmed by an independent observer before the movement is considered complete.

2.2.4 Moderation Control

Analyses of the storage areas take into account the effects of full and no moderation. Results show that flooding or lack of moderation produces no adverse effect on nuclear safety. The effects of optimum interspersed moderation and the protective actions taken considering it were discussed in Section 2.2.3.

The storage of fuel in the new fuel vault, fuel handling building pools, or containment fuel storage racks is such that if the array were flooded and then drained, the fuel packaging would not retain water around or within the assemblies.

2.2.5 Maximum Number of Fuel Assemblies Out of Authorized Locations

The maximum number of fuel bundles that will be allowed outside a normal, approved storage location or normal shipping container is three (3). Fuel bundles outside approved storage locations or shipping containers must maintain an edge-to-edge spacing of 12 inches or more from all other fuel. A fuel array of four or more bundles outside approved fuel storage locations or shipping containers is prohibited.

No more than one metal shipping container containing fuel may be opened at any one time and this container must be closed if all fuel is not immediately removed.

2.2.6 Criticality Accident Requirements - Fuel Handling and Containment Buildings

Emergency procedures and drills in conjunction with detectors and instrumentation for a criticality accident will be in place prior to fuel arrival on-site. Area Radiation Monitoring in the area of fuel movement and storage for criticality monitoring will be operable. Additionally, a criticality accident is not credible under the storage and handling conditions previously described. An exemption is requested from the requirements of 10CFR70.24 as provided in 70.24(d).

The area radiation monitoring system is provided to supplement the personnel and area radiation survey provisions of the plant health physics program described in FSAR Section 12.5 to ensure compliance with the personnel radiation protection guidelines of 10CFR20, 10CFR50, 10CFR70, and Regulatory Guides 8.2, 8.8, and 8.12.

The following design criteria are applicable to the area radiation monitoring system.

RANGEABILITY - Five decades of range with alarms for Alert and High Radiation levels and circuit failure. The Alert setpoint is established at twice background while the High setpoint is established at three times background. The system continues to read upscale if exposed to radiation levels above maximum range.

RESPONSE - Gamma sensitive to photon energies of 80 keV to 2.5 MeV.

RESPONSE TIME - Meter response is approximately 2.5 seconds for full scale deflection.

ENERGY DEPENDENCE - The dose rate (mrem/hr) readout is within 20 percent of the actual dose rate in each detected area from photon energies between 100 keV and 2.5 MeV.

ENVIRONMENTAL DEPENDENCE - The system meets the above requirements for all variations of temperature, pressure, and relative humidity within each area monitored which includes 95 percent relative humidity and temperatures between 32°F and 120°F.

EXPOSURE LIFE - Each detector maintains its characteristics up to an integrated dose of 10^5 rads.

Airborne radioactivity monitoring is provided in compliance with 10CFR20 and Regulatory Guides 8.2 and 8.8. The purpose of the airborne radioactivity monitoring system is to monitor the air within an enclosure by either direct measurement of the enclosure atmosphere or the exhaust air from this enclosure. The system indicates and records the levels of airborne radioactivity, and, if abnormal levels occur, actuates alarms. Alarms are provided to alert personnel that airborne radioactivity is at or above the selected setpoint level to ensure that personnel are not subjected to airborne radioactivity above limits in 10CFR20. The system provides a continuous record of airborne radioactivity levels which will aid operating personnel in maintaining airborne radioactivity at the lowest practicable level.

The in-plant airborne radiological monitoring and sampling systems are provided to allow determination of the content of radioactive material in various rooms throughout the plant.

The criteria for determining the type of airborne radioactivity monitoring system are based upon the nature and type of radioactive releases expected, and the location being monitored.

A complete description of the Radiation Protection design features is contained in subsection 12.3 of the FSAR.

2.3 Accident Analysis

2.3.1 Fuel Handling and Containment Buildings

Accident Analyses for fuel handling equipment and storage areas are provided throughout Sections 9.1.1, 9.1.2, and 9.1.4 of the FSAR. The potential for accidents affecting the safety of fuel in the storage areas is limited to the dropping of fuel assemblies over the storage area. No overhead load, having the potential of producing an impact energy greater than that produced by a dropped fuel assembly in the applicable safety analysis, will be allowed over the fuel storage array. This requirement will be contained in Administrative Procedures covering the use of fuel handling equipment and overhead cranes. The seismic design of the containment and the fuel handling building, and of cranes, racks, and pools precludes the credibility of more severe accidents. In the unlikely event of a dropped fuel assembly in the storage areas, the consequences affecting safety would be minimal. Due to the spacing of the storage arrays, a criticality condition would not be possible under these accident conditions. The consequence of the accident would be limited to the minimal effect of possible rupture of fuel rods and subsequent release of unirradiated uranium dioxide fuel.

3.0 OTHER MATERIAL REQUIRING NRC LICENSE

Authorization is requested to receive, possess, inspect and use antimony - beryllium (SbBe) neutron sources, in-vessel neutron detectors containing U-235 enriched greater than 20% and an irradiated neutron detector storage cask containing depleted uranium. These are in addition to the fuel bundles previously described in this application.

3.1 In-Vessel Neutron Detectors

3.1.1 Description

The neutron detectors consist of three types: Source Range Monitors (SRM), Intermediate Range Monitors (IRM) and Local Power Range Monitors. All of these detectors are sealed sources. The Transvering In-Core Probes (TIP) are the gamma sensitive type and do not contain any special nuclear material.

The quantities of U-235 are shown in the following table:

Qty.	Description	Grams U-235		Activity (microcuries)	
	(See Note Below)	Per Detector	Total	Per Detector	Total
8	SRM Detectors	.00272	.02176	5.82×10^{-3}	4.66×10^{-2}
16	IRM Detectors	.00075	.01200	1.60×10^{-3}	2.56×10^{-2}
196	LPRM Detectors	.00022	.04312	4.71×10^{-4}	9.23×10^{-2}

The total quantity of U-235 enriched greater than 20% is 0.07688 grams. This quantity of enriched U-235 does not exceed the "Formula quantity" defined in 10CFR73.2 bb. Therefore, the physical protection requirements of 10CFR73 do not apply.

3.1.2 Storage and Handling

Neutron detectors may be temporarily stored adjacent to the fuel pools in the Fuel Handling Building under the auspices of the Interim Security Plan. The neutron detectors will be installed in their normal use configuration in the reactor vessel when not stored in the Fuel Handling Building. Storage in this configuration will be in the detector dry tubes in the reactor vessel for the SRM, IRM and LPRM detectors. The spare neutron detectors will be stored adjacent to the fuel pools in the Fuel Handling Building under the auspices of the Interim Security Plan.

Health Physics will perform a survey of the detectors when received. The Reactor Engineer will be notified of any unsatisfactory results identified by the survey. Although it is not expected, the areas containing these detectors will be designated and posted as radiation areas if required.

3.2 Neutron Sources

3.2.1 Description

The neutron sources consist of an antimony (Sb) cylinder surrounded by a beryllium sleeve in each of seven in-vessel source holders. The radioactive antimony is not inserted into the source holder until shortly before installation in the vessel. Thus, the sources are only a gamma source until that time. The source activity being applied for is 19,600 curies of Sb-124. There are 14 individual sources of Sb-124 each having an estimated activity of 1400 curies.

The operational sources will be shipped in lead filled drums approximately 48" tall and 31" in diameter, which meet DOT package specifications (Figure 13). The source is positioned within a 7" diameter x 25" long cavity which is centered in the drum and surrounded by lead shielding. The cavity is sealed with a lead plug. This shipping container is a General Electric Model 1500 Shielded Container, licensed with the DOT under S.P. No. 5939.

3.2.2 Storage and Handling

3.2.2.1 Precautions and Limitations

Consistent with recommendations of Regulatory Guide 8.8, The Cleveland Electric Illuminating Company has committed to establish a health physics program to maintain occupational and general public exposure to radiation "As Low As Reasonably Achievable" (ALARA). The ALARA program commitment is contained in Section 12.1 of the FSAR.

The Radiation Protection Section will be responsible for the monitoring of the operational neutron sources. Procedures applicable to source handling and monitoring will be approved and in effect prior to receipt of the sources.

The operational neutron sources will be stored in the shielded container in either the containment building fuel pool or the cask pit pool. These pools are within a limited access area. The area containing the sources will be designated and posted as either a Radiation Area or High Radiation Area, if required, depending on the dose rate. The area will also be designated as a Radioactive Material Area. These areas will be established and controlled in accordance with plant administrative procedures. Periodic radiological surveys will be performed to ensure personnel safety.

The storage area will be posted in accordance with 10CFR20.203. Thermoluminescent dosimeters and self reading dosimeters will be used to monitor personnel for exposure. Exposure limits will be in accordance with 10CFR20.101.

3.2.2.2 Receipt of Sources

Upon arrival of the shipping container holding the lead cask which contains the 14 operational Sb source pins, the following will normally take place:

1. The Radiation Protection Section will perform a preliminary survey on the truck and shipping container. The Reactor Engineer will be notified of any unsatisfactory results identified by the survey.

2. The shipment is then directed from the gate to the railroad bay in the Fuel Handling Building at Elevation 620'-6".

3. The Radiation Protection Section will survey the shipping container.

4. Upon proper acceptance of shipping papers and radiation surveys, the shipping container will be offloaded.

5. The shipping container will then be transferred either to the Fuel Handling Building Cask Storage Pit or through the equipment hatch into containment and then up to the containment building fuel pool.

6. The jacket is then lifted off the lead cask and the Radiation Protection Section will survey the lead cask.

7. The shielding cask lid bolts are removed; the lid will remain in place.

8. The lead cask containing the Sb sources is then lowered into the water filled pool and brought to rest on the bottom of the pool.

A decision has not been made as to where the sources will be received and handled. The sources will either be stored in the cask storage pit and transferred into containment via the fuel transfer tube or stored in the containment fuel storage pool. The experiences at Kuosheng (which used the fuel transfer tube) and at Grand Gulf (which is planning on moving the sources through the equipment hatch) will be evaluated prior to making this decision.

3.2.2.3 Handling of Sources

This is a general description of the source handling which will be modified as required depending upon whether the sources are in the spent fuel pool or the containment fuel pool.

The pool will be filled with water. When pool level is established 24 feet above the pool floor, the cask lid may be removed. The individual sources will then be loaded into the seven source holders (see Figure 14). The estimated dose rate for this procedure is less than five millirem per hour. When all source holders are loaded and in place in the source holder rack, the source holder rack will be either transferred direct to the reactor cavity or through the transfer tube and then to the reactor cavity. The top of the source holder rack will be submerged at least five feet at all times during transfer operations. The source holders may then be installed in their designated positions inside the reactor vessel. The source holders will remain submerged at least five feet at all times during installation. The estimated exposure rate for installation of the seven source holders is expected to be less than 20 millirem per hour.

Dose rates are estimated to be 30-60 millirem per hour at the surface of the cask and 2-3 millirem per hour at 3 feet from the cask (in air). To minimize exposure, access to the Containment Building and/or the Fuel Handling Building will be restricted during source handling, transfer, and installation of those personnel directly involved with source handling operations or radiation monitoring. Radiation protection personnel will be continuously present during all source handling operations. Radiation protection personnel will be responsible for operating standard radiation survey instrumentation including a portable dose equivalent neutron detector. TLD's and self-reading dosimeters will be provided to all participating personnel to monitor personal exposure. Radiation surveys will be conducted of the area after the transfer has taken place. Consistent with Perry policy, a minimum of 5 feet of water will be maintained above the sources when moving them to provide proper shielding. Also, a minimum of 5 feet of water shielding will also be provided above the lead cask containing the sources upon removal of the cask lid. By familiarizing the personnel with ALARA concepts and by providing review of procedures, the operation will result in personnel doses which are as low as reasonably achievable.

3.2.2.4 Shipping Authorization

In addition to storage, authorization is requested for provisions to cover return shipping containers to the supplier in case of damage to the sources or excessive decay of sources due to start-up delays. Appropriate procedures and precautions will be utilized should this need arise.

3.3 Irradiated Neutron Detector Storage Cask

3.3.1 Description

The cask is a lead shielded container clad with stainless steel. It contains an aluminum repository bucket into which the neutron detectors and segments of irradiated cable are deposited. This bucket is sealed in with a stainless steel plug which acts as the lid and is filled with depleted uranium (U-238). The cask contains 91.36 kg of depleted uranium (U-238) and an estimated radioactivity of 32.8896 mci. The cask is shown in Figure 15.

3.3.2 Shipping Authorization

In addition to storage, authorization is requested for provisions to cover return of the storage cask to the supplier in case of damage to the cask. Appropriate procedures and precautions will be utilized should this need arise.

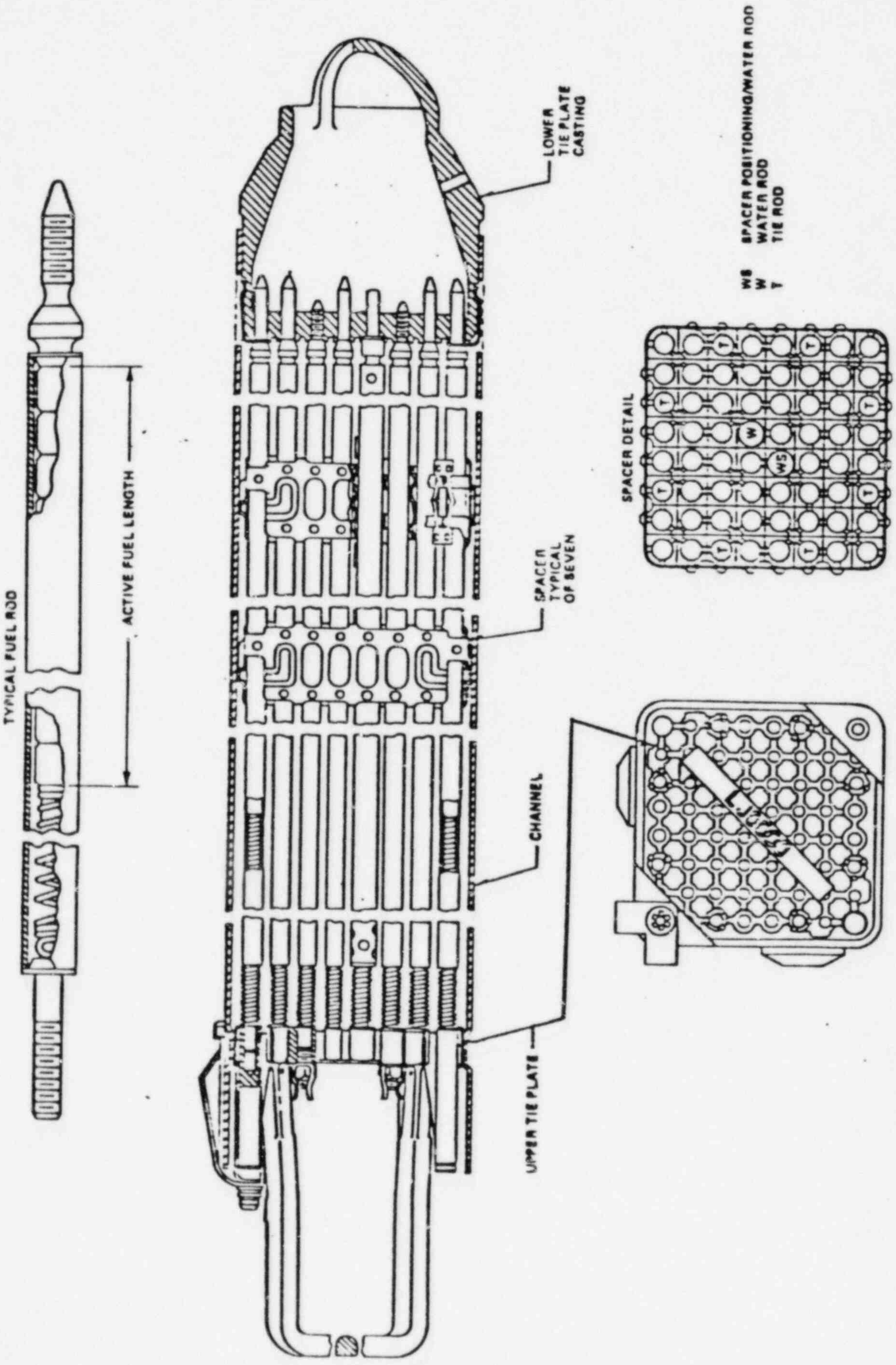


FIGURE 1
Fuel Assembly Cross Section

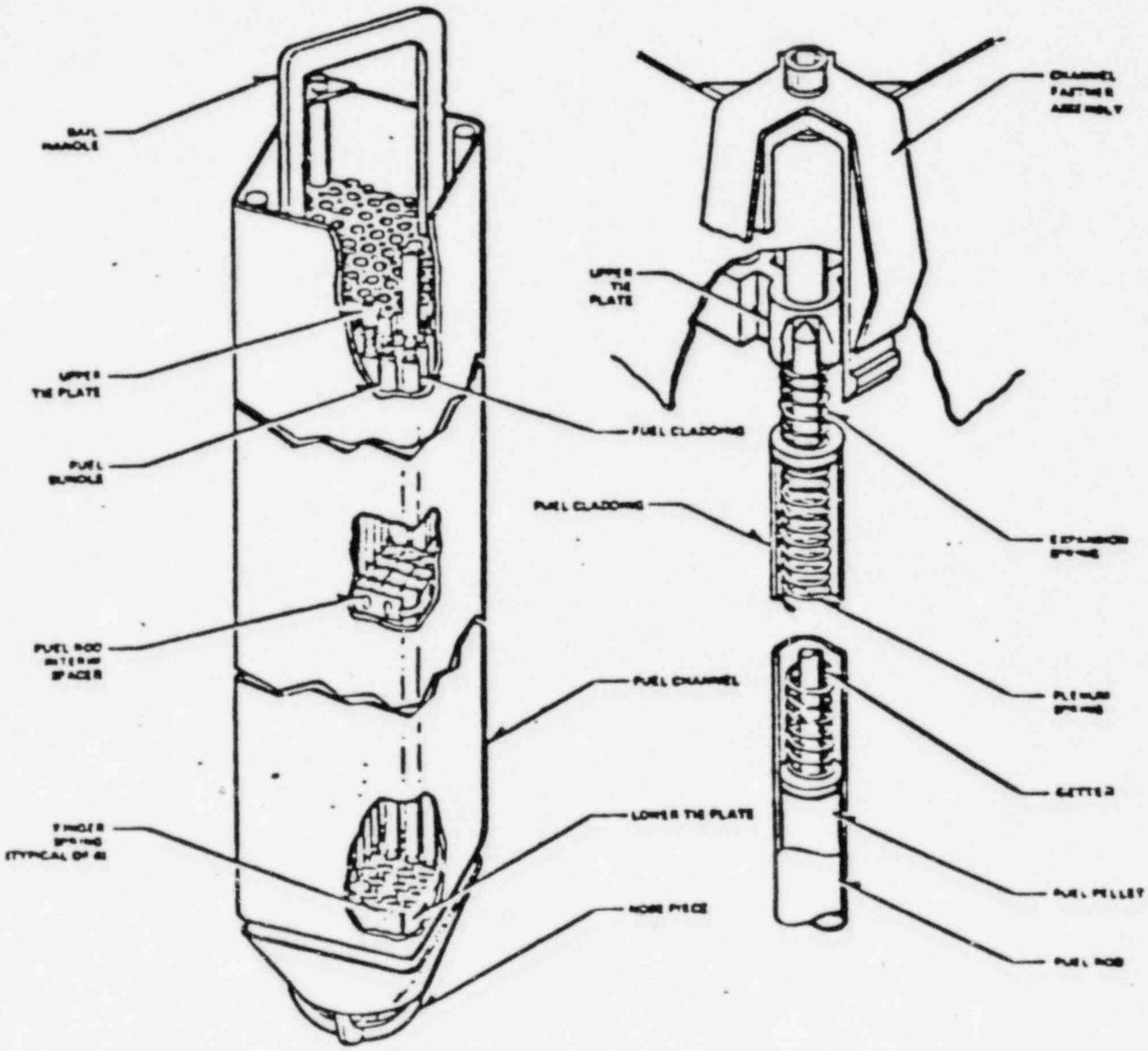
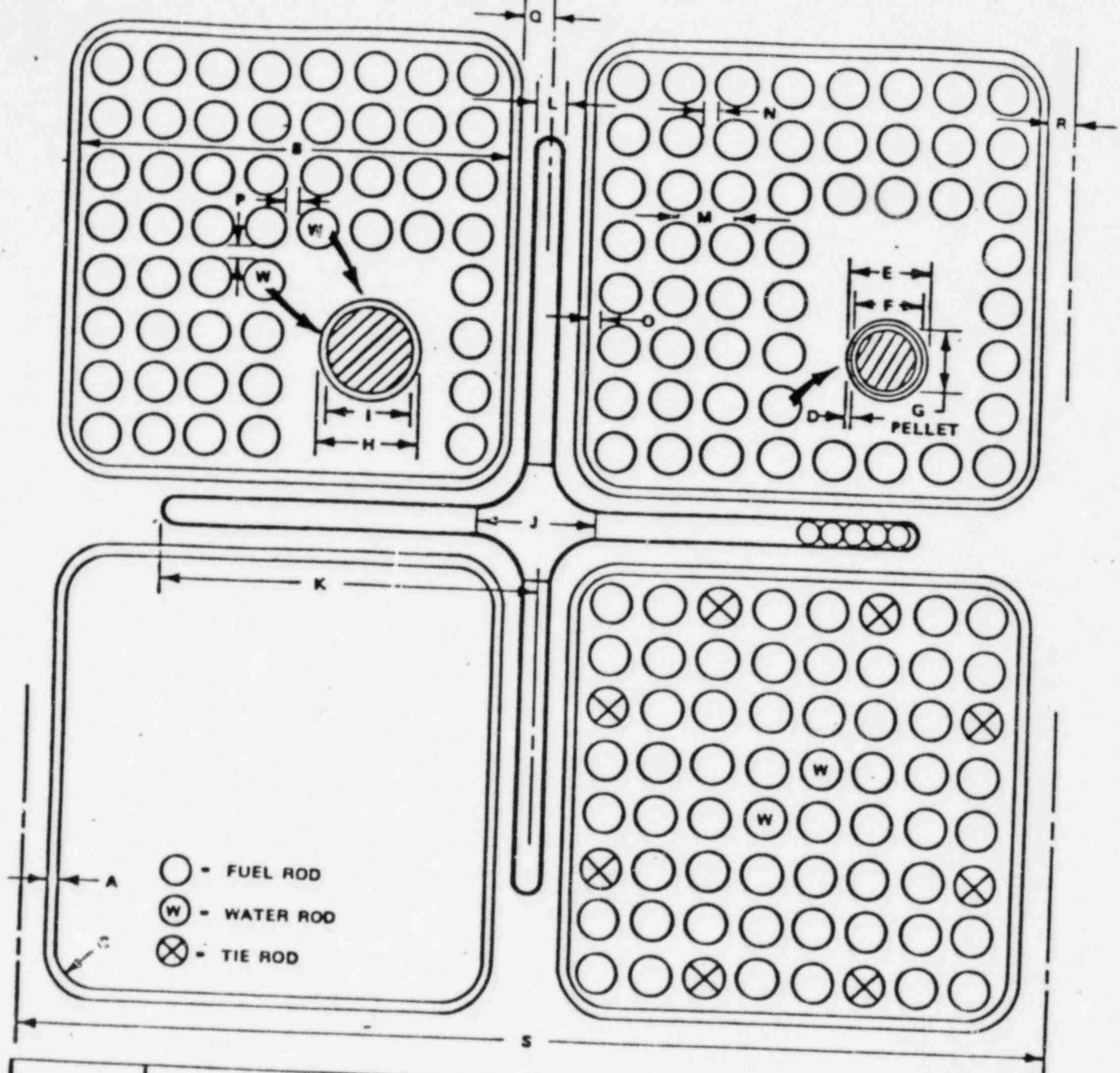


FIGURE 2
Fuel Assembly



	CHANNEL			FUEL ROD			PELLET	WATER ROD	
DIM. I.D.	A	B	C	D	E	F	G	H	I
DIM. INCHES	0.120	5.215	0.380	0.032	0.483	0.419	0.410	0.591	0.531

	CONTROL ROD			BUNDLE LATTICE				CELL		
DIM. I.D.	J	K	L	M	N	O	P	Q	R	S
DIM. INCHES	1.58	4.934	0.328	0.636	0.153	0.140	0.099	0.2725	0.2725	12.00

FIGURE 3
Lattice Dimensions

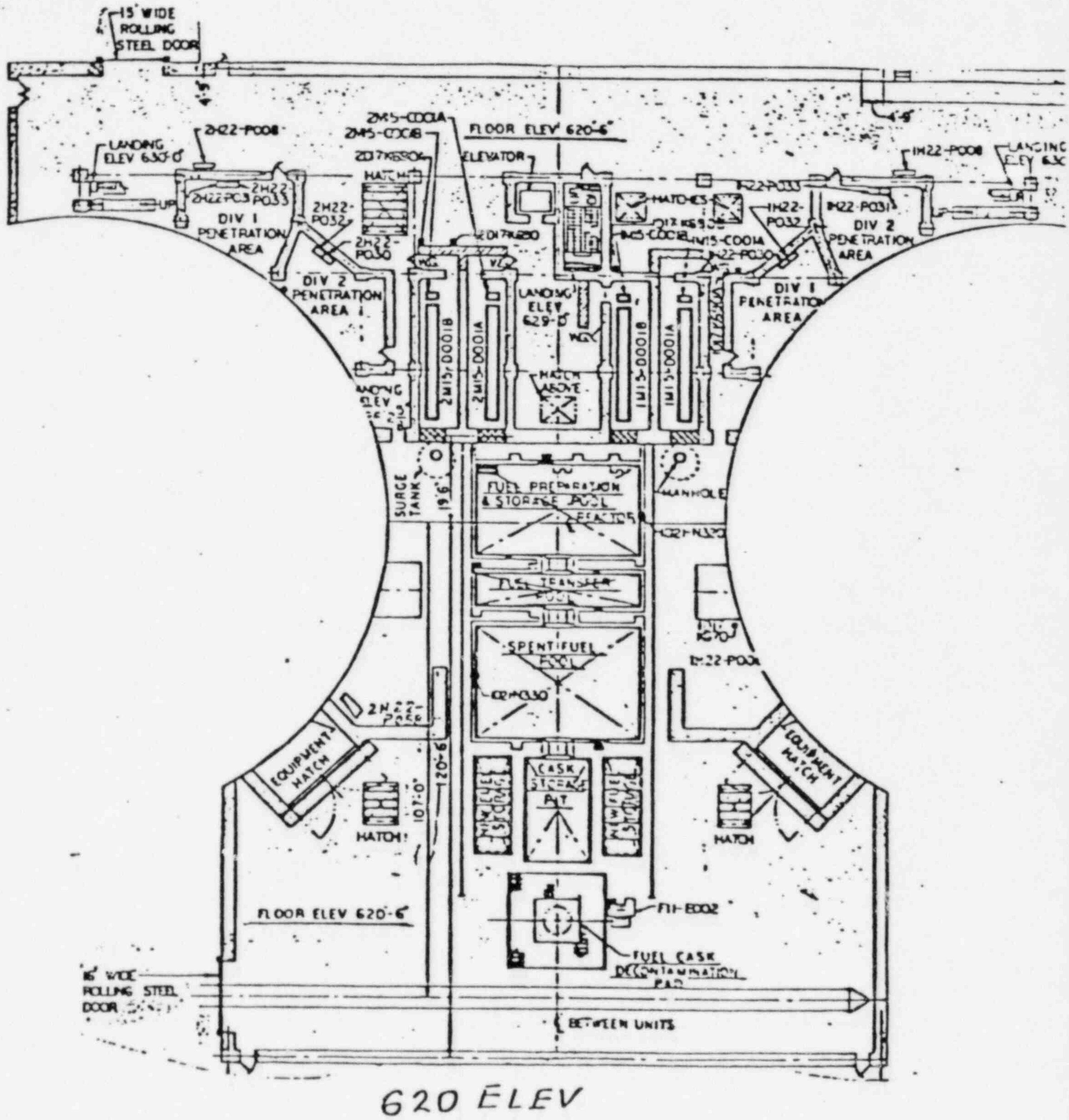


FIGURE 4
Intermediate Building and Fuel Handling Building

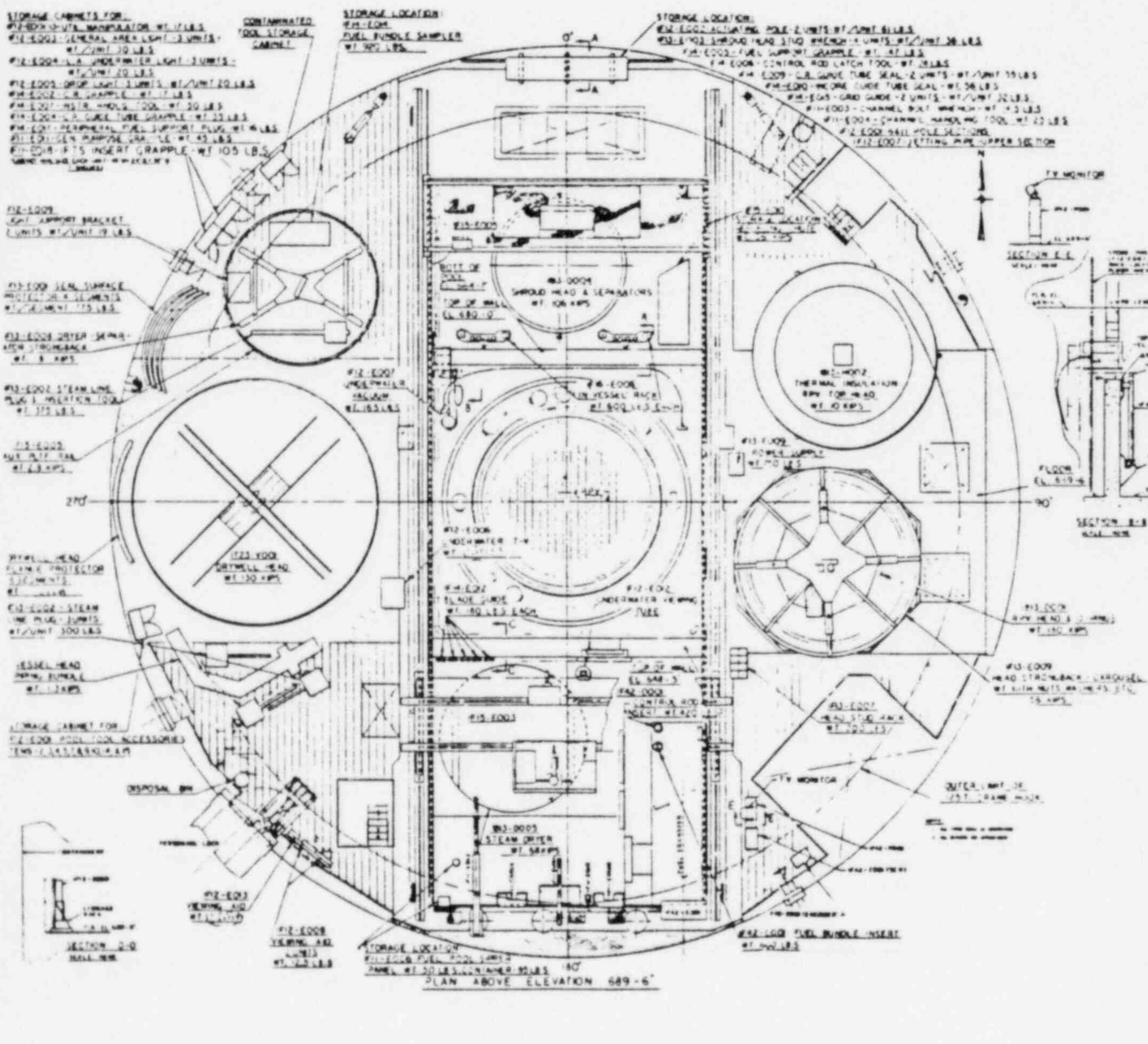


FIGURE 5
Reactor Refueling Floor

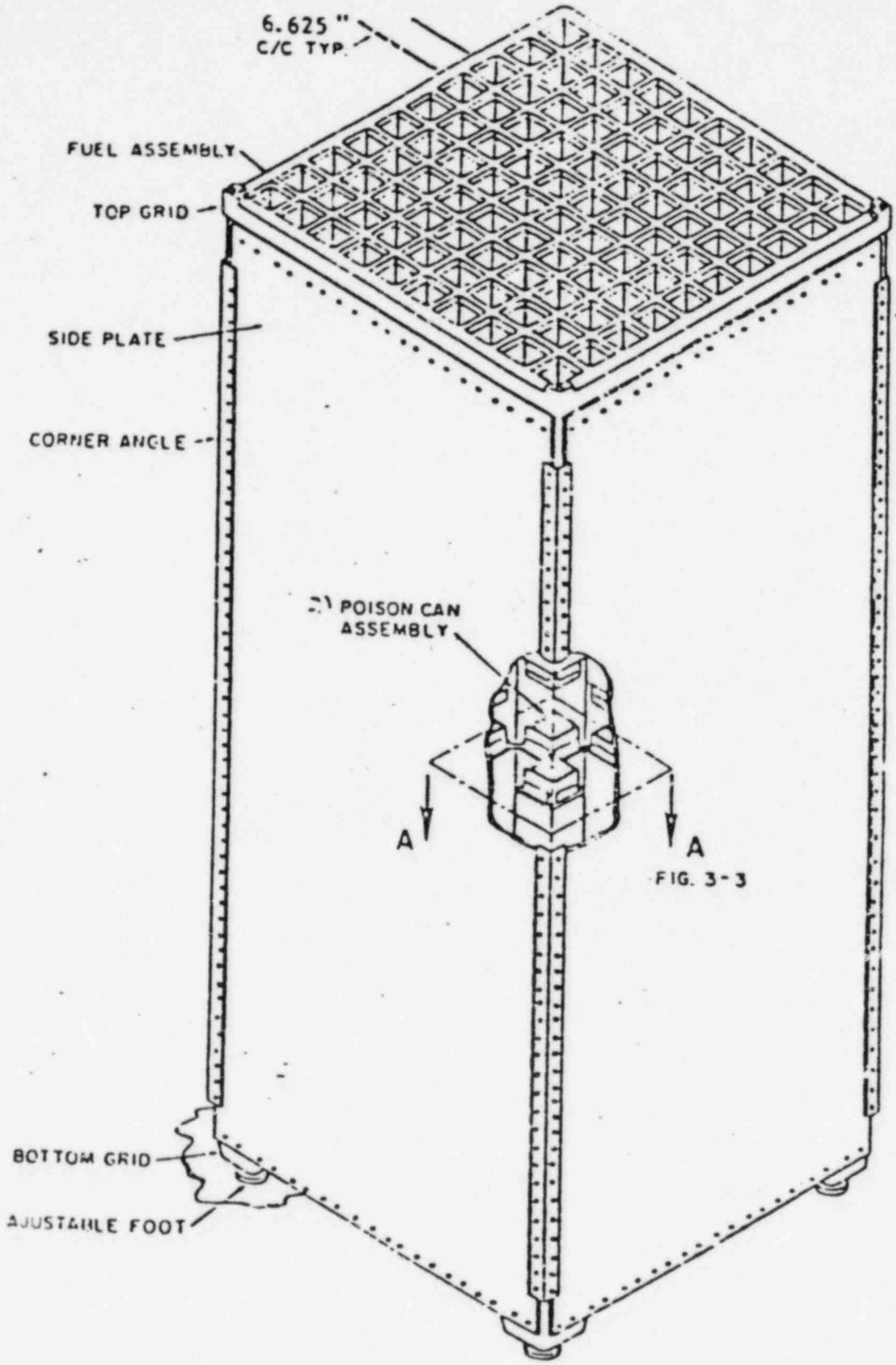


FIGURE 6
Module Isometric View of
10 x 10 Storage Racks

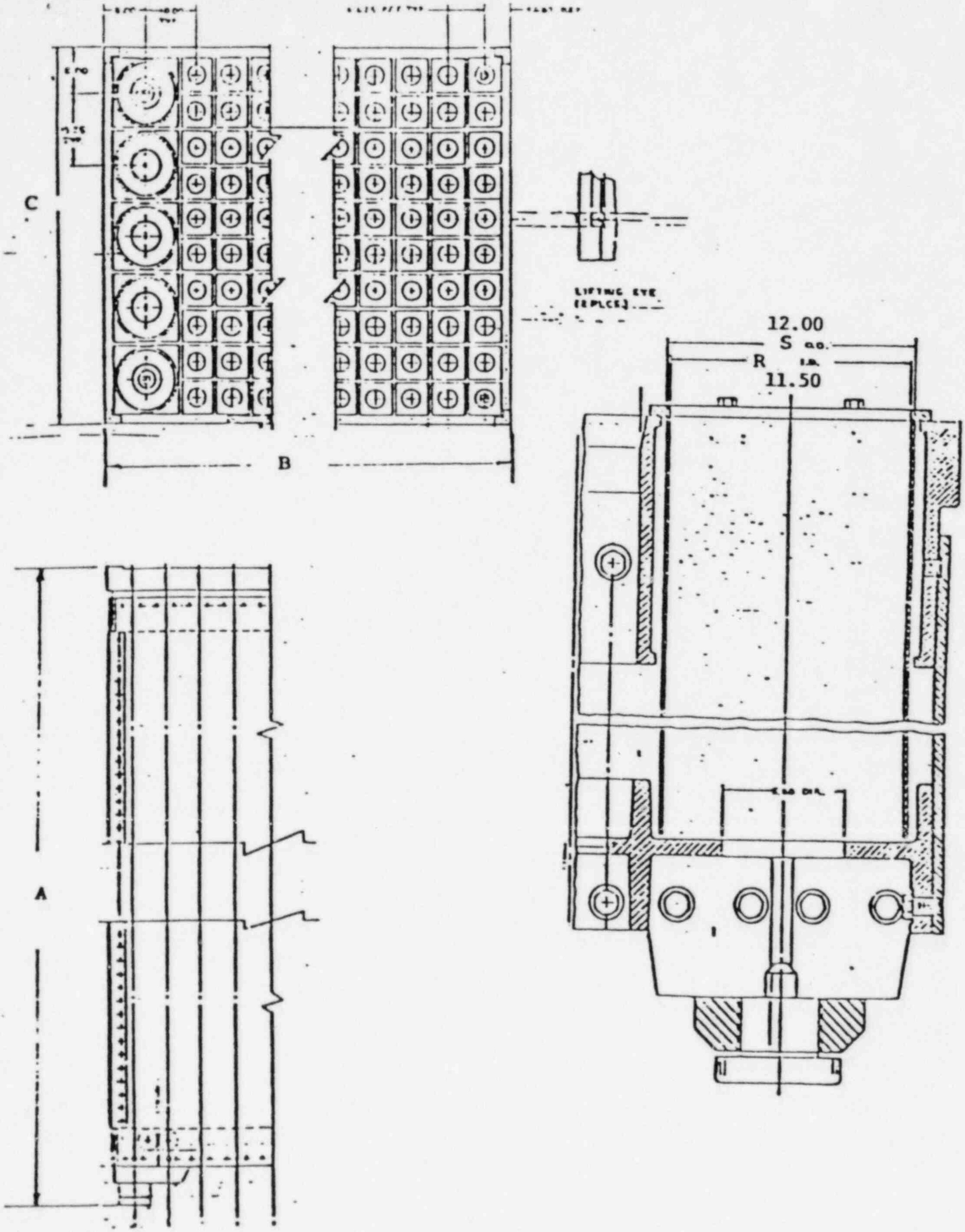


FIGURE 7
7 x 10 + 5 Multiple Purpose Cavities
BWR Spent Fuel Rack

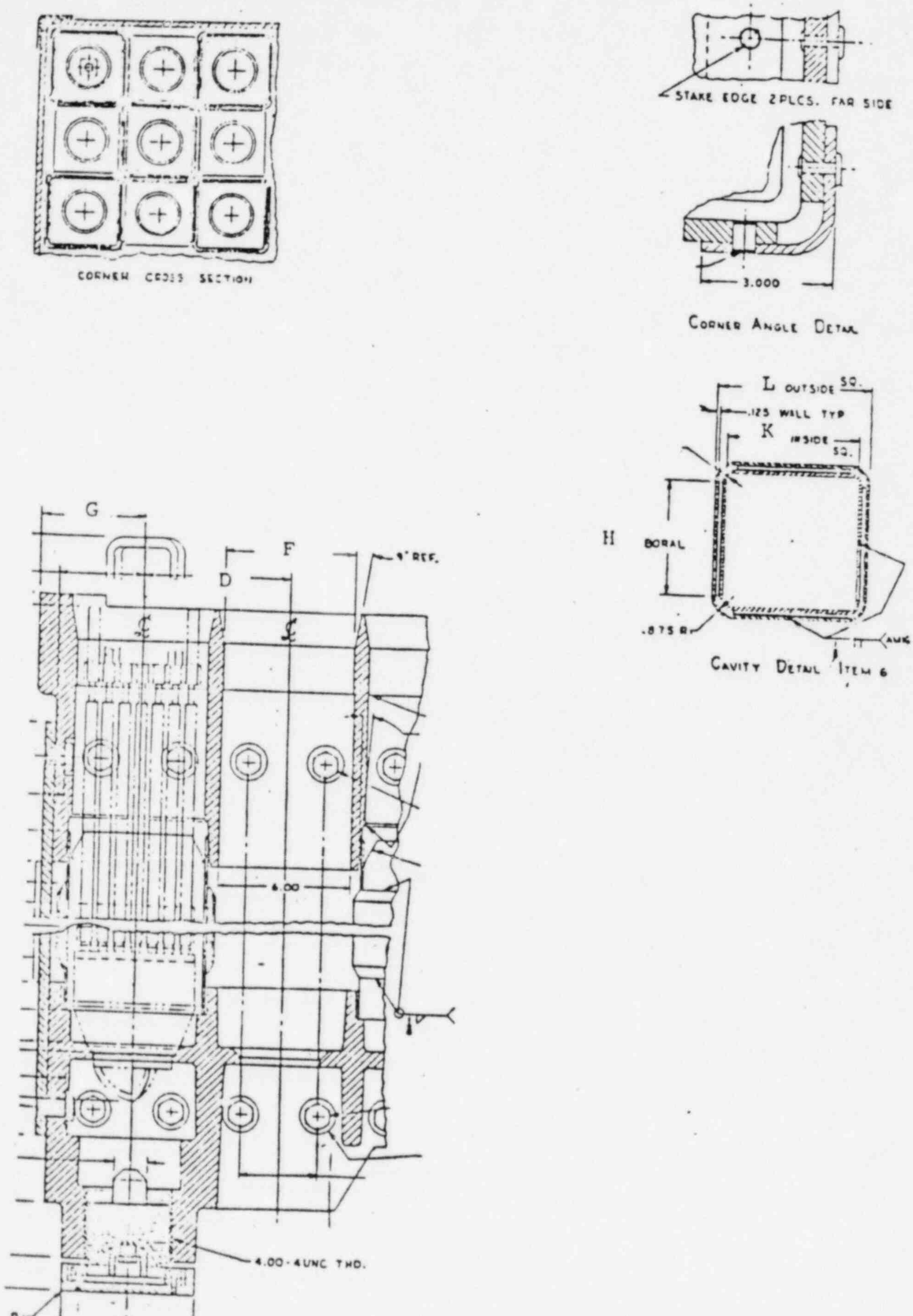


FIGURE 8
Detail Sections

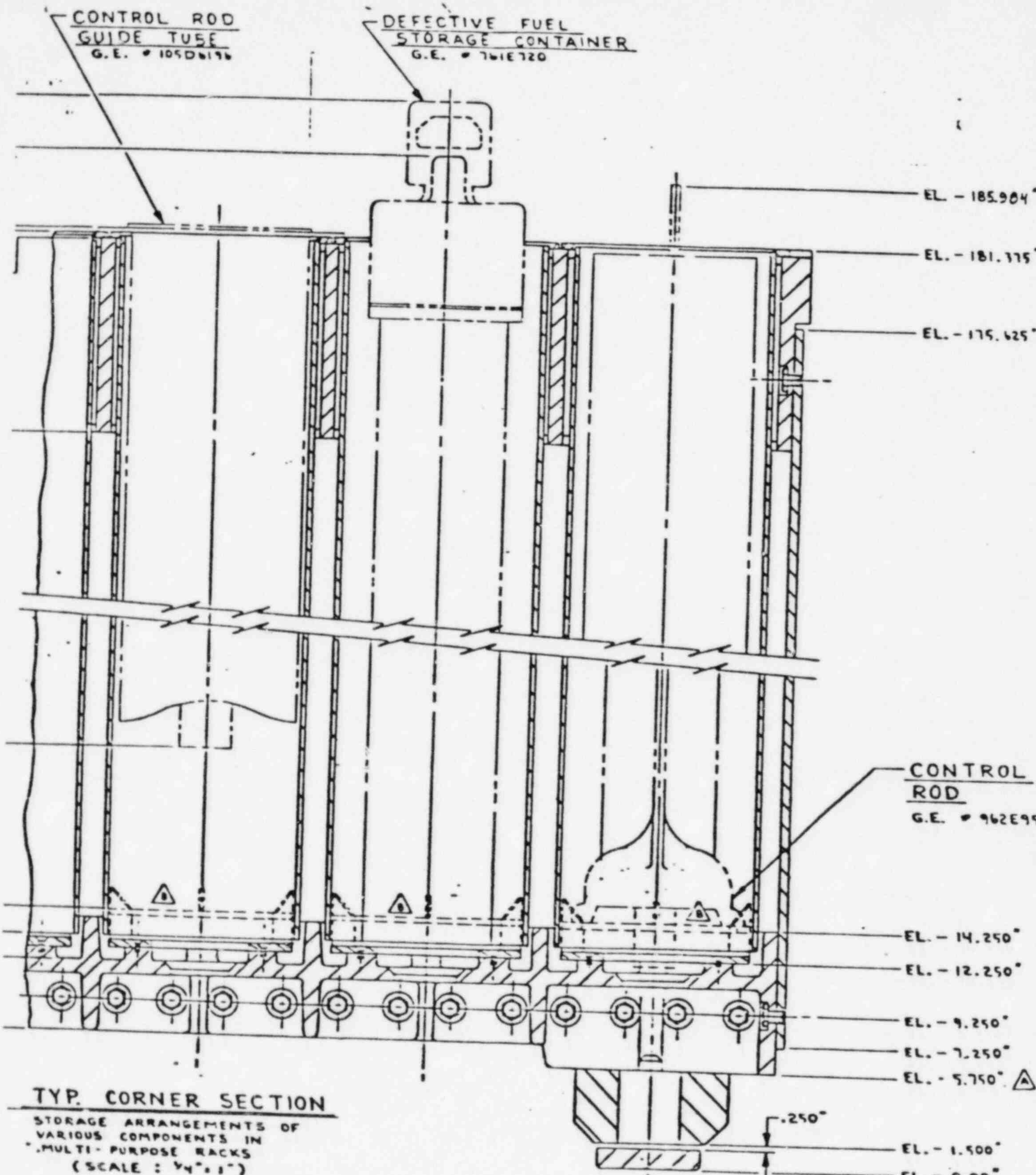


FIGURE 9
High Density Fuel Storage

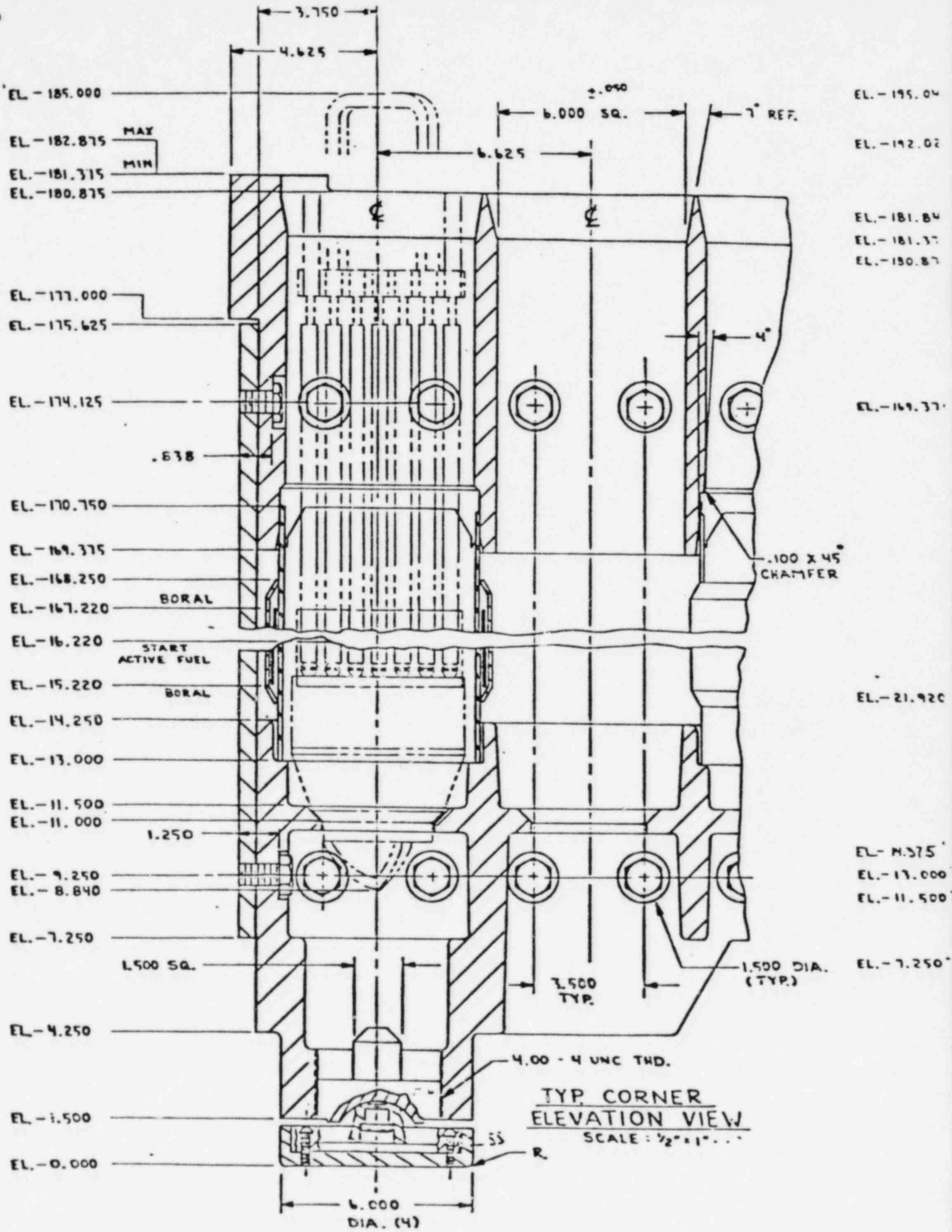
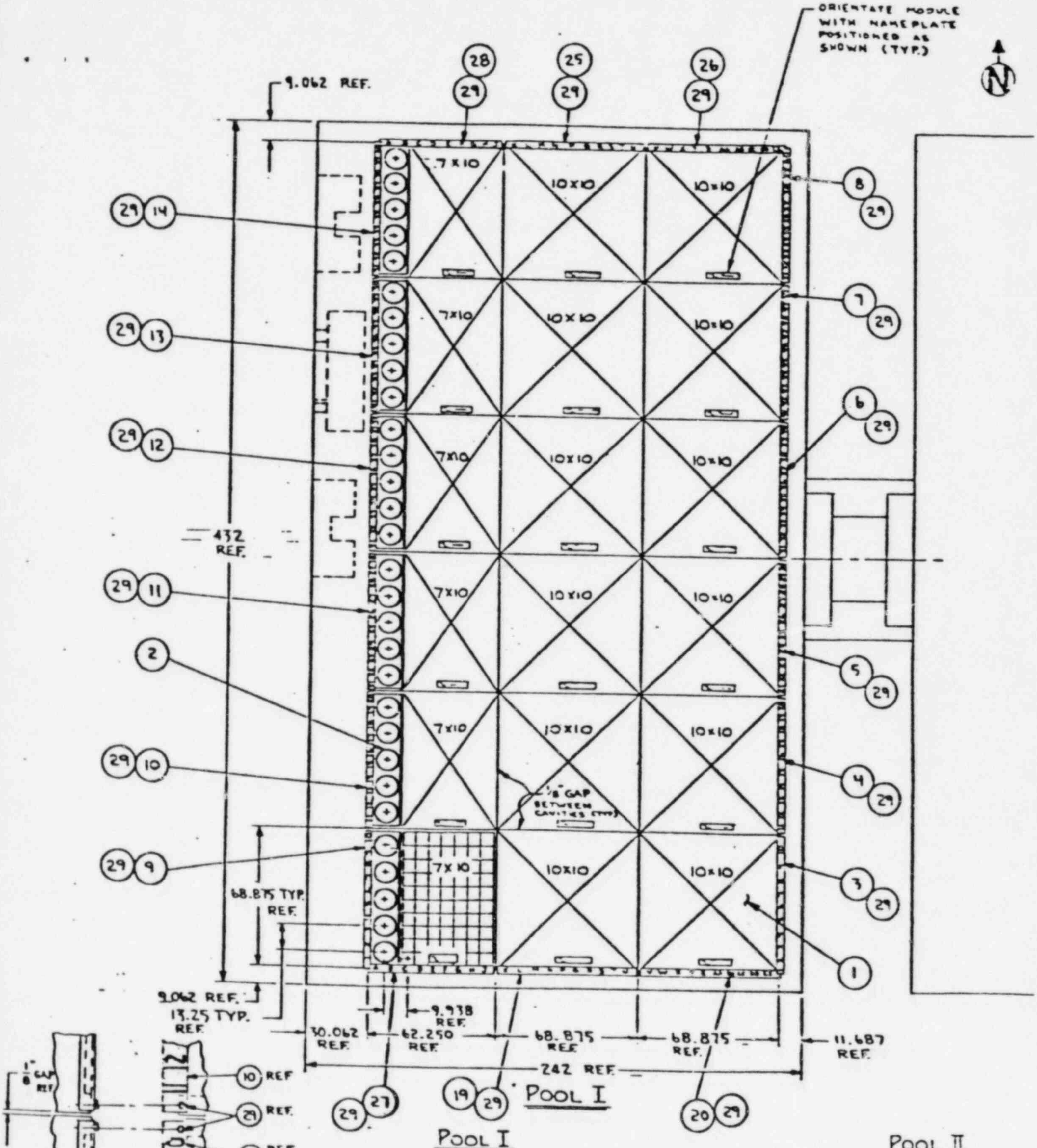


FIGURE 10
High Density Fuel Storage



DETAIL "B"
SCALE: NONE

POOL I

MODULES	NO.	CAVITIES
10×10	12	1200
7×10	6	420
		TOTAL: 1620

30 MULTIPLE PURPOSE STORAGE CAVITIES

POOL II

MODULES	NO.	CAVITIE
10×10	24	2400

(30) - LEVEL ADJUSTMENT END
(31) - LONG HANDLE TOOL
(32) - LIFTING TOOL
} NOT S

FIGURE 11
High Density Fuel Storage

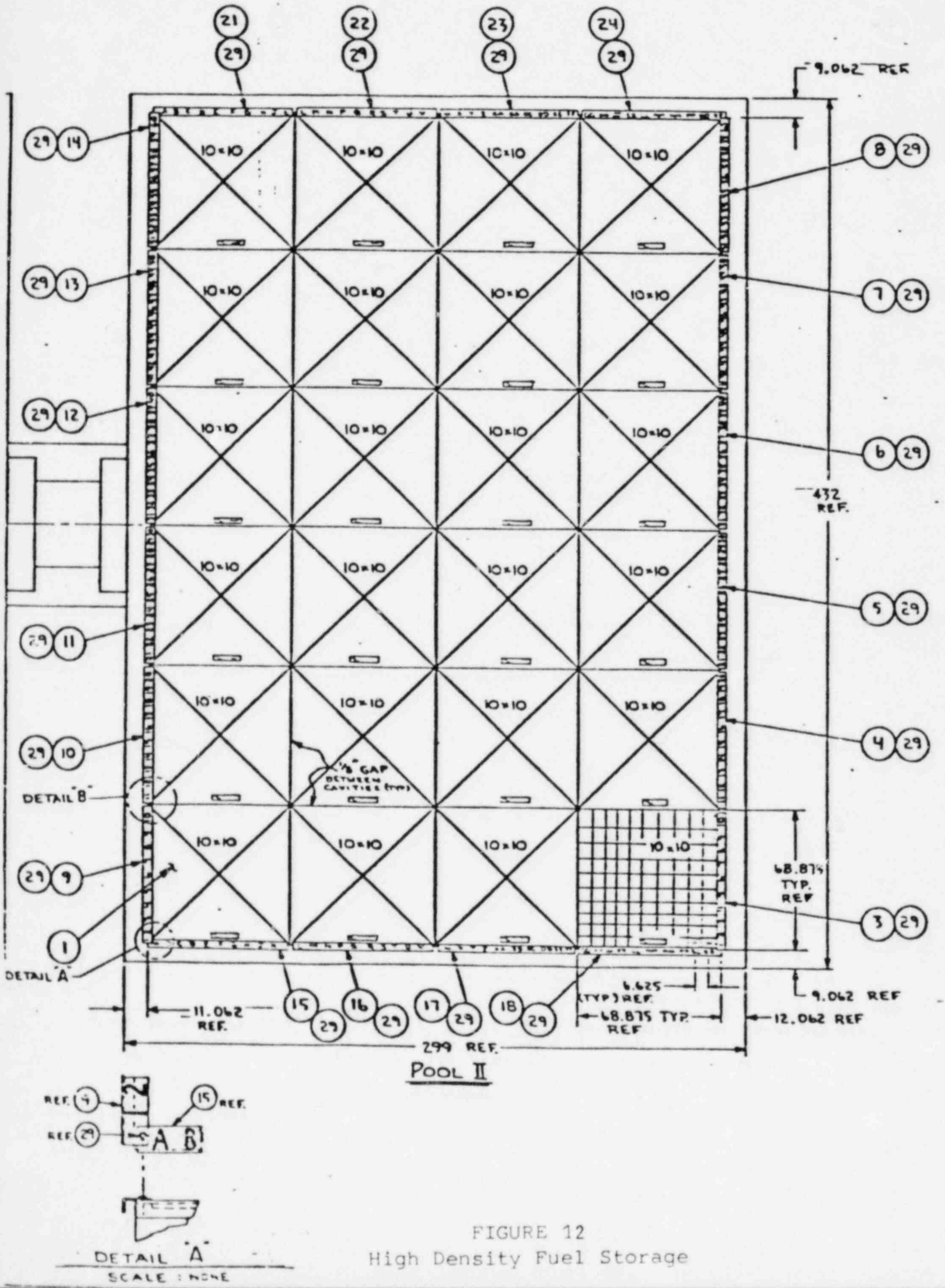


FIGURE 12
High Density Fuel Storage

1500 Series: D. O. T. S.P. No. 5939 (& I.A.E.A. Certified)
Cask Weight 12,000 Lbs. - 5455 Kgs.
Assembly Weight 15,160 Lbs - 6890 Kgs.
Assembly Drawing No. 106D3870G1
Modes of Transportation - ALL EXCEPT PASSENGER AIRCRAFT
Watt Load at 100°F Ambient 1875 Watts
Fissile Load ≤15 Grams

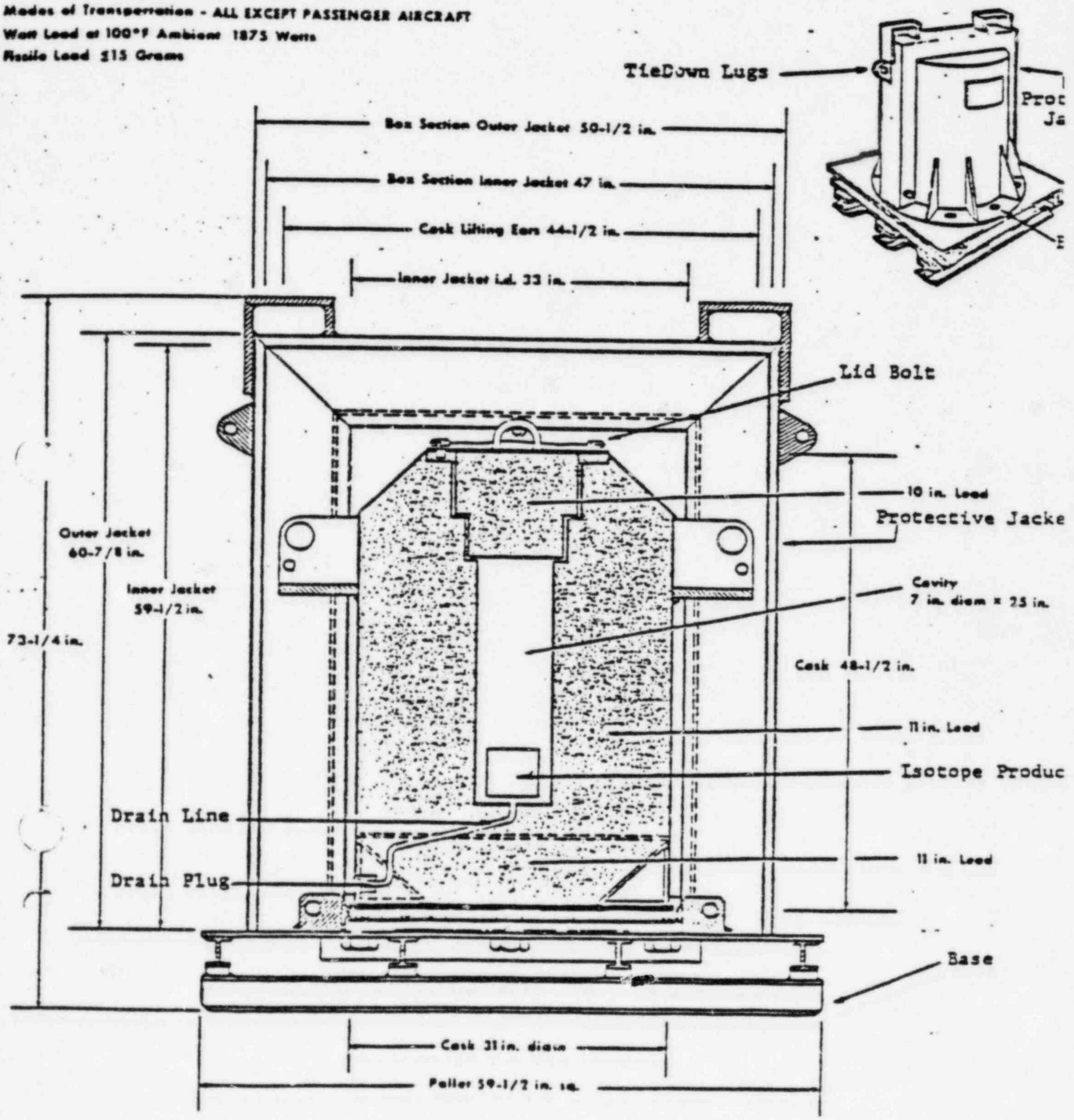


FIGURE 13
GENERAL ELECTRIC - MODEL 1500 SHIELDED CONTAINER

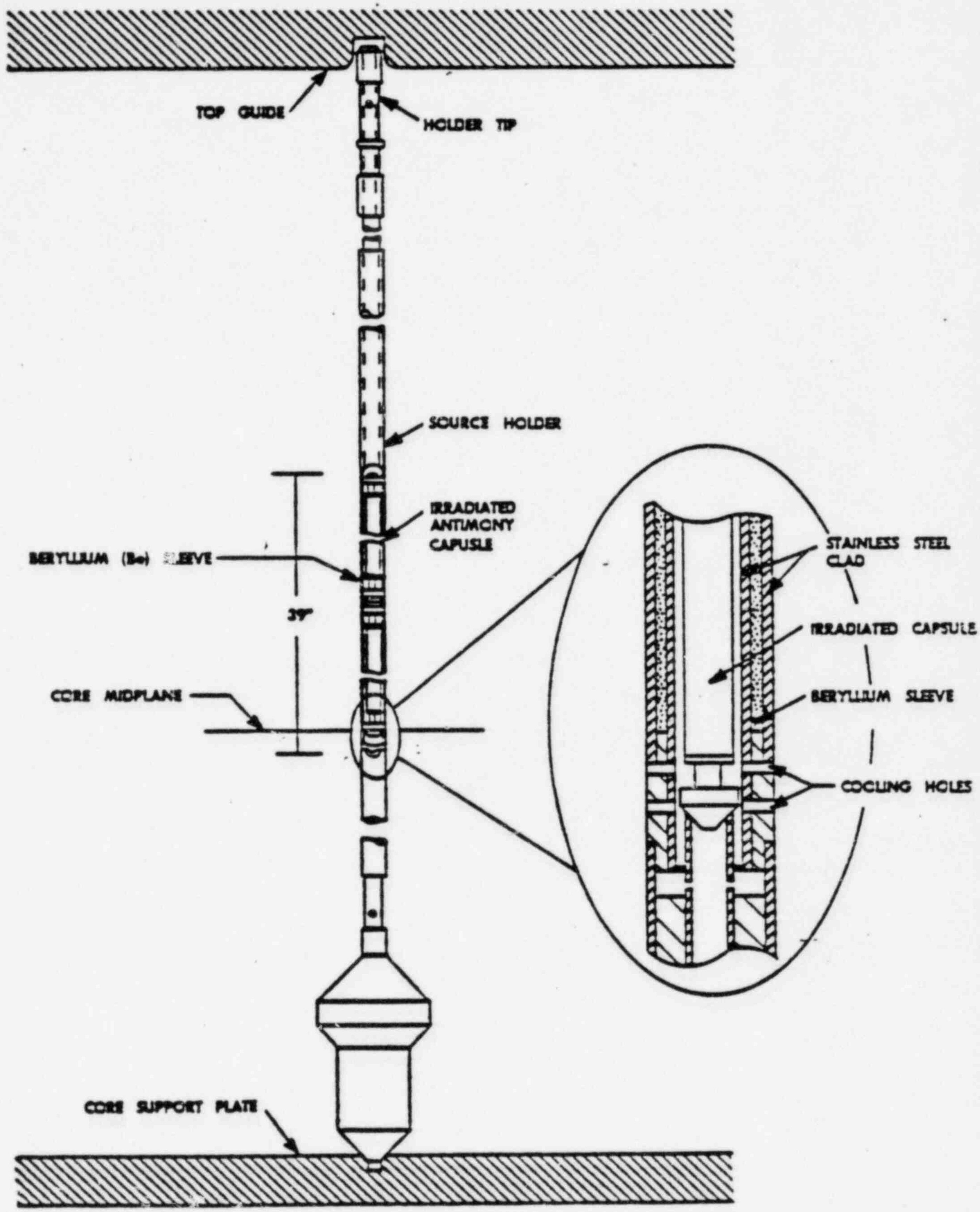


FIGURE 14
Source Holder

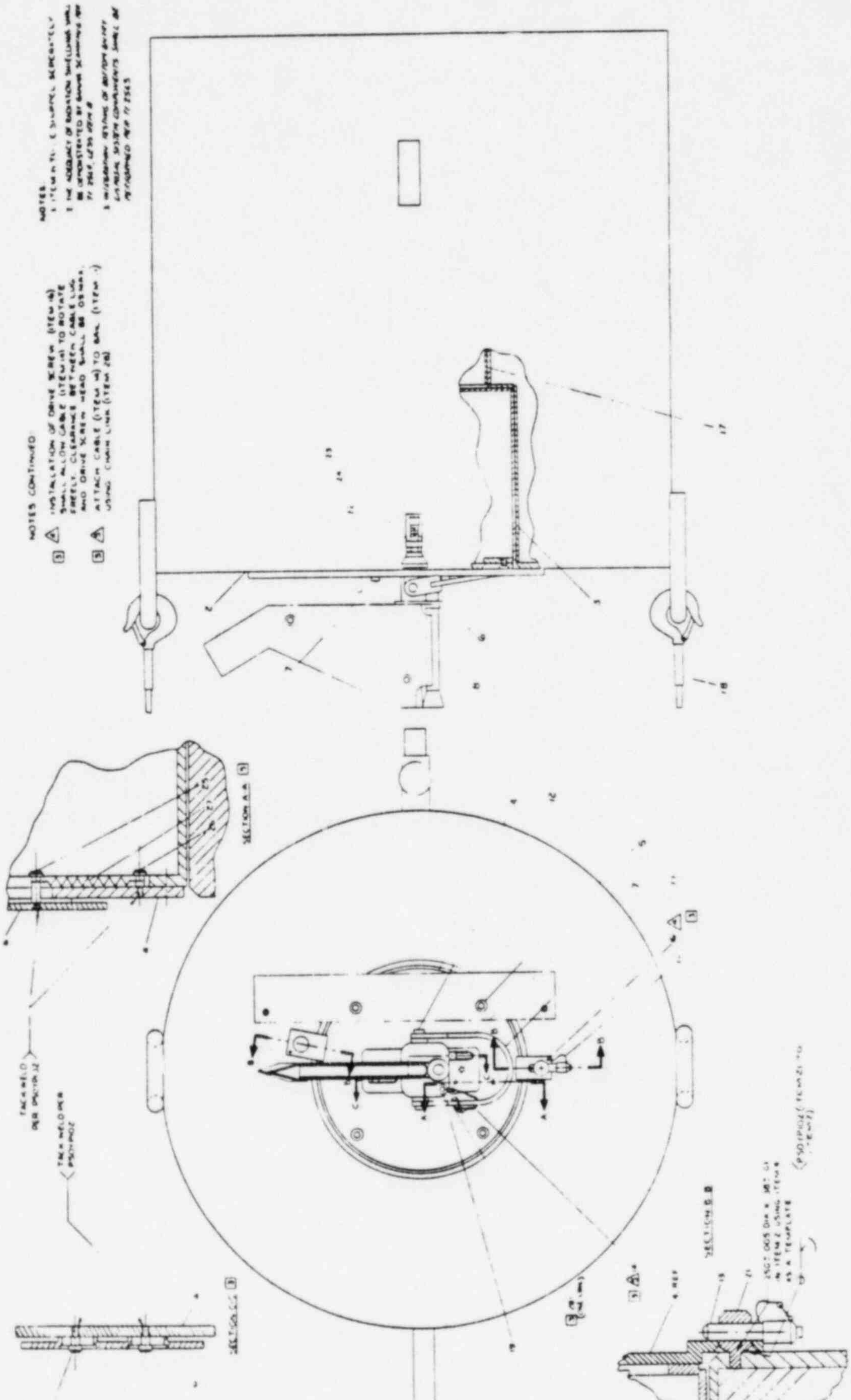


FIGURE 15
Irradiated Neutron Detector Storage Cask