70-2945

Prg. Code 23100

PDR RETURN TO D CRAMER 396 SS

UNION ELECTRIC COMPANY
1901 GRATIOT STREET
ST. LOUIS, MISSOURI

JOHN K. BRYAN
VICE PRESIDENT

MAILING ADDRESS:
P. O. BOX 149
ST. LOUIS, MISSOURI 63166

June 26, 1981

DOCKETED USNRC JUL 0 8 1981 NMSS MAIL SECTION DOCKET CLERK

Mr. John G. Davis
Director of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Davis:

ULNRC-457

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

Enclosed are 8 copies of an application for a Special Nuclear Material License for the Callaway Nuclear Plant, Unit 1. This application is filed pursuant to the Commission's regulations in 10CFR Part 70 requesting authorization for receipt, possession, and storage of Unit 1 unirradiated fuel assemblies and fission chambers for the incore detection system at the Callaway Nuclear Plant.

Fuel delivery to the Callaway site is scheduled to begin on or about April 1, 1982; therefore, we request the Special Nuclear Material License by March 1, 1982.

In accordance with 10CFR 170.11 (a)3 an application fee is not required.

Very truly yours,

John K. Bryan

ACP/CAB/kml

FEE EXEMPT

Part 50 licensee

cc: G. Edison w/a
N. A. Petrick w/a
G. A. Rathburn w/a
G. Charnoff, Esq. w/a

13330

STATE OF MISSOURI)
) S S
CITY OF ST. LOUIS)

John K. Bryan, of lawful age, being first duly sworn upon oath says that he is Vice President-Nuclear and an officer of Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By John K. Bryan
John K. Bryan
Vice President
Nuclear

SUBSCRIBED and sworn to before me this 26th day of June, 1981

Barbara J. Pfaff
BARBARA J. PFAFF
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL 22, 1985
ST. LOUIS COUNTY

UNION ELECTRIC COMPANY

APPLICATION FOR SPECIAL NUCLEAR MATERIALS LICENSE

FOR

RECEIPT AND POSSESSION OF UNIT 1 REACTOR FUEL

AND ASSOCIATED MATERIAL

CALLAWAY NUCLEAR PLANT

FINAL DRAFT

1.0 GENERAL INFORMATION

Union Electric Company (UE) hereby applies for a Special Nuclear Materials (SNM) License to provide for receipt, possession, inspection, storage and packaging for delivery to a carrier of fully assembled fuel assemblies and associated material for the initial core of the Callaway Unit 1 reactor. This license is to extend from April 1, 1982, until receipt of an operating license for Unit 1.

CORPORATE ORGANIZATION

UE is an independent investor-owned utility with its general offices located in St. Louis, Missouri. UE and its subsidiaries, Missouri Power and Light Company, Missouri Edison Company, and Missouri Utilities Company, serve an area which includes the greater part of the St. Louis metropolitan area and the eastern third of the State of Missouri, a 24,000 square mile area reaching into the southeastern tip of Iowa and into Illinois in the St. Louis area. All of the directors and principal officers are United States citizens. The names of Union Electric principal officers are as follows:

Name	Position
Charles J. Dougherty	Chairman of the Board and Chief Executive Officer
William E. Cornelius	President
Earl K. Dille	Executive Vice President
Stewart W. Smith, Jr.	Executive Vice President
H. Clyde Allen	Vice President
John K. Bryan	Vice President
James T. Friel	Vice President and Controller
Maurice E. Gatewood	Vice President
Granville J. Haven	Vice President
Robert O. Piening	Vice President
William A. Sanford	Vice President
Edgar J. Telthorst	Vice President

13330

Merle T. Welshans	Vice President
Hal Wuertenbaecher Jr.	Vice President
William E. Jaudes	General Counsel
George R. Murray	Secretary
Charles W. Mueller	Treasurer

The address of all the foregoing principal officers of Union Electric is:

P. O. Box 149
St. Louis, MO 63166

AGENCY

Union Electric is not acting as agent or representative of another person in filing this application. Union Electric is not owned, controlled, or dominated by an alien, a foreign corporation or a foreign government.

1.1 REACTOR AND FUEL

1.1.1 The Reactor

The Callaway Plant site area consists of approximately 2,767 acres. UE owns all of the area within the designated plant site boundary and will therefore exercise full ownership control of the site with full authority to determine all activities, including exclusion or removal of personnel and property from the area. It is located in east-central Missouri in Callaway County. The site is 25 miles east-northeast of Jefferson City and approximately 5 miles north of the Missouri River. It is situated approximately 10 miles southeast of Fulton and 80 miles west of St. Louis.

Callaway Unit 1 is presently under construction as authorized by Construction Permit CPPR-139, Docket Number 50-483 issued by the Nuclear Regulatory Commission on April 16, 1976.

1.1.2 Fuel Assemblies

Each fuel assembly (Figure 1.1-1) consists of 264 fuel rods, 24 guide thimble tubes and one instrumentation thimble tube arranged within a supporting structure in a 17 x 17 square array. The instrumentation thimble is located in the center position and provides a channel for insertion of an incore neutron detector, if the fuel assembly is located in an instrumentated core position. The guide thimbles provide channels for insertion of either a rod cluster control assembly (Figure 1.1-2), a neutron source assembly (Figure 1.1-3 and 1.1-4), a burnable poison assembly (Figure 1.1-5), or a thimble plug assembly (Figure 1.1-6), depending on the position of the particular fuel assembly in the core. The fuel rods (Figure 1.1-7) are loaded into the fuel assembly structure so that there is a clearance between the fuel rod ends and the top and bottom nozzles.

The fuel assembly structure consists of a bottom nozzle, top nozzle, guide thimbles, and grids. The bottom nozzle serves as the bottom structural element of the fuel assembly and is fabricated from Type 304 stainless steel. The top nozzle assembly functions as the upper structural element of the fuel assembly and is made of Type 304 stainless steel. The top nozzle springs and bolts are made of Inconel-718. The guide thimbles are fabricated from Zircaloy-4 tubing having two different diameters. The larger diameter is at the top and the smaller at the bottom. The guide thimbles are joined to the grids and the top and bottom nozzles to create an integrated structure. The fuel rods are supported at intervals along their length by grid assemblies which maintain the lateral spacing between the rods. Each fuel rod is supported within each grid by the combination of support dimples and springs. The grid material is Inconel-718. The length of a fuel assembly is approximately 160 inches.

The fuel rods consist of uranium dioxide ceramic pellets contained in slightly cold worked Zircaloy-4 tubing which is plugged and seal welded at the ends to encapsulate the fuel. The fuel pellets are right circular cylinders consisting of slightly enriched uranium dioxide powder which has been compacted by cold pressing and then sintered to the required density. The ends of each pellet are dished slightly to allow greater axial expansion at the center of the pellets.

A more detailed description of the fuel assemblies to be stored is set forth in the Standardized Nuclear Unit Power Plant System (SNUPPS) FSAR, Section 4.2.

1.1.3 URANIUM ENRICHMENT

The fuel assemblies are grouped into three regions, each region having a different nominal enrichment: Region 1 contains a nominal 2.10 w/o U-235, Region 2 contains a nominal 2.60 w/o U-235, Region 3 contains a nominal 3.10 w/o U-235. The average core enrichment is approximately 2.60 w/o U-235. A nominal enrichment is the design enrichment plus or minus a manufacturing tolerance. The maximum enrichment under this license will be 3.5 w/o U-235. Each fuel assembly will contain approximately 461 kg of uranium as uranium dioxide.

1.1.4 Number of Fuel Assemblies and Weight of U-235

The maximum quantity of special nuclear material for Callaway Unit 1 including one initial core of 193 fuel assemblies and allowance for extra material onsite will be 2,400 kg of U-235.

1.2 STORAGE CONDITIONS

1.2.1 Storage Area

The fuel will be handled, inspected, and stored in the Fuel Building. Scale drawings of the Fuel Building are presented in Figure 1.2-1. The fuel assemblies will be inspected in the New Fuel Assembly Inspection Area and stored in the new fuel storage facility and the spent fuel storage facility. Additional scale drawings of the Fuel Building can be found in Figures 1.2-20 through 1.2-22 of the SNUPPS FSAR.

1.2.2 Storage Area Facilities

Before fuel is stored in the Fuel Building, all heavy construction associated with the Fuel Building will be completed and all construction cranes located near the Fuel Building with the potential for damaging the building and decreasing the safety of storage will have been permanently removed. During activities required for completion of the Fuel Building, the following restrictions shall be imposed:

a. No crane operation directly over the stored fuel other than that required for fuel handling.

b. No construction or test work which adversely affects or decreases the safety of storage.

1.2.3 Fuel Handling Equipment

All storage facility structures, components, equipment and systems are located within the confines of the Fuel Building, a rectangular, structural steel, reinforced concrete structure meeting seismic Category I requirements.

The new fuel storage facility is located within the Fuel Building, and provides onsite dry storage for 66 new fuel elements (approximately one-third core). It is a separate and protected area containing fuel storage racks (Figure 1.2-2) and is enclosed by a reinforced concrete structure with an associated steel plate top containing hinged openings covering every two fuel assemblies. Drainage is provided to prevent accumulation of water within the vault. The new fuel storage racks are carbon steel with stainless steel guides where the rack comes into contact with the fuel assembly. Design, fabrication, and installation of the new fuel storage racks are based on the ASME Code specifications. Stresses in a loaded fuel rack are below the design stress level defined in the ASME Code, Section III, Appendix XVII. The new fuel storage racks are designed to seismic Category I criteria, and are anchored to the seismic Category I floor and walls of the new fuel storage facility. The new fuel storage facility maintains the new fuel elements in a subcritical array during all postulated design basis events. Assuming new fuel of the highest anticipated enrichment (3.5 w/o U-235) in place, the effective multiplication factor does not exceed 0.95 for the case of flooding with unborated water, nor does the effective multiplication factor exceed 0.98 assuming possible sources of moderation, such as aqueous foam or mist.

During the initial core fueling, more new fuel assemblies are delivered to each unit than can be contained within the new fuel storage facility. The new fuel assemblies which are not stored in the new fuel storage facility are stored dry in the designated spent fuel pool storage locations of Figure 1.2-3, Sheet 1. The spent fuel pool is a reinforced concrete structure with a stainless steel liner and is an integral part of the Fuel Building. The spent fuel storage racks (Figure 1.2-3, Sheets 2 and 3) are free standing mechanisms with leveling devices which rest on the spent fuel pool floor. The entire spent fuel storage rack will be maintained in a Region 1 configuration during the initial core receipt and fueling operation. The rack modules are constructed from square tubes which are welded together to form a honeycomb module. The spent fuel storage racks are designed to meet seismic Category I requirements. Design, fabrication, and installation of the spent fuel pool racks are based on AISC specifications. The design of the racks is based on the elastic design method and allowable stresses defined in Part 1 of the AISC specifications. Allowable stresses are expressed as percentages of yield stresses obtained from Section III of the ASME Code. Neither the framing nor the racks are tied to the liner plate at the floor or walls. Assuming a fuel enrichment of 3.5 w/o, criticality analysis shows that the spacing between fuel assemblies in the storage racks is sufficient to maintain the array, when fully loaded and flooded with nonborated water, in a subcritical condition with Keff less than 0.95. The structural, seismic, criticality, and thermal hydraulic analysis show the racks are designed so that there is no decrease in the degree of subcriticality provided during all normal, abnormal, or accident conditions.

All fuel handling will be performed with cranes, hoists, and handling equipment located in the Fuel Building. The new fuel assemblies are removed one at a time from the shipping container, utilizing the monorail on the cask handling crane (Figure 1.2-4) and a new fuel handling tool (Figure 1.2-5). The cask handling crane is a Crane Manufacturers Association of America No. 70, Class A indoor electrical overhead traveling bridge crane with a single trolley and all the necessary motors, controls, and brakes, and a festooned pendant control station. The monorail hoist on the cask handling crane is rated at 5 tons. The festooned pendant control station or radio control unit is utilized for controlling the cask handling crane and the monorail hoist.

The new fuel assembly handling tool is a short-handled device located on the cask handling crane monorail. The new fuel assembly handling tool is used to handle new fuel on the operating deck of the Fuel Building, to remove the new fuel from the shipping container, and to facilitate inspection and storage of the new fuel and loading of fuel into the new fuel storage racks or the new fuel elevator. The new fuel assembly handling fixture employs four cam-actuated latching fingers which grip the underside of the fuel assembly top nozzle. When the fingers are latched, the safety mechanism on the side of the tool is turned in to prevent accidental unlatching of the fingers. The new fuel elevator (Figure 1.2-6) consists of a box-shaped assembly with its top end open. The elevator is sized to house only one fuel assembly. The elevator is located on the wall of the cask loading pool and is used exclusively to lower a new fuel assembly to the pool bottom.

The spent fuel bridge crane (Figure 1.2-7) is a CMAA No. 70, Class B type and is designed to maintain its integrity during a Safe Shutdown Earthquake (SSE). The crane consists of a 5-ton-capacity wheeled bridge structure with steel deck walkway, a 2-ton motorized monorail trolley, and a 5-ton manual push-type trolley. The crane has interlocking capabilities with the new fuel elevator. The 2-ton electric hoist of the crane will be used for transfer of the new fuel assemblies from the new fuel elevator to storage in the spent fuel pool. Control will be from a pendant station supported from the trolley. The spent fuel assembly handling tool (Figure 1.2-8) will be used to manually handle the new fuel in the spent fuel pool. An operator on the spent fuel bridge guides and operates the tool. The tool is designed to maintain its integrity during an SSE. The tool employs four cam-actuated latching fingers which grip the underside of the fuel assembly top nozzle. When the fingers are latched, a lock pin is inserted into the operating handle to prevent the fingers from being accidentally unlatched during fuel handling operations.

1.2.4 Fire Protection

Fire protection for the railroad bay and the new fuel shipping container storage and unloading area is provided by a preaction sprinkler alarm system which can be triggered by a local pulldown station.

Additional fire protection is provided by two permanently mounted fire hose racks (75 feet), two 2 1/2-gallon water extinguishers and three 20-pound carbon dioxide extinguishers.

Fire protection for the new fuel storage area consists of one 20-pound carbon dioxide extinguisher and one 2 1/2-gallon water extinguisher. There is also one permanently mounted hose rack (75 feet) accessible through one door at the stairwell on the same elevation.

Fire protection for the spent fuel pool consists of one permanently mounted hose rack (75 feet), three 20-pound carbon dioxide extinguishers and one 2 1/2-gallon water extinguisher. There is also one permanently mounted hose rack (75 feet) and one 20-pound carbon dioxide extinguisher common to both the new fuel storage area and the spent fuel pool.

In the event an isolation valve to the permanently mounted hose rack or the preaction sprinkler alarm system is closed, an alarm sounds on fire control panel KC008 in the control room. In the event this detection system is inoperable, administrative procedures shall be instituted to provide adequate coverage.

A more detailed description of the Callaway Plant Unit 1 fire protection plan is found in the SNUPPS FSAR, Section 9.5.1.

1.2.5 Access Control

When fuel assemblies are stored in the new and/or spent fuel storage facilities, access to the storage area will be restricted to authorized personnel. A watchman will be located near the designated access door at all times when either the Security or Fire Protection System is inoperable and entry by authorized personnel shall be made after proper notification of the watchman has been made. All doors to the Fuel Building shall be locked.

1.3 PHYSICAL PROTECTION

The new fuel storage facility and the spent fuel storage facility are both located in the Fuel Building which is a controlled access area. A copy of the Physical Security Plan for the Callaway Plant Unit 1 has been provided to the NRC and has been withheld from public disclosure pursuant to paragraph 2.790(d), 10CFR Part 2, Rules of Practice.

1.4 TRANSFER OF SPECIAL NUCLEAR MATERIAL

The new fuel will be shipped to Callaway by Westinghouse in approved metal shipping containers under NRC Certificate of Compliance No. 5450, Docket 71-5450.

Union Electric Company will not package fuel for delivery to a carrier for transport, except in the event of a damaged or unacceptable fuel assembly to be shipped back to Westinghouse. In this case, the fuel will be packed and shipped in accordance with requirements of 10CFR71 and 49CFR170-189.

1.5 FINANCIAL PROTECTION AND INDEMNITY

Pursuant to 10CFR Part 140.13, an application will be submitted to American Nuclear Insurers for the required $1 million insurance covering the period from the first shipment of fuel assemblies from the Westinghouse manufacturing facilities in Columbia, South Carolina, until the first fuel assembly is loaded into the reactor. Proof of such financial protection will be furnished before fuel shipment.

2.0 HEALTH AND SAFETY

2.1 RADIATION CONTROL

2.1.1 Experience and Training of Radiation Control Personnel

James R. Peevy, Assistant Superintendent, Engineering - Radiochemistry, is responsible for the administration and implementation of the Health Physics program to ensure that appropriate radiological controls exist and that personnel radiation exposure is maintained per ALARA.

The training, experience and qualifications of this individual are delineated in Section 13.1.3.2 of the Callaway Plant FSAR and in Tables 1.2-1 and 1.2-2.

2.1.2 Contamination Detection Procedures

Site receipt of licensed material other than new fuel will be handled in accordance with the requirements of 10CFR20.205, "Procedures for picking up, receiving and opening packages" and the guidelines of Regulatory Guide 7.3. Upon receipt of SNM, the external surfaces of the shipping container will be monitored for radiation levels and radioactive contamination. Radiation surveys will be performed using a portable Geiger-Mueller survey instrument. If significant neutron levels are expected, neutron instrumentation will be utilized. Contamination levels will be evaluated by performing a smear survey. Smears will be counted for alpha and beta-gamma contamination. Radiological conditions exceeding the limits specified in 10CFR20.205 will result in the establishing of radiological controls and immediate notification of the NRC. Radiological precautions will be exercised during the opening of radioactive material shipping packages. Radiation and contamination surveys will be performed on the interior of the package and on the package contents.

Preliminary radiation and contamination surveys will be conducted on new fuel shipments prior to site access to evaluate the radiological status of the shipment. Upon arrival on site and pursuant with 10CFR20 and 49CFR173, a comprehensive radiation and contamination survey will be performed on the transport vehicle and the exterior of the fuel shipping containers. As a minimum, radiation readings will be obtained on contact with the vehicle, on contact with the fuel shipping container, at 3 feet from the fuel shipping container and at 6 feet from the vehicle. Prior to off loading of fuel shipping containers, smears will be taken on the vehicle and the external surface of the containers. The smears will be counted for beta-gamma and alpha contamination. When the fuel shipping containers are opened, a smear survey will be performed on the interior of the container and on the protective covering of the fuel assemblies. As the fuel assemblies are uncovered, smears and contact radiation readings will be taken at representative locations.

Radiological surveys of the fuel shipments will be performed using portable GM survey instruments and a portable alpha survey meter. Smears will be counted for alpha contamination using either a gas flow proportional counter or an alpha scintillation counter. Beta-gamma contamination will be evaluated by counting smears with a gas flow proportional counter or a shielded gross counting setup utilizing an end window GM detector.

All fuel handling activities will be covered by a Radiological Work Permit (RWP) system. The RWP will specify requirements for dosimetry, protective clothing and Health Physics coverage.

The fuel handling area will be posted with appropriate caution signs and boundaries as radiological conditions warrant. A contamination frisking station will be provided at the exit of the area during receipt, inspection and movement of new fuel. A portable area radiation monitor with an audible alarm will be located in the vicinity of the fuel handling area during fuel movement. Periodic air grab sampling will be conducted during the unpackaging and movement of fuel assemblies.

If contamination levels exceeding the site contamination limits are discovered, contamination control measures will be implemented. These actions will include establishing a contamination control point, strict control of personnel access to the area, use of appropriate protective clothing, and reestablishment of area barriers, boundaries and postings. As a precaution, periodic air sampling will be augmented.

Decontamination of the area and equipment will be initiated under the supervision of Health Physics personnel. Disposal of waste generated by the decontamination activities will be accomplished under the requirements of the plant radioactive material control program. Only when the area is decontaminated to levels below site limits, as defined in Health Physics Administrative Procesures will the contamination control provisions be removed.

2.1.3 Instrumentation Calibration

Portable survey instrumentation will be calibrated quarterly and following repair using National Bureau of Standards traceable radioactive sources. Readings at two points on each scale will be verified during the calibration process.

Frisking type instruments will be standardized on the same frequency by checking instrument response using an electronic pulse generator and determining instrument efficiency using a certified button source.

Portable radiation survey instruments will be source checked for a qualitative response to radiation prior to use.

Laboratory counting instruments such as the gas flow proportional counter, alpha scintillation counter and end window GM counter will be standardized monthly. An instrument operational check will be performed daily when instruments are in use. Standardization will consist of running a detector voltage plateau to determine operating voltage and determination of instrument counting efficiency.

2.2 NUCLEAR CRITICALITY SAFETY

The nuclear fuel assemblies will be transferred individually from their shipping containers for storage in the fuel storage racks.

The nuclear safety analysis for storage of fuel in the new and spent fuel storage facilities is discussed in the SNUPPS FSAR, Section 9.1. The entire spent fuel storage rack will be maintained in a Region 1 configuration during the initial core receipt and fueling operation, therefore, any reference to Region 2 criticality safety analysis is not applicable.

Having a maximum of one fuel assembly out of storage locations in the criticality safe metal shipping containers, the new fuel storage racks, or the spent fuel storage racks at any one time, precludes the possibility of accidental criticality during receipt, inspection, and handling activities. Accordingly, the monitoring and emergency procedures described in 10CFR70.24 are unnecessary, and an exemption from the requirements of 10CFR70.24 is requested.

When the fuel arrives, only one container with fuel will be unloaded at any one time. The fuel assemblies will be removed, one assembly at a time and inspected. If a fuel assembly fails inspection, it will be repaired, if possible, and reinspected. If the fuel assembly is irreparable, it will be properly stored until arrangement for subsequent shipment back to Westinghouse. After successful inspection, the fuel assemblies will be moved to the new and spent fuel storage racks. The fuel, at some later time, may be removed from the storage racks and reinspected.

A maximum of one fuel assembly will be removed from the approved shipping containers, the new fuel storage racks, or the spent fuel storage racks at any one time. This control precludes the possibility of accidental criticality during receipt, inspection, and handling.

2.3 ACCIDENT ANALYSIS

The possibility of a fuel handling accident is remote because of the many administrative controls and physical limitations imposed on the fuel handling operations. A dropped fuel assembly cannot impact the new fuel storage racks, since a steel cover is provided over the new fuel storage area.

The spent fuel storage racks are designed to prevent a dropped fuel assembly from penetrating and occupying a position other than a normal fuel storage location. The only positive reactivity effect of such a bundle on the multiplication factor of the spent fuel storage rack would be by virtue of a reduction in axial neutron leakage from the rack. Calculations show that a dropped fuel bundle would not have any significant effect on the reported maximum possible reactivity of the spent fuel storage rack. Furthermore, the reported maximum possible reactivity of the rack for both wet and dry storage conditions is based on infinite array calculations (both laterally and vertically). Additional accident analyses for the spent fuel storage rack can be found in the SNUPPS FSAR, Subsection 9.1A.2.5. The entire spent fuel storage rack will be maintained in a Region 1 configuration during the initial core receipt and fueling operation, therefore, any references to Region 2 criticality accident analysis is not applicable.

Despite the many administrative controls and physical limitations imposed on fuel handling operations, the postulated fuel handling accident of dropping a fuel assembly, resulting in the rupture of the cladding of all the fuel rods in the assembly has been analyzed. The results are discussed in the SNUPPS FSAR, Section 15.7.4. It is noted that for initial fuel receipt, all fuel is unirradiated, therefore, due to the lack of fission gas accumulation, permanent Heating, Ventilation and Air Conditioning and Radiation Monitoring System equipment may not be operable for the initial new fuel receipt and storage only.

The possibility of a criticality accident is considered remote due to the design of the fuel handling and storage equipment and the administrative controls.

The possibility of fuel damage due to fire in the fuel storage area is considered remote due to the limited supply of combustible materials and administrative controls governing ignition sources.

3.0 OTHER MATERIALS REQUIRING NRC LICENSE

3.1.1 Other Special Nuclear Materials

Other special nuclear materials for which a license is requested consists of:

Uranium-235 in the following form and quantity.

Form:	Approximately 93% U-235
Amount:	96.0 mg Uranium Oxide (U3O8) (81.2 mg U-235)
Capsule Type:	Fission chambers manufactured by Westinghouse Electric Corporation - Industrial and Government Tube Division, Model Number WL-23630 (15 chambers)
Amount/Chamber:	5.2 mg nominal Uranium Oxide (U3O8) (4.1 mg nominal U-235)

The fission chambers will be used in the Incore Detector system for Callaway Unit 1. Prior to use the detectors will be stored in either the Health Physics Department or the Reactor Engineering Department in a locked cabinet.

3.1.2 Storage Information

The onsite storage of radioactive material will comply with or exceed the requirements of 10CFR20.

1. Source storage areas will consist of a barrier wall or fence and lockable door. The storage area will be constructed such that radiation levels will not exceed the range of a radiation area (10CFR20.202(b)(2)) on the outside confines of the barrier as a result of stored radioactive material.

2. The area will be posted in accordance with 10CFR20.203.

3. Containers and storage casks containing radioactive material will be labeled pursuant to 10CFR20.203(f).

4. Access to radioactive material storage areas will be controlled by the Health Physics group. The storage area will be locked when unattended.

5. Radioactive material storage areas will be surveyed periodically for radiation and contamination.

6. Radioactive material stored in uncontrolled areas will meet the requirement of 10CFR20.105 in addition to the requirements listed above.

3.2 The fission chambers will not be used for any purposes other than storage until installation.

3.3 RADIATION PROTECTION

The storage and use of the radioactive materials identified in Section 3.1 will be conducted under the scope of the Health Physics program as described in Section 12 of the Callaway Plant FSAR. In addition, the equipment, facilities and radiological safety provisions described in the byproduct license application dated October 6, 1980, as referenced by the Callaway Plant broad scope byproduct license number 24-02020-06, are applicable to activities involving these radioactive sources. Health Physics coverage will be provided during the use or transfer of the described radioactive sources.

Table 2.1-1

TRAINING
James R. Peevy

FORMAL EDUCATION

Sept. '67 - May '69	Nathan Hale High School Tulsa, Oklahoma
Sept. '69 - Jan. '71 Dec. '76 - Dec. '78	Oklahoma State University Stillwater, Oklahoma B.S. Radiation - Nuclear

TRAINING

March '72 - Aug. '72	U.S. Navy Naval Nuclear Power School
Sept. '72 - March '73	U.S. Navy Naval Nuclear Prototype AIW Training
April '73 - June '73	U.S. Navy Engineering Laboratory Technician Training
July '73 - Sept. '73	U.S. Navy U.S.S. Enterprise - Shipboard Training
March '79 - April '79	Applied Health Physics Training for Supervisory Personnel Texas A & M University
April '79 - June '79	Westinghouse Phase I Nuclear Theory
July '79 - Sept. '79	Westinghouse Phase II Callaway Systems Training
Jan. '80 - April '80	Westinghouse PWR Chemist Course

Table 2.1-1 (Continued)

FORMAL TRAINING IN RADIATION SAFETY

The following class and laboratory work was completed at Oklahoma State University (listed by semester hours).

Public Health Aspects of Radiation	3 hrs.
Radiological Health	4 hrs.
Environmental Radiation Fundamentals	4 hrs.
Elements of Industrial Hygiene	4 hrs.
Radiation Measurement I	5 hrs.
Radiation Measurement II	4 hrs.
Health Physics Practices	3 hrs.
Nondestructive Testing	4 hrs.
Computer Programming	3 hrs.
Statistics	3 hrs.
Calculus I	3 hrs.
Calculus II	3 hrs.
Biological Science	4 hrs.
Radiation Biology	5 hrs.

Table 2.1-2

EXPERIENCE WITH RADIATION
James R. Peevy

SUMMARY OF RADIOLOGICAL WORK EXPERIENCE

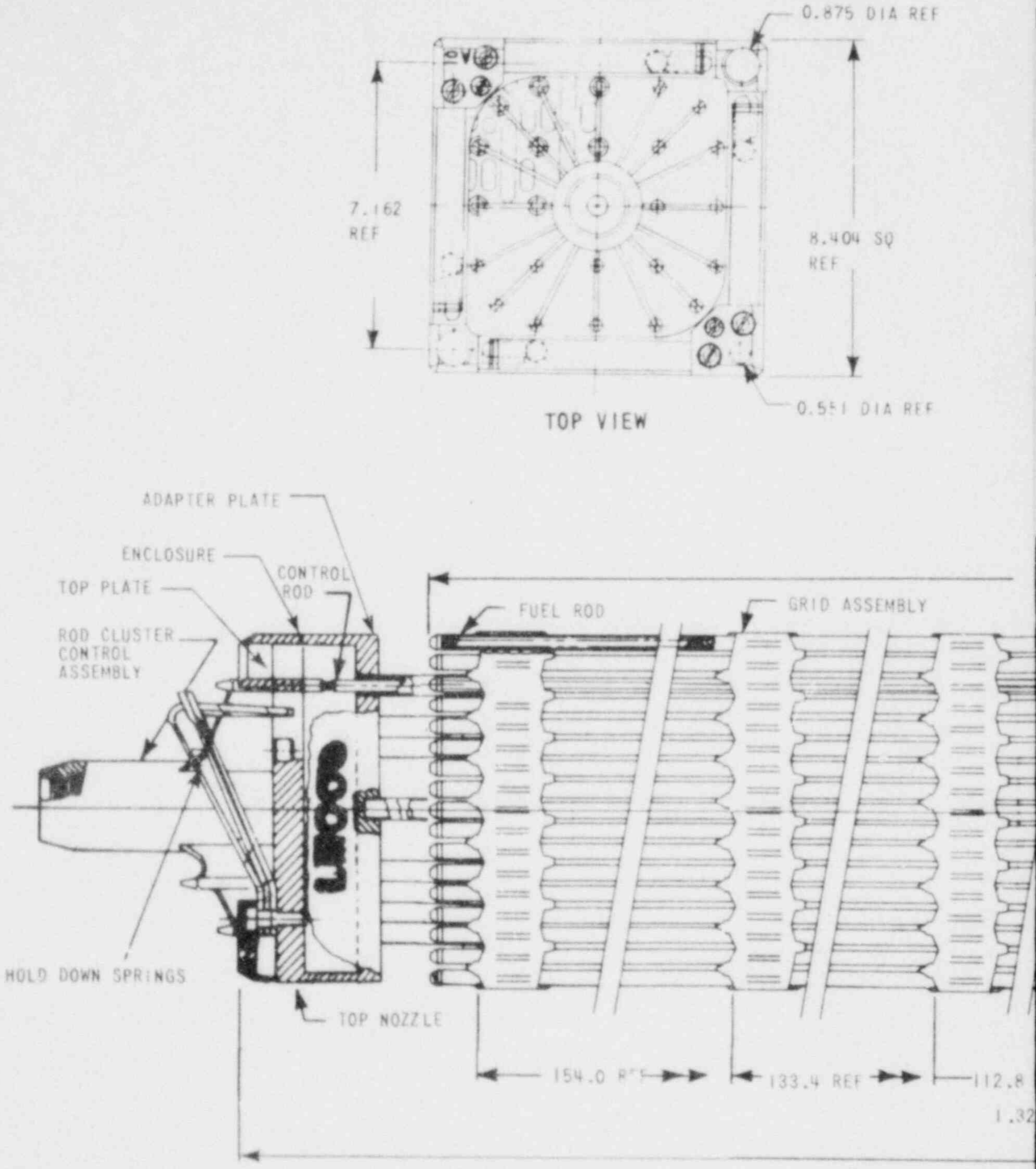
July '72 - Dec. '76	U.S.S. Enterprise Engineering Laboratory Technician - Performed chemical and radiochemical analyses on reactor and steam plant waters, implemented chemistry and radiological controls procedures for eight nuclear reactors. Worked with a 4 curie Pu-Be neutron source for power range detector calibration. Provided radiological monitoring and Health Physics controls for steam generator eddy current testing. Radiation fields consisted of 17 R/hr hard beta and up to 5 R/hr gamma. Provided radiological coverage for numerous jobs associated with reactor plant maintenance and was actively involved in many decontamination programs. Held position of Health Physics group supervisor. Responsible for the issue and control of more than eight hundred thermolumenescent dosimeters and documentation of radiation exposure for the entire ship.
Dec. '76 - Dec. '78	Oklahoma State University During course of laboratory work utilized a cobalt-60 irradiator, 1200 R/min. Numerous isotopes were used during course work usually in the micro curie range.
March '79 - April '79	During coarse of training at the Nuclear Science Center, Texas A & M University, an 8.96 curie Cs-137 source was utilized for instrument calibrations.
Feb. '80 - March '80	During course of training at Westinghouse ARD center numerous isotopes were used in conjunction with training on counting systems.

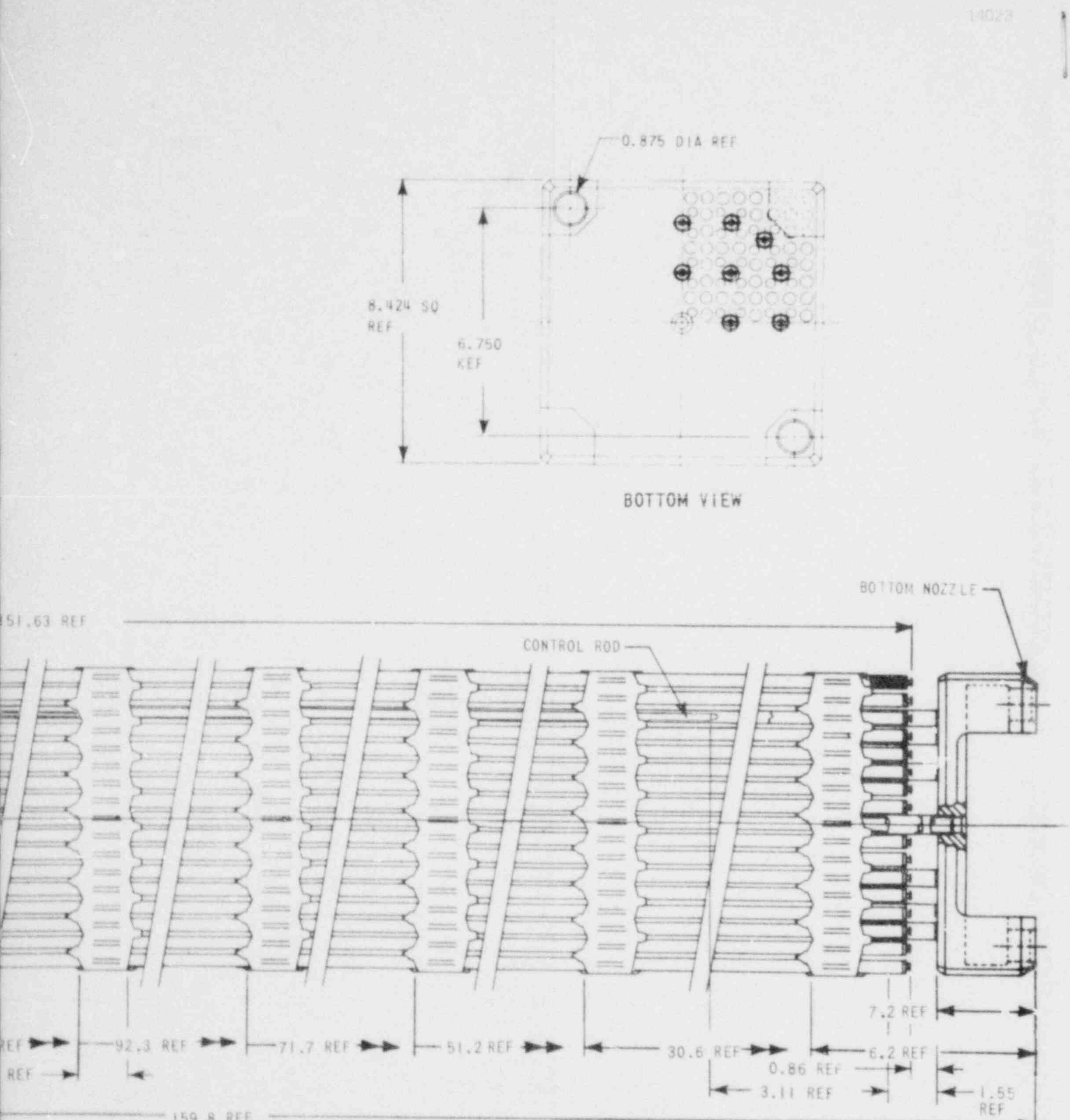
Table 2.1-2 (Continued)

March '80	On the job training at Farley Nuclear Plant. Worked with isotopes in normal daily laboratory analyses. Participated in cleaning of Waste Hold Up Tank working with gamma fields up to 40 R/hr and high airborne activity.

ACCUMULATIVE WORK EXPERIENCE

Nuclear Experience, U.S. Navy	51 months
Nuclear Power Plant, Operational Farley	1 month
Nuclear Power Plant, Startup Callaway	18 months
Total Creditable Power Plant Experience	70 months

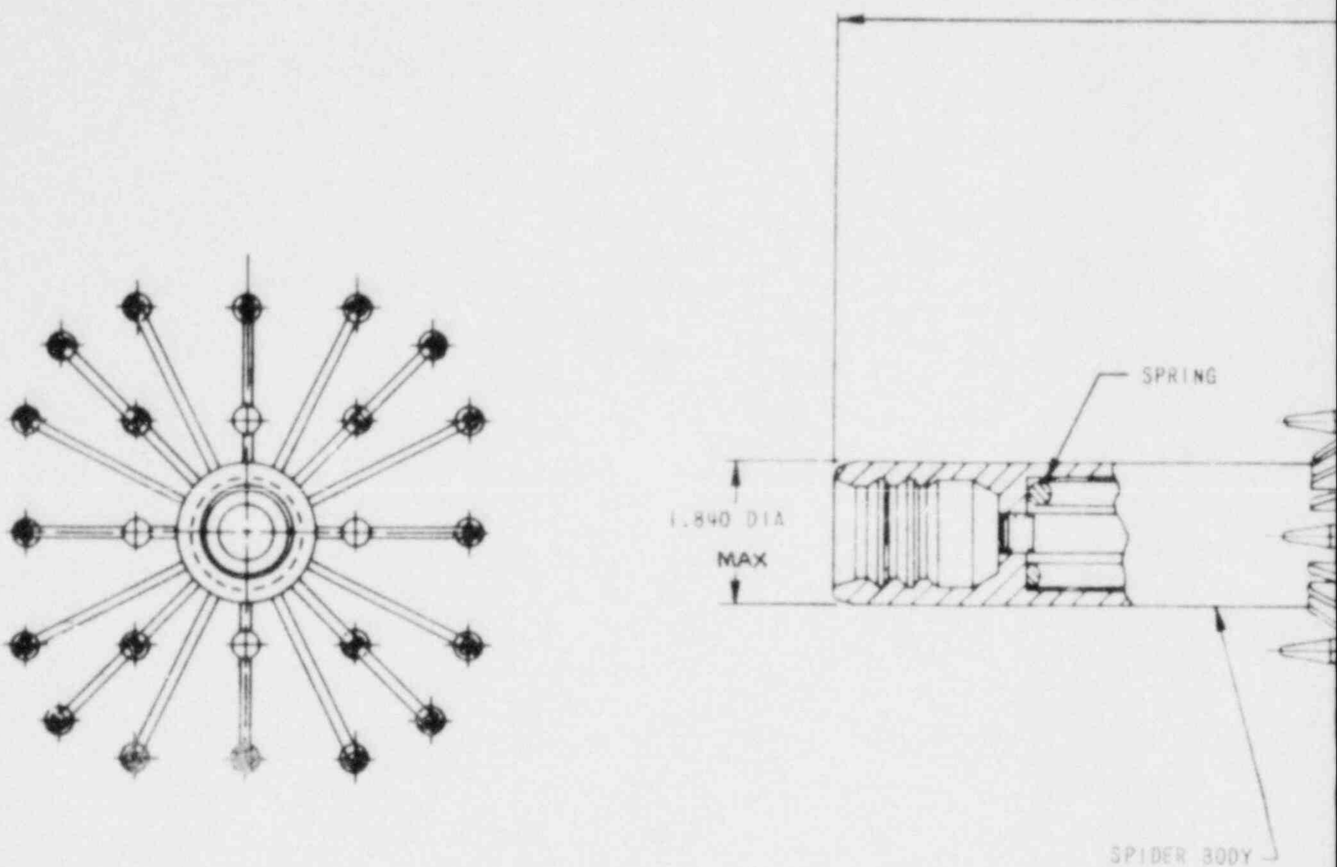

0.875 DIA REF
7.162
REF
8.404 SQ
REF
0.551 DIA REF
TOP VIEW
ADAPTER PLATE
ENCLOSURE
CONTROL
ROD
TOP PLATE
ROD CLUSTER
CONTROL
ASSEMBLY
FUEL ROD
GRID ASSEMBLY
HOLD DOWN SPRINGS
TOP NOZZLE
133.4 REF



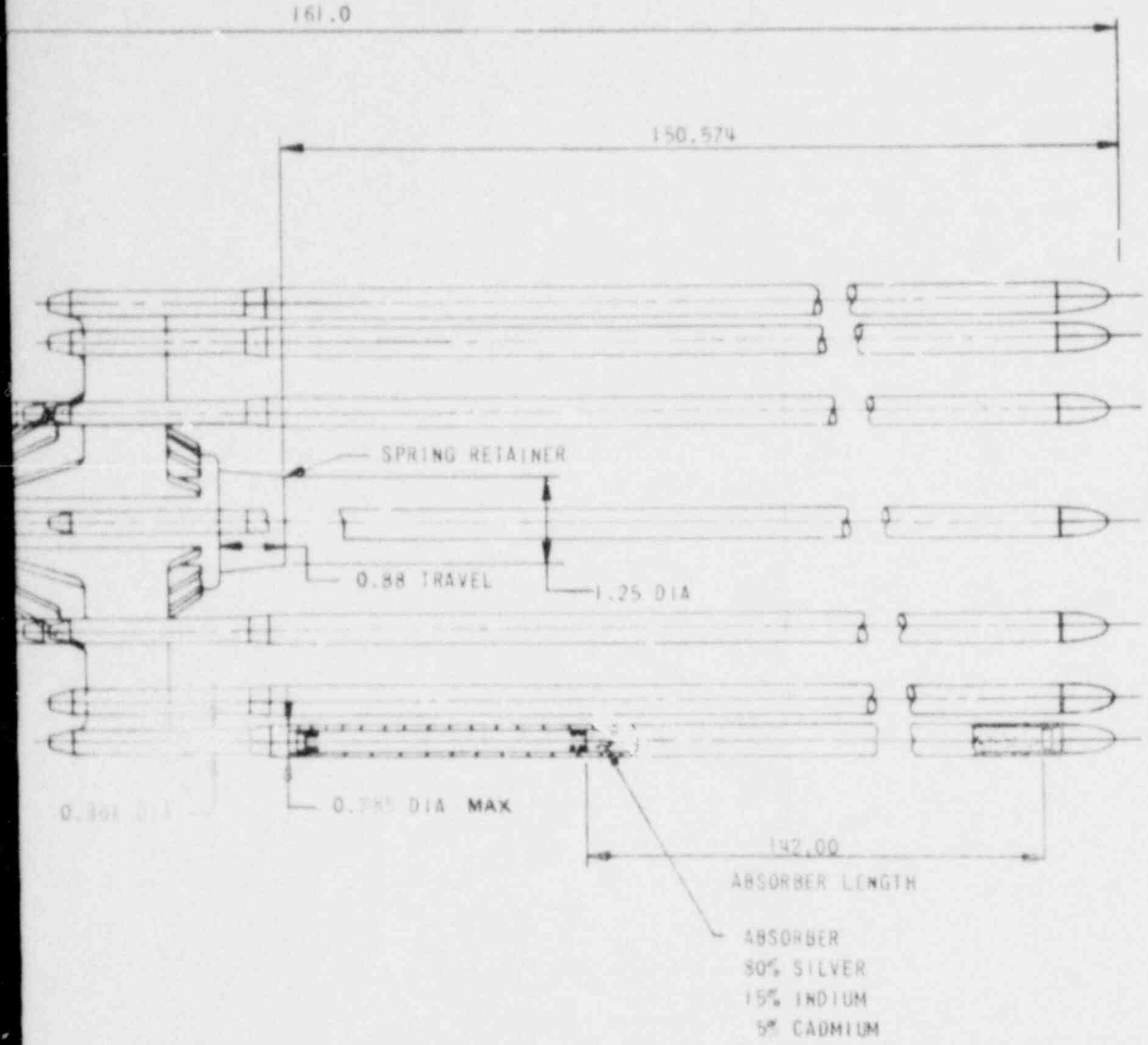
UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.1-1

FUEL ASSEMBLY
OUTLINE 17 x 17



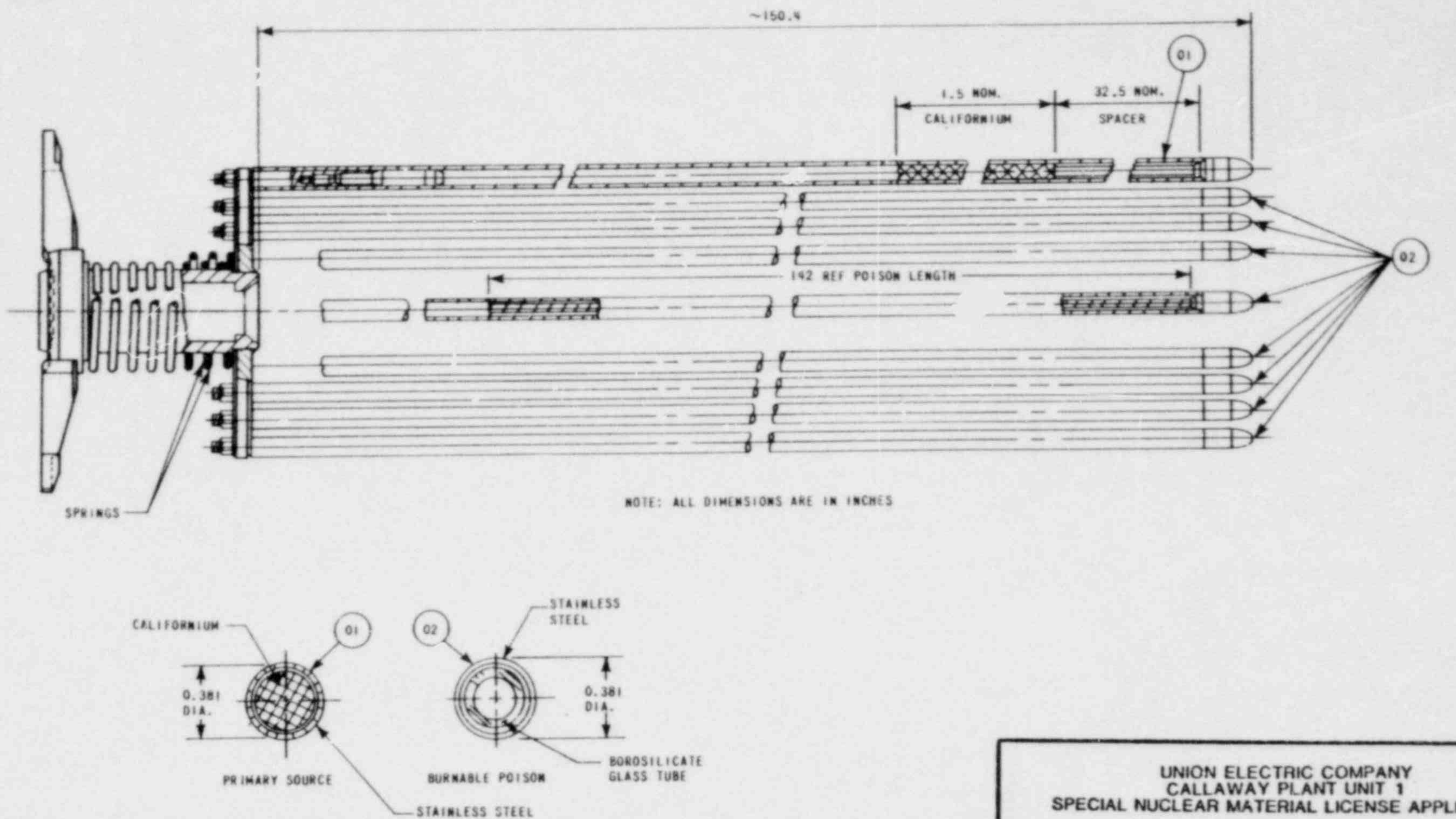
SPRING
1.840 DIA
MAX
SPIDER BODY



UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.1-2

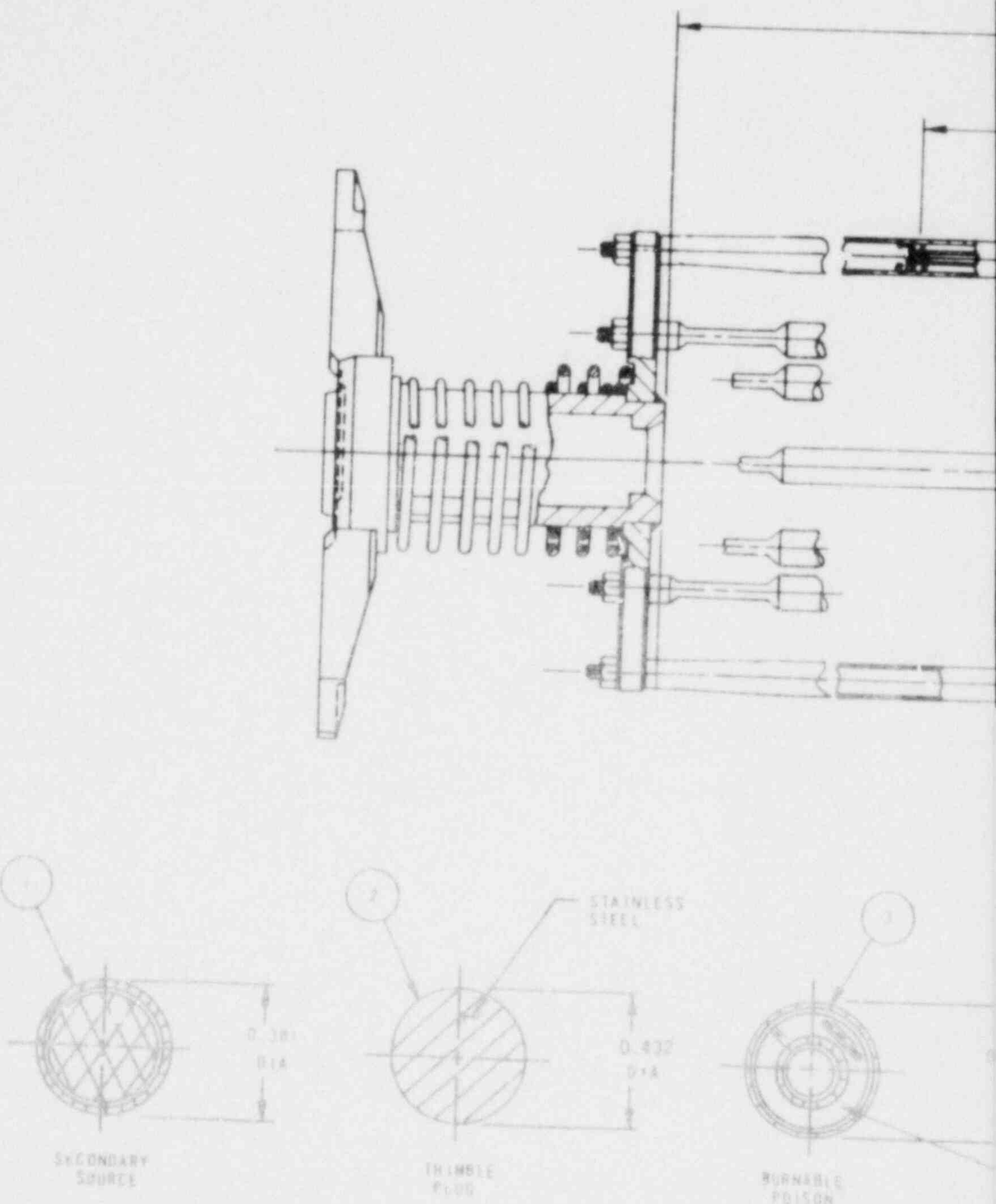
ROD CLUSTER
CONTROL ASSEMBLY OUTLINE

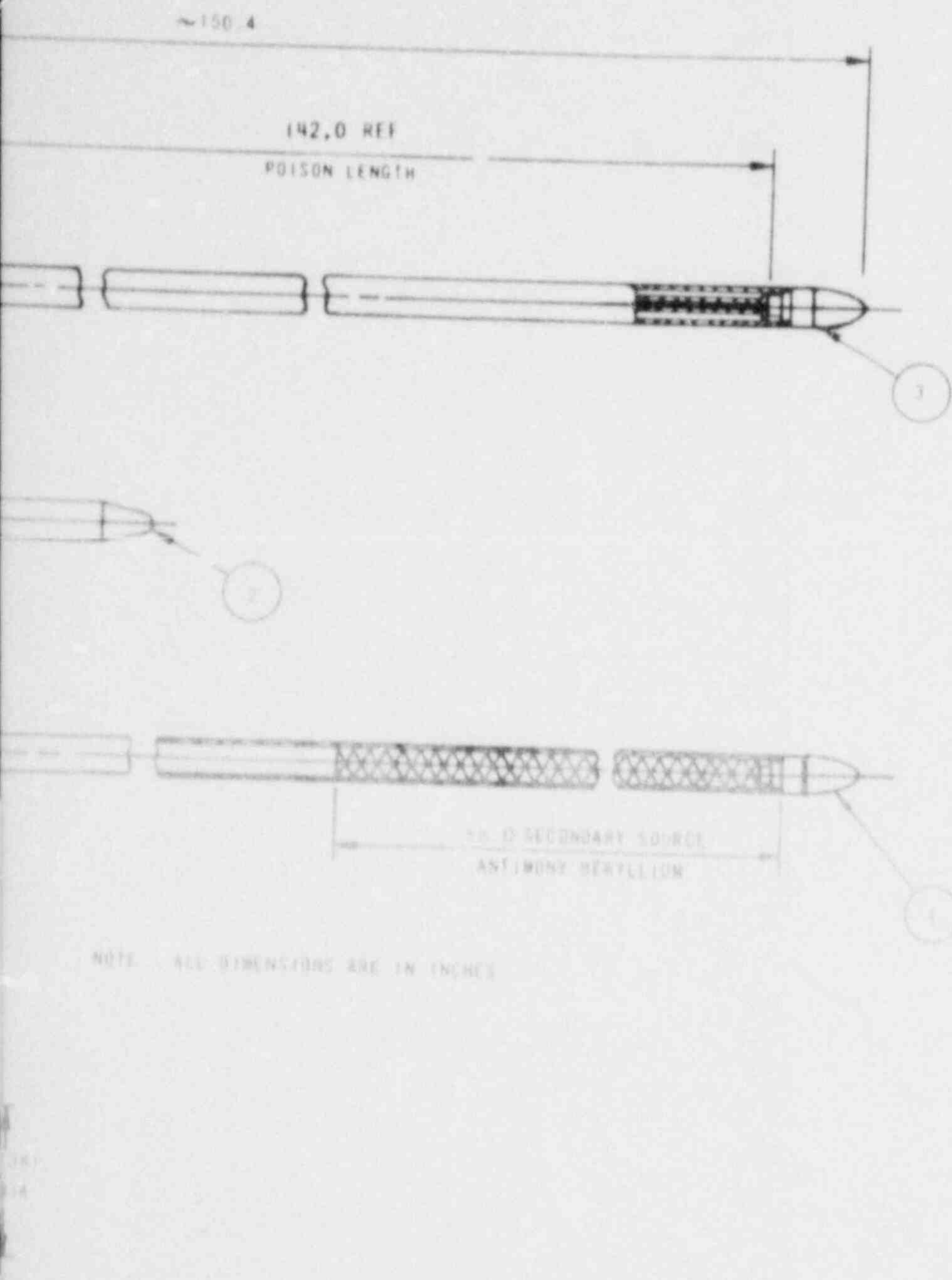


UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.1-3

PRIMARY SOURCE ASSEMBLY

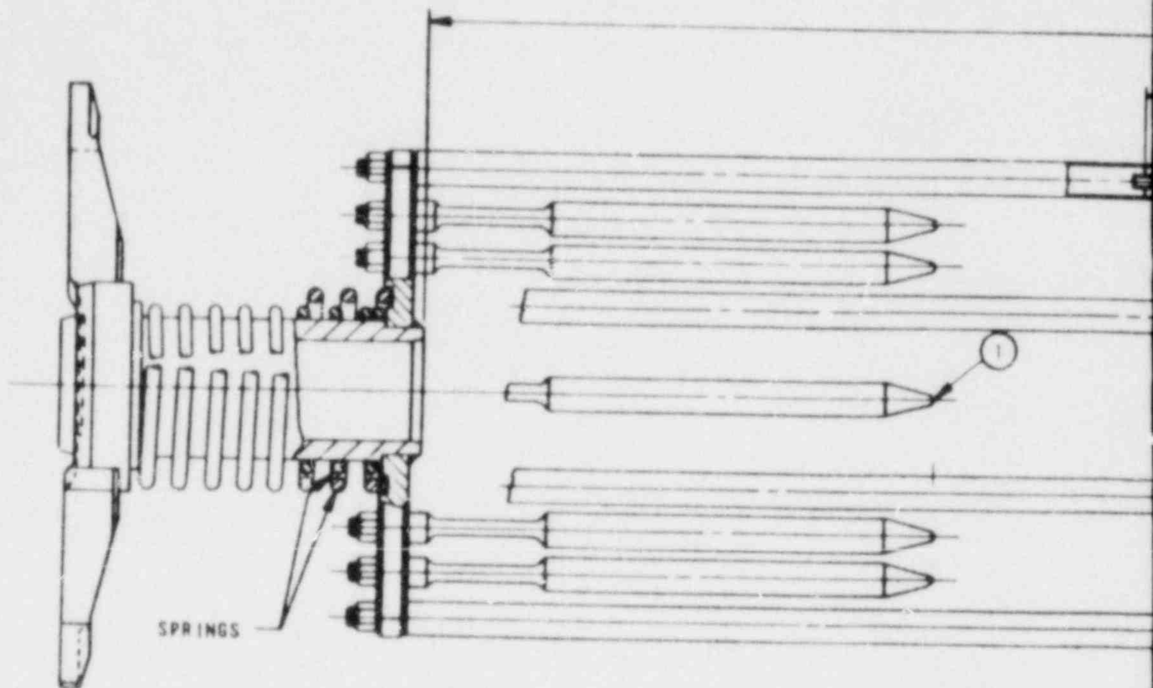

STAINLESS STEEL
0.432 DIA
SECONDARY SOURCE
THIMBLE PLUG
BURNABLE POISON

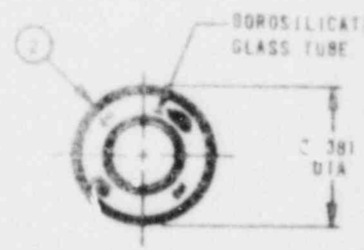


UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

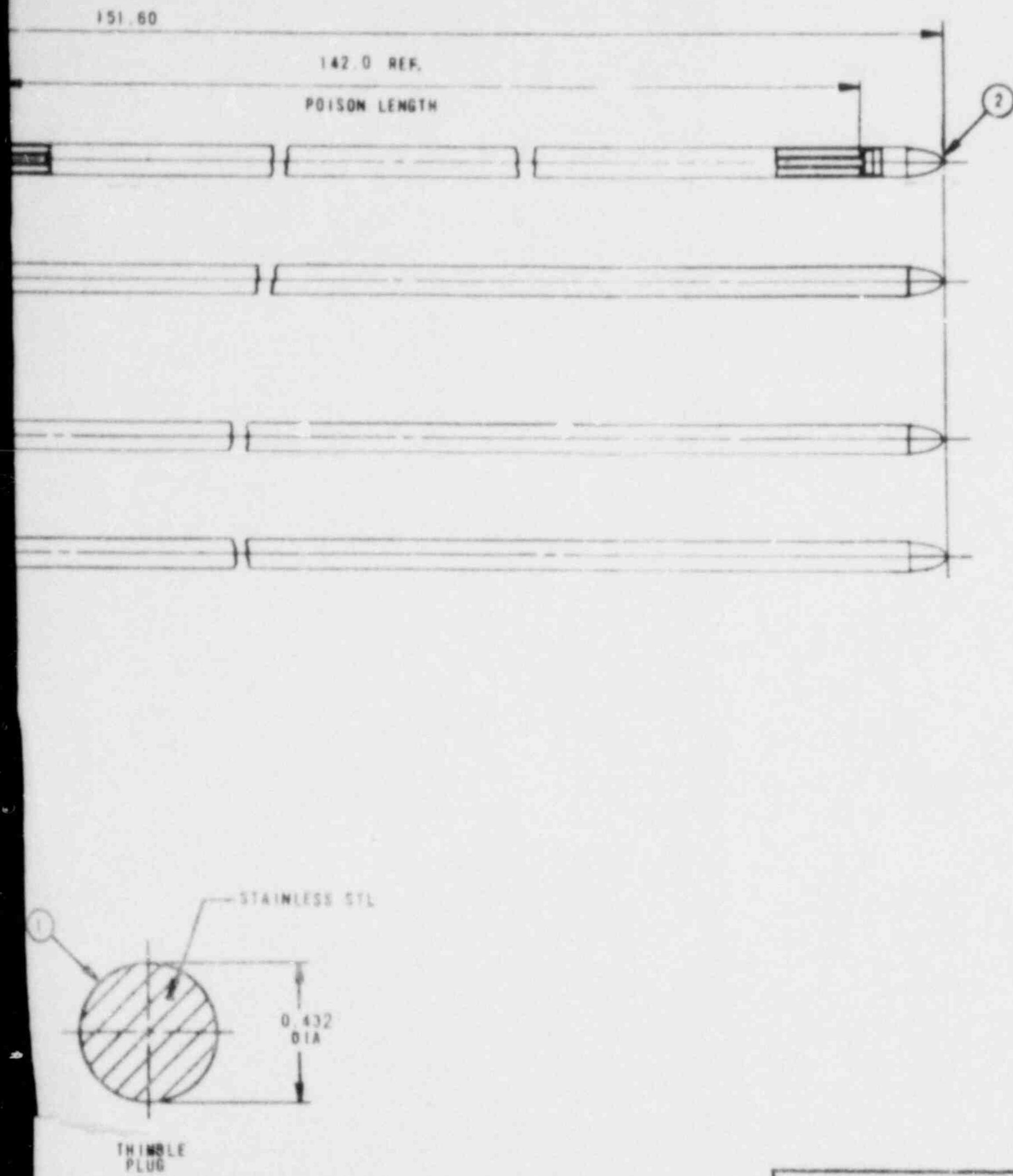
FIGURE 1.1-4

SECONDARY SOURCE ASSEMBLY





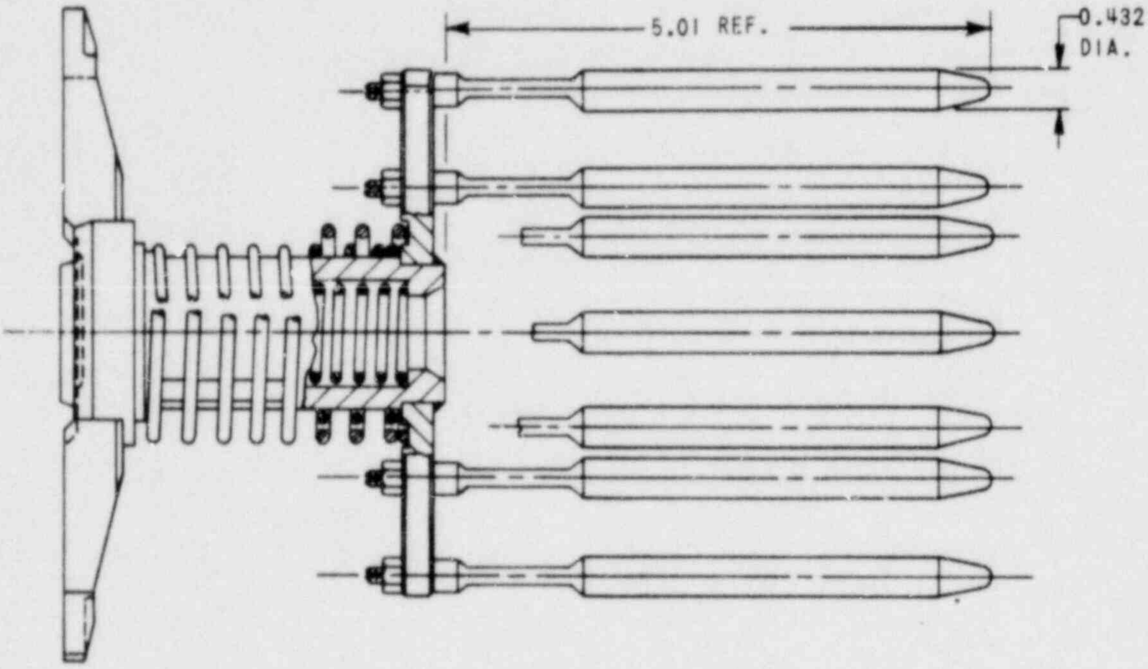
BURNABLE
POISON ROD



UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.1-5

BURNABLE POISON ASSEMBLY

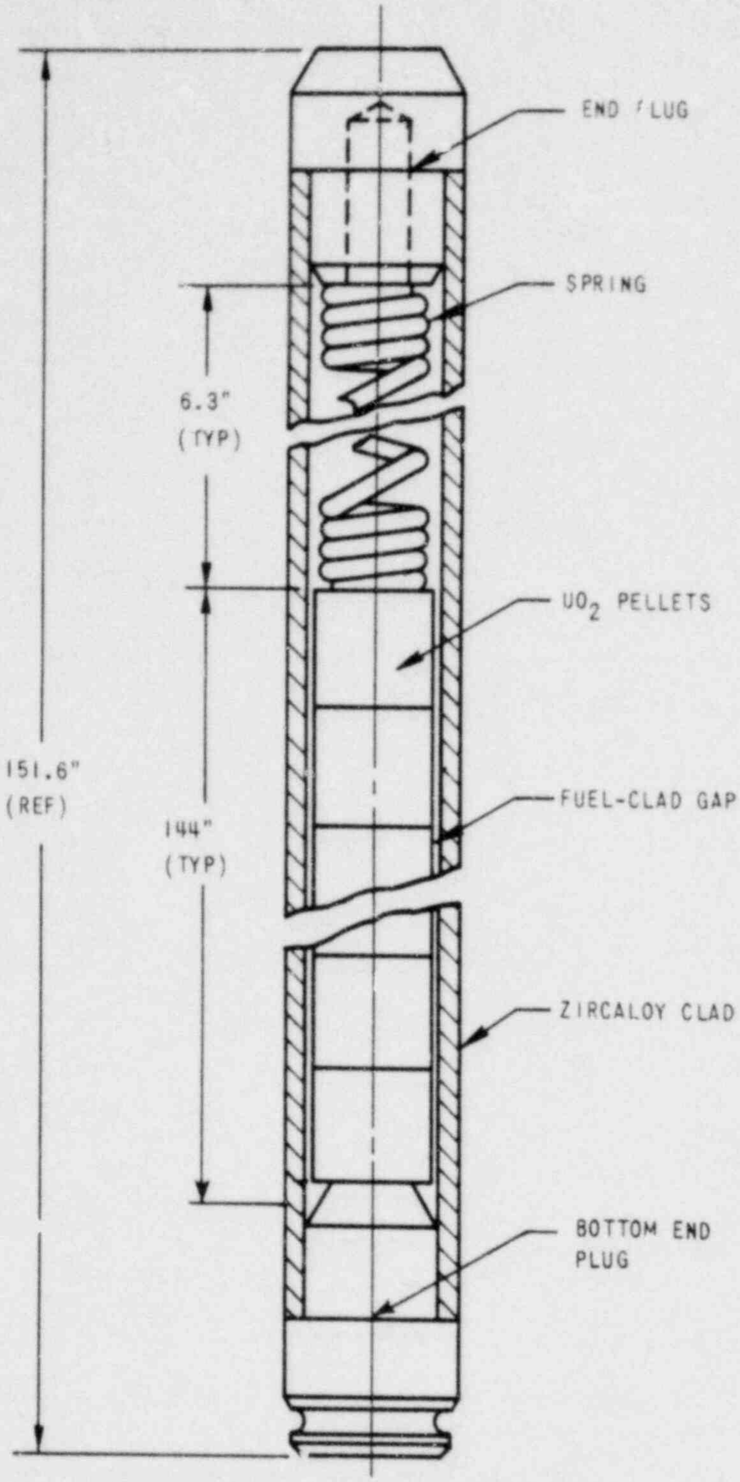


UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.1-6

THIMBLE PLUG ASSEMBLY

13384-266

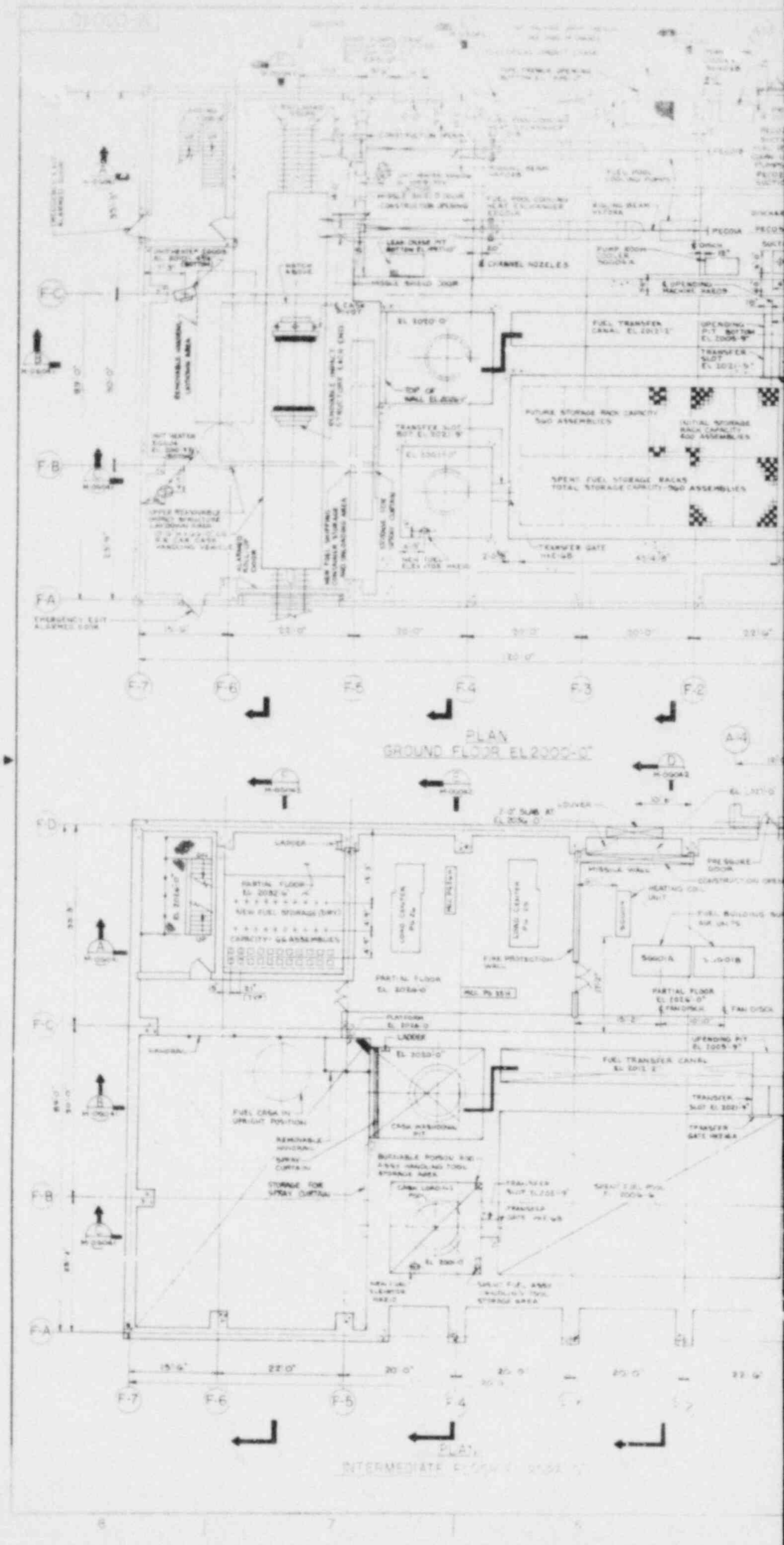


SPECIFIC DIMENSIONS DEPEND ON DESIGN VARIABLES SUCH AS PRE-PRESSURIZATION, POWER HISTORY, AND DISCHARGE BURNUP

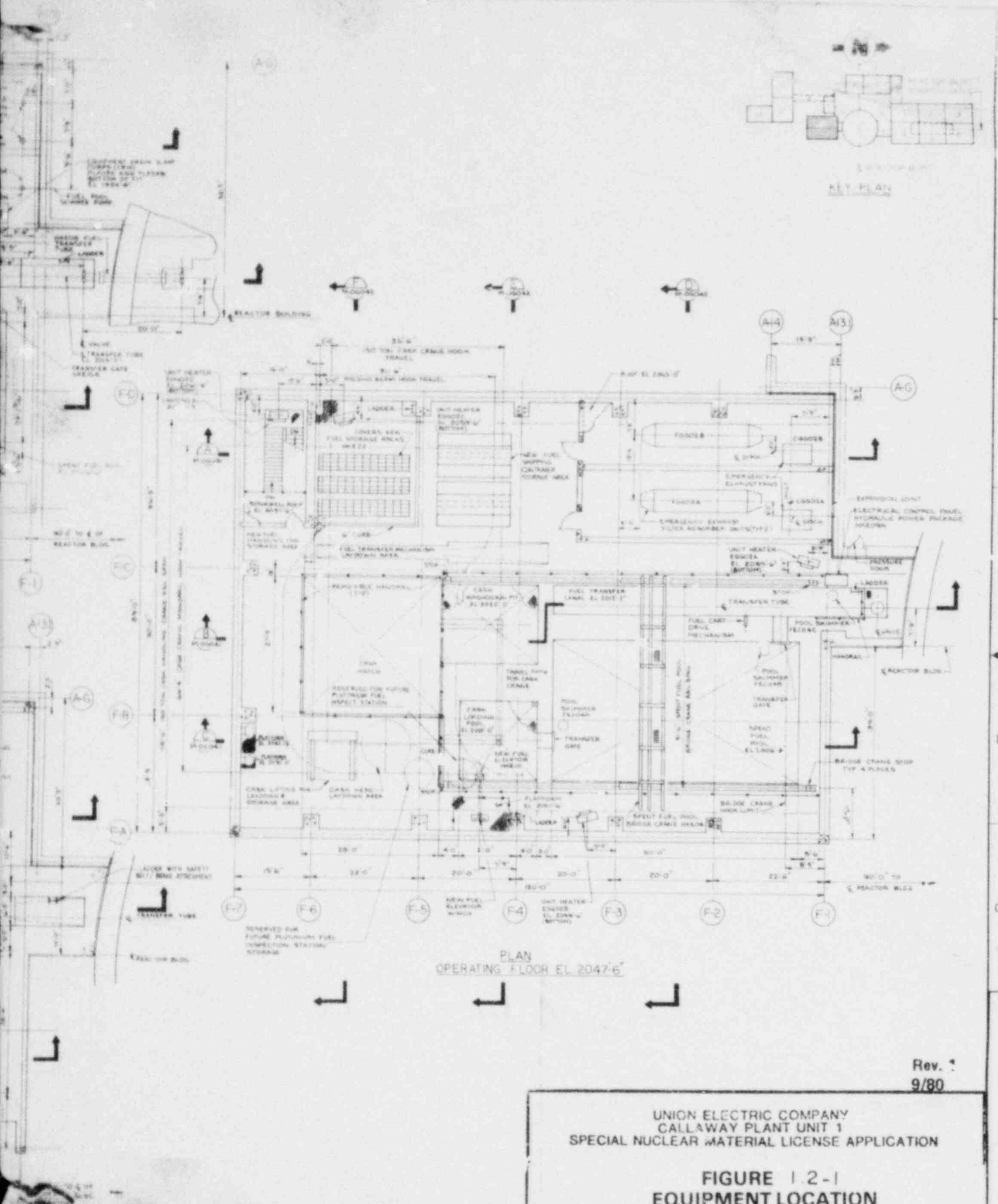
UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.1-7

FUEL ROD SCHEMATIC



PLAN
GROUND FLOOR EL 2000'-0"
FUEL TRANSFER CANAL
SPENT FUEL STORAGE RACKS
TOTAL STORAGE CAPACITY 960 ASSEMBLIES
FUTURE STORAGE RACK CAPACITY 560 ASSEMBLIES
TRANSFER GATE
EMERGENCY EXIT ALARMED DOOR
CHANNEL NOZZLES
F-A
F-B
F-C
F-D
F-2
F-3
F-4
F-5
F-6
F-7
LADDER
PARTIAL FLOOR
NEW FUEL STORAGE (DRY)
LOAD CENTER
FIRE PROTECTION WALL
FUEL TRANSFER CANAL
PLATFORM
MISSILE WALL
PRESSURE DOOR
FUEL CASK IN UPRIGHT POSITION
CASK WASHDOWN PIT
REMOVABLE HANDRAIL
SPRAY CURTAIN
STORAGE FOR SPRAY CURTAIN
UPENDING PIT
TRANSFER SLOT
TRANSFER GATE
PLAN



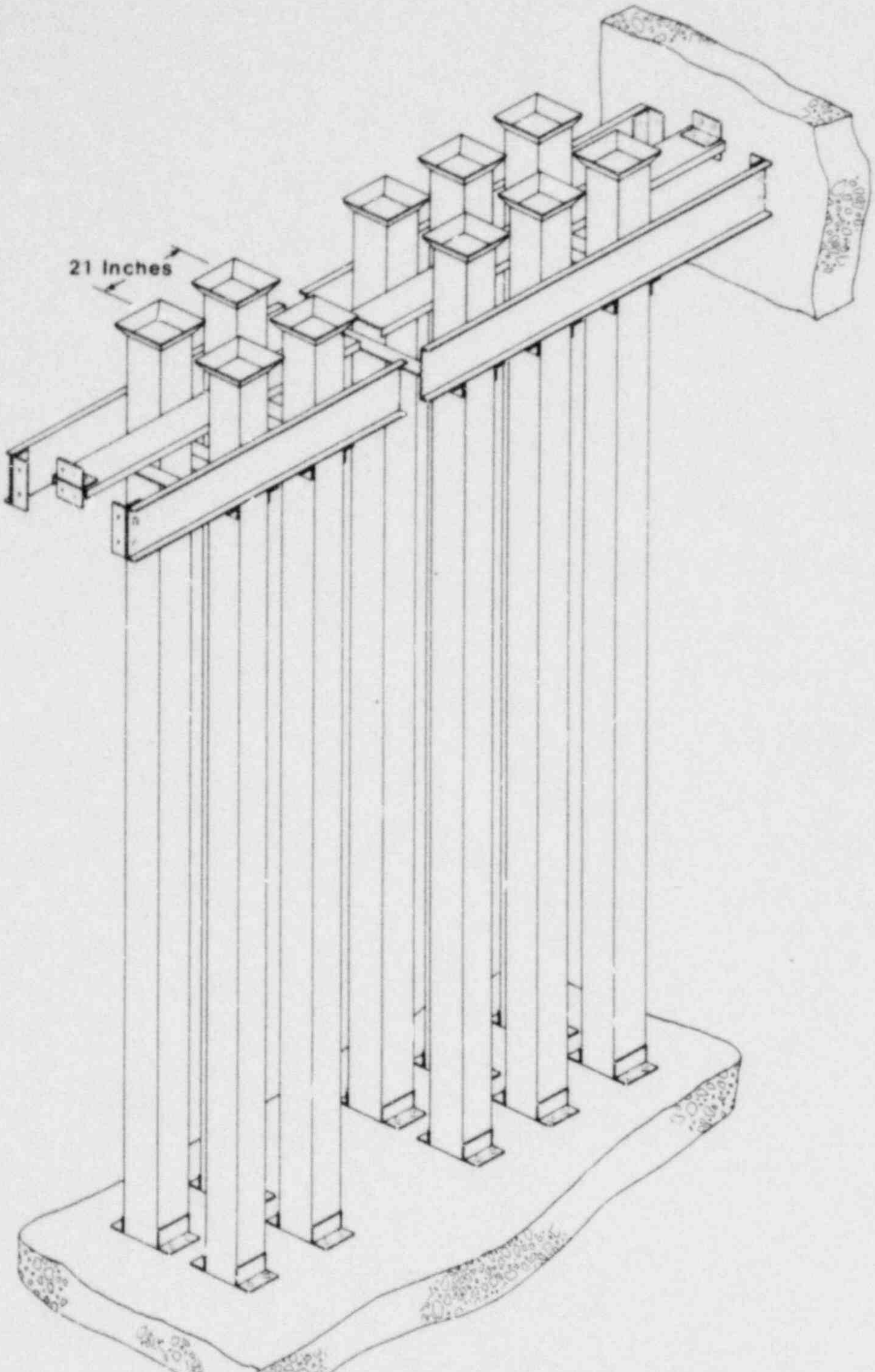
Rev. 1
9/80

UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-1
EQUIPMENT LOCATION
FUEL BUILDING PLAN
ELEVATION 2000'-0", 2026'-0" & 2047'-6"

(M-0G040-3)

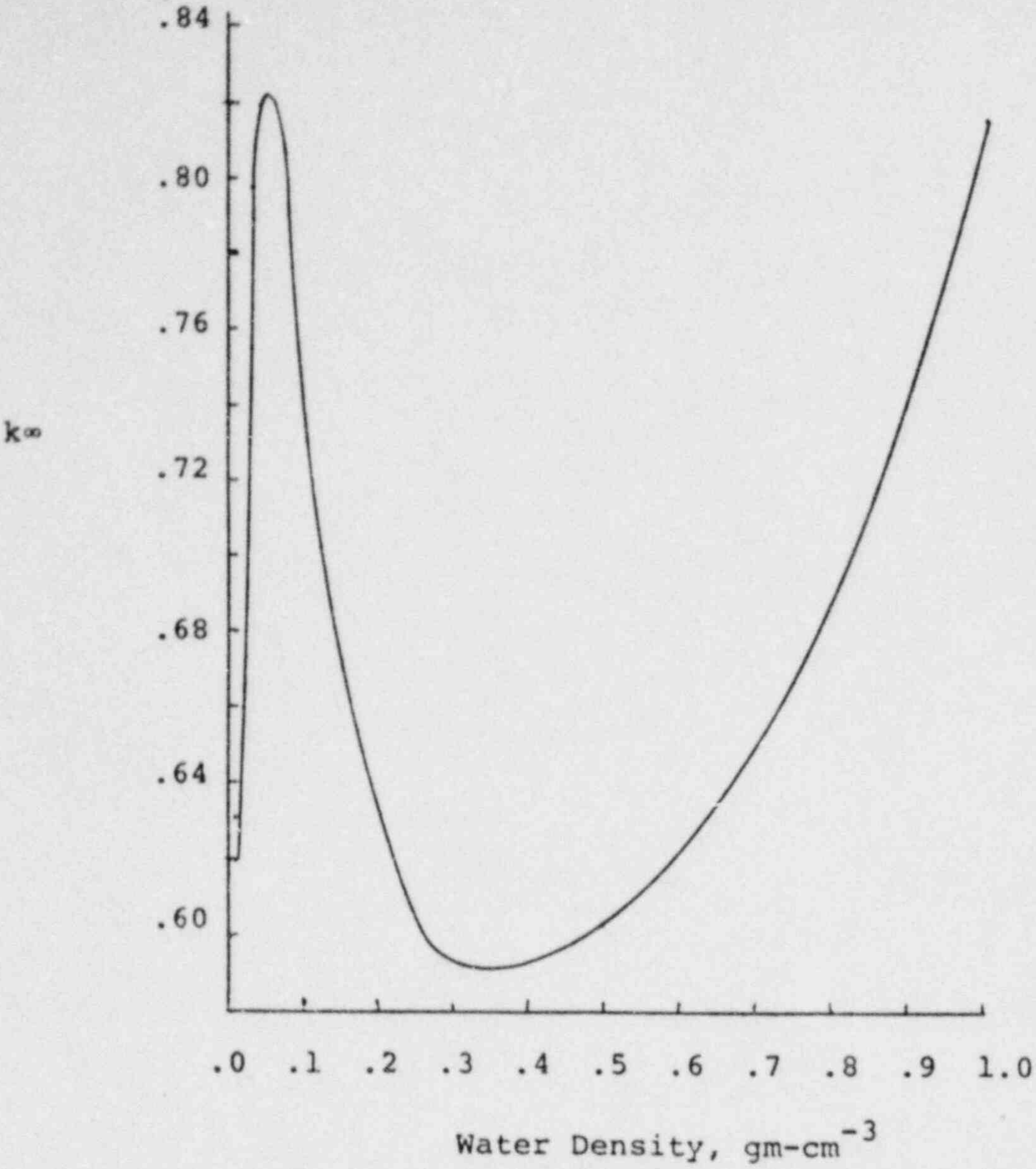
12999

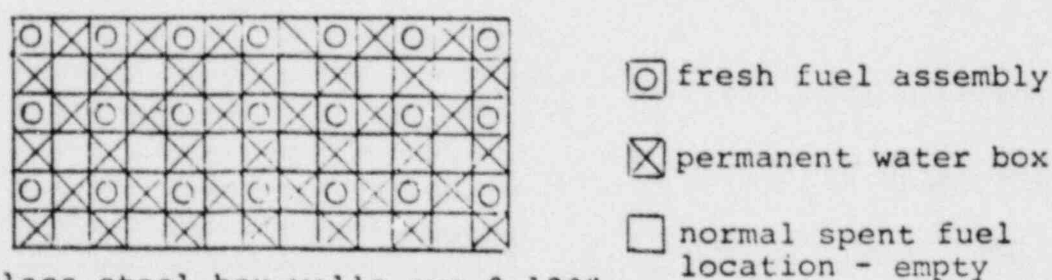


UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-2

NEW FUEL STORAGE RACK

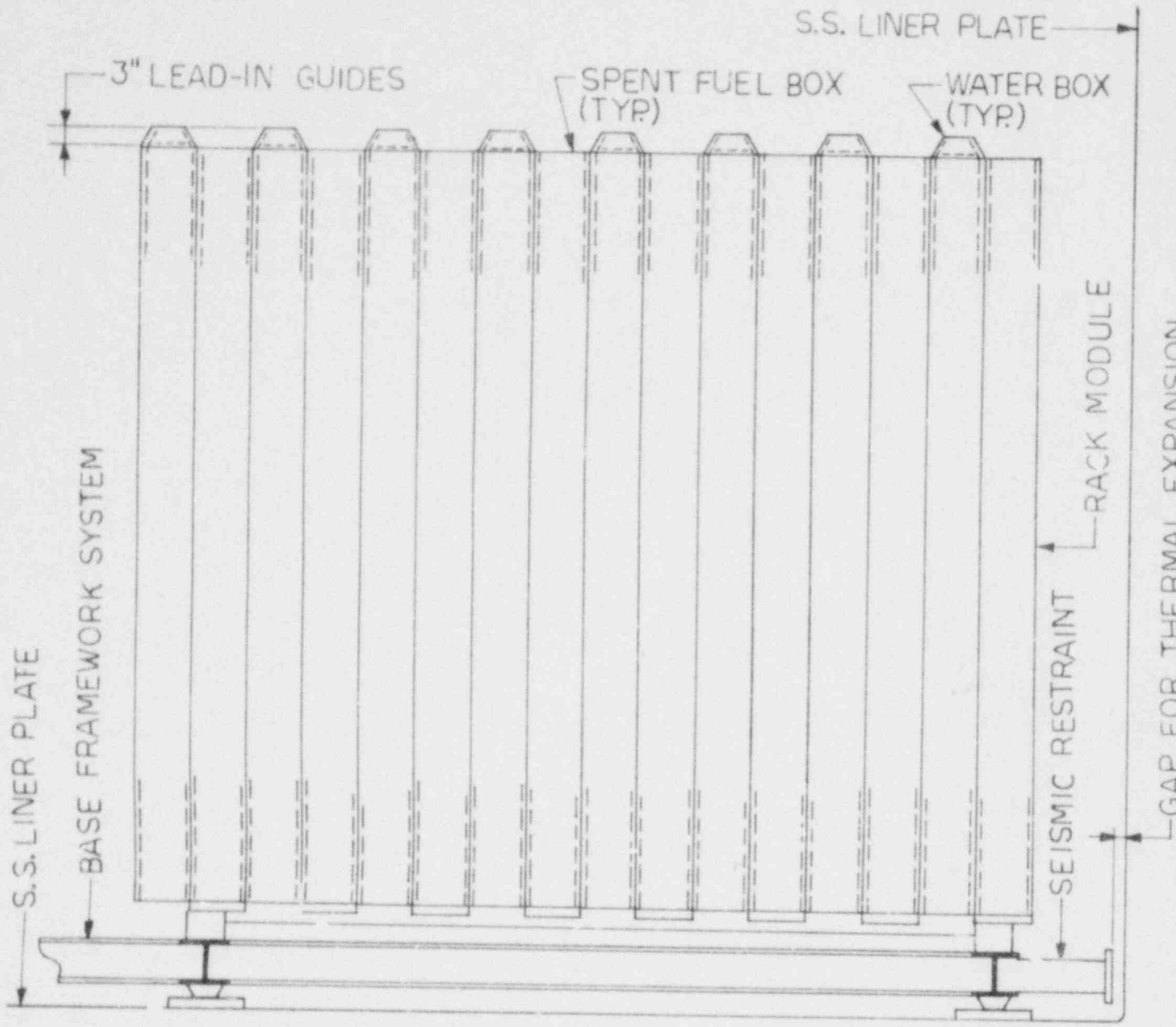




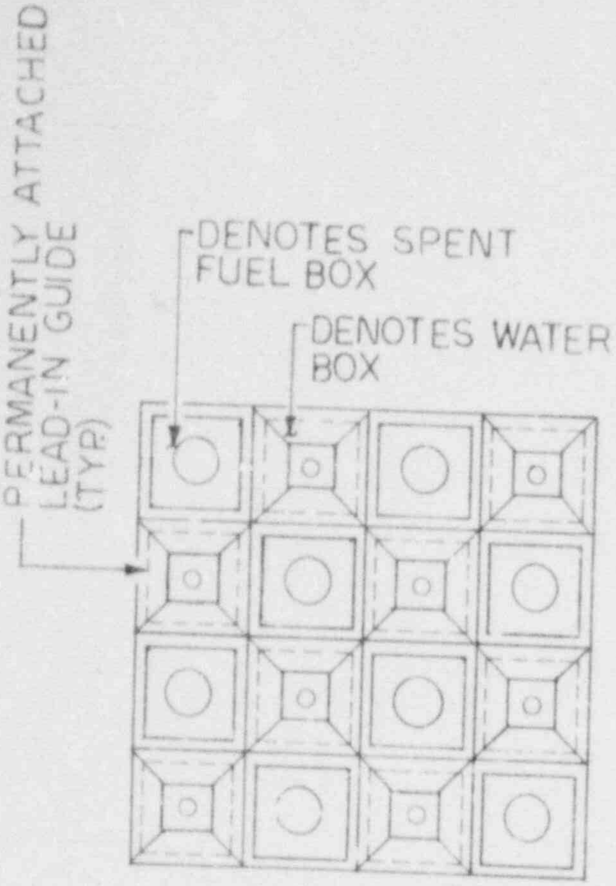
All stainless steel box walls are 0.120".

UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-3 SHEET 1
SNUPPS
SPENT FUEL STORAGE RACK k∞
As Loaded With Fresh Fuel for Core 1 in
Dry Condition
(Only Alternating Rows are Loaded)
vs
Water Density



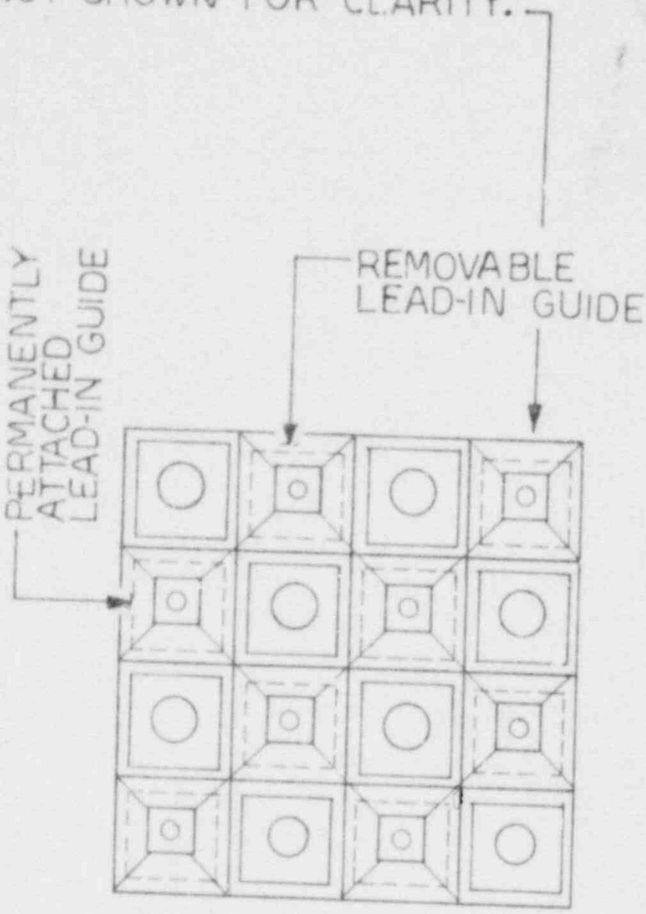
TYPICAL MODULE ELEV^TION



ENLARGED TYPICAL ARRAY

REGION I

NOTE: 3 1/2" HOLES IN CELLS WITH REMOVABLE LEAD-IN GUIDES ARE NOT SHOWN FOR CLARITY.



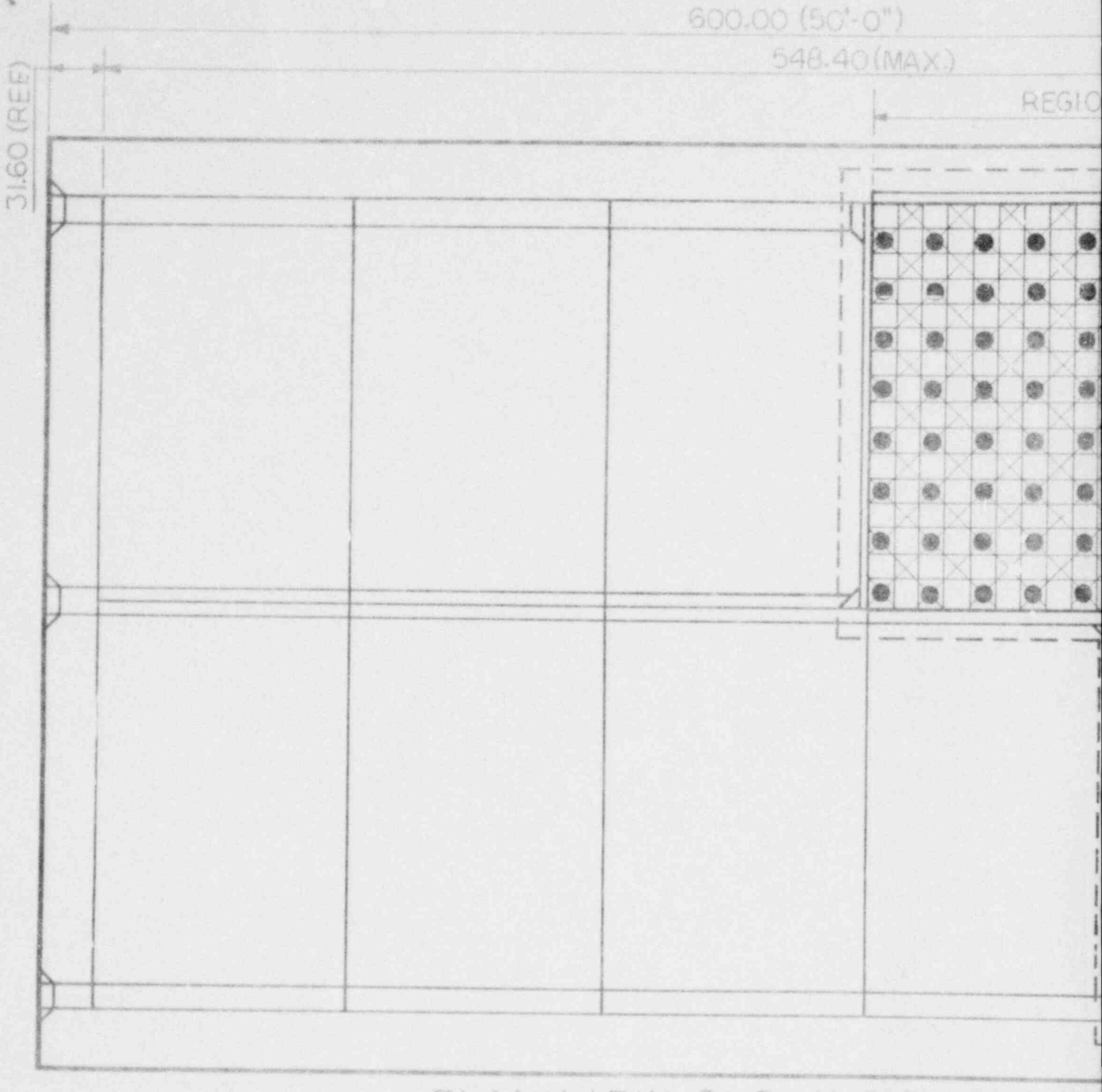
ENLARGED TYPICAL ARRAY

REGION II

UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

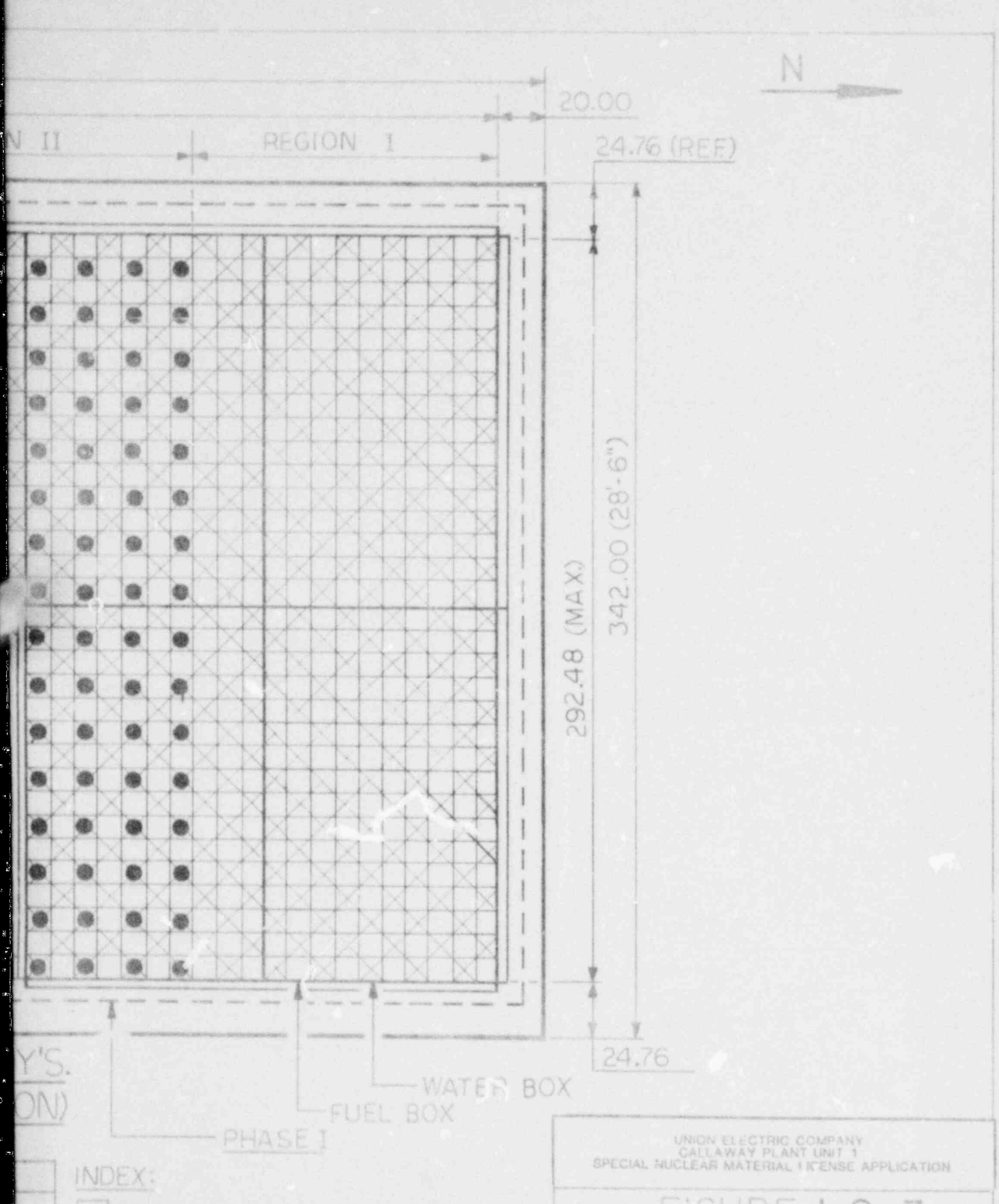
FIGURE 1.2-3
SHEET 2

SPENT FUEL STORAGE RACKS



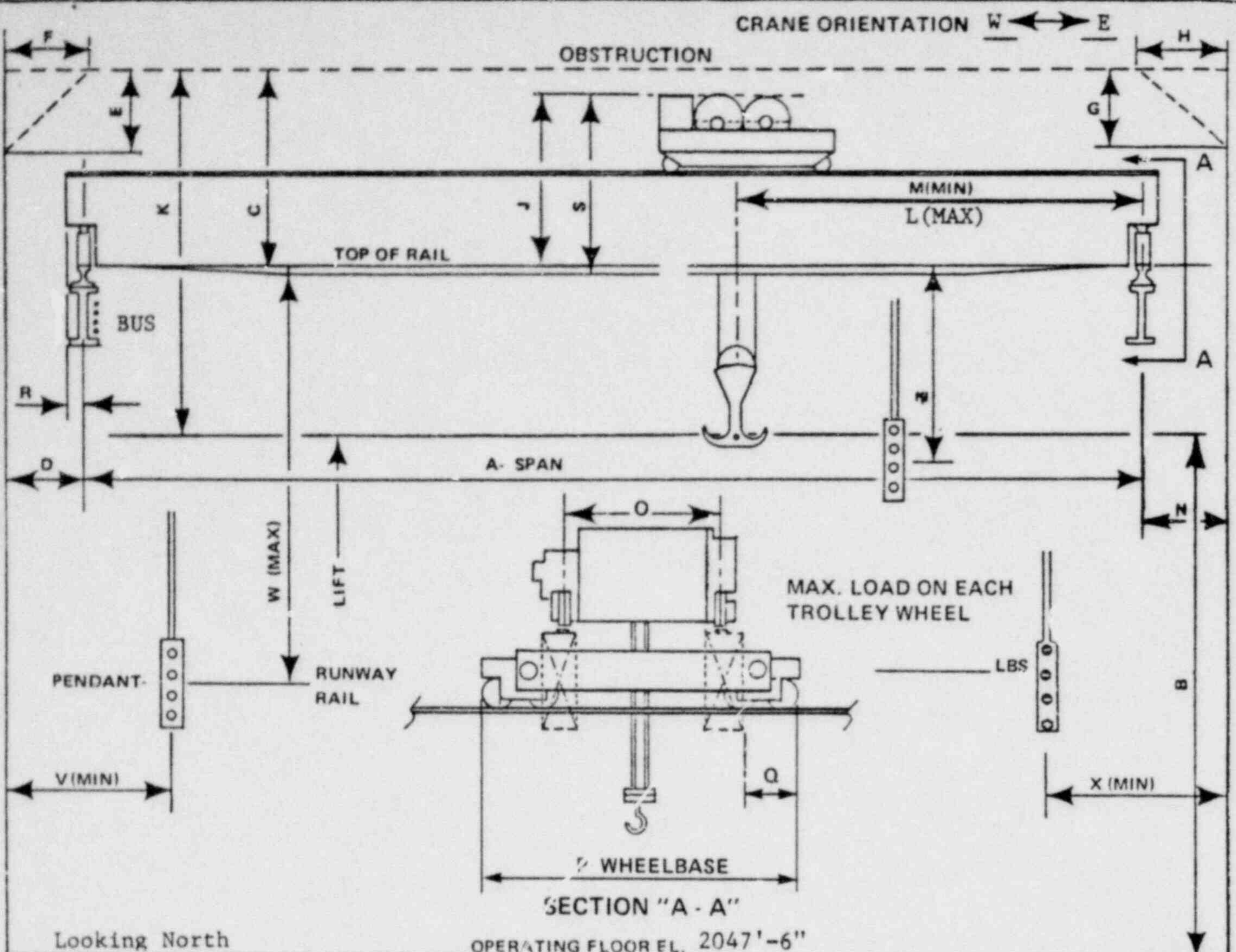
PLAN VIEW SHOWING RACK ASS
IN SPENT FUEL POOL (NON-POIS

SPENT FUEL STORAGE			
TYPE OF SYSTEM	M.D.R. SYSTEM		
PHASING	PHASE I	PHASE II	TOTA
FUEL CELLS	504	840	134
WATER CELLS	296	280	57



UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-3
SHEET 3
SPENT FUEL STORAGE RACKS



CAPACITY - MAIN 150 TONS
Aux 5 Tons**
LIFT - MAIN 82 FT 0 IN
Lift-Aux. 71 Ft. 0 In.
A 78 FT 6 IN
B 35 FT 0 IN (HIGH HOOK)
C 11 FT 11-1/2 IN
D 2 FT 1 IN
E 0 FT 0 IN
F 0 FT 0 IN
G 0 FT 0 IN

H 0 FT 0 IN
J 11 FT. 8-1/2 IN (MAX.ALLOWABLE)
K ____ FT ____ IN
L 49 FT 6 IN
M 14 FT 0 IN
N 2 FT 1 IN
O ____ FT ____ IN
P 45 FT 0 IN
Q ____ FT ____ IN
R ____ FT ____ IN
S ____ FT ____ IN

V 5 FT 1 IN
W 80 FT 6 IN
X 5 FT 1 IN

LENGTH OF MAIN LINE
RUNWAY 100 FT 0 IN
MAX. LOAD ON EACH
WHEEL ________ LBS
RUNWAY RAIL
Size 175 LBS
Z 8 FT 0 IN *

NOTE: "NEAR SIDE" & "LEFT/RIGHT" - FACING CRANE DRIVE SIDE.
Top of Rail - 2083'-6 1/2"

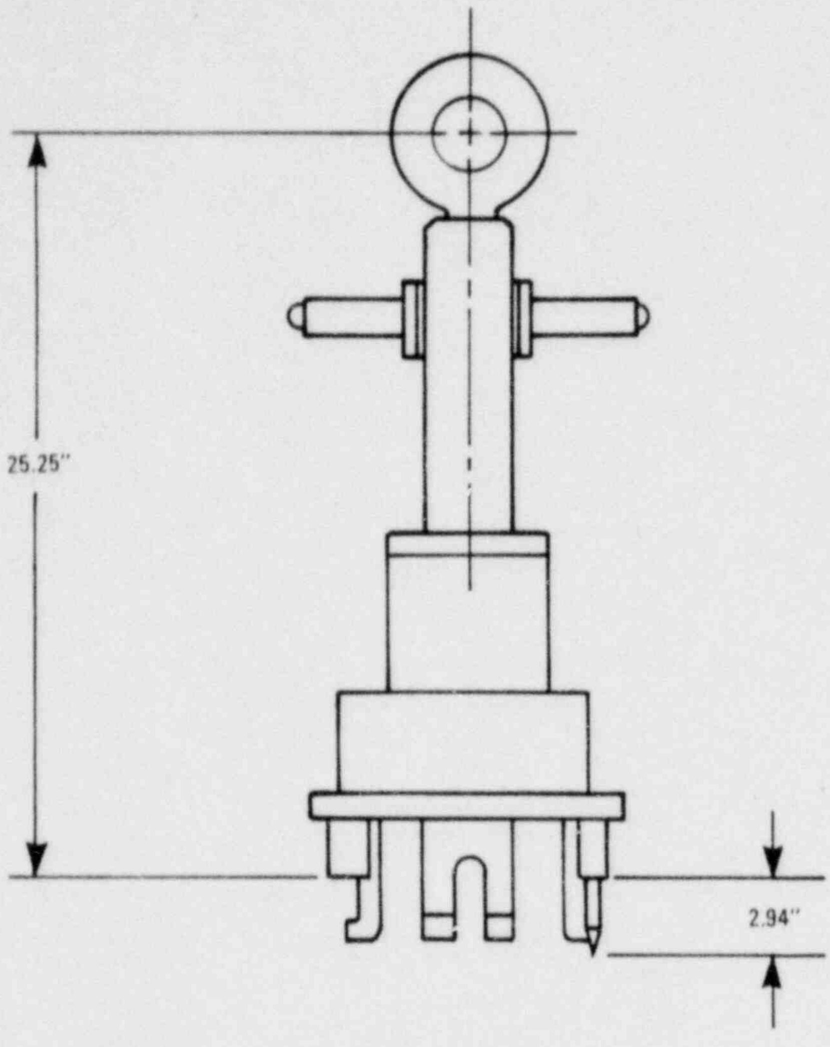
* HIGH PENDANT

** 5 tons, 2 tons over new fuel storage area
Aux. hoist is bridge mounted monorail system

UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

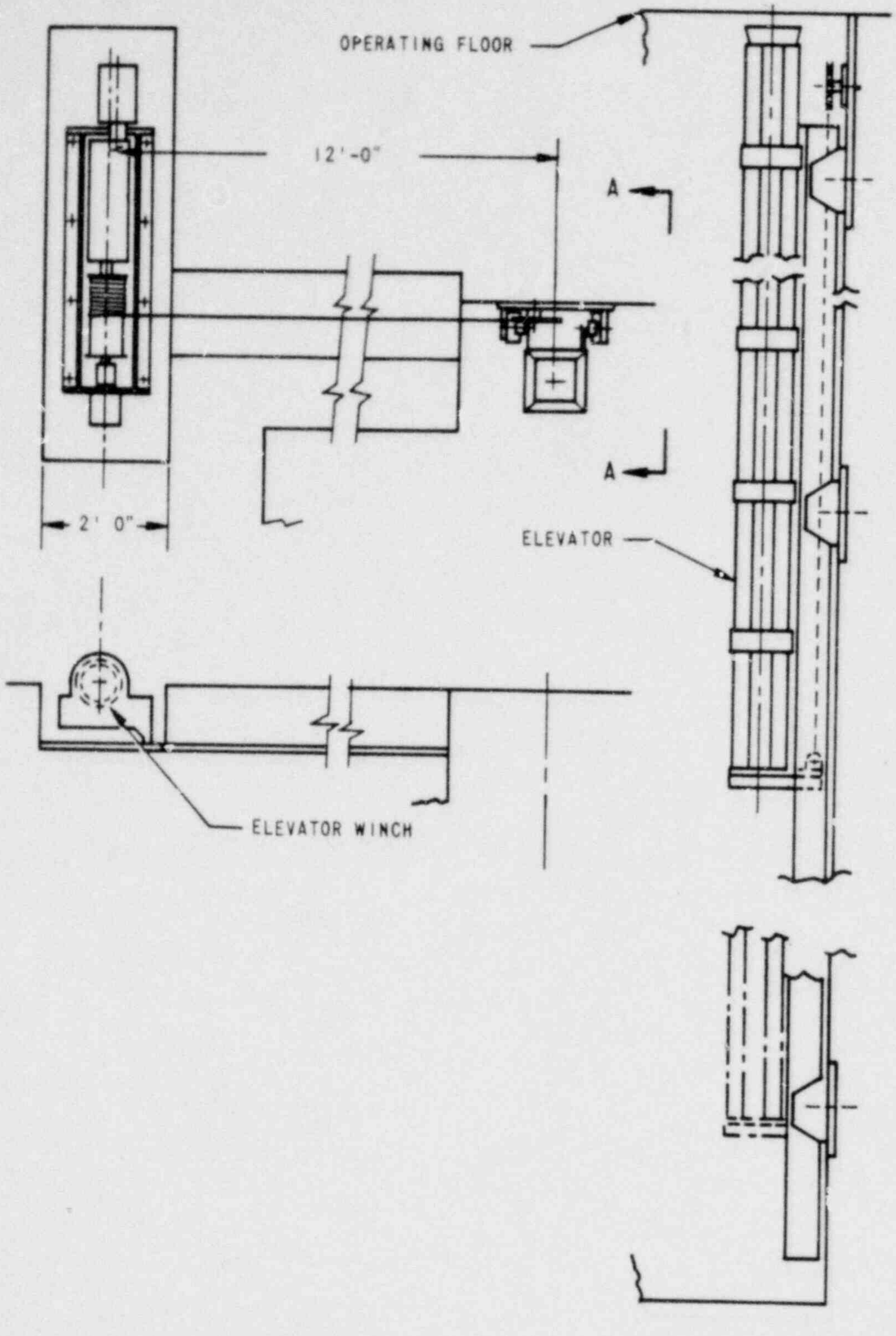
FIGURE 1.2-4

ARRANGEMENT DRAWING
FUEL BUILDING CASK
HANDLING CRANE



UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

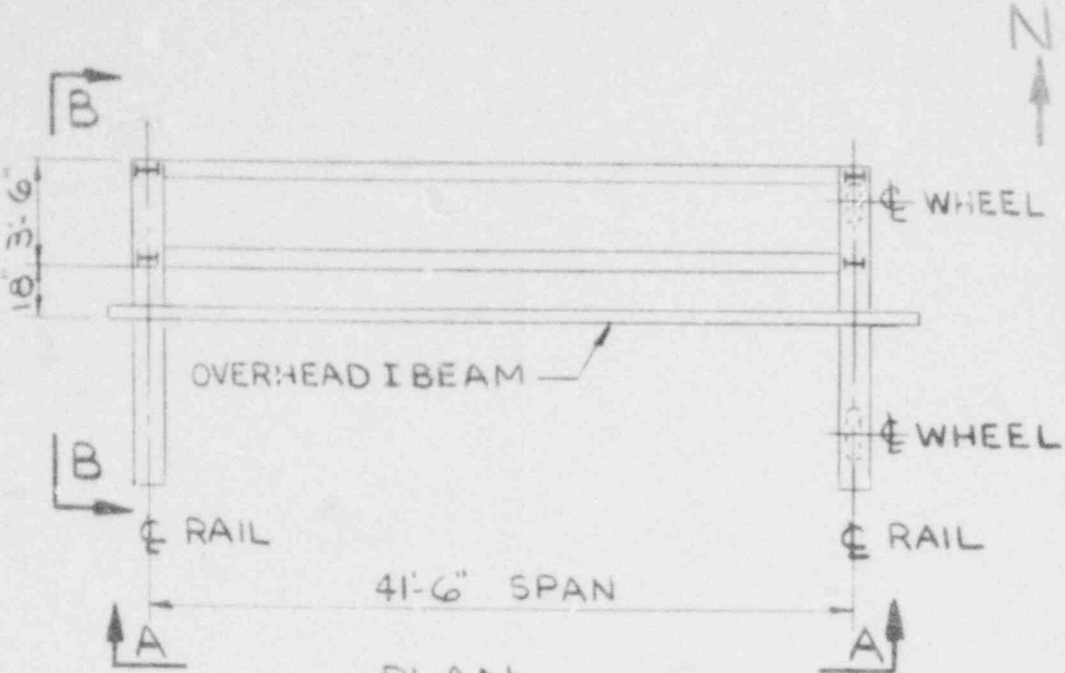
FIGURE 1.2-5
NEW FUEL HANDLING TOOL



UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-6

NEW FUEL ELEVATOR



PLAN

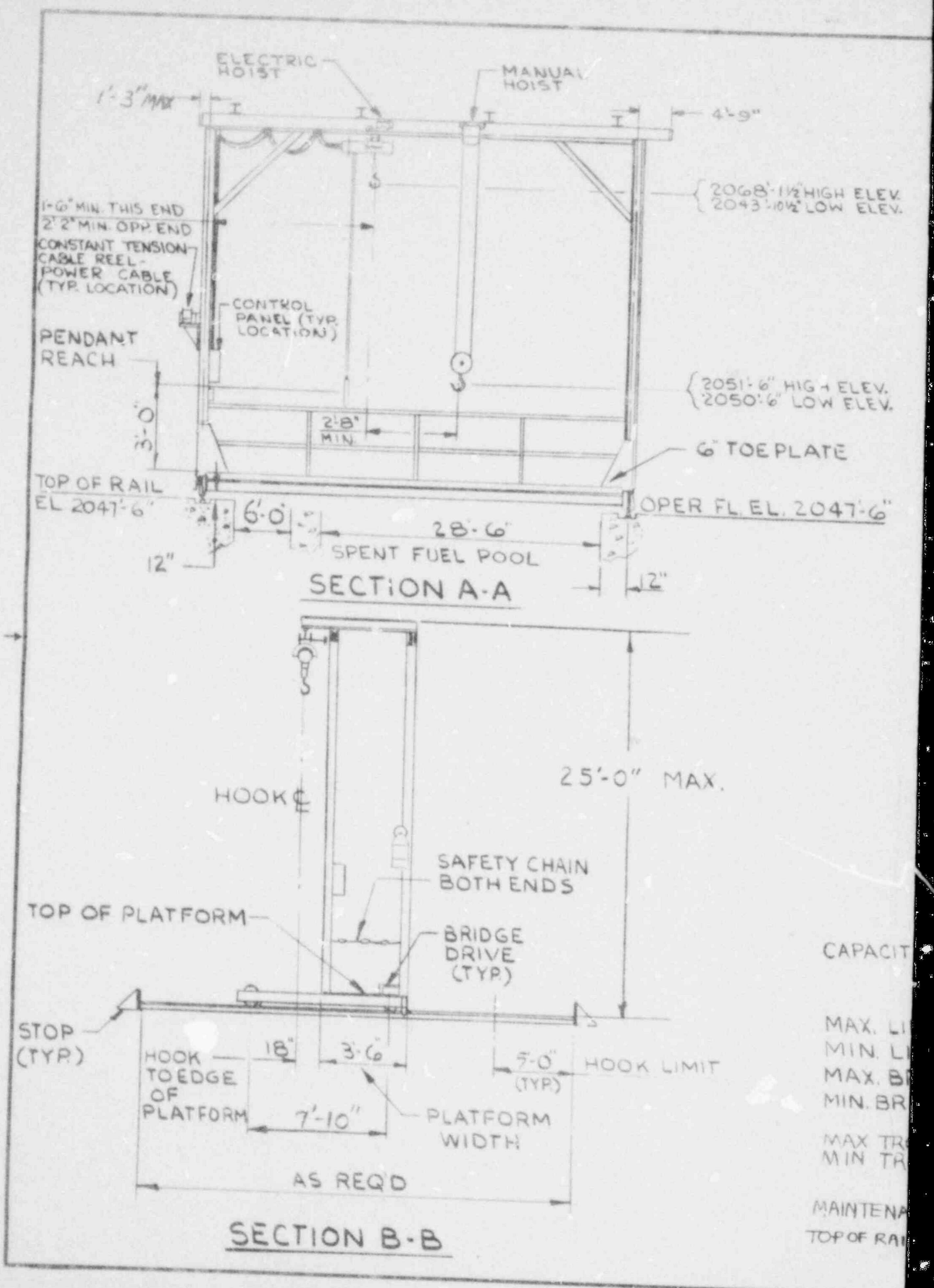
Y: BRIDGE -5 TON
ELEC. HOIST -2 TON
MANUAL HOIST -5 TON
FT SPEED ·21FPM ± 10%
FT SPEED ·7FPM ± 10%
RIDGE SPEED ·30FPM ± 10%
IDGE SPEED ·10FPM ± 10%
OLLEY SPEED 30FPM ± 10%
OLLEY SPEED 10FPM ± 10%

NCE PLATFORM - NOT SHOWN
L ELEVATION HAS NOT BEEN FINALIZED

UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-7

ARRANGEMENT DRAWING
SPENT FUEL BRIDGE CRANE



ELECTRIC HOIST
MANUAL HOIST
1'-3" MAX
4'-9"
1'-6" MIN. THIS END
2'2" MIN. OPP. END
CONSTANT TENSION CABLE REEL-POWER CABLE (TYP. LOCATION)
CONTROL PANEL (TYP. LOCATION)
PENDANT REACH
3'-0"
2068'-1½" HIGH ELEV.
2043'-10½" LOW ELEV.
2051'-6" HIGH ELEV.
2050'-6" LOW ELEV.
2'-8" MIN.
6" TOE PLATE
TOP OF RAIL EL 2047'-6"
OPER FL. EL. 2047'-6"
6'-0
28'-6"
12"
SPENT FUEL POOL
12"
SECTION A-A
HOOK ℄
25'-0" MAX.
SAFETY CHAIN BOTH ENDS
TOP OF PLATFORM
BRIDGE DRIVE (TYP.)
STOP (TYP.)
HOOK TO EDGE OF PLATFORM
18"
3'-6"
5'-0" (TYP.)
HOOK LIMIT
7'-10"
PLATFORM WIDTH
AS REQ'D
SECTION B-B
CAPACIT
MAX. LI
MIN. LI
MAX. BR
MIN. BR
MAX TR
MIN TR
MAINTENA
TOP OF RAI

UNION ELECTRIC COMPANY
CALLAWAY PLANT UNIT 1
SPECIAL NUCLEAR MATERIAL LICENSE APPLICATION

FIGURE 1.2-8
SPENT FUEL HANDLING TOOL