DEC 29 1986

DOCKET NO: 70-3016

APPLICANT: Houston Lighting & Power Company
City Public Service Board of San Antonio, Texas
Central Power and Light Company
City of Austin

FACILITY: South Texas Project Electric Generating Station (STPEGS), Unit 1

SUBJECT: SAFETY EVALUATION REPORT, RE LICENSE APPLICATION FOR UNIRRADIATED POWER REACTOR FUEL, DATED JUNE 14, 1985

I. INTRODUCTION

On June 14, 1985, Houston Lighting and Power Company (HL&P), acting for itself and the above applicants applied for a license to receive, possess, return, and store unirradiated nuclear fuel assemblies. On July 15, 1986, HL&P supplemented the application and requested that the license be issued by January 1, 1987, and remain effective until an operating license is issued. HL&P is responsible for construction and operation of Unit 1.

In December 1975, the NRC issued CPPR-128 for STPEGS, Unit 1, which is located in south central Matagorda County, about 8 miles northwest of Matagorda, Texas. Unit 1 is a pressurized water reactor and will use fuel supplied by Westinghouse Electric Corporation for the initial core loading. The license will not authorize core loading.

The uranium is in the form of U-235 enriched uranium oxide ceramic pellets. A fuel rod consists of pellets encapsulated (clad) in Zircaloy-4 tubing which is seal-welded at both ends. A fuel assembly contains fuel rods in 264 positions in a 17 x 17 square array. Other positions are taken by incore instrumentation and guide tubes. Each fuel assembly weighs about 1730 pounds. The applicant requests authorization to possess 197 assemblies, which includes 4 spare assemblies for the initial core load.

II. SCOPE OF REVIEW

The staff reviewed the HL&P application and discussed the application with the NRR Project Manager, the Region IV Resident Inspector, and the Region IV Project Section Chief. The Interim Security Plan was reviewed and approved by the staff in the Division of Safeguards.

III. POSSESSION LIMITS

The applicant has requested authorization to receive 2,300 kg U-235 enriched uranium. The U-235 enrichment will range from natural up to 2.9 w/o U-235. To accommodate this request, the staff recommends the following license condition:

Material	Form	Quantity
A. Uranium enriched up to 2.9 w/o in the U-235 isotope	A. UO_2 in reactor fuel assemblies	A. 2300 kg U-235 (197 assemblies)

IV. AUTHORIZED ACTIVITIES

The applicant requests authorization to receive, possess, inspect, and store fuel bundles at STPEGS-Unit 1. The applicant has also requested authority to package such fuel bundles for delivery to a carrier. To authorize these activities, the staff recommends the following license conditions:

> The licensee is authorized to receive, possess, use, deliver, and transfer uranium in fuel bundles in accordance with the statements, representations, and conditions in the revised license application dated June 14, 1985, and supplement dated July 15, 1986.
>
> The authorized place of use is the South Texas Project Electric Generating Station - Unit 1, which is located in Matagorda County, Texas.

V. ORGANIZATION AND ADMINISTRATIVE CONTROLS

The Plant Manager has overall responsibility for radiation protection and nuclear criticality safety.

A. Radiation Protection

The Health and Safety Services Manager (HSSM) is responsible for radiation safety of STPEGS. A Radiation Safety Committee will review the radiation safety program for regulatory compliance and safety of workers. The HSSM is responsible to the committee to see that committee recommendations are carried out. Committee recommendations can be appealed to higher management.

B. Nuclear Criticality Safety

The Reactor Performance Supervisor will be responsible for nuclear criticality safety and fuel handling during receipt, inspection, storage, and return of the fuel assemblies. The supervisor is responsible for coordinating the development of procedures and directing activities.

C. Technical Qualifications

The Plant Manager will have 10 years of power plant experience. The Plant Manager or the Plant Superintendent who reports to the Plant Manager will have a baccalaureate degree in engineering.

The minimum qualifications for the position of Health and Safety Manager will be as specified in RG 1.8, Rev. 1-R. Experience has been substituted for the degree in science or engineering.

The minimum qualifications for the position of Reactor Performance Supervisor will be as in RG 1.8, Rev. 1-R. The supervisor will have a degree in engineering or science and 2 years of experience in such areas as reactor physics and core physics testing.

D. Training

Training in radiation safety will be provided to all persons having access to the restricted areas. The training includes the requirements of 10 CFR Part 19 and will be provided before fuel handling activities are initiated.

Personnel who are involved in handling the fuel assemblies will be trained in procedures and equipment manipulation for fuel movement and inspection. Dummy elements will be used for training purposes.

E. Procedures

The radiation safety program will be conducted in accordance with written procedures prepared by the Health and Safety Services Division. All fuel handling activities will follow approved procedures.

VI. NUCLEAR CRITICALITY SAFETY

A. General

Fuel assembly shipping containers may be stored in two locations - the new fuel handling area and the new fuel inspection laydown area. Fuel assemblies may be handled and stored in four areas - the two storage areas for shipping containers, the new fuel storage pit, and the spent fuel pool. These areas are in the fuel handling building.

Each fuel rod contains 168-inches of uranium dioxide pellets which are 0.3225 inches in diameter. The cladding for each fuel rod is 0.374 inches in outside diameter. The diametral gap between the pellet and cladding is 0.0065 inches. Each fuel assembly contains 264 fuel rods in a 17 x 17 array. The fuel rod pitch is 0.496 inches. The remaining 25 positions in the fuel assembly are taken up by incore instrumentation and guide thimbles. Calculations performed by the NRC staff conservatively assumed a fuel rod, containing uranium enriched to 2.9 w/o U-235, in each of the 289 positions.

B. Shipping Container Storage

The fuel assemblies will be received in shipping containers which have been approved by the NRC pursuant to 10 CFR Part 71. Certificate of Compliance No. 5450 authorizes Fissile Class III shipments of 60 containers, each containing 2 assemblies. Because the safety factor for undamaged Fissile Class III shipments is greater than two and because of the number of fuel assemblies to be received, no criticality safety controls need be established for the two container storage areas. The applicant will restrict stacking of the containers without support to 2-high and with stacking support to 3-high. This is sufficient to prevent damage to the containers.

C. New Fuel Storage Pit

The new fuel storage pit is a reinforced concrete pit. The storage racks are composed of cells fastened together in a 2 x 11 module which is bolted to the floor and walls. There are three such modules in the pit. The individual cells are on 21-inch centers so that there is a minimum of 12 inches between fuel assemblies. Each cell consists of 14 gauge 304SS square cylinders with 8.98-inch inside dimensions. The spacing between modules is 37.2-inches. The applicants reported that the k-effective for the 3-module array would be less than 0.95 under water moderation conditions. The staff calculated that the k-effective array would not exceed 0.85. The calculations were performed using KENO-IV, a Monte Carlo code. The licensee used a 218 energy group cross-section set generated from ENDF/B-IV data. The staff used a 16 group cross-section set which is found in the SCALE program. Both sets of cross-sections have been validated against critical experiments.

D. Spent Fuel Pool Storage

The spent fuel pool is a stainless-lined reinforced concrete pool. The fresh fuel will be stored in modules which are designed to keep the fuel spaced a minimum 14-inches center-to-center. Each cell is similar to the fresh fuel cell except that the walls are 3/16-inch SS.

Calculations by the applicant show that k-effective will be less than 0.95. The staff calculated that k-effective will be less than 0.82.

E. Handling of Fuel Assemblies

All fuel handling activities will follow approved fuel handling procedures. The applicant has stated that assemblies may be removed from storage for inspection and core loading. Because core loading is not evaluated in this safety evaluation and will not be authorized by the license, the following license condition is recommended:

Core loading of fuel assemblies is not authorized.

To ensure that fuel assemblies outside of storage remain safely subcritical at all times, the applicant will limit the number of assemblies out of storage to two. In addition, only one assembly will be out of storage in any of the four areas identified in B, C, and D above.

The plastic dust wrapper on each fuel assembly will be removed from the fuel assembly or will be open at the bottom so that water will not collect in the wrapper. If the storage array were to become flooded, the dust wrappers filled with water, and then the pool or pit were drained, the fuel assemblies would be well-moderated and effectively coupled to other well-moderated fuel assemblies because the isolating water between the fuel assemblies had drained away. The staff evaluated the condition of full density water within the fuel assembly and low density water between fuel assemblies. There is not enough steel in the storage racks to assure that k-effective does not exceed 0.95. In some cases, k-effective would exceed 1.0 if control on the dust wrappers was not enforced. In Amendment 1 to the application, the applicant committed to maintaining the dust wrapper in a state that will not hold water. This eliminates the problem.

F. Exemption

The applicant requests an exemption from the monitoring requirements of 10 CFR 70.24 as provided in 70.24(d). The applicant's reasons for requesting the exemption are that the assemblies are stored in critically safe racks and procedural controls preclude situations in which criticality may occur.

The applicant's reasons for the exemption are valid and good cause exists for the exemption. The storage racks provide physical protection to ensure subcriticality. The procedural controls provide reasonable assurance that nuclear criticality will not occur during fuel handling and monitoring is not needed. Even if the procedural controls were violated, optimum conditions of neutron moderation, physical spacing, and neutron reflection would be required for assemblies to be in a critical situation.

The procedural controls, considering the limited activities and material handling methods, are deemed adequate to grant the exemption. This exemption is authorized by law, and will not endanger life or property or the common defense and security and is otherwise in the public interest. The following license condition is recommended:

> The licensee is hereby exempted from the requirements of 10 CFR 70.24.

VII. RADIATION SAFETY

The applicant's radiation protection program includes assignment of responsibility for radiation protection, safety committee oversight, training, written procedures, surveys, instrument calibration, personnel monitoring devices, and whole body counting. The primary hazard from encapsulated low-enriched uranium is low level radiation. The applicant's program, combined with 10 CFR Part 20 requirements, is adequate to protect the health and safety of the public.

VIII. ENVIRONMENTAL PROTECTION

The NRC staff prepared an Environmental Assessment for the proposed activities at STPEGS-Unit 1. Based on the Assessment, a Finding of No Significant Impact was made pursuant to 10 CFR Part 51. The Finding was published in the Federal Register on September 30, 1986.

IX. FIRE SAFETY

The applicant proposed to provide fire protection by combination of an automatic fire detection system and a standpipe and hose system. The hose stations are located so that at least one hose stream can reach all locations. Backup protection is provided by portable fire extinguishers. Considering that all licensed material is encapsulated, fire protection is adequate.

X. PHYSICAL PROTECTION

The Division of Safeguards, NMSS, determined that the HL&P security plan meets the requirements of 10 CFR 73.67. The Safeguards staff recommends the following license condition:

> The licensee shall maintain and fully implement all provisions of the Commission approved Physical Security Plan, including changes made pursuant to the authority of 10 CFR 70.32(e). The approved Physical Security Plan consists of "Interim Security Plan for Fuel Storage-South Texas Project Electric Generating Stations-Units 1 and 2, Revision 2" dated July 1985. The Physical Security Plan shall be withheld from public disclosure pursuant to 10 CFR 2.790(d).

XI. CONCLUSION

A. After reviewing the application and its supplement, the staff finds that:

1. HL&P meets the requirements of the Atomic Energy Act, as amended, and of the regulations of the Commission,

2. Issuance of the license would not be inimical to the common defense and security, and

3. Issuance of the license would not constitute an unreasonable risk to the health and safety of the public.

B. With the recommended license conditions, the NRC staff finds that:

1. HL&P is qualified by reason of training and experience to use the material for the purpose requested in accordance with regulations in 10 CFR Part 70.

2. HL&P's proposed equipment and facilities are adequate to protect health and minimize danger to life or property.

3. HL&P's proposed procedures to protect health and to minimize danger to life or property are adequate.

XII. RECOMMENDATION

The staff recommends issuance of the special nuclear materials license provided the conditions identified above are incorporated into the license.

Original Signed By:

George H. Bidinger
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and Material Safety

Approved by Original Signed By:
W. T. Crow, Section Leader

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