TU ELECTRIC

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October 16, 1992

William J. Cahill, Jr.
Group Vice President

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)- UNIT 1
DOCKET NO. 50-445
SUBMITTAL OF LICENSE AMENDMENT REQUEST 92-05
INCREASE IN FUEL ENRICHMENT

Gentlemen:

Pursuant to 10CFR50.90, TU Electric hereby requests an amendment to the CPSES Unit 1 Operating License (NPF-87) by incorporating the enclosed change into the CPSES Unit 1 Technical Specifications.

In general, the proposed change revises the CPSES Unit 1 Technical Specifications by changing the allowable fuel enrichment in Section 5.3 from 3.5% to 4.3% enriched fuel. Consistent with this change in the allowable fuel enrichment, the impact of fuel irradiation up to 60,000 megawatt days per metric ton of uranium has been evaluated. This change is being requested to allow CPSES Unit 1 to use the more highly enriched fuel to operate with 18 month fuel cycles (currently planned for Cycle 4 operation). Attachment 2 provides a detailed description of the proposed change, a safety analysis of the change, TU Electric's determination that the proposed change does not involve a significant hazards consideration, and an evaluation of the environmental impact of the proposed change. Attachment 3 provides the affected Technical Specification pages (NUREG-1399), marked-up to reflect the proposed change. Enclosure 1 provides a copy of a criticality safety analysis for the CPSES fuel storage facilities prepared for TU Electric by Holtec Incorporated.

The analysis performed to support the proposed change demonstrates that 4.3% enriched fuel can be safely placed in the fuel storage facilities at CPSES. Since fuel receipt for Cycle 4 operation is presently scheduled for mid-1993, TU Electric requests NRC review and approval of this change no later than June 30, 1993. TU Electric requests that the approval transmittal for this proposed amendment include a 30 day implementation period following the date of issuance.

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In accordance with 10CFR50.91(b), TU Electric is providing the State of Texas with a copy of this proposed amendment.

Should you have any questions, please contact Mr. Jimmy D. Seawright at (214) 812-8674.

Sincerely,

William J. Cahill, Jr.

JDS/grp
Attachments: 1. Affidavit
2. Description and Assessment
3. Affected Technical Specification pages (NUREG-1399)

Enclosure: 1. Criticality Safety Evaluation of Comanche Peak Fuel Storage Facilities with Fuel of 5% Enrichment
2. NUREG/CR-5009 Assessment of the Use of Extended Burnup Fuel in Light Water Power Reactors

c - Mr. J. L. Milhoan, Region IV
Mr. B. E. Holian, NRR
Mr. T. A. Bergman, NRR
Resident Inspectors, CPSES (2)

Mr. D. K. Lacker
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Texas Department of Public Health
1100 West 49th Street
Austin, Texas 78704

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Texas Utilities Electric Company	)	Docket Nos. 50-445
	)	
(Comanche Peak Steam Electric Station, Unit 1)	)	License No. NFP-87
	)	

AFFIDAVIT

William J. Cahill, Jr. being duly sworn, hereby deposes and says that he is Group Vice President, Nuclear of TU Electric, the lead Applicant herein; that he is duly authorized to sign and file with the Nuclear Regulatory Commission License Amendment Request 92-05, "Fuel Enrichment Increase"; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

William J. Cahill, Jr.
Group Vice President, Nuclear

STATE OF TEXAS)
)
COUNTY OF SOMERVELL)

Subscribed and sworn to before me, on this 16th day of October.

Patricia Wilson
Notary Public

PATRICIA WILSON
MY COMMISSION EXPIRES
March 16, 1993

DESCRIPTION AND ASSESSMENT

Proposed Enrichment Limit Upgrade To Support 18 Month Fuel Cycle For Comanche Peak Steam Electric Station (CPSES)

I. BACKGROUND

The proposed change increases the maximum Uranium-235 enrichment for reload fuel assemblies to 4.3 weight percent from the current 3.5 weight percent Uranium-235 in Section 5.3.1 of the CPSES Technical Specifications. Associated with the change is the allowance of fuel irradiation up to 60,000 megawatt days per metric ton of uranium (MWD/MTU). Section 5.3.1 provides a brief description of the fuel, cladding material, active fuel length, and maximum enrichment used in CPSES. The maximum enrichment limit cited in Section 5.3.1 pertains to fuel handling and to fuel storage in the fresh fuel and spent fuel storage racks.

TU Electric plans to operate CPSES Unit 1 with 18 month fuel cycles in the future. The higher enrichment value is required to support the 18 month fuel cycles.

In order to receive and store fuel with enrichments over 3.5 weight percent, this technical specification change is required. In order to justify this change for fuel receipt and storage, the safety implications associated with fuel handling and storage must be addressed. The assessments below address these issues. The assessments address not only fresh fuel but also spent fuel, including spent fuel with irradiation beyond 33,000 MWD/MTU.

The Comanche Peak Unit 1, Cycle 4 design and safety analyses (including operation with an 18 month fuel cycle) have not been completed. If any technical specification changes are required or if any of the evaluations result in an unreviewed safety question per 10CFR50.59, additional licensing amendment requests will be submitted to the NRC for approval.

II. DESCRIPTION OF TECHNICAL SPECIFICATION CHANGE REQUEST

The proposed change will revise the CPSES Technical Specification 5.3 REACTOR CORE, Section 5.3.1 to reflect the new enrichment limit. Specifically, the sentence "Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment not to exceed 3.5 weight percent U-235" will be changed to "Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment not to exceed 4.3 weight percent U-235."

III. ANALYSIS

TU Electric is currently using Westinghouse Electric Corporation built fresh fuel, spent fuel, and in-containment storage racks capable of storing 17 x 17 design fuel qualified at an enrichment limit of 3.5 weight percent U-235. It is anticipated that the 18 month fuel cycle will commence with CPSES Unit 1 Cycle 4, which is expected to begin operating in the Fall of 1993. Higher enrichments are required to economically accomodate the 18 month fuel cycle designs.

The fresh fuel storage racks at Comanche Peak Steam Electric Station consist of full-length annealed stainless steel storage cans with an inner dimension of 9.00 inches and a wall thickness of approximately 0.075 inches. The fresh fuel storage racks are designed so that there are seven groupings (sections) of two rows each, with a center-to-center spacing between assemblies within a row of 21 inches, and 21 inches between rows within a grouping. The center-to-center distance between nearest rows of assemblies in adjacent groupings is 36 inches. Three of the groupings have ten assemblies per row; the remainder, nine (See Figure 1). The fresh fuel storage racks can accommodate 132 fuel assemblies. Fresh fuel storage is normally dry. The fresh fuel storage racks are designed so that it is not possible to insert a fuel assembly in any position within the rack array not intended for fuel. The fresh fuel storage racks are currently licensed at an enrichment limit of 3.5 weight percent U-235 and are capable of storing Westinghouse 17 x 17, Standard and Optimized, and Siemens 17 x 17 large and small diameter fuel rod designs.

The spent fuel storage racks provide a center-to-center distance between fuel assemblies of 16 inches. The racks employ full length annealed stainless steel cans with an inner dimension of 9.00 inches and a wall thickness of approximately 0.075 inches. These racks do not contain any additional poison material and rely on the water gap to maintain sub-criticality. Comanche Peak has two spent fuel storage pools designed to contain spent fuel storage racks (including the damaged fuel containers) that have a total capacity of 1116 fuel assemblies. Pool number 1 is designed to contain twelve 6x5 rack modules, seven 5x5 rack modules, and one modified 5x5 rack module which can store 19 fuel assemblies and two damaged fuel containers. Pool number 2 is designed to contain twelve 6x5 rack modules and eight 5x5 rack modules. In both spent fuel storage pools, the space between storage positions is blocked to prevent insertion of fuel. The spent fuel pools are currently partially racked with a total of 553 storage cell locations. The spent fuel storage racks are currently designed to store Westinghouse 17 x 17, Standard and Optimized, and Siemens 17 x 17 large and small diameter fuel rod

designs with an enrichment limit of 3.5 weight percent U-235.

The containment refueling cavity of each unit has additional interim storage space consisting of one 5x5 rack module. The in-containment storage racks are identical in design to the spent fuel storage racks.

HOLTEC International has performed criticality safety analyses (reference 1) which verify the acceptability of an enrichment limit of 5.0 weight percent U-235 for the fresh fuel, spent fuel, and in-containment storage racks. The analyses bound the following fuel types: 1) Westinghouse 17 x 17 Standard and Optimized, and 2) Siemens 17 x 17 large and small diameter fuel rod designs. The computer codes KENO5a and CASMO-3 were used. KENO5a is a full three-dimensional analytical tool using transport theory to determine the reactivity of fuel storage rack geometries. CASMO-3 is a two-dimensional multigroup transport theory assembly computer code used in the criticality safety analyses to determine the most reactive fuel type and to investigate the reactivity effects of mechanical and material tolerances. The fresh fuel storage rack analyses considered the effect of full density water from a postulated flooding accident and low density water for optimum moderation scenarios. The spent fuel and in-containment storage racks were evaluated under normal storage conditions and postulated accident conditions. Criticality safety analyses of the fresh fuel, spent fuel, and in-containment storage racks using the most reactive fuel at 5.0 weight percent U-235 resulted in k_{eff} values which were less than the acceptance criteria identified in NRC guidance documents. The criticality safety analyses confirmed that the CPSES fuel storage facilities can safely accomodate fuel up to 5.0 weight percent U-235. However, the Technical Specification enrichment limit is being increased to only 4.3 weight percent U-235 which is anticipated to bound the requirements for 18 month fuel cycles. No burnup or checkerboarding of fuel assemblies is required.

IV. SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TU Electric has evaluated the significant hazards consideration involved with the proposed change by focusing on the three standards set forth in 10 CFR 50.92 (c) as discussed below:

Does the proposed change:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

There is no increase in the probability or consequences of misplacing fuel assemblies in the fresh fuel, spent fuel, and in-containment storage racks. These racks are designed to prevent the insertion of a fuel assembly in any position within a rack not intended for fuel. In the current partially racked configuration of the spent fuel pools, a mis-positioned fuel assembly could accidently be situated adjacent to a row of stored fuel or an inside corner adjacent to two rack modules. The postulated assembly mis-positioning accident was analyzed taking credit for the presence of boron in the pool water. The presence of 2000 ppm concentration boron in the pool water assures a k_{eff} much less than 0.95.

There is no increase in the probability of a fuel handling accident, such as dropping a spent fuel assembly, since the mass of the fuel assembly does not increase when the U-235 enrichment is increased. In fact, over the course of CPSES's lifetime, assuming 18 month fuel cycles, there will be fewer refueling outages and therefore fewer opportunities to drop a fuel assembly. There is no significant increase in the consequences of a spent fuel assembly drop accident since most of the fission product inventories in the fuel assembly do not change significantly due to an increase in the fuel enrichment or burnup expected in 18 month fuel cycles. A few of the radiologically important fission products have higher inventories for 18 month fuel cycles employing higher enriched fuels (reference 2). However, the current FSAR source terms assumed for fuel handling accidents bound the terms appropriate for 18 month fuel cycles. A report examining the effects of extending the fuel burnup estimated that the I-131 fuel gap release fraction in the peak fuel rod at 60,000 MWD/MTU could be up to 20% higher than the value typically used in calculating offsite dose from a postulated fuel handling accidents (reference 2). The resulting 20% increase in the thyroid dose in the current CPSES FSAR results in a total offsite dose which is still well within the regulatory limits specified in 10 CFR 100. For Control Room habitability, the personnel doses remain within 10 CFR 50, Appendix A and GDC-19. The Loss of Coolant Accident (LOCA) remains the most severe radiological hazard to Control Room personnel. Thus the proposed change does not significantly increase the consequences of a fuel handling accident.

This increase in fuel enrichment does not result in an increase in the probability or consequences of an event which introduces optimum moderation conditions in the fresh fuel storage racks. The fresh fuel storage racks have been analyzed for a range of moderation conditions from fully flooded to optimum moderation at an enrichment of 5.0 weight percent U-235. These analyses demonstrate that the fresh fuel storage racks remain subcritical

under such moderation conditions.

There is no increase in the probability of an accident involving loss of bulk pool cooling capability in the spent fuel storage pool as a result of increasing fuel enrichment and operating with 18 month fuel cycles. The decay heat loads for the spent fuel storage pools are slightly higher with 18 month fuel cycle operation than with annual fuel cycle operation. However, conservative analyses presented in the CPSES FSAR were performed for fully loaded spent fuel storage pools with heat loads exceeding those anticipated from 18 month fuel cycles, demonstrating that the existing spent fuel pool cooling system can safely accomodate 18 month fuel cycle designs. For localized decay heat removal during abnormal conditions such as partial flow blockage there is no local boiling between cells.

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated?

The possibility of a new or unique accident not previously evaluated is not created by the proposed change. Spent fuel handling accidents and loss of heat removal capability in the spent fuel storage pools have already been analyzed and documented in the CPSES FSAR. The types of criticality accidents in either the fresh fuel storage racks or the spent fuel storage racks are not new. Enrichment limit upgrade and 18 month fuel cycle operation for CPSES do not create any different types of accidents than those already analyzed and documented in the CPSES FSAR for fuel enrichments up to 3.5 weight percent U-235 with annual fuel cycle operation.

(3) Involve a significant reduction in the margin of safety?

The proposed change does not involve a significant reduction in the margin of safety. The increase in enrichment from 3.5 w/o U-235 to 4.3 w/o U-235 reduces the margin to criticality when the fresh fuel is placed in the storage areas. Criticality analyses performed for the fresh fuel storage racks demonstrate subcriticality under a range of moderation conditions from fully flooded to optimum moderation. Criticality analyses of the spent fuel and in-containment storage racks demonstrate that the fuel with enrichments up to 5.0 weight percent U-235 can be safely accomodated within the NRC guidelines. The spent fuel storage pool will be at least five percent subcritical under accident conditions with soluble boron (2000 ppm) present in the pool water. Thus, the increase in fuel enrichment does not result in a significant reduction in the margin of safety.

V. ENVIRONMENTAL EVALUATION

Radiological environmental impact assessments have been performed for the increased enrichment limit and higher burnup for CPSES Unit 1. TU Electric has determined that the published Notice of Environmental Assessment and Finding of No Significant Impact for extended burnup fuel use in Commercial LWRs in the Federal Register (53 FR 6040), dated February 29, 1988 is applicable to these changes for CPSES Unit 1 and its fuel. In the above cited notice, the staff concluded that the environmental impacts summarized in Table S-4 of 10CFR51.52 for the transportation of fuel up to 4.0 weight percent enriched uranium-235 and a burnup level of 33,000 MWT/MTU are conservative and bound the corresponding impacts for transportation of fuel with a burnup level up to 60,000 MWD/MTU and uranium-235 enrichments up to 5.0 weight percent. Therefore, the Staff's environmental assessment for the Sharon Harris Nuclear Power Plant of Carolina Power & Light Company for enrichment and extended fuel burnup increases prusuant to 10CFR51.21, 51.32, and 51.35 and a finding of no significant impact as published in the Federal Register (53 FR 30355) on August 11, 1988 are equally applicable to these changes for CPSES Unit 1.

VI. REFERENCES

1. "Criticality Safety Evaluation of Comanche Peak Fuel Storage Facilities with Fuel of 5% Enrichment," Holtec Report HI-92880, September, 1992.

2. "An Assessment of the Use of Extended Burnup Fuel in Light Water Power Reactors," NUREG/CR-5009, February, 1988.

3. Correspondence, T. C. Feigenbaum, New Hamphsire Yankee, to United States Nuclear Regulatory Commission, "Request for License Amendment; Increased Enrichment of Reload Fuel Assemblies," Facility Operating License No. NPF-86, Docket No. 5.-443, March 18, 1991.

VII. PRECEDENTS

New Hampshire Yankee Seabrook Station, Facility Operating License NPF-86, [See Reference 3].

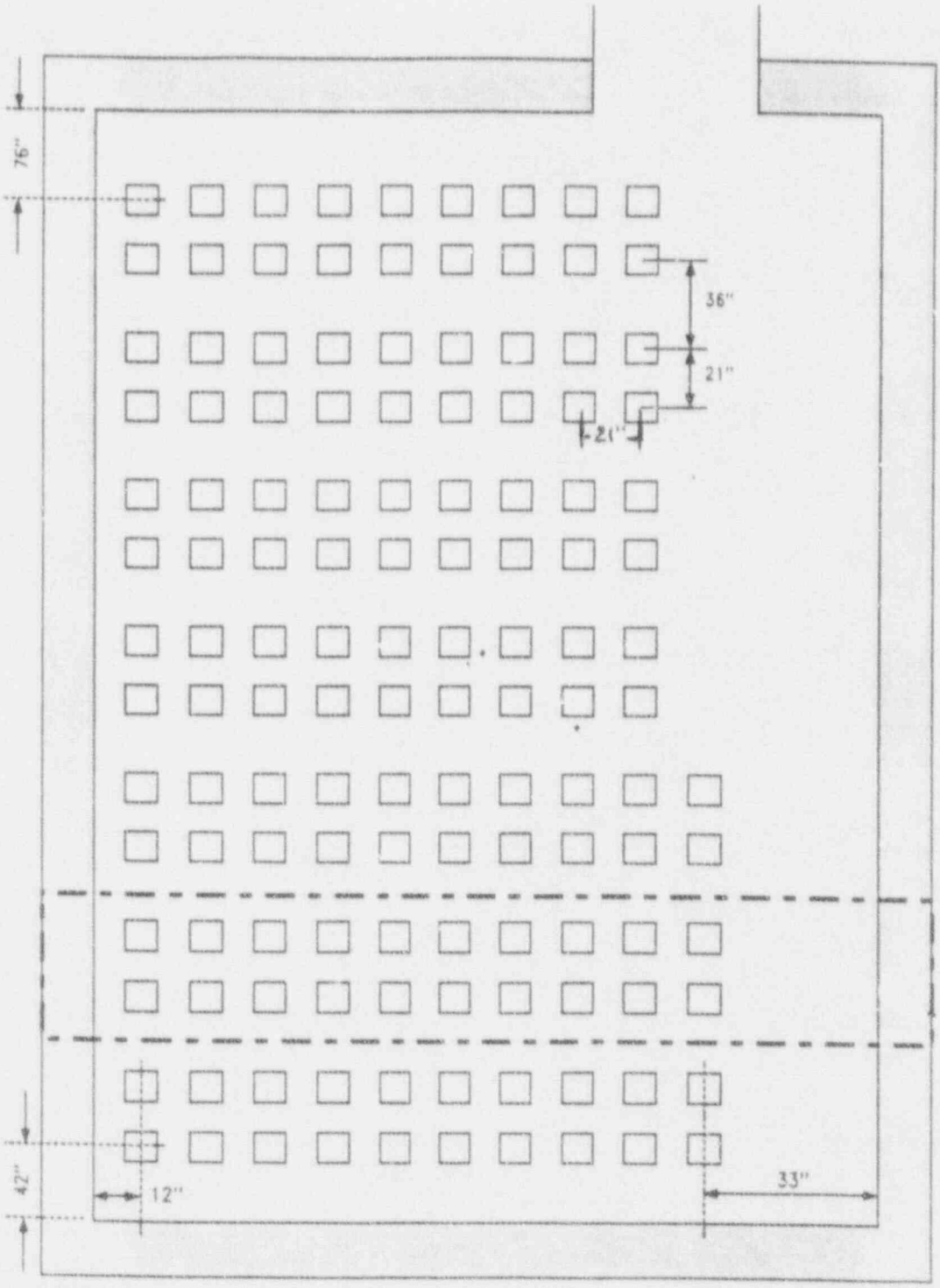

Fig. 1 NEW FUEL VAULT