TU ELECTRIC

Log # TXX-94048
File # 916 (5.0)
10010
Ref. # 10CFR50.90
10CFR50.36

William J. Cahill, Jr.
Group Vice President

April 22, 1994

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
SUBMITTAL OF LICENSE AMENDMENT REQUEST 94-009
INCREASE IN FUEL ENRICHMENT

REF: 1) TU Electric letter logged TXX-92468 from W. J. Cahill, Jr., to the NRC, dated October 16, 1992

2) NRC letter from Thomas A. Bergman to William J. Cahill, Jr., dated July 6, 1993

Gentlemen:

Pursuant to 10CFR50.90, TU Electric hereby requests an amendment to the CPSES Unit 1 and Unit 2 Operating Licenses (NPF-87 and NPF-89) by incorporating the attached change into the CPSES Units 1 and 2 Technical Specifications.

The proposed change revises the CPSES Units 1 and 2 Technical Specifications by increasing the allowable fuel enrichment from 4.3 weight percent to 5.0 weight percent. This change is being made to improve the overall fuel cycle efficiency. Analyses provided in Reference 1, to allow an increase in fuel enrichment from 3.5 weight percent to 4.3 weight percent, support an enrichment up to 5.0 weight percent. Those analyses are applicable to this request and are again included as part of this submittal (Enclosure 1). Reference 2 documented the NRC's review of those analyses.

Attachment 2 provides a detailed description of the proposed change, a safety analysis of the change, and TU Electric's determination that the proposed change does not involve a significant hazard consideration. Attachment 3 provides the affected Technical Specification pages (NUREG-1468), marked-up to reflect the proposed change.

D029 1/1

The initial use of fuel enriched to greater than 4.3 weight percent is currently planned for the fifth fuel cycle (Cycle 5) for Unit 1. Cycle 5 for Unit 1 is presently scheduled to start following the Spring, 1995 Unit 1 outage. The initial fuel receipt in support of this outage is expected in November 1994. TU Electric requests approval of this proposed license amendment by November 1, 1994, with implementation of the Technical Specification change to occur prior to initial receipt of fuel enriched to greater than 4.3 weight percent.

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

If you have any questions, please contact Mr. Bob Dacko at (214) 812-8228.

Sincerely,

William J. Cahill, Jr.

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

By: Roger D. Walker
Roger D. Walker
Regulatory Affairs Manager

BSD

Attachments: 1. Affidavit
2. Description and Assessment
3. Affected Technical Specification page (NUREG-1468) as revised by all approved license amendments

Enclosure: 1. Criticality Safety Evaluation of Comanche Peak Fuel Storage Facilities with Fuel of 5% Enrichment

c - Mr. L. J. Callan, Region IV
Mr. T. A. Bergman, NRR
Mr. L. A. Yandell, Region
Resident Inspectors, CPSES (2)

Mr. D. K. Lacker
Bureau of Radiation Control
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
	)	50-446
(Comanche Peak Steam Electric	)	License Nos. NPF-87
Station, Units 1 & 2)	)	NPF-89

AFFIDAVIT

Roger D. Walker being duly sworn, hereby deposes and says that he is Regulatory Affairs Manager for TU Electric, the licensee herein; that he is duly authorized to sign and file with the Nuclear Regulatory Commission this License Amendment Request 94-009; 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.

Roger D. Walker

Roger D. Walker
Regulatory Affairs Manager

STATE OF TEXAS)
)
COUNTY OF DALLAS)

Subscribed and sworn to before me, on this 22nd day of April, 1994.

Gayle R Peck

Notary Public

Gayle R. Peck
Notary Public, State of Texas
My Comm. Expires 01/06/98

DESCRIPTION AND ASSESSMENT

I. BACKGROUND

TU Electric requested and was granted an increase in the maximum uranium-235 (U-235) enrichment for reload fuel assemblies to 4.3 weight percent (w/o) from 3.5 w/o to support extended fuel cycles (18 months) starting with Unit 1, Cycle 4. The analyses provided in support of that request (Reference 1) were performed for a 5.0 w/o fuel enrichment. The submittal did not request an increase to 5.0 w/o at that time because 4.3 w/o was sufficient for an 18 month cycle and because the expected design of the proposed high density spent fuel racks was not consistent with fuel enrichments above 4.3 w/o. The design of the proposed high density rack is being revised and is now expected to accommodate spent fuel with up to 5.0 w/o initial enrichment.

In order to realize the significant fuel cycle efficiency improvements afforded by higher enrichment, TU Electric proposes to increase the maximum U-235 enrichment for reload fuel assemblies to 5.0 w/o from the current maximum of 4.3 w/o. The current allowance for fuel irradiation up to 60,000 megawatt days per metric ton of uranium (MWD/MTU) remains appropriate. The NRC evaluated this allowance for fuel irradiation as documented in Reference 2.

This technical specification change is required to allow receipt and storage of fuel with enrichments over 4.3 w/o at CPSES.

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 4.3 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 5.0 weight percent U-235."

III. ANALYSIS

This analysis considers only the impact of the higher fuel enrichment on the handling and storage of fresh fuel and spent fuel. The use of the fuel in the reactor core is analyzed each cycle in the reload safety analysis which is reviewed in accordance with the requirements of 10CFR50.59. The analysis below addresses only the existing fuel rack configurations. Future fuel rack configurations will be analyzed and approved prior to use.

TU Electric provided analyses to the NRC to increase the allowable U-235 enrichment from 3.5 w/o to 4.3 w/o and to increase the allowance of fuel irradiation up to 60,000 MWD/MTU (Reference 1). The changes were necessary to support an 18 month fuel cycle. The NRC approved the higher enrichment and higher fuel irradiation in Reference 2. The analyses provided in the Reference 1 submittal already support a 5.0 w/o fuel enrichment. Thus, the following discussions are essentially the same as those provided in Reference 1 updated to remove discussions relating to increasing the allowance of fuel irradiation (which is not being changed).

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 4.3 w/o 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.

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 3) which verify the acceptability of an enrichment limit of 5.0 w/o 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 multi-group 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 w/o 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 accommodate fuel up to 5.0 w/o U-235. No burnup restrictions 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?

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 accidentally 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.

The probability of a fuel handling accident, such as dropping a spent fuel assembly does not increase, since the mass of the fuel assembly does not increase when the U-235 enrichment is increased. The consequences of a spent fuel assembly drop accident do not increase significantly due to an increase in enrichment since fission product inventories in the fuel assembly do not change significantly due to an increase in the fuel enrichment. Fission product inventories are primarily a function of recent power history and fuel irradiation and are relatively insensitive to initial enrichment. The impact of increasing the allowance for fuel irradiation to the current limit of 60,000 (MWD/MTU) was previously analyzed and found to be acceptable in Reference 1. The results of this analysis for enrichments up to 4.3 w/o remain valid for an increase in the enrichment limit to 5.0 w/o. 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 w/o 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 cooling capability in the spent fuel storage pool as a result of increasing fuel enrichment from 4.3 w/o to 5.0 w/o. The decay heat loads are primarily a function of fission product inventory and, as discussed above, are relatively insensitive to initial enrichment. Decay heat loads for the 5.0 w/o enriched fuel may increase slightly, however, conservative analyses presented in the CPSES FSAR remain valid.

Thus the proposed change does not involve a significant increase in the probability or consequences of an accident previously analyzed.

(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. The enrichment limit upgrade does not create any different types of accidents than those already analyzed and documented in the CPSES FSAR.

(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 4.3 w/o to 5.0 w/o U-235 reduces the margin to criticality when the fresh fuel is placed in the storage areas. However, 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 fuel with enrichments up to 5.0 w/o U-235 can be safely accommodated 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

TU Electric has evaluated the proposed change and has determined that the change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of any effluent that may be released off-site, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

VI. REFERENCES

1. TU Electric letter logged TXX-92468 from W. J. Cahill, Jr., to the NRC, dated October 16, 1992

2. NRC letter from Thomas A. Bergman to William J. Cahill, Jr., dated July 6, 1993

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

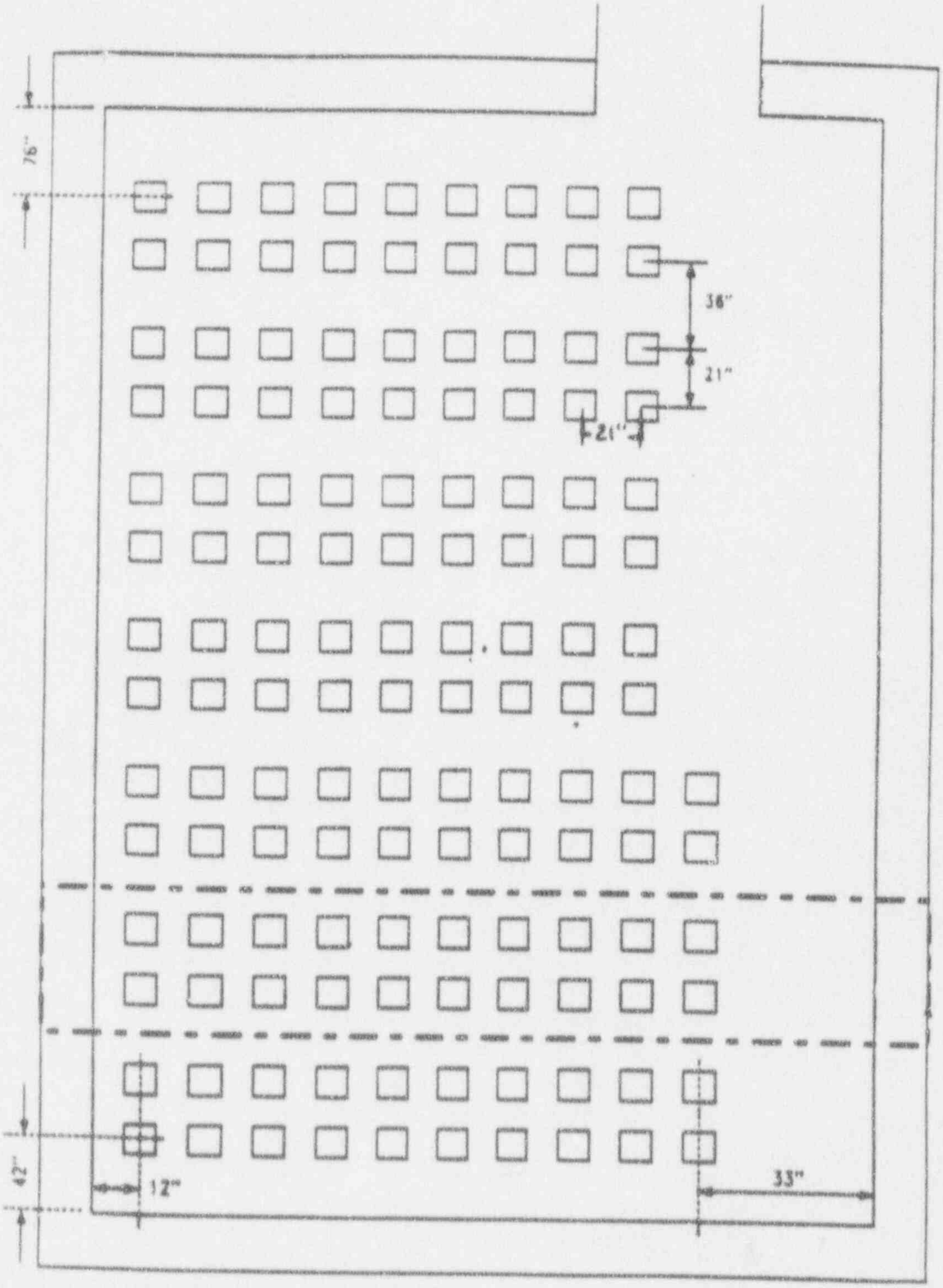

Fig. 1 NEW FUEL VAULT