

April 7, 1997

Mr. Oliver D. Kingsley, Jr.
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SUBJECT: ENVIRONMENTAL ASSESSMENT RELATED TO RERACKING OF SPENT FUEL POOL -
WATTS BAR NUCLEAR PLANT, UNIT 1 (TAC NO. M96930)

Dear Mr. Kingsley:

Enclosed for your information is a copy of an "Environmental Assessment and Finding of No Significant Impact." This notice relates to your application dated October 23, 1996 as supplemented by letters dated December 11, 1996, January 31, February 10 and 24, and March 11 and April 4, 1997 proposing an increase in the capacity of the spent fuel pool and an increase from 3.5 to 5.0 percent in the enrichment of fuel that may be stored in the spent fuel pool.

This notice is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Joseph F. Williams for
Frederick J. Hebdon, Director
Project Directorate II-3
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure: Environmental Assessment

cc w/enclosure: See next page

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UNITED STATES NUCLEAR REGULATORY COMMISSIONTENNESSEE VALLEY AUTHORITYDOCKET NO. 50-390WATTS BAR NUCLEAR PLANT, UNIT 1ENVIRONMENTAL ASSESSMENT AND FINDING OFNO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. NPF-90, issued to Tennessee Valley Authority, (the licensee), for operation of the Watts Bar Nuclear Plant, Unit 1, located in Rhea County, Tennessee.

ENVIRONMENTAL ASSESSMENTIdentification of the Proposed Action:

The current spent fuel pool storage capacity at the Watts Bar Nuclear Plant (WBN) is 1312 fuel assembly storage locations of which 484 are usable. The Tennessee Valley Authority (TVA) requested an amendment to the WBN Unit 1 operating license that would increase the storage capacity of the spent fuel pool to 1835 assemblies. The proposal consists of replacing the existing racks with spent fuel storage racks that were designed, manufactured, and used until 1995 in the Sequoyah Nuclear Plant, increasing the maximum initial enrichment of fuel to 5.0 weight percent (wt%) U-235, changing the spacing of stored fuel assemblies; adding limiting condition for operation (LCO) requirements for the combination of initial enrichment and burnup in an acceptable burnup domain, and requiring the boron concentration to be greater than or equal to 2000 parts per million (ppm) during fuel movement. The

submittal also proposed surveillance requirements to verify the initial enrichment and burnup and require chemical analysis to verify boron concentration. The proposed action is in accordance with the licensee's application for amendment dated October 23, 1996, as supplemented by letters dated December 11, 1996, January 31, February 10 and 24, and March 11 and , 1997.

The Need for the Proposed Action:

WBN is in its first operating cycle; therefore, the spent fuel pool is dry and no fuel assemblies are stored in it. Under current conditions, the spent fuel pool capacity will support three to four cycles of operation before losing the capacity for a full core offload (193 fuel assemblies). However, taking into account loading new fuel into the pool and component shuffling during an outage, the ability to accept a discharge of one full core off-load could be impacted as early as the year 2000. There are no commercial independent spent fuel storage facilities operating in the U.S., nor are there any domestic reprocessing facilities; therefore, the projected loss of storage capacity in the WBN pool would affect TVA's ability to operate WBN. The proposed amendment is needed to ensure the capability of full core offload is available for some time in the future.

Alternatives to the Proposed Action:

The licensee considered several wet and dry storage alternatives to the proposed action. The following wet storage alternatives were considered by the licensee: reracking with new ultra high density racks, rod consolidation, and transshipment (pool-to-pool). The following dry storage alternatives were considered by the licensee: metal casks, concrete casks, concrete vaults, and multi-purpose canisters/overpacks. The licensee considered several factors

when evaluating the options: effects on plant systems and operations; impacts on safety, including fuel handling; radiation exposure; industry experience; subsequent actions for further increasing onsite spent fuel storage capacity; flexibility for ultimate disposal of spent fuel; and overall costs. Based on these considerations, the licensee determined that reuse of the Sequoyah Nuclear Plant storage racks was the most viable option.

In 1975, the staff prepared a Generic Environmental Impact Statement (GEIS) on spent fuel storage. The findings were documented in NUREG-0575, "Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel." The storage of spent fuel, as discussed in the NUREG, is considered to be an interim action, not a final solution to permanent disposal. The methods of expanding spent fuel storage capacity considered in the FGEIS identified negligible differences in the environmental impacts and costs of the different alternatives, with the exception that expansion of the spent fuel pool was less costly and did not involve transportation issues. The FGEIS noted that since there are variations in storage design and limitations caused by spent fuel already stored in the pools, licensing reviews should be performed on a case-by-case basis to resolve plant-specific concerns.

The staff evaluated the licensee's list of alternatives as well as other alternatives. The following alternatives were considered by the staff:

Shipment of Fuel to a Permanent Federal Fuel Storage/Disposal Facility

Shipment of spent fuel to a high-level radioactive storage facility is an alternative to increasing the onsite spent fuel storage capacity. However, the U.S. Department of Energy's (DOE's) high-level radioactive waste repository is not expected to begin receiving spent fuel until approximately

2010, at the earliest. In October 1996, the Administration did commit DOE to begin storing wastes at a centralized location by January 31, 1998. However, no location has been identified and an interim federal storage facility has yet to be identified in advance of a decision on a permanent repository. Therefore, shipping spent fuel to the DOE repository is not considered an alternative to increased onsite spent fuel storage capacity at this time.

Shipment of Fuel to a Reprocessing Facility

Reprocessing of spent fuel from the WBN facility is not a viable alternative since there are no operating commercial reprocessing facilities in the United States. Therefore, spent fuel would have to be shipped to an overseas facility for reprocessing. However, this approach has never been used and it would require approval by the Department of State as well as other entities. Additionally, the cost of spent fuel reprocessing is not offset by the salvage value of the residual uranium; reprocessing represents an added cost.

Shipment of Fuel to Another Utility or Site for Storage

The shipment of fuel to another utility for storage would provide short-term relief from the storage problem at WBN. The Nuclear Waste Policy Act and 10 CFR Part 53, however, clearly places the responsibility for the interim storage of spent fuel with each owner or operator of a nuclear plant. The shipment of fuel to another source is not an acceptable alternative because of increased fuel handling risks and additional occupational radiation exposure, as well as the fact that no additional storage capacity would be created.

Reduction of Spent Fuel Generation

Improved usage of fuel and/or operation at a reduced power level would decrease the amount of fuel being stored in the pool and thus increase the

amount of time before full core off-load capacity is lost. With extended burnup of fuel assemblies, the fuel cycle would be extended and fewer offloads would be necessary. The licensee is planning on operating on an 18-month refueling cycle, and, as part of this proposed amendment, the licensee plans on increasing its fuel enrichment to 5 percent. Operating the plant at a reduced power level would not make effective use of available resources, and would cause unnecessary economic hardship on TVA and its customers.

Therefore, reducing the amount of spent fuel generated by increasing burnup further or reducing power is not considered a practical alternative.

Development of Onsite Independent Storage Facility

An independent spent fuel storage installation (ISFSI) is licensed under 10 CFR Part 72. It is a passive storage system which stores spent fuel in dry casks on a concrete platform in a secured area. There are no commercial ISFSIs operating in the United States. Although use of an ISFSI provides many benefits, the site-specific development of an independent dry fuel storage facility at WBN was deemed undesirable by the licensee compared to the use of the already existing, licensed spent fuel racks. Furthermore, construction of such a facility would not use the existing expansion capacity of the existing pool, would not use the existing spent fuel racks taken out of the Sequoyah plant, and would have the potential to cause additional and different environmental impacts due to activities related to construction and operation. Development of a site-specific ISFSI at this time and in response to TVA's current needs would waste available resources.

No Action Taken

If no action were taken, the storage capacity could be lost as early as 2000 and WBN would have to shut down. This alternative is considered a waste of available resources and is not considered viable.

Environmental Impacts of the Proposed Action:

Radiological Impact

The WBN has waste treatment systems designed to collect and process waste that may contain radioactive material. The radioactive waste treatment systems were evaluated in the Final Environmental Statement (FES) and its supplement. The Spent Fuel Pool Cooling and Cleaning System is designed to remove the decay heat generated by stored spent fuel assemblies and to clarify and purify the water to permit unrestricted access to the plant fuel storage area and maintain optical clarity of the spent fuel pool water. It is not expected that there will be an increase in the liquid release of radionuclides from the plant as a result of the spent fuel pool expansion. Although the amount of activity in the spent fuel pool cleanup system may increase due to the increased number of spent fuel assemblies and the enrichment, after processing by the liquid radioactive waste system, the amount of activity released to the environment as a result of the proposed change is expected to be negligible. The proposed amendment will not involve any change in the radioactive waste treatment systems or flowrates described in the FES and its supplement.

Because the racks are being removed from the WBN plant before any spent fuel has been stored in them, they are not contaminated and they will not contribute to the volume of solid radioactive waste. Additionally, the Sequoyah racks are being reused and are not classified as solid radioactive

waste at this time. No additional low specific activity waste output is generated and less solid waste will be generated due to the reuse of the spent fuel racks and removal of the existing racks before they become contaminated.

In addition to the spent fuel assemblies themselves, the only other solid radioactive waste generated by the spent fuel pool is the spent fuel pool polisher resin which is used for water clarity. These resins are replaced approximately once per refueling cycle. No additional resins are expected to be generated by the pool cleanup system; therefore, no significant increase in the volume of solid radioactive waste is expected with the proposed amendment.

The proposed amendment is not expected to significantly affect the doses to the workers in the fuel storage area. The licensee stated that pressurized water reactor experience has shown that area radiation dose rates are approximately 1-3 millirem/hour. Dose rates on the pool bridge crane platform are approximately 4-5 mrem/hr. During refueling operations, these rates may increase slightly. During the reracking procedures, the occupational exposure to the workers will be much less if the amendment is granted at this time rather than if the racks are taken out in the future, after spent fuel is stored in them. No increases are expected to the concentration of airborne radioactivity as a result of expanded storage capacity.

The environmental impacts on the uranium fuel cycle and transportation resulting from the use of higher enrichment fuel and extended irradiation were published in NUREG/CR-5009, "Assessment of the Use of Extended Burnup Fuels in Light Water Power Reactors," and discussed in the staff Environmental Assessment and Finding of No Significant Impact published in the FEDERAL REGISTER on February 29, 1988 (53 FR 6040). The staff concluded that no significant adverse effects will be generated by increasing the burnup levels

as long as the maximum rod average burnup level of any fuel rod is no greater than 60 Gwd/MtU. The staff also stated that the environmental impacts summarized in Table S-3 and S-4 for a burnup level of 33 Gwd/MtU are conservative and bound the corresponding impacts for burnup levels up to 60 Gwd/MtU and uranium-235 enrichments up to 5 wt%.

Based on the above, the staff concludes that there are no significant radiological environmental impacts associated with the proposal.

Non-radiological Impact

The proposed amendment does not modify land use at the site; no new facilities or laydown areas are needed to support the rerack or operation after rerack; therefore, the proposal does not affect land use or land with historical or archeological sites.

As a result of the proposal, steady state pool bulk temperature remains within the limits prescribed for the spent fuel pool to satisfy pool structural strength constraints. The increased spent fuel inventory results in a maximum bulk pool temperature increase of less than 10° F. This increase in temperature results in an increase in pool water evaporation rate. The original analysis was performed assuming two unit operation. The licensee reanalyzed the effects of the increased temperature and evaporation rate and found the increases were well within the capacity of the existing HVAC system and continued to be bounded by the original analysis. The total heat load for the unplanned emergency core off-load is less than 35 million BTU/hr, which is less than one percent of the total plant heat loss.

The proposal does not affect non-radiological plant effluents and no changes to the National Pollution Discharge Elimination System (NPDES) permit are needed. The proposal does not result in any significant changes to land

use or water use, or result in any significant changes to the quantity or quality of effluents; no effects on endangered or threatened species or on their habitat are expected.

The proposal will not change the method of generating electricity nor the method of handling any influent from the environment or non-radiological effluents to the environment. Therefore, no changes or different types of non-radiological environmental impacts are expected as a result of the amendment.

ACCIDENT CONSIDERATIONS

In its application, the licensee evaluated the possible consequences of postulated accidents and described the means for mitigating these consequences should they occur. This evaluation included spent fuel handling accidents. A fuel handling accident may be viewed as a reasonably foreseeable design basis event which the pool and associated structure, systems, and components are designed and constructed to prevent. On the basis of its analysis, the licensee concluded that the effects of the proposed TS changes are small and that the calculated consequences are within regulatory requirements and staff guideline dose values.

The staff evaluated the consequences of operation at a bounding value of burnup (60,000 MWD/T) because of the licensee's reference to the use of more highly enriched fuel (up to 5.0 weight percent U-235). The staff concluded that the only potential increased radiological consequences resulting from a fuel handling accident associated with extended burnup and higher fuel enrichment are the thyroid doses; these doses remain well within the acceptance criteria given in NUREG-0800 and are, therefore, acceptable. The environmental impacts of the accident were found not to be significant.

The staff has considered accidents whose consequences might exceed a fuel handling accident that is beyond design basis events. The licensee and staff, as part of the operating license review, performed an analysis of installation of severe accident mitigation design alternatives (SAMDAs) in the environmental impact review. The staff concluded that none of the five design improvements warranted implementation at WBN.

The staff believes that the probability of severe structural damage occurring at WBN is extremely low. This belief is based on the Commission's requirements for the design and construction of the spent fuel pool and the contents and on the licensee's adherence to approved industry codes and standards. Therefore, the staff concludes that the potential for environmental impact from severe accidents is negligible.

Summary

The Commission has completed its evaluation of the proposed action. The change will not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released offsite, and there is no significant increase in the allowable individual or cumulative occupational radiation exposure. Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential nonradiological impacts, the proposed action does involve features located entirely within the restricted area as defined in 10 CFR Part 20. It does not affect nonradiological plant effluents and has no other environmental impact. Accordingly, the Commission concludes that there are no significant nonradiological environmental impacts associated with the proposed action.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the FES for WBN Units 1 and 2, dated April 1995.

Agencies and Persons Consulted:

In accordance with its stated policy, on March 24, 1997 the staff consulted with the Tennessee State official, Ms. E. Flanagan of the Division of Radiological Health, regarding the environmental impact of the proposed action. The State official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

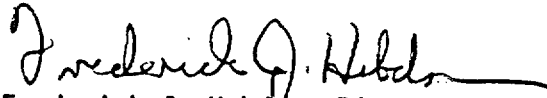
The staff has reviewed the proposed spent fuel pool modification to WBN Unit 1 relative to the requirements set forth in 10 CFR Part 51. Based upon the environmental assessment, the staff has concluded that there are no significant radiological or non-radiological impacts associated with the proposed action and that the proposed license amendment will not have a significant effect on the quality of the human environment. Therefore, the Commission has determined, pursuant to 10 CFR 51.31, not to prepare an environmental impact statement for the proposed amendment.

For further details with respect to the proposed action, see the licensee's letter dated October 23, 1996, as supplemented by letters dated December 11, 1996, January 31, February 10 and 24, March 11 and April 4, 1997, which are available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC, and at

the local public document room located at the Chattanooga-Hamilton County Library, 1001 Broad Street, Chattanooga, Tennessee.

Dated at Rockville, Maryland, this 7th day of April 1997.

FOR THE NUCLEAR REGULATORY COMMISSION



Frederick J. Hebbon, Director
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