



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
SUPPORTING AMENDMENT NO. 51 TO FACILITY OPERATING LICENSE NO. DPR-3  
YANKEE ATOMIC ELECTRIC COMPANY  
YANKEE NUCLEAR POWER STATION (YANKEE-ROWE)  
DOCKET NO. 50-29

Introduction

By application dated July 13, 1978 (Supplement No. 2 to Proposed Change No. 158) and additional information provided by letters dated September 15, 1978, and September 25, 1978, Yankee Atomic Electric Company (the licensee) requested an amendment to Facility Operating License No. DPR-3 for the Yankee Nuclear Power Station (Yankee-Rowe). The amendment would change the provisions of the Technical Specifications to permit moving of temporary support brackets and a shielded work platform over the spent fuel pit.

Discussion

By letter dated July 13, 1978, the licensee provided an outline of a multi-phased program of planned facility modifications designed to improve the spent fuel storage facilities. The modifications would include the installation of a storage pool liner and a division wall with a gate in the spent fuel pit. The program would also increase the spent fuel pool storage capacity. This increased capacity would be accomplished by installing additional spent fuel storage racks in 1984.

The Commission's "Notice of Proposed Issuance of Amendment to Operating License" in connection with the licensee's proposed program was published in the Federal Register on September 21, 1978 (43 FR42825). As indicated in the Notice, we have determined that the modifications described above have a utility independent of the proposed increase in spent fuel storage capacity. Therefore, some of the proposed modifications are being considered separately from the proposed increase in spent fuel storage capacity. This safety evaluation deals only with modifications preparatory to expanding the storage pool capacity to facilitate implementation

7870190175 P

of the remainder of the program in a timely and orderly manner at a radiation exposure level as low as reasonably achievable. The licensee has described this work in the July 13, 1978 submittal, Proposed Change No. 158, Supplement 1; in the July 13, 1978 application, Supplement 2 and in letters dated September 15, and September 25, 1978. The licensee proposed to: (1) rearrange the existing spent fuel storage racks and spent fuel in the spent fuel pit, (2) install a new roof hatch in the Spent Fuel Transfer Pit Building, and (3) install temporary gate support brackets in the spent fuel pit. The licensee also proposed a change to Section 3.9.7 of the Yankee Rowe Technical Specifications to permit the installation of temporary gate support brackets and use of a shielded work platform in the spent fuel pit.

The first task of the initial phase of the program would be to relocate the fuel and the spent fuel racks in the spent fuel pit. They would be moved as far as practical from the work area so that no spent fuel will be below the area where the proposed central roof hatch is to be installed.

In the July 13, 1978, Supplement No. 1, the licensee provided detailed information on the proposed central roof hatch for the Spent Fuel Transfer Pit Building. The purpose of the new central roof hatch is to enable installation and removal of a temporary gate in the spent fuel pit. The temporary gate, to be installed in the future, will divide the pit volume approximately in half. This will allow draining either half of the pit to facilitate the installation of a liner and a division wall with gate in the spent fuel pit. The detailed design of the gate and consideration of installation of the temporary gate and the division wall will be evaluated as a future license amendment.

The licensee stated that weather tightness of the roof and compliance with Technical Specification 3.9.12 on building isolation will be maintained during the installations by providing a temporary roof enclosure. Design of the enclosure is such that the roof may be sealed at any time simply by lifting it into place. Tests have shown the guyed assembly capable of withstanding a basic wind of 70 mph.

In Supplement No. 2, the licensee provided detailed information on the proposed installation of the temporary gate support brackets for the spent fuel pit. These brackets will allow future installation of a temporary gate to permit dewatering of either half of the pit while continuing to store spent fuel in the other half of the pool. The brackets will be in five large sections to be joined and installed at the site. The individual sections will be lowered through the new central roof hatch into the pit one at a time. The first section will be supported in the pit by beams that span the pool and welded to the second section. These sections will be supported in the pit and then welded to the third section and so on until all five sections have been welded together. The complete bracket is then lowered into the pit.

The licensee indicated that to lower the bracket sections into the pit there must be a small clearance between the completed bracket and the pit walls. Once the completed bracket is in place, this clearance space will be grouted in. The grout will be injected by a diver. A work platform will be provided to support the divers in the pit. The spent fuel in the pit has been rearranged to minimize radiation levels in the work area. The licensee expects no shielding will be required to protect the divers from radiation. The diver's work platform is an open cage arrangement which weighs less than 900 pounds. A shielded work platform will be available at the site in the event that radiation shielding is necessary. The radiation level inside the platform will be maintained below 50 mrem/hour and the total exposure to the divers should be below 8 man-rem.

The licensee has evaluated the consequences of dropping the work platform or any of the bracket pieces. The safety consideration in these evaluations was that the capability for removing residual heat from the spent fuel should not be impaired by loss of pit water. Such loss of water could occur if a dropped heavy load were to perforate the pit concrete slab. The heaviest bracket piece weighs about 5800 pounds and the shielded work platform weighs about 10,000 pounds.

### Evaluation

The licensee has proposed relocating the existing spent fuel racks and spent fuel in the fuel storage pit. The spent fuel racks and spent fuel are being relocated in the pit to separate them by distance from the area in the pit below the new roof hatch. The spent fuel racks, including movements of the racks, are those reviewed and accepted previously by the NRC in Amendment No. 33. Therefore, no additional restrictions are needed on the spent fuel racks for the safe storage of spent fuel.

The licensee has proposed to install a new roof hatch in the Spent Fuel Transfer Pit Building. This installation is presently underway. Technical Specifications prohibit moving loads greater than 900 pounds over the spent fuel pit, except for certain specified loads including roof hatch covers. The new hatch is of comparable size and weight to the two existing roof hatches. No object handled during installation of the roof hatch other than the roof hatch cover will weigh more than 900 pounds. Further, no objects will be carried over spent fuel inside the building. In addition, there will be a temporary pool cover beneath the work area. This will collect falling debris that might contaminate the pit water. The spent fuel in the pit has decayed more than a year. Therefore, the inventories of radioiodines and radioactive noble gases in the spent fuel are at low levels.

Based on the above considerations, we conclude that installation of the new roof hatch can be carried out safely within the existing restrictions in the Technical Specifications.

The licensee also proposes to install temporary gate support brackets in the spent fuel pit. The licensee proposed changes to Specification 3.9.7 of the Yankee Rowe Technical Specifications to allow the temporary gate support brackets and a shielded work platform, if required, to be handled over the pit.

The support brackets will be attached to the concrete using anchor bolts. The installation of these bolts will not impair the structural integrity of the pit walls or slab. The gap between the bracket plate and concrete will be filled with an epoxy grout. The licensee has determined that the epoxy compound will not introduce harmful concentrations of halides into the pit either through irradiation induced degradation or the leaching of contaminants. We have requested the licensee to provide additional information to document long-term

compatibility of this material with the pit environment. This may be of significance if spent fuel would be moved closer to the bracket location to allow dewatering of the pit. The licensee may not without further authorization move spent fuel closer to the bracket in any future phase of the spent fuel pit work. We will reexamine this matter and licensee's documentation concerning the long-term compatibility of the epoxy with the pit environment before moving spent fuel or dewatering a part of the pit, but in no case more than one year from the date of this amendment. We find that during the period of time until spent fuel might be moved closer to the location of the temporary bracket during the dewatering phase, no degradation of the material will take place that could introduce potentially harmful contaminants into the pit water. This is supported by the fact that the pit water temperature is low and we expect radiation levels to be low in the area of the epoxy. Furthermore, since a portion of the pit water is continuously passed through a demineralizer resin, impurities such as halides are maintained to acceptably low levels.

The shielded work platform (which will be available if needed) is 8 feet high and 4 feet square at the base. The front will be open to permit the diver access to the pit walls. The sides will be constructed of steel plate to provide radiation shielding. A thickness of 2 inches will be provided on three sides and the floor. Enough shielding will be provided to reduce the radiation levels inside the platform below 50 mrem/hour. The total exposure to the divers for the work is estimated by the licensee to be less than 8 manrem. We have concluded that the licensee is making every reasonable effort to maintain occupational exposures as low as reasonably achievable.

Neither the temporary gate brackets nor the shielded work platform will be allowed over spent fuel. They will be lowered separately straight down into the pit through the new roof hatch in the most direct and safest manner. The temporary gate brackets are supported by a crane or by the beams spanning the pit until it is bolted to the walls of the pit. The temporary gate bracket is a U-shaped structure with no cross-connected internal framework just fitting within the width of the pit so that it will not hit spent fuel racks or spent fuel if it falls into the pool and tips over. The brackets and the platform will be handled over cleared areas of the pit and in accordance with approved written procedures. Also, redundant slings and lifting eyes will be used so that the failure of any sling or lifting eye will not result in dropping the loads. The brackets will be secured and grouted to the pit walls and the platform will be in the pit only for the short time required to do this work.

The licensee has evaluated the consequences of an accidental drop of the shielded work platform or any of the bracket pieces onto the pit slab. A drop of 52 feet was postulated. The licensee's analysis assumed a striking velocity calculated for a free fall through air without considering the energy absorbing characteristics of the water. The dropped objects were conservatively assumed to be rigid and therefore no energy absorption from deformation of the objects was considered. The bracket pieces were assumed to impact on end and the work platform on a corner to simulate the most severe orientation in terms of pit slab perforation.

The Modified National Defense Research Committee Formula was used to calculate the penetration of these objects into the pit slab. A limiting penetration of 10.6 inches was calculated for the postulated drop of the work platform. These calculations indicate that the 36 inch slab would not be perforated from such a postulated accident and that the water would be retained in the spent fuel pit. We find these calculations to be reasonable and have concluded that even in the unlikely event that an accident were to occur, the safety consequences would be acceptable. Furthermore, the use of redundant slings and lifting eyes provides additional assurance that a construction handling accident will not occur.

Based on the above, we conclude that the proposed changes to Technical Specification 3.9.7 are acceptable, because these changes do not affect the potential consequences of previous evaluations of postulated design basis accidents for the spent fuel pit.

We have also reevaluated the potential consequences of the postulated design basis accidents for the spent fuel pit, the postulated fuel handling accident inside the Spent Fuel Pit Building and inside the containment in accordance with the guidance in Regulatory Guide 1.25. The assumptions made and results of our calculations of these potential consequences are given in Table 1. No credit is given for isolation of the Spent Fuel Pit Building although this is required to meet Technical Specification 3.9.12. The potential consequences of the postulated fuel handling accidents are appropriately within the guidelines of 10 CFR Part 100 and are, therefore, acceptable. Because no credit is given for isolation of the Spent Fuel Pit Building, this building is not considered and not required to be a safety-grade structure. However, compliance with specification 3.9.12 will reduce the consequences of fuel handling accidents.

Whole body doses were also examined but they are not controlling due to decay of the short lived radioisotopes prior to fuel handling. The potential consequences of these postulated accidents at the low population zone are less than those given for the Exclusion Area Boundary in Table 1 (attached).

In summary, we have concluded based on the above considerations that the licensee proposal to rearrange the spent fuel racks and spent fuel in the pit, install a new roof hatch above the pit, and install temporary gate support brackets in the pit is acceptable.

#### Environmental Considerations

We have determined that the amendment does not authorize a change in effluent types or an increase in total amounts of effluents nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

#### Conclusion

We have also concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Attachment:  
Table 1

Date: October 6, 1978

Table 1

POTENTIAL CONSEQUENCES OF THE POSTULATED  
FUEL HANDLING ACCIDENTS AT THE EXCLUSION AREA BOUNDARY

<u>Location</u>	<u>Consequences (Rem)</u>	
	<u>Thyroid</u>	<u>Whole Body</u>
Spent Fuel Pit Building	44	0.2
Inside Containment	44	0.2
Assumptions:		
Guidance in Regulatory Guide 1.25		
Power Level	618 Mwt	
Peaking factor	1.65	
Number of Assemblies damaged	1	
Number of Assemblies in core	76	
Charcoal Filters available	0	
Decay time before moving fuel	100 hours	
X/Q Value Exclusion Area Boundary (ground level release)	0-2 hours	$3.5 \times 10^{-4}$ sec/m