

September 6, 1981

Docket No. 50-29
LS05-81-09-021



Mr. James A. Kay
Senior Engineer-Licensing
Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701

Dear Mr. Kay:

SUBJECT: SEP TOPIC XV-20, RADIOLOGICAL CONSEQUENCES OF FUEL DAMAGING
ACCIDENTS (INSIDE AND OUTSIDE CONTAINMENT) - YANKEE ROWE
ATOMIC POWER STATION

Enclosed is a copy of our final evaluation of Systematic Evaluation Program Topic XV-20, Radiological Consequences of Fuel Damaging Accidents (Inside and Outside Containment). This assessment compares your facility, as described in Docket No. 50-29 with the criteria currently used by the regulatory staff for licensing new facilities. This evaluation has been revised to reflect the new atmospheric dispersion factors provided in our evaluation of Topic II-2.C.

Our review of this topic is complete and this evaluation will be a basic input to the integrated safety assessment for your facility unless you identify changes needed to reflect the as-built conditions at your facility. This topic assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this topic are modified before the integrated assessment is completed.

Sincerely,

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

Enclosure:
Completed SEP Topic XV-20

cc w/enclosure:
See next page

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Mr. James A. Kay

cc

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YANKEE ROWE

XV-20 RADIOLOGICAL CONSEQUENCES OF FUEL DAMAGING ACCIDENTS (INSIDE AND OUTSIDE CONTAINMENT)

I. INTRODUCTION

The safety objective of this topic is to assure that the offsite doses from fuel damaging accidents as a result of fuel handling inside and outside containment are well within the guideline values of 10 CFR Part 100.

II. REVIEW CRITERIA

Section 50.34 of 10 CFR Part 50, "Contents of Applications: Technical Information," requires that each applicant for a construction permit or operating license provide an analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility. A fuel handling accident in the fuel handling and storage facility resulting in damage to fuel cladding and subsequent release of radioactive material is one of the postulated accidents used to evaluate the adequacy of these structures, systems, and components with respect to the public health and safety.

10 CFR Part 100 provides the acceptable dose consequences for siting of nuclear power plants.

III. RELATED SAFETY TOPICS

Topic II-2.C, "Atmospheric Transport and Diffusion Characteristics for Accident Analysis" provides the meteorological data used for calculating the offsite dose consequences.

The review of the fuel damaging accidents did not consider fuel damage as a result of drops of the spent fuel cask or other heavy objects which can be carried either over an open reactor vessel or the spent fuel pool. Review of the drops of casks and heavy objects is covered in two SEP Topics, IX-2, "Overhead Handling Systems-Cranes" and XV-21, "Spent Fuel Cask Drop Accidents."

IV. REVIEW GUIDELINES

Accidents resulting from the movement of fuel inside and outside containment were reviewed following the assumptions and procedures outlined in Standard Review Plan (SRP) Section 15.7.4 and Regulatory Guide 1.25. The dose to an individual from a postulated fuel handling accident should be well within

the exposure guidelines of 10 CFR Part 100. "Well within" the guidelines of 10 CFR Part 100 has been defined as less than 100 rem to the thyroid. (Whole body doses are also examined but are not controlling due to the decay of the short-lived radioisotopes prior to fuel handling). This is based on the probability of this event relative to other events which are evaluated against 10 CFR Part 100 exposure guidelines. The review considers single failure, seismic design and equipment qualification only when the potential consequences might exceed the guidelines of 10 CFR Part 100 in the absence of containment isolation and effluent filtration.

V. EVALUATION

The design basis fuel handling accident is postulated to damage one fuel assembly during fuel handling operations either inside the Spent Fuel Building or inside containment. The postulated consequences are given in Table XV-1. The assumptions and input parameters used in calculating the potential consequences are given in Table XV-2.

The potential radiological consequences in the Spent Fuel Pit Building were calculated giving no credit for isolation of this building even though isolation is required to meet Technical Specification 3.9.12. However, compliance with this Technical Specification will reduce the consequences.

VI. CONCLUSIONS

Based on the above evaluation, we conclude that the radiological consequences of a fuel handling accident both inside and outside of containment are well within the guidelines of 10 CFR Part 100 and the SRP criteria are met.

REFERENCES

1. Hulman to Knighton, October 4, 1979, Meteorology Evaluation for Fuel Handling Accident Inside Containment.
2. Safety Evaluation by the Office of Nuclear Reactor Regulation Supporting Amendment No. 51 to License No. DPR-3, dated October 6, 1978.

TABLE XV-1

CALCULATED DOSES FOR FUEL HANDLING ACCIDENTS

	Doses, (Rem)	
	<u>Thyroid</u>	<u>Whole Body</u>
Exclusion Area Boundary (EAB) 2-Hour Doses:		
Spent Fuel Pit Building	35	0.2
Accident Inside Containment	35	0.2

TABLE XV-2

ASSUMPTIONS USED FOR THE FUEL HANDLING ACCIDENT

Power Level	618 Mwt
Operating Time	3 years
Peaking Factor	1.65
Number of Fuel Assemblies Damaged	1
Number of Fuel Assemblies in Core	76
Shutdown Time Before Start of Refueling	100 hours
Activity Release From Pool	Regulatory Guide 1.25
Containment Isolation (for Inside Containment Case)	Puff release assumed with no isolation or effluent filtration
0-2 hr, X/Q Value, Exclusion Area Boundary (ground level release)	$2.8 \times 10^{-4} \text{ sec/m}^3$