July 10, 1981

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Docket No. 50-29
LS05-81- 07-020

Mr. James A. Kay
Senior Engineer - Licensing
Yankee Atomic Power Company
1671 Woncester Street
Framingham, Massachusetts 01701

Dear Mr. Kay:

We have reviewed your letter of December 15, 1980, which requested clarification of the analysis requirements of NUREG-0737, Item II.B.3. Our response is enclosed.

We note that you imply that installation of the post-accident sampling system will not be completed by January 1, 1982, as required by NUREG-0737, because you are performing a complete shielding review as part of the Systematic Evaluation Program (SEP). However, it is the staff position that you should proceed with the design and procurement of equipment to meet the requirements of Item II.B.3 on a schedule to meet the original implementation date of January 1, 1982.

For the special case of unshielded containments such as Yankee Rowe, design dose calculations for sampling, retrieval, and handling of reactor coolant atmospheric samples should assume an extracameral or ambient radiation level of 25 R/hr of 0.5 MeV gamma photons at the s sampling location in addition to the radiation from the radioactivity integrated on the sample(s) for the purpose of assessing the design dose limits of 5 rem to the whole body and 75 rem to the extremities.

If you have any questions, please contact us.

Sincerely,

Original signed by

JUL 14 1981

Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

cc:w/enclosure:
See next page

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RESPONSE BY OFFICE OF NUCLEAR REACTOR REGULATION
TO REQUESTS FOR CLARIFICATION OF THE POST-ACCIDENT
SAMPLING REQUIREMENTS OF NUREG-0737, II.B.3
FOR YANKEE ROWE NUCLEAR GENERATING PLANT

YANKEE ATOMIC ELECTRIC COMPANY
DOCKET NO. 50-29

BACKGROUND

By letter dated December 15, 1980 the licensee had requested that the staff provide further clarification of the post-accident sampling requirements of NUREG-0737, II.B.3, for the chloride analysis and to suggest possible methods for performing accurate chloride analysis in the post-accident chemistry environment.

STAFF RESPONSE

II.B.3 Clarifications No. 2C and 5, Requiring Monitoring of Chloride in the Reactor Coolant

The licensee requested the staff to clarify the requirement for monitoring chloride in the post-accident reactor coolant because it contended that performance of the chloride analysis within the required time frame would result in excessive man rem exposure. Additionally, the licensee does not believe the chloride data will provide useful post-accident information and requested the staff to explain the need for chloride analysis and indicate acceptable analytical procedures.

The requirements of NUREG-0737 - II.B.3, clarifications Nos. 2C and 5 to monitor chloride within 24 or 96 hours (site dependent) is intended to provide information to the operator on the potential for chloride stress corrosion cracking (CSCC) of the reactor coolant stainless steel pressure boundary during the post-accident outage period. The two primary staff concerns are:

a. CSCC during a long outage may affect integrity of a critical system.

b. During recovery, an assessment will be made of chloride/oxygen/pH history to determine the extent of examination required for CSCC, prior to approving a restart.

Due to the multiple potential sources of chloride (plant cooling water, makeup water, chemical additives, resin degradation, etc.) we consider it likely that chloride contamination will exist at some point during the accident, as is the case at TMI-2 where 2-6 ppm chloride exists in the reactor coolant system. Therefore, our only means of assessing its effect is to be able to monitor chloride.

The primary factors which influence CSCC are temperature, stress, time, pH, chloride and oxygen concentration. During an accident condition temperature, stress and time are dictated by the accident. Therefore, to minimize the potential for and assess the possibility of CSCC we must monitor and control chloride, oxygen and pH. The verified absence of either chloride (<0.15ppm) or oxygen (<0.1ppm) in the reactor coolant system will practically eliminate concern for CSCC. Additionally, if pH is $\geq$7.0 the propensity for CSCC is further reduced.

Following an accident, the staff is interested in obtaining information on the potential for CSCC at the earliest opportunity, consistent with ALARA. Ideally, the capability to monitor oxygen and chloride with on line instrumentation will exist, with the capability to verify those analyses by grab sample when sufficient radioactive decay of the sample has occurred to meet ALARA.

Concerning analytical procedures which may be applicable for chloride analysis in the post accident environment, the staff believes that ion chromatography can provide an acceptable method. Also, automatic mercuric nitrate titration and specific ion electrode may be applicable if qualified. For whichever procedure is selected, it will be necessary to verify its accuracy and precision in the post-accident reactor coolant system environment.

We believe that to properly evaluate results, the procedure selected must be accurate to approximately 0.1 ± 0.05 ppm chloride. To obtain accurate results at a concentration of 0.1 ppm chloride the analytical procedure selected will require an undiluted sample of reactor coolant. Therefore, it will be necessary to consider the effects of radioactivity associated with Reg. Guide 1.3 and 1.4 source terms on the analysis as well as man rem exposure. The three chloride procedures indicated above can all be performed remotely. Thus, man rem exposure can be minimized.

The staff considers minimization of the potential for chloride stress corrosion cracking subsequent to an accident in which there is core degradation to be a valid requirement during post-accident chemistry conditions. Therefore, Yankee Rowe should meet the requirement to monitor reactor coolant chloride concentration in the post-accident chemistry environment. Additionally, in the event chloride exceeds 0.15 ppm in the reactor coolant, verification that oxygen concentration in the reactor coolant, is less than 0.1 ppm will be required.