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GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF NUCLEAR ENGINEERING
ATLANTA, GEORGIA 30332

FRANK H. NEELY
NUCLEAR RESEARCH CENTER
TELEPHONE: (404) 894-3600

April 9, 1980

U.S. Nuclear Regulatory Commission, Region II
101 Marietta Street, N.W. Suite 3100
Atlanta, Georgia 30303

Gentlemen:

Reference: RII:CJ; 50-160/80-1

This letter is in response to your report dated March 21, 1980, regarding an inspection of our facility by your staff.

A. Nuclear Safeguards Committee Audits

Immediate steps have been taken to correct this situation. At a meeting of the Nuclear Safeguards Committee on March 17, 1980, The Committee reaffirmed its committment to annual audits of the operation of the Georgia Tech Research Reactor. The nature of an effective audit is such that it will require several man-days to complete. Therefore, our audits will be conducted as a scheduled series of smaller units, performed by those members of the Nuclear Safeguards Committee who are not on the operating support staff for the reactor, as assisted by such technical specialists as they may designate. The first portion of the current audit was conducted on March 24, 1980 and is documented in the attached memo to Dr. M.V. Davis, from Drs. J. Russell and R. MacDonald, dated March 24, 1980. The schedule for the remaining portions will be developed at the April, 1980 meeting of the Nuclear Safeguards Committee.

B. Irradiation of Fissionable Materials

There is some confusion, mostly created by our own procedure 3101, "Operation of Expermental Facilities" about this problem. While the definition of a minor experiment indicates the material will be non-fissionable, specification H on page 2 of procedure 3101 reads in part: "The radioactive material content, including fission products of any doubly encapsulated or vented experiment..." Therefore the exact intent is not quite clear.

As noted by your staff, the three irradiations that were made involved only miligram amounts of uranium. While in partial conflict with our own procedure, the irradiations themselves caused no detectable reactivity effect, created no radiological handling problem and thus were done, we believe, within the intent of the minor experiment envelope. Because many materials contain trace amounts of uranium, additional confusion is caused by using the term "non-fissionable" materials. Since we feel the conflict lies within our own procedure, the Nuclear Safeguards Committee will be asked to specifically address this infraction. Until the Committee resolves the issue, no known fissionable material except samples

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that might contain trace amounts of uranium or other fissionable isotopes will be irradiated in the Georgia Tech reactor as minor experiments.

C. Quality Assurance Program for Experiments

Each major experiment to be done in the reactor requires a review by our Nuclear Safeguards Committee (NSC). This review includes a knowlegable evaluation of the safety of the experiment, including identification of significant safety features and necessary equipment safety tests if any. Reactor Operations and the Office of Radiological Safety are responsible for verifying that the experiment conforms to the NSC requirements.

Each minor experiment to be done in the reactor requires completion of our Form II (3-68) (copy enclosed) entitled "Georgia Tech Research Reactor, Request for Minor Experiment Approval". When properly completed, the form will identify the material and its weight, the estimated radioactivity to be produced and the encapsulation of the material.

The form is validated by signatures from at least Reactor Operations and the Office of Radiological Safety. This document, rather than our procedure 3101 as identified on page 3 of your Detail section, constitutes our QA confirmation for these experiments. This position was discussed and agreed upon by ourselves and Mr. Monte Conner, NRC Project Manager for our facility, during the development of the Technical Specifications as issued on June 6, 1974. However, as a part of the review of the procedure "Operation of Experimental Facilities" (B. above), the problem of QA procedures and verification will be addressed. It is the intent to broaden the scope of our QA procedures for both major and minor experiments to assure they adequately document verification of the significant safety aspects of all reactor experiments.

D. Monthly Flow Test, ECCS

After investigating this problem we have reached the following conclusions. During the time period 10/9/79 to 12/5/79, the ECCS system was capable of delivering D_2O at a flow rate of 8.0 to 8.5 gallons per minute. Since 12/5/79, the monthly surveillance checks of the flow rate have been satisfactory i.e. 8.5 ± 0.2 gpm. We believe, however, that in the period from 12/5/79 to 3/5/80 the minimum flow rate could, at times, have been as low as 8.0 gpm.

The operational lower limit for this flow rate is 8.5-0.2 or 8.3 gpm. The required minimum flow rate is 8.0 gpm as documented in our Safety Analysis Report (section 4.4.8.3, p. 79) and in a response letter to USAEC - Reactor Licensing dated July 13, 1971, question No. 6 (copy enclosed).

In our investigation, we found that while attempting to determine the ECCS flow rate on October 9, 1979, the reactor operator observed a flow rate of 8 gpm. This was less that our operational limit of 8.5 ± 0.2 gpm as stated on the job plan for this monthly surveillance. He further determined that the flow rate could be varied between 8.0 and 8.5 gpm by the manner in which ball-valve No. 94 was opened to initiate flow from the 300 gallon tank TD-2. A mechanical stop is provided for valve 94 to restrict its open position and thereby limit the total flow rate from the tank. The suspected cause of the variation in flow rate was thought to be due to a loosening of the lock nuts fixing the

handle to the ball operating shaft. The locknuts were tightened. A misunderstanding then arose resulting in the Reactor Supervisor believing the problem to be corrected. Further investigation revealed that some looseness still existed and, in March 1980, an additional attempt was made to correct the problem by inserting shim stock between the handle and the "flats" of the ball operating shaft. Complete verification of the fix has not been possible because the reactor is operating in Mode 1 as defined by our Technical Specifications and the ECCS tank TD-2 is not filled with D_2O.

We propose the following action to prevent this problem from occurring in the future. When additional D_2O is available, TD-2 will be filled and the operation of valve 94 completely verified. Prior to this, the reactor will not be operated at power levels greater than 1 MW. Additionally, to strengthen our surveillance program, we will establish a second review of the surveillance documentation to be performed by a person of at least the level of plant knowledge of a senior reactor operator. This last action (second review) has already been put into effect.

E. ECCS Report

The details supplied in item D above are applicable to this item. A licensee Event Report LER 80-1, has been issued.

F. Measurement of Primary Coolant pH

The measurement and interpretation of a pH value for a heavy water system presents some ambiguities. Because our cooling water is essentially formed of oxygen and the heavy hydrogen isotope deuterium, the term pH is probably more correctly termed a pD. Attempts to measure a value of "pH" using chemical electrodes inserted into a sample of moderator generally results in false acid readings as the unbuffered pure D_2O absorbs CO_2 from the air. To correct the problem stated in your inspection, we have re-instituted a weekly sampling of the D_2O and will log a value for "pH". This will be done in conjunction with our Weekly Precritical Startup Checklist, procedure 2002.

G. Kanne Chamber Inoperable

The Technical Specification in question, 3.2a states, in its entirety, that the reactor shall not be made critical unless "The reactor safety systems and related instrumentation are operable in accordance with Tables 3.1 and 3.2 including the minimum number of channels and the indicated maximum or minimum set points." Table 3.2 clearly permits a channel such as the Kanne to be bypassed for a period not to exceed 8 hours for test repair or calibration. It has, until now, been our understanding that this specification allowed multiple, daily startups consistent with our mode of operation as a research reactor. Because of redundancy, if an instrument such as the Kanne is taken out of service for repair, there is a backup instrument that is operable. The inspector's interpretation of the limit is to allow only steady state operation in progress to continue. We have modified our administrative controls to conform to this interpretation.

H. Natural Convection Limiting Safety System Setting

Once or twice a year for Nuclear Engineering Laboratory course work, the reactor is operated at very low powers ($\leq$ 1 kW) in a natural circulation mode to minimize the effect of flow turbluance on the reactor kinetic parameters being measured. The reactor power level is limited by administrative measures to values of 1 kW or less and it was not recognized that a Technical Specification required the actual adjustment of the flux monitor channels. Effective immediately, operation of the reactor in the natural convection mode will not be permitted unless the flux monitor trip points have been reset to value of 1.1 kW or less.

Sincerely yours,

John L. Russell, Jr.
Director

JLR:lrm

cc: Members of the Nuclear Safeguards Committee

Enclosures:

GEORGIA INSTITUTE OF TECHNOLOGY
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March 24, 1980

FRANK H. NEELY
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MEMO

TO: Dr. M. V. Davis

FROM: Dr. J. Russell, Dr. R. MacDonald R. MacDonald by JRuC.

SUBJECT: GTRR Audit by NSC

At the direction of the Nuclear Safeguard Committee, Dr. J. Russell and Dr. R. MacDonald audited GTRR operations:

Audited: Verification Filing System and Operator Log

Problems:

1. Some system work sheets were un-numbered. This led to apparent noting of problems for which no action was taken.
2. Files not in order
3. Blank work sheets, i.e., dates and initials but no comments on work done.
4. Operations file does not retain record of H.P. compliance with calibration procedures.

Commendation:

1. Recognition of flow problem from very small decrease in normal flow rate, and took immediate corrective action.

Recommendation:

1. All system work sheets should have I.D. number.
2. Any statement of a problem should either state resolution or refer to another SWS I.D. number.
3. Files in front office, console cards and maintainence lists should be reconciled and put in order. Master list may need up-dating.
4. Since H. P. retains calibration records and their numbered SWS, operations office should retain the note H. P. gives to Linda indicating the date of compliance. The calibration data can then be recalled via the date. Blank work sheets should not be put in operations office files.

cc: Committee
Kirkland

jm