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U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attention: Document Control Desk

Reference: License R-33, Docket 50-73

Gentlemen:

Enclosed are three signed copies of Annual Report No. 32 for  
the General Electric Nuclear Test Reactor.

Sincerely,

G. E. Cunningham  
Senior Licensing Engineer  
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Enclosures

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GENERAL ELECTRIC  
NUCLEAR TEST REACTOR

ANNUAL REPORT NO. 32

LICENSE R-33

DOCKET 50-73

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GE NUCLEAR ENERGY  
VALLECITOS NUCLEAR CENTER  
PLEASANTON, CA 94566

GENERAL ELECTRIC  
NUCLEAR TEST REACTOR

ANNUAL REPORT NO. 32

I. INTRODUCTION

This report summarizes the operation, changes, tests, experiments, and major maintenance at the Nuclear Test Reactor (NTR) which were authorized pursuant to License R-33 and 10CFR50, Section 50.59, for the period January 1, 1991, through December 31, 1991.

II. GENERAL

- A. The reactor was operated at or above critical for 804.46 hours; 380 startups were made. There were four scrams during this report period. Total plant operation equaled 3.216 MWd in 1991.
- B. The average radiation exposure to facility personnel was 1.8 Rem.
- C. There were no occurrences during 1991 that required notification of the NRC.
- D. There were no notices of violation issued as the result of NRC inspections.

III. ORGANIZATION

There were no organizational changes in 1991.

IV. FACILITY CHANGES, TESTS, EXPERIMENTS  
AND PROCEDURE CHANGES  
APPROVED BY THE FACILITY MANAGER

A. Facility Changes

Pursuant to 10CFR50.59(a), the Facility Manager authorized the following facility changes in 1991.

1. Motion Detector Circuit

Description: The control circuit for the reactor control room motion detector was modified so that the tamper switches associated with the detector head will activate an alarm in the security building when the bypass switch is in the "BYPASS" position. Previously, placing the bypass switch in the "BYPASS" position when the room was occupied would additionally bypass the tamper switches.

Safety Analysis: This revision was in conformance with the reactor security plan and did increase the security provided. The system was checked for proper operation after the change.

2. High Temperature Scram Test Switch

Description: This change authorized a relocation of the existing test switch to an area with a lower background radiation.

Safety Analysis: This change in location reduces the radiation exposure for those performing the test. The switch was tested after the change.

3. Low Flow Bypass Interrupter

Description: The low flow bypass relay may be reset at low power conditions. When this occurs, the scram bypass is activated and the low flow scram can be tested only when the bypass relay is removed. This change authorized the installation of a momentary contact test switch to allow easy testing of the low flow scram.

Safety Analysis: This switch retains the same scram logic and function. Failure of the switch would conservatively cause a reactor scram and not prevent one. The switch was tested after installation.

B. Tests

Pursuant to 10CFR50.59(a), there were no special tests performed during 1991 which required the approval of the Facility Manager.

C. Experiments

Pursuant to 10CFR50.59(a), the Facility Manager authorized the following new experiments in 1991.

1. Depleted U-238 Irradiation

Description: A previously approved irradiation was authorized to be irradiated in a second irradiation facility.

Safety Analysis: The reactivity worth of the experiment and the radiological effects resulting from handling and potential accidents were determined to be negligible.

2. N-Ray of Lithium-Filled Tube

Description: Lithium-filled metallic tubes were approved for neutron radiography.

Safety Analysis: The lithium tubes were filled in an inert atmosphere and sealed in tubes which were leak tested. Appropriate fire extinguishers were available in the area, the tubes were kept away from water, and the storage area was labeled "Flammable Solid" and "Dangerous When Wet".

3. Lutetium Oxide Irradiation

Description: A 0.3-gram sample of lutetium oxide was approved for irradiation.

Safety Analysis: The reactivity worth of the sample and potential radiation exposure and radiological hazards were all determined to be negligible.

4. Sodium Salt Irradiation

Description: This change authorized the irradiation of 0.05 gm of a sodium salt (carbonate, oxalate, acetate and chloride).

Safety Analysis: The reactivity worth of the experiment and the radiological effects resulting from handling and potential accidents were determined to be negligible.



C. Experiments (Continued)

5. Source Range Monitor (SRM) Test

Description: This change authorized the testing of an SRM with 10% of the U-235 of a previous test.

Safety Analysis: The reactivity effect, the radiological effects resulting from handling, and potential accidents were determined to be negligible.

D. Procedures

There were four changes to procedures. Pursuant to 10CFR50.59(a), the Facility Manager authorized the following procedure changes in 1991.

1. Manual Poison Sheet Modification

Description: This change authorized removing two strips of cadmium (instead of just one) when modifying a Manual Poison Sheet and deleting the subcritical multiplication plots.

Safety Analysis: Experience has shown that two cadmium strips may be removed at one time while maintaining reactor excess reactivity within limits. The critical position was still predicted and verified prior to startup. The reactivity change of the Manual Poison Sheet modifications has been well predicted.

2. Operations Request Form (ORF)

Description: The ORF was replaced by the Engineering Release (ER). This replacement standardizes the form used by all groups on site.

Safety Analysis: The replacement was administrative only. The function, reviews, audits and record retention remain unchanged. Procedures were revised.

3. Advanced Nuclear Applications Irradiation

Description: This change authorized the delegation of certifying the contents of routine Department of Defense classified irradiations from the group manager to the technicians preparing the samples.

Safety Analysis: The certification is unchanged. The sample preparers are fully knowledgeable of sample contents.

D. Procedures (Continued)

4. Quarterly Dosimeters

Description: This change authorized the use of TLD's instead of film to monitor beta and gamma exposure for personnel issued a quarterly dosimeter. This change does not affect reactor operations personnel who are issued monthly dosimeters.

Safety Analysis: The TLD's provide the equivalent exposure and documentation as the film badges.

V. MAJOR PREVENTIVE OR CORRECTIVE MAINTENANCE

There were no major preventive or corrective maintenance activities performed in 1991.

VI. UNSCHEDULED SHUTDOWNS

There were four (4) unscheduled shutdowns during this report period. These are summarized below.

- A. The reactor was manually shut down when one control rod failed to respond to switch actuation. The motor starter capacitor was determined to have failed. The capacitor was replaced and tested satisfactorily. Lost time was 2 hours and 43 minutes.
- B. A reactor scram occurred on two-of-three picoammeter trip because of a spurious condition. The instruments were reset and the reactor restarted. Lost time was 11 minutes.
- C. A reactor scram occurred while the reactor was operating for low power testing and the "Cooling Flow Needed" relay tripped spuriously. Since the primary pump was secured for the low power testing, a scram was initiated. Testing had just been completed so no operating time was lost.
- D. A reactor scram occurred when an AC power dip was caused in the incoming utility line. Lost time amounted to 18 minutes.

VII. RADIATION LEVELS AND SAMPLE RESULTS AT  
ON- AND OFF-SITE MONITORING STATIONS

The data below are from sample and dosimeter results accumulated during 1991. Except for the NTR stack data, these data are for the entire VNC site and include the effects of operations other than the NTR.

A. NTR Stack

Total airborne releases (stack emissions) for 1991 are as follows.

Alpha Particulate,  $< 0.36 \mu\text{Ci}$  (predominantly radon-thoron  
daughter products)  
Beta-Gamma Particulate,  $< 0.99 \mu\text{Ci}$   
Iodine-131,  $14.1 \mu\text{Ci}$   
Noble Gases,  $1.54 \times 10^2 \text{ Ci}$

Noble gas activities recorded from the NTR stack integrate both background readings and the actual releases. The background readings may account for 40 to 50% of the indicated release.

B. Air Monitors (Yearly average of all meteorological stations.)

Four environmental air monitoring stations are positioned approximately 90 degrees apart around the operating facilities of the site. Each station is equipped with a membrane filter which is changed weekly and analyzed for gross alpha and gross beta-gamma.

Alpha Concentration:

Maximum  $< 1.1 \times 10^{-14} \mu\text{Ci/cc}$  (predominantly radon-thoron  
daughter products)  
Average  $< 4.3 \times 10^{-15} \mu\text{Ci/cc}$

Beta Concentration:

Maximum  $< 2.2 \times 10^{-13} \mu\text{Ci/cc}$   
Average  $< 4.3 \times 10^{-14} \mu\text{Ci/cc}$

C. Gamma Radiation

The yearly dose results for the year 1991 as determined from evaluation of site perimeter TLD environmental monitoring dosimeters showed acceptable levels.

D. Vegetation

No alpha, beta or gamma activity attributable to activities at the NTR facility was found on or in vegetation in the vicinity of the site.



E. Water

There was no release of radioactivity in water or to the ground water greater than those limits specified in 10CFR20, Appendix B, Table II, Column 2.

F. Off-Site

Samples taken off the site indicate normal background for the area.

VIII. RADIATION EXPOSURE

The highest annual dose to NTR Operations personnel was 2.16 Rem, and the lowest was 1.63 Rem. The average dose was 1.84 Rem per person.

IX. CONCLUSIONS

The overall operating experience of the Nuclear Test Reactor reflects another year of safe and efficient operations. There were no reportable events.

GENERAL ELECTRIC COMPANY  
Irradiation Processing

By D. R. Smith  
D. R. Smith, Manager  
Nuclear Test Reactor