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March 30, 2004

File Copy DWT-2004-17

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Annual Report for NTR, 2003
Reference: License R-33, Docket 50-73
Enclosure: Annual Report No. 44 (3 copies)

Enclosed are three signed copies of Annual Report No. 44 for the General Electric Nuclear Test Reactor (NTR) located at Vallecitos Nuclear Center near Sunol, California.

If there are any questions or additional information required, please contact me at the number below.

Sincerely Yours,

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GENERAL ELECTRIC
NUCLEAR TEST REACTOR

ANNUAL REPORT NO. 44
FOR THE YEAR 2003

LICENSE R-33
DOCKET 50-73

MARCH 2004

General Electric Nuclear Test Reactor

Annual Report No. 44

This report summarizes the operation, changes, tests, experiments, and major maintenance at the General Electric Nuclear Test Reactor (NTR), which were authorized pursuant to License R-33, Docket 50-73, and 10CFR50, Section 50.59, for the period of January 1, 2003 through December 31, 2003.

I. General

Specific information about the operation of the NTR during the reporting period is presented as follows:

1. There were 211 reactor startups with the reactor operated at or above critical for 588.93 hours. Total power generation equaled 5.77 EFPH equivalent to 2.406 MWd in 2003.

2. The average radiation exposure to regular full-time NTR Operations personnel was 0.70 Rem.

3. There were three reactor scrams.

4. There were no occurrences during 2003 that required notification of the NRC. An informational call was made advising the NRC's NTR Project Manager about the failure of the NTR Control Room proximity security alarm and the backup actions being taken until the device was repaired was made on 1/29/03.

II. Organization

The details of changes in the status of personal which occurred during the reporting period are described as follows:

1. There was no change in the status of Mr. Edward Ehrlich who continued as Manager NTR and SRO.

2. Mr. Dennis Smith completed the necessary SRO proficiency training, SRO trainee watch standing under the direction and control of a Licensed Senior Reactor Operator, and the testing and biennial requalification program requirements necessary to reactivate his NTR Licensed SRO status. Mr. Dennis Smith continued as a part-time contractor, providing SRO duties, Quality Assurance (QA) consulting, SRO examination tutoring, and NDT training services.

3. Mr. Tim Peterson, Specialist, NTR, continued his operational duties governed by his Reactor Operators license. Mr. Peterson was certified Level II Neutron Radiography NDT in September 2003.

4. Mr. Art Raya continued on the NTR staff as a contract employee to perform NDT neutron radiography tasks under the direction and supervision of the licensed SRO staff and certified Level I, II and III NDT persons.

5. Mr. William Kreutel, NTR SRO, became disabled in the 4th quarter of 2002 and ceased Reactor Control panel operating duties. The disability is due to a medical condition and is unrelated to his employment duties or environment. Mr. Kreutel took formal disability retirement from the General Electric Company in 2003.

6. Mr. Daniel Thomas started as a full time NTR staff member in training for an SRO License in March 2003. Mr. Thomas is also performing NDT neutron radiography and other non-licensed NTR functions under the direction of the Licensed Operators and NDT Certified persons.

7. Mr. Charles Bassett started part time SRO training in 2003.

III. Facility Changes, Tests, Experiments, and Procedure Changes Approved by the Facility Manger

In accordance with written procedures, facility changes, tests, experiments, and procedure changes can only be approved by the Facility Manager. Specific information about the reporting period is presented as follows:

A. Facility Changes

Pursuant to 10CFR50.59(a), there were five facility changes made in 2003 requiring Facility Manager, Regulatory Compliance and VTSC approval.

1. A new additional electrical power link from the site emergency gas fueled generator to the NTR Rod Insert Bus via a "brake-before-make" key-lock manual switch was installed, tested and made operational. The change allows the reactor operator to first disconnect the rod drive bus from the normal commercial power source during an extended commercial power outage, reconnect it to the emergency generator power source and then insert the control rod drives and the safety rod drives. In the event of a loss of commercial power, a scram and a reactor shutdown will occur with safety rod magnet separation and rod insertion. The safety rod drives and the control rods and their drives would remain "as-is" until power became available and the reactor operator is required to standby and monitor the reactor in the interim. This change provide the reactor operator with an alternate backup power source to insert the safety and control rods drives during a loss of normal commercial power that thus "secure" the reactor during an extended commercial power outage.

2. Transistor replacements were made in a replacement Reactor Safety System Non-coincidence Module, Part No. 191X507G1 Serial No. 533 following a failure of the installed module to pass its annual preventative maintenance surveillance test performance specifications due to degradation of transistor performance. The Non-coincident module A side Q2, Q3 transistors changed from 2N527 to SK3004 and Q1, Q4 were changed from 2N336 and replaced with 2N697 and tested satisfactorily per PM 12-29. Non-coincident module B side Q2 transistor was changed from 2N527 to SK3004 and Q1 was changed from 2N336 and replaced with 2N697 and tested satisfactorily per PM 12-29. The Q2 and Q3 replacement transistors are those designated by the Manufacturer NTE. Q1 and Q4 replacement transistors were the RCA designated replacement transistors. Following the replacement, the module satisfied all PM surveillance test requirements as well and daily and monthly checks which were being satisfied.

3. A change was made to the structural support and pneumatic system of the Neutron Radiography shutter in the south cell. The structural change provides an additional welded support between the frame of the shutter support structure to the building frame. The pneumatic change added a valve in the discharge side of the south shutter pneumatic cylinder to dampen and reduce the force of the shutter closing on the shutter support frame. These changes were implemented to reduce and redistribute the load on the frame support bolts due to opening and closing of the shutter. Several of the bolts had previously experienced fatigue failures and had been replaced.

4. Additional emergency lighting was added to the north room mezzanine area.

5. A change was made to the north shutter logic to activate a red rotating beacon warning light at both personal entrances to the north room whenever the north shutter is not closed and power is available to the north shutter. This was done as part of a change to the radiological posting of the north room, which is now a high radiation area only when the north shutter is open (and the reactor is operating).

B. Tests

Pursuant to 10CFR50.59(a), there were no special tests performed during 2003 requiring Facility Manager approval.

C. Experiments

Pursuant to 10CFR50.59(a), there were no new experiments in 2003 requiring Facility Manager approval.

D. Procedure Changes

Pursuant to 10CFR50.59(a), there were procedural changes initiated to incorporate editorial or typographical corrections and technical data or changes to requirements or to provide additional or clarification of information. Changes made during 2003 were made with Facility Manager approval. Details of the changes are presented below:

1. An SOP change to the loss of electrical power emergency procedure was implemented to reflect the addition of the alternate / backup power supply to the rod drive bus.

2. An SOP change was implemented to the radiation zone classification for the North Room, which reclassified that from a High Radiation area to a Radiation Area under normal operating condition, and that it becomes a High Radiation Area when the North Room Radiography shutter is not closed and the reactor is operating.

3. Other minor SOP changes were made to effect editorial changes to the explosive information form that NTR receives with explosive shipment to add additional information about the ATF exempt status of the devices and to the calibration of the step wedge used to validate the film density of NTR radiographs. Neither of these changes is related to the NTR reactor license or technical specifications but rather are commercial quality elements.

IV. Major Preventative or Corrective Maintenance

Routine preventive maintenance and surveillance checks were performed as required and scheduled during the reporting period.

Noteworthy corrective maintenance activity performed during the reporting period consisted of the following:

- The NTR non-coincident logic module was tested in accordance with the required surveillance testing frequency during a shutdown period and the operation of the module did not meet the limits required by the PM procedure. A spare module was tested and that too did not meet the limits required by the PM procedure. Diagnostics were performed on the spare module and it was found that the performance of certain transistors had degraded. Those transistors were replaced with equivalent replacements, and the repaired spare unit again tested and showed satisfactory performance relative to the limits required by the PM procedure. The spare unit was installed and all scram tests were satisfactory. The repair of the spare logic module and transistor replacement was discussed above under Facility Changes.

- Permanent changes to the south shutter to correct the condition that had caused some foundation bolts to shear off and required their corrective action replacement were discussed above under Facility Changes.

V. Unscheduled Shutdowns

During the reporting period, there were no unscheduled manual shutdowns. There were three reactor scrams.

1. A loss of power to the NTR rod drive system occurred when a site electrician opened a breaker for non-NTR related work, not knowing that the breaker would interrupt vital power to NTR and cause a scram. An investigation determined that the cause of the scram was insufficient marking of circuit breakers that supply power to NTR. A review of the NTR building electrical distribution system was done and those breakers that supply power to NTR were marked. In additional, site procedures were changed to require that electrical work in the NTR building will be reviewed with the NTR staff and approved by the staff before such work is performed and the designated breaker is opened.

2. A 2 of 3 channel linear power hi-power scram occurred shortly after a reactor startup when the reactor operator was changed immediately after attaining 100% power to support a bathroom break. The on-coming operator was distracted by other non-reactor activities he had been directed to attend to which allowed his attention to be distracted away from the panel during a period of rapid xenon burnout, reactor heatup and control

rod adjustment to stable conditions as is typical shortly after startup. In addition, the reactor operator was using the optional reactivity testing pico ammeter to alert him of an excess power condition rather that the main pico ammeter readouts and that pico ammeter had not been turned on. An investigation was conducted and it was determine that the turnover to the on-coming operator could have been more comprehensive that it was in citing that the reactivity testing pico ammeter had not been turned on. Corrective actions included (a) avoiding a turnover between operators in the period following startup if at all possible, (b) requiring a formal and more comprehensive turnover between operators, and (c) standing orders that other activities are not to be engaged in by the reactor operator in the period immediately following a reactor startup when the reactor has not yet become xenon, temperature, and rod position stable.

3. A loss of power scram occurred during a period when a single source off-site commercial power was being supplied. That single source of off-site commercial power was interrupted, causing the reactor to scram. Commercial power was restored after about one minute.

No changes in radiation levels or in the off-gas or particulate levels were noted following any subsequent reactor startups following these scrams.

VI. Radiation Levels and Sample Results at On-Site and Off-Site Monitoring Stations

The data below are from sample and dosimeter results accumulated during the reporting period. 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 2003 are as follows:

Alpha Particulate, 7.90E-7 Ci (predominantly radon-thoron daughter products)
Beta-Gamma Particulate, 2.29E-6 Ci
Iodine-131, 1.57E-4 Ci
Noble Gases, 2.57E+2 Ci

Noble gas activities recorded from the NTR stack integrate both background readings and the actual releases. Background readings may account for as much as 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, 3.23E-14 µCi/cc (predominantly radon-thoron daughter products)
Average, 1.93E-14 µCi/cc

Beta Concentration:
Maximum, 7.57E-14 µCi/cc
Average, 1.93E-13 µCi/cc

C. Gamma Radiation

The yearly dose results for the year 2003 as determined from evaluation of site perimeter environmental monitoring dosimeters showed no departure from normal stable backgrounds.

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 groundwater greater than the limits specified in 10CFR20, Appendix B, Table 2, Column 2.

F. Off-Site

The results of samples collected from off-site locations indicate normal background for the regional area.

VII. Radiation Exposure

The highest annual dose to full time NTR Operations personnel was 0.82 Rem and the lowest was 0.56 Rem. The average radiation exposure to personnel was 0.70 Rem per person.

VIII. Conclusion

The General Electric Company concludes that the overall operating experience of the NTR reflects another year of safe and efficient operations. There were no reportable events.

GENERAL ELECTRIC COMPANY
Vallecitos and Morris Operations

Edward Ehrlich

E.H. Ehrlich, Manager
Nuclear Test Reactor