

GE Energy

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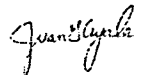
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Subject: Annual Report for NTR, 2005  
Reference: License R-33, Docket 50-73  
Enclosure: Annual Report No. 46 (3 copies)

Enclosed are three signed copies of Annual Report No. 45 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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**GE Nuclear Energy**

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General Electric Company  
Sunol, California*

**GENERAL ELECTRIC  
NUCLEAR TEST REACTOR**

**ANNUAL REPORT NO. 46  
FOR THE YEAR 2005**

**LICENSE R-33  
DOCKET 50-73**

**MARCH 2006**

## General Electric Nuclear Test Reactor

### Annual Report No. 46

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, 2005 through December 31, 2005.

#### I. General

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

1. There were 241 reactor startups with the reactor operated at or above critical for 694.36 hours. Total power generation equaled 677.62 EFPH equivalent to 2.82 MWd in 2005.
2. The average radiation exposure to regular full-time NTR Operations personnel was 0.615 Rem.
3. There were no reactor scrams or unscheduled shutdowns of the reactor by the operator after reaching criticality.
4. There were no occurrences during 2005 that required notification of the NRC.

## II. Organization

The details of changes in the status of personnel, 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. Mr. Ehrlich qualified NDT Level III in March of 2005.
2. There was no change in the status of Mr. Dennis Smith who continued as a part-time GE employee (pensioner) providing SRO duties, Quality Assurance (QA) consulting and NDT training services, and SRO tutoring.
3. Mr. Tim Peterson, Specialist, NTR, continued his operational duties governed by his Reactor Operators license. Mr. Peterson qualified NDT Level III in March of 2005.
4. Mr. Daniel Thomas Specialist NTR continued to provide full time SRO duties. Mr. Thomas qualified NDT Level II in March of 2005.
5. Mr. Art Raya continued on the NTR staff in 2005 as a contract employee to perform NDT neutron radiography tasks and non-reactor system maintenance tasks under the direction and supervision of the licensed SRO staff and certified Level II and III NDT personnel.
6. Mr. Max Paronable was added to the NTR staff in May of 2005 as a contract employee to perform NDT neutron radiography tasks and non-reactor system maintenance tasks under the direction and supervision of the licensed SRO staff and certified Level II and III NDT personnel.

### III. Facility Changes, Tests, Experiments, and Procedure Changes Approved by The Facility Manager

In accordance with written procedures, facility manager approval is required for changes to the facility, procedures, tests, and experiments. Specific information about the reporting period is presented as follows:

#### A. Facility Changes

Pursuant to 10CFR50.59(a), there were two facility changes made in 2005 requiring Facility Manager, Regulatory Compliance and VTSC approval.

1. The single stair platform leading to the top hat area of the graphite pack was replaced with a 2 level tread and handrail to meet required 29 CFR 1910.24 safety standards.
2. The PICO drawer indication lamp holders were replaced to provide a means of replacing the light bulbs without opening the PICO drawer, thereby increasing operator safety.
3. The vacuum system that provides for radiographic cassette vacuum for north side radiography was modified to allow access to the vacuum system without walking through of the scatter beam developed by the radiography process resulting in an ALARA improvement.

#### B. Tests

Pursuant to 10CFR50.59(a), there were no special tests performed during 2005 requiring Facility Manager approval.

#### C. Experiments

Pursuant to 10CFR50.59(a), there was one new experiment in 2005 requiring Facility Manager approval.

1. A new experiment type was approved that allows a 10-fold increase in irradiation time in the CHRIS for specified samples.

#### **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 2005 were made with Facility Manager approval and after Regulatory Compliance review when required. Details of the changes are presented below:

1. SOP 9-15, Preventative and Corrective Maintenance Program, was revised, (Rev. 950), to implement a controlled index and completion record for the NTR preventative maintenance items found in the SOP chapter 12. A summary table was added as Exhibit 4, that lists the PM, date last performed, and quarter and date next due. In addition, margin notes were added to act as an aid for scheduling and compliance. The margin notes provide information in regards to who is required to perform the PM and if the PM is specified by technical specifications.
2. SOP 9.5, Source, Byproduct, and Special Nuclear Material Control and Shipment, lists the criticality limits for NTR. These limits are complex function of material type and enrichment. SOP 9.5 establishes requirements to have these limits posted with an inventory of all applicable materials for the area. Memo M2005-005 was written to clarify the limits for the specific areas and to modify the required inventory log specified by SOP 9.5. so that the limits for each area are easier to understand.

#### **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:

1. Replace the Fine Control Rod In Limit Switch. This switch has been sticking open which prevents rod drive in function. The new switch tested satisfactorily.
2. During routine Preventative Maintenance, an out of specification reading on the hi-range of the South Cell Area Radiation Monitor was experienced. This was corrected by replacing the High Range PC board and a subsequent calibration check was completed satisfactorily.
3. Replaced Course Rod #1 Drive In Indicating light assembly on the control panel. The retainer clip that holds the light module in its socket was broken and the light was not properly operating. The new module tested satisfactorily.

4. PM 12-24 for the Log N IRM Circuit Calibration does not specify a tolerance. An ER was reviewed and approved to specify a 10% tolerance as acceptable since the Log N Scram is not required by license or technical specifications. The PM was completed satisfactorily using the 10% tolerance. The PM procedure and maintenance record card will be changed prior to next performance of this PM.
5. The selector switch that selects which PICO power instrument is recorded on the chart recorder was showing signs of wear. The selector switch was replaced and tested satisfactorily.
6. Due to a miss positioning of the limit switch coil cables for Safety Rod #2, a rod disconnect occurred while pulling the safety rods out during a start-up. The miss positioning allowed the movement of the rod to place stress on the coil cable and caused a temporary disconnect to the coupling magnet circuit thereby releasing the safety rod to be acted upon by the scram springs. The miss-positioning problem was identified and corrected. Continuity checks were performed on the coil cable and the system was tested satisfactorily.
7. The drive belt for the Source Rod was replaced as it was showing signs of wear. The source drive was subsequently tested satisfactorily.
8. The conductive matting was replaced on the worktable used for handling explosives. Conductivity tests were conducted after the replacement and the worktable tested satisfactorily.

#### V. Unscheduled Shutdowns

During the reporting period, there were no reactor scrams or unscheduled manual shutdowns prior to attaining criticality.

## 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 2005 are as follows:

Alpha Particulate, 1.30 E-6 Ci (predominantly radon-thoron daughter products)  
Beta-Gamma Particulate, 3.59 E-6 Ci  
Iodine-131, 1.26 E-5 Ci  
Noble Gases, 1.98 E+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, 4.48 E-13  $\mu\text{Ci/cc}$  (predominantly radon-thoron daughter products)  
Average, 1.85 E-14  $\mu\text{Ci/cc}$

#### Beta Concentration:

Maximum, 7.33 E-13  $\mu\text{Ci/cc}$   
Average, 4.64 E-14  $\mu\text{Ci/cc}$

### C. Gamma Radiation

The yearly dose results for the year 2005 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 0.718 Rem and the lowest was 0.54 Rem. The average radiation exposure to personnel was 0.610 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 Operations



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E.H. Ehrlich, Manager  
Nuclear Test Reactor