



HITACHI

GE Hitachi Nuclear Energy

Donald R. Krause
Regulatory Compliance Program Manager
Vallecitos Nuclear Center

6705 Vallecitos Rd
Sunol, CA 94586
USA

T 925 862 4360
F 925 304-7435
Donald.Krause@ge.com

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U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

Attn: Document Control Desk

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Subject: Annual Report for NTR, 2011
Reference: License R-33, Docket 50-73
Enclosure: Annual Report No. 52

Enclosed is the Annual Report No. 52 for the GE-Hitachi Nuclear Test Reactor (NTR) located at Vallecitos Nuclear Center in Sunol, California.

If you have questions regarding this request or additional information is required, please contact me using the contact information above.

Sincerely,

Donald R. Krause,
Regulatory Compliance
Program Manager

cc: Xiaosong Yin, NRC
Daniel Thomas, GEH VNC NTR

AD20
NRR



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Vallecitos Nuclear Center
6705 Vallecitos Rd
Sunol, CA 94586
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NUCLEAR TEST REACTOR

**ANNUAL REPORT NO. 52
FOR THE YEAR 2011**

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

MARCH 2012

General Electric Nuclear Test Reactor

Annual Report No. 52

This report summarizes the operations, 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, 2011 through December 31, 2011.

I. General

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

- There were 259 reactor startups with the reactor operating at or above critical for 1000 hours. Total power generation equaled 986.6 EFPH; equivalent to 4.11 MW days in 2011. The majority of this time was spent in the performance of approved radiography experiments. Additionally, experiments were conducted involving the irradiation of samples for forensic evaluations.
- The highest radiation exposure to any full-time NTR worker was 1.172 Rem.
- There was one unplanned shutdown of the reactor caused by an inadvertent initiation of a manual scram from the control console. This unscheduled shutdown is discussed in Section V.
- There were no occurrences during 2011 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:

- Mr. Daniel Thomas continued as Manager NTR performing licensed SRO activities and radiography NDT Level III activities in 2011.
- Mr. Edward Ehrlich's license has remained inactive since his retirement in 2008. His license, with an October 6th 2005 effective date, was amended for medical reasons on January 13th, 2008. There are no plans on reactivating his license at this time.
- Mr. Thomas McConnell continued performing licensed SRO activities in 2011. He also worked as a radiographer, NDT Level I.

- Mr. Dennis Smith continued working as a part-time GEH employee (pensioner) performing licensed SRO activities in 2011. His license expired at the end of the year. License renewal has now become contingent on his renewal of a pensioner's contract with GEH.
- Mr. Tim Peterson continued performing licensed RO and SRO activities in 2011. He also continues performing his radiography NDT Level III activities
- Mr. Max Paronable continued performing RO activities in 2011. He also continues his radiography NDT Level I activities.
- Mr. George Dumlao continues to perform radiography, and reactor and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.
- Mr. Terry Hofer continued as a part time GEH employee (pensioner) performing radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.
- Mr. James Graham, under contract as a radiographer, continues to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.
- Ms. Carmen Holmes, under contract as a radiographer, continues to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.
- Mr. Stephen Neel, under contracted as a radiographer, continues to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.
- Ms. Maralynn Segars was contracted as a radiographer in September to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.

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), no facility changes were implemented in 2011 requiring Facility Manager, Regulatory Compliance and VTSC approval. The following process changes were reviewed through the VTSC level.

- Control of the receipt of explosive materials to help ensure site quantity limits are not exceeded and the establishment of contingency plans to provide for temporary overflow storage away from the NTR to mitigate the effects of a receiving error.
- VNC response plan for severe weather involving potential for lightning strikes as it relates to the handling of explosive material in NTR NRay experiments.

B. Tests

Pursuant to 10CFR50.59(a), one special tests was performed during 2011 requiring Facility Manager, Regulatory Compliance and VTSC approval as requested.

- Additional coolant samples analyzed to resolve abnormally high Strontium concentrations in the coolant. After the cleanup system's filter and resin were changed, the levels returned to normal.

C. Experiments

Pursuant to 10CFR50.59(a), there were no new experiments in 2011 requiring Facility Manager, Regulatory Compliance and VTSC approval. The two routine experiment types described as neutron radiography and Schafer slide sample irradiations were properly authorized utilizing experiment authorization forms throughout 2011.

D. Procedure Changes

Pursuant to 10CFR50.59, there was one procedural changes initiated during 2011 to incorporate editorial or typographical corrections, technical data, and changes to requirements, or to provide for the addition or clarification of information and reliability of performance. Changes were made with Facility Manager and Regulatory Compliance review when required. A summary of the changes is presented in the table below.

Revision	Procedure	Summary of Changes
1008	SOP 12-20 Conductive Floor and Bench Inspection	Made changes to eliminate the performance of this PM. Since the NTR does not accepting materials above the minimum energy threshold proscribed in DoD Contractors Safety Manual, this requirement is not necessary and only adds to compliance confusion.

IV. Major Preventative or Corrective Maintenance

During this reporting period, all routine preventive maintenance and surveillance checks were completed as scheduled. The following lists the noteworthy corrective maintenance activities performed in 2011.

Safety Rods

- Safety Rod #4 pulley set screw on the motor side of the drive was found loose allowing slippage and preventing rod withdrawal. Tightened the set screw, tested the system, and returned Safety Rod #4 to service.

Log-N power supply

- The Log-N system provides log scale readout of reactor power and related functions including the high period scram. Erratic output readings from the power supply force a replacement of the Log-N Power Supply with the shop spare. After comprehensive in system testing, the Log-N system was returned to service.

Radiation Monitoring Instrumentation (Victoreen)

- On four occasions, performed corrective maintenance on the Victoreen detectors involving the replacement of one or more PC boards. This is a continuing effort to maintain the system with no change in the trend that would indicate a system wide concern.

V. Unscheduled Shutdowns

During the reporting period, there was one unscheduled reactor shutdown after reaching criticality.

Sequence and Cause of Event

At 8:10 AM on Wednesday the 11th of May 2011, an operator unintentionally initiated a manual scram from the control console during a reactor startup.

The unplanned shutdown was caused when the operator mistakenly and inadvertently pushed the "Manual Scram" button instead of the "Alarm Acknowledgement" button in response to the "flow required" alarm. This alarm is routinely received at 100 watts and requires acknowledgment during a reactor startup. The manual scram button is directly above the alarm acknowledgement button.

This action resulted in a manual actuation of the reactor safety system and a scram of the reactor. All safety rods automatically inserted to a full in position. All control rods drove in automatically to the full-in position.

Immediate Corrective Actions

The Senior Reactor Operator (SRO) evaluated the cause of the unplanned shutdown and determined that the action taken by the operator was unintentional. The operator was counseled in making positive identification of switches or buttons when taking actions and responding to alarms and indications. The Senior Reactor Operator authorized the restart of the reactor.

Manager's Investigation

The NTR Manager interviewed the operator soon after the reactor restart. It was his assessment that the improper action was unintentional. The operator understands what mistake he has made and maintains a positive attitude towards improving his performance.

Manager's Conclusions

The Manager, NTR endorsed the SRO's action to allow the restart of the reactor and to keep the same operator at the panel.

Preventive Actions

The NTR team met and discussed the lessons learned from this event and the human performance tools available to the operators to help prevent reoccurrences of the event. These tools include incorporating self-checking methods into the startup routines.

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 2011 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 2011 are as follows:

Alpha Particulate: $6.51E-07$ Ci (predominantly radon-thorium daughter products)
Beta-Gamma Particulate: $1.27E-07$ Ci
Iodine-131: $5.06E-06$ Ci
Noble Gases: $2.71E+2$ 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:
Weekly Maximum, $6.38E-13$ $\mu\text{Ci/cc}$
Weekly Average, $5.72E-14$ $\mu\text{Ci/cc}$
Beta Concentration:
Weekly Maximum, $3.81E-14$ $\mu\text{Ci/cc}$
Weekly Average, $7.20E-15$ $\mu\text{Ci/cc}$

C. Gamma Radiation

The yearly dose results for the year 2011 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, and Column 2.

F. Off-Site

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

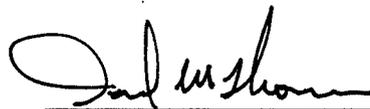
VII. Radiation Exposure

In 2011, the highest annual exposure to any full time NTR worker was 1.172 Rem and the lowest exposure for this category of worker was 0.282 Rem. The average radiation exposure to all NTR personnel was 0.500 Rem per person. The 2011 collective radiation exposure for NTR workers was 5.004 Person-Rem.

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.

GE-Hitachi Nuclear Energy Americas LLC
Vallecitos Operations



Daniel M. Thomas, Manager
Nuclear Test Reactor