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Attn: Document Control Desk

Subject: Annual Report for NTR, 2013
Reference: License R-33, Docket 50-73
Enclosure: Annual Report No. 54

Enclosed is the Annual Report No. 54 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

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cc: Xiaosong Yin, NRC (email)
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NUCLEAR TEST REACTOR

**ANNUAL REPORT NO. 54
FOR THE YEAR 2013**

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

MARCH 2013

GE Hitachi Nuclear Test Reactor

Annual Report No. 54

This report summarizes the operations, changes, tests, experiments, and major maintenance at the GE Hitachi (GEH) 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, 2013 through December 31, 2013.

I. General

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

- IN 2013 there were 255 reactor startups with the reactor operating at or above critical for 948 hours. Total power generation equaled 934.5 EFPH; equivalent to 3.89 MW days. The majority of this time was spent in the performance of approved experiments, either neutron radiography or small sample irradiations for forensic evaluations.
- The highest radiation exposure to any worker at NTR was 0.786 Rem.
- There was one unplanned shutdowns of the reactor in 2013. This shutdown is discussed in Section V.
- There were no occurrences that required notification of the NRC during 2013.

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.
- Mr. Thomas McConnell continued performing licensed SRO activities. He also worked as a radiographer, NDT Level I.
- Mr. Tim Peterson continued performing licensed SRO activities. He also continues performing his radiography NDT Level III activities.
- Mr. Max Paronable continued performing licensed RO activities. He also continues his radiography NDT Level I activities.

- Mr. Jorge Garcia continued performing as a full time specialist in 2013 to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and the licensed operations staff.
- Mr. Martin Whitman continued performing as a full time specialist in 2013 to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and the licensed operations staff.
- Ms. Carmen Holmes has been hired to the full time staff at NTR. She continues to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and the licensed operations staff.
- Mr. Stephen Neel has been hired to the full time staff at NTR. He 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. James Graham, under contract as a radiographer, has continued to perform radiography and non-reactor system maintenance tasks under the direction and supervision of the certified NDT personnel and licensed operations staff.
- Mr. Earl Saito continued performing as the Vallecitos Nuclear Center Manager for EHS and RC in 2013 with overall EHS responsibilities for the Vallecitos site, including NTR.
- Mr. Thomas Caine assumed the responsibilities as the VNC Site Manager and the NTR Level III Manager from Tony McFadden in September of 2013.
- Ms. Maralynn Segars last worked under contract as a radiographer in 2012. She did not work at NTR in 2013.
- Ms. Rose Bagnas last worked under contract as a radiographer in 2012. She did not work at NTR in 2013.

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), the following facility change was implemented in 2013 requiring Facility Manager, Regulatory Compliance and VTSC approval. The change and associated activities were comprehensively reviewed using a 50.59 analysis.

CA-304- Addition of Explosive Magazine to the NTR Facility — The NTR has added a substantially larger explosive magazine to be used for explosive storage. It has been located

adjacent to the Setup Room on the North side of the facility. The smaller magazine that previously held that location was moved to an area inside the North Room in the northeast corner of the building.

B. Tests

Pursuant to 10CFR50.59(a), no special test were performed during 2013 with Facility Manager, Regulatory Compliance and VTSC approval.

C. Experiments

Pursuant to 10CFR50.59(a), there were no new experiments in 2013 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 2013.

D. Procedure Changes

Pursuant to 10CFR50.59, three procedural changes were initiated during 2013 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 |
|----------|---|---|
| 1007 | SOP 10-4, Explosives Handling | Added reference to CP 3.1 for Severe weather detection and response |
| 1009 | SOP 6-4, Daily Surveillance Check Sheet | Defines the Technical Specification time imitations for operations with an elevated conductivity per T.S. 3.3.3.3 |
| 1010 | SOP 4-2, Safety Rod Repairs | Revises the Safety rod magnet alignment process |

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 2013.

Safety Rod Drive

- On 5/7/2013 the Safety Rod Drive #2 failed to drive in upon shutdown. The rod drive-in function, which is initiated by the illuminating push button switch (IN 32), was found to be inoperative. Replaced the switch (swapped) with an installed spare (DS 5) that was being utilized for indication only. Tested the safety rod drive system and returned it to service. ER 13-07; CR-6357.

Control Rod Drive

- Control Rod Drive #1 failed to drive in upon shutdown. The control circuit relay number 40, which provides the drive-in function for CR-1, was found inoperative. Replaced the relay with an identical new relay. Tested the control rod drive system and returned it to service. ER 13-03; CR 4692.

Log-N power supply

- The Log-N system provides log scale readout of reactor power and related functions including the high power and period scrams. A system failure occurred on 4/22/2013 resulting in a scram from 100% power. The cause was isolated to a voltage variance at the output of the power supply. A shop spare power supply was installed into the system. After an overnight run test of the realigned system showed the voltages were maintaining within specification, the system was declared operational.

Radiation Monitoring Instrumentation (Victoreen)

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

Recorder, Stack Gas and Particulate

- Performed corrective maintenance on the stack gas and particulate strip chart recorder to include the replacement of the print head and shaft the amplifier module, and the drive motor with stripped gears. Tested and checked calibration on the recorder and returned the system to service.

V. Unscheduled Shutdowns

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

Scram Report 13-01

Sequence of Events

At 11:25 AM on Monday the 22th of April 2013, an unplanned shutdown occurred while operating at 100% power. Alarm lights illuminated on the control room alarm panel were: Log N CIC trip, fast period and safety rod disconnect. The Reactor Operator observed all normal indications of a reactor scram and shutdown. All safety rods automatically scrammed to a full in position. All control rods and the source rod drove in automatically to their full-in positions. Manager, NTR and VNC Regulatory Compliance were notified of the scram.

Cause of Event

The unplanned shutdown was caused by a failed line rheostat in the positive leg of the power supply causing variances to the voltage being sent to the pre-regulator in the instrument drawer. This resulted in a scram signal being sent to the protection system causing all safety rods to automatically scram to the full-in position.

Corrective Actions

Both the pre-regulator and the power supply were exchange with shop spares. The system passes an overnight operation check with no trips locking in.

Weaknesses have been identified in the maintenance program for this system. CR-6224 was used to document the efforts to improve this program. The new program includes a complete inventory of the installed and shop spare components for this system. All shop maintenance and tests conducted at a component level will be recorded in a maintenance log kept by the maintenance technician and reviewed by the NTR operations group.

Conclusions

The system was declared operational and the reactor was re-started on 4/26/13.

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 2013 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 2013 are as follows:

Alpha Particulate: 1.27E-07 Ci (predominantly radon-thorium daughter products)
Beta-Gamma Particulate: 3.70E-07 Ci
Iodine-131: 2.55E-06 Ci
Noble Gases: 2.50E+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, 3.33 E-14 $\mu\text{Ci/cc}$
Weekly Average, 2.15 E-15 $\mu\text{Ci/cc}$
Beta Concentration:
Weekly Maximum, 3.32 E-14 $\mu\text{Ci/cc}$
Weekly Average, 1.07 E-14 $\mu\text{Ci/cc}$

C. Gamma Radiation

The yearly dose results for the year 2013 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 2013, the highest annual exposure to any full time workers while working at NTR was 0.786 Rem and the lowest exposure for this category of worker was 0.241 Rem. The average radiation exposure for the nine workers involved was 0.549 Rem per person.

The 2013 collective radiation exposure for all workers while performing work at NTR was 4.942 Person-Rem.

VIII. Conclusion

GE Hitachi 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

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