



HITACHI

GE Hitachi Nuclear Energy

Jeffrey Smyly
Regulatory Compliance Manager
6705 Vallecitos Road
Sunol, CA 94586
USA

T 925-918-6074
Jeffrey.Smyly@ge.com

M200049

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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-001

Subject: GEH Annual Nuclear Test Reactor (NTR) Operating Report for the Year 2019

Reference: NRC License R-33, Docket 50-73 (NTR)

Enclosed is the Annual Operating Report No. 60 for the GE Hitachi Nuclear Test Reactor (NTR) located at the Vallecitos Nuclear Center in Sunol, California.

If there are any questions regarding this report or additional information required, please contact me at the number above.

Sincerely,

Jeffrey Smyly
Regulatory Compliance Manager
Vallecitos Nuclear Center

Attachments: 1) NTR Annual Operating Report Number 60 for the year 2019

cc: D. Hardesty, NRC NRR
JS 20-004



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6705 Vallecitos Rd
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NUCLEAR TEST REACTOR

**ANNUAL REPORT NO. 60
FOR THE YEAR 2019**

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

MARCH 30, 2020

GE Hitachi Nuclear Test Reactor

Annual Report No. 60

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, 2019 through December 31, 2019.

I. General

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

- In 2019 there were 230 reactor startups with the reactor operating at or above critical for 695.17 hours. Total power generation equaled 680.27 EFPH; equivalent to 2.834 MW days. The majority of this time was spent in the performance of approved experiments, either neutron radiography or small sample irradiations.
- The highest radiation exposure to any worker at NTR was 0.695 Rem.
- There were two unscheduled shutdowns of the reactor in 2019 and five unscheduled shutdowns prior to criticality. See section V for details.
- There was one technical specification violation when the reactor console key was not in the possession of a licensed operator when the reactor was shut down. See section V for details.

II. Organization

The details of changes in the status of personnel and operator licenses, which occurred during the reporting period, are described as follows:

A. Personnel

- The Level 1 & 2, Level 3, and VNC site Regulatory Compliance managers were unchanged in 2019.
- An SRO trainee was hired on June 3, 2019.

B. Operator Licenses

- On February 28, 2019, a Reactor Operator's license was issued by the NRC. License number OP-502982.
- On October 31, 2019, a Senior Reactor Operator's license was renewed by the NRC. License number SOP-70551-2.

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

There were no facility changes implemented in 2019 requiring Facility Manager and Regulatory Compliance approval.

B. Tests

Pursuant to 10CFR50.59(a), no special tests were performed during 2019.

C. Experiments

Pursuant to 10CFR50.59(a), there were no new experiments in 2019 requiring Facility Manager, Regulatory Compliance and VTSC approval. The two routine experiment types described as neutron radiography and slide sample irradiations were properly authorized utilizing experiment authorization forms throughout 2019.

D. Procedure Changes

Pursuant to 10CFR50.59, four procedural changes were initiated during 2019 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
1054	SOP 1.3, Primary Coolant Water Chemistry	Reduced the required sample bottle size from 250 ml to 125 ml. Also changed the path the operator must use to transfer the radioactive sample to the chemical analysis building.
1055	SOP 9.1, Safety Responsibility and Authority	Specified additional tools to assist the operator with console key custody and control. This change tracked by the GEH Corrective Action Program, CR 31168.
1056	SOP 6.10, Shutdown Summary	References SOP 9.1 for console key control. This change tracked by the GEH Corrective Action Program, CR 31168.
1057	SOP 10.4, Explosives Handling	Incorporated associated portions of the GEH training matrix from CP-20-303. Referenced applicable human performance tools from CP-20-303. Incorporated common definitions from CP-20-303.

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 2019.

Replaced the Flux Deviation Chart Recorder

- On 4/24/19, replaced the flux deviation chart recorder with an identical spare. Recorder was not adequately tracking the selected PICO input.

Remote Area Monitoring System (RAM)

- Throughout the year several issues arose with the RAM system: 1) two detectors were replaced for not passing maintenance checks, 2) reactor cell RAM failed to trigger a local and remote alarm (see CR 32479), 3) spurious high level alarms occur at a periodicity of approximately several times each quarter. CR 29656 in the GEH Corrective Action program will initiate and track the replacement of this system – scheduled to be completed in 2020.

V. Unscheduled Shutdowns

During the reporting period, there were five unscheduled reactor shutdowns prior to reaching criticality, two unscheduled shutdowns after reaching criticality, and one technical specification violation.

A. Unscheduled Shutdowns

Scram Report 19-01

An automatic reactor scram occurred at 11:12 AM on 1/22/19. A spurious stack gas high particulate activity alarm caused a momentary distraction to the operator during a reactor startup resulting in a high power trip. The scram report and CR 30548 documented corrective actions.

Prior to Criticality – 1/29/19

Noise on the log N circuit caused an automatic insertion of safety rods prior to reaching critical rod height. Checked the seating of the Log N + and – high voltage and signal cable connectors in the reactor control panel. Retested by performing the Log N daily surveillance checks - tested satisfactorily.

Prior to Criticality – 5/1/19

Reactor operator performed a precautionary shutdown when noise was observed on the log N instrument. Checked the seating of the Log N + and – high voltage and signal cable connectors in the reactor control panel. Retested by performing the Log N daily surveillance checks - tested satisfactorily.

Scram Report 19-02

An automatic reactor scram occurred at 8:21 AM on 5/17/19. Noisy PICOs caused a scram just after critical rod height determined and operator was increasing power and ranging PICO instruments. PICO #2 signal cable connector found to be very loose. Disassembled, inspected, and repaired connections for all 3 PICOs over the next 3 days. Corrective maintenance form dated 5/22/19 and CR 31506 documented and tracked corrective actions.

Prior to Criticality – 6/28/19

Reactor operator performed a precautionary shutdown when noise was observed on the log N instrument. Checked the seating of the Log N + and – high voltage and signal cable connectors in the reactor control panel. Retested by performing the Log N daily surveillance checks - tested satisfactorily.

Prior to Criticality – 8/27/19

Reactor operator performed a precautionary shutdown to address noise on the log N instrument. Troubleshoot log N drawer in accordance with technical manual guidance – no discrepancies found and all drawer calibration checks were satisfactory.

Prior to Criticality – 9/4/19

Reactor operator performed a precautionary shutdown to address noise on the log N instrument. Troubleshoot log N drawer in accordance with technical manual guidance – no discrepancies found and all drawer calibration checks were satisfactory. Signal noise issues with the log N instrument will be addressed by CR 34089.

B. Technical Specification Violation

On April 4, 2019, a violation of NEDO 32765, NTR Technical Specification Section 6.1.3.1(a) occurred when a licensed operator was not present in the control room when the reactor was not secured. Details of this event are covered in GEH follow-up letter M190079 dated April 16, 2019 to GEH Event report 53983 dated April 5, 2019. A summary of the event follows:

The reactor was shut down at 12:41 pm. The operator exited and locked the control room at 12:50. The operator left the reactor console key at the console failing to lock it in the wall safe as required by NTR SOP 6.10 sect 5.12 to meet the conditions of securing the reactor. No one entered the control room until 13:45 when a senior Radiation Monitoring Technician entered and noticed the key.

Immediate Action Taken

- key was immediately returned to a licensed operator.
- event reported to the NTR, License Level 3, and regulatory compliance managers.
- event reported to the NRC the following working day as required by NTR Technical Specification Section 6.6.2 (NRC Event Number 53983).

Corrective Actions

- Condition Report 31168 was initiated in the GEH Corrective Action Program to track additional investigation findings, causes, and corrective and preventive actions.
- edited two NTR operating procedures to 1) incorporated visual “flags” to add rigor to key control, and 2) clarify expectations of operator responsibilities.
- held training for all operators/trainees.

- performed an independent review of the event by the VTSC as required by NTR Technical Specification Section 6.2.3.

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 2019 reporting period. Except for the NTR stack data, the data below covers the entire VNC site and include the effects of operations other than the NTR.

A. NTR Stack

Total airborne releases (stack emissions) for 2019 are as follows:

Alpha Particulate: 1.03E-08 Ci (predominantly radon-thorium daughter products)
Beta-Gamma Particulate: 3.81E-07 Ci
Iodine-131: 1.61E-06 Ci
Noble Gases: 1.54E+02 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. Gamma Radiation

The yearly dose results for the year 2019 as determined from evaluation of site perimeter environmental monitoring dosimeters showed no departure from normal stable backgrounds.

C. 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.

D. 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.

E. Off-Site

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

VII. Radiation Exposure

In 2019, the highest annual exposure to any fulltime radiation worker while working at NTR was 0.695 Rem and the lowest exposure for this category of worker was 0.027 Rem. The average radiation exposure for the ten workers involved was 0.401 Rem per person.

The 2019 total radiation exposure for all workers while performing work at NTR was 4.010 Rem.

VIII. Conclusion

GE Hitachi concludes that the NTR is staffed and organized for efficient operations. Our Corrective Action Program will continue contributing to making us a more safe and compliant operation.

GE-Hitachi Nuclear Energy Americas LLC
Vallecitos Operations

**Thomas
McConnell**

Digitally signed by Thomas McConnell
DN: cn=Thomas McConnell, o=GE
Hitachi, ou=NTR,
email=thomas.mcconnell@ge.com,
c=US
Date: 2020.03.30 06:56:16 -07'00'

Thomas J. McConnell, Manager
Nuclear Test Reactor