



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

April 9, 2021

Mr. Matt Feyrer, Site Manager
Vallecitos Nuclear Center
GE Hitachi Nuclear Energy
6705 Vallecitos Road
Sunol, CA 94586-8524

SUBJECT: GE HITACHI NUCLEAR ENERGY - NRC INSPECTION REPORT
050-00018/2021-001, 050-00070/2021-001, AND 050-00183/2021-001

Dear Mr. Feyrer:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection conducted on March 15-18, 2021, at your Vallecitos Nuclear Center in Sunol, California. The inspection covered the following shutdown reactors under the subject licenses, Vallecitos Boiling Water Reactor (VBWR), General Electric Test Reactor (GETR), and Empire State Atomic Development Associates Incorporated Vallecitos Experimental Superheat Reactor (EVESR). The NRC inspectors discussed the results of this inspection with you and members of your staff on March 18, 2021. The inspection results are documented in the enclosure to this letter.

During this inspection, the NRC inspectors examined activities conducted under your licenses as they relate to public health and safety, the environment, and to confirm compliance with the Commission's rules and regulations, as well as with the conditions of your license. Within these areas, the inspection consisted of the examination of selected procedures and representative records, tours of the reactors and supporting equipment, independent radiation surveys, and interviews with personnel. Within the scope of the inspection, no violations were identified and a response to this letter is not required.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC's Website at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

M. Feyrer

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If you have any questions concerning this inspection report, please contact Ms. Stephanie Anderson at 817-200-1213, or the undersigned at 817-200-1154.

Sincerely,

Natasha A. Greene, PhD, Chief
Reactor Inspection Branch
Division of Nuclear Materials Safety

Docket Nos.: 50-018; 50-070;
and 50-183

License Nos.: DPR-1; TR-1; and DR-10

Enclosure:

Inspection Report 05000018/2021-001;
05000070/2021-001; 05000183/2021-001

GE HITACHI NUCLEAR ENERGY - NRC INSPECTION REPORT 05000018/2021-001;
05000070/2021-001; 05000183/2021-001 - DATED APRIL 9, 2021

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**U.S. NUCLEAR REGULATORY COMMISSION
REGION IV**

Docket Numbers: 05000018; 05000070; and 05000183

License Numbers: DPR-1; TR-1; and DR-10

Report Numbers: 050-00018/2021-001; 050-00070/2021-001; and 050-00183/2021-001

Licensee: GE Hitachi Nuclear Energy

Facilities: Vallecitos Boiling Water Reactor (VBWR)
GE Test Reactor (GETR)
ESADA Vallecitos Experimental Superheat Reactor (EVESR)

Location: 6705 Vallecitos Road
Sunol, California

Inspection Dates: March 15-18, 2021

Inspectors: Stephanie G. Anderson, Senior Health Physicist
Reactor Inspection Branch
Division of Nuclear Materials Safety

Chris D. Steely, Health Physicist
Reactor Inspection Branch
Division of Nuclear Materials Safety

Accompanied By: Mary C. Muessle, Division Director
Division of Nuclear Materials Safety

Approved By: Natasha A. Greene, PhD, Chief
Reactor Inspection Branch
Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

GE Hitachi Nuclear Energy

NRC Inspection Report 05000018/2021-001; 05000070/2021-001; and 05000183/2021-001

This U.S. Nuclear Regulatory Commission (NRC) inspection was a routine, announced inspection of licensed activities being conducted at the three permanently defueled reactors at the Vallecitos Nuclear Center. In summary, the licensee was conducting these activities in accordance with site procedures, license requirements, and applicable NRC regulations. Within the scope of the inspection, no violations were identified.

Decommissioning Performance and Status Review at Permanently Shutdown Reactors and Class III Research and Test Reactors

- The licensee conducted annual inspections and audits of the three shutdown reactors in accordance with regulatory, license, and procedure requirements. The licensee adequately implemented an organization that reflected the shutdown reactor's license requirements and adequately managed the workload to support the shutdown reactor's activities. (Section 1.2)

Occupational Radiation Exposure at Permanently Shutdown Reactors

- The licensee conducted its radiation control program in accordance with license conditions and regulatory requirements. (Section 2.2)

Report Details

Summary of Plant Status

The GE Hitachi Nuclear Energy Americas, LLC (GEH or Licensee) continued to maintain the three shutdown reactors, Vallecitos Boiling Water Reactor (VBWR), General Electric Test Reactor (GETR), and Empire State Atomic Development Associates Incorporated Vallecitos Experimental Superheat Reactor (EVESR) in a possession-only, safe storage (SAFSTOR) condition, with no fuel remaining in the reactors or spent fuel pools. The condition of SAFSTOR is a decommissioning alternative in which the licensee is authorized to maintain the facility in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated to levels that permit release for unrestricted use within 60 years of permanent cessation of operations. Licensees who choose the SAFSTOR option must meet all NRC financial and safety regulations, both prior to and during the SAFSTOR period.

On April 24, 2015 (ADAMS Accession Nos. ML15114A437 and ML15114A438), the licensee submitted a request for a partial site release of approximately 610 acres of non-impacted property on the northern section of Vallecitos Nuclear Center (VNC) site, for unrestricted use pursuant to Title 10 *Code of Federal Regulation* (CFR) 50.83(b). The NRC approved the partial site release of 610 acres by letter dated May 3, 2016 (ADAMS Accession No. ML16007A348). The property continues to remain under the ownership of GEH.

On December 15, 2015, the licensee submitted a request for license continuance under 10 CFR 50.51(b) for reactor licenses DR-10 and TR-1 (ADAMS Accession No. ML15349A045). That request was approved by letter dated January 2, 2019 (ADAMS Accession No. ML18352A450). The licensee also submitted a request on July 10, 2015 (ADAMS Accession No. ML15195A088) for an alternate decommissioning schedule as described in 10 CFR 50.82(a)(3) and 50.82(b)(4)(i), using the exemption criteria of 10 CFR 50.12.

On May 16, 2017, the NRC staff issued a request to GEH for additional information on the structural integrity of the reactor buildings and how the integrity would be ensured during the extended decommissioning period, in order to assess whether the request would result in undue risk to public health and safety (ADAMS Accession No. ML17138A121). The licensee responded to this request by letter dated July 31, 2017 (ADAMS Accession No. ML17212B019).

Based on this response and a site visit conducted by NRC on September 13, 2017, the NRC determined that certain additional information must be provided by GEH to show how the licensee is ensuring the confinement of residual radioactivity associated with the shutdown reactors at the VNC and evaluating and monitoring the long-term physical safety of the reactor structures. The NRC requested more detailed information by letter dated January 18, 2018 (ADAMS Accession No. ML17312B359). On March 28, 2018 (ADAMS Accession No. ML18087A384), GEH provided a response indicating that it would provide an interim status report for the hydrological and structural analyses in approximately 6 months and anticipated completing the actions within approximately 12 months, which would be March 2019. On May 31, 2018 (ADAMS Accession No. ML18151A861), GEH submitted a partial response to the request for additional information. On October 23, 2018 (ADAMS Accession No. ML18296A159), GEH provided an interim status report on the efforts to respond to the two remaining requests for additional information. On March 28, 2019 (ADAMS Accession No. ML19087A221), GEH provided the response for some of the requested additional information, and provided a schedule for submitting the remaining hydrological and structural analysis needed to support the exemption request for an alternate decommissioning schedule.

On November 15, 2019 (ADAMS Accession No. ML19319B845), GEH provided its final response on the request for additional information. By letter dated March 16, 2020 (ADAMS Accession No. ML20071G411), the NRC staff requested additional information for EVESR and GETR to make an independent assessment regarding the acceptability of the proposed exemptions. GEH responded to that request for additional information by letter dated July 15, 2020 (ADAMS Accession No. ML20197A011). Also, on July 15, 2020 (ADAMS Accession No. ML20174A114), NRC staff requested additional information for the VBWR to make an independent assessment regarding the acceptability of the proposed exemptions. As of the time of this inspection, a complete response was due to the NRC on April 28, 2021.

1 Decommissioning Performance and Status Review at Permanently Shutdown Reactors (71801) and Class III Research and Test Reactors (69002)

1.1 Inspection Scope

The inspectors reviewed the licensee's control and oversight of the three shutdown reactors.

1.2 Observations and Findings

a. Status and tours of the shutdown reactors

1. Vallecitos Boiling Water Reactor

Vallecitos Boiling Water Reactor (VBWR) is a possession-only reactor under License No. DPR-1, Amendment 21. It was a 50-megawatt (MW) power reactor that achieved full power operations in 1957, after receiving its Construction Permit No. CPPR-3 on May 14, 1956. It was shut down on December 9, 1963, for an extended period of time and subsequently was deactivated. All fuel has been removed from the facility.

The possession-only facility license DPR-1, License Condition 4, states in part, that there should be an audible control device maintained on the doors to the containment building. In addition, License Condition 5 authorizes GE Hitachi (GEH) to dispose of component parts or devices from the VBWR facility in accordance with the provisions of 10 CFR Part 20. The licensee removed extensive components from the facility between October 2007 and November 2008. All reactor systems have been removed except for the reactor vessel. The licensee monitors the water level weekly in the reactor vessel and the inspectors confirmed that it had remained essentially constant at approximately 98 inches of water since the last NRC inspection conducted in September 2020.

The inspectors toured the facility with licensee representatives. The inspectors confirmed there was an audible control device functioning on the manual doors to the containment building that provided an alarm at the 300-foot elevation area alarm panel and at the Central Alarm Station. The inspectors observed that the roll-up door was secured, which was installed in place of the equipment hatch. The inspectors entered the basement level to observe the condition and integrity of the retired facility. The inspectors identified humidity and temperature sensors in the retired facility. The inspectors observed multiple crack formation throughout the containment building. The cracks are being monitored by the licensee to determine growth rate. During the inspection, the inspectors did not identify any water on the floor of the basement. The

sump pump was in operation at the time of the inspection, and any water that is collected in the basement of VBWR is pumped to the VBWR transfer tank, then ultimately transferred to the onsite waste evaporator plant for processing.

2. ESADA Vallecitos Experimental Superheat Reactor

The ESADA Vallecitos Experimental Superheat Reactor (EVESR) is a possession-only reactor under License No. DR-10, Amendment No. 7. The EVESR was a light water moderated, steam cooled, superheat, experimental research reactor that used slightly enriched uranium dioxide as fuel. It operated at a maximum of 17 MW thermal and was initially licensed in 1963. It achieved full power operation in 1964, and was shut down on February 1, 1967, and subsequently deactivated. All fuel and other special nuclear material had been removed and shipped offsite. In addition, a significant amount of equipment used to operate the reactor, such as nuclear instrumentation, piping, pumps, and valves, has been removed.

The inspectors toured the facility with licensee representatives. The inspectors confirmed there was an audible control device functioning on the airlock door to the containment building that provided an alarm at the 300-foot elevation area alarm panel and at the Central Alarm Station. The licensee had a portable dehumidifier to remove significant quantities of condensation that tended to build up in the facility. The licensee had lighting installed and it was operating sufficiently to ensure the passageways and stairs were safely lit. The stack was no longer operational, and the licensee was using a portable ventilation system.

The radiation levels were generally less than 1 milliroentgen per hour (mR/hr) throughout the facility, except in certain areas. The inspectors measured 485 microroentgen per hour (μ R/hr) on the two emergency cooling discharge valves located on the 534-foot level, using a Thermo Scientific RadEye G survey meter (Serial No. 373, calibration due date of July 27, 2021). The licensee maintained concrete blocks over the reactor vessel and the head/shield plug storage pit. In addition, a wooden cover was installed over the empty spent fuel storage pool, with an installed railing to prevent entry since the wooden cover was not designed to support a load. The licensee maintained control of the keys to the locked cover installed over the stairwell that provided access to areas below the main 549-foot level.

3. General Electric Test Reactor

The General Electric Test Reactor (GETR) is a possession-only reactor under License No. TR-1, Amendment No. 17. The reactor was a 50 MW thermal experimental test, development, and isotope production reactor that utilized highly enriched plate fuel and was initially licensed to operate in 1959. The reactor was shut down in 1977 and subsequently deactivated. All fuel and isotope production targets containing special nuclear material have been removed from the facility and shipped offsite. The reactor, systems and piping, and spent fuel pool have been drained of water. The containment polar crane was functional, and only required re-certification for it to be considered operable.

The inspectors toured the containment building, old control room, and GETR auxiliary buildings immediately adjacent to the containment structure. The radiation levels inside the containment building were generally less than 1 mR/hr throughout the facility, except

in certain areas. The inspectors measured 2.72 mR/hr about 1 foot away on the outside of the locked Experiment Liquid Effluent Holdup System cubicle door.

As GETR has been shut down since 1977, there are no licensed operators nor a requalification program, which is appropriate for the plant conditions. Staffing was appropriate to meet the required weekly surveillance patrols, which were being conducted in accordance with site procedures.

4. Other

The licenses for the three shutdown reactors require, in part, that activities involving access to the facility area and use of any area shall be conducted under the direction of a designated facility manager with functional responsibility and commensurate authority to maintain the facility in a safe and secure condition at all times. The inspectors reviewed the licensee's organization and discussed the organizational structure with members of the licensee's organization. Based on discussions and observations, the inspectors determined that the individual fulfilling the licensed responsibility as the facility manager for the defueled reactors, adequately met the license condition requirements.

The inspectors completed a review of various license and regulatory requirements while onsite, which included the review of the Final Report on Deactivation of VBWR. The licensee is managing the site as required by all regulatory and license requirements including the management of their decommissioning file as required by 10 CFR 50.75(g).

1.3 Conclusions

The licensee conducted annual inspections and audits of the three shutdown reactors in accordance with regulatory, license, and procedure requirements. The licensee adequately implemented an organization that reflected the shutdown reactor's license requirements and adequately managed the workload to support the shutdown reactor's activities.

2 Occupational Radiation Exposure at Permanently Shutdown Reactors (83750)

2.1 Inspection Scope

The inspectors reviewed the licensee's radiation protection program related to the oversight of the three shutdown reactors.

2.2 Observations and Findings

Each of the shutdown reactors have license conditions that require annual entries for routine radiation surveys and general examination of conditions throughout the buildings. The licensee performed its entries and surveillances in accordance with procedures 6.1, "Access Control," Revision 10, and 6.2, "Patrols and Inspections," Revision 15. The licensee had completed their annual inspections and surveys of the shutdown reactors, but at the time of this inspection, the report had not been issued. In the area of training, the inspectors focused on radiological training. In particular, the inspectors reviewed the training and qualifications for the Radiation Protection Supervisor

at the site. It was noted by the inspectors that all qualified radiological workers had received the appropriate training as required by licensee procedures.

During the inspection, the inspectors toured accessible areas within the VBWR, EVESR, and GETR containment buildings to observe radiological postings and access controls. The inspectors also performed independent radiation surveys to ensure that postings adequately reflected the radiological hazards using a Thermo Scientific RadEye G survey meter (Serial No. 373, calibration due date of July 27, 2021). Through performance of these surveys, the inspectors determined that the postings and controls within the areas were adequate to protect worker health and safety.

During the March 2019 NRC inspection, the inspectors identified a violation (VIO 0500018/2019001-03) associated with 10 CFR 20.1501(c), which stated, "the licensee shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated periodically for the radiation measured." Specifically, the inspectors determined that the licensee had not sampled and analyzed for hard-to-detect radionuclides (i.e., low-energy beta emitters such as carbon-14 and nickel-63) or transuranics in the shutdown reactors, even though such radionuclides could exist in the buildings due to the site's operational history. Without knowing the specific radionuclides that were present in the containment buildings, the licensee could not design a survey program that could adequately detect or quantify the radioactivity in those buildings.

The licensee responded to the Notice of Violation (NOV) by letter dated July 23, 2019 (ADAMS Accession No. ML19205A023), and submitted various corrective actions. The corrective actions included conducting surveys in the VBWR, EVESR, and GETR containment buildings, and completing a technical report in November 2019 on the radiological source term in those buildings. The information contained in the November 2019 radiological source term report was incorporated into a November 2020 technical report on the efficiency of GM detectors used at the shutdown reactors and other buildings at the VNC. The latter report concluded that it is appropriate to decrease the assigned detector efficiency from 20 percent to 10 percent for the portable survey instruments used to perform surveys in the VNC buildings based on new information on the radiological source term and other technical considerations. In February 2021, the licensee revised their survey procedures to account for the revised detector efficiency of 10 percent for the GM detectors. The inspectors discussed the technical reports and the completed corrective actions with the licensee. During this inspection, the inspectors also discussed the results of limited surveys conducted by the Oak Ridge Institute for Science and Education (ORISE) and the NRC staff in the shutdown reactors. The NRC staff plans to send the ORISE report to the licensee by April 30, 2021. The licensee indicated they would compare information contained in their radiological source term report to the ORISE data to inform their survey procedures for the shutdown reactors. Through these discussions and reviews, the inspectors determined that the licensee's corrective actions were adequate, and this violation is closed.

2.3 Conclusions

The licensee conducted its radiation control program in accordance with license conditions and regulatory requirements.

3 Exit Meeting Summary

On March 18, 2021, the NRC inspectors presented the final inspection results to Mr. Matt Feyrer, Site Manager, and other members of the licensee's staff. The inspectors asked the licensee whether any material examined during the inspection should be considered proprietary information. No proprietary information was identified.

SUPPLEMENTAL INSPECTION INFORMATION
KEY POINTS OF CONTACT

Licensee

M. Feyrer, VNC Site Manager
J. Smyly, Environmental Health and Safety Manager
D. Heckman, Regulatory Affairs and Licensing Lead
K. Zanotto, Project Management
J. Ayala, Radiation Protection Supervisor

INSPECTION PROCEDURES

IP 71801 Decommissioning Performance and Status Review at Permanently Shutdown Reactors
IP 69002 Class III Research and Test Reactors
IP 83750 Occupational Radiation Exposure at Permanently Shutdown Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

05000018/2019001-03	VIO	Failure to ensure that instruments and equipment used for radiation measurements in the containment buildings are calibrated for the radiation measured in compliance with 10 CFR 20.1501(c).
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Discussed

None

LIST OF ACRONYMS

ADAMS	Agency Documents Access and Management Systems
CFR	<i>Code of Federal Regulations</i>
ESADA	Empire State Atomic Development Associates
EVESR	ESADA Vallecitos Experimental Superheat Reactor
GEH	GE Hitachi Nuclear Energy Americas, LLC
GETR	General Electric Test Reactor
mR/hr	milliroentgen per hour
MW	Megawatt
NRC	U.S. Nuclear Regulatory Commission
NOV	Notice of Violation
ORISE	Oak Ridge Institute for Science and Education
μ R/hr	microroentgen per hour
VBWR	Vallecitos Boiling Water Reactor
VIO	Violation
VNC	Vallecitos Nuclear Center