UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

November 15, 2016

Mr. Matt Feyrer, Site Manager
6705 Vallecitos Road
GE Vallecitos Nuclear Center Building 102
Sunol, CA 94586-8524

SUBJECT: NRC INSPECTION REPORT 050-00018/16-001; 050-00070/16-001; 050-00183/16-001

Dear Mr. Feyrer:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection conducted on October 17 - 19, 2016, at your Vallecitos Nuclear Center in Sunol, California. The inspection covered the following decommissioning 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 inspector discussed the results of this inspection with Mr. T. Caine and other members of your staff on October 19, 2016. The inspection results are documented in the enclosure to this inspection report.

During this inspection, the NRC inspector examined activities conducted under your licenses as they relate to public health and safety, and the environment, to confirm compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, tour of the reactors and supporting equipment, and interviews with personnel. No violations were identified, and no response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site 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.

Should you have any questions concerning this inspection, please contact Rachel Browder, Senior Health Physicist, at 817-200-1452 or the undersigned at 817-200-1549.

Sincerely,

/RA/

Lee E. Brookhart, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Dockets: 050-00018; 050-00070;
and 050-00183
Licenses: DPR-1; TR-1; and DR-10

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cc see next page

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ADAMS ACCESSION NUMBER: ML16320A153

☒ SUNSI Review By: **RSB**	ADAMS ☒ Yes ☐ No	☒ Publicly Available ☐ Non-Publicly Available	☒ Non-Sensitive ☐ Sensitive	Keyword: NRC-002

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DATE	11/15/16	11/15/16		

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets:	050-00018; 050-00070; and 050-00183
Licenses:	DPR-1; TR-1; and DR-10
Report:	050-00018/16-001; 050-00070/16-001; and 050-00183/16-001
Licensee:	GE-Hitachi Nuclear Energy
Facilities:	Vallecitos Boiling Water Reactor (VBWR) GE Test Reactor (GETR) ESADA Vallecitos Experimental Superheat Reactor (EVESR)
Location:	Sunol, California
Dates:	October 17-19, 2016
Inspector:	Rachel S. Browder, C.H.P., Senior Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety Region IV
Approved by:	Lee E. Brookhart, Chief Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety Region IV
Attachment:	Supplemental Inspection Information

Enclosure

EXECUTIVE SUMMARY

GE-Hitachi Nuclear Energy
NRC Inspection Report 050-00018/16-001; 050-00070/16-001; and 050-00183/16-001

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 site activities in accordance with regulatory, license, and procedure requirements.

Decommissioning Performance and Status Review

- The licensee conducted annual inspections and audits of the three shutdown reactors in accordance with regulatory, license, and procedure requirements. The licensee conducted annual radiological surveys as required by the licenses and reported the annual verification of inspection items and radiological survey results to the NRC.

- The licensee monitored radioactive effluents and environmental samples as required. No effluent or environmental sample exceeded regulatory or licensed limits. The public dose assessment as a result of the effluent emissions and environmental results were well below the regulatory limits.

- The inspector conducted tours of the three shutdown reactors and concluded that the licensee was maintaining the shutdown reactors in accordance with procedure and license requirements. The licensee established an emergency response program and was maintaining the fire protection equipment in accordance with procedure requirements.

Report Details

Summary of Plant Status

The GE-Hitachi Nuclear Energy Americas, LLC (GE-Hitachi or Licensee) continued to maintain the three 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 December 15, 2015, the licensee submitted an alternate decommissioning schedule for reactor licenses DPR-1, DR-10, and TR-1, with a specific request for an exemption from the requirements of 10 CFR 50.82(a)(3) and 10 CFR 50.82(b)(4)(i), which is available in ADAMS under accession number (ML15349A045). This exemption request supplemented an initial letter submitted on July 10, 2015 (ML15195A088) for an alternate decommissioning schedule, as described in 10 CFR 50.82. The NRC is evaluating the exemption request for completion of decommissioning beyond 60 years, under the criteria provided in 10 CFR 50.83(a)(3).

On April 24, 2015, (ML15114A437 and ML15114A438) the licensee submitted a request for a partial site release of approximately 610 acres of non-impacted property for unrestricted use pursuant to 10 CFR 50.83(b). The acreage is considered undeveloped land and is primarily used for cattle grazing. The Vallecitos Nuclear Center encompasses approximately 1600 acres in Sunol, California, of which approximately 135 acres are used for licensed purposes. The NRC verified the historical site assessment, performed independent surveys, and concluded the proposed release areas were non-impacted during the site inspection conducted on July 20-23, 2015 (ML15303A361). After holding a public meeting in Pleasanton, CA on July 22, 2015, and publishing a notice of the receipt of the release approval request in the *Federal Register* on July 20, 2015, (*80 FR 42846*), the NRC approved the request for partial site release of the northern section of Vallecitos Nuclear Center site by letter dated May 3, 2016 (ML16007A348).

1 Decommissioning Performance and Status Review at Permanently Shutdown Reactors (71801 and 69002)

1.1 Inspection Scope

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

1.2 Observations and Findings

a. Status and Tours of the Facilities

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 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 only water remaining in the facility was inside the reactor vessel.

The inspector toured the facility with licensee representatives, and confirmed there was an alarm device functioning on the manual doors to the containment building that provided an alarm at the 300 area alarm panel and at the Central Alarm Station. The containment building had scaffolding to access the polar crane, which was not functioning. There were safety rails installed, as necessary, and the licensee was satisfactorily maintaining temporary lighting. The inspector observed that the roll-up door was secured, which was installed in place of the equipment hatch.

The licensee used a portable ventilation system with filtration because the plant ventilation system had been dismantled and was no longer available. The licensee monitored the water level in the reactor vessel and the inspector confirmed that it had remained essentially constant at approximately 95 inches of water, since the last NRC inspection conducted in July 2015. The inspector used a RadEye G gamma survey detector (NRC serial number 13427, calibration due date April 8, 2017) to perform general area dose rate measurements. The results indicated the general area dose rates in the containment building were approximately 25 microRoentgen per hour (μR/hr) and the general background dose rates outside of the containment building were 11 μR/hr.

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 has 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 have been removed. The polar crane was non-functional, and the licensee indicated there were not any plans to remove heavy equipment from the facility. The licensee identified a jib crane, which they stated was approximately 2 tons, so its use would be limited.

The inspector toured the facility with licensee representatives, and confirmed there was an alarm device functioning on the airlock door to the containment building that provided an alarm at the 300 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's procedure number 6.1, "Access Control," Revision 8 provided a cautionary note that quantities of water, as great as 30-50 gallons, was not unusual when initially opening the airlock door, as a result of condensation that had collected in the airlock. Although the dehumidifier pump was not working, the licensee explained that one was being procured. The inspector did not observe any quantities of water from the airlock. The licensee had temporary 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 less than 1 milliRoentgen per hour (mR/hr) throughout the facility, except in certain areas. The inspector measured approximately 35 mR/hr on the two emergency cooling discharge valves located on the 534-ft level, using a RadEye G gamma survey detector. 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-ft level. In addition, the licensee controlled access to areas inside the bioshield and reactor that was consistent with the requirements of 10 CFR 20.1601, "Control of Access to High Radiation Areas."

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 inspector observed the ventilation system was in service and that the ventilation stack particulate monitor was in operation as required by the Technical Specifications, Appendix A, Item C.2.

The inspector toured the facility with licensee representatives, and confirmed there was an alarm device functioning on the airlock door to the facility, which provided an alarm

locally in the control room and at the Central Alarm Station. Dose rate measurements observed by the inspector based on the RadEye G gamma survey detector, were less than 1 milliRoentgen per hour (mR/hr) throughout the facility, except in certain areas. The inspector measured approximately 2.5 mR/hr around the control rods underneath the reactor vessel and approximately 8 mR/hr around the locked door to the experimental exhaust system. The licensee had stored hardware such as fuel transfer containers and coupon storage containers in the dry spent fuel pool. The inspector toured the area where the control rods were refurbished to support activities at the time the reactor was operational, and observed the area remained as it had been left at the time the facility was shutdown.

The inspector observed that the licensee effectively maintained step-off pads for contamination control at the exits from each of the three reactors. In addition, the postings were adequate and in compliance with the requirements in 10 CFR Part 20.

b. License Compliance Reviews

The licensee procedure number 6.2, “Patrols and Inspections,” Revision 7, provides the instructions to ensure that the three reactors were inspected regularly and that periodic radiation and contamination surveys were conducted to ensure compliance with each of the three reactor Technical Specifications and 10 CFR Part 20 requirements. The licensee performed weekly patrols that consisted of items including but not limited to external door locks, ground water sump levels, postings, and power to the 300 area alarm panel. The licensee performed quarterly routines at GETR that included radiation survey measurements and verification of radiation signs and barriers. Finally, the licensee performed annual inspections and radiation survey measurements inside each of the three shutdown reactors. The procedure requirements are consistent with the Technical Specifications for each of the three reactors. The inspector reviewed several data sheets and confirmed the licensee was implementing the details in procedure 6.2, “Patrols and Inspections,” Revision 7, as required.

Procedure 6.1, “Access Control,” Revision 8, provides the step-by-step instructions for conducting entries into the three facilities. Based on the observed entries that were conducted and the documentation generated to support the entries, the inspector determined that the licensee had adequately implemented its instruction for entering the shutdown reactors, which ensured safe access to the facilities.

The annual reports for each of the three reactor licenses covered the period January 1, 2015 through December 31, 2015. The reports were dated March 2016 and submitted to the NRC, as required. The dose rates observed by the inspector during the tours through each of the shutdown reactors were consistent with the annual survey data documented in the annual reports. The reports also documented the licensee’s evaluation of the radiological contamination levels and air sample data for each reactor. The results indicated that all radiological measurements remained low and the licensee did not identify any unexpected anomalies.

The inspector questioned the statement in the annual report for GETR that specified the ventilation system was not fully operational, and the stack air flow had not been calibrated, when there were data results indicating that the stack was fully functional and the stack air flow was calibrated. The licensee submitted Revision 1 of its annual report for GETR, dated October 26, 2016. The annual report clarified that the ventilation

system was operational and the stack air flow had been calibrated. The stack monitor concentration result for alpha was 1.11 x 10^{-15} microCuries per cubic centimeter (µC/cc) and the concentration result for beta was 3.09 x 10^{-15} µCi/cc. The annual reports adequately described the status and radiological conditions at each of the three shutdown reactors.

The licensee submitted its annual report for 2015 Effluent Monitoring and Environmental Surveillance Programs on February 25, 2016, (ML16097A122), as required by various site licenses and permits issued by the NRC and the State of California. The licensee collected and analyzed environmental data for air, water, sediments, and vegetation in accordance with its procedures. The licensee performed analyses of both gross alpha and gross beta/gamma for water collected from basins 1-4. Other analyses of the environmental samples collected were performed by State-certified offsite laboratories. The analysis results documented that no radiological material was released equal to, or greater than the regulatory limits provided in 10 CFR Part 20, Appendix B, Table II, for air and water.

The inspector reviewed the data available in the effluent and environmental monitoring report and questioned some of the data results, the table legends, and graphs that were generated. The licensee produced the actual data analysis result in question and confirmed that the data had been incorrectly reported, as a result of typographical error. The actual data result was less than the value that was reported. In addition, the licensee indicated that the graphs and associated legends could be generated in such a manner to more accurately display the data. The licensee initiated condition report 21795 to review the 2015 Effluent Monitoring and Environmental Surveillance Programs report and make any necessary corrections.

The licensee completed its annual review of the radiation protection program for 2015, as required by 10 CFR 20.1101(c), under self-assessment number NOS-2016-14. The review was performed by the Manager, Facility Licensing from the GE Hitachi, Wilmington, North Carolina office. The assessment was thorough and reviewed the radiation protection program requirements for the operational licenses issued by the State of California and the NRC. The assessment identified two minor areas of improvement that was captured in the licensee's corrective action program. These included lack of an annual review for three safety standards and inadequate documentation of radiation safety inspections. Overall the assessment concluded that the Vallecitos Nuclear Center staff provided adequate oversight and control of radiation protection activities in accordance with the regulatory requirements.

c. Public Dose Assessment

The licensee used the COMPLY computer code to analyze the doses to members of the public based on the annual measured releases from the entire site during 2015. The release rates were based on five stacks, as well as noble gas from an operational facility and charcoal air sampler results. One of the five stacks included the stack releases from GETR, which consisted of strontium-90 and plutonium-239. The calculated effective dose equivalent from the entire site was 1.1 millirem per year (mrem/y) to the nearest resident. The licensee also calculated the projected dose at the industrial area boundary, which is onsite. This calculated dose was 7.5 mrem/y. These values were less than 10 mrem/yr total effective dose equivalent from air emissions of radioactive material to the environment, which is the regulatory constraint established in 10 CFR 20.1101(d).

The regulations under 10 CFR 20.1301 provides the dose limits for individual members of the public. This regulation specifies that the total effective dose equivalent to individual members of the public from licensed operations shall not exceed 100 millirem in a year. The licensee measured ambient gamma radiation levels at 20 environmental samples stations located around the site, in which 7 of the locations were designated as "background" dosimeter locations. The licensee explained that the "background dosimeters" were not subtracted from the sample stations dosimeters, but were used for informational purposes only.

The sample results were documented in the 2015 Effluent Monitoring and Environmental Surveillance Programs annual report. The average result was 57 mrem/y with a variation of 7 mrem, with no background results subtracted. Based on the dosimetry results, the dose limits for individual members of the public was not exceeded.

The licensee did not conduct work at any of the three shutdown reactors during 2015, therefore, there were no specific exposure records generated for the shutdown reactors. The licensee monitored individuals under the other operational licenses at the site, issued by both the State of California and the NRC.

d. Emergency Response

The inspector reviewed licensee's procedure A-5, "Emergency Control Procedure – General," Revision 10, which provides guidance for the response organizational structure, emergency response classifications, and responding to emergency situations. Section 7.3 of the procedure provided a range of postulated accidents that met the criteria for either a Notification of Unusual Event, Alert, and Site Area Emergency. The inspector selected a postulated fire in Area 300 as an example to review, since it was the most probable emergency response scenario for the shutdown reactors.

The emergency control procedure specified procedure C-5, "Fire Protection Procedure," Revision 7, as the detailed procedure utilized by the licensee for this postulated accident. The licensee trains all personnel onsite to respond to all fire alarms onsite. The licensee's site fire team responds to an incipient-stage fire and requests off-site assistance through pre-arranged agreements. The inspector reviewed the licensee's inspection and verification of fire protection equipment located in Area 300. On October 17, 2016, the licensee performed its monthly inspection of fire protection equipment. The documentation demonstrated that the licensee was implementing its procedure and that the fire protection equipment was operable and available, if needed.

The inspector also reviewed the mobile equipment platform (MEP). The licensee had developed a procedure in 2014, procedure number 4.8, "MEP Operation," Revision 0, that provided the instructions for operating the 250 gallon per minute pumper truck. The procedure provided specific instructions, since the operation is unique to the pumper truck for starting the pumper, controlling the valves to ensure correct hose pressure and drafting water. The inspector observed that the licensee maintained the MEP with the emergency response equipment, including several operational self-contained breathing apparatus (SCBA).

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 conducted annual radiological surveys as required by the licenses and reported the annual verification of inspection items and radiological survey results to the NRC.

The licensee monitored radioactive effluents and environmental samples as required. No effluent or environmental sample exceeded regulatory or licensed limits. The public dose assessment as a result of the effluent emissions and environmental results were well below the regulatory limits.

The inspector conducted tours of the three shutdown reactors and concluded that the licensee was maintaining the shutdown reactors in accordance with procedure and license requirements. The licensee established an emergency response program and was maintaining the fire protection equipment in accordance with procedure requirements.

2 Exit Meeting Summary

On October 19, 2016, the NRC inspector presented the final inspection results to Mr. T. Caine, Site Manager. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Ayala, Radiation Protection Supervisor
T. Caine, Manager, Vallecitos Nuclear Center
T. Christman, Manager, Advanced Programs
M. Leik, EHS and Regulatory Compliance Manager
S. Murray, Manager, Facility Licensing

INSPECTION PROCEDURES USED

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

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened / Closed

None

Discussed

None

LIST OF ACRONYMS

CFR	*Code of Federal Regulations*
EVESR	Empire State Atomic Development Associates Incorporated Vallecitos Experimental Superheat Reactor
GETR	General Electric Test Reactor
NRC	U.S. Nuclear Regulatory Commission
VBWR	Vallecitos Boiling Water Reactor