



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

October 30, 2015

Mr. Thomas A. Caine, Manager  
Vallecitos Nuclear Center  
GE-Hitachi Nuclear Energy  
6705 Vallecitos Road  
Sunol, CA 94586

SUBJECT: NRC INSPECTION REPORT 050-00018/15-001; 050-00070/15-001;  
050-00183/15-001

Dear Mr. Caine:

This letter refers to the inspection conducted from July 20-23, 2015, at your Vallecitos Nuclear Center in Sunol, California. During this inspection, the U.S. Nuclear Regulatory Commission (NRC) staff examined activities conducted under your licenses as they relate to public health and safety 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, observations of activities, and interviews with personnel. The preliminary inspection results were presented to you at the end of the onsite inspection.

During the onsite inspection, the NRC's contractor, ORAU, conducted a confirmatory survey of two tracts of land located in the northern section of the Vallecitos Nuclear Center site property. The ORAU survey results indicate that identified radionuclide concentrations in surface soils in the northern properties are consistent with regional background and/or world-wide fallout levels. In addition, there is no evidence that the two areas were impacted by previous site operations.

The final inspection conclusions were presented to your staff by telephone on October 22, 2015, after receipt of the ORAU confirmatory survey report dated October 19, 2015. The enclosed inspection report presents the results of this inspection. 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](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 Dr. Robert Evans, Senior Health Physicist, at 817-200-1234 or the undersigned at 817-200-1191.

Sincerely,

*/RA/*

Ray L. Kellar, P.E., Chief  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety

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

Enclosure:  
Inspection Report 050-00018/15-001;  
050-00070/15-001; 050-00183/15-001  
w/Attachment:  
Supplemental Information

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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: 050-00018/15-001; 050-00070/15-001; and 050-00183/15-001

Licensee: GE-Hitachi Nuclear Energy

Facility: Vallecitos Nuclear Center

Location: Sunol, California

Dates: July 20-23, 2015

Inspector: Robert Evans, Ph.D., P.E., C.H.P., Senior Health Physicist  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety  
Region IV

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Approved by: Ray L. Kellar, P.E., Chief  
Repository and Spent Fuel Safety Branch  
Division of Nuclear Materials Safety  
Region IV

Enclosure

## EXECUTIVE SUMMARY

GE-Hitachi Nuclear Energy, Vallecitos Nuclear Center  
NRC Inspection Report 050-00018/15-001; 050-00070/15-001; and 050-00183/15-001

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 addition to the routine inspection, the NRC's contractor (ORAU) conducted a confirmatory survey of the northern area at the Vallecitos Nuclear Center site. In summary, the licensee was conducting site activities in accordance with regulatory, license, and procedure requirements.

### Site Status

- The three reactors continued to remain permanently shut down and defueled. In recent years, the licensee conducted risk reduction work at two of three reactors. Risk reduction work consists of removal and disposal of contaminated equipment around and within the containment buildings, as allowed by the three licenses. The licensee plans to conduct risk reduction work at the third reactor in the future.

### Decommissioning Performance and Status Review

- The licensee continued to conduct annual inspections, radiological surveys, and audits of the three shutdown reactors in accordance with regulatory, license, and procedure requirements. No significant problems or abnormal survey results were identified during the 2014 annual inspections. The licensee continued to submit the results of the inspections to the NRC in annual reports. The licensee also implemented the site-wide As Low As Reasonably Achievable program as stipulated by regulatory and procedural requirements. (Section 1.2.a)
- Although no work was conducted in the three shutdown reactors in 2014-2015, the licensee continued to monitor workers for exposures to radioactive materials. During 2014, occupational exposures remained below regulatory limits. (Section 1.2.b)
- The licensee monitored radioactive effluents as required by the licenses. No effluent exceeded regulatory or licensed limits, and public doses from these effluents remained below regulatory limits. (Section 1.2.c)
- The inspector toured the three containment buildings and concluded that the licensee was maintaining the shutdown reactors in accordance with procedural requirements. Radiation postings, radioactive material control, and housekeeping were adequate. The inspector's independent radiological surveys were comparable to the licensee's survey results. (Section 1.2.d)
- Since the previous inspection, the licensee had not shipped any radioactive material; therefore, the transportation program area was not reviewed. (Section 1.2.e)
- The licensee established an emergency preparedness program in accordance with NRC and industry guidance. (Section 1.2.f)

- The licensee requested release of the 610-acre northern area from the 1,600-acre site. The licensee's request included a historical site assessment and radiological scoping survey. The NRC inspector confirmed that the licensee correctly categorized the northern area as non-impacted from previous operations. (Section 1.2.g)
- The NRC's contractor, ORAU, conducted a confirmatory survey of the northern area. The results of the confirmatory survey verified the results of the licensee's scoping survey. Based on all available information, the two northern properties have not been impacted from licensed operations and can be released for unrestricted use. (Section 1.2.h)

## Report Details

### Summary of Plant Status

At the time of the inspection, the licensee continued to maintain the three reactors in safe storage (SAFSTOR). The licensee plans to maintain the three reactors in SAFSTOR until it elects to decommission and decontaminate the facilities to levels that permit release of the facilities for unrestricted use. The primary reason for deferred decommissioning is to allow for the decay of radioactivity, including cobalt-60, resulting in lower occupational exposures when decommissioning is initiated. The licensee submitted an alternate decommissioning schedule for the three reactors to the NRC by letter dated July 10, 2015 (ADAMS Accession Number ML15195A088). The licensee's request was still under NRC review at the conclusion of the onsite inspection.

The Vallecitos Boiling Water Reactor (VBWR) achieved full power operations in 1957 but was permanently shut down in 1963. The licensee commenced with risk reduction work in October 2007 to remove all ancillary equipment from the VBWR containment. Risk reduction work consists of the removal and disposal of contaminated equipment within and around the containment buildings, as allowed by the three licenses. The licensee dismantled all systems and components within the VBWR containment with the exceptions of the reactor pressure vessel, polar crane, biological shield, and fuel pool. The licensee packaged and shipped the radioactive wastes for disposal at an out-of-state disposal facility. This phase of the risk reduction work was completed in November 2008. At the time of this inspection, the licensee continued to consider its options for conducting additional risk reduction work within the VBWR. This additional work may include removal and disposal of non-structural lead bricks and high-density concrete blocks from containment.

The Empire State Atomic Development Associates Incorporated Vallecitos Experimental Superheat Reactor (EVESR) achieved full power operations in 1964 but was permanently shut down in 1967. The licensee started risk reduction work within EVESR in 2008 but temporarily suspended the work pending a revision to the license. The licensee resumed risk reduction work at EVESR in March 2009. In August 2009, the licensee experienced a polar crane failure, resulting in the loss of the main hoist. The licensee was unable to repair the crane, thus, the licensee could no longer lift heavy components within the EVESR. Risk reduction work within the EVESR was completed in early 2011. The removal of the heavier components, including the dump tank, was deferred until a later date.

Finally, the GE Test Reactor (GETR) operated from 1958-1977. The licensee plans to commence with risk reduction work at GETR at some point in the future. Before this work can begin, certain activities must be completed. These activities include development of the various work plans, assignment of the project management team, recertification of the elevator, recertification of the overhead crane, refurbishment of the building ventilation system, and coordination for removal of the building electrical distribution systems.

The licensee implemented one staffing change since the previous inspection. By letter dated February 27, 2015 (ML15056A227), the licensee notified the NRC of a change in managers for site safety and regulatory compliance. The inspector reviewed the qualifications of the new site safety and regulatory compliance manager using the minimum qualification requirements provided in the NRC's Special Nuclear Material License SNM-960 for radiation safety managers. The inspector concluded that the new individual assigned to the position exceeded the minimum education and experience requirements provided in Section 4.3 of Appendix A to



License SNM-960. The licensee also changed the reporting requirements for the site manager, the highest ranking individual onsite. The site manager now reports to a different corporate general manager, one that has been assigned responsibility for other licensed sites.

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

### **1.1 Inspection Scope**

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

### **1.2 Observations and Findings**

#### **a. Routine Inspections and Audits**

Each of the three licenses requires the licensee to conduct routine inspections of the respective facilities. The licenses also require the licensee to conduct annual radiological surveys. The instructions for these inspections and surveys are provided in facilities maintenance procedures. Procedure 6.1, Revision 8, "Access Control," provided the step-by-step instructions for conducting entries into the three facilities. Procedure 6.2, Revision 7, "EVESR/VBWR/GETR Surveillance Procedures," stipulated that weekly inspections be conducted to observe attributes such as groundwater sump levels, door locks, electrical circuit breaker positions, and fence conditions. This procedure also describes the annual inspection and radiological survey requirements.

The licensee's staff conducted the most recent annual inspections in December 2014. The inspections included measurement of airborne radioactivity levels, ambient gamma exposure rates, and removable beta-gamma surface contamination levels. The records indicate that the radiation protection staff conducted the inspections and collected radiological survey data as stipulated by site procedures. The individuals performing the surveys did not identify any abnormal survey measurement. The records indicate that a damaged access door was identified at the EVESR, but the licensee subsequently repaired the door.

Each license requires the licensee to submit annual reports to the NRC. The most recent annual reports were submitted to the NRC by letter dated April 1, 2015 (ML15092A271 and ML15092A272). As required by the respective licenses, the annual reports included the results of the radioactive material surveys in each reactor building. The radiological conditions observed in calendar year 2014 were generally comparable to the results obtained in 2013. No air sample result exceeded the licensee's action level for entry into the three reactor structures.

Regulation 10 CFR 20.1101(c) requires licensees to conduct annual reviews of the radiation protection program content and implementation. In addition, two of three shutdown reactor licenses require periodic audits and reviews. The inspector inquired about the status of the licensee's annual radiation program audit. At the time of the inspection, the licensee had not finalized its annual program review for 2014. The inspector will review the 2014 program review during a future inspection.

The inspector noted that the licensee conducted mini-audits of certain radiation protection program areas to supplement the annual program review. For 2014, these regulatory compliance reviews included audits of radiation dosimetry, bioassays, radiation surveys, radiological postings, and radiation work permits. These limited audits identified that surveys and survey recordkeeping were inconsistent, suggesting that additional training was warranted to ensure consistent survey techniques and recordkeeping. The licensee provided this refresher training to site staff in September 2014.

The inspector reviewed the licensee's implementation of its As Low As Reasonably Achievable (ALARA) program. Regulation 10 CFR 20.1101(b) states that the licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are ALARA. The licensee implemented an ALARA program as required by its internal written standards. These written standards include instructions for maintaining exposures ALARA and for establishing and implementing an ALARA committee. The committee met quarterly during 2014-2015 to discuss relevant topics such as high-dose work activities and ALARA dose goals.

The inspector reviewed the licensee's ALARA goal for 2014 and compared this goal to actual doses. The ALARA goal for combined doses in 2014 was 11.392 rem (0.11392 Sievert). Actual total doses for 2014 were 9.261 rem (0.09261 Sievert). Most occupational doses were assigned to Nuclear Test Reactor workers, but some maintenance activities also contributed to assigned doses. The licensee did not conduct risk-reduction work at the three shutdown reactors in 2014; therefore, the 2014 ALARA goals did not include work at these reactors.

The licensee established a site-wide ALARA goal of 10.047 rem (0.10047 Sievert) for 2015. This goal does not include potential risk reduction work for the shutdown reactors. In the future, the licensee plans to conduct risk-reduction work at the GETR. At that time, the licensee will implement an ALARA program for this work activity.

b. Occupational Exposures

Although no work was conducted at any of the three shutdown reactors in 2014, the inspector reviewed the licensee's exposure records for 2014 to ensure that no worker exceeded the regulatory limits specified in 10 CFR 20.1201. Occupational doses for site workers were a combination of doses from exposure to radioactive materials licensed by both the State of California and the NRC. The licensee monitored employees for both external and internal exposures.

The inspector reviewed the licensee's tabulated data for occupational exposures for 2014. During 2014, all assigned doses were attributed to external sources. The licensee did not assign any internal dose to any worker based on the results of air sampling and whole body counting (bioassays). A total of 126 individuals were monitored in 2014. The highest annual total effective dose equivalent exposure was 0.603 rem (0.00603 Sievert) with a regulatory limit of 5 rem (0.05 Sievert). The highest extremity dose was 1.412 rem (0.01412 Sievert) with a regulatory limit of 50 rem (0.5 Sievert). Finally, the highest lens of eye dose was 0.358 rem (0.00358 Sievert) with a regulatory limit of 15 rem (0.15 Sievert).

c. Public Dose Assessment

Two of three licenses (VBWR and EVESR) require the licensee to maintain records of radioactivity released from the respective facilities. The environmental monitoring program requirements are provided in Section 10 of Appendix A to the SNM-960 license and the licensee's Environmental Monitoring Manual. The environmental monitoring program consists of gaseous effluent, liquid effluent, groundwater, stream bottom (sediment), and vegetation sampling. The Environmental Monitoring Manual provides additional requirements for measurement of ambient gamma radiation levels and collection of ambient air particulate and pond water samples.

License SNM-960 requires the licensee to submit the results of effluent and environmental monitoring to the NRC in annual reports. The inspector reviewed the 2014 annual report, submitted to the State of California by letter dated February 25, 2015, with a copy to the NRC (ML15069A472). The inspector compared the various sample results to the license and regulatory limits as well as the licensee's action levels. The licensee established action levels to help prevent the regulatory limits from being exceeded.

In summary, the licensee collected all required samples. No sample result exceeded the action levels or release limits specified in the SNM license. Several onsite groundwater sample results exceeded the gross beta-gamma action level provided in the Environmental Monitoring Manual. However, the licensee's assessment indicated that these samples contained only naturally occurring radioactive material.

Regulation 10 CFR 20.1101(d) places a constraint on air emissions of radioactive material to the environment. The licensee used the COMPLY computer code to analyze the doses for members of the public. For 2014, the licensee calculated an effective dose equivalent of 1 millirem (0.01 millisievert) per year to the nearest resident. The licensee also calculated the projected dose at the industrial fence line. This calculated dose was 6.7 millirem per year (0.067 millisievert). These calculated doses were less than the constraint limit of 10 millirem per year (0.1 milliSievert) as specified in regulations.

The licensee measured ambient gamma radiation levels at 20 environmental sample stations. The inspector reviewed the licensee's results for 2014. The difference between the highest and lowest environmental sample station was 16.5 millirem (0.165 millisievert). The difference between the highest and lowest station measurement remained below the public dose limit of 100 millirem (1 millisievert) specified in regulation 10 CFR 20.1301.

Finally, the licensee placed dosimeters in buildings occupied by visitors and employees in order to assess the dose that could be received by members of the public while visiting the Vallecitos Nuclear Center. The highest area dose was measured in the chemistry building. Based on these measurements, the licensee conservatively calculated a dose to an individual who may have occupied the building for 8 hours per day, 5 days per week, and 52 weeks per year. This occupancy could result in an annual dose of about 30 millirem (0.3 millisievert), a calculated dose that remained below the 100 millirem (1 milliSievert) per year limit for individual members of the public as specified in 10 CFR 20.1301.

d. Site Tours

The inspector toured the three reactor containment buildings. The VBWR remained in safe storage with no work in progress. Maintenance Procedure 6.2 requires routine checks of the VBWR reactor vessel water level using a level indicating meter located outside of the containment building. (The VBWR continues to contain water, in part, for radiation shielding.) The licensee's records indicate that the VBWR water level continues to remain relatively constant at 95.5 inches, meaning that the reactor pressure vessel was roughly three quarters full of water. The inspector noted that the water level in the VBWR has remained constant since the last inspection.

The inspector also toured the EVESR. One high radiation area continues to exist in the EVESR, and this area was positively controlled by the licensee. The inspector observed the components that will have to be removed from the building at a later date including the dump tank and control rod drive mechanisms.

Finally, the inspector toured the GETR. Little decommissioning work has been performed in this facility. As noted earlier, the licensee may commence with risk reduction work at the GETR in the near future, depending on the availability of funding. Several high radiation areas continue to exist within GETR, and these areas continue to be positively controlled by the licensee with locked doors and warning signs.

During site tours, the inspector conducted independent gamma exposure rate measurements using an NRC-issued Ludlum Model 2401-EC2 survey meter (NRC number 35484G, calibration due date of 03/13/16). The inspector's survey results during the site tour were consistent with the licensee's December 2014 annual survey results. The licensee had posted areas consistent with observed radiation levels.

In summary, no unsafe condition was identified, radiological postings were found to be adequate, and radiation levels measured by the inspector were comparable to the results documented in the licensee's annual reports. Housekeeping was appropriate for the status of each facility. The inspector concluded that the licensee had maintained the three structures in accordance with regulatory, license, and procedure requirements.

e. Transportation of Radioactive Material and Control of Radwaste

Since the previous inspection, the licensee had not shipped any radioactive material for disposal from any of the three reactors. The last shipment, consisting of waste material removed from the EVESR, was shipped offsite on August 31, 2011. This program area will be reviewed during a future inspection.

f. Emergency Response Program Review

By letter dated March 19, 2013 (ML12293A177), the NRC informed the licensee about the applicability of the Emergency Preparedness Final Rule for decommissioning at Vallecitos Nuclear Center. By letter dated May 24, 2013 (ML13144A752), the licensee informed the NRC that it conducted a review of the emergency preparedness requirements and that no changes of the site emergency preparedness plan were necessary. The licensee concluded that the current plan was sufficient because it was based on the guidance provided in NRC Regulatory Guide 2.6, Emergency Planning for Research and Test Reactors, and ANSI/ANS Standard 15.16, Emergency Planning for

Research Reactors. The NRC staff reviewed the licensee's May 24, 2013, letter during the inspection and concluded that the licensee's response was acceptable.

g. Review of Licensee's Request to Free-Release the Northern Properties

Regulation 10 CFR 50.83 provides the requirements for partial release of a power reactor facility for unrestricted use. This regulation states that prior written NRC approval is required to release part of a facility or site for unrestricted use at any time before receiving approval of a license termination plan. In accordance with the requirements of 10 CFR 50.83, by letter dated April 24, 2015 (ML15114A437), the licensee requested release of the northern portion of the Vallecitos Nuclear Center site for unrestricted use. If approved, the licensee would be allowed to sell the property to a third party without restrictions by the NRC.

The northern area encompasses approximately 610 acres in two sections called C1 (580 acres) and C2 (30 acres). According to the licensee, it purchased the 1,600-acre Vallecitos Nuclear Center property in 1956. Licensed operations were conducted only within a 135-acre section situated in the southwestern part of the 1,600-acre site. The licensee stated that it did not conduct licensed activities, store or use radioactive material, or dispose of radioactive material in the northern 610-acre portion of the property. The northern property is zoned as rural property and is currently being used for cattle grazing.

To support its request for the partial site release, the licensee conducted a historical site assessment and a limited radiological survey in the northern area. The historical site assessment included review of previous environmental monitoring data and interviews with site staff. Because the northern property is hydraulically upgradient of the 135-acre impacted area, the only potential for radioactive contamination in the northern area was fallout from gaseous effluents. The licensee's radiological survey included collection and analysis of soil samples. As a conservative measure, certain soil sample locations were selected because they represented low points where radioactive contamination could have concentrated following washout from airborne gaseous effluents.

The licensee's contractor collected and analyzed 11 soil samples for gross alpha and gross beta-gamma concentrations. The gross alpha concentrations ranged from 3.99 to 17.65 picocuries per gram (pCi/g), while the gross beta-gamma concentrations ranged from 4.18 to 23.52 pCi/g. The licensee chose to compare these sample results to the background screening limits established by Lawrence Livermore National Laboratory for its Site 300 facility. Site 300 is located roughly 20 miles east of the Vallecitos Nuclear Center and has similar terrain. The gross alpha screening limit for Site 300 was 11 pCi/g, while the gross beta-gamma screening limit was 21 pCi/g.

The licensee elected to reanalyze three of 11 soil samples using gamma spectroscopy because these sample results slightly exceeded the screening limits. Gamma spectroscopy was conducted to identify the individual radionuclides in the soil samples. The reanalyzed samples did not contain the fission products cobalt-60, cesium-134, or cesium-137. The licensee's sample results were consistent with naturally occurring radioactive material in background concentrations.

Based on all available information, the licensee designated the property as non-impacted. Regulation 10 CFR 50.2 defines *non-impacted areas* as areas with no

reasonable potential for residual radioactivity in excess of natural background or fallout levels. The licensee made this designation based on its visual inspections, historical records review, process knowledge, and soil sample results.

Because the most likely cause of radioactivity in the northern properties was fallout or washout from gaseous effluents from the main plant site, the inspector reviewed wind rose data. The licensee's data indicated that the winds were calm about two-thirds of the time. When the wind was blowing, the predominant wind direction was southwest to northeast (towards C1) or north-northeast to south-southwest (away from the two properties). The wind rose data indicates that the wind blows towards the northern properties only about 10-percent of the time, reducing the probability of fallout or washout from the main plant site onto the northern properties.

As noted in Section 1.2.c of this inspection report, the licensee routinely measured ambient gamma radiation levels at 20 sample stations using environmental dosimeters. (The licensee reduced the number of sample stations from 31 to 20 during 2014.) The NRC inspector reviewed the licensee's available environmental dosimeter data for 1973-2014. The records indicate that two onsite environmental stations, designated as Stations 4 and 22, had consistently elevated ambient gamma radiation measurements in the 1970s. These two stations were located within the 135-acre property where licensed operations were being conducted. Until 2014, the license maintained eight of 31 environmental dosimeters in the northern properties (C1 and C2). The available records indicate that ambient gamma radiation levels in the 610-acre northern properties were indistinguishable from background levels from 1973-2014.

During the inspection, NRC and ORAU staff conducted visual inspections of portions of the northern property. The staff looked for evidence of past licensed operations such as structures, disturbed land, and potential burials. The land appeared to have been used exclusively for grazing, and no evidence of structures, disturbance, or burials was observed.

In summary, the NRC confirmed that the licensee correctly categorized the northern area as non-impacted from previous operations.

h. Confirmatory Survey of Northern Properties

The NRC elected to conduct a confirmatory survey of the northern area. The purpose of the confirmatory survey was to verify the results of the licensee's scoping survey. The confirmatory survey was conducted by staff from ORAU on behalf of the NRC. The ORAU staff prepared a survey plan which documented the proposed survey design and implementation. The survey consisted of surface scans for ambient gamma radiation levels, collection of soil samples, and measurement of gamma radiation levels at the soil sample locations. The survey plan included instructions for both random (systematic) and judgmental (biased) sampling.

The surface scans were conducted using sodium-iodide scintillation detectors coupled to single-channel analyzers and global positioning system location devices. Two ORAU staff members conducted walkover scan surveys of approximately 1-2 percent of the 610-acre area. These scan surveys were conducted with an emphasis on drainage pathways. The scan results were compared to background measurements collected adjacent to the northern properties. The ORAU staff also collected 10 random and one

biased soil samples. The soil samples were split with the licensee's contractor. The licensee did not plan to analyze these split samples, pending the results of ORAU's sample analyses.

The ORAU staff submitted the results of their confirmatory survey to the NRC by report dated October 19, 2015 (ML15296A139). The scan survey results did not identify any area with elevated gamma radiation levels above natural background populations. The ORAU staff analyzed the 11 soil samples by gamma spectroscopy to determine if any licensed fission products were present in the samples. The radionuclides of interest included cobalt-60, cesium-134, and cesium-137. The analysis identified low levels of cesium-137 in the soil. (The ability to identify and quantify radioactivity in soil is based, in part, on the minimum detectable activities of the counting equipment and detector count times.) The sample results ranged from 0.058 to 0.201 picocuries of cesium-137 per gram of soil (pCi/g), with an average value of 0.134 pCi/g. As noted in the ORAU report, background levels within the U.S. range from less than 0.1 pCi/g to 1.5 pCi/g. The ORAU staff concluded that these sample results were comparable to background levels for radioactive fallout from previous nuclear weapons testing and nuclear accidents.

The NRC provides screening values for various radionuclides in soil, to ensure compliance with the radiological criteria for license termination as provided in 10 CFR Part 20, Subpart E. The use of the screening values provides reasonable assurance that the 25 millirem (0.25 millisievert) dose criterion provided in 10 CFR 20.1402 will be met. The NRC-accepted screening values are provided in Appendix B to NUREG-1757, Volume 1, Revision 2, Consolidated Decommissioning Guidance, Decommissioning Process for Materials Licensees. The screening value for cesium-137 is 11 pCi/g. As long as the cesium-137 radioactivity in the northern property remains below the screening value, there is reasonable assurance that the 25-millirem dose limit specified in 10 CFR 20.1402 will not be exceeded. The maximum cesium-137 concentration, 0.201 pCi/g, was well below the 11 pCi/g screening value. Thus, the ORAU's soil sample results indicate that the property could be released since none of the results exceeded the screening value.

In summary, the NRC staff verified the results of the licensee's scoping survey for the northern area properties. Based on all available information, ORAU concluded that radioactive concentrations in surface soils in the two northern properties (C1 and C2) are consistent with regional background conditions and/or worldwide fallout levels. There was no evidence that the areas were impacted by previous site operations. Because the northern properties appear to be non-impacted from licensed operations, the properties can be released for unrestricted use.

### 1.3 Conclusions

The licensee continued to conduct annual inspections, radiological surveys, and audits of the three shutdown reactors in accordance with regulatory, license, and procedure requirements. No significant problems or abnormal survey results were identified during the 2014 annual inspections. The licensee continued to submit the results of the inspections to the NRC in annual reports. The licensee also implemented the site-wide ALARA program as stipulated by regulatory and procedural requirements.

Although no work was conducted in the three shutdown reactors in 2014-2015, the licensee continued to monitor workers for exposures to radioactive materials. During 2014, occupational exposures remained below regulatory limits.

The licensee monitored radioactive effluents as required by the licenses. No effluent exceeded regulatory or licensed limits, and public doses from these effluents remained below regulatory limits.

The inspector toured the three containment buildings and concluded that the licensee was maintaining the shutdown reactors in accordance with procedural requirements. Radiation postings, radioactive material control, and housekeeping were adequate. The inspector's independent radiological surveys were comparable to the licensee's survey results.

Since the previous inspection, the licensee had not shipped any radioactive material; therefore, the transportation program area was not reviewed.

The licensee established an emergency response program in accordance with NRC and industry guidance.

The licensee requested release of the 610-acre northern area from the 1,600-acre site. The licensee's request included a historical site assessment and radiological scoping survey. The NRC inspector confirmed that the licensee correctly categorized the northern area as non-impacted from previous operations.

The NRC's contractor, ORAU, conducted a confirmatory survey of the northern area. The results of the confirmatory survey verified the results of the licensee's scoping survey. Based on all available information, the two northern properties have not been impacted from licensed operations and can be released for unrestricted use.

## **2 Exit Meeting Summary**

The inspector presented the preliminary inspection results to the licensee's representatives at the conclusion of the onsite inspection on July 23, 2015. The final inspection results were presented to the licensee by telephone on October 22, 2015, following receipt of the ORAU survey report dated October 19, 2015. Representatives of the licensee acknowledged the findings as presented. During the inspection, the licensee did not identify any information reviewed by the inspector as proprietary.



## SUPPLEMENTAL INSPECTION INFORMATION

### PARTIAL LIST OF PERSONS CONTACTED

#### Licensee

J. Ayala, Radiation Protection Supervisor  
T. Caine, Manager, Vallecitos Nuclear Center  
E. Hagberg, Radiological Measurement Technician  
D. Hart, Geo-hydrologist, Brown and Caldwell  
M. Leik, Manager, Environmental Health and Safety  
S. Murray, Manager, Facility Licensing  
R. Pearson, Radiological Measurement Technician  
H. Stuart, Radiological Measurement Technician

### 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

None

#### Closed

None

#### Discussed

None

### LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
CFR	<i>Code of Federal Regulations</i>
EVESR	Empire State Atomic Development Associates Incorporated Vallecitos Experimental Superheat Reactor
GETR	General Electric Test Reactor
NRC	U.S. Nuclear Regulatory Commission
pCi/g	picocuries per gram
VBWR	Vallecitos Boiling Water Reactor