



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

May 1, 2007

Ms. Charlotte Engstrom
Vice President and General Counsel
General Atomics
P.O. Box 85608
San Diego, California 92186-9784

SUBJECT: NRC INSPECTION REPORT 070-00734/07-001 AND NOTICE OF VIOLATION

Dear Ms. Engstrom:

This refers to the inspection conducted on February 26-March 1, 2007, at the General Atomics facility in San Diego, California. This inspection was an examination of activities conducted under your license as they relate to safety and 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. A preliminary exit briefing was held with your staff at the conclusion of the onsite inspection. Following the receipt of NRC's swipe and soil sample results on April 3, 2007, a final telephonic exit briefing was held with Ms. Laura Gonzales on April 25, 2007.

The inspection included confirmatory surveys conducted in several areas of the facility in support of decommissioning. The surveys included measurement of ambient gamma radiation exposure rates, measurement of fixed contamination, collection of soil samples, and collection of swipe samples for measurement of removable contamination. All survey results were below the NRC-approved release criteria, supporting your final determination that the areas had been effectively remediated.

Based on the results of this inspection, the NRC has determined that a Severity Level IV violation of NRC requirements occurred. The violation involved the failure to make, or cause to be made, surveys that may be necessary for compliance with the regulations in 10 CFR Part 20. Specifically, two survey meters in Building 21 that were used to survey people and hand-held equipment for free-release were found to be non-functional. The violation was evaluated in accordance with the NRC Enforcement Policy included on the NRC's Web site at www.nrc.gov/about-nrc/regulatory/enforcement.html. The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited because it was NRC identified and because it had potential safety significance.

The NRC has concluded that information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence is already adequately addressed on the docket in your Health Physics Report of Radiological Safety Condition dated March 16, 2007. Therefore, you are not required to respond to this letter unless the description

herein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, 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 www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Mr. Robert Evans, Senior Health Physicist, at (817) 860-8234 or the undersigned at (817) 860-8191.

Sincerely,

/RA JV Everett for/

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle & Decommissioning Branch

Docket No.: 070-00734
License No.: SNM-696

Enclosures:

1. Notice of Violation
2. NRC Inspection Report 070-00734/07-001

cc w/Enclosures:

Dr. K. E. Asmussen, Director
Licensing, Safety and Nuclear Compliance
P.O. Box 85608
San Diego, California 92186-9784

Gary W. Butner, Director
Radiologic Health Branch
P.O. Box 997414 MS 7610
Sacramento, CA 95899-7414

bcc w/Enclosures (via ADAMS e-mail distribution):

- LDWert
- MNBaker, NMSS/FCSS/FCFB
- DBSpitzberg
- RJEvans
- EMGarcia
- JFKatanic
- RITS Coordinator
- RIV Nuclear Materials File - 5th Floor

SUNSI Review Completed: RJE ADAMS: Yes No Initials: RJE
 Publicly Available Non-Publicly Available Sensitive Non-Sensitive

DOCUMENT NAME: s:\dnms\!fcdb\!rje\70073401.wpd final r:_dnms\70073401.wpd

RIV:DNMS:FCDB	FCDB	DNMS:NMIB	C:FCDB
RJEvans*	EMGarcia* (via email)	JFKatanic* (via conversation)	DBSpitzberg
<i>/RA/</i>	<i>/RA RJEvans for/</i>	<i>/RA RJEvans for/</i>	<i>/RA JV Everett for/</i>
04/27/07	04/17/07	04/26/07	05/01/07

OFFICIAL RECORD COPY

T=Telephone

E=E-mail

F=Fax

*Previous Concurrence

ENCLOSURE 1

NOTICE OF VIOLATION

General Atomics
San Diego, California

Docket No. 070-00734
License No. SNM-696

During an NRC inspection conducted on February 26 - March 1, 2007, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

10 CFR 20.1501 requires each licensee to make, or cause to be made, surveys that may be necessary for the licensee to comply with the regulations in Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present.

Pursuant to 10 CFR 20.1003, *survey* means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

Contrary to the above, the licensee did not make or cause to be made surveys to assure compliance with 10 CFR 20.1501. Specifically, on February 28, 2007, two survey meters located at the exit to Building 21 were found to be inoperable. These meters were used to survey personnel and hand-held items being released from Building 21, a restricted area as defined in 10 CFR 20.1003. As a result, the licensee was unable to make or cause to be made surveys to evaluate radiation levels on people and equipment being released from the building.

This is a Severity Level IV violation (Supplement IV).

The NRC has concluded that information regarding the reason for the violation, the corrective actions taken and planned to be taken to correct the violation and prevent recurrence, and the date when full compliance will be achieved, is already adequately addressed on the docket in your Health Physics Report of Radiological Safety Condition dated March 16, 2007. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region IV, within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you choose to respond, your response 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 www.nrc.gov/reading-rm/adams.html. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 1st day of May 2007.

ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 070-00734

License No.: SNM-696

Report No.: 070-00734/07-001

Licensee: General Atomics

Location: 3550 General Atomics Court
San Diego, California 92121

Dates: February 26 - March 1, 2007

Inspectors: Robert Evans, P.E., C.H.P., Senior Health Physicist
Fuel Cycle & Decommissioning Branch

Emilio M. Garcia, Health Physicist
Fuel Cycle & Decommissioning Branch

Janine F. Katanic, Ph.D., Health Physicist
Nuclear Materials Inspection Branch

Approved by: D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle & Decommissioning Branch

Attachment: Supplemental Inspection Information

EXECUTIVE SUMMARY

General Atomics
NRC Inspection Report 070-00734/07-001

This routine, announced inspection focused on decommissioning activities including management organization and controls, radiation protection, emergency preparedness, maintenance and surveillance, environmental protection, and closeout inspection and survey. Overall, the licensee was conducting operations in accordance with the requirements of the license and the Site Decommissioning Plan, with one exception described below.

Decommissioning Inspection Procedure for Materials Licensees

- The licensee had transferred all remaining special nuclear material to one of three licenses; its State of California byproduct material license or its two NRC research and test reactor licenses. The licensee maintained records of these transfers (Section 1).

Management Organization and Controls

- The licensee's organization was consistent with the license and the NRC-approved Site Decommissioning Plan. The licensee performed audits that were comprehensive and met the requirements of the license and regulations (Section 2).

Radiation Protection

- The licensee's records indicated that no individual exceeded the regulatory limits for occupational exposures. Radiation safety training had been implemented in accordance with license requirements (Section 3).

Emergency Preparedness

- The licensee had an emergency preparedness program, including fire protection, that met the commitments of the Radiological Contingency Plan (Section 4).

Maintenance and Surveillance Testing

- In Building 21, the NRC identified one hand and foot monitor and one survey meter that were inoperable. The failure of the licensee to make or cause to be made surveys of people and equipment leaving Building 21 was identified as a violation of NRC regulatory requirements (Section 5).

Environmental Protection

- The licensee implemented an environmental and effluent monitoring program as required by the license. The doses to members of the public were below regulatory and reportability limits (Section 6).

Closeout Inspection and Survey

- The inspectors conducted confirmatory surveys of the non-reactor portions of Building 21, the former Tank L-307 pit area, and portions of Buildings 30/31. The survey results were below the NRC-approved release criteria provided in the Site Decommissioning Plan, supporting your final determination that these areas had been effectively remediated (Section 7).

Report Details

Summary of Plant Status

At the time of the inspection, most areas of the site had been remediated and final surveyed. The licensee had transferred the remainder of its special nuclear material (SNM) from NRC Materials License No. SNM-696 to its State of California license or NRC research and test reactor licenses. The licensee continued to possess byproduct material under these licenses.

1 Decommissioning Inspection Procedure for Materials Licensees (87104, 84850, 84900, and 86740)

1.1 Inspection Scope

The inspectors reviewed facility operations to verify adherence to operational safety requirements as required by the license and site procedures. The licensee did not ship any radioactive material during 2005-2006; therefore, the transportation program area was not reviewed during the inspection.

1.2 Observations and Findings

Since the previous inspection, the licensee transferred all remaining SNM from NRC License SNM-696 to either its State of California License No. 0145-07 or its two NRC research and test reactor licenses R-38 and R-67. The remaining historical fuel samples and a calibration standard were transferred to the State of California license, while two irradiated fuel element sections were transferred to the NRC research and test reactor licenses. The licensee maintained records of the transfers on NRC Form 741, Nuclear Material Transaction Reports, and Form 742, Material Balance Reports. In addition, all residual radioactive material previously possessed under the SNM license has been disposed.

A tour was conducted in the building areas where the licensee continued to store the remaining SNM. The building was posted as a radiologically restricted area. Area fences, building door locks, and electronic security features were in place. Radiological postings were present in and around the building. The inspectors noted that the licensee continued to maintain five criticality alarms in the building. Two alarms had been removed from service since the previous inspection, because the licensee permanently discontinued storage of radioactive material in these two areas. The five remaining alarms were tested monthly.

1.3 Conclusions

The licensee had transferred all remaining SNM to one of three licenses, its State of California byproduct material license or its two NRC research and test reactor licenses. The licensee maintained records of these transfers.

2 Management Organization and Controls (88005)

2.1 Inspection Scope

The inspectors reviewed organization and staffing changes, internal audits, safety committee activities, and quality assurance requirements.

2.2 Observations and Findings

The site organization is described in Part II, Section 3, "Organization and Administrative Procedures," of the license and Sections 4.1 and 4.2 of the Site Decommissioning Plan. The licensee continues to maintain a licensing, safety and nuclear compliance organization. Since the previous inspection, the licensee notified the NRC of a change in vice presidents. The NRC approved the change by License Amendment 86 dated August 29, 2006. All management level positions were filled with qualified individuals at the time of the inspection. Radiation protection staffing included five full time and two part time employees. The staffing was determined to be sufficient to ensure compliance with license requirements.

License Condition S-5 specifies the requirements for the Criticality and Radiation Safety Committee (CRSC). The CRSC annual audit for 2006 was reviewed during the inspection. As documented in the audit, one radiological safety event was identified and investigated by the licensee during 2006. Specifically, during November 2006, a State-licensed radioactive check source shifted position in its package during transit, resulting in changes in surface dose rates. The CRSC audited the incident and was satisfied with the licensee's internal investigation. In summary, the CRSC continued to function as stipulated by the license.

A quality assurance audit of health physics activities was conducted in July 2006. Three audit findings were identified, corrected and closed. Further, the annual health physics program review was conducted in December 2006, as required by 10 CFR 20.1101(c). No significant findings were identified during this annual program review. The annual program review was thorough and provided relevant information.

2.3 Conclusions

The licensee's organization was consistent with the license and the NRC-approved Site Decommissioning Plan. The licensee continued to conduct internal reviews and audits. The licensee conducted audits that were comprehensive and met the requirements of the license and regulations.

3 Radiation Protection (83822)

3.1 Inspection Scope

The purpose of this portion of the inspection was to determine whether the licensee had implemented its radiation protection program in accordance with regulatory requirements and license conditions.

3.2 Observations and Findings

Occupational exposures were reviewed to ensure that no individual had exceeded the regulatory limits provided in 10 CFR Part 20. The licensee monitored individuals for external exposures only using thermo-luminescent dosimeters. Monitoring of internal exposures had been previously discontinued as allowed by 10 CFR 20.1502 because internal exposures were consistently below 10-percent of the applicable limits. The licensee's occupational exposure records for calendar year 2006 were reviewed. No measurable dose was recorded for individuals working under NRC License SNM-696.

License Conditions S-7 and S-8 as well as the Site Decommissioning Plan provide the training requirements. The inspectors examined the licensee's training records. The licensee presented 38 classes to 267 attendees during 2006. The training included general radiological training, radiation refresher training, and radiation contingency plan training. The licensee maintained a spreadsheet of training for site workers which tracked the completion and due dates for all required training.

3.3 Conclusions

The licensee's records indicate that no individual exceeded the regulatory limits for occupational exposures. Radiation safety training had been implemented in accordance with license requirements.

4 **Emergency Preparedness and Fire Protection (88050, 88055)**

4.1 Inspection Scope

The licensee's emergency preparedness and fire protection programs were reviewed for compliance with license requirements.

4.2 Observations and Findings

The Radiological Contingency Plan constitutes the emergency plan as required by 10 CFR 70.32(i). The Plan was revised on July 26, 2006, to reflect changes in the management organization and to update the names, telephone numbers, and facility descriptions. This revision was incorporated through the issuance of Amendment 86 to the license. Training for individuals designated as part of the emergency response team were current at the time of the inspection.

The licensee's fire protection program was also reviewed. In addition, a random selection of fire extinguishers in areas potentially containing radioactive material were inspected by the NRC inspectors and were found to be in proper working order. The licensee complied with the fire protection program requirements.

4.3 Conclusions

The licensee had an emergency preparedness program, including fire protection, that met the commitments of the Radiological Contingency Plan.

5 **Maintenance and Surveillance Testing (88025)**

5.1 Inspection Scope

The licensee's methods for controlling and testing radiation survey instruments were reviewed.

5.2 Observations and Findings

Regulation 10 CFR 70.38(j)(2)(ii) states that a licensee is required to specify the survey instruments used as part of the final survey and to certify that each instrument is properly

calibrated and tested. To verify compliance with this regulatory requirement, the inspectors interviewed selected individuals responsible for the testing, calibration, and use of radiation survey instruments. The inspectors also reviewed calibration records for selected survey instruments that were used during the performance of the final status survey. The instruments were found to be within their respective calibration intervals during the final status surveys.

The licensee was authorized through its State of California license to conduct instrument calibrations. The licensee maintained records of calibrations conducted on the radioactive source used for instrument calibrations. The calibration source was checked by independent contractors using instruments with traceability to the National Institute for Standards and Technology. The licensee's calibration program included evaluating the as-found condition of the final survey instruments when returned for calibration. This practice provided confidence that instruments were responding appropriately when used during the final status surveys.

At the entry/exit of Building 21, the inspectors observed that the "hand and foot" monitor with frisker used to evaluate possible personnel contamination did not appear to be functional. Specifically, the analog gauges were indicating less than zero count rates. Subsequent testing by NRC and licensee personnel with radiation check sources confirmed that the instrument was not responding to radioactivity as expected. Immediately after the onsite inspection, the licensee permanently removed the hand and foot monitor from service, because the licensee determined that it was no longer necessary.

Additionally, the inspectors noted that an Eberline RM-14 survey instrument with a thin window Geiger-Muller detector in the adjacent soils laboratory in Building 21 also appeared to be non-functional. This meter was being used to frisk and free-release hand-held items from Building 21. When exposed to a check source, the instrument failed to respond and to alarm as expected. As a result, the licensee declared this instrument inoperable and removed it from service prior to the conclusion of the onsite inspection. The licensee later determined that the meter was inoperable because of insufficient internal power caused by a defective rechargeable battery. The meter was subsequently repaired and returned to service.

Regulation 10 CFR 20.1501 requires each licensee to make, or cause to be made, surveys that may be necessary for the licensee to comply with the regulations in Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present. Pursuant to 10 CFR 20.1003, *survey* means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

Contrary to the above, the licensee did not make, or cause to be made, surveys to assure compliance with 10 CFR 20.1501, (VIO 070-00734/0701-01). Specifically, on February 28, 2007, two survey meters located at the exit to Building 21 were found to be inoperable: (1) a hand and foot monitor with frisker which was used to monitor people leaving Building 21, and (2) a RM-14 frisker which was used to survey hand-held items being released from Building 21. Building 21 was classified as a restricted area pursuant to

10 CFR 20.1003. As a result, the licensee was unable to make, or cause to be made, surveys to evaluate radiation levels on people and equipment being released from the building.

At the time of the inspection, the licensee's procedures did not specifically require the performance of daily functional tests as recommended in ANSI Standard N323A-1997, "Radiation Protection Instrumentation Test and Calibration." The health physics technician supporting the inspectors stated that he had not conducted performance checks on these instruments during the days that the inspectors had performed inspection activities in Building 21. Therefore, a contributing cause to the violation was the licensee's failure to conduct performance checks of the meters with a radiation source prior to use.

When these instrument operability problems were brought to the attention of the radiation safety officer, she promptly initiated corrective actions including a review of in-service equipment for operability, review of the need for the hand and foot monitor, and issuance of a Health Physics Report of Radiological Safety Condition. The immediate corrective actions included repair of the RM-14 frisker and permanent removal of the hand and foot monitor from service. Further, the licensee began source checking site meters to verify operability. One additional meter was identified with a defective cable in a laboratory using state-licensed radioactive material.

The licensee believed that the failure to have functional survey meters at the exit of Building 21 was not safety significant because the building had been decontaminated. There was little potential for contamination of people and hand-held equipment. Further, the remaining sources of radioactivity were sealed or secured from removal.

Actions planned to prevent recurrence of the violation include updating the maintenance procedure for RM-14 friskers and reviewing site procedures. The licensee will review site procedures, in part, to determine the need for response testing using dedicated check sources attached to each survey meter. The implementation of the instrumentation checks and procedure reviews will be verified through the licensee's corrective action program.

5.3 Conclusions

The NRC identified one hand and foot monitor with frisker and one survey meter that were inoperable. The failure of the licensee to make, or cause to be made, surveys of people and equipment leaving Building 21 was identified as a violation of regulatory requirements.

6 Environmental Protection (88045)

6.1 Inspection Scope

The licensee's environmental monitoring program was reviewed to determine compliance with the Site Decommissioning Plan and applicable regulations.

6.2 Observations and Findings

The environmental monitoring program consists of airborne effluent monitoring and sewage sampling. During 2006, airborne effluents were released from two NRC-licensed locations, the non-power reactor rooms and the health physics laboratory. Air samples were collected

weekly and analyzed for gross alpha and beta activity as well as iodine and mixed fission products. The inspectors compared the air sample results to the licensee's alert (action) levels. No sample result exceeded the respective alpha, beta or gamma alert levels. The air sampling data was reported to the NRC in semi-annual reports dated August 18, 2006, and February 5, 2007.

During the inspection, the inspectors observed that the semi-annual report submitted on February 5, 2007, did not include the supporting information for the airborne effluent sample results. The licensee submitted a revised report which included the required information on February 28, 2007, in accordance with the requirements of 10 CFR 70.59. The revised report was submitted within the deadline established in regulations.

Section 6.1 of the license application states that the licensee will estimate the dose from airborne radioactive emissions to the closest member of the public. Doses greater than 10 millirems per year are reportable to the NRC in accordance with 10 CFR 20.1101(d). The licensee conducted the assessment for 2006 during February 2007. Using the Environmental Protection Agency's computer code COMPLY, version 1.2, the licensee estimated doses from two sources at three nearest resident locations. The highest estimated dose for calendar year 2006 was 0.032 millirems per year at the property fence-line. This calculated dose was well below the reportability limit of 10 millirems per year.

There were no liquid effluent releases during calendar year 2006, therefore, this program area was not reviewed.

The licensee evaluated the doses received by members of the public using environmental monitoring dosimeters located along the restricted area fences and in buildings occupied by tenants, and from the estimated airborne doses described above. All evaluated doses were well below the public dose limits specified in 10 CFR 20.1301 and 10 CFR 20.1302.

6.3 Conclusions

The licensee implemented an environmental and effluent monitoring program as required by the license. All samples were collected, and no regulatory limit was exceeded. The doses to members of the public were below regulatory and reportability limits.

7 **Closeout Inspection and Survey (83890)**

7.1 Inspection Scope

The purpose of this portion of the inspection was to verify if the site had been decontaminated to acceptable radiological levels for unrestricted use and to ensure that the final survey had been performed as approved in the Site Decommissioning Plan.

7.2 Observations and Findings

At the time of the inspection, four areas had been final surveyed by the licensee but had not been free-released by either the NRC or the State of California. The areas included portions of Building 21, Phases IV and V of Buildings 30 and 31, the L-307 tank pit area, and the pneumatic "rabbit tube." During the inspection, NRC inspectors conducted confirmatory

surveys in Building 21, Phases IV/V of Buildings 30/31, and the L-307 tank pit area. The surveys consisted of measurement of ambient gamma exposure rates, measurement of surface radioactivity levels, collection of swipe samples for removable contamination, and collection of soil samples for laboratory analysis. The swipe and soil samples were submitted to Oak Ridge Institute for Science and Education (ORISE) for analysis on behalf of the NRC. Based on previous site studies, the radionuclides of concern include cobalt-60, cesium-137, uranium-235 and thorium.

After the conclusion of the onsite inspection, the licensee submitted a final status survey report for the pneumatic "rabbit tube" to the NRC by letter dated March 6, 2007. The rabbit tube was an underground metal tube that was used to pneumatically transfer radioisotopes in sealed containers between buildings. The licensee requested that the rabbit tube be free released because only short-lived radioisotopes had been transferred through the tube. The rabbit tube was not final surveyed by NRC during the inspection, in part, because it was not accessible.

a. Building 21

A confirmatory survey was conducted in the interior and exterior portions of the non-reactor portions of Building 21. The licensee had previously requested the release of these areas by letter to the NRC dated November 20, 2006. Many of the rooms within Building 21 had previously served as laboratories, storage rooms, and offices. The non-reactor portions of the building consisted of 336 square meters (m²) of interior floor space and 1700 m² of outdoor land area. The reactor portion of Building 21 contains the research and test reactor areas and is expected to be decommissioned and final surveyed by the licensee at a later date.

Ambient gamma radiation exposure rates were measured using a Ludlum Model 19 microRoentgen meter (NRC No. 015518, calibration due date of 12/11/07). The measured exposure rates were compared to the NRC-approved acceptance criteria of 10 microRoentgens per hour ($\mu\text{R/hr}$) above background as specified in Section 6.2.1 of the Site Decommissioning Plan. Ambient gamma radiation exposure rates were also measured using a Ludlum Model 18 count rate meter (NRC No. 012778, calibration due date of 11/06/07) coupled to a sodium-iodide SPA-3 scintillation detector. This meter was used to locate potentially elevated concentrations of radioactive material for further review and sampling.

The inspectors conducted confirmatory surveys for beta and alpha particulate contamination on concrete, cinder-block, and metal surfaces using two Eberline E600 survey meters (NRC No. 079977, calibration due date of 09/15/07 and NRC No. 063473, calibration due date of 11/21/07) with SHP380AB alpha-beta probes. The surface surveys included both scan surveys and fixed point measurements. Scan surveys were conducted to locate areas of potential elevated contamination, and fixed point measurements were collected for comparison to the release criteria limits. Swipe surveys were also collected at select locations for measurement of removable contamination levels. The sample results were compared to the NRC-approved release criteria for surfaces provided in Table 6-1, "Acceptable Surface Contamination Levels," of the Site Decommissioning Plan.

Prior to conducting the confirmatory survey, the inspectors collected background measurements inside and outside of Building 13. These areas had not been impacted by previous operations involving radioactive material. Inside the building's service corridor, background measurements were collected on cinder block, concrete, and metal surfaces. Outside of the building, background measurements were collected on concrete, cinder-block, asphalt, and metal surfaces. The background measurements were averaged, and survey meter lower limits of detection were calculated.

The inspectors conducted ambient gamma exposure rate measurements inside and outside of Building 21. With a background measurement of 11-23 $\mu\text{R/hr}$, three locations exceeded the release criteria limit of 10 $\mu\text{R/hr}$ above background. Two of the three measurements (36 and 38 $\mu\text{R/hr}$) were identified inside of the former Mark III reactor pit, while the third (50 $\mu\text{R/hr}$) was located outdoors adjacent to a location where licensed radioactive material was being stored.

The two elevated sample results inside the reactor pit were attributed to close proximity to naturally radioactive concrete because fixed and removable radioactive contamination was not identified in these areas. The third elevated exposure rate was attributed to radioactive "shine" from radioactive material being stored in an adjacent radiologically restricted area. Similar to the reactor pit, no radioactive contamination was identified in this area of the site. A licensee representative confirmed that the radioactive material had been moved within the building's restricted area to this general location since the performance of the final survey.

The inspectors conducted limited scans and fixed point surveys for measurement of total (fixed and removable) contamination. The inspectors collected 114 fixed point measurements inside of the building and 45 measurements outside of the building. Most measurements fell within the lower limits of detection of the instruments.

The highest fixed point alpha sample result was identified on cinder-blocks in the fenced-in area of the outside portion of Building 21. This sample result was 73 disintegrations per minute per 100-square centimeters (dpm/100 cm^2). This measurement was well below the average acceptable surface alpha contamination level of 5,000 dpm/100 cm^2 as specified in Table 6-1. The highest fixed point beta-gamma sample result was identified on the concrete floor in former laboratory and storage Room 112. This sample result was 6,252 dpm/100 cm^2 . This measurement was below the maximum acceptable surface beta-gamma contamination level of 15,000 dpm/100 cm^2 as specified in Table 6-1. In summary, neither the highest alpha sample result nor the highest beta-gamma sample result exceeded the respective limit.

Five swipe samples were collected for measurement of gross alpha and beta contamination levels. The swiped areas were approximately 12-inches in length, an area equivalent to 100 cm^2 . The swipe samples were submitted to ORISE for gross alpha and gross beta analysis. All sample results were less than the removable contamination limit of 1,000 dpm/100 cm^2 as provided in Table 6-1.

The inspectors also collected four soil samples, three from inside of Building 21 and one from outside of the building. The soil samples were submitted to ORISE for gamma spectroscopic analysis. The sample results, in units of picocuries per gram (pCi/g), are presented in Table 1.

Table 1: Building 21 Split Sample Results

Sample Location	NRC's Sample Results (pCi/g)		Licensee's Sample Results (pCi/g)	
NRC-1 Room 113	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	0.01 ± 0.03 0.04 ± 0.03 0.05 ± 0.09 0.96 ± 0.55 0.93 ± 0.07 0.97 ± 0.15	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	Not Detected Not Detected 0.16 ± 0.10 Not Detected 0.88 ± 0.20 1.62 ± 0.43
NRC-2 Room 114	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	-0.01 ± 0.03 0.33 ± 0.04 0.17 ± 0.15 1.20 ± 0.65 0.97 ± 0.08 0.89 ± 0.20	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	Not Detected 0.29 ± 0.09 0.09 ± 0.08 Not Detected 0.99 ± 0.20 1.40 ± 0.35
NRC-3 Room 109/110	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	0.26 ± 0.04 1.17 ± 0.07 0.04 ± 0.07 1.11 ± 0.43 0.67 ± 0.06 0.70 ± 0.12	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	0.32 ± 0.09 1.08 ± 0.16 Not Detected 1.11 ± 1.01 0.41 ± 0.11 1.07 ± 0.32
NRC-4 Fenced-in area outside of Building 21	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	-0.01 ± 0.03 0.01 ± 0.02 0.04 ± 0.09 0.78 ± 0.52 0.84 ± 0.07 1.07 ± 0.17	cobalt-60 cesium-137 uranium-235 uranium-238* thorium-228* thorium-232*	Not Detected Not Detected 0.12 ± 0.95 Not Detected 1.01 ± 0.24 1.60 ± 0.47

* Selected uranium and thorium concentrations were quantified using surrogate radionuclides: uranium-238 by thorium-234; thorium-228 by lead-212; and thorium-232 by actinium-228.

The sample results were compared to the NRC-approved release criteria provided in Table 6-2, "Soil and Concrete/Asphalt Rubble Release Criteria," of the Site Decommissioning Plan. All sample results were less than the respective limits provided in Table 6-2. The sample results were comparable to the background levels provided in 6.2.2 of the Site Decommissioning Plan. Further, the NRC's and licensee's sample results were comparable, suggesting that the licensee was capable of accurately detecting and quantifying radioactive material in soil samples.

b. Tank L-307 Pit Site

Tank L-307 was used by the licensee from about 1955-1980 for storage of waste water discharged from several laboratories located in Building 2. The tank was decommissioned during 1984. During 2003, the licensee conducted core sampling in the area of the tank to characterize the surface and subsurface soils. The licensee collected a total of 423 soil samples from depths up to 20-feet deep. The results for all samples were less than the

release limits provided in Table 6-2 of the Site Decommissioning Plan. Accordingly, the licensee submitted a request to the NRC by letter dated February 7, 2007, to release the former tank pit site from the license.

A limited confirmatory survey of the former tank area was conducted. The survey consisted of ambient gamma exposure rate measurements and split soil sampling. The confirmatory survey was limited in scope because any remaining contamination was situated below ground surface where the subsurface tank had been previously located. The location had since been backfilled by the licensee.

The ambient gamma exposure rate survey was conducted using the Ludlum Model 19 microRoentgen meter. The exposure rates ranged from 9-14 $\mu\text{R/hr}$ with a background measurement of 11-23 $\mu\text{R/hr}$ for outdoor areas. The ambient gamma exposure rates were indistinguishable from background levels.

Since collection of soil samples was not practical, the inspectors elected to conduct split sampling with the licensee. The licensee recently disposed of most of the 423 samples, but some samples were retained by the licensee for confirmatory analysis. Two samples were split and shipped to ORISE for analysis by gamma spectroscopy. The two samples were core samples 30R and 16K. The sample results were, in units of pCi/g, are presented in Table 2.

Table 2: Tank L-307 Sample Results

Sample Location	NRC's Sample Results (pCi/g)		Licensee's Sample Results (pCi/g)	
Sample 30R	cobalt-60	0.04 \pm 0.04	cobalt-60	Not Detected
	cesium-137	-0.01 \pm 0.02	cesium-137	Not Detected
	uranium-235	0.04 \pm 0.10	uranium-235	0.25 \pm 0.10
	uranium-238*	1.23 \pm 0.61	uranium-238*	1.28 \pm 1.54
	thorium-228*	1.57 \pm 0.11	thorium-228*	2.11 \pm 0.35
	thorium-232*	1.74 \pm 0.21	thorium-232*	1.94 \pm 0.38
Sample 16K	cobalt-60	0.03 \pm 0.07	cobalt-60	Not Detected
	cesium-137	2.46 \pm 0.15	cesium-137	2.44 \pm 0.36
	uranium-235	0.12 \pm 0.14	uranium-235	0.16 \pm 0.09
	uranium-238*	1.11 \pm 0.89	uranium-238*	0.54 \pm 1.24
	thorium-228*	1.30 \pm 0.12	thorium-228*	1.69 \pm 0.28
	thorium-232*	1.54 \pm 0.30	thorium-232*	2.38 \pm 0.54

* Selected uranium and thorium concentrations were quantified using surrogate radionuclides: uranium-238 by thorium-234; thorium-228 by lead-212; and thorium-232 by actinium-228.

All sample results were less than the acceptance criteria limits provided in Table 6-2 of the Site Decommissioning Plan. The sample results were comparable to background levels. Further, the NRC's and licensee's sample results were comparable.

c. Phase IV/V Rooms in Buildings 30/31

The inspectors conducted a limited confirmatory survey of Buildings 30 and 31. These structures previously housed the linear accelerator facility and two nuclear reactor assemblies. These buildings had been confirmatory surveyed by the State of California, therefore, the NRC confirmatory survey was limited to two rooms that previously housed SNM. Room 118 was

used for storage of fuel casks, while Room 123 housed a small sub-critical nuclear reactor assembly and a small critical assembly.

The NRC's confirmatory surveys consisted of ambient gamma exposure rate surveys and fixed point sampling for total (fixed and removable) surface contamination. The exposure rate surveys ranged from 20-32 $\mu\text{R/hr}$ with a background of 11-23 $\mu\text{R/hr}$. No exposure rate measurement exceeded the acceptance criteria limit of 10 $\mu\text{R/hr}$ above background. The inspectors also conducted six fixed point measurements of alpha and beta particulate radioactivity. The sample results were less than the lower limit of detection of the survey meter. No swipe sample results were collected because surface radioactivity was not identified in these two rooms.

7.3 Conclusions

The inspectors conducted confirmatory surveys of the non-reactor portions of Building 21, the former Tank L-307 pit area, and portions of Buildings 30/31. The survey results were below the NRC-approved release criteria provided in the Site Decommissioning Plan, supporting the licensee's conclusion that the areas had been effectively remediated.

8 Exit Meeting Summary

The inspectors presented the inspection results to the licensee at the exit meeting on March 1, 2007. A final telephonic exit briefing was held with the radiation safety officer on April 25, 2007, following receipt of swipe and soil sample results on April 3, 2007. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

K. Asmussen, Director, Licensing Safety and Nuclear Compliance
L. Gonzales, Radiation Safety Officer/Health Physics Manager
J. Greenwood, Decommissioning Project Manager
M. Monreal, Calibration Laboratory Coordinator
I. Cruz, Health Physics Senior Scientist
S. Cowan, Health Physics Technician
W. Stout, Limited Senior Reactor Operator

INSPECTION PROCEDURES USED

IP 87104	Decommissioning Inspection Procedure for Materials Licensees
IP 88005	Management Organization and Controls
IP 83822	Radiation Protection
IP 83890	Closeout Inspection and Survey
IP 88055	Fire Protection
IP 88025	Maintenance and Surveillance Testing
IP 84850	Radioactive Waste Management - Waste Generator Requirements
IP 84900	Low-Level Radioactive Waste Storage
IP 86740	Inspection of Transportation Activities
IP 88045	Environmental Protection
IP 88050	Emergency Preparedness

ITEMS OPENED, CLOSED, AND DISCUSSED

Open

070-00734/0701-01 VIO Failure to make or cause to be made surveys to assure compliance with 10 CFR 20.1501

Closed

None

Discussed

None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
CRSC	Criticality and Radiation Safety Committee
IP	NRC Inspection Procedure
ORISE	Oak Ridge Institute for Science and Education
SNM	special nuclear material
NOTICE	Notice of Violation