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

January 31, 2008

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

SUBJECT: NRC INSPECTION REPORT 070-00734/07-002

Dear Ms. Engstrom:

This refers to the inspection conducted on November 26, 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 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 members of your staff at the conclusion of the onsite inspection. Following the receipt of NRC's soil sample results, a final telephonic exit briefing was held with Ms. Laura Gonzales on January 25, 2007.

The inspection included a confirmatory survey of drain lines located beneath Building 30/31. The confirmatory survey included measurement of ambient gamma radiation exposure rates, measurement of fixed radiological contamination levels, collection of soil samples, and collection of swipe samples for measurement of removable radiological contamination. All survey results were below the NRC-approved release criteria suggesting that the drain lines had been effectively remediated.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," 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 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) 860-8197.

Sincerely,

***//RA//***

Jack E. Whitten, Chief
Nuclear Materials Safety Branch B

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

Enclosure:
NRC Inspection Report 070-00734/07-002

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

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|---|---|
| Docket No.: | 070-00734 |
| License No.: | SNM-696 |
| Report No.: | 070-00734/07-002 |
| Licensee: | General Atomics |
| Location: | 3550 General Atomics Court<br>San Diego, California 92121 |
| Date: | November 26, 2007 |
| Inspectors: | Robert Evans, PE, CHP, Senior Health Physicist<br>Nuclear Materials Safety Branch B |
| | Janine F. Katanic, PhD, Health Physicist<br>Nuclear Materials Safety Branch B |
| Approved by: | Jack E. Whitten, Chief<br>Nuclear Materials Safety Branch B |
| Attachment: | Supplemental Inspection Information |

## EXECUTIVE SUMMARY

General Atomics
NRC Inspection Report 070-00734/07-002

This non-routine, announced inspection focused on decommissioning activities including closeout inspection and survey and followup of a previous inspection finding. Overall, the licensee was conducting site activities in accordance with the requirements of the license and the Site Decommissioning Plan.

Closeout Inspection and Survey

- The inspectors conducted confirmatory surveys of the accessible portions of the drain line underneath Nuclear Calibration Laboratory Room 31-101. 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 (Section 1).

Followup

- During a previous inspection, the NRC identified a violation involving the licensee's failure to make, or cause to be made, surveys that may be necessary for compliance with the regulations in 10 CFR Part 20. At the time of the onsite inspection, the corrective actions were not complete. By Memorandum dated January 16, 2008, the licensee's radiation safety officer stated that all remaining corrective actions had been completed. This violation remains open pending verification of the completion of the licensee's corrective actions (Section 2).

## Report Details

Summary of Plant Status

At the time of the inspection, most areas of the site had been remediated and final surveyed. Decommissioning work was being conducted in selected areas as necessary. The licensee previously transferred the remainder of its special nuclear material (SNM) from NRC Materials License No. SNM-696 to its State of California or NRC research and test reactor licenses. The licensee continues to possess SNM and byproduct material under its other licenses.

### 1 Closeout Inspection and Survey (83890)

1.1 Inspection Scope

The purpose of this portion of the inspection effort was to verify if certain locations on the site had been decontaminated to acceptable radiological levels for unrestricted use and to ensure that final surveys have been performed in accordance with Site Decommissioning Plan requirements.

1.2 Observations and Findings

The inspectors conducted a confirmatory survey of underground drain lines located beneath the Nuclear Calibration Laboratory, Room 31-101. The drain lines originally traversed from the High Temperature Gas Reactor Critical Experiment Facility (Room 31-103) and Room 31-102A, which housed sinks and a decontamination shower, to an underground liquid radioactive waste tank. The tank, previously located outside of Building 30/31, was permanently removed in 1984. At that time, the drain lines leading to the tank were left in place.

Portions of the drain lines underneath Rooms 31-102 and 31-102A were removed during 2004. The final status survey results for these areas were documented in the licensee's letter to the State of California dated November 30, 2005. The licensee's final status survey sampling for those areas consisted of collection of four excavated trench soil samples and measurement of the ambient gamma radiation levels. Based on the licensee's documentation, the inspectors confirmed that these sample results were below the NRC-approved release criteria.

The licensee commenced decommissioning of the accessible portions of the remaining drain lines during October 2007. The licensee excavated about 20 feet of piping inside of Rooms 31-101/102 and about 20 feet of piping outside of Building 30/31. The licensee elected to leave portions of the drain line in place, in part, because the lines were located beneath a room that was still in use. Room 31-101 continues to be used as a nuclear calibration laboratory under the licensee's State of California license. The portion of the drain lines left in place were estimated to be approximately 40 feet in length.

The licensee conducted decontamination activities on the portions of the drain lines that were left in place and conducted a final status survey. The results of the licensee's final

status survey were presented in a letter to the NRC dated December 20, 2007. The final status survey results were below the NRC's approved release criteria, and the licensee requested authorization to free-release and to abandon the drain lines in place. At the close of the inspection period, the NRC had not formally responded to the licensee's letter.

The inspectors conducted confirmatory surveys of the accessible portions of the drain lines that were left in place. The three areas surveyed were the top drain area in Room 31-103, the excavated pit inside of Room 31-101, and the low point drain line located outside of Building 30/31. Prior to performance of the confirmatory survey, the inspectors conducted background measurements inside and outside of Building 13, a building that had not been impacted by previous operations involving radioactive material. The instrumentation used during the survey is listed in the Attachment to this Inspection Report. The confirmatory survey consisted of:

- Measurement of ambient gamma exposure rates at each accessible location

- Measurement of surface contamination around the upper drain line in Room 31-103

- Collection of three swipe samples for removable contamination, one each from the three accessible drain pipe openings, including the accessible interiors of the pipes.

- Collection of two soil samples–one from the excavated pit in Room 31-101 and the second from the low point drain in the outdoor trench

The two soil samples and the three swipe samples were submitted to the NRC's contractor, Oak Ridge Institute for Science and Education (ORISE), for analysis.

License Condition S-1 refers to the NRC-approved Site Decommissioning Plan which provides the acceptance criteria for decommissioning. The acceptance criteria includes limits for outdoor ambient gamma exposure rates, soil concentration limits, and surface contamination levels. The confirmatory sample results were compared to the limits provided in the decommissioning plan. As described below, all confirmatory sample results were less than the acceptance criteria limits.

The inspectors conducted ambient gamma radiation level measurements in the three areas where the drain lines were accessible. The indoor and outdoor background exposure rates were approximately 16 µR/hr. The upper drain point, located in Room 31-103, measured between 26-28 µR/hr. The excavated pit in Room 31-101 measured between 24-34 µR/hr. This location contained a shielded calibration source which may have impacted the ambient gamma exposure rates. Finally, the lower drain point, located in the outdoor trench, measured between 22-28 µR/hr. The Site Decommissioning Plan specifies that the outdoor exposure rates are not to exceed 20 µR/hr above background over any discrete area. None of the exposure rate readings exceeded the limit of 20 µR/hr above background, or 36 µR/hr.

Surface radiological contamination measurements were collected on concrete in the upper drain point area in Room 31-103. The inspectors conducted both alpha and beta contamination measurements. With background subtracted and efficiency taken into consideration, the surface contamination measurements in Room 31-103 ranged from 49-99 dpm/100 $cm^2$ for alpha, and 763-2,303 dpm/100 $cm^2$ for beta contamination. These values were below the Site Decommissioning Plan limits for average (5,000 dpm/100 $cm^2$) and maximum (15,000 dpm/100 $cm^2$) surface contamination.

Swipe samples were collected at each of the three accessible drain line openings for the determination of removable radiological contamination. The three swipe samples were submitted to ORISE for analysis of removable gross alpha and gross beta contamination. The sample results confirmed that the contamination levels in the swipe samples were less than the removable release criteria of 1,000 dpm per swipe for both alpha and beta contamination.

Finally, two soil samples were collected and submitted to ORISE for gamma spectroscopy analysis. The soil sample results were:

**Table: Drain Line Soil Sample Results**

| Sample Location | Radioisotope of Interest | Sample Results (pCi/g) |
|---|---|---|
| NRC-Soil 1<br>Middle Drain Point<br>(in Lab) | cobalt-60<br>cesium-137<br>uranium-235<br>uranium-238*<br>thorium-228*<br>thorium-232* | -0.03 ± 0.03<br>0.02 ± 0.02<br>0.12 ± 0.14<br>2.06 ± 0.82<br>0.99 ± 0.08<br>1.04 ± 0.17 |
| NRC-Soil 2<br>End Drain Point<br>(in Trench) | cobalt-60<br>cesium-137<br>uranium-235<br>uranium-238*<br>thorium-228*<br>thorium-232* | 0.01 ± 0.03<br>0.84 ± 0.07<br>0.18 ± 0.12<br>1.15 ± 0.51<br>1.13 ± 0.09<br>1.26 ± 0.23 |

* 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 limits provided in Table 6-2, "Soil and Concrete/Asphalt Rubble Release Criteria," of the Site Decommissioning Plan. All soil sample results were below the limits specified in Table 6-2. In addition, the sample results were comparable to background levels that have been approved for the site.

1.3 Conclusions

The inspectors conducted confirmatory surveys of the accessible portions of the drain line underneath Room 31-101. 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.

## 2 Followup (83822)

2.1 (Discussed) Violation 070-00734/0701-01: Failure to make or cause to be made surveys to assure compliance with 10 CFR 20.1501

During the February 26-March 1, 2007, inspection, the NRC identified a violation involving the licensee's failure to make, or cause to be made, surveys that may be necessary for compliance with the regulations in 10 CFR Part 20. Specifically, pieces of radiological survey equipment in Building 21 were found to be non-functional. One piece of equipment had been used to survey personnel for radiological contamination and the other had been used for free-release of items from Building 21. The licensee issued a Health Physics Report of Radiological Safety Condition dated March 16, 2007, which addressed its corrective actions.

Immediate corrective actions included removing the inoperable equipment from service and functional testing of all remaining equipment. One additional piece of equipment (out of 42 that were function-tested) was found to be inoperable due to a faulty cable. Long term corrective actions included the revision of site procedures and installation of check sources on about 50 survey meters.

At the time of the November 26, 2007, onsite inspection, the corrective actions were not complete. All check sources had not been installed on the meters, and all the site procedures had not been updated. By Memorandum dated January 16, 2008, the licensee's radiation safety officer certified that all remaining corrective actions had been completed. This violation remains open pending verification of the completion of the licensee's corrective actions.

## 3 Exit Meeting Summary

The inspectors presented the inspection results to the licensee at the preliminary exit briefing on November 26, 2007. A final telephonic exit briefing was held with the radiation safety officer on January 25, 2008, following receipt of swipe and soil sample results on December 14, 2007. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.

SUPPLEMENTAL INSPECTION 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
S. Cowan, Health Physics Technician

## INSPECTION PROCEDURES USED

| | |
|---|---|
| IP 83822 | Radiation Protection |
| IP 83890 | Closeout Inspection and Survey |

## ITEMS OPENED, CLOSED, AND DISCUSSED

Open

None

Closed

None

Discussed

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

## LIST OF ACRONYMS AND ABBREVIATIONS USED

| | |
|---|---|
| dpm | disintegrations per minute |
| dpm/100 $cm^2$ | disintegrations per minute per 100-square centimeters |
| IP | NRC Inspection Procedure |
| µR/hr | micro-Roentgen per hour |
| ORISE | Oak Ridge Institute for Science and Education\ |
| pCi/g | picocuries per gram |
| SNM | special nuclear material |

## Radiological Survey Instrumentation Used

Ludlum Model 19 MicroRoentgen Meter, Serial No. 33532, NRC No. 015546, calibration due date of February 12, 2008 (calibrated to radium-226)

Eberline E600 count rate meter with SHP380AB alpha-beta probe, Serial No. 2463, NRC No. 079977, calibration due date of September 25, 2008