



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

November 16, 2012

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

SUBJECT: NRC INSPECTION REPORT 050-00089/2012001, 050-00163/2012001,
070-00754/2012001

Dear Ms. Engstrom:

This letter refers to the inspection conducted on October 16-18, 2012, at the General Atomics facilities located 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. The inspection results were presented to your staff at the conclusion of the onsite inspection. The enclosed report presents the results of this inspection. In summary, the inspectors determined that you were conducting activities in accordance with license and regulatory requirements.

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's Web site at <http://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 Dr. Gerald Schlapper, Health Physicist, at 817-200-1273 or the undersigned at 817-200-1191.

Sincerely,

/RA/

D. Blair Spitzberg, PhD, Chief
Repository and Spent Fuel Safety Branch

Docket: 070-00734, 050-00089, 050-00163
License: SNM-696, R-38, R-67

Enclosure:

NRC Inspection Report 050-00089/2012001,
050-00163/2012001,070-00754/2012001

cc w/enclosure:

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 50-89, 50-163, 70-734

License: R-38, R-67, SNM-696

Report: 050-00089/2012-001, 050-00163/2012-001, 070-00734/2012-001

Licensee: General Atomics

Facility: TRIGA Mark I, TRIGA Mark F, Torrey Pines Main Site

Location: 3550 General Atomics Court
San Diego, California 92121

Dates: October 16-18, 2012

Inspector: Gerald Schlapper, CHP, PhD, Health Physicist
Repository and Spent Fuel Safety Branch

Approved By: D. Blair Spitzberg, PhD, Chief
Repository and Spent Fuel Safety Branch

Attachment: Supplemental Inspection Information

Enclosure

EXECUTIVE SUMMARY

General Atomics

NRC Inspection Report 050-0089/2012001, 050-0163/2012001, 070-0734/2012001

This inspection was a routine, announced inspection of licensed activities being conducted at the General Atomics Center, San Diego, CA.

Management Organization and Controls

- The licensee was providing oversight and control of site activities in accordance with license and procedure requirements (Section 1).

Radiation Protection

- The licensee implemented its radiation protection program in accordance with license and regulatory requirements. The licensee monitored workers for occupational exposures, and no individual exceeded the regulatory limits during the period examined (Section 2).
- The licensee determined that the maximum dose for non-radiation workers within site structures was below the regulatory limit of 100 millirem per year (Section 2).

Status of Decommissioning

- The licensee implemented decommissioning activities in accordance with license and regulatory requirements (Section 3).

Maintenance and Surveillance Testing

- The licensee maintained an adequate instrument inventory to support operations and conducted instrumentation calibrations in accordance with license requirements. Site capability for personal contamination monitoring was noted to be adequate. (Section 4).

Effluent Control and Environmental Protection

- The licensee implemented its effluent and environmental monitoring programs in accordance with license and regulatory requirements. All required samples were collected, and no sample result exceeded any license or regulatory limit. Required semiannual effluent reports were submitted in a timely manner (Section 5).

REPORT DETAILS

Summary of Plant Status

The main General Atomics campus is located on an approximately 120-acre site in San Diego, California. Located on the campus are engineering and test facilities, manufacturing installations, and laboratories. There are two reactor facilities currently undergoing decommissioning. By application dated November 16, 1957, the licensee was issued License R-38 for the TRIGA Mark I reactor. This reactor was originally licensed to operate at a power level of 10 kilowatts but was later upgraded to operate to a steady-state power of 250 kilowatts. The reactor had the capability to be pulsed to a power of over 1000 Megawatts. This original TRIGA operated until it was permanently shutdown on August 4, 1997. In 1960 the TRIGA Mark F reactor was constructed. The Mark F reactor ceased operation on April 11, 1995. General Atomics initiated the decontamination and decommissioning of the TRIGA Reactor Facility after the Mark I reactor was shutdown. The reactors have been dismantled and fuel shipped off-site. The licensee currently possesses the two TRIGA research reactors under possession-only amended Licenses R-38 and R-67.

The licensee began decommissioning of the TRIGA Reactor Facility by transferring all fuel from the Mark I reactor into the fuel storage canals of the Mark F reactor. The Mark I reactor was then dismantled, its pool emptied, the aluminum pool liner removed, and the reactor room and adjoining rooms decontaminated. After some delay, the TRIGA fuel was shipped to an out of state DOE facility in September of 2010 and the licensee commenced active decommissioning of the Mark F facility. The licensee estimates that during 2012 and 2013 major decommissioning activities will be completed to be followed by final status surveys. The NRC will also conduct confirmatory radiological surveys prior to license termination. A final report will be submitted with a goal for approval to release the site for unrestricted use in 2014.

In September 1996, General Atomic's SNM license, SNM-696, was amended to authorize only decommissioning activities. In 2003, the possession limit was lowered to less than critical mass quantities. SNM-696 is currently a possession-only special nuclear materials license. As validated by the inspector based on material transaction reports, all special nuclear material has been transferred from SNM-696 to the applicable State of California license (CAL 0145-37, Amendment 185). The licensee is considering termination of SNM-696 at this time.

1 Management Organization and Controls (88005)

1.1 Inspection Scope

The inspector reviewed the licensee's control and oversight of licensed activities.

1.2 Observations and Findings

The inspector reviewed the organizational structure and discussed the structure with licensee management. The licensee maintains the same structure as noted in the last inspection. All management positions continued to be filled with qualified individuals.

Advice and support of the Licensing, Safety and Nuclear Compliance Department (LSNC) on nuclear and radiation safety matters is supplied by the Compliance and Radiation Safety Working Group (C&RS WG). This working group was previously

known at the Criticality and Radiation Safety Working Group. The name reflects that sufficient material to attain criticality is no longer maintained on-site. The C&RS WG assists the LSNC in the development of policies and procedures and periodically reviews such policies and procedures. The group also conducts audits of activities involving radioactive material and radiation producing machines for conformance to and effectiveness of practices to include implementation of ALARA (as low as is reasonably achievable). The C&RS WG is required to meet as necessary but no less than annually. The inspector reviewed qualifications of individuals serving on this committee and found that they met criteria set for group membership. The inspector also reviewed minutes of committee meetings and determined that meetings were held as necessary, more frequently than the requirement for an annual meeting.

1.3 Conclusion

The licensee was providing oversight and control of site activities in accordance with license and procedure requirements.

2 **Radiation Protection (88030) Training (88010)**

2.1 Inspection Scope

The inspector reviewed the radiation protection program to verify compliance with 10 CFR Part 20 and license requirements.

2.2 Observations and Findings

The inspector reviewed the licensee's occupational exposure records for 2010 and 2012 to ensure that no individual had exceeded the limits specified in 10 CFR 20.1201. The licensee issued 474 badges during 2010. Approximately 60 percent of the employees received no measurable dose in 2010. No employee exceeded a dose of above 250 mrem for the year 2010. During 2010, all spent nuclear fuel located in the TRIGA Building and Mark F pool was packaged and removed from the site. Personnel doses recorded during the fuel movement were low, with a maximum exposure for the job duration of 218 mrem. In 2011, 442 badges were issued and 54 percent received no measurable dose. The highest recorded annual dose was 776 mrem, less than the 5000 mrem limit set in 10 CFR 20.1201. This high exposure was due to work with various activated items stored in the Mark F pool that were being inventoried and characterized for proper packaging and disposal off-site. Exposures were evaluated routinely and doses recorded. The licensee's training program was effective in ensuring radiological safety and the implementation of ALARA. In 2010, the Health Physics Organization conducted 41 training classes with a total of 272 attendees. In 2011, 27 training classes were scheduled with a total attendance of 317 personnel.

The licensee placed dosimeters in buildings occupied by employees in order to assess the maximum dose that could be received by a member of the public who worked at the General Atomics site. Varied locations in the buildings were chosen. Based on review of data supplied for 2010 by the Compliance and Radiation Safety Working Group, the dose to a tenant assumed to be a member of the public who was located in the breezeway outside of Building 2, is less than 12 millirem in a year, well below the site

ALARA goal of 25 mrem in a year and significantly less than the 100 millirem per year limit of 10 CFR 20.1301. The airborne effluent contribution to the annual public dose in 2010 was 0.0017 mrem. Measurements at the same location during 2011 resulted in an estimated dose to the public of less than 10 mrem. The airborne contribution for 2011 was less than 0.002 mrem. All of the above values are consistent with background levels.

Site tours provided the inspector an opportunity to observe that postings and labeling were in compliance with requirements. The inspector also noted that instruments selected for review were all within calibration. Instruments utilized by the licensee were found to be capable of detecting radiation of the type and at the levels expected for the location of usage.

The inspector reviewed selected radiation work permits (RWP) and found them to comply with regulatory requirements. RWPs are written for routine and specific tasks. Those for a specific task expire as the task is completed and the RWP is no longer required. RWPs written for routine tasks expire on a quarterly basis. The inspector noted that the RWPs did include a section addressing lessons learned as part of the closeout of the RWP. The licensee termed this the RWP Safety Effectiveness Evaluation. Clearly noted at the bottom of the form in bold letters was that health physics management should be notified of any problems encountered during performance of work described in the RWP. Of the closed out RWPs that were selected for review, this evaluation was completed in all cases. During site tours, the inspector noted that individuals followed requirements of the applicable RWP and completed adequate surveying of hands and feet after completion of the tour. The inspector also noted correct use of instrumentation for surveys and verified that the instruments used were in calibration and had been source checked as required.

The inspector reviewed documents describing the site response to emergencies. Emergency procedures were readily available and up to date (TRF-EP-01, Rev 25, June 2012). Tabular summaries of primary and secondary response groups to include notification details were reviewed by the inspector and found to be current. Individual records of training reviewed by the inspector indicated that all individuals were current on training requirements. Contact information was posted in the TRIGA Mark F Control Room. Monthly emergency and safety equipment inspections were documented. A visitor register was maintained.

2.3 Conclusions

The licensee implemented its radiation protection program in accordance with license and regulatory requirements since the last inspection. The licensee monitored workers for occupational exposures, and no individual exceeded the regulatory limits for whole-body and extremity doses during the period examined. The licensee determined that the maximum dose for non-radiation workers within site structures was below the regulatory limit of 100 millirem per year for members of the public. Though all fuel has been transferred to DOE and all highly radioactive material shipped for disposal, the licensee had an emergency preparedness plan and procedures that met commitments.

3 Status of Decommissioning (71801)

3.1 Inspection Scope

The inspector reviewed the status of decommissioning.

3.2 Observations and Findings

The long-range schedule for decommissioning and details as to how the process should proceed depend primarily on the extent of soil contamination surrounding the biological shield/pool of the Mark F reactor. The extent of soil contamination will impact the methods of building demolition and soil excavation. Characterization of the soil will require coring through the sides and floor of the Mark F Pool. Removal of radioactive items and water must be completed prior to initiating core sampling.

During decontamination and decommissioning of the TRIGA Reactor Facilities, several items of neutron-activated stainless steel and tantalum metal were identified as low level radioactive waste. These items consist of various reactor core structural and irradiation fixture components which were neutron activated due to their proximity to the reactor core during operation. These irradiated items had been stored in the Mark F pool. During 2010 and 2011, these items were inventoried and radiologically characterized. The licensee employed direct radiation dose rate survey data for Cobalt-60 activity and established facility specific scaling factors for beta emitters (Nickel-63 and Iron-55) to determine isotopic content of each of the stored items in the Mark F pool. Radiation levels at the surface and at various distances were measured during the period from mid-July to mid-September so that these high activity items could be shown to meet the waste acceptance criteria for the disposal and be correctly packaged and shipped. The shipment involved underwater loading of the items into steel capsules, closure of the capsules, transfer of the capsules into DOT 7A Type A certified B-25 boxes equipped with a specially designed cradle and grouting of the interior with concrete. As of September, all contaminated and/or activated hardware had been removed from the Mark F pool and packaged for disposal at the Nevada National Security Site (NNSS).

Removal of the fuel and highly activated items has allowed the licensee to proceed with the removal of water from the Mark F pool. The inspector reviewed how the pool water is being removed. The pool water is removed in 1000-gallon increments. Water is pumped directly from the pool through a 100 micron prefilter into a 1000-gallon capacity process tank. Then the water is transferred from the first tank through an in-line 25-micron filter, through four ion exchange resin cylinders, and through a final 0.45-micron filter into one of two 1000-gallon filtration tanks. The water from the filtration tanks is sampled and analyzed by the Health Physics Laboratory for radiological content. If the analysis shows that the water is satisfactory for unrestricted release, the water from the filtration tank is discharged to the sanitary sewer system as permitted by the City of San Diego Discharge Permit. Analytical results to date indicate that there is no detectable radiological material in the water discharged.

3.3 Conclusions

The licensee conducted decommissioning activities in accordance with regulatory and license requirements.

4 Maintenance and Surveillance Testing of Safety Systems (88025)

4.1 Inspection Scope

The inspector conducted a review of maintenance activities and calibration history of radiation detection instrumentation.

4.2 Observations and Findings

Surveillance and maintenance of the TRIGA Mark I and Mark F reactor facilities is conducted in accordance with requirements outlined in the current reactor license conditions. The inspector reviewed selected logs of required daily, weekly, and monthly maintenance and surveillance activities and noted that activities were performed and recorded as required. Monthly emergency and safety equipment inspections were also conducted as required. Decommissioning of the facility is detailed in the General Atomics TRIGA Reactor Decommissioning Plan, as approved by the USNRC in July 1999 (Document PC-000482/3 and associated licensee procedures). Radiological Work is authorized in Work Authorization 3427, as approved by the LSNC on July 17, 2012, and addresses the planning and execution of tasks, including the handling, packaging, staging, storing, and shipment of low level radioactive waste; filtration, sampling, and analysis and discharge of pool water from the Mark F facility; and future sampling and characterization of the reactor building structures to include core boring of the biological shield and backing soil.

The inspector noted that, at the time of the inspection, approximately 250 instruments that require calibration and maintenance are listed in site inventory. The inspector reviewed the database for instruments due for calibration. There did not appear to be a backlog of instrumentation awaiting action on the part of the instrument technician. The licensee had a sufficient number of calibrated instruments available for use by site workers. The licensee complied with the calibration requirements of 10 CFR 20.1501 by calibrating all instruments on an annual basis. The licensee had continued to ensure its personnel contamination monitoring capability. The inspector verified that preoperational checks, source response checks, and calibration of the contamination monitor located in the TRIGA building were conducted.

4.3 Conclusions

The licensee maintained an adequate instrument inventory to support operations and conducted instrumentation calibrations in accordance with license requirements. Site capability for personal contamination monitoring on exit from the TRIGA building complex had been maintained. The inspector observed appropriate use of the monitor on exit of personnel.

**5 Effluent Control and Environmental Protection (88045)
Waste Management (88035)**

5.1 Inspection Scope

The inspectors reviewed the licensee's liquid effluent discharge and waste shipment activity.

5.2 Observations and Findings

In accordance with 10 CFR 70.59, the licensee provides semiannual effluent reports to the U.S. Nuclear Regulatory Commission and the State of California. Table 1 of these reports provides details of radiological gaseous and particulate effluent releases to unrestricted areas from licensee facilities handling radioactive material. Release point designations are keyed to facility names and locations. Attachment A of the report provides details of airborne effluent stack samples for the reporting period. Table 2 of the report documents any liquid effluent releases to the sanitary sewer system which flows to a 100-million gallon per day sewerage treatment plant. Note that, for some periods, there was no release of radionuclides to the sanitary sewer system. The inspector reviewed reports for 2010, 2011, and 2012 to date. The reports verify compliance with applicable limits and were submitted in a timely manner.

The main disposal site for low-level radioactive waste (LLRW) generated during decommissioning activities is the government-owned and contractor-operated NNSS. The site is owned by the U. S. Department of Energy (DOE), which provides oversight through the Nevada Site Office of the National Nuclear Security Administration. By agreement, only LLRW determined to be government or commingled government and private waste may be disposed of at the NNSS site. This waste must comply with the NNSS Waste Acceptance Criteria. Licensee activities associated with the characterization, packaging, shipping, and disposal of LLRW at the NNSS are detailed in General Atomics document PC-000391, "General Atomics Low-Level Waste Certification Plan." Shipments to the NNSS are restricted to those waste streams that satisfy National Nuclear Security Administration approved NNSS Waste Profiles. Other commercial waste disposal sites will be utilized for disposal of private waste streams.

5.3 Conclusions

The licensee implemented its effluent and environmental monitoring programs in accordance with license and regulatory requirements. All required samples were collected, and no sample result exceeded any license or regulatory limit. Estimated doses to members of the public from air emissions were below the dose constraint specified in regulations.

6 Exit Meeting Summary

The inspector presented the preliminary inspection results to the licensee's representatives at the conclusion of the onsite inspection on October 18, 2012. The licensee did not identify as proprietary any information provided to or reviewed by the inspectors.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

K. Asmussen, Director, Licensing, Safety and Nuclear Compliance
J. Greenwood, Reactor Manager, TRIGA Facility
R. Noren, GA Energy.
P. Pater, Manager, Health Physics, RSO
J. Razvi, Chair, Compliance and Radiation Safety Working Group
M. Varno, Senior Vice President, Advanced Programs

INSPECTION PROCEDURES USED

IP 71801	Status of Decommissioning
IP 88005	Management Organization and Controls
IP 88010	Training
IP 88025	Maintenance and Surveillance Testing of Safety Controls
IP 88035	Waste Management
IP 88030	Radiation Protection
IP 88045	Effluent Control and Environmental Protection

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS

ALARA	as low as is reasonably achievable
C&RS WG	Compliance and Radiation Safety Working Group
CFR	<i>Code of Federal Regulations</i>
IP	inspection procedure
LLRW	low-level radioactive waste
LSNC	Licensing, Safety and Nuclear Compliance Department
MREM	millirem
NNSS	Nevada National Security Site
RWP	radiation work permit
SNM	special nuclear material
LSNC	Licensing, Safety and Nuclear Compliance Department