

TRIGA[®] Mark F Reactor

ANNUAL REPORT

CALENDAR YEAR 2012

prepared to satisfy the requirements of U.S. Nuclear Regulatory Commission Facility License R-67 Docket No. 50-163

MARCH 2013

GENERAL ATOMICS TRIGA[®] REACTORS FACILITY TRIGA[®] Mark F Reactor ANNUAL REPORT Calendar Year 2012

TABLE OF CONTENTS

Section				
Intro	ductio	>n	<u>1</u>	
1	Summary of Facility Activities		<u>2</u>	
	1.1	Decommissioning Activities	<u>2</u>	
	1.2	Facility Status	<u>2</u>	
	1.3	Decommissioning Schedule	<u>3</u>	
	1.4	Radioactive Material Shipments	<u>3</u>	
2.	Mair	ntenance Operations	<u>4</u>	
3.	10CI	FR50.59 Facility Modifications and Special Experiments	<u>4</u>	
4.	Radi	ioactive Effluents Released to the Environs	<u>4</u>	
5	Envi	ronmental Surveys	<u>4</u>	
6.	Summary of Radiation Exposures and Radiological Surveys			
	6.1	General Atomics Staff Whole Body Exposures	<u>5</u>	
	6.2	Non-General Atomics Staff Whole Body Exposures	<u>5</u>	
	6.3	Routine Wipe Surveys of Mark F Reactor Facility	<u>6</u>	
	6.4	Routine Radiation Measurements of Mark F Reactor Facility	<u>6</u>	

Introduction

This report documents operation of the General Atomics (GA) TRIGA[®] Mark F (MkF) Non-Power Reactor for the period January 1, 2012 through December 31, 2012. The TRIGA[®] Mark F Reactor, possessed by GA at its San Diego, California facilities, contains no fuel, is being decommissioned, and was not operated for the duration of the reporting period. The TRIGA[®] Mark F Reactor is possessed by GA under License No. R-67 (Amendment No. 45) granted by the U.S. Nuclear Regulatory Commission (Docket No. 50-163).

This report is being prepared and submitted to satisfy the requirements of Section 8.6(d) of the R-67 License Technical Specifications, as amended. This report is presented in six parts, consistent with the information required by the applicable Technical Specifications.

[®] TRIGA is a registered trademark of General Atomics

1. Summary of Facility Activities

1.1 Decommissioning Activities

During Calendar Year (CY) 2012, the TRIGA[®] Mark F (MkF) Reactor was in Decommissioning status. The major tasks accomplished during this reporting period included: 1) the characterization, packaging, and shipment to the Nevada National Security Site (NNSS) of nearly all of the non-fuel, neutron-activated, highly-radioactive metal items from the Mark F Reactor Pool, 2) the survey and free release of several clean hardware items associated with the MkF reactor, 3) the removal and packaging of nearly all contaminated hardware items from the MkF Pool, and 4) the pump-out, filtration, analysis, and discharge of all of the water from the Efforts are continuing to coordinate disposition of the MkF Pool. remaining ²⁴¹Am/Be TRIGA[®] MkF Reactor Startup Neutron Source. In the meantime, this Neutron Source was physically removed from the TRIGA® Mark F Reactor Room, placed into an interim shielded container, and conveyed to a temporary storage location within the TRIGA® Reactor Facility (TRF).

1.2 Facility Status

- 1.2.1 On January 10 11, 2012, NNSS Radioactive Waste Acceptance Program (RWAP) engineers conducted an impromptu surveillance of the GA Low-Level Radioactive Waste Certification Program. Two minor Observations were noted. Formal notice of acceptance of GA's corrective actions, and reaffirmation of GA's Approved Waste Generator Status, was received on April 23, 2012.
- 1.2.2 On January 23, 2012, GA received word that the DOE/NNSA Off-Site Source Recovery Program (OSRP) could not offer an immediate viable path for the disposal the MkF ²⁴¹Am/Be Startup Source, due to its relatively high gamma activity level (due to neutron activation of the stainless steel Source encapsulation during its exposure in the TRIGA[®] MkF Reactor core). Discussions continue between GA and the OSRP to resolve this issue. In order to clear the MkF Pool of remaining hardware, on June 13, 2012, the subject Neutron Startup Source was remotely loaded underwater into the TRF Single Rod Transfer Cask, which was then conveyed out of the MkF Reactor Room to a separate space within the TRF building.
- 1.2.3 On April 30, 2012, GA completed the remote transfer of nearly all of the non-fuel, neutron-activated, highly-radioactive metal items from the MkF Pool into four (4) specially designed shielded DOT 7A Type A steel waste containers. On May 30, 2012, these four

waste packages were dispatched and shipped to the NNSS, in four separate highway transport consignments for disposal. On May 31, 2012, these four shipments arrived at the NNSS without incident.

- On July 24, 2012, pumpout of the TRIGA® MkF Pool water was 1.2.4 initiated. This water pumpout campaign was performed in 1000 gallon batch increments. Each water batch was pumped into a 1000 gal capacity process holding tank, then pumped through several increasingly finer filters into a clean 1000 gal capacity filtrate tank. This filtrate water was then sampled and analyzed for radioactive content. Upon Health Physics release of the filtrate batches, the water batches were discharged to the sanitary sewer; such water discharges were made in accordance with a task-specific Batch Discharge Permit issued to GA by the City of San Diego. By November 2012, the MkF Pool was dry, and a total of 16,000 gallons of water had been pumped out. No radioactive contamination was detected above background in any of the incremental 1000 gal batch samples, and all batches were discharged to GA's sanitary sewer outfall without incident.
- 1.2.5 On October 16 18, 2012, Dr. G. Schlapper (NRC Region IV) visited GA to inspect all aspects of the ongoing GA TRF Decommissioning Project. No Observations or Findings were noted, and an Inspection Report was issued on November 16, 2012.
- 1.2.6 On February 8, 2013, the CY2012 annual inspection of the GA TRIGA[®] Reactor Facility by the GA Compliance and Radiation Safety Working Group (C&RSWG) was conducted. No problems or issues were noted. An Inspection Report is forthcoming.

1.3 Decommissioning Schedule

All major task items in the GA TRF Decommissioning Plan have been completed to the extent feasible. Now that the MkF Pool is dry, planning for the radiological and chemical characterization of the MkF Pit Liner, Biological Shield, and surrounding soil is underway.

1.4 Radioactive Material Shipments

As described above in Section 1.2.3, on May 30, 2012, four (4) each DOT 7A Type A Packages were shipped, in four (4) separate transport consignments, from GA, San Diego, CA, to the NNSS, Mercury NV, for disposal. The packages contained non-fuel, neutron-activated hardware items removed from the TRIGA[®] MkF Pool, as solid, metal oxides. The Activity contents of these packages/shipments were as follows:

Shipment No. BGL12001; Package ID L54001; Activity: 0.369 TBq (9.96 Ci); Radionuclides: 60 Co, 63 Ni, & 55 Fe.

Shipment No. BGL12002; Package ID L54002; Activity: 0.366 TBq (9.90 Ci); Radionuclides: 60 Co, 63 Ni, & 55 Fe.

Shipment No. BGL12003, Package ID L54003; Activity: 0.387 TBq (10.46 Ci); Radionuclides: 60 Co, 63 Ni, & 55 Fe.

Shipment No. BGL12004; Package ID L54004; Activity: 0.250 TBq (6.77 Ci); Radionuclides: ⁶⁰Co, ⁶³Ni, & ⁵⁵Fe.

2. Maintenance Operations

All maintenance activities, performed during the reporting period, generally fall into three categories: (i) routine preventive maintenance, (ii) routine calibration activities, and (iii) activities associated with replacement of older components and systems due to age. All maintenance activities are recorded in the TRIGA[®] Reactor Facility Decommissioning Logbook. Facility Maintenance Checklists are completed on a regular schedule at weekly, quarterly, and annual frequencies. All maintenance operations performed during CY2012 on the TRIGA[®] MkF Reactor and facility were minor in nature. There were no major maintenance operations performed during period.

3. 10CFR50.59 Facility Modifications and Special Experiments

No applications for Facility Modification under the provisions of 10CFR50.59 were submitted for the R-67 facility during the CY2012 reporting period.

There were no Special Experiments submitted for the R-67 facility during CY2012.

4. Radioactive Effluents Released to the Environs

During CY2012, 0.00 millicuries of Argon-41 were discharged from the TRIGA[®] MkF Reactor Facility exhaust ventilation stack to the atmosphere.

5 Environmental Surveys

During CY2012, the Environmental Monitoring Program (EMP) for the TRIGA[®] Reactors Facility (TRF) remained essentially unchanged from the prior year. The applicable EMP includes the following monitoring equipment and actions:

• Five (5) emergency air samplers, situated on the TRF roof and around the TRIGA[®] Reactor Facility perimeter.

- Six (6) environmental air samplers, situated adjacent to, and near the GA site perimeter, in accordance with the GA Special Nuclear Material License (SNM-696).
- Daily liquid effluent monitoring from the GA Main Sewerage Outfall Pump House, for gross alpha and beta radioactivity concentrations.
- External radiation monitoring of the TRF using five (5) passive area dosimeters, as well as radiation meter and wipe surveys conducted periodically.
- A Continuous Air Monitor (CAM), situated in the MkF Reactor Room (Rm. 21/107), continuously samples MkF Reactor Pit air for airborne radioactivity. In addition, a room air sampler is installed on the west wall of the MkF Reactor Room. Both the CAM and room air sampler air filters are collected each week and analyzed for radioactivity.

6. Summary of Radiation Exposures and Radiological Surveys

The following data summarizes measured personnel occupational radiation exposures and radiological surveys of the TRIGA[®] Reactors Facility during CY2012. Personnel who are listed on the TRIGA[®] Reactors Facility Work Authorization (WA #3410 and, as of July 17, 2012, WA #3427) and specific Radiological Work Permits (RWPs) were monitored for radiation exposure. These individuals included 25 General Atomics Staff and 15 Non-General Atomics Staff personnel. The following exposures were primarily as a result of the inspection of neutron-activated metal items in the MkF pool, their loading into waste boxes, and subsequent shipment activities.

6.1 General Atomics Staff Whole Body Exposures¹

Number of individuals monitored:	25
High Exposure:	0.107 REM
Low Exposure:	0.000 REM
Average Exposure:	0.012 REM

6.2 Non-General Atomics Staff Whole Body Exposures²

¹

Includes reactor facility staff and facility support staff authorized to work at the TRIGA Reactor Facility. These personnel may also work routinely at other GA radiation facilities; therefore, this dose represents *cumulative* exposure at all GA facilities.

² Includes non-GA personnel who were granted periodic access to the facility for the performance of work. These personnel may also work routinely at other GA radiation facilities; therefore, this dose represents *cumulative* exposure at all GA facilities.

Number of individuals monitored:	15
High Exposure:	0.020 REM
Low Exposure:	0.000 REM
Average Exposure:	0.005 REM

6.3 Routine Wipe Surveys of Mark F Reactor Facility

High Wipe:	825.0	dpm/100 cm ²
Low Wipe:	< 1.0	dpm/100 cm ²
Average Wipe:	15.5	dpm/100 cm ²

6.4 Routine Radiation Measurements of Mark F Reactor Facility

High Measurement:	50	mR/hr
Low Measurement:	< 0.2	mR/hr
Average Level:	1	mR/hr