GENERAL ATOMICS

April 14, 2000
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VIA OVERNIGHT DELIVERY SERVICE

Document Control Desk
ATTN: Mr. Alexander Adams, Jr., Senior Project Manager
Non-Power Reactors & Decommissioning Projects Directorate
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: **Docket No. 50-89, Facility License R-38, and**
Docket No. 50-163, Facility License R-67;
Submittal of the 1999 TRIGA Mark I and Mark F Annual Reports
(3 Copies each)

Dear Mr. Adams:

Enclosed are the annual reports required by the applicable Technical Specifications of General Atomics' (GA's) Mark I (License R-38) and Mark F (License R-67) TRIGA research reactors. These reports cover operations for the calendar year 1999. The sections of these reports are numbered consistent with the items of information referred to in Section 7.6d of the Technical Specifications for the Mark I TRIGA reactor and in 8.6d of the Technical Specifications for the Mark F TRIGA reactor.

Should you desire additional information concerning the above, please contact me at (858) 455-2823, or Mr. John Greenwood at (858) 455-4526.

Very truly yours,

Keith E. Asmussen

Dr. Keith E. Asmussen, Director
Licensing, Safety and Nuclear Compliance

Enclosure: TRIGA Mark I 1999 Annual Report dated April 2000 (3 Copies)
TRIGA Mark F 1999 Annual Report dated April 2000 (3 Copies)

A020

3550 GENERAL ATOMICS COURT, SAN DIEGO, CA 92121-1194 PO BOX 85608, SAN DIEGO, CA 92186-5608 (619) 455-3000

GENERAL ATOMICS

TRIGA® Mark F Reactor

ANNUAL REPORT

CALENDAR YEAR 1999

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

APRIL 2000

TRIGA REACTORS FACILITY
TRIGA Mark F Reactor
ANNUAL REPORT
Calendar Year 1999

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Introduction

This report documents operation of the General Atomics (GA) TRIGA® Mark F non-power reactor for the period January 1 - December 31, 1999. The Mark F reactor - possessed by GA at its San Diego, California facilities - has been non-operational for the duration of the reporting period. It 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 Technical Specifications, as amended. This report is presented in six parts, consistent with the information required by the applicable Technical Specifications.

1. Summary of Facility Activities

1.1 *Decommissioning Activities*

The TRIGA Mark F reactor was under a licensing amendment through August 12, 1999 that removed the authority to operate the reactor and authorized the possession only of the reactor. At that point, the Decommissioning Plan was approved. The TRIGA Mark F reactor license was then amended to place the reactor in decommissioning status. The following represents a summary of activities during this period:

1.1.1 Radiological Survey

A radiological survey of the Mark F facility has been completed.

1.1.2 Reactor Tank Water

All forced water cooling systems have been removed and dispositioned. This included the 2 MW cooling tower and the four (4) 500kW cooling towers. The items removed and dispositioned included all associated secondary and primary cooling system, pumps and pipes leading to and from the reactor pool.

1.2 *Facility Status*

- One SRO's license was renewed for six (6) years.
- The Mark F fuel remains situated out of the reactor shroud in the fuel storage canal. Activated hardware and control rods remain in the Mark F pool, which is maintained full of water.
- The NRC inspected the facility on February 4, 1999. There were no findings reported.

1.3 *Decommissioning Schedule*

Because of commitments of staff members on other decommissioning projects, the decommissioning of the TRIGA Reactor Facility did not start immediately after the approval of the Decommissioning Plan. The full staff will be available to commence dedicated work in January 2000. The decommissioning work performed to date was done on an availability basis.

1.4 *Radioactive Material Shipments*

Six (6) Low Specific Activity (LSA) boxes were filled with low level radioactive waste generated from the dismantlement of the cooling towers and associated piping.

All boxes remain on site and are planned to be shipped to the Nevada Test Site (NTS) during the next reporting period.

2. Maintenance Operations

All maintenance activities performed during the year generally fall into three categories: (i) routine preventative 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 decommissioning logbook. Two new maintenance checklists were prepared during the reporting period to be consistent with the requirements of the Decommissioning Plan. These checklists are completed on a regular schedule, one being weekly and the other being quarterly.

All maintenance performed for the facility was minor in nature. There were no major maintenance operations performed during the reporting period.

3. 10CFR50.59 Facility Modifications and Special Experiments

There were two (2) new applications for facility modifications under the provisions of 10CFR50.59 that was approved for the R-67 facility during the 1999 reporting period.

There were no new Special Experiments that were submitted for the R-67 facility during 1999.

The approved facility modifications were approved prior to the approval of the Decommissioning Plan and concerned:

1) The removal of the air conditioning unit for the Mark F control room. Review of this facility modification was provided and approval given in May 1999. It was determined that, since the control room was not occupied on a 24 hour-a-day basis and much of the equipment to operate the reactor was not turned on, the unit was unnecessary. The reason for removal of the air conditioning unit was to facilite decommissioning of the Mark III reactor.

2) The removal of the shield wall in front of the Mark F control console. Review of this facility modification was provided and approval given in June 1999. It was determined that since the fuel was removed from the core, and that this wall was installed for protection of the operator at the console during operations, it was no longer needed. Any shielding required during the decommissioning of the reactor will be added later on an as needed basis.

4. Radioactive Effluents Released to the Environs

During the calendar year 1999, 0.00 millicuries of Argon-41 were discharged at the Mark F reactor facility stack to the atmosphere.

5. Environmental Surveys

The environmental monitoring program during 1999 for the TRIGA Reactors Facility remained essentially unchanged from the prior year and included the following:

- Five (5) emergency air samplers situated on the roof and around the reactor building.
- Ten (10) environmental air samplers adjacent to, and near the GA site in accordance with GA's SNM-696 license.
- Daily liquid effluent monitoring from GA's main pump house, for gross alpha and beta concentrations.
- Annual soil and water sampling at ten (10) stations on the GA site, including stations around the GA reactor building.
- External radiation monitoring of the reactor facilities using five (5) area dosimeters as well as radiation meter surveys conducted periodically.
- Continuous Air Monitors are located in both reactor rooms to routinely sample room air for airborne radioactivity. Air filters are collected each week and measured for activity.

6. SUMMARY OF RADIATION EXPOSURES AND RADIOLOGICAL SURVEYS

The following data summarizes personnel radiation exposures (in Rem.) and radiological surveys of the facility during 1999. Only those people specified in the Facility Work Authorization (WA) #3184 and specific Radiological Work Permits (RWPs) have been monitored for exposure. Of those authorized to work in the facility, eleven (11) are General Atomics employees and two (2) are contractors granted periodic access.

6.1 *General Atomics Staff Whole Body Exposures*[1]

Number of individuals monitored:	11
High Exposure:	0.075 Rem
Low Exposure:	0.000 Rem
Average Exposure:	0.018 Rem

6.2 *Non General Atomics Staff Whole Body Exposures*[2]

Number of individuals monitored:	2
High Exposure:	0.075 Rem
Low Exposure:	0.000 Rem
Average Exposure:	0.038 Rem

6.3 *Routine Wipe Surveys of Mark F Reactor Facility*

High Wipe:	3.2 β dpm/100 cm^2
Low Wipe:	< 1.0 β dpm/100 cm^2
Average Wipe:	< 1.0 β dpm/100 cm^2

6.4 *Routine Radiation Measurements of Mark F Reactor Facility*

High Measurement:	100.0 mRem/hr @ 1 foot
Low Measurement:	<0.2 mRem/hr @ 1 foot
Average Level:	<1.8 mRem/hr @ 1 foot

(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.

GENERAL ATOMICS

TRIGA® Mark I Reactor

ANNUAL REPORT

CALENDAR YEAR 1999

prepared to satisfy the requirements of
U.S. Nuclear Regulatory Commission
Facility License R-38
Docket No. 50-89

APRIL 2000

TRIGA REACTORS FACILITY
TRIGA Mark I Reactor
ANNUAL REPORT
Calendar Year 1999

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Introduction

This report documents operation of the General Atomics (GA) TRIGA® Mark I non-power reactor for the period January 1 - December 31, 1999. The Mark I reactor - possessed by GA at its San Diego, California facilities - has been non-operational for the duration of the reporting period. It is possessed by GA under License No. R-38 (Amendment No. 36) granted by the U.S. Nuclear Regulatory Commission (Docket No. 50-89).

This report is being prepared and submitted to satisfy the requirements of Section 7.6(d) of the R-38 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*

The TRIGA Mark I reactor was under a licensing amendment through August 12, 1999 that removed the authority to operate the reactor and authorized the possession only of the reactor. At that point, the Decommissioning Plan was approved. The TRIGA Mark I reactor license was then amended to place the reactor in decommissioning status. The following represents a summary of activities during this period:

1.1.1 Radiological Survey

A radiological survey of the Mark I facility has been completed.

1.1.2 Reactor Facility Components Above Pool

The non-load bearing wall between rooms 21/102 and 21/106 was removed and dispositioned. All flooring tiles were removed and dispositioned. The shield wall around the Mark I pool was removed and dispositioned. Miscellaneous handling tools were removed and dispositioned. The control rod drive mechanisms and bridge were removed and dispositioned. All natural gas supplied to the building has been secured. The controlled storage yard north of the Mark I Facility was cleared out and items dispositioned. The surface of that yard was coated with Polymeric Barrier System paint.

1.1.3 Reactor Components in Pool

Removal and disposition of items from the inside of the Mark I pool has begun. Items removed and dispositioned were the diffusor, discharge line, startup source holder, water cooling system supply and return pipe, pneumatic transfer system terminus, and all dry tubes.

1.1.4 Reactor Tank Water

All forced water cooling systems have been removed and dispositioned. These included the 2 MW cooling tower and the four (4) 500kW cooling towers. The items removed and dispositioned included all associated secondary and primary cooling system, pumps and pipes leading to and from the reactor pool.

1.2 *Facility Status*

- o One SRO's license was renewed for six (6) years.
- o The Mark I decommissioning procedure was approved.

- o All Mark I fuel remains situated out of the reactor tank in long term storage. Activated hardware and control rods remain in the Mark I pool which is maintained full of water.

- o NRC inspected the facility on February 4, 1999. No findings were reported.

1.3 *Decommissioning Schedule*

Because of commitments of staff members on other decommissioning projects, the decommissioning of the TRIGA Reactor Facility did not start immediately after the approval of the Decommissioning Plan. The full staff will be available to commence dedicated work in January 2000. The decommissioning work performed to date was done on an availability basis.

1.4 *Radioactive Material Shipments*

Six (6) Low Specific Activity (LSA) boxes were filled with low level radioactive waste generated from the dismantlement of the cooling towers and associated piping. All boxes remain on site and are planned to be shipped to the Nevada Test Site (NTS) during the next reporting period.

2. Maintenance Operations

All maintenance activities performed during the year generally fall into three categories: (i) routine preventative 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 decommissioning logbook. Two new maintenance checklists were prepared during the reporting period to be consistent with the requirements of the Decommissioning Plan. These checklists are completed on a regular schedule, one being weekly and the other being quarterly.

All maintenance performed for the facility was minor in nature. There were no major maintenance operations performed during the reporting period.

3. 10CFR50.59 Facility Modifications and Special Experiments

There was one new application for a facility modification under the provisions of 10CFR50.59 that was approved for the R-38 facility during the 1999 reporting period.

There were no new Special Experiments submitted for approval for the R-38 facility during 1999.

The approved facility modification was approved prior to the approval of the Decommissioning Plan and concerned the removal of the shield wall around the Mark I pool. Review of this facility modification was provided and approval given in June 1999. It was determined that since the fuel was removed from the core, and that this wall was installed

for the protection of the operator at the console during operations, it was no longer needed. Any shielding required during the decommissioning of the reactor will be added later on an as-needed basis.

4. Radioactive Effluents Released to the Environs

During the calendar year 1999, 0.00 millicuries of Argon-41 were discharged at the Mark I reactor facility stack to the atmosphere.

5. Environmental Surveys

The environmental monitoring program during 1999 for the TRIGA Reactors Facility remained essentially unchanged from the prior year and included the following:

- Five (5) emergency air samplers situated on the roof and around the reactor building.
- Ten (10) environmental air samplers adjacent to, and near the GA site in accordance with GA's SNM-696 license.
- Daily liquid effluent monitoring from GA's main pump house, for gross alpha and beta concentrations.
- Annual soil and water sampling at ten (10) stations on the GA site, including stations around the GA reactor building.
- External radiation monitoring of the reactor facilities using five (5) area dosimeters as well as radiation meter surveys conducted periodically.
- Continuous Air Monitors are located in both reactor rooms to routinely sample room air for airborne radioactivity. Air filters are collected each week and measured for activity.

6. SUMMARY OF RADIATION EXPOSURES AND RADIOLOGICAL SURVEYS

The following data summarizes personnel radiation exposures (in Rem.) and radiological surveys of the facility during 1999. Only those people specified in the Facility Work Authorization (WA) #3184 and specific Radiation Work Permits (RWPs) have been monitored for exposure. Of those authorized to work in the facility, eleven are General Atomics employees and two are contractors granted periodic access.

6.1 *General Atomics Staff Whole Body Exposures*[1]

Number of individuals monitored:	11
High Exposure:	0.075 Rem.
Low Exposure:	0.000 Rem.
Average Exposure:	0.018 Rem.

6.2 *Non General Atomics Staff Whole Body Exposures*[2]

Number of individuals monitored:	2
High Exposure:	0.075 Rem.
Low Exposure:	0.000 Rem.
Average Exposure:	0.038 Rem.

6.3 *Routine Wipe Surveys of Mark I Reactor Facility*

High Wipe:	7.6 β dpm/100 cm^2
Low Wipe:	< 1.0 β dpm/100 cm^2
Average Wipe:	< 1.0 β dpm/100 cm^2

6.4 *Routine Radiation Measurements of Mark I Reactor Facility*

High Measurement:	8.0 mRem/hr @ 1 foot
Low Measurement:	<0.2 mRem/hr @ 1 foot
Average Level:	<0.2 mRem/hr @ 1 foot

(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.

GENERAL ATOMICS

TRIGA® Mark I Reactor

ANNUAL REPORT

CALENDAR YEAR 1999

prepared to satisfy the requirements of
U.S. Nuclear Regulatory Commission
Facility License R-38
Docket No. 50-89

APRIL 2000

TRIGA REACTORS FACILITY
TRIGA Mark I Reactor
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Introduction

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This report is being prepared and submitted to satisfy the requirements of Section 7.6(d) of the R-38 Technical Specifications, as amended. This report is presented in six parts, consistent with the information required by the applicable Technical Specifications.

1. Summary of Facility Activities

1.1 *Decommissioning Activities*

The TRIGA Mark I reactor was under a licensing amendment through August 12, 1999 that removed the authority to operate the reactor and authorized the possession only of the reactor. At that point, the Decommissioning Plan was approved. The TRIGA Mark I reactor license was then amended to place the reactor in decommissioning status. The following represents a summary of activities during this period:

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1.1.2 Reactor Facility Components Above Pool

The non-load bearing wall between rooms 21/102 and 21/106 was removed and dispositioned. All flooring tiles were removed and dispositioned. The shield wall around the Mark I pool was removed and dispositioned. Miscellaneous handling tools were removed and dispositioned. The control rod drive mechanisms and bridge were removed and dispositioned. All natural gas supplied to the building has been secured. The controlled storage yard north of the Mark I Facility was cleared out and items dispositioned. The surface of that yard was coated with Polymeric Barrier System paint.

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Removal and disposition of items from the inside of the Mark I pool has begun. Items removed and dispositioned were the diffusor, discharge line, startup source holder, water cooling system supply and return pipe, pneumatic transfer system terminus, and all dry tubes.

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All forced water cooling systems have been removed and dispositioned. These included the 2 MW cooling tower and the four (4) 500kW cooling towers. The items removed and dispositioned included all associated secondary and primary cooling system, pumps and pipes leading to and from the reactor pool.

1.2 *Facility Status*

- o One SRO's license was renewed for six (6) years.
- o The Mark I decommissioning procedure was approved.

- o All Mark I fuel remains situated out of the reactor tank in long term storage. Activated hardware and control rods remain in the Mark I pool which is maintained full of water.

- o NRC inspected the facility on February 4, 1999. No findings were reported.

1.3 *Decommissioning Schedule*

Because of commitments of staff members on other decommissioning projects, the decommissioning of the TRIGA Reactor Facility did not start immediately after the approval of the Decommissioning Plan. The full staff will be available to commence dedicated work in January 2000. The decommissioning work performed to date was done on an availability basis.

1.4 *Radioactive Material Shipments*

Six (6) Low Specific Activity (LSA) boxes were filled with low level radioactive waste generated from the dismantlement of the cooling towers and associated piping. All boxes remain on site and are planned to be shipped to the Nevada Test Site (NTS) during the next reporting period.

2. Maintenance Operations

All maintenance activities performed during the year generally fall into three categories: (i) routine preventative 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 decommissioning logbook. Two new maintenance checklists were prepared during the reporting period to be consistent with the requirements of the Decommissioning Plan. These checklists are completed on a regular schedule, one being weekly and the other being quarterly.

All maintenance performed for the facility was minor in nature. There were no major maintenance operations performed during the reporting period.

3. 10CFR50.59 Facility Modifications and Special Experiments

There was one new application for a facility modification under the provisions of 10CFR50.59 that was approved for the R-38 facility during the 1999 reporting period.

There were no new Special Experiments submitted for approval for the R-38 facility during 1999.

The approved facility modification was approved prior to the approval of the Decommissioning Plan and concerned the removal of the shield wall around the Mark I pool. Review of this facility modification was provided and approval given in June 1999. It was determined that since the fuel was removed from the core, and that this wall was installed

for the protection of the operator at the console during operations, it was no longer needed. Any shielding required during the decommissioning of the reactor will be added later on an as-needed basis.

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Average Exposure:	0.018 Rem.

6.2 *Non General Atomics Staff Whole Body Exposures*[2]

Number of individuals monitored:	2
High Exposure:	0.075 Rem.
Low Exposure:	0.000 Rem.
Average Exposure:	0.038 Rem.

6.3 *Routine Wipe Surveys of Mark I Reactor Facility*

High Wipe:	7.6 β dpm/100 cm^2
Low Wipe:	< 1.0 β dpm/100 cm^2
Average Wipe:	< 1.0 β dpm/100 cm^2

6.4 *Routine Radiation Measurements of Mark I Reactor Facility*

High Measurement:	8.0 mRem/hr @ 1 foot
Low Measurement:	<0.2 mRem/hr @ 1 foot
Average Level:	<0.2 mRem/hr @ 1 foot

(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.

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1. Summary of Facility Activities

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1.2 *Facility Status*

- One SRO's license was renewed for six (6) years.
- The Mark F fuel remains situated out of the reactor shroud in the fuel storage canal. Activated hardware and control rods remain in the Mark F pool, which is maintained full of water.
- The NRC inspected the facility on February 4, 1999. There were no findings reported.

1.3 *Decommissioning Schedule*

Because of commitments of staff members on other decommissioning projects, the decommissioning of the TRIGA Reactor Facility did not start immediately after the approval of the Decommissioning Plan. The full staff will be available to commence dedicated work in January 2000. The decommissioning work performed to date was done on an availability basis.

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There were no new Special Experiments that were submitted for the R-67 facility during 1999.

The approved facility modifications were approved prior to the approval of the Decommissioning Plan and concerned:

1) The removal of the air conditioning unit for the Mark F control room. Review of this facility modification was provided and approval given in May 1999. It was determined that, since the control room was not occupied on a 24 hour-a-day basis and much of the equipment to operate the reactor was not turned on, the unit was unnecessary. The reason for removal of the air conditioning unit was to facilite decommissioning of the Mark III reactor.

2) The removal of the shield wall in front of the Mark F control console. Review of this facility modification was provided and approval given in June 1999. It was determined that since the fuel was removed from the core, and that this wall was installed for protection of the operator at the console during operations, it was no longer needed. Any shielding required during the decommissioning of the reactor will be added later on an as needed basis.

4. Radioactive Effluents Released to the Environs

During the calendar year 1999, 0.00 millicuries of Argon-41 were discharged at the Mark F reactor facility stack to the atmosphere.

5. Environmental Surveys

The environmental monitoring program during 1999 for the TRIGA Reactors Facility remained essentially unchanged from the prior year and included the following:

- Five (5) emergency air samplers situated on the roof and around the reactor building.
- Ten (10) environmental air samplers adjacent to, and near the GA site in accordance with GA's SNM-696 license.
- Daily liquid effluent monitoring from GA's main pump house, for gross alpha and beta concentrations.
- Annual soil and water sampling at ten (10) stations on the GA site, including stations around the GA reactor building.
- External radiation monitoring of the reactor facilities using five (5) area dosimeters as well as radiation meter surveys conducted periodically.
- Continuous Air Monitors are located in both reactor rooms to routinely sample room air for airborne radioactivity. Air filters are collected each week and measured for activity.

6. SUMMARY OF RADIATION EXPOSURES AND RADIOLOGICAL SURVEYS

The following data summarizes personnel radiation exposures (in Rem.) and radiological surveys of the facility during 1999. Only those people specified in the Facility Work Authorization (WA) #3184 and specific Radiological Work Permits (RWPs) have been monitored for exposure. Of those authorized to work in the facility, eleven (11) are General Atomics employees and two (2) are contractors granted periodic access.

6.1 *General Atomics Staff Whole Body Exposures*[1]

Number of individuals monitored:	11
High Exposure:	0.075 Rem
Low Exposure:	0.000 Rem
Average Exposure:	0.018 Rem

6.2 *Non General Atomics Staff Whole Body Exposures*[2]

Number of individuals monitored:	2
High Exposure:	0.075 Rem
Low Exposure:	0.000 Rem
Average Exposure:	0.038 Rem

6.3 *Routine Wipe Surveys of Mark F Reactor Facility*

High Wipe:	3.2 β dpm/100 cm^2
Low Wipe:	< 1.0 β dpm/100 cm^2
Average Wipe:	< 1.0 β dpm/100 cm^2

6.4 *Routine Radiation Measurements of Mark F Reactor Facility*

High Measurement:	100.0 mRem/hr @ 1 foot
Low Measurement:	<0.2 mRem/hr @ 1 foot
Average Level:	<1.8 mRem/hr @ 1 foot

(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.