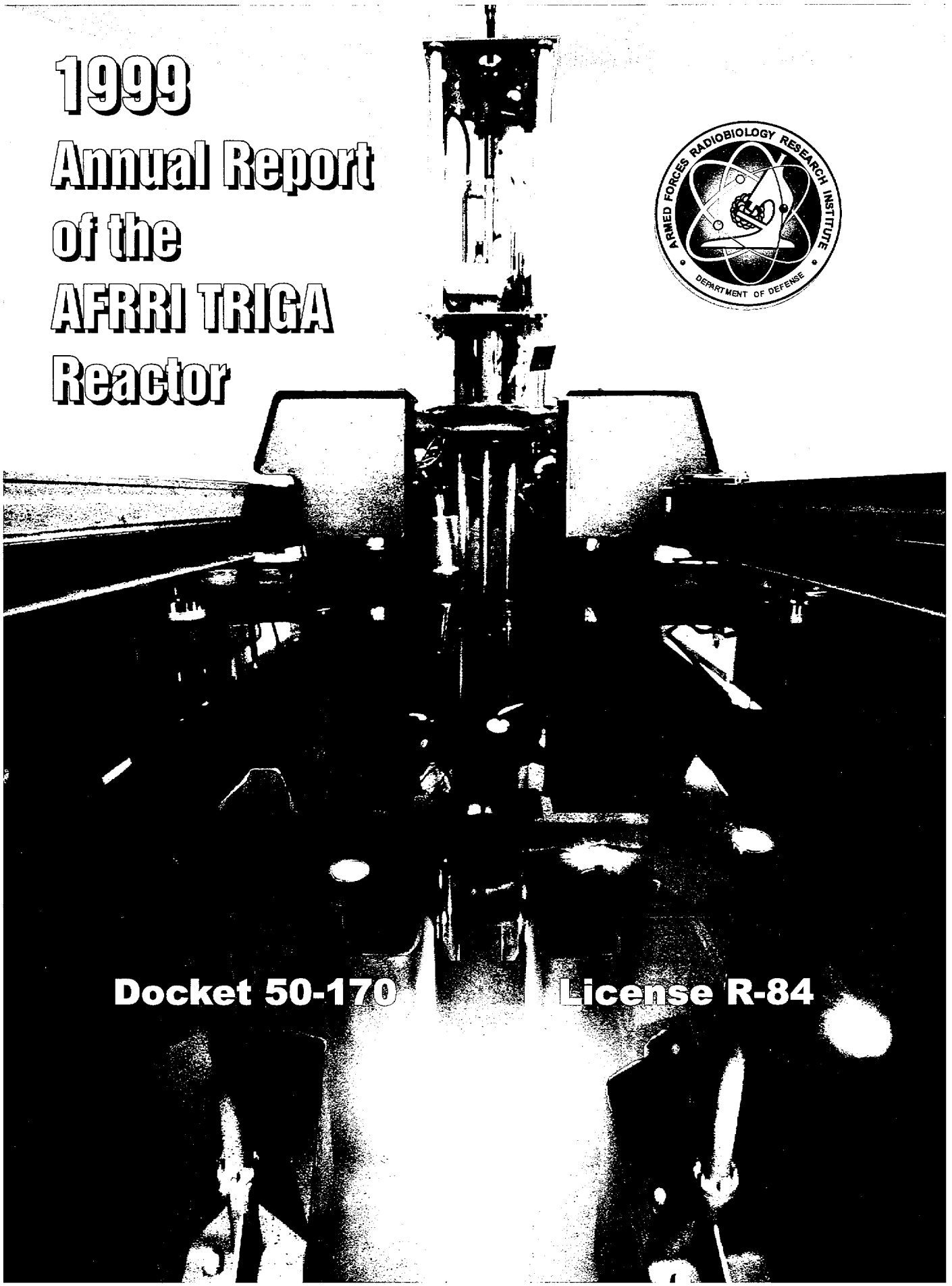
1999 Annual Report of the AFRRI TRIGA Reactor



Docket 50-170 License R-84

A020

Submission of 1999 Annual Report

Submitted by

STEPHEN I. MILLER
Reactor Facility Director

17 MAR 00
Date

Approved

ROBERT R. ENG
COL, MS, USA
Director

17 May 00
Date

Armed Forces Radiobiology Research Institute
AFRRI Triga Reactor Facility

1 January 1999 - 31 December 1999

To satisfy the requirements of
U.S. Nuclear Regulatory Commission, License No. R-84 (Docket No. 50-170),
Technical Specification 6.6.1.b.

The Reactor Facility Director acknowledges the participation of the following personnel for their contributions to this annual report.

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1999 ANNUAL REPORT

TABLE OF CONTENTS

Introduction

General Information

Section I
Changes in the Facility Design, Performance Characteristics, Administrative Procedures; Operational Procedures; Results of Surveillance Tests and Inspections

Section II
Energy Generated by the Reactor Core and the Number of Pulses $2.00 or Larger

Section III
Unscheduled Shutdowns

Section IV
Safety-Related Corrective Maintenance

Section V
Facility and Procedure Changes as Described in the Safety Analysis Report (SAR); New Experiments or Tests Performed During the Year

Section VI
Summary of Radioactive Effluent Released

Section VII
Environmental Radiological Surveys

Section VIII
Exposures Greater Than 10% of 10 CFR 20 Limits

Attachment A
10 CFR 50.59 Safety Evaluations of Modifications, Changes, and Enhancements to Procedures or Facilities

Attachment B
Appointment Letters for Changes to the Radiation Facility Safety Committee

Introduction

1999 ANNUAL REPORT

INTRODUCTION

The Armed Forces Radiobiology Research Institute (AFRRI) reactor facility was available for irradiation services throughout the year except for two nonoperational periods during the console software upgrade and annual reactor maintenance shutdown.

AFRRI volunteered to be the beta test site for the TRIGA reactor console software upgrade. General Atomics staff members spent approximately two months at AFRRI, during the initial testing phase, and made minor revisions to the software package. Changes to the software package included replacing IC-DOS with a state-of-the-art QNX operating system, replacing obsolete network cards, and replacing timing loops with clock timers. The software upgrade was implemented in stages, from a subcritical core to a fully loaded core. The combined General Atomics and AFRRI effort will facilitate smoother upgrades of other TRIGA consoles.

AFRRI acquired approximately 18,000 pounds of high-purity graphite from the University of Virginia reactor facility. The graphite will be used to provide a thermal beam for neutron activation analysis and other experiments.

Extensive work was performed on the reactor facility relicensing package that must be submitted to the Nuclear Regulatory Commission in September 2000. A request for extension of the current license is in progress. An extension will change the expiration date to 20 years from the issuance of the current license. This action will make the relicensing package due in August 2004.

Two reactor facility audits were conducted during 1999. The first audit, conducted in January, was for the 1998 period. The 1999 audit was performed in November. Neither audit identified any items of concern. Discussion of the audits are covered in Section I. The Nuclear Regulatory Commission did not inspect the AFRRI TRIGA reactor during 1999.

The NRC gave licensing examinations to two candidates in December 1999. As of 31 December, the NRC has not provided license certificates although they are expected shortly.

Changes were made to various procedures and facilities during 1999 in accordance with the provisions of 10 CFR 50.59. Summaries of modifications are found in Sections I and V.

Reactor staff personnel conducted a peer review of the reactor facility at Cornell University in Ithaca, New York.

The remainder of this report is written in the format designated in the Technical Specifications for the AFRRI TRIGA Reactor Facility. Items not specifically required are presented in the General Information section. The following sections correspond to the required items listed in Section 6.6.1.b. of the specifications.

General Information

- Key Personnel
- Reactor and Radiation Facility Committee

GENERAL INFORMATION

All personnel held the listed positions throughout the year unless otherwise specified.

Key AFRRI administration personnel (as of 31 December 1999) are as follows

1. Director Robert R. Eng, COL, MS, USA

   Radiation Sciences Department (RSD) Head, James W. Malinoski, CAPT, MSC, USN

   Radiation Protection Officer Bruce A. White, Maj, USAF

2. Reactor Facility Director Stephen I. Miller (SRO)

3. Reactor operations personnel:

   Reactor Operations Supervisor Robert G. Marté (SRO)

   SRO Training coordinator Robert G. Marté (SRO)

   ERT Training coordinator Kenneth L. Wrisley, MAJ, CM, USA (SRO)

   Maintenance Specialist John T. Nguyen (SRO)

   Records Administration Specialist Samuel D. Osborne, SFC, USA (SRO)

   Senior staff engineer Kenneth L. Wrisley, MAJ, CM, USA (SRO)

4. Senior Reactor Operator William H. Baxter, SFC, Jr., USA

5. Operator candidates are as follows.
   Steven W. Pierson, ET1, USN (24 August 1998)
   Harold H. Spence (16 August 1999)

6. Newly licensed operators: None

7. Addition to staff during 1999: Harold H. Spence (16 August 1999)

8. Departure during 1999: Michael Ortelli, CPT, FA, USA (30 August 1999)

9. There were several staff changes to the Reactor and Radiation Facility Safety Committee (RRFSC) during 1999. David G. Jarrett, COL, MC, USA, replaced Curtis W. Pearson, Col, USAF, MC, as chairman of the RRFSC on 14 October 1999. Joe Pawlovich replaced William Powers as an appointed voting member on 15 November 1999. Tyrone D. Naquin, CDR, MSC, USN, substituted as chairman of the RRFSC for the 8 December 1999 meeting and was

permanently appointed chairman on 9 December 1999.

In accordance with the requirements set forth in Section 6.2.1.1. of the Technical Specifications for the AFRRI Triga Reactor Facility, the 1999 RRFSC consisted of the following voting members as of 31 December 1999.

Regular members are as follows.
Radiation Protection Officer Bruce A. White, Maj, USAF
Reactor Facility Director Stephen I. Miller
Reactor Operations Specialist Marcus Voth
Health Physics Specialist Joe Pawlovich

Chairman and Director's Representative Tyrone D. Naquin, CDR, MSC, USN

Special member: James W. Malinoski, CAPT, MSC, USN

Special nonvoting member: Edward Herbert, Montgomery County Government (Environmental Protection Agency)

Recorder: Samuel D. Osborne, SFC, USA

As required by the Technical Specifications for the AFRRI Reactor Facility, four meetings of the RRFSC were conducted in 1999.

3 March, full committee meeting

26 May, full committee meeting

13 July, full committee meeting

8 December, full committee meeting

Section I

- Changes to the Facility Design, Performance Characteristics and Operational Procedures
- Results of Surveillance Tests and Inspections

SECTION I

Changes in the Facility Design, Performance Characteristics, Administrative Procedures, Operational Procedures; Results of Surveillance Tests and Inspections

A summary of changes to the facility design, performance characteristics, administrative procedures, and operational procedures as well as the results of surveillance testing are provided in this section. Revised reactor administrative and operational procedures with their 10 CFR 50.59 reviews are in Attachment A.

A. DESIGN CHANGES

There was one design change to the facility during 1999.

Wood was added to fill a two-foot gap between the core projection and the existing one-foot-thick wood lining in exposure room 2 (ER2). This area was filled to match the setup in ER1.The core excess reactivity changed one cent in ER2 due to the additional wood. This change will allow experiments previously performed in ER1 to be more readily performed in ER2.

B. PERFORMANCE CHARACTERISTICS

No changes to the core occurred during 1999. All fuel, chambers, and the core experiment tube (CET) remained in place for operations throughout the year. The performance characteristics of the core did not change.

C. ADMINISTRATIVE PROCEDURES

Three modifications to the Safety Analysis Report (SAR) were made in 1999.

1. The SAR was changed to remove all references to the use of thermoluminescent dosimeters (TLDs) as the perimeter monitoring method. The comply code method for reporting environmental releases is now used to determine radiation exposure to areas outside the AFRRI complex. Comply code is approved by the Nuclear Regulatory Commission and the Environmental Protection Agency for reporting environmental releases.

2. The Radiation Sources Department name changed to Radiation Sciences Department. The SAR was updated to reflect this change. References to the locations of two tables in the SAR were changed to appendices.

3. The meteorological monitoring station on the roof of AFRRI was replaced. The SAR was changed to remove the specific brand name of the existing monitoring system and replace it with a statement that a wind sensor will measure wind speed and direction. The new system performs the same functions as the previous unit.

D. OPERATIONAL PROCEDURES

1. Procedures A010 and A026 were modified to eliminate redundancy. A010 covers quarterly requirements for updating the prep area access memorandum and A026 covers annual prep area training requirements.

2. Procedure M014 for exercising all valves in the reactor water system, was modified to add the four new valves that were added during the heat exchanger installation. This procedure now encompasses all valves in the reactor water system.

3. Procedure 8, TAB C, was determined not to be a procedure but a data sheet of the administrative set points. This data sheet was removed from the procedure book and added to the Reactor Operational Reference Notebook. The set points from the Technical Specifications for the AFRRI Triga Reactor Facility were added to this data sheet.

4. Procedure 0 was rewritten to clarify the process of adding or changing procedures. The updated procedure better describes the format for procedures, procedure staffing, and the level of detail required. Removed from the procedure were specifications such as the word processing software, the font type and size, and the level of detail required for calibration procedures.

5. Procedures M021 and M022 were combined into M021 for the inspection of control rods. Each procedure covered half of the process of inspecting control rods. Combining the procedures provided a single, concise procedure for performing the task. Procedure M022 was removed from the procedure book.

6. Procedure M017, for checking belts on the standard rod drives, was changed to reflect the correct reference to procedure M037, Rod Position Indicator. The referenced procedure was under development at the time of the last revision. A procedure under development is given a temporary procedure number. The final version of the Rod Position Indicator procedure was published under procedure number M037.

7. Procedures M015 and M050 were combined into a single procedure for cooling tower maintenance. Procedure M015 was removed from the procedure book. The new procedure for cooling tower maintenance includes all required items from the deleted procedure.

8. Procedure S009 was combined with S006 since both the hydrostatic and visual testing of self-contained breathing apparatus (SCBA) bottles are performed at the same interval. Unnecessary details were removed, and procedure S009 was removed from the procedure book.

9. Procedure M005 for maintenance of the Millipore water makeup system was revised to remove unnecessary comments.

10. Procedure M001 for testing the uninterruptible power supply (UPS) was updated to replace references to the criticality monitor with references to the radiation area monitors (RAMs). The time period for testing the UPS was extended from 1 minute to 10 minutes.

11. The fuel measurement procedure, S010, was revised to include the new format for section headings, estimated time to perform the task, and current RAM alarm points.

12. Procedure M048 for the AmBe source swipe test was revised to include the new format for section headings. The requirement to turn RAMs up during the operation was removed, and the specification for the method of communication was eliminated.

13. Procedures M029, M030, M031, and M032 were removed to eliminate redundancy. An evaluation of the procedures showed there were two sets of procedures for the annual maintenance of rod drives. One set of procedures was referenced in Triga Tracker; the other set was referenced in the annual shutdown checklist. The current set of procedures is now properly referenced in both Triga Tracker and the annual shutdown checklist.

14. Procedure C010 was determined to be an index of calibration procedures containing scram circuits and not a true procedure. It was eliminated from the procedure book. Since each scram circuit is calibrated under its own procedure, this action had no effect on operations or the safety of the reactor.

15. Sections of procedure C011 were removed. Several rod withdraw prohibits (RWP) in the procedure are more appropriately calibrated in other procedures. Instructions for setting the 0.5 counts-per-second interlock, the 1-kilowatt pulse interlock, and the operational channel low-voltage interlock were removed. These interlocks are properly set when performing the operational channel alignment procedure. The estimated time, section heading names, and title of the procedure were updated.

16. Procedure C013, Calibration of the Criticality Monitor, was removed from the procedure book. RAM R5, a criticality monitor, was reclassified as a RAM. Since procedure C014 covers the calibration of all reactor RAMs, procedure C013 was no longer required.

17. A line was added to the weekly instrument checklist to remind operators to fill the

liquid nitrogen dewer for the multichannel analyzer. This change has no effect on operations.

18. The reactor console received a software and hardware update. The 286 computers and obsolete network cards were replaced in the console. Software changes included a new version of the UNIX operating system, conversion of IC-DOS routines to standard UNIX, and conversion of timing loops to CPU-independent timing code. The installation and testing were performed with the manufacturer of the reactor console on site. Sufficient fuel was removed from the core to prevent criticality until the updated console software was proven to be reliable and safe.

19. Changing the backup tape in the RSD network server was added to the shutdown checklist. This change has no effect on operations.

E. RESULTS OF SURVEILLANCE TESTS AND INSPECTIONS

All maintenance and surveillance tasks during 1999 were accomplished on time with one exception. The internally required visual check of the control rod connecting pins was not completed during the month of September. Checking the control rod pins requires raising control rod drives. The surveillance task was due while the console was nonoperational and the core was defueled for the software upgrade of the reactor console. The test was performed as soon as the reactor was back on line in October.

Malfunctions are detailed in Section IV, Safety-Related Corrective Maintenance.

The Nuclear Regulatory Commission did not inspect the reactor facility during 1999.

There were two audits conducted during 1999.

The first audit was conducted by Harold H. Spence, a retired Army sergeant major, who has many years of experience operating, maintaining, and overseeing compliance of TRIGA reactors. Mr. Spence performed the audit for the year 1998. This audit was conducted in January 1999 due to logistical difficulties arranging the audit in December. Items noted were administrative issues only. Mr. Spence found incomplete emergency plan copies that were used for training and had worked their way into circulation, and he found several completed documents missing signatures. A review of the emergency and physical security plans found a few items that needed updating due to changes in the facility personnel titles. No safety concerns were noted.

The second audit was conducted by Howard Aderhold, a retired TRIGA reactor facility director. The 1999 Audit was conducted in November 1999. Mr. Aderhold's recommendations were as follows:

1. Dispose of radioactive wooden tables that were decaying in warm storage .

2. Update letters of agreement with emergency organizations that service AFRRI.

3. Carefully review data copied into the TRIGA Tracker maintenance log.

Mr. Aderhold found a date was transcribed into the TRIGA Tracker incorrectly. No safety concerns were noted.

Section II

Energy Generated by Current Reactor Core and Number of Pulses $2.00 or Larger

SECTION II

Energy Generated by the Reactor Core and the Number of Pulses $2.00 or Larger

Month	Kilowatt Hours
JAN	141.5
FEB	2,957.1
MAR	364.2
APR	26.3
MAY	409.6
JUN	1,305.0
JUL	1,027.4
AUG	1,288.4
SEP	378.7
OCT	851.4
NOV	596.2
DEC	1,038.4
TOTAL	10,384.2

Total energy generated in 1999: 10,384.2 kWh

Total energy on fuel elements: 955,790.3 kWh

Total energy on FFCRs*: 222,992.6 kWh

Total pulses this year $\geq$ $2.00: 5

Total pulses on fuel elements $\geq$ $2.00: 4,211

Total pulses on FFCRs* $\geq$ $2.00: 99

Total pulses this year: 124

Total pulses on fuel elements: 11,564

Total pulses on FFCRs*: 1,799

*Fuel-following control rods

Section III

Unscheduled Shutdowns

SECTION III

Unscheduled Shutdowns

There were no unscheduled shutdowns in 1999.

Section IV

Safety-Related Corrective Maintenance

SECTION IV

Safety-Related Corrective Maintenance

The following are excerpts from the malfunction logbook during the reporting period. The reason for the corrective action taken, in all cases, was to return the failed equipment to its proper operational status.

03 Feb 1999 The data acquisition and control (DAC) Computer failed to boot up after a console reboot. The DAC hard drive was replaced. The DAC computer then successfully booted up and operated properly. All scram, interlock, and mode functions were tested before the console was placed back in an operational status.

04 Feb 1999 The console was found locked up with a network fault message during the daily morning startup. While diagnosing the network problem, the DAC video monitor went blank. The problem was determined to be a bad video card. With the previous day's hard drive problem, the bad network card, and the bad video card all occurring in a short time frame, a bad power supply was suspected. A test of the power supply found some AC noise on a 12-DC line. The power supply was replaced. The set of network cards was replaced and the DAC computer booted up properly. Operational verification testing proved all scram and interlock functions were operating properly.

11 Mar 1999 The secondary continuous air monitor (CAM) on the reactor deck failed to provide an audio alarm for a high radiation reading during a daily test. Logistics was notified of the problem. Logistics personnel returned the CAM to an operational condition. Testing of the CAM proved the unit was functioning properly.

15 Jun 1999 The transient rod would not drive up during the daily startup. Diagnostics found a relay that operates the trans rod drive was not switching states. The relay was replaced. Tests of the new relay showed that it was operating properly and the transient rod could be driven up.

Section V

- Facility Changes and Changes to Procedures as Described in the Safety Analysis Report
- New Experiments or Tests During the Year

SECTION V

Facility and Procedure Changes as Described in the Safety Analysis Report (SAR); New Experiments or Tests Performed During the Year

A. ADMINISTRATIVE CHANGES TO THE SAR

1. The SAR was changed to remove all references to the use of thermoluminescent dosimeters (TLDs) as the perimeter monitoring method. An NRC/EPA-approved method for reporting environmental releases was instituted and added to the SAR.

2. The Radiation Sources Department title changed to Radiation Sciences Department. The SAR was updated to reflect this change. References to the locations of two tables in the SAR were changed to appendices.

3. A statement that a wind sensor will measure wind speed and direction, replaced the specific brand name of the wind-monitoring station listed in the SAR. The meteorological monitoring station was replaced with an equivalent system.

B. PROCEDURAL CHANGES TO THE SAR

There were no changes to procedures described in the SAR. Changes to the operational procedures are covered in Section I.

C. NEW EXPERIMENTS OR TESTS

No new experiments or tests were performed during the reporting period that were not encompassed by the SAR.

Attachment B contains the safety evaluations for changes not submitted to the NRC, pursuant to the provisions of 10 CFR 50.59. Each modification was described and qualified using Administrative Procedure A3, Facility Modification. This procedure uses a step-by-step process to document that there were no unreviewed safety questions or technical specification changes required prior to implementation.

Section VI through VIII

- Summary of Radioactive Effluent Released
- Environmental Radiological Surveys
- Exposures Greater than 10% of 10 CFR Limits

SECTION VI

Summary of Radioactive Effluent Released

A. Liquid Waste: The reactor produced no liquid waste during 1999.

B. Gaseous Waste: There were no particulate discharges in 1999.

The total activity of Ar-41 discharged in 1999 was 3.44 curies. The estimated activity from the release of Argon-41 was below the constraint limit for unrestricted areas (Table 2 of Appendix B to 10 CFR 20).

Quarterly:	Jan - Mar 1999	1.04 Ci
	Apr - Jun 1999	0.25 Ci
	Jul - Sep 1999	1.20 Ci
	Oct - Dec 1999	0.95 Ci

C. Solid Waste: All solid radioactive waste material was transferred to the AFRRI byproduct license; none was disposed of under the R-84 License.

SECTION VII

Environmental Radiological Surveys

A. Environmental sampling of soil and vegetation reported no radionuclide levels above the normal range. The radionuclides that were detected were those expected from natural background and from long-term fallout from nuclear weapons testing.

B. The calculated annual dose, due to Argon-41 release to the environment for 1999, was 0.1 mRem at the location of maximum exposure. The maximum exposure is calculated at a location 91 meters from the release point. Exposure to the general population at the boundary of the National Naval Medical Center is significantly less due to the diffusion of Argon-41 in the atmosphere. The constraint limit for exposure to the public is 10 millirem per year. The exposure dose was calculated using COMPLY code, level 2, which is the most conservative level of COMPLY. Emissions due to reactor operations were 1% of the 10 millirem constraint limit, or 0.1 millirem for the entire year.

C. The reactor in-plant surveys, specified in HPP 3-2, did not exceed any of the action levels specified in HPP 0-2.

SECTION VIII

Exposures Greater than 10% of 10 CFR 20 Limits

There were no doses to reactor staff personnel or reactor visitors greater than 10% of 10 CFR 20 occupational and public radiation dose limits.

ATTACHMENT A

10 CFR 50.59 Safety Evaluations of Modifications, Changes, and Enhancements to Procedures or Facilities

Wood added around exposure room 2 core projection
Clarification of prep area access, training, and update procedures A010/26
Remove use of TLD's from SAR
Valves added to valve exercising procedure M014
Wording changes to SAR for organizational title changes
Update list of nuclear instrumentation set points
Rewrite operational procedure 0 for writing and modifying procedures
Meteorological monitoring change in SAR
Combine control rod inspection procedures into single procedure M021
Update procedure M017 for checking rod drive belts
Combine cooling tower procedures into single procedure M050
Combine SCBA tank procedures into single procedure S006
Update water makeup system procedure M005
Update uninterruptible power supply test procedure M001
Update fuel element measurement procedure S010
Update Am-Be source check procedure M048
Removal of procedures M029, M030, M031, and M032 due to duplication
Removal of procedure C010
Change procedure C011 to calibration of demineralizer inlet temperature
Remove procedure C013 due to duplication
Update of weekly operational checklist
Upgrade of reactor console computers
Change greasing requirements for cooling system pumps
Update daily operational shutdown checklist

FACILITY MODIFICATION SUMMARY SHEET
1999

NUM	INITIAL DATE	TYPE CHANGE	LOCATION	PROPOSED CHANGE	WS#	COMPLETE DATE	APPROVAL DATE (RFD)	APPROVAL DATE (RRFSC)
1	27 Jan 99	Facility		Add wood around core projection in exposure room 2	2	27 Jan 99	2 Mar 99	3 Mar 99
2	27 Jan 99	Procedure	Procedures A010 and A026	Clarification of Procedure A010 and A026 for Prep Area Access Memorandum	2	27 Jan 99	27 Apr 99	26 May 99
3	1 Feb 99	Facility	SAR	Remove perimeter monitoring and the use of TLDs from the SAR	1	1 Feb 99	3 Mar 99	3 Mar 99
4	3 Feb 99	Procedure	Procedure M014	Modification of Procedure M014, Exercise All Valves in the Reactor Water System	2	3 Feb 99	2 Mar 99	3 Mar 99
5	9 Feb 99	Facility	SAR	Wording change to the SAR for clarity and to reflect title changes in the facility	1	9 Feb 99	9 Feb 99	3 Mar 99
6	10 Feb 99	Procedure	Procedure 8, Tab C	Update of nuclear instrumentation setpoints	2	10 Feb 99	2 Mar 99	3 Mar 99
7	11 Feb 99	Procedure	Procedure 0	Modifcation of Procedure 0, Writing and Modifying Procedures	2	11 Feb 99	2 Mar 99	3 Mar 99
8	26 Feb 99	Facility	SAR	SAR change for meteorological monitoring	1	26 Feb 99	26 Feb 99	3 Mar 99
9	1 Apr 99	Procedure	Procedure M021 and M022	Combine procedures M021 and M022 into single procedure M021	2	1 Apr 99	28 Apr 99	26 May 99
10	1 Apr 99	Procedure	Procedure M017	Update of procedure M017, Check belts on Reg, Safe, and Shim drives	2	1 Apr 99	27 Apr 99	26 May 99
11	1 Apr 99	Procedure	Procedure M015 and M050	Removal of Procedure M015 and addition of steps M050	2	1 Apr 99	26 Apr 99	26 may 99
12	2 Apr 99	Procedure	Procedure S006 and S009	Combine procedures S006 and S009	2	2 Apr 99	27 Apr 99	26 May 99
13	2 Apr 99	Procedure	Procedure M005	Update Procedure M005, Water Makeup System	2	2 Apr 99	27 Apr 99	26 May 99
14	13 Apr 99	Procedure	Procedure M001	Update of Procedure M001, Test uninterruptible power supply for radiation monitors	2	13 Apr 99	27 Apr 99	26 May 99
15	14 Apr 99	Procedure	Procedure S010	Update Procedure S010, Measurement of fuel elements	2	14 Apr 99	27 Apr 99	26 May 99
16	14 Apr 99	Procedure	Procedure M048	Update Procedure M048, Am-Be source check	2	14 Apr 99	27 Apr 99	26 May 99
17	14 Apr 99	Procedure	Various Procedures	Removal of Procedures M029, M030, M031, and M032	2	14 Apr 99	26 Apr 99	26 May 99
18	14 Apr 99	Procedure	Procedure C010	Removal of Procedure C010, Calibration of all SCRAM circuits	2	14 Apr 99	27 Apr 99	26 May 99
19	15 Apr 99	Procedure	Procedure C011	Change Procedure C011, Calibration of RWP to Calibration of Demineralizer Inlet Temperature	2	15 Apr 99	27 Apr 99	26 May 99
20	15 Apr 99	Procedure	Procedure C013	Remove Procedure C013, Calibration of Criticality Monitor	2	15 Apr 99	27 Apr 99	26 May 99

FACILITY MODIFICATION SUMMARY SHEET
1999

NUM	INITIAL DATE	TYPE CHANGE	LOCATION	PROPOSED CHANGE	WS#	COMPLETE DATE	APPROVAL DATE (RFD)	APPROVAL DATE (RRFSC)
21	18 Aug 99	Procedure	Procedure 8, Tab H	Update Weekly Operational Checklist	2	18 Aug 99	23 Aug 99	13 Sept 99
22	28 Sep 99	Facility		Upgrade to Reactor Control System Console (CSC) and Data Acquistion Control (DAC) Computers	2	28 Sep 99	8 Oct 99	8 Dec 99
23	29 Oct 99	Procedure	Procedure M006 and M007	Change greasing requirements for the primary and secondary pumps	2	29 Oct 99	15 Nov 99	8 Dec 99
24	4 Nov 99	Procedure	Procedure 8, Tab I	Update Daily Operational Shutdown Checklist	2	4 Nov 99	4 Nov 99	8 Dec 99

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Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: ADD WOOD AROUND CORE PROJECTION IN EXPOSURE ROOM #2

Modification to: Procedure ____ Facility XXX Experiment ____

Submitted by: PIERSON/WRISLEY Date 27 JAN 1999

1. Description of change:

This change added wood to Exposure Room #2 to match the setup for Exposure Room #1. Wood was added in the area of the core projection to fill the gap between the existing wood spaces and the core projection. The wood addition to both sides of the projection is 24 inches across and 12 inches thick. The K-excess measured for the reflector in Exposure Room #2, without the wood in place was -$0.44 and with the wood was - $0.43. The difference is $0.01. There is no significant change in the K-excess with the new reflector in Exposure Room #2.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

The additional wood added to ER2 is to duplicate the room setup of ER1 so that experiments done in ER1 can be performed in ER2. Neither the SAR nor the Technical Specifications describe how close the wood lining approaches the core projection. Because this change to ER2 has been proven safe in ER1, no safety concern is involved.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

None

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted ____ Not Required _XX___

Reviewed and approved by RFD _____ Date 2-02-99

RRFSC Notified SPO Date MAR 3 1999

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Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: _Clarification of Procedure A010 and A026 for_____

_Prep Area Access Memorandum ____

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____ Marte _____ Date _27 Jan 1999__

1. Description of change:

Procedures A026 and A010 were updated such that A010 now covers quarterly requirements and A026 now covers annual requirements. This eliminates overlap between the procedures.

Procedure A010 will require a quarterly review of the prep area access roster. The review will remove persons who no longer work at AFRRI from the roster and the security computer. Procedure A026 will direct the annual prep area briefing and the updating of the roster and security computer. Both procedures were reworded for clarity.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

Separating the tasks into two appropriate procedures does not change the intent of purpose of the procedures. These changes will allow better tracking of the tasks the procedures require.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No drawing change required

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted XX Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 99

RRFSC Notified SMO Date JUN 7 1999 smc

5059A010.2wp

MAY 26 1999

ACTION SHEET FOR:

Prep Area Access Memorandum, Procedure A010 and Procedure A026
January 1999

___✓___ Electronic copy of procedure A010 updated

___✓___ Electronic copy of procedure A026 updated

___✓___ Control room copy of procedure A010 updated

___✓___ Control room copy of procedure A026 updated

___✓___ All staff members have reviewed new procedure A010

___✓___ All staff members have reviewed new procedure A026

___✓___ Procedures reviewed by RRFSC and noted on staffing sheet

Review/Update Prep Area Access Memorandum

GENERAL:

1. Reference: Operational Procedure A2, Procedure A026, Operational Procedure 1, Tab A
2. Requirement: Quarterly
3. Tools: None
4. Equipment: None
5. Coordination: Personnel needing access to Prep Area
6. Estimated Time: 1 hr
7. Safety Precaution/Protection: None

SPECIFIC:

1. Review unescorted access list posted in prep area.
2. Line out names of individuals who no longer work at AFRRI.
3. Remove deleted persons from the security computer.
4. Update Triga Tracker.

INITIAL AND ANNUAL REFRESHER BRIEFING FOR PREP AREA USERS

GENERAL:

1. Reference: 10 CFR 19.12, Procedures A010, A2, and 1 Tab A
2. Requirement: Internal. Non reactor personnel authorized to use the Prep Area without escort will receive initial and annual refresher briefing on conduct and procedures in the Prep Area.
3. Frequency: Annual
4. Equipment: None
5. Coordination: Notify persons on current prep area access roster and others who may need access.
6. Estimated Time: 4 hours
7. Safety Precaution/Protection: Frisk out of Prep Area

SPECIFIC:

1. Set dates and times for briefing. Multiple sessions can be used to ensure all prep area users have an opportunity to attend. Special briefing dates and times may be set for those who can not attend normally scheduled classes.
2. Notify prep area users of briefing dates and times.
3. Conduct appropriate prep area briefing/training.
4. Record completion of requirement with memorandums or exams.
5. Update security computer to reflect those who have completed the annual requirements. Those that have not completed the requirements will be denied prep area access. Persons planning to depart AFRRI within 3 months of the briefing may be granted an access extension.
6. Produce a new roster and obtain RFD signature.
7. Post the roster in the prep area.
8. Update TRIGA Tracker.

Review/Update Prep Area Access Memorandum

I. General:

1. Reference: Reactor Administrative Procedure A2 and Operational Procedure 1, Tab A.
2. Requirement: Quarterly
3. Tools: None
4. Equipment: None
5. Coordination: Personnel needing access to Prep Area
6. Estimated Time: 1 hr
7. Safety Precaution/Protection: None

II. Procedural Sequence:

1. Review most current unescorted access list posted in prep area.
2. Remove names of individuals who no longer need unescorted access to the prep area.
3. Add names of other individuals who have completed the prep area users training course and require unescorted access to the prep area.
4. Retype roster and obtain RFD signature.
5. File Roster in both exposure room entry books in Prep Area.
6. Update Triga Tracker.

PREVIOUS VERSION

ANNUAL REFRESHER TRAINING FOR PREP AREA USERS

I. General:

1. Reference: 10 CFR 19.12
2. Requirement: Personnel authorized to use the Prep Area without escort will receive initial and annual refresher training on conduct and procedures in the Prep Area
3. Tools: None
4. Equipment: None
5. Coordination: SHDH, personnel requiring training
6. Estimated Time: 4 hours
7. Safety Precaution/Protection: Frisk out of Prep Area

II. Procedural Sequence:

1. Set date and time for training. Ensure this is within 395 days of last training. Multiple sessions can be used to ensure all Prep Area users have an oppurtunity to attend.
2. Notify authorized Prep Area users and SHDH of training date and time.
3. Prepare roster of individuals to be trained and make space for the individuals to certify by signature that they received the training.
4. Give training following Prep Area Briefing in training manual. Have individuals in attendance certify by signature on the roster.
5. Referring to training roster, update Prep Area Access Roster, as per procedure A010
6. File training roster in Prep Area User training file.
7. Update TRIGA Tracker.

PREVIOUS VERSION

Facility Modification Work Sheet 1

10 CFR 50.59 Analysis

Proposed Change: REMOVE PERIMETER MONITORING AND THE USE OF TLDs FROM THE SAFETY ANALYSIS REPORT

Submitted by: OSBORNE Date: 1 FEBRUARY 99

1. Description of change:

This change is to remove all references of the perimeter monitoring program and the use of thermolumenescent dosimeters (TLDs) from the safety analysis report (SAR). The current and proposed wording for the SAR is listed in section 5 of this analysis.

2. Reason for change:

This modification was first submitted to the Reactor and Radiation Facility Safety Committee in April 1997. The original worksheet was to remove all references to thermolumenescent dosimeters from the safety analysis report. The change was approved by the RRFSC, but overturned by the AFRRI Director. The modification was reworded and implemented as per the Director's orders.

The current Director concurs with the Committee's initial approval of the 50.59.

3. Verify that the proposed change does not involve a change to the Technical Specifications or produce an unresolved safety issue as specified in 10 CFR 50.59(a)(2). Attach an analysis to show this.

The environmental TLD system is being removed from the SAR to allow the use of current reporting methods to demonstrate compliance with the more restrictive constraints/regulations presently in effect.

Analysis attached? No

4. The proposed modification constitutes a changes in the facility or an operational procedure as described in the SAR. Describe which (check all that apply).

Procedure ____ Facility ____ Experiment ____

Facility Modification Work Sheet 1

5. Specify what sections of the SAR are applicable. In general terms describe the necessary updates to the SAR. Note that this description need not contain the final SAR wording.

CURRENT

3.6.4 Perimeter Monitoring

An environmental monitoring program is conducted by AFRRI primarily to measure environmental doses received from radionuclides produced by the AFRRI-TRIGA reactor, particularly Ar^{41}. The environmental monitoring program shall consist of an NRC/EPA approved reporting method. Internal and perimeter monitoring of the AFRRI building complex is accomplished with Thermal Luminescent Dosimeters (TLD's). The TLD's report exposure levels within the AFRRI complex from all sources including various radioactive materials held under the byproduct license.
A detailed description of the environmental and perimeter monitoring programs can be found in HPP 2-5.D, Environmental Radioactivity Releases, and HPP 4-6, In-Plant Radiological Monitoring.[3]

PROPOSED

3.6.4 Perimeter Monitoring

An environmental monitoring program is conducted by AFRRI primarily to measure environmental doses received from radionuclides produced by the AFRRI-TRIGA reactor, particularly Ar^{41}. The environmental monitoring program shall consist of an NRC/EPA approved reporting method.

6. For facility modifications, specify what testing is to be performed to assure that the systems involved operate in accordance with their design intent.

N/A
Comply code accepted by EPA and NRC.

Facility Modification Work Sheet 1

7. Specify associated information.

New drawings are: Attached ____
Not required _XX_

Does a drawing need to be sent Logistics?	Yes ____	No _XX_
Are training materials effected?	Yes ____	No _XX_
Will any Logs have to be changed?	Yes ____	No _XX_
Are other procedures effected?	Yes ____	No _XX_

List of items effected:

No reactor procedures will need to be changed.

8. Create an Action Sheet containing a list of associated work specified in items #7, attach a copy, and submit another to the RFD.

Action Sheet: Submitted _XX_ Not Required ___

Reviewed and approved by RFD _____ Date MAR 3 19[illegible]

RRFSC Concurrence _____ Date MAR 3 1999

ACTION SHEET

CHANGING SAR ON RADIATION EFFLUENT MONITORING

✓ Update section 3.6.4 of electronic SAR.

✓ Update section 3.6.4 of file copy of SAR.

✓ Update section 3.6.4 of control room copy of SAR.

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: **Modification of Procedure M014, Exercise All Valves in the Reactor Water System**

Modification to: Procedure **XX** Facility ____ Experiment ____

Submitted by: **Osborne** Date **3 February 99**

1. Description of change:

Four valves were added during the heat exchanger replacement. This modification adds these new valves to the list that are exercised during monthly reactor maintenance.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

This modification will ensure that the new valves are exercised. This does not produce an unresolved safety issue. No changes are required to the Technical Specifications or Safety Analysis Report.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, forward a copy of changes necessary to Facilities.

No facility changes

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted **XX** Not Required ____

Reviewed and approved by RFD _____ Date 2 Mar 99

RRFSC Notified _____ Date MAR 3 1999

ACTION SHEET FOR

Procedure M014

03 February 1999

✓ Electronic copy of Procedure M014 Updated

✓ Control room copy of Procedure M014 Updated

✓ Verify Technical Specifications do not need changed

✓ Verify SAR does not need changed

✓ All staff members have reviewed this procedure

✓ Change reviewed by RRFSC

EXERCISE ALL VALVES IN REACTOR WATER SYSTEM

I. General

1. Reference: Internal
2. Requirement: Monthly
3. Tools: None
4. Equipment: None
5. Coordination: Operator of the day
6. Estimated time: 45 Minutes

II. Procedure:

1. Coordinate with the operation's staff to ensure that closing the valves will not interfere with the daily operations.
2. Turn off the primary, secondary, and purification pumps.
3. Locate each of the following valves listed below. Open and close or close and open only one valve at a time.

   A. If a valve is closed then open the valve fully and reclose the valve.

   B. If the valve is open then fully close the valve and reopen it.

   C. If the valve is partly open such as the demineralizer flow rate valves, fully open the valve, fully close the valve then open 1/6 turn. Adjust the flow rates after the pumps are turned back on.

Valve number	Room number	System	Normal position
CW-1	3161	Primary	Open
CW-2	3161	Primary	Open
CW-13	3161	Primary	Closed
CW-3	2158	Primary	Open
CW-4	2158	Primary	Closed
CW-5	2158	Primary	Open
CW-34	2158	Primary	Closed

CW-7	2158	Primary	Open
CW-8	2158	Primary	Open
CW-9	2158	Primary	Open
CW-10	2158	Primary	Open
CW-12	2158	Primary	Open
CW-39	2158	Primary	Closed
CW-20	2158	Purification	Open
CW-22	2158	Purification	Open
CW-23	2158	Purification	Closed
CW-24	2158	Purification	Open
CW-25	2158	Purification	Closed
CW-26	2158	Purification	Open
CW-27	2158	Purification	Open
CW-28	2158	Purificaiton	Partially
CW-29	2158	Purification	Partially
CW-14	2158	Secondary	Open
CW-16	2158	Secondary	Open
CW-38	2158	Secondary	Open

4. After each of the valves has been exercised, turn on the primary, secondary, and demineralizer pumps. Adjust valves CW-28 and CW-29 such that there is a flow rate of 6 gallons per minute as read in the flow rate meters located on the wall above the primary pump motor.
5. Make a notation in TRIGA TRACKER.

Facility Modification Work Sheet 1

10 CFR 50.59 Analysis

Proposed Change: WORDING CHANGE TO THE SAFETY ANALYSIS REPORT FOR CLARITY AND TO REFLECT TITLE CHANGES IN THE FACILITY

Submitted by: OSBORNE Date: 9 FEBRUARY 99

1. Description of change:

Minor wording change to the safety analysis report for clarity and to reflect title changes in the facility.

2. Reason for change:

Radiation Sources Department was changed to Radiation Sciences Department. Table 6-3 and 6-4 are referenced in the body of the SAR, but were omitted from the last revision. Tables will be added as Table 3 and Table 4 of Appendix C. The references to these tables will be changed as well.

3. Verify that the proposed change does not involve a change to the Technical Specifications or produce an unresolved safety issue as specified in 10 CFR 50.59(a)(2). Attach an analysis to show this.

Analysis attached? Minor administrative changes only. Analysis not required.

4. The proposed modification constitutes a changes in the facility or an operational procedure as described in the SAR. Describe which (check all that apply).

Procedure XX Facility ____ Experiment ____

Facility Modification Work Sheet 1

5. Specify what sections of the SAR are applicable. In general terms describe the necessary updates to the SAR. Note that this description need not contain the final SAR wording.

All references to Radiation Sources Department will be changed to Radiation Sciences Department in section 7.4.

All references to table 6-3 will be changed to table 3, appendix C.

All references to table 6-4 will be changed to table 4, appendix C.

6. For facility modifications, specify what testing is to be performed to assure that the systems involved operate in accordance with their design intent.

N/A

Facility Modification Work Sheet 1

7. Specify associated information.

New drawings are: Attached ____
Not required _XX_

Does a drawing need to be sent Logistics? Yes ____ No _XX_
Are training materials effected? Yes ____ No _XX_
Will any Logs have to be changed? Yes ____ No _XX_
Are other procedures effected? Yes ____ No _XX_

List of items effected:

No reactor procedures will need to be changed.

8. Create an Action Sheet containing a list of associated work specified in items #7, attach a copy, and submit another to the RFD.

Action Sheet: Submitted _XX_ Not Required ___

Reviewed and approved by RFD _____ Date 9-Feb 99

RRFSC Concurrence _____ Date MAR 3 1999

ACTION SHEET

CHANGING SAR ON RADIATION EFFLUENT MONITORING

✓ Update section 7.4 of electronic, file, and control room copies SAR.

✓ Update section 6.3.4.2 of electronic, file, and control room copies of SAR.

✓ Update section 6.3.4.1 of electronic, file, and control room copies of SAR.

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: ___ Update of Nuclear Instrumentation Set Points _____

___ Procedure 8, Tab C, and status change of procedure_____

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: ____ Marte _____ Date __ 10 Feb 1999 __

1. Description of change:

Operational Procedure 8.C. was determined to not be a procedure, but rather a listing of the administrative set points. This procedure was removed from the procedure book and moved to a more appropriate location; the Reactor Operational Reference Notebook.

In the process, the list of nuclear instrumentation set points was updated.
In Section 3.a., the RAM set points were changed to 10 mRem. A second column was added with the administrative settings placed beside Technical Specification settings as per staff request. Slight wording changes in the GENERAL and SPECIFIC paragraphs reflect this change.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

The setpoints listed in this procedure are listed in the reactor technical specifications, not their location. This change only makes these values easier to locate and reference, and does not change the intent or the specifications in the Tech specs or SAR.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No facility changes

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted XX Not Required ____

Reviewed and approved by RFD _____ Date 2 MAR 99

RRFSC Notified SPO Date MAR 3 1999

5059op8c.wpd

ACTION SHEET FOR:

Nuclear Instrumentation Sep Points and Procedure 8, TAB C
Febuary 1999

✓ Electronic copy of Nuclear Instrumentation Set Points stored on R drive

✓ Curve book copy of Nuclear Instrumentation Set Points added

✓ All staff members have reviewed new item

✓ Operational Procedure 8.C. removed from procedure book

✓ Operational Procedure 8.C. removed from R drive

✓ Procedure index updated

✓ Procedure reviewed by RRFSC

NUCLEAR INSTRUMENTATION SET POINTS

GENERAL:

The administrative set points may not be adjusted without specific approval by the RFD. In no case may they be set less-conservative than the Technical Specifications.

SPECIFIC

The following are channel or monitor set points (scram, rod withdrawal prevent, alarm) for the Technical Specifications and the Administrative settings.

	Tech Spec	Administrative
1. Scrams:		
a. Fuel Temperature 1 & 2:	600 C	575 C
b. High Flux 1 & 2:	110% (1.1 MW)	109%
c. Safe Chambers 1 & 2 HV Loss:	20%	10%
d. Pulse Timer:	< 15 seconds	<15 seconds
e. Pool level	14 feet above core	14 feet above core
2. Rod Withdrawal Prevents:		
a. Period:	3 seconds	3 seconds
b. 1 KW (Pulse Mode):	1 KW	1 KW
c. Source:	0.5 CPS	0.5 CPS
d. Water Inlet Temperature:	60 degrees C	50 degrees C
e. Fission Chamber HV Loss:	20%	10%
3. Alarms:		
a. RAMS:		10 mRem
b. CAMS:		10,000 CPM
c. Stack Gas:		3.2E-5 microCi/cc at stack top
d. Water Monitor Box Gamma:		7000 CPM

* Current set points are the administrative set points

NUCLEAR INSTRUMENTATION SET POINTS

GENERAL:

These set points may be adjusted for a specific operation by of the RFD or ROS but in no case may they be set at a point non-conservative to the technical specifications.

SPECIFIC

The following are channel or monitor set points (alarm, scram, rod withdrawal prevent).

1. Scrams:
   a. Fuel Temperature 1 & 2: 575 C
   b. High Flux 1 & 2: 110% (1.1 MW)
   c. Safe Chambers 1 & 2 HV Loss: 20%
   d. Pulse Timer: Less than 15 seconds
   e. Steady State Timer: as necessary
2. Rod Withdrawal Prevents:
   a. Period: 3 seconds
   b. 1 KW (Pulse Mode): 1 KW
   c. Source: 0.5 CPS
   d. Water Inlet Temperature: 50 degrees C
   e. Fission Chamber HV Loss: 20%
3. Alarms:
   a. RAMS: As directed in procedures
   b. CAMS: 10,000 CPM
   c. Stack Gas: 3.2E-5 microCi/cc at stack top
   d. Water Monitor Box Gamma: 7000 CPM

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: **Clarification of Procedure 0, Writing and Modifying Procedures**

Modification to: Procedure **XX** Facility ____ Experiment ____

Submitted by: **Marté** Date **11 February 99**

1. Description of change:

This modification is to simplify and clarify the process of adding new or changing existing procedures.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

This modification does not change the intent of the procedure. No changes to the Technical Specifications or Safety Analysis Report are required.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, forward a copy of changes necessary to Facilities.

No facility changes

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted **XX** Not Required ____

Reviewed and approved by RFD _____ Date 2 mar 99

RRFSC Notified _____ Date MAR 3 1999

ACTION SHEET FOR

Procedure 0 Writing and Modifying Procedures

11 February 1999

✓ Electronic copy of Procedure 0 Updated

✓ Control room copy of Procedure 0 Updated

✓ Verify Technical Specifications do not need changed

✓ Verify SAR does not need changed

✓ All staff members have reviewed this procedure

✓ Change reviewed by RRFSC

WRITING AND MODIFYING PROCEDURES

GENERAL

Procedures are written to ensure the safe operation of the reactor, but do not preclude the use of independent judgment or action. Writing and modifying of procedures will follow the guidelines given below.

SPECIFIC

1. Written procedures for certain activities shall be approved by the Reactor Facility Director and reviewed by the Reactor and Radiation Facility Safety Committee (RRFSC). The procedures shall be sufficient in scope to ensure the safe operation of the reactor, but shall not preclude the use of independent judgment and action as deemed necessary. These activities include the following:
    a. Conduct of irradiations and experiments that could affect the operation and safety of the reactor.
    b. Reactor staff-training program.
    c. Surveillance, testing, and calibration of instruments, components, and systems involving nuclear safety.
    d. Personnel radiation protection consistent with 10 CFR 20.
    e. Implementation of required plans such as the Security Plan and Emergency Plan.
    f. Reactor core loading and unloading.
    g. Checkout startup, standard operations, and securing the facility.
2. Write a new procedure following the attached sample format or edit the original electronic file.

    Procedures should contain the following.

    Procedure Type Bar with procedure type and number in bold. If the

procedure is new, obtain a new procedure number from the reactor management.

Procedure Name Bar with the procedure name in bold

Footer with version date, file location, and page number (if more than one page)

The procedure may also contain the following items in the section called GENERAL:

Reference: What manufacturer's literature or other procedures that may be referenced by this procedure.

Requirement: What document requires this procedure to be performed.

Frequency: How often is this procedure required to be performed.

Equipment: Hand tools and equipment required.

Coordination: Other departments, staff, reactor operations affected.

Estimated Time: How long it should take to complete the procedure.

Safety Precaution/protection: Safety issues associated with this procedure.

Specific actions which are to be followed should be entered under the SPECIFIC section. The level of detail will depend on the type of procedure. Calibration procedures will have a high amount of detail, i.e. step by step. General policy procedures should have general statements of policy.

a. A draft version of a new or modified procedure should be staffed to allow everyone an opportunity to review the procedure and make comments. If the procedure change involves an aspect covered by the Safety and Health Department, staff the procedure to the Radiation Safety Officer.
b. After the Reactor Facility Director has approved the final version of the procedure with the appropriate procedure modification documentation, the procedure shall be staffed and each reactor member will sign that they are aware of the changes in the new or changed procedure before performing the procedure for the first time. The staffing sheet is to be

filed with the procedure.

c. Send the procedure to RRFSC for review.

3. Although substantive changes to the above procedures shall be made only with approval by the Reactor Facility Director, temporary changes to the procedures that do not change their original intent may be made by the ROS. All such temporary changes shall be documented and subsequently reviewed and approved by the Reactor Facility Director.

PUMP & MOTOR BEARINGS OF PRIMARY WATER SYSTEM

GENERAL:

1. Reference: Manufacturer's Operating Manual
2. Requirement: Monthly
3. Tools: Adjustable wrench, grease gun and clean rags
4. Coordination: Coordinate removing primary pump from service with reactor staff
5. Estimated Time: 45 minutes
6. Safety Precaution/Protection:
   Turn off electrical power to pump motor at safety switch located on the wall behind motor

SPECIFIC:

1. Notify reactor staff the primary cooling water pump will be turned off for maintenance.
2. Take tools to second floor equipment room (RM 2158)
3. Locate safety switch on the wall behind the motor, move the handle on the right side of the box downward to the OFF position.
4. Lubricate in accordance with the manufacturer's instructions.
5. Locate the safety switch and move upward to the ON position.
6. Clean tools and return to the proper storage location.
7. Restore electrical power to motor by depressing pushbutton marked "Reactor Main Pump" located behind the door in RM 3160.
8. Record the date and name(s) of personnel performing maintenance on TRIGA Tracker .

Facility Modification Work Sheet 1

10 CFR 50.59 Analysis

Proposed Change: _____ SAR change for Meteorological Monitoring ___

Submitted by: _____ Marte _____ Date __ 26 Feb 99___

1. Description of change:

Section 3.7.3 was changed to remove the specification of Bendix-Freiz for the type of wind vane located at AFRRI. The wind vane was replaced with a new unit which provides wind speed and direction on a chart recorder in the ERT room.

2. Reason for change:

The old chart recorders were no longer economical to maintain.

3. Verify that the proposed change does not involve a change to the Technical Specifications or produce an unresolved safety issue as specified in 10 CFR 50.59(a)(2). Attach an analysis to show this.

Analysis attached? NO, Technical Specifications does not refer to the wind vane.

4. The proposed modification constitutes a changes in the facility or an operational procedure as described in the SAR. Describe which (check all that apply).

Procedure ____ Facility _XX_ Experiment ____

Facility Modification Work Sheet 1

5. Specify what sections of the SAR are applicable. In general terms describe the necessary updates to the SAR. Note that this description need not contain the final SAR wording.

The sentence "A Bendix-Freiz aerovane measures wind speed and direction at the AFRRI complex." was changed to "A wind monitor measures wind speed and direction at the AFRRI complex."

The rest of the paragraph, "The wind sensor is mounted on a tower located on the roof of Building #42. The wind direction and speed are recorded on a strip chart located in the Emergency Response Center." was unchanged.

6. For facility modifications, specify what testing is to be performed to assure that the systems involved operate in accordance with their design intent.

The new unit comes calibrated. The direction will be set using a magnetic compass. Manufacturers literature recommends maintenance only when parts (bearings or direction potentiometer) are replaced.

Facility Modification Work Sheet 1

7. Specify associated information.

New drawings are: Attached ____
Not required _XX_ (Manufacturer Literature Filed)

Does a drawing need to be sent Logistics?	Yes ____	No _XX_
Are training materials effected?	Yes ____	No _XX_
Will any Logs have to be changed?	Yes ____	No _XX_
Are other procedures effected?	Yes ____	No _XX_

List of items effected:

Section 3.7.3 of SAR only.

8. Create an Action Sheet containing a list of associated work specified in items #7, attach a copy, and submit another to the RFD.

Action Sheet: Submitted _XX_ Not Required ____

Reviewed and approved by RFD _____ Date 2/26/99

RRFSC Concurrence SPO Date MAR 3 1999

5059wind.wp

ACTION SHEET FOR

SAR Change for Wind Monitor

✓ Install new unit.

✓ Calibrate Direction of Wind Vane

✓ File Manufacturers Literature

✓ Electronic copy of SAR updated

✓ File copy of SAR Updated

✓ Control room copy of SAR updated

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Combine procedures M021 (Control Rods Visual Inspection) and M022 (Control Rod Examination) into single procedure M021

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __1 April 1999____

1. Description of change:

During a review of procedures, two procedures were found to have the same Technical Specification requirement. The two procedures were combined to include the visual inspection from M021 and the measurement inspection from procedure M022. Much of the procedure was reworded for clarity. The Reference and Requirement in the "General" section were changed to Requirement and Frequency. A safety precaution was added for the radioactive FFCR's.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

All of the Tech Spec requirements from the two procedures have been maintained. Combining M021 and M022 has resulted in a more concise, easy to follow procedure.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX__ Not Required ____

Reviewed and approved by RFD _____ Date 26 APR 99

RRFSC Notified _____ Date MAY 26 1999

5059M021.2wp

ACTION SHEET FOR

Procedure M021 and M022
1 April 1999

✓ Electronic copy of Procedure M021 updated
✓ Control room copy of Procedure M021 updated

✓ Electronic copy of Procedure M022 removed
✓ Control room copy of Procedure M022 removed

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ Check annual shutdown checklist for proper procedure number
✓ Perform index search for removed procedure and proper title entry

✓ All staff members have reviewed Procedure M021

✓ Procedure reviewed by RRFSC and staffing sheet updated

Examination of Control Rods

I. General:

1. Requirement: Tech Spec 4.1c, 4.2.5
2. Frequency: Annual
3. Tools: Wrenches, Allen Keys, Pliers, Screwdrivers, String
4. Equipment: None
5. Coordination: Annual Shutdown
6. Estimated time: 30 minutes
7. Safety Precaution: Keep radioactive FFCR's sufficiently below the pool surface.

II. Procedural Sequence:

1. Inspection of control rods should be conducted as part of annual shutdown activities. If this examination is not part of the annual shutdown, perform a shutdown margin calculation and remove enough fuel such that with a control rod removed, and a fuel followed control rod positioned with the fuel section in the core, the reactor is shut down by a minimum of $1.00 Remove the safe, shim, and reg rod drives as per procedure M035. Remove each of the rod drive barrels as per procedure M038.
2. Attach the FFCR measuring tool inside the reactor tank with the FFCR standard in the tool. Allow the temperature of the tool and standard to equalize with the pool water.
3. Individually pull each control rod out of the core. Only remove one control rod from the core at a time.
4. With a portable radiation survey device operating over the reactor pool, bring each control rod as close to the surface as possible without increasing the surface radiation level. About 4-6 feet of water is sufficient to ensure personnel safety.
5. Use binoculars to observe the surface of the control rod.

6. Look for bumps or dents on the stainless steel surface, areas of rubbing or scraping, or any type of corrosion or pock marks.
7. Zero measuring tool using FFCR standard.
8. Measure length of each FFCR and compare to measurements in fuel records.
9. Check bow for each FFCR.
10. Return each FFCR to core or storage.
11. With HP support, remove trans rod from pool and measure diameter of top, center, and bottom with micrometer. Compare to previous records.
12. Inspect surface of trans rod for damage.
13. Return trans rod to core or storage.
14. If any damage is observed notify the RFD.
15. After RFD has inspected the damaged rod, make appropriate entry into core physics log and fuel record log. Follow any special instructions made by the RFD.
16. Update Triga Tracker.

Visual Inspection of Control Rods

I. General:

1.	Reference:	Tech Spec 4.1c, 4.2.5
2.	Requirement:	Annual
3.	Tools:	Wrenches, Allen Keys, Pliers, Screwdrivers, String
4.	Equipment:	None
5.	Coordination:	Annual Shutdown
6.	Estimated time:	30 minutes

II. Procedural Sequence:

1. Perform a shutdown margin calculation.
2. Remove enough fuel such that with a control rod removed and a second fuel following control rod pulled with the fuel section in core that the reactor is shut down by at least 50 cents.
3. Remove the safe, shim, and reg rod drives.
4. With an operator on console manually pull up each of the rod drives and disconnect the piston from the connecting rod. Attach a string to each connecting rod.
5. Pull each connecting rod and control rod out of the core one at a time. Only remove one control rod from the core at a time.
6. Using a portable radiation survey device bring each control rod as close to the surface as possible without increasing the surface radiation level.
7. Use binoculars to observe the surface of the control rod.
8. Look for bumps or dents on the stainless steel surface, areas of rubbing or scraping, or any type of corrosion or pock marks.
9. If any damage is observed notify the RFD.
10. After verification of damage by the RFD, make appropriate entry into core physics log and fuel record log.
11. Continue with annual shutdown or reassemble connecting rods, rod drives,

and replace fuel.

12. Update Triga Tracker

PREVIOUS VERSION

Examination of Fuel Follower Control Rods and Transient Control Rod

I. General:

1. Reference: Technical Specification 4.1c, 4.2.5
2. Requirement: Annual
3. Tools: Wrenches
4. Equipment: Fuel measuring tool with FFCR adapters
5. Coordination: Coordinate with Safety and Health Department for health physics support prior to bringing any control rod above the surface of the pool.
6. Estimated Time: 5 hrs
7. Safety Precaution/Protection: Radiation protection measures should be taken as detailed below.

II. Procedural Sequence:

1. Inspection of control rods should be conducted as part of annual shutdown activities.
2. Visual inspection of FFCRs must be conducted using binoculars or the underwater camera since the radiation level of the fuel portion of the FFCR will preclude its removal from the water.
3. The transient control rod may be removed from the pool after being surveyed by a health physics technician.
4. CAUTION: FFCRs may be extremely radioactive and should not be brought within 5 feet of the surface of the pool without specific approval from the RFD.
5. Attach the fuel measuring tool to the core shroud by securing the measuring tool to the inside of the core support structure with the bottom end resting on the shelf.
6. Insert FFCR standard into tool and allow temperature to equalize.

7. Adjust length of measuring tool extension rod to zero tool.
8. Measure length of each FFCR and compare to previous records.
9. Inspect entire surface of FFCR for damage.
10 Return FFCR to core or storage.
11. With HP support, remove trans rod from pool and measure diameter of top, center, and bottom with micrometer. Compare to previous records.
12. Inspect surface of trans rod for damage.
13. Return trans rod to storage or core.
14. Make necessary entries in log book, shutdown checklist, and fuel element record book.
15. Update Triga Tracker.

DELETED VERSION

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Update of procedure M017, Check Belts on Reg, Safe, and Shim Drives

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __1 April 1999____

Step 7 of this procedure refers to procedure M0RPI. Temporary procedure M0RPI was under development at the last updating of procedure M017 and did not yet have its official name. Procedure M0RPI has since been added to the procedures and named M037, Digital Rod Position Indicator. This change was to rename the procedure name from M0RPI to M037 in step 7.

The word requirement was changed to frequency in the "General" section of the procedure. This update was made during a review of procedures.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

This change does not change the method of performing the procedure.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX__ Not Required ____

Reviewed and approved by RFD _____ Date 27 Apr 99

RRFSC Notified _____ Date MAY 26 1999

5059M017.2wp

ACTION SHEET FOR

Procedure M017

1 April 1999

✓ Electronic copy of Procedure M017 updated

✓ Control room copy of Procedure M017 updated

✓ Verify Technical Specifications do not need changed

✓ Verify SAR does not need changed

✓ All staff members have reviewed Procedure M017

✓ Procedure reviewed by RRFSC and staffing sheet updated

Check Belts on Reg, Safe, and Shim Drives

I. General

1.	Reference:	Internal requirement
2.	Frequency:	Quarterly
3.	Tools:	Screwdrivers, Wrenches
4.	Equipment:	None
5.	Coordination:	Operator of the Day
6.	Estimated Time:	30 to 60 minutes

II. Procedural Sequence:

1. Ensure that maintenance will not interfere with daily operations. Perform maintenance when console is not in use.
2. Loosen the four screws which hold the belt cover and remove the belt cover.
3. Gently flex the chain belt with a finger. The belt should be snug but not piano wire tight. If pressing the upper side of the belt causes the lower side of the belt to raise more than a millimeter, thus taking the slack out of the belt, then it is too loose.
4. Gently flex the no slip molded polyurethane belt. The belt should be snug but not piano wire tight or it will break. The belt will stretch as it is pressed but will bounce back when pressure is released. The belt should not be missing any teeth nor should any obvious cracks or damage be observed. If there is any damage to the belt replace it. New belts are stored in 3152 in the cabinet full of console parts.
5. ADJUSTING THE CHAIN DRIVE
   a. Loosen the four stepper motor mounting bolts.
   b. Move the stepper motor to adjust the chain.
   c. Hold the stepper motor in place and tighten the mounting bolts.
6. ADJUSTING THE MOLDED POLYURETHANE NO SLIP BELT

A. Loosen the mounting nut which holds the potentiometer to the bracket.

B. Move the potentiometer to adjust the belt.

C. Hold the potentiometer in place and tighten the mounting nut.

7. If an adjustment is made to either the chain drive or the no-slip belt check the calibration of the rod position numbers on the console. Adjust the rod position potentiometers following procedure M037.

8. Replace the belt cover and secure the mounting screws.

9. Make a notation in TRIGA TRACKER.

Check Belts on Reg, Safe, and Shim Drives

I. General

1.	Reference:	Internal
2.	Requirements:	Quarterly
3.	Tools:	Screwdrivers, Wrenches
4.	Equipment:	None
5.	Coordination:	Operator of the Day
6.	Estimated Time:	30 to 60 minutes

II. Procedural Sequence:

1. Ensure that maintenance will not interfere with daily operations. Perform maintenance when console is not operating.
2. Loosen the four screws which hold the belt cover and remove the belt cover.
3. Gently flex the chain belt with a finger. The belt should be snug but not piano wire tight. If pressing the upper side of the belt causes the lower side of the belt to raise more than a millimeter, thus taking the slack out of the belt, then it is too loose.
4. Gently flex the no slip molded polyurethane belt. The belt should be snug but not piano wire tight or it will break. The belt will stretch as it is pressed but will bounce back when pressure is released. The belt should not be missing any teeth nor should any obvious cracks or damage be observed. If there is any damage to the belt replace it. New belts are stored in 3152 in the cabinet full of console parts.
5. ADJUSTING THE CHAIN DRIVE
   a. Loosen the four stepper motor mounting bolts.
   b. Move the stepper motor to adjust the chain.
   c. Hold the stepper motor in place and tighten the mounting bolts.
6. ADJUSTING THE MOLDED POLYURETHANE NO SLIP BELT
   A. Loosen the mounting nut which holds the potentiometer to the bracket.

B. Move the potentiometer to adjust the belt.

C. Hold the potentiometer in place and tighten the mounting nut.

7. If an adjustment is made to either the chain drive or the no-slip belt check the calibration of the rod position numbers on the console. Adjust the rod position potentiometers following procedure M0RPI.

8. Replace the belt cover and secure the mounting screws.

9. Make a notation in TRIGA TRACKER.

PREVIOUS VERSION

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Removal of Procedure M015, "Cooling Tower Inspection" and Add additional steps to M050, "Cooling Tower Drain and Refill"

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __1 April 1999____

1. Description of change:

Procedure M015, Cooling Tower Inspection, was removed from the procedures, and important steps from procedure M015 were added to procedure M050.

Items added to M050 were: 1) Turning the fan to the Hand (on) position. 2) Checking the tower for leaks, foreign material, water level and physical damage. 3) Verifying the low water light is operational. 4) Verifying the fan operates. 5) Frequency was added to the "General" section.

The method of removing deposits was modified to include the use of a water hose.
This update was made during a review of procedures.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

Adding the important steps from M015 to procedure M050 does not produce an unresolved safety issue because the procedural steps were not changed. The procedural steps were simply combined with another procedure..

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX__ Not Required ____

Reviewed and approved by RFD _____ Date 4/26/99

RRFSC Notified _____ Date MAY 26 1999

5059M015.2wp

ACTION SHEET FOR

Procedures M015 and M050
1 April 1999

✓ Electronic copy of Procedure M015 removed
✓ Control room copy of Procedure M015 removed
✓ Triga Tracker updated to remove Procedure M015

✓ Electronic copy of Procedure M050 updated
✓ Control room copy of Procedure M050 updated

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed Procedure M050

✓ Procedure reviewed by RRFSC and staffing sheet updated

COOLING TOWER DRAIN and REFILL

I. General

1. Reference: None
2. Requirement: Internal
3. Frequency: Monthly
3. Tools: Broom, hose, radios
4. Coordination: Operations schedule. Not to be performed while cooling tower is needed. Notify guards that staff will be entering roof.
5. Estimated Time: Half hour
6. Safety Precaution/Protection: Use caution around operating fan.

II. Procedural Sequence:

The cooling tower sump needs to be drained more often in the summer than in the winter. Perform steps 1-12 in the following months: January, March, May, June, July, August, September, and November. In months not listed go to step 13, Update Triga Tracker.

1. Ensure that the reactor will not require cooling during this maintenance.
2. Turn fan switch at the motor control center to HAND (the "HAND" position indicates MANUAL on).
3. Verify water is flowing at the cooling tower and the fan is operating.
4. Shut off the cooling tower fan. The switch is on the south end of the cooling tower.
5. Use the radio to instruct someone to shut off the secondary pump. Label the control room switch indicating that it should not be turned on until the cooling tower sump is refilled.

6. Inspect the cooling tower for leaks, foreign material, water level and physical damage
7. Open the cooling tower sump drain valve located under the east side of the cooling tower.
8. Stir the deposits with the broom or flush them out with the hose. Not all deposits need to be removed every time the tower is drained.
9. When the cooling tower sump is empty, close the drain valve and allow the sump to refill. Verify the "low water in cooling tower lamp" is illuminated.
10. Turn the cooling tower fan back on at the tower.
11. When the low water in cooling tower lamp located over the motor control center goes out (about 15 minutes) turn the secondary pump back on.
12. Turn the fan switch at the motor control center to auto.
13. Update Triga Tracker.

COOLING TOWER DRAIN and REFILL

I. General

1. Reference: None
2. Requirement: Monthly
3. Tools: Broom
4. Coordination: Operations schedule. Not to be performed while cooling tower is needed. Notify guards that staff will be entering roof.
5. Estimated Time: Half hour
6. Safety Precaution/Protection: Shut off cooling tower fan.

II. Procedural Sequence:

The cooling tower sump needs to be drained more often in the summer than in the winter. Perform this procedure in the following months: January, March, May, June, July, August, September, and November. In months not listed go to step 9, Update Triga Tracker.

1. Ensure that the reactor will not be operating at power for 24 hours.
2. Shut off the secondary pump. Label the control room switch indicating that it should not be turned on until the cooling tower sump is refilled.
3. Shut off the cooling tower fan. The switch is on the south end of the cooling tower.
4. Open the cooling tower sump drain valve located under the east side of the cooling tower.
5. Stir the deposits in the sump of the tower with the broom and attempt to flush as much of them down the drain line as possible. You may refill the cooling tower and redrain to flush out more deposites if desired. Not all deposites need to be removed every time the tower is drained.

6. When the cooling tower sump is empty, close the drain valve and allow the sump to refill.
7. Turn the cooling tower fan back on.
8. When the low water in cooling tower lamp located over the motor control center goes out (about 15 minutes) turn the secondary pump back on.
9. Update Triga Tracker.

PREVIOUS VERSION

Cooling Tower Inspection

I. General

1. Reference: Internal
2. Requirement: Semi-annually
3. Tools: (2) Two way radio and 8 foot step ladder
4. Coordination: Notify the Security Desk before going onto roof
5. Estimated Time: 30 minutes
6. Safety Precaution/Protection: Low overhead clearance, poor footing and falling hazard when using ladder

II. Procedural Sequence

1. Enlist the assistance of one other reactor staff member with a two way radio to observe the Low Cooling Tower Water Level indicator light in the reactor room (RM 3160)
2. Ensure the secondary water pump is operating
3. Open the valve indicated in drawing, determine if the indicator light in the reactor room came on, by using the two way radio
4. Inspect cooling tower for leaks, foreign material, water level, and physical damage
5. Insure proper operation of fan, float valve and drains
6. Record date and name(s) of personnel performing maintenance in TRIGA Tracker.

REMOVED FROM PROCEDURES

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Combine Procedures S006 and S009

Hydrostatic and Visual Testing of SCBA Tanks

Modification to: Procedure XX Facility ____ Experiment ____

Submitted by: Marté Date 2 April 1999

1. Description of change:
The word "Requirement" was changed to "Frequency" in the General section.
The specification for Visual testing was moved from procedure S009 to procedure S006. Step three was rewritten to simply specify the Hydrostatic and Visual testing. Pick up and delivery will be handled on a contractor by contractor basis, and need not be specified in the procedure.
Procedure S009 was removed from the procedures as all its requirements are covered in the new S006 procedure.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).
Changing who is responsible for pick up and delivery of the tanks does not cause an unresolved safety issue.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.
No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.
None.

5. List of associated drawings, procedures, logs, or other materials to be changed:
None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.
Action Sheet: Submitted XX Not Required ____

Reviewed and approved by RFD _____ Date 4/27/99

RRFSC Notified SNO Date MAY 26 1999

5059S006.2wp

ACTION SHEET FOR

Procedure S006
2 April 1999

✓ Electronic copy of Procedure S006 updated
✓ Control room copy of Procedure S006 updated
✓ Verify "Letter from Survivair" is moved to S006 procedure

✓ Electronic copy of Procedure S009 removed
✓ Control room copy of Procedure S009 removed
✓ Remove Procedure S009 from Triga Tracker

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed the new procedure
✓ Change reviewed by RRFSC

Hydrostatic and Visual Testing of SCBA Tanks

I. General:

1. Requirement: 49 CFR 173.34, CGA Pamphlet C-6.1A, Instruction Manual for the Survivair Mark 2 SCBA , Letter from Survivair
2. Frequency: Every three years
3. Tools: As required
4. Equipment: None
5. Coordination: None
6. Estimated Time: 3-5 days depending on contractor turn-around.
7. Safety Precaution/Protection: Standard safety procedures for handling pressurized cylinders

II. Procedural Sequence:

1. Review TRIGA Tracker for dates of required testing.
2. Notify purchasing and ensure contract is in place for contractor servicing of SCBA tanks.
3. Make arrangements for hydrostatic and visual testing of SCBA tanks. Tanks should be tested in multiple batches to ensure availability of equipment at all times.
4. Return tanks to storage location.
5. Record date of test in TRIGA Tracker and file test certification from contractor in reactor files.

Hydrostatic Testing of SCBA Tanks

I. General:

1. Reference: 49 CFR 173.34, CGA Pamphlet C-6.1A, Instruction Manual for the Survivair Mark 2 SCBA
2. Requirement: Every three years
3. Tools: As required
4. Equipment: SCBA air cylinders, hydrostatic testing machine
5. Coordination: Coordinate with purchasing department for contract procedures and with contractor for acceptable time
6. Estimated Time: 3-5 days depending on contractor turn-around.
7. Safety Precaution/Protection: Standard safety procedures for handling pressurized cylinders

II. Procedural Sequence:

1. Review TRIGA Tracker for dates of required testing.
2. Notify purchasing and ensure contract is in place for contractor servicing of SCBAs.
3. Deliver tanks to the contractor unless arrangements have been made for pickup (test tanks in several batches so not all are gone at one time)
4. Pick-up tanks and return to storage location.
5. Record date of test in TRIGA Tracker and file test certification from contractor in reactor files.

PREVIOUS VERSION

SCBA Visual Inspection (VIP)

I. General:

1. Reference: Letter from Survivair; CGA Standard C-6; Instruction Manual for the Survivair Mark 2 SCBA
2. Requirement: Every 3 years remove the cylinder valve and inspect the interior of the cylinder
3. Tools: As required
4. Equipment: SCBA air cylinders
5. Coordination: Coordinate with purchasing department for contract procedures and with contractor for acceptable time
6. Estimated Time: 2-3 days depending on contractor turn-around
7. Safety Precaution/Protection: Standard safety procedures for handling pressurized cylinders

II. Procedural Sequence:

1. Review TRIGA Tracker for dates of required testing.
2. Place purchase request to have SCBA bottles hydrostatic and VIP tested.
3. Deliver tanks to the contractor unless arrangements have been made for pickup (test tanks in several batches so not all are gone at one time)
4. Pick-up tanks and return to storage location.
5. Record date of test in TRIGA Tracker and file test certification or receipt from contractor in reactor files.

REMOVED FROM PROCEDURES

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Update Procedure M005, Millipore Water Makeup System

Modification to: Procedure XX Facility ____ Experiment ____

Submitted by: Marté Date 2 April 1999

1. Description of change:
The word "Requirement" was changed to "Frequency" in the General section.
The line describing the location of the "open line" being behind the "still tank" was removed.
Line 2 in the procedure was shortened to remove unnecessary comments.
Line 5, the comment about leaving the bucket, was removed.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).
The changes outlined reflect minor wording changes to enhance the clarity of the document.
No Unresolved safety issues are raised by this action.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.
No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.
None.

5. List of associated drawings, procedures, logs, or other materials to be changed:
None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.
Action Sheet: Submitted XX Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 99

RRFSC Notified SPD Date MAY 26 1999

5059M005.2wp

ACTION SHEET FOR

Procedure M005
2 April 1999

✓ Electronic copy of Procedure M005 updated
✓ Control room copy of Procedure M005 updated

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed the new procedure
✓ Change reviewed by RRFSC

MILLIPORE WATER MAKEUP SYSTEM.

I. General:

1. Reference: Millipore System Manual
2. Frequency: Monthly
3. Tools: None
4. Equipment: Bucket
5. Coordination: None
6. Estimated Time: Ten minutes
7. Safety precautions: None

II. Procedural Sequence:

1. Place bucket under open end of water line on right side of millipore filter system. Make sure the line is open so that the water does not go into the pool.
2. Open valve CW32, which allows water to pass through the system.
3. Run half a gallon to a gallon of water through the system into the bucket. Observe the conductivity meter on the outlet pipe. If the reading on the meter does not increase during test, notify ROS or RFD.
4. Turn off the valve.
5. Update TRIGA Tracker.

MILLIPORE WATER MAKEUP SYSTEM.

I. General:

1. Reference: Millipore System Manual
2. Requirement: Monthly
3. Tools: None
4. Equipment: Bucket
5. Coordination: None
6. Estimated Time: Ten minutes
7. Safety precautions: None

II. Procedural Sequence:

1. Place bucket under open end of line on right side of millipore filter system. The open line is located behind the still tank. Make sure the line is open so that the water does not go into the pool.
2. Move around to the millipore system. Reach above your head and slowly open the valve beside the light fixture which allows water to pass through the system.
3. Run half a gallon to a gallon of water through the system into the bucket. Observe the conductivity meter on the outlet pipe.
4. Turn off the valve.
5. Leave the bucket in place unless needed elsewhere.
6. Update TRIGA Tracker.

Previous Version

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Update of Procedure M001

"Test Uninterruptible Power Supply for Radiation Monitors"

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __13 April 1999____

1. Description of change:

Procedure M001, Test Uninterruptible Power Supply for Radiation Monitors, was updated to replace references to the "Criticality Monitor" with the word "RAMs". The time period for the test was increased to 10 minutes. The reference to 10CFR70.24, which discusses criticality monitors, and the tools and equipment sections were removed. The word requirement was changed to frequency.

This update was made during a procedure review.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

The criticality monitor was removed in a facility change 12 March 98. This change removes a reference to the criticality monitor and increases the length of the uninterruptible power supply test. The function of the test did not change. The longer test period will ensure the UPS can maintain RAM function until the emergency backup generator activates to provide power.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX__ Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 99

RRFSC Notified _____ Date _____

ACTION SHEET FOR

Procedure M001
1 April 1999

✓ Electronic copy of procedure updated
✓ Control room copy of Procedure updated

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed new procedure

✓ Procedure reviewed by RRFSC and staffing sheet updated

Test Uninterruptible Power Supply For Radiation Monitors

I. General

1. Frequency: Monthly
2. Coordination: Perform test when reactor is not operating
3. Estimated Time: 20 minutes

II. Procedure:

1. Unplug the uninterruptible power supply for the auxiliary console from the wall.
2. Channel check RAMs after 10 minutes.
3. Check the high and fail alarms for the RAMs
4. Plug uninterruptible power supply back into wall.
5. If any of the tests fail, notify the ROS or RFD.
6. Update TRIGA Tracker

Test Uninterruptible Power Supply for Criticality Monitor

I. General

1. Reference: 10 CFR 70
2. Requirement: Monthly
3. Tools: None
4. Equipment: None
5. Coordination: None
6. Estimated Time: 10 minutes

II. Procedure:

1. Unplug the uninteruptible power supply for the auxiliary console from the wall.
2. Channel check R1 and R5 after 1 minute.
3. Check the high and fail alarms for R1 and R5.
4. Plug uninterruptible power supply back into wall.
5. Update TRIGA Tracker

OLD VERSION

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Update of Procedure S010, Measurement of Fuel Elements

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __14 April 1999____

1. Description of change:
Changes to the General section of the procedure include changing the words reference and requirement to requirement and frequency respectively. The set points for the RAMs under safety precautions were removed. The new set points of 10 mRem/hr are more appropriate than the 20 mRem/hr the procedure calls for. The estimated time was dropped to 2-4 days as experience has shown experienced operators can measure the fuel in 2 days if not interrupted.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).
These changes do not change the intent or the method of measuring fuel. The change is simply an update of the RAM set points with the renaming of the reference and requirement sections.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.
No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.
None.

5. List of associated drawings, procedures, logs, or other materials to be changed:
None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.
Action Sheet: Submitted _XX_ Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 99

RRFSC Notified _____ Date MAY 26 1999

5059S010.2wp

ACTION SHEET FOR

Procedure S010
14 April 1999

✓ Electronic copy of Procedure S010 updated
✓ Control room copy of Procedure S010 updated

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed the new procedure
✓ Change reviewed by RRFSC

MEASUREMENT 0F FUEL ELEMENTS/INSPECTION

1. General:

1.	Requirement:	Tech Specs Sections 4.2.5 and 5.2.2e
2.	Frequency:	Annually or after every 500 pulses $2.00 or larger
3.	Tools:	Fuel handling tool
4.	Equipment:	Fuel measuring tool, standard fuel element
5.	Coordination:	RFD/ROS
6.	Estimated time:	2-4 days to measure all fuel

7. Safety precautions/protection: The fuel should be kept under enough water to prevent any RAM's from alarming. Typically 4' of water will be sufficient. Verify RAMs are operational.

II. Record Keeping:

This section describes how to make entries in the Operational Logbook and the Fuel Element Record Book.

Logbook Entries: (In red ink)

The operator should enter the time that the element was removed from the core and a statement such as the following in the logbook: **Element #"number" removed from "grid position", measured, and replaced**. Write **"Verified"** if the serial number was visually verified.

Fuel Element Record Book Entries:

A. Stamp the date in the date column.

B. Enter the current length, (read from the measuring device). The measurements are recorded in thousandths.

C. Determine the difference between the initial measured length listed in the top section of the sheet and the current length and enter the difference in the growth column.

D. If the element fits into the measuring tool it passes the bow test. This

should be noted with a check mark on the fuel element record.

E. Record the temperature of the pool water in the temp column.

F. Record the current core grid position in the core position column.

G. Enter the current number of pulses for that element under the pulses column. ***If the element was removed during the last year, it may have missed some pulses.*** **Take this into account when calculating total pulses.**

H. Enter the total core power in Megawatt-Hours under the total power column. ***If the element was removed during the last year, take into account any power the element may have missed during its time out of core.***

I. The operator on console should watch for any element that has gone over 8-10 years since its last verification and have that element verified. Write "Verified" in the right column if the serial number was visually verified.

III. Procedural Sequence:

1. Determine total power and number of pulses on each element since last fuel measurement and update each fuel record sheet by adding to previous total. ***Be careful to account for any fuel movements during the year that could have affected the total energy on the element.***
2. Perform a shutdown margin calculation. (Unloading 6 F-ring elements and 2 E-ring elements should provide an adequate SDM.) The shutdown margin calculation should be checked by the RFD or ROS.
3. Remove all chambers and experiments from vicinity of core. Place the operational channel outside the core but close enough to qualitatively measure the reactor power level.
4. Place 3 large work platform plates on rails to cover pool.
5. Place fuel measuring holder in pool by hanging it on the inside of the shroud just to the left of opening; secure in place with a C-clamp.
6. Using a fuel handling tool, place the standard element into the holder and allow

them to come to temperature equilibrium in reactor pool. This takes about 2 hours.

7. Turn off primary system pumps to minimize ripples in pool (optional).
8. Place notched end of fuel measuring extension rod on the top of the standard rod. Place the other end under micrometer extension rod (photo A).
9. Adjust micrometer to zero.
10. While fuel measuring/moving activities are being executed, a licensed operator must be on console and the fuel movement operation must be under the supervision of an SRO. The operator on console may be the SRO supervising the fuel movement. The operator on console is responsible to give permission to remove and insert fuel, to log fuel movements in console logbook, and to enter data into the fuel element record book. The key must be in the console and turned to the "ON" position for the chart recorders to operate.
11. Coordinating with operator on console, use the fuel handling tool to withdraw first element from the core and place it in measuring holder. The person moving the fuel should loudly and clearly state "COMING OUT" and "GOING IN" as they move fuel out of and into the reactor core such that the person on console can hear them over the intercom, and "OPEN" and "CLOSE" to the person who is operating the handle of the fuel handling tool. The operator on console should acknowledge the movement of the fuel into and out of the core before the fuel is moved. The person operating the handle of the fuel handling tool should echo the words "OPEN" and "CLOSE" just prior to performing the operation.
12. Disconnect handling tool from element.
13. Place extension rod on triflute as before.
14. Read length measurement on micrometer and communicate the measurement to the operator in the control room.
15. Control room operator enters data on record sheet for element being measured and compares to previous years. A measurement of less than 5/1000 from the initial measurement listed in the top section of the fuel element record page is

generally accepted without question. For a measurement differential greater than 5/1000 the operator on console should look at the fuel element record to see if there is a trend for that element to be not of the original length or if the new reading does not follow the historical measurement record. If the current reading is out of line from the historical measurements then the person measuring the element should be told to "TRY AGAIN". This should continue until the current measurement is accepted, even if it determines the element be bad. If the measurement is more than 12/1000 out of line from historical measurements, the Reactor Facility Director should be notified. Growth greater than +100/1000 from initial measurement data is considered defective and the element is not to be placed back into the core. Large length changes require investigation.

16. Return the element to core. When placing a fuel element into the core, listen for the characteristic double click of the element as it seats in the lower grid plate. Double clicks are also produced if the element hits an experiment hole in the lower grid plate or, if the element sits in an F-ring position, when the element drops off of the side of the lower grid plate. To prevent hitting the wrong hole or missing the grid plate, the operator returning the fuel to the core should use care to place their hand directly above the grid plate position. Note that the round structural metal plate above the water has the same radius as the core. The operator's hand should always be under this plate when seating fuel elements in the core. Also, the person's hand should be the same distance from the center of this plate as the fuel element is from the center of the core.
17. Repeat steps 11-16 for each element in core.
18. Rezero micrometer (as in steps 8 and 9) after no more than 10 elements. The operator on console is responsible for keeping track of when to rezero the instrument.
19. Instrumented elements and FFCR's are handled by their extension tubes, not with the handling tool. Move the elements with a minimum of bending of the extension tubes.

20. Check the serial numbers of fuel elements if the elements have gone more than about 8 to 10 years since the last verification. Check an element by resting it at a 45° angle on the lip of the shroud or fuel measuring tool (with the fuel still attached to the handling tool).
21. Shine a bright light, if necessary, on the triflute and observe with binoculars the number engraved on one side of the triflute. Some adjustment of the light may be necessary to provide the necessary shadowing of the engraved numbers.
22. The number must agree with the element listed for that core position. If not, try to determine the location where the element may have been moved to by studying the fuel element log. Begin verifying other fuel elements in other possible locations in the core until the error is found. If any of the switched elements spent any time out of the core during the time they were switched, recalculate the Kilowatt-Hour usage on those elements. Notify the RFD of any fuel elements found out of place.
23. The control room operator will annotate in the logbook and fuel element record which elements' serial numbers were checked by writing the word "Verified". (Do not verify all the same elements as last year. Check elements which have not been checked for several years).
24. **Ensure that at least 10% of the elements are checked.**
25. Elements in storage will be inspected just as the core elements were checked. **(Do Not Disturb Any Damaged Elements)**
26. The serial number must be checked on every element in storage to meet requirements of Reactor Administrative Procedure A4.
27. When measuring is completed, remove all equipment/tools from pool area and update TRIGA Tracker.

MEASUREMENT 0F FUEL ELEMENTS/INSPECTION

1. General:

1.	References:	Tech Specs Sections 4.2.5 and 5.2.2e
2.	Requirement:	All fuel elements, to include Fuel Followed Control Rods,(FFCR's), shall be inspected for damage and measured for length and bow annually or after every 500 pulses of $2.00 or larger, whichever occurs first
3.	Tools:	Fuel handling tool
4.	Equipment:	Fuel measuring tool, standard fuel element
5.	Coordination:	RFD/ROS
6.	Estimated time:	3-4 days to measure all fuel

7. Safety precautions/protection: The fuel should be kept under enough water to prevent any RAM's from alarming. Typically 4' of water will be enough. (Set R1 and R5 for 20 mrem/hr.)

II. Record Keeping:

This section describes how to make entries in the Operational Logbook and the Fuel Element Record Book.

Logbook Entries: (In red ink)

The operator should enter the time that the element was removed from the core and a statement such as the following in the logbook: **Element #"number" removed from "grid position", measured, and replaced**. Write **"Verified"** if the serial number was visually verified.

Fuel Element Record Book Entries:

A. Stamp the date in the date column.

B. Enter the current length, (read from the measuring device). The measurements are recorded in thousandths.

C. Determine the difference between the initial measured length listed in the top section of the sheet and the current length and enter the difference in the growth column.

D. If the element fits into the measuring tool it passes the bow test. This should be noted with a check mark on the fuel element record.

E. Record the temperature of the pool water in the temp column.

F. Record the current core grid position in the core position column.

G. Enter the current number of pulses for that element under the pulses column. ***If the element was removed during the last year it may have missed some pulses.*** **Take this into account when calculating total pulses.**

H. Enter the total core power in Megawatt-Hours under the total power column. ***If the element was removed during the last year take into account any power the element may have missed during its time out of core.***

I. The operator on console should watch for any element that has gone over 8-10 years since its last verification and have that element verified. Write "Verified" in the right column if the serial number was visually verified.

III. Procedural Sequence:

1. Determine total power and number of pulses on each element since last fuel measurement and update each fuel record sheet by adding to previous total. ***Be careful to account for any fuel movements during the year that will affect the total energy on the element.***

2. Perform a shutdown margin calculation. (Unloading 6 F-ring elements and 2 E-ring elements should provide an adequate SDM.) The shutdown margin calculation should be checked by the RFD or ROS.

3. Remove all chambers and experiments from vicinity of core. Place the

operational channel outside the core but close enough to qualitatively measure the reactor power level.

4. Place 3 large work platform plates on rails to cover pool.
5. Place fuel measuring holder in pool by hanging it on the inside of the shroud just to the left of opening; secure in place with a C-clamp.
6. Using a fuel handling tool, place the standard element into the holder and allow them to come to temperature equilibrium in reactor pool. This takes about 2 hours.
7. Turn off primary system pumps to minimize ripples in pool (optional).
8. Place notched end of fuel measuring extension rod on the top of the standard rod. Place the other end under micrometer extension rod (photo A).
9. Adjust micrometer to zero.
10. While fuel measuring/moving activities are being executed, a licensed operator must be on console and the fuel movement operation must be under the supervision of an SRO. The operator on console may be the SRO supervising the fuel movement. The operator on console is responsible to give permission to remove and insert fuel, to log fuel movements in console logbook, and to enter data into the fuel element record book. The key must be in the console and turned to the "ON" position for the chart recorders to operate.
11. Coordinating with operator on console, use the fuel handling tool to withdraw first element from the core and place it in measuring holder. The person moving the fuel should loudly and clearly state "COMING OUT" and "GOING IN" as they move fuel out of and into the reactor core such that the person on console can hear them over the intercom, and "OPEN" and "CLOSE" to the person who is operating the handle of the fuel handling tool. The operator on console should acknowledge the movement of the fuel into and out of the core before the fuel is moved. The person operating the handle of the fuel handling tool should echo the words "OPEN" and "CLOSE" just prior to performing the operation.

12. Disconnect handling tool from element.
13. Place extension rod on triflute as before.
14. Read length measurement on micrometer and communicate the measurement to the operator in the control room.
15. Control room operator enters data on record sheet for element being measured and compares to previous years. A measurement of less than 5/1000 from the initial measurement listed in the top section of the fuel element record page is generally accepted without question. For a measurement differential greater than 5/1000 the operator on console should look at the fuel element record to see if there is a trend for that element to be not of the original length or if the new reading does not follow the historical measurement record. If the current reading is out of line from the historical measurements then the person measuring the element should be told to "TRY AGAIN". This should continue until the current measurement is accepted, even if it determines the element be bad. If the measurement is more than 12/1000 out of line from historical measurements, the Reactor Facility Director should be notified. Growth greater than +100/1000 from initial measurement data is considered defective and the element is not to be placed back into the core. Large length changes require investigation.
16. Return the element to core. When placing a fuel element into the core, listen for the characteristic double click of the element as it seats in the lower grid plate. Double clicks are also produced if the element hits an experiment hole in the lower grid plate or, if the element sits in an F-ring position, when the element drops off of the side of the lower grid plate. To prevent hitting the wrong hole or missing the grid plate, the operator returning the fuel to the core should use care to place their hand directly above the grid plate position. Note that the round structural metal plate above the water has the same radius as the core. The operator's hand should always be under this plate when seating fuel elements in the core. Also, the person's hand should be the same distance

from the center of this plate as the fuel element is from the center of the core.

17. Repeat steps 11-16 for each element in core.
18. Rezero micrometer (as in steps 8 and 9) after no more than 10 elements. The operator on console is responsible for keeping track of when to rezero the instrument.
19. Instrumented elements and FFCR's are handled by their extension tubes, not with the handling tool. Move the elements with a minimum of bending of the extension tubes.
20. Check the serial numbers of fuel elements if the elements have gone more than about 8 to 10 years since the last verification. Check an element by resting it at a 45° angle on the lip of the shroud or fuel measuring tool (with the fuel still attached to the handling tool).
21. Shine a bright light, if necessary, on the triflute and observe with binoculars the number engraved on one side of the triflute. Some adjustment of the light may be necessary to provide the necessary shadowing of the engraved numbers.
22. The number must agree with the element listed for that core position. If not, try to determine the location where the element may have been moved to by studying the fuel element log. Begin verifying other fuel elements in other possible locations in the core until the error is found. If any of the switched elements spent any time out of the core during the time they were switched, recalculate the Kilowatt-Hour usage on those elements. Notify the RFD of any fuel elements found out of place.
23. The control room operator will annotate in the logbook and fuel element record which elements' serial numbers were checked by writing the word "Verified". (Do not verify all the same elements as last year. Check elements which have not been checked for several years).
24. **Ensure that at least 10% of the elements are checked.**
25. Elements in storage will be inspected just as the core elements were checked. **(Do Not Disturb Any Damaged Elements)**

26. The serial number must be checked on every element in storage to meet requirements of Reactor Administrative Procedure A4.
27. When measuring is completed, remove all equipment/tools from pool area and update TRIGA Tracker.

PREVIOUS VERSION

r:/procedwp/s010.WP6

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Update Procedure M048, Americium-Beryllium Neutron Source Check

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __14 April 1999____

1. Description of change:
line 2 "Turn R1 & R5 to full scale" was removed from the procedure.
The specification on how to communicate was removed. Establishing communications was left in.
The words Reference and Requirement were changed to Requirement and Frequency.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

This procedure change is a follow up to a previous facility modification (13 March 98). With the relocation of the RAMs, the alarm points no longer need to be set up. The normal alarm set point for the RAMs is more conservative than setting the alarm point up.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX__ Not Required ____

Reviewed and approved by RFD _____ Date 23 APR 99

RRFSC Notified _____ Date MAY 26 1999

5059M048.2wp

ACTION SHEET FOR

Procedure M048
2 April 1999

✓ Electronic copy of Procedure M048 updated
✓ Control room copy of Procedure M048 updated

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed Procedure M048

✓ Procedure reviewed by RRFSC and staffing sheet updated

Americium-Beryllium Neutron Source Check

I. General:

1.	Requirement:	NRC Byproduct License
2.	Frequency:	Annually
3.	Tools:	None
4.	Equipment:	None
5.	Coordination:	Notify RFD or ROS and SHD
6.	Safety Precaution:	Neutron source yields approximately 6.3×10^6 neutrons per second.

II. Procedural Sequence

1. Notify the SHD in advance for neutron source check.
2. Two reactor staff members and one SHD person are required to perform the neutron source check. One operator monitors in the reactor console and other personnel are in the reactor room. Establish communications between control room and reactor room.
3. One reactor staff member removes the source from the reactor pool and places it on a cloth/towel/absorbent pad on the core dolly.
4. SHD quickly swipes the source.
5. The reactor staff member quickly returns the source to the reactor pool and then replaces it back to the source holder.
6. Update TRIGA Tracker.

Americium-Beryllium Neutron Source Check

I. General:

1.	Reference:	NRC Byproduct License
2.	Requirement:	Annually
3.	Tools:	None
4.	Equipment:	None
5.	Coordination:	Notify RFD or ROS and SHD
6.	Safety Precaution:	Neutron source yields approximately 6.3×10^6 neutrons per second.

II. Procedural Sequence

1. Notify the SHD in advance for neutron source check
2. Turn R1 & R5 to full scale
3. Two reactor staff members and one SHD person are required to perform the neutron source check. One operator monitors in the reactor console and other personnel are in the reactor room. All of them should communicate by intercom.
4. One reactor staff member removes the source from the reactor pool and places it on a cloth/towel/absorbent pad on the core dolly.
5. SHD quickly swipes the source.
6. The reactor staff member quickly returns the source to the reactor pool and then replaces it back to the source holder.
7. Update TRIGA Tracker.

PREVIOUS VERSION

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Removal of Procedures M029, M030, M031 and M032 Reg, Safe, Shim and Trans Rod Annual Maintenance

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __14 April 1999____

1. Description of change:

Elimination of redundancy. The four procedures above were used for the rod drives on the last reactor console. When the rod drives were replaced, procedures were written for the new rod drives. The old procedures were never removed.

These four procedures are covered by procedures M035 (Rod Drive Removal), M017 (Check Belts on ... Drives), M023 (Rod Drive Installation), and M036 (Transient Rod Drive Inspection) in greater detail than the procedures deleted. Currently, all eight procedures are in TRIGA tracker and only the new procedures are used for the required maintenance.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

The maintenance procedures necessary for the rod drive maintenance are procedures M035, M017, M023 and M036. These procedures will remain the active procedures. The removed procedures do not have any effect on rod drive maintenance because the maintenance steps are performed in the more detailed procedures. The old procedures were superceded by the new ones.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX_ Not Required ____

Reviewed and approved by RFD _____ Date 26 APR 99

RRFSC Notified _____ Date MAY 26 1999

5059M029.2wp

ACTION SHEET FOR

Procedure M029, M030, M031, M032
14 April 1999

✓ Electronic copy of Procedure M029 removed
✓ Control room copy of Procedure M029 removed
✓ Procedure M029 removed from Triga Tracker

✓ Electronic copy of Procedure M030 removed
✓ Control room copy of Procedure M030 removed
✓ Procedure M030 removed from Triga Tracker

✓ Electronic copy of Procedure M031 removed
✓ Control room copy of Procedure M031 removed
✓ Procedure M031 removed from Triga Tracker

✓ Electronic copy of Procedure M032 removed
✓ Control room copy of Procedure M032 removed
✓ Procedure M032 removed from Triga Tracker

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ Check Annual Maintenance Shutdown Checklist for the Procedures.
✓ Change reviewed by RRFSC

Reg Rod Drive Annual Maintenance

I. General:

1. References: GA Manufacturer's Literature (Attached)
2. Requirement: Annual
3. Tools: Allen wrenches, adjustable wrenches and vise grips
4. Equipment: None
5. Coordination: Set time up with LOG for inspecting and cleaning
6. Estimated time: 1 day
7. Safety precaution/protection: Use caution when working around electrical/electronic devices. Place tools and parts in a safe place to prevent anything from being dropped into the pool.

II. Procedural sequence:

1. Ensure that maintenance will not interfere with daily operation. Perform maintenance when console is not operating.
2. Prepare bag for small parts such as screws, nuts.
3. Check all micro-switches for proper adjustment.
4. With drive unit removed, visually inspect rod drive motor for solid mounting of micro-switches, loose wiring, frayed insulation and other possible damage.
5. Check barrel for defects.
6. Update TRIGA Tracker.

REMOVED FROM PROCEDURES

Safe Rod Drive Annual Maintenance

I. General:

1. References: GA Manufacturer's Literature (Attached)
2. Requirement: Annual
3. Tools: Allen wrenches, adjustable wrenches and vise grips
4. Equipment: None
5. Coordination: Set time up with LOG for inspecting and cleaning
6. Estimated time: 1 day
7. Safety precaution/protection: Use caution when working around electrical/electronic devices. Place tools and parts in a safe place to prevent anything from being dropped into the pool.

II. Procedural sequence:

1. Ensure that maintenance will not interfere with daily operation. Perform when console is not operating
2. Prepare bag for small parts such as screws, nuts.
3. Check all micro-switches for proper adjustment.
4. With drive unit removed, visually inspect rod drive motor for solid mounting of micro-switches, loose wiring, frayed insulation and other possible damage
5. Check barrel for defects.
6. Update Triga Tracker.

REMOVED FROM PROCEDURES

Shim Rod Drive Annual Maintenance

I. General:

1. References: GA Manufacturer's Literature (Attached)
2. Requirement: Annual
3. Tools: Allen wrenches, adjustable wrenches and vise grips
4. Equipment: None
5. Coordination: Set time up with LOG for inspecting and cleaning
6. Estimated time: 1 day
7. Safety precaution/protection: Use caution when working around electrical/electronic devices. Place tools and parts in a safe place to prevent anything from being dropped into the pool.

II. Procedural sequence:

1. Ensure that maintenance will not interfere with daily operation. Perform when console is not operating
2. Prepare bag for small parts such as screws, nuts.
3. Check all micro-switches for proper adjustment.
4. With drive unit removed, visually inspect rod drive motor for solid mounting of micro-switches, loose wiring, frayed insulation and other possible damage.
5. Check barrel for defects.
6. Update Triga Tracker.

REMOVED FROM PROCEDURES

Transient Rod Drive Annual Maintenance

I. General:

1. References: GA Manufacturer's Literature, (Attached)
2. Requirement: Annual
3. Tools: Allen wrenches, adjustable wrenches and vise grips
4. Equipment: None
5. Coordination: Set time up with LOG for inspecting and cleaning
6. Estimated time: 1 day
7. Safety precaution/protection: Use caution when working around electrical/electronic devices. Place tools and parts in a safe place to prevent anything from being dropped into the pool.

II. Procedural sequence:

1. Ensure that maintenance will not interfere with daily operation. Perform when console is not operating
2. Prepare bag for small parts such as screws, nuts.
3. Check all micro-switches for proper adjustment.
4. Use mirror and flash light to inspect the gear, motor, and drive housing.
5. Remove shock absorber assembly by driving the transient rod drive full up, then loosening the entire assembly with a strap wrench, and unscrewing this assembly.
6. Inspect cylinder, spay with a light coat of silicon spray lubricant.
7. After cleaning and inspecting, tighten shock absorber with the strap wrench.
8. Update Triga Tracker

REMOVED FROM PROCEDURES

STANDARD ROD DRIVE REMOVAL

I. General:

1.	Reference:	Tech Spec 4.2.5, 2.1
2.	Requirement:	Annual
3.	Tools:	Allen Keys, Small wrenches, Large pliers, Screwdriver, Ziplock bags
4.	Equipment:	None
5.	Coordination:	Shutdown checklist
6.	Estimated Time:	1 hour

II. Procedural Sequence:

1. Locate a ziplock bag for each of the rod drives. Label the ziplock bag for the desired drive.
2. Disconnect stepper motor power cable.
3. Remove gear cover.
4. Loosen allen bolt in the rod down limit switch yoke. Hold the yoke down while loosening to prevent yoke from springing off.
5. Remove switch yoke, spring, and washer. Place parts in ziplock bag.
6. Loosen and remove jam nut at the lower end of the pull rod foot. Use the large pliers to hold the large foot nut and the small wrench to loosen the jam nut. Place jam nut into the ziplock bag.
7. Remove the foot nut from the lower end of the pull rod. Hold the pull rod so that it does not fall into core when the foot nut is removed.
8. Remove the pull rod by lowering from guide tube. Do not force the pull rod upward past the limit switch.
9. Remove the 4 allen bolts that connect the rod drive to the rod drive foot. Where there are two allen bolts, remove the top bolt.
10. Carefully raise the rod drive straight up from the foot watching that the magnet wire guide band does not interfere with the trans rod drive. The rod

drive can be partly raised by hand to make removal easier by turning the stepper motor drive gear by hand.

11. Place the stepper motor drive on a bench out of the way.
12. Continue with the next drive or next step.
13. Update Triga Tracker.

VERSION IN USE

Check Belts on Reg, Safe, and Shim Drives

I. General

1.	Reference:	Internal
2.	Requirements:	Quarterly
3.	Tools:	Screwdrivers, Wrenches
4.	Equipment:	None
5.	Coordination:	Operator of the Day
6.	Estimated Time:	30 to 60 minutes

II. Procedural Sequence:

1. Ensure that maintenance will not interfere with daily operations. Perform maintenance when console is not operating.
2. Loosen the four screws which hold the belt cover and remove the belt cover.
3. Gently flex the chain belt with a finger. The belt should be snug but not piano wire tight. If pressing the upper side of the belt causes the lower side of the belt to raise more than a millimeter, thus taking the slack out of the belt, then it is too loose.
4. Gently flex the no slip molded polyurethane belt. The belt should be snug but not piano wire tight or it will break. The belt will stretch as it is pressed but will bounce back when pressure is released. The belt should not be missing any teeth nor should any obvious cracks or damage be observed. If there is any damage to the belt replace it. New belts are stored in 3152 in the cabinet full of console parts.
5. ADJUSTING THE CHAIN DRIVE
   a. Loosen the four stepper motor mounting bolts.
   b. Move the stepper motor to adjust the chain.
   c. Hold the stepper motor in place and tighten the mounting bolts.
6. ADJUSTING THE MOLDED POLYURETHANE NO SLIP BELT
   A. Loosen the mounting nut which holds the potentiometer to the bracket.

B. Move the potentiometer to adjust the belt.

C. Hold the potentiometer in place and tighten the mounting nut.

7. If an adjustment is made to either the chain drive or the no-slip belt check the calibration of the rod position numbers on the console. Adjust the rod position potentiometers following procedure M0RPI.

8. Replace the belt cover and secure the mounting screws.

9. Make a notation in TRIGA TRACKER.

VERSION IN USE

Rod Drive Installation

I. General:

1.	Reference:	Attached Drawings
2.	Requirement:	Annual shutdown Maintenance
3.	Tools:	Allen Keys, Small Wrenches, Large Pliers Screwdriver.
4.	Equipment:	None
5.	Coordination:	None
6.	Time Estimate:	1 hour for 3 drives

II. Procedural Sequence:

1. Inspect rod drives for obvious damage, broken or worn gears, damaged or broken chains or drive belts, loose screws. Replace belts or chains if required.
2. Gently lower the proper drive on to the correct drive foot. Gently shake drive to ensure correct seating of foot connector. (See Figure 1)
3. Replace the four allen bolts into the foot to hold the drive in place.
4. Replace the pull rod through the pull rod guide tube. Feed the pull rod into the tube from underneath the core structure
5. Hold the top of the pull rod so it will not fall into the core (see figure 2) while someone threads the foot nut on to the lower threaded end of the pull rod. (See Figure 3) Screw the foot nut most of the way up the pull rod.
6. Replace the jam nut on to the pull rod. Tighten the jam nut to the foot nut. Large pliers work well to hold the foot nut and a small wrench works well to turn the jam nut. Two of the drives use a 3/8" wrench and the other one uses 11/32" wrench.
7. Slide the small washer, spring, and yoke over the top of the pull rod. (See figure 4)
8. Hold the pull rod foot up to make contact with the armature, (Do not raise the control rod) while pressing down on the yoke compressing the spring. Do

not completely compress the spring. There should be some give in the spring, (a couple wire thicknesses is fine). Tighten the 1/16" allen screw in the yoke to secure the yoke to the pull rod. (see figure 5)

9. Turn either of the chain drive sprockets counter clockwise to raise the drive about 1/2" from the bottom if the drive is not already up some.
10. Loosen the 3/8" nut on top of the yoke. Use a wrench and screwdriver to prevent the yoke from turning. Loosen the bolt several turns until the switch clicks off.
11. Slowly tighten the bolt in the yoke until the switch just clicks on. Turn the bolt an additional 1/4 turn. Carefully tighten the nut against the yoke to hold the bolt in position. Hold the yoke while tightening the nut.
12. Reach under the carriage and push the foot up raising the control rod 1/4" to 1/2" and lower back down slowly and rapidly several times. See that the switch clicks every time the rod is dropped whether it be fast or slow. If it does not, repeat steps 10, 11, and 12.
13. Turn the motor chain sprocket clockwise until the rod drive down limit switch clicks on. Several attempts may be made until a step by step turning of the motor sprocket causes the switch to click.
14. Check for a small gap between the magnet and the armature. (See figure 7). The gap will be about 1/32 inch. The magnet and armature should not touch. If they touch the drive will bottom out and damage the drive. If the gap is too big (1/16th is to big) the magnet will not pick up the armature. If necessary adjust the set screw on the top of the draw tube. To increase the gap, screw the adjustment bolt into the holder (Clockwise). To decrease the gap screw the adjustment bolt out of the holder (Counter clockwise).
15. Turn either of the sprockets counter clockwise to raise the draw tube about an inch.
16. Connect the stepper motor power cannon plug for the drive. Be sure to attach the correct plug. CAUTION: The wrong plug will cause the drive to drive down uncontrollably and the drive will drive down to the limit switch when the plug is connected.

17. Check the gap between the magnet and armature again to see that it has not changed.
18. Check chain tightness. The chain should not be floppy loose but should not be piano wire tight either. If necessary loosen the stepper motor mounting bolts and adjust the stepper motor to make the chain taunt.
19. Check the potentiometer drive belt tightness. Again the belt should not be floppy loose nor should it be piano wire tight. If necessary adjust the potentiometer to make the drive belt taunt. A little stretching is acceptable. Looseness in this belt will cause hysteresis in the rod positions on the CSC console.
20. Check that the push rod falls freely when raised and released. If it does not fall freely loosen the rod drive foot hex bolts and adjust the drive until the push rod drops freely through its guide tube. The safe rod drive is the most troublesome of the three drives on this point.
21. Measure the height of the top of the rod drive draw tube to the base around it to the 1/32" (See Figure 7). Note that height in the core physics log. _____
22. Drive the rod out of the core from the console.
23. Measure the height of the top of the rod drive draw tube to the base around it to the 1/32". Note that height in the core physics log. _____
24. Subtract the data from step #18 from the data in step #20 and enter the travel length in the core physics log. The travel length should be 15" +/- 1/32"
25. If the travel distance is not within specs, adjust the length of the push rod (see Figure 9). Screw the adjustment bolt into the push rod to lengthen the travel distance. Screw the adjustment bolt out of the push rod to shorten the travel distance. Be sure to screw the locking nut against the push rod to prevent the adjustment bolt from working loose.
26. Continue with another drive or the next step.

VERSION IN USE

INSPECTION OF TRANSIENT ROD DRIVE

I. General:

1. References: Tech Specs Section 4.1d
2. Requirement: Semiannually, not to exceed 7.5 months, the transient rod drive cylinder & associated air supply system shall be inspected, cleaned & lubricated as necessary.
3. Tools: Strap wrench, adjustable crescent wrench, flashlight, flexible grabber
4. Equipment: None
5. Coordination: None
6. Estimated time: One hour
7. Safety precautions/protection: Bleed air from accumulator tank before starting work

II. Procedural Sequence:

1. Turn off air supply by closing valve CA-12 on reactor room wall.
2. Using crescent wrench, bleed air from accumulator tank by opening valve on bottom of tank.
3. With strap wrench, unscrew shock absorber from top of drive.
4. Look down into barrel with flashlight; check for oil, dirt, or scratches.
5. Secure lint-free tissue on end of grabber & swab out barrel until clean.
6. Spray teflon spray onto clean tissue & apply light coat to inside of barrel
7. Update Triga Tracker .

VERSION IN USE

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Removal of Procedure C010, Calibration of all Scram Circuits

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __14 April 1999____

1. Description of change:
Removal of procedure C010. Upon review, it was determined that procedure C010 is not a procedure, but rather an index of scram circuit calibration procedures.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

This procedure does not calibrate anything in the reactor electronics or scram circuits. Removal of this procedure will have no effect on the calibration of the reactor electronics and subsequent scram circuits. An index of the calibration procedures exists in the calibration procedure notebook.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.

None.

5. List of associated drawings, procedures, logs, or other materials to be changed:

None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted _XX_ Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 99

RRFSC Notified _____ Date MAY 2 6 1999

5059C010.2wp

ACTION SHEET FOR

Procedure C010
14 April 1999

✓ Electronic copy of Procedure C010 removed
✓ Control room copy of Procedure C010 removed

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ Update table of content in calibration procedure book
✓ Check that Annual Shutdown Maintenance Checklist does not refer to this procedure.
✓ Change reviewed by RRFSC

Calibration of all Scram Circuits

I. General:

1. Reference: Tech Spec 3.2.2
2. Requirement: Annual
3. Tools: As required by procedures
4. Equipment: As required by procedures
5. Coordination: Operator of the day
6. Estimated Time: 1 day

II. Procedure:

Locate the desired calibration scram circuit to be calibrated in the list below. Follow the specific instructions for the desired scram circuit.

Safety Channel 1 (NP)	Calibration Procedure C008
Safety Channel 2 (NPP)	Calibration Procedure C009
Fuel Temp Channel 1	Calibration Procedure C004
Fuel Temp Channel 2	Calibration Procedure C005
NP High Voltage Low	Calibration Procedure C008
NPP High Voltage Low	Calibration Procedure C009
Manual Scram	Press Switch. Check Scram
Emergency Stop	Press Switch. Check Scram
Extremely Low Pool Water	Plunge lower float bulb with metal pole. Float is located in east side of pool. Check for scram.
CSC Watchdog Timer	Software Controlled. Press button for 10 seconds. Check for scram
DAC Watchdog Timer	Software Controled. Press button for 10 seconds. Check for scram
Pulse Timer	Time set by timer located behind LED gar graphs.
Steady State Timer	Time set by timer in aux console.

Reactor Key Of	Turn off key. Check for scram.
Facility Interlock	Maintenance Procedure M033
Operator Logout	Software Controled. Magnet power cannot be obtained unless someone is logged in.
Network Fault	Software Controled.
CSC DIS064 Timeout	Software Controled.
DAC DIS064 Timeout	Software Controled.
Data Base Timeout	Software Controled.
DOM 32 Fault	Software Controled.
AIO16 #1 Fault	Software Controled.
AIO16 #2 Fault	Software Controled.
CSC Watchdog Fault	Software Controled.
DAC Watchdog Fault	Software Controled.

REMOVED FROM PROCEDURES

Calibration Procedures for all Scram Circuits

Locate the desired calibration scram circuit to be calibrated in the list below. Follow the specific instructions for the desired scram circuit.

Safety Channel 1 (NP)	Calibration Procedure C008
Safety Channel 2 (NPP)	Calibration Procedure C009
Fuel Temp Channel 1	Calibration Procedure C004
Fuel Temp Channel 2	Calibration Procedure C005
NP High Voltage Low	Calibration Procedure C008
NPP High Voltage Low	Calibration Procedure C009
Manual Scram	Press Switch. Check Scram
Emergency Stop	Press Switch. Check Scram
Extremely Low Pool Water	Plunge lower float bulb with metal pole. Float is located in east side of pool. Check for scram.
CSC Watchdog Timer	Software Controlled. Press button for 10 seconds. Check for scram
DAC Watchdog Timer	Software Controled. Press button for 10 seconds. Check for scram
Pulse Timer	Time set by timer located behind LED gar graphs.
Steady State Timer	Time set by timer in aux console.
Reactor Key Of	Turn off key. Check for scram.
Facility Interlock	Maintenance Procedure M033
Operator Logout	Software Controled. Magnet power cannot be obtained unless someone is logged in.
Network Fault	Software Controled.
CSC DIS064 Timeout	Software Controled.
DAC DIS064 Timeout	Software Controled.
Data Base Timeout	Software Controled.

DOM 32 Fault	Software Controled.
AIO16 #1 Fault	Software Controled.
AIO16 #2 Fault	Software Controled.
CSC Watchdog Fault	Software Controled.
DAC Watchdog Fault	Software Controled.

C:\FILES\WP\Scrams

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Change Procedure C011, Calibration of RWP to Calibration of Demineralizer Inlet Temperature

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __15 April 1999____

1. Description of change:
Remove information on how to set the 1 Kilowatt Pulse interlock, the 0.5 CPS RWP, the Three Second RWP, and the proper voltage range for the fission detector. Each of these items is covered in Procedure C026 (Operational Channel Alignment) or verified in procedure C007 (Calibration of Operational Channel). The items should not require routine adjustment, nor should they be adjusted unless you are preforming either procedure C026 or C007. The procedure was renamed to reflect the calibration of the inlet to the demineralizer. The Reference and Requirement in the General section were changed to Requirement and Frequency, The Equipment line was dropped. A screwdriver was added to the Tools line. 15 Minutes was added to the Estimated Time line. Procedures C007 and C026 attached for reference.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).
The items removed from procedure C011 are covered in more detail in procedure C026. This procedure represents only organizational changes.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.
No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.
None.

5. List of associated drawings, procedures, logs, or other materials to be changed:
None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.
Action Sheet: Submitted _XX_ Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 99

RRFSC Notified _____ Date MAY 2 [illegible]

5059C011.2wp

ACTION SHEET FOR

Procedure C011
15 April 1999

✓ Electronic copy of Procedure C011 updated
✓ Control room copy of Procedure C011 updated

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ All staff members have reviewed this procedure..
✓ Check Annual Shutdown Checklist for procedure C011
✓ Update Triga Tracker for new procedure name
✓ Change reviewed by RRFSC

Calibration of Demineralizer Inlet RWP

I. General:

1. Requirement: Tech Spec 3.3
2. Frequency: Annual
3. Tools: Small screwdriver
4. Coordination: Operator of the day
5. Estimated Time: 15 minutes

II. Procedural Sequence:

1. Technical Specification requirement is 60 degrees. The administrative limit of 50 degrees Celsius will be observed in this procedure.
2. On the CSC MCP panel turn the scram and interlock test knob to "POOL".
3. Press and hold the red button under the knob on the CSC MCP panel.
4. Read the pool temperature on the high resolution display.
5. The temperature should be 50 degrees Celsius. Temperature as found and as left should be recorded in the calibration log.

   As Found _____
6. If not, a second person should locate the potentiometer in the DAC which is used to adjust the interlock trip temperature. The potentiometer is located on the forth shelf of the DAC in the rear center of the shelf. Access to the potentiometer is gained through the back of the DAC.
7. Adjust the potentiometer while a person on console reads the temperature over the intercom. Adjust the trip temperature to 50 degrees Celsius.

   As Left _____

Calibration of RWP

I.General:

1. Reference: Tech Spec 3.2.2
2. Requirement: Annual
3. Tools: None
4. Equipment: As required
5. Coordination: Operator of the day
6. Estimated Time: Depends on what kind of problems

II. Procedural Sequence:

To set interlocks, use the following specific procedures:

1 KILOWATT PULSE INITIATION INTERLOCK

The 1 kw pulse interlock is set in the NM-1000

1. Press (F4)(2) on the NM-1000.
2. Does the NM-1000 display 0.1? If it does don't mess with it. If it does not, press the following buttons (F8)(.)(1)(enter)
3. Update TRIGA Tracker

WITHDRAWAL OF ANY CONTROL ROD OTHER THAN TRANSIENT ROD IN PULSE MODE

There is no adjustment for this. It is software controlled.

0.5 CPS ROD WITHDRAWAL INTERLOCK

Setting of the 0.5 CPS interlock is set during the NM-1000 Operational Channel Calibration. Refer to procedure C007 for this calibration. The last set point should be recorded in the calibration log.

SIMULTANEOUS MANUAL WITHDRAWAL OF TWO STANDARD CONTROL RODS

There is no adjustment for this. It is software controlled.

THREE SECOND ROD WITHDRAWAL INTERLOCK

1. Setting of the 3 second RWP is set in the NM-1000

2. Press (F4)(3) in the NM-1000. Does the NM-1000 display 3.0? If it does, don't mess with it. If not press (F8)(3)(enter).

PROPER VOLTAGE RANGE FOR FISSION DETECTOR

The fission detector voltage is set during the NM-1000 Operational Channel Calibration. Refer to procedure C007 for this calibration.

INLET TO THE DEMINERALIZER LESS THAN 60 DEGREES CELSIUS

1. Technical Specification requirement is 60 degrees. The administrative limit of 50 degrees celsius will be observed in this procedure.
2. On the CSC MCP panel turn the scram and interlock test knob to "POOL".
3. Press the red button under the knob.
4. Read the pool temperature on the high resolution display.
5. The temperature should be 50 degrees celsius. Temperature as found and as left should be recorded in the calibration log.

   As Found _____

6. If not, a second person should locate the potentiometer in the DAC which is used to adjust the interlock trip temperature. The potentiometer is located on the forth shelf of the DAC in the center rear of the shelf. Access to the potentiometer is gained through the back of the DAC.
7. Adjust the potentiometer while a person on console reads the temperature over the intercom. Adjust the trip temperature to 50 degrees celsius.

   As Left _____

PREVIOUS VERSION

Calibration of Operational Channel

I. General:

1. Requirements: Tech Spec 4.2.2c
2. Frequency: Annual
3. Tools: None
4. Equipment: Pool stirrer, digital thermometer, ion chamber, high voltage power supply, electrometer (610C), coax signal cable, various connectors and adapters
5. Coordination: Operations Schedule
6. Estimated Time: 4 hours.
7. Safety Precaution/protection: Electrical shock hazard due to high voltage in lower section of PA15

II. Procedural Sequence:

1 Move the core to the center of the pool.

2. Turn off AC power to the NM-1000 (left side). Attach a battery operated voltmeter capable of reading 1000 volts in 1 volt divisions to the coax line into the high voltage distributing and monitoring assembly.

3. Turn the AC power on. Use caution around any exposed high voltage connections.

4. Adjust the potentiometer labeled HV on the front of the high voltage distributing and monitoring assembly to give between 720 and 740 Volts (Nominal set point - <10% loss) on the volt meter.

5. Check to see a trip on the NM-1000 or console. If it does not trip, adjust the potentiometer labeled UV TRIP (under voltage trip) until there is a high voltage trip on the NM-1000 or console. Set point _____

6. Adjust the potentiometer labeled HV to give 840 volts (Nominal set point +5%) on the voltmeter. **WARNING: DO NOT EXCEED 1000 VOLTS. DAMAGE MAY OCCUR TO THE PA15 IF VOLTAGE EXCEEDS 1000 VOLTS.**

7. Adjust the potentiometer labeled OV TRIP (over voltage trip) until a trip occurs on the NM-1000 or console. Set point _____
8. Reset the high voltage to 800 volts. _____ Power off the NM-1000 and remove the voltmeter from the line. Power on the NM-1000.
9. With an operator on console, remove the neutron source. See that the console power drops to zero. It often takes a couple minutes for the console power to drop. If the reactor has been to power within the last several hours, there will be enough delayed neutrons that the power will not drop to zero. If so, you must wait several hours to continue this procedure. If the console has not been to power and the power does not drop to zero then exit this procedure and perform procedure C026, Channel Alignment.
10. Place an independent ion chamber above the core. Rough adjustment for the chamber is about 3 to 4 inches above the core.
11. Attach a high voltage power supply to the HV line of the chamber
12. Attach a signal line from the chamber to an electrometer in the control room. (A signal line is usually behind the DAC and in the control room cable tray.) Recommendation: Hang the power cables and signal lines along the boom.
13. Perform a thermal power calibration according to procedure C015. Adjust the reactor power such that the actual power is 100 Kw (the console indication may be off). Turn on the electrometer and the high voltage power supply. Read the electrometer at 100 Kw reactor thermal power. The reading should be no greater than 0.01 ma. Adjust the independent chamber height to get the proper current. The reading is _____
14. Increase the reactor power such that the electrometer indicates one decade higher power. The reactor should be in manual mode and stable to continue.
15. Adjust the operational channel chamber height to increase indicated reactor power by lowering the chamber, or to decrease indicated power by raising the operational channel chamber.
16. Scram the reactor. Observe the log and linear chart recorders. When the power drops below the crossover point, see that there is not a jump in indicated power

when the NM-1000 crosses the crossover point. Jumps can be corrected by changing item #31 on the Burr Brown unit. Item #31 should not be increased to greater than +/- 400. To change item #31 press (F3)(1)(F8)(+/- number desired)(enter). If a change of more than 400 is required, perform a channel alignment because the correction factor is too large. Increase and decrease the power as necessary to verify or correct the crossover jump. Scram when complete.

17. Verify the following items are correct in the NM-1000 Burr Brown unit as per the last channel alignment of the operational channel. The data for the current settings can be located in the core physics/calibration log.

    Item #25, Item #29

    Item #35, Item #39

    Item #40, Item #41

    Item #42, Item #43

    .5 CPS
    1KW
    3sec

18. Allow the reactor to cool for several hours or overnight.
19. Increase reactor power from 100 watts to 1 megawatt by decades based on the independent chamber. Plot the independent chamber against the operational channel on graph paper to verify the linearity of the operational channel. Present this data to the ROS or RFD for approval. If the ROS or RFD reject the data, proceed with procedure C026 to perform a Channel Alignment. (Note: if there is a significant core history, the 10 watt and 100 watt data from the ion chamber will be bad. Skip it.)
20. Record into the core physics/calibration log any changes to the Burr Brown unit, a verification that items listed above have not changed, and that the linearity has been approved by the ROS or RFD.

NM-1000 CALIBRATION DATA SHEET

DATE_____ Last Channel Alignment_____

Personnel involved _____

Equipment used	Serial Number	Cal Expir Date
Voltmeter-_____	_____	_____
Electrometer-_____	_____	_____

Points Checked or Changed	Expected	Actual
Under Voltage Trip Point	720-740 Volt	_____
Over Voltage Trip Point	≤840 Volt	_____
High voltage set point	800 Volt	_____
NM-1000 Item #25 (count region span)	*	_____
NM-1000 Item #29 (⇑ crossover)	700,000	700.000
NM-1000 Item #31 (offset)	< +/- 400	_____
NM-1000 Item #33 (Camp Constant)	.370	.370
NM-1000 Item #35 (Campbell region span)	*	_____
NM-1000 Item #39 (⇓ crossover)	2,400	2,400
NM-1000 Item #40 (.5 cps interlock)	*	_____
NM-1000 Item #41 (Max Reactor power)	109	109
NM-1000 Item #42 (1 kw interlock)	.1	.1
NM-1000 Item #43 (3 sec interlock)	3.0	3.0

Linearity curve approved by ROS or RFD _____

* Check last Channel Alignment for "As Left" data.

Operational Channel Alignment

I. General:

1. Reference: General Atomics Technical Staff
2. Requirement: Upon installation of new components or as needed
3. Tools: Small Flat Screwdriver, Philips Screwdriver
4. Equipment: Pool stirrer, digital thermometer, ion chamber, high voltage power supply, electrometer (610C), coax signal cable, battery operated volt meter, battery operated current meter, various connectors and adapters
5. Coordination: Operations Schedule
6. Estimated Time: 4 to 8 days
7. Safety Precaution: Electrical shock hazard due to high voltage in lower section of PA15

II. Procedural Sequence:

1 Move the core to the center of the pool.

2. With an operator on console remove the neutron source and see that the console power drops to zero. It often takes a couple minutes for the console power to drop. If the reactor has been to power within the last hour there will probably be enough delayed neutrons that the power will not drop to zero and therefore no adjustment should be made. If the console has not been to power and the power does not drop to zero then adjust the discriminator no more than 1/8th turn every 1 minute until the console power drops to zero. The discriminator potentiometer is located inside a hole on the top of the PA15. There are two holes in the top right side of the PA15. The discriminator is located in the hole closest to the plug. Usually a tool is left in the hole. If not, the cover can be removed from the PA15 to find the discriminator. Warning: There is high voltage in the lower section of the PA15. Counter Clockwise to decrease counts.

3. Place an independent ion chamber above the core. Adjust the chamber to be about 3 to 4 inches above the core.
4. Attach a high voltage power supply to the HV line of the chamber
5. Attach a signal line from the chamber to an electrometer in the control room. A signal line is usually behind the DAC and in the control room cable tray. Hang the power cables and signal lines along the boom.
6. Perform a thermal power calibration according to procedure C015 except for adjustment of the chamber. Adjust the reactor power such that the reactor is at 100 Kw. Turn on the electrometer and the high voltage power supply. Take the reading on the electrometer at 100 Kw reactor thermal power. The reading should be no greater than 0.01 ma. Adjust the independent chamber height to get the proper current. The reading is _____
7. Scram the reactor. Do not move the independent ion chamber until this procedure is finished.
8. Turn off AC power in the enclosure containing the PA15 high voltage power supply. This is the left gray steel enclosure.
9. Disconnect the high voltage coax from J2 of the high voltage distributing and monitoring assembly. This assembly is the box located on the bottom right of the enclosure.
10. Assemble the necessary fittings to add a current meter in series with the high voltage line and J2. The current meter should be battery operated and able to read current as low as .01 ma and as high as 1.00 ma.
11. Attach a battery operated voltmeter capable of reading 1000 volts in 1 volt divisions.
12. Turn the AC power on. Use caution around any exposed high voltage connections.
13. Adjust the potentiometer labeled HV on the front of the high voltage distributing and monitoring assembly to give between 720 and 740 Volts (Nominal set point - <10% loss) on the volt meter.
14. Adjust the potentiometer labeled UV TRIP (under voltage trip) until there is a high

HV

HV

voltage trip on the NM-1000 or console.

15. Adjust the potentiometer labeled HV to give 840 volts (Nominal set point + 5%) on the voltmeter. **WARNING: DO NOT EXCEED 1000 VOLTS. DAMAGE MAY OCCUR TO THE PA15 IF VOLTAGE EXCEEDS 1000 VOLTS.**
16. Adjust the potentiometer labeled OV TRIP (over voltage trip) until a trip occurs on the NM-1000 or console.
17. Adjust the potentiometer labeled HV to give 800 Volt on the voltmeter.
18. Change item #31 in the NM-1000 to 1. Press (F3)(1)(F8)(1)(enter)
19. Remove the cover on the Campbell amplifier.
20. Press (F3) on the NM-1000.
21 Increase reactor power to 1 Mw based on the independent ion chamber.
22. Read and record the at power current from the high voltage power supply. _____ ma
23. Adjust the height of the fission detector to give an at power current of .25 mA. This means that the fission detector is outputting .25 milliamp at 1 Mw.

CALIBRATING THE CAMPBELL REGION

24. Read and record the NM-1000. The NM-1000 should have approximately 80,000 displayed. _____
25. Adjust the "AC GAIN" potentiometer in the Campbell amplifier to give an average reading of 80,000 on the NM-1000. If 80 K is unobtainable then adjust the potentiometer "DC GAIN" to achieve 80 K on the NM-1000. Scram and allow the reactor gamma background to decay for at least half an hour.
26. Increase the reactor power to 10 kw based on the independent ion chamber.
27. Read the NM-1000 item 30 (F3). The average value 8000 should be displayed.
28. Adjust the "BALANCE" potentiometer in the Campbell amplifier to display an average of 8000 on the NM-1000 and 10 Kw on the console.
29. Increase reactor power to 1 Mw based on the independent ion chamber.
30. Read item 30 (F3). The NM-1000 should read 80,000.
31. Adjust the "AC GAIN" potentiometer in the Campbell amplifier to give 80,000 on the NM-1000.

32. Check item #10, press (F1) _____ and item #35, press (F3)(5)_____ . If Necessary, calculate a new item #35 to give 100% power on the console.
    Use the formula: Item #35 * 100 / Item #10 = New item #35_____
33. Enter the new item #35 by pressing (F3)(5)(F8)(number see below)(enter)
    For Example: The number 2.109E-8 would be entered (F3)(5)(F8) (2) (.) (1) (0) (9) (Space)(-)(8).
34. Observe the item #10, (F1), on the NM-1000, or the CSC console for the proper reactor power. If the power is incorrect go back to step 33.
35. When the reactor power is 1 Mw on the console, and the NM-1000 displays 100% on item #10 (F1), and item #30 (F3) is 80,000 then scram and let the reactor cool for at least 30 minutes.
36. Raise power to 10 Kw. Item #30 (F3) should display 8000 and console should read 10 Kw. If not adjust the "BALANCE" potentiometer in the Campbell amplifier to give 8000 on the NM-1000 and 10 Kw on the console.
    We have been adjusting the Campbell region "Zero" 8000 on item #30 at 10 kw with the "BALANCE" pot and the "Span" 80,000 on item #30 at 1 Mw with the "AC GAIN" pot. The Burr Brown unit should display 2500 at 1 kilowatt, 8000 at 10 Kilowatt, 25,000 at 100 kilowatt, and 80,000 at 1 megawatt. To verify the 1 kw and 10 Kw points the reactor will have to be allowed to cool overnight. The core gamma background gives false readings on the independent ion chamber at low powers if the gamma is not allowed to decay for a significant period of time after a power run. Figure: number of hours for decay = (decades - 1) squared.
37. At this point the Campbell region should be calibrated. If the console reading is not correct go back to step 30 and continue. If it is correct then continue.

CALIBRATING THE COUNT RATE REGION.

38. Allow the reactor to cool for several hours before taking the power to 1 kw.
39. Change the Campbell crossover point item #39 in the NM-1000 to 2000. Press

(F3)(9)(F8)(2)(0)(0)(0)(enter) to prevent the NM-1000 from changing into count rate region.

40. Decrease reactor power to 1 kw based on the independent ion chamber. Stabilize in manual mode such that the reactor power does not change. The reactor must be very stable. The CSC should indicate approximately 1 kw. Be sure that the NM-1000 is using Campbell mode. Press (F2). There will be only zeros if the MN-1000 is in Campbell region.
41. Change item #39 to 4000. Press (F3)(9)(F8)(4)(0)(0)(0)(enter) to force the NM-1000 to use count rate region
42. Read item #20, press (F2), on the NM-1000.
43. Read item #20 on the NM-1000. Average several readings of item #20. Calculate the new item 25. Use the formula:
    0.1 / Item #20 = Item #25. _____
44. Enter the new Item #25. Press (F2)(5)(F8)(number), see below,(Enter).
    Example number: 1.471E-7. Press (1)(.)(4)(7)(1)(space)(-)(7)
    Power is determined in the count rate region by multiplying the number of counts by a constant. Zero counts multiplied by a constant gives zero power. Approximately 680,000 counts (item #20) multiplied by some constant gives 0.1% power or 1 kw in count rate mode. Therefor the "Zero" is an absolute zero and cannot be set, and the "Span" is set by item #25.
45. Calculate the new .5 CPS interlock and enter as item #40.
    Multiply .5 * Item #25 as calculated two steps above. _____
    Press (F4)(F8)(number see below)(enter).
    Example number: 7.355E-8. Press (7)(.)(3)(5)(5)(space)(-)(8).
46. Change item #29 (count rate crossover point) for 700,000.
    Press (F2)(9)(F8)(7)(0)(0)(0)(0)(0)
47. Set Item #39 (Campbell crossover point) for 2400.
    Press (F3)(9)(F8)(2)(4)(0)(0)(enter).
48. Increase and decrease the reactor power slowly from about 3 kw to .5 kw based on the CSC console power to check the crossover point. The crossover points

are typically between 1 kW and 2 kW. There should not be a jump in power when the crossover occurs. If there is a big cross over jump that can not be corrected by adjusting Item #31, go back and start this section (Calibrating the Count Rate Region) over. If the cross over has a small jump, item #31 can be increased or decreased (no more than +/- 400) to line up the Campbell and count rate regions. To change the offset press (F3)(1)(F8)(guessed number, no calculation here)(enter). Check crossover point. The number in item #31 changes the lower end of the Campbell range.

49. The console power should be calibrated and linear at this point. Scram and allow the reactor gamma background to cool. Increase the reactor power from 100 watts to 1 Mw by decades based on the independent ion chamber and graph the results. Maintain the power at 1 Meg for 10 minutes and generate a scram curve.

CORRECTING THE PRESTARTS:

The NM-1000 inserts 4 signals into the PA15 and campbelling amplifier to test the circuitry during prestarts. Two of the signals are generated in the NM-1000 and test the count rate region. The PA15 signals cannot be modified. Two of the signals test the campbelling region and are adjusted in the campbelling amplifier with two potentiometers. The "CAMP HI" signal checks the campbelling range at 1.1 Mw and the "CAMP LO" at a lower area in the Campbell range.

50. Press (F5)(F8)(5)(enter) to insert the CAMP HI signal. Press (F1) to read the indicated reactor power. The power should be 109 or 110 which is the percentage of full power._____

51. Adjust the CAMP HI pot to give an indication of 109 or 110 on the NM-1000. _____

52. Exit calibrate mode by pressing (F5)(F8)(0)(enter).

53. Press (F5)(F8)(4)(enter) to insert the CAMP LOW signal.
Press (F3) to display the Campbell counts. _____ Adjust the Low Camp potentiometer to give as low an indication on the NM-1000 as possible but not lower than 2500. _____

54. Exit calibrate mode by pressing (F5)(F8)(0)(enter).
55. Run prestarts. Expect that the NM-1000 calibration modes 2, 3, 4, and 5 will fail. The new constants on the prestart printout will have to be changed in the CSC configurator. Accidents modifying the configurator can blow the database and cause the console to not boot up properly. Do not attempt to change the configurator without proper assistance from experienced staff. The information on how to change the configurator is not included here. For changes to the configurator, see the ROS or RFD.
56. Copy the following NM-1000 constants into the core physics log: Items 21, 25, 29=700,000, 31, 33=0.370, 35, 39, 40, 41=109, 42=0.1, 43=3.0, 51=1, 52=0, 53=0. Note: some of the items above have numbers attached (=) and should not change, but should be checked for accuracy.
57. Replace covers on the PA15 and campbelling amplifier.
58. Turn off high voltage power supply for the independent ion chamber and remove.
59. Remove independent ion chamber from core and hang along the side of the reactor pool. Do not remove the chamber from the pool for several weeks due to high activation of the chamber.
60. Clean up any additional mess or apparatus.
61. Update Triga Tracker.

NM-1000 CHANNEL ALIGNMENT DATA SHEET

DATE_____ Personnel involved_____

Equipment used	Serial Number	Cal Expir Date
Voltmeter-_____	_____	_____
Current Meter-_____	_____	_____
Electrometer-_____	_____	_____

Points Tested or Changed	As Found	As Left
Under Voltage Trip Point	_____ Volt	_____ Volt
Over Voltage Trip Point	_____ Volt	_____ Volt
High voltage set to	_____ Volt	_____ Volt
Current at 1 Meg	_____ mA	_____ mA
NM-1000 Item #31 (offset)	_____	_____
NM-1000 Item #30 at 1 Mw (~80k)	*	_____ CTS
NM-1000 Item #30 at 10 Kw (~8,000)	*	_____ CTS
NM-1000 Item #35 (Campbell region span)	_____	_____
NM-1000 Item #39 (⇓ crossover)	2400 CTS	2400 CTS
NM-1000 Item #20 at 1 Kw	*	_____ CTS
NM-1000 Item #25 (count region span)	_____	_____
NM-1000 Item #29 (⇑ crossover)	700,000 CTS	700,000 CTS
NM-1000 Item #40 (.5 cps interlock)	_____	_____
CAMP HI Calibration Signal	_____	_____
CAMP LO Calibration Signal	_____	_____
NM-1000 Item #33 (Camp Constant)	.370	.370
NM-1000 Item #41 (Max Reactor power)	109	109
NM-1000 Item #42 (1 kw interlock)	.1	.1
NM-1000 Item #43 (3 sec interlock)	3.0	3.0
NM-1000 Item #51	1.0	1.0
NM-1000 Item #52	0.0	0.0
NM-1000 Item #53	0.0	0.0

HV

.5 CPS

1KW

3 sec

*Information not required

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: Remove Procedure C013, Calibration of Criticality Monitor

Modification to: Procedure _XX_ Facility ____ Experiment ____

Submitted by: _____Marté_____ Date __15 April 1999____

1. Description of change:
Remove procedure C013. When the criticality monitor was removed from the facility in a 50.59 change approved 13 April 1998, the calibration of RAM R5 fell under procedure C014, Calibration of Reactor Ram System. This change removes the unnecessary procedure.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).
Procedures C013 and C014 are identical. Using procedure C014 does not change how the RAMs are calibrated. Criticality monitors are no longer specified in the SAR.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.
No change to facility. No drawings to change.

4. Determine what other procedures, logs, or training material may be affected and record below.
None.

5. List of associated drawings, procedures, logs, or other materials to be changed:
None

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.
Action Sheet: Submitted _XX__ Not Required ____

Reviewed and approved by RFD _____ Date 27 APR 1

RRFSC Notified _____ Date _____

5059C013.2wp

ACTION SHEET FOR

Procedure C013
15 April 1999

✓ Electronic copy of Procedure C013 removed
✓ Control room copy of Procedure C013 removed

✓ Verify Technical Specifications do not need changed
✓ Verify SAR does not need changed

✓ Verify Triga Tracker does not call for C013
✓ Change reviewed by RRFSC

Calibration of Criticality Monitor (Electronic)

I. General:

1. Reference: Tech Spec Section 4.5
2. Requirement: Annually
3. Tools: Screwdriver
4. Coordination: Schedule calibration with SHD and LOGI
5. Estimated Time: One hour
6. Safety Precaution/Protection: Open radiation source, personal dosimetry required and practice ALARA

II. Procedural Sequence:

1. Refer to Health Physics Procedure HPP 7-2.
2. Update TRIGA Tracker.

REMOVED FROM PROCEDURES

Calibration of Reactor RAM System

I. General

1. Reference Tech Spec Section 4.5
2. Requirement: Annual
3. Tools: Screwdriver
4. Coordination: Schedule calibration with SHD and LOGI
5. Estimated Time: One hour
6. Safety Precaution/Protection: Open radiation source, personal dosimetry required and practice ALARA

II. Procedural Sequence

1. Refer to Health Physics Procedure HPP 7-2.
2. Update TRIGA Tracker.

VERSION IN USE

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: **UPDATE OF WEEKLY OPERATIONAL INSTRUMENT CHECKLIST PROCEDURE 8, TAB H**

Modification to: Procedure **XX** Facility ____ Experiment ____

Submitted by: **Osborne** Date **18 August 1999**

1. Description of change:

Filling of the multichannel analyzer (MCA) liquid nitrogen dewer was added as to the weekly operational instrument checklist.

This modification will ensure that the germanium crystal is not damaged due to lack of liquid nitrogen.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

Failure to fill the MCA dewer will damage the germanium crystal and not produce an unresolved safety issue. The MCA is not required by the Technical Specifications or Safety Analysis Report

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, forward a copy of changes necessary to Facilities.

No facility changes

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted **XX** Not Required ____

Reviewed and approved by RFD _____ Date AUG 23 1999

RRFSC Notified SMO _____ Date SEP 13 199

ACTION SHEET FOR

Weekly Operational Instrumentation Checklist, Procedure 8 TAB H

18 August 1999

✓ Electronic copy of Procedure 8, TAB H Updated

✓ Control room copy of Procedure 8, TAB H Updated

✓ Verify Technical Specifications do not need changed

✓ Verify SAR does not need changed

✓ All staff members have reviewed this procedure

✓ Change reviewed by RRFSC

WEEKLY OPERATIONAL INSTRUMENT CHECKLIST

CHECKLIST # _____ DATE _____
SUPERVISED BY _____
ASSISTED BY _____ REVIEWED BY _____

I. WATER LEVEL INDICATOR

A. In pool, east side, depress float on water level indicator ..... _____
B. Observe scram on console ..... _____

II. WATER RESISTIVITY

List resistivity readings for previous calendar week from daily startup checklists. Determine the average at each point is >0.5 Mohm-cm.

	MON	TUE	WED	THU	FRI	AVG
Monitor Box	_____	_____	_____	_____	_____	_____
DM1	_____	_____	_____	_____	_____	_____
DM2	_____	_____	_____	_____	_____	_____

III. RADIATION ALARMS

A. Test alarm functions for high level and failure

Monitor	Failure alarm functional	HIGH Level alarm functional
R-1	_____	_____
R-2	_____	_____
R-5	_____	_____
E-3	_____	_____
E-6	_____	_____
Reactor Room CAM	_____	_____
Gas Stack Monitor	_____	_____

B. Reset alarms..... _____

IV. OTHER

A. Top lock key seals at Security Desk and at LOG verified intact ..... _____
B. Change Filter in the Stack Gas Monitor ..... _____
C. Fill Multichannel Analyzer Liquid Nitrogen Dewer ..... _____

FACILITY MODIFICATION WORK SHEET 2

NO 10 CFR 50.59 ANALYSIS REQUIRED

Proposed Change: UPGRADE TO REACTOR CONTROL SYSTEM CONSOLE (CSC) AND DATA ACQUISITION CONTROL COMPUTERS (DAC)

Modification to: Procedure ____ Facility _XX_ Experiment ____

Submitted by: ____Marté_____ Date 28 September 1999

1. Description of change:

The TRIGA console software project will replace the old IC-DOS software with a new supported operating system (QNX) and current supported hardware.

The following software items were modified:

- IC Dos 16-bit code converted to 32-bit QNX code.
- IC Dos networking converted to industry standard Ethernet.
- Networking interface was modified to be more deterministic and reliable.
- IC-DOS proprietary routines were converted to standard UNIX functions.
- IC-DOS 'floating point' routines were converted to standard UNIX.
- IC-DOS RAM files were converted to UNIX shared memory routines.
- Modified software timing loops to be CPU speed independent.
- Restructured many routines to be visually easier to read and understand.
- Assembly language routines were converted to 'C' functions.

Hardware components replaced as follows:

- The computer chassis was replaced in both the CSC and DAC. The new chassis contain new power supplies, floppy drives, and hard drives.
- The computer motherboards and processors were replaced with up to date Pentium processors and backplane motherboards.
- The obsolete network cards were replaced with industry standard ethernet network cards.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

- The control system update will provide all existing control and safety functions, while preserving the original look and feel of the current version. The console update will not degrade the ability to implement all existing control and SCRAM functions.

    - The technical specifications and SAR do not specify the control system console software or components.

    - The scram and interlock requirements specified in the technical specifications and SAR, are maintained in the updated software, and will be tested to verify compliance with technical specifications before final implementation.

    - The new QNX operating system provides better recovery from system crashes. The multitasking design of the QNX operating system provides a reactor scram upon simulated failure of the console software, while the operating system continues to provide system status and recovery information to the operator.

    - Tests of the system will include a sub-critical fueled core, a partially fueled core, and a fully loaded core. This sequence of testing will provide the safest method for detecting potential software problems, and minimize the consequences of such problems. The details for the testing can be found in the attached V & V plan.

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, modification of drawings must be approved by RFD and forward a copy of changes necessary to Facilities.

- No changes to facility drawings

4. Determine what other procedures, logs, or training material may be affected and record below.

- A board layout diagram was added to the Calibration procedure for AIO16 cards. The diagram shows the location of calibration adjustment potentiometers for the new boards.

5. List of associated drawings, procedures, logs, or other materials to be changed:

- A drawing for the new AIO16 cards was added to the procedure.

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted XX Not Required ____

Reviewed and approved by RFD _____ Date _____

RRFSC Notified _____ Date DEC 8 1999

5059consolecomputer.2wp

ACTION SHEET FOR:

UPGRADE TO REACTOR CONTROL SYSTEM CONSOLE (CSC) AND DATA ACQUISITION CONTROL COMPUTERS (DAC)
28 September 1999

✓ Install new components and software.
✓ Test software using V&V procedure.

✓ Obtain RFD approval on completion of update and successful testing of package.

✓ Add a diagram of the new AIO16 cards to the procedure.
✓ Perform calibration of new AIO16 cards.

✓ Develop a list of spare parts required.
✓ Remove outdated spare parts from the supply cabinet.
✓ Update spare parts inventory list.

✓ RRFSC reviewed software update and results of testing for console upgrade.

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: **To change the greasing requirements for the primary Pump and secondary pump.**

Modification to: Procedure ___XX_ Facility _ Experiment ____

Submitted by: **Pierson & Marté** Date **29 oct 1999**

1. Description of change:
Change the greasing time of the reactor water system pumps from monthly to quarterly IAW the manufacturer's operating manual. The manual recommends only 2 to 3 times per year to prevent bearing damage of the pump and motor. To combine maintenance procedure M006 and M007 into one procedure and delete M007 and rename maintenance procedure M006 to "Lube Pump & Motor Bearings Of Reactor Water System". All the steps for M007 have been incorporated into maintenance procedure M006.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

NONE

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, forward a copy of changes necessary to Facilities.

NONE

4. Determine what other procedures, logs, or training material may be affected and record below.

NONE

5. List of associated drawings, procedures, logs, or other materials to be changed:

Maintenance procedure M006, Triga tracker

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted XX Not Required ____

Reviewed and approved by RFD _____ Date 15 NOV 99

RRFSC Notified _____ Date DEC 8 1999

ACTION SHEET FOR

Maintenance Procedure M006, Lube Pump And Motor Bearings Of Reactor Water System

✓	Electronic copy of Maintenance Procedure M006 updated
✓	Control room copy of Maintenance Procedure M006 updated
✓	Triga Tracker for Maintenance Procedure M006 updated
✓	Verify Maintenance Procedure M007 is deleted from Triga Tracker
✓	Verify Technical Specifications do not need change
✓	Verify Safety Analysis Report does not need change
✓	All staff members have reviewed this procedure
✓	Reviewed by the Reactor and Radiation Safety Committee

LUBE PUMP & MOTOR BEARINGS OF REACTOR WATER SYSTEM

MAINTENANCE PROCEDURE M006

I. General:

1. Reference: Manufacturer's Operating Manual
2. Requirement: Quarterly
3. Tools: Adjustable wrench, grease gun and clean rags
4. Coordination: Coordinate removing reactor pumps from service with reactor staff
5. Estimated Time: 45 minutes
6. Safety Precaution/Protection: Turn off electrical power to pump motor at safety switch located on the wall behind motors

II. Procedural Sequence:

1. Notify reactor staff the reactor cooling water pumps will be turned off for maintenance.
2. Take tools to second floor equipment room (RM 2158)
3. Locate safety switch on the wall behind the motors, move the handle on the right side of the box downward to the OFF position.
4. Lubricate in accordance with the manufacturer's instructions.
5. Locate the safety switch and move upward to the ON position.
6. Clean tools and return to the proper storage location.
7. Restore electrical power to motor by depressing pushbutton marked "Reactor Main Pump" and "Heat Exchange Pump" located behind the door in RM 3160.
8. Record the date and name(s) of personnel performing maintenance on TRIGA Tracker .

LUBE PUMP & MOTOR BEARINGS OF PRIMARY WATER SYSTEM

I. General:

1. Reference: Manufacturer's Operating Manual
2. Requirement: Monthly
3. Tools: Adjustable wrench, grease gun and clean rags
4. Coordination: Coordinate removing primary pump from service with reactor staff
5. Estimated Time: 45 minutes
6. Safety Precaution/Protection: Turn off electrical power to pump motor at safety switch located on the wall behind motor

II. Procedural Sequence:

1. Notify reactor staff the primary cooling water pump will be turned off for maintenance.
2. Take tools to second floor equipment room (RM 2158)
3. Locate safety switch on the wall behind the motor, move the handle on the right side of the box downward to the OFF position.
4. Lubricate in accordance with the manufacturer's instructions.
5. Locate the safety switch and move upward to the ON position.
6. Clean tools and return to the proper storage location.
7. Restore electrical power to motor by depressing pushbutton marked "Reactor Main Pump" located behind the door in RM 3160.
8. Record the date and name(s) of personnel performing maintenance on TRIGA Tracker .

LUBE PUMP & MOTOR BEARINGS OF SECONDARY WATER

I. General

1. Reference: Manufacturer's Operating Manual
2. Requirement: Monthly
3. Tools: Adjustable wrench, grease gun and clean rags.
4. Coordination: Coordinate removing secondary pump from service with reactor staff.
5. Estimated Time: 30-45 minutes.
6. Safety Precaution/Protection: Turn off electrical power to pump motor at safety switch located on the wall behind motor.

II. Procedural Sequence

1. Notify reactor staff the secondary cooling water pump will be turned off for maintenance.
2. Take tools to second floor equipment room (RM 2158)
3. Locate safety switch on the wall behind the motor, move the handle on the right side of the box downward to the OFF position.
4. Lubricate in accordance with the manufacturer's instructions.
5. Locate the safety switch and move upward to the ON position.
6. Clean tools and return to the proper storage location.
7. Restore electrical power to motor by depressing pushbutton marked "Heat Exchange Pump" located behind the door in RM 3160.
8. Record the date and name(s) of personnel performing maintenance on TRIGA TRACKER.

5. Insert remaining rings with joints staggered 180° apart. Compress each ring firmly as described above. Rotate shaft by hand each time a ring is inserted to aid in seating packing. If pump is equipped with seal cage, install it opposite sealing water connection.

6. When the box is full, compress the packing with the gland. Be sure to adjust gland evenly and also be sure that the gland has entered the box at least ⅛". If the packing will not compress enough to allow this amount of gland entrance, remove one ring of packing.

7. After pump is started, adjust gland nuts so that leakage is as described above. Care should be taken during the first hour of operation to take up on the packing gradually just enough to maintain this amount of leakage. The "breaking in" period of the packing is most important in the satisfactory performance of a stuffing box.

CARE OF BALL BEARINGS: The ball bearings on pump and motor, as shipped from factory, are furnished with sufficient lubricant for from two to three months' operation. Do not add more lubricant when putting the unit in service.

Injury to ball bearings is more likely to result from over-greasing than from under-greasing. The real purpose of a lubricant for ball bearings is to form a coating on the highly polished surfaces as a protection against corrosion, rather than for lubrication. An over supply of grease in ball bearings produces heating . . . due to friction . . . and causes the grease to ooze out of bearing housing along the shaft, as the bearing becomes warm.

Under usual conditions, ball bearings will reach a temperature of from 10 to 55 F. above surrounding temperature. Unless the bearing temperature reaches 125 F. above surrounding temperature, there is no cause for alarm.

Ball bearings require additional lubricant only two or three times per year, depending upon the continuity of service. Do not use more grease than necessary to fill the bearing housing one-fourth to one-third full.

If bearings are removed from housing for cleaning, use extreme care to see that they are thoroughly dry before being re-installed. Use carbon-tetrachloride, or kerosene to clean bearings. Water or moisture is destructive to all ball bearings.

The particular brand of grease is unimportant, providing it is a lithium base grease, especially if the bearing is used in a location where there is excessive moisture or danger of water getting into the housing.

For temperatures of from 32° to 200° F. at the bearings, the following brands of lubricant are suggested:

Grease Lubricated Pumps and Motors:

American Oil Company	Amolith No. 2
Cities Service Oil Co.	Trojan H2
Continental Oil Co.	Conoco Super Lube
Humble Oil & Refining Co.	Nebula EP No. 2
Fiske Bros.	Lubriplate 630-2
Shell Oil Co.	Alvania No. 2
Sinclair Refining Co.	Litholine 2
Standard Oil of Ohio	Sohitran 2
Texaco Inc.	Multifak 2
Union Oil Co.	UNOBA No. 2

Oil Lubricated Pumps:

American Oil Co.	American No. 31
Cities Service Oil Co.	Pacemaker No. 3
Continental Oil Co.	Conoco Dectol Medium
Humble Oil & Refining Co.	Teresso 52
Fiske Bros.	Lubriplate No. 2
Shell Oil Co.	Tellus Oil 33
Sinclair Refining Co.	Rubilene Medium
Standard Oil of Ohio	Sohiois 52
Texaco Inc.	Regal Oil PC (R & O)
Union Oil Co.	Red Line-Turmaco 300

The WEINMAN PUMP MFG. COMPANY is prepared to supply suitable grease put up in foil tubes, about 1" diameter x 5" long . . . containing 1¾ ounces. Approximately ½ ounce of grease, or a teaspoonful for bearings of small size, and a tablespoonful for larger sizes, is needed each time a bearing is relubricated.

PUMP TROUBLES and THEIR CAUSES

FAILURE TO PUMP

1. Pump not properly primed.
2. Wrong direction of rotation.
3. Speed too low.
4. Total head too high.

REDUCED CAPACITY AND/OR HEAD

1. Air pockets or leaks in suction line.
2. Clogged impeller.
3. Foot-valve-strainer too small or clogged.
4. Insufficient submergence for suction pipe.
5. Excessive suction lift . . . much over 15 ft.
6. Insufficient positive suction head (for hot water).
7. Total head more than that for which pump is intended.
8. Excessively worn impeller and wearing rings.

RAPID WEAR OF COUPLING CUSHIONS

1. Always the result of misalignment or a bent shaft.

PUMP LOSES PRIMING

1. Air leaks in suction line.
2. Excessive amount of air in water.
3. Water seal in stuffing box not functioning.
4. Excessive suction lift and pump operating too near shut-off point.

OVERLOADED DRIVING UNIT

1. Head much lower than that for which pump is designed.
2. Speed too high . . . higher than that contemplated.
3. Liquid handled of high specific gravity and greater viscosity than that of water.

MECHANICAL TROUBLES AND NOISE

1. Misalignment.
2. Excessive suction lift or vapor binding (hot water).
3. Bent shaft and/or damaged bearings.
4. Suction and discharge piping not properly supported and anchored.

Facility Modification Work Sheet 2

No 10 CFR 50.59 Analysis Required

Proposed Change: **UPDATE OF DAILY OPERATIONAL SHUTDOWN CHECKLIST PROCEDURE 8, TAB I**

Modification to: Procedure **XX** Facility ____ Experiment ____

Submitted by: **Osborne** Date **4 November 99**

1. Description of change:

Placing a backup tape in the RSD server tape drive was added to the daily operational shutdown checklist.

This modification will ensure that the data on RSD server will be backed up and that a current archive will always exist.

2. Verify that the proposed change does not involve a change to the Technical Specifications, the facility as described in the SAR, or procedures as described in the SAR, and does not produce an unresolved safety issue as defined in 10 CFR 50.59(a)(2).

Failure to change a tape will result in the RSD server not being backed up for that day. This will not produce an unresolved safety issue. There is no requirement for this in the Technical Specifications or Safety Analysis Report

3. If change involves a facility modification, attach a drawing if appropriate. If structural facility drawings need updating, forward a copy of changes necessary to Facilities.

No facility changes

4. Determine what other procedures, logs, or training material may be affected and record below.

None identified

5. List of associated drawings, procedures, logs, or other materials to be changed:

None identified

6. Create an Action Sheet containing the list of associated work, specified above, attach a copy, and submit it to the RFD.

Action Sheet: Submitted **XX** Not Required ____

Reviewed and approved by RFD _____ Date 4-12-99

RRFSC Notified SNO Date DEC 8 1999

ACTION SHEET FOR

Procedure 8 TAB I

4 November 1999

✓ Electronic copy of Procedure 8, TAB I Updated

✓ Control room copy of Procedure 8, TAB I Updated

✓ Verify Technical Specifications do not need changed

✓ Verify SAR does not need changed

✓ All staff members have reviewed this procedure

✓ Change reviewed by RRFSC

DAILY OPERATIONAL SHUTDOWN CHECKLIST

Checklist No. _____
Time Completed _____

Date _____
Supervised by _____
Assisted by _____
_____

I. REACTOR ROOM (Room 3161)

1. All rod drives DOWN ..... _____
2. Carriage lights OFF ..... _____
3. Door 3162 SECURED ..... _____
4. Channel test completed on both CAM's ..... _____
5. Door 3161 locked with key ..... _____
6. Backup tape changed in RSD server tape drive ..... _____

II. EQUIPMENT ROOM (Room 3152)

1. Distillation unit discharge valve CLOSED ..... _____
2. Air dryer OPERATIONAL ..... _____
3. Doors 231, 231A, and roof hatch SECURED ..... _____

III. EQUIPMENT ROOM (Room 2158)

1. Primary discharge pressure (11 - 16 psig) ..... _____*
2. Demineralizer flow rates set to (5.5 - 6.5 gpm) ..... _____*
3. Visual inspection for leaks ..... _____
4. Door 2158 and 2164 SECURED ..... _____

IV. PREPARATION AREA

1. ER2 plug door CONTROL LOCKED ..... _____
   Door closed; and handwheel PADLOCKED ..... _____
2. ER2 lights ON and rheostat at 10% ..... _____
3. ER1 plug door CONTROL LOCKED ..... _____
   Door closed; and handwheel PADLOCKED ..... _____
4. ER1 lights ON and rheostat at 10% ..... _____
5. Visual inspection of area ..... _____
6. Warm storage doors closed ..... _____

V. LOBBY ALARM

Lobby alarm audio ON . . . . . _____

VI. REACTOR CONTROL ROOM (Room 3160)

1. Reactor tank lights OFF . . . . . _____
2. Console chart recorder pens raised . . . . . _____
3. Steady-state timer OFF . . . . . _____
4. Console LOCKED, and all required keys returned to lock box . . . . . _____
5. Diffuser pumps OFF . . . . . _____
6. Purification, secondary and primary pumps ON . . . . . _____
7. Reactor monthly usage summary completed . . . . . _____
8. Auxiliary chart recorders operating and tracing . . . . . _____
9. Radiation monitors . . . . . _____

MONITOR	READING	HIGH LEVEL ALARM SETTING (mrem/hr)
a. R-1	(<10) _____*	10 _____
b. R-2	(<10) _____*	10 _____
c. R-3	(<10) _____*	10 _____
d. R-5	(<10) _____*	10 _____
e. E-3	(<10) _____*	10 _____
f. E-6	(<10) _____*	10 _____
g. R-6	(<10) _____*	

* Numerical Entry

ATTACHMENT B

Appointment Letters for Current Reactor and Radiation Facility Safety Committee Changes

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
8901 WISCONSIN AVENUE
BETHESDA, MARYLAND 20889-5603

AFRRI/RSD

6055
9 December 1999

MEMORANDUM FOR REACTOR DEPARTMENT FILES

SUBJECT: Reactor and Radiation Facility Safety Committee Membership

Effective this date, the following individuals are members of the Armed Forces Radiobiology Research Institute (AFRRI) Reactor and Radiation Facility Safety Committee (RRFSC). Memberships are in accordance with the Technical Specifications of Nuclear Regulatory Commission license R-84.

PERMANENT MEMBERS

Stephen I. Miller, AFRRI, Reactor Facility Director	Voting Member
Bruce A. White, MAJ, USAF, AFRRI, Radiation Safety Officer	Voting Member

APPOINTED MEMBERS

Tyrone D. Naquin, CDR, MSC, USN, Chairman	Voting Member
Dr. Marcus Voth, Monticello Nuclear Generating Plant, Licensing Project Manager	Voting Member
Joe Pawlovich, Naval Research Laboratories, Radiation Safety Officer	Voting Member

SPECIAL MEMBERS

J.W. Malinoski, CAPT, MSC, USN, AFRRI, Head, Radiation Sciences Department	Special Voting Member
Edward R. Herbert, Montgomery County Government, Environmental Protection Department	Special Non-Voting Member

RECORDER

Samuel D. Osborne, SFC, USA, AFRRI

ROBERT R. ENG
COL, MS, USA
Director

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
8901 WISCONSIN AVENUE
BETHESDA, MARYLAND 20889-5603

6055
9 December 1999

MEMORANDUM FOR DISTRIBUTION A

SUBJECT: Reactor and Radiation Facility Safety Committee Member

The following appointment is made:

Commander Tyrone D. Naquin

ACTION: Appointed as the Chairman of the Reactor and Radiation Facility Safety Committee. Commander Tyrone D. Naquin replaces Colonel David G. Jarrett.

AUTHORITY: Verbal orders, Director AFRRI

EFFECTIVE: 9 December 1999

PERIOD: Until superseded or rescinded

SPECIAL INSTRUCTIONS: This appointment is made in accordance with the AFFRI Reactor Technical Specifications of the NRC license R-84. All questions regarding AFRRI Reactor and Radiation Safety Committee should be directed to Mr. Miller at 295-1290.

ROBERT R. ENG
COL, MS, USA
Director

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
8901 WISCONSIN AVENUE
BETHESDA, MARYLAND 20889-5603

AFRRI/RSD

6055
15 November 1999

MEMORANDUM FOR REACTOR DEPARTMENT FILES

SUBJECT: Reactor and Radiation Facility Safety Committee Membership

Effective this date, the following individuals are members of the Armed Forces Radiobiology Research Institute (AFRRI) Reactor and Radiation Facility Safety Committee (RRFSC). Memberships are in accordance with the Technical Specifications of Nuclear Regulatory Commission license R-84.

PERMANENT MEMBERS

Stephen I. Miller, AFRRI, Reactor Facility Director	Voting Member
Bruce A. White, MAJ, USAF, AFRRI, Radiation Safety Officer	Voting Member

APPOINTED MEMBERS

David G. Jarrett, COL, MC, USA, Chairman	Voting Member
Dr. Marcus Voth, Monticello Nuclear Generating Plant, Licensing Project Manager	Voting Member
Joe Pawlovich, Naval Research Laboratories, Radiation Safety Officer	Voting Member

SPECIAL MEMBERS

J.W. Malinoski, CAPT, MSC, USN, AFRRI, Head, Radiation Sciences Department	Special Voting Member
Edward R. Herbert, Montgomery County Government, Environmental Protection Department	Special Non-Voting Member

RECORDER

Samuel D. Osborne, SFC, USA, AFRRI

ROBERT R. ENG
COL, MS, USA
Director

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
8901 WISCONSIN AVENUE
BETHESDA, MARYLAND 20889-5603

6055
15 November 1999

MEMORANDUM FOR DISTRIBUTION A

SUBJECT: Reactor and Radiation Facility Safety Committee Member

The following appointment is made:

Mr. Joe Pawlovich

ACTION: Mr. Joe Pawlovich, Radiation Safety Officer, Naval Research Laboratories replaces Mr. Bill Powers.

AUTHORITY: Verbal orders, Director AFRRI

EFFECTIVE: 15 November 1999

PERIOD: Until superseded or rescinded

SPECIAL INSTRUCTIONS: Mr. Pawlovich is appointed as a permanent voting member to the RRFSC in his capacity as Radiation Safety Officer, Naval Research Laboratories. This appointment is made in accordance with the AFFRI Reactor Technical Specifications of the NRC license R-84. All questions regarding AFRRI Reactor and Radiation Safety Committee should be directed to SFC Osborne at 295-1290.

ROBERT R. ENG
COL, MS, USA
Director

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE
8901 WISCONSIN AVENUE
BETHESDA, MARYLAND 20889-5603

6055
14 October 1999

MEMORANDUM FOR DISTRIBUTION A

SUBJECT: Reactor and Radiation Facility Safety Committee Member

The following appointment is made:

Colonel David G. Jarrett

ACTION: Appointed as the Chairman of the Reactor and Radiation Facility Safety Committee. Colonel David G. Jarrett replaces Colonel Curtis W. Pearson.

AUTHORITY: Verbal orders, Director AFRRI

EFFECTIVE: 14 October 1999

PERIOD: Until superseded or rescinded

SPECIAL INSTRUCTIONS: This appointment is made in accordance with the AFFRI Reactor Technical Specifications of the NRC license R-84. All questions regarding AFRRI Reactor and Radiation Safety Committee should be directed to Mr. Miller at 295-1290.

ROBERT R. ENG
COL, MS, USA
Director