

# UNIVERSITY of MISSOURI

## RESEARCH REACTOR CENTER

January 4, 2013

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

REFERENCE: Docket 50-186  
University of Missouri-Columbia Research Reactor  
Amended Facility License R-103

SUBJECT: Written communication as specified by 10 CFR 50.4 regarding the response to the  
"University of Missouri, Columbia – Request for a Copy of the Physical Security Plan  
and Operator Requalification Program, RE: License Renewal (TAC No. ME1584)," dated December 20, 2012

On August 31, 2006, the University of Missouri-Columbia Research Reactor (MURR) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) to renew Amended Facility Operating License R-103.

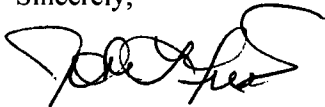
On December 20, 2012, as part of the NRC's review of MURR's renewal request, the NRC requested a copy of the current Physical Security Plan (PSP) and Operator Requalification Program. Enclosed is a copy of each of the documents.

The PSP is enclosed in a separate envelope that has been classified as SAFEGUARDS INFORMATION as per 10 CFR 73.21(b)(1). Pursuant to 10 CFR 2.390, we request that this correspondence be withheld from public disclosure. No person may have access to SAFEGUARDS INFORMATION unless the person has an established "need to know" for this information and is authorized per 10 CFR 73.21.

Please deliver the enclosed envelope, which contains SAFEGUARDS INFORMATION, to the addressee (Beth Reed) on the envelope. The envelope is clearly marked: "Attention: Beth Reed, Withhold from Public Disclosure Under 10 CFR 2.390." If this person is no longer employed at your facility or will be absent for an extended period, please call (573) 882-5296 for the correct disposition of these materials.

As required by 10 CFR 50.30(b), I declare under penalty of perjury that the foregoing is true and correct.

Sincerely,



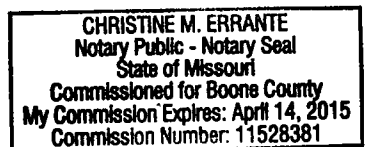
John L. Fruits  
Reactor Manager

### ENDORSEMENT:

Reviewed and Approved,



Ralph A. Butler, P.E.  
Director



M003  
5001A  
NRC

Enclosed:

1. Operator Requalification Program – University of Missouri Research Reactor (MURR) –  
Submitted January 7, 1997
2. Physical Security Plan for University of Missouri Research Reactor

xc: Reactor Advisory Committee  
Reactor Safety Subcommittee  
Dr. Robert Duncan, Vice Chancellor for Research  
Mr. Geoffrey A. Wertz, U.S. NRC  
Mr. Alexander Adams, U.S. NRC  
Mr. Craig Bassett, U.S. NRC



UNIVERSITY OF MISSOURI

# **OPERATOR REQUALIFICATION PROGRAM**

**UNIVERSITY OF MISSOURI  
RESEARCH REACTOR  
(MURR)**

**Submitted  
January 7, 1997**

OPERATOR REQUALIFICATION PROGRAM

UNIVERSITY OF MISSOURI RESEARCH REACTOR (MURR)

SUBMITTED:

JANUARY 7, 1997

## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Table of Contents .....	i
List of Effective Pages .....	ii
1.0 INTRODUCTION .....	1
2.0 DESCRIPTION OF THE PROGRAM .....	1
2.1 Operation .....	2
2.2 Biennial Requalification Examination and Retraining Lectures .....	2
2.3 On-The-Job Training .....	4
2.4 Annual Operating Examination and Evaluation .....	4
2.5 Documented Review of Changes .....	4
3.0 ADMINISTRATION OF THE PROGRAM .....	4
3.1 Training Coordinator .....	4
3.2 Reactor Manager and Reactor Operations Engineer .....	5
3.3 Individual Operator .....	5
4.0 RECORDS .....	6
APPENDIX A:	
Annual On-The-Job Training Requirement/Checklist .....	A-1
Written Examination Form .....	A-3
Annual Operating Test Record .....	A-4
Change Review Sheet .....	A-6
MURR Operator Active Status Log .....	A-7
APPENDIX B:	
Topics for Operating Tests .....	B-1
Operational Tasks Index .....	B-2

# MURR OPERATOR REQUALIFICATION PROGRAM

## LIST OF EFFECTIVE PAGES

<u>PAGE</u>	<u>DATED</u>
i .....	Original
ii .....	Original
1 .....	Original
2 .....	Original
3 .....	Original
4 .....	Original
5 .....	Original
6 .....	Original

### APPENDIX A:

A-1 .....	Original
A-2 .....	Original
A-3 .....	Original
A-4 .....	Original
A-5 .....	Original
A-6 .....	Original
A-7 .....	Original
A-8 .....	Original

### APPENDIX B:

B-1 .....	Original
B-2 .....	Original
B-3 .....	Original
B-4 .....	Original

## 1.0 INTRODUCTION

In August 1973 the AEC (now the Nuclear Regulatory Commission) published amendments to Parts 50 and 55 to Title 10, Chapter I, Code of Federal Regulations, which require that all licensees submit for approval an operator requalification program. All reactor operators and senior reactor operators shall complete this program as a condition for retaining their current licenses and meeting the requirements for renewal of their licenses.

This document is the Operator Requalification Program for the University of Missouri Research Reactor (MURR) which is required by 10 CFR 50.54(i-1) and conforms generally to the requirements of 10 CFR 55.59(c) as specified by 10 CFR 55.59(c)(7). All licensed operators at MURR shall participate in the program and shall satisfactorily complete this program during each requalification cycle, which shall not exceed 24 months in duration. Each two year requalification program cycle shall be promptly followed by successive requalification program cycles.

## 2.0 DESCRIPTION OF THE PROGRAM

The requalification program is divided into four major areas which are designed to provide assurance that all operators maintain competence in all aspects of licensed activities. The four areas are as follows:

- a. A biennial written examination which is used to verify the operator's knowledge level. Preplanned lectures shall be used to retrain those operators who demonstrate deficiencies in any part of the examination.
- b. On-the-job training which will ensure (1) that the operator maintains his competence in manipulating the plant controls and in operating all apparatus and mechanisms required by his license, and (2) that he has a thorough understanding of all emergency procedures.
- c. An annual operating test which will require the operator or senior operator to demonstrate an understanding of and ability to perform the actions necessary to accomplish a broad sample of applicable items specified in 10 CFR 55.45(a) (2) through (13). These applicable items are further specified in NUREG-1478, Rev. 1, Non-Power Reactor Operator Licensing Examination Standards, Procedure ES-301N, "Preparation of Operating Tasks at Non-Power Reactors," Attachment 1.

d. Document review which will ensure all licensed individuals are cognizant of all design, procedure, and license changes.

## 2.1 Operation

To maintain active status [as defined in 10 CFR 55.53(e)] each licensed operator shall actively perform the functions of an operator or senior operator for a minimum of four hours per calendar quarter. These functions can be documented for reactor operators for time performing refuelings, reactor startups, or as console operator. Each senior operator can document time directing refuelings or startups, or time directing shift activities.

Documentation of active status will be on the Active Status Log form (A-8). If a licensed operator has not been actively performing the functions of an operator or senior operator as described above, the Reactor Manager shall verify the operator's license is current and valid. The operator shall complete a minimum of six hours of operation under the supervision of an operator or senior operator as appropriate, covering the functions described in the preceding paragraph.

## 2.2 Biennial Regualification Examination and Retraining Lectures

Biennially a comprehensive examination will be administered to all operators having a reactor operator or a senior reactor operator license for more than 90 days. This examination will be given within a period of one to two weeks and will be of a scope and complexity equivalent to the license examinations administered by the Commission. The function of the examination is to establish the knowledge level of the operator in all areas applicable to the licensed activities he performs. The results of this examination shall provide the basis for a determination of those areas in which an operator needs retraining.

The examination will contain questions from each of the following areas as described in procedure ES-401N, "Preparation of Facility-Specific Written Examinations at Non-Power Reactors" of NUREG-1478, Rev. 1, Non-Power Reactor Operator Licensing Examination Standards:

- A. Reactor Theory, Thermodynamics and Facility Operating Characteristics
- B. Normal and Emergency Procedures, Radiological Controls
- C. Plant and Radiation Monitoring Systems



At the discretion of the facility training coordinator, a review program may be instituted to prepare individuals for the examination. The review program may utilize, but is not limited to, the following study aids:

- a. Lectures or review seminars to present or discuss in a preplanned manner the information relative to each of the areas listed above.
- b. Worksheet questions and problems which the operator can answer in his spare time.
- c. Taped lectures which the operator can review while on shift, but not while assigned console watch or other license required activity.

The Training Coordinator is responsible for scheduling the preparation and administration of the requalification examination. Two separate exams will be developed and administered such that no licensed operators will take an exam they helped develop and review. The examinations will be developed from the MURR requalification question bank and other relevant source material. The examinations will be open reference.

Each examination will be graded by the Training Coordinator and will be submitted to the Reactor Manager or Operations Engineer for review. The evaluation of each operator will be facilitated by completing an Examination Form as shown in Appendix A to this document.

After all of the examinations have been graded, the Training Coordinator will prepare the retraining schedule for those operators who were deficient in any area. An operator will be considered deficient in any area of the examination in which he scores less than 70%; he will retrain until he satisfactorily passes reexamination in the section(s) on which he scored below 70%. If the grade for an operator is less than 70% averaged over all required sections, the operator shall be placed in an accelerated training program until he has been retrained and satisfactorily passes reexamination over the section(s) on which he was below 70% with a grade greater than 70% in each section. Furthermore, the individual will be removed from licensed activities until he passes his written reexamination. All examinations and reexaminations will be reviewed with the operator and will be retained for a period covering the duration of each operator's license (> 6 years) in the facility's files.

### **2.3 On-The-Job-Training**

This section of the program provides assurance that all operators will maintain competence in those major evolutions which can be performed by licensed operators only. These evolutions consist of control plant manipulations and plant evolutions required by 10 CFR 55.59(c)(3), as applicable to MURR. The requirements are outlined in the checklist in Appendix A.

### **2.4 Annual Operating Test and Evaluation**

The Reactor Management will, on a continuing basis, observe and evaluate the performance of all operators to maintain familiarity with the operators' competence in handling routine and emergency evolutions. This program implements the means of documenting the evaluations made by management.

The Training Coordinator, Reactor Manager, Reactor Operations Engineer, or Shift Supervisor will annually conduct an operating test for all licensed operators. The person conducting the evaluation will complete an Operator Annual Operating Test Evaluation Sheet (Appendix A).

### **2.5 Documented Review of Changes**

All design changes, procedure revisions, and license changes will be reviewed within 60 days. The reviews will be documented on the Change Review Sheet (Appendix A). The operator shall read the document attached to the Change Review Sheet and then sign the sheet verifying he understands the change. The completed Change Review Sheet will be retained for six years in Reactor Operations files.

## **3.0 ADMINISTRATION OF THE PROGRAM**

### **3.1 Training Coordinator**

The Reactor Manager shall assign a member of the reactor staff to be the Training Coordinator (TC) for this requalification program. The Training Coordinator shall be responsible for:

- a. The overall administration of this program.
- b. Scheduling the preparation and administration of biennial written examination.

- c. Assisting in the preparation of material, examinations, and retraining lectures or tutoring sessions.
- d. Reviewing the graded examinations with the operators and scheduling any retraining indicated by the examination results.
- e. Periodically reviewing the on-the-job training checklist of each operator to ensure that the operators are progressing satisfactorily in this area of requalification. If an operator is not progressing satisfactorily in the on-the-job training, the TC will ask the operator's immediate supervisor to accelerate the operator's efforts.
- f. Scheduling the reviews required by the Reactor Manager or the Reactor Operations Engineer.
- g. Scheduling the annual operating test and the staff member who will conduct the test.
- h. Maintaining all of the requalification records required by Section 4.0.
- i. Annually reviewing the content of this program.
- j. Ensuring that all newly licensed operators are aware of the requirements of this program and are provided with the necessary requalification materials

### **3.2 Reactor Manager and Reactor Operations Engineer**

The Reactor Manager, Reactor Operations Engineer and each Shift Supervisor will assist the TC as necessary to ensure that all operators participate in and complete all of the requirements of this program. They shall also schedule and conduct the reviews of changes in the license, facility design and operating procedures.

If an operator scores an average grade of less than 70% on the biennial examination, the Reactor Manager shall ensure that the requirements of Section 2.1 are met. The Reactor Manager or Operations Engineer will review the reexamination of a deficient operator with the TC and if the operator's scores are satisfactory, he shall reinstate the operator to normal licensed activities.

### **3.3 Individual Operator**

The extensive responsibilities of the TC for administering this program do not relieve the individual operator of the responsibility for ensuring that all of his requirements of this requalification program are completed as required.

#### 4.0 RECORDS

As indicated in Section 3.1, the TC is responsible for ensuring that all of the records required by this requalification program are maintained. The following records shall be retained at the facility for a period covering the duration of each operator's license (> 6 years):

- a. All examinations and required reexaminations which were administered during the requalification period and the answers used to grade these examinations.
- b. The examination review sheets completed after the biennial examination and any subsequent reexaminations.
- c. The annual operating exam performance evaluation sheet used to evaluate the operator's competence in operating the reactor.
- d. The retraining schedule used to correct any deficiencies discovered through the biennial examination.
- e. Copies of the completed on-the-job training checksheets.
- f. Record of reviews of the License, Operating Procedures, and Facility Design changes.

**MURR OPERATOR REQUALIFICATION PROGRAM**  
**ANNUAL ON-THE-JOB TRAINING REQUIREMENTS/CHECKLIST**

**I. Reactivity Changes**

Each Reactor Operator must perform five (5) reactivity changes and each Senior Reactor Operator must perform or direct five (5) reactivity changes annually, with at least one change in each of the below categories.

**1. Reactor Startup to Criticality**

Date				
Initials of Observer				

**2. Reactor Power Level Change (in manual mode) of greater than 1 MW.**

Date				
Initials of Observer				

**3. Reactor Shutdown**

Date				
Initials of Observer				

**II. Process Equipment Operation**

Each licensed operator must perform at least two (2) process instrumentation startups or shutdowns as the Control Room Operator and one startup or shutdown as the Roving Operator.

**1. Process Instrumentation Startups and Shutdowns as Control Room Operator.**

Date				
Initials of Observer				
Startup				
Shutdown				

**2. Process Instrumentation Startups and Shutdowns as Roving Operator.**

Date				
Initials of Observer				
Startup				
Shutdown				



MURR OPERATOR REQUALIFICATION PROGRAM  
WRITTEN EXAMINATION FORM

Name \_\_\_\_\_

License: \_\_\_\_\_

SRO \_\_\_\_\_

RO \_\_\_\_\_

I. EXAMINATION TOPIC

- A. Reactor Theory, Thermodynamics & Facility Operating Characteristics
- B. Normal & Emergency Procedures & Radiological Controls
- C. Plant & Radiation Monitoring Systems

Comp Grade	Exam Date	Reexamination	
		Grade	Date

AVERAGE SCORE

II. REQUALIFICATION SUMMARY

A. Retraining Required: No \_\_\_\_\_ Yes \_\_\_\_\_ Parts (circle) A B C

B. Recommend relieved of normal licensed activities while retraining:  
No \_\_\_\_\_ Yes \_\_\_\_\_

III. COMMENTS

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Reviewed by: \_\_\_\_\_

Approved by: \_\_\_\_\_

# MURR REQUALIFICATION EXAMINATION ANNUAL OPERATING TEST RECORD

NAME: \_\_\_\_\_

	Critical Steps Number/Correct	Oral Questions Number/Correct
Control Console Reactivity Task No: Title:	_____/____	_____/____
Response to Abnormal Event Task No: Title:	_____/____	_____/____
Response to Emergency Task No: Title:	_____/____	_____/____
In-Facility Evolution Task No: Title:	_____/____	_____/____
Any Task Task No: Title:	_____/____	_____/____
Totals	_____/____	_____/____
Percentage	_____%	_____%
Overall Evaluation: _____ Satisfactory =	≥70%	≥70%
_____ Unsatisfactory		
Facility Examiner: _____	Date _____	



## ANNUAL OPERATING TEST RECORD (Cont'd)

### Test Administration:

1. Tasks are derived from MURR specific tasks in the MURR Operational Task Index.
2. The operating test is "open reference" with a minimum of 5 tasks evaluated.
3. Where appropriate, there should be a differentiation between the RO and SRO level of tasks. An RO is only responsible for RO tasks; an SRO is responsible for all tasks. For each task, the facility specifies the criteria for satisfactory completion and indicates critical steps. Critical steps are those which, if performed incorrectly or not at all would prevent the system from operating safely or prevent completion of an essential safety action. Examples of essential safety actions are the ability to:
  - effectively manipulate controls affecting reactivity
  - actuate a reactor trip
  - comply with technical specifications
  - reduce excessive levels of radiation and to guard against personnel exposure
4. Of the tasks that each operator must perform, at least one must be a control console operation involving a reactivity manipulation. This operation may be part of an overall evolution including more than one task. For example, an operator may perform a reactor startup as the first task, then respond to a simulated instrument failure during the startup as a second task.

At least one task must involve a response to an abnormal event. Examples are an instrument failure, component failure, radiation monitor alarm or similar problem.

At least one task must involve a response to an emergency situation. Examples are a building evacuation or a large reactor pool leak or high radiation levels.

At least one task must be performed in the facility (i.e., out of the control room, where appropriate).
5. At least two questions will be developed to ask the operator at the completion of each task. Questions may be selected from facility question banks or previously administered NRC examinations. However, to the extent possible, the questions should:
  - be based on the task or system being operated
  - discriminate between RO/SRO responsibilities, where appropriate
  - emphasize knowledge required for task performance or procedure implementation



# MURR OPERATOR ACTIVE STATUS LOG

OPERATOR NAME: \_\_\_\_\_

YEAR: \_\_\_\_\_

NOTE: This form is for documenting active status of licensed operators. The Reactor Manager evaluates the status of licensed operators not assigned to shifts and the shift supervisor evaluates the status of operators assigned to rotating shifts.

## QUARTER 1

☐ Active status needs to be documented to meet minimum requirements (4 hours)

Shift Supervisor/Reactor Manager Initial

☐ Active status lapsed, documentation required for return to active status (6 hours)

Date	Total Time	Activity	Shift Supervisor Initial (for SROs)
			SRO Initial (for ROs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

## QUARTER 2

☐ Active status needs to be documented to meet minimum requirements (4 hours)

Shift Supervisor/Reactor Manager Initial

☐ Active status lapsed, documentation required for return to active status (6 hours)

Date	Total Time	Activity	Shift Supervisor Initial (for SROs)
			SRO Initial (for ROs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

# MURR OPERATOR ACTIVE STATUS LOG

OPERATOR NAME: \_\_\_\_\_

YEAR: \_\_\_\_\_

NOTE: This form is for documenting active status of licensed operators. The Reactor Manager evaluates the status of licensed operators not assigned to shifts and the shift supervisor evaluates the status of operators assigned to rotating shifts.

## QUARTER 3

☐ Active status needs to be documented to meet minimum requirements (4 hours)

Shift Supervisor/Reactor Manager Initial

☐ Active status lapsed, documentation required for return to active status (6 hours)

Date	Total Time	Activity	Shift Supervisor Initial (for SROs) SRO Initial (for ROs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

## QUARTER 4

☐ Active status needs to be documented to meet minimum requirements (4 hours)

Shift Supervisor/Reactor Manager Initial

☐ Active status lapsed, documentation required for return to active status (6 hours)

Date	Total Time	Activity	Shift Supervisor Initial (for SROs) SRO Initial (for ROs)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

## MAJOR SYSTEMS (MAJ):

reactor  
reactor power level control  
rods  
control rod drives  
primary system  
secondary system  
mechanical design (fuel assembly)  
reactor vessel - pool  
core construction

## AUXILIARY SYSTEMS (AUX):

reactor building cooling water control  
service air (compressed air system)  
sampling system  
fire protection system  
service water system  
equipment and floor drainage  
containment air recirculation  
radioactive waste (solid and liquid)  
demineralized water  
heating ventilation and air conditioning  
reactor water clean-up/make-up  
chemical additions

## ENGINEERED SAFETY FEATURES (ESF):

decay heat removal  
core spray  
core flooding control  
containment/reactor building isolation  
reactor building isolation  
reactor protective system

## ELECTRICAL (ELT):

normal AC supply  
emergency AC supply  
normal DC supply  
emergency DC supply  
reactor protection  
electrical power system  
batteries

## REACTOR FACILITIES (FAC):

fuel handling and storage  
exposure rooms  
incore experiment tubes  
beam tubes  
thermal columns  
pneumatic tube facilities  
liquid waste handling and disposal  
gaseous waste handling  
solid waste handling and disposal

## NUCLEAR AND RADIATION SYSTEMS (NUC):

startup channels  
log N channels  
safety channels  
incore instrumentation/incore probe  
liquid effluent monitors  
area radiation monitors  
gaseous effluent  
stack gas

## REACTOR TRANSIENT RESPONSE:

Power increase/decrease - auto control  
Power increase/decrease - manual control  
emergency shutdown from full power scram -  
hot restart  
sub critical to critical  
normal shutdown from full power  
rod malfunction  
primary system leak control  
instrument malfunction  
fuel clad failure

## REACTOR OPERATOR OPERATIONAL TASKS INDEX

### FACILITY TASKS

- #1F Perform nuclear instrument pre-startup checks of intermediate range 2 & 3
- #2F Perform nuclear instrument pre-startup checks of wide range monitor channel 4
- #3F Pump waste tank #2 to the sanitary sewer
- #4F Change nitrogen station bottles
- #5F Perform diesel generator operational checklist
- #6F Perform nuclear instrument pre-startup checks of power range monitor channels 5 & 6
- #7F Perform physical adjustment of either IRM channel 2 or 3 drywell at power
- #8F Perform physical adjustment of any PRM channel 4, 5 or 6 drywell at power
- #9F Area radiation monitor alarm tests
- #10F Fan failure alarm test
- #11F Operational check of the stack monitor

### REACTOR TASKS

- #1R Perform a normal startup to a power level 50 kW
- #2R Perform a reactor shutdown
- #3R Perform a reduction in power
- #4R Perform a power level change
- #5R Continue a normal reactor startup from 50 kW to 10 MW
- #6R Perform a fuel handling evolution
- #7R Assuming automatic control of the reactor
- #8R Startup of the reactor cooling loop
- #9R Shutdown of the primary cooling system
- #10R Startup of the pool cooling loop
- #11R Shutdown of the pool cooling system
- #12R Operation of bypass control valves S-1 & S-2

## OPERATIONAL TASKS INDEX - Cont'd

### EMERGENCY TASKS

- #1E Respond to increasing radiation levels before a trip occurs
- #2E All IRM channel 2 indications fail down scale
- #3E Respond to a loss of secondary flow
- #4E Respond to V546 A (and/or) B failing to open during operation
- #5E Respond to a bomb or other overt threat
- #6E Both V543 A & B fail to open automatically
- #7E Reactor isolation
- #8E Failure to scram or rod run-in
- #9E Reactor scram from unknown source
- #10E Reactor scram from loss of primary system pressure or flow
- #11E Area radiation monitoring system (ARMS) fails to actuate a reactor isolation
- #12E Control rod drive failure / stuck rod
- #13E Single phasing or low line voltage
- #14E Failure of experimental apparatus
- #15E Low fire main pressure
- #16E Loss of domestic cold water (DCW)
- #17E Loss of pool flow
- #18E Loss of pool water
- #19E Reactor loop valves (V507A & V507B) fail to close automatically
- #20E Pressurizer valves fail to operate
- #21E High activity levels in primary cooling system
- #22 E High Stack monitor indications
- #23 E Respond to a medical emergency

## OPERATIONAL TASKS INDEX - Cont'd

### ABNORMAL TASKS

- #1A Reactor is not critical within ECP limitations
- #2A Rod "D" drops off before "drive full-in" clears
- #3A During reactor operation the reg blade position indication chain breaks
- #4A Respond to stack monitor low flow alarm
- #5A Air seals for both personnel airlock doors are discovered to have air supplies isolated
- #6A Obtain a pool and/or primary water sample
- #7A Reactor isolation from instrument failure
- #8A Rod run-in from an unknown source
- #9A Loss of containment integrity at power
- #10A Loss of cooling tower fan
- #11A Dropped control rod while at power (10 MW)
- #12A Erratic indication on NI channels 2 through 6