LICENSED OPERATOR

REQUALIFICATION PROGRAM

August 23, 1979

VIRGINIA ELECTRIC AND POWER COMPANY

REQUALIFICATION PROGRAMS FOR NUCLEAR OPERATORS

A. PURPOSE

The purpose of the operator requalification program is to maintain a level of operator skill and knowledge consistent with safe and efficient plant operation. In addition, the program will serve to demonstrate the continued competence of operators and senior operators to perform their licensed duties, in accordance with Section 55.33 of 10 CFR Part 55.

This program describes the minimum combination of lectures, on-the-job training, evaluation methods and records for requalification of licensed individuals at the Surry and North Anna Power Stations.

B. DEFINITIONS

As used in this program:

1. "Operator" means any individual who possesses an operator license pursuant to 10 CFR Part 55.
2. "Senior Operator" means any individual who possesses a senior operator license pursuant to 10 CFR Part 55.
3. "Licensed Staff Member" means any individual who maintains an operator or senior operator license for the purpose of providing backup capability to the normal operating staff. Such individuals may include, but are not limited to, Station Manager, Superintendent - Station Operations, Operating Supervisor, Assistant Operating Supervisor, Nuclear Training Supervisor, Nuclear Training Coordinators, and Engineers.

4. "Controls" means apparatus and mechanism, the manipulations of which directly affect the reactivity or power level of the reactor.

5. "Control Manipulation" means manipulation of any apparatus or mechanism which directly affects the reactivity or power level of the reactor. This shall mean:

   a. Startup to the point of adding heat.

   b. Orderly shutdown.

   c. Manual control of steam generator level during startup or shutdown.

   d. Operation of the main turbine controls in manual during startup.

   e. Boration during power operation.

   f. Dilution.

   g. Operation of the manipulator crane while moving fuel in the core during refueling.

   h. Operation of the rod control system in manual during a power change of greater than 10%.

   i. Operation of the rod control system in manual prior to and during generator synchronization.

6. "Acceptable Simulator" means a simulator which reproduces the general operating characteristics of Surry Units 1 and 2, and is approved by the Nuclear Regulatory Commission for the requalification program.

7. "Operating Personnel" means those operators and senior operators who are actively engaged, on a routine basis, in manipulating or directing the manipulation of the controls. Such individuals include, but are not limited to, operators and senior operators assigned to a shift.

8. "Inactive Operators and Senior Operators" means those operators or senior operators who have been absent from the facility for a period of longer than four (4) months.

9. "Licensed Duties" means those duties which involve the manipulation or direction of the manipulation of the controls.

10. "Requalification Cycle" means two (2) year period in which the Retraining Program shall be covered on a recurring basis. Any personnel issued an NRC License during the cycle, shall be entered into the program upon receipt of the license.

C. TRAINING PROGRAM

1. Annual Lecture Series

The requalification program shall include preplanned lectures on a regular and continuing basis. The minimum number of lectures in any calendar year shall not be less than six, evenly spaced throughout the year and taking into consideration heavy vacation periods and infrequent operations, such as refueling periods. Lectures may be deferred due to unanticipated shutdowns or other special operations. However, these lectures should be conducted at a later date. The annual lectures series shall cover the subjects listed below with stress placed on weak areas determined by the previous annual written examination.

1) Reactor Theory
2) Thermal/Hydraulic Design
3) Instrumentation and Control
4) Reactor Plant Transients
5) Normal Operating Procedures
6) Emergency/Abnormal Operations and Procedures
7) Operating Experience and Recent Problems
8) Radiological Safety and Health Physics
9) Water Chemistry Control
10) Technical Specifications

An annual schedule of subject matter to be covered during the lecture period shall be promulgated.

All operating personnel, as defined in Section B, should attend the annual lecture series. If any operating personnel should miss the lecture, every effort shall be made to reschedule the lecture during the year or other remedial training will be assigned.

Operators, Senior Operators and Licensed Staff Members will be exempt from attending the lecture series providing they attain a grade of 80% on all sections of the annual examination. Any person making less than 80% on a section shall be required to attend those lectures to cover his deficiencies. He shall be reexamined by written examination in those sections where he was deficient.

Training aids, such as video tapes and films, may be used in lieu of an instructor for the lecture series, However, the use of such training aids shall not constitute more than 50% of the lecture series. A test shall be administered at the end of each lecture session to determine operator comprehension of the material covered.

2. On-The-Job Training

Each operator shall perform and each senior operator shall either perform, or direct the performance of, at least ten (10) control manipulations during the requalification cycle. These manipulations shall be a mix of the acceptable control manipulations.

All operators and senior operators shall demonstrate satisfactory operation of plant equipment by actual manipulation of the equipment or by walk-through of the procedural steps required.

An acceptable simulator may be utilized in meeting the requirements for reactivity control manipulation and understanding of plant equipment. However, every effort should be made to obtain actual hands-on experience in the plant in accomplishing the above.

3. Changes to Design and Documentation

Changes to procedures, precautions, setpoints and limitations, facility design, facility license, technical specifications and any other information of interest shall be promulgated as required reading.

The information shall be placed in the required reading book in the Control Room. Each operator shall read and sign the attached sheet signifying completion. The Shift Supervisor shall certify that all personnel assigned to him have, in fact, read the information. The Operating Supervisor shall assign material to the required reading book with a completion time for each document. A file to document completion of required reading shall be maintained in the Records Vault. These changes should also be reviewed during the classroom phase.

4. Abnormal and Emergency Procedures Review

The abnormal and emergency procedures shall be reviewed on an annual basis. A schedule will be promulgated monthly designating those procedures to be reviewed. Where conditions are such that review cannot be done within a specific month, those procedures shall be rescheduled to complete the review within the year. A record of this review shall be maintained by the Nuclear Training Supervisor.

D. EVALUATION

1. Annual Examination

All operators and senior operators shall take the annual written examination at the end of each calendar year. The annual written examination shall consist of six sections which will cover all subject matter specified in C.1. of this program as well as 10 CFR 55. The exam will include all catagories covered by an NRC examination and be of comparable difficulty. An overall grade of less than 70% shall require removal from licensed duties and participation in an accelerated requalification program.

2. Written Test

A written test shall be administered at the completion of each lecture session to ensure that the participants have learned the material presented. A grade of less than 80% shall require additional training in the subjects covered; either by self-study or additional lectures. Retesting in the unsatisfactory areas shall be required and a grade of 80% attained.

3. Operational Evaluation

A systematic observation and evaluation of an individual's performance and competency including actions taken, or to be taken, during actual or simulated abnormal and emergency conditions shall be conducted at least once each year. This evaluation shall be in addition to the immediate supervisor's normal continuous evaluation. The Surry simulator may be used for systematic evaluation of performance. The evaluation may be conducted by a licensed Senior Reactor Operator assigned by the Nuclear Training Supervisor or the Operating Supervisor.

E. ACCELERATED REQUALIFICATION PROGRAMS

Specifics of accelerated requalification programs are not included because of the wide variety that may be required based on an individual's need. However, an overall grade criterion of 70% or greater on any written examination is required to indicate successful completion of the accelerated requalification program.

F. LICENSED STAFF MEMBERS

As a minimum, licensed staff members, as defined in Section B, shall:

1. Be administered the annual written examination and participate in the lecture series based on the results thereof.
2. Manipulate the controls or supervise the manipulation of the controls through ten (10) reactivity changes. An acceptable simulator may be used to accomplish this.
3. Systematically review design changes, procedure changes and facility license changes.
4. Systematically review the contents of all abnormal and emergency procedures on a regularly scheduled basis.
5. Be systematically evaluated regarding actions to be taken during simulated abnormal and emergency conditions by a walk-through of the steps of the procedures on an annual basis. An approved simulator may be utilized.

G. INACTIVE OPERATORS AND SENIOR OPERATORS

It is anticipated that some licensed operator or senior operators will be absent from the units for which they hold licenses for periods longer than four (4) months. Prior to resuming activities as an operator or senior operator, at the licensed facility, a review series shall be completed covering all operating, abnormal, administrative, emergency procedures and any unit design changes that may have occurred during his absence. In addition, a period of one (1) month of operating under the guidance of a licensed operator shall be conducted, after which he will be required to pass a comprehensive oral examination administered by the Training Department or Operating Supervisor. If this is satisfactory, he will resume his activities and immediately be placed in the normal retraining cycle.

H. TRAINING COORDINATORS

The Nuclear Training Supervisor and Training Coordinators who prepare, administer and grade the annual written examination need not take the examination. A maximum of three Training personnel may be exempt.

I. RECORDS AND DOCUMENTATIONS

Records of the requalification program shall be maintained to document each licensed operator's and senior operator's participation in the requalification program. The records to be maintained follow:

1. Annual examination and each licensed operator's answers to these examination questions.
2. Documentation indicating that each licensed operator has reviewed the contents of abnormal and emergency procedures.
3. Documentation indicating that each operator is cognizant of significant facility design, procedure, and license changes.
4. Details and results of any accelerated and/or remedial training conducted.
5. Results of observation and evaluation performed on each licensed operator, including any deficiencies in the individual's training results.
6. Documentation indicating that group discussions were held including attendance and subject matter discussed.
7. Documentation of oral examinations given due to failure of written examinations indicating areas covered and results.
8. Documentation of lecture series quiz results.

SECTION 1

REACTOR THEORY

RO - (14)
SRO - (9)

RO 1. Define or explain the following:

a. K-effective (.5)

b. Reactivity (.5)

c. Shutdown Margin (.5)

d. Fermi Age (τ) (.5)

e. Period (.5)

f. Pair Production (.5)

g. Binding Energy (.5)

RO 2. There are 1000 neutrons in a present generation of which 994 are prompt neutrons and 6 are delayed neutrons. There were 996 neutrons in the preceding generation.

a. Define prompt and delayed neutrons. (1)

b. Is the reactor subcritical, critical, or supercritical? Explain. (.5)

c. Explain how only 6 of 1000 neutrons can have such a strong effect on the control of the reactor. (2)

d. How and why does the delayed neutron fraction change during core life? (1)

e. What is the difference between the delayed neutron fraction and the effective delayed neutron fraction? Explain. (1)

SRO,RO 3. The reactor has been at 100% power for 50 hours when a reactor trip occurs. On the attached graph 1, indicate the resulting Xenon transient. (1)

SRO,RO 4. a. Explain Subcritical Multiplication. (2)

b. The source range instruments indicate 50 and 55 cps respectively. What will be the approximate count rate at which criticality will be obtained under normal startup conditions? Explain. (1)

SRO,RO 5. There has been an instrument failure which caused rods to be inserted into the core in automatic at 100% power, equilibrium xenon. After 2 hours the rods are returned to their original position. How will this effect the axial flux distribution? (1)

SRO 6. It is often stated that the equilibrium concentration of Samarium in our reactor is not flux (ϕ) dependent. Explain. (1)

SRO 7. By procedure the reactor is stabilized at a certain power level every startup to record critical data.

a. At what power level is the reactor stabilized? (.5)

b. Why was this power level selected versus 10^{4}cps or 10^{-5}amps? (.5)

c. If the SUR is 0.8 dpm, how many rod steps would be required to stabilize the reactor to record critical data? State all assumptions. Show all work. (1)

d. Assuming the reactor was not stabilized, trace on the attached graph 2 the reactor power response for the given power levels and times. (1)

SECTION 2

HEALTH PHYSICS

RO - (9)
SRO - (11)

RO 1. You are inside containment performing PT 17.2 on the inside recirc spray pump and you decide to check your self reading dosimeter. You can't find it.

a. What should you do? (1)

b. List the steps in sequential order for removing your anti-contamination clothing when leaving containment. (1)

RO 2. How can you tell where the high radiation areas are in the plant from:

a. The Control Room. (.5)

b. In the plant. (.5)

c. What are the requirements for entering a high radiation area? (.5)

SRO,RO 3. You are in the Auxiliary Building near the bottom of the Boric Acid Tanks. You see water running out of the caged area. What are your actions? (1)

SRO,RO 4. a. At what minimum distance from a small gamma point source reading 3 Rem/hr at 1 foot would you erect a "High Radiation Area" barricade? (2)

b. Which instrument would you use to determine the 1 foot reading? (1)

SRO,RO 5. Define the following:

a. Excluded Radiation worker. (.5)

b. Radiation worker. (.5)

c. Restricted Controlled area. (.5)

SRO 6. You are the Shift Supervisor.

a. What are your responsibilities in filling out a RWP for transferring resin? (1)

b. What are the responsibilities of HP? (1)

c. What are the responsibilities of the originator? (.5)

d. What is normally required to terminate a RWP? (.5)

e. When is a RWP required? (.5)

SRO 7. A crud buildup inside a valve results in a radiation reading of 600 mR/hr at five (5) feet. It is necessary to perform maintenance in the area five feet from the valve. The desired maximum radiation level is 20 mR/hr. Lead shielding is to be used. How thick should the lead shield be? Show your work. (Assume a linear absorption coefficient (λ) for lead of 0.47 cm^{-1}) (2)

SECTION 3

OPERATING CHARACTERISTICS

RO - (15)
SRO - (15)

RO 1. a. During plant operation what would be the consequence of the VCT pressure going below 5 psig? (1)

b. Which indications in the Control Room will identify your answer(s) in part "a"? (2)

RO 2. What are the automatic trips associated with the main feed pumps? (2)

SRO,RO 3. A Main Steam Non-Return Valve has stuck closed.

a. How will an operator detect the stuck valve at low power levels? List (4) four. (2)

b. What effect would this have on the core if the Unit were brought to 15% power and remained there for 2 hours? Explain. (2)

SRO,RO 4. a. Describe the Reactor Coolant Pump seal system. (2)

b. What would indicate the failure of number 2 seal? (1)

c. What would indicate the failure of number 1 seal? (1)

SRO,RO 5. (Referring to Section 1, Question 5) Indicate the response of the following parameters on the attached graph 3.

a. PZR Level (.5)

b. PZR Pressure (.5)

c. S.G. Pressure (.5)

d. RCS ΔT (.5)

SRO 6. a. Why was the new SG blowdown system installed? (1)

b. Describe the flow path of the SG blowdown using the new system. (1)

SRO 7. The Reactor recently was tripped on a Low Pressure when Pressurizer level went from 10% to 65%.

a. Describe the relationship of Liquid Temperature and Vapor Temperature in controlling Pressurizer pressure. (2)

b. Describe what could have been done by the operator to prevent the trip and why? (1)

SECTION 4

INSTRUMENTATION AND CONTROL

RO - (18)
SRO - (11)

RO 1. a. What conditions initiate an automatic turbine runback? (1)

b. How are these conditions detected? (1)

c. Why was this feature provided? (1)

d. Explain the operation of the Steam Dump System on a 50% turbine load reject. (3)

RO 2. a. Sketch a one line diagram of the Intermediate Range including all outputs. (2)

b. Explain what is meant by over and under compensated. (1)

c. On the attached graph 4 draw an over and under compensated trace as seen on NR-45. (2)

SRO,RO 3. Explain how the overpressure mitigating system is brought into service and how it functions. (2)

SRO,RO 4. a. (Referring to Section 1, Question 5) Which instrument failures external to Rod control could have caused this failure? (1)

b. Why are these parameters used to control the movement of control rods? (2)

SRO,RO 5. Explain in detail the plant response on a failure of the Pressurizer pressure transmitter PC 445 in the high direction assuming no operator action. (2)

SRO 6. What are the minimum Nuclear Instruments required for a startup? (1)

SRO 7. Both Volume Control Tank Level Transmitters failed Low. What would be the plant response to this failure and what automatic action would trip the Reactor? (3)

SECTION 5

PROTECTION AND EMERGENCY SYSTEMS

RO - (14.5)
SRO - (14.5)

RO 1. a. Explain the operation of an Emergency Diesel on a SI. (1)

b. Explain the operation of #1 Emergency Diesel on a Station Blackout. (1)

RO 2. a. Draw a one line diagram depicting the Vital Bus system including all the possible supplies. (2)

b. What automatic actions would occur upon loss of VB-1? (1)

SRO,RO 3. (Referring to Section 1, Question 5) If the rods continued to be inserted into the core, which reactor trip would terminate the accident? (2)

SRO,RO 4. a. List the automatic Safety Injection initiation signals. (1)

b. What accident (be specific) is each automatic signal designed for? (1)

c. List the coincidences and parameters monitored for three of the automatic signals. (2)

d. Discuss the operation of the system on an actuation. (3)

e. Which parameters do you monitor to predict when the recirculation phase of SI should occur? (.5)

SRO 5. Explain:

What will trip the Turbine if both rod control M-Gs were tripped? (2)

SRO 6. The new Tech. Spec. Modification for license lists new conditions for operation concerning service water temperature versus containment pressure.

a. What is the required RWST level above 87°F service water temperature? (1)

b. What is the basis for the modification? (2)

SECTION 6

FUEL HANDLING AND CORE PARAMETERS

RO - (11)
SRO - (10.5)

RO 1. a. Explain what is meant by DNB? (1)

b. Why is it hazardous to exceed DNB? (2)

RO 2. What is the purpose of moving rods in an overlap program? (.5)

RO 3. a. What is the purpose of having an Insertion Limit? (1)

b. What accidents are the Insertion Limit designed for? (.5)

c. List two (2) indications in the Control Room that an Insertion Limit has been violated. (1)

SRO,RO 4. Calculate the attached ECP. (5)

SRO 5. a. Define and explain F_q^N and $F_\Delta^N h$. (2)

b. What protection actuations prevents the core from exceeding $F_\Delta^N h$ and F_q^N limits? (1)

SRO 6. a. List (4) four Manipulator Crane INterlocks and explain their purpose. (1)

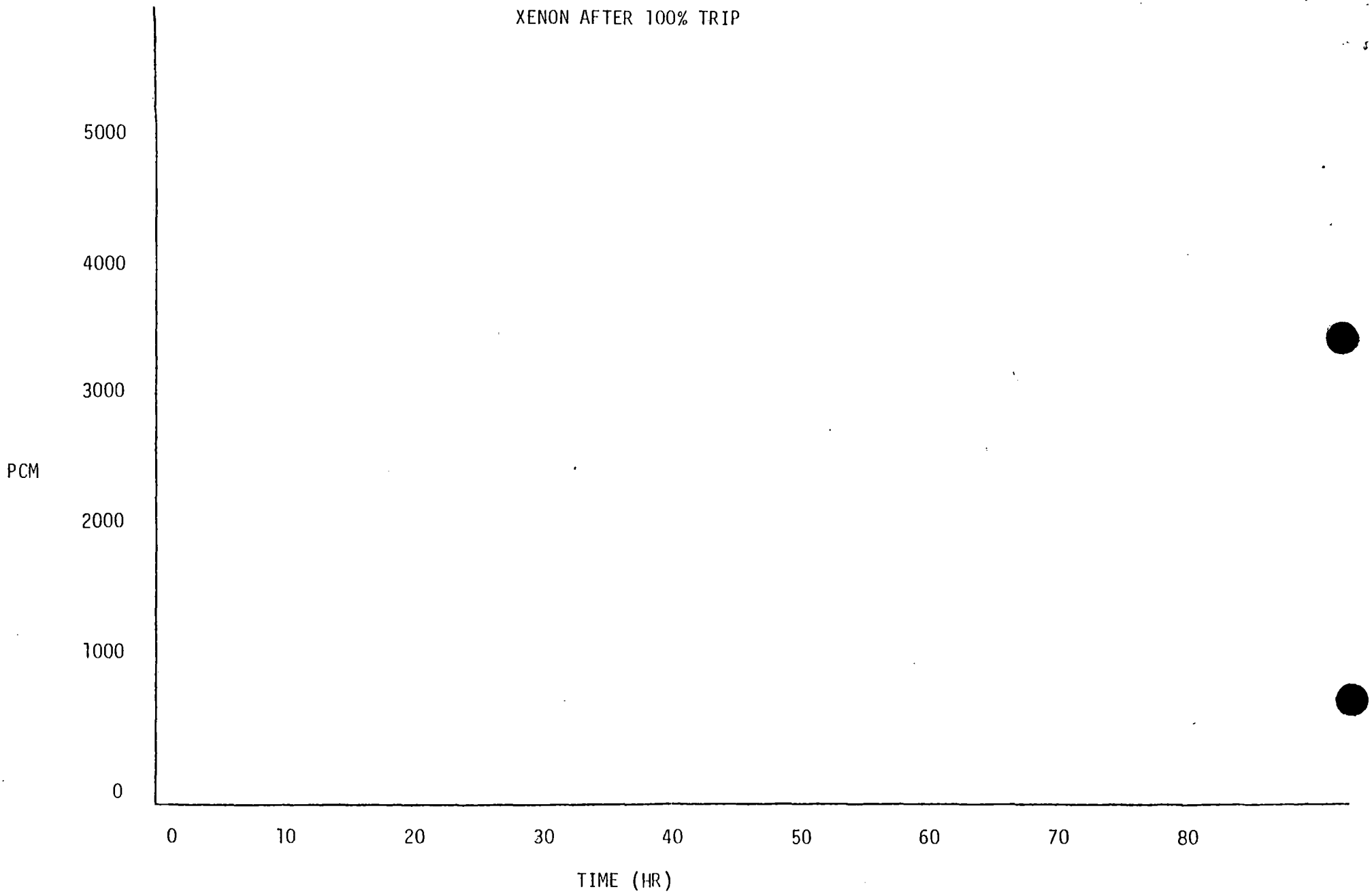
b. List (2) two Upender Interlocks and explain their purpose. (.5)

SRO 7. a. What are the Nuclear Instrumentation System Requirements for Refueling? (.5)

b. What are the chemistry requirements for Refueling? (.5)

GRAPH #1

XENON AFTER 100% TRIP

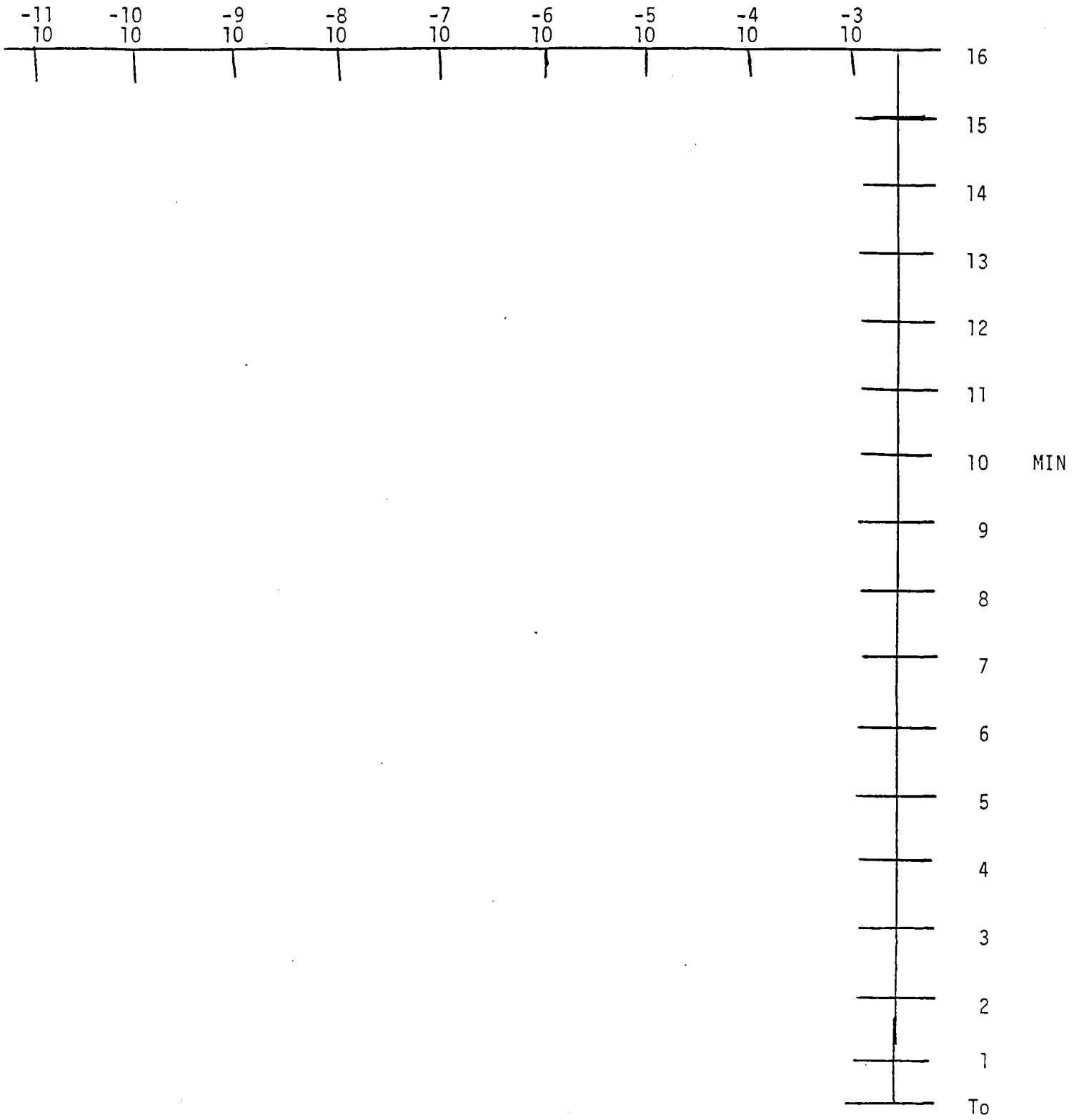


NAME_____

DATE_____

GRAPH #2

POWER INCREASE AT .8dpm NO OPERATOR RESPONSE



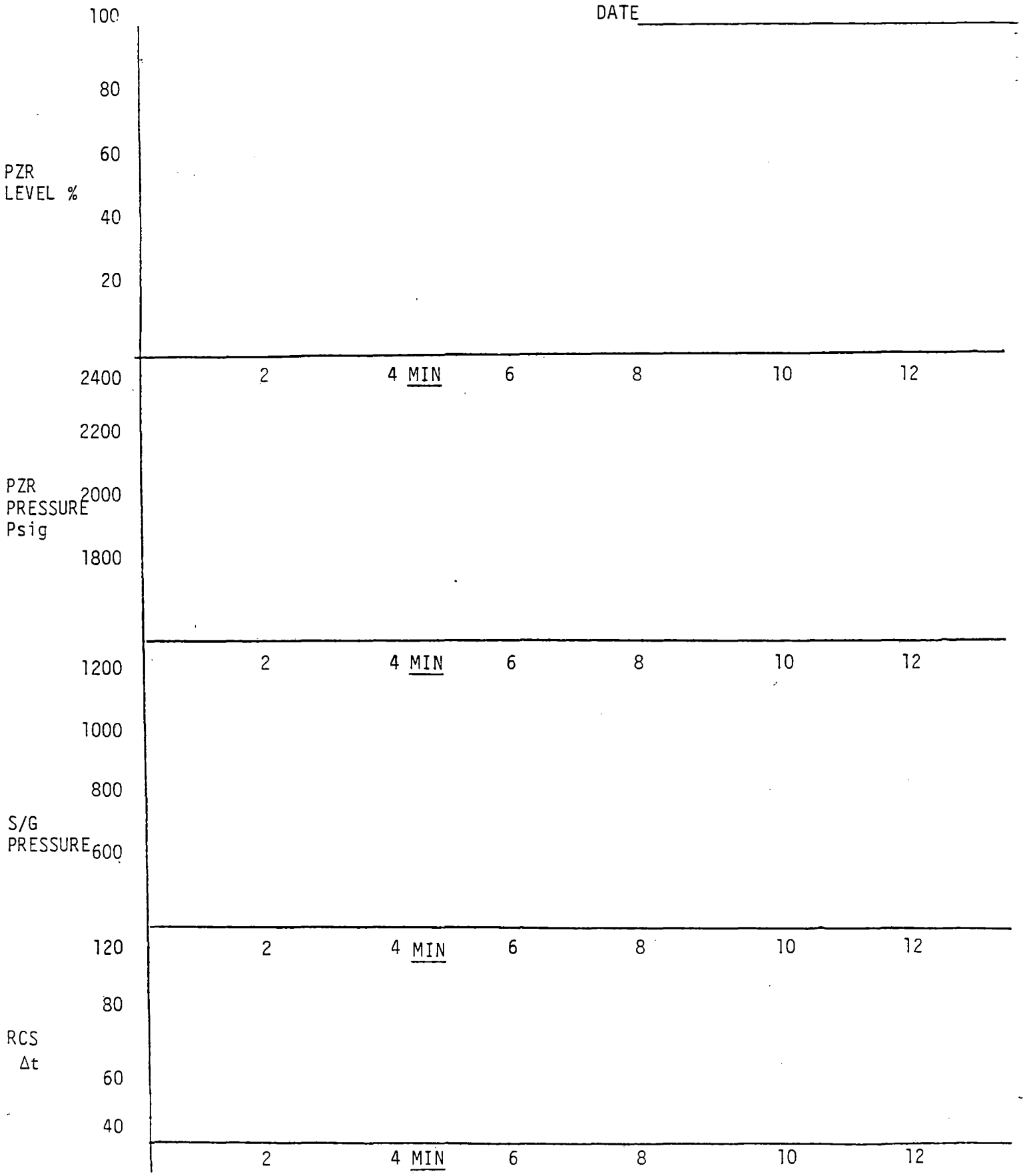
DATE_____ NAME_____

GRAPH #3

PLANT TRANSIENT ON A ROD INSERTION

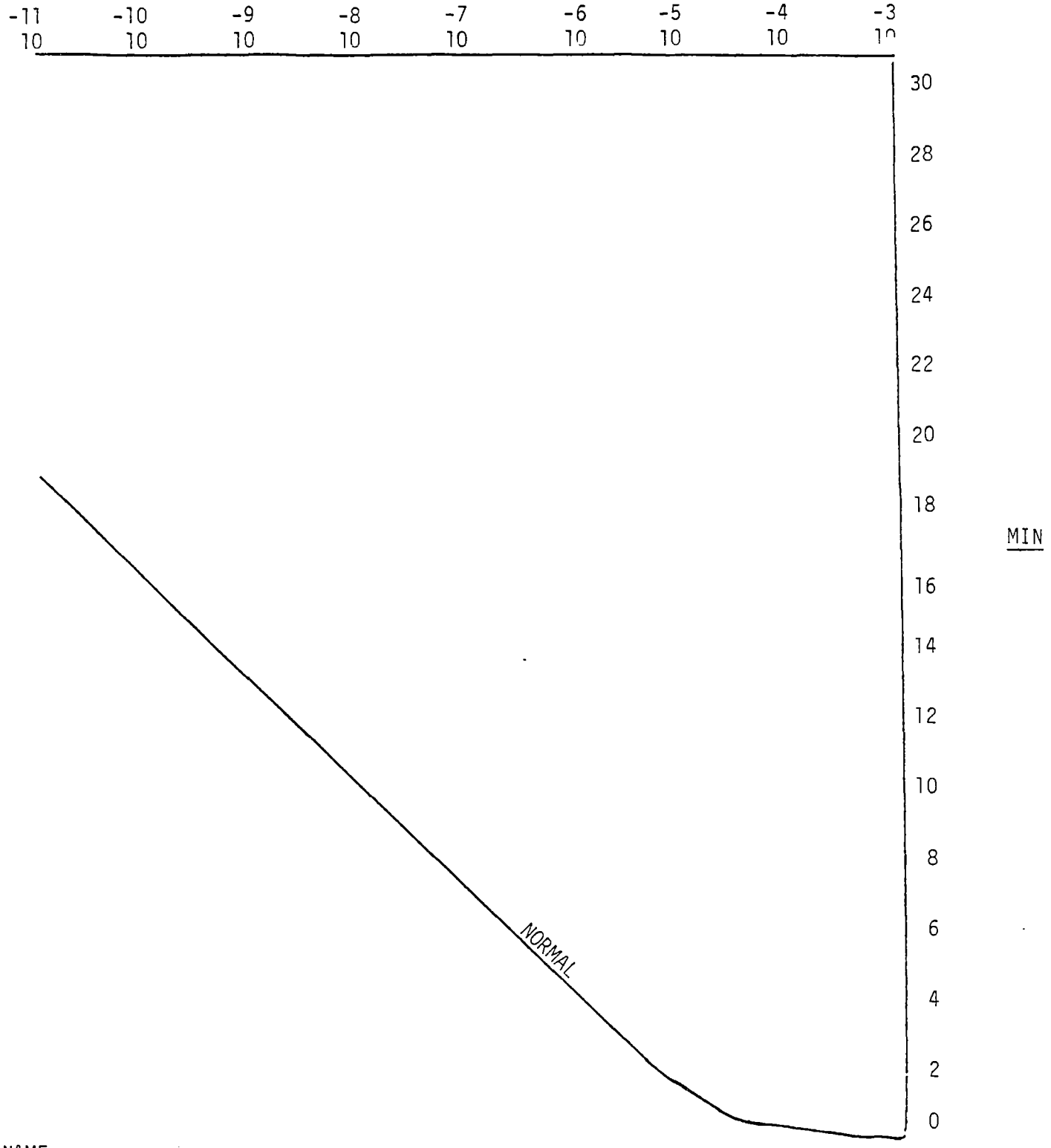
NAME _____

DATE _____



GRAPH #4

IR RESPONSE FOR OVER AND UNDER COMPENSATION



NAME_____

DATE_____

Annual Comp ECP

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION
UNIT NO. 1

ESTIMATED ROD BANK POSITION

1.0 Purpose

1.1 This procedure provides the necessary calculations to determine Critical Boron Concentration for a given Rod Bank position.

1.2 This procedure will be used to determine amount of dilution required when decreasing C_B below the Cold Shutdown concentration.

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION

UNIT NO. 1

Estimated Rod Bank Position After Shutdown or Trip

1.0 Critical Conditons as Logged PRIOR to Rampdown or Trip*

1.1 Date: 12-2-78

1.2 Time: 0800

1.3 Rod Banks - Overlap Program

		Steps Withdrawn	Reactivity Curve Page	Reactivity Worth (pcm)
1.3.1	Part Length	229	39	
1.3.2	Bank B	225	29a,b,c	
1.3.3	Bank C	225	29a,b,c	
1.3.4	Bank D	215	30a,b,c	

1.3.5 Total Rod Bank Reactivity = (1.3.1) + (1.3.2) + (1.3.3) + (1.3.4)

ρ(rod) = _____ pcm

1.4 Boron

1.4.1 Boron Concentration C_B = 250 ppm

1.4.2 Differential boron worth (Curve Page 28) $\Delta\rho/\Delta C_B$ = _____ pcm/ppm

1.4.3 Total boron worth = (1.4.1) x (1.4.2)

ρ(boron) = _____ pcm =

1.5 Power

1.5.1 Power Level 100 %

1.5.2 Total power defect (Curve Page 32a,b,c)

ρ(power) = _____ pcm

*Information entered in Section 1.0 Shall be the Conditons prior to the start of the Rampdown or Trip
IF a Rampdown has taken place, completed Section "B" of Appendix B.

1.6 Xenon

1.6.1 Date and time reactor began Rampdown or Trip 12/2/78 0800

1.6.2 Average power for Xenon calculation as per Appendix A = _____%

1.6.3 Total Xenon worth (Curve Page 33)

ρ(Xenon) = _____pcm = D

1.7 Total A + B + C + D = _____pcm = E

1.8 REQUIRED SHUTDOWN MARGIN

Whenever the reactor is subcritical, maintain boron concentration such that the rod position at which criticality would be achieved if the control rod assemblies were withdrawn shall not be lower than the insertion limits for zero power. (T.S. 3.12-A)

NOTE: This means that we begin borating above the operating concentration as Xenon decays below its equilibrium value, as verified by OP-1F, if to remain at hot shutdown.

2.0 Estimated Critical Condition Calculation

2.1 Date: 12/2/78

2.2 Estimated time for Criticality: 2000

2.3 Boron (Verified concentration required by 1.8)

2.3.1 Actual boron concentration C_B = 325 ppm

2.3.2 Differential boron worth (Curve Page 28) $\Delta\rho/\Delta C_B$ = _____pcm/ppm

2.3.3 Total boron worth = (2.3.1) x (2.3.2)

ρ(boron) = _____pcm = F

2.4 Moderator Deviation from Reference

2.4.1 Moderator Average Temperature = 549 °F

2.4.2 Boron concentration C_B = 325 ppm

2.4.3 ISOTHERMAL Temperature reactivity worth (Curve Page 31a, b, c)

ρ(Temperature) = _____pcm = G*

* (G) maybe positive or negative

2.5 Xenon.

2.5.1 Time after shutdown (2.2 - 1.6.1) = 12 hrs.

2.5.2 Average power for Xenon (1.6.3) = _____ %

2.5.3 Did a rampdown of power occur before shutdown? YES

2.5.4 If 2.5.3 is yes, proceed to Appendix B

2.5.5 Total Xenon worth (Curve Page 35 or Appendix B)

ρ(Xenon) = _____ pcm = I

2.6 Samarium

2.6.1 Time after Shutdown (2.5.1) = 12 hrs.

2.6.2 Actual power at shutdown (1.5.1) = _____ %

2.6.3 Samarium reactivity worth (Curve Page 37)

ρ(Sm) = _____ pcm =

2.7 Desired Critical Rod Bank Position (maneuvering band for zero power)

	Steps Withdrawn	Reactivity Curve Page	Reactivity Worth (pcm)
2.7.1 Part Length	228	39	_____
2.7.2 Bank B	228	29a,b,c	_____
2.7.3 Bank C	228	29a,b,c	_____
2.7.4 Bank D	150	30a,b,c	_____

2.7.5 Total Rod Bank Reactivity = (2.7.1) + (2.7.2) + (2.7.3) + (2.7.4)

ρ(rod) = _____ pcm =

2.8 Total F + G + H + I + J = _____ pcm =

2.9 Reactivity Change

2.9.1 K(2.8) - E(1.7) = _____ pcm =

3.0 Boron Concentration Change

3.1 Dilution

3.1.1 Reactivity change required (2.9) = _____ pcm = M

3.1.2 Differential boron worth $\Delta\rho/\Delta C_B$ (Curve Page 28)= _____ pcm/pp

3.1.3 Boron concentration decrease $\Delta C_B = \frac{M}{3.1.2}$ = _____ ppm

3.1.4 New boron concentration (2.3.1) - (3.1.3) = _____ ppm

3.1.5 Boron Concentration as verified prior to commencing reactor startup:

C_B: _____ ppm Time: _____ Date: _____

4.0 Control Rod Position Limits (Administrative)

4.1 _____ pcm - 400 pcm = _____ pcm (rods) = _____ steps withdrawn.
(2.7.5.J)

4.2 _____ pcm + 250 pcm = _____ pcm (rods) = _____ steps withdrawn.
(2.7.5.J)

NOTE: If criticality is not achieved within 400 pcm above (4.1) or 250 pcm below (4.2) the estimated critical position, insert all controlling group rods and re-evaluate the ECP. If the error is not detected, obtain the Operating Supervisor's permission to approach criticality using a 1/M plot as per OP-1.4, Appendix A.

5.0 Review

5.1 Calculated By: _____

Date: _____

5.2 Reviewed by: _____ / _____
(Shift Supervisor) (CRO performing startup)

Date: _____ Date: _____

6.0 Actual Critical Condition

6.1 Time and Date critical: _____ / _____

6.2 T_{avg} (Auct. Hi) _____ °F

6.3 Boron Concentration

Loop _____ ppm

6.4 Rod Position (Steps)

S_A _____ S_B _____

C_A _____ C_B _____

C_C _____ C_D _____

Completed by: _____

Date: _____

AUG 2 3 1978

APPROVED BY: T. L. Simon
Chairman, Station Nuclear Safety and Operating Committee

DATE: 8/23/78

RECOMMEND APPROVAL: J. W. Wilson

DATE: 8-22-78

LIST OF EFFECTIVE REVISIONS

PAGE	DATE
1	AUG 2 3 1978
2	AUG 2 3 1978
3	AUG 2 3 1978
4	AUG 2 3 1978
5	AUG 2 3 1978
APPENDIX A	2-07-75
APPENDIX B	
PAGE 1	3-26-75
PAGE 2	2-07-75

APPENDIX A

*AVERAGE POWER PRIOR TO SHUTDOWN FOR XENON CALCULATION

Hours prior to rampdown or trip	Multiplier	Product (Power x Multiplier)
0-1	6	100 X6 =
1-2	5	100 X5 =
2-3	5	100 X5 =
3-4	5	100 X5 =
4-5	4	100 X4 =
5-6	4	75 X4 =
6-7	4	75 X4 =
7-8	4	75 X4 =
8-9	4	50 X4 =
9-10	3	50 X3 =
10-11	3	25 X3 =
11-12	3	5 X3 =
12-13	3	0 X3 =
13-14	3	0 X3 =
14-15	3	0 X3 =
15-16	3	0 X3 =
16-17	2	0 X2 =
17-18	2	100 X2 =
18-19	2	100 X2 =
19-20	2	100 X2 =
20-21	2	100 X2 =
21-22	2	100 X2 =
22-23	2	100 X2 =
23-24	2	100 X2 =
24-25	2	100 X2 =
25-26	1	100 X1 =
26-27	1	100 X1 =
27-28	1	100 X1 =
28-29	1	100 X1 =
29-30	1	100 X1 =
30-31	1	100 X1 =
31-32	1	100 X1 =
32-33	1	100 X1 =
33-34	1	100 X1 =
34-35	1	100 X1 =
35-36	1	100 X1 =
TOTAL	91	(A)

AVERAGE POWER = $\frac{(A)}{91}$ = _____

* Use only if reactor has had a power change greater than 5% in the last 36 hours

APPENDIX B

EFFECTIVE RAMPDOWN TIME CALCULATION FOR XENON WORTH

A. Purpose

1.0 To provide a means of computing Xenon Worth following three types of Rampdowns:

1.1 A continuous Rampdown to all Control Rods inserted.

1.2 Rampdown with a Trip occuring during the rampdown.

1.3 Rampdown to a desired power level and held at that power level for some length of time followed by an insertion of Control Rods

B. Information

1.0 Time

1.1	Time at the start of Rampdown	0800 (1.1)
1.2	Time reached desired power level	1000 (1.2)
1.3	Time of unschedule insertion of Control Rods	NA (1.3)
1.4	Estimated time of criticality	2000 (1.4)

2.0 Power Level

2.1	Starting Power Level	100 %(2.1)
2.2	Desired Power Level or Power Level at Reactor Trip	0 %(2.2)

C. Procedure

1.0 Continuous Rampdown

1.1	Elapsed time after Shutdown (B.1.4 - B.1.1)	_____ hrs.
1.2	Base Rampdown time corresponding to B.2.1	_____ hrs.
1.3	Rampdown time (B.1.2 - B.1.1)	_____ hrs.
1.4	Effective Rampdown Time	

$$\{C.1.1 + \frac{(C.1.2 - C.1.3)}{2}\} = \text{\_\_\_\_\_ hrs} = \text{"A"}$$

1.5 Proceed to C.4.0