ARKANSAS POWER & LIGHT COMPANY
POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

July 21, 1982

ØCANØ78211

Director of Nuclear Reactor Regulation
ATTN: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Director of Nuclear Reactor Regulation
ATTN: Mr. J. F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Arkansas Nuclear One - Units 1 & 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Additional Information Relative to
Operator Training

Gentlemen:

In response to your request for additional information, dated April 13, 1982, (ØCNAØ48204), concerning the Training and Requalification Program for Arkansas Nuclear One Units 1 and 2, enclosed is the information you requested. The information is cast in a format of listing the questions from the letter of request and answering them in succession. Enclosed for supporting documentation is an organization chart, an outline of the ANO training program's operator requalification program, and requalification documents from our simulator vendors, Babcock & Wilcox and Combustion Engineering.

Sincerely,

John R. Marshall
Manager, Licensing

M003

JRM:RCE:sl

cc: Dr. R. T. Liner
Science Applications, Inc.

ENCLOSURE 1

RESPONSE TO SPECIFIC QUESTIONS

Requalification Program (Section A.1)

1. Are the lectures and quizzes on the subject of accident mitigation given to Shift Technical Advisors and operating personnel from the plant manager through the operations chain to the licensed operators? If they are, would you please provide the titles of the people who are trained and an organization chart which illustrates their position in the operations chain?

Response

Shift Technical Advisors receive accident mitigation requalification along with the licensed operators. Enclosed is an organization chart with those persons participating in the requalification indicated. (Enclosure 2)

Requalification Program (Section A.2)

2. Do the Requalification Program elements which involve heat transfer, fluid flow, thermodynamics and accident mitigation involve 80 contact hours in each program? (A contact hour of instruction is a one-hour period in which the course instructor is present or available for instructing or assisting students; lectures, seminars, discussions, problem-solving sessions, and examinations are considered contact periods under this definition.)

Response

The Requalification Program, both onsite and at the simulator locations (CE-B&W), involves heat transfer, fluid flow, thermodynamics and accident mitigation, but does not necessarily involve 80 contact hours. Since it is assumed that the licensees have been taught those subjects in the detail required by Denton's letter in the training program, the Requalification Program is designed to provide a review with special emphasis being placed on those areas identified as needing attention based on the latest Annual Requalification Examination results.

Requalification Program (Section A.3)

3. Does your Requalification Program for Reactor Operator and Senior Reactor Operator cover the subjects of heat transfer, fluid flow, and thermodynamics? If it does, is the coverage to the level of detail spelled out in Enclosure 2 of Denton's letter? Please send a course outline if available.

Response

Yes, the Reactor Operator and Senior Reactor Operator Requalification Program covers heat transfer, fluid flow, and thermodynamics. The response to item A2 spells out the method used. A course outline is not available since the areas and depth of coverage in the Requalification Program may vary from year to year depending upon the results of the latest Annual Requalification Examination.

Requalification Program (Section A.4)

4. Does your Requalification Program for Reactor Operator and Senior Reactor Operator cover the subject of using installed plant systems to control or mitigate an accident in which the core is severely damaged? If it does, is the coverage to the level of detail spelled out in Enclosure 3 of Denton's letter? Please send a course outline if available.

Response

Yes, the Reactor Operator and Senior Reactor Operator Requalification Program does cover such use of installed plant systems. Coverage is to the level of detail in Enclosure 3 of Denton's letter. A course outline is not available since the areas and depth of coverage in the Requalification Program may vary from year to year depending upon the results of the latest Annual Requalification Examination.

Requalification Program (Section A.5)

5. Dose your Requalification Program for Reactor Operators and Senior Reactor Operators cover the required training in control manipulations? If it does, is the coverage to the level of detail and frequency spelled out in Enclosure 4 of Denton's letter?

Response

Yes, the Reactor Operator and Senior Reactor Operator Requalification Program does cover the required training in control manipulations to the level of detail and frequency spelled out in Enclosure 4 of Denton's letter.

Training Program (Section B.1)

1. The course summary for mitigating core damage has lectures which appear to address the subject of using installed plant systems to control or mitigate an accident in which the core is severely damaged. Do these lectures address the topic and do they cover the subject to the level of detail spelled out in Enclosure 3 of Denton's letter? Please send course outline if it is different from that used in the training program.

Response

Yes, these lectures do address the topics to the levels spelled out in Enclosure 3 of Denton's letter. The training program follows the course outline.

Training Program (Section B.2)

1. Are the lectures and quizzes on the subject of accident mitigation given to the Shift Technical Advisors and operating personnel from the plant manager through the operations chain to the licensed operators? If they are, would you please provide the titles of the people who are trained and an organization chart which illustrates their position in the operations chain?

Response

All new Shift Technical Advisors and Reactor Operator candidates receive the courses as outlined in the letter ANO-80-3228 from J. P. O'Hanlon to Paul Collins. See Enclosure 2 for the organization chart.

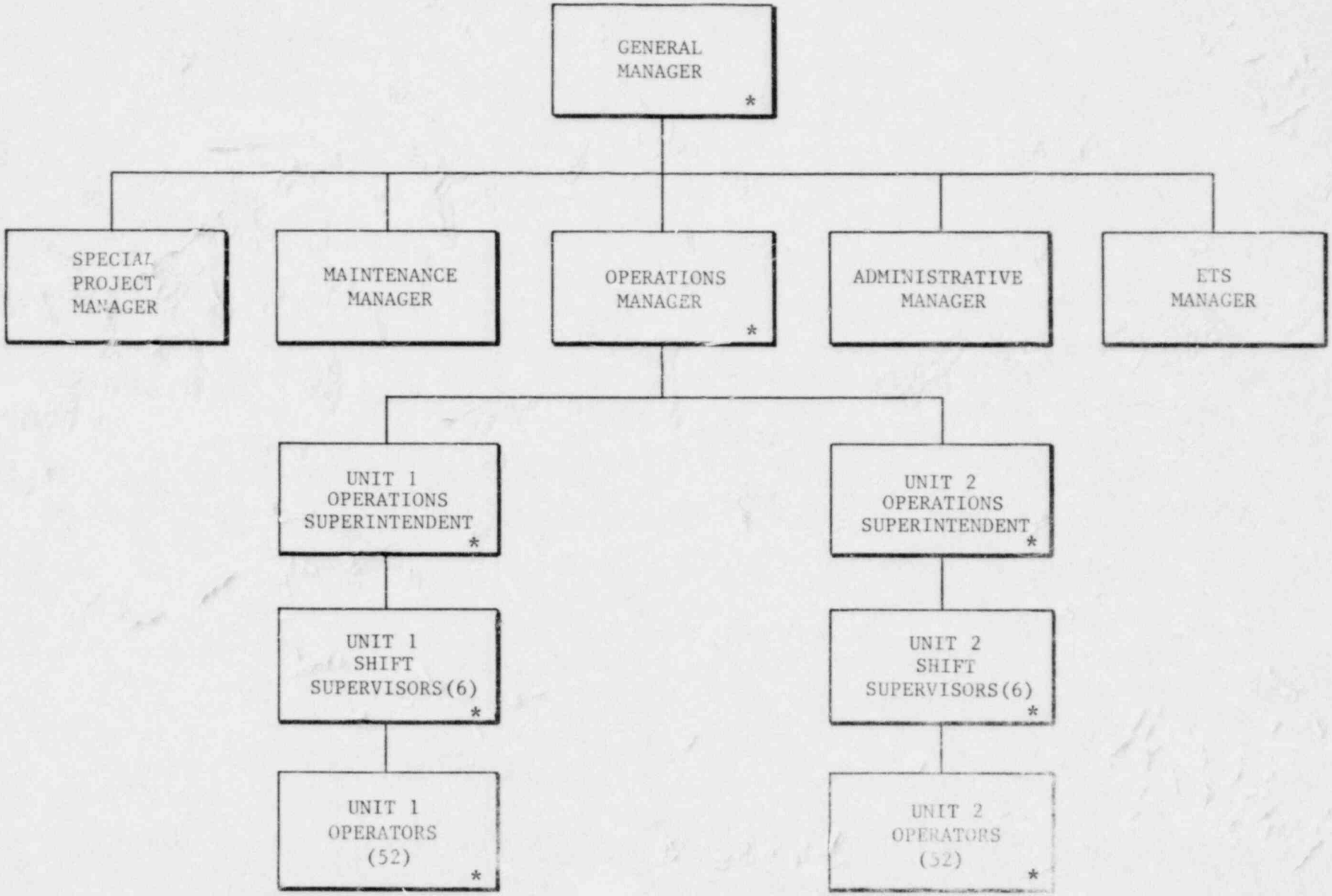
Training Program (Section B.2)

2. Do the training program elements which involve heat transfer, fluid flow, thermodynamics and accident mitigation involve 80 contact hours in each program? (A contact hour of instruction is a one-hour period in which the course instructor is present or available for instructing or assisting students; lectures, seminars, discussions, problem-solving sessions, and examinations are considered contact periods under this definition).

Response

No, the heat transfer, fluid flow, and thermodynamics program involves about 40 contact hours. The mitigation of core damage program involves approximately 20 to 40 contact hours.

ENCLOSURE 2



* Indicates those persons trained in accident mitigation.

6.6 Operator Requalification Program

6.6.1 This program is established for the purpose of maintaining licensed operators at a level of knowledge and proficiency which is necessary for continued safe operation of the plant. License holders shall participate in the requalification program. Failure to complete training shall result in written notification to the licensee and their supervisor within one week of licensee's scheduled training. If the training is not completed within seven additional weeks, written notification will be made to the licensee, the licensee's supervisor, and licensee's department manager. If training is not completed within an additional four weeks, written notification will be made to those listed above and the General Manager.

Licensed individuals receiving less than 80% in a category of the annual requalification exam shall attend requalification lectures covering topics in the weak category and successfully complete examinations covering those areas of the annual requalification exam.

Licensed individuals should attend lectures on series topics included in the annual program. Because of operations work load while on four shift rotation, attendance to selected training lectures may be waived by the Operations Manager if the individual scored greater than 80% on that topic on the last annual requalification exam.

The lecture series will be conducted as the annual requalification examinations indicate the need in the following areas:

A. Theory and principles of operation

B. General and specific plant operating characteristics

C. Plant instrumentation and control systems

D. Plant protection systems

E. Engineering safety features systems

F. Normal, Abnormal, and Emergency Operating Procedures

G. Radiation control and safety

H. Technical Specifications

I. Applicable portions of 10CFR

J. Heat transfer and fluid flow

K. Mitigating core damage

L. Emergency Plan Training

To monitor the progress of individuals during the annual requalification training cycle, a requalification status log shall be maintained by the Operations Trainer responsible for the requalification training. As a minimum, the log should contain:

A. Program title

B. Lectures scheduled

C. Names of individuals required to attend

D. The date training was given

E. Examination scores

F. Date the notifications of missed training were made

G. Date and/or exam scores for retraining conducted

H. Dates when annual performance evaluation forms were distributed and when completed.

This status log is a training management aid to the Operations Trainer only, and is not considered a permanent record.

6.6.2 Operator Performance

A. Each licensed operator shall demonstrate, in the performance of duties, satisfactory understanding of the operation of systems, apparatus and knowledge of operating procedures.

B. Licensed operators shall be informed of changes in station design, procedures, and facility license as designated by the Operations Superintendent. These changes will be reviewed by licensed personnel either on-the-job or during the lecture series.

C. Licensed operators shall review the abnormal and emergency operating procedures not less than twice each year. Licensed personnel will participate in these procedure reviews while on-the-job and during the lecture series.

D. In addition to the semi-annual review of emergency procedures, on shift drills, class room reviews, and examinations, should be conducted on the following procedures annually:

1.	1202.02/2202.02	Blackout
2.	1202.03/2202.03	Turbine Trip
3.	1202.04/2202.04	Reactor-Turbine Trip
4.	1202.05/2202.05	Degraded Power
5.	1202.06/2202.06	Loss of Reactor Coolant/Coolant Pressure
6.	1202.14/2202.14	Loss of Reactor Coolant Flow
7.	1202.18/2202.18	Emergency Shutdown
8.	1202.23/2202.23	Steam Generator Tube Rupture
9.	1202.24/2202.24	Steam Supply System Rupture

During annual simulator requalification training, ANO technical specifications and emergency procedures will be used where possible.

E. A licensed operator who has been inactive in plant operations for four or more months shall, before resuming licensed activities, demonstrate adequate knowledge of current station operations. This shall be accomplished by the observations of station operations for a minimum of 40 hours followed by a documented oral examination given by the Operations Manager or designated representative with emphasis placed on changes which were made during the period the operator was inactive. An unsatisfactory result on the oral examination shall require the operator to have additional training in areas of weakness. If the job responsibilities of licensed individuals requires that they report to the ANO plant site on a day-to-day basis, they shall be considered to be actively involved with plant operations.

6.7 Requalification Training for Licensed Non-Shift Personnel.

6.7.1 Section 6.7 is applicable to licensed individuals whose day-to-day work does not involve activities that require manipulation of control or supervise the manipulation of controls as defined in 10 CFR 55.

6.7.2 Licensed non-shift individuals shall participate in the following activities:

A. Annual written examinations in accordance with section 6.8.1.

B. Attend lectures on topics in the categories in which a grade of less than 80% was scored on the annual examination.

C. Semi-annual emergency procedure review in accordance with section 6.6.2.C.

D. Simulator training in accordance with section 6.10.

E. Annual evaluation by their supervisor in accordance with section 6.8.3.

F. Reactivity manipulations in accordance with section 6.9.

6.7.3 Licensed non-shift personnel should attend the lectures on all topics in the requalification lecture series, and should complete special training in accordance with section 6.11.

6.7.4 Licensed non-shift individual's training shall be reviewed, and the individual certified by the Operations Manager, before being allowed to manipulate facility controls, or supervise the manipulation of controls, as defined in 10 CFR 55. If the individual is deemed unqualified to manipulate facility controls, the individual shall complete additional training and be re-examined before being allowed to manipulate the controls.

6.8 Evaluation

6.8.1 Annual written examinations shall be given to licensed operators. These examinations may be prepared and evaluated by either ANO station personnel, or an outside agency. A minimum average grade of 80% is required for passing the exam with greater than 70% in each category of the exam.

6.8.2 The performance of licensed operators shall be evaluated at least annually by their supervisor. This shall include evaluation of actions taken or to be taken during actual or simulated abnormal and emergency conditions. An appropriate simulator may be used to meet this requirement.

6.8.3 An average grade of less than 80% overall, and less than 70% in any category, on an annual written examination, or an unsatisfactory performance evaluation, shall require an operator or senior operator to be relieved of licensed duties so he may participate in an accelerated requalification program. The operator shall be removed from his licensed duties by the General Manager when advised of unsatisfactory performance by the Operations Manager or Operations Superintendent.

An operator who has been removed from licensed duties may return to license duties following completion of requalification training in areas of weakness, and completion of an examination with a grade of not less than 80%.

6.8.4 Written examinations shall be given covering material presented in the requalification program lecture series. These examinations shall include abnormal and emergency operating procedures and will normally be prepared and evaluated by ANO station personnel.

Failure to score equal to or greater than 80% on a lecture series examination shall result in written notification to the licensee and their supervisor within one week of the examination. The licensee shall complete additional training and complete an examination with a score of greater than or equal to 80% within seven weeks of notification. If the above requirement is not met, written notification will be made to licensee, licensee's supervisor, and licensee's department manager. If the above requirements are not completed within an additional four weeks, written notification of failure to complete requalification training will be made to those listed above and the General Manager.

6.9 Reactivity Manipulations

The following control manipulations and plant evolution are acceptable for meeting the reactivity control manipulations required by Appendix A, Paragraph 3.a. of 10 CFR Part 55. Licensed operators shall perform or participate in a combination of reactivity control manipulations based on the availability of plant equipment and systems. Those control manipulations which are not performed at the plant may be performed on a simulator. The use of ANO Technical Specifications should be maximized during simulator control manipulations. Personnel with senior licenses are credited with these activities if they direct or evaluate control manipulations of licensed operators.
The starred items shall be performed on an annual basis; other items shall be performed on a two-year cycle. Completed manipulation forms shall be forwarded to training department for tracking and filing.

6.9.1* Plant or reactor startups to include a range that reactivity feedback from nuclear heat addition is noticeable and heatup rate is established.

6.9.2 Plant shutdown.

6.9.3 Manual control of steam generators and/or feedwater during startup and shutdown.

6.9.4 Boration and or dilution during power operation.

6.9.5* Any significant (>10%) power changes in manual.

6.9.6 Any reactor power change of 10% or greater where load change is performed with load limit control or where flux, temperature, or speed control is in manual.

6.9.7 Loss of primary coolant including:

1. Significant steam generator leaks

2. Inside and outside primary containment

3. Large and small, including leak-rate determination

4. Saturated Reactor Coolant response

6.9.8 Loss of instrument air.

6.9.9 Loss of electrical power and/or degraded power sources.

6.9.10* Loss of core coolant flow/natural circulation.

6.9.11 Loss of condenser vacuum.

6.9.12 Loss of service water.

6.9.13 Loss of shutdown cooling.

6.9.14 Loss of component cooling system or cooling to an individual component.

6.9.15 Loss of normal feedwater or normal feedwater system failure.

6.9.16* Loss of all feedwater (normal and emergency).

6.9.17 Loss of protective system channel.

6.9.18 Mispositioned control rod or rods (or rod drops).

6.9.19 Inability to drive control rods.

6.9.20 Conditions requiring use of emergency boration.

6.9.21 Fuel cladding failure or high activity in reactor coolant or offgas.

6.9.22 Turbine or generator trip.

6.9.23 Malfunction of automatic control system(s) which affect reactivity.

6.9.24 Malfunction of reactor coolant pressure/volume control system.

6.9.25 Reactor trip.

6.9.26 Main steam line break (inside or outside containment).

6.9.27 Nuclear instrumentation failure(s).

6.10 Simulator Training

Annually, licensed operators shall complete a one (1) week simulator requalification training course. During this training, required reactivity manipulations may be completed.

6.11 Special Training

Special training will be conducted during requalification training, as deemed necessary, in the following areas:

6.11.1 DCP's affecting plant operation

6.11.2 Significant plant events

6.11.3 Procedure changes affecting plant operations

6.11.4 Topics that the operations experience assessment group deems necessary

6.11.5 Those requirements outlined in OP 1023.07, General Employee Training Program, that require annual retraining for plant personnel

6.12 Forms and Attachments

1023.08A Systems Qualification Guide Auxiliary Operator Unit 1
1023.08B Systems Qualification Guide Auxiliary Operator Unit 2
1023.08C Systems Qualification Guide Waste Control Operator Unit 1
1023.08D Systems Qualification Guide Waste Control Operator Unit 2
1023.08E Waste Control Operator Shift H.P. Qualification
1023.08F Shift H.P. Representative Certification
1023.08G Waste Control Operator Training and Certification
1023.08H Control Room Qualification Guide Unit 1
1023.08I Control Room Qualification Guide Unit 2

ENCLOSURE 5
TYPICAL REQUALIFICATION TRAINING OUTLINE
(CUMBUSTION ENGINEERING SIMULATOR)

C-E Power Systems
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095
Tel. 203/688-1911
Telex 99297

POWER SYSTEMS

2

July 2, 1982

NT-82-5144

Mr. Jim Constantin
Arkansas Power & Light Co.
P. O. Box 608
Russellville, Arkansas 72801

Subject: Simulator Training for Arkansas Power and Light, April through June, 1982

Dear Mr. Constantin;

The purpose of this letter is to document the various training programs conducted at the CE Simulator for the Arkansas Power and Light staff during the period of April 26 through June 18, 1982. The names of the attendees and the type of program attended are listed on enclosure 1. The training schedules which describe the various programs are included as enclosure 2. Also included, where applicable, are the Record of Reactivity Control Manipulation sheets (enclosure 3) for each student.

Members of the AP&L staff attended one week requalification programs during the weeks beginning April 26, May 3, 10, and 17, 1982. The program consisted of twenty hours of simulator training and twenty hours of classroom training and exams. The exams administered and proctored by the CE staff, were the RO and SRO exams generated by the AP&L training staff.

During the week of May 24, 1982, five members of the AP&L staff attended a one week introductory course for executives. The program was designed for persons with little or no previous nuclear experience.

The program for the week of May 31, 1982 was designed to prepare members of the AP&L staff for the SRO at-power exams administered by the NRC on June 4, 1982. In addition, the program served as a requalification mechanism to allow documentation of the required reactivity control manipulations.

The programs for the weeks of June 7 and 14, were designed to prepare the AP&L staff members for NRC at-power exams to be administered later in the year. These staff members consisted mainly of the students from the Hot License class of April, 1982.

Very truly yours,

Armand Dieli

Armand Dieli
Supervisor, Simulator Training

AD:ch
Encls.

ENCLOSURE 1
to NT-82-5144

SUMMARY OF ATTENDEES AND PROGRAMS ATTENDED
BY AP&L STAFF APRIL THRU JUNE 1982

Requalification and Proctored Written Exams

4/26/82

R. Terwilliger
M. Gulick
L. McClure
R. Dyer

5/3/82

C. Taylor
R. Wewers
R. Froehlich
R. Hamilton

5/10/82

J. Teter
B. Morris
P. House
B. Baker

5/17/82

G. Woolf
R. Doty
T. Loyd
L. McCarty

Introductory Training Program

5/24/82

D. Shehadeh
T. Ott
W. Bell
M. Azami
R. Evans

NRC At-Power Exam for SRO

5/31/82

M. Harris
J. Constantin
R. Rust
R. Espolt

Intensive Review for NRC At-Power Exams

6/7/82

D. Johnson
G. King
D. McKinney
S. Hamick
M. Ruder
R. Hargrove

6/14/82

C. Keen
G. Wrightam
L. Taylor
R. Edington
R. Pierce
D. Robison

ARKANSAS POWER & LIGHT — Classroom A

Requalification — Week of 4/26/82

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1200-1400	Plant OP. Char. and Heat Transfer	C	WS
1400-1530	SG Feed Ring Problems - Waterhammer	C	WS
1600-1800	Plant Maneuvering PS-20	P	LC
1800-2000	Plant Maneuvering PS-26	P	LC
Tuesday			
1200-1530	Reactor Operating Characteristics	C	TS/RH
1600-1800	Plant Maneuvering - Rx Startup for R. Terwilliger PS-33	P	RR
1800-2000	Plant Maneuvering PS-36	P	RR
Wednesday			
1200-1530	NRC exam review w/problem calculations stressing Reactor Physics	C	TS
1600-1800	Plant Maneuvering PS-40	P	LC
1800-2000	Plant Maneuvering PS-43	P	LC
Thursday			
1200-1530	AP&L Written Exams	C	TS
1600-1800	Plant Maneuvering PS-45	P	RR
1800-2000	Plant Maneuvering PS-46	P	RR
Friday			
1200-1530	AP&L Written Exams	C	TS
1600-1800	Plant Maneuvering PS-49	P	RR
1800-2000	Plant Maneuvering PS-54	P	RR

LEGEND

C = Classroom D = Demonstration P = Practice E = Exercise

Rev. 0 4/20/82

ARKANSAS POWER & LIGHT — Classroom B

REQUAL — Week of 5/3/82

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1200-1400	Plant OP Characteristics & Heat Transfer	C	RR
1400-1530	SG Feed Ring Problems - Waterhammer	C	RR
1600-1800	Plant Maneuvering PS-20	P	RH
1800-2000	Plant Maneuvering PS-26	P	RH
Tuesday			
1200-1530	Reactor Operating Characteristics	C	RR
1600-1800	Plant Maneuvering - Rx Startup Control Manip. - one student PS-33	P	RH
1800-2000	Plant Maneuvering PS-36	P	RH
Wednesday			
1200-1530	NRC exam review w/Problem Calculations stressing Reactor Physics	C	RH
1600-1800	Plant Maneuvering PS-40	P	RH
1800-2000	Plant Maneuvering PS-43	P	RH
Thursday			
1200-1530	AP&L Written Exams	C	RH
1600-1800	Plant Maneuvering PS-45	P	RH
1800-2000	Plant Maneuvering PS-46	P	RH
Friday			
1200-1530	AP&L Written Exams	C	RH
1600-1800	Plant Maneuvering PS-49	P	RH
1800-2000	Plant Maneuvering PS-54	P	RH

LEGEND

C = Classroom D = Demonstration P = Practice E = Exercise

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Curt Taylor
Ray Wewers
Russell Froehlich
Randy Hamilton

Classroom B

ARKANSAS POWER & LIGHT

REQUALIFICATION

Week of 5/10/82

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1200-1400	Plant OP Characteristics & Heat Transfer	C	LC
1400-1530	SG Feed Ring Problems - Waterhammer	C	LC
1600-1800	Plant Maneuvering PS-20	P	LC
1800-2000	Plant Maneuvering PS-26	P	LC
Tuesday			
1200-1530	Reactor Operating Characteristics	C	BPO
1600-1800	Plant Maneuvering - Rx Startup Control Manipulation - one student PS-33	P	TK
1800-2000	Plant Maneuvering PS-36	P	TK
Wednesday			
1200-1530	NRC exam review w/Problem Calculations stressing Reactor Physics	C	LC
1600-1800	Plant Maneuvering PS-40	P	LC
1800-2000	Plant Maneuvering PS-43	P	LC
Thursday			
1200-1530	AP&L Written Exams	C	TK
1600-1800	Plant Maneuvering PS-45	P	TK
1800-2000	Plant Maneuvering PS-46	P	TK
Friday			
1200-1530	AP&L Written Exams	C	TK
1600-1800	Plant Maneuvering PS-49	P	TK
1800-2000	Plant Maneuvering PS-54	P	TK

LEGEND

C = Classroom D = Demonstration P = Practice E = Exercise

10-061701 Rev. 0 5/3/82

Jerry Teter (SRO)
Bud Morris
Paul House
Basil Baker (Special Written Exam)

ARKANSAS POWER & LIGHT Classroom B

REQUALIFICATION

Week of 5/17/82

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1200-1400	Plant OP Characteristics & Heat Transfer	C	BPO
1400-1530	SG Feed Ring Problems - Waterhammer	C	BPO
1600-1800	Plant Maneuvering PS-20	P	BPO
1800-2000	Plant Maneuvering PS-26	P	BPO
Tuesday			
1200-1530	Reactor Operating Characteristics	C	TK
1600-1800	Plant Maneuvering - Rx Startup Control Manipulation - one student PS-33	P	TK
1800-2000	Plant Maneuvering PS-36	P	BPO
Wednesday			
1200-1530	NRC exam Review w/Problem Calculations stressing Reactor Physics	C	BPO
1600-1800	Plant Maneuvering PS-40	P	BPO
1800-2000	Plant Maneuvering PS-43	P	BPO
Thursday			
1200-1530	AP&L Written Exams	C	TS
1600-1800	Plant Maneuvering PS-45	P	BPO
1800-2000	Plant Maneuvering PS-46	P	BPO
Friday			
1200-1530	AP&L Written Exams	C	TS
1600-1800	Plant Maneuvering PS-49	P	BPO
1800-2000	Plant Maneuvering PS-54	P	BPO

LEGEND

C = Classroom D = Demonstration P= Practice E = Exercise

10-061701 Rev. 0 5/11/82

George Woolf (SRO)
Bob Doty (SRO)
Tom Lloyd (SRO)
Larry McCarty

ARKANSAS UNIT 2

Classroom B

REQUAL

Week of 5-31-82

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1600-1800	Plant Operating Characteristics	C	TK
1800-2000	Steam Generator Tube Rupture	C	TK
2000-2100	Orientation PS-1	P	TK
2100-2400	Reactor Startup PS-6		
Tuesday			
1600-1800	Reactor Operating Characteristics	C	TK
1800-2000	Reactor Operating Characteristics	C	TK
2000-2200	NRC at Power Exam Scenarios	P	TK
2200-2400	Instructors' Choice	P	TK
Wednesday			
1600-1800	SG Feed Ring Problems - Waterhammer	C	TK
1800-2000	Loss of Coolant Accident	C	TK
2000-2200	NRC at Power Exam Scenarios	P	TK
2200-2400	Instructors' Choice	P	TK
Thursday			
1600-1800	Excess Steam Demand	C	TK
1800-2000	Natural Circulation	C	TK
2000-2200	NRC at Power Exam Scenario	P	TK
2200-2400	Instructors' Choice	P	TK
Friday			
1600-1800	Accident Identification	C	TK
1800-2000	Accident Identification	C	TK
2000-2200	NRC at Power Exam	P	TK/WS
2200-2400	NRC at Power Exam	P	TK/WS

LEGEND

C = Classroom D = Demonstration P = Practice E = Exercise

Rev. 0 5/25/82

ARKANSAS POWER & LIGHT

INTENSIVE REVIEW

Week of 6/7/82

Classroom B

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1600-1800	Plant Operating Characteristics	C	BPO
1800-2000	Natural Circulation	C	BPO
2000-2200	NRC At Power Exam Scenarios	P	BPO
2200-2400	Instructor's Choice	P	BPO
Tuesday			
1600-1800	Reactor Operating Characteristics	C	BPO
1800-2000	Reactor Operating Characteristics	C	BPO
2000-2200	NRC At Power Exam Scenarios	P	BPO
2200-2400	Instructor's Choice	P	BPO
Wednesday			
1600-1800	LOCA	C	BPO
1800-2000	S/G Feedring Problems	C	BPO
2000-2200	NRC At Power Exam Scenarios	P	BPO
2200-2400	Instructor's Choice	P	BPO
Thursday			
1600-1800	Steam Generator Tube Rupture	C	BPO
1800-2000	Excess Steam Demand	C	BPO
2000-2200	NRC At Power Exam Scenarios	P	BPO
2200-2400	Instructor's Choice	P	BPO
Friday			
1200-1530	Accident Identification	C	WS
1600-1800	NRC At Power Exam Scenarios	P	TS
1800-2000	NRC At Power Exam Scenarios	P	TS

LEGEND

C = Classroom D = Demonstration P = Practice E = Exercise

Rev. 0 6/2/82

Dwight Johnson
George King
David McKinney
Sam Hamick
Mike Ruder
Ron Hargrove

ARKANSAS POWER & LIGHT

Classroom A

INTENSIVE REVIEW

Week of 6/14/82

TIME	SUBJECT	D-P-E-C	INSTRUCTOR
Monday			
1600-1800	Plant Operating Characteristics	C	RR
1800-1930	Natural Circulation	C	RR
2000-2200	NRC At Power Exam Scenarios	P	RR
2200-2400	Instructor's Choice	P	RR
Tuesday			
1600-1800	Reactor Operating Characteristics	C	LC
1800-1930	Reactor Operating Characteristics	C	LC
2000-2200	NRC At Power Exam Scenarios	P	LC
2200-2400	Instructor's Choice	P	LC
Wednesday			
1600-1800	LOCA	C	RR
1800-1930	S/G Feedring Problems	C	RR
2000-2200	NRC At Power Exam Scenarios	P	RR
2200-2400	Instructor's Choice	P	RR
Thursday			
1600-1800	Steam Generator Tube Rupture	C	RR
1800-1930	Excess Steam Demand	C	RR
2000-2200	NRC At Power Exam Scenarios	P	RR
2200-2400	Instructor's Choice	P	RR
Friday			
1600-1930	Accident Identification	C	WS
2000-2200	NRC At Power Exam Scenarios	P	WS
2200-2400	NRC At Power Exam Scenarios	P	WS

LEGEND

C = Classroom D = Demonstration P = Practice E = Exercise

10-061701

Rev. 0 6/8/82

Chuck Keen Randy Edington
George Wrightam Roger Pierce
Larry Taylor Dennis Robison

Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Date_____ Company_____ Simulator Instructor_____

Title MF Fail, PRZR LMV Fail, Hot Leg Rupture

Practice Session# 20 Time Allowed 2 hours

Initial Conditions 2% Power BOL

Sequence:

1. Increase power to 750 MWe with the CEDS and selected pressurizer level controller in manual operation. (CM#1,5,3) ALSO SG. LEVEL - FEED PP SPEED AND FW REG. VALVES
2. Transfer controls to automatic.
3. MAL #13 Lin. A up Det. Fail.(CM#27, 17)
4. MAL #22 Pressurizer level transmitter X or Y high or low. Fail non-selected channel low. Set F-720 on digi-box to 1 to fail channel low.(CM#24)
5. Increase plant load to 850 MWe. Maintain reactive load at 200 MVAR out.
6. MAL #90 External power loss. (CM#9)
7. MAL #30 Reactor hot leg rupture. (CM#7, 10)
8. Carry out required actions.

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Date_____ Company_____ Simulator Instructor_____

Title Secondary Plant Initiation

Practice Session ... allowed 2 hours

Initial Conditions 100% Power MOL 100% Peak Xenon

Sequence:

1. Maintain reactive load at 200 MVAR lagging.
2. MAL #75 Heater drain pump 12 off.
3. Reduce plant load to 600 MWe.
4. Plant chemist informs shift supervisor that the boron concentration in 11 B.A. storage tank 5.8 wt.%.
5. MAL #76 Heater 13B level control freeze.
6. Increase plant load to 883 MWe.
7. MAL #72 Circ. water pump 14 off/loss of cond. vacuum. (CM #11)
8. MAL #85 Loss 4KV bus 11. (CM #9)

Name_____ Operating Station_____

1

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Date_____ Company_____ Simulator Instructor_____

Title Turbine Startup/Power Increase/Turbine Trip

Practice Session# 33 Time Allowed 2 hours

Initial Conditions 2% Power BOL

Sequence:

1. Start turbine. (CM#2)
2. Parallel generator to grid.
3. Increase plant load to 883 MWe with CEDS in manual sequential and the feedwater flow control valves in manual. (CM#5)
4. MAL #70. SG level signal to RPS low. (CM#17,27)
5. When at 883 MWe, place the CEDS and feedwater flow control valves in automatic.
6. MAL #40. Selected charging pump overcurrent trip. Short. (CM#24)
7. Reduce plant load to 575 MWe by boration. Maintain reactive load at 350 MVAR lagging.(CM#4)
8. MAL #54. Turbine 1st stage pressure signal to EHC low. (CM#22) If a turbine trip does not occur, trip the turbine on MAL# 89 Loss of Exitation.
9. Place the plant in a hot shutdown condition.

Name_____ Operating Station_____

1

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Date_____ Company_____ Simulator Instructor_____

Title Power Increase/Natural Circ. Demonstration

Practice Session# 3a Time Allowed 2 hours

Initial Conditions 15% BOL

Sequence:

1. Maintain reactive load at 75 MVAR lagging.
2. Increase plant load to 883 MWe with the following in manual control.
   a. CEDS (CM#5)
   b. Feed pump turbine speed controllers.
   c. Letdown flow control valve.
   d. Letdown pressure control valve.
   e. Feedwater flow control valves.
3. Place systems in automatic when at full load.
4. MAL #25 RCP 2B vibration high.
5. LT1111 fails low, at Address 06J442 change Instruction to 22I631 (CM#15)
6. MAL #49 Steam line break at the turbine. (CM#10, 20, 25, 26)
7. Carry out required actions.
8. Natural Convection Demonstration (CM#9, 10)
   a. Reinitialize at 100% BOL
   b. Stop all 4 RCP's by opening RCP Bus Unit 1 FDR BKR 252-1201
   c. Observe and discuss ΔT/Natural circulation
   d. Manually control turbine bypass valves to increase ΔT and cause cooldown.

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Control Manipulations_____

Date _____ Company _____ Simulator Instructor _____

Title Power Changes with Malfunctions

Practice Session# 40 Time Allowed 2 hours

Initial Conditions 100% Power MOL

Sequence:

1. Reduce power to 300 MWe at 3%/min with the CEA's and feedwater in manual control. Maintain reactive load at 200 MVAR's out. (CM#5)
2. MAL #3. CEA group withdrawal/insertion at 400 MWe (CM#23)
3. Continue load decrease by boration. (CM#4)
4. Alarm - Purification filter ΔP - A,328,St .
5. Alarm - Actuation system sensor channel ZF tripped- A,428,S t .
6. Clear MAL #3 and restore CEA's and feedwater to automatic operation when at 300 MWe.
7. Shift Supervisor is notified that a bistable on channel ZF for containment isolation signal is tripped I&C will investigate and repair.
8. Alarm - Actuation system cabinet door open A,385,S t .
9. MAL #99. False containment isolation signal.(CM#14)
10. Increase load to 883 MWe.
11. Commence dilution at maximum rate when CEA's are fully withdrawn.
12. Alarm - Condensate pump #11 low oil flow A,103,St . Reset when operator opens pump breaker A,103,Rt . Give intermittent vibration alarm from digi-box as pump is slowing down - G-314 1t Bt .
13. MAL #1. Stuck CEA. (CM#18)
14. MAL #17. Main steam safety valve leakage - max. Give 15 minutes before end of session.
15. MAL #74. Service water line rupture. (CM#12)

Name _____ Operating Station _____

Control Manipulations _____

Name _____ Operating Station _____

Control Manipulations _____

Name _____ Operating Station _____

Control Manipulations _____

Name _____ Operating Station _____

Control Manipulations _____

Name _____ Operating Station _____

Control Manipulations _____

Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Date_____ Company_____ Simulator Instructor_____

Practice Session# 43 Time Allowed 2 hours

Initial Conditions a) 100%, plus [015 & [016 to "1";MAL #8
b) 23 MWe, Put Turbine
c) V,47,9999↑ and V,48,0000↑
d) C,16,S↑
e) Keys for PORV isolation valves removed from control room.
f) V,19,9999↑

Objectives:

a) Maintain proficiency and demonstrate adherence to procedures during normal secondary plant startups.

b) Practice diagnostic analyses to locate-for correction-minor problems.

c) Practice manual operation of Control Board-operated equipment.

d) Demonstrate careful checkoffs of emergency procedure steps.

Sequence:

1. Start feed system.
2. Start turbine generator and parallel to the grid.(CM-3)
3. Raise power to 883 MWe, during which: (CM-5)
   a) Fail CCW HX outlet valve (5206) shut [use computer panel]. (CM-14)
   b) Direct PPO to take manual control of the pressurizer spray valves.
   c) At 800 MWe, put in MAL #53, "Gen. Load Sig. to EHC Freeze."
4. Put in MAL #100, "LP Safety Injection Pump 12 Fails."
5. Isolate Auxiliary Feedwater; V,63,0000↑ & V,64,0000↑. (CM-16)
6. Isolate Main Feedwater; V, 28,0000↑ & V,29,0000↑. (CM-15)
7. When pressurizer pressure peaks, put in MAL#17, "Power Opr. RV Vary Leakage." (CM-7)

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

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Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Simulator Instructor_____

ate_____ Time Allowed 2 hours

ractice Session# 45

nitial Conditions a) MAL#7 plus F015 & F016 to "1"; MAL#8
b) 100%, MOL
c) V,47,9999↑ & V,48,0000↑
d) MAL#37, "Boric Acid Strainer Blocked"

bjectives:

a) Maintain proficiency and demonstrate adherence to procedures and Technical Specifications furing load changes.

b) Practice adjusting generator reactive load.

c) Demonstrate ability to recognize a nonalarmed malfunction

d) Demonstrate proper response to loss of a vital bus; correctly follow the Emergency Procedure and comply with the associated Technical Specification(s).

e) Demonstrate proper use of procedures in restoration from electrical loss.

f) Demonstrate ability to respond to equipment failure

g) Demonstrate ability to recognize, and properly respond to; an ATWS.

Sequence:

1. Adjust reactive load to 100 MVAR In.
2. Reduce plant load to 300 MWe (CM-5) (CM-4)
3. MAL#85, "4KV Bus 11 Loss."(CM-9)
4. Raise load to 800 MWe.
5. Reset MAL#85
   - Parallel 4KV bus to normal power
   - Shutdown emergency diesels
6. At computer, fail pressurizer spray valves open (CM-24)
7. MAL#4, "Reactor Trip Bypass"
8. Isolate auxiliary feedwater; V,63,0000↑ & V,64,0000↑(CM-16)
9. [illegible] 0000↑ (CM-15)

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Date_____ Company_____ Simulator Instructor_____

Practice Session#__46__ Time Allowed__2 hours__

Initial Conditions a) MAL#7 ; plus F015 & F016 to "1"; MAL#8
b) 100% Power EOL
c) V,47,9999↑ & V,48,0000↑

Objectives:

a) Demonstrate proficient transient operation of plant with key equipment in manual operation

b) Demonstrate alert operation of reactivity control panel.

c) Demonstration of adherence to Tech. Specs. when safety related equipment is lost

d) Demonstrate a knowledge of alternate means of accomplishing reactor makeup

e) Practice diagnostic analysis to locate and respond to a system leak.

Sequence:

1. MAL#61, "SG Feed Pump 12 Vary Output". Adjust potentiometer enough that operators secure #12MFP. (CM-15)
2. At computer cause LT-1121 to fail low.(CM-15)
3. MAL #60, "FW Reg System 11 Vary FW Demand;" pot. to 60%(CM-15)
4. Tell students that previous watch processed a work request to service letdown control instrumentation shift letdown control valve to manual operation
5. Reduce load toward 440 MWe.
6. MAL#3, "CEA Withdrawal/Insertion". (CM-23)
7. MAL#41, "VCTLC closes VCT Discharge Valve" (CM-24)
8. Students may charge through boration/dilution valve
9. Repair VCT discharge valve control.
10. Fail L-10 ANN window; Computer 11G314 to no-op.
11. Flash L-10 to simulate GM tube saturation (Digibox H413).
12. MAL#44 "SG Tube Leak Increase"; pot to about 10% (CM-7)
13. Digibox H413 to "1"; inform operators that Aux. Bldg. stack monitor is alarming

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Date_____ Company_____ Simulator Instructor_____

Practice Session 49 Time Allowed 2 hours

Initial Conditions a) MAL#8 plus F015 & F016 to "1"; MAL#8
b) 10 [illegible]
c) V,47,0999I; V,48,0000I
d) C,16,St

Objectives:

a) Practice Secondary plant startup

b) Demonstration of procedure adherence

c) Demonstrate proper malfunction identification

d) Demonstrate procedural response to accidents and malfunctions; checking of emergency actions against the procedure steps

e) Practice of natural circulation cooldown.

Sequence:

1. Raise reactor power to 1-2% (CM-1)
2. Startup secondary plant per Procedure B.5. (CM-3)
3. MAL#90, "External Power Loss" (CM-9) (CM-10)
4. MAL#44, "SG11 Tube Leak Increase." (CM-7) (Pot at 30%)
5. Cool down in natural circulation.(CM-2)

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Combustion Engineering, Inc.

Pressurized Water Reactor Simulator

Date_____ Company_____ Simulator Instructor_____

Practice Session# 5A Time Allowed 1 hour Accident Recovery

Initial Conditions 100% [illegible] valve 3824 is Open, HIC-5208 is "0" output

Sequence:

1. Slow dilution (X,BB,22I000,22A001, etc.)
2. Open SDC HX outlet valves (see Computer Panel)
3. Close outlet #2 CCWHX (see Computer Panel)
4. Fail-Open Pzr Spray Valves (Address #09E500 to Instruction 22H777)
5. Turbine bypass valves Fail Open (see Computer Panel)
6. Drop a Regulating Group CEA, After Address #11S152 receives Instruction 00A000
7. MAL#19, "CEA Group Withdrawal/Insertion" after evolution is in progress that requires CEA motion.

(24) REVIEW STUDENTS' CONTROL MANIPULATION SHEETS TO INSURE ALL ITEMS COMPLETED

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Name_____ Operating Station_____

Reactivity Changes_____

Date_____ Company_____ Simulator Instructor_____

Title Reactor Startups to POAH (4 students)

Practice Session# 1 Time Allowed 4 hours

Initial Conditions 100% Power

Sequence:

1. Initialize plant at 100% power.
2. Record necessary data for ECP.
3. Trip reactor.
4. Startup reactor by procedure.
5. Establish critical rod height.
6. Place the reactor on a steady 1 DPM startup rate.
7. Level reactor power at 5%. (CM#1)
8. Reduce reactor power to 5 x 10^{-2}% and level off.
9. Make reactor 1.5% subcritical.
10. Rotate operating stations and repeat steps 4 through 10 until all students have performed a reactor startup.
11. The following malfunctions may be held during the startups. Indicate which malfunction was given and the startup during which it occurred.
    a. MAL #1 Stuck CEA. (CM#19)
    b. MAL #16 Vary power range channel output.(CM#27)
    c. MAL #14 Wide range subcritical multiplication absent. (CM#27)
    d. MAL #15 Wide range channel noisy. (CM#27)

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Date_____ Company_____ Simulator Instructor_____

Title Plant Startup to Full Power

Practice Session# 6 Time Allowed 2 hours

Initial Conditions 10[illegible]% Power, Hot Turbine, BOL

Sequence:

1. Raise reactor power. (CM#1)
2. Start turbine.
3. Start main feed system. (CM#3)
4. Parallel main generator to the grid.
5. Increase power to 883 MWe.
6. MAL #17 Power operated relief valve leakage. (CM#24)
7. Indicate other malfunctions given.

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

Name_____ Operating Station_____

Control Manipulations_____

D. MCINTIRE
G. LONGSTREET
R.E. STANCLIFF
J. CARSON
D.W. SCHREINER
B. BLACK

ENCLOSURE 4
TYPICAL REQUALIFICATION TRAINING OUTLINE
(BABCOCK & WILCOX SIMULATOR)

BOB EVANS
GARY DETHRAGE

ARKANSAS REQUALIFICATION

CLASS ROOM SCHEDULE

CONTROL ROOM SCHEDULE

Day No.	Day/Date	Time	Subject	Reference Instructor	Time	Operation	Reference Instructor
1	MONDAY 4/19/82	0800 to 0945	ICS REVIEW	D.M.	1200 to 1600	REACTOR STARTUP FROM SAFETYS OUT TO 100% POWER	
		0945 to 1130	CRD	G.L.		UNANNOUNCED CASUALTIES	J.C.
2	TUESDAY 4/20/82	0800 to 1130	OPERATING LIMITS AND CORE CONTROL/REACTIVITY CURVE BASIS	BRIAN DELANO	1200 to 1600	UNANNOUNCED CASUALTIES	D.W.S.
3	WEDNESDAY 4/21/82	0800 to 0945	FUEL PERFORMANCE INCLUDING MECHANICAL MANEUVERING RATES	LEW WALTON	1200 to 1600	UNANNOUNCED CASUALTIES	D.M.
		0945 to 1130	FUEL IN COMPRESSION CURVES	BRIAN METCALF			
4	THURSDAY 4/22/82	0800 to 1130	PRIMARY AND SECONDARY WATER CHEMISTRY (WITH AND LEVEL PROBLEMS)	MERL BELL	1200 to 1600	UNANNOUNCED CASUALTIES	R.E.S.
5	FRIDAY 4/23/82	0800 to 0945	OTSG TUBE RUPTURE GUIDELINES	R.E.S.	1200 to 1600	UNANNOUNCED CASUALTIES	B.B.
		0945 to 1130	EMERGENCY FEEDWATER TAP REPORT REVIEW (DISCUSSION OF NEW SYSTEM)	R.E.S.			

BABCOCK & WILCOX

* ARKANSAS POWER & LIGHT CO.

MONDAY

A. Reactor Startup

1. Safety rods out to > 15% power.

2. NI failure.

3. Feedwater system failure.

4. CRD malfunctions

a. Dropped rod
b. Inability to drive rod or rods

TUESDAY

A. ICS malfunctions.

B. Fail pressurizer spray and spray block valve.

C. Small steam leak inside reactor building.

1. Allow plant to be shut down to $\geq$ 15% before reactor building pressure reaches trip point for building isolation.

2. After building isolation, have CCW valve fail to reopen.

3. Cooldown on single steam generator by natural circulation.

D. RCS leak outside reactor building. (MU&P)

WEDNESDAY

A. Failed electromagnetic relief and block valve.

1. Isolable after pressurizer is full for $\approx$ 10 min.

2. Solid plant operations.

3. Draw a bubble in the pressurizer.

B. Reactor trip with failed secondary safety valve initiated by loss of condenser vacuum.

THURSDAY

A. LOCA

1. Small break with repressurization ($\approx$ 180#/sec).

B. Main steam line break outside containment.

C. Tube leak of $\approx$ 10 gpm increase by doubling $\approx$ every 2 mins. until maximum of 350 GPM.

FRIDAY

A. Overfeed accident.

B. LOCA

1. Establish long term cooling.

C. Blackout with loss of both diesels, regain at least one diesel after 10 mins.

1. Total loss of feedwater.

a. Primary feed and bleed.

2. Regain emergency feedwater.

a. Establish natural circulation cooldown.

3. Subsequent loss of emergency feedwater.

a. Complete cooldown to long term cooling using primary feed and bleed.

Name _____

Date _____

Unit 1 /___/ Unit 2 /___/

REACTIVITY CONTROL MANIPULATION

	Initial Condition	Final Condition
Power level change		
Control Rod movement		
Boron concentration change		
Time		
Reactivity manipulation number		

Remarks _____

_____

_____

Shift Supervisor's Signature _____

Reactivity Manipulations

The following control manipulations and plant evolution are acceptable for meeting the reactivity control manipulations required by Appendix A, Paragraph 3.a. of 10 CFR Part 55. Each licensee operator shall perform or participate in a combination of reactivity control manipulations based on the availability of plant equipment and systems. Those control manipulations which are not performed at the plant may be performed on a simulator. The use of the Technical Specifications should be maximized during the simulator control manipulations. Personnel with senior licenses are credited with these activities if they direct or evaluate control manipulations as they are performed.

The starred items shall be performed on an annual basis; other items shall be performed on a two-year cycle.

(1*) Plant or reactor startups to include a range that reactivity feedback from nuclear heat addition is noticeable and heatup rate is established.

(2) Plant shutdown.

3. Manual control of steam generators and/or feedwater during startup and shutdown.

4. Boration and or dilution during power operation.

5* Any significant (>10%) power changes in manual.

6. Any reactor power change of 10% or greater where load change is performed with load limit control or where flux, temperature, or speed control is in manual.

7* Loss of primary coolant including:

1. significant steam generator leaks

2. inside and outside primary containment

3. large and small, including leak-rate determination

4. saturated reactor coolant response

8 Loss of instrument air.

9. Loss of electrical power and/or degraded power sources.

10* Loss of core conlant flow/natural circulatiou.

11 Loss of condenser vacuum.

12. Loss of service water.

13. Loss of shtudown cooling

14. Loss of component cooling system or cooling to an individual component.

15. Loss of normal feedwater or normal feedwater system failure.

16* Loss of all feedwater (normal and emergency).

17. Loss of protective system chanuel.

18. Mispositioned control rod or rods (or rod drops).

19. Inability to drive control rods.

20. Conditions requiring use of emergency boration.

21. Fuel cladding failure or high activity in reacolr coolant or offgas.

22. Turbine or generator trip.

23. Malfunction of automatic control system(s) which affect reactivity.

24. Malfunction of reactor coolant pressure/volume control system.

25. Reactor trip.

26. Main steam line break (inside or outside containment).

27. Nuclear instrumentation failure(s).

BENCHMARK RESPONSIBILITY	TAPE #	FILE #	DATA DECK #	DATE RUN

1. Plant Heatup from 280°F to 535°F
2. Plant Startup to 100% Power
3. Reactor Trip from 100% Power followed by recovery to 100% Power
4. Load change 100-50-100 Automatic
5. Load change 100-50-100 Turbine In Manual
6. Load change 100-50-100 Reactor In Manual
7. Load change 100-50-100 Feedwater In Manual
8. Reactor Startup to 15% Power with 3 RCP Operating
9. Load Change 15-50-15 with 3 RCP Operating
10. Plant Shutdown from 100% Power to Hot Standby
11. Plant Cooldown from Hot Standby to 200°F
12. Plant Shutdown to Hot Standby with 3 RCP Operating
13. Double Ended Tube Rupture with Offsite Power Available
14. Double Ended Tube Rupture Coincident with Loss of Offsite Power
15. Largest Cold Leg Break that will not Actuate HPI-NO Feedwater for 20 minutes
16. Smallest Cold Leg Break that will Actuate HPI-NO Feedwater
17. .07 Ft^2 Cold Leg Break - No Feedwater
18. Largest Cold Leg Break that will not Actuate HPI-NO Feedwater or HPI after 20 minutes
19. Largest Cold Leg Break that will not Actuate HPI- Emergency Feedwater to Both S/G
20. Largest Cold Leg Break that will not Actuate HPI - Emergency Feedwater to One S/G
21. Design Basis Accident (8.55 $ft.^2$ break)
22. Stuck Open FORV
23. Stuck Open Code Safety
24. ~~Loss of Instrument Air~~ CANNOT SIMULATE
25. Blackout

ATTACHMENT 1

SIMULATED RUNNERS WHICH WOULD PASS THE 1975 NRC CRITERIA (DESIGN CRITERIA)

BENCHMARK RESPONSIBILITY	TAPE #	FILE #	DATA DECK #	DATE RUN

26. Steam Leak Inside Containment .5%
27. Loss of One RCP 90% Power
28. Pump Restart 50% Power
29. Loss of All RCP Transition to Natural Circulation
30. Loss of Natural Circulation Due to Inadequate Feed
31. Loss of Natural Circulation Due to Primary Voiding
32. Regaining Natural Circulation
33. Loss of Condenser Vacuum
34. Loss of Cooling Water to Letdown Cooler
35. Loss of Decay Heat Removal Cooling
36. Loss of Main Feedwater
37. Feedwater Pump Trip
38. Main Feedwater Value Closure at Power
39. Loss of All Feedwater
    a. Refill Dry OTSG with Emergency Feed
    b. Solid Plant Cooldown
    c. Draw a Bubble in Pressurizer
    d. Transition to Long Term Cooling
40. TMI II Transient
41. Dropped Safety Rod
42. Dropped Regulating Rod
43. Dropped Regulating Group
44. Asymmetric Regulating Rod
45. Stuck Regulating Rod
46. Disabled Regulating Group
47. Gross Fuel Clad Failure
48. Turbine Trip 100%
49. Generator Trip 100%

ATTACHMENT 1

	BENCHMARK RESPONSIBILITY	TAPE #	FILE #	DATA DECK #	DATE RUN
50. Reactor Trip 100%					
51. Ejected Rod					
52. Continuous Rod withdrawal accident from Source Range					
53. Continuous Rod withdrawal accident from Intermediate Range					
54. Spray Valve Fail Open					
55. Loss of Pressurizer Heaters					
56. Steam Line Break Inside Containment					
57. Steam Line Break Outside Containment					
58. Bypass Valve Failure at 90% Power					
59. Steam Safety Value Failed Open on Reactor Trip					
60. Bypass Valve Fails Open at 10^{-8} Amps					
61. Reactor Trip with Feedwater in Hand					
62. Fail Open MFW Control and Block Valve					
63. Fail Th Low					
64. Fail Tc High					
65. Fail Tc Low					
66. Fail RC Flow Low					
67. Fail Steam HDR Pressure High					
68. Fail Steam HDR Pressure Low					
69. Fail FWP ΔP Low					
70. Fail OTSG SU Level Low					
71. Fail OTSG Operating Level High					
72. Fail FW Flow Low					
73. Fail TAVE					
74. Fail OTSG Pressure					

ATTACHMENT 1

BENCHMARK RESPONSIBILITY	TAPE #	FILE #	DATA DECK #	DATE RUN

75. Fail FW Temperature

76. Fail Neutron Error

77. Loss of Diesel Generator

ATTACHMENT 1