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REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM



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REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM

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REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM

1.0 PURPOSE

1.1 The purpose of this training program description is to:

- 1.1.1 Define the prerequisites required for entry into the Reactor Operator/Assistant Control Operator Training Program.
- 1.1.2 Define the prerequisites required for submitting the candidate for the NRC Reactor Operators license examination.
- 1.1.3 Define those areas of training required to satisfy the Reactor Operator/Assistant Control Operator Training Program.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

2.0 REFERENCES

2.1 Federal Regulations

- 2.1.1 10CFR19, "Notice Instructions, and Reports to Workers; Inspections," Section 19.12.
- 2.1.2 10CFR50, "Domestic Licensing of Production and Utilization Facilities," Appendices B, E, and R.
- 2.1.3 10CFR55, "Operator's Licenses."

2.2 USNRC Regulatory Guides

- 2.2.1 Regulatory Guide 1.8, "Personnel Selection and Training," Revision 1, 1975.
- 2.2.2 Regulatory Guide 1.114, "Guidance on Being an Operator at the Controls of a Nuclear Power Plant."

2.3 USNRC Nuclear Reactor Regulation Guides

- 2.3.1 NUREG 0094, "A Guide for the Licensing of Facility Operators, Including Senior Operators," July 1976.
- 2.3.2 NUREG 0737, "Clarification of TMI Action Plan Requirements," Items I.A.2.1, I.A.2.3, I.A.3.1 and II.B.4, October 1980.

2.4 USNRC Memoranda

- 2.4.1 SECY-79-330E, "Qualifications of Reactor Operators," July 1979.
- 2.4.2 SECY-81-84, "Qualifications of Reactor Operators," February 1981, as amended May 1981.

2.5 American National Standards

- 2.5.1 ANSI/ANS 18.1, "Selection and Training of Nuclear Power Plant Personnel," 1971.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

2.0 REFERENCES (Continued)

2.6 INPO Guidelines

2.6.1 INPO 82-008, "Control Room Operator, Senior Control Room Operator, and Shift Supervisor Qualification," September 1982.

2.7 SONGS Station Orders

2.7.1 S0123-A-126, "Personnel Training."

2.8 Nuclear Training Division Training

2.8.1 GEN-2 "General Employee Orientation" Program Descriptions

2.8.2 HPT-5 "Professional Radiation Training"

2.9 Unit 1 Tech. Specifications Section 6.4 "Administrative Controls - Training"

2.10 Unit(s) 1 or 2 & 3 Operations Qualification Guide for Assistant Control Operator.

2.11 SONGS Units 2 & 3 FSAR Section 13.2 Training

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

3.0 DEFINITIONS

3.1 Academic Training

Academic training is successfully completed college-level work leading to a recognized degree in a discipline related to the position in question.

3.2 Equivalent

Equivalent experience or training is that as defined by "Nuclear Power Plant Experience," 3.10. Equivalency will be determined on an individual basis by the Supervisor, Operations Training, and the Unit(s) 1 or 2 & 3 Operator Training Administrator and may replace all or part of individual training requirements.

Documentation should be provided any time equivalent training, operational experience or education is used to replace any portion of this training program.

3.3 Exam (Oral/Written)

An evaluation tool used to prove satisfactory progress in any program or course.

3.4 Experience

Applicable work in design, construction, preoperational and startup testing activities, operation, maintenance, onsite activities, or technical services. Observation of others performing work in the above areas is not experience.

3.5 Extra Person On Shift Training

Training conducted on-shift prior to licensing for a minimum of three (3) months (12 weeks or 480 hours). During this training period the candidate participates in the operation of a Nuclear Power Plant performing duties, under instruction of licensed operators, consistent with the licensed position for which the candidate is being trained. (NUREG 0737, I.A.2)

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

3.0 DEFINITIONS (Continued)3.6 Licensed Reactor Operator (RO)

Any individual who possesses an operator's license pursuant to Title 10, Code of Federal Regulations, Part 55, "Operating Licenses." An individual performing the functions of a licensed reactor operator will normally be designated as either Control Operator (CO) or Assistant Control Operator (ACO).

3.7 Licensed Senior Reactor Operator (SRO)

Any individual who possesses a Senior Operators License pursuant to Title 10 Code of Federal Regulations, Part 55, "Operators Licenses." Any individual performing the functions of a licensed senior reactor operator will normally be designated as either a Control Room Supervisor (CRS) or a Shift Superintendent (SS).

3.8 Nuclear Plant Equipment Operator (NPEO)

Any individual who carries out the duties and responsibilities identified in the Southern California Edison job specification for job code, "Operator, Nuclear Plant Equipment."

3.9 Nuclear Power Plant

A nuclear power plant is any plant using a nuclear reactor to produce electric power, process steam, or space heating.

3.10 Nuclear Power Plant Experience

Experience acquired in the preoperational and startup testing activities, or operation of nuclear power plants. Experience in design, construction, and operational training (not classroom) may be considered applicable nuclear power plant experience and should be evaluated on a case-by-case basis.

Experience acquired at military, nonstationary, propulsion, or production nuclear plants may qualify as equivalent to nuclear power plant experience on a two-for-one time basis up to a maximum of three years. Two years of such experience equals one year nuclear power plant experience.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATORTRAINING PROGRAM

(Continued)

3.0 DEFINITIONS (Continued)

3.10 (Continued)

Training may qualify as equivalent to nuclear power plant experience if acquired in reactor simulator training programs to a maximum of three month's credit.

On-the-job training may qualify as equivalent to nuclear power plant experience on a one-for-one time basis for up to a maximum of one year's credit.

3.11 Nuclear Reactor

Any assembly of fissionable material which is designed to achieve a controlled, self-sustaining neutron chain reaction.

3.12 NRC Examination for Operator Licenses

Reactor Operator and Senior Reactor Operator licenses may be issued by the NRC to qualified and examined personnel prior to initial core loading of the subject reactor. Examinations for these licenses are termed "Cold" examinations. Examinations administered subsequent to the initial criticality of the reactor are termed "Hot" examinations. The licenses issued based on the results of either hot or cold examinations are equivalent, and are issued for two-year periods. (ANSI N18.1-1971, Sec. 2.2.8)

3.13 On-the-Job Training

On-the-job training is participation in nuclear power plant startup, operation, maintenance, or technical services under the direction of appropriately experienced personnel.

3.14 Related Technical Training

Related technical training is formal training beyond the high school level in technical subjects associated with the position in question, acquired in training schools or programs conducted by the military, industry, utilities, universities, vocational schools, or others. Such training programs should be of a scheduled and planned length and include text material, lectures, and frequent examinations.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

3.0 DEFINITIONS (Continued)3.15 Simulator Training

The simulator used to meet the training requirements for license candidates and requalification training. A simulator shall have similar operating characteristics to the trainee's own plant.

3.16 Shall, Should, May

The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may" to denote permission, neither a requirement nor a recommendation.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

4.0 PREREQUISITES

4.1 Program Prerequisites

Prior to being accepted into the Reactor Operator Training Program, the applicant shall have met the following program prerequisites:

4.1.1 Education

High school diploma or equivalency certificate.
(ANSI-N18.1-1971, Sec. 4.5.1)

4.1.2 Aptitude

Power Operators Selection Service (POSS) test score of 11 or greater.

4.2 NRC Licensing Prerequisites

Before submitting an application to take the NRC Operator Licensing Examination, the Reactor Operator license candidate shall have satisfied the following prerequisites:

4.2.1 Experience

- .1 Minimum of 2 years of power plant experience of which at least 1 year shall be nuclear power experience. (ANSI-N18.1-1971, Sec. 4.5.1)

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

4.0 PREREQUISITES (Continued)

- .2 Minimum of 6 months at the site for which the license is sought. NUREG-0094, Appendix F, Sec. C.2), (Letter from H. Denton, Mar. 28, 1980, Enclosure 1, Sec. A-1)
- .3 Military propulsion plant operating experience and licensed operator experience at another facility may be substituted as stated in paragraph 4.2.1.1.

4.2.2 Training

- .1 Minimum of 3 months' training in the control room as an extra person on shift (Letter from H. Denton, Mar. 28, 1980, Enclosure 1, Sec. A.2.b).
- .2 Training in (1) heat transfer, (2) fluid flow, (3) thermodynamics, (4) use of installed plant systems to control or mitigate an accident in which the core is severely damaged, and (5) reactor and plant transients (NUREG-0737, Enclosure 1, Sec. A.2.c).
- .3 Total of 500 hours of lectures on subjects listed in ANSI N18.1-1971, Section 5.2.1, related subjects and prerequisite courses (NUREG-0094, Appendix F, Sec. C).
- .4 Manipulation of the controls of the facility during five significant reactivity changes as described in the operator requalification program. Every effort should be made to diversify reactivity changes (NUREG-0094, Appendix F, Sec. C.4). A simulator may be used to meet this requirement.
- .5 Participation in reactor and plant operation at power levels up to at least 20% power operation (NUREG-0094, Appendix F, Sec. C.3). A simulator may be used to meet this requirement.
- .6 Paragraphs 4.2.2.2 and 4.2.2.3 of these training prerequisites can be met by successful completion of the training program described in Section 5.1 of this document.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

4.0 PREREQUISITES (Continued)

4.2.3 Facility Certification

Certifications completed pursuant to sections 55.10(a)(6) and 55.33a(4) and (5) of 10CFR Part 55 shall be signed by the highest level of corporate management for plant operation within the Southern California Edison Company. (NUREG 0737, Sec. A.3)

4.2.4 Medical

Comply with the guidelines for physical condition and general health for control room operators as stated in the applicable portions of ANS 3.4/ANSI N546, "American National Standard Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants." (10CFR 55.10(7)) (NUREG 0094, Appendix D)

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION

5.1 Program Administration

5.1.1 The Reactor Operator/Assistant Control Operator Training Program should follow the program appendices provided in the RO/ACO Program Description. Specifically, items identified as required in section 5.1 shall be completed.

5.1.2 Classroom Training

.1 Science and Engineering Fundamentals (Appendix C) and Plant Specific Training (Appendix D) shall consist of a combined program length of 500 hours of lectures. (ANSI N18.1-1971, Sec. 5.2.1)(NUREG-0094, App. F, Sec. C)

.1.1 Approximately four (4) hours per day should be devoted to presentation of material and/or examination. The remaining time each day should be for structured study or review of appropriate material in either laboratory, classroom, or the plant. Instructors should be available during study periods to assist the candidate as necessary.

.1.2 A waiver of candidate participation in any of the classroom training courses may be granted provided:

.1.2.1 An oral and/or written evaluation administered by the Nuclear Training Division that demonstrates knowledge comparable to that required for satisfactory course completion.

.1.2.2 Previous equivalent training has been successfully completed as determined by the Supervisor of Operations Training and the unit(s) 1 or 2/3 Operator Training Administrator.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION (Continued)

- 5.1.3 Extra Person On Shift Training (EPOS) (Appendix E.1)
- .1 An EPOS training plan should be developed and approved by the Unit(s) 1 or 2 & 3 Operation Superintendent or his designee and the Unit(s) 1 or 2 & 3 Operations Training Administrator for all candidates entering EPOS training. Specifically identified portions of the RO/ACO (On-the-Job Training) Qualification Guide should be completed as a part of the EPOS training.
 - .2 Before beginning actual training, the Unit(s) 1 or 2 & 3 Operations Superintendent or his designee and the Unit(s) 1 or 2 & 3 Operations Training Administrator should meet with all candidates to discuss the plan(s) for completing EPOS training and the on-shift responsibilities of the candidates.
 - .3 During the EPOS phase of the training program, the RO/ACO candidate should be assigned to a shift as a control room operator in training in the SONGS Unit(s) 1 or 2 & 3 Operations Department and placed under the administrative control of the Operations Department.
 - .3.1 While in the EPOS phase of the training program, the candidate should make satisfactory progress toward completing the approved EPOS training defined from topics contained in Appendix E.1 "Extra Person On Shift Training."
 - .3.2 The RO/ACO candidate shall have a minimum of three (3) months (12 weeks or 480 hours) training as an extra person on shift.
 - .4 As an extra person on shift, the candidate should be considered in training for the Assistant Control Operator position on SONGS Unit(s) 1 or 2 & 3 and should not be assigned collateral duties.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION (Continued)

- .4.1 Signatures for completed EPOS training and evaluation should be obtained from qualified Unit(s) 1 or 2 & 3 Operations personnel.
- .4.2 The candidate's progress and performance, in completing his/her EPOS training plan, should be reviewed monthly by the unit on-shift trainer. The on-shift trainer should forward a copy of the documentation for the Assistance Control Operator Qualification Program upon completion of EPOS program to the Supervisor of Operations Training.
- .5 Upon completion of the three (3) months EPOS training, the RO/ACO candidate should be assigned to the Nuclear Training Department to complete additional licensing requirements.

5.1.4 Simulator Training (Appendix E.2)

- .1 The simulator training and attendant classroom training shall total at least 4 (four) weeks of which 50% may be classroom training.
- .2 Simulator team training should be in groups of no more than four (4) persons.
- .3 Simulator training shall include participation in the evolutions specified in Appendix E.2 of this program description. Simulator and facility reactivity manipulations are considered equivalent.
 - .1 Manipulation of the controls during five significant reactivity changes evolutions (NUREG 0094, App. F, Sec. C.4).
 - .2 Participation in reactor and plant operation at power levels up to at least 20% power operation (NUREG 0094, Sec. C.3).

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION (Continued)

- .3 Each candidate shall perform a reactor startup during the Simulator Training Program.
- 5.1.4.4 SONGS Unit(s) 1 or 2 & 3 procedures and technical specifications should be used whenever possible and appropriate during simulator training.
- .5 Documentation of simulator training shall be provided by the simulator facility.
- 5.1.5 Pre-license Review

A review course should be conducted to ensure candidate preparedness for the NRC licensing examinations.

 - .1 The course may include coverage of any or all of the items from the previously conducted science/engineering fundamentals and plant-specific training courses.
 - .2 The review course should include training in recent plant system and procedure modifications impacting the duties and responsibilities of the licensed operator.
 - .3 The review course should include Simulator Training as described in Section 5.1.4.
- 5.1.6 Examinations

The following criteria should be used as a basis for determining an acceptable level of performance during all phases of training for RO and SRO candidates.

 - .1 Written examinations.
 - .1.1 Science and Engineering Fundamentals, Systems Training and Pre-License Review
 - .1.1.1 Greater than 70% in each section or retested in that section.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION (Continued)

.1.1.2 Greater than 80% overall or a complete retest.

.1.1.3 Retest scores greater than 70% in each section and greater than 80% overall.

.1.1.4 Failure of an overall examination requires administrative review by the Unit License Coordinator and implementation of a Remedial Program approved by the Unit Training Administrator.

.1.1.5 Failure of a retake examination or section of a retake examination requires administrative review by the Unit Training Administrator, and could be grounds for removal from the current licensing program.

.1.2 Pre-License Audit Examination.

.1.2.1 An NRC type written audit examination should be administered at approximately the 12th week of the Pre-License Review Program. The examination will be written and evaluated in accordance with NUREG-1021, Guidelines for Operator Written Examinations.

1.2.2 A grade of less than 70% in any section or less than 80% overall shall require an administrative review by the Units 2/3 Training Administrator and could be grounds for removal from the current licensing program.

5.1.6.2 Oral Examinations

.2.1 Pre-License Review

A minimum of one Oral/Plant Walk-Through Examinations shall be conducted for each license candidate during the Pre-License Review.

An oral examination shall be graded as "Satisfactory", "Unsatisfactory", or "Marginal" based upon the candidates responses to questions during an oral examination or plant walk-through.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION (Continued)

- .2.1.1 "Unsatisfactory" evaluations require a retest.
- .2.1.2 An "Unsatisfactory" evaluation on a retest shall require an administrative review by the Unit License Coordinator and implementation of a Remedial Program approved by the Unit Training Administrator.
- .2.1.3 An Oral/Plant Walk-Through Examination shall be included as a portion of the Pre-License Audit Examination process.
- .3.1 An evaluation of a Pre-License Audit Oral/Plant Walk-Through marked as "Unsatisfactory" shall require an administrative review by the Unit Training Administrator and could be grounds for removal from the current licensing program.

5.1.6.3 Simulator Evaluations

NOTE: Simulator Evaluations shall be conducted during simulator operations training and during the Pre-License Audit Examination as applicable.

- 3.1 Subjective periodic evaluations by the simulator instructors shall be completed for each candidate. The evaluations should address such areas as teamwork, communication, control board technique and dexterity, procedural knowledge, and plant system knowledge.
 - 3.1.1 Periodic evaluation by the simulator instructors shall be "Satisfactory", "Unsatisfactory", or "Marginal" in each category described above and either "Satisfactory", "Unsatisfactory", or "Marginal" overall.
 - 3.1.2 Two consecutive periodic overall "Unsatisfactory" or "Marginal" evaluations shall require an administrative review by the Unit Training Administrator, and implementation of a Remedial Program approved by the Unit Training Administrator.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
(Continued)

5.0 PROGRAM DESCRIPTION (Continued)

3.2 A simulator operational demonstration should be included as a portion of the Pre-License Audit Examination Process as applicable.

3.2.1 An evaluation of a Pre-License Simulator Audit marked as "Unsatisfactory" shall require an administrative review by the Unit Training Administrator and could be grounds for removal from the current licensing program.

5.1.6.4 REVIEW BOARD

.1 Approximately 2 weeks prior to the NRC Examination, a Review Board should be convened to determine the final acceptability of candidates to participate in the NRC Examination.

4.1.1 The Review Board shall examine the training documentation of each candidate to determine the acceptability of each candidate to participate in the NRC Examination.

4.1.2 The Review Board should consist of the following members:

2.1 *Unit License Coordinator.

2.2 *Unit Operations Training Administrator.

2.3 *Supervisor of Operations Training.

2.4 (1) Unit Operations Superintendent.

2.5 (1) STA Supervisor.

* Minimum quorum required.

(1) As applicable to the individual license candidate.

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
TRAINING PROGRAM
 (Continued)

5.0 PROGRAM DESCRIPTION (Continued)

5.2 Program Training Requirements

5.2.1 Plant Familiarization

- .1 General Employee Orientation (Appendix A)
- .2 Red Badge Training
- .3 Initial Plant Familiarization (Appendix B)

5.2.2 Science and Engineering Fundamentals Courses

- .1 Power Plant Overview (Appendix D.1)
- .2 Mathematics (Appendix D.2)
- .3 Classical Physics (Appendix D.3)
- .4 Chemistry Fundamentals (Appendix D.4)
- .5 Fluids/Heat Transfer/Thermodynamics (Appendix D.5)

	REQUIREMENT SOURCES				
	10 CFR	ANSI	NUREG	DENTON LTR	OTHER
.1 General Employee Orientation (Appendix A)	19	N18.1	18.17 1.8		
.2 Red Badge Training					
.3 Initial Plant Familiarization (Appendix B)					
.1 Power Plant Overview (Appendix D.1)					
.2 Mathematics (Appendix D.2)					
.3 Classical Physics (Appendix D.3)					
.4 Chemistry Fundamentals (Appendix D.4)					S023- VI-3.0
.5 Fluids/Heat Transfer/Thermodynamics (Appendix D.5)			0737 1021, ES109	Sec. II	S023- VI-3.0

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
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 (Continued)

5.0 PROGRAM DESCRIPTION (Continued)

	REQUIREMENT SOURCES				
	10 CFR	ANSI	NUREG	DENTON LTR	OTHER
.6 Reactor Thermodynamics (Appendix D.6)					
.7 Mechanical Fundamentals (Appendix D.7)					
.8 Electrical Science (Appendix D.8)					SECY 81-84
.9 Nuclear Physics (Appendix D.9)	55	N18.1	0094		REGUIDE 1.8 S023-VI-3.0 SECY 81-84
.10 Reactor Theory (Appendix D.10)	55.21(a) 55.22(e)	N18.1	0094		REGUIDE 1.8 S023-VI-3.0 SECY 81-84
.11 Radiation Science (Appendix D.11)	55.21(l) 55.22(d) 55.23(j)	N18.1	0094		S023-VI-3.0 SECY 81-84
.12 Radiochemistry (Appendix D.12)					
.13 Materials Science (Appendix D.13)					
.14 Instrumentation and Control Fundamentals (Appendix D.14)	55.23(c) 55.23(d)	N18.1	0737		REGUIDE 1.8 SECY 81-84

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
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 (Continued)

5.0 PROGRAM DESCRIPTION (Continued)

5.2.3 Plant-Specific Training Courses

	REQUIREMENT SOURCES				
	10 CFR	ANSI	NUREG	DENTON LTR	OTHER
.1 Administrative Requirements (Appendix E.1)	55.21(j)	N18.1	0578 0094		REGUIDE 1.8
.2 Plant Systems (Appendix E.2)	55.21* 55.22* 55.23*	N18.1	0094		REGUIDE 1.8 SECY 81-84
.3 Transient/Accident Analysis (Appendix E.3)	55.21(e)		0094 0737		
.4 Core Damage Recognition/ Mitigation (Appendix E.4)	55	N18.1	0094 0737 0578	Sec. II	REQUIRE 1.8 SECY 81-84
.5 Integrated Plant Operations (Appendix E.5)	55.22(f) 55.22(g)				
.6 Emergency Plan (Appendix E.6)	55.23(k)				
.7 Industry and Facility Experiences (Appendix E.7)	55.23(e) 55.23(f) 55.23(l)				

*55.21(b),(c),(d),(f),(h),(i),(k);
 55.22(a),(b),(c),(h),(i);
 55.23(a),(b),(g),(h),(i)

REACTOR OPERATOR/ASSISTANT CONTROL OPERATOR
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5.0 PROGRAM DESCRIPTION (Continued)

	REQUIREMENT SOURCES				
	10 CFR	ANSI	NUREG	DENTON LTR	OTHER
5.2.4 Operations Training Courses					
.1 Extra-Person-On-Shift Training (Appendix E.1)			1021ES109 0737 Encl. I		
.2 Simulator Training (Appendix E.2)	55	3.5	0737		REGUIDE 11.49 SECY 81-84 SECY 330E
.3 Control Room Communications (Appendix E.3)					
5.2.5 Pre-License Review					
5.2.6 Site Certification Test					
5.2.7 Job Qualification Training (Appendix F)					REGUIDE 1.8

APPENDICES

- A. General Employee Orientation
- B. Initial Plant Familiarization
- C. Science and Engineering Fundamentals Courses
 - C.1 Power Plant Overview
 - C.2 Mathematics
 - C.3 Classical Physics
 - C.4 Chemistry Fundamentals
 - C.5 Fluids/Heat Transfer/Thermodynamics
 - C.6 Reactor Thermodynamics
 - C.7 Mechanical Fundamentals
 - C.8 Electrical Science
 - C.9 Nuclear Physics
 - C.10 Reactor Theory
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- E. Operations Training Courses
 - E.1 Extra Person On Shift Training
 - E.2 Simulator Training
 - E.3 Control Room Operator Skills Training
- F. Job Qualification Training

APPENDIX A

GENERAL EMPLOYEE ORIENTATION

- A. General Employee Orientation should include training in policies, practices, procedures and employee responsibilities related to:
 - 1. Station security
 - 2. Industrial safety
 - 3. Health physics/radiation protection
 - 4. Station emergencies (including radiological emergency plan)
 - 5. Quality assurance/Quality control
 - 6. Station administration
 - 7. First aid
 - 8. Station fire protection program
 - 9. Station communications
- B. This training should be conducted in accordance with Training Program Description GEN-2.
- C. This section may be waived if previously completed.

APPENDIX B

INITIAL PLANT FAMILIARIZATION

- A. Initial plant familiarization should include both formal classroom presentations and in-plant tours.
1. The classroom portion should introduce the candidate to the basic primary and secondary plant systems, major components and their functions. A list of commonly used acronyms and industry terms should be provided to enhance the candidate's ability to interact with other plant personnel.
 2. Both instructor guided and self guided tours should be conducted to ensure the candidate can locate major plant areas and specific equipment. "Initial Plant Familiarization Checklists" should be provided for this purpose.
 3. At the completion of the familiarization period a written test may be administered.
 4. This section may be waived if previously completed.

APPENDIX C.1

SCIENCE AND ENGINEERING FUNDAMENTALS

POWER PLANT OVERVIEW

- A. Training in this area should include:
1. Nuclear Energy
 - a. Power Production
 - b. Fission
 - c. Myths
 - d. Risks/Benefits
 2. The Nuclear Power Plant
 - a. Reactor Components
 - b. BWR
 - c. PWR
 - d. Other Designs
 3. Construction and Licensing
 - a. NRC
 - b. Plant Licensing
 - c. Operator Licensing
 - d. Fuel Load
 4. Plant Operations
 - a. Organization
 - b. Quality Assurance
 - c. Training
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.2

SCIENCE AND ENGINEERING FUNDAMENTALS

MATHEMATICS

A. Training in this area should include:

1. Arithmetic
 - a. Whole numbers
 - b. Fractions
 - c. Decimals
 - d. Arithmetic Operations
2. Exponents
3. Scientific Notation
4. Common Logarithms
5. Natural Logarithms
6. Algebra
 - a. Functions
 - b. Linear Equations
 - c. Quadratic Equations
 - d. Solutions of Equations
7. Unit Analysis
8. Trigonometry
 - a. Functions
 - b. Tables
 - c. Vectors
9. Graphs
 - a. Cartesian coordinates
 - b. Polar coordinates
 - c. Seim-Log
 - d. Log-Log
 - e. Nomographs
10. Dynamic Situation Analysis
 - a. Slope of a line
 - b. Area under a line

APPENDIX C.2

SCIENCE AND ENGINEERING FUNDAMENTALS

MATHEMATICS

11. Statistics

- a. Averages
- b. Weighted Averages
- c. Deviations

12. Probability

- a. Random Events
- b. Nuclear Applications

B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.3

SCIENCE AND ENGINEERING FUNDAMENTALS

CLASSICAL PHYSICS

A. Training in this area should include:

1. Unit Analysis

- a. Units of measurement
 - 1) Time
 - 2) Distance
 - 3) Mass
 - 4) Metric vs. English
- b. Combining Fundamental Units
- c. Unit Conversion

2. Element of Mechanics

- a. Forces
 - 1) Gravitational Forces
 - 2) Friction
- b. Motion
 - 1) Linear
 - 2) Newton's Laws
 - 3) Rotational
- c. Momentum
 - 1) Linear
 - 2) Angular
- d. Work and Energy
- e. Power

3. Electrostatics

- a. Electric Charges
- b. Coulombs Law
- c. Electric Field
- d. Electric Potential
- e. Electron Volt

4. Electromagnetic Radiation

- a. Wave propagation.
- b. Quantum theory.

APPENDIX C.3 (cont.)

SCIENCE AND ENGINEERING FUNDAMENTALS

CLASSICAL PHYSICS

- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.4

SCIENCE AND ENGINEERING FUNDAMENTALS

CHEMISTRY FUNDAMENTALS

A. Training in this area should include:

1. Physical/Chemical Properties
2. Elements/Compounds/Mixtures
3. Atomic Structure
4. Ionization/Valence
5. Periodic Table
6. Bonding
7. Reactions
8. Catalysis
9. Acids and Bases
10. pH
11. Conductivity
12. Solubility
13. Types of impurities
 - a. Dissolved
 - b. Suspended
14. Sources of Impurities
 - a. Erosion
 - b. Corrosion
 - c. Carryover
 - d. Makeup
15. Corrosion Types
 - a. General
 - b. Localized
 - c. Galvanic
 - d. Crevice
 - f. Chloride stress
 - g. Caustic stress

APPENDIX C.4 (cont.)

SCIENCE AND ENGINEERING FUNDAMENTALS

CHEMISTRY FUNDAMENTALS

16. Corrosion of Plant Materials

- a. Carbon steel
- b. Stainless steel
- c. Zircalloy
 - 1) Hydriding
 - 2) Metal-Water

17. Effects of Corrosion and Corrosion Products

18. Impurity Control/Removal

- a. Filtration
 - 1) Cartridge
 - 2) Deep Bed
 - 3) Precoat
- b. Ion Exchange
 - 1) Theory
 - 2) Single Bed
 - 3) Mixed Bed
 - 4) Regeneration
- c. Blowdown

19. Chemistry Control

- a. Soluble
- b. Volatile

20. Routine Analyses

- a. Types
- b. Significance

21. Technical Specification Requirements

- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.5

SCIENCE AND ENGINEERING FUNDAMENTALS

FLUIDS/HEAT TRANSFER/THERMODYNAMICS

A. Training topics shall cover:

1. Basic Properties of Fluids and Matter
2. Fluid Statics
3. Fluid Dynamics
4. Heat Transfer by Conduction, Convection, and Radiation
5. Change of Phase-Boiling

Training for these topics should include:

1. Properties of Fluids
2. Gas Laws
3. Hydrostatics
4. Units of Fluid Flow
5. Laminar/Turbulent Flow
6. Continuity of Flow
7. Bernoulli's Principle
8. Fluid Friction/Head Loss
9. Flow Measurement
10. Two Phase Flow
 - a. Water Hammer
 - b. Erosion
11. Pumps
 - a. Types
 - b. Theory of Operation
 - c. Pump Laws
 - d. NPSH
 - e. Head/Losses
 - f. Performance Curves
 - g. Runout
12. Other Forms of Energy

APPENDIX C.5 (cont.)

SCIENCE AND ENGINEERING FUNDAMENTALS

FLUIDS/HEAT TRANSFER/THERMODYNAMICS

13. Heat
 - a. Heat capacity
 - b. Sensible
 - c. Latent
 - d. Saturation
 - e. Superheat
 - f. Subcooling
14. Thermodynamic Properties of Fluids
15. Representations of Properties
 - a. P vs. V
 - b. P vs. T
 - c. T vs. h
 - d. P vs. h
16. First Law of Thermodynamics
 - a. Conservation
 - b. Conversion
17. Second Law of Thermodynamics
 - a. Efficiency
 - b. Entropy
18. TS Diagram/Processes
 - a. Isobaric
 - b. Isothermal
 - c. Adiabatic
 - d. Isenthalpic
 - e. Isentropic
19. HS (Mollier) Diagram/Processes
 - a. Isobaric
 - b. Isothermal
 - c. Adiabatic
 - d. Isenthalpic
 - e. Isentropic
20. Steam Tables

APPENDIX C.5 (cont.)

SCIENCE AND ENGINEERING FUNDAMENTALS

FLUIDS/HEAT TRANSFER/THERMODYNAMICS

21. Heat Transfer Methods
 - a. Conduction
 - b. Convection
 - c. Radiation
22. Heat Exchangers
 - a. Direct/Surface
 - b. Flow Classifications
 - c. Regenerative/Non regenerative
 - d. Components
 - e. Theory of Operation
 - f. Applications
 - g. Calculations
23. Steam Generators
 - a. Types
 - b. Components
 - c. Boiling Heat Transfer
 - d. Circulation
 - e. Recirculation
 - f. Operating Characteristics
24. Condensers
 - a. Types
 - b. Operation
 - c. Efficiency: Effects and Factors
 - d. Cooling Systems
25. Steam Turbines
 - a. Components
 - b. Types
 - c. Compounding
 - d. Flow Classifications
 - e. Energy Conversion
 - f. Auxiliary/Support Systems
 - g. Hazards
26. Plant Cycles
 - a. Carnot
 - b. Ideal Rankine
 - c. Actual Plant
 - d. Efficiency Determination/comparison

APPENDIX C.5 (cont.)

SCIENCE AND ENGINEERING FUNDAMENTALS

FLUIDS/HEAT TRANSFER/THERMODYNAMICS

27. PWR Operation

a. Steady state

- 1) secondary pressure vs. primary temperature
- 2) primary vs. secondary mass flow rates

b. Transients

- 1) up-power
- 2) down-power
- 3) PRZR insurge
- 4) PRZR outsurge
- 5) effects on S.G. level

B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.6SCIENCE AND ENGINEERING FUNDAMENTALS
REACTOR THERMODYNAMICS

A. Training topics shall cover:

1. Burnout and Flow Ductability
2. Reactor Heat Transfer Limits

Training for these topics should include:

1. Reactor Heat Generation
 - a. Calorimetric
 - b. Heat Flux
 - c. Linear Heat Rate
 - d. Hot Channel factors
 - e. Peaking Factors
 - f. Power Profiles
 - 1) axial
 - 2) radial
 - 3) poison effects
 - 4) burnup effects
 - g. Indications
2. Fuel Heat Transfer
 - a. Fuel temperature/heat flux profiles
 - 1) axial
 - 2) radial
 - b. Power transients
 - c. Fuel densification
 - d. Fuel pellet swelling
 - e. Clad creep
 - f. Pellet/Clad interactions
 - g. Corrosion
 - h. Crud/fouling
 - i. Gap conductance
3. Reactor Thermal-Hydraulics
 - a. Channel temperature/enthalpy profiles
 - 1) axial
 - 2) radial
 - b. Boiling
 - c. DNB/CHF
 - d. DNBR

APPENDIX C.6

SCIENCE AND ENGINEERING FUNDAMENTALS

REACTOR THERMODYNAMICS

e. DNBR variations with:

- 1) RCS flow
- 2) RCS pressure
- 3) RCS temperature
- 4) Power

f. Forced convection flow

- 1) conditions
- 2) requirements
- 3) pump operating limits

g. Natural circulation

- 1) theory
- 2) recognition
- 3) limitations
- 4) two phase flow
- 5) vapor binding

4. Limitations

a. Operational limits

- 1) total power
- 2) power distribution

b. Safety limits

- 1) technical specifications
- 2) bases
- 3) transient challenges

B. All, or portions, of this section may be waived based on previous equivalent training, education or experience.

APPENDIX C.7

SCIENCE AND ENGINEERING FUNDAMENTALS

MECHANICAL FUNDAMENTALS

- A. Training in this area should include:
1. Lubrication
 - a. Lubricant types/characteristics
 - b. Systems
 - 1) Splash
 - 2) Drip
 - 3) Forced
 - 4) Gravity
 - c. Hazards
 2. Bearings
 - a. Types
 - b. Applications
 3. Valves
 - a. Types
 - b. Characteristics
 - c. Applications
 4. Valve Operators
 - a. Manual
 - b. Remote/Automatic
 5. Piping Auxiliaries
 - a. Traps
 - b. Strainers/Filters
 - c. Hangers/Snubbers
 6. Reading Piping Diagrams (P&ID's)
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.8

SCIENCE AND ENGINEERING FUNDAMENTALS

ELECTRICAL SCIENCE

- A. Training in this area should include:
1. Atomic Structure
 2. Voltage
 3. Magnetism/Current Flow
 4. Resistance/Conductance
 5. Electrical Laws
 - a. Coulomb's Law
 - b. Ohm's Law
 6. DC Fundamentals
 - a. Series Circuits
 - b. Parallel Circuits
 - c. Power
 7. AC Fundamentals
 - a. Effective Current/Voltage
 - b. Inductance/Inductive Reactance
 - c. Capacitance/capacitive Reactance
 - d. Impedance
 - e. I/E Phase Relationships
 - f. Power
 8. Buses, Bus Ducts and Disconnects
 9. Circuit Breakers and Switchgear
 10. AC Generators
 11. Excitation Systems
 12. Transformers
 13. Three Phase Power
 14. Power Plant Motors

APPENDIX C.8 (cont.)

SCIENCE AND ENGINEERING FUNDAMENTALS

ELECTRICAL SCIENCE

15. Protective Relaying
 16. Motor Control
 17. Storage Batteries
 18. Inverters
 19. Power System Operation
 - a. Unit operation
 - b. Synchronization
 - c. Parallel operation
 20. Semiconductor Fundamentals
 - a. Semi conductors
 - b. Diodes
 - c. Special devices
 21. Logic
 - a. Concepts
 - b. Bistables
 22. Computer Literacy
 23. Hazards and Safety Precautions
 24. Electrical and Electronic Prints and Diagrams
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.9

SCIENCE AND ENGINEERING FUNDAMENTALS

NUCLEAR PHYSICS

- A. Training in this area should include:
1. Atomic/Nuclear Structure
 2. Chart of the Nuclides
 3. Binding Energy
 4. Mass/Energy Conversion
 5. Radiation
 - a. Types
 - b. Origins
 - c. Interactions
 6. Radioactive Decay
 7. Induced Nuclear Reactions
 8. Fission
 9. Microscopic Cross Section
 10. Macroscopic Cross Section
 11. Neutron Interactions with Reactor Materials
 12. Neutron Moderation and Diffusion
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.10

SCIENCE AND ENGINEERING FUNDAMENTALS

REACTOR THEORY

- A. Training in this area should include:
1. Neutron Multiplication
 2. Multiplication Factors
 3. Flux Distribution
 4. Neutron Kinetics
 5. Reactor Kinetics
 6. Reactor Control
 7. Coefficients
 8. Reactivity Variations
 9. Fission Product Poisons
 10. Core Characteristics
 11. Subcritical Multiplication
 12. Power Operations
 13. Reactor Shutdown
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.11

SCIENCE AND ENGINEERING FUNDAMENTALS

RADIATION SCIENCE

- A. Training in this area should include:
1. Fundamentals of Health Physics
 2. Biological Effects of Ionizing Radiation
 3. Principles of Radiation Detection
 4. Standards and Regulations
 5. ALARA Concepts and Principles
 6. Equilibrium
 7. Chart of the Nuclides
 8. Health Physics Instrumentation
 9. Respiratory Protection
 10. Contamination and Decontamination
 11. Radioactive Waste Management
 12. Radiation Protection and Shielding
 13. Radioactive Material Classification
 14. Area Classification
 15. Warning Signs and Equipment
 16. Health Physics Workshop
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.12

SCIENCE AND ENGINEERING FUNDAMENTALS

RADIOCHEMISTRY

- A. Training in this area should include:
1. Nuclear Reactions
 2. Fission Product Activity
 3. Activated Corrosion/Wear Products
 4. Activated RCS Impurities
 5. Indications of Fuel Damage
 6. Fission Product Concentrations
 7. Parent-Daughter Relationships
 8. Measurement Techniques
- B. All, or portions of this section may be waived based on equivalent training, education or experience.

APPENDIX C.13

SCIENCE AND ENGINEERING FUNDAMENTALS

MATERIALS SCIENCE

- A. Training in this area should include:
1. States of Matter
 2. Structure of the Solid State
 3. Properties of the Solid State
 4. Metallic Structure
 5. Elastic Deformation
 6. Plastic Deformation
 7. Fracture Mechanics
 8. Corrosion Effects
 9. Pressurized Thermal Shock
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX C.14

SCIENCE AND ENGINEERING FUNDAMENTALS

INSTRUMENTATION AND CONTROL FUNDAMENTALS

- A. Training in this area should include:
1. Pressure Measurement/Devices
 2. Temperature Measurement/Devices
 3. Level Measurement/Devices
 4. Flow Measurement/Devices
 5. Nuclear Instrumentation
 - a. In-Core
 - b. Ex-Core
 - 1) Proportional
 - 2) Compensated Ion Chamber
 - 3) Uncompensated Ion Chamber
 - 4) Fission Chamber
 6. Basic Control Loops
 - a. Analog
 - b. Proportional
 - c. Rate
 - d. Gain
 - e. Feed Forward/Back
 - f. Combinations
 7. Logic Diagrams
- B. All, or portions, of this section may be waived based on equivalent training, education or experience.

APPENDIX D.1

PLANT-SPECIFIC TRAINING COURSES

ADMINISTRATIVE REQUIREMENTS

- A. Training in this area shall include an overview of the requirements of regulations, orders, policies and procedures, including the Station Administrative Operating Instructions.
- B. This section may be waived if previously completed.

APPENDIX D.2

PLANT-SPECIFIC TRAINING COURSES.

PLANT SYSTEMS

- A. Training shall be plant-specific and include, as applicable:
1. Component types/design features
 2. Component and control locations
 3. Line-ups and flow paths
 4. Power supplies
 5. Inter-relationships with other systems
 6. Automatic features
 7. Instrumentation and controls
 8. Major parameters
 9. Limits, precautions of setpoints
 10. Procedures
 - a. Normal
 - b. Abnormal
 - c. Emergency
 - d. Surveillance
 11. Transient function/response
 12. Design bases
 13. Technical Specification Requirements
- B. The following lessons should be presented prior to the start of systems training:
1. Introduction to Technical Specifications.
 2. Introduction to Piping and Instrumentation Drawings (P & ID's).
- C. The following systems should be presented at a knowledge level consistent with that required for system operation for Units 2 & 3:
1. 200kv Electrical
 2. 6.9/4.1kv Electrical
 3. 480v Electrical

APPENDIX D.2 (cont.)

PLANT-SPECIFIC TRAINING COURSES

PLANT SYSTEMS

4. Non-IE 250/125v DC and 120v AC
5. Class IE 120v AC/125v DC
6. Emergency Diesel Generator
7. Misc. Power Supplies
8. Main Circulating Water
9. Saltwater Cooling
10. Domestic and Service Water
11. Demineralized Water, Makeup and Transfer
12. Nuclear Service Water
13. Condensate and Feedwater
14. Feedwater Pump Turbine
15. Auxiliary Feedwater
16. Steam Generator
17. Feedwater Regulating System
18. Blowdown Processing
19. Main and Reheat Steam
20. Auxiliary Steam/Auxiliary Boiler
21. Heater Drains and Vents
22. Turbine Generator Construction
23. Turbine Mechanical Systems
24. Turbine Gland/Valve Steam Sealing
25. Turbine Lube Oil
26. Generator Seal Oil
27. Generator Gas Cooling
28. Generator Stator Cooling
29. Condenser Air Removal
30. Turbine Supervisory and Protection System
31. Turbine Controls
32. Main Turbine Unitized Actuators
33. Main Generator and 22kv System
34. Turbine Plant Cooling Water
35. Auxiliary Gas (Nitrogen & Hydrogen)
36. Ventilation System
37. Fire Computer
38. Main Condensate and Feedwater Chemical Addition System
39. Auxiliary Feedwater Chemical Addition
40. Fire Detection System
41. Fuel Fabrication/Receipt, Storage
42. Reactor Vessel Internals
43. Spent Fuel Pool Cooling
44. Fuel Handling Building Ventilation
45. Refueling
46. Reactor Coolant System
47. Loose Parts Monitoring System
48. Nuclear Plant Sampling System

APPENDIX D.2 (cont.)

PLANT-SPECIFIC TRAINING COURSES

PLANT SYSTEMS

49. Chemical and Volume Control System
50. Pressurizer Pressure and Level Control System
51. Control Element Drive Mechanism Control System
52. Reactor Regulating System
53. Steam Bypass Control System
54. Gaseous Radwaste
55. Coolant Radwaste
56. Misc. Liquid Waste System
57. Area & Effluent Rad Monitor System
58. Wide Range Gas Monitor
59. Process Radiation Monitoring System
60. Ventilation Systems
61. Engineered Safety Features
62. Containment Design
63. Containment Air Handling Systems
64. Shutdown Cooling Systems
65. Excore Nuclear Instrumentation
66. Plant Protection System
67. CEAC's and CPC's
68. COLSS
69. Fixed and Moveable Incore NI's
70. Subcooled Margin Monitor
71. Critical Functions Monitoring Systems/QSPDS
72. Plant Computer
73. Component Cooling Water System
74. Post Accident Sampling System
75. Compressed Air Systems
76. Secondary Plant Sampling System
77. Essential Plant Parameters Display

D. The following systems should be presented at a knowledge level consistent with that required for system operation for Unit 1:

1. Steam Generator
2. Main and Auxiliary Steam System
3. Main Steam Dump & Control
4. Feedwater and Condensate
5. Secondary Make-up System
6. Turbine Cycle Vents and Drains
7. Reheaters
8. Reheater Steam Dump
9. Main Circulating Water
10. Turbine Plant Cooling Water
11. Steam Generator Level Control System
12. Auxiliary Feedwater
13. Turbine Mechanical

APPENDIX D.2 (cont.)

PLANT-SPECIFIC TRAINING COURSES

PLANT SYSTEMS

14. Turbine Controls and Oil Systems
15. Turbine Cycle Sampling
16. Turbine Cycle Chemical Addition
17. Service and Domestic Water
18. Evaporators
19. Screen Wash System
20. Salt Water Cooling System
21. Fire Protection System
22. Instrument and Service Air
23. Lubricating Oil Storage and Transfer
24. Waste Water System
25. Condenser Air Removal
26. Turbine Gland Seal and Exhaust
27. Diesel Generators
28. Diesel Generator Support Systems
29. Main Generator Excitation & Control
30. 220KV System
31. Main Generator Protection
32. Generator Hydrogen
33. Generator Hydrogen Seal Oil
34. 4KV and 480KV Systems
35. Maintained 120VAC
36. Battery and DC Systems
37. Main and Auxiliary Transformers
38. Station Lighting
39. Ventilation
40. Reactor Vessel and Internals
41. Reactor Coolant System
42. Reactor Coolant Pump
43. Pressurizer, Pressure and Level Control
44. CVCS Charging and Letdown
45. CVCS Seal Injection
46. CVCS Boric Acid System
47. Component Cooling Water
48. Safety Injection System
49. Sequencer
50. Containment Spray Hydrazine Injection System
51. Residual Heat Removal
52. Gaseous Radwaste & CVI
53. Liquid Radwaste
54. Spent Fuel Pit and Cooling System
55. Rod Control and Position Indication
56. REactor Control and Protection
57. Nuclear Instrumentation
58. Post Accident Containment Monitoring Systems
59. Primary Make-up Systems

APPENDIX D.2 (cont.)

PLANT-SPECIFIC TRAINING COURSES

PLANT SYSTEMS

60. Refueling and Fuel Handling
 61. Reactor Coolant System Instrumentation
 62. Reactor Plant Sampling
 63. Radiation Monitoring System
 64. Post-Accident Radiation Monitoring
 65. Post-Accident Sampling System
 66. Wide Range Gas Monitor
 67. Annunciators
 68. Communication Systems
 69. Seismic Monitoring
 70. Weather Station
 71. Cathodic Protection
 72. Liquid/Gas N₂
- E. At the completion of presentation of the electrical distribution systems, the candidate should be provided with a tour of the Alhambra Energy Control Center.
- F. If the candidate has previously completed the NPEO training program, presentation of those systems presented at a level consistent with that required for system operation may be waived.

APPENDIX D.3

PLANT-SPECIFIC TRAINING COURSES

TRANSIENT/ACCIDENT ANALYSIS

- A. Training in Transient/Accident Analysis shall be provided. Topics in this area should include:
 1. FSAR Overview
 - a. Transient analysis
 - b. Accident analysis (including design basis accident)
 2. Facility License/Technical Specifications
 - a. Overview
 - b. Safety Limits
 - c. LCO's
 3. Thermal-hydraulic Operating Envelope
 4. Accident Identification and Trending

APPENDIX D.4

PLANT-SPECIFIC TRAINING COURSES

CORE DAMAGE RECOGNITION/MITIGATION

- A. Training in Core Damage Recognition/Mitigation shall be provided. Topics in this area should include:
1. Core Cooling Mechanics
 2. Potentially Damaging Conditions
 3. Gas/Steam Binding
 4. Recognizing Core Damage
 5. Recriticality Considerations
 6. Hydrogen Generation/Hazards
 7. Monitoring of Critical Parameters
 8. Radiation - Hazards and Monitor Response
 9. Cooling Mode Selection/Operation

APPENDIX D.5

PLANT-SPECIFIC TRAINING COURSES

INTEGRATED PLANT OPERATIONS

- A. Training should include an overview of the following major integrated plant procedures, including expected plant response and emphasizing the duties and responsibilities of the licensed operator.
1. Plant startup from cold shutdown to hot standby
 2. Plant startup from hot standby to minimum load
 3. Plant operation from minimum load to full power
 4. Plant shutdown from full power to hot standby
 5. Plant shutdown from hot standby
 6. Reactor trip or safety injection
 7. Shutdown from outside the control room
 8. Loss of reactor coolant
 9. Loss of secondary coolant
 10. Steam generator tube rupture
 11. Loss of secondary heat sink
 12. Malfunction of instrument air system
 13. Loss of condenser vacuum
 14. Earthquake
 15. Fire in 4KV room turbine lube oil reservoir area
 16. Loss of offsite power/station blackout

APPENDIX D.6

PLANT-SPECIFIC TRAINING COURSES

EMERGENCY PLAN

- A. Training should include:
 - 1. Emergency plan overview
 - 2. Classification of emergencies
 - 3. Dose projection source term/dose assessment
 - 4. First aid

- B. The first aid portion of this section may be waived based on equivalent training, education or experience.

APPENDIX D.7

PLANT-SPECIFIC TRAINING COURSES

INDUSTRY/FACILITY EXPERIENCE

- A. Operating experiences to be covered in this training should be designated by the Unit Operator Training Administrator.
- B. Training should include a review of applicable industry and facility operating experiences.
- C. Potential sources of items to be included in this training should include, but not be limited to:
 1. Licensee Event Report (LER's)
 - a. On-site
 - b. Other plant sites
 2. Station Incident Reports (SIR's)
 3. INPO/NSAC, Significant Operating Experience Reports (SOER's)

APPENDIX E.1

OPERATIONS TRAINING COURSES

EXTRA PERSON ON SHIFT TRAINING (EPOS)

- A. A plan for the training, to be included in the EPOS phase of the program, should be developed by the Units 2 & 3 Operations Superintendent, or his designee, and the Units 2 & 3 Operations Training Administrator.
- B. EPOS training should be selected from the following list of topics:
 - 1. Administrative Requirements
 - 1.0 Station Operations
 - 2.0 Use of Procedures
 - 3.0 Duties and Responsibilities
 - 4.0 Notification and Reporting of Significant Events
 - 5.0 Equipment Control Implementation
 - 6.0 Control of System Alignments
 - 7.0 Equipment Deficiency Status
 - 8.0 Temporary Facilities Modification Control
 - 9.0 Operations Shift Relief
 - 10.0 Acknowledgement of Information
 - 11.0 Containment Sphere Integrity and Access
 - 2. Primary Plant Systems
 - 13.0 Reactor Coolant System
 - 14.0 Pressurizer and Pressurizer Relief Tank
 - 15.0 Reactor Coolant Pump Seal Water System
 - 16.0 Safety Injection System
 - 17.0 Letdown System
 - 18.0 Volume Control and Charging System
 - 19.0 Boric Acid System
 - 20.0 Residual Heat Removal System
 - 21.0 Reactor Cycle Sampling System
 - 22.0 Containment Spray and Recirculation System
 - 23.0 Post Accident Sampling System
 - 3. Radwaste System
 - 24.0 Radwaste Liquid Collection System
 - 25.0 Radwaste Liquid Processing and Release System
 - 26.0 Radwaste Gas System
 - 27.0 Radwaste Cryogenic Gas Treatment System

APPENDIX E.1 (Continued)

OPERATIONS TRAINING COURSES

EXTRA PERSON ON SHIFT TRAINING (EPOS)

4. Secondary Plant Systems
 - 28.0 Main Steam System
 - 29.0 Condensate System
 - 30.0 Feedwater System
 - 31.0 Auxiliary Feedwater System
 - 32.0 Feedwater Heaters
 - 33.0 Condenser Air Removal System
 - 34.0 Flash Evaporator System
5. Main Turbine/Generator
 - 35.0 Main Turbine
 - 36.0 Turbine Lube Oil System
 - 37.0 Main Generator and Excitation Systems
 - 38.0 Generator Seal Oil System
6. Electrical Systems
 - 39.0 Diesel Generators
 - 40.0 220kv Buses, 18kv Buses, and Main Transformer
 - 41.0 4kv Buses
 - 42.0 480 Volt Buses
 - 43.0 Vital Buses, Utility Buses and Regulated Buses
 - 44.0 DC Buses 1 & 2
 - 45.0 Plant Lighting System
7. Instrumentation and Control Systems
 - 46.0 Reactor Control and Protection System
 - 47.0 Control Rod Drive System
 - 48.0 Nuclear Instrumentation System
 - 49.0 Reactor Plant Instrumentation
 - 50.0 Auxiliary Control Panel
 - 51.0 Radiation Monitoring System
8. Water Systems
 - 52.0 Circulating Water System
 - 53.0 Component Cooling Water System
 - 54.0 Saltwater Cooling System
 - 55.0 Turbine Plant Cooling Water System
 - 56.0 Spent Fuel Pit Cooling System
 - 57.0 Service and Domestic Water System
 - 58.0 Fire Systems
 - 59.0 Primary Plant Makeup Water System

APPENDIX E.1 (Continued)

OPERATIONS TRAINING COURSES

EXTRA PERSON ON SHIFT TRAINING (EPOS)

9. Miscellaneous Systems

60.0 Instrument and Service Air System

61.0 Containment Ventilation System

62.0 Miscellaneous Ventilation System

10. Integrated Plant Operations

64.0 Integrated Plant Operations

65.0 Plant Startup from Cold Shutdown to Hot Standby

66.0 Plant Startup from Hot Standby to Minimum Load

67.0 Plant Operation from Minimum Load to Full Power

68.0 Plant Shutdown from Full Power to Hot Standby

69.0 Plant Shutdown from Hot Standby to Cold Shutdown

70.0 Natural Circulation Operations

71.0 Power Operations

72.0 Critical Safety Function Status Trees

73.0 Emergency Operating Instructions

- C. Training topics, listed above, should be maintained current with those listed in the "Table of Contents," Units 2 & 3 Reactor Operator/Assistant Control Operator Qualification Guide, Rev. 0.

APPENDIX E.2

OPERATIONS TRAINING COURSES

SIMULATOR TRAINING

As described in Section 5.1.4 of this program description, reactivity manipulations and plant evolutions shall be performed at the plant or on an appropriate simulator during initial operator training. Items indicated with an asterisk (*) may be used to meet the requirement. (10CFR55, App. A.3.a)(NUREG 0737, Attachment 4)

- *1. Reactor Startups to a point where heatup rate is established.
- *2. Manual control of steam generators and/or feedwater during startup and shutdown.
- *3. Manual Rod Control for power changes greater than 10%.
4. LOCA with significant S/G leakage.
5. LOCA inside primary containment.
6. LOCA outside primary containment.
7. Large LOCA with leak-rate determination.
8. Small LOCA with leak-rate determination.
9. Saturated RCS response.
10. Loss of coolant flow/natural circulation.
11. Loss of all feedwater (normal and emergency).
- *12. Plant Shutdown.
- *13. Boration and/or dilution during power operation.
- *14. Any reactor power change of 10% or greater where load change is performed with load limit control.
- *15. Reactor trip.
16. Turbine or generator trip.
17. Main Steam line break (inside or outside containment).
18. Loss of normal feedwater.

APPENDIX E.2 (Continued)

OPERATIONS TRAINING COURSES

SIMULATOR TRAINING

19. Loss of shutdown cooling (RHR).
20. Nuclear Instrumentation System Failure.
21. Loss of Reactor Protection System Channel.
- *22. Misaligned Control Rod(s) or dropped rod(s).
23. Inability to drive control rods or stuck rod.
24. Automatic Control Malfunctions which effect core reactivity.
- *25. Conditions requiring emergency boration.
26. RCS or CVCS pressure control system failure.
27. Loss of Offsite Power.
28. Loss of Vital bus.
29. Loss of condenser vacuum.
30. Loss of Saltwater Cooling.
31. Loss of Component Cooling Water (system or component).
32. Loss of Instrument Air.
33. Fuel Cladding failure or high activity in reactor coolant.

APPENDIX E.3

OPERATIONS TRAINING COURSES

CONTROL ROOM OPERATOR SKILLS TRAINING

- A. Training should include the fundamentals of effective speaking, listening and writing.
- B. Completion of the following lessons administered by the Nuclear Training Division satisfies this requirement.
 1. Problem Solving
 2. Communication
 - Face-to-Face
 - Phone
 - Radio
 3. Tailboarding
 4. Procedure Use
 - Normal
 - Emergency
 - Multiple
 5. Plant Manipulations
 6. Plant Monitoring
 7. Annunicator Response
 8. Log Book Keeping
- C. All, or portions of this section may be waived based on equivalent training or experience.

APPENDIX F

JOB QUALIFICATION TRAINING

Requirements as identified in the "Units 2 & 3 Assistant Control Operator Qualification Guide."