

**Florida
Power**
CORPORATION

NUCLEAR OPERATIONS TRAINING DEPARTMENT PROCEDURE

TDP-201 Rev.3

DATE: 6/21/85

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TITLE:

NON-LICENSED OPERATOR TRAINING PROGRAM

Document Section

INFORMATION ONLY

C. R. Nuclear

1.0 PURPOSE

The purpose of this procedure is to provide instructions for the implementation of the Non-Licensed Operator Training Program.

2.0 SCOPE

This procedure shall apply to those persons within the Nuclear Operations Training Department assigned responsibilities for implementing the Non-Licensed Training Program and to those students in the Non-Licensed Training Program.

3.0 REFERENCES

- 3.1 Florida Power Corporation, Crystal River Unit 3, Final Safety Analysis Report (FSAR)
- 3.2 Florida Power Corporation, Crystal River Unit 3, Technical Specifications
- 3.3 Institute of Nuclear Power Operations Guideline GPG-04, "Guidelines for Qualification Programs", March 1981
- 3.4 American National Standards Institute - ANSI N18.1 - 1971, "Selection and Training of Nuclear Power Plant Personnel"
- 3.5 Operations Section Implementation Manual (OSIM)
- 3.6 TDP-105, "Lesson Plan Preparation"
- 3.7 TDP-108, "Training Program Evaluation"
- 3.8 TDP-109, "Training Records Management"
- 3.9 OSIM, Enclosure 25

REVIEW/CONCURRENCE*

APPROVAL

Department

Representative

Date

NTS/NOTSS

Date

NOTM

MSNOTS*

DSNO*

PIT. Mgr.

Paul J. Mera

6/26/85

NTS/NOTSS *[Signature]*

6/20/85

NOTM *[Signature]*

6/20/85

MSNOTS* *[Signature]*

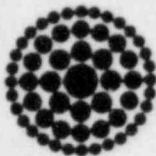
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* As applicable

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TITLE:

NON-LICENSED OPERATOR TRAINING PROGRAM

4.0 DEFINITIONS

4.1 ASSISTANT NUCLEAR AUXILIARY OPERATOR

The Assistant Nuclear Auxiliary Operator are those persons who operate the support systems equipment on the secondary plant side of the Florida Power Corporation Crystal River Nuclear Plant.

4.2 NUCLEAR AUXILIARY OPERATOR

The Nuclear Auxiliary Operators are those persons who operate the secondary plant side equipment of the Florida Power Corporation Crystal River Nuclear Plant.

4.3 ASSISTANT NUCLEAR OPERATOR

The Assistant Nuclear Operators are those persons who operate the primary plant side equipment of the Florida Power Corporation Crystal River Nuclear Plant.

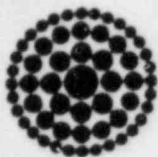
5.0 RESPONSIBILITIES

5.1 OPERATIONS SUPERINTENDENT - Responsible for: ensuring that annual evaluations are performed for all Non-Licensed Operators; review evaluations and recommend any special training as needed.

5.2 NUCLEAR SHIFT SUPERVISOR - Responsible for performing the Non-License Annual evaluations.

5.3 NUCLEAR OPERATIONS TRAINING SUPERVISOR (NOTS) - Responsible for the overall implementation and administration of the Non-Licensed Operator Training Program. The NOTS is also responsible for approving all Lesson Plans and for developing lesson plans that will provide feedback of operating experience to the students.

5.4 NON-LICENSED OPERATOR STUDENT - Responsible for satisfactorily completing the Non-Licensed Operator Training Program.



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6.0 ACTION

6.1 INTRODUCTION

6.1.1 The goal of the Non-Licensed Operator Training Program is to ensure that the Assistant Nuclear Auxiliary Operators, Nuclear Auxiliary Operators, and Assistant Nuclear Operators have the necessary knowledge and skills to operate the associated equipment of the Nuclear plant in a safe and competent manner.

6.1.2 The Non-Licensed Operator Training Program shall consist of three separate phases. These phases are:

1. Assistant Nuclear Auxiliary Operator - ANAO
2. Nuclear Auxiliary Operator - NAO
3. Assistant Nuclear Operator - ANO

6.1.3 For each subject of course instruction in this program, an estimated time is stated as an indication of the instructional time required to achieve the desired depth of understanding.

6.2 TRAINING PROGRAM STRUCTURE

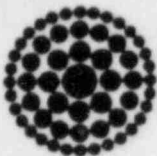
6.2.1 Classroom Training

Classroom training will be the first part given for each phase of the Non-Licensed Operator Training Program.

6.2.2 On-Shift Training

Upon completion of classroom training associated with a phase of the Non-Licensed Operator Training Program the individual will be assigned on shift.

6.2.2.1 During on-shift training the Non-Licensed Operator Candidate will complete the appropriate Qualification Manual for the classroom phase he has just completed.



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6.2.2.2 The Qualification Manuals for the Non-Licensed Operator are as follows:

1. Assistant Nuclear Auxiliary Operator Qualification Manual
2. Nuclear Auxiliary Operator Qualification Manual
3. Assistant Nuclear Operator Qualification Checklist (Enclosure 17 of the OSIM)

6.2.2.3 Prior to entering the next phase of Non-Licensed Operator Training, the student must have the previous courses, and Qualification Manual/List completed.

6.2.3 Training Cycle

6.2.3.1 The steps to complete the Non-Licensed Operator Training Program shall be in the following order:

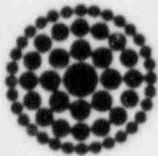
1. ANAO - Classroom Training
2. ANAO - On-Shift Training
3. NAO - Classroom Training
4. NAO - On-Shift Training
5. ANO - Classroom Training
6. ANO - On-Shift Training

6.2.3.2 Authorization to alter or exempt part or all of the Non-Licensed Operator Training Program cycle steps must be obtained from the Nuclear Operations Training Supervisor.

6.3 PROGRAM CONTENT

6.3.1 Assistant Nuclear Auxiliary Operator Program (ANAO)

The ANAO classroom program summary depicting Topics, Contact Hours and Lesson Plan Numbers is listed on Attachment 1 of this procedure.



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6.3.2 Nuclear Auxiliary Operator Program (NAO)

The NAO classroom program summary depicting Topics, Contact Hours and Lesson Plan Numbers is listed on Attachment 2 of this procedure.

6.3.3 Assistant Nuclear Operator Program (ANO)

The ANO classroom program summary depicting Topics, Contact Hours and Lesson Plan Numbers is listed on Attachment 3 of this procedure.

6.3.4 Special Training Program

6.3.4.1 The purpose of this program is to provide update information to Non-Licensed Operators.

6.3.4.2 Update information may include, but is not limited to, the following:

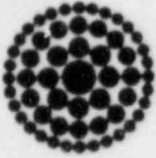
- a. Applicable Procedure Changes
- b. Plant Modifications
- c. Licensee Event Reports
- d. Industry Operating Experiences

6.4 STUDENT EVALUATION

The purpose of the student evaluation is to ensure that the Non-Licensed Operator has acquired sufficient knowledge and skills to properly perform assigned tasks.

6.4.1 Written Examinations

6.4.1.1 Satisfactory completion of a written examination is met when the student attains, at a minimum, a score of 70% for each individual category with an overall examination average of 80%.



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6.4.1.2 Advancement to the next phase or final completion of the Non-Licensed Operator Training Program requires that the student have final program phase averages of 70% in each category, and 80% overall.

6.4.2 Oral Examinations

6.4.2.1 Oral examinations will be administered to evaluate a student's academic progress and ability to explain information verbally.

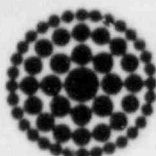
6.4.2.2 The grading scale for Oral Examinations will be as follows:

- 90 - 100 Excellent - answers are accurate, concise, complete.
- 80 - 89 Good - answers are accurate, partially complete.
- 70 - 79 Fair - answers are accurate, partially complete, needed some prompting.
- 0 - 69 Unsatisfactory - answers inaccurate, unable to answer, or answered only after much prompting.

6.4.2.3 Satisfactory completion of an oral examination is met when the student attains, at a minimum, a score of 70% for each individual category with an overall examination average of 80%.

6.4.3 Remedial Training

The Nuclear Non-Licensed Operator Training Supervisor shall determine any Remedial Training to be performed in the event of unsatisfactory student progress.



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6.5 REQUALIFICATION

6.5.1 All Non-Licensed Operators must attend the portions of the Licensed Operator requalification classroom sessions that apply to their job position. These portions will be determined by the NOTS or his designee according to each non-licensed job skill matrix and noted on the Licensed Operator requalification schedule. As a minimum, Non-Licensed Operators will participate in on-shift lectures that cover the following topics as they pertain to the Non-Licensed Operator positions:

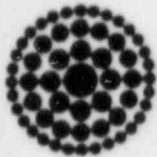
- o normal operating procedures
- o abnormal operating procedures
- o emergency operating procedures

Note: The above discussions will include operational limitations, precautions and set points.

- o emergency plan
- o security procedures
- o changes in plant design and operating procedures

Additionally, the Non-Licensed Operators must attend pre-planned lectures on emergency shutdown systems and alarm and instrumentation systems and signals as part of the Licensed Operator Requalification Program as they pertain to the Non-Licensed Operator positions. The Non-Licensed Operator will receive retraining on general safety, first aid, and radiation safety as part of General Employee Retraining.

6.5.2 All ANO's and any other Non-Licensed Operators performing as stepped up ANO's shall have biannual retraining in the Operation of Radioactive Waste Systems.



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6.5.3 In addition, special training will be provided to the Non-Licensed Operators in areas identified by the NOTS or his designee. Section 6.3.4 provides guidance for special training topics.

6.5.4 The Non-Licensed Operators will be evaluated annually in the performance of assigned duties including operation of selected auxiliary systems important to overall plant safety. The Nuclear Shift Supervisor or the Assistant Nuclear Shift Supervisor will perform this evaluation using Enclosure 25 of the OSIM. The Nuclear Shift Supervisor will forward the completed OSIM Enclosure 25 to the Operations Superintendent. The Operations Superintendent will review the evaluations and recommend any special training as needed, and date/sign the evaluation and forward it to the NOTS with the recommendations.

6.6 LESSON PLANS

6.6.1 All Lesson Plans used and material developed must be completed in accordance with TDP-105, "Lesson Plan Preparation". Exemptions to this policy will be allowed for vendor supplied training.

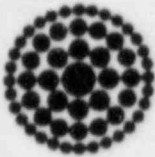
6.6.2 The NOTS is responsible for approving all Lesson Plans and for developing lesson plans that will provide feedback of operating experience to the students.

6.7 PROGRAM EVALUATION

6.7.1 The Non-Licensed Operator Training Program will be evaluated in accordance with TDP-108, "Training Program Evaluation".

6.8 EXAMINATION PREPARATION

6.8.1 All examinations must be prepared, administered and graded in accordance with procedure TDP-106, "Examination Preparation, Administration and Evaluation".



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6.9 INSTRUCTOR QUALIFICATION

6.9.1 The Instructors who teach or otherwise conduct training for this program must meet the requirements of TDP-111, "Instructor Development Program".

7.0 ATTACHMENTS AND APPENDICES

7.1 Appendix A - Assistant Nuclear Auxiliary Operator Program Description

7.2 Appendix B - Nuclear Auxiliary Operator Program Description

7.3 Appendix C - Assistant Nuclear Operator Program Description

8.0 QUALITY RECORDS

8.1 The following records are quality records and shall be maintained in accordance with TDP-109 "Training Program Documentation".

8.1.1 Non-Licensed Operator Training Program description for each class.

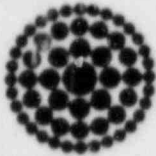
8.1.2 Non-Licensed Operator Training Program schedule for each class.

8.1.3 Each Lesson Plan used.

8.1.4 Class attendance list. This record must also show who the Instructor is for each lesson.

8.1.5 Copy of each examination with answer key.

8.1.6 Class examination summary (TDP-106 Attachment 4).



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8.2 The following individual student records shall be kept as part of each student's file.

8.2.1 Each written examination and corresponding answers.

8.2.2 The results of each oral examination.

8.2.3 Any remedial training program description and results.

8.2.4 Any training program waivers.

8.2.5 Completed qualification manuals.

9.0 INTERPRETATION CONTACT

Nuclear Operations Training Supervisor

10.0 REVISION HISTORY

Revision 0 Date: 10/01/81 Original Release

Revision 1 Date: 09/15/83 Complete Revision

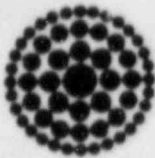
Revision 2 Date: 01/10/85 Partial Revision

Revision 3 Date: 06/21/85 Complete Revision

11.0 REVIEW HISTORY

<u>Date</u>	<u>Person Conducting Review</u>	<u>Comments</u>
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_____	_____	_____
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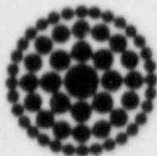
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ATTACHMENT 1

Assistant Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		ANAO-1	<u>Accident Prevention Manual</u>
12		ANAO-2	<u>First Aid</u>
8		ANAO-3	<u>Cardiopulmonary Resuscitation</u>
4		ANAO-4	<u>Administration</u> Introduction: Emergency Plan OSIM POQAM STS-ETS Logkeeping Good Housekeeping
8		ANAO-5	<u>Prints</u> Flow Diagrams Print Readings MARS Aperture Card/Microfilm Index
		ANAO-6	Deleted
8		ANAO-7	<u>Valves</u> Introduction: Purpose Types Applications



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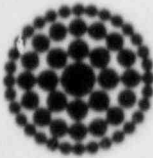
TITLE:

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ATTACHMENT 1 (Continued)

Assistant Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	ANAO-8	<u>Pumps</u> Introduction: Purpose Types Applications
2	ANAO-9	<u>Traps, Strainers, and Filters</u>
12	ANAO-10	<u>HTFF</u> Introduction: Energy Conversion Properties and Fluid Flow Pressure Temperature and Heat
2	ANAO-11	<u>Measuring Devices</u> Introduction: Temperature Pressure Flow Level



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ATTACHMENT 1 (Continued)

Assistant Nuclear Auxiliary Operator Program

CONTACT HOURS

LESSON NUMBER

TOPIC

4

ANAO-12

Primary Systems

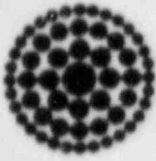
Introduction: Reactor Coolant
Makeup and
Purification
Nuclear Services
Cooling
Decay Heat
Removal
Decay Heat
Closed Cycle
Cooling
Decay Heat and
Nuclear Services
Raw Water
Core Flood
Spent Fuel
Cooling

4

ANAO-13

Secondary Systems

Introduction: Main Steam
Auxiliary Steam
Reheat and
Extraction Steam
Main Turbine
Main Condenser
Condensate
Feedwater
Emergency Feedwater
Circulating Water
Secondary Services
Cooling



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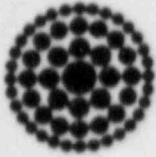
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ATTACHMENT 1 (Continued)

Assistant Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	ANAO-14	<u>Electrical Distribution</u> Introduction: Switchyard 6,900 Volt Switchgear 4,160 Volt Switchgear 480 Volt Switchgear Emergency Diesel Generator
2	ANAO-15	<u>Chemistry</u> Introduction: Atomic Structure Periodic Table Water Purity and Quality Water Softening
2	ANAO-16	<u>Chemistry</u> Introduction: Ion Exchange Neutralization
2	ANAO-17	<u>Chemistry</u> Introduction: Deaerating Distilling
2	ANAO-18	<u>Radiation Protection</u> Introduction: Types Biological Effects Limits

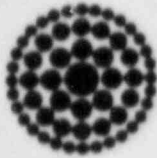


TITLE: NON-LICENSED OPERATOR TRAINING PROGRAM

ATTACHMENT 1 (Continued)

Assistant Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		ANAO-19	<u>Nuclear Plant</u> Nuclear Energy
2		ANAO-20	<u>Nuclear Plant</u> The Nuclear Power Plant
2		ANAO-21	<u>Nuclear Plant</u> Nuclear Power Plant Construction and Licensing
2		ANAO-22	<u>Nuclear Plant</u> Nuclear Power Plant Operations
2		ANAO-23	<u>Nuclear Plant</u> Crystal River Nuclear Plant Orientation and Layout
2		ANAO-24	<u>Plant Communication System</u>
4		ANAO-25	<u>Screen Wash System</u>
4		ANAO-26	<u>Domestic Water System</u>
2		ANAO-27	<u>Demineralized Water System</u>
4		ANAO-28	<u>Circulating Water System</u>

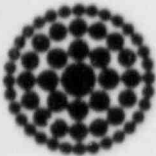


TITLE: NON-LICENSED OPERATOR TRAINING PROGRAM

ATTACHMENT 1 (Continued)

Assistant Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		ANAO-29	<u>Water Box Priming System</u>
		ANAO-30	Deleted
2		ANAO-31	<u>Main Condenser Air Removal System</u>
4		ANAO-32	<u>Secondary Services Closed Cycle Cooling System</u>
2		ANAO-33	<u>Secondary Chemical Sampling and Addition System</u>
2		ANAO-34	<u>Introduction: Condensate and Main Feedwater Systems</u>
4		ANAO-35	<u>Station Air and Instrument Air System</u>
4		ANAO-36	<u>Ventilation Systems</u> Turbine Building Fire Pump House NaOH Tank Area Office Building
2		ANAO-37	<u>CO₂- N₂-H₂ Storage System</u>
2		ANAO-38	<u>Turbine Building and Out Building Drains and Sumps</u>
8		ANAO-39	<u>Fire Protection and Detection System</u>



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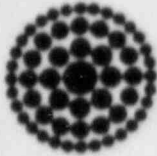
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Assistant Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2	ANAO-40	<u>Emergency Support Facilities</u> Technical Support Center Emergency Operations Facility Corporate Command Center
2	ANAO-41	<u>Meteorological Tower System</u>
2	ANAO-42	<u>Oil Water Separator and Purifier Systems</u>
4	ANAO-43	<u>SP-300/301</u>



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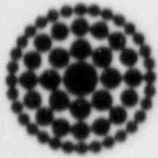
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ATTACHMENT 2

Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
		NAO-1	Deleted
		NAO-2	Deleted
2		NAO-3	<u>Math</u> Whole Numbers Fractions
2		NAO-4	<u>Math</u> Decimals Percentages Arithmetic Operations
2		NAO-5	<u>Math</u> Exponents Powers Radicals
2		NAO-6	<u>Math</u> Scientific Notation
2		NAO-7 & NAO-8	<u>Math</u> Logarithms



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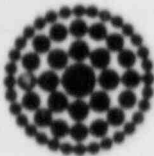
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Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2	NAO-9	<u>Math</u> Algebraic Operations I
2	NAO-10	<u>Math</u> Algebraic Operations II
2	NAO-11	<u>Math</u> Algebraic Problems
2	NAO-12	<u>Math</u> Systems of Equations
2	NAO-13	<u>Math</u> Quadratic Equations
2	NAO-14	<u>Math</u> Exponential Equations
2	NAO-15	<u>Math</u> Applications of Equations to Physical Systems
2	NAO-16	<u>Math</u> Graphing



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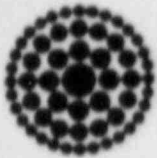
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<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		NAO-17	<u>Math</u> Geometry
2		NAO-18	<u>Math</u> Trigonometry
2 2		NAO-19& NAO-20	<u>Math</u> Derivatives and Differentials
2		NAO-21	<u>Math</u> Integrals and Summations
2		NAO-22	<u>Chemistry</u> Atoms and Electrons Basic Model Bohr's Model
2		NAO-23	<u>Chemistry</u> Electron Distribution Types of Bonds



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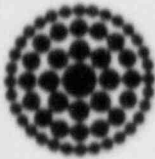
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Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2	NAO-24	<u>Chemistry</u> State of Matter Reactions
2	NAO-25	<u>Chemistry</u> Periodic Table
2	NAO-26	<u>Chemistry</u> Acids Bases pH
2	NAO-27	<u>Chemistry</u> Purpose of Water Chemistry Controls Chemicals Controls
2	NAO-28	<u>Chemistry</u> Effects of Impurities Types of Corrosion
2	NAO-29	<u>Chemistry</u> Analysis: pH Conductivity Resistivity Total Dissolved Solids



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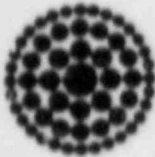
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TITLE: NON-LICENSED OPERATOR TRAINING PROGRAM

ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2	NAO-30	<u>Chemistry</u> Analysis: Chlorides Fluorides Silica
2	NAO-31	<u>Chemistry</u> OTSG Chemistry Limits
8	NAC-32	<u>Valves</u> Types Components Operators Characteristics
2	NAO-33	<u>Turbines</u> Introduction: Types Applications
2	NAO-34	<u>Turbines</u> Nozzles/Blades Rotors/Casing
2	NAO-35	<u>Turbines</u> Rateau Curtiss



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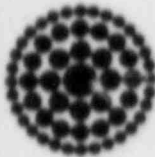
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TITLE: NON-LICENSED OPERATOR TRAINING PROGRAM

ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		NAO-37	<u>Turbines</u> Compounding P - V Steam Flows
2		NAO-38	<u>Turbines</u> Turbine Safety Hazards
2		NAO-39	<u>Pumps</u> Purpose Types Applications
2		NAO-40	<u>Pumps</u> Centrifugal Pumps
2		NAO-41	<u>Pumps</u> Positive Displacement Pumps
2		NAO-42	<u>Pumps</u> Rotary Pumps



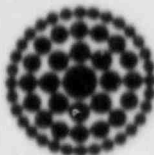
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4		NAO-43	<u>Compressors</u> Purpose Types Operation Applications
2		NAO-44	<u>Lubrication</u> Principles of Lubrication
2		NAO-45	<u>Lubrication</u> Lubricant Characteristics
2		NAO-46	<u>Lubrication</u> Additives, Lubricating Action and Bearing Lubrication
2		NAO-47	<u>Lubrication</u> Oils and Applications
2		NAO-48	<u>Lubrication</u> Greases
2		NAO-49	<u>Lubrication</u> Lubricating Compounds



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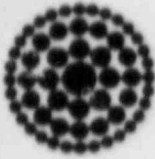
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TITLE: NON-LICENSED OPERATOR TRAINING PROGRAM

ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	NAO-50	<u>HTFF</u> The Steam Power Cycle
4	NAO-51	<u>HTFF</u> Thermodynamics: Heat at Work
4	NAO-52	<u>HTFF</u> Steam Boilers
4	NAO-53	<u>HTFF</u> Turbine Generator
4	NAO-54	<u>HTFF</u> Condenser
4	NAO-55	<u>HTFF</u> Pumps and Fluid Flow
4	NAO-56	<u>HTFF</u> Steam Plant Calculations
4	NAO-57	<u>HTFF</u> Reactor Thermal and Hydraulic Performance



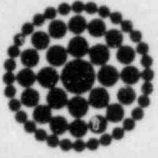
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	NAO-58	<u>HTFF</u> Reactor Fuel and Core Design (PWR)
4	NAO-59	<u>HTFF</u> PWR Performance
1 1	NAO-60& NAO-61	<u>Instrumentation and Controls</u> Pressure Sensing Instruments Temperature Sensing Instruments Level Sensing Instruments Flow Sensing Instruments
3 3	NAO-62& NAO-63	<u>Instrumentation and Controls</u> Pneumatic Control Instruments Proportional Controllers Proportional Plus Integral Controllers Proportional Plus Integral Plus Reset Controllers
4	NAO-64	<u>Electrical Theory</u> Introduction Conductors and Insulators Voltage



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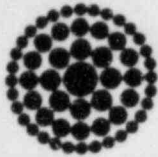
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	NAO-65	<u>Electrical Theory</u> Electrical Units OHM'S Law Basic Circuits DC Power
4	NAO-66	<u>Electrical Theory</u> Characteristics of AC and DC Current Current Flow in a Circuit Circuit Types Series and Parallel Circuits Kirchoff's Law Open and Short Circuits
4	NAO-67	<u>Electrical Theory</u> Magnets and Magnetism Motion-Flux-Current Induced Voltage Induction Capacitors and Inductors Reactance Impedence Power Factor Power Triangle



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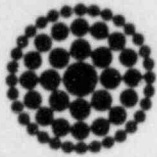
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	NAO-68	<u>Electrical Theory</u> Three-Phase Systems Wye and Delta Connections Three-Phase Power Transformers Basic Motor Construction and Operation Generators Relays Switchgear
	NAO-69	Deleted
	NAO-70	Deleted
	NAO-71	Deleted
	NAO-72	Deleted
4	NAO-73	<u>Nuclear Theory</u> The Atom
2	NAO-74	<u>Nuclear Theory</u> Equivalence of Mass and Energy
2	NAO-75	<u>Nuclear Theory</u> Radiation
2	NAO-76	<u>Nuclear Theory</u> Interaction of Radiation with Matter



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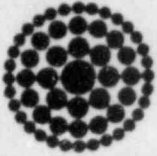
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2	NAO-77	<u>Nuclear Theory</u> Number of Atoms
2	NAO-78	<u>Nuclear Theory</u> Radioactive Decay
2	NAO-79	<u>Nuclear Theory</u> Induced Nuclear Reactions
2	NAO-80	<u>Nuclear Theory</u> Nuclear Fission
4	NAO-81	<u>Secondary Plant Start-up and Heat-up</u>
4	NAO-82	<u>Secondary Plant Shutdown and Cooldown</u>



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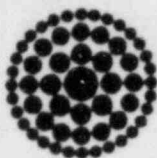
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
8	NAO-83	<u>Main Steam System</u>
4	NAO-84	<u>Main Turbine Protection Devices</u>
8	NAO-85	<u>Main and Plant Lube Oil System/Lube Oil Transfer and Purification</u>
8	NAO-86	<u>EHC System</u>
4	NAO-87	<u>Auxiliary Steam System</u>
4	NAO-88	<u>Moisture Separator and Reheat Steam System</u>
4	NAO-89	<u>Extraction Steam System</u>
2	NAO-90	<u>Gland Seal System</u>
2	NAO-91	<u>Gland Water/Condensate Injection System</u>
2	NAO-92	<u>Condensate System</u>
1 1	NAO-93 & NAO-94	<u>Condensate Heaters and Drains System</u>
4	NAO-95	<u>Condensate System</u>
2	NAO-96	<u>Main Feedwater System</u>
2	NAO-97	<u>Main Feedwater Pump System</u>



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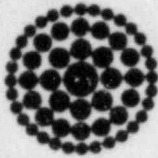
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ATTACHMENT 2 (Continued)

Nuclear Auxiliary Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		NAO-98	<u>Main Feedwater Pump Lube Oil System</u>
4		NAO-99	<u>Main Feedwater Heaters and Drains System</u>
		NAO-100	Deleted
2		NAO-101	<u>Cycle Start-Up System</u>
2		NAO-102	<u>Main Generator System</u>
2		NAO-103	<u>Main Generator Exciter System</u>
2		NAO-104	<u>Main Generator and Bus Duct Cooling System</u>
4		NAO-105	<u>Main Generator Seal Oil System</u>
2		NAO-106	<u>Main Transformer and Switchyard System</u>
2		NAO-107	<u>6,900 Volt Bus Distribution System</u>
2		NAO-108	<u>4,160 Volt Unit Bus Distribution System</u>
2		NAO-109	<u>480 Volt Unit Bus Distribution System</u>
2		NAO-110	<u>Industrial Cooling System</u>
2		NAO-111	<u>Secondary Ventilation Systems</u>
8		NAO-112	<u>Main Turbine Construction and Operation</u>
4		NAO-113	<u>OTSG - Secondary Side</u>

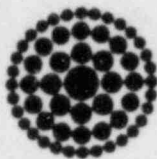


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ATTACHMENT 3

Assistant Nuclear Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
	ANO-1	Deleted
	ANO-2	Deleted
2	ANO-3	<u>Math</u> Review: Simple Equations and Their Solutions Real Numbers Monomials and Polynomials
2	ANO-4	<u>Math</u> Review: Equations and Inequalities of the First Degree in One Variable Geometry and Formulas Coordinate Geometry: Graphing Linear Equations and Linear Inequalities
2	ANO-5	<u>Math</u> Review: Systems of Linear Equations and Linear Inequalities in Two Variables Problem Solving Special Products and Factoring
2	ANO-6	<u>Math</u> Review: Fractions and Rational Expressions Roots and Radicals Quadratic Equations in One Variable



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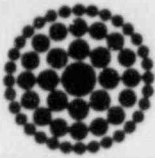
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ATTACHMENT 3 (Continued)

Assistant Nuclear Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2	ANO-7	<u>Math</u> Review: Indirect Measurement Laws of Pythagoras, Proportions and Similar Triangles
2	ANO-8	<u>Math</u> Logarithms Power, Exponential and Logarithmic Curves
2	ANO-9	<u>Math</u> Angles and Arc Length
2	ANO-10	<u>Math</u> General Angle
2	ANO-11	<u>Math</u> Acute Angle
2	ANO-12	<u>Math</u> Tables
	ANO-13 through 25	Deleted

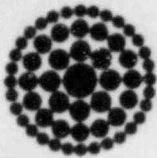


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ATTACHMENT 3 (Continued)

Assistant Nuclear Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	ANO-26	<u>Nuclear Theory</u> Review: The Atom Equivalence of Mass and Energy
4	ANO-27	<u>Nuclear Theory</u> Review: Radiation Interaction of Radiation With Matter
4	ANO-28	<u>Nuclear Theory</u> Review: Number of Atoms Radioactive Decay
4	ANO-29	<u>Nuclear Theory</u> Review: Induced Nuclear Reactions Nuclear Fission
4	ANO-30	<u>Nuclear Theory</u> Microscopic Cross Section
4	ANO-31	<u>Nuclear Theory</u> Macroscopic Cross Section and Neutron Flux



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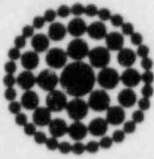
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ATTACHMENT 3 (Continued)

Assistant Nuclear Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	ANO-32	<u>Nuclear Theory</u> Neutron Interactions With Reactor Materials
4	ANO-33	<u>Nuclear Theory</u> Neutron Moderation and Diffusion
4	ANO-34	<u>Nuclear Theory</u> Neutron Multiplication
4	ANO-35	<u>Nuclear Theory</u> Multiplication Factors I
4	ANO-36	<u>Nuclear Theory</u> Multiplication Factors II
4	ANO-37	<u>Nuclear Theory</u> Reactor Flux Distribution
4	ANO-38	<u>Nuclear Theory</u> Neutron Kinetics
4	ANO-39	<u>Nuclear Theory</u> Reactor Kinetics



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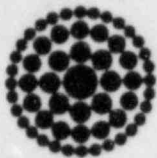
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ATTACHMENT 3 (Continued)

Assistant Nuclear Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4		ANO-41	<u>Nuclear Theory</u> Coefficients and Control
4		ANO-42	<u>Nuclear Theory</u> Reactivity Variations
4		ANO-43	<u>Nuclear Theory</u> Fission Product Poisons
4		ANO-44	<u>Nuclear Theory</u> Reactor Core Characteristics
4		ANO-45	<u>Nuclear Theory</u> Fuel Loading and Start-Up
4		ANO-46	<u>Nuclear Theory</u> Power Operation
4		ANO-47	<u>Nuclear Theory</u> Reactor Shutdown
4		ANO-48	<u>Radiation Protection</u> Biological Effects of Radiation



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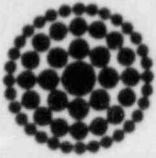
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ATTACHMENT 3 (Continued)

Assistant Nuclear Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4		ANO-49	<u>Radiation Protection</u> Units, Guides and Limits
4		ANO-50	<u>Radiation Protection</u> Protection Techniques
4		ANO-51	<u>Radiation Protection</u> Contamination
4		ANO-52	<u>Radiation Protection</u> Radiation Detection
4		ANO-53	<u>Radiation Protection</u> Detection and Personnel Monitoring
4		ANO-54	<u>Radiation Protection</u> Survey Techniques
4		ANO-55	<u>Radiation Protection</u> In-Plant Monitors
4		ANO-56	<u>Radiation Protection</u> Radioactive Material Control



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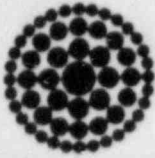
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Assistant Nuclear Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	ANO-57	<u>Radiation Protection</u> Environmental Considerations and Emergency Planning
4	ANO-58	<u>Chemistry</u> Basic Concepts
4	ANO-59	<u>Chemistry</u> Corrosion of Plant Materials
4	ANO-60	<u>Chemistry</u> Effects of Nuclear Operations
4	ANO-61	<u>Chemistry</u> Chemistry Control Equipment
4	ANO-62	<u>Chemistry</u> PWR Primary Water Chemistry
4	ANO-63	<u>Chemistry</u> PWR Secondary System Water Chemistry
4	ANO-64	<u>Waste Treatment</u> Radioactive Waste



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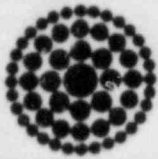
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ATTACHMENT 3 (Continued)

Assistant Nuclear Operator Program

<u>CONTACT HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4	ANO-65	<u>Waste Treatment</u> Radwaste Discharge
2	ANO-66	<u>Metallurgy</u> Properties of Metals
2	ANO-67	<u>Metallurgy</u> Composition of Alloys
2	ANO-68	<u>Metallurgy</u> Heat Treatment of Metals
2	ANO-69	<u>Metallurgy</u> Brittle Fracture and Metal Damage
2	ANO-70	<u>Metallurgy</u> Testing of Metals
6	ANO-71	<u>Metallurgy</u> Pressure/Temperature Effects (Pressurized Thermal Shock)
2	ANO-72	<u>Metallurgy</u> Irradiation Effects



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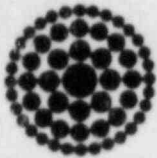
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Assistant Nuclear Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
4		ANO-73	<u>Plant Start-Up and Heat-Up</u>
4		ANO-74	<u>Plant Shutdown and Cooldown</u>
2		ANO-75	<u>Reactor Containment and Penetrations System</u>
2		ANO-76	<u>Reactor Containment Ventilation Systems</u>
8		ANO-77	<u>Reactor Vessel and Internals, Fuel and Control Components</u>
2		ANO-78	<u>Reactor Coolant Pump and Motor</u>
2		ANO-79	<u>Pressurizer and System Parameters</u>
2		ANO-80	<u>Once-Through Steam Generator System</u>
4		ANO-81	<u>Reactor Coolant System</u>
4		ANO-82	<u>Make-Up and Purification System</u>
2		ANO-83	<u>Nuclear Services and Decay Heat Raw Water System</u>
4		ANO-84	<u>Nuclear Services Closed Cycle Cooling System</u>
2		ANO-85	<u>Decay Heat Closed Cycle Cooling System</u>
2		ANO-86	<u>Decay Heat Removal System</u>



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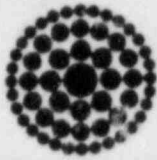
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Assistant Nuclear Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		ANO-87	<u>Boric Acid System</u>
4		ANO-88	<u>Primary Chemical Addition and Sampling System</u>
4		ANO-89	<u>Emergency Core Cooling System</u>
2		ANO-90	<u>Reactor Building Spray System</u>
2		ANO-91	<u>Reactor Building Isolation and Cooling System</u>
4		ANO-92	<u>Waste Evaporators</u>
4		ANO-93	<u>Liquid Waste System</u>
4		ANO-94	<u>Gas Waste System</u>
2		ANO-95	<u>Solid Waste System</u>
2		ANO-96	<u>N2 Supply</u>
4		ANO-97	<u>Spent Fuel Storage and Cooling System</u>
4		ANO-98	<u>Auxiliary Building Fuel Handling System</u>
4		ANO-99	<u>Reactor Building Fuel Handling System</u>
2		ANO-100	<u>Leak Rate Test System</u>
2		ANO-101	<u>Auxiliary Building Ventilation System</u>



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Assistant Nuclear Operator Program

<u>CONTACT</u>	<u>HOURS</u>	<u>LESSON NUMBER</u>	<u>TOPIC</u>
2		ANO-102	<u>Control Complex Chiller System</u>
2		ANO-103	<u>Control Complex Ventilation System</u>
4		ANO-104	<u>Radiation Monitoring System</u>
4		ANO-105	<u>Emergency Diesel System</u> Engine
4		ANO-106	<u>Emergency Diesel System</u> Generator
2		ANO-107	<u>Reactor/Auxiliary Building Drains and Sumps</u>
2		ANO-108	<u>4,160 Volt ES Bus Distribution System</u>
2		ANO-109	<u>480 Volt ES Bus Distribution System</u>
2		ANO-110	<u>Station Battery System</u>
2		ANO-111	<u>250/125 Volt DC Distribution System</u>
2		ANO-112	<u>120 Volt Vital Bus Distribution System</u>
4		ANO-113	<u>Emergency Feedwater System</u>
2		ANO-114	<u>Electrical Heat System</u>
4		ANO-115	<u>Post Accident Sampling System and H2 Monitoring</u>
8		ANO-116	<u>Plant Transients and Integrated Plant</u>