

## NUCLEAR PLANT SHIFT EXPERIENCE

- o Operating Shift Experience Requirements
- o Experience Categories and Factors for Accumulating Nuclear Power Plant Experience
- o Shift Advisor Qualifications

Developed By

NTOL UTILITY WORKING GROUP

Presented By

Donald F. Schnell  
February 24, 1984

840607009

## INTRODUCTORY REMARKS

DONALD F. SCHNELL

Mr. Chairman, Commissioners, by way of introduction, I am Vice President - Nuclear of Union Electric, and am responsible for design, construction, startup and operation of Callaway Plant, an 1150 MW PWR -- the lead SNUPPS plant. SNUPPS, you will remember, is the original multi-utility, multi-site plant standardization concept. I have been engaged full-time in responsible management positions associated with Callaway since the project was conceived in 1971, and have been directly responsible for plant operation since 1980.

In related industry activities, I am a member of the Nuclear Power Division Committee of EPRI and serve as Chairman of the Industry Review Group for INPO's Construction Project Evaluation Program.

Our Callaway Plant is within two months of readiness for fuel load, so it is fitting that I speak to you on this issue. Mr. Miller has described Georgia Power's program for selecting and training operating personnel; we at Union Electric also recognize our management responsibility to properly select and train operators so that Callaway Plant is started and operated in a manner which helps ensure public health and safety, while at the same time protecting our investment in the



plant. We expect Callaway to provide safe, reliable and efficient generation to our system; nothing less will be tolerated.

With this goal in mind, we have selected an outstanding group of operator candidates who, though light in commercial nuclear plant experience, have already demonstrated their competence and reliability in activities leading to plant startup. To prepare our operators for this heavy responsibility, we have assembled a training staff of superior individuals and have invested in an on-site training center which includes a Callaway Reference Simulator. The simulator has been in operation at Callaway since mid-1982; a Callaway/SNUPPS simulator has been operational and available to our personnel since 1979 at the Westinghouse Training Center. We have also sent our SRO/RO candidates to operating plants for participation training. They have assisted in preoperational test activities at Callaway and have had shift responsibility for our hot functional test program. I am convinced we have prepared these people to handle the responsibility of operating Callaway Plant.

Notwithstanding this, the staff as well as the ACRS have required the addition of advisors to supplement our shift experience base. We committed to add shift advisors in 1981 and have relied on this concept to satisfy NRC's concern over the commercial experience issue. I might also point out that we have intentionally avoided soliciting operations personnel away



from other utilities with operating plants, believing this practice to be outside the best interests of the industry.

With this personal background, I will now present to you the plan developed by our working group to assure a responsible level of Shift Operating Experience.

- ° Slide illustrates experience requirements of the four licensed shift positions: Shift Supervisor (SRO), Senior Operator (SRO), and two Licensed Operators (RO's).
- ° Experience requirements: Derived from ANSI/ANS-3.1-1981, with additional hot plant shift time within assigned crew.
- ° Power Plant Experience: As defined in ANSI/ANS-3.1-1981. Assures minimum of 13 years per shift crew.
- ° Nuclear Plant Experience: Equivalent experience derived from 10 categories of applicable experience, with specific weighting factors and maximum time credited to each category. Assures minimum of 6 years equivalent experience per crew.
- ° Hot Participation Experience: Defined as direct involvement in review and discussions leading to decisions relative to operation of a commercial nuclear plant, or, direct hands-on operation as a trainee at a commercial nuclear power plant.
  - Includes: Six weeks participation in SRO/RO duties at an operating plant of the same type for Shift Supervisor and Senior Operator;
  - Shift Supervisor participation in reactor startup and shutdown at same type plant;
  - Six months participation in SRO/RO duties at an operating plant of the same type by the Shift Supervisor or the Senior Operator. (An SRO-Licensed STA may be considered an acceptable alternate for this experience factor.)
- ° Experience at "same type plant": Refers to commercial BWR or PWR
- ° Qualified Advisor: Must be on shift if any Hot Participation Experience factor is not satisfied by the Shift Supervisor or Senior Operator.

## OPERATING SHIFT EXPERIENCE REQUIREMENTS

Position	Power Plant Experience Years	Nuclear Plant Experience Years	License	Hot Participation Experience at Same Type Plant*		
				>20% Pwr	Startup and Shutdown	6 Months on Shift
Shift Supv	4	2	SRO	6 weeks	X	Either
Sr Operator	3	2	SRO	6 weeks		SRO
Licensed Oper	3	1	RO			
Licensed Oper	<u>3</u>	<u>1</u>	RO			
Totals	13	6				

\*If any of the Hot Participation Experience requirements are not satisfied by the SRO's, a qualified advisor is required.



EXPERIENCE CATEGORIES AND FACTORS FOR  
ACCUMULATING NUCLEAR POWER PLANT EXPERIENCE

1. COMMERCIAL PLANT SRO/RO - SAME TYPE PLANT (BWR/PWR)

This experience category is applicable when the individual was assigned to licensed operator duties at a commercial nuclear power plant of the same type (BWR/PWR) as the one for which the operating license is sought.

Nuclear Plant Experience Value

Weighting Factor	1.00
Maximum Time Credit	No limit

Background

Actual hands-on experience at the same type (BWR/PWR) plant is essentially equivalent to the experience that would be acquired once the plant in question goes into operation.

2. COMMERCIAL PLANT SRO/RO - NOT FROM THE SAME TYPE PLANT

This experience category is applicable when the individual was assigned to licensed operator duties at a commercial nuclear power plant which is not of the same type as the one for which the operating license is sought.

Nuclear Plant Experience Value

Weighting Factor	0.75
Maximum Time Credit	No Limit

Background

Hands-on experience at a commercial nuclear power plant which is not the same type plant is assigned a weighting factor of 0.75 based on our working group's task-by-task comparison of the PWR/BWR control room operator job task data base available from INPO. Analysis of the data shows a 75% correlation between PWR and BWR tasks at the RO level and over 85% correlation at the SRO level.

3. NAVY (MILITARY) NUCLEAR OPERATING EXPERIENCE

This experience category is applicable when the individual was assigned in the positions discussed below at a Navy (military) nuclear power plant.

a. Navy Operating Experience

Nuclear Plant Experience Value

Weighting Factor	0.5
Maximum Time Credit	36 months

Background

This experience category applies to Navy watch positions such as Reactor Operator (RO), Engineering Watch Supervisor (EWS), Propulsion Plant Watch Supervisor (PPWS), and Engineering Officer of the Watch (EOOW). A comparison of control room operator tasks as compared to Navy nuclear operator tasks



was performed by the working group, with a correlation greater than 50% for both the PWR and BWR tasks listed in the INPO data base. Thus, a weighting factor of 0.5 is appropriate.

b. Other Navy Nuclear Experience

Nuclear Plant Experience Value

Weighting Factor	0.25
Maximum Time Credit	36 months

Background

Comparison of PWR and BWR control room operator tasks listed in the INPO data base with tasks performed by Navy personnel not directly in control of the reactor plant is more variable. Comparisons varied from 75% to 25% depending on the type of plant; therefore, a weighting factor of 0.25 is applicable.

Note

The maximum time credit allowed for a combination of a. and b. is 36 months.

4. FULL SCOPE NUCLEAR POWER PLANT SIMULATOR

This experience category is applicable for the actual time spent in the simulator control room in a structured training program including instruction, practice, and demonstration of competence in normal and abnormal operations.

Nuclear Plant Experience Value

a. Reference Plant Simulator

Weighting Factor	5.0
Maximum Time Credit	12 months



b. Similar Plant Simulator

Weighting Factor            3.0

Maximum Time Credit        9 months

Note

The maximum credit applicable when simulators of both types are used in a training program is 12 months.

Background

Simulators are generally accepted as an alternative to gaining actual operating experience. The training simulator affords the operator the opportunity to develop and demonstrate application skills. The full-scope nuclear power plant training simulator provides a means for obtaining, in a compressed time frame, extensive exposure to the full spectrum of plant operational evolutions and occurrences beyond that which could be gained through years of on-shift operating experience. Full credit experience equivalency has been demonstrated for training on simulators in other industry applications.

The reference plant simulator is presently recognized as equivalent to actual plant experience by the NRC staff and the industry in that these simulators have instrumentation and control configurations which reproduce the operator's own plant arrangement, they have operational characteristics modeled specifically from actual plant performance and/or



design data, and they allow direct use of the operator's actual plant normal, abnormal and emergency operating procedures. Training on the simulator can realistically demonstrate the shift crew's command and communication hierarchy. A 5.0 weighting factor is easily supported by the working group's study which indicated that, on a real-time basis, control manipulations take place on a simulator in a ratio of perhaps 400 to 1 when compared with actual plant control actions.

The NRC staff also recognizes the use of similar plant simulator certification programs in meeting operator license eligibility requirements. Although lacking the direct benefits a reference plant simulator affords in training, credit pertaining to similar type plant experience is valid. A 3.0 weighting factor for similar plant simulator experience has been endorsed by the Operator Licensing Branch of the NRC. We believe this weighting factor remains valid.

5. NUCLEAR POWER PLANT EXPERIENCE ON SHIFT AT OWN PLANT

This experience category is applicable when the individual is assigned on-shift SRO/RO duties at his own plant during the construction and testing phases prior to fuel load.





Nuclear Plant Experience Value

	<u>Weighting Factor</u>	<u>Maximum Time Credit</u>
a. Less than 1 1/2 years prior to fuel load	0.75	12 months
b. More than 1 1/2 years prior to fuel load	0.50	12 months

Background

To be a successful operator, an individual must have an intimate knowledge of the construction, layout and design of the plant and its equipment. He must know the physical location and relationships of each piece of equipment, piping routes, etc. This knowledge can only be gained by an extended assignment to the plant and is best gained by assignment during the construction and testing phases prior to initial fuel loading. During this period, the operator has access to all plant equipment. Operators assigned after the plant has commenced operation do not have such full access because of radiation restrictions.

During the year and a half period preceding fuel load, much system testing and equipment operation occurs; therefore, a weighting factor of 0.75 has been assigned.

Prior to this time, testing and equipment operation may be less frequent; thus, a weighting factor of 0.5 is assigned.



6. LICENSE CLASSROOM TRAINING AND EXAMINATION  
AT OWN PLANT

This experience category is applicable when an individual successfully completes a license training program including an examination for the license being sought. This experience is applicable to the classroom portions of the license training program. Simulator and on-the-job training are addressed in other experience categories.

Nuclear Plant Experience Value

Weighting Factor	0.5
Maximum Time Credit	9 months

Background

This contribution to experience consists of knowledge in nuclear power plant principles, systems and theory of operation. It is essential that a nuclear operator understands the theoretical and specific aspects of his plant. The license training program contributes to experience in areas of power plant equipment operation, plant specific design, plant transient behavior, plant technical specifications and regulations.



7. PARTICIPATION IN OPERATIONAL DUTIES AT AN OPERATING COMMERCIAL NUCLEAR POWER PLANT

This experience category is applicable when an individual has participated in operational duties at an operating plant. Participation is defined as either direct hands-on operation as a trainee or direct involvement in review and discussions leading to decisions relative to operation of a commercial nuclear power plant. Personnel assigned as equipment or auxiliary operators at operating plants would also gain experience under this category.

Nuclear Plant Experience Value

Weighting Factor	0.75
Maximum Time Credit	12 months

Background

Participation in operational duties provides significant experience. Involvement in plant operation provides an individual with knowledge of the regulated nuclear environment; i.e., radiation safety and ALARA, quality assurance, security, emergency plans, etc.

8. OTHER NUCLEAR POWER PLANT EXPERIENCE

This experience category is applicable when an individual has performed job duties related to design, construction, startup testing, maintenance or preoperational testing of any nuclear power plant.



Nuclear Plant Experience Value

Weighting Factor	0.25
Maximum Time Credit	12 months

Background

Personnel involved in related areas of plant operation also gain experience of value depending on the specific job assignment. Such activities could include technical specification writing, writing or performing surveillance tests and/or operating procedures, design/installation of plant modifications, participation in preoperational system checkouts and hot functional testing, to name but a few. Through such activities in a regulated environment, personnel gain experience in the areas of radiation safety, exposure control, quality assurance, security, emergency planning and emergency response. They gain knowledge of nuclear plant concepts and technology simply by performance of their job duties.

9. CONDUCTING LICENSE TRAINING

This experience factor is applicable to those individuals who provide training in license training programs. This experience is applicable for individuals who provide this training on site or at any other facility.

Nuclear Plant Experience Value

Weighting Factor	0.25
Maximum Time Credit	9 months





### Background

Instructors in licensed operator training programs gain a considerable depth of knowledge in nuclear theory and system operation. Some operational skills are also gained, depending on the individual's involvement with on-the-job training or simulator training aspects of the overall license training program. Recognizing that an instructor does not necessarily provide all elements of training and may not be involved in any hands-on training, the weighting factor is conservatively set as 0.25. A maximum credit of 9 months is allowed to account for the variety of instructor assignments.

### 10. DEGREE (ENGINEERING OR APPLIED SCIENCE)

This experience category is applicable for completion of degree requirements and credit for equivalent college work. For Bachelor's and Associate degrees, credit may be assigned as indicated. Experience credit for college work toward a degree may be assigned at the rate of one (1) month experience credit for each ten (10) semester hours college credit earned in engineering or applied science course work. The maximum credit assigned to this experience factor is 12 months.



Nuclear Plant Experience Value

Bachelor's Degree      12 months

Associate Degree      6 months

Degree Equivalent      1 month credit allowed for each 10 semester hours completed in technical subjects

Background

This contribution to experience is the exposure to fundamentals and principles of nuclear power plant operation. It is essential for a nuclear operator to become knowledgeable in the theoretical aspects of plant operation.



## EXPERIENCE CATEGORIES AND FACTORS FOR ACCUMULATING NUCLEAR POWER PLANT EXPERIENCE

EXPERIENCE CATEGORIES	WEIGHTING FACTOR	MAXIMUM CREDIT
1. Same Type Commercial RO/SRO	1.00	No Limit
2. Other Commercial RO/SRO	0.75	No Limit
3. Navy (Military) Nuclear (RO, EWS, EOOW, PPWS) (Other)	0.50 0.25	36 Months
4. Simulator (Reference Plant) (Similar)	5.00 3.00	12 Months (12 Months) (9 Months)
5. Nuclear Plant Experience on Shift (Own Plant) (Less than 1 1/2 Years Prior to F.L.) (More than 1 1/2 Years Prior to F.L.)	0.75 0.50	24 Months (12 Months) (12 Months)
6. Licensed Classroom Training and Exam (Own Plant)	0.50	9 Months
7. Participation at Operating Plant	0.75	12 Months
8. Other Nuclear Plant Experience	0.25	12 Months
9. Conducting License Training	0.25	9 Months
10. Degree (Engineering, Applied Science or Equivalent) (Bachelors Degree) (Associates Degree)		12 Months (12 Months) (6 Months)

# 1. MINIMUM EXPERIENCE

- a. Four years power plant  
As defined by ANSI/ANS-3.1-1981
- b. Two years nuclear power plant  
Equivalent nuclear experience as calculated for  
shift license positions
- c. One year on shift as a licensed SRO/RO at an  
operating plant of the same type

# 2. TRAINING PROVIDED BY UTILITY

- a. Extent to be determined by advisor's previous  
experience -- typically 4 to 8 weeks
- b. Program will include training in:
  - Plant Procedures, including administrative,  
normal/abnormal and emergency
  - Technical Specifications
  - Plant Systems
  - Simulator time, if available on site
- c. Examination to be administered and evaluated by utility

# 3. RESPONSIBILITIES/DUTIES

- a. Advisor responsibilities, authority and limitations  
will be clearly defined and included in his training
  - Shift crews will be trained to understand  
Advisor's function
- b. Responsibilities assigned by Shift Supervisor
  - Level typical of senior operator with commensurate authority
  - Will not include assignments which require  
operator license
  - Will not include direction of licensed operators  
in assignments which require operator license
- c. Responsible to recommend appropriate actions to Shift  
Supervisor, including shutdown of unit
- d. Advisor will have direct access to management above  
Shift Supervisor to resolve disagreements which may  
affect safe operation of the unit

# 4. DURATION OF ADVISOR ASSIGNMENT

As a minimum, until utility personnel meet operating  
shift experience requirements

- Utility management will review shift crew  
experience base prior to releasing advisor
- May be influenced by previous license commitment

## **SHIFT ADVISOR**

### **1. EXPERIENCE**

- 4 Years Power Plant
- 2 Years of Which Is Nuclear Power Plant
- 1 Year Onshift at a Hot Nuclear Plant of the Same Type—With NRC License

### **2. TRAINING**

**Must Complete the Utility's Qualification Program to Include:**

- Procedures (Administrative, Normal, Abnormal and Emergency)
- Tech Specs
- Systems
- Examination

**Note: Training Will Be Determined by Individual's Previous Experience**

### **3. RESPONSIBILITIES/DUTIES**

- Responsibilities at the Senior Operator Level with Commensurate Authority Will Be Assigned by Shift Supervisor
- Responsible to Recommend Appropriate Actions (Including Shutdown) to Shift Supervisor
- This Individual Will Have Direct Access to Management Above the Shift Supervisor to Resolve Any Disagreements that Arise

### **4. DURATION**

- Until Utility Meets Stated Shift Experience Requirements





In closing, let me again state that, in our judgment, our plan will provide a more effective mechanism for assuring a responsible level of shift operating experience than other plans which have been suggested. It provides an effective mechanism for measuring the nuclear plant experience base within each operating crew. It assures that each shift will have commercial plant experience within the SRO positions or within the trained shift advisor. Finally, it will avoid further strains and dislocations within the utilities now operating plants which would almost surely result if the NTOL utilities were now required to recruit experienced operators from others.

All of the utilities represented here appreciate the opportunity to discuss this question with you. We appreciate the input of the staff and are hopeful that our plan will receive your endorsement.



INFORMATION REQUIRED REGARDING SHIFT ADVISORS

1. A resume of each shift advisor which highlights his previous operating experience.
2. A copy of the procedure which describes the duties and authority of the shift advisors and the working relationships between the advisors and the operating shift personnel.
3. A copy of the training program presented to the shift advisors to assure they have adequate knowledge of plant specific matters to properly perform their duties.
4. A copy of the written examination administered to the shift advisors and the results of the examination, if available.
5. A description of, and copies of notes regarding, the oral examination administered to the shift advisors.
6. A description of the training program presented to the operating shift crews to assure that they understand the role of the shift advisors.
7. A statement regarding the medical qualification requirements for the shift advisors.
8. A description of the procedures that will be used to evaluate the performance of the shift advisors during plant start-up.

