

Power Generation Division

P.O. Box 1200, Lynchburg, Va. 24505  
Telephone: (703) 645-7251

August 3, 1963

Mr. J. T. Rodgers, Director  
Power Engineering & Construction Dept.  
Florida Power Corporation  
P. O. Box 3332  
St. Petersburg, Florida 33733

Subject: Crystal River Plant, Unit No. 3  
Nuclear Operator Training Program

References: (1) CHIEF FOR THE ORGANIZATION AND TRAINING OF THE  
NUCLEAR PLANT STAFF, Florida Power Corporation,  
April, 1967.

(2) Letter, FPC-18, "Operator Training Program", May 5, 1967.

(3) Letter, FCC-36, "Operator Training Program", July 15, 1967.

(1) Letter, FPC-93, "Crystal River Plant, Unit No. 3 Training Brochure", March 12, 1966.

(5) Letter, W. O. May to Fred J. Zornes, June 27, 1968.

F. R. T.

AUG 26 1968

Dear Mr. Rogers:

On March 29, 1968, Messrs. R. R. Beach, J. C. DeHans, and F. Norman of B&W presented to Florida Power Corporation personnel the status of AEC reactor operator license requirements and the status of B&W's plans to procure a training simulator. The purpose of the training simulator is to replace the operational experience at a comparable reactor required by the AEC for licensing. The simulator has now been ordered by B&W for delivery in late 1969 and will be installed in a new training center currently being constructed in Martinsburg, Virginia. The facility is expected to be ready for training early in 1970.

In accordance with our previous discussions with you, we propose, for your consideration, utilization of the B&W F&R Simulator and the B&W Lynchburg Pool Reactor (P&R) in the training of your operating personnel who will operate Crystal River Unit No. 3. The F&R Simulator training program as presently planned provides a ten-week course containing classroom training and operational training using hands-on operation of the F&R Simulator. The proposed use of the Lynchburg Pool Reactor provides laboratory and operational training incorporating actual reactor operation including

**CONFIDENTIAL**  
**COUNSEL ONLY**

The Babcock & Wilcox Company / Established 1857

8307070074 680808  
PDR ADCK 05000289  
A HOL

0132

2065

Babcock & Wilcox

Mr. J. T. Rodgers

- 2 -

August 8, 1968

reactor startups. This training in conjunction with the proposed training on the B&W PWR Simulator can fulfill all of the reactor startups required by the AEC for licensing of reactor operators.

We propose to provide the ten-week course in PWR Simulator training (part of Phase IV) generally as described in attached Table 3, starting in July, 1970. The details of the course material are subject to slight modifications during the final preparation of instruction material. We are pleased to quote for this program a price of two hundred thousand dollars (\$200,000) for training a 12-man group. We further quote a price of one hundred thousand dollars (\$100,000) for an additional group of six (6) men. This quotation is subject to the same terms and conditions as our Nuclear Steam Supply Contract A12-10S dated November 10, 1967. The above prices cover only the additional B&W cost for conducting the PWR Simulator training, including the use of B&W facilities, personnel, and training materials during the ten-week program. This quotation excludes that portion of the classroom training presently in Phases III and IV and included in the present NSS Contract. The salaries and expenses of FPC personnel shall be by Florida Power. A quotation on the two-week program utilizing the Lynchburg Pool Reactor as presented in Table 2, "Tentative Course Outline, Introduction to Reactor Operations and Practical Reactor Physics", will be sent to you in the near future.

B&W has fabricated a mockup of the console of the power plant simulator. We invite you and your personnel to visit Lynchburg to inspect this console mockup and to discuss the simulator training program further as you may desire. We recommend that you discuss your overall operator training program, including training on the B&W PWR Simulator, with the Operator Licensing Branch, USAEC, (Mr. Frank Kelly, Branch Chief). I request that B&W participate with you in any discussions that may take place with this branch of the AEC.

Please advise if any further information is required to enable you to make an early decision on this quotation.

RESPONSE TO FPC LETTER DATED JUNE 27, 1968:

Reference (5) requested that we address ourselves to certain questions when submitting this proposal. Our response to Mr. May's questions follows:

1. At the present time, the AEC recognizes the difficulty that will be experienced in providing nuclear power station experience for the great number of reactor operators which will be required by the electrical utilities. In addition, the value of time spent in an operating plant could be limited, since during any four to six-month period of time, a plant could be base loaded and no significant operating experience would be obtained. In discussions with the AEC, verbal approval has been given for the use of a simulator as a substitute for power reactor operating experience. This approval is contingent on B&W providing an adequate simulation of the plant and on the Utility agreement to send the trainee to a power reactor for a short period of observation. This observation will not require "hands-on" control of the operating plant. Although

D9

7/14/68

0132

20066

Dabcock & Wilcox

Mr. J. T. Rodgers

- 3 -

August 8, 1968

no written guarantee can be obtained from the AEC, B&W will make any reasonable modifications required to make the B&W simulator program acceptable to the AEC.

2. The schedule for B&W's simulator is that it be operational and debugged in early January, 1970. The six-month period preceding the first class will be utilized by B&W personnel for their own training in addition to acquainting the AEC with its functions. Also, any modifications required in hardware or programming that may become apparent during this period will also be made. We feel that adequate "cushion" has been provided in the schedule to assure that the FPC program can be provided during the time period scheduled.
3. B&W's simulator facility will include a representation of the control console for a single unit B&W nuclear power station with the controls operating a computer instead of the power station components. The control room will contain the consoles for control of the overall 800 MWe plant and the required operational indicators and alarms. The layout of the simulator will be sent to you about the first of September for use in laying out the console for the Crystal River No. 3 unit.
4. The entire approach in the design of the simulator has been to provide a piece of "high fidelity" equipment which will operate in real time. We have accomplished this with the equipment purchased and as such, there are no discernible limitations in the accuracy of simulating operation. There may be, however, differences in the scope of instrumentation as presented by the simulator and as provided by FPC and also in the arrangement or design of the console. These differences will be slight compared with differences that a trainee would experience by going into any plant in operation today or in 1970 when the training will be required.
5. Provision for training the operators in abnormal operating situations or "casualties" is quite extensive. Casualties can be introduced either on a programmed basis or directly by the instructors and are done in such a manner that the atmosphere of an artificially imposed condition is avoided. At the present time, we are programming approximately 80 casualties which involve the control rod drive system, nuclear instrumentation system, reactor coolant system, secondary plant turbine and feedwater systems, auxiliary systems, and electrical systems. In addition to the preceding, the instructor has the ability to impose redundant casualties concurrent with those programmed. It is anticipated that all of these casualties will be imposed a number of times, since improvement in response by the operator to a situation is the means of evaluating the operator.

D9

0132

2067

Eabrock & Wilcox

Mr. J. T. Rodgers

- 4 -

August 8, 1968

RELATIONSHIP OF SIMULATOR TRAINING TO OVERALL TRAINING PROGRAM

The B&W Training Guide, reference (1), describes an overall program of training which does not include use of a power plant simulator. The material in this document has been discussed with Florida Power Operating and Engineering personnel. The revised program including simulator training is as follows:

Phase I	Theoretical Training
Phase II	PWR Observation
Phase III	B&W PWR Technology Training
Phase IV	PWR Operation Training
Phase V	On-the-Job Training

1. Phase I Theoretical Training - By Florida Power

We continue to recommend that the theoretical training be conducted essentially as proposed in Section 3.2, "Description and Schedule for Typical Training Program", pages 8, 9, and 10 of reference (1), as given in more detail in our letter, FPC-18, reference (2), with one exception. The introduction to calculus may be de-emphasized by reducing the estimated time spent on this subject from 60 to 10 hours. This is in accordance with our discussions with the AEC as reported in our letter, FPC-36, reference (3).

2. Phase II PWR Observation - By Florida Power

This is an observation period at an operating pressurized water power reactor to provide the practical background required by the AEC. We believe this residence time of Florida personnel at an operating reactor can be reduced from six (6) months to about three (3) months by use of the B&W simulator in Phase IV. Also, the requirement for operation of this power reactor can be eliminated completely if the B&W simulator, together with ten (10) startups on the Lynchburg Pool Reactor, is utilized in Phase IV.

3. Phase III B&W PWR Technology Training - By B&W

This phase is a classroom training program conducted at the Lynchburg training facility by B&W and is included in our present USS scope of supply. Utilization of the training simulator in Phase IV would change the curriculum of this phase by transferring those items associated with reactor plant operation from Phase III to Phase IV. These include reactor operation, fuel handling, part of the safety analysis, and the startup and test program. The curriculum is listed in Table 1, "Tentative Operator Training Program Outline, PWR Technology Training (Phase III)".

D9

210.618

0132

210.618

August 8, 1968

4. Phase IV PWR Operation Training - By B&W

Phase IV is an operational training period utilizing classroom lectures and B&W facilities at Lynchburg, Virginia, including the Lynnhurst Pool Reactor and the PWR Simulator for a coordinated training effort in PWR power station operation. This period of training is directed towards the understanding and actual performance of operational procedures that may be encountered in Crystal River Unit No. 3. This phase of training consists of six (6) weeks of instruction split between classroom and simulator operation, two (2) weeks of training on the LPR, followed by four (4) weeks of shift operation on the PWR Simulator including an AEC-type written and operating examination.

Training during this phase is centered about actual control of the plant at the reactor console. The nuclear power station simulator will be a representation of the B&W NSS utilizing the latest in simulation techniques to reproduce operation of the power station for operator training. After first learning the details of plant design and construction in Phase III and the theory of operation in the classroom portion of Phase IV, the operator is schooled in the practical conduct of plant operations. During the four-week period of shift operations, the trainees will operate the control room as if it were a unit in commercial operation. Conduct of casualty and emergency procedures are possible to an extent impractical on an operating reactor. The instructor will probe the level of knowledge of each operator by interjecting various system and component failures into plant operation. Major casualties that cannot be conducted on an operating reactor will be conducted on the simulator in detail. Actual operational experience and responsibility will be greater than that available at any nuclear power reactor station that can be used for training.

The proposed curriculum for the classroom training associated with the PWR Simulator operation is given in Table 3, "Tentative Outline, Reactor Subjects During Operational Phase of Operator Training Program (Phase IV)".

Optional training at the Company's Nuclear Development Center is described in Section 4.3 of the Training Guide, reference (1). We would propose that this portion of Phase IV be increased from 40 hours to 80 hours in accordance with Table 2, "Tentative Course Outline Introduction to Reactor Operations and Practical Reactor Physics". If this option is selected, trainees will perform actual reactor startups and physics experiments at the LPR. Each trainee will be expected to complete ten (10) startups on the LPR thus fulfilling all of the AEC requirements for actual reactor startups. You may elect, of course, to meet the AEC requirement for reactor startups on another power reactor if you do not wish to utilize the training at the LPR. The proposed curriculum for this portion of the program is given in Table 2, "Tentative Course Outline, Introduction to Reactor Operations and Practical Reactor Physics".



Encl: 6 V. H. Box

Mr. J. T. Rodgers

- 2 -

August 8, 1972

5. Phase V On-the-Job Training - By BMW

The training program conducted at the Crystal River site involving the testing and startup activities will not be affected by use of the BMW training simulator. The BMW participation in this phase is included in our scope of supply in the DFB Contract.

Sincerely yours,

*C. E. Thomas*

C. E. Thomas  
Project Manager

CET/csj

Attachments - 3

CC: (W/Attach.)

R. F. Haller

J. W. Thompson

BOB: (W/Attach.)

J. C. Daddens

R. R. Beach

W. B. Beisel

J. McFarland

R. T. Schoner

File 12-1

D9

0132

4070