

U. S. ATOMIC ENERGY COMMISSION  
REGION II  
DIVISION OF COMPLIANCE

Report of Inspection  
CO Report No. 50-302/69-1

Licensee: Florida Power Corporation  
License No. CPPR-51  
Category A

Date of Inspection: January 23-24, 1969

Date of Previous Inspection: October 30 - November 1, 1968

*W. B. Swan  
inspected by  
F. J. Long*

Inspected By: J. C. Bryant 2/18/69  
J. C. Bryant, Reactor Inspector (Date)

Inspected By: W. B. Swan 2/19/69  
W. B. Swan, Reactor Inspector (Const.) (Date)

Reviewed By: F. J. Long 2/19/69  
F. J. Long, Senior Reactor Inspector (Date)

SCOPE

A routine announced inspection was made of the 855 MWe pressurized water reactor under construction near Crystal River, Florida.

SUMMARY

Safety Items: None

Nonconformance Items: The PSAR, Vol. 4, Page 21, states that the site will be excavated to cap rock and back-filled to foundation level partially with grouted crushed limerock and partially with

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compacted crushed limerock. Excavation to cap rock has been completed, but plans have been changed to back-fill with 1500 psi strength concrete. Bennett stated that the change will be justified in the FSAR, and since the change is regarded as an improvement by the inspectors, no action will be taken by Region II. (See Detail E.)

Unusual Occurrences: None

Status of Previously Reported Problems: None

Other Significant Items: None

Management Interview: Present were Bennett, Froats, and Shows.

In discussing the quality assurance program, the inspector stated that he felt Florida Power Corp. would feel the need to become more directly involved in the actual observation of work than now seemed to be indicated. He informed Bennett that Froats had all information readily retrievable at present, but pointed out that trained personnel would probably soon be needed for this to free Froats for field work and planning. Bennett stated that help would be provided as needed and reminded the inspector that F. P. C. had competent engineers in each necessary discipline at the site. The inspector asked if these men had managerial duties as well as the duty to see that quality work was done. He stated that they actually planned and directed the work, and had complete authority over the quality of the work. The inspector stated that this would place them in the position of approving their own performance. Bennett agreed, but believes he has adequate checks on performance, and he has complete confidence in the men. (See Detail D.)

The inspector informed Bennett that it would be well to discuss major design changes with DRL to avoid possible future difficulties. The inspector stated that he anticipated no problems due to changes in foundation preparation, but that future changes might be more questionable. Bennett stated that all changes would be justified, and would probably be discussed with DRL beforehand. (See Detail E.)

Bennett asked if many problems were being experienced with Cadwelds at other sites. The inspector said that in Region II none of the inspectors had reported difficulty recently and that proper technique and qualification seemed to minimize difficulties.

DETAILS

A. Persons Contacted

H. L. Bennett, Construction Manager, FPC  
W. R. Zimmerman, Assistant Construction Manager, FPC  
E. Froats, Quality Assurance Supervisor, FPC  
E. P. Shows, Project Manager, J. A. Jones Construction Co.  
W. Connely, Plant Manager, West Coast Concrete Co.  
J. Westover, Batch Plant Operator, West Coast Concrete Co.

B. Organization:

In CO Report 50-302/68-1, it was reported that Jones Construction Co. was building Unit 2 and would build Unit 3. This was in error. The inspector was under the erroneous opinion that Mills and Jones Construction Co. and J. A. Jones Construction Co. were affiliates. Shows has 20 years experience with J. A. Jones, with much of this time spent at Hanford. Shows will be at the site full time from now until construction is complete.

Froats stated that Gilbert Associates, the Architect Engineer, will have a QA man on site beginning January 27, 1969.

C. Concrete

A ready-mix batching plant was erected 4-1/2 miles from the construction site by the West Coast Concrete Co. of Brooksville and Crystal River, Florida. This plant was erected to furnish grout for sub-surface consolidation at Unit 3, to serve other local projects, and in the hope of getting the contract for all concrete used in Unit 3. In the event that West Coast Concrete Co. gets the contract for Unit 3, they will serve no other customers from this ready-mix plant. Since it seems quite likely that West Coast will receive the contract for Unit 3, the plant was inspected during the visit.

The plant is a new Rex-Chain Belt fully-automatic concrete batching plant according to N. R. M. C. A. standards. This plant can accurately weigh and discharge any 2 of 2 cements or fly ash, any 3 of 5 aggregates, and any 2 of 3 admixtures into each truck. A punch card is precoded for each special mixture

and inserted into the control panel. The batch operator dials the amount of concrete desired up to 10 yards in 1/4 yard increments. All weighing and adjustments for moisture are electronically controlled. All weights are printed out on the delivery ticket along with the truck number, date, time, and batch number. Howe Richardson scales are used, and are calibrated every 90 days by Fairbanks Morse.

The plant capacity is 150 yards per hour, and adequate delivery equipment is available. Twenty-four hour service can be provided if needed. West Coast has another batch plant about eight miles away which can serve as back-up if needed.

Aggregate piles are separated by about twenty feet and are each enclosed in concrete block walled and concrete floored bins. Sprays are installed for washing coarse aggregates.

#### Materials

Sand: Sand is furnished by Silica Sand Co., Leesburg, Florida pit, and is specified as natural silica sand. Analysis records by Law Engineering Testing Co show this sand meets ASTM C33 gradation specifications except that 89% passed a No. 16 screen, while 50 to 85% is specified. The soundness modulus is 2.38 and deleterious matter was specified as satisfactory according to ASTM C33. The sand has been accepted by the Architect Engineers, Gilbert and Associates, and by their consultants, Woodward - Clyde - Sherard and Associates. The Silica Sand Co. is on the approved list of suppliers of the Corps of Engineers.

#### Coarse Aggregate

Brooksville Crushed Limestone from Brooksville Rock Co. pit and by Florida Crushed Stone Co. Aggregates meet ASTM C33 gradation specifications and ASTM C131 Los Angeles Abrasion Test requirements according to Law Engineering Testing Co. reports. Sodium sulfate tests show, on three different aggregates, losses of 13.5%, 19.7%, and 33.8%, whereas ASTM C33 specifies 12%. Paragraph 9 of ASTM C33 states that aggregates failing to meet this requirement may be accepted, based on a sound history of usage. Froats and Connely stated that this history exists, and showed the inspector that the vendor is on the Corps of Engineers approved list of suppliers. Gilbert Associates has accepted the aggregate.



The inspector stated that he felt shear and tensile tests should be run on the aggregate since the stratified limestone seemed somewhat deficient in these respects. Compressive strength tests on 20 design mix reports inspected revealed an average of at least 30% over design compressive strength.

Further tests are being performed on the aggregate, and these results will be reviewed on the next inspection.

#### Cement

Cement will be supplied by Florida Portland Cement Co. Test reports verified analysis according to ASTM C-150.

#### Water

Water is supplied from a well. Florida Testing Laboratory analysis shows chlorides as 27 ppm, sulfides as 0, nitrates as 0.01 ppm, and turbidity as 50 ppm.

#### Admixtures

Admixtures are supplied by W. R. Grace Co., and are bulk Darex (air entraining agrant), Daratard HC (retarding densifier), and W.R.D.A. (water reducer). All are delivered in bulk and dispensed through the electronic batching panel.

#### D. Quality Assurance

Froats outlined plans for quality control on site and for record keeping, and also for scheduling of acceptance tests of equipment and systems. Swan asked if he had considered timing his schedule of critical tests to event numbers on the construction schedule print-out rather than to anticipated dates. Froats said that he would consider this method. He has established a record keeping plan by systems and employing a decimal system. Since there are very few records so far, he has little feel for how workable the system will be.

There still are no immediate plans for augmenting the QC staff, and heavy reliance is being placed on contractor and independent agent quality control. The inspector mentioned that as the work tempo increases, it is unlikely that Froats will have time for assembling and filing records and also be able to retain his

confidence that his quality control system is working. The inspector also stated that he felt Florida Power Corporation will find it needs to become more deeply involved in in-house inspectors than it now anticipates.

Froats was asked what plans had been made for protection of reinforcing steel between its arrival at the site and placement in the structure. He said that so far no specific plans had been made for this. The inspectors pointed out that dirt or excessive corrosion on the re-steel could cause considerable difficulty in meeting specifications when concrete placements were to be made. (Storage of materials was also discussed in CO Report 50-302/68-1.) It was mentioned that a QC plan for handling of the steel could be beneficial.

E. Foundation Preparations

As stated in CO Report 50-302/68-1, the curtain wall around the reactor building and around the turbine and auxiliary buildings has been completed. The area under the reactor building has been excavated to cap rock. This has provided a base which varies about 5 feet in depth with the lower point about 12 feet below grade. The PSAR stated that this would be back filled with grouted crushed limerock fill of three grades and elevations. Compacted limerock has been placed in the lower part to a maximum depth of 18 inches and feathering out toward the edges, presenting a level floor except for the 5-foot-high limestone plateau extending over approximately 25% of the excavation. The tendon gallery wall outer forms are fine grained grouted concrete block which will serve as permanent outer forms for the 2 foot, 9 inch thick gallery wall. It has been decided to backfill to the top of the gallery wall with a 1500 psi design mix rather than with the grouted limerock. This elevation will be the bottom of the base mat.

Two wells extending 60 feet below grade are in use to remove water from the excavated area. This water is believed to be coming from beneath the curtain wall, and is being maintained at the -60 foot level by pumps removing approximately 500 to 600 gpm.

When the backfill has been completed, the pumps will be stopped and consolidation grouting will be done through the concrete backfill forcing the water out. Consolidation grouting will be done as described in the PSAR.

The limestone cap rock seemed to have little uniformity or integrity, some of it being ruptured by kicking; however, Florida Power Corporation personnel said they obtained very good bearing by grouting this material under Units 1 and 2. There has been no measured settling under Unit 1 as verified by frequent surveys.

F. Construction Schedule

Selected schedule milestones are as follows:

- 2/15/69 - Begin consolidation grouting
- 3/69 - Place tendon gallery walls
- 4/69 - Erect base mat steel
- 6/3/69 - First concrete placement in base mat
- 8/69 - Complete base mat
- 8/69 - Begin bottom liner plate
- 11/69 - First wall concrete placement
- 10/71 - Leak rate test
- 11/71 - Hot functional test
- 2/9/72 - Fuel loading
- 5/24/72 - Startup

G. Tendons

The contract for tendons has been given to Prescon Corp. of Corpus Christi. Tendons will be made of 163 strand, 0.276 inch wire with a tensile strength of 240,000 psi, conforming to ASTM A 421-65. This wire will be imported and is described as British stabilized wire.