

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

Report of Inspection

CO Report No. 50-302/70-2

Licensee: Florida Power Corporation
Crystal River Unit 3
License No. CPPR-51
Category A

Date of Inspection: June 3-4, 1970

Date of Previous Inspection: January 8-9, 1970

Inspected By: W. C. Seidle for 7/1/70
J. G. Bryant, Reactor Inspector Date
(In Charge)

W. C. Seidle for 7/1/70
L. L. Beratan, Senior Structural Engineer Date

Reviewed By: W. C. Seidle 7/1/70
W. C. Seidle, Senior Reactor Inspector Date

Proprietary Information: None

SCOPE

A routine announced inspection was made of Crystal River Unit 3, an 855 Mwe pressurized water reactor under construction near Crystal River, Florida. The inspector was accompanied by L. L. Beratan, Senior Structural Engineer, Compliance, Headquarters.

SUMMARY

Safety Items - None

Nonconformance Items - None

Status of Previously Reported Problems - None

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Other Significant Items - None

Management Interview - Those present at the interview were Bennett and Pedrick. Since no problem areas had been identified, the interview was a discussion of schedules, construction plans, and quality control. The following items were discussed:

1. Construction status and schedule. (See Section C.)
2. Reinforcing steel-storage and testing. (See Section D.)
3. Concrete. (See Section E.)
4. Work and QC procedures. (See Sections F and G.)
5. Primary pipe. (See Section H.)
6. Subsurface grouting. (See Section I.)

DETAILSA. Persons Contacted

- H. L. Bennett - FPC (Florida Power Corporation), Manager,
Power Construction
- D. W. Pedrick - FPC, Assistant Quality Engineer
- G. Pachos - FPC, Supervisor, Structural Construction
- D. Johnson - Gilbert Associates, Incorporated, Supervisor,
Contract Grouting
- W. Hurst - Pittsburgh Testing Laboratories, Resident QC Chief Inspector

B. Organization

Daniel W. Pedrick has been added to the FPC staff as Assistant Quality Engineer. In 1964 he received a BS degree in marine engineering from the U. S. Merchant Marine Academy. He worked from 1964 to 1966 for Moore McCormick Lines, Incorporated, as a licensed marine engineer. In 1966 to 1967 he worked for Philadelphia Gear Corporation as a design and test engineer. In 1968 he went into business for himself as a home constructor. For a time in 1968 to 1969 he worked for Gulf Coast Transit Company as a marine engineer, and in March 1970 he joined FPC in his present condition.

C. Construction Status

Subsurface grouting has been completed under the containment building and the reactor auxiliary building with the exception of the residual

heat pit which is being maintained as a drain blanket. During the inspection, subsurface grouting was in progress under the turbine building and control complex.

During the inspection, the first reinforcing steel was placed for the base mat and portions of the auxiliary building. It was anticipated that erection of the steel for the first placement of the containment base mat would begin the week of June 8. The predicted fuel loading date of September 1972 and commercial operation date of December 1972 have not changed.

D. Reinforcing Steel (4605.04.a.6; 4605.05.a.1; 4605.06.a.8)

Reinforcing steel for the site is purchased from Florida Steel Corporation, who produces all but the 18 S bar. The 18 S bar is purchased by Florida Steel from Bethlehem Steel Corporation. Mill certifications and users break test results were examined and found to conform to ASTM 615 Grade 40.

FPC makes user's break tests at the site and requires two tests on each bar size from heats of 25 tons or less and additional tests if more than 25 tons per heat is received. In addition to breaking user's test bars, some bars are cut from stock for testing.

The rebar receiving yard was inspected. All rebar was found to be stored on dunnage and was segregated according to its assigned usage. The receiving, storage, and handling procedure requires that the steel be delivered to its placement area still bound as received from Florida Steel Corporation. At this point, QC verifies mill certifications and break test results before the steel can be unbound.

Steel was being placed for the base mat of a portion of the auxiliary building. The area was clean, the steel was placed on concrete block, properly tied, and laps exceeded ACI 318 requirements. Placement records and break test results were available for the concrete block used.

The Forney testing machine purchased by FPC is rated at a 400,000-pound capacity, but is giving some trouble and is not expected to give lasting service. The licensee reported that after breaking several 18 S bars, which approach the 400,000-pound breaking strength capacity, it is necessary to retighten portions of the machine. Bennett feels that it will be necessary to purchase a higher capacity machine or send the 18 S bar to the University of Florida for testing. His preference is to purchase a higher capacity machine, but this has not been decided upon as yet.

E. Concrete (4605.04.b.1 and 2; 4605.05.a.1 and 2, b.2, 3 and 7)

The ready-mix batch plant was reinspected. Scale calibrations were up to date, aggregate separation was satisfactory, and coarse aggregate was being washed. The crushed limerock aggregate had a fair amount of loose material on it, but later examination of broken cylinders showed that the aggregate was, in most cases, broken. There was no indication of cylinders that broke under strength. An icehouse has been built and the crusher installed. Bennett said that FPC found that they could buy ice cheaper than they could manufacture it. FPC has purchased twelve new nine-yard mixing trucks for use at the site. All equipment appeared to be clean and in good shape.

Two Pittsburgh Testing Laboratory (PTL) men were at the plant. One was running moisture analyses, which he said he ran several times daily. Bennett said that two PTL men were at the plant continuously during plant operations. Bennett said that FPC exercises direct control of all plant operations and that all operations are observed by PTL, even though it is still a West Coast Concrete plant and is manned by West Coast personnel.

FPC has decided to use only 3/4-inch coarse aggregate in the structure rather than two coarse aggregates as previously planned. They have developed new design mixes and tested them using the 3/4-inch aggregate. The 3,000 psi mix was designed by Law Engineering Testing Company and uses 5.5 bags of cement per yard and has an average 28-day strength of 4,820 psi. Bennett said that he hoped to use a 5-1/4 bag per yard mix but has not yet been able to get a good workable mix within the other parameters. The 5,000 psi mix was designed by PTL and uses 6.75 bags per yard with a W/C ratio of 5 and a 3-inch slump. The 28-day break test results are not in, but the 7-day breaks were at 4,860 psi; therefore, there is little doubt that the 28-day strength will be adequate.

Batching, delivery, and placement QC records on concrete placed to date were complete and easily recoverable for any placement. Slump, air, and cylinder break tests were made according to requirements and all records met specifications.

Mill certifications on cement were examined and found to be acceptable. At the exit interview, the inspector asked Bennett if he had considered getting a chloride analysis on the cement, even though it is not required by the specifications, since the question of chloride content might well arise at some later date. Bennett agreed that this might be a good idea, and in the inspector's presence, Pedrick called the cement supplier and requested that chloride analysis be added to the mill certifications.

Bennett said that he was looking for a new source of fine aggregate, other than that reported previously, but that as yet he has not found a satisfactory source.

F. Work Procedures

FPC has identified areas requiring written work procedures and established a format and basic content which will be used in each procedure. A summary of the requirements for writing these procedures and the use of them is as follows.

1. It is the responsibility of the FPC quality engineer to provide the appropriate parties with the procedure and to verify that the requirements are adhered to.
2. The procedure will reference all applicable Gilbert Associates, Incorporated (GAI), specifications.
3. The title page will include the contractor's name and title, reference the GAI specification, procedure number, date of finalized issue, and date of latest addendum.
4. The first page will describe the purpose and scope.
5. The first page will state by job title the person within the contracting organization responsible for assuring that the procedure is implemented and adhered to. It will also delineate by job title the person to whom reports are to be sent.
6. Following the above shall be the start of instructions. It is in this section that the contractor shall include detailed, logically sequenced steps for all operations covered in the scope of the procedure.
7. The work procedure will be written as instructions and not as a specification.
8. For each operation, six things must be covered:
 - a. The person by job title who will be responsible.
 - b. What preparation is necessary to be completed before the operation can be started.
 - c. Special tools required for the job.
 - d. Unusual cautions to be taken to prevent damage to delicate or critical components.
 - e. Protection to be afforded to the finished product to prevent damage.
 - f. Actual step-by-step routine for doing the work.

To date, FPC has identified 41 work items requiring procedures. Thirteen of these procedures have been completed and were examined to some extent by the inspector. These procedures met the requirement for writing work procedures and seemed to be detailed and well done. The procedures completed included that work now in progress and that which may be expected to be done in the near future. The list of procedures to be written and those completed is on file at Region II.

G. Quality Control Procedures

Quality control procedures are written as separate and distinct from work procedures. The control document for these procedures indicates that the quality control department is separate and on an equal plane with the manufacturing operation. The quality control procedures completed to date included the writing of QC procedures, excavation and placement of structural fill, furnishing, delivery, and placement of ready-mix grout, placing of reinforcing steel, nondestructive testing including PT, MT, RT, UT, and vacuum box testing, furnishing and delivery of structural concrete, placement of structural concrete, work stoppage tagging control, and reports of deficiency.

The tagging control procedure is for the handling of discrepant material. It describes authorities for tagging material, a deficiency report that must be written and the routing of this report, the authorities for removal of the tags, and the action-taken report that must accompany removal of the tag.

H. Primary Pipe

GO Report No. 50-302/70-1, Section F, discusses the residual heat removal pump suction lines which are to be embedded in the base mat and which were not annealed after bending. This pipe has some discoloration at the bend. USAS B31.7, paragraph 1-729.3.2.b states that austenitic stainless steel pipe that has been heated for bending may be used in the as-bent condition unless the design specification requires a postbending heat treatment. This heat treatment was not specified by FPC; however, it has been the intent to specify heat treatment. It has been decided that the pipe will be used as is and an engineering justification will be made. The GAI report states that the pipe will be cleaned and will be coated with Thurmadox 70 silicon coating. The GAI report stated that the steel was not sensitized. Pedrick could not say how this had been determined.

The final engineering justification will be examined by the inspector when it is complete.

I. Subsurface Grouting and Foundations

The inspectors examined records of chemical and concrete grouting and examined cores taken before and after grouting. The inspections indicated that this work was carried out in a competent manner. Bennett said that final reports to FPC by their consultants would be available for CO examination.

For details of this inspection, see the attached feeder report from L. Beratan, CO Headquarters.

Attachment:

Feeder Report dated 6/23/70 -

L. L. Beratan (CO:HQ)