

Sengupta, Abhijit

From: Williams, Charles R. [Charles.Williams@pgnmail.com]
Sent: Monday, January 11, 2010 5:42 PM
To: Lake, Louis; Thomas, George; 'nausdj@ornl.gov'; Carrion, Robert; Souther, Martin; 'trowe@wje.com'
Subject: FM 5.4 Draft for Review *- 2 pages*
Attachments: FM 5.4 Exhibit 2 - QC Procedures_PTL-10.pdf; FM 5.4 Exhibit 3 - Pour712RBElev210.pdf; FM 5.4.pdf; FM 5.4 Exhibit 1 - Forms - SP5618 Placement of Structural Concrete.pdf

Mr Lake and others, *1 page* *2 pages* *1 page*

Attached for your review is draft of FM 5.4 and its exhibits. If you have any questions, please contact me or Craig Miller.

Thank You,

Charles Williams
919-516-7417

The message is ready to be sent with the following file or link attachments:

FM 5.4 Exhibit 2 - QC Procedures_PTL-10.pdf FM 5.4 Exhibit 3 - Pour712RBElev210.pdf FM 5.4.pdf FM 5.4 Exhibit 1 - Forms - SP5618 Placement of Structural Concrete.pdf

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P/111



PITTSBURGH TESTING LABORATORY

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Order No. TA-7732

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REPORT of CONCRETE PLACEMENT

REPORTED TO: FLORIDA POWER CORP.
PROJECT: CRYSTAL RIVER PLANT UNIT NO. 3
Concrete Supplier: West Coast Concrete, Inc.
Arch-Engineer: Gilbert Assoc., Inc.
General Contractor: J. A. Jones

Inspector: *T. Gibbeney*
T. Gibbeney, P.T.L.

Location: _____ **POUR: 712 RB** _____ Date 2-16-73

SUBGRADE INSPECTION: NA

JOINT PREPARATION: OK

FORMS:		REINFORCEMENTS:	EMBEDDED ITEMS: (List)
Properly Coated <input checked="" type="checkbox"/>		Proper Clearance <input checked="" type="checkbox"/>	<u>Conforms to drawings</u>
Free From Holes <input checked="" type="checkbox"/>		Proper Support <input checked="" type="checkbox"/>	_____
Seams Tight <input checked="" type="checkbox"/>		Clean <input checked="" type="checkbox"/>	_____
Clean <input checked="" type="checkbox"/>		No. Tie Rods <u>OK</u>	_____
Proper Shoring & Supports <input checked="" type="checkbox"/>		Location Tie Rods <u>varied</u>	_____
Alignment <input checked="" type="checkbox"/>			_____

EQUIPMENT:

No. & Size of Vibrators 8 - 10,500 Frequency plus

Placement Equipment 2 - 6" Whiteman Concrete Pumps

Tremie Pipes - Number NA Size NA Location NA

PLACEMENT:

Consolidation Procedure Mechanical Vibration

Grouted Yes Time 9:06 AM - 9:50 AM Location Hor. Const. Jt.

Concrete - Lift Depth 18" max. Direction of Pour E to W; W to E

REMARKS: Exceptions: None

CC: 2 - FPG Quality Records
3 - P.T.L.
7-2-20-3-5b

PITTSBURGH TESTING LABORATORY
Ross T. McGillivray
Ross T. McGillivray, P. E.

FM 5.4 Exhibit 1
3:00 FORMWORK

3:01 General

3:01.1 All formwork shall be in accordance with "Recommended Practice for Concrete Formwork" ACI 347-68.

3:01.2 All poured concrete shall be formed, including the sides of footings and other portions of structures below grade, except that rock cuts shall be used as forms for vertical surfaces as shown on the Drawings and/or as directed by the ENGINEER. Earth cuts shall not be used as forms for vertical surfaces.

3:01.3 All exposed concrete edges shall be chamfered. The size of the chamfer strip shall be 3/4 inches unless otherwise noted on the Drawings.

3:02 Materials

3:02.1 Forms shall be wood or metal that are of sufficient strength and rigidity, and have a surface suitable for the required finish. If wood is used to form concrete that will be exposed to view, it shall be made with at least 5/8 in. thick Douglas fir S/B "Plyform" as graded by D.F.P.A. Concrete that will be concealed from view may also be formed with 5/8 in. thick "Plyform," as above, or else shall be formed with seasoned wood boards of not less than 1 in. stock thickness. Boards shall be free from excessive warpage or other defects that would prevent tight joints or affect the true lines and surfaces of the concrete.

3:02.2 All form lumber may be reused in various parts of this construction as long as it remains in good condition.

3:02.3 Metal forms shall be straight and free from distortion that would be apparent in the poured concrete. The forms shall be accurately assembled and fitted so that joints will be straight and continuous and so that adjoining surfaces will be flush.

3:02.4 Forms shall be thoroughly cleaned after each use, and surfaces in contact with concrete shall be coated with form oil which has been approved by the OWNER.

3:03 Design

3:03.1 The design and engineering of the formwork shall be the responsibility of the CONTRACTOR. No shop or field drawings for formwork need be submitted to the ENGINEER.

3:03.2 Centering for beams and girders shall be so designed that they can be stripped without disturbing the intermediate supporting posts or can be reshored in an acceptable manner.

3:03.3 The ENGINEER shall be consulted regarding the cambering of beams and slabs to compensate for anticipated deflections in the formwork.

3:03.4 Except as noted hereinafter, formwork shall be constructed so as to ensure that the concrete surfaces will conform to the tolerances of ACI 301-66. The steel plate liner on the reactor building when used as a concrete form shall be braced and shored to ensure that the deflection does not exceed 1/4 in. for an arc length of 10 ft of the plate as installed.

3:04 Form Removal

3:04.1 The removal of formwork shall be in accordance with the requirements of ACI 301-66.

3:04.2 The following table shows required minimum strengths required before the forms are removed:

<u>Structural Classification</u>	<u>Min. Strength Required - Psi</u>	<u>Min. Period - Days</u>
Sides of footings, walls	500	1
Sides of beams, girders, columns	1500	3
Forms under floor slabs	2000	7
Centering under beams, girders, flat slabs	2500	10

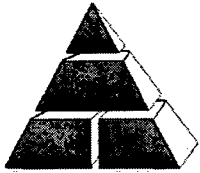
3:04.3 The minimum time limits are average values based on 3000 psi concrete, attaining strength under normal job conditions at a temperature of 70 degrees F.

3:04.4 The time limits shall be increased for concrete having slower strength development due to lower temperatures or other conditions and may be reduced for concrete developing strength more rapidly, all subject to the approval of the ENGINEER.

4:00 JOINTS

4:01 Construction Joints

4:01.1 Joints not shown on the Drawings shall be made and located in accordance with the requirements of ACI 301-66 and shall be approved in writing by the ENGINEER. Construction joint surfaces except as noted otherwise hereinafter, shall be prepared for the placement of concrete thereon by cleaning thoroughly with wire brushes, water under pressure, or other means to remove all coatings, stains, debris or other foreign material.



5.4 Concrete Form Release Agent

Description:

Release agents are applied to the form contact surfaces to prevent bond and facilitate stripping. They may be applied to the form before each use, at which time care must be exercised to prevent coating adjacent construction joint surfaces or reinforcing steel. A good release agent should provide a clean and easy release without damage to either the concrete face or the form, while contributing to the production of blemish free surface. It should have no adverse effect upon either the form or the concrete surface. When applied improperly, form oil may prevent bond between the concrete and reinforcing bars or weaken joints by preventing bond of old to new concrete.

Data to be collected and Analyzed:

1. Review concrete placement specifications.
2. Review Quality Control (QC) specifications.
3. Review QC reports.

Verified Supporting Evidence: None

Verified Refuting Evidence:

- a. Project specifications (FM 5.4 Exhibit 1 – Specification SP-5618) require that forms are thoroughly cleaned after each use, and surfaces in contact with concrete be coated with form oil which has been approved by the OWNER.
- b. Project QC specifications (FM 5.4 Exhibit 2) included requirements for verifying form oiling and cleanliness of all surfaces prior to concrete placement.
- c. QC reports (representative example in FM 5.4 Exhibit 3) show that inspectors followed the established QC specifications and monitored proper form coating.
- d. Exhaustive review of Non-Conformance Reports (NCRs) found no evidence of improper application of form oil during the construction of the containment building.

Conclusion:

Form release agents were applied properly and were not a contributing factor to the delamination.

PITTSBURGH TESTING LABORATORY

QUALITY CONTROL PROCEDURES
FOR PLACEMENT OF STRUCTURAL CONCRETE

QUALITY CONTROL PROCEDURE NO. PTL-Q10

"SPECIFICATIONS PLACEMENT OF STRUCTURAL CONCRETE"
GILBERT ASSOCIATES, INC.
SP-5618

MAY, 1969

COMPLETE^ELY REVISED - OCT., 1972

Approved by: _____
H. L. Bennett
Director - Gen. Const.

Date: _____

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

C. Field Placement Inspection

1. Testing laboratory inspectors shall perform the following inspections and shall document this inspection on each placement. (Sample inspection form attached.)

- a. Formwork for cleanliness, tight joints, form oiling and exposed edges chamfered.
- b. Reinforcement for cleanliness, adequate securing and clearances to forms and subgrades.
- c. Construction joint surfaces except as noted otherwise hereinafter shall be prepared for the placement of concrete there on by cleaning thoroughly with wire brushes, water under pressure, or by other means to remove all coatings, stains, debris, or other foreign material.
- d. Horizontal and vertical construction joints in the reactor building cylindrical shell below 250'0 level shall be prepared for receiving next pour by either sandblasting, air water jet, bush hammering, or other means to remove all coatings, stains, debris or other foreign material. The horizontal joints shall be dampened, then thoroughly covered with cement - sand mortar, of similar proportions in concrete, of approximately 1/2 inch thick and concrete placed before initial set of mortar. Vertical joints shall be dampened before concreting.
- e. Construction joint surface in the Ring Girder and Dome at and above 250'0 of the Reactor Bldg. are to be prepared by sandblasting to produce a clean rough surface and the applying an evenly distributed film of Colma Fix 8% adhesive.
- f. Conveyance equipment in accordance with ACI 301 Chapter 8 and ASTM C94. All transporting to point of deposit to be without segregation of concrete.
- g. Concrete deposited in horizontal layer not exceeding 18" - avoiding inclined joints with maximum free fall of 3 feet. Each layer vibrated together.
- h. Placing of concrete shall not cause movement or damage to embedded items.
- i. Concrete vibrated adequately and concrete of proper workability to avoid seams or planes of weakness.