

EDASCO SERVICES INCORPORATED
WATERFORD STEAM ELECTRIC STATION - UNIT NO 3

PROCEDURE FOR: CONTROL OF CONCRETE MATERIALS
AND MIXES

PROC. NO. QCIP-4

ISSUE SUMMARY

ISSUE/DATE	PREPARED	APPROVED	REMARKS
"A" 11/17/72 "B" 2/14/73	C R Satterfield	<i>H. S. Vinson</i> <i>H. S. Vinson</i>	Revised paragraph 3.2, 5.5, 5.8, 5.11 and 5.12, 9.5. and 9.7, 9.11.
"C" DRAFT 8/19/75	<i>C. R. Satterfield</i> C. R. Satterfield		Update of QC 4.0-2, Concrete Materials and Mixes
"C" 9/8/75	<i>C. R. Satterfield</i> C. R. Satterfield	<i>J. O. Booth</i> J. O. Booth	
"D" DRAFT 10-29-75	<i>W. C. Griggs</i> W. C. Griggs		Incorporated comments from letter LPL 4273. Revised form numbers.
D/11-29-75	<i>W. C. Griggs</i> W. C. Griggs	<i>J. O. Booth</i> J. O. Booth	
"E" DRAFT 1-8-76	<i>F. R. Howard</i> F. R. Howard		Revised Form No. QCIP-4-1.
"E" 1-14-76	<i>F. R. Howard</i> F. R. Howard	<i>J. O. Booth</i> J. O. Booth	
"F" DRAFT 3-5-76	<i>W. C. Griggs</i> W. C. Griggs		Revised Form No. QCIP-4-3, Form No. QCIP-4-4, Form No. QCIP-4-5, and Form No. QCIP-4-6
F/3-19-76	<i>W. C. Griggs</i> W. C. Griggs	<i>J. O. Booth</i> J. O. Booth	

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FREEDOM OF INFORMATION
ACT REQUEST

84-455

C/413

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

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1.0 PURPOSE

- 1.1 The purpose of this procedure is to identify the methods by which the concrete materials and mixes shall be tested and controlled.

2.0 SCOPE

- 2.1 This procedure covers the testing and recording of the test results on concrete materials which are to be used in the permanent plant of Waterford Steam Electric Station, Unit No. 3.

3.0 REFERENCES

- 3.1 Ebasco Specification LOU-1564.472, Concrete Masonry
- 3.2 ANSI N45.2.5-1974, Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel during the Construction Phase of Nuclear Power Plants.
- 3.3 QCIP-7, Inspection of Concrete Placement, Curing and Finishing

4.0 DEFINITIONS

- 4.1 Aggregates - Fine and coarse inert materials used in the manufacture of concrete. Sand is a fine aggregate. Crushed rock, natural gravel or crushed gravel are coarse aggregates.
- 4.2 Inspector - Shall mean the person directly responsible for ensuring that the section under 6.0 (Procedure) is implemented, for making inspections, and for completing reports on his inspections. He also ensures that tests required of the laboratory technician are performed and reported.
- 4.3 Laboratory Technician - Shall perform the tests required and report the results of these tests on appropriate forms.

5.0 RESPONSIBILITY

- 5.1 The Quality Control Civil Supervisor is responsible for the inspection of testing and documentation of the test results which are covered in this procedure.
- 5.2 The Quality Control Civil Inspector is responsible for implementing the procedure and performing the inspections.

6.0 PROCEDURE

6.1 Cement

- 6.1.1 The Quality Control Civil Inspector shall check each incoming shipment of cement, and he shall document this on Form No. QCIP-4-1.

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANCES HAVE BEEN MADE

"F"
ISSUE: DRAFT

EDASCO SERVICES INCORPORATED
WATERFORD STEAM ELECTRIC STATION - UNIT NO 3

NO. QCIP-4
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6.1.1.1 He shall review the mill certificate to verify that only one type of cement from one mill is being supplied.

6.1.1.2 He shall determine and record the temperature of the incoming cement. Cement exceeding 140°F shall not be used.

6.1.2 One test sample for each 1200 tons of cement received shall be obtained and tested (ASTM C150). Samples shall be taken by a laboratory technician. Information concerning the sample shall be recorded on Form No. QCIP-4-2 by laboratory technician.

6.2 Aggregates

6.2.1 The Quality Control Civil Inspector shall make a report on stock-pile conditions daily during concrete production or weekly during inactive periods. Form No. QCIP-4-3 shall be used to report these conditions.

6.2.2 The following sampling and testing shall be performed by the materials testing laboratory during concrete production using the appropriate ASTM Standard.

- | | |
|--|------------------|
| a) Gradation (ASTM C136) | - once per shift |
| b) Organic impurities (ASTM C40) | - weekly |
| c) Material finer than No. 200 sieve (ASTM C117) | - daily |
| d) Clay Lumps and friable particles (ASTM C142) | - monthly |
| e) Specific gravity and absorption (ASTM C-127 or C-128) | - weekly |
| f) Percentage voids (ASTM C-30) | - weekly |
| g) Lightweight pieces (ASTM C123) | - monthly |
| h) Soft fragments (ASTM C 235) | - monthly |
| i) Los Angeles abrasion (ASTM C131 or C535) | - 6 months |
| j) Flat and elongated particles (CRD C119) | - 6 months |
| k) Potential reactivity (ASTM C 289) | - 6 months |
| l) Soundness (ASTM C88) | - 6 months |
| m) Moisture content (ASTM C566) | - daily |

6.2.3 Any of the above tests shall be performed more frequently when required by the Quality Control Civil Supervisor based on job conditions. These tests are to be made during concrete production and also on material received when required.

6.2.4 Results of these tests shall be recorded on Form No. QCIP-4-4, Form No. QCIP-4-5, and Form No. QCIP-4-6 as appropriate.

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

6.3 Water

6.3.1 The following tests shall be conducted by a testing laboratory to verify that the material meets the requirements as established in LOU 1564.472. A copy of this report shall be included in the Quality Control records.

6.3.1.1 Water shall be tested for air content every three months.

6.3.1.2 Water shall be tested for temperature every three months.

6.3.1.3 If ice is used, samples of the ice and samples of the water shall be tested to meet the same requirements as the water and at the same intervals.

6.4 Air-Entraining Agent

6.4.1 The Quality Control Civil Inspector shall verify the air-entraining agent to confirm the certificate delivered preceeding the shipment showing that the material meets the requirements according to Specific Requirements. This information shall be entered in this notice in the Batch Plant Log.

6.5 Water Reducing of Water Reducing Set Retarders

6.5.1 The Quality Control Civil Inspector shall assure that the Infra-red spectral analysis of the shipment and the certification of the material supplies is the same as the test results. This information shall be entered in the Log.

6.5.2 The Quality Control Civil Inspector shall verify the reducing, set retarder admixture in the concrete. The bulb temperature equals or exceeds the temperature of the fresh concrete equals exceeds the temperature at placement when so directed. Notice shall be entered in the Batch Plant Log.

6.5.3 The Quality Control Civil Inspector shall verify the admixture is used in all concrete. This information shall be entered in paragraph 6.5.2.

6.6 Concrete Mixes

6.6.1 Concrete mixes shall be designed by a testing laboratory in accordance with applicable specifications.

7.0 ATTACHMENTS

7.1 The following Quality Control documents (forms) shall be used in accordance with tests and inspections in this procedure by designated inspectors and technicians:

QCIP-4-1	Quality Control Cement Approval
QCIP-4-2	Quality Control Cement Certification
QCIP-4-3	Quality Control Aggregate Storage
QCIP-4-4	Quality Control Aggregate Analysis
QCIP-4-5	Quality Control Aggregate Tests
QCIP-4-6	Quality Control Concrete Aggregate Deleterious Substances
Batch Plant Log	Continuous record of events in book form

7.2 These documents shall be reviewed by the Quality Control Civil Supervisor or his designee for completeness and certification of inspection.

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

WATERFORD SES - UNIT NO 3
QUALITY CONTROL
CEMENT APPROVAL

[illegible]

WATERFOORD STS - UNIT NO 3
QUALITY CONTROL
CEMENT CERTIFICATION

[illegible]

WATERFORD SES - UNIT NO 3
QUALITY CONTROL
AGGREGATE STORAGE

- 1.) Separation from other stockpiles maintained? _____
- 2.) Barriers or walls intact, if applicable? _____
- 3.) Using sand from pile number _____
- 4.) Using #4 - 1/2" from pile number _____
- 5.) Using 1/2" - 1" from pile number _____
- 6.) Sand stockpile surface moist? _____
- 7.) No 4 - 1/2" aggregate pile surface moist? _____
- 8.) 1/2" - 1" aggregate pile surface moist? _____
- 9.) Temperature of sand - (1 ft below surface) _____
- 10.) Temperature of #4 - 1/2" (1 ft below surface) _____
- 11.) Temperature of 1/2" - 1" (1 ft below surface) _____
- 12.) Method of stockpiling coarse aggregate _____

Comments _____

ACCEPTED ☐
REJECTED ☐

Inspector _____ Date _____ Time _____

If rejected, refer to Discrepancy Notice No. _____

WATERFORD SES - UNIT NO. 3

QUALITY CONTROL
AGGREGATE ANALYSIS

Sample Size _____ 1" to 1/2" Stone Location Sampled _____

Sieve	Cumulative Weight-Grams	Cumulative % Retained	% Passing	Specs
1-1/2"				100
1"				85-100
1/2"				* 0 - 30
#4				** 0 - 5
#200				0 - 1
PAN				

Lab. Report No. _____ Laboratory Technician _____ Date _____

Accepted ☐ Ebasco Inspector _____ Date _____

Rejected ☐ _____

If rejected, refer to Discrepancy Notice No. _____

Sample Size _____ 1/2" to #4 Stone Location Sampled _____

3/4"				95-100
1/2"				80-100
#4				* 0 - 15
#8				** 0 - 5
#200				0 - 1
PAN				

Lab. Report No. _____ Laboratory Technician _____ Date _____

Accepted ☐ Ebasco Inspector _____ Date _____

Rejected ☐ _____

If rejected, refer to Discrepancy Notice No. _____

*Nominal undersize

**Significant undersize

Sample Size _____ SAND Location Sampled _____

	Cumulative Weight - Grams	Cumulative % Retained	% Passing	Specs
3/8				100
#4				95-100
#8				80-100
#16				50-85
#30				25-60
#50				10-30
#100				2-10
#200				0-3
PAN				

F M 2.30 - 3.10

Cumulative % Retained _____

F M = _____ = _____
100

Note: ASTM-C33 The minimum percent shown above for material passing the No. 50 and No. 100 sieves may be reduced to 5 and 0, respectively, if the aggregate is to be used in air entrained concrete containing more than 4-1/2 bags of cement.

Lab. Report No. _____ Laboratory Technician _____ Date _____

Accepted ☐ Ebasco Inspector _____ Date _____

Rejected ☐ _____

If rejected, refer to Discrepancy Notice No. _____

WATERFORD SES - UNIT NO 3
QUALITY CONTROL
AGGREGATE TESTS
WEEKLY

	Organic - Impurities		Specific Gravity	Absorption	% Voids	Free Moisture Content
Sand						
4 - 1/2"						
1/2" - 1"						

$$\text{Coarse Aggregate Specific Gravity} = \frac{\text{wt of SSD sample in air}}{\text{wt of SSD sample in air} - \text{wt of SSD sample in water}}$$

$$\text{Percentage Absorption} = 100 \left[\frac{\text{wt of SSD sample in air} - \text{wt of oven dry sample in air}}{\text{wt of oven dry sample in air}} \right]$$

$$\text{Percentage Voids} = 100 \left[\frac{(\text{Specific Gravity of agg} \times \text{unit wt of water}) - \text{unit wt of agg}}{\text{Specific gravity of agg} \times \text{unit wt of water}} \right]$$

$$\text{Unit wt of Aggregate} = \frac{\text{Net wt of material in measure (lb)}}{\text{Volume of container (cu ft)}}$$

$$\text{Percentage Free Moisture} = 100 \left[\frac{\text{wet wt of agg} - \text{SSD wt of agg}}{\text{SSD wt of agg}} \right]$$

$$\text{Sand Specific Gravity} = \frac{500}{\text{volume in ml of flask} - \text{volume in ml of water added to flask}}$$

NOTE: Standard ASTM method using 500 gram sample SSD

Lab. Report No. _____ Laboratory Technician _____ Date _____

ACCEPTED ☐

REJECTED ☐

Ebasco Inspector _____ Date _____

If rejected, refer to Discrepancy Notice No. _____

Form No. QCIP-4-5 (3-5-76)

WATERFORD SES - UNIT NO 3
QUALITY CONTROL
CONCRETE AGGREGATE
DELETERIOUS SUBSTANCES

SAND	Percent by Weight	
	Spec Limits	Test
Material passing No 200 screen	3	
Shale	1	
Coal and lignite	1	
Clay lumps	1	
Other deleterious substances, total	2	
Total of all above substances	5	

Lab Report No. _____ Laboratory Technician _____ Date _____

ACCEPTED ☐ _____

REJECTED ☐ Ebasco Inspector _____ Date _____

If rejected, refer to Discrepancy Notice No. _____.

COARSE AGGREGATE	Percent by Weight	
	Spec Limits	Test
		#4-1/2" 1/2"-1"
Material passing No 200 screen	1	
Shale	1	
Coal and lignite	1	
Clay lumps	1	
Other deleterious substances, total	1	
Total of all above substances	3	

Lab Report No. _____ Laboratory Technician _____ Date _____

ACCEPTED ☐ _____

REJECTED ☐ Ebasco Inspector _____ Date _____

If rejected, refer to Discrepancy Notice No. _____.