EBASCO SERVICES INCORPORATED

WATERFORD STEAM ELECTRIC STATION - UNIT N[illegible]

PROCEDURE FOR: CONTROL OF CONCRETE MIXING AND TRANSPORTING	PROC. NO QCIP-5

ISSUE SUMMARY

ISSUE/DATE	PREPARED	APPROVED	REMARKS
"A" 1-5-73	C Satterfield	[signature]	
"B" DRAFT 8-22-75	C Satterfield	[signature]	
B/9-9-75	C Satterfield	J. O. Booth	Finalizes preliminary QC 4.0-3, Concrete Mixing & Transportation. Also, supersedes QC 4.0-6, Concrete Aggregate Processing and Concrete Mixing Plants, and QC 4.0-8, Concrete Back-up Plant.
"C" Draft 1-23-76	F. R. Howard		Revised to conform with other QCIP's.
"C" 2-27-76	F. R. Howard	J. O. Booth	

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

FORM NO. E-1 (3-3-72)

c/414

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

C 1.0 PURPOSE

1.1 The purpose of this procedure is to record the certification of equipment and the mixing and transportation of concrete.

2.0 SCOPE

C 2.1 This procedure covers the requirements for inspection of the concrete batching and mixing plants, certification of batch plant equipment, in process inspection of plant operation, mixing of concrete, transportation of concrete from the off-site location of the mixing plant or batch plant to the site of the placement.

3.0 REFERENCES

C 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 National Ready Mix Concrete Association (NRMCA)

3.3.1 Certification of Ready Mixed Concrete Production Facilities

3.3.2 Measuring the Uniformity of Concrete Produced in Truck Mixer

4.0 DEFINITIONS

4.1 None

5.0 RESPONSIBILITY

C 5.1 The Quality Control Civil Supervisor is responsible for the inspection and recording of the results of the inspection of the material and equipment which are covered in this procedure.

5.2 The Quality Control Civil Inspector shall report to the Quality Control Civil Supervisor and be directly responsible for enforcing and implementing this procedure and making those reports required.

5.3 The Testing Laboratory Technician shall perform testing and reporting of concrete materials.

6.0 PROCEDURE

C 6.1 Concrete Plant Inspection

6.1.1 The QC Civil Inspector shall perform daily correlation check between scale dial readings and remote readouts at control console. Results are to be documented in batch plant log.

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

6.1.2 The QC Civil Inspector shall maintain a log of daily plant operation including time which batching started and finished.

6.1.3 The QC Civil Inspector shall maintain continuous surveillance of batch plant operation until relieved by another QC Civil Inspector. Change of inspectors shall be documented in batch plant log.

6.1.4 During the batching operation the QC Civil Inspector shall:

6.1.4.1 Periodically check scale remote read out for zero reading prior to the weighing of a batch.

6.1.4.2 Periodically check batch selector to assure that proper mix is being batched.

6.1.4.3 Periodically check moisture meter reading to verify proper moisture and aggregate weight compensation.

6.1.4.4 Periodically witness the weighing of cement, sand, stone, water, and measurement of admixtures to assure that weights are within the specified limits.

6.1.4.5 Periodically check recording ticket for confirmation of batch weights. If the automatic batch printer breaks down, the batch plant operator will fill out the ticket manually using the actual weights read from the remote readout. The QC Civil Inspector shall not fill out the ticket but shall only verify that the weights are within tolerance and sign the ticket.

6.1.4.6 Periodically verify that the truck ticket has the batch time stamped on it.

6.2 Mixing and Transporting Equipment

C 6.2.1 The QC Civil Inspector shall before each start-up of concrete, examine and evaluate all truck mixers and agitator units used to deliver concrete for conformance with the following procedures and record on Form No. QCIP-5-3 and Form No. QCIP-5-4.

6.2.1.1 Daily Inspection

Interior condition satisfactory:
No appreciable accumulation of hardened concrete; blades free of excessive wear; charging and discharging openings and chute in good condition: Free from appreciable accumulations of cement or concrete; hopper and chute surfaces clean and smooth. Equipped with a counter in working condition to indicate the number of total revolutions and mixing revolutions of drum. Results shall be recorded on Form No. QCIP-5-3 and QCIP-5-4.

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

6.2.1.2 Six Month Inspection

Blade wear shall be checked at the point of maximum drum diameter nearest to the drum head. When the height of the blade at this point, measured from the drum shell, is less than 90 percent of the original height (See NRMCA "Certification of Ready Mixed Concrete Production Facilities" Checklist, for sketch of different type blades giving "X" dimension for the original radial height), the blade is considered excessively worn. All dialy inspection procedures shall also be done at this time. Results shall be recorded on Form No. QCIP-5-4.

6.2.1.3 Drum or container of such size that the rating as a mixer (in volume of concrete) does not exceed 63 percent of the gross volume of the mixer disregarding blades. Gross volume computed according to NRMCA. This check is done once, first time on site. If unit has rating plate of "Truck Mixer Manufacturer's Bureau", it is not necessary to check.

6.2.1.4 Provided with a plate showing mixer manufacturer's recommended operating speed for mixing.

6.3 Documentation

C 6.3.1 The main and back up plants shall be certified according to National Ready Mix Concrete Association by an independent registered engineer and shall be maintained in the file as permanent record. Plant shall be recertified every 2 years.

6.3.2 A ticket shall accompany each truck load of concrete with a unique number which shall identify the batch for any future reference.

6.3.3 Each truck used on the project shall be marked in such a way as to be identifiable by the Engineer's inspector from a distance, and a list of the identification marks cross listed to truck chassis serial number shall be provided.

6.3.4 Batch Plant Log - Log as referred to in this procedure is a continuous record of events maintained in book form with not more than one day of events per page.

6.3.5 Concrete mixers or agitators used in transportation of production concrete shall be inspected daily prior to use and results recorded on Form No. QCIP-5-3 and QCIP-5-4.

6.3.6 The uniformity of concrete produced in truck mixers shall be verified every 6 months and recorded on Form No. QCIP-5-1

NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

6.3.7 Scale calibration shall be made every 90 days or at the Quality Control Civil Supervisor's direction, by a licensed scale calibrating company using weights certified to be traceable to the National Bureau of Standards. Scales shall have a repeatability accuracy, on three successive tests, of one quarter of the total allowable accuracy limit of the material for which the scales are used. Results shall be recorded on Form No. QCIP-5-2.

7.0 ATTACHMENTS

7.1 Forms

QCIP-5-1	Measuring the Uniformity of Concrete Produced in Truck Mixers	Filled out by Lab. Tech.
QCIP-5-2	Batch Plant Scale Calibration	Filled out by Lab. Tech.
QCIP-5-3	Concrete Equipment Clearance	Filled out by QC Inspector
QCIP-5-4	Concrete Transporter Record	Filled out by QC Inspector

WATERFORD STEAM ELECTRIC STATION
1980 - 1165 MW INSTALLATION - UNIT NO 3
MEASURING THE UNIFORMITY OF
CONCRETE PRODUCED IN TRUCK MIXERS
ASTM C-94-74

Truck o: Mixer No _____

RPM ___ _____ No of Revolutions _____

Air Tem: rature _____

	Sample No 1	Sample No 2	Variation Limits Between 1 and 2
Temperat: re of concrete			
Slump (A erage of 2 per sample)			1" if avg. slump is 4"
Unit Wei ht			1.5" if avg. slump is 4 to 6"
Air Cont nt			1 percent
Air free unit weight of mortar			1.6% of avg of samples
Air free unit weight of concrete			1 lb per cubic foot
Coarse a gregate			6% by weight of concrete
Compress ve strength (Average 3 cylinders)			7.5% of avg of each age

Formula or calculating air-free unit weights:

$$M = \frac{b - c}{V \left(\frac{V \times A}{100} + \frac{c}{G \times 62.4} \right)}$$

$$C = \frac{b}{V - \left(\frac{V \times A}{100} \right)}$$

M = lb/ft^3 (unit wt of air free mortar)

C = lb/ft^3 (unit wt of air free concrete)

b = lbs (wt of concrete sample in unit wt container)

c = lbs (S S D wt of agg on #4 screen)

V = ft^3 (volume of unit wt test container)

A = % (air content of concrete)

G = sp gravity of coarse aggregate

P = % retained on No 4 sieve

Percenta : of coarse aggregate

$$P = \frac{c}{b} \times 100$$

Accepted ☐ Rejected ☐ QC Inspector _____ Date _____

Form No)CIP-5-1 (2-27-76)

Form No. QCIP-5-2 (2-27-76)

S - Scale Weight
C - Computer Read-Out

WATERFORD SES - UNIT NO. 3
QUALITY CONTROL
BATCH PLANT SCALE CALIBRATION

Date: _____
Accepted by Testing Laboratory _____
Accepted by Q. C. Inspector _____

AGGREGATE					AGGREGATE					AGGREGATE					AGGREGATE					AGGREGATE				
True Wt	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Scale Wt	Computer Read-Out	% Error S	% Error C
[illegible]					8200					16200					24200					32200				
[illegible]					8400					16400					24400					32400				
8000					8600					16600					24600					32600				
[illegible]					8800					16800					24800					32800				
[illegible]					9000					17000					25000					33000				
[illegible]					9200					17200					25200					33200				
[illegible]					9400					17400					25400					33400				
[illegible]					9600					17600					25600					33600				
[illegible]					9800					17800					25800					33800				
[illegible]					10000					18000					26000					34000				
[illegible]					10200					18200					26200					34200				
[illegible]					10400					18400					26400					34400				
[illegible]					10600					18600					26600					34600				
[illegible]					10800					18800					26800					34800				
[illegible]					11000					19000					27000					35000				
[illegible]					11200					19200					27200					35200				
[illegible]					11400					19400					27400					35400				
[illegible]					11600					19600					27600					35600				
[illegible]					11800					19800					27800					35800				
[illegible]					12000					20000					28000					36000				
[illegible]					12200					20200					28200					36200				
[illegible]					12400					20400					28400					36400				
[illegible]					12600					20600					28600					36600				
[illegible]					12800					20800					28800					36800				
[illegible]					13000					21000					29000					37000				
[illegible]					13200					21200					29200					37200				
[illegible]					13400					21400					29400					37400				
[illegible]					13600					21600					29600					37600				
[illegible]					13800					21800					29800					37800				
[illegible]					14000					22000					30000					38000				
[illegible]					14200					22200					30200					38200				
[illegible]					14400					22400					30400					38400				
[illegible]					14600					22600					30600					38600				
[illegible]					14800					22800					30800					38800				
[illegible]					15000					23000					31000					39000				
[illegible]					15200					23200					31200					39200				
[illegible]					15400					23400					31400					39400				
[illegible]					15600					23600					31600					39600				
[illegible]					15800					23800					31800					39800				
[illegible]					16000					24000					32000					[illegible]				

Form No. QCIP-5-2 (7-23-76)

Sheet 2 of 3

WATERFORD SES - UNIT NO. 3

QUALITY CONTROL

BATCH PLANT SCALE CALIBRATION

Date: _____

Accepted by Testing Laboratory _____

Accepted by Q.C. Inspector: _____

S - Scale Weight
C - Computer Read-Out

CEMENT						CEMENT						WATER						WATER					
True Wt	Nearest Scale Wt Division	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Nearest Scale Wt Division	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Nearest Scale Wt Division	Scale Wt	Computer Read-Out	% Error S	% Error C	True Wt	Nearest Scale Wt Division	Scale Wt	Computer Read-Out	% Error S	% Error C
100	98					4100	4102					50	51					2050	2049				
200	203					4200	4200					100	99					2100	2100				
300	301					4300	4295					150	150					2150	2151				
400	399					4400	4401					200	201					2200	2199				
500	497					4500	4501					250	249					2250	2250				
600	602					4600	4599					300	300					2300	2301				
700	700					4700	4697					350	351					2350	2349				
800	798					4800	4802					400	399					2400	2400				
900	903					4900	4900					450	450					2450	2451				
1000	1001					5000	4998					500	501					2500	2499				
1100	1099					5100	5103					550	549					2550	2550				
1200	1197					5200	5201					600	600					2600	2601				
1300	1302					5300	5299					650	651					2650	2649				
1400	1400					5400	5397					700	699					2700	2700				
1500	1498					5500	5502					750	750					2750	2751				
1600	1603					5600	5600					800	801					2800	2799				
1700	1701					5700	5698					850	849					2850	2850				
1800	1799					5800	5803					900	900					2900	2901				
1900	1897					5900	5902					950	951					2950	2949				
2000	2002					6000	5999					1000	999					3000	3000				
2100	2100					6100	6097					1050	1050										
2200	2198					6200	6202					1100	1101										
2300	2302					6300	6300					1150	1149										
2400	2401					6400	6398					1200	1200										
2500	2499					6500	6503					1250	1251										
2600	2597					6600	6601					1300	1299										
2700	2702					6700	6699					1350	1350										
2800	2800					6800	6797					1400	1401										
2900	2898					6900	6902					1450	1449										
3000	3003					7000	7000					1500	1500										
3100	3101											1550	1551										
3200	3199											1600	1599										
3300	3297											1650	1650										
3400	3402											1700	1701										
3500	3500											1750	1749										
3600	3598											1800	1800										
3700	3703											1850	1851										
3800	3801											1900	1899										
3900	3899											1950	1950										
4000	3997											2000	2001										

Form No. QCIP-5-2 (2-27-76)

S - Scale Weight
C - Computer Read-Out

WATERFORD SES - UNIT NO. 3
QUALITY CONTROL
BATCH PLANT SCALE CALIBRATION

Date: _____
Accepted by Testing Laboratory: _____
Accepted by Q.C. Inspector: _____

WATER REDUCING SET RETARDER																					
Admixture D					Admixture D					AEA					WATER REDUCING AGENT						
															Admixture A					Admixture A	
Grad Glass Oz.	Meas. Oz.	Computer Read-Out	% Error S	% Error C	Grad Glass Oz.	Meas. Oz.	Computer Read-Out	% Error S	% Error C	Grad. Glass Oz.	Meas. Oz.	Computer Read-Out	% Error S	% Error C	Grad. Glass Oz.	Meas. Oz.	Computer Read Out	% Error S	% Error C	Grad. Glass Oz.	Meas. Oz.	Computer Read-Out	% Error S	% Error C
4					164					4					4					164				
8					168					8					8					168				
12					172					12					12					172				
16					176					16					16					176				
20					180					20					20					180				
24					184					24					24					184				
28					188					28					28					188				
32					192					32					32					192				
36					196					36					36					196				
40					200					40					40					200				
44					204					44					44					204				
48					208					48					48					208				
52					212					52					52					212				
56					216					56					56					216				
60					220					60					60					220				
64					224					64					64					224				
68					228					68					68					228				
72					232					72					72					232				
76					236					76					76					236				
80					240					80					80					240				
84					244					84					84					244				
88					248					88					88					248				
92					252					92					92					252				
96					256					96					96					256				
100					260					100					100					260				
104					264					104					104					264				
108					268					108					108					268				
112					272										112					272				
116					276										116					276				
120					280										120					280				
124					284										124					284				
128					288										128					288				
132					292										132					292				
136					296										136					296				
140					300										140					300				
144					304										144					304				
148					308										148					308				
152					312										152					312				
156					316										156					316				
160					320										160					320				

WATERFORD STEAM ELECTRIC STATION
1980 - 1165 MW INSTALLATION - UNIT NO 3
QUALITY CONTROL
CONCRETE EQUIPMENT CLEARANCE

Date: _____

Inspector: _____

Mixer or Agitator No	Condition of Openings, Hopper and Chute	Clean	Condition Mixer Blades	Revolution Counter Working	Approved or Disapproved

Form No QCIP-5-3 (1-23-76)

Form No. QCIP-5-4 (1-23-76)

CONCRETE TRANSPORTER RECORD

TRUCK NO. _____ TRANSIT MIXER NO. _____ AGITATOR NO. _____

R.P.M. REQ'D _____ REV. REQ'D AT MIXING SPEED _____

DATE	LEVEL OF CHECK	APPROVED	DISAP-PROVED	REASON DISAPPROVED	INSPECTOR

Note: See Reverse Side For Level of Check.

(NOTES ON REVERSE SIDE OF FORM No. QCIP-5-4.

Level I check: First time on site and periodically thereafter.

Level II check: Each day prior to commencement of mixing concrete.

Level I check:

*Rating as mixer, volume of concrete does not exceed 63% of gross volume of mixer.

*Rating as agitator, volume of concrete does not exceed 80% of gross volume of mixer.

**Check efficiency of mixer and establish RPM necessary. Blades free of excessive wear. Plus all level II checks.

Level II check: Check RPM established for this mixer. No appreciable accumulation of hardened concrete at charging and discharge openings and chute in good condition. Hopper and chute surfaces clean and smooth. Revolution counter working.

*Check once, first time on site. If unit has rating plate of "Truck Mixer Manufacturers Bureau", it is not necessary to check.

**Check first time on site and enter on other side of card.

Level I check each 6 months or more frequent if required.