

AFFIDAVIT OF THOMAS F. GERRETS

Parish Of Orleans)

) ss.

State of Louisiana)

THOMAS F. GERRETS, being first duly sworn, deposes and says:

1. I am employed by Louisiana Power & Light Company ("LP&L") as Quality Assurance Manager for the Waterford 3 Nuclear Generating Plant, and I have been involved in the Waterford 3 project since the beginning of construction of the plant. I have personal knowledge of the matters stated herein, and I make this Affidavit in support of LP&L's Motion for Summary Disposition of Joint Intervenors' Contention 22.

2. LP&L's architect-engineer for the Waterford 3 project is Ebasco Services, Inc., which has general supervisory responsibility for construction, including the placement of all safety-related concrete. Most of the concrete was actually placed by an Ebasco subcontractor, the J. A. Jones Construction Company. Some of the specialized concrete placements were performed by another subcontractor, Fegles Power Service. At present, more than 99% of safety-related concrete construction at Waterford 3 has been completed.

3. LP&L has implemented a rigorous Quality Assurance ("QA") and Quality Control ("QC") program for Waterford 3 in compliance with 10 C.F.R. Part 50, Appendix B. LP&L's QA/QC program is described in Section 1.8 of the Waterford 3 Preliminary Safety Analysis Report

and in Chapter 17 of the Waterford 3 Final Safety Analysis Report. In addition, Ebasco independently implements its own QA/QC program, which has been generically approved by the Nuclear Regulatory Commission ("NRC"). Both concrete construction subcontractors also have detailed QA/QC programs, which have been reviewed and approved by Ebasco.

4. The cement, aggregate, admixtures and other materials used in batching concrete for Waterford 3 are all obtained from supply sources with QA programs that have been reviewed and approved by Ebasco. The concrete batch contractor, an affiliate of QA Corporation, performs a receiving inspection on the concrete constituent materials to ensure that the materials conform to the specification requirements established by Ebasco. In addition, an independent testing laboratory, Peabody Testing Services, Inc., performs physical and chemical tests on the cement, aggregates and water. A copy of the test and inspection procedure followed by Peabody Testing Services is attached hereto as Exhibit A.

5. All concrete is batched in accordance with mix designs that meet industry standards and have been approved by Ebasco. After batching, both Ebasco and Peabody Testing Service perform appropriate tests and inspections to ensure that the concrete has been properly mixed and is acceptable before it leaves the batch plant. A copy of the Ebasco specification for batching concrete is attached hereto as Exhibit B.

6. When the first concrete truck of the day reaches the placement location, and before any safety-related placement begins, Peabody Testing Services tests for air content, slump, unit weight, ambient temperature and concrete temperature. These tests are repeated approximately every 50 cubic yards of concrete after the first batch of the day and every batch is checked for proper water/cement ratio and the number of drum revolutions on the delivery truck. Additionally, Peabody Testing Services makes a set of four compression cylinders from the first batch of the day and every 150 cubic yards thereafter. If a concrete placement is less than 150 cubic yards, but more than 50 cubic yards, a minimum of two sets of cylinders must be molded. The cylinders are then tested for compressive strength at the Peabody Concrete Testing Laboratory with one cylinder being broken at 7 days of age, two at 28 days and one which is used as a spare should problems be encountered with the 28 day breaks. Cylinders are molded, cured and broken in accordance with ASTM C-31.

7. Before each concrete placement, the placement location is subjected to a preplacement inspection by representatives of Ebasco and the concrete subcontractor. This inspection is designed to ensure proper preparation of the placement location for receipt of concrete, including proper surface preparation and form placement, proper placement of reinforcing steel, and adequate cleanliness. Copies of the concrete preplacement inspection checklists are attached hereto as Exhibit C.

8. The actual placement of concrete is performed in strict compliance with Ebasco's Detailed Specification for Concrete Placement, Curing and Finishing, a copy of which is attached hereto as Exhibit D. The placement must also be carried out in accordance with the detailed concrete placement procedures of the concrete subcontractor. For example, a copy of the J. A. Jones Construction Company Construction Work Procedure for Concrete Placing, Curing, Finishing and Repairs is attached hereto as Exhibit E. All concrete placements are observed and inspected by QC inspectors of the concrete subcontractor to ensure that the concrete is properly placed and cured in accordance with the established procedures and specifications. In addition, most of the concrete placements have been independently observed and inspected by Ebasco QC inspectors. A copy of the concrete placement inspection checklist used at Waterford 3 is attached hereto as Exhibit F.

9. All inspections and QA/QC functions concerning safety-related concrete are thoroughly documented in accordance with 10 C.F.R. Part 50, Appendix B, and the documentation is retained by LP&L. In addition, LP&L QA auditors periodically observe the work at Waterford 3 and audit the QA/QC programs of Ebasco and the concrete subcontractors to ensure that proper QA/QC procedures are being followed. Ebasco also independently audits the concrete subcontractors' QA/QC procedures, and Ebasco's QA/QC program at the Waterford 3 site is in turn audited by representatives from Ebasco's headquarters in New York. LP&L's QA/QC program is audited by Middle

South Services, Inc., a subsidiary of the holding company that owns LP&L. Finally, the NRC performs its own on-site inspections of the construction at Waterford 3 and audits of the QA/QC program.

10. An important aspect of the Waterford 3 QA/QC program is the system of documenting, reporting and resolving problems that are identified during the process of construction. Minor problems are documented on Discrepancy Notices and corrected, usually at the site. Nonconformance Reports are used to document more serious problems, such as those requiring design engineering input and those requiring procedural changes or other action to preclude recurrence. Nonconformance Reports are reviewed and evaluated by Ebasco to ensure that proper corrective action is taken. Problems that, if left uncorrected, could affect the safety of the plant within the meaning of 10 C.F.R. § 50.55(e) become the subject of Construction Deficiency Reports and are reported to the NRC within 24 hours. Thereafter, LP&L submits to the NRC a detailed analysis of the deficiency and the means by which it will be corrected. After repairs or other corrective measures have been completed, the NRC performs an on-site inspection to verify the adequacy of the corrective action. When the NRC inspection is successfully completed, the Construction Deficiency Report is considered to be closed. In general, LP&L has taken a conservative approach to reporting deficiencies to the NRC. We have always resolved any substantial doubts in favor of reporting the problem to the NRC in a Construction Deficiency Report.

11. During the course of construction, the placement of safety-related concrete has resulted in only four Construction Deficiency Reports. Each deficiency was duly reported to the NRC, corrected by LP&L, and closed out through an NRC inspection. These four Construction Deficiency Reports are summarized below:

1. Construction Deficiency Report No. 1
Common Foundation Mat-Block 19
Placement 499S03-19
24-hour notice given to NRC on July 6, 1976
Final Report submitted to NRC on July 19, 1977
Closed out by NRC Inspection No. 77-07

2. Construction Deficiency Report No. 2
Reactor Auxiliary Building
Interior Wall 51B
Placement 570S03-51B
24-hour notice given to NRC on August 18, 1976
Final Report submitted to NRC on April 11, 1977
Closed out by NRC Inspection No. 77-06

3. Construction Deficiency Report No. 3
Common Foundation Structure Wall
Placement 499S04-11A4
24-hour notice given to NRC on May 19, 1977
Final Report submitted to NRC on November 8, 1977
Closed out by NRC Inspection No. 77-15

4. Construction Deficiency Report No. 13
Reactor Containment Building Dome
Placement 521-1B
24-hour notice given to NRC on August 16, 1979
Final Report submitted to NRC on April 21, 1980
Closed out by NRC Inspection No. 80-03

12. During the course of construction, the NRC made a number of unannounced visits to the Waterford 3 site to inspect the construction, including the placement of safety-related concrete. None of the NRC inspections revealed any significant defect in the safety-related concrete placed at Waterford 3, of such seriousness that it should have been reported to the NRC under 10 C.F.R. §50.55(e) because of its effect on safety. All of the deficiencies concerning safety-related concrete identified in NRC inspections have been relatively minor, mostly involving problems with QA/QC procedures and documentation. The results of the inspections dealing with safety-related concrete are detailed in NRC Inspection Report Nos. 75-05, 75-10, 76-01, 76-04, 76-06, 76-11 and 77-05. In each case, the problem discovered has been corrected by LP&L, and the matter has been closed following a reinspection by the NRC.

13. I am informed that Joint Intervenors' Contention 22 was filed as a result of an article appearing in the April 3, 1979, issue of the New Orleans States Item. The article stated that three construction workers had questioned the concrete placement practices at Waterford 3. The workers were unnamed but were apparently working on the Intake Structure, which is not a safety-related structure. I personally investigated the allegations in the newspaper article, including numerous interviews with construction workers, but I was unable to locate the three concrete workers in question, and I was unable to discover any factual basis for the questions they reportedly raised. The NRC investigated the matter independently and it also was

unable to find any basis for the allegations. A copy of the NRC's inspection report is attached hereto as Exhibit G.

14. I can state unequivocally that I know of no basis for Joint Intervenors' Contention 22. I believe that no significant defects in safety-related concrete have gone undetected through our QA/QC program, as is demonstrated by the results of the NRC's independent inspections. We have properly documented, evaluated and corrected as necessary, all known defects in safety-related concrete, and have fully complied with NRC regulations in reporting deficiencies to the NRC.

Thomas F. Gerrets
THOMAS F. GERRETS

Subscribed and sworn to before me this 19th day of August, 1981.

[Signature]
NOTARY PUBLIC

My Commission Expires: WITH 2 LIFE.



MAD
 APPROVED _____ DATE 5-23-80
John F. DeLo
 APPROVED _____ DATE 5-23-80
Mark R. Huerto
 AUTHORIZED FOR USE _____ DATE 5-30-80

**EPASCO SERVICES
 INCORPORATED**
**QUALITY
 ASSURANCE
 ENGINEERING**

This Document is:

Reviewed Without Comments
 Reviewed With Comments as
 noted; Incorporate Comments,
 and Resubmit; Proceed With
 Order.
 Rejected; Revise and Resubmit

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[Signature]
 Date: 6-17-80

PEABODY TESTING SERVICES, INC.
 TEST AND INSPECTION PROCEDURE
 QA12-6752
 FIELD AND LABORATORY INSPECTION
 AND TESTING OF CONCRETE

CONTROLLED COPY #4

19

REVISION NO.	DESCRIPTION	BY	EFFECTIVE DATE
2	Revised As Noted In Text	MAD	5-20-80
1	Page 1, 3.3-3.6 Page 2, 3.7.-3.10, 4.1,4.2,5.1,6.1 Page 3, 6.1-6.7 Page 4, 6.9-6.11, Page 5,6.7.16 Page 6,6.10.3 Page 7,6.10.6, 6.12, 6.13	MF	9-21-79
0	Issued for Use Forms Attached	WRW	8-23-75

1.0 SCOPE

1.1 The purpose of this procedure is to outline the instructions for those quality control inspection and testing functions (field and laboratory) relative to concrete for permanent inspection data, and to identify the methods by which the concrete materials and mixes shall be tested and controlled.

2.0 GENERAL

2.1 This procedure covers the inspection and testing (field and laboratory) of concrete for permanent plant structures, the requirements for in-process inspection of batch plant operations and the testing and recording of the test results on concrete materials which are to be used in the permanent plant structures.

2.2 The degree of testing and inspection by Peabody Testing Services, Inc. is limited to sampling, performance of tests, recording and reporting of test results. Contractors performing safety-related work shall be responsible for inspection and documentation of that work.

2.3 Definitions of terms used in this procedure may be found in the references noted in Section 3.0.

2.4 Frequency of testing shall be as called out at the point of reference or as directed by the Engineer.

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 Steel during the Construction Phase of Nuclear Power Plants.
- 3.3 ANSI N45.2.6-1973-Qualifications of Inspection, Examination, and Testing Personnel for Construction Phase of Nuclear Power Plants.
- 3.4 ACI Manual of Concrete Inspection
- 3.5 ASTM Manual of Concrete Aggregates; Concrete Testing, Part 14.
- 3.6 Peabody Testing Services Personnel Qualification and Certification Procedure 33.G.5 Section III.

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- 3.7 Peabody Testing Services, Inc. Procedure QA6-6752-
Equipment Identification and Calibration.
- 3.8 Peabody Testing Services, Inc. Procedure QA13-6752-
Discrepancies and Nonconformances.
- 3.9 Peabody Testing Services, Inc. Procedure QA3-6752-
Identification and Disposition of Material and Test
Samples.
- 3.10 Peabody Testing Services, Inc. Procedure QA7-6752-
Document Control and Storage.

4.0 PERSONNEL QUALIFICATIONS

- 4.1 This test procedure shall be conducted by any Level I Assistant, Level I, Level II, or Level III Technician who has been qualified in accordance with Peabody Testing Services Administrative Procedure 33.G.5- Qualification and Certification of Personnel. All data recorded shall be checked by a Level II or a Level III Technician. The results cannot be checked and approved by the same technician who performed the actual procedure.
- 4.2 The Level I Assistant shall be a designated Level I Technician for that Test Procedure he has been Qualified to perform Independently and function accordingly.

5.0 EQUIPMENT

- 5.1 Calibrated equipment shall be used in the performance of any test required by this procedure. Calibration shall be in accordance with Peabody Testing Services, Inc. Procedure QA6-6752. The identification of the equipment used in the performance of any test shall be recorded on the test results form.

6.0 PROCESS-PROCEDURE

- 6.1 The Concrete Field Supervisor shall report to the Peabody Testing Services, Inc. Project Engineer and shall be responsible for implementation of the requirements, the inspection of testing, and the documentation of inspection and test results for materials and equipment, which are covered in this procedure.
 - 6.1.1 He shall assign Concrete Field Inspectors to sample and test concrete as required.
 - 6.1.2 He shall assign Batch Plant Inspectors as required and monitor their activities.
 - 6.1.3 He shall assign Concrete Laboratory Technicians to sample and test concrete materials as required.

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- 6.1.4 He shall be responsible for checking test results for acceptance.
- 6.1.5 He shall be responsible for assuring that the inspection and testing results are properly recorded.
- 6.2 The Concrete Field Inspectors shall report to the Concrete Field Supervisor and shall be responsible for performances of the field inspections and test as instructed in this procedure.
- 6.3 The Concrete Laboratory Technician shall report to the Concrete Field Supervisor and shall be responsible for implementation of the procedures, the performance of laboratory testing and reporting of test results on concrete materials as covered in this procedure.
- 6.4 The Batch Plant Inspector shall report to the Concrete Field Supervisor and shall be responsible for monitoring all batch plant activities.
- 6.5 The Peabody Testing Services, Inc. Project Engineer shall be responsible to provide technical assistance to the Concrete Field Supervisor. 2
- 6.6 The Site Quality Assurance Manager shall be responsible for maintaining quality documentation, performing internal audits on Peabody Testing Services, Inc. personnel and procedures, and general maintenance of the site Quality Assurance program. 2
- 6.7 The Concrete Field Inspector shall insure that control is maintained on the consistency of the delivered concrete. This control shall be by means of sampling and testing. The initial concrete truck for each design mix each day from each batching plant shall be tested at the tailgate and no concrete shall be permitted to discharge into any placement until its test results are known from the initial truck and the concrete is acceptable. Record test shall also be performed on this initial truck with no concrete permitted to discharge from the test truck into the placement until the test results are known and the concrete is acceptable. After the initial truck of the day, tailgates need not be taken if the concrete is delivered continuously. (Continuously shall be defined as having the batch plant in operation without an interruption of more than two hours). In the event of an admix dosage change, the first truck with the change shall be tested at the tailgate. Until tailgate test results are known and acceptable no concrete shall be permitted into any placement. The test results shall

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be recorded on Form No. PB05-0.752, Field Concrete Inspection Data. This form shall be filled-in completely.

- 6.7.1 Ticket Number-The inspector shall record all ticket numbers for any batch of concrete being sampled.
- 6.7.2 Truck Number-The inspector shall record all truck numbers for the batch of concrete being sampled.
- 6.7.3 Time Batched-The time that the concrete being sampled was batched shall be entered here. This information is on the batch ticket.
- 6.7.4 Time Completed Discharging-The time that the truck completed discharging shall be entered.
- 6.7.5 Quantities-The number of yards in the batch being sampled shall be recorded. This information is on the batch ticket. The cumulative number of yards for the placement shall also be recorded.
- 6.7.6 Drum Revolutions @Mixing Speed-Prior to discharging of concrete from truck, the number of revolutions at mixing speed shall be recorded.
- 6.7.7 Total Drum Revolutions-At the start of discharging of concrete from truck, the number of total revolutions of the drum shall be recorded. This number shall not exceed 300 before completion of discharge.
- 6.7.8 Water Added-When the amount of water in a batch of concrete is below the allowable water/cement ratio, additional water may be added to the load of concrete. The inspector shall determine the actual amount of additional water added by others, and record this figure in gallons. The total amount of water added shall not exceed the allowable water/cement ratio. After water is added, a minimum of 30 mixing revolutions shall be added, with total mix revolutions not to exceed 130.
- 6.7.9 Slump-The first batch of concrete produced each day and every 50 + 10 cubic yards placed thereafter shall be tested for slump in accordance with ASTM-C-143. The inspector shall record the test results.
- 6.7.10 Air Content-The first batch of concrete produced each day and every 50 + 10 cubic yards placed thereafter shall be tested for air content in accordance with ASTM-C-231. The results of the tests shall be recorded.

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- 6.7.11 Unit Weight-The unit weight will be determined once for each 50 + 10 cubic yards palced in accordance with ASTM-C-138. The weight of the bucket and sample shall be entered here. The actual unit weight shall be calculated upon completion of placement:
 - 6.7.12 Ambient Temperature-The ambient temperature at the time cylinders are cast shall be determined and recorded.
 - 6.7.13 Concrete Temperature-The temperature of the first batch of concrete produced each day and every 50 + 10 cubic yards placed thereafter shall be determined and recorded.
 - 6.7.14 Rejected-Yes-or No-The inspector shall indicate whether the load of concrete was rejected by entering Yes or No. If yes, Section 6.2 of QA3-6752, Indentification and Disposition of Material and Test Samples shall be followed.
 - 6.7.15 Remarks-Indicate if there were any remarks by entering Yes or No here. from No. PB05-01B-6752 is to used to record the reason for rejection of concrete and the approximate amount rejected. Other statements which are pertinent to the test record shall be entered.
 - 6.7.16 A set of four (4) compression cylinders shall be made from the first acceptable batch of concrete produced each day and every 150 cu.yds. there- after. However, a minimum of two sets of cylinders must be taken whenever the concrete placement is less than 150 c.y. but more than 50 c.y. (In accordance with ASTM-C-31). A set of five (5) cylinders shall be made every 300 cu. yards. All sets shall be numbered and this number made a part of the permenent record.
 - 6.7.17 Particular attention shall be given to the notes on this form, No. PB05-01-6752. The inspector shall record equipment identification numbers of testing equipment used in the appropriate blanks.
- 6.8 The Concrete field Inspector shall enter the following information on Form No. PB05-04-6752, compressive strength of concrete cylinders.
- A. Date and Time Cast
 - B. Cylinder Molded by
 - C. Curing Box Number
 - D. Quality Represented

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- E. Placement Number
- F. Design Number
- G. Ticket Number
- H. Truck Number
- I. Cubic Yards in Batch

6.8.1 The remaining information shall be entered on Form No. PBO5-04-6752 by the Concrete Laboratory Technician.

6.9 The Concrete Testing Laboratory shall report the results of concrete cylinder testing on Form No. PBO5-04-6752, Compressive Strength of Concrete Cylinders. Compressive strength specimens shall be picked up within the allowable time in accordance with ASTM-C-31. The cylinders will be removed from the mold and the cylinder set number shall be marked on the side of the specimen. The specimens shall be placed vertically in saturated lime water tanks for the remainder of the curing time. A daily temperature log will be maintained of the temperatures in the curing tanks. All applicable data will be recorded for traceability of cylinders in the "Cylinder Log Book". Cylinders will be tested in accordance with ASTM-C-39-72 and C-683-76.

6.10 The Concrete Laboratory Technician shall insure that control is maintained on the consistency of the concrete materials by sampling and testing.

6.10.1 Cement-The Concrete Laboratory Technician shall check the temperature of each incoming shipment of cement and shall document this on Form No. PBU2-17-6752, Cement Certification. Cement exceeding 170° F. shall not be used.

6.10.2 One test sample for each 1200 tons of cement received shall be obtained and tested in accordance with ASTM-C-150. Samples shall be taken by the Concrete Laboratory Technician. The lab number assigned the sample, date sampled, car number from which sample was obtained and tests required shall be recorded in the laboratory log book and shipped to the support laboratory for testing.

6.10.3 Aggregates-The following sampling and testing shall be performed by the Concrete Laboratory Technician during concrete production using the appropriate ASTM standards.

- a) Gradation (ASTM-C-136) -once per shift
- b) Organic Impurities (ASTM-C-40) -weekly
- c) Material finer than #200 Sieve (ASTM-C-117) -once per shift
- d) Clay Lumps and Friable Particles (ASTM-C-142)

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- e) Specific Gravity and Absorption (ASTM-C-127 or C-128) -weekly
- f) Percentage Voids (ASTM-C-30) -weekly
- g) Lightweight Pieces (ASTM-C-123) -monthly
- h) Soft Fragments (ASTM-C-235) -monthly
- i) Los Angeles Abrasion (ASTM-C-131 or C-535) -6 months
- j) Flat and Elongated Particles (CFD-C-119) -6 months
- k) Soundness (ASTM-C-88) -6 months
- l) Moisture Content (ASTM-C-566) -daily, as needed

6.10.4 Any of the above tests shall be performed more frequently when required by the Concrete Field Supervisor, owner, Representative of owner based on job conditions. These tests are to be made during concrete production. Results of tests run once per shift shall be reported on Form No. PB01-02-6752. Results of tests run weekly shall be reported on Form No. PB01-03-6752. Results of tests run monthly shall be reported on Form No. PB01-04-6752. Results of tests run every 6 months shall be reported on Form No. PB01-05-6752. Moisture Content shall be reported on Form No. PB01-01-6752.

6.10.5 Water-The following tests shall be conducted to verify that the quality of water meets the requirements as established by specification LOU 1564.472. A copy of this report will be obtained for the Quality Control records. Sampling shall be done by the Concrete Laboratory Technician.

- a) Acidity & Alkalinity (AASHTO T-26) -Monthly
- b) Scotts Mineral Analysis (AASHTO T-26) -every three months
- c) Mohr Method Chloride (AASHTO T-26) -Monthly
- d) Bolhard Method Chloride (AASHTO T-26) -when required
- e) Effects on Compressive Strength (ASTM-C-109) -6 months
- f) Effects on Setting Time (ASTM -C-191) -6 months
- g) Effects on Soundness (ASTM-C-151) -6 months

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

6.11 The Batch Plant Inspector shall be responsible for assuring

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that the weights used for each batch are within the allowable tolerances. He shall also be responsible for the computation of per batch water/cement ratio and computation of the maximum allowable water which can be added in the field.

6.12 The disposition of rejected material (ie: concrete constituent materials, mixed concrete), shall be in accordance with Peabody Testing Services, Inc. Procedure QA3-6752-Identification and Disposition of Material and Test Samples-Or as directed by the Engineer. 2

6.13 Documentation of Deficient materials or testing procedures shall be in accordance with Peabody Testing Services, Inc. Procedure QA13-6752-Discrepancies and Nonconformances. 2

7.0 REPORTS

7.1 Forms-See attachments for applicable forms to this procedure

7.2 Results Acceptability-Test results will indicate "Meets Specification Requirements" or "Does Not Meet Specification Requirements", whichever applicable.

7.3 All forms are to be filled out completely.

7.4. Reports will be transmitted in accordance with Peabody Testing Services, Inc. Procedure QA7-6752-Document Control and Storage. 2

8.0 ACCEPTANCE CRITERIA

8.1 Ebasco Specification LOU-1564.472, Concrete Masonry.

8.2 Report forms will contain applicable criteria.

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EBASCO SPECIFICATION
CONCRETE MASONRY
SECTION III
CONCRETE AGGREGATE PROCESSING
AND CONCRETE MIXING PLANTS

Project Identification
No. LOU-1564.472
Issue Date: December 31, 197

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EBASCO SPECIFICATION
CONCRETE MASONRY
SECTION III
CONCRETE AGGREGATE PROCESSING
AND CONCRETE MIXING PLANTS

Project Identification
No. LOU-1564.472
Issue Date: December 31, 19

1. This is Section III of a Specification covering the general and specific requirements for concrete using on-site or established commercial off-site concrete production facilities.

SCOPE

This section covers the requirements of aggregate processing plants and the requirements of concrete mixing plants to be used if an on-site plant is established.

2. Definition of terms used in this Specification are as follows:

DEFINITION

.1 Engineer

In these specifications, the word "Engineer" shall mean the person in responsible charge of the work for the Owner, or his representative.

.2 ASTM Standards

When this Specification refers to certain "Standard Specifications" or "Tentative Specifications" of the American Society for Testing and Materials, the latest revision of those specifications shall apply.

.3 Detailed Specifications

Where the phrase "detailed specifications" is used in this Specification, it shall be understood to refer to specifications which may be included on the construction drawings or in the Contract for the purpose of supplementing, modifying or eliminating any of the requirements of this Specification.

.4 Aggregates

"Aggregate" in general designates both the 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.

3. This Specification for "Aggregate Processing Plant" is intended to cover jobs where a plant for processing of aggregates is required. No deviation from the requirements of this Specification will be permitted without the written approval of the Engineer, or unless they are specifically and individually called for in the detailed specifications for a particular job.

AGGREGATE
PROCESSING
PLANT

EBASCO SPECIFICATION
CONCRETE MASONRY
SECTION III (Cont'd)

Project Identification
No. LOU-1564.472
Issue Date: December 31, 19

3.1 Type of Plant

Complete and adequate facilities shall be provided for proper crushing, screening, washing, classifying, storing, reclaiming and delivering the aggregates to the mixing plant.

AGGREGATE
PROCESSING
PLANT
(Cont'd)

.2 Samples and Tests

The aggregate plant shall be operated a sufficient time in advance of the date set for the first placement of concrete to permit the development of procedures which result in high capacity production of aggregates proven by test to meet all the requirements of this Specification.

.3 Fines in Sand

The facilities for fine aggregate production shall be so designed and operated as to retain the necessary quantity of suitable sub 50 mesh fractions. Conversely, an excess of fines will not be permitted.

.4 Drainage of Aggregate

Aggregates shall not be removed directly from the washing or classifying operations to the aggregate bins in the concrete mixing plant, but shall be stored as required to permit drainage of excess water and shall be stored in such a manner as to avoid the inclusion of foreign materials. Sand shall remain in free-draining storage for at least 48 hours prior to use.

.5 Segregation

The storage piles for aggregates shall be constructed so as to prevent segregation, and as approved by the Engineer. The deposition and removal therefrom shall be done in a manner to improve the uniformity of grading insofar as practicable.

The side slopes of stock-piled aggregates shall be kept flatter than the angle of repose to prevent accumulation of coarser material at the bottom of the slope. To reduce breakage of the larger sizes of coarse aggregate the number of handlings shall be reduced to a minimum and rock ladders of satisfactory design shall be installed if so ordered by the Engineer.

.6 Volume of Storage

Sufficient live storage of all size fractions of processed aggregates shall be maintained to permit continuous placing of concrete at the rates required to meet the schedule requirements.

EBASCO SPECIFICATION
CONCRETE MASONRY
SECTION III (Cont'd)

Project Identification

No. LOU-1564.472

Issue Date: December 31, 197

3.7 Approval of Aggregate Plant Layout

Plans and specifications for the aggregate processing plant which are proposed for use including description and capacity data on the processing equipment and flow charts of the whole processing operations which shall show rates of flow of material at the various crushing and separation points in the processing, as well as the volumes of stockpiles and the number and kinds of equipment to be used in transporting the aggregates from the aggregate plant to the mixing plant shall be furnished to the Engineer for his comments or approval before start of plant erection.

AGGREGATE
PROCESSING
PLANT
(Cont'd)

4. When required a modern and dependable batch-type mixing plant capable of producing concrete of specified quality and at the rate of output required to meet the schedule requirements and a balanced complement of transporting, handling and placing equipment shall be provided at a location and in a manner acceptable to the Engineer.

CONCRETE
PLANT

The concrete mixing plant shall be completely installed with preliminary operation for a sufficient length of time prior to first scheduled concrete placement to enable the Engineer to make the necessary physical tests prior to substantial concrete procedure.

.1 Type of Plant

The plant may be semiautomatic or automatic. "Semi-automatic" is used to define a plant in which:

- a - Batch weights are set manually.
- b - Mixes are changed manually.
- c - Materials are batched automatically.

"Automatic" is used to define a plant in which:

- a - Batch weights are set manually on a mix selector.
- b - Mixes are changed automatically by mix selector.
- c - Materials are batched automatically.

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CONCRETE MASONRY
SECTION III (Cont'd)

Project Identification

No. LOU-1564.472

Issue Date: December 31, 19

4.2 Batchers

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PLANT
(Cont'd)

Individual weigh batchers shall be provided for all work requiring the use of more than two separate size groups of coarse aggregates. The cement shall be weighed and batched separately from the aggregates.

The batchers shall be arranged to permit the convenient addition or removal of material. Batching equipment shall be so constructed and arranged that the sequence and time of discharge can be controlled to produce a ribboning and mixing of the aggregates and, wherever practicable, of the cement with the aggregates as the materials pass through the charging hopper into the mixer. This shall be affected by the control of the batcher discharge gates. Batching controls shall be so interlocked that a new batching cycle cannot be started until all batchers are completely empty.

- a - Weighing Units - Every delivery point of aggregates and cement into the mixer charging hopper shall have a weighing unit and each weighing unit shall include a visible, springless, direct-reading dial which shall indicate the scale load at all stages of the weighing operation from zero to full capacity.

Insofar as practicable, the scale dials shall be in full view of the operator and the weighing equipment shall be arranged so that the operator may conveniently observe the operation of the batcher gates and the discharge of the materials. Provision shall be made for adjustment and change in weights of materials being charged into the hopper.

- b - Measuring Water - Water shall be measured by weight unless written approval is given by the Engineer to measure by volume. The mechanism for measuring and delivering water to the mixers shall not permit leakage when the valves are closed. The filling and discharge valves for the water tank shall be so interlocked that the discharge valves cannot be opened before the filling valve is fully closed.
- c - Dispenser for Air Entrainment - The concrete plant shall include a dispensing device to accurately measure and deposit the air entraining agent into each mix. The dispenser shall be interlocked with the batching and discharging controls of the water so that the batching and discharge of the air entraining agent will be automatic. The device shall be capable of ready adjustment to permit varying the quantity of the air entraining agent to be batched.

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 CONCRETE MASONRY
 SECTION III (Cont'd)

Project Identification
 No. LOU-1564.472
 Issue Date: December 31, 1974
 R4: January 3, 1975

4.2 (Cont'd)

CONCRETE
 PLANT
 (Cont'd)

- d - Dispenser for Admixtures - The concrete plant shall include a dispensing device for admixtures in accordance with the manufacturer's recommendations to accurately measure and control the deposit of each admixture.
- e - Moisture Adjustment - The automatic controls shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates.
- f - Accuracy Limits - Delivery of materials from the batching equipment shall be within the following limits of accuracy:

<u>Material</u>	<u>Percent</u>
Cement	1 (By Weight)
Water	1 (By Weight)
Aggregate smaller than 1-1/2" size	2 (By Weight)
Aggregate larger than 1-1/2" size	3 (By Weight)
Air entraining agent	±3 (By Weight or Volume)
Admixtures	±3 Limitations as Recommended by Manufacturer

R4
 R4

.3 Mixers

Mixers may be of either the tilting or non-tilting stationary type, or truck mixers, of approved design.

- a - Maintenance - The mixers shall be maintained in satisfactory operating condition, and mixer drums shall be kept free of hardened concrete. Mixer blades shall be replaced when worn down more than 10 percent of their depth. Should any mixer at any time produce unsatisfactory results, leak mortar or cause waste of materials, its use shall be promptly discontinued until it is repaired.
- b - Stationary Mixers - Mixers which have a rated capacity of 2 cu yd, or more, of mixed concrete shall be the tilting type. Mixers shall not be charged in excess of the capacity recommended by the manufacturer. Mixers shall be capable of combining the materials into a uniform mixture and of discharging this mixture without segregation. The mixers shall be operated at the drum speed designated by the manufacturer on the nameplate.

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~~CONCRETE~~ MASONRY
SECTION III (Cont'd)

Project Identification

No. LOU-1564.472
Issue Date: December 31, 197
R1: March 15, 1972
R7: August 3, 1976

4.3 (Cont'd)

CONCRETE
PLANT
(Cont'd)

- c - Mixing Time - The mixing periods specified herein are predicated on proper control of the speed of rotation of the mixer drum, and on proper introduction of the materials into the mixer. The mixing time will be increased when necessary to secure the required uniformity and consistency of the concrete. Excessive overmixing requiring additions of water will not be permitted.

When stationary mixers are used, the mixing time for each batch shall be as follows: Time shall start when all solid materials are in the mixer drum, provided that all of the mixing water shall be introduced before one-fourth of the mixing time has elapsed.

<u>Capacity of Mixer</u>	<u>Minimum Mixing Time</u>
1 cu yd	1 minute
2 and 3 cu yd	2 minutes
4 cu yd	2-1/2 minutes

When a stationary mixer is used for partial mixing of the concrete (shrink-mixed) the mixing time in the stationary mixer may be reduced to the minimum necessary to intermingle the ingredients.

Stationary mixers shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. Provision also shall be made to assure that each batch is discharged completely before the mixer is recharged.

- d - Truck Mixers - Truck mixers, conforming to ASTM C-94, may be used when authorized by the Engineer and the equipment and methods are approved in writing. Concrete so manufactured shall comply in every respect with the requirements of these specifications.

When a truck mixer is used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer, each batch of concrete shall be mixed, after the initial addition of water, not less than 50 or more than 100 revolutions of the drum at the rate of rotation designated by the manufacturer of the equipment as mixing speed. Any additional mixing shall be done at the speed designated by the manufacturer of the equipment as agitating speed. When necessary for proper control of the concrete, mixing of transit-mixed concrete shall not commence

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CONCRETE MASONRY
SECTION III (Cont'd)

Project Identification

No. LOU-1564.472
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R1: March 15, 1972

4.3 (Cont'd)

d - (Cont'd)

CONCRETE
PLANT
(Cont'd)

and the addition of water shall not be permitted until the truck mixer is at the site of the concrete placement.

Truck mixers shall be equipped with accurate revolution counters.

.4 Provision for Inspection

The complete plant assembly shall include provisions to facilitate the inspection of all operations at all times.

.5 Sampling Facilities

Suitable facilities shall be provided for readily obtaining representative samples of aggregate from each of the batchers, and suitable devices for obtaining representative samples of concrete for slump tests, unit weight, air content, and uniformity tests to be made by the Engineer, shall be provided. All necessary platforms, tools and equipment for obtaining samples shall be furnished prior to the start of operations.

.6 Concrete Specimens

Concrete specimens will be prepared from the mixtures used in the work and tested to determine the adequacy of control of the materials entering into the concrete mix. Preparation, storage and testing of the specimens will be performed by the Engineer. Suitable facilities shall be provided within the plant for the Engineer for this control work.

.7 Test Weights

Standard test weights and any other auxiliary equipment required for checking the operating performance of each scale and measuring device shall be provided. Periodic tests shall be made in the presence of the Engineer in such a manner and at such intervals as may be directed by the Engineer. Upon completion of each such test, and before further use of the measuring, weighing or recording devices, the adjustments, repairs or replacements required to secure satisfactory performance shall be made.

.8 Approval of Concrete Plant Layout

Plans and written specification for the proposed concrete plant shall be submitted to the Engineer for his comments or approval. The concrete plant shall be inspected by the Engineer using the Check List for Certification of Ready Mixed Concrete Production Facilities published by the National Ready Mixed Concrete Association as a guide.

ASTM SPECIFICATIONS REFERRED TO
IN SPECIFICATION LCU-1564.472

C31	Standard Method of Making and Curing Concrete Compressive and Flexural Strength Test Specimens in the Field.	R2
C33	Standard Specification for Concrete Aggregates.	R2
C39	Standard Method Test for Compressive Strength of Cylindrical Concrete Specimens.	R2
C94	Standard Specifications for Ready-Mixed Concrete.	R2
C127	Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate.	
C128	Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate.	R2
C143	Standard Method of Test for Slump of Portland Cement Concrete.	R2
C 150	Standard Specification for Portland Cement.	R2
C172	Standard Method of Sampling Fresh Concrete.	
C173	Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.	
C192	Standard Method of Making and Curing Concrete and Test Specimens in the Laboratory	R2
C231	Standard Method for Air Content of Freshly Mixed Concrete by the Pressure Method.	
C260	Standard Specification for Air Entraining Admixtures for Concrete.	
C494	Standard Specification for Chemical Admixtures for Concrete.	
C567	Standard Method of Test for Unit Weight of Structural Lightweight Concrete.	R2
C40	Standard Method of Test for Organic Impurities in Sands for Concrete.	R3

WATERFORD STEAM ELECTRIC STATION
 1980 - 1165 MW INSTALLATION - UNIT NO. 3
 CONCRETE PREPLACEMENT CHECKLIST RECORD

Location: _____

Elevation: _____ to _____ Placement No. _____

Detailed Description: _____

ITEM	CONTRACTOR			INSPECTOR		
	Time	Date	Int.	Time	Date	Int.
Sandblast/Greencut/Foundation Treatment						
Forms (Line and Grade)						
Blockouts, Keys, Waterstop, etc.						
Reinforcing Steel						
Anchor Bolts, Embedded Steel						
Electrical						
Mechanical						
Final Clean-up						

Remarks: _____

Approved for Placing _____ Time _____ Date _____
 Contractor's Representative

Approved for Placing _____ Time _____ Date _____
 Ebasco's Engineering

(See Reverse Side for Instructions)

REVISION 20
7-18-78

W-WP-7 Appendix A

POUR NO. _____
ELEV. _____

BUILDING _____

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3

ACTUAL POUR DATE _____

CONCRETE PRE-PLACEMENT CHECKLIST RECORD

	COMPLETED AND INSPECTED												REMARKS
	J. A. JONES SUPERVISION				J. A. JONES ENGINEER				QUALITY VERIFICATION				
	Name	Date	Time	Per Dwg & Rev	Name	Date	Time	Per Dwg & Rev	Name	Date	Time	Per Dwg & Rev	
1. CONCRETE													
a. Sandblast													
b. Greencut													
c. Treatment													
2. FORMS													
a. Dimension													
b. Line & Grade													
c. Clean													
d. Tight													
e. Braced													
f. Coating													
g. Chaffer Strips													
h. Key Ways													
i. Block Outs													
j. Walers & Strenebacks													
k. Waterstop													
l. Release Agent													
3. REINFORCING													
a. Bar Quantities													
b. Soacing													
c. Elevation													
d. Field Mapping													
4. ENDS													
a. Quantity													
b. Line & Grade													
c. Elevation													
d. Identification													
5. GENERAL													
a. Cleanliness													
b. Instrumentation													
c. Weather Protection													

APPROVED AREA SUPERINTENDENT _____

DATE _____

APPROVED Q. V. SUPERVISOR _____

DATE _____

EBASCO SPECIFICATION
CONCRETE MASONRY
SECTION II
CONCRETE PLACEMENT, CURING
AND FINISHING

Project Identification
No. LOU-1564.472
Issue Date: December 31, 1971
R1: March 15, 1972

1. This is Section II of a specification covering the general and specific requirements for concrete using on-site or established commercial off-site concrete production facilities.

SCOPE

This section covers the transportation of concrete from the mixer to the place of final deposit and the placing, curing, protecting, repairing and finishing of the concrete. It also covers the cleanup and other preparation of the areas in which the concrete is to be deposited.

2. Definition of terms used in this Specification are as follows:

DEFINITIONS

.1 Engineer

In these specifications, the "Engineer" shall mean the person in responsible charge of the work for the Owner, or his representative.

.2 ASTM Standards

When this Specification refers to certain "Standard Specifications" or "Tentative Specifications" of the American Society for Testing and Materials, the latest revision of those specifications shall apply.

.3 Detailed Specifications

Where the phrase "detailed specifications" is used in this Specification, it shall be understood to refer to specifications which may be included on the construction drawings or in the Contract for the purpose of supplementing, modifying or eliminating any of the requirements of this Specification.

.4 Aggregates

"Aggregate" in general designates both the 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.

3. All concrete shall be conveyed from the mixer to the place of final deposit in suitable buckets, containers or conveyors which shall be mortar-tight. All means of conveyance shall be adapted to delivering concrete of the required consistency and plasticity without segregation or loss of slump.

TRANSPORTATION

R:

SECTION II (Cont'd)

TRANSPORTATION
(Cont'd)

3.1 Time Interval Between Mixing and Placing

For all structures, concrete shall be placed in the forms within sixty (60) minutes after the initial addition of water, and before the drum has made 300 revolutions unless otherwise authorized by the Engineer. In addition, the concrete temperature shall conform to Section I, Paragraph 14. However, at no time shall the concrete be placed after the initial set, or more than ninety (90) minutes after the initial addition of water.

R1
R4
R5
R6

.2 Retempered Concrete

Water may be added to transit mix concrete on arrival at the site so long as the total allowable quantity of water is not exceeded and provided the requirements of Paragraph 3.1 above are met. After the addition of water, the drum shall be turned an additional 30 revolutions at mixing speed, however, in no case shall the total revolutions exceed 300. Water shall not be added to the concrete at any other time.

R4

.3 Cleaning Equipment

All equipment used for transporting and placing of concrete shall be maintained in clean condition. All buckets, hoppers, chutes, and other equipment shall be thoroughly cleaned after each period of placement.

4. The procedure for placing of concrete shall be as follows: PLACING

.1 Engineer's Approval of Equipment and Methods

Before any concrete is placed, the entire placing program, consisting of equipment, layout, proposed procedures and methods shall be submitted to the Engineer for approval, and no concrete shall be placed until the Engineer's approval has been received.

.2 Control of Placing

The control of placing shall begin at the mixer discharge. Concrete shall be discharged by a vertical drop into the middle of the bucket or hopper and this principle of vertical discharge of concrete shall be adhered to throughout all stages of delivery until the concrete comes to rest in the structures.

.3 Avoiding Segregation

Concrete shall, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be caused to flow in a manner which will cause segregation. For locations where direct placement is not possible, and in narrow forms, the Contractor shall provide suitable drop chutes and "elephant trunks" to confine the concrete in movement.

.4 Type of Buckets

Central-bottom-dump buckets shall be employed of a type that provides for positive regulation of the amount and rate of deposit of concrete in all dumping positions.

4.5 Operation of Buckets

PLACING
(Cont'd)

In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall just clear the concrete already in place and the unconfined height of drop shall not exceed 5 ft unless larger drops are specifically approved by the Engineer. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing, or in any manner which results in separation of ingredients or disturbances of previously placed concrete will not be permitted. R1
R2

.6 Placement in Restricted Forms

Concrete placed in restricted forms by barrows, buggies, cars, short chutes or hand shoveling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing.

.7 Chuting

Where it is necessary to use transfer chutes between mixer, containers or hoppers, and point of deposit in the forms, specific approval of the Engineer must be obtained as to type, length, slopes, baffles and vertical terminals. Concrete shall not be permitted to fall from the end of the chute or tube more than 5 ft unless specific approval is obtained from the Engineer. Chutes, when used, shall have slopes not flatter than 1 to 3, and not steeper than 1 to 2. R4

.8 Placing by Pumping

Concrete may be conveyed and placed by mechanically operated pressure equipment with the permission of the Engineer. The water-cement ratio may not be increased above that of the same class concrete placed by bucket, and the slump shall be held to the minimum necessary for conveying concrete by this method. Aluminum or galvanized steel pipe shall not be used to convey concrete from the pump to the place of deposit. The first 1000 cu yd placed by pumping shall be sampled and tested in accordance with this Specification at the point of placement in the forms and prior to the pump. If consistency is found in concrete properties at both those points further sampling and testing may be done solely prior to entering the pump. Lubrication of the pipe line at the start of the pumping operation shall be provided by a Class F mortar or a batch of concrete without the coarse aggregate. This mortar or concrete shall be wasted and not used in the work. R1,4
R4

.9 Cleanup

Concrete shall not be placed until the forms, the cleaning of rock or concrete surfaces, reinforcing steel and embedded parts in place have been inspected and approved by the Engineer. See Paragraph 7 and Paragraph 8.1 of this Section.

.10 Removing Surface Water

No concrete shall be placed on a water-covered surface.

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CONCRETE MASONRY
SECTION II (Cont'd)

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Issue Date: December 31, 1971

4.11 Thickness of Layers

PLACING
(Cont'd)

Concrete shall be placed in successive horizontal layers ranging in thickness from 6 to 20 in. as directed by the Engineer. The bucket loads, or other units of deposit, shall be spotted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum of shoveling. Any tendency to segregation shall be corrected by shoveling stones into mortar rather than mortar onto stones. Such a condition shall be corrected by redesign of mix or other means, as directed by the Engineer.

.12 Bedding of Layers

Bedding planes shall be approximately horizontal, except in dams or other structures where it may be required to incline the beds, without forms, on a downward slope of about 1 vertical to 10 horizontal in an upstream direction, in which case the placement shall proceed in an upslope direction.

.13 Compaction

Concrete shall be compacted with mechanical vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets or coarse aggregate, and fits tightly against all form surfaces and embedded materials.

- a - Type of Vibrators - Vibrators shall be the internal or immersion high-frequency type, with speeds of not less than 6000 revolutions per minute when immersed in the concrete. Vibrators shall be used in sufficient number of units and power of each unit to properly consolidate all concrete.
- b - Use of Vibrators - Vibrators shall be inserted in a vertical position at intervals of about 2 ft, depending upon the mix, the equipment used, and continued experience on the job. Vibrators shall be withdrawn slowly. In no case shall vibrators be used to transport concrete inside the forms.
- c - Melding Successive Batches - In placing concrete in layers which are advancing horizontally as the work progresses, great care shall be exercised to insure adequate vibration, blending and melding of the concrete between the succeeding batches.
- d - Vibrator Penetration of Underlayer - The vibrator shall penetrate the layer being placed and also penetrate the layer below while the under layer is still plastic to insure good bond and homogeneity between the two layers and prevent the formation of cold joints.

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CONCRETE MASONRY
SECTION II (Cont'd)

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R4: January 3, 1975

4.13 (Cont'd)

PLACING
(Cont'd)

- e - Vibrating Against Reinforcement - Care shall be taken to minimize contact of vibrators against reinforcement steel. Vibrators shall not be allowed to come in contact with the extending reinforced steel at the point less than 5 feet above concrete which has reached a stage of initial set. Vibrators shall not be allowed to come in contact with forms of finished surfaces.
- f - Use of Form Attached Vibrators - The use of form attached vibrators shall not be permitted without specific authorization of the Engineer.
- g - Use of Surface Vibrators - The use of surface vibrators will not be permitted under ordinary conditions. However, for thin slabs such as highways, runways and similar construction, surface vibration by specially designed vibrators may be permitted, upon approval of the Engineer.
- h - Stone Pockets and Mortar Pondages - The formation of stone pockets or mortar pondage in corners and against face forms shall not be permitted. Should these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for thorough bonding as directed by the Engineer.

.14 Construction Joints and Keys

Horizontal and vertical construction joints and bonding keys shall be located and shall conform in detail to the requirements of the plans unless otherwise directed by the Engineer.

- a - Edging Strip - The top layer of any block or any day's work shall be trued-up to a rectangular edging strip set horizontally in the forms in a uniform pattern pleasing to the eye. Chamfered edging strips may be used at the discretion of the Engineer in specific locations.
- b - Treatment on Suspension of Work - Whenever work is suspended on any section for more than one hour, the horizontal edges of the concrete next to the forms on surfaces which will be exposed shall be brought to a horizontal plane perpendicular to the plane of the forms and treated so that the finished work will show smooth, straight lines conforming to an architecturally pleasing pattern.
- c - For surface preparation at construction joints see Paragraph 7.3

.15 Wash Water

Wash water shall be removed in a manner to prevent running down and staining of concrete surfaces which will be exposed at the completion of the job. Should unsightly wash water streaks develop on the exposed surfaces, they shall be removed to a uniform color and texture satisfactory to the Engineer.

EBASCO SPECIFICATION
CONCRETE MASONRY
SECTION II (Cont'd)

Project Identification
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Issue Date: December 31, 1971
R1: March 15, 1972

4.16 Placement Interval

PLACING
(Cont'd)

Except when placing with slip forms, each placement of concrete in multiple lift work shall be allowed to set for 48 hours, and longer when required by the Engineer before the start of a subsequent placement. This interval may be shortened by the Engineer for a specific location.

.17 Special Provisions in Placing

When placing concrete in walls with openings, in floors of integral slab and beam construction and other similar conditions, the placing shall stop when the concrete reaches the top of the opening, or bottom horizontal surface of the slab, as the case may be. Placing shall be resumed before the concrete in place takes initial set, but not until it has had time, as determined by the Engineer, to settle. The fresh concrete shall be vibrated through into that in place to avoid cold joints.

.18 Placing Concrete Through Reinforcing Steel

In placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregate. Where the congestion of steel makes placing difficult, it may be necessary to move top steel aside to get proper placement. In such instances, the top steel should be replaced in proper position before the concrete hardens.

5. All concrete shall be cured by keeping it damp for the period of time required for complete hydration and hardening to take place.

CURING,
PROTECTING
REPAIRING
AND FINISH

Certain types of finish, or preparation for overlying concrete must be done at certain stages of the curing process and special treatment may be required for specified concrete surface finish.

.1 Curing With Water

Except when otherwise directed by the Engineer, all concrete shall be cured by use of water which shall be continuously (not periodically) maintained on all exposed surfaces.

.2 Continuous Spraying

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances of hose, sprinklers and spraying devices. Continuous fine-mist spraying or sprinkling shall be used, unless otherwise specified or approved by the Engineer.

.3 Water Quality

For specifications as to the quality of water see Section I Paragraph 7.

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CONCRETE MASONRY
SECTION II (Cont'd)

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5.4 Alternate Curing Methods

Whenever, in the judgment of the Engineer, it may be necessary, the continuous spray method may be omitted and a covering of sand, or other approved mulching which will prevent loss of moisture from the concrete may be used. No type of covering will be approved which would stain or damage the concrete during or after the curing period. Covering shall be kept continuously wet during the curing period.

CURING,
PROTECTING,
REPAIRING
AND FINISHING
(Cont'd)

.5 Curing Compounds

Surface coating type curing compounds shall be used only by special permission of and under the direction of the Engineer. Curing compounds shall be colorless pigmented, liquid type conforming to AASHTO Specification M148. No curing compound shall be used on surfaces where future bonding with concrete or painting is specified.

.6 Ponding

For curing of concrete in pavements, sidewalks, floors, flat roofs or other level surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by the Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded areas shall be kept continuously filled with water.

.7 Curing Temperature

Concrete shall be maintained above 50 F and in a moist condition for at least the first 7 days after placing, except that high-early-strength concrete shall be so maintained for at least the first 3 days. Other curing periods may be used if the specified strengths are obtained. For concrete containing a pozzolan, the curing time shall be not less than fourteen (14) days. For additional requirements see Paragraph 8 of this Section on "Cold Weather" and "Hot Weather Conditions."

.8 Curing Equipment

All equipment and materials required for curing shall be on hand and ready for use before concrete is placed.

.9 Protecting Fresh Concrete

Fresh concrete shall be protected by leaving the forms in place for an ample period (See Paragraph 6.12 of this Section), by prevention of disturbing shocks and vibrations, and by avoidance of premature stressing until the concrete has attained sufficient strength to sustain the dead and live loads.

Workmen shall be warned against and prevented from disturbing green concrete during its setting period.

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CONCRETE MASONRY
SECTION II (Cont'd)

Project Identification

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Issue Date: December 31, 1971

5.9 (Cont'd)

If it is necessary that workman enter the area of freshly placed concrete, the Engineer may require that bridges be placed over the work area. Workmen with duties on freshly placed concrete slabs shall wear wooden "slats" approximately 8 in. wide by 18 in. long.

CURING,
PROTECTING,
REPAIRING
AND FINISH
(Cont'd)

.10 Repair and Replacement of Unsatisfactory Concrete

Unsatisfactory concrete shall be cut out and replaced with new concrete, as soon as practicable after removal of forms. Anchors, keys or dovetail slots shall be provided whenever necessary to attach the new material securely in place. Surfaces of prepared voids shall be wetted for 24 hours immediately before the patching material is placed.

- a - Use of Epoxy - The use of an epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of the Engineer. Epoxies shall be applied in strict accordance with the instructions of the Manufacturer.
- b - Method of Repair - "Dry-pack" filling shall be used for small size holes having surface dimensions about equal to the depth of the hole; for holes left after removal of form ties, grout insert holes and slots cut for repair of cracks.

Mortar filling by cement gun shall be used for repair of areas too large for dry-pack, and too shallow for concrete filling.

For holes extending entirely through the concrete section, for areas greater than 1 sq ft and deeper than 4 in. and holes in reinforced concrete which are greater in area than one-half square foot and which extend beyond the reinforcement, the repair shall be made by making a complete filling of the void with washed gravel or broken stone and liquid Portland cement grout shall be placed through filler pipes under pressure. Pipe nipples shall be placed through the forms at bottom of the void so that the grout rises upward through the aggregate to spill through a vent at the top edge of the void.

- c - Matching of Patched Surfaces - Filling material used in repair of surfaces which will be exposed after completion of the project shall be made with cement from the same source as that used in the concrete blended with

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5.10 (Cont'd)

c (Cont'd)

a sufficient amount of white Portland cement to produce the same color in the adjoining concrete.

Patched surfaces shall be given a final treatment to match the texture of the surrounding material.

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(Cont'd)

d - Curing of Patched Work - The patched area shall be covered immediately with an approved nonstaining, water-saturated material which shall be kept wet and protected against sun and wind for a period of 12 hours. Thereafter, the patched area shall be kept wet continuously by a fine spray or sprinkling for not less than 7 or 14 days as required by Paragraph 5.7 of this Section. The temperature in the repair area shall be maintained above 50 F during the entire period of placing and curing.

R1

e - Approval of Engineer - All materials, procedure and operations used in the repair of concrete and also the finished work shall be subject to the approval of the Engineer. All fillings shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks or drummy areas after the fillings have been cured and dried.

.11 Finishing - General

This Specification is intended to cover the treatment of concrete surfaces of all structures. Areas requiring special finish not covered by this Specification will be clearly indicated on the drawings and special specifications will be furnished.

a - Finish for Formed Surfaces - The type of finish for formed concrete surfaces shall be as follows, unless otherwise specified by the Engineer.

1 - For surfaces against which backfill or concrete is to be placed, no treatment is required except repair of defective areas and filling of holes left by form ties and rods.

R4

2 - For surfaces below grade which will receive waterproofing treatment, the concrete shall be free of surface irregularities which would interfere with proper application of the waterproofing material which is specified for use.

3 - Surfaces which will be exposed when the structure is complete shall receive no special finish, except repair of damaged or defective concrete, removal of fins exceeding 1/4 in in height and abrupt irregularities, filling of holes left by form ties and rods, and cleanup of loose or adhering debris.

R4

5.11 (Cont'd)

b - Finish for Unformed Surfaces

- 1 - Surfaces which will be exposed to the weather and which would normally be level, shall be sloped for drainage. Unless the drawing specifies a horizontal surface or shows the slope required, the tops of narrow surfaces, such as stair threads, walls, curbs and parapets shall be sloped approximately 3/8 in. per foot of width; broader surfaces such as walks, roads, parking areas and platforms shall be sloped about 1/4 in. per foot.
- 2 - Surfaces that will be covered by backfill or concrete, sub-floors to be covered with concrete topping, terrazzo or quarry tile, and similar surfaces shall be smooth screeded and leveled to produce even surfaces. Surface irregularities shall not exceed 1/4 in. higher or lower from the specified surface.
- 3 - Surfaces which will not be covered by backfill, concrete or tile toppings, such as outside decks, floors and galleries and sumps, parapets, gutters, sidewalks and slabs, shall be consolidated, screeded and floated. Floating may be done with hand or with power-driven equipment. Floating shall be started as soon as the screeded surface has attained a stiffness to permit finishing operations, and shall be the minimum required to produce a surface uniform in texture and free from screed marks or other imperfections. Joints and edges shall be tooled as called for on the drawing or as directed by the Engineer.

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- c - Finish for Waterway Surfaces - For surfaces which will be subjected to moderate or high velocities of water, such as the crest section of spillways, spillway chutes, channels, etc, final finish shall be given by a steel trowel.

Special care shall be taken to manipulate screeds so that the surfaces shall conform to the shapes shown for these parts. When the surface has been screeded to correct shape, wood floats shall be used to secure a firm, uniform texture without raising excess fine material to the surface. As soon as the floated surface has hardened sufficiently so as not to raise fines, the surface shall be brought to a uniform smoothness by use of steel trowels.

Steel troweling shall be performed with a firm pressure to flatten the sandy texture and leave a dense, uniform surface, free from trowel marks or other imperfections.

R

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- 5.11 d - Protection - All concrete shall be protected against damage until final acceptance by the Owner or his representative. Special requirements governing the curing and protection of concrete during periods of freezing temperatures and during periods of high ambient temperatures are given in Paragraph 8 of this Section.

CURING,
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(Cont'd)

.12 Special Floor Finishes

Floors of offices, shops, assembly rooms and other areas where a very uniform appearance and freedom from cracks or other imperfections are desired, will require special care.

5.121 Finishing Operations

Upon completion of compaction by vibration and before initial set occurs, the floor surface shall be graded and all spots brought to grade adding extra concrete of the same mix when necessary. Finishing operations shall start as soon as the concrete will support the weight of the operators and machines. The operator shall stand on mats, if necessary, to distribute his weight. If free water collects on the surface, it shall be removed by a light screed or sponging.

- a - Screeding - Screeding and bull-floating shall be done in a manner so that the coarse aggregate is below the finished surface of the concrete. A coarse wire mesh may be used to depress the aggregate below the surface about 1/4 in.
- b - Surface Finishing - Surface finishing of concrete shall preferably be by motor driven rotary float, but may be by hand. Use of wood-floats and wooden-bull floats are preferred over metal tools. Use of metal hand tools shall be avoided until the concrete has had initial set and all bleeding water is gone.
- c - Surface Texture - The final surface texture may be one of the following as specified on the drawing or by the Engineer.
 - 1 - "Steel Trowel" - The final finish shall be made by use of steel bladed finishing trowels. Steel trowels shall follow the use of wood-floats by which the concrete shall have been brought to correct elevation and all surface imperfections corrected. Steel troweling shall be continued only until the surface is smooth and uniform in texture and appearance. If free water is brought to the surface during the finishing operations it shall be removed by sponging. Dry cement shall never be

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5.121 (Cont'd)

c - (Cont'd)

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(Cont'd)

used over the surface to absorb free water, or to help smooth the surface, or for any other reason. Finishing shall be timed and performed so that extra water will not have to be applied to the surface being troweled.

2. - "Wood Float" - The final finish shall be made with floats made of soft wood. Floats made of hard, dense surface wood will not be satisfactory. The floor surface shall be troweled only until the surface is entirely free of imperfections and uniform in texture and appearance.
- 3 - "Hair Brush" - This finish shall be formed as for steel trowel finish, except that the final step shall consist of brushing with a hair bristled floor brush. Sufficient pressure shall be applied that the surface is roughened to a depth of about 1/32 in. and is of uniform appearance and texture.
- 4 - "Broom Finish" - This finish shall be the same as for wood-float except that the final step shall consist of roughening the surface with a fiber bristled broom or floor brush. The final surface texture shall be uniform in appearance with scores about 1/16 to 1/8 in. in depth.
- 5 - "Rubber Float Finish" - This finish shall be formed as per steel trowel finish except that the final step shall consist of a light hand rotary scrubbing with a soft rubber float to roughen the surface to a depth of not more than 1/32 in.

.122 Surface Slopes

Special care shall be taken to ensure the correct shaping of the surface drainage slopes as called for on the drawings, or as directed by the Engineer. Screens shall be set accurately. After concrete has been placed and compacted, a template shall be used to determine that the slopes to floor drains are true and that no low areas exist. Low areas shall be brought to correct height after the concrete has been compacted, and high areas shall be smoothed down.

.123 Curing

Proper curing is essential and immediately following completion of finishing operations, and after concrete has taken initial set, the floor shall be covered to prevent evaporation of water from the concrete. Protection shall be provided in one of the following ways, given in order of preference.

- a - "Ponding" - Cover the entire floor area with a layer of water contained by the side forms or by a dam around the periphery. Water lost by leakage or evaporation shall be replaced to insure constant cover. This shall be maintained for 7 days.

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5.123 (Cont'd)

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(Cont'd)

- b - "Wet Sand" - Cover the entire floor area with sand to a depth of 2 in. and keep the sand fully saturated for a period of 7 days.
- c - "Sisalcraft Paper and Polyethylene Sheeting" - Cover the entire floor area with a white pigmented polyethylene sheeting or a two ply layer of sisalcraft paper lapping the covering not less than 1 ft at joints and sealing the joints and edges with an adhesive backed tape.
- d - "Compound" - The use of a colorless curing compound conforming to ASTM designation C309 Type 1, clear and translucent will be approved by the Engineer only if ponding or the wet sand methods are not possible because of essential construction operations. Specification for its use will be issued with the Engineer's approval. A compound is not permitted on areas which will have toppings or composition floor tile.
- e - Burlap, canvas, or any material which could stain the concrete shall not be used. This restriction does not apply to surfaces which shall receive a separate finish such as paint or tile.

R4
R6

.124 Separate Finishes

A curing compound shall not be permitted on base slabs which will have a separate finish or composition tile.

- a - A separate Class T concrete finish shall be used when specified on the design drawings, or when directed by the Engineer for special conditions, and shall be applied in conformance with Engineer's instructions.
- b - When a separate terrazzo or quarry tile finish is specified, the surface of the base concrete slab shall be leveled true with a tolerance of plus or minus 1/4 in. It shall be a uniform distance below the finished floor level as shown on the design drawings or as directed by the Engineer. The surface shall be wood-floated and water cured for a minimum of 3 days. Terrazzo or quarry tile finish shall be applied in conformance with special specifications furnished by the Engineer.
- c - Floors that will be covered with composition floor tile bonded with adhesives shall be steel troweled smooth and level within 1/8 in. tolerance and water cured for a minimum of 3 days.

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5.124 (Cont'd)

- d - When color concrete floor finishes are required, the admixture or dust-on colors shall be applied in accordance with Manufacturer's instructions and special specifications furnished by the Engineer.
- e - When separate topping slabs 3 in. or less in thickness are required, they shall be bonded to the base slab by and approved bonding agent applied in accordance with Manufacturer's instructions.

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(Cont'd)

.125 Floor Hardener

Floors subject to severe usage shall have an approved non-staining liquid floor hardener applied to the cured surface when specified on the drawings or when directed by the Engineer.

.126 Base Preparation for Topping Slab

Prior to the placement of the turbine-generator pedestal topping slab the concrete base shall be prepared by removing all irregularities. The entire top surface shall be roughened uniformly and projecting metal jack posts or other similar items shall be cut off close to the concrete surface.

- a - All areas having oil or grease absorption shall be thoroughly cleaned by repeated washings with a strong solvent or detergent, followed by thorough washing with clean water. The entire surface shall be cleaned by air-water jet to remove all dirt and loose particles of concrete. Concrete shall not be placed when the turbine is in operation.
- b - Topping slabs shall be bonded to the base slab with bonding agent, approved by the Engineer, applied in accordance with the Manufacturer's instructions and as noted on the drawings.

.127 Inspection

Only by careful attention to all the details of the work will it be possible to accomplish the desired result of crack-free slabs of good appearance. The most critical point in the entire procedure is the competence of inspection. The personal attention of the Engineer during the placing and finishing operation is considered essential to assure that all work is done in accordance with the Specification. Care should be taken to avoid marring the completed floor by abrasion or staining.

6. Forms of concrete shall be as follows:

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R2: June 1, 1972

6.1 Form Requirements

FORMS
(Cont'd)

Forms shall be built true to slopes, lines and dimensions as called for on the drawings. They shall be properly braced and tied to maintain correct position and shape until their removal. Bulges or offsets which result from yielding of the form to pressures of fluid concrete or other forces must be removed before acceptance of the work. Both form material and method of construction shall be subject to the approval of the Engineer. Form work shall meet the tolerance requirements of Table 4.3.1 of proposed Revision of ACI 301-66 as published in ACI Journal, June 1971.

.2 Inspection

Forms in place, with ties and braces, shall be subject to inspection and approval by the Engineer and no concrete shall be placed until approval has been received.

.3 Form Material

Form faces for surfaces which will be exposed at the completion of the project shall be made of metal, plywood or sanded and surfaced lumber, unless otherwise approved, and shall be mortar-tight and smooth.

Form and form linings of water-absorbent material or material required to produce a special face finish, will be shown on approved plans or called for in the detailed specifications for a specific job.

.4 Tie Rods

Metal tie rods shall be used for supporting all forms. Provision shall be made for removal of a section of each rod at surface of the concrete to a depth of approximately 1 in. Form ties for walls subject to internal or external hydrostatic pressure and required to be watertight against all leaks shall be permanent snap type with water seals. When form ties are broken back when removed, the resulting hole shall be filled with grout.

.5 Tie Wires

Tie wires will not be permitted on any surfaces which will be exposed in the completed work or in unexposed surfaces or joints along which water might travel. Tie wires will be permitted only upon approval of the Engineer, and when permitted, shall be cut off flush with the face of the concrete, or countersunk, filled and finished, as required by the Engineer, in the manner specified in Paragraph 5.11 of this Section.

.6 Form Oil

Forms left in place from a previous placement of concrete shall be thoroughly cleaned and treated with an approved nonstaining

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(Cont'd)

6.6 (Cont'd)

form oil shortly before the succeeding placement. Oil treatment shall be made before the placement of any reinforcement steel adjacent to the forms. All excess oil on the form surfaces and any oil on metal or other parts to be embedded in the concrete shall be carefully removed.

.7 Chamfers and Fillets

All outside corners and angles exposed in the finished structure shall be formed with moldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 3/4 in. by 3/4 in. Care shall be exercised to insure accurate moldings. The diagonal face of the molding shall be planed or surfaced to the same texture as the forms to which it is attached. Forms on inside corners shall not require beveling or chamfers unless indicated on the drawings or as directed by the Engineer.

.8 Vertical Construction Joint Chamfers

Vertical construction joints on faces which will be exposed at the completion of the project shall be finished true and plumb as shown on the drawings or as directed by the Engineer.

R.
R7

.9 Joints

Joints in forms shall be horizontal or vertical unless otherwise specified and shall be smooth, tight and unyielding. Suitable devices shall be used to hold adjacent edges together in accurate alignment. All forms shall be so made that they can be removed without hammering or prying against the concrete.

.10 Reuse of Forms

Forms which are to be reused shall be repaired before reuse to provide smooth and mortar-tight faces. If the forms will be reused for concrete which will be exposed in the completed work, holes or openings shall be filled with wood and sanded smooth. Forms shall be thoroughly cleaned of all adhering concrete and dirt left from previous use. Forms shall be recoiled before resetting in accordance with Manufacturer's recommendation unless otherwise directed by the Engineer. Forms which are badly damaged or which have had excessive repair work done on them shall be discarded at the direction of the Engineer.

.11 Cleanout Provisions

Forms with limited working space within shall be provided with temporary cleanout doors or openings for cleaning, washing, blowing and removal of water, wood chips, dirt trash, etc.

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6.12 Removal of Forms

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(Cont'd)

Forms shall be left in place until removal is authorized and shall be removed carefully to avoid injury to the concrete. Form removal will be authorized and forms shall be removed as soon as practicable to permit start of water curing and repair of surface imperfections as provided in Paragraph 5.10 of this Section.

.13 Time for Keeping Forms in Place

Under favorable curing conditions for concrete using Type II Portland cement, forms shall remain in place after placement of concrete for approximately:

36 hours for massive walls or face of mass concrete

48 hours for thin walls and columns

7 days for underside of floor slabs

14 days for the underside of beams

} Provided shoring and/or
reshoring are left in
place for 28 days.

R4

These time intervals may be reduced only if approved in writing by the Engineer. Such approval for variance shall be in strict accordance with ACI-347.

R4

7. All surfaces upon or against which concrete will be placed shall be prepared by suitably shaping and thoroughly cleaning, washing and unwatering as may be indicated in the plans, or as the Engineer may direct, to meet the various situations encountered in the work.

FOUNDATION
BEDDING,
BONDING AND
JOINTING

.1 Preparation of Rock Foundation

The prescribed methods of rock excavation will be shown on the drawings or given in the general specifications for excavation and foundation preparation for a particular job and not in this Specification. The exact foundation configuration cannot always be predicted and the subsequent treatment thereof cannot always be shown or indicated on drawings prepared before the excavation is done. However, the following general requirements shall be observed.

- a - Concrete shall not be deposited on large sloping plane rock surfaces. Where required by the Engineer, or as indicated on the plans, the rock shall be cut to form rough steps or benches, to provide roughness or a more suitable bearing surface.
- b - Rock foundations shall be prepared by picking, barring, wedging and similar methods which will leave the rock in an entirely sound and unshattered condition.

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7.1 (Cont'd)

- c - Shortly before concrete is placed, the rock surface shall be cleaned with a high-pressure water and air jet, even though it may have been previously cleaned in that manner.
- d - Prior to placing concrete, the rock foundation shall be kept wet for a period of two to four hours unless otherwise directed by the Engineer.
- e - Before placing concrete on rock foundations, all water shall be removed from depressions to permit thorough inspection and proper bonding of the concrete to the rock.

FOUNDATION
BEDDING,
BONDING AND
JOINTING
(Cont'd)

.2 Preparation of Earth Foundations

All earth surfaces upon which or against which concrete is to be placed shall be well compacted and free from standing water, mud or debris. Soft or yielding soil shall be removed and replaced with lean concrete or with selected soils and compacted to the same density as surrounding area. The surface of absorptive soils against which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

.3 Preparation of Concrete Surfaces

The preparation of concrete surfaces upon which additional concrete is to be placed shall preferably be done by scarifying and cleaning while the concrete is between its initial and final set or soon after final set. This method shall be used wherever practicable and shall consist of cutting the surface with picks and stiff brooms and by use of an approved combination air and water jet, as directed by the Engineer. Great care shall be taken in performing this work to avoid removal of too much mortar and the weakening of the surface by loosening of aggregate.

When it is not practicable to follow the above method, it will be necessary to employ chipping tools to remove laitance and roughen the surface.

The final required result shall be a roughened, pitted surface from which all dirt, unsound concrete, laitance and glazed mortar have been removed and aggregate exposed for approximately 1/4 in. depth, and shall be subjected to the approval of the Engineer. Wet sandblasting shall be done, if required by the Engineer. See Paragraph 7.4 for general guidelines.

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7.4 General Guidelines for Preparation of Concrete Surfaces

FOUNDATION
BEDDING,
BONDING AND
JOINTING
(Cont'd)

- a - Shortly before new concrete is placed, the existing concrete surface shall be cleaned with a high pressure water and air jet, even though it may previously have been cleaned in that manner.
- b - Prior to placing new concrete, the existing concrete surface shall be kept wet for a period of two to four hours unless otherwise directed by the Engineer.
- c - Before placing new concrete, all water shall be removed from depressions in the existing concrete in order to permit thorough inspection and proper bonding of the new concrete to existing concrete.

.5 Epoxy Bonding Compound

Epoxy bonding compounds, approved by the Engineer, may be used to bond new to old concrete.

.6 Cleaning and Bonding Formed Construction Joints

Vertical construction joints without keys shall be cleaned as in Paragraph 7.3 of this Section.

Formed vertical construction joints with keys shall be inspected upon stripping of forms and laitance and unsound mortar removed.

Vertical construction joints formed by use of expanded metal mesh shall be cleaned with wire brush and other means as specified in Paragraph 7.3 of this Section.

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7.7 Expansion and Contraction Joints

Provision will be made for expansion and contraction in concrete by use of special type joints located as shown on the drawings. Contraction joint surfaces are to be treated as directed by the specifications shown on the drawings or as directed by the Engineer.

FOUNDATION
BEDDING,
BONDING AND
JOINTING
(Cont'd)

8.1 When concrete is to be placed under adverse weather conditions special provision shall be made in the handling and placing methods and in protection during the curing period to ensure that concrete of full strength and free from damage will be obtained. Hot weather conditions shall be considered to be in effect whenever the dry bulb temperature is above 85 F and is expected to go higher. Cold weather conditions shall be considered to be in effect whenever the dry bulb temperature is at, or below, 40 F and can be expected to fall lower.

ADVERSE
WEATHER
CONDITIONS

.2 Hot Weather

Before concrete shall be placed when hot weather conditions apply, the Contractor shall have prepared adequate means for protection of the concrete during the entire curing period. The methods proposed shall be subject to the approval of the Engineer. In addition the following steps shall be taken:

- a - Placing in Hot Weather - When hot weather conditions are in effect the concrete shall be placed in the forms and consolidated to final state as soon as possible, but the interval between mixing and placing shall not exceed 60 minutes, or before the drum has revolved 300 revolutions, which come first, after the addition of water to the cement and aggregates, unless otherwise directed by the Engineer. R4
- b - Height of Lifts in Hot Weather - During hot weather conditions, the height of lifts in structures of large concrete volume shall be reduced, as necessary, or other means employed as approved by the Engineer to reduce the heat of hydration in the interior of mass. Extreme care shall be taken to prevent crack formation in areas of restraint to concrete shrinkage. R5

.3 Cold Weather

When cold weather conditions are in effect, no concrete shall be placed until satisfactory provisions have been made for protection and to maintain the ambient temperature at minimum 45 F and maximum of 65 F for at least 10 days after placing. In addition, the following steps shall be taken:

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8.3 (Cont'd)

ADVERSE
WEATHER
CONDITIONS
(Cont'd)

- a - Frozen Surfaces - Frozen or frost covered surfaces, against which concrete is to be placed shall be covered and heated before start of placement of concrete, to remove all frost and raise the temperature of the surfaces to above freezing. Check shall be made to insure that frost has been removed from soil to its full penetrated depth.
- b - Concrete Temperature - The operation of protection equipment and the removal of forms shall be handled in such manner that the surface concrete will not be subjected to a differential in temperature of more than 25 F, as determined by observation of ambient and concrete surface temperature indicated by suitable thermometers.
- c - Use of Steam Coils or Heater Air - Steam coils, confined steam vapor or heated air shall be used when necessary for curing and for protecting the concrete from frost. Sufficient coverings or housings of fabric, wood or other material shall be provided and used to retain the heat and moisture. The concrete shall be kept sufficiently moist at all times during the curing period to prevent detrimental loss of water of hydration. If heated air is used, extra care must be exercised to assure a continuous condition of sufficient moisture. The flow of heated air shall be directed by means of baffles so as to provide a condition of uniform temperature and to avoid "hot spots."

.4 Use of Calcium Chloride

Calcium chloride shall not be used for accelerating the set of the cement in any concrete containing reinforcement or embedded metal parts. The use of calcium chloride in mass concrete of footings and similar locations will be permitted only upon written approval of the Engineer. When calcium chloride is used, it shall be liquefied and added to the mixing water in an amount not to exceed two percent of the weight of the cement in each batch of concrete.

9. Under all ordinary conditions, all foundations shall be completely unwat and concrete placed in the dry. However, when concrete placement under water is necessary, the procedure shall be as follows:

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CONCRETE
UNDER
WATER

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9.1 Methods of Placement

Concrete shall be deposited underwater by means of tremies, or bottom-dump covered buckets of approved type.

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CONCRETE
UNDER
WATER
(Cont'd)

.2 Direction Inspection and Approval

All work requiring placement of concrete underwater shall be designed, directed and inspected with due regard to local circumstances and purposes. All underwater concrete shall be placed according to the plans or specifications and as directed and approved by the Engineer.

J. A. JONES CONSTRUCTION COMPANY
 CONSTRUCTION WORK PROCEDURE
 FOR
 CONCRETE PLACING, CURING, FINISHING AND REPAIRS

WATERFORD SES UNIT NO. 3
 CONTRACT NO. W3-NY-4

REV.	DATE	ENGINEERING APPROVED BY	DATE	QUALITY ASSURANCE APPROVED BY	DATE	CONSTRUCTION APPROVED BY	DATE
0	11-21-75	al Prince	11/24/75	[Signature]	11/24/75	Leo Terry	11/24/75
1	11-26-75	al Prince	11/26/75	[Signature]	11/26/75	Leo Terry	11/26/75
2	12-18-75	al Prince	12/18/75	[Signature]	12/18/75	Jerry Lemar	12/18/75
3	3-5-76	al Prince	3/8/76	[Signature]	3/8/75	Leo Terry	3-8-76
4	4-30-76	D. Gallagher	4/30/76	W. E. [Signature]	4/30/76	Leo Terry	4/30/76
5	5-7-76	al Prince	5/7/76	[Signature]	5/7/76	Jerry Lemar	5/7/76
6	5/26/76	al Prince	5/26/76	W. E. [Signature]	5/27/76	Leo Terry	5/27/76
7	7/14/76	al Prince	7/14/76	W. E. [Signature]	7/14/76	Leo Terry	7/15/76
8	9/20/76	al Prince	9/29/76	[Signature]	9/20/76	O. E. Harris	9/20/76
9	10/1/76	al Prince	10/1/76	[Signature]	10/4/76	O. E. Harris	10/27/76
10	11/3/76	al Prince	11/9/76	Z. R. Wilson	11/2/77	O. E. Harris	11/2/77
11	12/3/76	al Prince	12/3/76	R. M. Sullivan	12-16-76	O. E. Harris	12-16-76
12	5-9-77	al Prince	5/9/77	Z. R. Wilson	5/10/77	D. Behrman	5/10/77
13	5-16-77	al Prince	5/16/77	Z. R. Wilson	5/16/77	D. Behrman	5/16/77
14							



CONSTRUCTION WORK PROCEDURE	PROCEDURE NO. W-WP-7
TITLE OF PROCEDURE: CONCRETE PLACING, CURING, FINISHING AND REPAIRS	Issue Date: 11-24-75
PROJECT TITLE: WATERFORD SES UNIT NO. 3 CONTRACT NO. W3-NY-4	Rev. No. & Date: 20 7-18-78

1.0 PURPOSE

To outline methods used by J. A. Jones Construction Company and Subcontractors to place, cure, finish and repair concrete.

2.0 SCOPE

This procedure includes the requirements to be used by J. A. Jones and their Subcontractors to comply with approved construction drawings and specifications.

3.0 DEFINITIONS

3.1 Water

The water used for all aspects of this procedure shall be furnished and certified acceptable by the Engineer. It shall be free from any injurious amounts of acid, alkali, salts, sediment or organic matter and shall not contain more than 1000 ppm of dissolved solids and not more than 100 ppm chloride ion.

3.2 Hot Weather

Hot weather is when the dry bulb temperature is above 85 degrees and is expected to go higher.

3.3 Cold Weather

Cold weather is when the dry bulb temperature is at or below 40 degrees F and can be expected to fall lower.

3.4 Cold Joint

A cold joint is defined as an area in which previously placed concrete cannot be made monolithic with a successive layer due to loss of plasticity in the original layer, where concrete shall be considered plastic if a vibrator spud, up to 2 inches diameter, suspended vertically, will penetrate to a depth of at least 6 inches in a period of 15 seconds.



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R-1

4.0 REFERENCES

- 4.1 Ebasco Services, Inc. Specification LOU-1564.472, Section 11, latest revision, "Concrete Placement, Curing and Finishing".
- 4.2 J. A. Jones' Procedure, W-SITP-7, "Concrete Placing, Curing, Finishing and Repair Inspection".
- R-12 4.3 Engineering Information Requests 200-53, dated 9-17-76 and 200-67, dated 12-23-76.
- R-12 4.4 Ebasco Letter No. F-10055, Dated 8-27-76.
- R-13 4.5 Ebasco Letter No. F-15886, Dated 5-06-77.

5.0 RESPONSIBILITIES

- 5.1 Ebasco Services, Inc. is responsible for furnishing all materials, receiving inspection, testing and documentation of such test as required by Reference 4.1 to support J. A. Jones and their Subcontractors in performing their work.
- 5.2 J. A. Jones and their Subcontractors are responsible for forming, placing, curing, finishing, repairing and inspection of concrete as required by the approved drawings and specifications.

6.0 TRANSPORTATION

R-1

6.1 Convey all concrete from mixer to place of final deposit in bucket, container or conveyors to assure required consistency and plasticity without segregation or loss of slump beyond limits of specification.

R-4

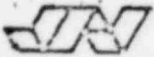
6.2 Check time and number of drum rotations after water has been added to the cement and aggregate, as deemed necessary. Concrete must be placed in forms within one hour or 300 rotations of drum, whichever one occurs first, unless authorized by the Engineer and then time must not exceed one and one-half hours.

R-1

6.3 Water shall be added only by the Engineer.

R-1

6.4 Clean all tools and equipment used in placing concrete before and after placement.



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R-2

- 6.5 At any time it becomes necessary to break down concrete conveying equipment for cleaning or repair during a placing operation, care shall be taken to prevent the concrete contained in the equipment from being dropped in excess of 5'-0" into the placement.
- 6.5.1 Acceptable concrete contained in the conveying equipment may be transported by other acceptable means (skip pans, wheelbarrows, carts, etc.) and deposited in the placement by the approved method, except that concrete must not be dropped in excess of 5'-0" or handled in any other way that would cause segregation. Concrete that has been handled in any detrimental method shall not be placed in the placement.
- 6.5.2 When it is necessary to disassemble conveying equipment over the placement and the concrete would fall in excess of 5'-0", the area shall be covered with plywood or other suitable material to catch the concrete and prevent it from falling into the placement. Concrete that has fallen in excess of 5'-0" or handled in any other detrimental method or that cannot be placed in the allowed time limit shall be removed from the placement area and discarded.

-1

7.0 PLACING

- 7.1 Obtain Engineer review of equipment, layout, procedures and methods, prior to placing concrete.
- 7.2 Discharge concrete from mixer into center of bucket or hopper. This principle of vertical discharge shall be used during all stages of delivery.
- 7.3 Deposit concrete as near as practicable to its final location. When direct placement is not possible, use suitable chutes and "elephant trunks" to confine concrete movement. Do not allow concrete to flow in a manner that will cause segregation.
- 7.4 Use a central-bottom-dump bucket that provides positive regulation of amount and rate of deposit in all dumping positions.
- 7.5 When placing concrete with bucket, spot bucket over exact location, then lower to just clear the concrete already in place, with bucket open. The unconfined height must not be more than five feet unless approved by the Engineer. Do not dump buckets while swinging or in any manner that will cause separation or disturb previously placed concrete.



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- R-8 7.6 Concrete shall be placed at a low rate to provide sufficient time to consolidate concrete by vibration. Take care to place concrete and vibrate it as it approaches the bottom of blockouts, penetrations, embeds, etc. to prevent building up on sides and failing to fill voids underneath. Provide adequate supervision to assure the proper steps are taken to avoid problems encountered in placing concrete in restricted and confined areas.
- R-1 7.7 Slope on chutes shall not be flatter than 1 to 3 and not steeper than 1 to 2.
- R-1 7.8 Aluminum or galvanized steel pipe will not be used to convey concrete.
- R-1 7.9 Obtain Engineer inspection of cleanliness prior to placing concrete.
- 7.10 Remove all surface water from forms, embeds, resteel, and adjoining concrete. No concrete will be placed on a water covered surface.
- 7.11 Place concrete in successive 6 to 20 inch thick horizontal layers. Correct tendency to segregate by shoveling stones into mortar.
- 7.12 Bedding planes shall be approximately horizontal, except in dams or other structures where it may be required to incline the beds. Without forms, on a downward slope of about one vertical to ten horizontal in an upstream direction in which case the placement shall proceed in an upslope direction.
- 7.13 Compact concrete with mechanical vibrating equipment until the concrete has been consolidated to the maximum density, free of pockets or coarse aggregate, and fits tight against forms and embed material.
- R-6 - 7.13.1 Use vibrators of the high-frequency type with not less than 6000 revolutions per minute, to properly consolidate the concrete. See Appendix D.
- 7.13.2 Insert vibrators approximately every 2 feet in the vertical position. Remove vibrator slowly to avoid creating pockets. Do not use vibrators to transport the concrete.
- 7.13.3 Use vibrators to blend and meld new layer with previously placed layer. Care must be taken to assure adequate vibration.



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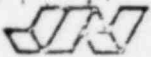
7.13.4 Insure vibrator penetrates the layer being placed and also the layer below while it is still plastic to provide good bond between the two layers and prevent the formation of cold joints.

R-5 7.13.4.1 Should the placement of concrete to be curtailed for any reason or if the placing gets out of sequence, the minimum thickness requirements for successive horizontal layers in Par. 7.11 no longer apply. Keep the entire exposed surface not topped out, covered with fresh horizontal layers of concrete as thick as the supply will allow and keep vibrated.

R-5 7.13.4.2 If the possibility of a cold joint exists, test the surface with a blunt end rod. If the rod can be inserted into the concrete only 2 or 3 inches, test the concrete by the method described in Par. 3.4 above. By this method, if it is determined that a cold joint exists, stop work immediately in area of cold joint.

R-5 7.13.4.3 If after work stoppage in placement, concrete is so green that it can readily be dug out with a hand pick, then no treatment shall be required, provided any laitance is removed, the surface roughened, loose material removed and the surfaces are kept moist; the concrete shall be placed against the surfaces and thoroughly and systematically vibrated over the concrete area adjacent to the older concrete.

R-5 7.13.4.4 In placements, when the concrete is not green, as described in the preceding paragraph, the surface shall be roughened and cleaned of any laitance and loose material, and coated with Sika-Hi-Mod Epoxy or approved equal and the fresh concrete thoroughly vibrated beside the affected area. In all cases where epoxy is used, the manufacturer's instructions particularly as regards time limits, shall be followed. In all cases, surfaces shall be kept moist after cleaning until concrete is placed.



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- 7.13.5 Care must be taken to minimize contact between vibrator and reinforcing steel. Do not allow vibrator to contact reinforcing steel extending out of concrete that has reached a stage of initial set, within five feet of the concrete. Do not allow contact with forms of finished surfaces.
- 7.13.6 Obtain Engineer approval before using any form attached vibrators.
- 7.13.7 Obtain Engineer approval prior to using any surface vibrators.
- 7.13.8 All areas of stone pockets and mortar pondage is unacceptable. These areas shall be removed and replaced as directed by the Engineer.

7.14 Install horizontal and vertical construction joints as shown and detailed on the approved construction drawings.

7.15 Remove wash water in manner to prevent it from running down and staining exposed faces. Should staining occur, it shall be removed.

7.16 In multiple lift placement, allow each placement to set 48 hours or longer if required by Engineer before placing next lift. The interval may be shortened by the Engineer for certain locations.

8.0 CURING

8.1 Cure concrete by using water applied continuously to all exposed concrete.

8.2 Assure ample water supply for continuous fine-mist spraying or sprinkling.

8.3 Certification for water, if required, will be the responsibility of the Engineer and should meet requirements in Paragraph 3.1 of this procedure.

8.4 If water during cannot be used, obtain Engineer approval of alternate method. Other methods are covering with mulch, curing compounds and ponding as outlined in Reference 4.1.



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<p>8.5 The concrete shall be kept above 50 degrees F in a moist condition for at least the first seven days after placing, except as follows:</p> <p>8.5.1 High-early concrete shall be cured for at least the first three days other period may be used if approved by Engineer.</p> <p>8.5.2 Concrete containing pozzolon shall be for not less than 14 days.</p> <p>8.5.3 For curing during "hot" and "cold" weather conditions refer to Section 13.</p> <p>8.6 All equipment required for curing shall be on hand, checked out and ready for use prior to placing concrete.</p> <p>8.7 Fresh concrete shall be protected by leaving forms in place as required. Assure against disturbing by shock, vibration and premature stressing until the concrete has attained sufficient strength to sustain the load.</p> <p>8.8 Instruct each worker in the importance of not disturbing green concrete during its setting period. Worker with duties on freshly placed concrete slabs shall wear wooden "slats" approximately 8 x 18 inches.</p> <p>9.0 <u>REPAIR</u></p> <p>Unsatisfactory concrete shall be cut out and replaced with new concrete as soon as practicable after removal of forms.</p> <p>9.1 Provide anchors, keys or dovetail slots by grinding and chipping to hold new material securely in place.</p> <p>9.2 Method of repair, matching of color, curing and Engineer approval shall be performed per-Reference 4.1.</p> <p>9.3 The method of repair for all defective areas in concrete more than one cubic yard after stripping of forms, shall be detailed step-by-step on Concrete Pour Plan, Appendix C, and accompanied with a sketch, if required, to completely cover the method of repair and curing to meet the specification requirements.</p> <p>10.0 <u>FINISHING FORMED SURFACES</u></p> <p>10.1 No finishing is required for formed surfaces against which backfill or concrete is to be placed, except repair of defective areas and filling of holes left by form ties and rods.</p>	



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10.2 Surfaces below grade which will receive waterproofing shall be free of irregularities which would interfere with proper application of the waterproofing material.

10.3 Surfaces which will be exposed when structure is in service will receive no special finish. Repair damaged or defective concrete, remove fins $\frac{1}{4}$ " in height, and abrupt irregularities, fill holes left by form ties and rods.

11.0 FINISHING UNFORMED SURFACES

11.1 Surfaces exposed to the weather which the approved construction drawings do not specify a horizontal surface or slope required shall be as follows:

11.1.1 Tops of narrow surfaces, such as stair treads, walls, curbs and parapets shall be sloped approximately $\frac{3}{8}$ " per foot of width.

11.1.2 Broad surfaces, such as walks, roads, parking areas and platforms shall be sloped approximately $\frac{1}{4}$ " per foot of width.

11.2 Screed and level all surfaces to be covered by backfill or concrete, subfloors to be covered with concrete topping, terrazzo or quarry tile and similar surfaces. Surface irregularities shall not exceed $\frac{1}{4}$ " higher or lower from the specified surfaces.

11.3 Surfaces that will not be covered by backfill, concrete or tile topping shall be consolidated, screeded and floated. Perform floating by hand or machine. Assure surface is free from screed marks or other imperfections and that surface is uniform in texture. Tool joints and edges as shown on the approved construction drawings.

11.4 Surfaces subjected to moderate or high velocities or water shall be screed to correct shape required by approved construction drawings, then floated with wood floats to secure a firm, uniform texture without raising excess fine material to the surface. When surface has hardened sufficiently, it shall be brought to a uniform smoothness by using a steel trowel. Steel trowel with a firm pressure to flatten the sandy texture and leave a dense, uniform surface free from trowel marks.



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11.5 All concrete shall be protected against damage until final acceptance by the Engineer.

11.6 Use special care in the finishing of floor areas of offices, shops, assembly rooms and other areas where appearance is important. Special floor finishes shall be in accordance with Reference 4.1.

12.0 FORMS

All forms shall be built true to slopes, lines and dimensions. They shall be properly tied and braced to maintain correct position and shape until removed.

12.1 Form design and materials shall be subject to the Engineer's review.

12.2 Form oils shall be approved by the Engineer and applied per Ref. 4.1.

12.3 Chamfers and fillets shall be installed per the approved construction drawing and Ref. 4.1.

12.4 Forms shall remain in place for time specified in Ref. 4.1.

12.5 Forms for placement which do not provide adequate space for personnel access due to size or congestion of resteel, blockouts or embeds shall be erected to allow leaving out panels which will provide access for vibration and inspection. Sufficient light shall be provided inside forms to allow construction forces to see what they are doing and also allow inspection to observe the work and assure adequate consolidation of the concrete and filling of all voids.

13.0 ADVERSE WEATHER CONDITIONS

* 13.1 Rain Procedure

Based on the forecast received from the weather forecasting service received each day, precautions shall be taken per the following procedure.

13.1.1 Walls and Large Equipment Foundations

When the rain forecast is greater than 20%, a suitable support system shall be installed and polyethylene available at the placement for immediate covering in case of rain prior to starting placement. When the rain forecast is greater than 60%, the polyethylene covering shall be installed prior to starting the placement, or the placement may be delayed.

* As directed by Ebasco Services, Inc., Letter #F-18123, Dated July 21, 1977.



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13-12	13.1.2 Columns, Small Surface Areas and Equipment Foundations.	
13-16 13-17	When the rain forecast is greater than 20%, a suitable support system shall be installed prior to starting the placement and polyethylene shall be available at the placement for immediate use as covering in case of rain.	
13-12	13.1.3 Floor and Roof Slabs and other Large Surface Area Placements	
13-17	When the forecast is for rain during the scheduled placement time, prefabricated rain sheds with polyethylene curtains attached shall be within the reach of a suitable crane for immediate covering of the placement. Rolled polyethylene shall be available at the placement for surface covering any area which the surface finish has been completed.	
13-18	When the rain forecast is greater than 50%, the prefabricated rain sheds with polyethylene curtains shall be installed to cover the starting area of the placement. The sheds shall be moved as the placement proceeds. The surface of any finished area shall be covered with rolled polyethylene prior to moving shed during rain.	
	13.1.4 In case rain occurs during any placement and the quality of the concrete cannot be controlled due to the intrusion of rain water, the concrete placement shall be discontinued and the surface prepared in accordance with Reference 4.1.	
	13.1.5 Concrete placed during rain shall be placed in steps in accordance with approved pour plan, pushing the collected water ahead of placement until water can be removed by vacuum or pump. Any concrete showing segregation or rock pockets shall be removed.	
13-11	13.2 Cold Weather Procedure	
	13.2.1 When cold weather conditions, as defined in Par. 3.3, are in effect, no concrete shall be placed until provisions have been made to maintain the ambient temperature around the placement at a minimum of 45 degrees F during placement and until green cutting is complete and curing compound has been applied or other approved means of curing has been started, and concrete surface is protected to maintain a surface temperature of minimum 50 degrees F.	

3



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13.2.2 The concrete shall be protected to maintain a concrete surface temperature of a minimum of 50 degrees F for the first seven (7) days after placement and at a minimum of 45 degrees F for an additional three (3) days. The surface may be protected by any fire resistant non-staining insulating material. Forming material may be used for the insulating material. The chart, Appendix E, shall be used to determine the concrete surface temperature of various thickness and at different ambient temperatures. The chart may be projected and interpolated as required. If the stripping of forms and bulkheads are prior to the required ten (10) day period and the differential temperature between the concrete surface and ambient temperature is more than 25 degrees F, the stripped area shall be protected in a reasonable period of time. This time is not to exceed four (4) hours.

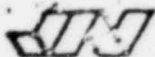
13.2.3 At any time during the required ten (10) day period the heat produced by hydration cannot be entrapped by the insulating material to maintain the required concrete surface temperature then the ambient temperature must be raised by applying heat as required. Core shall be taken when applying heat not to cause "hot spots" on the concrete. Heat shall be diffused by using circulating blowers, baffels, etc. as required.

-14 13.3 Hot Weather Procedure

13.3.1 "Hot weather conditions shall be considered to be in effect whenever the dry bulb temperature is above 85 degrees F and is expected to go higher". (LOU-1564.472 - 11 - 8.1)

13.3.2 SLABS Mass concrete slabs will be cured with water. Placing will be completed as soon as possible and within the limits of the specification.

-15 13.3.3 WALLS Mass concrete walls above the slab will be cured with water ponded on top of the walls. Wall forms will be left in place for the normal curing period. However, if the necessary arises to strip the walls before the normal curing period, they will be cured with wet burlap. Vertical bulkheads in walls, when stripped prior to normal cure time, will be cured with wet burlap. The heights of lifts in hot weather will be controlled, as necessary, to avoid any initial or premature set. Form shebolts should be loosened to allow curing water to run down the inside of the forms.



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13.3.4 Walls, slabs and foundations below existing slabs will be cured with curing compound.

R-15

14.0 DOCUMENTATION

All Engineer approvals shall be obtained and become a part of the final document record package and be turned over to the Engineer after each pour is completed.

R-20

14.1 All work relating to each pour shall be completed, checked and approved prior to placement of concrete. The J. A. Jones "Concrete Pre-Placement Checklist Record", Appendix A, shall be completed for each pour. The J. A. Jones "Concrete Pre-Placement Checklist Record" shall be prepared by the Area Engineer or his Designee giving the pour number, building location and actual pour date. As each item of work is completed, the Field Superintendent shall sign off by the work activity including the date, time and drawing including the revision the work was performed by. The Jones' Field Engineer shall check each work item and sign off by the work activity including the date, time, drawing and revision used to make the check. If errors are found, the Jones' Field Engineer shall not sign off until they have been corrected and checked. The Jones' Quality Verification Inspector shall verify that the work has been completed and checked. He then shall sign off including the date, time, drawing and revision used for the verification. All applicable blocks shall be completed. All other blocks shall be marked N/A. When all work, checking and verification has been completed, the Area Superintendent and the Area Quality Verification Supervisor shall sign off and date in the space provided.

14.2 When the pour has been completed, the actual pour date shall be placed in space provided and J. A. Jones' "Concrete Pre-Placement Checklist Record" shall become a part of the final document record package.



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14.3 After the Area Superintendent and Quality Verification Supervisor has signed off the J. A. Jones "Concrete Pre-Placement Checklist Record" verifying that Jones is ready to place concrete, the J. A. Jones Quality Verification Supervisor shall be authorized to sign off the Ebasco "Concrete Pre-Placement Checklist Record", Form QCIP-6-1, Appendix B, in contractor column indicating J. A. Jones is ready to place concrete.

14.4 After all required signatures have been secured and the pour is approved for concrete placement, J. A. Jones shall be provided a copy of the Ebasco "Concrete Pre-Placement Checklist Record" and it shall become a part of the final document record package which will be turned over to the Engineer after the placement.

15.0 APPENDIX

- 15.1 Appendix A, "Concrete Pre-Placement Checklist Record"
- 15.2 Appendix B, "Concrete Pre-Placement Checklist Record", Ebasco's Form QCIP-6-1
- 15.3 Appendix C, "Concrete Pour Plan"
- 15.4 Appendix D, "Vibrating Schedule"
- 15.5 Appendix E, "Concrete Surface Temperature Chart"

REVISION 20
7-18-78

W-WP-7 Appendix A

POSS NO. _____
E. EV. _____

BUILDING _____

J. A. JONES CONSTRUCTION COMPANY
WATERFORD UNIT NO. 3

ACTUAL POUR DATE _____

CONCRETE PRE-PLACEMENT CHECKLIST RECORD

	COMPLETED AND INSPECTED												REMARKS	
	J. A. JONES SUPERVISION				J. A. JONES ENGINEER				QUALITY VERIFICATION					
	Name	Date	Time	Per Dwg & Rev	Name	Date	Time	Per Dwg & Rev	Name	Date	Time	Per Dwg & Rev		
1. CONCRETE														
a. Sandblast														
b. Greencut														
c. Treatment														
2. FORMS														
a. Dimension														
b. Line & Grade														
c. Clean														
d. Tight														
e. Braced														
f. Coating														
g. Chaffer Strips														
h. Key Ways														
i. Block Outs														
j. Walers & Strongbacks														
k. Waterstop														
l. Release Agent														
3. REINFORCING														
a. Bar Quantities														
b. Spacing														
c. Elevation														
d. Field Mapping														
4. EMBEDS														
a. Quantity														
b. Line & Grade														
c. Elevation														
d. Identification														
5. GENERAL														
a. Cleanliness														
b. Instrumentation														
c. Weather Protection														

APPROVED AREA SUPERINTENDENT _____ DATE _____ APPROVED Q. V. SUPERVISOR _____ DATE _____

WATERFORD STEAM ELECTRIC STATION
 1980 - 1165 MW INSTALLATION - UNIT NO. 3
 CONCRETE PREPLACEMENT CHECKLIST RECORD

Location: _____

Elevation: _____ to _____ Placement No. _____

Detailed Description: _____

ITEM	CONTRACTOR			INSPECTOR		
	Time	Date	Int.	Time	Date	Int.
Sandblast/Greencut/Foundation Treatment						
Forms (Line and Grade)						
Blockouts, Keys, Waterstop, etc.						
Reinforcing Steel						
Anchor Bolts, Embedded Steel						
Electrical						
Mechanical						
Final Clean-up						

Remarks: _____

Approved for Placing _____ Time _____ Date _____
 Contractor's Representative

Approved for Placing _____ Time _____ Date _____
 Ebasco's Engineering

(See Reverse Side for Instructions)

JONES CONSTRUCTION COMPANY
WATERFORD SES UNIT NO. 3
CONCRETE POUR PLAN

APPENDIX C

POUR NO. _____ ELEV. _____ TO _____
EST. CUBIC YARDS _____ LOCATION _____
DATE PREPARED _____

PLACING PROCEDURE: _____

TOTAL C.Y. _____ BATCH LOAD _____ RATE OF DELIVERY _____

PLACING EQUIPMENT: _____

STANDBY: _____

VIBRATORS: _____
STANDBY: _____

HOPPERS, TREMIES: _____

FINISH REQUIRED: _____
CURING PROCEDURE: _____

MANPOWER: _____
STANDBY: _____

Field Engineer _____
Area Superintendent _____
Quality Assurance _____

J. A. JONES CONSTRUCTION COMPANY
 WATERFORD SES UNIT NO. 3
 JOB # 75-317

VIBRATING SCHEDULE

RATINGS OF VIBRATORS BY CUBIC YARDS PER HOUR AS SPECIFIED BY MANUFACTURER.

TYPE VIBRATOR	RATINGS IN C.Y./HOUR - ACCORDING TO TIME VIBRATORS IN USE			
	100%	75%	50%	25%
1 3/4' Electric	18.0	13.5	9.0	4.5
1 7/8' Air	20.0	15.0	10.0	5.0
2 1/2' Air	40.0	30.0	20.0	10.0
2 3/8' Electric	35.0	26.3	17.5	6.3
3 1/2' Air	40.0	30.0	20.0	10.0

NOTE: Required number and type of vibrators to be determined by field depending on pour rate and percentage of time used.

KE 10 X 10 TO 15 INCH 45 TCR
7 X 10 INCHES
BRUNNEN & BECKER CO.

Thompson & E. Gulligler 11-11-76

APPENDIX: "E"

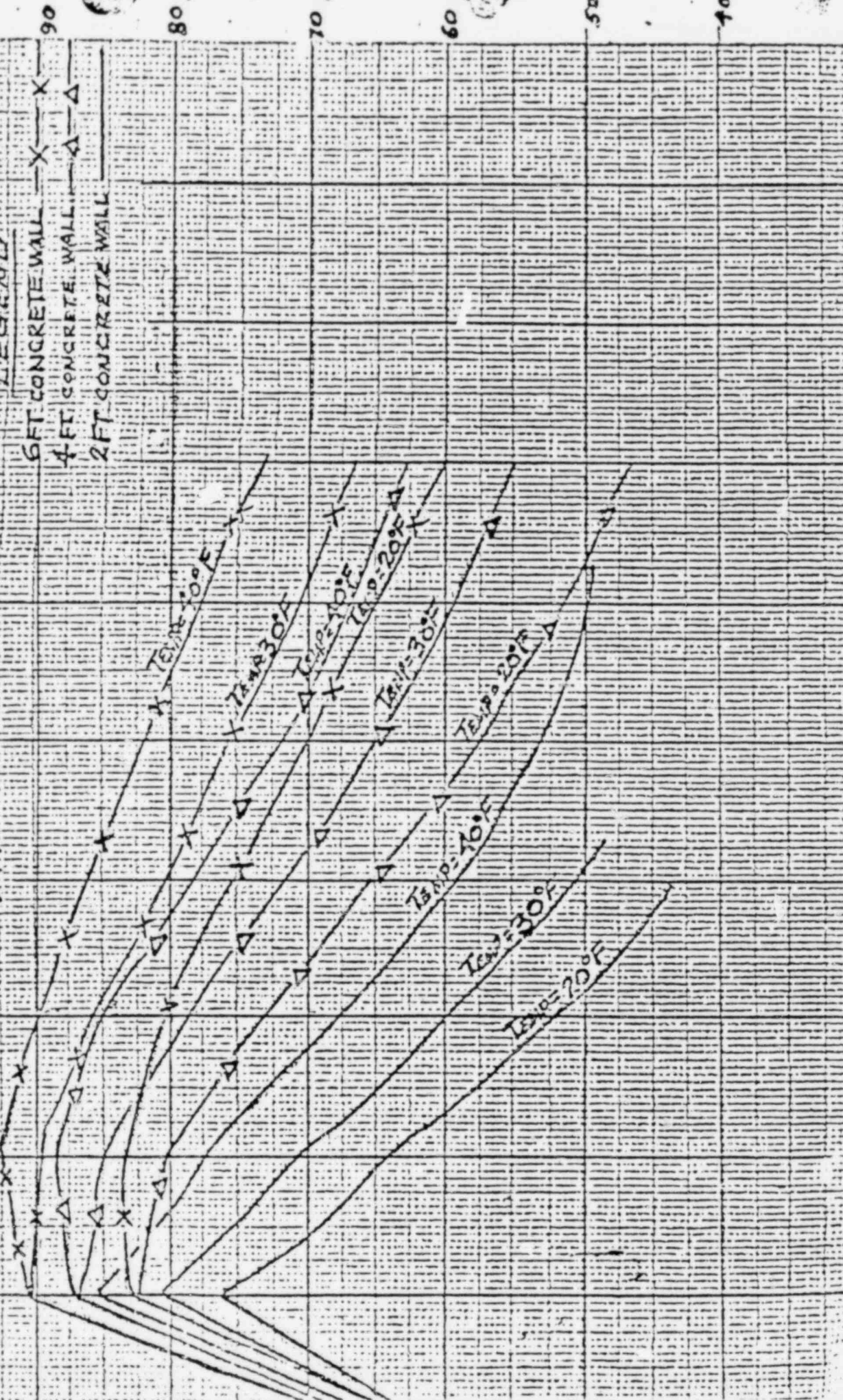
RECEIVED
NOV 29 1976
CONS. DIV.

CONCRETE SURFACE TEMPERATURE
W 3/4" PLYFORM

LEGEND

6 FT CONCRETE WALL — X — X —
4 FT CONCRETE WALL — Δ — Δ —
2 FT CONCRETE WALL — — —

CENTERS SURFACE TEMP (°F)





UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

May 30, 1979

Sheldon J. Wolfe, Esq., Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dr. Harry Foreman, Director
Box 395, Mayo
University of Minnesota
Minneapolis, MN 55455

Dr. Walter H. Jordan
881 West Outer Drive
Oak Ridge, TN 37830

In the Matter of Louisiana Power & Light Company
(Waterford Steam Electric Station, Unit 3)
Docket No. 50-382

Gentlemen:

At the April 26, 1979 Special Prehearing Conference, this Board requested the NRC Staff to advise it whether the NRC had investigated the matter reported in the April 3, 1979 New Orleans "States Item" regarding defects in concrete work at Waterford, Unit 3 (Tr. 106).

The NRC's Office of Inspection and Enforcement has investigated this matter as indicated in the enclosed memorandum dated April 4, 1979 and concluded that the concerns are baseless.

Sincerely,

A handwritten signature in dark ink, appearing to read "Henry J. McGurren".

Henry J. McGurren
Counsel for NRC Staff

Enclosure: As stated

April 4, 1979

Socket No. 50-382

MEMORANDUM FOR: File

THRU: W. C. Seidle, Chief, RC&ES Branch

FROM: R. E. Hall, Chief, Engineering Support Section

SUBJECT: NEWSPAPER ARTICLE REGARDING WATERFORD, UNIT 3
DN 50-382

Pursuant to your request, I contacted the author of the enclosed newspaper article regarding the "allegation" contained in the third column. Mr. Jim Amoss (504 526-3560) is a staff writer for the New Orleans States Item, the New Orleans afternoon paper. After identifying myself to him, he indicated that he had no further information than that presented in the article. The three concrete workers he talked to were working on the Intake Structure, a nonsafety related structure; but did say their comments also were applicable to prior work on the plant proper. He did not know if they were J. A. Jones or Boh Bros. workers. Only J. A. Jones did safety related work at Waterford, Unit 3.

I tried to impress upon him how important it is to obtain sufficient specifics to permit pursuit of all allegations; and that if he does get allegations, we would follow to completion any he relayed to us. His moral obligation to help assure the safety of the Waterford, Unit 3 facility was stressed, as were our statutory obligations. He was given the RIV telephone number should further items be brought to his attention. The Waterford, Unit 3 HCR process was also explained to him.

April 4, 1979

Based on the vagueness of the allegation and the reported employees relationship to previous safety related work activities, it is not considered practical to pursue this matter further.

"Original Signed by:
R. E. HALL"

R. E. Hall, Chief
Engineering Support Section

Enclosure:

News article - New Orleans
States Item, April 3, 1979

cc: W. A. Crossman
R. C. Stewart

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)
)
LOUISIANA POWER & LIGHT COMPANY) Docket No. 50-382
)
(Waterford Steam Electric)
Station, Unit 3))

O R D E R

Louisiana Power & Light Company ("Applicant") has moved pursuant to 10 C.F.R. § 2.749 for summary disposition of Joint Intervenors' Contention 22, which alleges:

22. Applicant has failed to discover, acknowledge, report or remedy defects in safety related concrete construction.

Having considered the papers filed in support of Applicant's motion, including the affidavit of Applicant's Quality Assurance Manager, Thomas F. Gerrets, and the papers filed in opposition to the motion by Joint Intervenors, the Board concludes that there is no genuine issue as to any fact material to Contention 22 and that Applicant is entitled to a decision as a matter of law. Accordingly, Applicant's motion is granted, and Joint Intervenors' Contention 22 is hereby dismissed with prejudice.

FOR THE ATOMIC SAFETY AND
LICENSING BOARD

Sheldon J. Wolfe, Esq.
Chairman

DATED: _____

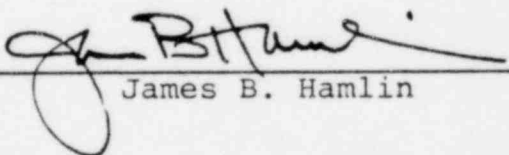
UNITED STATES OF AMERICA
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)
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)
(Waterford Steam Electric)
Station, Unit 3))

CERTIFICATE OF SERVICE

I hereby certify that true copies of "Applicant's Motion For Summary Disposition Of Joint Intervenors' Contention 22 (Safety-Related Concrete)," "Brief in Support of Applicant's Motion For Summary Disposition Of Joint Intervenors' Contention 22 (Safety-Related Concrete)," "Applicant's Statement Of Material Facts Relating To Joint Intervenors' Contention 22 (Safety-Related Concrete)," and "Affidavit of Thomas F. Gerrets" with exhibits, were served this 21st day of August, 1981, by United States mail, postage prepaid, upon those persons on the attached Service List.



James B. Hamlin

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of)
)
LOUISIANA POWER & LIGHT COMPANY) Docket No. 50-382
)
(Waterford Steam Electric)
Station, Unit 3))

SERVICE LIST

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Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555

Atomic Safety and Licensing
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U.S. Nuclear Regulatory
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