APPENDIX 2.5C

PROCEDURE FOR SOILS CONTROL

AND

FILTER AND BACKFILL SPECIFICATION

APPENDIX 2.5C

PROCEDURE FOR SOILS CONTROL AND FILTER AND BACKFILL SPECIFICATION-

1.0 PURPOSE

This procedure outlines a means to verify and record compliance with applicable drawings, specifications, procedures, codes, regulatory requirements and documented instructions relating to soils inspection at the construction site.

2.0 SCOPE

The scope of the procedure applies to safety-related items and services involving excavation and backfill operations. The soils control activities will be performed in the excavated areas, borrow-stockpile areas, the plant backfill and earth structure backfill areas. In-place inspections and tests as well as laboratory tests and analyses will be performed as a combined program for control of intergrated activities in all areas.

The scope of inspection activities shall be divided into two types of inspection, full scale Q. C. inspection of soils operations when the Contractor does not have a Quality Assurance Program and Designated Inspection in order to monitor Contractor's performance when first-level Quality Control activities are performed by the Contractor.

3.0 REFERENCES

3.1 Ebasco Services Incorporated,
Ebasco Specification,
Excavation and Backfill,
Seismically Designed Category I Structures,
Project Identification No.
LOU 1564.482

3.2 J. A. Jones Construction Company,
Construction Work Procedure,
Backfill and Compaction,
W-WP-12

3.3 J. A. Jones Construction Company,
Site Inspection and Test Procedure
Backfill and Compaction Inspection
W-SITP-12

3.4 Barrow-Agee Labs.,
Laboratory and Field Testing
Backfill Materials

4.0 DEFINITIONS

All definitions of material type, placement and compaction activities are contained in Reference 3.

5.0 RESPONSIBILITIES

The responsibilities of performing Quality Control soil related activities shall be divided as follows:

5.1 Material Acceptance - The performance of inspections of the backfill material to determine material acceptability whether by test fills, in the borrow pit, stockpiles or in trucks shall be performed by Ebasco Services Incorporated.

5.2 Construction Activities - Final inspection of excavated or stripped areas shall be performed by Ebasco Services Incorporated. When placement and compaction operations are performed by a contractor that does not have a Quality Assurance Program, first-level inspection of these operations shall be performed by Ebasco. When the contractor has an accepted Quality Assurance Program, Designated Inspection of placement and compactions shall be performed by Ebasco as defined in Procedure No. ASP-III-11.

5.3 Soils Testing - The in-place and laboratory soils testing shall be performed by Barrow Agee Labs. under the direction of Ebasco Services Incorporated.

5.4 Documentation - All Quality Control records required by this procedure shall be prepared by the proper agency as stated above and then compiled into a single package for each backfill lift by Ebasco Services Incorporated.

5.5 Acceptance

Preliminary Acceptance - All test data generated by the field laboratory, for specification acceptance shall be reviewed and signed for acceptance in the field by Ebasco's Quality Control Inspector. This signature shall appear on each appropriate testing form.

Final Acceptance - All soil related activities shall be the responsibility of Ebasco Services Incorporated. Acceptability shall be documented in writing on Form QCIP-2-4 and attached to documentation package described above.

5.6 To comply with the applicable sections of the above stated inspection requirements, Ebasco Services Incorporated shall institute the following Quality Control program and personnel:

5.6.1 The Senior Quality Control Supervisor is responsible for supervising and performing the following jobsite Quality Control activities:

a) Performing inspection of borrow pit - stockpile material to determine material acceptability.

b) Performing inspection of all soil construction activities and operations.

c) Directing Soils Laboratory and testing operations.

d) Enforcing quality control documentation requirements and preparing the quality control records required by this procedure for the final acceptance of the work.

5.6.2 Quality Control Civil Supervisor, reporting to a Lead Quality Control Engineer (Civil) will receive technical assistance from the Site Soils Engineer as required and shall be responsible for supervision of soils inspector(s) who shall perform inspections to verify a satisfactory quality level as defined in applicable documents. He shall also be responsible for Supervising and directing the Soils Laboratory and observing Field Testing as well as:

a) Assuring that tests, certifications and examinations are accomplished in accordance with the applicable design drawings, specifications and any other governing documents.

b) Accepting or rejecting work tests in accordance with the specifications and procedures and documenting same, including preparation of Statistical Analysis of compacted backfill where provided for by the specifications.

5.6.3 Civil Quality Control Inspector(s), reporting to the Quality Control Civil Supervisor, are responsible for the following:

a) Performing inspections of work and witnessing or performing soil tests in the work areas.

b) Provide the assistance during the performance of soils laboratory operations.

c) Preparing documentation of all operations requiring specific reports and/or form completion, and submitting same to the Quality Control Civil Supervisor for review and further action as required.

5.6.4 The Site Soils Engineer, reporting to the Home Office Supervising Soils Engineer and consulting with the Senior Resident Engineer shall be a qualified soils engineer who is familiar with the design intent and shall be responsible for the following:

a) Maintain liaison with the Supervising Soils Engineer of the Ebasco Home Office in order to ensure that field operations yield the design intent.

b) Consult with the Senior Resident Engineer, Quality Control Supervisor, Field Superintendents and Contractors to provide technical assistance, in accordance with the specifications, in establishing field methods and construction procedures for specified compliance.

c) The Site Soils Engineer, representing the Home Office design organization responsible for the formation, review and approval of specification and its revisions, shall have the authority to deviate and qualify specifications in isolated cases when in his technical opinion, the specifications will not yield the required results (design intent) in a certain situation. He shall in this case, review and approve detailed written documentation of the deviation encountered and the earthwork performed on and Ebasco Nonconformance Report, Field Change Request or Design Change Notice.

6.0 PROCEDURE

6.1 Test Fills

Test fills will be constructed for the purpose of determining the optimum construction technique to achieve the design conditions. Test fills shall be conducted, inspected and tested as required by the specifications and the general requirements of this Soils Inspection Procedure.

The Senior Quality Control Supervisor or his inspector shall observe and document results of the following operations when required by the specifications.

6.1.1 Surveying and layout

6.1.2 Excavation

6.1.3 Backfill

6.1.4 Compaction, including equipment performance and operational characteristics.

6.1.5 Field density tests

6.1.6 Trench inspection

6.1.7 Mapping

6.1.8 Laboratory Tests

6.1.9 They shall act as a liaison with the Supervising Soils Engineer and the Senior Resident Engineer concerning the progress of the test fill and obtaining the required approvals for any design changes.

6.1.10 They shall be responsible for the maintenance of formal records of all operations and observations as required by the specification and any approved changes thereto.

6.2 Borrow and/or Stockpile Areas - Material Acceptance

6.2.1 Perform visual inspection either at the pit or onsite to assure that all areas are cleaned of all undesirable material such as trees, roots, vegetation, muck and silt in accordance with specification LOU 1564.482 and document results on Form QCIP-2-1.

6.2.2 Monitor loading or delivery of backfill material to insure that only material which meet the specifications is used as backfill.

6.2.3 Inspect, sample and test Class A borrow materials to determine compliance of gradation and moisture content with the specifications and record the results on form QCIP-2-1. One set of tests shall be run for every 1,000 cubic yards of borrow material or for each working shift whichever represents the smaller quantity of material.

6.3 Excavated or Stripped Areas

6.3.1 Prior to start of backfill operations, excavated or stripped areas shall be inspected to assure proper drainage and a sound base and for conformance to the specified requirements and the results recorded on Form QCIP-2-2.

6.3.2 Material that exceeds the permissible moisture content may be dried by specified means or removed and replaced with new fill. Reworked fill material shall be tested for moisture content and the results recorded on Form QCIP-2-2.

6.3.3 After satisfaction of all specified prerequisites, proof compaction of the final excavated grade may begin if required. Proof compaction shall be accomplished to the satisfaction of the Engineer before the fill operation begins.

6.4 Soil Related Construction Activity Inspections

All soils placements, inspection and testing operations shall be conducted in accordance with the drawings and specifications. Inspections results shall be recorded on Form QCIP-2-3 for each shift by each inspector and shall include the following:

6.4.1 Material has been determined to be suitable and released for backfill.

6.4.2 Base to receive backfill has been properly prepared and compacted to the density required.

6.4.3 Backfilling is accomplished in the proper sequence in accordance with Ebasco Drawing No. LOU-1564-G490.

6.4.4 Sand backfill materials for Class "A" fill are spread and leveled in layers not exceeding 15 in. prior to compaction.

6.4.5 Clay for Class "A" backfill and material selected from the excavation for Class "B" backfill is placed in layers not exceeding ten in. prior to compaction.

6.4.6 Fill material is deposited uniformly over entire area being filled to a particular stage or level.

6.4.7 When required, fill material shall be disc-harrowed after spreading and before compaction to blend and aerate the material into a texture that can be consolidated into a homogeneous mass by the compaction operations.

6.4.8 Surface of each lift is kept reasonably smooth and free of ridges or grooves which would adversely affect proper compaction of subsequent lifts.

6.4.9 Hauling equipment uses paths different from each other in order to aid compaction of the entire area and to avoid overcompaction of any given area.

6.4.10 If area to receive fill is an original excavation, or compacted more than two days previously, surface shall be cleaned of all loose debris and improperly compacted material. Area then shall be proof rolled and accepted prior to subsequent backfill.

6.4.11 When two sections of fill join, fill placed first must have its slope shaved a minimum of three ft. to expose undisturbed compacted material.

6.4.12 Compaction is achieved with proper equipment operating and proper speed.

6.4.13 Compaction is reasonably uniform within any one layer over entire area.

6.4.14 All layers are compacted to full width.

6.4.15 In restricted areas, fill does not contain material greater than three in. in size.

6.4.16 Reasonable care is taken to protect waterproofing membrane boards.

6.4.17 Backfill placed against waterproofing membrane boards does not contain any particle greater than 1/2 in. in size.

6.4.18 No fill is placed during heavy rain or on top of or into a pool of water.

6.4.19 Material has been compacted until the specified density is obtained and verified by in-place density testing.

6.4.20 Surface of fill areas to be sloped to effect drainage away from building and into site drainage pattern. Low areas to be pumped if required.

6.5 Soils Laboratory

The following functions are performed by the soils laboratory staff under the direction of the Quality Control Civil Supervisor.

6.5.1 Testing materials to be used as backfills to determine their suitability; borrow materials are sampled and gradation and compaction tests performed to determine the moisture-density relationships with respect to the specified standards.

6.5.2 Performing gradation tests (including moisture content determinations) on the materials from the work points in the borrow and stockpile areas or out of delivery trucks to determine their suitability for use in the compacted backfill.

6.5.3 Testing materials being used as "test fill" to establish the optimum number of passes of the compactor to obtain the required density.

6.5.4 Performing field density moisture and gradation tests on materials from the compacted backfill in accordance with the specifications to assure the suitability of the materials and their proper compaction.

6.5.5 Performing any additional tests as required to assure the adequacy of the tested material as required by the specifications.

6.6 Soil Testing

All soil testing shall be conducted in accordance with the drawings, specifications and applicable codes and procedures. Verification of soil testing shall be indicated on the forms listed below for each fill at each elevation for each shift.

6.6.1 Test Fills - These tests shall be run in accordance with Section 6.1 of this procedure and recorded on the appropriate forms.

6.6.2 Material Acceptance - These tests shall be run in accordance with Section 6.2.3 of this procedure and results recorded on Form QCIP-2-1.

6.6.3 Excavated and stripped areas - These tests shall be run in accordance with Section 6.3 of this procedure and recorded on the appropriate forms.

6.6.4 In Place Density Tests (Barrow-Agee Labs Test Forms, QCIP-2-3)

a) One test for every 20,000 $ft.^2$ or less of Class A material placed.

b) One test for every 40,000 $ft.^2$ or less of Class B material placed.

6.6.5 Laboratory Testing (Barrow-Agee Labs. Forms, QCIP-2-3)

a) One one point Proctor check and Gradation Test for every 10 in place densities.

b) One five point Proctor Test and Gradation Test for every 100 in place densities.

c) One six point Proctor, one Gradiation, and three sets of Maximum-Minimum Relative Density tests to be run onsite (Proctor and Gradation) and offsite (all tests) for every 200 in place densities.

d) Additional tests may be requested at the engineer's discretion.

6.7 Documentation and Work Acceptance

All documentation concerning each fill shall be forwarded to the Ebasco Senior Quality Control Supervisor upon its completion for final work acceptance. The documentation reviewed for the acceptance of each fill shall include the following forms when applicable.

6.7.1 Material Acceptance Inspection Form No. QCIP-2-1.

6.7.2 Excavation and Stripping Form No. QCIP-2-2.

6.7.3 Daily Backfill Inspection Report Form No. QCIP-2-3.

6.7.4 Soil testing forms including In Place Density, Proctor, and Gradation Test Summary forms in accordance with Peabody Services testing procedure.

6.7.5 At the completion of this review a Backfill Acceptance Form No. QCIP-2-4 shall be issued. If all areas of the work are in accordance with the drawings and specifications, this form shall be signed by the Senior Quality Control Supervisor or his inspector attached to the forms listed above and filed by Ebasco. If any of the areas reviewed indicates a nonconformance to the specifications, the remedial action required shall be noted on this form by the Senior Quality Control Supervisor or his inspector and the form then forwarded back to the responsible party for correction. This procedure shall continue until all areas are acceptable at which time the form shall be signed and filed.

7.0 ATTACHMENTS

7.1 Form No. QCIP-2-1, Borrow Material Inspection Report

7.2 Form No. QCIP-2-2, Excavation and Stripping Inspection Report

7.3 Form No. QCIP-2-3, Daily Backfill Inspection Report

7.4 Form No. QCIP-2-4, Backfill Acceptance Report

8.0 INSPECTION AND TESTING DESIGNATION-

8.1 Test Fills (Paragraph 6.1) - 100 percent by Ebasco.

8.2 Borrow and/or Stockpile Areas - Material Acceptance (including materials in trucks) - (Paragraph 6.2) - 100 percent by Ebasco.

8.3 Excavated or Stripped Areas - (Paragraph 6.3) Final inspection by Ebasco.

8.4 Inspection of placement and compaction operations (Paragraph 6.4).

8.4.1 When the work is preformed by a Contractor that does not have an acceptable Quality Assurance Program: 100 percent by Ebasco.

8.4.2 When the work is performed by a Contractor that has an acceptable Quality Assurance Program: One per day, by checklist, when work is in progress.

8.5 In-place density testing and soils laboratory testing - 100 percent by the soils laboratory staff under the direction of the Ebasco Quality Control Civil Supervisor.

8.6 Work Acceptance (Paragraph 6.7) - Ebasco Senior Quality Control Supervisor.

EBASCO SERVICES INCORPORATED
WATERFORD UNIT NO. 3

BORROW MATERIAL INSPECTION REPORT

Q. C. Inspector_____ Date_____

1. Material Location: Truck_____ Borrow Pit_____ Other_____

2. Material to be Placed on Fill No._____ El. _____

	Accept	Reject See Comments
3. Visual Inspection		
4. Moisture Content Check: Test No._____ Result_____%		
5. Gradation Check: Test No._____ Result_____%		

Comments:

Borrow Material Acceptable as Class A Fill _____ _____

Q. C. Signature Date

Form No. QCIP-2-1 (6/16/76)

Form No. QCIP-2-2
6/16/76

EBASCO SERVICES INCORPORATED
WATERFORD UNIT NO. 3

EXCAVATION AND STRIPPING INSPECTION REPORT

Q. C. Inspector_____ Date_____

Fill Location _____ El._____

	Accept	Reject See Comments

BASE

1. Drainage Conditions:

2. Regarding Of Base To Provide Adequate Drainage:

3. Composition Of Base Material:

4. Stripping Of Objectionable Materials On Surface:

5. Moisture Content Of Base Material:
   Test No. Test Result %

6. Moisture Content Of Reworked Or Replaced Base Material: Test No. Test Result %

7. Base Density:

8. Proof Compaction Performed Properly If Required:

SLOPES

9. Stripping of Slopes:

Comments:

Form No. QCIP-2-3
6/16/76

EBASCO SERVICES INCORPORATED
WATERFORD UNIT NO. 3

DAILY BACKFILL INSPECTION REPORT-

Q. C. Inspector _____ Date _____

Fill Placement Area/Location _____ El. _____

Fill Surface Area ft.^{2}, Number of tests required; In Place Density
Gradation _____ Proctor _____ Special_____

Verify fill location is released for placement and compaction:_____
Representative

Borrow material released as backfill: Material acceptable: Yes _____ No_____

Spreading and compaction equipment satisfactory: Yes_____ No_____

Base to receive fill properly prepared and compacted: Yes_____ No_____

Backfilling done in proper sequence: Yes_____ No_____

Fill material properly placed and spread to a maximum loose thickness of 15 inches: Yes_____ No_____

Fill material disc-harrowed, if necessary: Yes_____ No_____

Surface of each lift reasonably smooth and free of ridges or grooves: Yes _____ No_____

Hauling equipment using different paths: Yes_____ No_____

Surface properly treated: Yes_____ No_____

Fill junctions properly treated: Yes_____ No_____

Layers compacted to full width: Yes_____ No_____

Fill material not greater than 3 inches in size in restricted areas:
Yes_____ No_____

Fill thickness not greater than 6 inches in the loose state in restricted areas: Yes_____ No_____

Waterproofing membrane protected during backfilling operations:
Yes_____ No_____

Backfill placed against waterproofing membrane contains no particles larger than 1/2 inch: Yes_____ No_____

Form No. QCIP-2-3
6/16/76

EBASCO SERVICES INCORPORATED
WATERFORD UNIT NO. 3

DAILY BACKFILL INSPECTION REPORT (Cont.d)

No fill placed during heavy rain or on top of or into standing water:
Yes_____ No_____

Material testing is properly performed: In Place Density Yes_____ No_____
Lab Test Yes_____ No_____
Not Required_____
Special Tests Yes_____ No_____
Not Required_____

Comments:

Form No. QCIP-2-4
8/20/76

EBASCO SERVICES INCORPORATED
WATERFORD UNIT NO. 3

BACKFILL ACCEPTANCE REPORT

Q. C. Inspector_____ Date_____

Fill Location: _____ El _____

	Accept	Reject See Comments
1. Material Acceptance Testing (Form QCIP-1):		
2. Excavation And Stripping Testing (Form QCIP-2):		
3. Backfill Construction (Form QCIP-3):		
4. Laboratory Testing (Barrow-Age Test Form):		

Comments:

EBASCO SPECIFICATION
FILTER & BACKFILL

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ATTACHMENT

Clam Shell Filter Blanket Placement and Compaction Procedures.

Ebasco Specification
Filter & Backfill

Project Identification
No. LOU-1564-482

1.0 GENERAL

These Specifications cover furnishing (if required) and placing filter blanket and backfill material below and around the foundation structures at the site of the Waterford Steam Electric Station - Unit No. 3, located on the right descending bank of the Mississippi River, in St Charles parish, near Taft, Louisiana.

2.0 SCOPE

The general scope of the work consists of installing a 12 in. well-compacted filter blanket, test section to establish the optimum construction techniques to be used for the filter blanket construction at the bottom of the excavation for the Nuclear Plant Island Structure below the concrete foundation. The work also includes placing, compacting and testing the backfill material around the completed foundation walls of the structure. Backfill shall consist of both Class A or Class B material as hereinafter described.

3.0 DEFINITIONS

Definitions of terms used in this Specification are as follows:

3.1 Engineer

In these Specifications, the work "Engineer" shall mean the Engineer or person in responsible charge of the work for the Owner, or his authorized agents, assistants, inspectors and superintendents, acting severally within the scope of the particular duties and authorities delegated to them. A Soils Engineer representing the Design Engineer will be present at the time of initial testing as hereinafter specified.

3.2 Contractor

The work "Contractor" shall mean the person, persons, partnership, company, corporation, or organization entering into a contract for the performance of the work.

3.3 ASTM Standards

This Specification includes reference to, or requirements for meeting or adhering to, certain "Standard Specifications" or "Tentative Specifications" of the American Society for Testing Materials. In these Specifications, the letters "ASTM" or "ASTM Standards" shall mean the latest revision of those Standard Specifications or Tentative Specifications of the American Society for Testing Materials.

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Except as otherwise called for in this Specification, the requirements for and the method of taking samples and the testing of all constituents shall conform to the pertinent ASTM Standards.

4.0 EXISTING SUBSURFACE CONDITIONS

A soil investigation program has been completed at the site and a complete record of the boring logs, results of laboratory tests, including gradation analyses, Atterberg limits, permeability data, unconfined strengths and consolidation tests are available and may be inspected at the offices of Ebasco Services Inc.

The boring records represent the best available current information concerning subsurface conditions at the site. Additional borings are presently being made and data may be examined by Contractor as it becomes available. Drawings summarizing boring logs and test data are listed in Paragraph 5 of these Specifications and are included herewith.

4.1 Owner's and Engineer's Responsibility

The Owner and Engineer assume no responsibility for the accuracy and completeness of the soils investigation data. The Contractor must make his own interpretation of the records and is at liberty to make other borings or soil tests at no additional cost to the Owner to supplement the information provided.

5.0 DRAWINGS

The following drawings show the location and extent of the work covered by these Specifications and describe the soil conditions which existed prior to the start of excavation.

5.1 Reference Drawings

LOU-1564-Gl27 Plot Plan
LOU-1564-G489 Excavation Plan and Sections
LOU-1564-G490 Construction Sequence
LOU-1564-G497 Backfill Plan and Sections

5.2 Soil Boring Data

a - Drawings summarizing boring logs and test data on the existing soils at the site are:

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LOU-1564-G-486 - Boring Location Plan
LOU-1564-G-487 - S01 thru S05 - Soil Profiles

5.3 Other Reference Drawings

Other reference drawings are:

LOU-1564-G496-Combined Structural Layout
Nuclear Plant Island Structure
LOU-1564-G611-Turbine Building Pile Caps

6.0 FILTER BLANKET UNDER FOUNDATION

The Contractor shall furnish, install and compact a test section of filter material as described below. The results of this test section shall be the basis of a construction procedure for the placement, compaction and control of the filter blanket to be placed under the Nuclear Plant Island Structure.

6.1 Material and Thickness

Material shall be locally available clam shell and shall be subject to the approval of the Engineer. It shall be free of vegetation, organic matter, debris or other unsuitable material. One layer of material shall be installed, such that the final in-place thickness of the filter blanket shall not be less than 12 in. Care shall be taken during placement and compaction not to disturb any soils instrumentation which may be in place.

6.2 Compaction

The degree of compaction required for the filter blanket shall be established by a field testing program in accordance with the following procedure:

a - After excavation to the top of the Pleistocene, a quantity of clam shell material, sufficient to cover an area of about 50 ft by 25 ft, shall be placed in the condition in which it would normally be dumped from trucks. The thickness of the material which is put down shall be such that its thickness after compaction shall be about 12 in.

In areas within the Pleistocene Formation where the surface materials consist of lenses of silty and/or sandy materials, a filtering membrane or filter cloth shall be utilized to prevent contamination of the compacted shell blanket.

b - Three steel plates, 12 in. sq, shall be placed on the material at approximately equal spacing and their elevations read before any compacting is performed.

c - Two passes shall be made with either a 10 ton pneumatic wheel roller or a smooth drum vibrating roller and again the elevations of the three plates shall be measured. This procedure shall then be continually repeated for 12 passes of this roller or as otherwise directed by the Soils Engineer.

d - A curve will be plotted by the Soils Engineer of number of passes of the roller versus average settlement of the three plates after each pass. It is anticipated that this curve will become asymptotic to some value of settlement after about 10 or 12 passes with the roller. Based on the curve and the appearance of the compacted material and response to rolling of the test section, the responsible Soils Engineer will make a judgment as to the degree of compaction required for the service filter.

e - Control and inspection of the service filter shall consist of assuring that the correct number of passes, as determined by the responsible Soils Engineer, are made.

f - All compacting shall be done in the presence of the Soils Engineer and shall be subject to his direction and approval. The analysis of the test curve of number of passes versus settlement- will be made by the Soils Engineer and his interpretation of the results shall govern. The Soils Engineer may also, at his discretion, require any modifications in the testing program as may seem necessary in order to accomplish the desired results.

g - After the Soils Engineer has made his review of the results of the test program, all work associated with the installation and compaction of the in-place filter blanket shall follow the procedures used during the testing program as closely as practicable, except as specific modifications are called for by the Soils Engineer.

h - The use of shell material of a different type, or from a different source, or the use of a different type or model of compacting equipment, will require new tests to be made to determine the proper number of passes for the filter blanket-

7.0 BACKFILL MATERIAL

The backfill material around the foundation walls of the structures shall be either seismic I Class A fill or Class B fill as indicated on the Drawings. Material for backfill shall be in accordance with the following requirements:

7.1 All backfill material shall be free of stumps, logs, large twigs, large stones in excess of three in., muck, organic matter, rubbish, debris or other unsuitable materials.

7.2 Any shell incorporated in the fill shall be sound and amply bedded in the finer materials. Any material larger than specified above or which is otherwise deemed unsuitable by the Engineer shall be removed.

7.3 The moisture content of the material shall be within the limits required to obtain the compacted densities hereinafter specified. Materials with a higher moisture content than required, for the specified compaction shall, at the Engineer's option, be either wasted or spread on a dry area and raked and harrowed to reduce the moisture content by evaporation. Materials with a lower moisture content than that required for the specified compaction shall be sprinkled with water, then raked and harrowed if necessary until the required moisture content is attained.

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7.4 Class A backfill material shall be either sand or Louisiana Department of Transportation 610 mix (LA-610) containing no more than a 12 percent fines content (finer than No. 200 sieve), or Pleistocene clay excavated from the plant island excavation. Clam shell, used as surface material of construction roads may be contained within either the sand or clay.

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7.4A The Louisiana Department of Transportation 610 mix (LA-610) is a well-graded aggregate made from crushed limestone. LA-610 mix maintains no more than 12% fines passing the #200 sieve, which classifies the mix as Seismic I, Class A backfill.

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7.5 Class B backfill material shall be sand or the LA-610 mix. Clam shell used as surface material of construction roads may be contained within the sand.

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8.0 BACKFILL PROCEDURES

Since the "floating foundation" concept is used for the design of the foundation for the Nuclear Plant Island Structure, the sequence in which Seismic I Class A backfill is placed, the degree to which the fill is saturated to achieve buoyancy, and the time when the dewatering system is released, are all essential features of the design. In addition to controlled release of the dewatering system, an additional source of water shall be provided by the Contractor to permit saturation of the backfill at a predetermined rate. The Contractor shall, therefore, explicitly follow the directions of the Engineer in all respects in matters relating to the construction sequence. The Contractor shall refer to Drawing LOU-1564-G-490 - Nuclear Plant Island Structure - Construction Sequence, for the proper sequence for the construction and backfilling operations relating to the Nuclear Plant Island Structure. This sequence may be modified by the Engineer. Care shall be taken to avoid damage to existing instrumentation. Irreparable damage will necessitate replacement as soon as possible or as directed by the Engineer.

8.1 The Contractor shall prepare the areas to be backfilled by compacting the material at the surface upon which new fill material is to be placed in accordance with the following:

Compact base material to the minimum density indicated herein, or as shown on the drawings. The density referred to is that obtained in the modified Proctor Compaction (ASTM D-1557).

Ebasco Specification
Filter & Backfill

Project Identification
No. LOU-1564-482

8.2 Compaction of filter material for the Nuclear Plant Island Structure shall be as per the Criteria and Construction Methods developed from the procedure hereinbefore specified (for clam shell filter blanket placement and compaction procedures see attachments). Compaction of other base material shall be by means of the same equipment used later for the compacted fill.

8.3 The fill operation shall be performed as mechanically compacted fill or as hydraulic fill in accordance with the following:

.1 Mechanically Compacted Fill

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·a - Sand and clam shell material to be used as Class A fill shall be spread and leveled in layers not to exceed 15 in. thick before compaction. Clay material to be used as Class A fill or material selected from the excavation for Class B fill shall be spread and leveled in layers not to exceed 10 in. thick before compaction. Class A sand backfill to be used in Class B area shall have a maximum lift thickness of 15 in. before compaction. The LA-610 mix to be used as Class A or Class B fill shall be spread in layers not to exceed 10 in. before compaction. Fill material shall be deposited over the entire area being filled to a particular stage or level. When required by the nature of the material, the spreading equipment shall be followed by disc harrowing, using such weight, size and intensity that will blend and aerate material throughout the entire thickness of the layer to a texture that will be consolidated into a homogeneous mass by the subsequent rolling. The first few lifts of the filling operation shall be carried out as a test section to determine the best possible combination of equipment and compaction procedure therewith to attain required results or uniformly compacted fill of specified density. The details of the test fill shall be developed and instrumented by the engineer.

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b - Backfill material in each layer, before being compacted by rolling, shall be within the range of moisture required for optimum compaction, as determined by the Engineer and the moisture content shall be uniform throughout the thickness of the layer. The application of water to the material, when required, shall be performed by sprinkling the preceding layer prior to placing new material thereon or by sprinkling the new material in place prior to rolling. No material having a moisture content three percent greater than that required for optimum compaction, as determined by the Engineer, shall be placed in the fill unless the fill is being used as an active drying area, nor shall any material be placed if the surface of the fill is greater than three percent wetter than optimum. Such surfaces shall be dried out by discing through the excessively wet material and aerating and recompacting prior to placing new material. Any previously compacted

material which in any way has become unsuitable, as determined by the Engineer's tests, shall be removed and replaced with new fill at the Contractor's expense. Any area from which compacted fill has been stripped shall be recompacted before new fill is placed.

c - Class A and B fill shall be placed as concurrently as practicable and layers shall be placed horizontally around concrete structures such that the effective pressures at the base of the mat are approximately equal as determined by the Engineer.

d - The surface of each lift shall be kept reasonably smooth and free of ridges or grooves which might affect the compaction of later lifts.

e - Equipment used for hauling shall follow paths different from each other to aid compaction of the entire area and to avoid over compaction of any one area.

f - All naturally existing material against which fill is to be placed shall be first cleaned of all loose debris and cut to fresh material. Any contaminated pockets of material shall be removed and replaced to the required degree of compaction.

g - Where fill is placed against naturally existing material on slopes, the slope shall be cut a minimum of six in. to remove surface vegetation, desiccated material, rain gullies and all other discontinuities.

h - Where two sections of fill join, that fill placed first must have its slope cut a minimum of three ft to expose undisturbed compacted material.

i - Placement of new fill on fill compacted more than two days previously will be treated as placing fill on the original excavated area. The surface of the area shall be first cleaned of all loose debris. Any contaminated material shall be removed and replaced to the required degree of compaction.

j - The fill material spread and leveled in layers as specified herein shall be compacted by the Contractor by means of suitable compaction equipment, approved by the Engineer. Compaction technique shall be consistent within any one layer over the entire area. All layers shall be compacted to their full width. No fill shall be placed within 20 ft of the boundary between material being compacted and the uncompacted material being placed.

k - In restricted areas where it is not possible to compact the material with large scale compaction equipment, the fill shall not contain material larger than three in. in size. This fill material shall be compacted with a mechanical tamper, small vibratory roller, vibratory plate or other suitable means to attain the required compaction. These areas shall be compacted to the same minimum compaction as the rest of the fill and shall be brought up in lift thickness to be determined by the Engineer; but in no case thicker than 12 in. after compaction. Care shall be taken to insure that the fill in these areas is integral with the rest of the fill.

l - Any material which fails to meet the specified minimum density indicated by these Specifications shall be either recompacted until it meets these Specifications or removed and replaced with material compacted to the required density.

m - When backfill is placed against building walls, the compaction of the material shall be started nearest the walls and proceed outward, unless directed otherwise in writing by the Engineer. Where backfill and compaction is to be made at building walls where waterproofing membrane sheet is used, care shall be taken to ensure that the protective board over the membrane sheet is not struck, gouged or otherwise damaged by the equipment used in backfilling. Maximum stone size of backfill against membrane sheet shall be one-half in. or less. These precautions shall be taken whether or not the waterproofing membrane is covered by protection boards in order to assure that the integrity of the waterproofing membrane is maintained.

.2 HYDRAULIC FILL

a - Material to be used as hydraulic fill shall be a sand meeting all the requirements for a Class A material.

b - All methods of hydraulic filling shall be performed in such a manner as to allow for free standing water on the top of the fill and maximum drawdown through the fill material.

c - Each layer of fill shall be a maximum of five ft thick.

d - Dredge or pump water resulting from the hydraulic filling operation shall be carefully contained, collected and removed as so directed by the engineer so as not to affect construction activities in adjacent areas. The design of water removal system shall be provided to the Engineer for his approval prior to the start of any filling.

e - All hydraulic fill shall meet the density requirements specified herein. Material which fails to meet the specified density shall be recompacted or removed and replaced with material compacted to the required density.

f - A test hydraulic fill shall be conducted by the engineer prior to the actual filling operation to determine the optimum hydraulic fill techniques. The results of this test shall be made available to the contractor prior to the start of work.

9.0 IN-PLACE DENSITY AND TESTING

Sand materials and clam shell to be used as Class A backfill shall have an in-place relative density of 75 percent. The variation for Class A fill from the above specified degrees of compaction shall be a maximum of one standard deviation less than the specified relative density. The numerical value of the standard deviation for Class A fill will be established by a series of field tests to be conducted during the initial compaction operations and will be reported in terms of minimum allowable density required.

The minimum allowable density for the basis of field control at the start of work and until establishment of the standard deviation for Class A fill shall be 95 percent of Modified Proctor. The required percent compaction will be adjusted either up or down, depending upon the results of statistical studies which will be made during the backfilling operations in order to maintain the 75 percent relative density requirement.

Clay materials to be used for Class A backfill shall have an in-place density of 90 percent of the maximum density obtained in the Modified Proctor Compaction Test. All materials to be used for Class B backfill shall have an in-place density of 90 percent of the maximum density obtained in the Modified Proctor Compaction Test. The variation from the above specified degrees of compaction shall be a maximum of 10 percent of the density test results falling a maximum of five percent less than the specified density in a random distribution as determined by the Engineer.

.1 Control tests of densities and moisture contents shall be made by the Engineer as the work progresses, to assure that required densities and moisture contents are being achieved.

.2 The in-place density shall be tested in accordance with ASTM-Dl556, ASTM-D2167, ASTM-D2922 and any other method suitable in the judgment of the Engineer to insure that the backfill has been properly compacted. One test shall be made in each layer for every 20,000 sq ft of compacted Class A fill area and one test for every

area of less than 20,000 sq ft placed in one day. One test shall be made in each layer for every 40,000 sq. ft. of compacted Class B fill area and one test for every area of less than 40,000 sq. ft. placed in one day. More tests may be run at the discretion of the Engineer.

.3 The optimum conditions for both moisture and density will be determined by the Engineer for the fill materials. One laboratory density test (ASTM-Dl557) and one mechanical gradation test (ASTM-D422) shall be performed on samples taken from in-place density test holes for each 10 in-place density tests performed. The results of these tests made during the backfilling operation shall be made available to the Contractor.

10.0 WEATHER CONDITIONS

When, in the opinion of the Engineer, the weather is of such a nature as to endanger the quality of the fill material being placed, whether this is due to rain, snow or any other element of the weather, the placement of fill shall be halted until the Engineer orders a continuation of the work. Under no conditions shall fill be placed during heavy rains, or on top of or into a pool of water.

11.0 ENGINEER'S CONTROL

Any and all questions regarding preparation, placement, compaction and protection of the fill, shall be referred to the Engineer. All decisions by the Engineer regarding the compacted fill, in any aspect, shall be final. No work on any phase of the job shall proceed without the consent of the Engineer.

.1 During the start of placing and compacting operations, the Engineer will have a Soils Engineer on the site to develop proper backfill techniques and procedures and to supervise the testing of the compacted backfill. Based on these procedures, the Ebasco Sr QC Supervisor will be responsible for either accepting or rejecting the work done by the Contractor.

12.0 CLEANUP

Upon completion of fill operations, the Contractor shall dress up the slopes of any storage areas, as directed by the Engineer. The Contractor shall level off any waste piles which he has build and clean up all debris and trash in the area due to this operation as directed by the Engineer.

13.0 RECORDS

All tests performed by the Engineer shall be documented and the results shall be provided to Ebasco Sr QC Supervisor for Purchaser's records.

ATTACHMENT

CLAM SHELL FILTER BLANKET

PLACEMENT AND COMPACTION PROCEDURES

GENERAL

Prior to the placement of any Clam Shell, the final exposed Pleistocene Foundation shall be mapped by the Site Soils Engineer in accordance with Ebasco Specification LOU-1564-469. After completion of the mapping, the Clam Shell Filter Blanket shall be placed and compacted in accordance with the criteria stated herein. Final foundation testing shall then be performed by the Engineer in accordance with Ebasco Specification LOU-1564-469.

The guniting of the final exposed vertical faces around the perimeter of the foundation mat shall be coordinated with the earthwork contractor to the extent possible so that all exposed faces to be gunited shall be gunited within 8 hours after excavation and exposure to the elements. No vehicular traffic shall be permitted on the exposed foundation material during the guniting operation without permission of the Engineer.

Prior to the placement of any Clam Shell, in any strip, a drainage system shall be designed, detailed, submitted for approval by the Engineer. Subsequently, the approved drainage system shall be constructed in a timely sequence prior to or along with the placement of the Clam Shell Blanket.

CONSTRUCTION

Scheduling of the Clam Shell Placement and Compaction shall be coordinated with the earthwork Contractor and the Soils Engineer, to the extent possible so that all final exposed surfaces excavated each day shall be either covered with shell or covered with a protective membrane to prevent over wetting the exposed foundation materials due to rain.

Traffic on the exposed foundation materials or the Clam Shell Filter Blanket shall be limited to the spreading and compacting equipment specified herein. No other vehicles shall be allowed in the final excavated strip without approval of the Engineer.

Any special construction operations required for the placement or compaction of the Clam Shell Filter Blanket shall be performed with a minimum amount of activity on the shell material and foundation material after approval by the Engineer.

Care shall be taken not to disturb or damage any instrumentation which may be in place. Damage to any instrumentation shall be repaired immediately.

In areas where Clam Shell is to be placed against a gunited surface, care shall be taken not to disturb or damage the gunite.

MATERIAL

Material shall be locally-available clam shell. It shall be free of vegetation, organic matter, rubbish, debris or other unsuitable material. The compacted clam shell shall have a maximum moisture content of @O percent. One moisture content test shall be conducted for every 5000 ft of compacted shell fill during the density testing operation.

PLACEMENT

When the final foundation surface materials consist of stiff clays, as determined by the Engineer, one layer of shell shall be spread and leveled directly on top of the clay foundation materials such that the final compacted in place thickness shall be 12 in. The tolerable range shall be from 10 in. to 14 1/2 in.

When the final foundation surface materials consist of lenses of silty and/or sandy materials as determined by the Engineer, a filter cloth material shall be placed on top of the foundation materials prior to the placement of any shell. The type of filter cloth to be used shall be the "Mirafi Filter" or an equal approved by the Engineer prior to its use. One layer of shell shall then be spread and leveled on top of the filter cloth using whatever means is necessary to minimize construction activity on the shell. The final compacted in place thickness shall be 12 in. The tolerance shall range from 10 in. to 14 1/2 in. Care shall be taken to avoid damaging the filter cloth. Any sections of filter cloth determined to be damaged, shall be removed and replaced. The shell material shall be spread in a uniform horizontal lift by a steel tread bulldozer of Size JD-450 or equal. The surface of the completed shell blanket shall be kept reasonably smooth and free of ridges, grooves and ruts which might affect compaction.

Any clam shell material found to be contaminated or unacceptable, shall be removed and replaced at the discretion of the Engineer.

COMPACTION

The shell-fill material spread and leveled in a single layer as specified herein shall be compacted using a 12 ton self propelled, smooth, drum vibrating roller. Compaction shall be uniform throughout the shell blanket over the entire area. The shell blanket shall be compacted to its full width using 10 passes of the specified roller traveling at 1.0 to 3.0 mph at full vibration on all passes or as directed by the Engineer.

In restricted areas where it is not possible to compact the material with large-scale equipment, the shell material shall be compacted with a mechanical tamper, small vibratory roller, vibration plate or other method to the suitability of the Engineer. Care shall be taken to insure that the fill in these areas is integral with the rest of the blanket.

Any compacted material which in any way has become unsuitable, as determined by the Engineer, shall be removed and replaced with new material.

IN-PLACE DENSITY TESTING

One In-Place Density Test (AST4-DI556 or ASTM-D2167) shall be conducted by the Engineer for every 5000 ft- of Clam Shell Filter Blanket placed and compacted in order to document the

density of the completed blanket. All test locations shall be randomly selected by the Site Soils Engineer.

In-Place Density Test results shall be completed and forwarded to the Site Soils Engineer for his review on the same day that the tests were performed.

INSTRUMENTATION

Five pneumatic type pore pressure indicators shall be installed in the compacted Clam Shell Filter Blanket in accordance with drawing LOU-1564-G499 S09. Scheduling of this activity shall be coordinated with the Contractor to the extent possible so as not to delay the placement of the concrete and mat.