EBASCO SERVICES INCORPORATED

WATERFORD STEAM ELECTRIC STATION - UNIT NO 3

PROCEDURE FOR: SOILS CONTROL	PROCEDURE NUMBER: QCIP-2

ISSUE SUMMARY

ISSUE/DATE	PREPARED	APPROVED	REMARKS
A/Draft 8/1/75	M. Temchin J. Ice		
A/ 9/17/75	M. Temchin	J. O. Booth	
B/Draft 9/30/75	M. Temchin		
B/ 10/14/75	M. Temchin	J. O. Booth	
C/Draft 6/16/76	M. Temchin / F. Howard		Complete procedure revised.
C/ 6-29-76	F. Howard/ Myron Temchin	W. C. Griggs	

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NOTATIONS IN THIS COLUMN INDICATE WHICH CHANGES HAVE BEEN MADE

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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 Ebasco Services, Inc. is doing the work and random inspection of Q. V. inspection forces when others are doing the work. The requirements for each of these two types of inspection are called out separately in this procedure.

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 Peabody Testing Services,
Laboratory and Field Testing
Backfill Materials

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4.0 DEFINITIONS

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

5.0 RESPONSIBILITIES

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

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

5.2 Construction Actitities - The performance inspections of the placement and compaction operations and other soil related backfill activities shall be performed by the agency performing the work.

The inspection of construction activities stated in Section 6 of this procedure apply only to Ebasco Services Incorporated when the placement and compaction operations are being performed by Ebasco Services. Soil related construction activities performed by others shall be quality controlled by their own Quality Control personnel in accordance with their own inspection procedure approved by Ebasco. Ebasco's Q.C. will perform surveillance inspections of Contractor activities.

5.3 Soil Testing - The in-place and laboratory soil testing shall be performed by Peabody Services (Barrow-Agee) 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 - Final acceptance of all soil related activities shall be the responsibility of Ebasco Services Incorporated. Acceptability shall be documented in writing and attached to the 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 jobiste Quality Control activities:

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

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

c) Directing Soils Laboratory and testing operations.

d) Enforcing quality control documentation requirements and perparing 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.

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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 with the assistance of the Site Soils Engineer shall observe, document and coordinate the technical aspects 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

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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 on site 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 permissable 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.

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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-1-1 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-1564-0490.

6.4.4 Sand backfill materials for Class "A" fill are spread and leveled in layers not exceeding 15 inches 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 inches 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 feet 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 inches in size.

6.4.16 Reasonable care is taken to protect waterproofing membrane boards.

6.4.17 Backfill placed against waterproofing membrane boards do contain any particle greater than ½ inch 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.

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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 (Peabody 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 (Peabody Test Forms, QCIP-2-3)

a) One 3 point Proctor Test and Gradation Test for every 10 in place densities.

b) One 5 point Proctor Test and Gradation Test for every 100 in place densities.

c) One 6 point Proctor, one Gradation, and 3 sets of Maximum-Minimum Relative Density Tests to be run on site (Proctor and Gradation) and off site (all tests) for every 200 in place densities.

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.

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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

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: _____

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_____

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. Regrading 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: _____

_____

_____

_____

_____

Base and Slopes Acceptable For Backfill: _____ _____

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EBASCO SERVICES INCORPORATED
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DAILY BACKFILL INSPECTION REPORT

Q. C. Inspector_____ Date_____

1. Fill Placement Area/Location_____ El._____

2. Fill Surface Area _____ft.^{2}, Number of tests required: In Place Density____ Gradation_____ Proctor_____ Special _____

3. Verify fill location is release for placement and compaction:_____ Representative

4. Borrow material released as backfill: Material acceptable: Yes_____ No_____

5. Spreading and compaction equipment satisfactory: Yes_____ No_____

6. Base to receive fill properly prepared and compacted: Yes_____ No_____

7. Backfilling done in proper sequence: Yes_____ No_____

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

9. Fill material disc-harrowed, if necessary: Yes_____ No_____

10. Surface of each lift reasonably smooth and free of ridges or grooves: Yes_____ No_____

11. Hauling equipment using different paths: Yes_____ No_____

12. Surface properly treated: Yes_____ No_____

13. Fill junctions properly treated: Yes_____ No_____

14. Layers compacted to full width: Yes_____ No_____

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

16. Fill thickness not greater than 6 inches in the loose state in restricted areas: Yes___ No___

17. Waterproofing membrane protected during backfilling operations: Yes_____ No_____

18. Backfill placed against waterproofing membrane contains no particles larger than ½ inch: Yes_____ No_____

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

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

21. Comments:_____

_____

_____

_____

Backfilling Operations Acceptable: _____

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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 (Peabody Test Form):		

Comments: _____

Fill Accepted: _____ _____
Q. C. Signature Date