CONSTRUCTION QUALITY ASSURANCE PLAN

ASH MANAGEMENT AREA (AMA)
PLANT YATES
COWETA COUNTY, GEORGIA

FOR

Georgia Power

FEBRUARY 2026

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1. GENERAL

The fossil fuel units at Plant Yates, located in Newnan, Coweta County, Georgia have been dismantled and all existing CCR surface impoundments will be closed. The CCR removed from Ash Pond 1 (AP-1), Ash Pond 2 (AP-2), Ash Pond A (AP-A), Ash Pond B (AP-B) and the R6 CCR Landfill (R6) ditch will be placed in an area encompassing Ponds Ash Pond B' (AP-B') and Ash Pond 3 (AP-3) that will become the CCR Ash Management Area (AMA) in order to achieve required final AMA grades.

This Construction Quality Assurance (CQA) Plan describes the quality assurance activities that will be undertaken during the consolidation and in-place closure of the AMA waste footprint. The purpose of this document is to define the scope, formal organization, and procedures necessary to perform quality assurance tasks such that the construction elements of the consolidation and closure of the AMA waste footprint comply with the design as shown or indicated in the approved CCR Permit and Closure Plan.

This CQA Plan addresses those areas of construction pertaining to environmental protection. At the end of closure, a CQA Report will be submitted to the Georgia Environmental Protection Division (EPD) Solid Waste Program along with a certification by an engineer registered in the state of Georgia that the area was closed within the limitations of, and according to, the CCR Permit and approved Closure Plan.

Construction Quality Control (CQC) services will be provided by an independent third-party consulting engineering firm specializing in the inspection and testing of soils and geosynthetics. The services of the CQA firm are to oversee the CQC services required during construction and the installation of the final cover system are described in this CQA Plan.

Parties involved in the CQA program:

1. PURCHASER, OWNER, OPERATOR: Georgia Power Company (Georgia Power).

2. CONTRACTOR: The entity awarded the contract to furnish the materials and perform the work as described herein and as specified in the Closure Plan.

3. PROJECT CONSTRUCTION MANAGER (PCM): The on-site manager of the project or his designated representative. He is the authorized representative at the site for the Purchaser.

4. DESIGN ENGINEER: The company or companies hired by the owner/operator to furnish the design, drawings, plans, and specifications for the facility. The DESIGN ENGINEER will be a registered professional engineer licensed in Georgia.

5. CQA ENGINEER, CQA FIRM, and CQA INSPECTOR: Responsible for implementing the construction quality assurance requirements as stated in the project plans, technical specifications, this CQA Plan, and the project objectives; verifying basic data as reasonable and complete; outlining procedures to process data; developing statistical procedures for the analysis of test data; and preparing quality assurance memoranda and quality assurance reports. The CQA Engineer will report to Georgia Power. The CQA Engineer will be a registered professional engineer licensed in Georgia. Reference to the CQA Engineer, for the purpose of this document, will include the CQA Engineer and his/her designated representatives.

6. CQC ENGINEER/TECHNICIAN: Refer to the third party firm responsible for construction quality control monitoring, testing and documentation for all field work performed during the construction at the facility. The CQC Engineer will be a registered professional engineer and licensed in Georgia.

7. AS BUILT SURVEYOR: As-built certification surveys will be performed by a registered professional land surveyor licensed in Georgia on the components identified in the CQA Plan.

2. CCR EXCAVATION

In the context of this CQA Plan, "CCR removal" refers to the process of verifying and documenting that CCR has been removed from the surface impoundments. The surface impoundments are known to contain a mixture of fly ash and bottom ash collectively referred to as CCR. The CCR will be excavated until native soils are encountered indicating that the CCR has been removed. In addition, a six-inch layer of soil will be removed below the verified CCR/soil interface. The CCR excavation and removal criteria are described below.

Visual Verification of CCR Removal Procedure:

The CQA firm will monitor and document CCR removal according to the following procedure:

1. The CQA Consultant will prepare a surface impoundment map using a 100-ft grid spacing. Grid points will be assigned a unique alphanumeric label for reference and documentation of CCR removal.
2. CCR will be excavated until there is no visible CCR present. This surface will be referred to as the CCR/soil interface.
3. CQA personnel will observe the CCR/soil interface at the working face to confirm that visible CCR has been removed. Observations will be made with reference to the grid map. Observations will include, but not be limited to, taking photographs, and describing soil color. CQC personnel will document observations in field logs or reports.
4. The CCR/soil interface surface will be surveyed.
5. The excavation will continue to a minimum of 6-inches below the CCR/soil interface. This surface will be referred to as the bottom of excavation. Excavated soil will be disposed of in the AMA.
6. The bottom of excavation surface will be surveyed and confirmed to be a minimum of 6-inches below the CCR/soil interface.

3. PLACEMENT OF EXCAVATED CCR INTO THE AMA WASTE FOOTPRINT

3.1 Material

The AMA waste footprint is located within the former footprints of Ash Pond 3 (AP-3) and Ash Pond B' (AP-B'). CCR from Ash Pond A (AP-A), Ash Pond B (AP-B), Ash Pond B' (AP-B'), Ash Pond 1 (AP-1), Ash Pond 2 (AP-2) and Ash Pond 3 (AP-3) have been or will be placed in the AMA waste footprint area. CCR material placed will be compacted to meet the requirements outlined in this Section. The CQA firm will monitor and document the placement of CCR fill according to the following requirements.

3.2 Lift Thickness and Compaction Requirements

3.2.1 The CQA Consultant will document and confirm that the CCR is placed in accordance with the requirements shown in Table 3.1 of this section. Areas failing to meet the requirements in Table 3.1 below will be reworked or removed and replaced by the Contractor and retested by the CQA Consultant.

3.2.2 The CQA consultant will document and confirm that each lift is satisfactorily compacted prior to placement of succeeding lifts. The CQC Engineer will document and verify compaction in confined areas where mechanical equipment, suitable for small areas and capable of achieving the density requirements, is used.

3.2.3 The CQA Consultant will document and confirm that lift compaction is performed with an appropriately heavy, properly ballasted, penetrating-foot or smooth-drum vibratory/non-vibratory compactor depending on CCR characteristics.

Table 3.1 - Required CCR Fill Properties

Item	Required % Compaction Standard Proctor (ASTM D698)	Required % of Optimum Moisture, Standard Proctor (ASTM D698)	Maximum Lift Thickness (Loose) (inches)
Compacted CCR	95	-5 to +2	12

3.3 Observations

Prior to CCR fill placement, the CQA Consultant will observe and document the condition of the base surface or surface of the previous lift. The CQA Consultant will monitor the soils to confirm that the soils are free of deleterious materials and that they meet the project specification requirements. During CCR fill placement, the CQA Consultant will observe and document the lift thicknesses.

3.4 Testing

CCR fill testing will consist of both in-place and laboratory testing described as follows.

3.4.1 Laboratory Testing (Conformance Testing)

For laboratory testing, The CQA Consultant will obtain a bulk sample of the CCR fill for each 50,000 cubic yards of material placed and changes in material. The CQA Consultant may modify the number of bulk samples needed for laboratory testing depending on the variability of the soils being placed. Laboratory testing will include, but not be limited, to the following tests.

Table – 3.2 CCR Fill Laboratory Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Standard Proctor Compaction Characteristics	ASTM D698	One (1) test per 50,000 cubic yards

3.4.2 In-Place Testing (Record Testing)

The CQA Consultant will perform in-place field density and moisture content tests as shown in Table 3.3. Where multiple test methods are listed, only one test method need be used.

Table – 3.3 CCR Fill In-Place Field Density Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Field Density and Moisture Content	Sand Cone (ASTM D1556) and Field Moisture (ASTM D2216) OR Nuclear Gauge (ASTM D6938)	One (1) test per acre per lift
Confirmatory Field Density and Moisture Content for Nuclear Gauge Testing	Drive Cylinder (ASTM D2937) Field Moisture (ASTM D2216)	One (1) per day

[1] Required when a nuclear gauge is used for testing

Required field density and moisture content tests will be completed before the overlying lift is placed.

If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layers, it will be loosened by harrowing or other means, before the succeeding layer is placed. When moisture content is too low, the moisture content will be adjusted to within the above limits prior to compaction. Moisture adjustment will be achieved by sprinkling and disking sufficiently to bring the moisture content within the specified range. Sprinkling and harrowing of the layer will be done after deposition, but before compaction. If the moisture content is too high, the CCR will be disked in place or stockpiled and disked to promote drying to bring it back within the allowable moisture range.

4. BORROW AREAS

Soil testing will be performed to determine soil type (based on Unified Soil Classification System), grain size distribution, moisture content, Atterberg Limits, and moisture-density relationship of materials from borrow areas. For soil materials obtained from on-site sources, visual inspections and conformance tests will be performed prior to the materials being used. If soil materials are obtained from off-site borrow sources, visual inspection and conformance tests will be performed at the source location. Borrow area inspections may also be utilized to verify that only suitable soil materials are transported to the Site.

5. STRUCTURAL EARTH FILL

5.1 Material

Structural fill is soil material placed and compacted to achieve final grades. Structural fill will consist of on-site soils that meet the project specifications. Soils may be imported from off-site if needed. The structural fill will be constructed and compacted to meet the requirements outlined in this Section. Each structural fill material source will be approved in advance by the Engineer through the submittal process. Soil imported from off-site and on-site soils from outside the CCR surface impoundment will be evaluated per project specification requirements to confirm they are not impacted. The approximate 6-inch thick surficial soil layer will be capable of supporting vegetation and will be evaluated through agronomic testing per the project specifications requirements and amended as necessary. The CQA firm will monitor and document structural earth fill according to the following requirements.

5.2 Lift Thickness and Compaction Requirements

5.2.1 The CQA Consultant will document and confirm that the structural fill is placed in accordance with the requirements shown in Table 5.1 of this section. Areas failing to meet the requirements in Table 5.1 below will be reworked, or removed and replaced by the Contractor and retested by the CQC Engineer.

5.2.2 The CQA Consultant will document and confirm that each lift is compacted prior to placement of succeeding lifts. The CQA Consultant will document and verify compaction in confined areas where mechanical equipment, suitable for small areas and capable of achieving the density requirements is used.

5.2.3 The CQA Consultant will document and confirm that lift compaction is performed with an appropriately heavy, properly ballasted, penetrating-foot or smooth-drum vibratory/non-vibratory compactor depending on the soil type.

Table 5.1 - Required Structural Earth Fill Properties

Item	Required % Compaction Standard Proctor (ASTM D698)	Required % of Optimum Moisture, Standard Proctor (ASTM D698)	Maximum Lift Thickness (Loose) (inches)
Structural Fill	95	-3 to +3	8

5.3 Observations

Prior to structural fill placement, the CQA Consultant will observe and document the condition of the base surface or surface of the previous lift. The CQA Consultant will monitor the soils to confirm that the soils are free of deleterious materials and that they meet the project specification requirements. During structural fill placement, the CQA Consultant will observe and document the lift thicknesses and the uniform mixing of soils.

5.4 Testing

Structural fill testing will consist of both in-place and laboratory testing described as follows.

5.4.1 Laboratory Testing (Conformance Testing)

For laboratory testing, The CQA Consultant will obtain a bulk sample of the structural fill soils for conformance testing as described below. The CQA Consultant may modify the number of bulk samples needed for laboratory testing depending on the variability of the soils being placed. Laboratory testing will include, but not be limited, to the following tests.

Table – 5.2 Structural Earth Fill Laboratory Testing Requirements

TEST	METHOD	MINIMUM CQA FREQUENCY
Visual Observation	-	As required (continuous during placement)
Particle Size Analysis	ASTM D422	1 per source or visual change in material type & 1 per 5,000 yd^3
Atterberg Limits	ASTM D4318	1 per source or visual change in material type & 1 per 5,000 yd^3
Soil Classification	ASTM D2488	1 per source or visual change in material type & 1 per 5,000 yd^3
Moisture Content	ASTM D2216	1 per source or visual change in material type & 1 per 5,000 yd^3
Standard Proctor	ASTM D698	1 per source or visual change in material type & 1 per 20,000 yd^3
Triaxial Testing	ASTM D4767	1 per source or visual change in material type

5.4.2 In-Place Testing (Record Testing)

The CQA Consultant will perform in-place field density and moisture content tests as shown in Table 5.3. Where multiple test methods are listed, only one test method need be used.

Table – 5.3 Structural Fill In-Place Field Density Testing Requirements

TEST	METHOD	MINIMUM CQA FREQUENCY
Visual Observation	-	Continuous
Lift Depth Check	-	As Required
Nuclear Densometer In-place Density and Moisture Content	ASTM D6938	1 per 10,000 sf per lift or 1 test per 200 lf per lift for liner features
Moisture Content	ASTM D2216	1 per 10 Nuclear densometer tests
Sand Cone Density or Drive Tube Sample	ASTM D1556 or ASTM D2937	1 per 25 Nuclear densometer tests

Required field density and moisture content tests will be completed before the overlying lift is placed.

If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layers, it will be loosened by harrowing or other means, before the succeeding layer is placed. When moisture content is too low, the moisture content will be adjusted to within the above limits prior to compaction. Moisture adjustment will be achieved by sprinkling and disking sufficiently to bring the moisture content within the specified range. Sprinkling and harrowing of the layer will be done after deposition, but before compaction. If the moisture content is too high, the CCR will be disked in place or stockpiled and disked to promote drying to bring it back within the allowable moisture range.

6. LOW PERMEABILITY SOIL LAYER FOR FINAL COVER SYSTEM

6.1 Material

A majority of the AMA will utilize a geosynthetic cover system; however, in discrete areas near the R6 CCR Landfill, a low-permeability compacted clay cover will be used to facilitate transition from the R6 landfill cover to the AMA cover system. The low permeability soil layer material will consist of cohesive soils capable of being place and compacted to meet the permeability criterion of $k \leq 1x10^{-5}$ cm/sec.

6.2 Pre-Construction Material Evaluation

6.2.1 All material to be used to construct the low-permeability soil layer will be sampled and tested by the CQA Consultant in advance of being placed. Such testing can be performed during excavation of the borrow area or from existing stockpiles.

6.2.2 The procedure for pre-construction testing of material to be used for low-permeability soil layer is outlined below:

A. Five representative samples will be obtained from each five-acre section of the proposed borrow source.

B. The following tests will be performed on each sample to verify soil properties:

- Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487
- Standard Test Method for Particle-Size Analysis of Soils, ASTM D422 (Mechanical Sieve Method Only).
- Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D2216.
- Test Method for Liquid Limit, and Plasticity Index of Soils, ASTM D4318.
- Standard Test Method for laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D698.

- Standard Test Methods for Measurement of Hydraulic Conductivity of Saturate Porous Materials Using a Flexible Wall Permeameter, ASTM D5084.

6.3 Construction

6.3.1 Only soil from a source previously sampled, tested and confirmed to meet the technical specifications by the CQA Consultant will be used in construction of the low-permeability soil layer. The CQA Consultant will notify the Contractor when material does not meet the requirements of the technical specification, and will document that this material is not used for low-permeability soil layer construction.

6.3.2 The CQA Consultant will complete all required field density and moisture content tests before the overlying lift of low-permeability soil is placed.

6.3.3 The CQA Consultant will observe and document that the Contractor completes all prior lift surface preparation (e.g., wetting, drying, scarification, etc.) before placement of subsequent lifts.

6.3.4 The CQA Consultant will observe and document that loose lift thicknesses do not exceed 8 inches (unless otherwise required in the technical specifications).

6.3.5 The CQA Consultant will check each lift visually for particle sizes or clods that exceed the technical specifications, rocks, debris, plant materials, and other foreign material. The CQA Consultant will inform the Contractor, if such materials are found, and will document their removal.

6.3.6 The CQA Consultant will observe and document that the exposed surface of the low permeability soil layer is rolled with a smooth drum roller or equivalent at the end of each work day or when required to protect the compacted soil from adverse weather conditions.

6.3.7 The CQA Consultant will observe and document that the exposed surface of the low permeability soil layer is reasonably free of rock, rock fragments, or loose materials.

6.3.8 As-built certification surveys will be performed on the low-permeability soil layer prior to installing the overlying materials. Due to settlement and consolidation of underlying material the as-built certification points may not accurately provide actual thickness of the low permeability soil layer. In such cases, the CQA Consultant will perform hand augers to confirm that the required thickness of the low-permeability soil layer has been achieved. Results of the thickness confirmation borings will be documented by the CQA Consultant in the CQA Construction Certification Report. All holes will be patched with sodium bentonite pellets, mixed with low-permeability soils in the holes, hydrated and compacted.

6.3.9 The CQA Consultant will inspect the low-permeability soil layer and certify that it is constructed in accordance with the approved permit, the technical specifications and approved plans.

6.4 Testing

CQC sampling and testing will meet the minimum requirements indicated in the Table below. The CQA Consultant will randomly determine the location of each test. All holes will be patched

with a mixture of low-permeability soil and sodium bentonite pellets hydrated and compacted in the holes.

Table 6.1 Required Low Permeability Soil Layer Properties

Item	Required % Compaction Standard Proctor (ASTM D698)	Required % of Optimum Moisture, Standard Proctor (ASTM D698)	Maximum Lift Thickness (Loose) (inches)
Compacted Low Permeability Soil Layer	95	+2 to +5	8

Table 6.2 Low Permeability Soil Layer Requirements

TEST	METHOD	MINIMUM FREQUENCY
Water (Moisture) Content	ASTM D2216	One (1) test per 5,000 cubic yards or change in material
Particle Size	ASTM D422	
Liquid Limit, Plastic Limit, and Plasticity Index	ASTM D4318	
Standard Proctor Compaction Characteristics	ASTM D698	

Table 6.3 Low Permeability Soil Layer In-Place Field Density Testing Requirements

TEST	METHOD	MINIMUM FREQUENCY
Field Density and Moisture Content	Sand Cone (ASTM D1556) OR Nuclear Gauge (ASTM D6938)	One (1) test per 10,000 sf
	Field Moisture (ASTM D2216)	
Field Density and Moisture Content	Drive Cylinder (ASTM D2937)[1] Field Moisture (ASTM D2216)[1]	One (1) per day
Hydraulic Conductivity	ASTM D5084	One test per 40,000 sf

[1] Required when a nuclear gauge is used for testing

The CQA Consultant will follow this procedure in the event of a density or permeability test failure. If the density does not meet minimum requirements of the CQA Plan, recompaction of the failed area (minimum 100' x 100') will be performed and retested until the area meets or exceeds requirements outlined in the CQA Plan. If a permeability sample fails to meet the minimum hydraulic conductivity requirements outlined in the CQA Plan, the area of failing permeability (minimum 40,000 sf) will be reconstructed. Optionally, at least four (4) replicate samples will be obtained in the immediate vicinity of the failed test. Should the replicate samples confirm the failure of the low permeability soil layer to meet CQA Plan, the area of failure

will be localized according to the results of the replicate samples and reconstructed in accordance with the CQA Plan. All areas of reconstruction will be retested as outlined in the plan.

7. GEOMEMBRANE LINER, ENGINEERED TURF & SAND BALLAST – CLOSURETURF® COVER SYSTEM

7.1 Introduction

The CQA Consultant will perform conformance and destructive seam testing, and monitor the installation of geomembranes, as required by the CCR Permit and this CQA Plan. The testing will evaluate the conformance of the geomembrane panels and seams with the requirements of the CCR Permit. The testing will be performed in accordance with the current versions of the ASTM and other applicable test procedures indicated in Tables 7.1 and 7.2. Additionally, the ClosureTurf® system that will be used as the final cover system will be monitored and tested to verify that installation is performed in accordance with the Manufacturer's specifications in addition to the requirements of the CCR Permit and this CQA Plan. Georgia Power and the CQA Firm will be notified prior to installation of any geosynthetics material.

7.2 Manufacturing Plant Visit

At the request of the Owner, the CQA Consultant or the Owner's Representative will visit the plant of the geomembrane Manufacturer to verify that manufacturing quality control procedures are in conformance with the Construction Documents. If possible, such a visit will be performed prior to or during the manufacturing of the geomembrane rolls for the Project.

During the project-specific manufacturing plant visit, the CQA Consultant or Owner's Representative will:

- verify that the measurements of properties by the Manufacturer are properly documented and test methods used are acceptable;
- spot-inspect the rolls and verify that they are free of holes, blisters, or any sign of contamination by foreign matter;
- review packaging and transportation procedures to verify that these procedures are not damaging the geomembrane;
- verify that all rolls are properly labeled; and
- verify that extrusion rods and/or beads manufactured for the field seaming of the geomembrane are derived from the same base resin type as the geomembrane.

Upon completion of the manufacturing plant visit, a report describing the findings and observations will be completed by the CQA Consultant or Owner's Representative and be included as an attachment to the final CQA Certification Report.

7.3 Materials, Handling, and Storage

The CQA Consultant will monitor the materials, handling, and storage of the geomembrane on the Project Site. Upon delivery at the Site, the Contractor, Installer, and CQA Consultant will conduct an inspection of the rolls for defects and damage. This inspection will be conducted without unrolling the materials unless defects or damages are found or suspected in the rolled material. All rolls of geomembrane delivered to the site will be inspected for the following:

- The Geomembrane is wrapped in rolls with protective covering.
- The rolls are not damaged during unloading.

- Protect the Geomembrane from mud, soil, dirt, dust, debris, cutting, or impact forces.
- Each roll must be marked or tagged with proper, original, manufacturer - applied identification.
- Separate damaged rolls from undamaged rolls and store at locations designated by the Purchaser until proper disposition of material is determined by the Purchaser.
- The Purchaser will be the final authority regarding damage.

The CQA Consultant will also monitor that equipment used to handle the geomembrane on-site is adequate and does not pose any risk of damage to the geomembrane during handling.

7.4 Manufacturer QC (MQC) Testing and Conformance (CQA) Testing

7.4.1 Sampling Procedures

If possible, the CQA Consultant will obtain representative geomembrane conformance samples from the Manufacturer at the specified frequency prior to delivery of the geomembrane rolls to the Site and forward them to the Geosynthetics CQA Laboratory for testing. Geomembrane conformance samples will be taken across the entire width of the roll and will not include the first 3 feet of material. Unless otherwise directed by the Design Engineer, samples will be 3 feet long by the roll width. The required minimum geomembrane conformance sampling frequencies are provided in Table 7.1. The CQA Consultant will mark the machine direction on the samples with an arrow and affix a label, tag, or otherwise mark each sample with the following information:

- date sampled;
- project number;
- lot/batch number and roll number;
- conformance sample number; and
- CQA personnel identification.

7.4.2 Testing Procedures

Conformance testing of the geomembrane materials obtained from the Manufacturer will be conducted by the Geosynthetics CQA Laboratory to verify compliance with the CCR Permit, this CQA Plan, and the Manufacturer's list of minimum average roll values.

7.4.3 Test Results

All MQC and conformance test results will be reviewed, accepted, and reported by the CQA Consultant before deployment of the geomembrane. Any non-conformance of the material properties with the requirements of the CCR Permit will be reported to the Contractor and Construction Site Manager.

7.4.4 Conformance Test Failure

In the case of failing test results, the Contractor may request that another sample from the failing roll be retested by the Geosynthetics CQA Laboratory. If the retest fails or if the option to retest is not exercised, then two isolation conformance samples will be obtained by the CQA Consultant. These isolation

samples will be taken from rolls, which have been determined by correlation with the Manufacturer's roll number, to have been manufactured prior to and after the failing roll. This method for choosing isolation rolls for testing should continue until passing tests are achieved. All rolls that fall numerically between the passing roll numbers will be rejected.

The CQA Consultant will verify that the Contractor has replaced all rejected rolls. The CQA Consultant will document all actions taken in conjunction with geomembrane conformance failures.

7.5 Anchor Trenches

The CQA Consultant will monitor, verify, and document that the anchor trench has been constructed as shown in the CCR Permit and meets the minimum requirements of the CQA Plan as described below.

To confirm conformance with the CCR Permit, the CQC Engineer/technician will:

- monitor that the anchor trench is constructed with a slightly rounded corner where the geosynthetics enter the trench and is backfilled as soon as possible after all geosynthetics are installed;
- perform in-place moisture/density testing of the compacted anchor trench backfill by nuclear methods at a frequency of one per 250 linear feet of anchor trench, or more frequent if deemed necessary in the opinion of the CQA Consultant;
- observe that geosynthetic materials in the anchor trench are temporarily anchored with sand bags or other suitable methods approved by the CQA Consultant if the trench will remain open after the installation of geosynthetics;
- monitor that no loose soils are left to underlie the geosynthetics in the anchor trench and all temporary ballast (i.e., sandbags) and deleterious materials are removed from the anchor trench prior to backfilling; and
- monitor that backfilling of the anchor trench is performed using extreme care when the geomembrane is in its most contracted state to minimize wrinkling and stress concentrations.

7.6 Geomembrane Placement

7.6.1 CQA Consultant Responsibility During Placement

The CQA Consultant will monitor, verify, and document that geomembrane placement is conducted is accordance with the CCR Permit and that CQA activities are performed as described in the subsections below.

7.6.2 Field Panel Identification

A field panel is a piece of geomembrane larger than approximately 10 square feet (ft^2) that is to be seamed in the field, i.e., a field panel is a roll or a portion of roll to be seamed in the field. The CQA Consultant will verify that each field panel is given an "identification code" (number or letter-number) that will:

- be selected as simple and logical as possible;
- be substantially consistent with the as-built layout plan; and
- allow tracing of the Manufacturer's roll numbers to the field panel identification code.

The CQA Consultant will verify documentation showing the correspondence between roll numbers, factory panels, and field panel identification codes. The field panel identification code will be used for all CQA records.

7.6.3 Field Panel Placement

The CQA Consultant will monitor that field panels are installed substantially at the location indicated in the Installer's layout plan, as approved, or modified. The CQA Consultant will record the field panel identification code, Manufacturer's roll number, location, date of installation, time of installation, and dimensions of each field panel.

The CQA Consultant will monitor that geomembrane placement does not proceed:

- at an ambient temperature below 40°F or above 104°F unless authorized by the Design Engineer; or
- during any precipitation, in the presence of excessive moisture (e.g., fog, dew), in an area of ponded water, or in the presence of excessive winds.

The CQA Consultant will monitor that the above conditions are fulfilled and that the supporting soil has not been damaged by adverse weather conditions. The CQA Consultant will monitor geomembrane deployment for conformance with the CCR Permit, including that:

- the geomembrane is deployed under acceptable temperature and weather conditions;
- any equipment used does not damage the geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons, or other means;
- the prepared surface underlying the geomembrane has not deteriorated since previous acceptance and is still acceptable immediately prior to geomembrane placement;
- any geosynthetic elements immediately underlying the geomembrane are clean and free of foreign objects or debris;
- all personnel working on the geomembrane do not smoke, wear damaging shoes, or engage in other activities that could damage the geomembrane;
- the method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting subbase;
- the method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels);
- adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, has been placed to prevent uplift by wind; and
- direct contact with the geomembrane is minimized; i.e., the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where excessive traffic may be expected.

The CQA Consultant will observe the geomembrane panels, after placement and prior to seaming, for damage. The CQA Consultant will advise the Construction Manager of any panels, or portions of panels, that should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected will be marked and their removal from the work area recorded by the CQA Consultant. CQA for geomembrane repairs will be in accordance with the CQA Plan.

7.7 Field Panel Seaming

7.7.1 CQA Consultant Responsibility During Seaming

The CQA Consultant will monitor, verify, and document that geomembrane panel layout and field panel seaming is conducted in accordance with the CCR Permit and that CQA activities are performed as described in the subsections below.

7.7.2 Panel Layout

The CQA Consultant will review the panel layout drawing previously submitted to the Construction Manager by the Installer and verify that:

- seams are generally oriented parallel to the line of maximum slope, i.e., oriented along, not across, the slope;
- the number of seams is minimized in corners and odd-shaped geometric locations;
- a seam numbering system is used that is compatible with the field panel identification numbering system and is agreed upon by the CQA Consultant and the Installer prior to any seaming; and
- the panel layout is consistent with accepted state of practice.

7.7.3 Seaming Equipment and Products

The CQA Consultant will verify that only extrusion welding and fusion welding are used for field seaming. The CQA Consultant will document that any alternate process proposed by the Installer is reviewed and approved by the Design Engineer and Construction Manager.

The CQA Consultant will verify that no geomembrane seaming is performed unless the CQA Consultant is on-site. The CQA Consultant will monitor the general seaming procedure used as follows:

- the Installer uses of seaming equipment specifically recommended by the Geosynthetics Manufacturer by make and model, and marked with an identification number;
- the Installer uses of a firm substrate such as a flat board, a conveyor belt, or similar hard surface directly under the seam overlap, if required, to achieve proper support;
- the Installer cuts fishmouths or wrinkles at the seam overlaps along the ridge of the wrinkle in order to achieve a flat overlap;
- the Installer cuts fishmouths or wrinkles, and patches any portion, where the overlap is inadequate, with an oval or round patch of the same geomembrane extending a minimum of 6-inches beyond the cut in all directions;

- the Installer/Contractor provides adequate illumination if seaming operations are carried out at night, and
- the Installer extends seaming to the outside edge of panels to be placed in the anchor trench.

7.7.4 Fusion Process

The CQA Consultant will monitor ambient temperatures, geomembrane surface temperatures, apparatus speed, and apparatus temperatures at appropriate intervals.

The CQA Consultant will also monitor that:

- the fusion-welding apparatus is an automated, self-propelled device;
- the fusion-welding apparatus is equipped with gauges giving the applicable temperatures and welding speed;
- the number of spare operable seaming apparatus agreed by the Construction Manager are maintained on-site;
- equipment used for seaming will not damage the geomembrane;
- the seaming zone is dry and clean;
- there is sufficient overlap between panels;
- the electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
- for cross seams, the edge of the cross seam is cut or ground to a smooth incline (top and bottom) prior to welding;
- an insulating material is placed beneath the hot welding apparatus after usage; and
- a movable protective layer is used, as necessary, directly below each overlap of geomembrane that is to be seamed to prevent build-up of moisture between the sheets.

7.7.5 Extrusion Process

The CQA Consultant will verify that the extrudate is comprised of the same resin as the geomembrane sheeting. The CQA Consultant will monitor extrudate temperatures, ambient temperatures, and geomembrane surface temperatures at appropriate intervals to document that they conform to the CCR Permit.

The CQA Consultant will also monitor that:

- the extrusion-welding apparatus is equipped with gauges giving the temperature in the apparatus and at the nozzle;
- the number of spare operable seaming apparatus agreed by the Construction Manager are maintained on-site;
- equipment used for seaming is not likely to damage the geomembrane;
- the seaming zone is dry and clean;
- the extruder is purged prior to beginning a seam until all heat-degraded extrudate has been

removed from the barrel;

- the electric generator is placed on a smooth base such that no damage occurs to the geomembrane; and
- an insulating material is placed beneath the hot welding apparatus after usage.

7.7.6 Seam Preparation

To confirm conformance with the CCR Permit, the CQA Consultant will monitor that:

- prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris of any kind, and foreign material;
- seams are overlapped in accordance with the requirements of the CCR Permit;
- if seam overlap grinding is required, the process is completed according to the Geosynthetics Manufacturer's instructions or the CCR Permit, whichever is the more stringent, prior to the seaming operation, and in a way that does not damage the geomembrane;
- the grind depth is constructed in accordance with the requirements of the CCR Permit;
- grinding marks do not appear beyond the extrudate after it is placed; and
- seams are aligned with the fewest possible number of wrinkles and fishmouths.

7.7.7 Weather Conditions for Seaming

The CQA Consultant will monitor that the weather conditions for seaming are within the acceptable range, as follows:

- the ambient temperature is not below 40°F or above 104°F, unless authorized by the Design Engineer;
- geomembrane is preheated by either sun or hot air device between ambient temperatures of 40°F and 50°F prior to performing seaming; and
- geomembrane seam areas are dry and protected from rain and wind.

The CQA Consultant will verify that methods used by the Installer for seaming at ambient temperatures below 40°F or above 104°F will produce seams that are entirely equivalent to seams produced at ambient temperatures between 40°F and 104°F and will protect the overall quality of the geomembrane. The CQA Consultant will monitor that seaming conducted during abnormal weather conditions is performed in accordance with the methods approved by the Design Engineer.

7.7.8 Overlapping and Temporary Bonding

The CQA Consultant will monitor that:

- the panels of geomembrane have a finished overlap of a minimum of 4 inches for both extrusion and fusion welding, but in any event sufficient overlap is provided to allow peel tests to be performed on the seam;
- no solvent or adhesive is used; and
- the procedure used to temporarily bond adjacent panels together does not damage the

geomembrane. In particular, the temperature of hot air at the nozzle of any spot welding apparatus is controlled such that the geomembrane is not damaged.

7.7.9 Trial Seams

The CQA Consultant will verify that the Installer performs trial seam tests in accordance with the CCR Permit. The CQA Consultant will observe and document the Installer's trial seam testing procedures. The trial seam samples will be assigned an identification number and marked accordingly by the CQA Consultant. Each sample will be marked with the date, time, machine temperature(s) and setting(s), number of seaming unit, and name of seaming technician. Trial seam samples will be maintained until destructive seam testing of the applicable seams are tested and pass.

7.7.10 Nondestructive Seam Continuity Testing

The CQA Consultant will monitor that the Installer nondestructively tests all field seams over their full length using a vacuum test unit or air pressure test (for double fusion seams only). The CQA Consultant will monitor that the Installer performs spark testing if the seam cannot be tested using the vacuum or air pressure test methods. The purpose of nondestructive tests is to check the continuity of seams. The CQA Consultant will monitor that the Installer performs continuity testing as the seaming work progresses, not at the completion of all field seaming. The CQA Consultant will:

- monitor nondestructive testing;
- document the results of the nondestructive testing; and
- inform the Contractor and Construction Manager of any noncompliance.

The CQA Consultant will monitor that the Installer performs any required seam repairs in accordance with the CCR Permit. The CQA Consultant will:

- observe the repair procedures;
- observe the re-testing procedures; and
- document the results.

The seam number, date of observation, dimensions and/or descriptive location of the seam length tested, name of person performing the test, and outcome of the test will be recorded by the CQA Consultant.

7.7.11 Destructive Testing and CQA Performance Testing Requirements

The CQA Consultant will monitor the Installer performing destructive seam field testing during the geomembrane installation. The purpose of this testing is to evaluate seam strength. The CQA Consultant will monitor that the Installer performs destructive seam testing as the seaming work progresses, not at the completion of all field seaming.

The CQA Consultant will also conduct laboratory destructive seam testing as required by this CQA Plan. The testing will be performed in accordance with the current versions of the ASTM and other applicable test procedures and at the minimum frequencies presented in Table 7.1

The CQA Consultant will review the destructive seam test results to verify that the requirements of the CCR Permit and this CQA Plan are met. The CQA Consultant may conduct additional destructive seam testing if deemed necessary by the Owner and/or CQA Certifying Engineer. Such additional testing may only be performed after the CQA Consultant submits, and the Owner approves, a written request that describes the reason(s) for additional testing.

7.7.12 Location and Frequency

The CQA Consultant will select all destructive seam test sample locations. Sample locations will be established as follows.

- Destructive testing will be performed at a minimum frequency of one test location per 500 feet of seam length. This minimum frequency is to be determined as an average taken throughout the entire installation. This minimum frequency may be increased for seams made outside the normal ambient temperature range of 40°F to 104°F.
- Test locations will be determined during seaming at the CQA Consultant's discretion. Selection of such locations may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding.

The Installer will not be informed in advance of the locations where the seam samples will be taken.

7.7.13 Sampling Procedures

Destructive seam testing will be performed by the Geosynthetics CQA Laboratory as seaming progresses in order to obtain test results prior to the geomembrane being covered by overlying materials. The CQA Consultant will:

- observe sample cutting;
- assign a number to each sample, and mark it accordingly; and
- record sample location on geomembrane panel layout drawing.

The CQA Consultant will monitor that the Installer performs repairs to all holes in the geomembrane resulting from destructive seam test sampling in accordance with repair procedures described in the CCR Permit. In addition, the CQA Consultant will monitor that the Installer performs non-destructive testing as described in this Section to ensure the continuity of the new seams.

7.7.14 Size of Samples

The CQA Consultant will monitor that at a given sampling location, two types of samples (field test samples and laboratory test samples) are taken:

- First, a minimum of two field samples or test strips are taken for field testing. Each of these test strips are approximately 1 inch wide by 12-inches long, with the seam centered parallel to the width. The distance between these two specimens is approximately 42-inches. If both specimens pass the field test described in this Section, a second full laboratory destructive sample is taken for testing by the Geosynthetics CQA Laboratory.

- The full destructive sample is located between the two field test strips. The sample is approximately 12-inches wide by 42-inches long with the seam centered lengthwise. The sample is cut into three parts and distributed as follows:
- one approximately 12-inches by 12-inches portion to the Installer;
- one approximately 12-inches by 12 inches portion to the Construction Manager for archive storage; and
- one approximately 12-inches by 18-inches portion for Geosynthetics CQA Laboratory testing.

7.7.15 Field Testing

The CQA Consultant will monitor that the test strips are tested in the field, for peel adhesion, using a gauged tensiometer by the Installer. In addition to meeting the strength requirements outlined in Table 7.1, the CQA Consultant will monitor that all specimens exhibit a film tear bond and do not fail in the weld. If any field test sample fails to meet these requirements, the destructive sample has failed.

The CQA Consultant will witness all field tests and mark all samples and portions with their number. The CQA Consultant will also log the date, number of seaming unit, seaming technician identification, destructive sampling, and pass or fail description.

7.7.16 Geosynthetics CQA Laboratory Testing

Destructive test samples will be tested by the Geosynthetics CQA Laboratory. Testing will include "Bonded Seam Strength" and "Peel Adhesion". The minimum acceptable values to be obtained in these tests are presented in Table 7.1. At least five specimens will be tested for each test method (i.e., five for peel and five for shear). Specimens will be selected alternately by test from the samples (i.e., peel, shear, peel, shear, etc.). Both the inside and outside tracks of the double track fusion seams will be tested for peel adhesion. A passing test will meet the minimum required values in Table 7.1.

The Geosynthetics CQA Laboratory will provide test results no more than 24 hours after they receive the samples. The CQA Consultant will review laboratory test results as soon as they become available and report the results to the Construction Manager.

7.7.17 Procedures for Destructive Test Failure

The CQA Consultant will monitor that the following procedures apply whenever a sample fails a destructive test, whether that test was conducted in the field or by the Geosynthetics CQA Laboratory. The CQA Consultant will monitor that the Installer follows one of the two options below:

- The Installer can reconstruct the seam (e.g., remove the old seam and re-seam) between any two passed destructive test locations or between points judged by the CQA Consultant to represent conditions of the failed seam (e.g., a tie-in seam or a seam made by the apparatus and/or operator used in the failing seam); or
- The Installer can trace the welding path to an intermediate location a minimum of 10 feet from the point of the failed test in each direction and take a small sample for additional field testing in accordance with the destructive test procedure at each location. If these additional isolation

samples pass the field test, then full laboratory samples are taken at both locations. If these laboratory samples meet the specified strength criteria, then the seam is reconstructed between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be reconstructed or repaired.

The CQA Consultant will monitor that all failed seams are bound by two locations from which samples passing laboratory destructive tests have been taken or the entire seam is reconstructed and re-tested. In cases exceeding 150 feet of reconstructed seam, a sample will be taken from the reconstructed portion of the seam and must pass destructive testing. The CQA Consultant will observe that any repairs are made in accordance with Section 7.7. The CQA Consultant will document all actions taken in conjunction with destructive test failures.

7.8 Defects and Repairs

7.8.1 CQA Consultant Responsibility for Monitoring Defects and Repairs

The CQA Consultant will monitor, verify, and document that geomembrane defects are addressed and repairs are made in accordance with the CCR Permit and that CQA activities are performed as described below.

7.8.2 Identification

All seams and non-seam areas of the geomembrane will be examined by the CQA Consultant for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane will be clean at the time of examination. The CQA Consultant will request that the Contractor broom or wash the geomembrane surface if the amount of dust or mud inhibits examination.

7.8.3 Repair Procedures

The CQA Consultant will monitor that any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, is repaired by the Installer in accordance with the CCR Permit. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure, materials, and equipment will be agreed upon between the Installer and CQA Consultant. In addition, the following conditions will be monitored by the CQA Consultant:

- surfaces of the geomembrane which are to be repaired are abraded no more than one hour prior to the repair;
- all surfaces are clean and dry at the time of the repair;
- patches or caps extend at least 6-inches beyond the edge of the defect, and all corners of patches are rounded with a radius of at least 3-inches; and
- the geomembrane below large caps is appropriately cut to avoid water between the two sheets.

7.8.4 Verification of Repairs

Each repair will be numbered and logged by the CQA Consultant. The CQA Consultant will monitor that each repair is non-destructively tested by the Installer using approved methods. Repairs which pass

the non-destructive test will be taken as an indication of an adequate repair. Large caps may be of sufficient extent to require destructive test sampling, at the discretion of the CQA Consultant or as specified in Table 7.1. The CQA Consultant will observe all non- destructive testing of repairs and will record the number of each repair, date, and test outcome.

7.9 Geomembrane and Cap System Acceptance

In accordance with the CCR Permit, the Contractor retains all responsibility for the geosynthetics until acceptance by the Construction Manager. The terms and conditions for the geomembrane and cover system acceptance are described in the CCR Permit.

7.10 Materials in Contact with the Geomembrane

The procedures outlined in this section are intended to allow the CQA Consultant to verify that the installation of materials in contact with the geomembrane do not cause damage to it.

7.10.1 Material and Engineered Turf

The CQA Consultant will monitor that the Contractor conforms with the requirements of the CCR Permit and takes all necessary precautions to verify that the geomembrane is not damaged during its installation, during the installation of other components of the final cover systems, or by other construction activities. The CQA Consultant will monitor the following:

- placement of materials above the geomembrane are not placed at an ambient temperature below 40°F or above 104°F unless otherwise approved by the Design Engineer and Construction Site Manager;
- material placement operations above the geomembrane are performed by the Contractor to minimize wrinkles in the geomembrane;
- equipment used for placing material are not driven directly on the geomembrane or other geosynthetic layers;

7.10.2 Appurtenances

The CQA Consultant will monitor that:

- installation of the geomembrane in appurtenant areas and connection of geomembrane to appurtenances (e.g., concrete pads or concrete embedment strips at geomembrane termination) are made in accordance with the CCR Permit;
- extreme care is given by the Installer when seaming around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas; and
- the geomembrane is not visibly damaged when making connections to appurtenances.

7.11 Engineered Turf & Sand Ballast - Closureturf® Cover System

7.11.1 Installer

The Engineered Turf Installer will submit the following as obtained from the Product Manufacturers to the CQA Consultant:

- Production Certification including project references
- Testing Program of Compound Ingredients
- Material Certifications
- Test Data for Materials
- All of the above submittals will be reviewed and retained by the CQA Consultant

The Geomembrane and Engineered Turf Installer will submit the following to the CQA Consultant prior to the installation:

- Qualifications of Engineered Turf Installer Superintendent and Foreman
- Resumes of Contractor field crews
- Proposed geomembrane panel layout drawings

The Engineered Turf Installer will submit the following prior to installation:

- The ClosureTurf™ and HydroTurf® installer shall be an experienced and trained installer and be able to provide documentation that they have manufacturer's approval status. The ClosureTurf™ and HydroTurf® installation contractor shall also utilize a licensed installer for the sand infill installation of ClosureTurf™ and the HydroBinder® for the HydroTurf® if not licensed to install the infill themselves.
- Copy of Installer's Letter of Approval or License issued by the Manufacturer shall be provided to the Purchaser.

7.11.2 Engineered Turf Deployment

1. After geomembrane installation, including required documentation, has been completed, the geomembrane surface shall be cleared of all significant deposits of stones, soil and debris that could damage the geomembrane or impede the hydraulic function between the stud side of the structured geomembrane and the Engineered Turf component. Any soil or debris washed down to the toe of slope during cleaning procedures shall be physically removed from the geomembrane surface without damage to the geomembrane.
2. The Engineered Turf shall be deployed without damage to the geotextile component and minimal loss of the synthetic grass component.
3. Deployment equipment shall not damage the Engineered Turf geotextile, cause synthetic grass loss, or damage underlying geomembrane by handling, trafficking, leakage of hydrocarbons, or by other means.
4. The Engineered Turf shall be deployed smooth and free of tension, stress, folds, wrinkles, creases, and free of contaminants such as soil, grease, fuel, etc.
5. The Engineered Turf shall be deployed with the synthetic grass blades pointing towards the top of the slope on side slopes greater than 12%.
6. Engineered Turf shall be secured with sand bag anchoring at the top of the slope and then rolled down the slope.
7. Seaming operations shall be performed using a 4-inch overlap and fastened with heavy-duty textile stitching machine. A prayer type seam is to be constructed using a Nulong

sewing machine or equivalent. Stitching operations shall be performed such that the woven geotextiles are not exposed.

8. Sewing shall occur between the 1st and 2nd row of stiches to avoid exposure of the black geotextile after flipping the panel.
9. After seaming operations, the ends of the Engineered Turf panels shall be permanently anchored in the perimeter and bench roadways.
10. Construction equipment on the deployed Engineered Turf shall be minimized to reduce the potential for geosynthetic material puncture.
11. Equipment travel on exposed structured geomembrane is prohibited. Small equipment such as generators shall be placed on scrap geomembrane material (rub sheets) above geosynthetic materials in the CLOSURETURF™ Final Cover System.

7.11.3 Engineered Turf Seaming

1. Seaming of the Engineered Turf shall be in accordance with this plan and the manufacturer's recommendations.
2. Seaming of the Engineered Turf component will be performed by sewing. At no point shall a seam be heat bonded if the sewing method can be applied.
3. Seaming operations shall be performed using a 4-inch overlap and fastened with heavy-duty textile stitching machine. A prayer type seam is to be constructed using a Nulong sewing machine or equivalent. Stitching operations shall be performed such that the woven geotextiles are not exposed. Sewing shall occur between the first and second row of stiches to avoid exposure of the black geotextile after flipping the panel.
4. In the bench areas, seams for the Engineered Turf shall be located no more than 5 ft. inboard of the outside edge of the bench.
5. After seaming operations, the ends of the Engineered Turf panels shall be permanently anchored in the perimeter and bench roadways.
6. Construction equipment on the deployed Engineered Turf shall be minimized to reduce the potential for geosynthetic material puncture. Equipment travel on exposed structured geomembrane is prohibited. Small equipment such as generators shall be placed on scrap geomembrane material (rub sheets) above geosynthetic materials in the Final Cover System.
7. The placement shall be observed by the third-party QC ENGINEER and the Purchasers Representative.
8. For short sections (around penetrations, patches, and/or corners), the synthetic turf seaming may be completed by using a 4-inch (min) overlapped seam which is fastened by heat-bonding. This can be accomplished by using a hand-held Leister (followed by a press wheel), DemTech 4-inch, single-wedge welder Model No. VM-20/4/A, and/or a Varimat V2 (or equal) leistering machine.
9. Since the temperature, pressure and speed controls of the DemTech 4-inch single-wedge welder Model No. VM-20/4/A and the Varimat V2 leistering machine are variable and can

be increased / decreased depending on weather and environment conditions, the temperature and speed shall be confirmed with a trial seam.

10. Field testing of heat bonded seams shall consist of a visual inspection done every hour.

11. The visual inspection of the field seams shall include observation of the geotextile backings in order to confirm that it is not melting. If it is melting, then the machine is too hot. Observe and feel the seam in order to confirm that there is a stiff, inner core which is continuous along the weld. All seams shall be verified that they are continuous by running their fingers along the seam. If there is any penetration of their fingers into the seam, the Installer will need to use a hand-held Leister at the location of the penetration in the seam in order to weld it continuously. The seam will need to be re-inspected.

7.11.4 Engineered Turf Field Trial Seams

1. All Turf field trial seams shall be made in accordance with this plan and the manufacturer's recommendations.

2. Field trial seams shall be made in accordance with the manufacturer's recommendations and the project Specifications. The Contractor shall submit a copy of the proposed testing procedures for the Purchaser's review.

3. Field trial seams shall be conducted, per seaming apparatus and per seamer, on the turf to verify that seaming conditions are satisfactory. Trial seams shall be conducted at the beginning of each seaming period, at least once every four hours for each seaming apparatus and personnel used that day. Additional field trial seams may be requested by the Purchaser's Representative.

4. All trial seams shall be made in contact with the underlying material as it will be done in the field.

5. Thread used for trial seam stitching shall be the same as used during deployment.

6. Field trial seaming shall be conducted under the same ambient temperature and conditions as the production seams.

7. The quality of the trial seams for heat bonding shall be confirmed by visual observations.

8. Visual observations shall ensure that the geotextile backings are not melting.

9. Observe and feel the welded trial seam in order to confirm that there is a stiff, inner core continuous along the weld.

10. Observe and confirm that the welds may not be pulled or peeled apart.

11. All heat bonded seams shall be continuous. The continuity shall be confirmed by the CQA Consultant by running his fingers along the seam. If there is any penetration of their fingers into the seam, the installer shall use a hand – leister at the location to weld the seam. The seam shall be re-inspected by the CQA Consultant.

12. The trial seams for heat bonding shall also have a peel test performed. The CQA Consultant shall grab the geotextile backings of the top overlapped piece on the seam at one location. The geotextile backing is then to be pulled up. For a passing seam, the tufts of

the upper synthetic turf shall pull out through the geotextile backings since they are heat bonded to the tufts of the lower synthetic turf piece. If the tufts do not pull out of the geotextile backings and the seam pulls apart, the seam would fail the test most likely because there was not enough heat.

13. Sewn trial seams shall be inspected to ensure that the woven geotextiles are not exposed and that the sewing has occurred between the first and second row of stiches.
14. Sewn trial seams should not be capable of being pulled apart by hand using vice grips. If this occurs during trial weld procedures, adjustments to the sewing machine may be required before proceeding.
15. Prepare trial seams that are at least 10-foot long by 1-foot wide after seaming with the seam centered lengthwise. Seaming of the Engineered Turf shall be in accordance with this plan and the manufacturer's recommendations.

7.11.5 Sand Ballast Infill

1. The sand layer will be a minimum 1/2 inch thick. The sand shall be worked into the Engineered Turf layer as in-fill between the synthetic yarn blades. The physical characteristics of the sand layer will be evaluated through visual observation (and laboratory testing if deemed necessary by the CQA Consultant) before construction and visual observation during construction. Additional testing during construction will be at the discretion of the CQA Consultant.
2. The sand may be spread using low ground pressure equipment and a pull-behind spreader bar. Rotary brush equipment may be used to evenly distribute the sand infill into the synthetic grass matrix. The sand spreading operation shall be done in front of deployment equipment travel to improve the bearing capacity of the cover system below. Use of rotary brush equipment shall be performed in a manner that does not result in removal of the synthetic grass blades from the underlying woven geotextile.
3. Conveyor systems and/or blower equipment may be used to spread and place the sand in-fill on slopes too steep for equipment contact. These deployment systems shall not be used during wind speed conditions higher than 15 miles per hour. Dust generation may be mitigated by maintaining the sand infill at a moisture content sufficient to control dust but not impede the placement operation.
4. Contractor shall explain in detail in the pre-construction meeting the method of sand deployment to be used. The method shall be approved by the Purchaser. For slopes steeper than 3H:1V the sand infill shall be placed using long reach conveyors belts or using water or air express blower methods. The sand layer may be placed using any appropriate equipment capable of completing the work and should only receive minimal compaction required for stability.
5. Sand ballast infill shall completely cover the double-layer woven geotextile of the Engineered Turf component. Areas of exposed geotextile or thin layering of sand ballast unsatisfactory to the requirements of Table 1, shall receive additional sand ballast. If the cause of poor sand ballast placement and resulting geotextile exposure is wrinkles in the underlying structure geomembrane, the Engineered Turf component shall be pulled back from the geomembrane component, the geomembrane wrinkle removed and the geomembrane shall be repaired per the requirements of this Plan and the project specifications.

6. The CQA Consultant shall verify that a minimum thickness of ½ inch of sand is placed on the Turf. Frequency will be 20 measurements per acre of final cover installed.
7. The Contractor shall provide to the Purchaser the grain size distribution, from the source of the sand infill/ballast, for every 1500 cy of material.

7.11.6 Hydrobinder Infill Installations

1. Installation of the HydroBinder™ infill for the HydroTurf® shall be performed by a licensed installer.
2. The HydroBinder™ infill layer shall be a minimum 7/8-inch thick (dry). The desired thickness will be achieved prior to the hydration process. At grade breaks and drainage benches, the thickness of the HydroBinder™ shall be a minimum of 1.25 inches.
3. If weep holes are required for draining the internal drainage layer through the Engineered Turf, remove the HydroBinder™ in the areas of the weep holes prior to hydration or block the weep hole locations prior to infilling. Blocks may consist of pipe, dowels, etc. Weep hole diameters shall be one (1) inch and be located at the toe of slope on 2 ft. centers.
4. The infill shall be installed into the HydroTurf® while it is in a dry state. The HydroTurf® shall be dry. If the HydroTurf® is wet from rain or dew, the installer shall wait until it is dry. The installer may attempt to speed up the drying process by using a blower. In addition, the infill shall not be installed in inclement, wet or rainy weather, or the threat of inclement weather. Also, the infill shall not be installed in freezing temperatures.
5. The infill shall be worked into the Engineered Turf layer between the synthetic yarn blades so that the tuffs are in an upright position. The physical characteristics of the infill layer will be evaluated through visual observation (and laboratory testing if deemed necessary by the CQA Consultant) before construction and visual observation during construction. Additional testing during construction will be at the discretion of the CQA Consultant.
6. The hydration process must occur the day of the infill placement.
7. Personnel access on the HydroTurf® shall be prohibited for 24 hours following the hydration of the HydroBinder™.
8. The infill shall be thoroughly hydrated, however, care must be taken to avoid displacement of the non-hydrated infill. The Installer shall not overhydrate the infill so that water begins to run-off and cause erosion of the cement infill. The objective is to soak the area to start the hydration process but not to inundate with water beyond saturation.
9. Once hydration is completed as described, backfill and compaction of the anchor trenches should take place.
10. The HydroBinder™ shall be at minimum performance levels within 24 hours listed in Table 3 of this Plan. HydroBinder™ not meeting the performance levels will be removed and replaced.

11. The infill may be spread using low ground pressure equipment and a pull-behind spreader bar. Rotary brush equipment may be used to evenly distribute the infill into the synthetic grass matrix. The infill spreading operation shall be done in front of deployment equipment travel to improve the bearing capacity of the cover system below. Use of rotary brush equipment shall be performed in a manner that does not result in removal of the synthetic grass blades from the underlying woven geotextile. In addition, hand spreading and rakes maybe be used to spread the infill material. If rakes are used, only plastic rakes shall be allowed.

12. Conveyor systems and or blower equipment may be used to spread and place the infill on slopes too steep for equipment contact. These deployment systems shall not be used during wind speed conditions higher than 15 miles per hour. Dust generation may be mitigated by maintaining the infill at a moisture content sufficient to control dust but not impede the placement operation.

13. Contractor shall explain in detail in the pre-construction meeting the method of infill deployment to be used. The method shall be approved by the Purchaser. For slopes steeper than 3H:1V the infill shall be placed using long reach conveyors belts or using water or air express blower methods. The infill layer may be placed using any appropriate equipment capable of completing the work and should only receive minimal compaction required for stability.

14. HydroBinder™ infill shall completely cover the double-layer woven geotextile of the Engineered Turf component. Areas of exposed geotextile or thin layering of infill unsatisfactory to the requirements of this Plan shall receive additional infill. If the cause of poor infill placement and resulting geotextile exposure is wrinkles in the underlying structure geomembrane, the Engineered Turf component shall be pulled back from the geomembrane component, the geomembrane wrinkle removed and the geomembrane repaired per the requirements of this Plan. The Engineered Turf shall be re-deployed and ballasted with infill satisfactory to the requirements of this Plan.

15. For areas with exposed geotextile due to wrinkles and isolated small voids, a UV resistant coating shall be applied to the exposed area and additional infill material shall be applied immediately to the coating and hydrated. The UV coating product shall be manufactured by Quikrete product #8640, Sakrete product #60205006, or approved equivalent.

16. The CQA Consultant shall verify that a minimum thickness of 7/8-inch of infill (dry) is placed on the synthetic Turf. At grade breaks and drainage benches, the thickness of the HydroBinderTM shall be a minimum of 1.25 inches. Frequency shall be one test per 100 linear feet of ditch and twenty (20) measurements per acre of final cover installed. Thickness measurements shall be taken using a caliper or equivalent device. The CQA Consultant shall also inspect to confirm full hydration by excavating with a small tool into the infill.

17. The Contractor shall provide to the Purchaser the manufacturers certifications for the HydroBinder™ infill properties listed in Table 3 of this Plan. Upon delivery, or as determined by the Purchaser and/or the Purchaser's Representative, a representative sample of the HydroBinder™ mix shall be taken by the Purchaser for verification of the compressive strength.

18. The sand infill layer will be a minimum 1/2 inch thick. The sand shall be worked into the Engineered Turf layer as in-fill between the synthetic yarn blades. The physical

characteristics of the sand layer will be evaluated through visual observation (and laboratory testing if deemed necessary by the CQA Consultant) before construction and visual observation during construction. Additional testing during construction will be at the discretion of the CQA Consultant.

19. The sand may be spread using low ground pressure equipment and a pull-behind spreader bar. Rotary brush equipment may be used to evenly distribute the sand infill into the synthetic grass matrix. The sand spreading operation shall be done in front of deployment equipment travel to improve the bearing capacity of the cover system below. Use of rotary brush equipment shall be performed in a manner that does not result in removal of the synthetic grass blades from the underlying woven geotextile.

GEOMEMBRANE
CONFORMANCE TESTING

TABLE 7.1

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY
Density	ASTM D 1505 OR ASTM D 792	NOTE 1
Thickness	ASTM D 5994	
Tensile Strength at Yield	ASTM D 6693, Type IV	
Tensile Strength at Break		
Elongation at Yield		
Elongation at Break		
Carbon Black Content	ASTM D 1603 or ASTM D 4218	

Notes:

1. The minimum number of rolls to be sampled for each shipment will be determined by computing the cube root of the total number of rolls delivered in the shipment, and rounding this value upward to the nearest integer, with at least one sample per each manufacture's lot, For instance, if 40 rolls of geomembrane are delivered in a shipment at least four rolls will be sampled. Testing should be performed at a minimum frequency of one per lot or as described above, whichever is more frequent.

MANUFACTURER QUALITY CONTROL REQUIREMENTS
50-MIL LLDPE GEOMEMBRANE

TABLE 7.2			
Property	Frequency	Test Method	Minimum Average Value
Raw Materials: Density Melt Index	 Once per 200,000 lbs of resin Once per 200,000 lbs resin	 ASTM D 1505 ASTM D 792 ASTM D 1238,190˚C, 2.16kg	 Max. 0.939 g/cc ≤ 1.0 g/10 min.
Thickness Minimum Average Lowest individual of 8 of 10 readings	per roll	ASTM D 5994	 50 mils 45 mils
Drainage Stud Height (min. avg)	Every Second Roll	ASTM D7466[2]	130 mil
Asperity Height (min. avg)	Every Second Roll	ASTM D7466[2]	20 mil
Density	Once per 200,000 lbs of resin	ASTM D 792B	Max. 0.939 g/cc
Tensile Properties (avg. both directions) (min. avg) Break Strength Break Elongation	20,000 lbs.	ASTM D 6693, Type IV	 105 lb/in 300 %
Tear Resistance	45,000 lbs	ASTM D 1004	30 lb (min. avg.)
Puncture Resistance	45,000 lbs	ASTM D 4833	55 lb (min. avg.)
2% Modulus lb/in (max)	Per formulation	D5323	3000 (max)
Axi-Symmetric Break Resistance Strain - % (min.)	Per formulation	D5617	30
Carbon Black Content	20,000 lbs.	ASTM D 4218	2.0 % - 3.0 %
Carbon Black Dispersion	45,000 lbs.	ASTM D 5596	Note (3)
Oxidative Induction Time (OIT) Standard OIT, minutes	200,000 lbs	ASTM D 3895, 200˚C, 1 atm 0_2	 140 (min. avg.)
Oven Aging @ 85ºC High Pressure OIT (min. avg.) - % retained after 90 days	Per Each Formulation	ASTM D5721 ASTM D5885, 150˚C, 500psi 0_2	 60%
UV Resistance High Pressure OIT - % retained after 1600 hours	Per Each Formulation	ASTM D7238 ASTM D5885, 150˚C, 500psi 0_2	(20hr. cycle @ 75˚C/4hr. condensation @60˚) 35%

1. Reference GRI GM17, LLDPE MicroDrain Liner Product Data Sheet, Agru America.
2. Even though ASTM D7466 is specific to textured geomembrane, this method is still applicable for MicroDrain materials.
3. Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.

MANUFACTURER QUALITY CONTROL REQUIREMENTS
50-MIL HDPE GEOMEMBRANE

TABLE 7.3			
Property	Frequency	Test Method	Minimum Average Value
Raw Materials: Density Melt Index	 Once per 200,000 lbs of resin Once per 200,000 lbs resin	 ASTM D 1505 ASTM D 792 ASTM D 1238,190˚C, 2.16kg	 Min. 0.932 g/cc ≤ 1.0 g/10 min.
Thickness Minimum Average Lowest individual of 8 of 10 readings	per roll	ASTM D 5994	 50 mils 45 mils
Drainage Stud Height (min. avg)	Every Second Roll	ASTM D7466[2]	130 mil
Asperity Height (min. avg)	Every Second Roll	ASTM D7466[2]	20 mil
Density	Once per 200,000 lbs of resin	ASTM D 792B	Min. 0.94 g/cc
Tensile Properties (avg. both directions) (min. avg) Break Strength Break Elongation	20,000 lbs.	ASTM D 6693, Type IV 2 in/min	 110 lb/in 300 %
Tear Resistance	45,000 lbs	ASTM D 1004	38 lb (min. avg.)
Puncture Resistance	45,000 lbs	ASTM D 4833	80 lb (min. avg.)
Carbon Black Content	20,000 lbs.	ASTM D 4218	2.0 % - 3.0 %
Carbon Black Dispersion	45,000 lbs.	ASTM D 5596	Note (3)
Oxidative Induction Time (OIT) Standard OIT, minutes	200,000 lbs	ASTM D 3895, 200˚C, 1 atm 0_2	 140 (min. avg.)
Oven Aging @ 85ºC High Pressure OIT (min. avg.) - % retained after 90 days	Per Each Formulation	ASTM D5721 ASTM D5885, 150˚C, 500psi 0_2	 80%
UV Resistance High Pressure OIT - % retained after 1600 hours	Per Each Formulation	ASTM D7238 ASTM D5885, 150˚C, 500psi 0_2	(20hr. cycle @ 75˚C/4hr. condensation @60˚) 50%

1. Reference GRI GM13, HDPE MicroDrain Liner Product Data Sheet, Agru America.
2. Even though ASTM D7466 is specific to textured geomembrane, this method is still applicable for MicroDrain materials.
3. Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.

TABLE 7.4 - ENGINEERED TURF COMPONENT					
Property	**Frequency**	**Test Method**	**(CT Product) Minimum Average Value**	**(CTX Product) Minimum Average Value**	**(CTHD Product) Minimum Average Value**
Yarn Type	N/A	N/A	Polyethylene, Fibrillated	Polyethylene, Fibrillated/Monofilament Blend	Polyethylene, Fibrillated
Yarn Color	N/A	N/A	Olive Green, Play Green, Tan (Owner to designate color)	Green, Tan Blend (Owner to designate color)	Olive Green (Owner to designate color)
Yarn Weight (Total product weight)	Once per 300,000 sf	ASTM D5261 (sample size, 1 yd[2)]	≥20 oz/sq.yd. (32 oz/sq.yd ± 2 oz)	≥22 oz/sq.yd. (34 oz/sq.yd ± 2 oz)	≥31 oz/sq.yd. (40 oz/sq.yd ± 2 oz)
Tensile Strength of Yarn	Once per 300,000 sf	ASTM D2256	15 lbs min.	15 lbs min.	15 lbs min.
CBR Puncture	Once per 300,000 sf	ASTM D6241	1,500 lbs (MARV)	1,500 lbs (MARV)	1,500 lbs (MARV)
Tensile Product (MD/XD)	Once per 300,000 sf	ASTM D4595	2,100 MD/1,600 XD lb/ft min. (MARV)	2,100 MD/1,600 XD lb/ft min. (MARV)	2,100 MD/1,600 XD lb/ft min. (MARV)
Rainfall Induced Erosion	N/A	ASTM D6459	Infill Loss <0.1% at 6 in/hr rainfall	Infill Loss <0.1% at 6 in/hr rainfall	Infill Loss <0.1% at 6 in/hr rainfall
Aerodynamic Evaluation	N/A	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 psf	120 mph with max. uplift of 0.12 psf	120 mph with max. uplift of 0.12 psf
Turf Fiber UV Stability	N/A	ASTM G147	>60% retained tensile strength @ 100 yrs (projected)	>60% retained tensile strength @ 100 yrs (projected)	>60% retained tensile strength @ 100 yrs (projected)
Backing system UV Stability (Exposed)	N/A	ASTM G154 Modified Cycle 1, UVA340	110 lb/ft retained tensile strength @ 6,500 hrs (projected)	110 lb/ft retained tensile strength @ 6,500 hrs (projected)	110 lb/ft retained tensile strength @ 6,500 hrs (projected)
Steady State Hydraulic Overtopping (ClosureTurf® with HydroBinder™)	N/A	ASTM D7277 ASTM D7276	5 ft overtopping resulting in 29 fps velocity & 8.8 psf shear stress for Manning N Value of 0.02	5 ft overtopping resulting in 29 fps velocity & 8.8 psf shear stress for Manning N Value of 0.02	5 ft overtopping resulting in 29 fps velocity & 8.8 psf shear stress for Manning N Value of 0.02
Full Scale Wave Overtopping Test – Cumulative Volume (ClosureTurf® with HydroBinder™)	N/A	CSU Wave Simulator	165,000 ft^3/ft	165,000 ft^3/ft	165,000 ft^3/ft
Full Scale Wave Overtopping Test – Max. Avg. Wave Overtopping Discharge (ClosureTurf® w/ HydroBinderTM)	N/A	CSU Wave Simulator	4.0 $ft^3/s/ft$	4.0 $ft^3/s/ft$	4.0 $ft^3/s/ft$

Transmissivity w/ underlying structured geomembrane, Normal Stress @ 50 psf & 0.33m^2/sec gradient	NA	ASTM D4716	2.5 x 10^{-3} m^2/sec, min.	2.5 x 10^{-3} m^2/sec, min.	2.5 x 10^{-3} m^2/sec, min.
Internal Friction of combined components	N/A	ASTM D5321	33˚, min. peak	34˚, min. peak	33˚, min. peak

TABLE 7.5 - ENGINEERED TURF INFILL & BALLAST SAND	
ASTM C136	
Sieve	Percent Passing
3/8 in. (9.5mm)	100
No. 4 (4.75 mm)	90 – 100
No. 8 (2.36 mm)	50 – 85
No. 16 (1.18 mm)	25 – 65
No. 30 (600 µm)	10 – 45
No. 50 (300 µm)	0 – 30
No. 100 (150 µm)	0 - 10
No. 200 (750 µm)	0 - 5
ADDITIONAL REQUIREMENTS	
Fine aggregate angularity shall be tested in accordance with ASTM C 1252/AASHTO T 304, Standard Test Methods for Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading). Method A. Method A uncompacted void content shall be greater than or equal to 40%.	
Sand infill specific gravity shall be tested in accordance with ASTM C 128/AASHTO T 84, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate. Bulk oven-dry specific gravity shall be greater than or equal to 2.40.	

TABLE 7.6 – ArmorFill™M POLYMER EMULSION	
Product	Full Strength Emulsion (260-gallon tote typical)
Mix	6 parts water to 1 part ArmorFill Polymer Emulsion

TABLE 7.7 – ENGINEERED TURF HydroBinder™ INFILL & BALLAST	
Product	80 lb. bags or 3000 lb. bulk super sacks
Cement	Portland Cement Brand meeting ASTM C150, Type I or II. Only one brand used throughout project.
Cementitious Infill Mix	ASTM C387 for high strength mortars. Min. 28 day compressive strength of 5000 psi for the batched material as supplied

8. GEOTEXTILES

8.1 Introduction

The CQC Engineer/technician will perform conformance testing, review the MQC documentation, and monitor the installation of geotextile layers as required by the Design Documents and this CQA Plan. The conformance testing will be performed in accordance with the current versions of the ASTM or other applicable test procedure indicated in Table 8.1. Georgia Power will be notified prior to installation of any geosynthetics material.

8.2 Transportation, Handling, and Storage

The CQA Consultant will monitor the transportation, handling, and storage of the geotextile on the Project Site. The CQA Consultant will verify that the geotextile is protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

The CQA Consultant will monitor that transportation, handling, and storage of geotextile conforms with the Design Documents, including:

- handling of the geotextile rolls is performed in a competent manner such that damage does not occur to the geotextile or to its protective wrapping;
- geotextile rolls are not stacked upon one another to the extent that deformation of the core occurs or to the point where accessibility can cause damage in handling;
- geotextile rolls are stacked in such a way that access for conformance sampling is possible;
- protective wrappings are removed less than one hour prior to unrolling the geotextile;
- after unrolling, a geotextile is not exposed to ultraviolet light for more than 30 calendar days;
- outdoor storage of geotextile rolls does not exceed the Manufacturer's recommendations or longer than six months whichever is less;
- for storage periods longer than Manufacturer's recommendation or six months (whichever is less), a temporary enclosure is placed over the rolls, or they are moved to an enclosed facility; and
- the location of temporary field storage is not in areas where water can accumulate, and the rolls are elevated off the ground to prevent contact with ponded water.

Upon delivery at the Site, the Contractor, Installer, and CQA Consultant will conduct an inspection of the rolls for defects and damage. This inspection will be conducted without unrolling the materials unless defects or damages are found or suspected. The CQA Consultant will indicate to the Construction Manager:

- rolls, or portions thereof, that will be rejected and removed from the Site because they have severe flaws; and
- rolls that include minor repairable flaws that do not compromise geotextile functionality.

The CQA Consultant will also monitor that equipment used to handle the geotextiles on-site is adequate and does not pose any risk of damage to the geotextiles during handling.

8.3 MQC and CQA Testing

8.3.1 Geotextile MQC Testing Requirements

The geotextile Manufacturer will perform QC testing on the geotextile materials and rolls that will be used on this Project in accordance with the current versions of the ASTM and other applicable test procedures and at the minimum MQC frequencies as presented in Table 8.1

The CQA Consultant will review the MQC certifications and test results to verify that the Manufacturer's specifications and the requirements of the CCR Permit and the CQA Plan are met.

8.3.2 Geotextile Conformance Testing Requirements

The CQA Consultant will coordinate, and the CQA Geosynthetics Laboratory will perform, geotextile conformance testing to evaluate the conformance of the geotextile with the requirements of the CCR Permit and the CQA Plan. The testing will be performed in accordance with the current versions of the ASTM and other applicable test procedures and at the minimum frequencies indicated in Table 8.1, corresponding to each geotextile material type that will be used.

The CQA Consultant may conduct additional conformance testing if deemed necessary by the Owner and/or the CQA Certifying Engineer. Such additional testing may only be performed after the CQA Consultant submits, and the Owner approves, a written request the describes the reason(s) for additional testing.

8.3.3 Test Results

The CQA Consultant will review all laboratory conformance test results and verify compliance of the test results with the specifications prior to deployment of the geotextiles. Any non-conformance will be reported to the Contractor and Construction Manager.

8.3.4 Conformance Test Failure

In the case of failing test results, the Contractor may request that another sample from the failing roll be re-tested by the Geosynthetics CQA Laboratory. If the retest fails or if the option to retest is not exercised, then two isolation conformance samples will be obtained by the CQA Consultant. These isolation samples will be taken from rolls that have been determined by correlation with the Manufacturer's roll number to have been manufactured prior to and after the failing roll. This method for choosing isolation rolls for testing will continue until passing tests are achieved. All rolls that fall numerically between the passing roll numbers will be rejected. The CQA Consultant will verify that the Contractor has replaced all rejected rolls. The CQA Consultant will document all actions taken in conjunction with geotextile conformance failures.

8.4 Placement

The CQA Consultant will monitor the placement of all geotextiles to verify that they are not damaged in any way, and the following requirements of the Design Documents are met:

- on slopes, the geotextiles are securely anchored in the anchor trench and then deployed down the slope in such a manner as to continually keep the geotextile in tension;
- in the presence of wind, all geotextiles are weighted with sandbags or equivalent. Such sandbags are installed during placement and will remain until replaced with earth cover material;
- trimming of the geotextiles are performed using only an upward cutting hook blade.
- Special care is given to protect other materials from damage which could be caused by the cutting of the geotextiles;
- the Installer is taking necessary precautions to prevent damage to underlying layers during placement of the geotextile;
- during placement of geotextiles, care is given not to entrap stones, excessive dust, or moisture that could generate clogging of drains or filters; and
- a visual examination of the geotextile is carried out over the entire surface, after installation, to verify that no potentially harmful foreign objects, (e.g., stones, sharp objects, small tools, sandbags, etc.) are present.

8.5 Seams and Overlaps

The CQA Consultant will monitor that the following requirements of the Design Documents are met:

- all geotextiles are continuously sewn (i.e., no spot sewing);
- geotextiles are overlapped 6-inches prior to seaming;
- no horizontal seams are constructed on side slopes that are steeper than 10 horizontal to 1 vertical (i.e., seams to be aligned along, not across the slope), except as part of a patch;
- sewing uses polymeric thread with chemical and ultraviolet resistance properties equal to or exceeding those of the geotextile; and
- seams are sewn using a single row Stich Type 401 two-thread chain stitch.

8.6 Repairs

The CQA Consultant will monitor, verify, and document that geotextile repairs are made in accordance with the CCR Permit and that CQA activities are performed as described below.

The CQA Consultant will monitor that any holes or tears in the geotextile are repaired as follows:

- For slopes steeper than 10 horizontal: 1 vertical, a patch made from the same geotextile is double seamed into place (with each seam ¼-inches to ¾-inches apart and no closer than 1-inch from any edge) with a minimum 12-inch overlap. Should any tear exceed 50 percent of the width of the roll, that roll is removed from the slope and replaced.
- For slopes milder than 10 horizontal: 1 vertical, a patch made from the same geotextile is sewn in place with a minimum of 12-inch overlap in all directions away from the repair area.

The CQA Consultant will observe that care is given to remove any soil or other material which may have penetrated the torn geotextile, and all repairs and verify that any non-conformance with the above requirements is corrected.

8.7 Placement of Soils or Granular Materials

The CQA Consultant will monitor, verify, and document that placement of soils or granular materials on top of geotextiles is conducted in accordance with the CCR Permit and that CQA activities are performed as described below.

The CQA Consultant will monitor that the Contractor's placement of soil or granular materials on top of the geotextile is in conformance with the Design Documents, including:

- that no damage occurs to the geotextile;
- that no shifting of the geotextile from its intended position occurs and underlying materials are not exposed or damaged;
- that excess tensile stress does not occur in the geotextile;
- that equipment does not drive directly on the geotextile; and
- the Contractor uses only LGP equipment on layers less than 3 feet thick above the geomembrane and geotextile separator or cushion layer.

The CQA Consultant will monitor that covering of the geotextile with overlying layers is completed within 30 days of installation to prevent UV degradation and on side slopes, soil and granular layers are placed over the geotextile from the bottom of the slope upward.

TABLE 8.1

GEOTEXTILE CONFORMANCE TESTING REQUIREMENTS[(1)]

TEST NAME	TEST METHOD	MINIMUM TESTING FREQUENCY
Mass per Unit Area	ASTM D5261	1 test per 500,000 ft^2
Grab Strength	ASTM D4632 [(2)]	1 test per 500,000 ft^2
Trapezoidal Tear Strength	ASTM D4533 [(3)]	1 test per 500,000 ft^2
CBR Puncture Resistance	ASTM D6241	1 test per 500,000 ft^2

Notes:

1. Geotextile conformance test results will meet material properties specified in Table 8.2. & 8.3
2. Minimum of values measured in machine and cross machine directions with 1-inch clamp on Constant Rate of Extension (CRE) machine.
3. Minimum value measured in machine and cross machine direction.
4. At least one test will be performed for each lot. A lot is defined by ASTM D4354.

TABLE 8.2
NON-WOVEN GEOTEXTILE MANUFACTURER QUALITY CONTROL REQUIREMENTS -FILTER

Property	ASTM Test Method	Units	Values	
			6 oz.	8 oz.
Apparent Opening Size	D 4751	in.	0.024	0.024
Permittivity	D 4491	sec^{-1}	0.02	0.02
Mass per Unit Area	D 5261	oz/yd^2	6	8
Trapezoidal Tear Strength	D 4533	lbs	60	90
Grab Tensile Strength	D 4632	lbs	160	220
CBR Puncture Strength	D 6241	lbs	320	440
Ultraviolet Stability(2)	D 4355	% retained	70	70

(1) All values are MARV except AOS which is a maximum average roll value (MaxARV) and UV resistance; it is a minimum value
(2) Evaluation to be on 2.0 inch strip tensile specimens after 500 hours exposure.

TABLE 8.3
NON-WOVEN GEOTEXTILE MANUFACTURER QUALITY CONTROL REQUIREMENTS CUSHION

Property	ASTM Test Method	Units	Values		
			10 oz.	12 oz.	16 oz.
Mass per Unit Area	D 5261	oz/yd^2	10	12	16
Grab Tensile Strength	D 4632	lb	230	300	370
Grab Tensile Elongation	D 4632	%	50	50	50
Trapezoidal Tear Strength	D 4533	lb	95	115	145
CBR Puncture Strength	D 6241	lb	700	800	900
CBR Puncture Elongation	D 6241	in.	1.5	1.5	1.5
Ultraviolet Resistance (2)	D 4355	%	70	70	70

(1) All values are MARV except UV resistance; it is a minimum value.
(2) Evaluation to be on 2.0 inch strip tensile specimens after 500 hours exposure.

9. HDPE PIPES AND FITTINGS

9.1 Introduction

The CQA Consultant will review the MQC documentation and will monitor the installation of HDPE pipes and fittings for surface water applications as required by the Design Documents and this CQA Plan.

9.2 Butt-Fusion Welding Process

The CQA Consultant will monitor the assembling of lengths of HDPE pipe into suitable installation lengths by the butt-fusion welding process. Butt-fusion welding is the butt-joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure. The CQA Consultant will monitor that butt-fusion welding of the HDPE pipes and fittings is performed by the Contractor in accordance with the Design Documents and Pipe Manufacturer's recommendations as to equipment and technique.

9.3 Transportation, Handling, and Storage

The CQA Consultant will monitor:

- the off-loading of the pipes to verify that handling is done in a competent manner and that the pipes are not placed in areas where water can accumulate;
- the pipes are not stacked more than three layers high or in such a manner that could cause damage to the pipe; and
- for outdoor storage periods longer than Manufacturer's recommendations or 12 months (whichever is less), a temporary covering is placed over the pipes, or they are moved to within an enclosed facility.

9.4 Installation

The CQA Consultant will monitor that pipes are installed in accordance with the Design Documents, including:

- care is given during installation of the pipes such that they are not be cut, kinked, or otherwise damaged;
- ropes, fabric, or rubber-protected slings and straps are used by the Contractor when installing pipes; chains, cables, or hooks inserted into the pipe are not used for this purpose;
- the Contractor installs the pipes and fittings in such a manner that the materials are not damaged;
- slings for handling the pipe are not positioned at butt-fused joints of HDPE pipes;
- sections of the pipes with deep cuts and/or gouges are removed and the ends of the pipeline re-joined; and
- care is exercised when lowering pipe into the trench to prevent damage or twisting of the pipe.

9.5 Testing

The CQA Consultant will perform the testing of all pipes as required by the Design Documents and this CQA Plan.

10. ROAD CONSTRUCTION

10.1 Introduction

The CQA Consultant will monitor construction of the roads and will confirm that materials used in the construction of roads are in compliance with the Design Documents and this CQA Plan.

10.2 Subgrade Preparation

The CQA Consultant will monitor that road subgrade is prepared in accordance with requirements in the Design Documents and the Earthwork Section of the CQA Plan.

10.3 Geotextile Separator

The CQA Consultant will review the relevant geotextile submittal(s) to confirm that the specified geotextile properties are met and will monitor that the geotextile separator is installed in accordance with requirements of the Construction Documents and Geotextile Section of this CQA Plan. The CQA Consultant will provide CQA relative to the geotextile separator layer in accordance with the Geotextile Section of the CQA Plan.

10.4 Base Aggregate Layer

The CQA Consultant will monitor the base aggregate to verify it is constructed to the thickness, grades, and limits shown on Design Documents. The CQA Consultant will confirm that base aggregate material is certified by the supplier to meet the requirements of the material type shown on Design Documents. A test strip including the entire road section (i.e., fill material, if needed, and base aggregate) will be prepared in the field for review by the design engineer to determine the requirements for placement, compaction, and moisture conditioning of base aggregates. The CQA Consultant will monitor the construction of the test strip and assist the Contractor with evaluating placement methods. The CQA Consultant will document and monitor road construction to verify that materials are placed in accordance with placement methods recommended during test strip construction.

10.5 Repairs

If a defective area is discovered during construction, the CQA Consultant will evaluate the extent and nature of the defect. After this evaluation, the CQA Consultant will observe that the Contractor corrects the deficiency to the satisfaction of the Construction Manager and does not perform additional work in the area until the Construction Manager approves the correction of the defect. In the event of

damage, the CQA Consultant will observe the repairs and replacements made by the Contractor, as necessary, to the satisfaction of the Construction Manager.

11. GENERAL SITE WORK

11.1 Introduction

The CQA Consultant will monitor the activities that are to be performed for various general site work items including, but not limited to installation of riprap, erosion and sediment control measures, culverts, outfall weirs, pipes, vegetative cover, topsoil, and vegetation for compliance with the Design Documents.

In addition, the CQA Consultant will verify that materials are in accordance with the Design Documents and are installed in accordance with Manufacturer's recommendations.

11.2 Conformance

Conformance of materials and construction techniques to verify compliance with the Design Documents will be performed by the CQC Engineer/technician. If non-conformances or other deficiencies are found by the CQC Engineer/technician in the materials or completed work, they will be reported to the Contractor and Construction Site Manager. The CQC Engineer/technician will observe the repairs or replacements of any non-compliant items.

12. CERTIFICATION

The CQA Consultant will provide written certification that the final cover, access roads, ditches, and other associated ancillary facilities for the Plant Yates AMA closures were constructed according to the approved closure drawings, technical specifications, and this CQA Plan. Said certification will have the CQA Consultant's seal as a professional engineer registered in the State of Georgia in accordance with the Georgia Environmental Protection Division's State CCR Rule 391-3-4-.10.

Georgia Power, as required by EPD, will submit confirmation that a notation on the property deed, inclusive of the final consolidated waste boundary, has been recorded in accordance with State CCR Rule 391-3-4-.10(7)(f).

"Based on the field observation of the capping project and on the results of quality control/quality assurance procedures implemented and described in this report, it is my professional opinion that the (partial) final cover system described in this report, including the subgrade, bridging layer, geomembrane, drainage layer and overlying protective cover/erosion control layer, surface storm water drainage system components and vegetative cover, was constructed in conformance with EPD Rule 391-3-4-.10(7)(b) [and by reference 40CRF 257.102(d) for Closure performance standard when leaving CCR in place]. This certification is made to fulfill the requirements of EPD Rule 391-4-.10 (7)(c) [by reference 40CFR 257.102(f)(3) – Completion of Closure Activities per written Closure Plan] for the CCR removal requirements of the Written Closure Plan."