PART 115 CONSTRUCTION PERMIT APPLICATION

MATLIN ROAD LANDFILL VERTICAL EXPANSION OPERATIONS PLAN

Regulated Resource Recovery, Inc.
Ash Township
Monroe County, Michigan

May 2025
NTH Project No. 23001760

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OPERATIONS PLAN

This Operations Plan has been prepared for Matlin Road Landfill (MRL), located in Ash Township, Monroe County, Michigan and owned/operated by Regulated Resource Recovery, Inc (RRR). The purpose of this plan is to address the requirements of Rule R299.4911(2) of the Administrative Rules for Part 115 of PA 451, The Natural Resources and Environmental Protection Act (Part 115). MRL is a Type III construction and demolition (C&D) waste landfill.

1.0 EQUIPMENT

Typical heavy equipment used for landfill operation and construction include compactors, front-end loader, and bulldozers. Currently, MRL has the following landfill operational equipment on-site for daily operations:

- Cat® 309D water truck
- Cat® 826C landfill compactor
- Cat® 963 track loader
- Cat® D6K and 936B bulldozers
- Komatsu 240, 270 and 300 excavators
- Komatsu 25-ton haul truck
- Cat® CP-563C sheepsfoot compactor
- Bobcat skid steer with sweeper broom
- Various generators, pumps and small tools

The actual type, size and number of equipment which will be used at any given time may change depending on waste types and volumes received, weather conditions and landfill phased development. The facility will provide adequate equipment to operate and construct the landfill. Backup equipment will be available on-site or arrangements will be made to provide such equipment from other sources for use during equipment breakdown or during peak waste receipt periods, as required.

2.0 PERSONNEL

The landfill will be operated under the authority of a Facility Manager. Other typical personnel may include the following: laborer, clerk, equipment operator, and mechanic. Landfill personnel staffing is dependent upon waste volumes as well as site and weather conditions. RRR will provide an adequate number and type of personnel to operate the facility in compliance with applicable regulations.

The duties and authority of landfill personnel are as follows:

Facility Manager: Ensure landfill operations are conducted in accordance with applicable regulations, maintain an adequate number of operating personnel and equipment on-site at all times, and ensure that landfill personnel receive the level of training commensurate with their duties and responsibilities. The Facility Manager is responsible for the immediate direction of landfill operations.

Equipment Operators: Operate equipment in a safe manner which minimizes hazards to human health and safety as well as damage to landfill components; perform duties outlined in the facility waste inspection procedure, specifically perform visual observations of waste during unloading procedures for the purpose of identifying potential regulated hazardous wastes and PCB wastes and other prohibited wastes that may be present within the incoming waste loads. Equipment Operators will be supervised by the Facility Manager.

Clerical: Process customer invoices and billing, and other clerical functions such as weigh master, customer service, etc. Clerical staff will report to the General Manager.

Laborers: Litter removal and other duties as assigned. Laborers will report to the Facility Manager.

3.0 TRAINING

Training will be provided for all landfill employees. This training will consist of instruction in the following items, consistent with employee duties and responsibilities:

A. Facility site plan and basic responsibilities,

B. Solid wastes regulation requirements which pertain to landfill operations;

C. Facility environmental permits and licenses; and

D. Procedures for excluding prohibited wastes.

Employees will be trained when initially assigned to a position or to new duties and responsibilities, which require additional training beyond that previously provided. Refresher training will be provided on a yearly basis. Training regarding new regulatory requirements will be implemented as needed.

4.0 USAGE RULES

MRL is a Type III C&D landfill, licensed according to the Part 115 solid waste rules. The majority of waste that will be received by the facility will consist of construction and demolition waste. No special wastes, including industrial waste or sludge(s), will be accepted. MRL does not accept Regulated Asbestos Containing Material (RACM). Any non-regulated material is managed as construction and demolition debris.

Every effort is made to prevent any waste not meeting the requirements of a Type III C&D landfill from entering the facility. Wastes that will not be accepted include regulated hazardous materials/wastes, industrial, municipal, medical waste, beverage containers, tires, yard clippings, batteries, oil, antifreeze, paints, thinners (liquid wastes), low level radioactive waste, sewage, PCB's and empty drums. Additionally, waste loads that have not been properly prepared for disposal or are deemed questionable will not be received.

Certain physical access controls will be constructed, including signage, barriers, and traffic control. Waste will be categorized prior to shipment to the landfill and inspected during the unloading process. Unacceptable waste will be reloaded into a truck and shipped off-site for proposal disposal. Refer to Section 14.0 of this Plan for waste receipt and acceptance procedures.

5.0 ACCESS CONTROL

Unauthorized access and disposal at the facility will be controlled through a combination of signage, barriers, traffic controls and usage rules. All waste delivery vehicles will enter and exit the facility through the designated entrance.

A sign at the facility entrance displays the facility name, facility type, and the days and hours of operation. The facility will provide additional signage on the site to direct traffic to the disposal area and notify drivers of speed limits as needed. An additional on-site sign is provided which outlines the facility usage rules, including waste types acceptable for disposal at the facility, waste types prohibited from disposal at the facility and other information deemed by facility management. The facility may also post warning signs around the site perimeter prohibiting unauthorized entry.

The hours of operation will be 6:30 a.m. to 6:00 p.m. Hours will be amended, as needed, to accommodate waste flows into the facility. During periods of construction, the hours of equipment operations may vary due to weather, seasonal, and scheduling constraints.

Barriers used for control of access include natural vegetation, berms, artificial barriers or fencing that are constructed or maintained in accordance with regulatory requirements. A gate is provided at the facility entrance, which will be locked during non-operating hours. If other gates are installed around the site, they will be locked when not in use.

Traffic control on-site will be maintained through the use of signage, barriers or a combination of these methods. Other means may be used if deemed appropriate and necessary by facility management.

6.0 CONVENIENCE STATION

The facility is not open to the public and will not provide a convenience station for the general public or small vehicles to unload C&D refuse at the landfill.

7.0 NUISANCE CONTROL METHODS

Control methods will be used for dust, blowing papers and wind dispersal of particulate matter, odor, fire, disease vectors, pest animals and noise. The specific methods to be employed for each of these nuisance conditions are discussed below. A recommended isolation distance, based on the impacts of each nuisance condition and the control methods outlined, is provided at the end of this section.

A. Dust Control

Dust at the active fill area will be controlled by the application of water. Dust from areas that are closed or under interim cover will be controlled through the application of water, if possible.

Dust originating from on-site roads will be controlled through the application of water on the roads or sweeping. Road sweeping will be disposed of in the landfill.

Dust from construction activities will be controlled by the methods outlined above. The construction contracting company will be required to provide dust control measures.

B. Blowing Refuse and Wind Dispersal of Particulate Matter

Blowing litter and wind dispersal of particulate matter from the landfill may be controlled by several methods. These include any of, but not limited to, the following methods: application of an approved cover material, use of fencing, and hand picking.

Operations during high wind events which have the potential to significantly increase blowing litter and wind dispersal of particulate matter situations may be addressed in several ways: move operations to a lower or shielded elevation if possible; continuously apply cover in such a way as to minimize the exposed active face; and/or installation or wind shield fencing.

C. Odor

Odor controls will be implemented if necessary; however, given the nature of C&D waste disposed at MRL, odors are not anticipated. If required, control measures will consist of immediately covering odorous refuse with additional refuse or approved cover material which would provide a barrier over the odorous refuse, or the application of odor masking agents or neutralizers. Alternatively, the facility may refuse to accept certain refuse, which has a high odor potential.

D. Fire

Fire extinguishers will be provided in facility buildings and heavy equipment as well as other appropriate areas of the site. Facility personnel will observe incoming waste loads for smoke, heat or other indications of potential fire. The facility may refuse to accept loads for disposal if the load displays fire potential or may take appropriate action to segregate and extinguish materials, which have been unloaded.

E. Disease Vectors and Pest Animals

Diseases originating from refuse material generally are associated with putrescible waste. The waste types accepted for disposal at a Type III facility do not contain putrescible waste. If disease vectors do materialize, they can be controlled through the application of approved cover materials. The facility will apply cover in accordance with regulatory requirements and, if required, more frequently to minimize disease vectors.

Pest animals are attracted to types of waste, which can serve as a food source. The waste types accepted for disposal at a Type III facility do not contain waste which typically serves as a food source. If necessary, the facility will control this type of nuisance by applying cover in accordance with regulatory requirements and, if required, more frequently to minimize the occurrence of pest animals. Additional control methods for birds include cannons or other noise making devices and bird distress calls to alarm birds or the installation of overhead wires to disrupt bird flight patterns.

F. Noise and Equipment Vibration

The operation of the facility will not result in noise levels exceeding the standards for specified adjacent land uses cited in Administrative Rule R 299.4305 (5) of Part 115 of Act 451. The area surrounding the landfill is composed of agricultural lands and several residences, which are located over 900 feet from the active work area. Studies performed by the Caterpillar Equipment Company (CAT) on various types of heavy equipment confirm that the noise level will be below the levels

designated for surrounding land uses cited in Rule 305. At its discretion MRL will test for noise being generated. Based on these studies, noise level exceedances will not be experienced at adjacent properties based on the criteria for surrounding land uses and the typical noise rating for heavy equipment and therefore, no noise abatement measures are required. However, the facility presently provides a natural buffer area around that site which will further attenuate noise impacts.

Landfill equipment vibration is not anticipated to be a nuisance condition associated with facility operation due to the absorbing capacity of the waste and soils and the distance of equipment operation to adjacent land uses.

G. Recommended Isolation Distance

The existing MRL will operate within the same horizontal footprint it has operated within since 1981. Isolation distances to residences, existing water wells, surface water bodies, wetlands, and other sensitive receptors will not change as a result of the vertical expansion of the MRL.

8.0 DISPOSAL OF LARGE BULKY ITEMS

Disposal of large and bulky items will be handled in a manner, which minimizes the potential for damage to the disposal area liner and leachate collection/removal systems. Large and bulky items will not be placed within the initial five feet of refuse placed above the drainage sand of liner within a disposal area.

9.0 ON-SITE ROADS

On-site roads will consist of the site entrance road and interior haul road(s). The roads will be designed, constructed and maintained to accommodate expected traffic loading and geometric requirements as well as provide access in all weather conditions as required by particular site activities.

The entrance roadway has been paved with asphalt.

Interior haul roads will be located within the landfill, which allows access to the active work area and as required by other landfill operations. The location of the interior haul roads will change with the phasing of filling operations and site activities. The haul roads may be constructed of demolition material and gravel or other suitable materials.

Fugitive dust emissions generated from on-site roads will be appropriately controlled through the methods outlined in Section 7.0.

10.0 PROCEDURES FOR SEPARATING RECYCLABLES

When debris and material are emptied from trucks in the landfill, a visual inspection of the material is performed by landfill personnel, and recyclable materials are identified for separation. The most common material for recycling that is identified is scrap metal (ferrous and non-ferrous). Landfill machinery is then used to remove the recyclable materials. These materials are stored in stockpiles in the vicinity of the working face then transferred into containers or trucks for shipment to the appropriate recycling facilities. Records are maintained to document the material that was recycled (i.e., tons or cubic yards recovered) and the facility where the material was shipped.

11.0 SALVAGING

Salvaging at the facility will not be allowed as per MRL policy.

12.0 STORAGE OF WHITE GOODS AND OTHER RECYCLABLES

MRL does not handle or store white goods or recyclable materials on this site.

13.0 REFUSE COVER MATERIALS

The facility will apply approved cover material over the refuse in accordance with regulatory requirements of Rule 316 on a weekly basis, consistent with currently-approved variance provided by in the facility's Operating License. This cover material will consist of clean soil or other alternate materials, which have been approved for use by the regulatory agency.

Clean cover soil will be provided from on-site sources. Required quantities of soil will be dependent on waste volumes, use of alternative cover materials and requirements for frequency of application. Soil will be placed over refuse cover with heavy equipment and spread to the minimum thickness required by regulation.

Alternate Cover materials (AC) may be approved for use at the facility by the authorized regulatory agency. The types of materials, which may be approved by the regulatory agency for use as an AC, include geotextiles, spray-on materials, shredded tires, foundry sand, wood chips, ground compost, certain waste materials and other applicable materials. The material types, source and quantity of ACs used will be dependent on regulatory approval and waste volumes. The method of AC application is dependent on the material type, but typically involves some use of heavy equipment. The facility will apply ACs over refuse in accordance with regulatory requirements.

14.0 PROCEDURES FOR SOLID WASTE RECEIPT AND UNLOADING

All waste inspection occurs during unloading by the operator and facility manager. Vehicles delivering waste to the landfill that are from an unknown source will be required to stop and provide required documents to facility personnel prior to unloading of waste. Facility personnel will review the documents for a description of the refuse load material and required processing. All waste loads will be subject to random load inspections, which may be conducted at the entrance or at the active work area. Load checking activities will be documented on a "Load Checking Log" similar to the example form provided as Appendix A to this Plan.

The vehicle will be directed by landfill personnel to the appropriate disposal area for unloading and exit the facility after unloading. Unloaded refuse will be spread and compacted with appropriate equipment in lift thickness not exceeding 2.0 feet in accordance with Rule 315(6).

Facility personnel will keep records of waste manifests and receipts to record the amount of waste disposed and comply with regulatory agency reporting requirements, as required.

15.0 LEACHATE MANAGEMENT SYSTEMS

Leachate from Existing Cell 3N/4N and 4S/5S is collect via leachate collection pipes that penetrate the perimeter berm and outfall to vertical collection manholes. Cell 5N leachate will be pumped up a vertical side slope riser. Leachate from Proposed cells V1 to V3 of the vertical expansion will be pumped up vertical side slope risers and collected into two 10,000-gallon leachate holding tanks located within the solid waste boundary. Currently (and proposed to continue) leachate is recirculated within the active landfill disposal area and/or pumped and hauled for proper disposal. The pumps will have automatic controls or other means to activate and deactivate the pumps so that liquid levels in the sump are maintained at or below regulatory required levels.

During final operations of the landfill and near closure, a permanent, leachate holding and loadout facility, with dual-containment will be constructed in the northeast corner of MRL property. Leachate will be transported from the sumps via a dual-contained forcemain pipe and pumped directly to the leachate loadout facility. The tanks will be emptied and the leachate will be transported via tanker trucks to an approved facility for treatment.

Consistent with the existing landfill license, the facility intends to continue leachate recirculation. Surface (working face) application will be used for leachate recirculation. The leachate recirculation will be conducted according to the Leachate Recirculation Plan, currently licensed and in use at the facility. During recirculation, soil berms may be built at top of waste slopes to prevent surface runoff. In addition, leachate should not be applied to any area within 100 feet from the edge of waste slope. Furthermore, leachate should not be recirculated during any rain or high wind event.

The leachate collection piping system will be cleaned periodically to prevent clogging due to construction or operations. This should be done by "jetting" at least every five years. Obstructions in the pipe system may require the use of specialized retrieval equipment used in well installation or by excavating to the obstruction. The pumps in the manholes and risers will be inspected for proper operation. Adjustments and calibration will be made to the pumping system as required.

16.0 WASTE PLACEMENT

Dumping of waste onto or down the sideslope liner of any cell will not be allowed.

Waste will not be placed in lifts exceeding 2.0 feet.

No more than 30 feet of any sideslope liner, measured vertically, will be covered by leachate collection sand in advance of waste placement.

Waste slopes during filling will not exceed the requirements stipulated in the facility Basis of Design Report.

17.0 RUN-ON AND RUNOFF CONTROL SYSTEM

MRL is constructed with a perimeter dike system. This perimeter dike serves as a run-on control system to prevent stormwater flow onto the active portion of the landfill. The top of dike slopes outward such that the precipitation is directed away from landfill cells.

In the active work area, waste will be placed in a manner that a ditch is formed between the perimeter dike and the waste to catch the runoff from the waste surface and prevent runoff from the active portion of the landfill that does not receive interim cover. The ditch will direct the runoff to the leachate collection sump through the leachate collection system.

Erosion control measures and stormwater diversion berms within the waste area will be implemented as necessary to prevent erosion and excessive stormwater rutting for any areas of interim cover. Interim cover, consisting of at least 1 foot of compacted material (which may include at least 6 inches of cover) will be placed and vegetated if more than 3 months passes for any subsequent waste lifts in an area per Rule 316(2).

18.0 LANDSCAPING PLAN

Natural vegetation will be preserved to serve as natural screening, consistent with the current site layout and MRL operations.

19.0 GAS MANAGEMENT SYSTEM

Because the landfill is a Type III C&D Waste landfill, and the nature of the proposed final cover system, landfill gas generation is not anticipated to require a landfill gas management system.

APPENDIX A

- LOAD CHECKING LOG

LOAD CHECKING LOG

FACILITY NAME: _____ MONTH: _____ YEAR: _____

DATE	TIME	COMPANY NAME	DRIVERS NAME DRIVER SIGNATURE	LICENSE PLATE #	SOURCE OF WASTE	NO EVIDENCE OF HAZARDOUS WASTE OR PCB WASTE	NO EVIDENCE OF PROHIBITED WASTE	SIGNATURE OF INSPECTOR

PART 115 CONSTRUCTION PERMIT APPLICATION

MATLIN ROAD LANDFILL VERTICAL EXPANSION CONSTRUCTION QUALITY ASSURANCE PLAN

Regulated Resource Recovery, Inc.
Ash Township
Monroe County, Michigan

July 31, 2018
Revised May 2025
NTH Project No. 23001760

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FOREWARD

This Construction Quality Assurance Plan (CQA Plan) has been prepared for Matlin Road Landfill in accordance with Rule 916 of the administrative rules promulgated under the provisions of Part 115 of the Michigan Environmental Protection Act, Act 451, Public Acts of 1994, as amended (Part 115) to provide a quality assurance plan for construction of the liner system, the leachate collection system, and the final cover system. This document is to be used in conjunction with the engineering plans and reports incorporated in the facility construction permit application and associated with construction of existing Cells 4 South, 5 South, and 5 North as well as construction for the vertical expansion. We note some sections of this plan describe features not part of the currently planned construction, but specifications are included in case required as a result of changes made or conditions encountered during construction that may necessitate their use (e.g., geomembrane, geotextiles, and leachate collection system components).

1.0 AREAS OF RESPONSIBILITY

This section contains a general description of the responsibilities of various parties to be involved in construction of the landfill.

1.1 FACILITY OWNER/OPERATOR (OWNER)

The facility is owned and operated by Regulated Resource Recovery, Inc. (RRR). All contractors and subcontractors are directly responsible to RRR, employing all organizations that will be performing work on this project.

1.2 CERTIFYING ENGINEER (CE)

The Certifying Engineer (CE) shall be a Professional Engineer registered in the State of Michigan with experience in civil engineering and construction projects. The CE shall be a qualified, professional consultant.

The CE shall provide all coordination of documentation submitted in support of this plan, including surveying. The CE is responsible for the implementation of the CQA Plan and certifying that the facility has been constructed in substantial conformance with the approved plans and Michigan Department of Environment, Great Lakes, and Energy (EGLE) Standards, Rules, Regulations, and Requirements.

1.3 CONSTRUCTION QUALITY ASSURANCE CONSULTANT (CQAC)

The Construction Quality Assurance Consultant (CQAC) will be responsible for construction monitoring to observe compliance with engineering drawings and this plan. Specific duties of the CQAC include: observation of construction materials, documentation of construction conditions, performance of testing in accordance with the project documents, documenting that construction is performed in substantial conformance with the engineering plans and the CQA Plan at the locations observed, preparation of record construction documents, and the preparation of a report that documents the observations and testing associated with construction.

The Construction Quality Assurance Manager (CQA Manager) will be the CQAC's official on-site representative. The CQA Manager will provide direction to the CQAC staff (CQA Monitors) performing the construction monitoring activities. The CQA Manager will prepare a Construction Documentation Report as described in Section 3.4, in conjunction with the CE, to form the basis for certification.

1.4 DESIGN ENGINEER (DE)

The Design Engineer is the company hired to furnish the construction level design, drawings, and plans for the landfill facility. The DE may be the same entity as the CQAC.

1.5 GEOTECHNICAL DESIGN ENGINEER (GDE)

The geotechnical design engineer is the company hired to furnish the geotechnical services related to the design, permitting, and construction of the landfill. The GDE may be the same entity as the DE.

1.6 GEOSYNTHETIC MANUFACTURER (MANUFACTURER)

The Geosynthetic Manufacturer refers to those companies that will furnish the geosynthetic components referenced in this CQA Plan. The term "Manufacturer" is used throughout this plan to indicate the companies supplying these materials to the job site.

1.7 GEOSYNTHETIC INSTALLER (INSTALLER)

The Installer is responsible for transportation, field handling, storing, deploying, seaming, temporary restraining (against wind), and all operations related to installation of geosynthetic components. The Installer will conduct construction quality assurance testing with respect to in-place seam integrity testing. The Installer will provide documentation of the seam installation and material testing. The Installer will also supply material quality control test results supplied by the manufacturer of the geosynthetic components to the Owner and CE.

1.8 TESTING LABORATORY

The Testing Laboratory is the independent laboratory performing the required quality assurance testing as indicated in the plan. The term "Testing Laboratory" is used to denote the official representative of that laboratory throughout this manual. The testing laboratory may be the same entity as the CQAC.

1.9 EARTH MOVING CONTRACTOR (EMC)

The Earth Moving Contractor is the company responsible for furnishing earthwork construction needed to complete the construction of the facility. The Owner may be the Earth Moving Contractor.

1.10 LAND SURVEYOR (RLS)

The RLS will provide equipment and personnel needed to perform surveying activities specified in this document. The RLS may be the same entity as the CQAC or another qualified entity as agreed to by the CQAC and the Owner.

2.0 LINES OF AUTHORITY

RRR is the facility owner and operator, and has ultimate responsibility for operation of the facility during construction, operation, and closure. RRR shall have final authority with respect to all phases of construction associated with this project. Each company shall be responsible for the supervision of their employees and the implementation of their own Quality Assurance/Quality Control (QA/QC) programs.

3.0 DOCUMENTATION REQUIREMENTS

3.1 DAILY CONSTRUCTION REPORTS

The CQA Monitor will complete a daily summary report for each day's construction activities. Each construction report will contain, at a minimum, the following information:

1. Date, project name, location, and report preparer's name; the number and name of people on site under the direction of the preparer for conducting CQA tasks; the name and title of the construction supervisor.

2. Start-up and end times of daily construction activities. This information should also include any work stoppages due to inclement weather or insufficient equipment or personnel.

3. If work is not conducted on any day, it must be noted on the next day's daily report. All working days must be accounted for in the daily reports.

4. Information on weather conditions including maximum and minimum temperatures, and precipitation notations, if any.

5. Contractor's or Installer's work force, equipment in use, and materials delivered to or removed from the job site.

6. Chronological description of work in progress including any notices to or requests from the Contractor and/or Installer.

7. Results or a clear reference to where the results can be found, for testing performed on site by personnel under the direction of the preparer.

8. Problem/deficiency identification and corrective action taken to document field problems and non-conforming materials or work.

9. Laboratory samples collected, marked, and sent to the outside testing laboratories will be clearly indicated by direct inclusion or by reference to the document containing such information.

Likewise, reference should be included for any test data submitted by any outside testing laboratories.

10. A record of communications with other CQA Plan parties, or any other outside companies, regulatory agencies, or consultants regarding the day's construction activities.

11. A record of calibrations or standardization performed on field testing equipment, including actions taken as a result of recalibrations.

3.2 FORMS, CHECKLISTS, AND DATA SHEETS

It is the responsibility of the CQA Monitor to prepare, in advance, any forms, checklists, and/or data sheets that will allow for a more expedient handling of data communications, and routine observations.

3.3 PROBLEM/DEFICIENCY IDENTIFICATION AND CORRECTIVE ACTION

Problem and/or deficiency identification and corrective action will be documented in the Daily Landfill Construction Field Reports (DLCFR) by the CQA Monitor(s) when any construction material or activity is observed or tested that does not meet the requirements set forth in this plan. The documentation reports should be cross-referenced to the forms, data sheets, checklists, and other reports that contain data or observations leading to the determination of a problem or deficiency. Problem/deficiency identification and corrective action documentation shall include the following information as a minimum:

1. A detailed description of the problem or deficiency, including reference to any supplemental data or observations responsible for determining the problem or deficiency.

2. Location of the problem or deficiency, including how and when the problem or deficiency was discovered. In addition, the documentation should include an estimate of how long the problem or deficiency has existed.

3. An opinion as to the probable cause of the problem or deficiency.

4. A recommended corrective action for resolving the problem of deficiency. If the corrective action has already been implemented, the observations and documentation to show that the problem or deficiency has been resolved should be included. If the problem or deficiency has not been resolved or corrected by the end of the day upon which it was discovered, the problem will be documented in a Problem/Deficiency and Corrective Action Form for further follow up. The form will include description of the problem and date of identification. After correcting the problem, the corrective action and date of implementation will be documented on the form and on the daily report of the day of implementation.

If the problem or deficiency has not been resolved, then the CE and the CQAC will discuss the necessary corrective actions to resolve the problem or deficiency in a timely manner.

The CE will determine if the problem or deficiency is an identification of a situation that might require changes to the plans and/or the CQA Plan. If this situation develops, then a meeting will be

held with the appropriate people on site, including the DE and the GDE, to determine if revisions to the plans or specifications should be made. Any revisions to the plans, specifications, or the CQA Plan must be approved by the EGLE Office of Waste Management and Radiological Protection (MMD), Jackson District Office.

3.4 CONSTRUCTION DOCUMENTATION REPORT

A Construction Documentation Report will be assembled by the CQAC under the direction of the CE for the entire construction project by combining the data and daily reports generated by the CQA Monitor(s). The Construction Documentation Report shall include all information required by Rule 299.4921 of the Part 115 rules.

At a minimum, the Construction Documentation Report will contain the following information:

1. Record plans to document all elevations of a newly constructed landfill or closed landfill. All elevations shall be referenced to United States Geologic Survey Datum. Record plans shall indicate all of the following information: (1) Dimensions and maximum and minimum elevation of each cell in each direction. Elevations shall be within 0.2 foot of approved plans, if each component meets the minimum thickness requirements; (2) the location and elevation of all sumps and gravity pipelines. Elevations shall be within 0.2 foot of approved plans; (3) the location and elevations of all drainage facilities; and (4) the surface elevation of a final cover. The final cover shall not deviate more than 1 foot from the latest, approved engineering plans.

2. Written correspondence with the EGLE.

3. Summary of field observations and tests performed, laboratory samples collected, and test results reported by the testing laboratory.

4. Summary of field observations of leachate pump testing.

5. Summary of problems and/or deficiencies encountered during the construction, including any recurring problems or deficiencies that were discovered, as well as documentation of resolutions for problems and deficiencies.

6. Documentation that acceptance criteria were met, including comparison of data with the engineering plans and requirements set forth in this CQA Plan.

7. Certification by the CE that the construction was completed in substantial conformance with the requirements of the engineering plans and this CQA Plan.

4.0 MEETINGS

4.1 PRE-CONSTRUCTION MEETING

Prior to the start of work, a pre-construction meeting shall be held. In this meeting, all involved parties shall review applicable sections of the plans and specifications as well as this CQA Plan. In particular, the parties shall review areas of responsibility, lines of authority and procedures for dealing with problems or rejected work. The CQAC will document each pre-construction meeting.

4.2 GEOSYNTHETICS PRE-CONSTRUCTION MEETING

A pre-construction meeting between the Installer, the CQAC, RRR, as well as any other interested parties, shall be held prior to the start of installation. This meeting will be documented by the CQAC. The purpose of the meeting will be to:

1. Communicate to all parties any relevant documents.
2. Review critical design details of the project.
3. Review the quality assurance plan.
4. Review responsibilities of each party.
5. Review lines of authority and lines of communication.
6. Review methods for documenting, reporting and distributing documents and reports.
7. Establish rules for writing on the geomembrane; i.e., who is authorized to write, what can be written, and in which color.
8. Review panel layout and numbering systems for panels and seams.
9. Review procedures for packing and storing archive samples.
10. Review the Installer's schedule for all operations.
11. Conduct a site walk-through to observe site conditions and establish material storage locations.
12. Review seam testing procedures.
13. Review repair procedures.
14. Review precautions to be taken against clay cracking (surface desiccation).

4.3 PROBLEM RESOLUTION MEETINGS

These meetings will be held on the site, as necessary. At such a meeting, the problem will be defined and discussed by all concerned parties. Possible solutions will be discussed and an acceptable solution will be selected. Implementation procedures of the chosen solution will also be discussed and agreed upon. The CQAC shall document the meeting and distribute minutes, as necessary.

5.0 LANDFILL FOUNDATIONS (As Applicable)

The EMC will perform the following:

1. Excavate overburden soil down to design subgrade elevations.

2. Proof-roll the subgrade with rubber tire equipment.

3. The CQAC shall visually inspect the landfill base and the perimeter sidewalls for anomalous soils.

4. The Owner and the CQAC may order additional excavation where unsuitable soils are encountered.

5. The CQAC will coordinate surveying of base elevations to assure that base elevations are consistent with design grades shown on the construction drawings.

6. The RLS shall establish a 100-foot survey grid across the landfill base, survey points along the perimeter of the landfill, and the sump to verify proper lines and grades in accordance with engineering plans. Final grades shall be within 0.2 foot from design grades.

5.1 STRUCTURAL FILL (AS APPLICABLE)

Structural fill consists of cohesive materials which are used for the purpose of earthfill construction that is placed 2 feet or more below the design subgrade elevation.

5.1.1 Construction Materials

The following requirements apply to structural fill which is placed to bring subgrade for low permeable soil liners up to design grades. The soils used in the construction of the structural fill shall meet the following requirements:

1. Has a classification of SC, CH, CL or ML (or combination) as determined by the Unified Soil Classification System, ASTM D2487.

2. Well graded natural material with maximum particle size less than 6 inches.

3. Has a cohesive strength of 2,000 pounds per square foot.

4. Shall be free of boulders, organics, debris, or other deleterious material.

5.1.2 Placement and Testing

The CQA Monitor shall perform the following:

1. For every 10,000 cubic yards of structural fill material type, or when visual observations indicate that a change has occurred in the borrow soils, obtain a soil sample and perform the following tests:

    a. Moisture-density relationship test using Modified Proctor (ASTM D1557) or Standard Proctor (ASTM D698);

    b. Atterberg Limits (ASTM D4318)

c. Grain Size Analysis by sieve and hydrometer (ASTM D422); and Unified Soil Classification (ASTM D2487).

2. Monitor and document the placement and compaction of the soils used for structural filling.

3. Determine the in-place moisture content and dry density of the structural fill by nuclear methods following ASTM D2922, latest edition. In-place tests shall be performed at a minimum frequency three tests per lift of soil to verify compliance with the compaction requirements.

4. Verify that the structural fill is compacted to at least 90 percent of the maximum dry density determined by Modified Proctor (ASTM D1557) or at least 95 percent of the maximum dry density as determined by the Standard Proctor (ASTM D698).

5. Verify the structural fill achieves a cohesive strength of 2,000 pounds per square foot using a pocket penetrometer or Torvane shear device at every density test location.

6. Prepare daily landfill construction field reports documenting observations and testing results.

The EMC shall perform the following:

1. Proof-roll the subgrade prior to placing the first lift of the structural fill.

2. Place and compact each lift with a maximum thickness of 9 inches after compaction, unless otherwise indicated in the engineering plans.

3. Compact each soil lift thoroughly and uniformly to the required density. Integrate each lift into the previous lift by techniques such as scarifying each lift and by using compaction equipment that is capable of penetrating the thickness of each compacted lift.

4. Protect the fill from detrimental climatic effects during construction by doing all the following:

    a. Remove all ice, snow, and frozen soil during winter construction prior to placing a lift and not using any frozen soil in any part of the compacted earthfill;

    b. Re-compact any soil lift of which its integrity is so adversely affected by weather that it no longer meets the requirements of the CQA Plan, at the discretion of the Owner and CQA Monitor; and

    c. Provide cover to prevent frost penetration during and following placement during winter construction.

5. Remove observed roots, rocks, rubbish, or soils that do not meet specifications.

The Owner will coordinate and direct all contractors/subcontractors during the construction of the structural fill.

Survey the areas of the structural fill as directed by the Owner to determine the thickness of the structural earthfill and verify that the elevations and thickness are consistent with design grades shown on the engineering design plans for the placement of low permeability soil liner material.

6.0 LOW PERMEABILITY SOIL LINERS (LPSL)

6.1 MATERIALS

The soil used in the construction of the low permeability liners shall meet the following requirements:

1. Has a classification of SC, CH, CL or ML (or combination) as determined by the Unified Soil Classification system, ASTM D2487.

2. Has a laboratory hydraulic conductivity that is equal to or less than 1 x 10-7 centimeter per second (cm/s) for the primary liners and final cover infiltration layer within density and moisture content range specified for construction as determined by the laboratory study of the relationship between moisture, density, and hydraulic conductivity described in Section 6.2(1).

6.2 PLACEMENT AND TESTING

The CQA Monitor shall perform the following:

1. Establish a relationship between moisture content, dry density, and hydraulic conductivity by laboratory testing of potential soil borrow prior to placement of that soil. A modified proctor test (ASTM D1557) or a standard proctor test (ASTM D698) shall be performed on a representative sample to determine the moisture-density relationship. The sample shall be tested to determine its classification according to ASTM D2487. Specimens of this sample shall be tested for hydraulic conductivity using the procedures of item (4). The test specimens shall be prepared at appropriate moisture contents and dry densities to establish a range of values which yield hydraulic conductivities (ASTM D5084, as amended by R299.4920) no greater than 1 x 10-7 cm/s for primary liner/ final cover infiltration layer. The compaction requirements for this soil borrow shall be established based upon this range.

2. Monitor the placement and compaction of the soils used in the construction of the LPSL.

3. For every 5,000 cubic yards placed, or when visual observation indicate that change has occurred in the borrow soils, obtain a soil sample and perform the following testing: (1) moisture-density relationship test using the modified Proctor test, ASTM D1557 or the standard proctor test, ASTM D698; (2) Atterberg Limits, ASTM D4318; (3) Grain Size Analysis, ASTM D422; and (4) Unified Soil Classification, ASTM D2487.

4. For every 10,000 cubic yards placed, obtain an undisturbed sample of compacted soil and perform hydraulic conductivity testing using ASTM 5084 as amended by R299.4920 of Act 451, Part 115 Administrative Rules. Any alternative test method shall not be used unless submitted to, and approved by, the EGLE-MMD. Each landfill unit or portion thereof constructed at a given time shall have a minimum of three tests.

5. Determine the in-place moisture content and dry density of the LPSL at least one test per acre and a minimum of three tests per lift of soil to verify compliance with the requirements of item (1) or a minimum of 90 percent of the maximum dry density as determined by the Modified Proctor (ASTM D1557) or 95 percent of the maximum dry density as determined by the Standard Proctor (ASTM D698). The moisture content shall be in compliance with the requirements of item (1) or a minimum of optimum moisture content to 5 percent wet of optimum.

6. Inform the Contractor of a failing test and observe that one of the following remedial actions are performed:

    a. For a failing density test, the Contractor shall recompact the soils until the required density is obtained.

    b. For a failing moisture content test, the Contractor shall disc the non-conforming soils and add water or work soils to dry material and recompact the soils to meet the density and moisture requirements of this sections.

7. Prepare daily landfill construction field reports documenting the observations and testing of the construction.

The EMC shall perform the following:

1. Proof-roll the subgrade surface prior to placing the first lift of the compacted soil liner.

2. Compact each lift thoroughly and uniformly to that density, and at that moisture content, determined necessary to achieve the required hydraulic conductivity as described in 6.2(1) and 6.2(5).

3. Place and compact each lift with a general thickness of 6 inches after compaction.

4. Integrate each lift into the previous lift by techniques such as scarifying each lift and by using compaction equipment that is capable of penetrating the thickness of each compacted lift, except such a compactor shall not be used in the first two lifts immediately above the synthetic liner or other liner system sensitive components, if applicable. The maximum clod size is 4 inches.

5. Protect the compacted soil liner from detrimental climatic effects during construction by doing all of the following:

    a. Remove all ice and snow during winter construction before placing a lift and not using frozen soil in any part of the compacted soil liner.

    b. Re-compact any soil lift that has its integrity so adversely affected by weather that the soil lift is no longer in compliance with the requirements of this plan.

c. Ensure that the compacted soil liner is not subject to desiccation cracking by sprinkling the liner with water or covering the soil. Any soil that has experienced desiccation cracking must be removed and replaced in compliance with this section.

6. Remove observed debris, roots, and any angular or sharp rocks that may damage the geomembrane.

The Owner will perform the following:

1. Coordinate and direct all contractors/subcontractors during the construction of the LPSL.

The RLS shall perform the following:

1. Survey LPSL areas as directed by the CQAC to verify that the LPSL elevations, thickness and slope meet the design requirements.

7.0 SUBGRADE PREPARATION

The CQA Monitor shall perform the following:

1. Inspect the subgrade surface for compliance with the requirement described in this section.

2. Identify areas that need repair and monitor and document the repair operations.

The EMC shall perform the following:

1. Grade the subgrade to a smooth and true line foundation and grade which does not deviate more than 0.2 foot from those shown on engineering plans.

2. Remove organic material, roots, stones or other material that may puncture an overlying liner, if present.

3. Repair desiccated surfaces and soft areas per the direction of the Owner and the CQAC. All backfill soils used to repair anomalous areas in the subgrade surfaces shall meet the applicable requirements of Section 5.0 or 6.0.

4. Protect the subgrade from damage due to desiccation, flooding, and freezing.

The Owner will perform the following:

1. Coordinate and direct all contractors/subcontractors during subgrade surface preparation.

2. Inspect the subgrade surface for compliance with the requirement described in this section.

8.0 GEOMEMBRANE (As Applicable)

8.1 MATERIALS

1. The polymer used in the geomembrane shall meet the requirements of GRI Test Method GM13.

2. The geomembrane manufacturer shall provide a quality control certificate for each roll of geomembrane to be delivered.

The CQA Manager shall perform the following:

1. Review the resin submittals provided by the manufacturer to verify compliance with the requirements described in Section 8.1. Shipment of the geomembrane to the site should remain contingent upon a satisfactory review of this submitted information.

8.2 DELIVERY AND STORAGE

The Installer shall perform the following:

1. Assure that geomembrane rolls or panels are packaged, shipped, off-loaded, and stored by appropriate means such that the rolls are not damaged.

2. Separate all damaged rolls from undamaged rolls and store at locations designated by Owner until proper disposition of material is determined by the Owner.

3. Take care that any equipment used in handling the geomembrane will not cause damage during the off-loading process. Appropriate handling equipment includes cloth chokers and spreader bar for loading, spreader and roll bars for deployment. Dragging panels on ground surfaces will not be permitted.

4. Take care that all personnel handle the geomembrane with care, so as not to damage the material.

5. Assure that the geomembrane is not folded; folded material shall be rejected.

6. Prepare the storage area surface to protect the geomembrane from puncture, grease, water, moisture, mud, mechanical abrasions, excessive heat, or any other damage. The surface shall be smooth, without obstructions and/or debris. Geomembrane shall not be stored on wooden pallets.

7. Store the geomembrane in a location designated by the Owner. It shall be protected against theft, vandalism, passing vehicles, adverse weather, and any other hazards.

8. Stack the geomembrane rolls per Manufacturer's recommendations.

The CQA Monitor shall perform the following:

1. Inspect the storage location to verify compliance with the requirements described in Section 8.2.

2. Periodically observe the off-loading of geomembrane to verify compliance with the requirements described in Section 8.2.

3. Visually inspect the surface of all rolls for defects and/or damage. Any damage occurring during the off-loading shall be documented.

8.3 INSTALLATION

8.3.1 Anchor Trench

The EMC shall perform the following:

1. Excavate the anchor trench to the line, grade, and width shown on the engineering drawings, prior to liner system placement. If the anchor trench is excavated in a clay liner susceptible to desiccation, no more than the amount of trench required for the geomembrane to be anchored in one day shall be excavated to minimize desiccation potential of the anchor trench clay soils.

2. Provide rounded corners in and at the top of the trench so as to avoid sharp bends in the geomembrane.

3. Provide adequate drainage for the anchor trench to prevent ponding or softening of the adjacent soils while the trench is open.

4. Backfill the trench with soil meeting the requirements of Section 6.1.

5. Compact the trench backfill material by wheel rolling with light rubber-tired vehicle or other light compaction equipment.

6. Take care when backfilling the trenches to prevent any damage to the geomembrane. If damage occurs, it shall be repaired prior to the completion of the backfill.

The CQA Monitor shall perform the following:

1. Verify that the anchor trench has been constructed according to the requirements described in Section 8.3.1. Observe the placement of anchor trench backfill material as outlined in Section 6.1.

8.3.2 Weather Conditions

The Installer shall perform the following:

1. Not weld during precipitation events; in the presence of excessive moisture (i.e., heavy fog or dew) in an area of ponded water; or in presence of winds which affect the control of the welding temperatures (unless wind barriers are provided).

2. Measure and document ambient temperatures approximately one (1) foot above the liner surface.

3. Stop seaming if ambient temperatures are below 40°F, except with the approval of the Owner and the CQAC.

4. Stop seaming if ambient temperatures are above 105° F, except with the approval of the Owner and the CQAC.

The CQA Monitor shall perform the following:

1. Verify that seaming is performed only during weather conditions which are considered acceptable, according to the requirements of Sections 8.3.2.

8.3.3 Method of Placement

The Installer shall install the geomembrane in a loose and relaxed condition, and shall be in a loose and relaxed condition at the time of seaming. The geomembrane shall be deployed in a manner to minimize handling.

On a sand subgrade, care shall be taken to prevent rutting prior to and during placement of the geomembrane. The sand should be compact and in a dry condition (well drained) prior to placement of the geomembrane. Low ground pressure equipment should be used and repairs to the subgrade made if rutting occurs.

8.3.4 Prevention of Damage

The Installer shall be responsible to assure that:

1. No equipment or tools are used that may damage the geomembrane by handling, trafficking, or other means. Vehicles are not allowed to drive on the surface of or be in direct contact with any geosynthetic layer. NOTE: This applies to the placement and care of geosynthetic layers prior to the placement of the overlying protective soil layer and is not in conflict with Section 10.1.2, Placement of Granular Soils.

2. No personnel working on the geomembrane shall smoke, wear damaging shoes, or engage in other activities that could damage the geomembrane.

3. The method used to unroll the panels shall not cause scratches or crimps in the geomembrane and shall not damage the supporting soil.

4. The method used to place panels shall minimize wrinkles. Ballast shall be used to prevent relocation of wrinkles by wind.

5. Bridging of grade changes by the geomembrane shall be removed as directed by, and at the discretion of, the Owner and the CQAC.

6. Adequate loading (i.e. sandbags or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind.

7. Direct contact with the geomembrane shall be minimized; i.e., the geomembrane in traffic areas is to be protected by geotextiles, extra geomembrane, or other materials approved by the CQAC.

The CQA Monitor shall observe the panel deployment to verify that all provisions for preventing geomembrane damage, as detailed in Section 8.3.4, are followed.

8.3.5 Field Panel Identification

The Installer shall give each field panel an "identification code". A field panel is the unit area of geomembrane which is to be seamed in the field, i.e., a field panel is a roll or a portion of a roll cut in the field.

The CQA Monitor shall verify that each panel is clearly identified.

8.3.6 Field Panel Placement

The Installer shall record installed field panels. Identification code, location and date shall be recorded.

The CQA Monitor shall verify and document that panel deployment proceeds as planned, and that pertinent information is recorded.

8.4 FIELD SEAMING

8.4.1 General Procedures

The Installer shall perform the following:

1. Overlap geomembrane panels such that any fluid flowing across the seams would flow from the top panel to the underlying panel. In corners and odd shaped geometric locations, the number of field seams shall be minimized.

2. Orient all seams located on slopes steeper than 5 percent parallel to the fall of the slope, when possible. No cross-seams shall be allowed on base liner side lopes. Final cover cross-seams may be oriented 45 degrees to the maximum line of slope if the following conditions are met:

    a. Use of seams is minimized and only used when conditions warrant.
    b. Joining method is dual track fusion seaming only.
    c. Cross seams are staggered at least 25 feet and no more than one occurs per panel width between the slope crest and toe.
    d. Not within 50 feet of the crest of the slope, without the approval of the CE.

4. Clean the seam area such that it is free of moisture, dust, dirt, debris, and foreign materials of any kind before seaming.

5. Shall not field seam in adverse weather conditions that could impair the quality of the liner, unless approved by the Owner and the CQAC.

6. Align seams with the least possible number of wrinkles and "fishmouths." All "fishmouths" shall be cut, removed and patched.

The CQA Monitor shall perform the following:

1. Observe the seaming process to verify that the requirements described in Section 8.4.1 are being consistently achieved.

8.4.2 Seam Preparation

The Installer shall perform the following:

1. Use extrusion welders and dual track fusion welders for field seaming. Extrusion welders shall be equipped with gauges giving the temperature in the apparatus and the preheat temperature at the nozzle.

2. Overlap the panels of the geomembrane to be welded a minimum of 3 inches, taking care not to damage the geomembrane.

3. Bevel the top edges of geomembrane before extrusion welding by grinding of the geomembrane liner with a hand held rotary grinder. The thickness of the liner after beveling shall exceed the specified thickness.

4. Clean the seam prior to seaming to assure the area is clean and free of moisture, dust, dirt, and debris.

5. Purge the extruder prior to beginning the seam to remove all heat-degraded extrudate from the barrel.

6. Keep the welding rod clean and dry.

7. Abrade surfaces of welded liners over a maximum width of one-quarter inch.

The CQA Monitor shall verify that seam overlapping and preparation for extrusion seaming is performed as required by this section.

8.4.3 Pipe Penetrations

The Installer shall perform the following:

1. Pass the HDPE pipe through a hole in the geomembrane which is not more than 6 inches in diameter greater than of the pipe diameter.

2. Install a factory pre-formed "boot" of the same geomembrane material as the geomembrane liner over the end of the pipe on the landfill side.

3. Extrusion weld the boot to the geomembrane and the pipe to complete the seal.

4. The extrusion weld shall be non-destructively tested as per Section 8.5 or visual inspection as approved by the CQAC.

8.5 NON-DESTRUCTIVE SEAM TESTING

The Installer shall non-destructively test all field seams over their full length. All test equipment required for non-destructive testing shall be furnished and operated by the Installer. Where the seam cannot be non-destructively tested, as determined by the CQA Monitor, the Installer shall submit to the CQA Monitor an alternative testing method for approval.

The CQA Monitor shall observe and record the results of non-destructive seam testing. He/she shall also verify that the test methods and equipment conform to the requirements of Section 8.5 and that the results are properly evaluated. The CQA Monitor shall also verify and record that seams which fail non-destructive tests are appropriately repaired.

8.6 DEFECTS AND REPAIRS

The CQA Monitor shall perform the following:

1. As each panel is deployed, or as soon thereafter as possible, observe the geomembrane surface for damage and imperfections including holes, cracks, thin spots, tears, punctures, blisters, and foreign materials. The surface of the geomembrane shall be clean at the time of observation.

2. Identify, mark, and observe non-destructive testing of suspect locations.

3. Verify that all defects found as a result of: 1) the inspection and testing of suspected areas; 2) non-destructive testing, 3) any other inspection or observation, shall be identified for repair.

4. Verify that all identified defects are appropriately repaired in accordance with this section. Repair equipment, materials and procedures are subject to the approval of the CQA Monitor.

5. Verify that all repairs are non-destructively tested and either pass the test, or are again repaired and tested until passing test results are achieved.

6. Record the locations and types of defects and shall record the repairs and non-destructive testing at these defects.

The Installer shall perform the following:

1. Clean the surface of the geomembrane prior to CQA inspection. The geomembrane surface shall be brushed, blown, or washed if the amount of dust or mud inhibits observation.

2. Non-destructively test each suspect location as appropriate in the presence of the CQA Monitor. Each location that fails the non-destructive testing shall be marked by the CQA Monitor, and repaired accordingly.

3. Repair any portion of the geomembrane exhibiting a flaw or failing a non-destructive test as follows:

    a. Small holes shall be repaired by extrusion welding. If the hole is larger than 1/4 inch, it shall be patched.

b. Failed seams shall be cap-stripped.

c. Tears shall be repaired by patching. Where the tear is on a slope or an area of stress and has a sharp end, it must be rounded by cutting prior to patching.

d. Blisters, large holes, undispersed raw materials, and contamination by foreign matter shall be repaired by large patches.

e. Surfaces of the geomembrane which are to be patched shall be abraded and cleaned no more than 15 minutes prior to the repair. No more than 5 percent of the thickness shall be removed by abrading.

f. Folded geomembrane that has been creased or otherwise damaged shall be replaced; patching will be permitted at the approval of the CQA Monitor provided seams are parallel to slope and not transverse or per the approval of Owner and the CQAC.

g. Patches shall be round or oval in shape, made of the same geomembrane, and extend a minimum 6 inches beyond the edge of defects. All patches shall be of the same compound and thickness as the geomembrane specified. All patches shall have their top edge beveled with a grinder prior to placement on the geomembrane.

h. All surfaces must be clean and dry at the time of repairs. All seaming equipment used in repairs must be approved by Owner and the CQAC. All repair procedures, materials, and techniques must be approved in advance by Owner and the CQAC.

4. Non-destructively test each repair. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved. Acceptance of the repaired seam cap may then also be subject to the sampling, testing and acceptance requirements of Section 8.6, at the discretion of the CQA Monitor.

8.7 GEOMEMBRANE ACCEPTANCE

1. The Installer retains all ownership and responsibility for the geomembrane until acceptance by Owner.

2. The Owner will accept the geomembrane installation when:

   a. The installation is finished.

   b. Verification that all field seams and repairs, including associated testing, is complete.

   c. Written inspection reports prepared by the CQAC have been received by the Owner.

9.0 GEOTEXTILE (As Applicable)

9.1 MATERIALS

1. The geotextile shall meet the requirements of GRI GT12a.

2. The manufacturer shall provide a quality control certificate for each roll of geotextile to be delivered.

The CQA Manager shall perform the following:

1. Review the submittals provided by the manufacturer to verify compliance with the requirements described in Section 9.1. Shipment of the geotextile to the site should remain contingent upon a satisfactory review of this submitted information.

9.2 DELIVERY AND STORAGE

The Installer shall perform the following:

1. Assure that geotextile rolls are packaged, shipped, off-loaded, and stored by appropriate means, and in accordance with this section, such that the rolls are not damaged. The Installer shall be responsible for replacing any damaged or unacceptable material at no cost to the Owner.

2. Protect the materials from inundation, mud, dirt, cutting, and other damaging or deleterious condition. The Manufacturer's written instructions for shipping, storage, and handling shall be followed.

3. Ship the geotextiles in a closed container or wrapped condition to prevent exposure.

4. Assure that the geotextile rolls are clearly labeled with the Manufacturer's name, roll number, lot number and batch number.

5. Remove damaged rolls or rolls not properly labeled from the site.

The CQAC shall perform the following:

1. Periodically observe the off-loading of geotextile.

2. Visually inspect the surface of all rolls for defects and/or damage.

3. Document any observed damage to the rolls.

9.3 PLACEMENT

The Installer shall perform the following:

1. Assure that all geotextiles are handled in a manner to ensure that they are not damaged.

2. Assure that no materials are placed over the geomembrane until all the required documentation regarding the geomembrane installation is complete.

3. Assure that the surface on which the materials are to be placed does not contain stones or excessive dust that could cause damage to any geosynthetic components.

4. Secure the geotextile on cell side slopes and on the final cover system in the anchor trench.

5. In the presence of wind, weight all geosynthetic components with sandbags. The Installer shall be responsible for damage to the geosynthetics from wind damage.

6. Cut the geotextiles using an approved cutter. Care must be taken to protect underlying geomembranes if the materials are being cut in place.

7. Use equipment to deploy the geosynthetic components that will not cause damage to any such components.

8. Assure that no personnel working on the geosynthetic materials shall smoke, wear damaging shoes, or engage in other activities that could damage the materials.

9. The CQA Monitor shall observe and document the deployment of geonet and geotextile to verify that all provisions of this section are followed.

9.4 FIELD SEAMS

The Installer shall field seam the geotextile as follows:

1. Seams shall be overlapped a minimum of 6 inches.

2. The geotextile shall be continuously sewn between panel edges, except with the approval of the Owner and CQAC. Sewing is the preferred way to seam between panel end seams, however, the geotextile may be overlapped 8 inches on all sides of the seam and heat bonded if sufficient geotextile is not available for sewing.

3. The thread used to sew the geotextile together shall meet the manufacturer's requirements.

4. No horizontal seams shall be allowed on base liner slopes exceeding 5 percent, except with the approval of the Owner and CQAC. Horizontal seams on the final cover slopes shall be in accordance with 8.4.1(2).

The CQA Monitor shall observe and document the seaming of geotextile to verify that all provisions of this section are followed.

9.5 REPAIRS

The Installer shall repair any holes or tears in the geosynthetic materials as follows, using patches made from the same material:

1. Damaged areas of geotextile shall be repaired by sewing a patch in place with an 8-inch overlap in all directions.

The CQA Monitor shall observe and document the repairing of geotextile to verify that provisions of this section are followed.

9.6 MATERIAL ACCEPTANCE

1. The Installer retains ownership and responsibility for the geotextiles until acceptance by Owner.

2. The Owner will accept the geosynthetic component installation when:

    a. The installation is finished.

    b. The completion of field seams and repairs, including associated testing, is verified.

    c. Written inspection reports by the CQAC have been received by Owner.

10.0 GRANULAR SOILS

10.1 DRAINAGE AGGREGATE

10.1.1 Materials
The drainage aggregate used in the leachate collection system shall meet the following requirements:

1. It shall consist of granular fill free of organic material, trash, clay clods, or other deleterious material. No sharp-edged stones or hard objects shall be allowed.

2. The granular fill shall meet the gradation requirements for MDOT Class II material, except that no more than 5 percent by weight may pass the #200 U.S. Standard Sieve by washing and no soil particles are more than a ½ inch sieve. Samples shall be obtained on a frequency of at least one per every 1,000 yd3 placed and analyzed for grain size distribution using a sieve analysis in accordance with ASTM D422 or C136.

3. Samples shall be obtained on a frequency of at least one per every 2,500 yd3 placed and shall be tested for hydraulic conductivity in accordance with ASTM D2434. Samples of the granular soils placed on any cell floor shall be required to exhibit conductivity no less than 1 x 10-2 cm/sec, or as required by the engineering design. The samples shall be collected and tested by the CQAC. The CQAC will verify that the test results meet the requirements of this section.

10.1.2 Placement

The EMC shall install the drainage aggregate in accordance with the following:

1. Low ground-pressure tire or track-mounted equipment shall be utilized for work on the granular materials whenever the thickness of the granular material is less than 24 inches overlying a geosynthetic component, if present. Not less than 12 inches of granular material shall be maintained between the underlying leachate collection system and/or geosynthetics and construction equipment treads at all times.

2. The granular fill beneath roadways for transporting material over the cell floor and side slopes shall be at least 3 feet thick at all times. Excessive rutting shall be prevented.

3. No portion of any earthmoving equipment shall be allowed to contact the underlying geomembrane at any time.

4. The granular fill shall be placed on the landfill cell at the time the cell is constructed. The granular soils on the cell side slopes shall be placed concurrently with waste placement.

5. Granular material shall be placed to minimize stresses on the underlying geomembrane. Placement shall proceed by pushing the granular material up the side slope. No granular materials shall be allowed to fall or slide into place down the side slope.

The CQAC will perform the following:

1. Observe the spreading of the granular fill and document material uniformity and the presence or absence of foreign materials.

2. Detect potential and actual damage to the geomembrane (if present) during placement. Where damage is suspected, the liner surface shall be exposed to verify its condition. Actual damage shall be fully documented and corrective action shall be taken in accordance with procedures outlined in Section 8.0.

3. Certify that the granular blanket has been placed in accordance with the engineering design plans at the locations tested.

The RLS will survey the granular blanket on a 100-foot grid to verify the blanket thickness. In addition, direct depth checks may be used to determine sand thickness. Locations where the granular soil thickness is less than shown on the drawings shall be brought to the attention of the Owner and for the placement of more granular materials.

1. The drainage aggregate shall be placed on the geotextile envelope and around the leachate collection pipe as soon as the granular soils on the cell have been placed and prior to waste placement.

2. Drainage aggregate shall be placed no higher than the midpoint of the leachate collection pipe and compacted underneath the pipe by rodding with a square nosed shovel.

3. Drainage aggregate shall be placed above the bedding material to the thickness required above the pipe. The geotextile envelope shall be overlapped above the drainage aggregate and heat leistered or sewn.

4. Drainage aggregate shall be placed to minimize stresses on the underlying geomembrane, if present. Placement shall proceed by placing or by dumping and not pushing the drainage aggregate material. No drainage aggregate shall be allowed to fall or slide into place down the side slope.

The CQAC will perform the following:

1. Observe the placement of the drainage aggregate and document material uniformity and the presence or absence of foreign materials.

2. Detect potential and actual damage to the geomembrane during placement, if present. Where damage is suspected, the liner surface shall be exposed to verify its condition. Actual damage shall be fully documented and corrective action shall be taken in accordance with procedures outlined in Section 8.0.

3. Certify that the drainage aggregate has been placed in accordance with the engineering design plans at the locations tested.

10.2 BEDDING STONE

10.2.1 Materials

The granular stone used as pipe bedding in the leachate collection system shall meet the following requirements:

1. It shall consist of granular fill free of organic material, trash, clay clods, or other deleterious material. No sharp-edged stones or hard objects shall be allowed.

2. The bedding stone shall meet the requirements for 100% by weight pass the 2 ½ inch sieve and 0-5% passing the ½ inch sieve. Samples shall be obtained on a frequency of at least one per every 1,000 yd3 placed and analyzed for grain size distribution using a sieve analysis in accordance with ASTM D422 or C136.

3. Bedding stone shall be natural aggregate, not crushed, and not limestone materials which could break down or cause biological clogging in the leachate environment. One sample per source shall be obtained and analyzed for carbonate content and be less than 15% soluble material in accordance with ASTM D3042, using a modified pH of 4.0 solution.

10.2.2 Placement

The EMC shall install the bedding stone in accordance with the following:

1. The bedding stone shall be placed on the geotextile envelope and around the leachate collection pipe as soon as the granular soils on the cell have been placed and prior to waste placement.

2. Bedding stone shall be placed no higher than the midpoint of the leachate collection pipe and compacted underneath the pipe by rodding with a square nosed shovel.

3. Bedding stone shall be placed above the bedding material to the thickness required above the pipe. The geotextile envelope shall be overlapped above the bedding stone and heat leistered or sewn.

4. Bedding stone shall be placed to minimize stresses on the underlying geomembrane, if present. Placement shall proceed by placing or by dumping and not pushing the bedding stone.

The CQAC will perform the following:

1. Observe the placement of the bedding stone and document material uniformity and the presence or absence of foreign materials.

2. Detect potential and actual damage to the geomembrane during placement, if present. Where damage is suspected, the liner surface shall be exposed to verify its condition. Actual damage shall be fully documented and corrective action shall be taken in accordance with procedures outlined in Section 8.0.

3. Certify that the bedding stone has been placed in accordance with the engineering design plans at the locations observed.

11.0 PIPING (As Applicable)

This section of the CQA Plan applies to piping used throughout the landfill. Individual pipe sizes and standard dimension ratios (SDRs) to be used for each individual pipe installation are shown on the engineering plans.

11.1 MATERIALS

Any pipe used must be made from extra high molecular weight (EHMW) polyethylene (PE) resin, and the manufactured piping must be classified as Type III, Class C, Category 5, Grade P34 material according to ASTM D1248 and also have a cell classification of 345434C as defined by ASTM D3350.

The CQAC shall review the manufacturer's data to verify the requirements of this section being satisfied.

11.2 DELIVERY AND STORAGE

The piping manufacturer is responsible for preparing and shipping the pipe to the job site. Each bundle of pipe prepared for shipment by the manufacturer will be marked with the following information:

1. Name of manufacturer

2. Product type and identification number

3. Pipe diameter (I.D.)

4. Pipe Standard Dimension Ratio (SDR)

The pipe shall be protected, during shipment, from excessive heat or cold, puncture, or other damaging or deleterious conditions. The pipe will be stored on-site in a manner suitable to protect it from long-term ultraviolet exposure, prior to actual installation.

The CQA Monitor shall verify that the manufacturer, type and size of each pipe is correct. The CQA Monitor shall also maintain a log of pipe deliveries throughout the installation. The following information at a minimum shall be recorded on the log for each shipment received at the job site:

- Date of shipment from piping manufacturer

- Date of receipt of delivery at job site

11.3 INSTALLATION

11.3.1 Pipe Joining

Unless approved by the Owner and CQAC, the Installer will join all pipes by the butt fusion procedure as defined by Plexco Piping Co. in their Bulletin No. 108 titled "Butt Fusion Procedures – High Density Polyethylene PE 3408 Pipe," or approved manufacturer's recommendations.

11.3.2 Pipe Placement

The Installer will place the pipe in accordance with the following procedure and requirements:

1. Piping placement will not be performed in the presence of excessive moisture. The prepared surface underlying the piping should be inspected and accepted by the Owner and CQAC.

2. Method used to place the piping does not cause damage and clogging to the piping and does not disturb the supporting backfill. The CQA Monitor will observe and document that the Installer provides adequate handling equipment used for moving pipe and the equipment and handling methods used do not pose any risk of damage.

3. All piping should be located as noted in the plans and specifications. Locations, grades and size requirements are specified on the details for the plan set. Observations and surveying should be made to ensure the pipes are the specified size, manufactured of specified material, and are placed according to the plan. Observations should be made to ensure that backfill is completed as specified and that the pipe network is not damaged.

4. The CQA Monitor will observe and document the placement of geotextile wrap and granular material around the collector pipes according to the engineering plans.

5. The CQA Monitor will examine each pipe after placement for damage. The Owner and CQAC will decide which pipes should be rejected, repaired, or accepted after reviewing the information provided by CQA Monitor. Damaged or repaired pipes or portions of pipes which have been

rejected will be marked and removed from the installation area and documented by CQA Monitor.

6. The CQA Monitor will observe and document the placement and joining throughout the landfill. The CQA Monitor will verify that placement and joining of piping meet the requirements in this section, plans and specifications. Deviations from the plans and specifications will be brought to the attention of the Owner and CQAC for evaluation of the necessity of corrective action.

11.4 ACCEPTANCE

1. The Installer retains all ownership and responsibility for the piping until acceptance by Owner.

2. The Owner will accept the piping system installation when:

    a. All required documentation from the Manufacturer and Installer has been received and accepted.

    b. The installation is finished.

    c. The completion of field joining and repairs, including associated testing, is verified.

    d. Written inspection reports prepared by the CQAC have been received by the Owner.

12.0 PROTECTIVE SOIL AND TOPSOIL FOR FINAL COVER

12.1 MATERIALS

The soil layers components of the final cover shall meet the following requirements:

1. They shall consist of soil which is free of trash, debris, stumps, or other deleterious material. No sharp-edged stones or hard objects shall be allowed.

2. The soil in protective layer shall have a maximum hydraulic conductivity of 1.0 x 10-5 cm/s and shall be tested for hydraulic conductivity in accordance with ASTM D2434 and particle size distribution (ASTM D422) for every 10,000 yd3 placed within a final cover area being closed.

3. The soil in the topsoil layer shall also exhibit the color, odor, and texture indicating that it contains the residue of plant growth and decay exhibiting an organic matter content of 2.0 percent or greater. Testing of the organic content of topsoil shall be performed for each proposed source of materials prior to placement and at any time that materials appear to change. Acceptance of the topsoil shall be at the discretion of the CQA Monitor.

The CQAC will perform laboratory testing at the frequency specified in this section.

12.2 PLACEMENT

The soil layers components of the final cover shall be installed in accordance with the following:

1. Low ground-pressure tire or track-mounted equipment shall be utilized for work on the soil cover whenever the thickness of the soil is less than 24 inches if a geomembrane is present. Roadway fill for transporting material over the cover shall be at least 3 feet thick at all times. Excessive rutting shall be prevented.

2. Placement shall proceed by pushing the soil up the slope. No soil materials shall be allowed to fall or slide into place down the final cover slope.

3. Place the protective soil layer in lifts not exceeding 12 inches in thickness after compaction. Topsoil shall be placed in a single, 6-inch lift.

The CQAC shall perform the following:

1. Observe the spreading of the soil layers and document material uniformity and the presence or absence of foreign materials.

2. Determine the in-place moisture content and dry density of the protective soil layer at least one test per acre and a minimum of three tests per lift of soil to verify compliance with the requirements of item (1) or a minimum of 90 percent of the maximum dry density as determined by the Modified Proctor (ASTM D1557) or 95 percent of the maximum dry density as determined by the Standard Proctor (ASTM D698).

3. Inform the Contractor of a failing test and observe that one of the following remedial actions are performed:

    a. For a failing density test, the Contractor shall recompact the soils until the required density is obtained.

4. Certify that the soil layers have been placed in accordance with the engineering design plans at the locations tested. Perform depth checks as stipulated below in conjunction with the RLS Survey.

The RLS shall survey on a 100-foot grid to verify total thickness of the layers combined. Alternately, direct depth checks may be used to determine soil thickness. Locations at which soil thickness is less than required shall be brought to the attention of the Owner and remediated under its direction.