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Prepared for:

BFI North America

CONSTRUCTION QUALITY ASSURANCE PLAN

REMEDIAL ACTION CONSTRUCTION MIG/DEWANE LANDFILL SUPERFUND SITE BELVIDERE, ILLINOIS

Prepared by:

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Project Number CHE8214

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1. INTRODUCTION

1.1 Purpose of CQAP

This Construction Quality Assurance Plan (CQAP) establishes the quality-assurance monitoring and documentation procedures that will be used during construction of the Remedial Design/Remedial Action (RD/RA) remedy at the MIG/DeWane Landfill Superfund Site (Site). The construction quality assurance (CQA) program set forth in this document shall be used by an independent, third-party consultant to verify that the RA is constructed in accordance with the Final Design, and thus, achieves the applicable performance standards. RA construction monitoring and documentation will be performed for installation of the soils, geosynthetics, gas collection system, erosion controls, and related features of the remedy, as shown on the Final Design documents (i.e., Drawings, Specifications, etc.). This CQAP is intended to supplement the Final Design and to provide a ready-reference for the parties involved with assuring the quality of construction for this project. The CQAP is not intended to cover analytical test and the elements of the Quality Assurance Project Plan (QAPP) for the MIG/DeWane Landfill. Revision 3 of the MIG/DeWane QAPP was prepared as a separate document dated April 2014. The organization of information contained in the CQAP is generally parallel to the organization of Division 1 through Division 6 of the Specifications.

1.2 CQAP Elements Relevant to the UFP-QAPP Manual

IEPA has requested that relevant information from the CQAP be presented in a format which includes worksheets outlined in the uniform federal policy for Quality Assurance Project Plans (UFP-QAPP Manual). The UFP-QAPP Manual is a consensus quality systems document prepared by the Intergovernmental Data Quality Task Force (IDQTF), a working group made up of representatives from the U.S. Environmental Protection Agency (EPA), the Department of Defense (DoD), and the Department of Energy (DOE). There are 37 "Optimized UFP-QAPP Worksheets" which once completed contain all required elements of a QAPP.

However, only certain elements of the CQAP are relevant to certain UFP-QAPP Worksheets. Much of the information required by the UFP-QAPP is included in the project QAPP.

To provide information in the required format, this CQAP includes only those worksheets (CQAP Worksheets) which are relevant for construction quality control. Worksheets which are to contain information regarding analytical testing of materials are not included. The following UFP-QAPP Worksheets are included in this CQAP:

- CQAP Worksheet #1 Title and Approval Page
- CQAP Worksheet #2 CQAP Identifying Information
- CQAP Worksheet #3 Distribution List
- CQAP Worksheet #4 Project Personnel Sign-Off Sheet
- CQAP Worksheet #5.1 RA Construction Organization Chart
- CQAP Worksheet #5.2 CQA Construction Organization Chart
- CQAP Worksheet #6 Communication Pathways
- CQAP Worksheet #7 Personnel Responsibilities and Qualifications Table
- CQAP Worksheet #8 Special Personnel Training Requirements Table
- CQAP Worksheet #9 Project Meetings Participants Sheet
- CQAP Worksheet #22 Field Equipment Calibration
- CQAP Worksheet #23 Testing Methods
- CQAP Worksheet #29 Project Documents and Records

The following table provides a "cross-walk" between the CQAP elements and worksheets that are relevant to certain QAPP elements outlined in the uniform federal policy for UFP-QAPP Manual.

Table 1-1. Crosswalk

Section(s) of UFP-QAPP Manual	CQAP Relevant Information	Crosswalk to Worksheet No.	CQAP Page No.
2.1 - Title and Approval Page	Title and Approval Page	1	Section 1, 5
2.2 - CQAP Identifying Information	CQAP Identifying Information	2	Section 1, 6
2.3 - Distribution List and Project and Personnel Sign-Off Sheet	Distribution List Project Personnel Sign-Off Sheet	3 4	Section 1, 7 Section 1, 8
2.4 - Project Organization	Project Organization Chart RD/RA Project Organization Chart CQA Communication Pathways Personnel Responsibilities Special Personnel Training Requirements	5.1 5.2 6 7 8	Section 1, 11 Section 1, 12 Section 1, 18 Section 1,19 Section 1, 21
2.5 - Project Planning/Problem Definition	Project Meetings Conceptual Site Model (Not Applicable (N/A) for CQAP, see project QAPP)	9 N/A (10)	Section 1, 26 N/A
2.6 - Project Quality Objectives	See project QAPP for PQOs and Measurement Performance Criteria	N/A (11) N/A (12)	N/A N/A
2.7 - Secondary Data Evaluation	N/A for CQAP – Not Using Secondary Data	N/A (13)	N/A
2.8 - Project Overview and Schedule	N/A for CQAP - see Remedial Design Report for Project Tasks and Schedule. Project Specific Detection/Quantitation Limits for Environmental Samples is included in the project QAPP	N/A (14) N/A (15) N/A (16)	N/A N/A N/A
3.1- Sampling Tasks	see project QAPP for Analytical Sampling Tasks CQA Field Equipment Calibration Table	N/A (17) N/A (18) N/A (19) N/A (20) N/A (21) 22	N/A N/A N/A N/A N/A Section 5, 6
3.2 - Analytical Tasks – Analytical SOPs, Analytical Instrument Calibration Procedures, Maintenance, and Inspection	CQA Methods Table see project QAPP for Analytical SOPs, Analytical Instrument Calibration Procedures, Maintenance, and Inspection	23 N/A (24) N/A (25)	Section 5, 7 N/A N/A
3.3 – Analytical Sample Collection Documentation, Handling, Tracking, and Custody Procedures	See project QAPP for analytical sample collection, handling, tracking and custody procedures	N/A (26) N/A (27)	N/A N/A
3.4 – Analytical Quality Control Samples	See project QAPP	N/A (28)	N/A
3.5 –Data Management	CQA Documentation & Records Analytical Services Table	29 N/A (30)	Section 7, 7 N/A
4.1 – Assessment and Response Actions	See project QAPP for Project Assessment and Response Actions	N/A (31) N/A (32) N/A (33)	N/A N/A N/A
5.1 – Data Review	See project QAPP for Project Analytical Data Validation Information	N/A (34) N/A (35) N/A (36) N/A (37)	N/A N/A N/A N/A

The following pages include the title and approval page (**Worksheet #1**) and CQAP identifying information (**Worksheet #2**), CQAP Distribution List (**Worksheet #3**) and CQAP Project Personnel Sign-Off Sheet (**Worksheet #4**).

CQAP Worksheet #1
Title and Approval Page

Construction Quality Assurance Plan
for
MIG/DeWane Landfill Superfund Site
Boone County, Illinois

Illinois Environmental Protection Agency (IEPA)
USEPA Region 5

Prepared by: Geosyntec consultants
134 N. La Salle Street, Suite 300
Chicago, Illinois 60618

Date: April 2014

BFINA Project Coordinator

Signature_____

Geosyntec Project Manager:

Signature_____

CQA Certifying Engineer:

Signature_____

IEPA Project Manager:

Signature_____

USEPA Project Manager:

Signature_____

CQAP Worksheet #2
CQAP Identifying Information

Site Name/Project: MIG/DeWane Landfill Superfund Site

Site Location: Boone County, Illinois

Regulatory Program: CERCLA[1]

Approval Entities: Illinois EPA and USEPA Region 5

Plans and Reports Relevant to this CQAP:
MIG/DeWane Landfill Superfund Site Remedial Design Report dated April 2014
MIG/DeWane Landfill Superfund Site Design Drawings dated April 2014
MIG/DeWane Landfill Superfund Site Design Specifications dated April 2014
MIG/DeWane Landfill Superfund Site Remedial Action Work Plan dated April 2014

[1] The MIG DeWane Landfill is a State led Superfund Site.

CQAP Worksheet #3
Distribution List

CQAP Recipients	Title	Organization	Phone No.	E-mail
Ms. Nicole Wilson, P.E.	Remedial Project Manager	IEPA	(217) 785 8729	Nicole.Wilson@illinois.gov
Mr. Howard Caine	Remedial Project Manager	USEPA, Region 5	(312) 353-9685	Caine.Howard@epamail.epa.gov
John Grabs, P.E.	Regulatory Contractor	CDM Smith	(312) 780-7737	GrabsJC@CDMSmith.com
Eric Ballenger	BFINA Project Coordinator	Republic Services	(630) 894-9095	Eric.Ballenger@republicservices.com
John Seymour, P.E.	Remedial Design Project Director/CQA Certifying Engineer	Geosyntec Consultants	(312) 416-3919	JSeymour@geosyntec.com
Bradley D. Bodine, P.E.	Remedial Design Project Manager	Geosyntec Consultants	(312) 416-3909	BBodine@geosyntec.com
To Be Named	CQA Site Manager	Geosyntec Consultants	To Be Named	To Be Named
To Be Named	CQA Geotechnical Testing Laboratory	To Be Named	To Be Named	To Be Named
To Be Named	CQA Surveyor	To Be Named	To Be Named	To Be Named
To Be Named	Remedial Action Contractor	To Be Named	To Be Named	To Be Named

CQAP Worksheet #4
Project Personnel Sign-Off Sheet

Project Personnel	Title	Organization	Phone No.	Date CQAP Read	Signature
John Seymour, P.E.	Remedial Design Project Director/CQA Certifying Engineer	Geosyntec Consultants	(312) 416-3919		
Bradley D. Bodine, P.E.	Remedial Design Project Manager	Geosyntec Consultants	(312) 416-3909		
To Be Named	CQA Site Manager	Geosyntec Consultants	To Be Named		
To Be Named	CQA Technician	Geosyntec Consultants	To Be Named		
To Be Named	CQA Technician	Geosyntec Consultants	To Be Named		
To Be Named	CQA Geotechnical Testing Laboratory	CQA Geotechnical Testing Laboratory	To Be Named		
To Be Named	CQA Surveyor	CQA Surveyor	To Be Named		

1.3 Construction Quality Assurance and Construction Quality Control

The CQAP is a site-specific document which addresses the following: (i) CQA Consultant responsibilities and authorities; (ii) monitoring and testing activities that will be performed during implementation of RD/RA remedy for the Site; and (iii) CQA documentation requirements. In the context of this document, Construction Quality Assurance and Construction Quality Control are defined as follows:

- Construction Quality Assurance (CQA) refers to means and actions employed by the CQA Consultant, to assure conformity of RD/RA remedy construction with the requirements of the Final Design (i.e., drawings, specifications, plans, and this CQAP). CQA is provided by an independent third-party consultant that is contracted by BFI Waste Systems North America, LLC (BFINA), the "lead Potentially Responsible Party (PRP)", and independent from production and installation (i.e., independent of the Contractor and any material suppliers).

- Construction Quality Control (CQC) refers to those actions taken by the Contractor, Manufacturers, or Suppliers, including their designated representatives, to ensure that the materials and the workmanship meet the requirements of the Final Design.

1.4 Project Personnel

1.4.1 Organization of Personnel

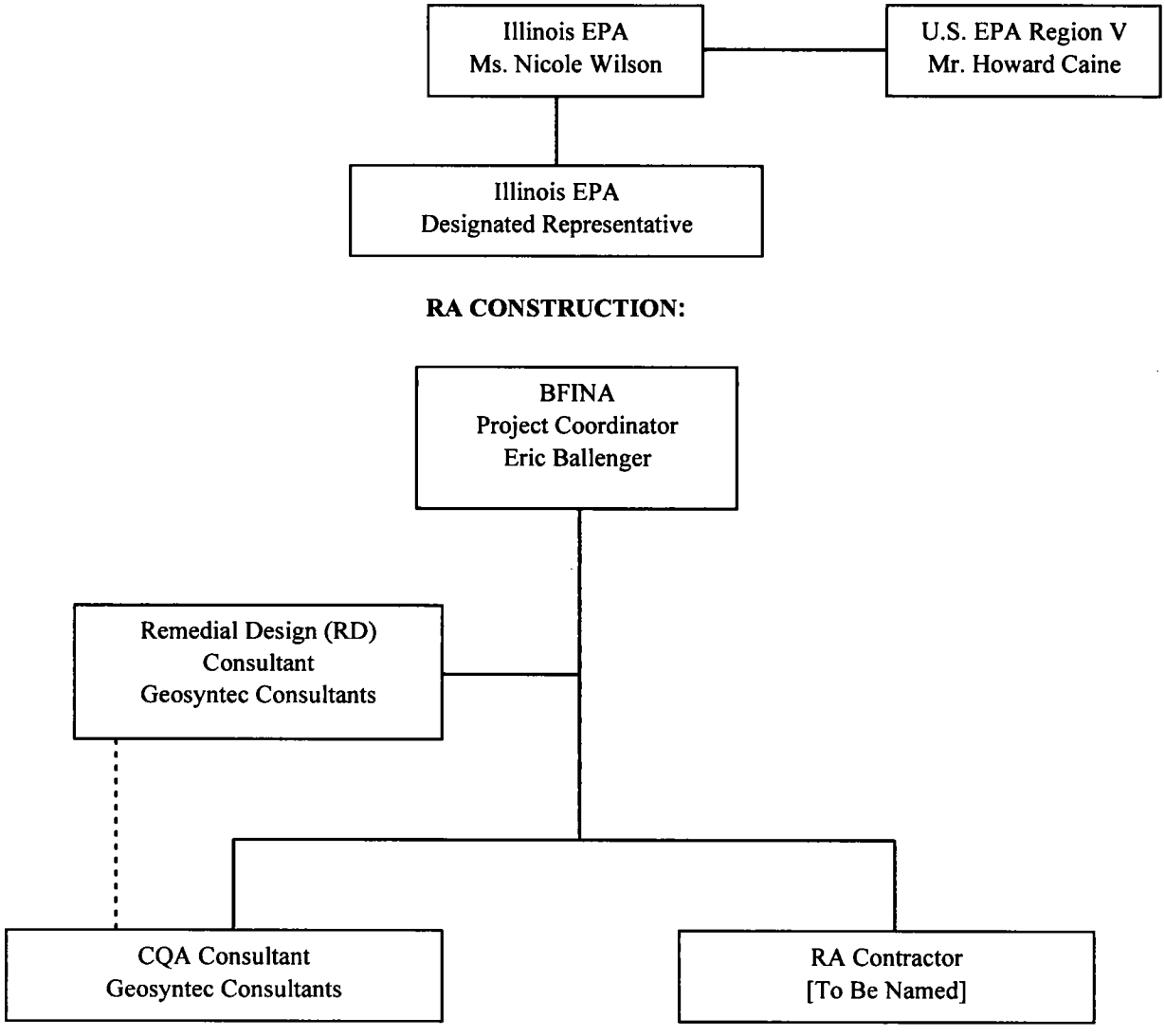
The project personnel organization chart for construction of RD/RA remedy is provided in **CQAP Worksheet #5.1**, and the personnel directly involved with the CQA are shown in **CQAP Worksheet #5.2**. **CQAP Worksheets #5.1** and **#5.2** are located at the end of this section. The communication pathways for the project are shown in **CQAP Worksheet #6** at the end of this section. The duties, responsibilities, and authorities of the entities and personnel positions identified in these figures as they relate to the CQA program are described below and summarized in **CQAP Worksheet #7** at the end of this section. All on-site project personnel will have received 40-hour OSHA training prior to entering the project site (see **CQAP Worksheet #8** at the end of this section).

As shown on **Worksheets #5.1** and **#5.2**, in some cases the individual names and their affiliations of the project personnel are not identified. Updated project personnel organization charts that name the responsible individuals and their affiliation will be

issued to Illinois EPA and U.S. EPA by the RD Consultant after completion of the Final Design and after the bidding process (at least four weeks prior to the start of RA construction). These project personnel organization charts will be discussed during the pre-construction meeting (see Section 1.6 of this CQAP) and will be attached to the pre-construction meeting minutes and distributed to the meeting attendees.

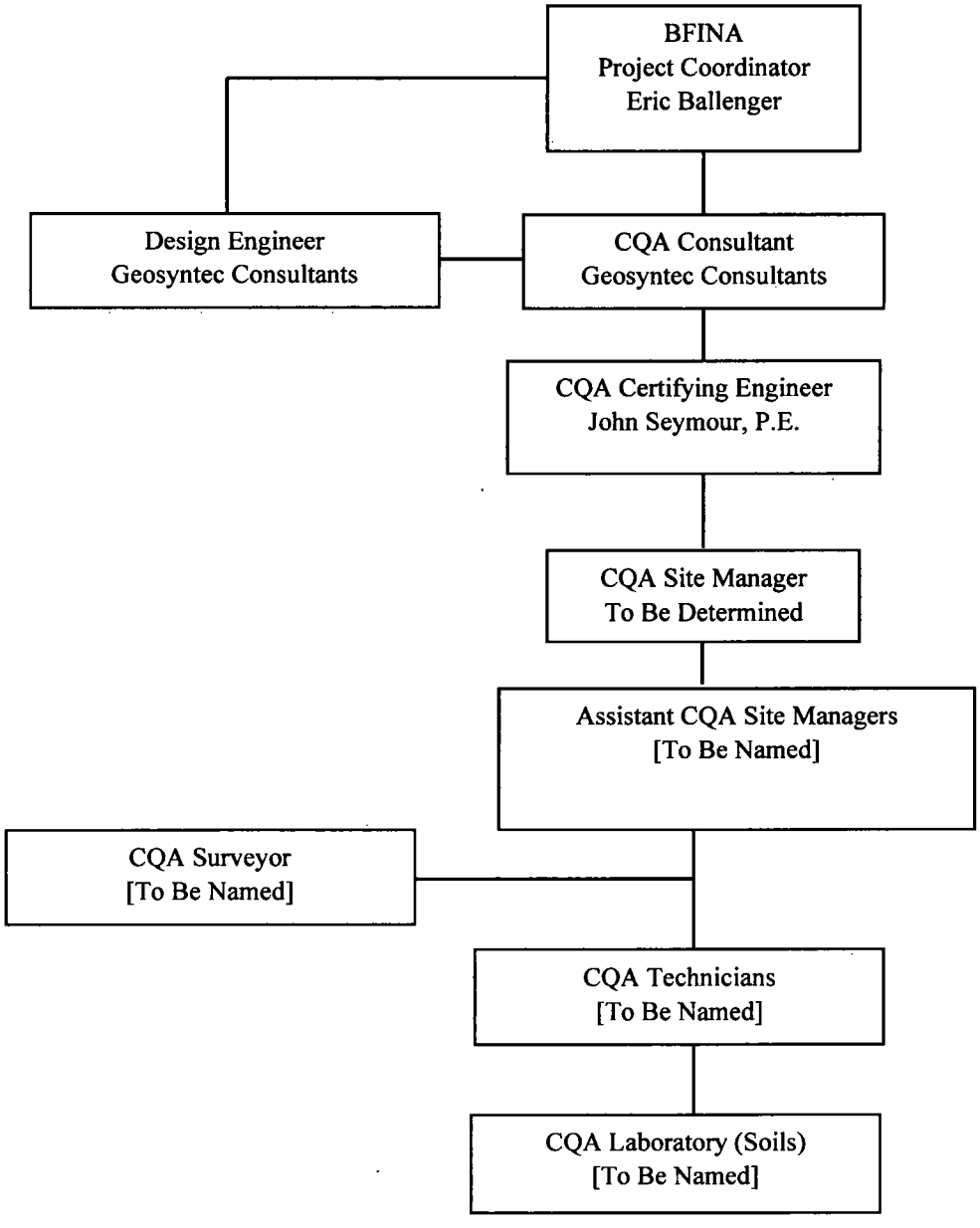
CQAP Worksheet #5.1

RA Construction Organization Chart
MIG/DeWane Landfill Superfund Site
Belvidere, Illinois



CQAP Worksheet #5.2

CQA Construction Organization Chart
MIG/DeWane Landfill Superfund Site
Belvidere, Illinois



1.4.2 Contract with the Contractor(s) and the CQA Consultant

The lead PRP will contract with the Contractor(s) for implementation of the remedy and with the CQA Consultant to implement the CQA program. The lead PRP will designate a Project Coordinator to serve as the primary point of contact and to act as construction manager/lead PRP's representative during the project.

1.4.3 Regulatory Agencies

Regulatory agencies providing oversight for this project are Illinois Environmental Protection Agency (IEPA) and the United States Environmental Protection Agency (U.S. EPA) Region V. Additionally, Illinois EPA may contract with a consultant to serve as their field representative during implementation of the RA. These agencies and their designated representatives (identified on **Worksheet #5.1**) will provide regulatory oversight on the RA phase of the project. Project deliverables (e.g., progress reports, construction completion report, etc.) will be submitted to Illinois EPA and its field representative and to U.S. EPA for their review and approval as described subsequently in this CQAP.

1.4.4 CQA Consultant

The CQA Consultant will be an independent, third-party engineering firm that contracts with the lead PRP to implement the CQA program described in this document. Specific responsibilities of the CQA Consultant are described in the remainder of Section 1.4 of this CQAP.

1.4.5 Contractor

The Contractor will be the construction company that contracts with the lead PRP to implement the RA construction phase of the project. The scope of the RA Contractor's activities is to construct and perform the work to satisfy the IEPA-approved Final Design, as set forth in the Contract Documents (Drawings, Specifications, Plans, Contract Terms and Conditions).

1.4.6 CQA Certifying Engineer

The CQA Certifying Engineer will serve as the lead quality assurance official on the project. As such, the CQA program will be directed and supervised by the CQA Certifying

Engineer. He/she will be directly accessible to the lead PRP, Project Coordinator, RD Consultant (the Engineer), and CQA Consultant for technical direction during construction. The CQA Certifying Engineer must be a registered Professional Engineer (Civil) in the State of Illinois. The responsibilities and duties of the CQA Certifying Engineer include the following:

- be familiar with the design calculations used to develop the Final Design;
- review conformance of material and construction to verify compliance with the intent of the requirements of the Final Design;
- be familiar with other site-specific documentation, including the Contractor's bid;
- review and approve the Contractor's submittals;
- conduct periodic site inspections;
- attend the meetings described in Section 1.6 of this CQAP;
- administer the CQA program (i.e., assign and manage CQA Consultant, review field reports, and provide engineering review of CQA related issues);
- oversee the ongoing preparation of as-built drawings by the Contractor;
- review and approve the CQA Surveyor's work products; and
- prepare and certify the Construction Completion Report.

1.4.7 CQA Site Manager

The CQA Site Manager will report to the CQA Certifying Engineer and will supervise and direct the day-to-day CQA activities on the project. The CQA Site Manager will interact on a frequent basis with the CQA Certifying Engineer and will have authority over the CQA Consultant. The CQA Site Manager will also serve as the point of contact and oversee the work of the CQA Surveyor, the CQA Testing Laboratory. The CQA Site Manager must have on-site field CQA work experience on at least five previous landfill projects, two of which must involve final closure. The responsibilities and duties of the CQA Site Manager include the following:

- be familiar with the basic concepts used to develop the Final Design;
- evaluate the conformance of material and construction to verify compliance with the intent of the requirements of the Final Design;
- be familiar with other site-specific documentation, including the Contractor's bid;
- attend the meetings described in Section 1.6 of this CQAP;
- direct and supervise daily CQA activities (e.g., assign and manage CQA Consultant, review field reports, and interact with the RA Contractor and the CQA Certifying Engineer on a frequent basis);
- coordinate and supervise preparation of CQA documentation by select CQA technicians, and maintain the on-site documentation in a neat and organized manner;
- oversee the ongoing preparation of as-built drawings by the Contractor;
- review the CQA Surveyor's work products; and
- prepare the Construction Completion Report.

1.4.8 Construction Quality Assurance Technician(s)

The CQA Technician(s) will be responsible for on-site CQA activities. The CQA Technician(s) must have on-site field CQA work experience on at least one previous project. The general duties of the CQA technician will include the following:

- be familiar with the CQA requirements for the project;
- perform daily CQA activities;
- attend CQA-related meetings discussed in Section 1.6 of this CQAP;
- verify the calibration and condition of on-site CQA equipment;
- assign locations for testing and sampling;
- perform CQA field testing;

- monitor the Contractor's CQC testing activities and review soils CQC data;
- establish, with the CQA Certifying Engineer, additional test requirements beyond those in the specifications and/or CQAP, when necessary;
- coordinate collection and shipping of geotechnical laboratory test samples;
- monitor material delivery when possible to document that materials are not damaged prior to or during unloading;
- review and report results of laboratory testing and Manufacturer and Contractor testing;
- review and assist the CQA Site Manager and the CQA Certifying Engineer in approving the Contractor's submittals;
- prepare CQA daily field reports that include descriptions of the construction progress and any relevant observations;
- provide daily field reports and logs to the CQA Certifying Engineer upon request;
- report any unresolved deviations from the Final Design to the CQA Certifying Engineer; and
- assist in preparing the Construction Completion Report.

In addition to these duties, CQA Consultant will take note of on-site activities that could result in damage to the soils, geosynthetics, or other components of the project. Observations so noted will be reported as soon as possible to the Contractor and to the CQA Site Manager and the CQA Certifying Engineer.

1.4.9 Construction Quality Assurance Geotechnical Testing Laboratory

The CQA Testing Laboratory will be a geotechnical testing laboratory firm that has experience in the physical testing of soils and properly equipped to perform the geotechnical testing required by the CQAP. The CQA Testing Laboratory may be a subcontractor to the CQA Consultant, or may be performed in-house by a laboratory-testing division of the CQA Consultant. CQA Testing Laboratory personnel will report to the CQA Site Manager, who will direct the laboratory personnel on the CQA testing requirements (methods, workload, deadlines, test results, etc.).

1.4.10 Construction Quality Assurance Surveyor

A CQA Surveyor, contracted by the CQA Consultant or by the lead PRP, will provide survey data to verify the Contractor's work and spot-verify as-built documentation. The CQA Surveyor will report directly to the CQA Certifying Engineer. Responsibilities of the CQA Surveyor will include spot-checking of soil layer thickness, grade (slope), locations of key features, and providing quality assurance of Record Drawings.

The duties of the CQA Surveyor are for verification and do not lessen the responsibility of the Contractor to provide his own surveying to layout, control, and document the work. The Contractor is required to meet the surveying and as-built drawing requirements set forth in the Specifications.

CQAP Worksheet #6
Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone No.	Procedure (Timing Pathways, etc.)
Regulatory Oversight of CQA Activities	Illinois EPA Designated Representative	To Be Named	To Be Named	Direct access to CQA Certifying Engineer and CQA Site Manager
Oversight of CQA Activities	Geosyntec Consultants	CQA Certifying Engineer John Seymour, P.E.	(312) 416-3919	Directly accessible to the lead PRP, Project Coordinator, RD Consultant (the Engineer), and CQA Consultant for technical direction
Manage CQA Activities	Geosyntec Consultants	CQA Site Manager (To Be Named)	To Be Named	Interact on a frequent basis with the CQA Certifying Engineer, point of contact and oversee the work of the CQA Surveyor, the CQA Testing Laboratory, coordinate day-to-day CQA Activities with CQA Technician(s) and communicate any field CQA issues to CQA Certifying Engineer
Conduct CQA Activities	Geosyntec Consultants	CQA Technician(s) (To Be Named)	To Be Named	Conduct day to day field CQA activities and communicate on a daily basis with the CQA Site Manager
Conduct CQA Geotechnical Testing	CQA Geotechnical Testing Laboratory	To Be Named	To Be Named	Coordination with CQA Site Manager
Conduct CQA Surveying	CQA Surveyor	To Be Named	To Be Named	Coordination with CQA Site Manager

CQAP Worksheet #7
Personnel Responsibilities and Qualifications Table

Name	Title	Organization	Responsibilities	Required Qualifications
To Be Named	RA Contractor	To Be Named	The scope of the RA Contractor's activities is to construct and perform the work to satisfy the IEPA-approved Final Design, as set forth in the Contract Documents (Drawings, Specifications, Plans, Contract Terms and Conditions)	Contractor work is to be bid by potential contractors. Contractor will be selected based on review of qualified contractor proposals to complete the required scope of work.
John Seymour, P.E.	CQA Certifying Engineer	Geosyntec Consultants	Review conformance of material and construction to verify compliance with the intent of the requirements of the Final Design; Review and approve the Contractor's submittals; Conduct periodic site inspections; Attend the required meetings (Section 1.5); Administer the CQA program; Oversee preparation of as-built drawings by the Contractor; Review and approve the CQA Surveyor's work products; and Prepare and certify the Construction Completion Report	Registered Professional Engineer (Civil) in the State of Illinois
To Be Named	CQA Site Manager	Geosyntec Consultants	Evaluate the conformance of material and construction to verify compliance with the intent of the requirements of the Final Design; Attend the meetings described in Section 1.5 of CQAP; Direct and supervise daily CQA activities; Coordinate and supervise preparation of CQA documentation, and maintain the on-site documentation; Oversee the ongoing preparation of as-built drawings by the Contractor; Review the CQA Surveyor's work products; and Prepare the Construction Completion Report.	The CQA Site Manager must have on-site field CQA work experience on at least five previous landfill projects, two of which must involve final closure.

Personnel Responsibilities and Qualifications Table, continued

Name	Title	Organization	Responsibilities	Required Qualifications
To Be Named	CQA Technician(s)	Geosyntec Consultants	Perform daily CQA activities.	The CQA Technicians must have on-site field CQA work experience on at least one previous project.
To Be Named	CQA Geotechnical Testing Laboratory	To Be Named	Physical testing of soils required by the CQAP.	The CQA Testing Laboratory will be a geotechnical testing laboratory firm that has experience in the physical testing of soils and properly equipped to perform the geotechnical testing required by the CQAP.
To Be Named	CQA Surveyor	To Be Named	Spot-checking of soil layer thickness, grade (slope), locations of key features, and providing quality assurance of Record Drawings.	The CQA Surveyor will be a surveyor that has experience in CQA surveying of landfills.

CQAP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training	Training Provider	Training Date	Personnel/Groups Required Training	Personnel Titles/Organization	Location of Training Records
All Field Activities	40-hour OSHA Training and Annual 8-hour refresher	40 hour Training Vendor	Various – prior to site work	All Geosyntec and subcontractor personnel	Geosyntec Staff and Subcontractors, Illinois EPA designated representative	On-Site and respective organization databases
All Field Activities	Site Supervisor Training	Training Vendor	Various – prior to site work	CQA Site Manger	CQA Site Manager/Geosyntec	On-Site and respective organization databases

1.5 Applicable References

Organizations whose standards are referenced in the CQAP and the Specifications are as follows:

- AASHTO - American Association of State Highway and Transportation Officials;
- ASTM - American Society for Testing and Materials;
- IDOT - Illinois Department of Transportation;
- IEPA - Illinois Environmental Protection Agency; and
- OSHA - Occupational Safety and Health Administration.
- USEPA - United States Environmental Protection Agency

Any reference to standards of any society, institute, association, or governmental agency will pertain to the edition in effect as of the date of this CQAP, unless stated otherwise.

1.6 Site and Project Meetings

1.6.1 Pre-Construction Meeting

Prior to initiating construction activities at the site, requirements set forth in the Final Design for the project will be addressed in a Pre-Construction meeting. At a minimum, the meeting will be attended by the Contractor, the CQA Certifying Engineer, the CQA Surveyor, the Contractor, and representatives of the lead PRP. The meeting also may be attended by select CQA Consultant and by IEPA and U.S. EPA representatives.

The purpose of this meeting is to begin planning for coordination of tasks, to present the schedule and sequence of work, to discuss anticipated problems that might cause difficulties and delays in construction, and present the procedures for clarifications.

The Pre-Construction meeting should include discussion of the following activities:

- review the responsibilities of each party;
- confirm the lines of authority and communication, and update/finalize project personnel organization charts;
- distribute relevant documents to all parties;
- review critical design details of the project;
- review the Contractor's schedule;
- address approved modifications to the CQAP;
- address approved modifications to the Final Design so that the fulfillment of design specifications or performance standards can be achieved;
- establish an understanding by the parties of the CQAP, and QA and QC procedures;
- establish work area security and safety protocol in accordance with the Contractor's health and safety plan for RD/RA remedy;
- describe soil borrow source locations;
- establish soil stockpiling locations;
- confirm QA and QC testing subcontractors;
- confirm the methods for documenting and reporting, and for distributing documents and reports; and
- confirm acceptance and approval process for task completion prior to schedule sequence advancement.

Items discussed during the Pre-Construction meeting will be documented by a person designated at the beginning of the meeting, and minutes will be distributed within 10 days of the meeting.

1.6.2 Progress Meetings

A weekly progress meeting (via teleconference and/or at the site) will be held each week during construction between the CQA Certifying Engineer, select CQA Consultant, the Contractor, and the lead PRP. Current progress, planned activities for the upcoming week, and any new business or revisions to the work will be discussed at this meeting.

The CQA Certifying Engineer will document in the meeting minutes any problems, decisions, or questions arising at this meeting. Any matters requiring action which are raised in this meeting will be reported to the appropriate parties. Minutes of weekly progress meetings will be distributed to each party present at the meeting within five working days. A record of any project meeting participants will be kept in documents that are in the format of **CQAP Worksheet #9** included at the end of Section 1.6.

Daily progress meetings will be held between select CQA Consultant and the Contractor prior to the start of work. The purpose of these meetings will be to maintain safe working environment for all project personnel, to review the schedule for the day, previous day's activities, and identify any needs or potential construction problems. Major items discussed during these meetings will be documented in the CQA Consultant's daily field reports.

1.6.3 Problem or Work Deficiency Meetings

Special meetings will be held by the CQA Certifying Engineer when and if problems or deficiencies are present or judged likely to occur. At a minimum, these meetings will be attended by the Contractor, the CQA Site Manager, the lead PRP's Project Coordinator, and the CQA Consultant. The Engineer will participate if needed. The purpose of these meetings will be to define and resolve the problem or work deficiency as follows:

- define and discuss the problem or deficiency;
- review alternative solutions; and
- implement an action plan to resolve the problem or deficiency.

Items discussed during these meetings will be documented by the CQA Site Manager, and if deemed necessary by the CQA Certifying Engineer, minutes will be transmitted to affected parties.

CQAP Worksheet #9
Project Meetings Participants Sheet

Site Name: MIG De/DeWane Landfill Superfund Site **Site Location: Belvidere, Illinois**		**Meeting Type:**		
Meeting Date:				
Name	Affiliation	Phone No.	E-mail Address	Project Role

2. CQA SURVEYING

2.1 Introduction

CQA surveying of lines and grades will be conducted on a periodic basis during construction to independently verify the work of the Contractor's Surveyor. The responsibilities of the Contractor's Surveyor are described in Section 02100 of the Specifications. The CQA Surveyor will be responsible for verifying select aspects of the Contractor's work and for quality assurance of the Contractor's Surveyor's Record Drawings for inclusion in the Construction Completion Report.

2.2 Surveying Personnel

CQA Surveying will be performed under the direct supervision of a registered Land Surveyor licensed in the State of Illinois, who may also be the Senior CQA Surveyor on site. The survey crew will consist of the senior surveyor and as many surveying assistants as required to satisfactorily perform the work. Personnel will be experienced in all aspects of surveying, including detailed, accurate documentation and generation of Record Drawings.

2.3 Precision and Accuracy

The survey instruments used by the CQA Surveyor will be sufficiently precise and accurate to meet the needs of the project as defined in the Specifications. Survey instruments will be capable of reading to a precision of 0.01 ft and with a setting accuracy of 10 seconds. Calibration certificates for survey instruments will be submitted on request to the CQA Certifying Engineer prior to the initiating CQA surveying activities at the site.

2.4 Scope of CQA Surveying

The scope of CQA surveying will include, but not necessarily be limited to performing quality assurance (spot-verification) of the following:

- existing control monuments at the site and the control monuments established by the Contractor's Surveyor during construction;
- horizontal and vertical coordinates of selected construction control points;

- the 100 ft x 100 ft grid pattern at the site for verifying the Contractor's work at each grid point;
- information regarding the horizontal and vertical alignment of the various components of the work (e.g., Stormwater berms, trenches, piping, etc.);
- if requested by the lead PRP, providing sufficient survey information of interim conditions such that material quantities can be calculated for comparison/verification of the Contractor's reported quantities; and
- surveying documentation, as described in Section 2.5 of this CQAP.

It will be the responsibility of the CQA Consultant and the CQA Surveyor to coordinate the CQA surveying work such that areas are promptly surveyed, interim results are reviewed, and approval is granted for the Contractor to proceed with subsequent work in the areas. CQA Consultant will report nonconformances or inconsistencies to the Contractor promptly to minimize delays in the construction.

2.5 Documentation

Original field CQA survey notes and electronic data files will be retained by the Senior CQA Surveyor. Interim and final survey information will be provided to CQA Consultant in tabular or electronic format at the end of each day of surveying or at the end of a given surveying task, as requested by CQA Consultant. CQA Consultant may also request that the CQA Surveyor periodically verify partial/draft record drawings for a given project component.

2.6 Record Drawings

The CQA Surveyor shall verify information on the following Record Drawings, provided by the Contractor, for inclusion in the Construction Completion Report:

- Top of final cover system;
- Leachate collection trenches (including pipe alignments and elevations, type and size of pipes, cleanouts, vent locations, locations of electrical conduits, etc.).
- Stormwater conveyance structures;

- Bottom of sediment excavation and top of restored (backfilled) sediment excavation areas; and

- Access roads.

The final Record Drawing for a given project component shall be submitted by the Contractor to the CQA Certifying Engineer within 30 days of completion of that component. The CQA Surveyor shall then provide quality assurance on the Record Drawing prior to inclusion into the Construction Completion Report.

3. EROSION AND SEDIMENT CONTROL

3.1 Overview

This section of the CQAP addresses the CQA program to be implemented with regard to erosion and sediment controls at the site. The following CQA activities are discussed in this section:

- Pre-Construction Qualifying of Material Sources;
- Field Evaluation/Monitoring of Construction Techniques; and
- Deficiencies, Problems, and Repairs.

3.2 Pre-Construction Qualifying of Material Sources

Prior to construction, the Contractor will be required to provide CQA Consultant with the quality control information and certification from the supplier(s) of temporary seed, permanent seed, mulch, erosion control blanket, straw wattles and silt fence, as set forth in the Specifications.

CQA Consultant will examine all of the supplier's certifications to verify that the property values listed on the certifications meet or exceed those specified in the Specifications and that proper and complete documentation has been provided by the Contractor. CQA Consultant will report any deviations from the above requirements to the CQA Certifying Engineer prior to installation of the materials.

3.3 Field Evaluation/Monitoring

CQA Consultant will observe the Contractor's work activities and will verify that, prior to initiating work in any given area, erosion and sediment controls, as set forth in the Specifications and on the Drawings have been installed. CQA Consultant will routinely verify that the Contractor keeps the site free from excessive sediment and in as neat a condition as possible. This includes the project area, haul roads, borrow areas,

stockpile areas, site entrance roads, and nearby streets. CQA Consultant will routinely verify that the Contractor's erosion controls are in adequate condition. The Contractor shall provide the CQA Consultant copies of all shipping documentation to verify the type and quantities of materials and seed supplied. The CQA Consultant shall verify that the application rates meet specifications.

3.4 Deficiencies, Problems, and Repairs

Deficiencies, problems, or other non-conformances with the erosion and sediment control requirements set forth in the Final Design will be documented and reported to the Contractor and the CQA Certifying Engineer for immediate repair.

4. CLEARING, GRUBBING, AND STRIPPING

4.1 Overview

This section of the CQAP addresses the CQA program to be implemented with regard to clearing, grubbing, and stripping of existing on-site soil. The following CQA activities are addressed in this section:

- Field Evaluation/Monitoring of Construction Techniques; and
- Deficiencies and Problems.

4.2 Field Evaluation/Monitoring of Construction Techniques

Monitoring activities for clearing and grubbing and for the stripping and stockpiling of on-site soils will include the following:

- verifying and documenting that erosion and sediment controls are in-place prior to the start of clearing, grubbing, and stripping and that they are maintained throughout construction;
- verifying that trees, brush, and stumps are shredded, chipped, or otherwise size-reduced;
- verifying that the cleared and size-reduced vegetation is hauled offsite or placed in the Designated Refuse Area as shown in the Drawings.
- verifying that minimal disturbance to surrounding areas occurs during clearing and grubbing activities, and that any such areas are restored by the Contractor;
- monitoring stripping and stockpiling of topsoil, including checking for noncomplying materials and verifying that over-stripping (i.e., excess soil removal) does not take place; and
- monitoring the location and configuration of soil stockpile areas and verifying the separation of adjacent stockpiles of different material.

4.3 Deficiencies and Problems

Deficiencies, problems, or other non-conformances with the Final Design will be documented and reported to the Contractor and the CQA Certifying Engineer.

5. EARTHWORK

5.1 Overview

This section of the CQAP addresses the CQA program to be implemented with regard to earthwork, particularly as associated with placement/compaction of Clay Fill, Structural Fill, Vegetative Soil Layer, Road Surface Course, Road Base Aggregate and Separator Fabric. The following CQA activities are discussed in this section:

- Pre-Construction Qualifying of Material Sources;
- Material Conformance Testing;
- Field Evaluation/Monitoring of Construction Techniques;
- Field Testing of Work Product; and
- Deficiencies, Problems, and Repairs.

5.2 Pre-Construction Qualifying of Material Sources

CQA Consultant will obtain soil and aggregate samples from each proposed source prior to construction. Soil and aggregate samples will be shipped to the CQA Testing Laboratory by the Contractor. The properties of soils and aggregates will be evaluated by the CQA Testing Laboratory and results will be reviewed by CQA Consultant and compared to the requirements of the Specifications to ensure that all soil and aggregate samples meet the requirements set forth in the Specifications. The laboratory test methods to be performed for pre-construction testing are summarized in **Table 5-1**. **CQAP Worksheet #23** also summarizes the test methods for qualifying material sources.

If during Pre-Construction qualifying, a sample fails to meet the requirements of the Specifications, CQA Consultant will notify the Contractor and the CQA Certifying Engineer. Use of the material will not be allowed until the material is prequalified by further tests or otherwise accepted by the CQA Certifying Engineer and the Engineer. Additional tests, if necessary, will be performed by CQA Consultant at the request of the CQA Certifying Engineer and at the Contractor's expense.

5.3 Material Conformance Testing

During construction, a conformance testing program will be implemented by CQA Consultant to verify that the properties of all soils and aggregates meet the specified material properties. CQA Consultant will obtain soil samples for conformance testing from either on-site stockpiles or from trucks as they unload material in the work area. The laboratory test methods and frequencies required for CQA conformance testing are given in **Table 5-1**. **CQAP Worksheet #23** also summarizes the test methods for materials conformance testing.

If a sample fails a conformance test, CQA Consultant will notify the Contractor and use of the material represented by that sample will not be allowed. Use of the material will not be allowed until the material is re-qualified by further tests or otherwise accepted by the CQA Certifying Engineer and the Engineer, or the Contractor will use material from a different approved source.

5.4 Field Evaluation/Monitoring of Construction Techniques

CQA Consultant will monitor and document at a minimum the following earthwork activities:

- verifying and documenting that erosion and sediment controls are in-place prior to the start of any earthwork activity and that they are maintained throughout construction;
- verification of the existing Clay Fill thicknesses prior to excavation of the existing grade at the top of the landfill. Clay Fill thickness shall be verified in accordance with Paragraph 3.05 of Section 02200 of Specifications.
- verification of the existing Clay Fill thicknesses at portions of the landfill side slope where existing grade will be excavated prior to Clay Fill placement. Clay Fill thickness shall be verified in accordance with Paragraph 3.05 of Section 02200 of Specifications.
- monitoring the thickness of loose and compacted lifts;
- monitoring number of passes for compacting soils or aggregates;
- verifying that the surface of a previously-placed lift is properly scarified and prepared prior to placement of the adjacent lift;

- documenting the construction equipment used to place and compact the material;
- observing compaction and heavy hauling equipment on the construction surface to detect inadequate compaction (i.e., penetration, pumping, cracking, etc.);
- monitoring the condition of Separator Fabric as they are placed and monitoring stitching between Separator Fabric segments;
- verifying that proper equipment and methods are used to place soil or aggregate over Separator Fabric;
- monitoring the construction of trenches and stormwater conveyance structures;
- monitoring road subgrade prior to placement of Road Base Aggregate placement to document the existence of smooth and firm ground without excessively soft, loose, or unstable areas;
- verifying that the surface of the Vegetative Soil Layer is properly prepared for seeding, and that seeding takes place within the specified time limits.
- Minimum 2 feet of existing soil to be excavated from the existing leachate impoundment with confirmation sampling in accordance with the Remedial Action Work Plan.

5.5 Field Testing and Verification of Work Product

5.5.1 Routine Field Testing

Field testing (i.e., density and moisture content testing) of placed/compacted soils and aggregates will be performed by CQA Consultant during construction to evaluate the Contractor's work product with respect to the requirements of the Specifications. The test methods and frequencies for CQA field testing are given in **Table 5-1**. **CQAP Worksheet #23** also summarizes the test methods for field testing. Sampling and test locations will be selected by CQA Consultant.

Moisture/density testing will be performed using a nuclear gauge (in accordance with ASTM D 6938). CQA Consultant will also routinely verify calibration of the nuclear gauge throughout construction using methods such as Drive Cylinder (ASTM D 2937)

density testing (**Worksheet #22**). One drive cylinder sample shall be taken for every 30 nuclear gauge tests.

In addition to field testing, the CQA Consultant shall verify the thickness of Clay Fill in accordance with Paragraph 3.05 of Section 02200 of Specifications. For areas where Clay Fill thickness is less than 3-ft, the Contractor shall place additional Clay Fill and maintain minimum of 3 percent grade.

5.5.2 Special Testing

A special testing frequency will be used at the discretion of the CQA Certifying Engineer or CQA Consultant when visual observations of construction performance indicate a potential problem. Additional testing for suspected areas will be considered when:

- the compactor rollers slip during rolling operations;
- the lift thickness is greater than specified;
- the material is at improper and/or highly variable moisture content;
- fewer than the specified number of roller passes are made;
- dirt-clogged rollers are used to compact the material;
- the degree of compaction is doubtful; or
- as directed by the CQA Certifying Engineer.

During construction, the frequency of testing may also be increased in the following situations:

- adverse weather conditions;
- breakdown of equipment;
- at the start and finish of grading; or
- if the material fails to meet specification requirements.

5.5.3 Perforations

All holes created in the ground by nuclear gauge probe will be backfilled by CQA Consultant with bentonite powder and compacted in-place by tamping in 3 inch lifts. Bentonite will be provided by the Contractor.

5.6 Deficiencies, Problems, and Repairs

If a deficiency or noncompliance is discovered, CQA Consultant will promptly evaluate the extent and nature of the defect. The extent of the deficient area will be evaluated by additional tests, observations, a review of records, or other means deemed appropriate (e.g., proof rolling by the Contractor).

After defining the extent and nature of a defect, CQA Consultant will notify the Contractor and the CQA Certifying Engineer to schedule appropriate retests after the work deficiency is corrected.

The Contractor will correct the deficiency to the satisfaction of the CQA Consultant and the CQA Certifying Engineer. If a project specification criterion cannot be met, or unusual weather conditions hinder work, then the CQA Consultant will develop and present to the CQA Certifying Engineer suggested alternative solutions for approval. All retests recommended by CQA Consultant must verify that the deficiency has been corrected before any additional work is performed by the Contractor in the area of the deficiency.

CQAP Worksheet #22
Field Equipment Calibration

Field Equipment	Activity	SOP Reference	Title or position of responsible person	Frequency	Acceptance Criteria	Corrective Action
Nuclear Density Gauge	Calibration	ASTM D6938	CQA Technician	Daily	Verify with Drive Cylinder Testing – 1 Drive Cylinder per 30 Nuclear Gauge Tests	Recalibrate Nuclear Density Gauge and replace gauge as necessary

CQAP Worksheet #23
Testing Methods

Method[1]	Title	Data Type	Matrix	Equipment Type
ASTM D422	Standard Test Method for Particle Size Analysis of Soils	Geotechnical Characterization	Soil	Geotechnical Laboratory Equipment
ASTM C136	Standard Test Method for Sieve analysis of Fine and Coarse Aggregates			
ASTM D4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils			
ASTM D2487	Standard Practice for Classification of Soils for Engineering purposes (Unified Soil Classification System)			
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort			
ASTM D2216	Standard Test Methods for Laboratory Determination of Water Content of Soil and Rock by Mass			
ASTM D5084	Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter			
ASTM D2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)			
ASTM D2974	Standard Test Methods for Moisture, Ash, and Organic matter of Peat and Other Organic Soils			
ASTM D4972	Standard Test Method for pH of Soils			
ASTM D4373	Standard Test Method for Rapid Determination of Carbonate Content of Soils			

[1] Testing methods that are current at the time of construction shall be used.

CQAP Worksheet #23
Testing Methods, continued

Method	Title	Data Type	Matrix	Equipment Type
ASTM D6938	Standard Test Method for In-place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)	Field Verification Testing	Clay Fill	Nuclear Density Gauge
ASTM D2937	Standard Test Method for Density of Soil in Place by the Drive Cylinder Method			Drive Cylinder
SW846 8260B	TAL Volatile Organic Compounds	Soil Chemical Characterization – See Project QAPP for more details regarding analytical methods	Soil	Analytical Laboratory Equipment
SW846 8270C	TAL Semivolatile Organic Compounds			
SW846 8081A	Organochlorine Pesticides by Gas Chromatography			
SW846 8082	PCBs by Gas Chromatography			
SW846 8321A	Solvent Extractable Nonvolatile Compounds by High Performance Liquid Chromatography / Thermospray / Mass Spectrometry or Ultraviolet Detection			
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete	Concrete Verification Testing	Concrete	Field Equipment
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method			
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens			Laboratory Equipment

6. LEACHATE AND GAS MANAGEMENT SYSTEM

6.1 Overview

This section of the CQAP addresses the CQA program to be implemented with regard to installation of the leachate and gas management system. Items associated with the leachate and gas control system includes: (i) Leachate Collection Pipe; (ii) Leachate Transmission Pipe; (iii) Trench Backfill; (iv) Pipe Bedding; (v) Cement-Bentonite Grout Fill; (vi) underground and above ground storage tanks, pumps, piping, fittings and associated accessories; (vii) Force Main; (viii) cleanout and passive vent risers; and (ix) Separator Fabric.

The following CQA activities are discussed in this section:

- Pre-Construction Qualifying of Material Sources;
- Material Conformance Testing;
- Field Evaluation/Monitoring of Construction Techniques
- Field Testing of Work Product; and
- Deficiencies, Problems, and Repairs.

6.2 Pre-construction Qualifying of Material Sources

6.2.1 HDPE Pipe

The leachate and gas collection system will include perforated and solid-wall HDPE pipes. The pipes must be pre-qualified as described below. Prior to the shipment of the HDPE pipes and fittings the Contractor will be required to provide CQA Consultant with the quality control information and certifications from the HDPE pipe manufacturer as set forth in Section 04100 of the Specifications.

CQA Consultant will examine all of the HDPE pipe manufacturer's certifications to verify that the property values listed on the certifications meet or exceed the Specifications, and that proper and complete documentation has been provided by the

Contractor for all HDPE pipe, fittings, and pipe-accessories to be used at the site. CQA Consultant will report any deviations from the above requirements to the Contractor prior to approving installation of the pipe.

CQA Consultant will verify that the following information is printed at frequent intervals on, or otherwise clearly provided for the HDPE pipe used on the project:

- name and/or trademark of the pipe Manufacturer;
- nominal pipe size, wall thickness, and SDR;
- manufacturing standard references; and
- a production code from which the date and place of manufacture can be determined.

If, during pre-construction qualifying, any of the HDPE piping fails to meet the Specifications, CQA Consultant will notify the Contractor. Use of the material will not be allowed until the material is prequalified by further tests or otherwise accepted by the Engineer.

6.2.2 PVC Pipe

PVC pipe must be prequalified as described below. Prior to the shipment of the pipes and fittings, the Contractor will be required to provide CQA Consultant with the quality control information and certifications from the manufacturers as set forth in Section 04090 of the Specifications.

CQA Consultant will examine all of the manufacturer's certifications to verify that the property values listed on the certifications meet or exceed the Specifications, and that proper and complete documentation has been provided by the Contractor for all pipe, fittings, and pipe-accessories to be used at the site. CQA Consultant will report any deviations from the above requirements to the Contractor prior to approving installation of the pipe.

CQA Consultant will verify that the following information is printed at frequent intervals on, or otherwise clearly provided for the pipe used on the project:

- name and/or trademark of the pipe Manufacturer;

- nominal pipe size and wall thickness and/or schedule designation;
- manufacturing standard reference; and
- a production code from which the date and place of manufacture can be determined.

If, during pre-construction qualifying, any of the piping or turbines fails to meet the Specifications, CQA Consultant will notify the Contractor. Use of the material will not be allowed until the material is prequalified by further tests or otherwise accepted by the Designer.

6.2.3 Trench Backfill and Pipe Bedding

CQA Consultant will obtain samples from each proposed source prior to construction. Samples will be shipped to the CQA Testing Laboratory by the Contractor. The properties of Trench Backfill and Pipe Bedding will be evaluated by the CQA Testing Laboratory, and results will be reviewed by CQA Consultant and compared to the requirements of the Specifications to ensure that all samples meet the requirements set forth in the Specifications. The laboratory test methods to be performed for pre-construction testing for Trench Backfill and Pipe Bedding are included in **Table 5-1**.

If, during Pre-Construction qualifying, a sample fails to meet the requirements of the Specifications, CQA Consultant will notify the Contractor and the CQA Certifying Engineer. Use of the material will not be allowed until the material is prequalified by further tests or otherwise accepted by the CQA Certifying Engineer and the Engineer. Additional tests, if necessary, will be performed by CQA Consultant at the request of the CQA Certifying Engineer and at the Contractor's expense.

6.2.4 Cement-Bentonite Grout Fill

Cement-Bentonite Grout Fill will be pre-qualified by the CQA Consultant if the mix design provided by the Contractor as part of the submittal process is in accordance with Section 02300 of the Specifications. The products will be verified upon delivery at the field.

6.2.5 Separator Fabric

Separator Fabric will be pre-qualified by the CQA Consultant if the data sheet provided by the Contractor as part of the submittal process is in accordance with Section 02200 of the Specifications. The product will be verified upon delivery at the field.

6.2.6 Leachate Storage Tanks, Pumps, Piping, Fittings and Accessories

Leachate Storage Tanks, pumps, piping, fittings and accessories will be pre-qualified by the CQA Consultant by the data sheets provided by the Contractor as part of the submittal process is in accordance with Division 4 through 5 of the Specifications. The products will be verified upon delivery at the field. Contractor shall provide copies of all shipping information to the CQA Consultant documenting the shipped materials/equipment (quantities, model types, etc.).

6.3 Material Conformance Testing

A conformance testing program will be implemented by CQA Consultant during construction to verify that the properties of all soils and aggregates meet the specified material properties. CQA Consultant will obtain soil samples for conformance testing from either on-site stockpiles or from trucks as they unload material in the work area. The laboratory test methods and frequencies required for CQA conformance testing are given in Table 5-1.

If a sample fails a conformance test, CQA Consultant will notify the Contractor and use of the material represented by that sample will not be allowed. Use of the material will not be allowed until the material is re-qualified by further tests or otherwise accepted by the CQA Certifying Engineer and the Engineer, or the Contractor will use material from a different approved source.

Material conformance testing for the remaining components of the leachate and gas collection system will not be required unless aspects of the pre-qualifying information are deficient or suspect, or if requested by the Engineer. If deemed necessary by the CQA Certifying Engineer, CQA Consultant will deliver a sample to the appropriate testing laboratory for testing to evaluate whether the products in suspect meet the required properties of the Specifications. The conformance test requirements will be determined at that time by the Engineer. The cost of additional testing will be borne by the Contractor.

CQA Worksheet #29
Project Documents and Records

Record	Generation	Verification	Storage location/archival
Daily Field Report	CQA Technician(s)	CQA Site Manager	On-site until project end, archive location for 10 years after certification of completion
Personnel Log	CQA Site Manager	CQA Certifying Engineer	On-Site until project end, archive location for 10 years after certification of completion
CQA Inspection Records	CQA Technician(s) CQA Manager	CQA Certifying Engineer	On-site until project end, archive location for 10 years after certification of completion
CQA Testing Records	CQA Technician(s) CQA Manager	CQA Certifying Engineer	On-site until project end, archive location for 10 years after certification of completion
Record Drawings	CQA Surveyor	CQA Certifying Engineer	On-site until project end, archive location for 10 years after certification of completion
Clarification/Changes to Drawings, Specs or CQAP	CQA Consultant	CQA Certifying Engineer/Regulatory Personnel	On-site until project end, archive location for 10 years after certification of completion
Monthly Progress	Reports CQA Site Manager, Project Manager	CQA Certifying Engineer	On-site and distribution to involved parties, archive location for 10 years after certification of completion
Construction Completion Report	CQA Site Manager	CQA Certifying Engineer	Project file and distribution to involved parties, archive location for 10 years after certification of completion

TABLE

Table 5-1. Summary of Construction Quality Assurance Testing

Soil/Aggregate	Test	Method	Pre-construction Qualification Testing per Source	Minimum Frequency of Conformance Testing per Source	Minimum Frequency of Field Testing [3]
Clay Fill	Particle Size Analysis	ASTM D 422	✓	1 per 5,000 yd^3	-
	Atterberg Limits	ASTM D 4318	✓	1 per 5,000 yd^3	-
	Soil Classification	ASTM D 2487	✓	1 per 5,000 yd^3	-
	Standard Compaction	ASTM D 698	✓	1 per 5,000 yd^3	-
	As-ReceivedMoisture Content	ASTM D 2216	✓	1 per 5,000 yd^3	-
	Flexible Wall Permeability	ASTM D 5084	✓[2]	1 per 10,000 yd^3 [2]	1 per 4 acre per lift
	Chemical Characterization[5,6]	USEPA SW-846	✓[5]	-	-
	In-Place Density/Moisture	ASTM D 6938	-	-	1 per 100 ft grid or equivalent area per lift & 1 per 500 ft of Leachate Trench[4]
	Thickness Verification	-	-	-	1 per 200 ft grid or equivalent area
	Visual Classification	ASTM D 2488	-	-	As necessary
General Fill	Particle Size Analysis	ASTM D 422	✓	1 per 5,000 yd^3	-
	Atterberg Limits	ASTM D 4318	✓	1 per 5,000 yd^3	-
	Soil Classification	ASTM D 2487	✓	1 per 5,000 yd^3	-
	Standard Compaction	ASTM D 698	✓	1 per 5,000 yd^3	-
	As-ReceivedMoisture Content	ASTM D 2216	✓	1 per 5,000 yd^3	-
	Chemical Characterization[5,6]	USEPA SW-846	✓[5]	-	-
	In-Place Density/Moisture	ASTM D 6938	-	-	1 per 100 ft grid or equivalent area per lift
	Visual Classification	ASTM D 2488	-	-	As necessary
Vegetative Soil Layer[1]	Organic Content	ASTM D 2974	✓	1 per 5,000 yd^3	-
	Soil pH Test	ASTM D 4972	✓	1 per 5,000 yd^3	-
	Particle Size Analysis	ASTM D 422	✓	1 per 5,000 yd^3	-
	Atterberg Limits	ASTM D 4318	✓	1 per 5,000 yd^3	-
	Soil Classification	ASTM D 2487	✓	1 per 5,000 yd^3	-
	As-ReceivedMoisture Content	ASTM D 2216	✓	1 per 5,000 yd^3	-
	Chemical Characterization[5,6]	USEPA SW-846	✓[5]	-	-
	Visual Classification	ASTM D 2488	-	-	As necessary
Road Surface Course & Structural Fill	Particle Size Analysis	ASTM D 422	✓	1 per 5,000 yd^3	-
	Modified Compaction	ASTM D 1557	✓	1 per 5,000 yd^3	-
	In-Place Density/Moisture	ASTM D 6938	-	-	1 per 200 ft length per lift
	Visual Classification	ASTM D 2488	-	-	As necessary
Road Base Aggregate	Particle Size Analysis	ASTM C 136	✓	1 per 5,000 yd^3	-
Trench Backfill	Particle Size Analysis	ASTM C 136	✓	1 per 5,000 yd^3	-
	Carbonate Content	ASTM D 4373	✓	-	-
	Visual Classification	ASTM D 2488	-	-	As necessary
Pipe Bedding	Particle Size Analysis	ASTM D 422	✓	1 per 5,000 yd^3	-
	Chemical Characterization[6]	USEPA SW-846	✓	1 per 5,000 yd^3	-
Riprap	Visual Inspection	-	✓	As necessary	As necessary

[1] Applies to Vegetative Soil Layer supplied from an offsite source.

[2] Applies to offsite source. Samples shall be compacted to minimum 93 percent of the standard proctor (ASTM D 698) and 1, 2, 3 and 4 percent above optimum moisture content based on standard proctor. Samples shall be to be consolidated at an effective confining pressure of 5 psi and permeated with water using gradients recommended by ASTM D 5084.

[3] CQA Consultant may perform additional testing if he/she believes that adequate compaction is not achieved.

[4] Depending on the extent of Clay Fill placed in the Leachate Collection Trench, more frequent testing may be required.

[5] Applies to soil from an offsite source. Chemical characterization results for the pre-construction qualification samples shall be submitted by the Contractor to the CQA Consultant.

[6] Chemical characterization shall include the following USEPA SW-846 methods which are included in the project QAPP:

Parameter	Extraction/Preparation	Analysis
Target Analyte List (TAL) Volatile Organic Compound	5035	8260B
TAL Semi-Volatile Organic Compound	3540/3550	8270C
Pesticide	3540/3550	8081A
PCB	3540/3550	8082
Herbicides	3580	8321A
TAL Metals	3050	6000/7000 Series
Cyanide	9014	9010