APPENDIX L

FINAL COVER VENEER STABILITY ANALYSES
FOR SCA DESIGN
GEOSYNTEC CONSULTANTS

COMPUTATION COVER SHEET

Client: Honeywell  Project: Onondaga Lake SCA Design  Project/Proposal #: GJ4299  Task #: 18

TITLE OF COMPUTATIONS  FINAL COVER VENEER STABILITY ANALYSES FOR SCA DESIGN

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DATE: 1/12/2010

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DATE: 1/12/2010

APPROVAL NOTES:  

REVISIONS (Number and initial all revisions)

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GA090663/SCA Veneer Stability  I/12/2010
FINAL COVER VENEER STABILITY ANALYSES FOR SCA DESIGN

INTRODUCTION

This package was prepared in support of the design of the Sediment Consolidation Area (SCA) for the Onondaga Lake Bottom Site, which will be constructed on Wastebed 13 (WB-13). The SCA will contain geotextile tubes (geo-tubes) surrounded by a perimeter dike. This package presents analysis of the static slope stability, in a veneer slip mode, of the final cover system that will be placed over the geo-tubes.

Seismic stability was not evaluated because the site is not located in a seismic impact zone as defined by New York State Department of Environmental Conservation (NYSDEC) Regulations Section 360-2.7(b)(7). A detailed explanation regarding the seismic impact zone assessment has been presented in “Slope Stability Analyses for SCA design” (Appendix G of the SCA Final Design and referred to herein as the “Slope Stability Package”).

METHODOLOGY

Static Slope Stability

Slope stability of a final cover system can be analyzed by assuming infinite slope conditions or finite slope conditions. The infinite slope method considers a slope of infinite length whereby driving and resisting forces occur only along or parallel to an interface (i.e., slip plane). The finite slope method considers a slope of finite length and additionally takes into account soil strength above a slip plane, primarily as a toe-buttressing effect. The evaluations in this package have been performed using a finite slope method, following the equations of Giroud, et al [1995].

\[
FS = \left[ \frac{\gamma_i(t-t_w) + \gamma_b t_w}{\gamma_i(t-t_w) + \gamma_{sat} t_w} \right] \tan \delta + \frac{a / \sin \beta}{\tan \beta} \left[ \frac{\gamma_i(t-t_w) + \gamma_{sat} t_w}{\gamma_i(t-t_w) + \gamma_{sat} t_w} \right] \left[ \frac{\tan \phi / (2 \sin \beta \cos^2 \beta) t}{1 - \tan \beta \tan \phi} \right] h \\
+ \left[ \frac{1}{\gamma_i(t-t_w) + \gamma_{sat} t_w} \right] \left[ \frac{1 / (\sin \beta \cos \beta)}{1 - \tan \beta \tan \phi} \right] ct h
\] (1)
where:  $FS = \text{factor of safety};$
$\delta = \text{interface friction angle};$
$a = \text{interface adhesion intercept};$
$\phi = \text{soil internal friction angle};$
$c = \text{soil cohesion intercept};$
$\gamma_i = \text{moist soil unit weight};$
$\gamma_{sat} = \text{saturated soil unit weight};$
$\gamma_b = \text{buoyant soil unit weight} = \gamma_i - \gamma_w;$
$\gamma_w = \text{unit weight of water};$
$t = \text{depth of cover soil above critical interface};$
$t_w = \text{water depth above critical interface};$
$t^*w = \text{water depth at slope toe};$
$\beta = \text{slope inclination};$ and
$h = \text{vertical height of slope}.$

It should be noted that while the above equation is specifically for an interface above a geomembrane or similar layers, it can also be applied to interfaces below the geomembrane by changing the coefficient of the first term, (i.e., the coefficient of $\frac{\delta}{\tan \beta}$) to 1.0. The slope geometry, which is used to derive the above equation, is shown in Figure 1. It is noted that tension in the geosynthetics (T) has conservatively not been included in the above equation or analyses presented herein.

Target Factor of Safety

Two target factors of safety (FSs) were considered for stability of the proposed SCA. The target FS values using peak and residual shear strength values were considered to be 1.5 and 1.2, respectively. The analyses were performed by solving the finite slope stability equation, (i.e., Equation 1) for various combinations of internal/interface shear strength parameters (i.e., “$\delta$” and “$a$” for above and below a geomembrane) corresponding to the target FS. By using this method, minimum acceptable internal/interface shear strength parameters for the cover system components could be established.

MATERIAL PROPERTIES

Cover System Along SCA Side Slopes

The proposed final cover system above the geo-tubes consists of a leveling layer, a low density polyethylene (LDPE) geomembrane (GM), a geocomposite drainage layer along the side
slopes, 24 inches of protective soil and 6 inches of topsoil. It is further noted that the type of GM is not expected to impact the results because required shear strength properties are back-calculated to be compared with actual properties. The protective soil and the topsoil are modeled as a single 30 inch thick soil layer above the GM. This soil layer was modeled with a unit weight of 120 pcf, as discussed in the Slope Stability Package. The shear strength parameters of the final cover soils were modeled with a friction angle of 30 degrees and a cohesion intercept of zero, as discussed in the Slope Stability Package.

SCA Slope Geometry

The current design of the side slopes of the final cover assumes a minimum thickness of 30 inches of cover soil material on top of five stacks of geo-tubes, the leveling layer, and the geosynthetics (i.e., geomembrane and geocomposite drainage layer). Each geo-tube stack is offset 20 ft from the layer below and is assumed to be approximately 6 ft thick. This results in side slopes of 20 horizontal:6 vertical (20H:6V), a total slope height of 30 ft, and a slope angle $\beta = 16.7$ degrees.

Depth of Water $t_w$

The water depth in the drainage layer ($t_w$) was computed using the “Hydraulic Evaluation of Landfill Performance” (HELP) software, Version 3.07, developed by the U.S. Environmental Protection Agency. The HELP model is a quasi two-dimensional hydrologic model of water movement across, into, through and out of landfills. The HELP model accepts weather, soil, and design data and uses solution techniques to account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, lateral drainage, and leakage through liners [Schroeder, 1994]. More detailed information on the use of HELP is presented in Appendix I of the SCA Final Design, “Evaluation of Hydraulic Performance for SCA Design” (hereafter referred to as the “HELP package”). The highest daily value for the average water depth (i.e., average peak daily water depth) on the SCA side slopes was calculated by HELP to be 0.02 inches (0.002 ft). This value is less than the thickness of a typical geocomposite.

RESULTS OF ANALYSES

The interface friction angle and adhesion combinations for the final cover system that meet the target FS were calculated using a computer spreadsheet (see Tables 1 and 2). Results of final cover system veneer stability analyses are presented in Figures 2 and 3. These figures represent various combinations of peak and residual internal/interface shear strength parameters (i.e., $\delta$ and $a$) required for a calculated static FS of 1.5, and 1.2, respectively. It is noted that the required parameters to achieve the target FS for components above the GM were found to be more critical.
than required parameters for components below the GM. Therefore, only the required shear strength parameters to achieve stability above the GM are shown on these figures. These required parameters can be achieved with commercially available products.

**SUMMARY AND CONCLUSIONS**

Results of the final cover system veneer slope stability indicated that a peak internal/interface shear strength of $\delta = 22.7$ degrees and $a = 0$ psf (or equivalent $\delta - a$ combinations as shown in Figure 2), and a residual internal/interface shear strength of $\delta = 18.1$ degrees and $a = 0$ psf (or equivalent $\delta - a$ combinations as shown in Figure 3) were the minimum requirements for a calculated FS of 1.5 and 1.2, respectively. These required properties correspond to a confining stress of approximately 300 psf due to the weight of the protective soil and topsoil layers.

It is noted that the minimum requirements for internal/interface shear strength parameters for the final cover are typical of many commercially available geosynthetic materials. Prior to construction of the final cover system, the internal/interface shear strength properties of the soil and geosynthetic materials selected for use should be verified by performing site-specific interface shear strength testing.
REFERENCES


Tables
**Onondaga Lake SCA Final Design**  
*Finite Slope Equation [Giroud et. al., 1995]*

### FS Above GEOMEMBRANE

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<tr>
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<tr>
<td>$t^*$ (water depth at slope toe)</td>
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<tr>
<td>$\delta$ (interface friction angle)</td>
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<tr>
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**FS:** 1.50

### FS Below GEOMEMBRANE

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**FS:** 1.50

Table 1. Peak Stability Calculation Spreadsheet
Onondaga Lake SCA Final Design

Finite Slope Equation [Giroud et. al., 1995]

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Table 2. Residual Stability Calculation Spreadsheet
Figures
Figure 1. Slope Geometry used to derive Slope Stability Equation
[Giroud et al, 1995]
Figure 2. Minimum Required Peak Interface/Internal Shear Strength Parameters for Cover System Geosynthetic Components
Figure 3. Minimum Required Residual Interface/Internal Shear Strength Parameters for Cover System Geosynthetic Components
APPENDIX M

CONSTRUCTION QUALITY ASSURANCE PLAN
CONSTRUCTION QUALITY ASSURANCE PLAN

ONONDAGA LAKE SEDIMENT CONSOLIDATION AREA (SCA) FINAL DESIGN
Camillus, New York

Prepared by

Geosyntec consultants
engineers | scientists | innovators

301 Plainfield Road, Suite 200
Kennesaw, Georgia 30144

Project Number GJ4299
January 2010
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LIST OF ATTACHMENTS

Attachment A – CQA Testing and Monitoring Procedures
Attachment B – Sample Forms
Attachment C – Field Change Forms
LIST OF ACRONYMS

ACAP  Alternative Cover Assessment Program
ASTM  American Society for Testing and Materials
BOD   Basis of Design
CHASP Construction Health and Safety Plan
CM    Construction Manager
CQA   Construction Quality Assurance
CQAP  Construction Quality Assurance Plan
CQC   Construction Quality Control
cy   Cubic yards
NPL   Nation Priorities List
NYSDEC New York State Department of Environmental Conservation
OM&M  Operation, Maintenance, and Monitoring
PM    Parsons Project Manager
PRG   Preliminary Remedial Goal
QA/QC Quality Assurance/Quality Control
RAO   Remedial Action Objectives
RAC   Remedial Action Contractor
ROD   Record of Decision
SCA   Sediment Consolidation Area
SHSO  Site Health and Safety Officer
SMU   Sediment Management Unit
SOW   Statement of Work
USEPA United States Environmental Protection Agency
1. INTRODUCTION

1.1 Purpose

This Construction Quality Assurance Plan (CQAP) presents the procedures and protocols that will ensure the construction of the Onondaga Lake Sediment Consolidation Area (SCA) will be executed in accordance with the approved design documents.

This CQAP has been prepared on behalf of Honeywell International Inc. (Honeywell). The Onondaga Lake bottom is on the New York State Registry of Inactive Hazardous Waste Sites and is part of the Onondaga Lake National Priorities List (NPL) Site. Honeywell entered into a Consent Decree (United States District Court, Northern District of New York, 2007) (89-CV-815) with the New York State Department of Environmental Conservation (NYSDEC) to implement the selected remedy for Onondaga Lake as outlined in the Record of Decision (ROD) issued on July 1, 2005. The following documents are appended to the Consent Decree: ROD, Explanation of Significant Differences, Statement of Work (SOW), and Environmental Easement. The Draft Onondaga Lake SCA Civil and Geotechnical Final Design (Final Design) Report (Parsons and Geosyntec, 2010) presents the design of the SCA.

1.2 Remedial Action Objectives

Activities associated with the Onondaga Lake remediation, including construction of the SCA, are designed to ensure the health and safety of the surrounding community, the environment, and onsite workers from potential hazards associated with the execution of the remedy. The ROD also provides more specific objectives - referred to as remedial action objectives [RAOs] - and goals (referred to as preliminary remedial goals [PRGs]) for the lake remedy. The specific objectives related to the SCA design include the following:

- Design the SCA for the efficient and secure containment of sediments dredged as part of the Onondaga Lake remedy in a manner that ensures the health and safety of the community and the environment.

- Incorporate dredging, SCA operations, and water treatment into the SCA civil and geotechnical design.
Incorporate stakeholder (i.e., regulatory agencies and the community) input in the process to identify design criteria (i.e., odor mitigation, redundancy of operations, leachate containment, dewatering, traffic, beneficial use, groundwater monitoring, etc.).

1.3 Report Organization

This CQAP is organized into five sections and three attachments. The remedial action objectives, and site location and description are presented in Section 1. The definitions relative to the Quality Management System are defined in Section 2. Project management, including roles and responsibilities of the project team, chain of command, communication, and meetings is presented in Section 3. Construction oversight tasks, which will ensure SCA construction quality, such as inspections, Quality Assurance/Quality Control (QA/QC) testing, and documentation are presented as Section 4. References are included in Section 5.

Attachment A contains CQA testing and monitoring procedures. Sample copies of construction documentation forms are provided in Attachment B. A Field Change Form is presented as Attachment C.

1.4 Site Location and Description

Onondaga Lake is a 4.6 square mile (3,000 acre) lake located in Central New York State immediately northwest of the City of Syracuse. As specified in the ROD, a component of the selected lake remedy includes the dredging and onsite consolidation of sediments removed from the lake. Honeywell evaluated potential locations for building and operating an SCA to contain sediment removed from Onondaga Lake during the remedial action, as documented in the Onondaga Lake SCA Siting Evaluation (Parsons, 2006). Each of Honeywell’s Solvay Wastebeds was evaluated as a potential location for an SCA based on accessibility, estimated capacity, current and future site use, geotechnical considerations, and distance from residences. Based on the evaluation results, and as documented in the SOW of the Consent Decree, Wastebed 13 was selected for building and operating the SCA.

Wastebed 13 is located in the Town of Camillus and encompasses approximately 163 acres. It is bordered to the north by Ninemile Creek and the CSX Railroad tracks; to the west by an Onondaga County Garage property and a former gravel excavation owned
by Honeywell; and to the east and south by Wastebeds 12 and 14, respectively. Wastebed 13 was originally designed as a settling basin for the disposal of Solvay waste and has recently been used by the State University of New York College of Environmental Science and Forestry (SUNY ESF) and Honeywell for willow/evapotranspiration cover pilot test plots. These test plots now occupy several acres along the southern border of the wastebed.

1.5 **SCA Design**

The SCA has been designed to provide long-term protection to human health of the surrounding community members and the public, and satisfy the requirements of the NYSDEC’s ROD, and the RDWP. The SCA design is presented in the Draft Final SCA Civil and Geotechnical Design. This CQAP describes CQA activities that will be performed on SCA construction, which includes the following components:

- composite liner and liquid collection system;
- surface water control system; and
- final cover system.

**1.5.1 Composite Liner and Liquid Collection System**

The composite liner and liquid collection system consists of the following components from top to bottom:

- 24-inch (average) drainage layer (24-inch minimum in truck traffic areas);
- geotextile cushion;
- 60-mil LLDPE geomembrane liner; and
- 12-inch minimum (18-inch minimum at the sumps) low-permeability soil component with top 6 inches compacted to achieve a permeability less than or equal to $1 \times 10^{-6}$ centimeters per second (cm/sec).

The liquids management system includes the drainage layer (which is also part of the base composite liner system), pumps, sumps, and risers, which are designed to handle...
the appropriate design flows. The design and performance criteria for these systems and the assumptions made and calculations performed to develop the liquid management system design are presented in the SCA Final Design.

1.5.2 Surface Water Control System

The surface water control system will be constructed as the cover system is constructed. This surface water management system includes the following features:

- diversion berms;
- riprap chutes;
- toe drainage channels; and
- perimeter culverts.

1.5.3 Final Cover System

The specific components of the final cover system are as follows from top to bottom:

- 6-inches of topsoil;
- 24-inches of protective soil layer; and
- 40-mil LLDPE geomembrane.

In addition, the sideslope cover system will include a geocomposite drainage layer between the protective soil layer and the geomembrane. The type of vegetation (e.g., grasses, shrubs, etc.) that will be planted after topsoil placement is completed will be established when the final cover design is finalized.
2. DEFINITIONS AND USE OF TERMS

2.1 Definitions Relating to CQA

Generally, construction quality assurance and construction quality control are defined as follows:

- **Construction Quality Assurance (CQA)** - The planned and systematic means and actions that provides the permitting agency and Honeywell International, Inc. (Honeywell) adequate confidence that materials and/or services meet contractual and regulatory requirements and will perform satisfactorily in service.

- **Construction Quality Control (CQC)** - Planned system of inspections and testing taken by the contractor to monitor and control the characteristics of an item or service in relation to contractual and regulatory requirements.

In the context of this document:

- CQA refers to means and actions employed by the Engineer to assess conformity of the various components of the SCA construction with the requirements of the Drawings, Specifications, and work plans.

- CQC refers to those actions taken by the Contractor to determine compliance of the materials and workmanship of the SCA construction with the requirements of the Drawings, Specifications, and work plans.

Generally, manufacturing quality assurance and manufacturing quality control are defined as follows:

- **Manufacturing Quality Control (MQC)** - A planned system of inspections that is used to directly monitor and control the manufacture of a material which is factory originated. MQC is normally performed by the manufacturer of geosynthetic materials and is necessary to ensure minimum (or maximum) specified values in the manufactured product. MQC refers to measures taken by the manufacturer to determine compliance with the requirements for materials and workmanship as stated in certification documents and contract specifications.
• **Manufacturing Quality Assurance (MQA)** - A planned system of activities that provides assurance that the materials were constructed as specified in the certification documents and contract specifications. MQA includes manufacturing facility inspections, verifications, audits and evaluation of the raw materials (resins and additives) and geosynthetic products to assess the quality of the manufactured materials. MQA refers to measures taken by the MQA organization to determine if the manufacturer is in compliance with the product certification and contract specifications for the project.

Roles and responsibilities of the SCA Construction Team relating to the CQA/CQC tasks are described in the next section.

### 2.2 References to Standard

The CQAP references to test procedures indicate that they pertain to the latest editions of the American Society for Testing and Materials (ASTM).

### 2.3 Units

In this CQAP, all parameters, properties, and dimensions are expressed in English units, unless specified otherwise. If the geomembrane manufacturer, fabricator, or installer provides SI units, a conversion to English units shall be provided.
3. PROJECT MANAGEMENT

3.1 Roles and Responsibilities of the SCA Construction Team

The SCA construction is a consorted effort between NYSDEC and Honeywell. Each entity plays a key role and has responsibilities necessary to execute the project in accordance with the ROD, Consent Decree, Final Design, and Contract Documents. An established chain of command is essential for communication and decisive decision making. Roles and responsibilities of the team members and agencies are described below. Key contact information is presented in Table 3.1.

3.1.1 Agencies

NYSDEC

The NYSDEC is the lead agency for the SCA construction. The NYSDEC will designate a Project Manager for the SCA construction project. The NYSDEC’s Project Manager participates in progress meetings, conducts site inspections, and provides regulatory approval for components of the remedy. The NYSDEC’s Project Manager both conducts and participates in public meetings, as necessary, and is the point of contact for public questions and concerns.

OTHER AGENCIES

The USEPA, Onondaga County, and the Town of Camillus are parties of interest to the project. These agencies provide comments to the project team through NYSDEC.

3.1.2 Honeywell

Honeywell, as the Owner, is ultimately responsible for implementing the SCA construction in accordance with the ROD and Consent Decree. Mr. John McAuliffe is Honeywell’s Project Manager and direct contact with the NYSDEC. Honeywell’s Project Manager attends public meetings and specific construction meetings, and reviews documents prior to submission to the NYSDEC.
3.1.3 Parsons Project Manager

The Parsons Project Manager (PM) serves as Honeywell’s onsite representative. The PM is responsible for ensuring that SCA construction is completed in accordance with the Contract Documents and approved Final Design. The PM will interface directly with Honeywell, NYSDEC, the Construction Manager, the Project Engineer, and the CQA Engineer as necessary.

The PM has the following specific duties:

- Provide centralized leadership for project activities;
- Interpret and plan the overall work effort;
- Communicate directly with the Construction Manager, CQA Engineer, and Project Engineer for project needs;
- Ensure that QA/QC activities are conducted;
- Define personnel and equipment requirements and secure resource commitments;
- Orchestrate and participate in meetings as required; and
- Maintain overall project safety standards.

3.1.4 Construction Manager

The Construction Manager (CM) is responsible for completion of the construction work. The CM’s project team will consist of, at a minimum, construction personnel and/or, subcontractors, a Site Health and Safety Officer (SHSO), and a Construction Quality Control (CQC) Inspector.

The CM has the following specific duties:

- Communicate directly with the PM for project needs;
- Implement onsite construction activities and direct the work crew and onsite construction personnel on daily operations;
• Prepare for and attend meetings as required;
• Procure, contract with, and monitor subcontractors and suppliers as needed;
• Establish work budgets and schedules with milestones;
• Assure that documentation is submitted to the Project Engineer as required in the Contract Documents;
• Monitor the financial status of the project, negotiate change orders, and submit pay applications; and
• Maintain construction quality and safety standards.

The full-time onsite SHSO is responsible for implementation of the Construction Health and Safety Plan (CHASP). The SHSO has the following specific duties:
• Ensure that site personnel possess necessary training and medical surveillance;
• Conduct daily safety meetings with the workers;
• Establish work zones and relocating zones as necessary;
• Determine personnel protective equipment requirements for specific work tasks and order any changes based on work area monitoring data;
• Ensure work is performed in compliance with the HASP and applicable regulations;
• Implement air monitoring program and report data;
• Perform routine safety inspections; and
• Report and investigate accidents or incidents.

The full-time onsite CQC Inspector is responsible for preparing technical submittals, conducting CQC testing (or working with independent testing subcontractor), and documenting the work (i.e., daily reports, etc.).
The CM is responsible for obtaining a surveyor to determine the lines and grades required to control the work during the construction. The project surveyor shall be a licensed Professional Land Surveyor in the state of New York, who will sign and seal survey record drawings.

3.1.5 Project Engineer

The Project Engineer is responsible for providing engineering support and interpretation of the design. The Project Engineer will work with the Design Engineer on issues that require engineering interpretation related to the design. The Project Engineer is responsible for managing submittal review and submittal of appropriate submittals to the Design Engineer and the CQA Engineer.

3.1.5.1 Design Engineer

The Design Engineer will provide engineering support as needed and review construction submittals that require engineering interpretation. The Design Engineer will be a New York State licensed Professional Engineer. The Design Engineer for the SCA is Dr. Jay Beech, P.E. of Geosyntec Consultants (Geosyntec). The Design Engineer is also responsible for the instrumentation (i.e., piezometers, settlement cells, settlement profilers, and inclinometers) associated with the SCA as shown on the SCA Final Design Drawings. If modifications to the approved Final Design are necessary, approval by the Design Engineer is required.

3.1.6 CQA Engineer (Engineer)

The CQA Engineer is responsible for certifying that the construction is performed in accordance with the design. The CQA Engineer will be a New York State licensed Professional Engineer. The CQA Engineer will have an independent line of reporting, separate from the PM. The CQA Engineer (or Engineer) will conduct routine inspections, document the work, and communicate with the PM, the CM, and the Project Engineer on a day-to-day basis. The CQA Engineer, or his representatives, should be onsite full-time during construction. The CQA Engineer will be responsible for completing QA activities including, monitoring, and documenting daily construction work, monitoring the compliance of materials, and confirming that workmanship is in accordance with the requirements of the Drawings and Specifications. Daily reporting
will include a daily summary report, field logs, photographic documentation, and, if necessary, reports of problem identification and corrective measures taken.

The CQA Engineer will also be responsible for onsite and offsite QA testing and documentation of materials as required. The CQA Engineer will review the CQC procedures and documentation as provided by CM. In addition to the QA testing described in the design documents, additional QA testing may be required by the CQA Engineer and/or Honeywell.

3.1.6.1 Soils CQA Laboratory

The soils CQA laboratory is the party, independent from Honeywell and the CM, responsible for conducting geotechnical laboratory tests in accordance with standards referenced in the Design Specifications. Tests include, for example, material qualifications (conformance) tests and material construction quality assurance (performance) tests as described in the Design Specifications. The CQA Engineer will verify that CQA laboratory test results comply with the requirements of the Design Specifications and previously approved submittals. The Soils CQA laboratory shall not be the same Independent Testing Lab used by the CQC Inspector for QC testing, as defined in the Design Specifications.

3.1.6.2 Geosynthetics CQA Laboratory

The geosynthetics CQA laboratory is the party, independent from Honeywell and the CM, responsible for conducting geosynthetic laboratory tests in accordance with standards referenced in the Design Specifications. Tests include, for example, material qualifications (conformance) tests and material construction quality assurance (performance) tests as described in the Design Specifications. The CQA Engineer will verify that test results comply with the requirements of the Design Specifications and previously approved submittals. The Geosynthetics CQA laboratory shall not be the same Independent Testing Lab used by the CQC Inspector for QC testing, as defined in the Design Specifications.

3.2 Chain of Command and Communication

A SCA Construction Work Plan will be prepared by the Contractor. The SCA construction cannot commence until the SCA Construction Work Plan is approved by
the NYSDEC. Once approved and the work starts, Honeywell ultimately controls the work in terms of its contractors, the project schedule, sequencing, and means and methods as long as the work is conducted in accordance with the approved design.

The chain of command onsite starts with the PM. Issues or concerns from the NYSDEC will be channeled through the PM. During construction, the PM will be in direct communication with the NYSDEC and Honeywell’s Project Manager. To minimize confusion and miscommunication, NYSDEC, other agencies, and the media will not communicate directly with the CM or subcontractors.

NYSDEC, Honeywell, the PM, or any other project personnel may immediately stop work if a condition is observed that threatens the safety of an onsite worker. However, if the work is being conducted safely and in accordance with the approved Final Design and Contract Documents, only the PM and Honeywell have authority to stop work. NYSDEC or other agencies can communicate directly with the PM regarding a specific issue. If it is agreed by the agencies and the PM that work must be stopped to rectify the issue, the PM is to communicate directly with the CM.

Modifications to the Final Design, if required, must not be made without written approval of the Design Engineer. The Design Engineer will notify the CQA Engineer of modifications, and the CQA Engineer will document the correspondence and the modification.

3.3 **Meetings**

3.3.1 **Construction Kickoff Meeting**

Following approval of the Final Design, PM is to conduct a Construction Kickoff Meeting scheduled for the Project Team. Meeting attendees include Representatives from NYSDEC, Honeywell, the CQA Engineer, Project Engineer, the Design Engineer, and the CM. At a minimum, the meeting agenda includes the planned construction activities, construction means and methods, site safety, roles and responsibilities, and should include a site walk.

3.3.2 **Progress Meetings**

The PM is to conduct progress meetings on a weekly basis to discuss the prior week’s completed work and the next week’s anticipated work. The NYSDEC representative,
the PM, the CM, the Project Engineer, and the CQA Engineer will participate, at a minimum. The agency’s issues will be raised and addressed during the meeting. One weekly meeting will be substituted by a monthly meeting for which a larger audience of Honeywell and agency personnel will be invited to participate. A brief project summary will be provided at the monthly meeting.

3.3.3 Public Meetings

If deemed necessary by NYSDEC, a public meeting prior to starting the SCA construction will be conducted. Residents, business, local officials, and others will be invited to the meeting to discuss the project. The PM will work closely with NYSDEC to arrange the meeting, provide appropriate public notifications (i.e., fact sheets and meeting agendas), and meeting presentation materials.

3.3.4 Construction Wrap-up Meeting

Following substantial completion of the SCA construction, the project team will conduct a Wrap-up Meeting to discuss the final punch list, site operation, maintenance, monitoring, and project completion issues. The Construction Certification Report punch list also will be addressed at this meeting.
Table 3.1
Key Contact List

NEW YORK STATE DEC
State Project Manager
Mr. Timothy Larson
NYS Dept. of Environmental Conservation
625 Broadway
Albany, NY 12233-7015
Phone: (518) 402-9676
Fax: (518) 402-9773

U.S. ENVIRONMENTAL PROTECTION AGENCY
Remedial Project Manager
Mr. Robert Nunes
U.S. Environmental Protection Agency, Region II
290 Broadway, 20th Floor
New York, NY 10007-1866
Phone: (212) 637-4254

HONEYWELL, INC.
Honeywell Project Manager
John McAuliffe
Honeywell Inc.
301 Plainfield Road, Suite 330
Syracuse, NY 13212
Phone: (315) 552-9782
Fax: (315) 552-9780
Email: John.McAuliffe@honeywell.com

Al Labuz
Honeywell Inc.
301 Plainfield Road, Suite 330
Syracuse, NY 13212
Phone: (315) 552-9781
Fax: (315) 552-9780
Email: al.labuz@honeywell.com
Table 3.1
Key Contact List (Cont.)

<table>
<thead>
<tr>
<th>Company</th>
<th>Role</th>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARSONS</td>
<td>Project Manager</td>
<td>TBD</td>
<td>Parsons 301 Plainfield Road, Suite 350</td>
<td>(315) 451-9560</td>
<td>(315) 451-9570</td>
<td>TBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parsons</td>
<td>Slyracuse, NY 13212</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEOSYNTREC</td>
<td>Design Engineer</td>
<td>Jay Beech, P.E.</td>
<td>Geosyntec 1255 Roberts Boulevard, Suite 200</td>
<td>(678) 202-9500</td>
<td></td>
<td><a href="mailto:JBeech@Geosyntec.com">JBeech@Geosyntec.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kennesaw, Georgia 30144</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. CONSTRUCTION OVERSIGHT

4.1 Inspections

Members of the project team will conduct site inspections at various stages of the construction to ensure consistent quality is maintained. The CQA Engineer, or his representatives, will conduct inspections of representative work areas on a daily basis. NYSDEC and the other agencies are free to conduct inspections during any work hour period. Inspections by the CQA Engineer, Project Engineer, and regulatory agencies are intended to augment, not replace, the Contractor’s inspections required by the Contract Documents and good practice.

4.1.1 Routine Work Inspections

The CQA Engineer will conduct routine inspections of specific work elements, including:

- Earthwork;
- low permeability soil layer construction;
- geomembrane installation;
- geotextile installation;
- gravel drainage layer installation;
- geocomposite drainage layer installation;
- protective soil layer construction;
- vegetative soil layer construction; and
- surface water drainage system construction.

In addition to these specific work elements, the CQA Engineer will periodically inspect the overall site condition. Overall site condition items include field trailer, parking lot,
access roads, soil erosion and sediment control measures, security fence/gate(s), and survey markings.

4.1.2 Pre-Final and Final Inspections

Following notification of substantial completion by the CM, the PM, CQA Engineer, the Project Engineer, and the NYSDEC inspector will conduct a pre-final inspection of the site. A final written work punchlist will be prepared by the PM and the NYSDEC inspector for submittal to the CM. The final punch list will enable the CM to understand the project completion expectations and schedule work activities, including demobilization. Once punch list items have been addressed by the CM and approved by the PM in writing, the NYSDEC inspector will conduct a final inspection. Upon written NYSDEC approval, the SCA construction activities will be considered completed and the Contractor will demobilize from the site.

4.2 Construction Quality Control and Assurance Testing

CQA/QC testing is part of ensuring the construction is completed in accordance with the Final Design. CQC testing will be performed by the Contractor. Requirements of CQC testing are detailed in the Technical Specifications. CQA testing will be performed by the CQA Engineer. Procedures of CQA testing and monitoring are presented in Attachment A.

4.3 Technical Submittal Review

The CM is required to prepare a schedule of submittals and meet the submittal requirements as stated in the Design Specifications. Construction submittals will be reviewed by the Project Engineer. Submittals requiring engineering interpretation will be reviewed by the Design Engineer. Submittals required by the Consent Decree such as the Certification Report will be reviewed by the agencies.

4.4 Documentation

4.4.1 Field Log Book

The CQA Engineer and CM will maintain daily field log books for the project. Construction activities will be documented with the following details at a minimum: dates, times, weather conditions, personnel onsite, equipment used, materials used,
visitors, health and safety issues, work activities completed, delays, and other construction related issues.

4.4.2 Daily Field Reports

The CM will prepare a Daily Activity Report that summarizes construction activities from the field book. Required information for Daily Activity Report is detailed in the specifications. The Report will also include site photos and sketches of work completed as necessary. The Daily Activity Reports will be prepared and submitted to the Project Engineer on a regular basis. Refer to Attachment B for an example of the Daily Activity Report. The CM will prepare a weekly report which will document the various aspects of the work. This will include but not be limited to construction activities, safety issues, QC requirements, deviations, schedule, budget, and other topics related to the weekly construction activities.

The CQC Inspector will prepare a daily CQC report summarizing the CQC activities. The report will be submitted to the Project Engineer on a daily basis. The CQA Engineer will also prepare a daily CQA report. Any CQA/QC issues will be addressed at the daily CQA/QC meeting between the CM, the CQA Engineer, and the PM.

4.4.3 Photographic Documentation

The CQA Engineer will be responsible for obtaining photographic documentation of the construction activities, materials installation methods, and testing procedures. Photographs will serve as a pictorial record of work progress, problems, and corrective measures. Photographic reporting data sheets should be utilized to organize and document photographs taken during construction. Such data sheets could be cross-referenced or appended to summary reports, CQA monitoring logs, or test data sheets and/or problem identification and corrective measures reports.

4.4.4 Monthly Progress Report

The CM will prepare a monthly status report and submit it to the Project Engineer. Information to be included in the monthly status report is detailed in the specifications of the design.

Per the Consent Decree, Honeywell will prepare and submit a monthly progress report to the NYSDEC. The Monthly Progress Report will summarize work activities and
other issues pertinent to the construction completion. The PM will assist Honeywell to fulfill this requirement.

4.4.5 Construction Certification Report and Record Drawings

Per the Consent Decree, a Construction Certification Report will be prepared and submitted to the NYSDEC 90 days following the each phase of SCA completion. The CQA Engineer will certify that the construction was performed in accordance with the approved Final Design and approved field changes. The Construction Certification Report will include a description of the completed SCA construction work activities, approved design changes to the Final Design, Record Drawings, a project photo log, sampling/analysis summary table, waste manifests, material trip tickets and/or summary table, and other pertinent information.

Record Drawings will be prepared based on the Design Drawings, Contractor markups on the drawings conducted throughout the construction, and construction survey information conducted during and after the construction. The Record Drawings will be signed/sealed by the CQA Engineer.

4.4.6 Field Change Form

Changes to the approved Final Design will require approval by the Design Engineer, and if deemed significant, by Honeywell and the NYSDEC. Attachment C presents an example Field Change Form that includes a description and reason for the field change, date, and signatures. Material substitutions (i.e., “or equals”) are not considered a field change and will be approved by the Project Engineer as part of the technical submittal review process.
5. REFERENCES

ATTACHMENT A

CQA TESTING AND MONITORING PROCEDURES
EARTHWORK

1. Introduction

CQA testing and monitoring will be performed during installation of the various soil components of the SCA. Criteria to be used for determination of acceptability of the various soil components are identified in the Specifications and this CQAP. CQA testing will consist of conformance testing and performance testing. Conformance testing will be conducted in the laboratory on samples of the soil materials before they are placed in the SCA. Performance testing will be conducted in the field on the soil materials after they are placed in the SCA. Testing may be performed as duplicates of CQC tests or as independently selected locations or samples at the CQA Engineer’s discretion.

2. Soil Components

The CQA personnel will conduct soil material conformance and performance testing. Soil material components include those soil materials provided to establish the perimeter berm, the liner system, and the final cover system. The CQA personnel should test soil materials in accordance with the tests methods and frequencies shown in Table A-1 (for conformance testing) and A-2 (for performance testing) to verify conformance with the Specifications and CQAP. The CQA personnel will monitor placement of the soil materials to verify compliance with the Specifications.

3. Conformance Testing

Initial evaluation of various soil types by the CQA personnel during construction will be largely visual; therefore, the CQA personnel must be experienced with visual-manual soil classification procedures. The CQA personnel will be aware that changes in color or texture can be indicative of a change in soil type. The CQA personnel will observe soils for deleterious materials (e.g., roots, stumps, glass, and large objects). When necessary, the visual-manual procedure for the description and identification of soils will be conducted by the CQA personnel in accordance with test method ASTM D 2488.

Conformance tests will be performed in accordance with the current ASTM or other applicable test procedures indicated in Table A-1. The frequency of conformance tests will conform to the minimum frequencies presented in Table A-1. The frequency of testing may be increased at the discretion of the CQA Engineer or if variability of the
materials is observed. The test reporting will indicate if a test is a duplicate of a CQC test or is performed on an independently selected sample.

4. **Construction Monitoring**

During installation of the various soil components, the CQA personnel will visually observe and document the Contractor’s earthwork activities for the following:

- changes in the soil consistency;
- the thickness of lifts as loosely placed and as compacted;
- soil conditioning prior to placement including general observations;
- moisture distribution, clod size, etc.;
- the action of the compaction and heavy hauling equipment on the construction surface (padfoot penetration, pumping, cracking, etc.);
- the number of passes used to compact each lift;
- desiccation cracks or the presence of ponded water; and
- final lift or layer thickness.

5. **Performance Testing**

During construction, the CQA personnel will observe and test the soil components of the SCA construction to verify that they are installed in accordance with the requirements of the Drawings, Specifications, and CQAP. The CQA Engineer will also evaluate the procedures, methods, and equipment used by the Contractor to install the various soil components.

The contractor shall perform Quality Control laboratory testing to determine an Acceptable Permeability Zone (APZ) for each low permeability layer soil material. The APZ is a range of dry densities and moisture contents within which the compacted soil has been demonstrated to meet the hydraulic conductivity requirements. This testing shall be performed by the contractor at the frequency specified in the specifications. The contractor will submit the laboratory data to the Project Engineer. The Project Engineer shall route the submittal to the Design Engineer for approval at which time it will be forwarded to the CQA Engineer by the Project Engineer. The CQA Engineer
shall perform the performance testing described above to ensure that the soil is placed and compacted in the appropriate APZ for that material.

Performance tests will be performed in accordance with the current ASTM or other applicable test procedures indicated in Table A-2. The frequency of performance tests will conform to the minimum frequencies presented in Table A-2. The frequency of testing may be increased at the discretion of the CQA Engineer or if variability of the materials is observed. Sampling locations will be selected by the CQA Engineer. If necessary, the location of routine in-place density tests will be determined using a non-biased sampling approach.

6. Deficiencies

If a defect is discovered in the soils construction, the CQA Engineer will immediately determine the extent and nature of the defect. The failing area will be reworked at the Contractor’s cost. Retests will be performed by the CQA personnel to verify that the deficiency has been corrected before additional work is performed by the Contractor in the area of the deficiency.

7. Initial Monitoring and Testing of Low Permeability Soil Liner

The CQA Engineer will work closely with the Contractor to monitor the initial construction of the low permeability soil liner. The CQA personnel will perform additional performance testing to verify that the low permeability soil liner was installed in accordance with the requirements of the Drawings and Specifications. The objective of the initial monitoring and testing is to determine the effectiveness of the construction procedures for the installation of the low permeability soil liner and to make improvements, if necessary.
# Table A-1
MINIMUM EARTHWORK CONFORMANCE TESTING REQUIREMENTS

<table>
<thead>
<tr>
<th>TEST NAME/TEST METHOD</th>
<th>ENGINEERED FILL</th>
<th>LOW PERMEABILITY SOIL LINER</th>
<th>GRAVEL DRAINAGE LAYER</th>
<th>PROTECTIVE SOIL LAYER</th>
<th>VEGETATIVE SOIL LAYER</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFICATION SECTION</td>
<td>02200</td>
<td>02250</td>
<td>02300</td>
<td>02235</td>
<td>02910</td>
</tr>
<tr>
<td>Particle Size Analysis/ASTM D 422 for soils, ASTM C 136 for aggregate</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
</tr>
<tr>
<td>Atterberg Limits/ASTM D 4318</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
</tr>
<tr>
<td>Moisture Content/ASTM D 2216 or ASTM D 4643</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
</tr>
<tr>
<td>Organic Content/ASTM D 2974</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
</tr>
<tr>
<td>Soil Classification/ASTM D 2487</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
</tr>
<tr>
<td>Standard Proctor/ASTM D 698</td>
<td>1 test per five QC tests</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
</tr>
<tr>
<td>Hydraulic Conductivity/ASTM D 5084</td>
<td>N/A</td>
<td>1 test per five QC sample</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Interface Direct Shear/ASTM D 5321</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
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<tr>
<td>pH/ASTM D 4972</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1 test per five QC tests</td>
</tr>
</tbody>
</table>

Notes:
1. Perform a minimum of 1 test per borrow source to verify that the material meets the NYSDEC requirements for clean fill.
2. The CQA Engineer shall perform the tests per the frequency in the table or a minimum of 1 test per source, whichever is more frequent.
3. N/A = Not Applicable
**Table A-2**

**MINIMUM EARTHWORK PERFORMANCE TESTING REQUIREMENTS**

<table>
<thead>
<tr>
<th>TEST NAME/TEST METHOD</th>
<th>LOW PERMEABILITY SOIL LINER Initial Phase</th>
<th>LOW PERMEABILITY SOIL LINER Full-Scale Phase</th>
<th>GRAVEL DRAINAGE LAYER</th>
<th>PROTECTIVE SOIL LAYER</th>
<th>VEGETATIVE SOIL LAYER</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFICATION SECTION</td>
<td>02200</td>
<td>02250</td>
<td>02300</td>
<td>02235</td>
<td>02910</td>
</tr>
<tr>
<td>In-situ Moisture/ASTM D 3017</td>
<td>5 tests per acre</td>
<td>9 tests per acre</td>
<td>9 tests per acre</td>
<td>N/A</td>
<td>5 tests per acre</td>
</tr>
<tr>
<td>In-situ Density/ASTM D 2922</td>
<td>5 tests per acre</td>
<td>9 tests per acre</td>
<td>9 tests per acre</td>
<td>N/A</td>
<td>5 tests per acre</td>
</tr>
<tr>
<td>Drive Cylinder/ASTM D 2937</td>
<td>1 test per 25in-situ moisture density tests</td>
<td>1 test per 25in-situ moisture density tests</td>
<td>1 test per 25in-situ moisture density tests</td>
<td>N/A</td>
<td>1 test per 25in-situ moisture density tests</td>
</tr>
<tr>
<td>Hydraulic Conductivity/ASTM D 5084</td>
<td>N/A</td>
<td>1 test per acre</td>
<td>NA</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note:  
N/A = Not Applicable
1. Introduction

CQA testing and monitoring will be performed during installation of the geomembrane in the SCA. Criteria to be used for determination of acceptability of the geomembrane are identified in the Specifications and this CQAP. CQA testing will consist of conformance testing and performance testing. Conformance testing will be conducted in the laboratory on samples of the geomembrane materials before they are placed in the SCA. Performance testing will be conducted in the field on the geomembrane materials after they are placed in the SCA.

2. Conformance Testing

Conformance sampling of geomembrane rolls will be performed by a third-party other than the Contractor or manufacturer. Samples will be obtained and forwarded to the Geosynthetics CQA Laboratory for testing to evaluate whether the material meets the requirements of the Specifications and Geomembrane Manufacturer’s list of guaranteed properties.

Conformance samples will be taken across the entire width of the roll and will not include the first 3-ft (1-m) of material. Unless otherwise specified, samples will be 3-ft (1-m) long by the roll width. The machine direction will be marked on the samples with an arrow and a label, tag, or otherwise mark will be affixed to each sample with the following information:

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

The laboratory test methods and frequencies required for CQA conformance testing of the geomembrane are given in Table A-3.

The CQA Engineer will review conformance test results before geomembrane deployment. Any nonconformance of the material’s physical properties will be immediately reported to the Construction Project Manager (PM). The following procedure will apply whenever a geomembrane sample fails a conformance test conducted by the Geosynthetics CQA Laboratory:
• The Geomembrane Manufacturer will be required to replace all of the rolls of geomembrane within the batch from which the sample that is not in conformance with the specifications was obtained. The material must be replaced with geomembrane that meets the requirements of the Specifications.

• Alternatively, if the Geomembrane Manufacturer and the PM both agree, the CQA personnel will obtain additional conformance samples from the closest numerical roll on both sides of the roll from which the failing sample was obtained. These two samples must pass the conformance tests specified above. If either of these samples fails to meet the requirements, material must be replaced with geomembrane that meets the requirements of the Specifications.

The CQA personnel will also verify that the Geomembrane Manufacturer has identified all rolls of geomembrane with the following information:

• name of manufacturer;
• product identification;
• lot number;
• batch number;
• roll number; and
• roll dimensions.

Additionally, if any special handling of the geomembrane is required, it will be so marked on the top surface of the geomembrane (e.g., "This Side Up"). The CQA personnel will record all of the above information for each roll delivered to the Site using the Material Inventory Log form.

3. Construction Monitoring

3.1 Handling and Delivery

During unloading and storage, the Contractor and/or the Geosynthetics Installer will be required to keep the geomembrane off the ground and protect the geomembrane from precipitation or other inundation, excessive heat or cold, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions.
The CQA personnel and the Geosynthetics Installer will observe rolls upon delivery at the site and any deviation from the requirements will be reported to the PM. Any damaged rolls will be rejected by the CQA personnel and required to be repaired or replaced by the Contractor or Geosynthetics Installer.

### 3.2 Field Panel Identification

The CQA personnel will ensure that each field panel is given an identification code consistent with the Geosynthetics Installer’s panel layout plan. This identification code will be agreed upon by the CQA Engineer, PM, and Geosynthetics Installer, and will allow for the geomembrane roll numbers to be traceable to the field panel identification code.

The CQA personnel will document the relationship between roll numbers, factory panels, and field panel identification codes. The field panel identification code will be used for all quality assurance/quality control records.

### 3.3 Field Panel Placement

The CQA personnel will monitor field panel placement and verify that field panels are installed at the location indicated in the Geosynthetics Installer’s panel layout plan. CQA personnel will record the field panel identification code, manufacturers roll number, location, date of installation, and dimensions of each field panel.

The CQA personnel will monitor geomembrane deployment and verify compliance with the following:

- ambient temperatures are within the limits required by the Manufacturers Specifications, and wind is not excessive;

- any equipment used does not damage the geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons or other means;

- the prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement, without excessive moisture (e.g., dew, ponding, etc.);

- all personnel working on the geomembrane do not smoke, wear damaging shoes, or engage in other activities which could damage the geomembrane;
• the method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil;

• the method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels);

• adequate temporary loading and/or anchoring (e.g., sand bags, tires) has been placed to prevent uplift by wind; and

• direct contact with the geomembrane is minimized in areas where excessive traffic may be expected (e.g., the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials).

The CQA personnel will observe the geomembrane panels, after placement and prior to seaming, for damage, and will advise the PM which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels which have been rejected will be marked and their removal from the work area will be recorded by CQA personnel.

3.4 Field Panel Seaming

3.4.1 Panel Layout

CQA personnel will review and become familiar with the panel layout drawing previously submitted to the PM by the Geosynthetics Installer. In general, seams should be oriented parallel to the line of maximum slope, i.e., oriented along, not across, the slope. In corners and odd-shaped geometric locations, the number of seams should be minimized. Horizontal seam should be located in accordance with the specifications, unless otherwise authorized by the PM and the Design Engineer. A seam numbering system compatible with the field panel identification numbering system will be agreed upon prior to any seaming.

3.4.2 Seaming Equipment and Products

Fillet Extrusion Process

The CQA personnel will perform the following activities during the fillet extrusion welding process:

• verify and document that the extrusion-welding apparatus is permanently marked with an identification number;
- verify that the extrusion-welding apparatus is equipped with gauges giving the temperature in the apparatus and at the nozzle;
- verify that the extrudate is comprised of the same resin as the geomembrane sheeting;
- monitor extrudate temperatures, ambient temperatures, and geomembrane sheet temperatures at appropriate intervals;
- verify that a suitable number of spare operable seaming apparatus are maintained on site;
- verify that the extruder is purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel;
- confirm that the electric generator is placed on a smooth base such that no damage occurs to the geomembrane; and
- confirm that a smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage.

**Fusion Process**

The CQA personnel will perform the following activities during the fusion welding process:

- verify and document that the fusion-welding apparatus is a self-propelled device and that it is permanently marked with an identification number;
- verify that the fusion-welding apparatus is equipped with gauges giving the applicable temperatures and welding speed;
- verify that a suitable number of spare operable seaming apparatus are maintained on site;
- confirm that the electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
- confirm that, for cross seams, the edge of the cross seam is ground to a smooth incline (top and bottom) prior to welding;
- verify that a smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage; and
• verify that a movable protection layer is used, as necessary, directly below each overlap of geomembrane that is to be seamed to prevent build-up of moisture between the sheets.

3.4.3 Seam Preparation

The CQA personnel will monitor that:

• weather conditions for seaming are within the limits required by the Specifications, unless authorized by the Design Engineer;

• prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris of any kind, and foreign material;

• seams are overlapped per the specifications;

• if seam overlap grinding is required, the process is completed according to the Geomembrane Manufacturer's instructions or the Specifications, whichever is the more stringent, prior to the seaming operation, and in a way that does not damage the geomembrane;

• the grind depth shall not exceed 10 percent of the geomembrane thickness;

• grinding marks shall not appear beyond the extrudate after it is placed; and

• seams are aligned with the fewest possible number of wrinkles and “fishmouths”.

3.4.4 Overlapping and Temporary Bonding

The CQA personnel will monitor that:

• the panels of geomembrane have a finished overlap in accordance with the specifications for both extrusion and fusion welding, but in any event sufficient overlap shall be provided to allow peel tests to be performed on the seam;

• no solvent or adhesive is used; and

• the procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any spot welding apparatus is controlled such that the geomembrane is not damaged.
4. **Performance Testing**

4.1 **Trial Seams**

Trial seam testing will be performed by the Geosynthetics Installer. The CQA personnel will observe and document the Geosynthetic Installer’s trial seam testing procedures and verify that they are in accordance with the Specifications. The CQA personnel will document identification numbers of trial seam samples and record results. The Installer will ensure that each is marked with the date, time, machine temperature(s) and setting(s), number of seaming unit, and name of seaming technician.

4.2 **Nondestructive Seam Testing**

Nondestructive field seam testing will be performed by the Geosynthetics Installer to check the continuity of seams. During the Geosynthetics Installer’s nondestructive testing of field seams, the CQA personnel will confirm that seams are tested over their full length using either the vacuum test (for extrusion seam type) or the air pressure test (for double fusion seams). The CQA personnel will also monitor nondestructive testing and document the results. Any required seam repairs identified as a result of failed nondestructive seam testing will be made by the Geosynthetics Installer in accordance with the Specifications, and the CQA personnel will:

- observe the repair procedures;
- observe the retesting procedures; and
- document the results.

4.3 **Destructive Testing**

4.3.1 **Location and Frequency**

The CQA personnel will select all destructive seam test sample locations in order to accomplish the sampling and testing frequencies given in Table A-4. Sample locations will be established by the CQA personnel according to the guidelines given below.

- Test locations will be determined during seaming at the CQA Engineer’s discretion. Selection of such locations may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding.
• The Geosynthetics Installer will not be informed in advance of the locations where the seam samples will be taken.

4.3.2 Sampling Procedures

The Geosynthetics Installer will cut the destructive samples at the locations designated by the CQA Engineer, under observation of the CQA personnel when possible. The CQA personnel will mark each sample accordingly and record the sample location on the standardized Seam and Panel Repair Location Log. At a given sampling location, two types of samples will be taken: (i) field test samples; and (ii) laboratory test samples. A minimum of two field samples (i.e., test strips) should be taken for field-testing (see section 4.3.3). Each of these test strips should be 1 in. wide by 12 in. long, with the seam centered parallel to the width. The distance between these two specimens should be 42 in. If both specimens pass the field test described in this Section, a full destructive sample will be taken for testing by the CQA personnel, as follows:

• The full destructive sample should be located between the two field test strips. The sample should be 12 in. wide by 42 in. long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:
  • one 12 in. by 12 in. portion retained by the Geosynthetics Installer;
  • one 12 in. by 12 in. portion archived by the CQA personnel; and
  • the remaining 12 in. by 18 in. portion should be tested by the CQA personnel.

All holes in the geomembrane resulting from destructive seam test sampling will be immediately repaired by the Geosynthetics Installer in accordance with repair procedures described in the Specifications. The continuity of the new seams in the repaired area will be nondestructively tested, followed by the CQA procedures described in Section 5.2.

4.3.3 Field Testing

The test strips will be tested for peel adhesion and bonded seam strength in the field by the Geosynthetics Installer, using a gauged tensiometer. The CQA personnel will observe all field tests and mark all samples and portions with their number. The CQA personnel will also document using the appropriate standardized field forms: the date, number of seaming unit, seaming technician identification, destructive sampling, and pass or fail description.
4.3.4 CQA Testing

Destructive test samples will either be shipped to the Geosynthetics CQA laboratory for testing or be tested by the CQA personnel using equipment provided by the Geosynthetics Installers. The testing methods and criteria are given in Table A-4. The CQA personnel should provide test results no more than 24 hours after they receive the samples. Results will be reviewed for conformance with the Specifications as soon as they become available. The PM will be notified of any inconsistencies or nonconformances.

4.3.5 Procedures for Destructive Test Failure

The following procedures will apply whenever a sample fails a destructive test, whether that test was conducted in the field by the Installer or by the CQA personnel. The CQA personnel will monitor that the Geosynthetics Installer follows one of two options between points that are judged by the CQA personnel to represent conditions of the failed seam (e.g., a tie-in seam or a seam made by the apparatus and/or operator used in the failing seam):

- The Geosynthetics Installer can reconstruct the seam (e.g., remove the old seam and reseam) between any two passed destructive test locations.

- The Geosynthetics Installer can trace the welding path to an intermediate location a minimum of 10 ft from the point of the failed test in each direction and take a small sample for an additional field-test in accordance with the destructive test procedure at each location. If these additional isolation samples pass the field test, then full samples for CQA testing are taken at both locations. If these samples meet the specified strength criteria, then the seam is reconstructed or capped between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be reconstructed or capped.

All failed seams must be bounded by two locations from which samples passing destructive tests have been taken or the entire seam is reconstructed or capped and retested. In cases exceeding 150 ft of reconstructed seam, a sample taken from the zone in which the seam has been reconstructed must pass destructive testing. Repairs will be made in accordance with this Section. The CQA personnel will document all actions taken in conjunction with destructive test failures.

4.4 Leak Location Survey

An electrical leak location survey will be performed for the base geomembrane liner. The survey will be generally based on ASTM D 7007 and ASTM D 6747. The leak survey will be
performed after the placement of the gravel drainage layer. The equipment and survey procedures used will be capable of detecting a 0.01 in$^2$ leak. A specialty leak detection survey contractor who is independent of the Contractor will be selected to perform the work by the Project Manager. The Contractor shall provide assistance as needed for the post-construction electrical leak location survey. The specific procedures and associated health and safety requirements will be decided during a pre-survey meeting with the selected leak detection specialty contractor, CQA Engineer, and Project Engineer. The leak detection specialty contractor will be required to inspect the site and provide a written work plan before the pre-survey meeting. The Contractor shall assist in creating and repairing the 0.1-inch diameter holes in the liner required for instrument calibration in the presence of CQA Engineer, Project Engineer, and leak detection survey contractor. The leak detection survey contractor will be required to provide a written report that includes a drawing identifying locations of calibration and detection holes. All calibration holes and detected holes will be repaired by the Contractor in the presence of the CQA Engineer.

5. **Defects and Repairs**

5.1 **Inspection for Defects**

The CQA personnel will examine seam and non-seam areas of the geomembrane for identification of defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane should be clean at the time of examination.

5.2 **Repair Procedures**

Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, must be repaired by the Geosynthetics Installer in accordance with the Specifications. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be agreed upon between the Geosynthetics Installer, the CQA Engineer, and the PM.

In addition, the following conditions will be monitored by the CQA personnel:

- surfaces of the geomembrane which are to be repaired shall be abraded no more than one hour prior to the repair;
- all surfaces must be clean and dry at the time of the repair;
- all seaming equipment used in repairing procedures must be approved;
• the repair procedures, materials, and techniques are those approved by the CQA Engineer in advance of the specific repair;

• patches or caps should extend at least 6 in. beyond the edge of the defect, and all corners of patches should be rounded with a radius of at least 3 in.; and

• the geomembrane below large caps should be appropriately cut to avoid water or gas collection between the two sheets.

5.3 Verification of Repairs

Each repair will be numbered, logged, and non-destructively tested using approved methods. Repairs which pass the non-destructive test will be taken as an indication of an adequate repair. Large caps may be of sufficient extent to require destructive test sampling, at the discretion of the CQA Engineer or as specified in Table A-4. The CQA personnel will observe all non-destructive testing of repairs and will record the number of each repair, date, and test outcome.
# Table A-3

## MATERIAL CONFORMANCE TESTING REQUIREMENTS FOR LLDPE GEOMEMBRANE

<table>
<thead>
<tr>
<th>TEST</th>
<th>METHOD</th>
<th>REQUIRED VALUE</th>
<th>FREQUENCY [1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness, mil (min.)</td>
<td>ASTM D 5994</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Density, g/cm³ (max)</td>
<td>ASTM D 1505</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Carbon Black Content (Allowable range in %)</td>
<td>ASTM D 1603</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Carbon Black Dispersion</td>
<td>ASTM D 5596</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Tensile Strength (force per unit width at Break (lb/in.))</td>
<td>ASTM D 6693</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Elongation at Break (%)</td>
<td>ASTM D 6693</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Tear Resistance, lbs (min.)</td>
<td>ASTM D 1004, Die C Puncture</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Puncture Resistance, lbs (min)</td>
<td>ASTM D 4833</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
<tr>
<td>Shear Strength</td>
<td>ASTM D 5321</td>
<td>per specification</td>
<td>1 per 250,000 ft²</td>
</tr>
</tbody>
</table>

Note
1. The QA Engineer shall perform the tests per the frequency in the table or a minimum of 1 test per material, whichever is more frequent.
### Table A-4
FIELD TESTING REQUIREMENTS FOR GEOMEMBRANE SEAMS

| TEST                                      | METHOD                           | REQUIRED VALUE       | MINIMUM FREQUENCY OF TESTING |
|-------------------------------------------|                                 |                     |                              |
| Peel Adhesion Fusion and Extrusion, lb/in. (min) | ASTM D 6392<sup>(1,3)</sup>     | per specification   | 1 per 500 ft of seam        |
| Shear Strength Fusion and Extrusion, lb/in. (min) | ASTM D 6392<sup>(2,3)</sup>     | per specification   | 1 per 500 ft of seam        |
| Vacuum Testing Welded Seams               | Vacuum = 5 psi gauge suction     | No visible air bubbles | 100 percent of extrusion seams<sup>4</sup> |
|                                          | Test time = 20 seconds (s)       |                     |                              |
| Air Pressure Testing Welded Seams         | PrePMure = 25 to 30 psi          | Shall not lose more than 3 psi over the 5 minute duration | 100 percent of fusion seams<sup>4</sup> |
|                                          | Test time = 5 minutes (min)      |                     |                              |

Notes:
1. For peel adhesion, seam separation shall not extend more than 10 percent into the seam interface. Testing shall be discontinued when the sample has visually yielded.
2. For shear tests, the sheet shall yield before failure of the seam.
3. For either test, sample failure shall be a Film Tear Bond (FTB).
4. Vacuum and air pressure testing will be conducted by the Contractor as part of the quality control requirements presented in the specifications. The CQA personnel will observe the testing.
1. **Overview**

CQA testing and monitoring will be performed during installation of the geocomposite drainage layer for the final cover system along the side slopes of the SCA. Criteria to be used for determination of acceptability of the geocomposite are identified in the Specifications and this CQAP. CQA testing will consist of conformance testing. Conformance testing will be conducted in the laboratory on samples of the geocomposite drainage layer materials before they are placed in the SCA.

2. **Conformance Testing**

Conformance sampling of geocomposite rolls will be performed by a third-party other than the Contractor or manufacturer. Samples will be obtained at the manufacturing plant and forwarded to the Geosynthetics CQA Laboratory for testing to evaluate whether the material meets the requirements of the Specifications and Manufacturer's list of guaranteed properties.

Conformance samples will be taken across the entire width of the roll and will not include the first 3-ft (1-m) along the length of the roll. Unless otherwise specified, samples will be 3-ft (1-m) long by the full roll width. The machine direction will be marked on the samples with an arrow and a label, tag, or otherwise mark affixed to each sample with the following information:

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

The laboratory test methods and frequencies required for geocomposite CQA conformance testing are given in Table A-5.

The following procedure will apply whenever a geocomposite sample fails a conformance test conducted by the Geosynthetics CQA Laboratory:

- The Geocomposite Manufacturer will be required to replace all of the rolls of
geocomposite within the batch from which the sample that is not in conformance with the specifications was obtained. The material must be replaced with geocomposite that meets the requirements of the Specifications.

- Alternatively, if the Geocomposite Manufacturer and the PM both agree, the CQA personnel will obtain additional conformance samples from the closest numerical roll on both sides of the roll from which the failing sample was obtained. These two samples must pass the conformance tests specified above. If either of these samples fails to meet the requirements, the material must be replaced with geocomposite that meets the requirements of the Specifications.

During conformance testing, the CQA personnel will also verify that the Geocomposite Manufacturer has identified all rolls of geocomposite with the following information:

- name of manufacturer;
- product identification;
- lot number;
- batch number;
- roll number; and
- roll dimensions.

Additionally, if any special handling of the geocomposite is required, it will be so marked on the top surface of the geocomposite (e.g., "This Side Up"). The CQA personnel will record all of the above information for each roll delivered to the site using the Material Inventory Log form.

3. **Construction Monitoring**

During unloading and storage, the Contractor and/or the Geosynthetics Installer will be required to keep the geocomposite off the ground and protect the geocomposite from direct sunlight, precipitation or other inundation, excessive heat or cold, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions. To that effect, the Specifications require that the geocomposite rolls be shipped and stored in opaque and watertight wrappings.

The CQA personnel will observe rolls upon delivery at the site and any deviation from the above requirements will be reported to the PM. Any damaged rolls will be rejected by the CQA Engineer and required to be repaired or replaced by the Contractor or Geosynthetics Installer.
The Contractor and/or Geosynthetics Installer will be required to handle all geocomposite in such a manner as to ensure the geocomposite is not damaged in any way. The CQA personnel will verify compliance with the following:

- immediately prior to geocomposite placement, the underlying geomembrane surface or soil surface is free of moisture or obstructions that could potentially damage the geocomposite;

- in the presence of wind, all geocomposite is weighted with sandbags (or equivalent ballast weight approved by the CQA Engineer), and that sandbags remain until replaced with the overlying protective soil layer;

- geocomposite is kept continually under slight tension to minimize the presence of wrinkles in the geocomposite, and if necessary, the geocomposite is positioned by hand after being unrolled to minimize wrinkles;

- care is taken by the Geosynthetics Installer not to entrap stones, soil, dust, or moisture that could damage or cause clogging to the geocomposite;

- a visual examination of the geocomposite is carried out over the entire surface, after installation, to verify that no potentially harmful foreign objects, such as needles or tools, are present; and

- the geocomposite is not left exposed for a period in excess of 14 days after placement unless a longer exposure period is approved by the CQA Engineer and warranted by the Geocomposite Manufacturer.

The CQA personnel will verify that the components of the geocomposite (i.e., geotextile-geonet-geotextile) are seamed, joined, and overlapped to like-components in adjacent geocomposite panels, as required in the Specifications. The top geotextile of the geocomposite is to be continuously sewn (i.e., spot sewing or thermal bonding is only allowed for repairs), using polymeric thread and stitching type, as required in the Specifications.

The CQA personnel will verify that the Geosynthetics Installer places soil and aggregate materials on top of geocomposites in such a manner that:

- the geocomposite and underlying materials are not damaged;

- wrinkles are minimized; and
• excess tensile stresses are not produced in the geocomposite.

4. Defects and Repairs

The CQA personnel will report to the Geosynthetics Installer and the PM any deficiencies in the underlying geomembrane or soil layer prior to geocomposite placement, and will not allow geocomposite deployment until the geomembrane or soil layer is improved to the satisfaction of the CQA personnel and in accordance with the Specifications.

The CQA personnel will verify that any holes or tears in the geocomposite are repaired as follows:

• a patch made from the same geocomposite is overlapped in accordance with the specifications and fastened into place; and

• care is taken to remove any soil or other material which may have penetrated the torn geocomposite.

The CQA personnel will document any deficiencies or noncompliance with the specified requirements and report them to the PM. The extent of deficiencies will be evaluated by observations, a review of records, or other means deemed appropriate.

The Geosynthetics Installer will correct the deficiency to the satisfaction of the CQA Engineer and the PM. If a project specification criterion cannot be met, or unusual weather conditions hinder work, then the CQA Engineer will develop and present to the PM suggested alternative solutions for approval. All retests or subsequent re-evaluations recommended by the CQA Engineer must verify that the deficiency has been corrected before any additional work is performed by the Geosynthetics Installer in the area of the deficiency.
### Table A-5
MATERIAL CONFORMANCE TESTING REQUIREMENTS FOR GEOCOMPOSITE DRAINAGE LAYER

<table>
<thead>
<tr>
<th>PROPERTIES</th>
<th>QUALIFIER</th>
<th>UNITS</th>
<th>SPECIFIED VALUES (1)</th>
<th>TEST METHOD</th>
<th>FREQUENCY[1]</th>
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</thead>
<tbody>
<tr>
<td>Geonet Component:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polymer composition</td>
<td>Minimum</td>
<td>%</td>
<td>per specification</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Density</td>
<td>Minimum</td>
<td>g/cm(^3)</td>
<td>per specification</td>
<td>ASTM D 1505</td>
<td>1 per 250,000 ft(^2)</td>
</tr>
<tr>
<td>Carbon black content</td>
<td>Range</td>
<td>%</td>
<td>per specification</td>
<td>ASTM D 1603 or D 4218</td>
<td>1 per 250,000 ft(^2)</td>
</tr>
<tr>
<td>Nominal thickness</td>
<td>Minimum</td>
<td>mil</td>
<td>per specification</td>
<td>ASTM D 5199</td>
<td>1 per 250,000 ft(^2)</td>
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<td>Melt flow index</td>
<td>Maximum</td>
<td>g/10min</td>
<td>per specification</td>
<td>ASTM D 1238</td>
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<td>Geotextile Component:</td>
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<td></td>
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<tr>
<td>Type</td>
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<td>none</td>
<td>per specification</td>
<td>N/A</td>
<td>N/A</td>
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<td>Polymer composition</td>
<td>Minimum</td>
<td>%</td>
<td>per specification</td>
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<td>N/A</td>
</tr>
<tr>
<td>Mass per unit area</td>
<td>Minimum</td>
<td>oz/yd(^2)</td>
<td>per specification</td>
<td>ASTM D 5261</td>
<td>1 per 250,000 ft(^2)</td>
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<tr>
<td>Apparent opening size</td>
<td>Maximum</td>
<td>mm</td>
<td>per specification</td>
<td>ASTM D 4751</td>
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Notes:
1. The QA Engineer shall perform the tests per the frequency in the table or a minimum of 1 test per material, whichever is more frequent.
2. N/A = Not Applicable
GEOTEXTILE

1. Overview

CQA testing and monitoring will be performed during installation of the geotextile for the base liner system of the SCA. Criteria to be used for determination of acceptability of the geotextile are identified in the Specifications and this CQAP. CQA testing will consist of conformance testing. Conformance testing will be conducted in the laboratory on samples of the geotextile materials before they are placed in the SCA.

2. Conformance Testing

Conformance sampling of geotextile rolls will be performed on geotextile by a third-party other than the Contractor or manufacturer. Samples will be obtained at the manufacturing plant and forwarded to the Geosynthetics CQA Laboratory for testing to evaluate whether the material meets the requirements of the Specifications and Geotextile Manufacturer's list of guaranteed properties.

Conformance samples will be taken across the entire width of the roll and will not include the first 3-ft (1-m) of material. Unless otherwise specified, samples will be 3-ft (1-m) long by the roll width. The machine direction will be marked on the samples with an arrow and a label, tag, or otherwise mark will be affixed to each sample with the following information:

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

The laboratory test methods and frequencies required for conformance testing of the geotextiles are given in Table A-6.

The following procedure will apply whenever a geotextile sample fails a conformance test conducted by the Geosynthetics CQA Laboratory:
• The Geotextile Manufacturer will be required to replace all of the rolls of geotextile within the batch from which the sample that is not in conformance with the specifications was obtained. The material must be replaced with geotextile that meets the requirements of the Specifications.

• Alternatively, if the Geotextile Manufacturer and the PM both agree, the CQA personnel will obtain additional conformance samples from the closest numerical roll on both sides of the roll from which the failing sample was obtained. These two samples must pass the conformance tests specified above. If either of these samples fails to meet the requirements, the material must be replaced with geotextile that meets the requirements of the Specifications.

During conformance testing, the CQA personnel will also verify that the Geotextile Manufacturer has identified all rolls of geotextile with the following information:

• name of manufacturer;
• product identification;
• lot number;
• batch number;
• roll number; and
• roll dimensions.

Additionally, if any special handling of the geotextile is required, it will be so marked on the top surface of the geotextile (e.g., "This Side Up"). The CQA personnel will record all of the above information for each roll delivered to the site using the Material Inventory Log form for the geotextile.

3. **Construction Monitoring**

During unloading and storage, the Contractor and/or the Geosynthetics Installer will be required to keep the geotextile off the ground and protect the geotextile from direct sunlight, precipitation or other inundation, excessive heat or cold, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions. The Specifications require that the geotextile rolls be shipped and stored in opaque and watertight wrappings.
The CQA personnel will observe rolls upon delivery at the site and any deviation from the above requirements will be reported to the PM. Any damaged rolls will be rejected by the CQA Design Engineer and required to be repaired or replaced by the Contractor or Geosynthetics Installer.

The Contractor and/or the Geosynthetics Installer will be required to handle all geotextile in such a manner as to ensure the geotextile is not damaged in any way. The CQA personnel will verify compliance with the following:

- immediately prior to geotextile placement, the subgrade is free of sharp protrusions or other obstructions that could potentially damage the geotextile, if applicable;

- in the presence of wind, all geotextile is weighted with sandbags (or equivalent ballast weight approved by the CQA Engineer), and that sandbags remain until replaced with an overlying layer;

- geotextile is kept continually under slight tension to minimize the presence of wrinkles in the geotextile, and if necessary, the geotextile is positioned by hand after being unrolled to minimize wrinkles;

- a visual examination of the geotextile is carried out over the entire surface, after installation, to verify that no potentially harmful foreign objects, such as needles or tools, are present; and

- the geotextile is not left exposed for a period in excess of 14 days after placement unless a longer exposure period is approved by the Engineer and warranted by the Geotextile Manufacturer.

The CQA personnel will verify that, where required in the Specifications or shown on the Drawings, geotextiles are continuously sewn or overlapped in accordance with the specifications, and that sewing (where performed) is performed using polymeric thread and stitching type, as required in the Specifications.

The CQA personnel will verify that the Contractor places all soil and aggregate materials on top of geotextiles in such a manner as to verify:

- the geotextile and underlying materials are not damaged;

- wrinkles are minimized; and

- excess tensile stresses are not produced in the geotextile.
4. **Defects and Repairs**

The CQA personnel will report to the Contractor and the PM any deficiencies in the subgrade prior to geotextile placement, and will not allow geotextile deployment until the subgrade is improved to the satisfaction of CQA personnel and in accordance with the Specifications. The CQA personnel will verify that any holes or tears in the geotextile are repaired as follows:

- a patch made from the same geotextile is overlapped per the specifications and stitched into place; and
- care is taken to remove any soil or other material which may have penetrated the torn geotextile.

The CQA personnel will document any deficiencies or noncompliance with the specified requirements and report them to the PM. The extent of deficiencies will be evaluated by observations, a review of records, or other means deemed appropriate.

The Geosynthetics Installer will correct the deficiency to the satisfaction of the CQA Engineer and the PM. If a project specification criterion cannot be met, or unusual weather conditions hinder work, then the CQA Engineer will develop and present to the PM suggested alternative solutions for approval. All subsequent re-evaluations recommended by the CQA Engineer must verify that the deficiency has been corrected before any additional work is performed by the Contractor and/or the Geosynthetics Installer in the area of the deficiency.
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Notes:
1. The QA Engineer shall perform the tests per the frequency in the table or a minimum of 1 test per material, whichever is more frequent.
2. N/A = Not Applicable
ATTACHMENT B

SAMPLE FORMS
**Property Consultants**

1214 JFK Blvd.
Suite 950
Philadelphia, PA 19100

Phone: 215-555-2001

**DAILY REPORT**

No. 00007

**COMPANY:** ACME General Contractors  
**DATE:** 8/16/2008

**REPORT PERIOD:** Daily  
**DAY:** Monday

**PROJECT:** School Addition-Automotive Center  
**JOB:** JBAA450

**WEATHER:**

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**ACTIVITY**

Standard Paving continued mass excavation with 3/4 CY track mounted backhoe and a smaller track hoe with mounted bucket.

**SCHEDULE**

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### Parsons
201 Technology Road
Suite 350
Syracuse, NY 13212

**MEETING AGENDA**
No. MA-05

**PROJECT TITLE:** Willis Groundwater Collection Trench  **MEETING DATE:** 10/6/2009

**LOCATION:** Willis Site Trailer  **SUBJECT:** Weekly Meeting Agendas

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Design Group
1215 Vine Ave
Philadelphia, PA 19100

MEETING MINUTES
No. 00002

PROJECT TITLE: Office Building
LOCATION: 6th Floor Conference Room

MEETING DATE: 4/7/2008
SUBJECT: Design Progress

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Chris assigned specific activities to be accomplished by each department and reported on each meeting. One person from each department will attend the meetings and notify others in the department. Meeting minutes will be distributed to all involved in the design including A-1.

00002 NEW 4/7/2008 DESIGN CA

For each meeting each department will give an account of progress on their part of the design and how many man hours have been spent. Chris will accumulate these numbers and total them to find out total hours spent for the design.

00003 AOK 4/7/2008

Chris reviewed the building design and the results of the project kick-off meeting for those who did not attend.

00004 AOK 4/7/2008

Chris explained that the design will now include a fitness and health facility. This will affect mostly the Architectural, Mechanical and Electrical departments.

00005 AOK 4/7/2008

To promote design coordination, Chris explained that Expedition will be used on the network. The project is set up and passwords and access rights will be given. He encouraged the use of the Helpdesk and the Telephone log to keep the process moving.
Design Group  

1215 Venutio Avenue  

Philadelphia, PA 19100  

Phone: (215) 555-6444  

Fax: (215) 555-6445  

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According to the P3 schedule the Schematic Design refinement is due September 20, 1997.

Prepared By: The Design Group  

Signed: ___________________________  

Dated: 11/10/2000  

Chris Atkinson
# REQUEST FOR INFORMATION

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| Est. Schedule Impact:             |                |
| Est. Cost Impact:                 |                |
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| Drawing Reference:                |                |
| Specification Reference:          |                |

**REQUEST:**

**PROPOSED SOLUTION:**

**ANSWER:**

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You are hereby authorized and instructed to complete the following modifications to the approved Final Design:

______________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________________

APPROVALS:

Design Engineer
Name: __________________________
Signature: ______________________
Date: __________________________

Contractor Representative
Name: __________________________
Signature: ______________________
Date: __________________________

Agency Representative
Name: __________________________
Signature: ______________________
Date: __________________________

cc: Honeywell Project Manager
APPENDIX N

GEOTECHNICAL INSTRUMENTATION AND MONITORING PLAN
GEOTECHNICAL INSTRUMENTATION
AND MONITORING PLAN
ONONDAGA LAKE SEDIMENT CONSOLIDATION AREA
(SCA) FINAL DESIGN SUBMITTAL
Camillus, New York

Prepared by
Parsons
301 Plainfield Road, Suite 350
Syracuse, NY 13212

Geosyntec Consultants
engineers | scientists | innovators
1255 Roberts Boulevard, Suite 200
Kennesaw, Georgia 30144

Project Number GJ4299
January 2010
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Attachment B – Installation and Operation of Geosyntec Settlement Profiler System
Attachment C – Installation of Vibrating Wire Settlement Cells
Attachment D – Installation of Inclinometers
1. INTRODUCTION

1.1 Project Background

Onondaga Lake is a 4.6 square mile (3,000 acre) lake located in Central New York State immediately northwest of the City of Syracuse. A major component of the selected lake remedy includes the dredging and onsite consolidation of sediments removed from the lake. Honeywell evaluated potential locations for building and operating a Sediment Consolidation Area (SCA) to contain sediment removed from Onondaga Lake during the remedial action. Based on the evaluation results, Wastebed 13 was selected for building and operating the SCA. Wastebed 13 is located in the Town of Camillus and encompasses approximately 163 acres. It is bordered to the north by Ninemile Creek and the CSX Railroad tracks; to the west by an Onondaga County Garage property, a former gravel excavation owned by Honeywell, and a few residential properties; and to the east and south by Wastebeds 12 and 14, respectively. Wastebed 13 was originally designed as a settling basin for the disposal of Solvay waste (SOLW).

The purpose of the SCA is to contain dredged sediment from the Onondaga Lake remedial action. Geotextile tubes were selected as the dewatering method for the dredged sediment within the SCA. The SCA will have a maximum footprint of approximately 70 acres and will include a perimeter berm, a liner system, a gravel drainage system, stacked geotextile tubes filled with dredged sediment, and a final cap. The SCA design includes a phased construction approach to facilitate the dredging schedule, odor mitigation, underlying Solvay waste consolidation, and/or enhanced final closure.

1.2 Purpose of Instrumentation and Monitoring Program

The purpose of instrumentation and monitoring is to provide data to: (i) evaluate whether the SCA is performing as expected; and (ii) evaluate whether SCA construction and/or operations are impacting SCA and/or Wastebed 13 stability. Specifically, the scope of the Geotechnical Instrumentation and Monitoring Plan (referred to as the Plan) includes: (i) a description of the proposed instrumentation to be installed in the SCA; (ii) recommended procedures for instrument installation; (iii) requirements of instrument operation, data collection, and instrument maintenance; and (iv) recommendations on data management and analysis.
1.3 **Plan Organization**

The remainder of the Plan is organized as follows:

- Section 2 provides a description of the instrumentation program. It includes a summary of instrumentation to be installed in the SCA, the requirements for testing and calibration of instrument components, the recommended procedures of instrument installation, and the requirements for documentation.

- Section 3 provides a description of the monitoring program. It includes the requirements for baseline survey and monitoring prior to the SCA construction, requirements for collecting reliable data during construction, requirements for post-closure monitoring, and recommendations on data management and analysis.

- Section 4 describes the contingency plan. It includes the recommended response actions for unexpected monitoring results.

- Section 5 describes the instrumentation maintenance. It includes the requirements for maintenance of the instrumentation system during service life.
2. INSTRUMENTATION PROGRAM

2.1 Introduction

Instrumentation will be installed in the SCA and field data will be collected to assist in the evaluation of the performance of the SCA. The parameters to be monitored in the SCA include: (i) porewater pressures in the foundation SOLW at specified locations; (ii) settlement of the foundation SOLW at specified locations; and (iii) lateral movement of the foundation SOLW at specified locations near the toe of the SCA perimeter berm. In addition, porewater pressures in the Wastebed 13 dikes will be monitored.

2.2 Instrumentation Plan

A plan view of the proposed locations of instrumentation in the SCA is shown on Drawing No. 7 titled “Instrumentation and Monitoring Plan” of the Final design drawings prepared by Geosyntec Consultants in January 2010. The following instruments are planned to be installed:

- Seven sets of nested vibrating wire piezometers will be installed within the footprint of the SCA. Each set of nested piezometers will consist of three piezometers at depths of 15 ft, 30 ft, and 45 ft, respectively. The piezometers will be used to monitor porewater pressures before, during, and after the SCA construction.

- Six settlement profilers will be installed along three sections. Each section has two profile pipes (one primary and one back-up) placed in an excavated trench near the wastebed surface. The profilers will be used to monitor the settlement of the foundation SOLW under the loading from the SCA.

- Ten vibrating wire settlement cells will be installed within the footprint of the SCA. The settlement cells will be used to monitor the settlement of the foundation SOLW under the loading from the SCA.

- Four inclinometers will be installed. Two of them are located inside the SCA footprint near the proposed boundaries of Phase I. The other two are located outside the SCA footprint at the toe of the SCA perimeter berm. The
inclinometers will be used to evaluate the amount of lateral movement of the foundation SOLW due to the SCA construction.

The SCA is expected to be constructed in phases. Installation of instrumentation in the SCA should be coordinated with the construction phasing.

In addition to the above-mentioned instruments, two vibrating wire piezometers will be installed on the side slope of the existing northern Wastebed 13 perimeter dike, as shown on Drawing No. 7 of the Final design drawings. These new piezometers, together with three nearby existing piezometers, will be used to monitor any change of porewater pressures in the existing Wastebed 13 dike due to the SCA construction.

2.3 Surveying and Settlement Model Calibration

In addition to the proposed instrumentation, a 50 ft by 50 ft survey grid will be set up over the footprint of the SCA. An initial survey will be performed to obtain the elevation of the existing ground. In addition, two more surveys are planned after construction of the clay liner and the gravel drainage layer, respectively, to obtain the elevations of the top of these two layers. The surveying results, together with the settlement of the foundation SOLW measured by the settlement cells and the settlement profilers, will be used to calibrate the settlement computation models. The calibrated model will be used to improve the prediction of future settlement, if needed.

2.4 Pre-Installation Acceptance Tests

The instrumentation personnel should perform pre-installation acceptance tests to ensure that the instruments and readout units are functioning properly. The U.S. Army Corps of Engineers’ manual [USACE, 1995] provides a good list of items to be checked as part of pre-installation acceptance tests. According to the manual, pre-installation acceptance tests should include items from, but not limited to, the following list, as applicable:

- Examine factory calibration data to verify completeness (factory calibration and documentation should be specified).
• Examine manufacturer’s quality assurance inspection check list to verify completeness (quality assurance procedures and documentation should be specified).

• Check cable length and tag numbers on instrument and cable.

• Check, by comparing with procurement documents, that the model, dimensions, materials, product performance criteria, etc. are correct.

• Bend cable back and forth at point of connection to the instrument while reading the instrument to verify connection integrity.

• Check water pressure or humidity test components as appropriate for the service entity to identify leaks.

• Verify that instrument reading as required compares favorably with factory reading.

• Perform resistance and insulation testing, in accordance with criteria provided by the instrument manufacturer.

• Verify that all components fit together in the correct configuration.

• Check all components for signs of damage in transit.

• Check that quantities received correspond to quantities ordered.

2.5 Instrumentation Installation

General installation procedures for vibrating wire piezometers, settlement profilers, vibrating wire settlement cells, and inclinometers are presented in Attachments A through D of this Plan, respectively.

2.6 Post-Installation Acceptance Tests

The installation personnel should demonstrate that the instrument was correctly installed and is functioning properly. A minimum of three readings should be made during a short span of time to demonstrate that the instrument reading can be repeated.
The installation may have an effect on the parameter which is to be measured; therefore, the instrument should be allowed to stabilize and the acceptance test repeated.

2.7 Documentation

An installation report will be prepared after completion of the installation of all instruments for each phase. The report should include a minimum of the following items [USACE, 1995]:

- Description of instruments, readout units, and other related equipment.
- Plan(s) to show as-built locations of installed instruments.
- Information of subsurface stratigraphy from boring.
- Instrument calibration and maintenance procedures.
- Instrumentation and automation documentation from manufacturers, including calibration data and warranty information.
- Pre-installation acceptance test results.
- A record of instrument installation.
- Post-installation acceptance test results.
- Names, addresses, and phone numbers of maintenance and repair sources.

The installation report should be maintained on file at the project site.

2.8 Care and Handling

All instruments should be handled carefully in accordance with manufactures’ instructions to ensure satisfactory performance. Cables and tubes should be protected from nicking, bending, and kinking. Instruments installed outside the SCA footprint should be protected with a protective housing that is provided with a vented locking cap. Protective housings should be grouted into place not only to secure the cap but also to prevent surface water from flowing into the instrument. Locations of
instruments, cables, and tubes should be staked with warning flags. Care should be taken by contractors during the SCA construction to prevent the damage of the system by excavation, if any, and construction traffic.
3. MONITORING PROGRAM

3.1 Introduction

The performance of the SCA will be monitored during the construction and operations and for a limited period of time after closure as determined by the Design Engineer based on monitoring results. Geotechnical data to be collected include porewater pressures and vertical and horizontal displacements. This section addresses the procedures and requirements for monitoring.

3.2 Baseline Survey

As mentioned previously, a 50 ft by 50 ft survey grid will be set up over the footprint of the SCA. Prior to the SCA construction of a phase (i.e., before the construction of perimeter berm and the liner system), an initial survey will be performed to obtain the northing, easting, and elevation of the existing ground within that phase.

3.3 Baseline Monitoring

Baseline values will be established from the instruments installed in the SCA. The following baseline monitoring will be performed prior to the SCA construction:

- The piezometers will be monitored frequently until the installation-induced pore pressures have dissipated and the steady-state is reached. Piezometers may take a significant amount of time to stabilize after installation due to drilling effects, lag time, or temperature.

- Initial readings will be taken from the settlement profilers, inclinometers, and settlement cells before the construction of the SCA commences.

3.4 Monitoring during Construction and Operations

3.4.1 Measurement of Settlement

Settlement of the foundation SOLW due to loading from the SCA will be monitored by the settlement profilers and the settlement cells. The total settlement of the foundation SOLW due to the liner system and the gravel drainage layer will be measured by surveying.
The procedure of measuring the settlement using the profiler is presented in Attachment B of this Plan. The process can be carried out as a two-man operation with one pulling the draw cord and the other booking the readings. The settlement profilers will be read bi-weekly during the construction and operation of the SCA. Under the direction of the Design Engineer, profiler readings may only need to be performed in the areas that are undergoing active filling or have been filled during the last few weeks. In addition, the Design Engineer may adjust the monitoring frequency based on the observed readings.

The settlement cells will be read automatically with a data logger. Data will be retrieved remotely from the logger using electrical cables or wireless options. The automated monitoring provides a real-time continuous observation of the performance of the SCA during construction and operations and enables a quick response to any unexpected monitoring results, if they occur.

Survey will be performed at the following stages of SCA construction and operations: (i) before and after the construction of the perimeter berm and the clay liner; (ii) after the construction of the gravel drainage layer; and (iii) before and after the placement of final cover. By comparing the measurement at different times, the total and incremental settlement of the foundation SOLW and the dredge material can be determined.

3.4.2 Measurement of Porewater Pressure

Piezometers will be used to monitor the porewater pressures in the foundation SOLW and to confirm the dissipation of excess porewater pressures that are developed as a result of the SCA construction. Potential change of porewater pressures in the existing Wastebed 13 perimeter dike will also be monitored by piezometers. Similar to the settlement cells, the piezometers will be monitored automatically using remote techniques during SCA construction and operation.

3.4.3 Measurement of Lateral Movement

Lateral movement of the foundation SOLW will be monitored by the inclinometers. Readings will be taken manually using a portable inclinometer probe and a portable readout two times a week during SCA construction and operation. The Design Engineer may adjust the monitoring frequency based on the observed readings. It is recommended that the same probe and control cable be used for each survey for consistency.
The two inclinometers inside the SCA footprint near the proposed boundaries of Phase I will be abandoned during the construction of Phases II and III liner systems, as directed by the Design Engineer.

3.5 Post-Closure Monitoring

The piezometers will be used to continue to monitor the excess pore water pressures for a period of one year or more after closure, as determined by the Design Engineer based on the observed readings. Remote monitoring techniques, as discussed previously, will be used for monitoring the piezometers. The two inclinometers outside the SCA footprint at the toe of the SCA perimeter berm are to be monitored monthly during the first two months after closure and every two months for the next four months. The Design Engineer may increase the frequency of monitoring or extend the period of monitoring based on the actual readings as they relate to the stability of the SCA. Settlement monitoring of the liner system will not be performed after closure. Post-closure visual monitoring of the existing Wastebed 13 perimeter dike will be in accordance with the Wastebed 9 through 15 Closure.

3.6 Data Management and Analysis

The management of data consists of data collection, reduction and processing, and presentation. The instrumentation manufacturers usually provide tools (i.e., hardware and software) to automatically retrieve the data from a data logger or a portable readout, interpret the data, and plot the data graphically as a function of time. For the measurement of settlement using the profiler, the data should be recorded and saved electronically (i.e., in Excel® spreadsheets) for analysis. The Design Engineer will interpret and evaluate the monitoring data in a timely manner. Based on the evaluation, the Design Engineer may request more frequent measurements or additional instruments. The Design Engineer will notify Honeywell and the contractor immediately if an unexpected condition occurs that may affect the stability of the SCA. Unexpected conditions include: (i) excessive lateral or vertical movement in a relatively short period; (ii) rapid increase of porewater pressures associated with shear movement; and (iii) significant reversal of the base liner grades.
4. CONTINGENCY PLAN

The steps outlined below should be followed when an unexpected condition occurs that will affect the stability or performance of the SCA.

In the event of stability issues:

- Temporarily suspend the SCA construction or operation in the affected area to allow the underlying SOLW to consolidate and gain strength.

- Visually inspect the SCA for any sign of cracks or bulges on the ground or on top of the SCA.

- Ensure that all monitoring equipment is working properly. Additional instruments may be installed nearby if data collected from the existing instruments is determined to be questionable due to defective equipment or installation procedures.

- Increase the frequency of readings to monitor and provide data to further evaluate the situation.

- Should excessive movement rate continue after construction work has ceased, construction of a compacted soil berm adjacent to the toe of the SCA perimeter berm may be needed.

- The solution will be executed with concurrence of Honeywell, the NYSDEC, and the Design Engineer.

In the event of significant grade reversal of the base liner that will adversely affect the flow of liquid in the drainage layer:

- Temporarily suspend the SCA construction or operation in the affected area.

- Ensure that the profilers and the settlement cells are working properly.

- Modify geotextile tube fill sequence to correct the grade reversal.
• Increase the frequency of readings to monitor and provide data to further evaluate the situation.

• The solution will be executed with concurrence of Honeywell, the NYSDEC, and the Design Engineer.
5. INSTRUMENTATION MAINTENANCE

Regular maintenance should be performed to ensure that the instrumentation systems remain in a satisfactory operating condition during their service lives. The instrumentation personnel should follow the manufacturer’s maintenance schedules during the SCA construction and operations. After the SCA closure, the instrument components will be inspected as part of the quarterly final cover inspections.

The maintenance should be performed in accordance with the manufacturer’s procedures. General requirements for the maintenance of the major components of the instrumentation system are discussed below:

- **Portable readout units**: Portable readout units should be protected from mishandling. The units should be kept clean and dry and checked routinely for connection and damaged parts. Batteries should be replaced as needed. In addition, the units should be recalibrated regularly following the manufacturer’s instructions or sent to manufacture for calibration, adjustment, or repair.

- **Retrievable components**: Retrievable components, including wires, tubes, cables, data loggers, data controllers, and communications systems should be protected from rodents, vandals, and transient voltage surges. All plugs, caps, and covers should be maintained in good condition. Reservoirs for the settlement cells should be checked periodically and refilled as necessary in accordance with the manufacturer’s instructions.

- **Embedded components**: Embedded components are normally inaccessible and maintenance is not possible. Embedded components that are accessible, such as inclinometer casings, can be inspected by downhole video cameras to determine if maintenance is required.

Any maintenance, recalibration, or replacement should be documented and reported to the Engineer. Follow-up checks should be made to verify success of maintenance.
REFERENCES

Attachment A
Installation of Vibrating Wire Piezometers
Piezometers will be installed by the grout-in method using boreholes. The installation procedures should be in accordance with the specific manufacturer’s instruction and generally as follows:

1. Stake out specified installation locations, which can be performed using a hand-held GPS unit. It should be noted that the as-built locations of the installed piezometers should be obtained by a licensed surveyor. Surveying activities should be completed in accordance with the appropriate New York State rules and regulations.

2. Advance borehole to desired depth using a center hole (i.e., hollow stem) auger. During drilling, perform continuous SPT sampling over the full depth to allow characterization of the subsurface soils, if no existing borings are located within 20 ft of the borehole. Flush the borehole with water or biodegradable drilling mud.

3. Obtain pore pressure and thermistor zero readings prior to installation.

4. Saturate the filter stone with water, in accordance with manufacturer’s recommendations.

5. Check pore pressure transducer calibration with the piezometer set in a bucket of water. Obtain readings for at least two different water levels.

6. Tie the piezometer to its own signal cable and lower it, with filter-end up, into the borehole to the design elevation. Nested piezometers at various depths can be installed in one borehole or separate boreholes. If multiple piezometers are installed in the same borehole, lower the deeper piezometers first. For separate borehole installation, the piezometers shall be offset from each other by about 5 ft to avoid damage to the piezometers during installation. Handle the piezometers carefully.

7. Backfill the borehole with grout specified by the manufacture. Mix cement with water first, and then add the bentonite. Adjust the amount of bentonite to produce a grout with the consistency of heavy cream. If the grout is too thin, the solids and the water will separate. If the grout is too thick, it will be difficult to pump.

8. Readings taken immediately after installation will be high, but will decrease as the grout cures. Datum readings can be taken hours to days after installation, depending on the permeability of the soil. The lag time caused by the grout itself is measured in minutes.

9. Thread piezometer cables through a PVC pipe for burial in a trench extending to a monitoring station, located outside the SCA footprint.
Attachment B
Installation and Operation of Geosyntec Settlement Profiler System
Settlement profile pipes will be installed in the SCA to monitor the settlement of the foundation SOLW under the loading from the SCA. Details of a profiler system are shown on Drawing No. 11 titled “Instrumentation and Monitoring Details” of the Final Design Drawings prepared by Geosyntec Consultants in January 2010.

The contractor shall stake out the specified locations for the pipes prior to installation, which can be performed using a hand-held GPS unit. It should be noted that the as-built locations of the installed settlement profile pipes should be surveyed by a licensed surveyor.

Before construction of the SCA, an approximately 1.5-ft wide by 1-foot deep trench will be excavated along the length of each profile line for each phase. After excavation of the trench, two 4-inch nominal diameter single-wall corrugated pipes manufactured by Advanced Drainage System (ADS) should be placed in the trench and the trench backfilled with sand. The ADS piping was selected due to its flexibility to facilitate the measurement of differential settlement.

To facilitate settlement measurements, a ¼-inch diameter polypropylene rope will be advanced through the entire length of each buried profile pipe. This rope will be used to pull the settlement profiling device through the ADS pipe. In many cases it may be advantageous to place the rope as the pipe is being installed. The ADS pipe and trench configuration discussed previously was selected such that the pipe would resist crushing due to the overburden loading of the SCA.

After the settlement pipes are installed and the trenches are backfilled, the contractor should test the pipes by pulling the transducer through each pipe to confirm that the pipe did not get crushed during installation.

Settlements will be measured using a proprietary settlement profiling system developed by Geosyntec. This system is designed to measure relative settlements at any location along the profile pipe by using a pressure transducer to measure the hydrostatic water pressure imposed on the transducer from a stationary water supply reservoir. The pressure transducer is housed within a steel or plastic “torpedo” that is pulled through the ADS pipe using a steel cable. This transducer is connected to water-filled vinyl tubing that, in turn, is connected to the fluid reservoir maintained at a constant elevation. As the transducer and vinyl tubing are pulled through the profile pipe, any change in elevation (i.e., settlement) is recorded as a pressure change on the transducer. The relative elevation of the transducer can be converted to an absolute elevation by
measuring the pressure at the transducer when it is placed on a point (i.e., survey hub) of known elevation.

Adjacent to the entrance of the profile pipe, the surveyed “hub” will need to be installed and maintained for the duration of the project. Prior to each profile survey, initial readings on the transducer will be recorded by placing the torpedo and enclosed pressure transducer on the hub. The specific components that are used to conduct a profile survey include:

- ADS profile pipe installed in a trench prior to SCA construction;
- Polypropylene rope placed in the profile pipe;
- Model 15 Wika EcoTronic pressure transducer (transducer) with a built-in direct-connect (DC) signal conditioner (or compatible alternative);
- Geosyntec-fabricated torpedo device to house the transducer;
- Bundled vinyl tubing, electrical cable, and steel cable attached to the torpedo;
- Water reservoir and settlement hub located at one end of the profile lines; and
- Palm® IIIxe handheld personal data assistant (PDA) device and a MyCorder DAS 1206 analog to digital (A/D) converter; the MyCorder is a general-purpose, six-channel, 12-bit, multirange A/D device for data acquisition.

Alternate devices for recording the settlement may be used as improvements to the system are developed. To initiate a test, an initial pressure reading is obtained when the torpedo/transducer is placed on the hub. The settlement profiler device is then pulled through the profile pipe under the SCA using the polypropylene rope. To begin testing, the profiler is then pulled backwards through the profile pipe using the steel cable while stopping at pre-selected test locations to obtain readings from the transducer.

Measurements are proposed to be obtained at approximately 5-ft linear intervals along the profile length as the torpedo/transducer is pulled back through the ADS pipe. At the end of a test, the torpedo/transducer is again placed on the hub, and the final elevation readings are established. At all times during the test, the liquid reservoir is maintained at a constant elevation.
Attachment C
Installation of Vibrating Wire Settlement Cells
The installation procedure for vibrating wire settlement cells shall be in accordance with the specific manufacturer’s instructions and generally as follows:

1. Stake out specified installation locations, which can be performed using a hand-held GPS unit. It should be noted that the as-built locations of the installed settlement cells should be obtained by a licensed surveyor. Surveying activities should be completed in accordance with the appropriate New York State rules and regulations.

2. Excavate a trench approximately 6-in wide and 1-ft deep extending from the location of the settlement cell to the reservoir mounted on a post located outside the SCA footprint. Remove sharp stones and rocks, if any, and place a 4-in layer of sand on the bottom of the trench.

3. At the proposed location of the settlement cell, increase the trench size as needed to fit the settlement cell and the steel plate. Place an 18-in by 18-in (or the size specified by the manufacturer) steel plate at the top of the sand layer in the trench. The steel plate helps maintain required upright orientation of the cell.

4. Place the settlement cell in an upright (vertical) position on the steel plate.

5. Cover the settlement cell with hand-compacted sand.

6. Thread cables and tubing through a PVC pipe along the trench extending to the reservoir.

7. Backfill the trench with hand-compacted sand.

8. Test the system in accordance with manufacturer’s instructions to ensure it is functioning properly.
Attachment D
Installation of Inclinometers
The installation procedure for inclinometers should be in accordance with the specific manufacturer’s instructions. The installation procedure generally includes the following steps:

1. A borehole is first advanced to the desired depth (i.e., a minimum of 3 feet into the native material underlying the Solvay waste) using a center hole (i.e., hollow stem) auger. During drilling, it is recommended that continuous standard penetration test (SPT) sampling be conducted over the full depth to allow characterization of the subsurface soils, if no existing borings are located within 20 ft of the borehole.

2. Place a threaded cap on the bottom of the lowest section of inclinometer casing pipe to keep the inside of the casing dry and to keep grout from clogging the casing.

3. Place a pipe clamp on the top of the casing, and manually lower this first section inside of the borehole. Install another pipe clamp on top of the second section of casing. Attach this casing to the top of the casing in the borehole. Remove the lower pipe clamp, and slowly lower the casing. This procedure of clamping and incrementally adding and lowering the rigid inclinometer casing inside the borehole continues until the casing rests on the bottom of the borehole.

4. Backfill the borehole with grout specified by the manufacturer. Take measures to counter buoyancy during grouting and allow the grout to set.

5. Install a plug on the top section of inclinometer casing to keep foreign materials and water out of the casing.
APPENDIX O

POST-CLOSURE CARE PLAN
DRAFT POST-CLOSURE CARE PLAN
ONONDAGA LAKE SEDIMENT CONSOLIDATION AREA (SCA) FINAL DESIGN SUBMITTAL
Camillus, New York

Prepared by

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Project Number GJ4299
January 2010
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Appendix A: Inspection, Operation, and Maintenance Schedule
1. INTRODUCTION

1.1 Project Background

Onondaga Lake is a 4.6 square mile (3,000 acre) lake located in Central New York State immediately northwest of the City of Syracuse. As specified in the Record of Decision (ROD) (NYSDEC and USEPA, 2005), a major component of the selected lake remedy includes the dredging and onsite consolidation of sediments removed from the lake. Honeywell evaluated potential locations for building and operating a Sediment Consolidation Area (SCA) to contain sediment removed from Onondaga Lake during the remedial action. Based on the evaluation results, and as documented in the Statement of Work (SOW) of the Consent Decree (CD) (United States District Court, 2007), Wastebed 13 was selected for building and operating the SCA.

Wastebed 13 is located in the Town of Camillus and encompasses approximately 163 acres. It is bordered to the north by Ninemile Creek and the CSX Railroad tracks; to the west by an Onondaga County Garage property, a former gravel excavation owned by Honeywell, and a few residential properties; and to the east and south by Wastebeds 12 and 14, respectively. Wastebed 13 was originally designed as a settling basin for the disposal of Solvay waste, but has most recently been used by the State University of New York College of Environmental Science and Forestry (SUNY ESF) for planting willow test plots. These test plots now occupy several acres along the southern border of the wastebed. Wastebed 13, except for the area occupied by the SCA, and other wastebeds in the area will be capped under a separate CD.

The design and construction details of the SCA can be found in the project documents (i.e., SCA Final Design).

1.2 Purpose of Post-Closure Care Plan

This Post-Closure Care Plan (PCCP) was prepared in accordance with: (i) the requirements set forth in the ROD and SOW for “Implementation of a long-term operation, maintenance, and monitoring program to monitor and maintain the effectiveness of the remedy”; and (ii) the New York State Department of Environmental Conservation (NYSDEC) Regulation Section 360-2.15 (k) (7) that states “A comprehensive post-closure monitoring and maintenance operations manual is required.”
The overall objective of the PCCP is to maintain and verify the integrity and effectiveness of the SCA facility including final cover system, surface water management system, the liquid management system (LMS), and the SCA perimeter berm. The overall objective will be achieved by regular inspections and maintenance activities. The specific objectives of the PCCP are:

- to provide a routine inspection program that allows for assessment of conditions at the Site;
- to provide a maintenance program for the Site that will facilitate the long-term and continual performance of the SCA facility;
- to provide, if necessary, guidance and protocols for the repair and/or restoration of deficiencies in the SCA facility; and
- to provide a standardized procedure for notice to project parties (Honeywell and NYSDEC) regarding inspections, the conditions of the SCA, and annual reporting.

Per NYSDEC regulations, the minimum post-closure care period is 30 years. Elements of the post-closure care activities may be discontinued sooner, as approved by NYSDEC based on inspection and monitoring results.

1.3 Plan Organization

The remainder of the report is organized as follows:

- Section 2 contains the inspection and maintenance programs for the final cover system;
- Section 3 contains the inspection and maintenance programs for the surface water management, soil erosion, and sediment control;
- Section 4 contains the operation requirements and inspection and maintenance programs for the LMS;
- Section 5 describes the requirements for the geotechnical instrumentation monitoring;
• Section 6 describes the recordkeeping and reporting requirements;
• Section 7 presents the documentation requirements;
• Section 8 contains the operation, monitoring, & maintenance (OM&M) staffing requirements;
• Section 9 describes the citizen participation program;
• Section 10 contains the health and safety requirements;
• Section 11 contains the access control requirements;
• Section 12 presents the post-closure site use; and
• Section 13 contains the references.

The following appendix is also included as part of this PCCP.

• Appendix A: Inspection, Operation, and Maintenance Schedule

1.4 Administrative Requirements

Honeywell will appoint a Facility Supervisor for the SCA. This Facility Supervisor will serve as the contact person for the SCA. Pursuant to the requirements set forth in Paragraph 100 of the CD, Honeywell will provide a written notice and a copy of the CD to each contractor and subcontractor hired to perform any portion of the work required by this PCCP.
2. FINAL COVER

2.1 Introduction

The final cover system for the SCA facility must be periodically inspected and maintained. The subsequent sections discuss in more detail the requirements, procedures, protocols, and schedules of the inspection and maintenance activities for the final cover system. At the time of writing this PCCP, it has not been decided whether the cover vegetation will include grass or willows. General post-closure care requirements for both types of vegetation are presented herein. Any additional requirements can be added to this PCCP at the time of closure. A detailed inspection and maintenance schedule is presented in Appendix A.

2.2 Inspection Interval and Procedures

Inspection of the final cover system will be completed quarterly throughout the post-closure period. Inspection will be conducted as soon as practical after major storm events (i.e., 5-year storm), possible flooding events, or other events that may result in damage to the final cover system, but only at such time as the safety and health of inspection personnel can be assured. Honeywell may petition NYSDEC to modify the quarterly inspection to annual inspection as a part of the five-year remedy review.

The objective of the final cover system inspection is to detect any observable issues or conditions that would prevent the final cover system from continuing to preclude direct contact with the underlying materials. During the inspections, the final cover system will be visually examined for the following:

- evidence of subsidence or settling that results in low points or depressions;
- evidence of burrowing animals;
- evidence of trespassing or unauthorized use of the final cover area;
- presence of any erosion rills;
- condition of vegetation (grass or willows);
- observable irregularities such as bulges, bumps, slumps, or cracks;
• evidence of ponded water;

• condition of any access roads (i.e., erosion, aggregate washout, exposed geotextile, and debris on the road);

• condition of SCA perimeter berm;

• condition of areas near anchor trenches; and

• any other irregularities.

During inspections, special attention shall be given to evidence of slope movement (i.e., slumps), erosion features (i.e., rills, scarping, or slips), and evidence of burrowing animals, as well as the overall condition of the final cover vegetation.

2.3 Maintenance Interval and Procedures

The following maintenance activities must be performed on the final cover system soil as needed, unless otherwise indicated:

• Erosion rills on the final cover system will be repaired by packing straw mulch into the void areas or by other alternate methods. This will prevent further erosion and allow the cap vegetation to take root in the area, stabilizing the rill. If rills reach 4 to 6 inches in depth, additional soil material will be added and the area will be re-compacted, re-seeded or re-planted, fertilized, and mulched. Materials equivalent to those already in place will be used.

• Significant depressions caused by erosion, settlement, or subsidence that can hold water will be repaired by placing additional soil in the depression and re-seeding or re-planting as soon as possible. Materials equivalent to those already in place will be used.

• If an area has less than 25 percent coverage by grass and/or woody plants, the area will be reworked and re-seeded or re-planted. High quality agricultural fertilizer may be applied at the rate suggested by the manufacturer to promote the re-establishment of a self-sustaining vegetative cover.
• Grass cover will be maintained by mowing on a regular schedule. Initially the grass will be cut quarterly; however, once the grass is established, it will be cut twice a year. The mowing schedule is intended to limit the growth of weeds or rooting of unplanned brush species. Willow cover will be maintained in accordance with a site specific plan developed and added as an attachment to this PCCP at the time of closure. This site specific plan shall address specific items such as harvesting and fertilizing schedules and guidelines for the willows.

• Animal burrows will be filled following inspection and seeded or planted to prevent creation of erosion rills.

• Additional aggregate will be placed on access roads as needed to avoid exposed sub-base or potholes so that the access roads remain in drivable condition.

• Any penetrations through the soil cover will be repaired by locally reconstructing the soil cover similar to the surrounding cover. Penetrations through geosynthetic components will be covered with a tarp or other impervious cover and repaired by a geosynthetics installer using materials equivalent to those used to construct the final cover system. The geosynthetics installer shall meet the project qualification requirements and shall be approved by Honeywell prior to commencing the repair.

• Routine maintenance will take place throughout the year and at such times as necessary based upon the results of the site inspections. Maintenance to repair the final cover system will be conducted on an as-needed basis.
3. SURFACE WATER MANAGEMENT, SOIL EROSION, AND SEDIMENT CONTROL

3.1 Introduction

The final cover system for the SCA facility was designed with storm water control berms, perimeter drainage channels, and culverts. Erosion and sediment control measures installed as part of the SCA operations and closure construction are intended to be removed once the final cover vegetation is established, and hence are not addressed herein. These temporary erosion and sediment control structures will be inspected after 5-year storm events while they are in service. Permanent surface water management structures such as stormwater control berms, perimeter drainage channels, and culverts are addressed in this plan.

3.2 Inspection Interval and Procedures

The inspection of the surface water management, soil erosion, and sediment control structures at the SCA facility includes visually examining and evaluating the integrity and proper functioning of the following items, as applicable:

- stormwater control berms;
- drainage channels;
- inlet and outlet protection of the perimeter culverts; and
- perimeter culverts.

The surface water management, soil erosion, and sediment control structures will be inspected quarterly unless otherwise specified. Honeywell may petition NYSDEC to modify the quarterly inspection to annual inspection as a part of the five-year remedy review.

3.3 Maintenance Interval and Procedures

The maintenance activities associated with the surface water management, and soil erosion and sediment control structures at the SCA facility include the following items:
• removal of debris or any other objects obstructing the flow in drainage channels, inlets, and outlets of culvert pipes;

• repair, as needed, of any damaged stormwater, erosion, and sediment control structures; and

• cleaning (by removal and replacement, as needed) of clogged riprap.
4. LIQUID MANAGEMENT SYSTEM (LMS)

4.1 Introduction

This section of the PCCP establishes operating, inspection, and maintenance guidelines to be followed to achieve proper performance of the SCA LMS which includes a liquid transmission system (LTS) and two sumps for collecting and removing liquid from two vertical risers. One additional backup vertical riser is provided at each sump location. The backup riser will be supplied with a pump only on an as-needed basis such as if the primary riser becomes damaged. The dual-contained LTS will transfer the collected liquid along the final cover system to the on-site Wastewater Treatment Plant (WTP).

4.2 LMS Operation

The LMS is designed to function automatically. Liquid will enter the risers via sumps by gravity flow. The riser pumps are designed to turn on and off automatically based on the liquid levels within the risers. Pumps shall include monitoring devices to measure the total amount of liquid pumped from each sump. Total amount of liquid received at the WTP will also be recorded.

4.3 Inspection Interval and Procedures

The LMS contains pumps, discharge hoses, pump retrieval chains, high density polyethylene (HDPE) vertical risers, riser caps, control panels, flow meters, pressure transducers, sampling ports, valves, connections, liquid transmission pipes, and forcemains. When liquid is present in the sump in pumpable quantities, these components must be inspected monthly (unless otherwise specified) for the following:

- ensure that the automatic controls of the LMS pumps are on at all times (except for those periods where the automatic controls need to be switched off for system maintenance and repair or in the event of an operational emergency);
- examine the condition of instrumentation and/or valves (e.g., note sticking or jammed devices, corrosion, leaks, and misalignments) monthly, or if liquid removal processes from the SCA facility are not functioning properly;
• verify that the operating conditions of the LMS are specified so that the liquid head on the liner does not exceed 1 foot (i.e., liquid depth in the sump does not exceed 9 feet);

• verify that liquid is flowing from the sumps to the WTP during pumping daily, either by using a remote monitoring system or direct inspection of the flow gauges;

• record the flow rate and volume of liquids flowing from each sump daily, either by using a remote monitoring system or direct inspection of the flow gauges;

• confirm that the pumps are operating daily and high level alarm conditions are not reached, either by using a remote monitoring system or direct inspection of the flow gauges;

• examine the condition of the aboveground piping and the insulation around the pipes when pumping activities occur. The aboveground pipes include pipes at the top of riser as well as the LTS piping;

• verify appropriate warning signs are clearly visible (e.g., buried live electric line, liquid transmission pipe);

• examine the condition of any mechanical and electrical instrumentation devices in winter when the temperature falls below equipment-specific operating ranges;

• check the presence of liquid in the outer pipe of the dual-contained LTS piping which may indicate a leak in the forcemain piping; and

• examine the condition of the sump riser covers to prevent any potential fall-into-riser accident.

It is recommended that if remote monitoring systems are used that they be equipped with automatic call options for alarm conditions.

When there is no liquid in the sump risers or the liquid is present in an un-pumpable amount for a long time (i.e., several weeks), Honeywell may petition NYSDEC to
modify the various inspections mentioned above for the LMS to quarterly inspection, as a part of the five-year remedy review.

4.4 **Maintenance Interval and Procedures**

The following maintenance activities must be performed on the LMS in order to ensure proper functioning of the SCA facility:

- if an alarm is activated, the Facility Supervisor or a representative shall respond as soon as practical to assess the reasons for the alarm sounding and to take corrective actions;

- the Facility Supervisor must remedy any problems identified during the inspection as soon as practicable;

- mechanical and electrical equipment including the pump, pressure transducers, and flow meters shall be calibrated, operated, maintained, and serviced in accordance with the manufacturer’s instructions;

- any warning signs that are damaged to the point where the sign no longer is legible will be repaired/replaced;

- if an inspection indicates that a LTS pipe or a forcemain is obstructed, the pipe shall be flushed by pumping fresh water from a water truck through a hose inserted in the pipe cleanout. If flushing does not remove the obstruction, other methods shall be used to clean the pipe. Other methods may include blowing the obstruction out with air, vacuuming, rodding, or inserting a snake, fish tape, or other suitable devices. If air or water pressure is used, the working pressure inside the LTS pipe or the forcemain shall not exceed the pressure rating of those pipes; and

- any damage to the sump riser covers that threatens the integrity of this structure will be repaired.
5. **GEOTECHNICAL INSTRUMENTATION MONITORING**

Details of the geotechnical instrumentation monitoring after closure of the SCA are presented in the Geotechnical Instrumentation and Monitoring Plan. A brief summary is provided herein.

Vibrating wire piezometers will be used to continue to monitor the excess pore pressures for a period of one year or more after closure as determined by the Engineer of Record based on the observed readings. Remote monitoring techniques will be used for this. Two proposed inclinometers (SI-G3 and SI-G4) are to be monitored monthly during the first two months after closure and every two months for the next four months. The Engineer of Record may increase the frequency of monitoring or extend the period of monitoring based on the actual readings as they relate to the stability of the SCA. Settlement monitoring of the liner system will not be performed after closure. The instrument structures and enclosures will be inspected as part of the quarterly final cover inspections.
6. RECORDKEEPING AND REPORTING

6.1 Recordkeeping and Record Retention Requirements

Recordkeeping procedures will be followed for post-closure care of the SCA facility including final cover system, surface water management system, LMS, and the SCA perimeter berm at the Site. The records to be maintained include, at a minimum:

- a summary of the findings of inspections;
- a description of maintenance performed;
- a detailed description of any emergencies that occurred and the measures taken to address them;
- a detailed description of the issues encountered and the actions taken to correct them;
- the daily flow rates and volumes of liquids pumped from LMS;
- the overall monthly average of the daily flow rates (gallons per acre per day or gpad) for each LMS sump;
- the geotechnical instrumentation monitoring data; and
- a detailed description (what, when, where, and how much) of the information and/or documents provided to NYSDEC.

Records and files for post-closure care will be kept by Honeywell. Copies of these files will be kept at the site contact office for all the wastebeds. Records will be preserved for documents and information relating to post-closure care inspection and maintenance activities for the most recent six years. At the end of this six-year period, and thirty calendar days before any document or information is destroyed, Honeywell will notify NYSDEC that such documents and information are available to NYSDEC for inspection, and upon request shall provide the originals or copies of such documents and information to NYSDEC.
6.2 Reporting Requirements and Procedures

Honeywell will follow all reporting requirements provided in the CD. A Post-Closure Care Report shall be submitted every five years as part of the closure and post-closure registration renewal for the site.
7. DOCUMENTATION

7.1 Inspection, Operation, and Maintenance Forms

The information gathered during each inspection, operation, and maintenance event will be legibly recorded in Inspection, Operation, and Maintenance Forms to be developed at the time of closure. Data to be recorded on the Inspection, Operation, and Maintenance Form include:

- date and time of the inspection or maintenance;
- weather condition during inspection or maintenance;
- the name(s) of the personnel conducting the inspection or maintenance;
- a written description of the observation made;
- nature of any remedial actions to be taken;
- recommendation for corrective measures; and
- documentation of any repair/maintenance activities.

Photographs taken during inspection or maintenance activities will be recorded in Photographic Logs.

7.2 Annual Reports

The Annual Post-Closure Care Report will summarize the quarterly and other significant inspection, maintenance, and monitoring activities. The detailed logs for each inspection, maintenance, and monitoring events will be kept at the site and will be available for review if requested, but are not intended to be a part of the annual report. The Annual Post-Closure Care Report will include:

- a description of the Site, Site location, historical site background, and responsible project parties;
- a narrative summary of inspections conducted at the Site over the past year;
• a narrative summary of maintenance conducted at the Site over the past year;

• a narrative summary detailing resolution of outstanding inspection or maintenance issues from the prior year, or in the event that resolution has not been reached, a descriptive summary of the outstanding issues and “go-forward” strategy; and

• recommendations for modifications to this PCCP, if necessary.

The Annual Post-Closure Care Reports will be submitted to the NYSDEC and used as the basis to develop the Five-Year Post-Closure Care Report, which is also required for submittal to NYSDEC.

7.3 Five-Year Review Report

The inspection and maintenance program will be performed as described above for a minimum of five years. If the final cover system has stabilized, an abbreviated inspection and maintenance program will be presented to NYSDEC for approval. The final cover system shall be considered as stabilized when no significant erosion, settlement, or subsidence areas have been observed within two consecutive calendar years. The abbreviated inspection and maintenance program will consist of semi-annual or annual inspection, operation, and maintenance for the final cover system, surface water management, soil erosion and sediment control, and LMS. The Five-Year Post-Closure Care Report shall be submitted as part of the closure and post-closure registration renewal for the site and will be developed based on the Annual Post-Closure Care Reports.
8. OPERATION, MONITORING, & MAINTENANCE (OM&M) STAFFING REQUIREMENTS

8.1 Manpower Requirements

The OM&M Contractor team will consist of an inspector, an OM&M Manager, and a maintenance crew of one to two people that can operate site equipment. Honeywell will have a representative that can communicate between the OM&M Contractor and NYSDEC in terms of documentation, reviews, and agency inspections.

8.2 Responsibilities and Duties

OM&M Contractor

The OM&M Contractor will be responsible for conducting site inspections, maintenance of the site, sampling, field documentation of the OM&M activities, and report preparation. The OM&M Contractor is responsible for site health and safety during OM&M activities.

Honeywell

Honeywell is ultimately responsible for implementing the OM&M program in accordance with the Consent Decree. Honeywell is financially responsible for the OM&M program and must contract for OM&M services. Honeywell will submit required documentation to NYSDEC and participate in five-year meetings, if requested by NYSDEC.

NYSDEC

The NYSDEC is responsible for enforcing the CD. The NYSDEC will review reports including the Five-Year Post-Closure Care Report and will participate in the five-year review meeting, as needed, to make decisions regarding the long-term OM&M program.
8.3 Qualifications and Training

The OM&M Contractor must be a Honeywell prequalified contractor with adequate similar experience. In addition, the OM&M Contractor must be approved by NYSDEC prior to contract commitment.

OM&M personnel must have similar OM&M experience and be 40-hour Occupational Safety and Health Administration (OSHA) Hazwoper trained to conduct intrusive work at the site. For non-intrusive work (i.e., surveying, general inspections), 24-hour Hazwoper training is sufficient. Confined space entry training and certification is required for personnel maintaining the LMS.

Visitors are not required to have training or any specific qualifications. However, visitors must be escorted by Honeywell.
9. CITIZEN PARTICIPATION

In cooperation with Honeywell, NYSDEC is committed to informing and involving the public through a public participation program during the OM&M period.

The citizen participation activities are designed to achieve the following objectives:

- help the interested and affected public to understand the nature and extent of impacted media at the site and the nature and progress of the program to clean up the site;
- ensure open communication between the public and project staff throughout the remedial process;
- create opportunities for the public to contribute information, opinions, and perspectives that have the potential to influence decisions about the site’s clean-up; and
- document that public input received was considered and how it was factored into the decision-making.

Honeywell will conduct the OM&M with NYSDEC oversight. NYSDEC will implement the citizen participation activities described in this section. Honeywell will assist with some citizen participation activities under NYSDEC oversight, review, and approval.

9.1 OM&M Citizen Participation Activities

Information collected during the OM&M period will be available to the public through periodic Fact Sheets and through the Annual Post-Closure Care Reports. The Fact Sheets will include a description of how the remedial program has mitigated hazardous waste issues, any post construction operation and maintenance activities planned, and staff contacts and other ways for people to obtain further information. The Fact Sheets will be distributed to the public by NYSDEC.

The Annual Post-Closure Care Reports will be made available to the public in both the Administrative Record and document repositories (see Section 9.3). Information to be included in the Annual Report is a summary of the year’s monthly inspections,
maintenance, and monitoring activities. Operation log summary, inspection forms, and other pertinent information will be attached to the annual report.

9.2 Contact List

For additional information, the public is encouraged to contact any of the following project staff:

NEW YORK STATE Department of Environmental Conservation
State Project Manager
Mr. Timothy Larson
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233-7016
Phone: 518/402-9789
Email: tjarson@gw.dec.state.ny.us

NEW YORK STATE DEPARTMENT OF HEALTH
Regional Toxics Coordinator
Mr. Mark S. Sergott
Public Health Specialist II
New York State Department of Health
Bureau of Environmental Exposure Investigation
547 River Street
Troy, NY 12180-2216
Phone: (518) 402-7860

U.S. ENVIRONMENTAL PROTECTION AGENCY
Remedial Project Manager
Mr. Robert Nunes
U.S. Environmental Protection Agency, Region II
290 Broadway, 20th Floor
New York, NY 10007-1866
Phone: (212) 637-4254

HONEYWELL, INC.
Remediation Project Manager
John McAuliffe, P.E.
Honeywell Inc.
301 Plainfield Road
Syracuse, NY 13212
Phone: (315) 431-0936
Fax: (315) 431-4777
Email: john.mcauliffe@honeywell.com

9.3 Freedom of Information Law Packet

Eight document repositories have been established to provide the public with convenient access to important project documents and other information. The site document repositories are:

NYSDEC, Region 7
615 Erie Boulevard West
Syracuse, NY 13204
Please call (315) 426-7400 for appointment

Onondaga County Public Library
Syracuse Branch at the Galleries
447 South Salina Street
Syracuse, NY 13204
(315) 435-1840

Atlantic States Legal Foundation
658 West Onondaga Street
Syracuse, New York 13204
Please call (315) 475-1170 for appointment

Liverpool Public Library
310 Tulip Street
Liverpool, NY 13088
(315) 457-0310
Camillus Town Hall
4600 West Genesee Street, Room 100
Syracuse, NY 13219
(315) 488-1234

Moon Library
SUNY ESF
1 Forestry Drive
Syracuse, NY 13210
(315) 470-6712

Solvay Public Library
615 Woods Road
Solvay, NY 13209
(315) 468-2441

Joseph Heath, Esq.
716 E. Washington Street
Suite 104
Syracuse, NY 13210
(315) 475-2559

Freedom of information law requests must be submitted in writing to the NYSDEC Records Access Officer. Requests can be mailed, faxed, or emailed to the appropriate address listed below.

Mailing Address:
Lauren Rivera
Records Access Officer
New York State Department of State
41 State Street
Albany, NY 12231
Phone: (518) 474-4752
Fax: (518) 474-4597

Freedom of Information Law regulations for guidance regarding the processing of requests of records maintained by the agency for public inspection and copying are available at [http://www.dec.ny.gov/pubs/373.html](http://www.dec.ny.gov/pubs/373.html).
10. HEALTH AND SAFETY

Upon completion of the Remedial Action, impacted materials will have been contained in compliance with the approved plans and specifications. The OM&M Contractor will be responsible for preparing and submitting an OM&M Health and Safety Plan.
11. ACCESS CONTROL

Control of site access will be provided as part of the Wastebeds 9 through 15 Closure; therefore, it is not addressed herein.
12. POST-CLOSURE SITE USE

Post-closure site use will be established during development of the Wastebeds 9 through 15 Closure; therefore, it is not addressed herein.
13. REFERENCES


APPENDIX A

Inspection, Operation, and Maintenance Schedule
## Inspection, Operation, and Maintenance Schedule

### SCA Component/Activity

<table>
<thead>
<tr>
<th>Items to Inspect/Monitor/Maintain</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Quarterly</th>
<th>Semi-annually</th>
<th>Annually</th>
<th>Every Five Years</th>
<th>Other</th>
</tr>
</thead>
</table>

#### Final Cover
- **Physical Inspection:**
  - evidence of trespassing or unauthorized use of the final cover area
  - evidence of subsidence or settling that results in low spots
  - evidence of burrowing animals
  - presence of any erosion rills
  - condition of vegetation (grass or willows)
  - observable irregularities such as bulges, bumps, slumps, or cracks
  - evidence of ponded water
  - condition of any access roads (i.e., erosion, aggregate washout, exposed pavement, and debris on the road)
  - condition of SCA parameter berms
  - any other irregularities.

#### Routine Maintenance:
- Repairs
  - if grass cover, mowing
  - if willows, harvesting

#### Surface Water Management, Soil Erosion, and Sediment Control
- **Physical Inspection:**
  - stormwater control berms
  - drainage channels
  - inlet and outlet protection of the perimeter culverts
  - perimeter culverts.

#### Liquid Management System
- **Monitoring/Recording:**
  - total amount of liquid pumped into the riser
  - total amount of liquid reaching WTP from the SCA
  - high level liquid alarm for each tank

- **Physical Inspection:**
  - verify that the automatic controls of the LMS pumps are on
  - verify that the condition of instrumentation and/or valves is as needed
  - verify that the operating conditions of the LMS are specified so that the liquid depth over the liner does not exceed 1 foot
  - examine the condition of the aboveground piping and the insulation around the pipes when pumping activities occur.
  - check the presence of liquid in the outer pipe of the aboveground dual-contained LTS piping which may indicate a leak in the forcemain piping
  - examine the condition of any mechanical and electrical instrumentation devices in winter when the temperature falls below equipment-specific operating ranges
  - examine the condition of any access roads (i.e., erosion, aggregate washout, exposed pavement, and debris on the road)
  - condition of SCA parameter berms
  - any other irregularities.

#### Routine Maintenance:
- Repairs
  - if grass cover, mowing
  - if willows, harvesting

#### Geotechnical Instrumentation
- **Monitoring/Recording as applicable:**
  - Monitoring of pore pressures from vibrating wire piezometers

- **Physical Inspection:**
  - inspect instrument casings and cables, if accessible

#### Minimum Frequency

- **Daily**
  - X

- **Weekly**
  - X

- **Monthly**
  - X

- **Quarterly**
  - X

- **Semi-annually**
  - X

- **Annually**
  - X

- **Every Five Years**
  - X

- **Other**
  - X
## Inspection, Operation, and Maintenance Schedule

<table>
<thead>
<tr>
<th>SCA Component/Activity</th>
<th>Items to Inspect/Monitor/Maintain</th>
<th>Minimum Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Daily</td>
</tr>
<tr>
<td>Reports</td>
<td>● Inspection logs - Internal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Annual report – Internal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● 5-year Report – Regulatory submit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incident Report for any action or occurrence which causes or threatens to cause an additional release of hazardous substances, pollutants, or contaminants on, at, or from the SCA, or which may create a danger to public health, welfare, or the environment.</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

1. “X” indicates onsite physical inspection, monitoring, or repair work.
2. “R” indicates remote monitoring can be used in lieu of site visit and direct inspection or monitoring.
3. Based on the monitoring and inspection results obtained, Honeywell can petition NYSDEC for a reduced monitoring frequency for different items.
4. Inspection for the evidence of trespassing or unauthorized use of the final cover area will be performed monthly for the first year and quarterly thereafter.
5. Initially the grass will be cut quarterly; however, once the grass is established, it will be cut twice a year.