Honeywell
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October 25, 2010

To: Diane Carlton, NYSDEC, Region 7 (1 CD)
Holly Sammon, Onondaga County Public Library (1 bound)
Samuel Sage, Atlantic States Legal Foundation (1 bound)

Re: Letter of Transmittal – Wastebeds 1-8 Integrated IRM and Mitigation Wetlands – Pre-Design Work Plan Addendum

The below document has been approved by the New York State Department of Environmental Conservation (NYSDEC) and is enclosed for your document holdings:

- Wastebeds 1-8 Integrated IRM and Mitigation Wetlands – Pre-Design Work Plan Addendum (SMU 4 Hydraulic Control Geotechnical Information) dated August 23, 2010.

Sincerely,
John P McAuliffe by ccc
John P. McAuliffe, P.E.
Program Director, Syracuse

Enc.

cc: Susan Edwards - Project Manager

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau D – 12th Floor
625 Broadway, Albany, New York 12233-7013
Phone: (518) 402-9676 • **Fax:** (518) 402-9020
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

October 14, 2010

John McAuliffe
Honeywell International
301 Plainfield Road, Suite 330
Syracuse, New York 13212

Re: Waste Beds 1-8 Site, Town of Geddes, Onondaga County, New York
Site # 734081, Index # D-7-0002-02-08
IRM and Mitigation Wetlands Pre-Design Work Plan Addendum
(SMU 4 Hydraulic Control Geotechnical Information)

Dear Mr. McAuliffe:

The New York State Department of Environmental Conservation (NYSDEC) has reviewed the work plan dated August 23, 2010 for the Integrated IRM Pre-Design Investigation. This work plan, which was submitted pursuant to the Administrative Order on Consent (Index # D-7-0002-02-08), and relates to information gathering for the Onondaga Lake RD/RA work to address/control upwelling in the SMU-4 Remediation Area, is approved by the Department with the following limitations and conditions:

1. The Work Plan is approved conditioned on a copy of this letter being affixed to all copies of the August 23, 2010 Work Plan that are distributed by Honeywell (including any copies distributed within Honeywell) to its agents (including all contractors working on the PDI) and to the public.

2. Please send/place a copy of the Work Plan, and this approval letter, in the following document repositories:

   Onondaga County Public Library at the Galleries
   447 South Salina Street
   Syracuse, NY 13204

   Atlantic States Legal Foundation
   658 West Onondaga Street
   Syracuse, NY 13204

The work plan, as limited by and subject to the conditions identified in this letter, is hereby incorporated into the Consent Order.

Sincerely,

Susan L. Edwards

Susan Edwards, P.E.
Project Manager

ec: D. Crawford, OB &G
A.J. Labuz – Honeywell

Honeywell
301 Plainfield Road
Suite 330
Syracuse, NY 13212
315-552-9700
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August 23, 2010

Ms. Susan Edwards
Project Manager
Remedial Bureau D
New York State Department of Environmental Conservation
625 Broadway, 12th Floor
Albany, New York 12233-7016

Re: Wastebeds 1 – 8, Town of Geddes, Onondaga County, New York
Index # D-7-0002-02-08 - Integrated Interim Remedial Measure and Mitigation Wetlands – Pre-Design Investigation Work Plan Addendum

Dear Ms. Edwards:

This letter presents an addendum to the December 2009 Pre-Design Investigation (PDI) Work Plan (O'Brien & Gere, 2009) for New York State Department of Environmental Conservation (NYSDEC) review. This addendum describes proposed activities to aid in the design of the proposed additional hydraulic control measures at Wastebeds 1 - 8 (Site). These hydraulic control measures are situated along the northern shoreline of the Site, bordering SMU-4 (Remediation Area A), as shown on **Figure 1**.

This PDI Work Plan Addendum has been developed pursuant to the Administrative Consent Order (ACO) D-7-0002-02-08 between the New York State Department of Environmental Conservation (NYSDEC) and Honeywell International, Inc. (Honeywell), dated January 22, 2004. It consists of the four sections listed below:

- Background
- Field Investigation and Sampling Plan
- Reporting
- Schedule

Quality Assurance/Quality Control (QA/QC) procedures for the program, including decontamination, will be consistent with the PDI Work Plan, and are specified in the Wastebeds 1-8 RI/FS Quality Assurance Project Plan (QAPP). The QAPP is located in Appendix A of the Wastebeds 1-8 RI/FS Work Plan (O'Brien & Gere, 2006). Health and safety procedures for this program are also presented in the Wastebeds 1-8 Preliminary Site Assessment Health and Safety Plan (O'Brien & Gere, 2004).

Background

Based on recent pre-design investigations associated with the Lake Capping and Dredging Design, an isolation cap may be placed within Remediation Area A in locations near the site. Due to the proximity of the cap material to the Site, there is the potential for groundwater upwelling velocities to affect the integrity of the cap. To mitigate the potentially unacceptable upwelling velocities, hydraulic control of the groundwater near the Remediation Area A is being considered.

The hydraulic control would likely consist of a groundwater collection trench and passive wells/wick drains, similar to the groundwater collection systems planned for the Wastebeds 1-8 IRM. The preliminary alignment of the collection system is depicted on **Figure 1**.

Field Investigation and Sampling Plan

Access Agreements

Site access agreements are currently in place for the Site. Honeywell will contact the current landowners, New York State Agriculture and Markets and Onondaga County, prior to mobilization.

Marking of Subsurface Utilities

Dig Safely New York will be contacted prior to the initiation of intrusive work at the Site. A date and time will be established for the various utility companies to meet a Honeywell representative to mark locations of subsurface utilities in the areas of proposed work.

Marking of Final Locations in the Field

Honeywell will seek NYSDEC concurrence on the final soil boring and piezometer locations after the subsurface utilities have been marked. Proposed investigation sampling locations are presented on **Figure 1** for the soil borings and piezometers.

Geotechnical Borings

Objective: Up to eight soil borings will be advanced to obtain standard penetration test (SPT) N-values, which will be used in conjunction with laboratory test data to develop soil strength parameters. Proposed boring locations are presented on **Figure 1**.

Soil strength parameters and subsurface strata information will be used during the design of the Remediation Area A lakeshore groundwater collection trench. Specifically, this information will be used to select input design parameters for various design calculations including:

- slope stability evaluations associated with collection trench installation
- settlement analysis for an access road and pump station
- estimated groundwater collection system flow rates
- depth of collection trench and passive wells/wick drains.

Approach: Drilling will be overseen by a qualified O'Brien & Gere geologist who will complete a boring log to document encountered subsurface strata and other pertinent observations at each boring location. Proposed borings will be completed using conventional hollow stem auger drilling techniques in accordance with ASTM D1452.

The soil borings will be completed within the following areas, to the depths indicated:

- Seven borings (WB18-SB-244, WB18-SB-245, WB18-SB-246, WB18-SB-247, WB18-SB-248, WB18-SB-249, W18-SB-250) along the Remediation Area A shoreline groundwater collection system alignment to the silt and clay stratum
- One boring (WB18-SB-251) on the upper tier of Wastebed 5 for slope stability, up to 60 ft deep.

Samples will be collected continuously, in accordance with ASTM Method D1586, using a 140-lb hammer and 2-ft split barrel samplers. Selected split spoon samples listed in **Table 1**will be tested, in accordance with **Section 3.2** of the PDI Work Plan. Shelby tube samples will also be collected, in lieu of split barrel samplers, in selected borings in accordance with ASTM D1587 for subsequent laboratory testing, in accordance with **Section 3.2** of the PDI Work Plan.

When the terminal depth for the borehole is reached, the borehole will either be filled to grade with a Portland cement/bentonite grout through a tremie pipe or converted to a piezometer. Four of the geotechnical borings will be grouted and four of the geotechnical borings will be converted into piezometers (**Figure 1**). The piezometer installation details are described in the hydrogeologic investigation section below.

Consistent with previous subsurface investigations, the split spoon samples will have approximately eight ounces of representative material archived and stored in an appropriately controlled environment. The split spoon samples will be described on the boring logs completed for each boring. The boring logs will be reviewed by a qualified O'Brien & Gere representative and samples will be selected for geotechnical laboratory testing based on the soil descriptions. The selected samples will then be shipped to the geotechnical laboratory for testing.

In addition, each split spoon sample will be screened in the field using a photionization detector (PID), consistent with previous investigations. The PID screening results will be included on the boring logs. Drill cuttings will be containerized in a lined roll-off for subsequent characterization and disposal, as discussed in **Section 2.4** of the PDI Work Plan. Drilling fluids, if generated, will be containerized in a storage tank for subsequent characterization and disposal, as discussed in **Section 2.4** of the PDI Work Plan.

Following completion, the horizontal and vertical locations of the test borings will be surveyed. The survey will be completed by a New York State licensed surveyor. The New York State Plane Coordinates (NAD 83) will be used and units will be in feet.

Geotechnical Testing

Objective: Selected split spoon samples will be tested for geotechnical index properties to assist in developing and confirming the consistency of the subsurface stratigraphy. Natural moisture content, particle size, and Atterberg limits are index tests to assist in classifying the soil and evaluating the consistency of the soil and subsurface materials. The CU triaxial and direct shear testing will establish the strength of the soil.

Approach: Geotechnical tests to be performed as part of this PDI addendum will consist of the following:

Test	Method
Natural Moisture Content	ASTM D2216
Particle Size Analysis of Soils	ASTM D422 and D1140
Atterberg (Liquid and Plastic) Limits	ASTM D4318
Consolidated, Undrained (CU) Triaxial	ASTM D4767
Direct Shear	ASTM D3080

The following numbers of tests are anticipated to be performed:

- 14 natural moisture content tests
- 20 grain size with hydrometer tests
- 14 Atterberg Limits tests
- 8 CU triaxial tests
- 1 Direct Shear test.

Table 1 provides a summary of the borings including the boring identification, anticipated termination depth, and proposed laboratory testing. This table was developed with consideration of a combination of criteria, which included results of previous boring and testing results, design considerations for specific technologies, and constructability.

Hydraulic Conductivity Evaluation

Background: Previous investigations at the Site have identified four primary hydrogeologic zones consisting of the shallow, intermediate, deep, and bedrock units. The shallow and the intermediate units are separated from the deep and bedrock units by a silt and clay confining layer.

As discussed in the PDI Work Plan, the shallow hydrogeologic unit is located in anthropogenic fill, which consists mainly of heterogeneous materials of variable hydraulic conductivity. The shallow groundwater unit is recharged by precipitation infiltrating on the Site.

The intermediate unit along the northern shoreline consists of marl and deltaic deposits associated with Ninemile Creek immediately underlying the shallow fill unit. In general, the marl unit texture fines downward from the upper contact with the shallow fill unit to the underlying silt and clay unit. Localized deltaic deposits associated with Ninemile Creek are present along the northern sholeline and generally consist of silt and fine grained sand with coarse-grained sand and gravel layers intermittently distributed. In this area the marl has been replaced by, or intermixed with, the deltaic deposit. The deltaic deposits are located above the silt and clay layer and a general gradation in grain size consistent with the marl unit has been observed.

Underlying the intermediate unit along the northern lakeshore and beneath most of the wastebeds is a silt and clay layer. Because of its low hydraulic conductivity, the silt and clay acts as a confining layer between the deep groundwater unit and the intermediate and shallow units.

Hydraulic conductivity plays an important role in groundwater flow and is a key factor in the design of the groundwater collection system. Based on the proposed groundwater collection along the northern shoreline, the focus of this PDI addendum task is on the intermediate unit.

Objective: The objective of this task is to evaluate the horizontal and vertical hydraulic conductivity of the intermediate unit along the anticipated alignment of the Remediation Area A groundwater collection system. Hydraulic conductivity data have been previously collected and documented during the various Site investigations, as outlined in the PDI Work Plan. *In situ* hydraulic conductivity testing (slug tests) and pumping tests have been used to develop these hydraulic conductivity data for the intermediate unit. The additional hydraulic conductivity data will be compared to previously collected site hydraulic conductivity data, and collectively the data will be used for design elements associated with the passive extraction well/wick drain spacing, trench construction and component specifications.

The hydraulic conductivity evaluation will consist of:

- Collecting soil samples of the marl for grain size and hydrometer analyses
- Estimating the hydraulic conductivity of the marl and Ninemile Creek deltaic deposit using the grain size/hydrometer results and the Hazen method
- Installing four piezometers within the intermediate unit
- Completing *in situ* hydraulic conductivity tests on the newly installed piezometers.

Approach:

Grain Size/Hydrometer Analysis

As described in **Section 3.1** of the PDI Work Plan, soil samples will be collected from the groundwater collection system alignment borings for grain size/hydrometer analysis. **Table 1** identifies the additional grain size/hydrometer analyses to be completed under this PDI addendum task. The samples will be collected from borings WB18-SB-245, WB18-SB-247, and WB18-SB-249 from multiple depth intervals. Samples to be analyzed for grain size/hydrometer were selected to be spaced along the alignment of the proposed groundwater collection system to provide a well-distributed horizontal and vertical coverage of hydraulic conductivity values that can be compared with existing hydraulic conductivity data and proposed hydraulic conductivity data to be collected from the proposed piezometers. This data will be used to estimate the hydraulic conductivity as described below.

The Hazen method (Fetter 1988) will be used to estimate the hydraulic conductivity of the marl from the grain size distribution curve. The Hazen approximation is $K = C \cdot (D_{10})^2$ where:

- K is the hydraulic conductivity in centimeters per second (cm/sec)
- D_{10} is the effective grain size in centimeters (cm)
- C is a coefficient based on the composition of the sediment.

Piezometers

Up to four piezometers will be installed within the proposed geotechnical boring locations shown on **Figure 1**. Piezometers will be installed to fully screen the intermediate unit.

Piezometer Installation

Subsequent to reaching the terminal depth of the borehole, a 2-inch ID PVC piezometer, consisting of a of 0.010-inch slot screen flush-threaded to riser casing, will be installed in the borehole. The screen interval for each location will depend on the thickness of the native material. The riser casing will be extended approximately 2 ft above ground surface. A sand pack suitable for use with the screen slot size will be installed within the annular space between the borehole and the piezometer. The sand pack will extend from the bottom of the piezometer to approximately 2 ft above the top of the well screen. The remaining annular space will be filled with Portland cement/bentonite grout through a tremie pipe. To protect the piezometer and prevent unauthorized access, a steel guard pipe with a cover and pad lock will be installed around each piezometer. A concrete pad will be installed around the guard pipe to direct precipitation away from the borehole. A vented cap will be placed on the piezometer. Drill cuttings will be containerized in a lined roll-off for subsequent characterization and disposal, as discussed in **Section 2.4** of the PDI Work Plan. Drilling fluids, if generated, will be containerized in a storage tank for subsequent characterization and disposal, as discussed in **Section 2.4** of the PDI Work Plan.

Piezometer Development
Following installation of the piezometers and prior to performing the hydraulic conductivity tests, each piezometer will be developed to remove material that may have settled in and around the piezometer screen. Development will consist of the removal of ten well volumes using either a bailer or centrifugal pump. Development water will be contained in a 500-gallon tank located on-site for subsequent disposal. The method of disposal will be determined based on the water quality results of a composite sample from the tank, as referenced in **Section 2.4** of the PDI Work Plan.

Hydraulic Conductivity Testing
Hydraulic conductivity tests will be performed on each of the newly installed piezometers to estimate the horizontal hydraulic conductivity of materials surrounding the well screen. Rising and falling head measurements will be obtained following both insertion and removal of a PVC slug into the well. The groundwater level measurements will be recorded using an electronic data logger. The data will be analyzed using the Bouwer and Rice method (Bouwer 1989) with the software AquiferWin®. Graphs of the test data will be generated for the hydraulic conductivity interpretation.

The *in situ* hydraulic conductivity tests will be completed to correlate measured hydraulic conductivity values with the hydraulic conductivity values estimated using the grain size/hydrometer data. The existing hydraulic conductivity and grain size data from existing wells and piezometers located along the alignment of the groundwater collection system will also be used in this correlation.

Reporting
Geotechnical sample data will be uploaded to the Locus Technologies Environmental Information Management (EIM)™ environmental data management system for the Site. The investigation results will be presented in either the IRM and Mitigation Wetlands 50% Design submittal or in a separate data summary report.

Project Schedule
The proposed PDI Work Plan Addendum field work implementation schedule is attached as **Figure 2.** Honeywell will communicate with NYSDEC to discuss key technical issues that may arise during the course of the PDI Work Plan Addendum implementation.

If you have any questions or comments, please do no hesitate to contact Doug Crawford of O'Brien & Gere at (315)437-6100 or me at (315)552-9782.

Sincerely,

John P. McAuliffe by CCC

John P. McAuliffe, P.E.
Program Director, Syracuse

Attachments

cc:	Mr. Robert Nunes	USEPA (4 copies)
	Mr. Gregg Townsend	NYSDEC Region 7 (1 copy, 1 CD)
	Mr. Mark Sergott	NYSDOH (1 copy, 1 CD)
	Mr. Geoffrey J. Laccetti	NYSDOH (ltr only)
	Margaret A. Sheen, Esq.	NYSDEC, Region 7 (ltr only)
	Argie Cirillo, Esq.	USEPA (ltr only)
	Brian D. Israel, Esq.	Arnold & Porter (ec)
	Mr. David Coburn	O.C. Office of the Environment (1 copy, 1 CD)
	Joseph J. Heath, Esq.	(copy & ec)
	Thane Joyal, Esq.	(ec)
	Mr. Fred Kirschner	AESE, Inc. (ec)
	Ms. Jeanne Shenandoah	Onondaga Nation (ec)
	Ms. Heidi Kuhl	Onondaga Nation (ec)
	Mr. Michael Spera	AECOM (1 copy)
	Mr. William Hague	Honeywell (ec)
	Mr. Alfred J. Labuz	Honeywell (ltr only)
	Mr. Steve Miller	Parsons (CD/ltr only)
	Mr. Thomas Conklin	O'Brien & Gere (ec)
	Mr. Bradley Kubiak	O'Brien & Gere (ec)
	Mr. Douglas M. Crawford	O'Brien & Gere (ec)
	Mr. Christopher C. Calkins	O'Brien & Gere (ec)

References

Bower, H., 1989. The Bower and Rice slug test – an update. Groundwater. Vol. 24, pp 304-309

Fetter, C.W., 1988. *Applied Hydrogeology*, Second Edition. Macmillian Publishing Company. ISBN 0-675-20887-4.

O'Brien & Gere Engineers, Inc. 2009. *Wastebeds 1 through 8 Integrated Interim Remedial Measure and Mitigation Wetlands – Revised Pre-Design Investigation Work Plan. Geddes, New York.* O'Brien & Gere Engineers, Inc., Syracuse, New York.

O'Brien & Gere Engineers, Inc. 2006. *Wastebeds 1 through 8 Remedial Investigation/Feasibility Study Work Plan. Geddes, New York.* O'Brien & Gere Engineers, Inc., Syracuse, New York.

O'Brien & Gere Engineers, Inc. 2004. *Health and Safety Plan for Wastebeds 1 through 8 Site. Geddes, New York.* O'Brien & Gere Engineers, Inc., Syracuse, New York.

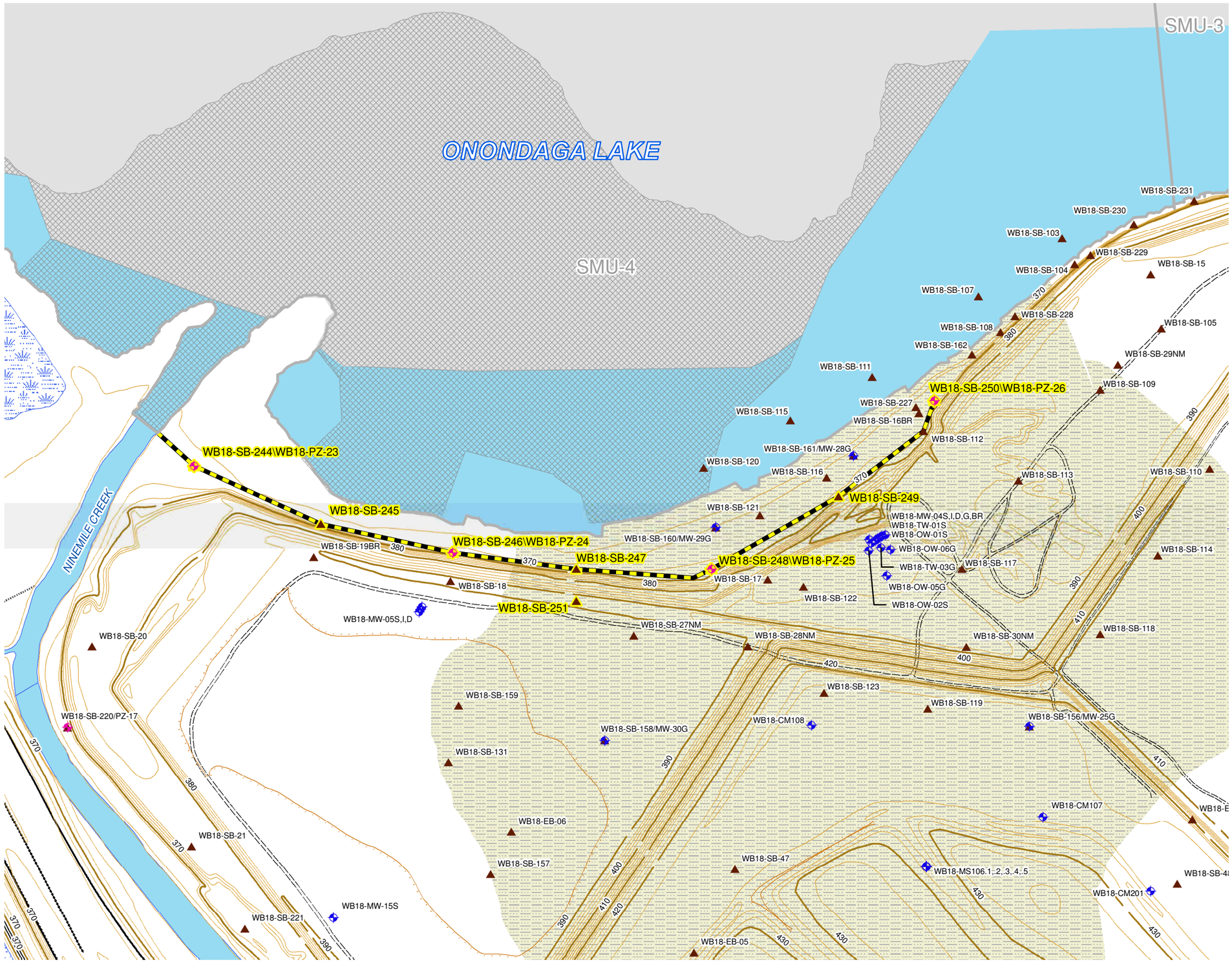
Table 1. ***Proposed Boring Summary***

Soil Boring	Termination Depth (FBG)	Anticipated Termination Strata	PDI Area	Sample Strata	Sample Type	Proposed Testing				
						MC	GS	AL	CU	Direct Shear
WB18-SB-245	80	Silt/Clay	SMU 4	1st & last 4' Marl	SS		**2**			
WB18-SB-247	60	Silt/Clay	SMU 4	1st & last 4' Marl	SS		**2**			
				Marl	SS	**3**	**3**	**3**		
				Marl	ST				**2**	
WB18-SB-248/ PZ-25	50	Silt/Clay	SMU 4	Marl	SS	**3**	**3**	**3**		
				Marl	ST				**2**	
WB18-SB-249	60	Silt/Clay	SMU 4	1st & last 4' Marl	SS		**2**			
				Marl	SS	**3**	**3**	**3**		
				Marl	ST				**2**	
WB18-SB-251	60	Silt/Clay	SMU 4	Solvay Waste	ST				**2**	
				Peat	ST	**2**	**2**	**2**		**1**
				Solvay Waste	SS	**3**	**3**	**3**		

NOTES:

AL - Atterberg Limits
CU - Consolidated, Undrained Triaxial
FBG - Feet Below Grade
GS - Grain Size with Hydrometer
MC - Natural Moisture Content
SS - Split Spoon
ST - Shelby Tube

FIGURE 1



LEGEND

- PRELIMINARY ALIGNMENT OF PROPOSED GROUNDWATER COLLECTION SYSTEM
- DREDGE AREA
- CAP AREA
- DELTAIC DEPOSITS

LOCATION

- MONITORING WELL
- PIEZOMETER
- SOIL BORING
- PROPOSED SOIL BORING
- PROPOSED PIEZOMETER

NOTE: CAP AND DREDGE LIMITS ADOPTED FROM THE DRAFT ONONDAGA LAKE CAPPING AND DREDGE AREA AND DEPTH INITIAL DESIGN SUBMITTAL (PARSONS 2009)

HONEYWELL
WASTEBEDS 1 - 8
PRE-DESIGN INVESTIGATION
GEDDES, NEW YORK

PROPOSED SOIL BORING AND PIEZOMETER LOCATION PLAN

0 100 200 400
Feet

AUGUST 2010
1163.45082

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NAME: NewtonJM

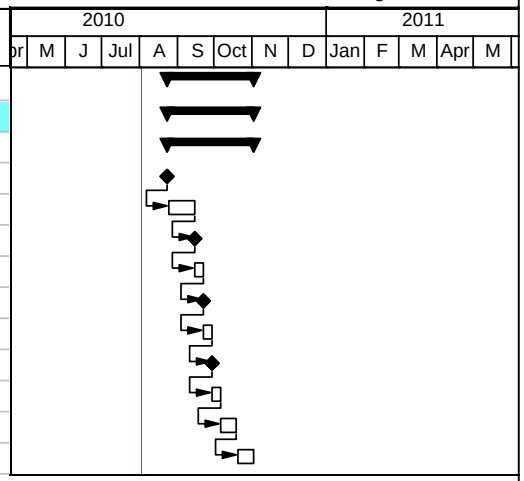
DATE: 8/9/2010 5:57:36 PM

Figure 2

Data Date: 02-Aug-2010

Print Version: 23-Aug-2010 13:58

Activity ID	Activity Name	Original Duration	Start	Finish
35046 Wastebeds 1 - 8		50	23-Aug-2010	02-Nov-2010
Wastebeds 1 to 8 IRM Design		50	23-Aug-2010	02-Nov-2010
IRM PDI Addendum		50	23-Aug-2010	02-Nov-2010
FG 321	Honeywell Submit PDI Work Plan Addendum to DEC	0		23-Aug-2010
FG 326	DEC Review of PDI Work Plan Addendum	15	24-Aug-2010	14-Sep-2010
FG 331	DEC Submit Comments to Honeywell on PDI Work Plan Addendum	0		14-Sep-2010
FG 336	Revise PDI Work Plan Addendum	5	15-Sep-2010	21-Sep-2010
FG 341	Honeywell Submit Revised PDI Work Plan Addendum to DEC	0		21-Sep-2010
FG 346	DEC Final Review of PDI Work Plan Addendum	5	22-Sep-2010	28-Sep-2010
FG 351	DEC Approval of Revised PDI Work Plan Addendum	0		28-Sep-2010
FG 361	Scoping / Pre-Planning of PDI	5	29-Sep-2010	05-Oct-2010
FG 371	Geotechnical Investigation	10	06-Oct-2010	19-Oct-2010
FG 381	Hydro-Geologic Investigation	10	20-Oct-2010	02-Nov-2010



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