Honeywell

Honeywell
301 Plainfield Road
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Syracuse, NY 13212
315-552-9700
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July 13, 2015

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

Re: Letter of Transmittal – Wastebeds 1-8 Site Document Repository Addition

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

- Revised Remedial Design/Remedial Action Work Plan – Wastebeds 1-8 Operable Unit 1 (OU-01) dated June 2015

Sincerely,

John P. McAuliffe by LLC

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

Enc.

cc: Tracy A. Smith – NYSDEC (ec)
Chris Fitch, Communications (ec)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Remedial Bureau D
625 Broadway, 12th Floor, Albany, NY 12233-7013
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www.dec.ny.gov

July 6, 2015

Mr. John P. McAuliffe, P.E.
Honeywell International, Inc.
301 Plainfield Road
Suite 330
Syracuse, NY 13212

Re: Wastebeds 1-8 OU1 Remedial Design/Remedial Action Work Plan

Dear Mr. McAuliffe:

The New York State Department of Environmental Conservation (NYSDEC) has completed its review of the "Remedial Design/Remedial Action Work Plan - Wastebeds 1-8 Operable Unit (OU1)" (RD/RA Work Plan) dated June 2015 and submitted with your letter dated June 29, 2015. Based on our review, the RD/RA Work Plan is approved. If you have any questions, please contact me at 518-402-9796.

Sincerely,

Tracy A. Smith

Tracy A. Smith
Project Manager

ecc: J. Gregg, NYSDEC
D. Hesler, NYSDEC
J. Heath, Esq.
C. Waterman
C. Calkins, OBG
B. Kubiak, OBG
R. Nunes, USEPA
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T. Joyal, Esq.
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M. Sergott, NYSDOH
J. Shenandoah
A. Lowry
R. Quail, NYSDEC
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D. Crawford, OBG

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

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June 29, 2015

Mr. Tracy Smith, P.E.
Project Manager
NYSDEC Div. of Environmental Remediation
Remedial Bureau D - 12th Floor
625 Broadway
Albany, NY 12233-7016

RE: Revised Remedial Design/Remedial Action Work Plan
Wastebeds 1-8 Operable Unit 1 (OU-1)
Town of Geddes, Onondaga County, New York

Dear Mr. Smith:

Attached please find two copies of the Revised Remedial Design/Remedial Action (RD/RA) Work Plan – Wastebeds 1-8, Operable Unit 1. The Revised RD/RA Work Plan was prepared by O'Brien & Gere.

Please contact Michael Broschart of O'Brien & Gere (315-956-6585) or myself if you have any questions.

Sincerely,

John P. McAuliffe by CCC

John P. McAuliffe, PE
Program Director, Syracuse

Enc. (2 copies)

cc:	Robert Nunes	USEPA (1 copy, 2 CDs)
	Harry Warner	NYSDEC Reg 7 (1 copy, 1 CD)
	Mark Sergott	NYSDOH (1 copy, 1 CD)
	Margaret A. Sheen, Esq.	NYSDEC, Reg 7 (ec)
	Argie Cirillo, Esq.	USEPA (ec)
	Brian D. Israel, Esq.	Arnold & Porter (ec or CD)
	Travis Glazier	O.C. Office of the Environment (1 copy, 1 CD)
	Joseph Heath, Esq.	(ec)
	Thane Joyal, Esq.	(1 copy, 1 CD)
	Jeanne Shenandoah	Onondaga Nation (1 copy)
	Curtis Waterman	HETF (ec or CD)
	Alma Lowry	(ec or CD)
	Michael Spera	AECOM (1 copy, 1 CD)
	William Hague	Honeywell (ec or CD)
	Steve Miller	Parsons (CD)
	Thomas Conklin	O'Brien & Gere (1 copy)
	Bradley Kubiak	O'Brien & Gere (ec)
	Douglas M. Crawford	O'Brien & Gere (ec)
	Christopher C. Calkins	O'Brien & Gere (ec)
	Michael B. Broschart	O'Brien & Gere (ec)

REVISED WORK PLAN

Revised
Remedial Design/Remedial Action Work Plan
Wastebeds 1-8 Operable Unit 1 (OU-1)
Town of Geddes, Onondaga County, New York

Honeywell

June 2015

JUNE 29, 2015 | 1163 | 60388

Revised Remedial Design/Remedial Action Work Plan

Revised Remedial Design/ Remedial Action Work Plan Wastebeds 1-8 Operable Unit 1 (OU-1) Town of Geddes, Onondaga County, New York

Prepared for:

Honeywell

DOUGLAS M. CRAWFORD, P.E., VICE PRESIDENT
O'BRIEN & GERE ENGINEERS, INC

CERTIFICATIONS

I, **Douglas M. Crawford**, certify that I am currently a NYS-registered Professional Engineer and that this Remedial Design/Remedial Action Work Plan was prepared in accordance with applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

This Work Plan was developed pursuant to the Order on Consent (Index R7-0849-15-02) between Honeywell and the New York State Department of Environmental Conservation (NYSDEC).

066649	June 29, 2015	
NYS Professional Engineer #	Date	Signature

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LIST OF EXHIBITS

1 Record of Decision

LIST OF ACRONYMS

ACO	Administrative Consent Order
ARAR	Applicable or Relevant and Appropriate Requirement
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of Concern
DER	Division of Environmental Remediation
E&SC	Erosion and Sediment Control
FS	Feasibility Study
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
NMC	Ninemile Creek
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
RD/RA	Remedial Design/Remedial Action
RAWP	Remedial Action Work Plan
RAO	Remedial Action Objective
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SWPPP	Stormwater Pollution Prevention Plan
SCO	Soil Cleanup Objectives
TVOC	Total Volatile Organic Compounds
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compounds

1. INTRODUCTION

This Remedial Design/Remedial Action (RD/RA) Work Plan (Work Plan) presents the framework for implementation of the remedial design and remedial action associated with Operable Unit (OU)-1 (soil/fill materials) at the Wastebeds 1 - 8 Site (Site) This RD/RA Work Plan has been prepared pursuant to the Administrative Consent Order (ACO) (R7-0849-15-02) entered into by Honeywell International, Inc. (Honeywell), and the New York State Department of Environmental Conservation (NYSDEC) dated May 8, 2015. In addition, it has been developed in general accordance with NYSDEC's Division of Environmental Remediation (DER)-10 *Technical Guidance for Site Investigation and Remediation (DER-10)* (NYSDEC 2010).

This Work Plan was developed to address the Wastebeds 1 - 8 OU-1 selected remedy, as outlined in the U.S. Environmental Protection Agency's (USEPA) and NYSDEC's Record of Decision (ROD) dated December 2, 2014 (ROD; NYSDEC and USEPA 2014). The following Remedial Action Objectives (RAOs) have been established for the OU-1 remedy and are presented in the ROD:

- Prevent ingestion/direct contact with soil/fill material/Solvay waste in surface and subsurface soil above levels that would result in unacceptable human exposure.
- Prevent or minimize inhalation of or exposure to contaminants volatilizing from contaminated soil/fill material/Solvay waste that would result in unacceptable human exposure. In the event that buildings are constructed, mitigate impacts to public health resulting from soil vapor intrusion into those buildings, as may be warranted.
- Prevent or minimize adverse ecological impacts to biota from ingestion/direct contact with soil/fill material/Solvay waste causing toxicity or impacts from bioaccumulation through the terrestrial food chain.
- Prevent or minimize, the further migration of contaminants that would result in groundwater, sediment, or surface water contamination.

Portions of Site groundwater are being addressed by elements of an ongoing Interim Remedial Measure ((IRM); O'Brien & Gere 2013). The long-term remedy for Site groundwater and Ditch A will be addressed as Wastebeds 1 - 8 Operable Unit 2 (OU-2).

The selected OU-1 remedy consists of the following cover components for the site:

- One-foot thick vegetated soil cover
- Two-foot thick vegetated soil cover
- One-foot thick vegetated structural fill cover
- Vegetation enhancement cover
- The specific cover type for a given area will be based on the current and reasonably anticipated future land use, and corresponding soil clean-up objectives (SCO's).

Additional details of the cover components are provided in Section 3.1.1, below.

This Work Plan is organized in five sections. Background information is presented in **Section 1**. **Section 2** presents the remedial design investigation approach. **Section 3** presents the phased project approach for the combined remedial design and remedial action elements leading up to construction mobilization. Regulatory and permit requirements are described in **Section 4**, and schedule considerations are described in **Section 5**.

1.1 BACKGROUND

1.1.1 Site Background

The Wastebeds 1-8 Site (Site) is located along the southwestern shore of Onondaga Lake as shown in **Figure 1.** A Site plan of Wastebeds 1-8 is included as **Figure 2**. The wastebeds extend approximately 1.5 miles along the shoreline, with a maximum width of 0.5 mile, and include approximately 315 acres. The Site, in its entirety,

includes approximately 404 acres. The Site elevation ranges from approximately 363 to 430 ft above mean sea level. NMC borders the Site along the northwest side to where it flows into Onondaga Lake.

1.1.2 Regulatory Background

Remedial investigation and feasibility study activities have been conducted at this subsite to the Onondaga Lake Superfund Site pursuant to the ACO (D-7-0002-02-08) between the NYSDEC and Honeywell dated January 22, 2004. Remediation at the Site began in 2011, in accordance with a 2011 Response Action Document (RAD) (NYSDEC and USEPA 2011) that called for an Interim Remedial Measure (IRM) to address shallow and intermediate groundwater and seeps, removal of sediments in a portion of a ditch, and shoreline stabilization that were evaluated in a Focused Feasibility Study (FFS) (O'Brien & Gere 2010a). The FFS was conducted pursuant to the ACO and as described in the *Shallow and Intermediate Groundwater FFS Work Plan* (O'Brien & Gere 2008a).

Evaluation of remedial alternatives for the Site proceeded during implementation of the IRM, and the site was separated into two operable units (OUs), OU-1 and OU-2. OU-1 comprises surface soil/fill material, while OU-2 comprises groundwater and Ditch A at the Site. The development and evaluation of cover system alternatives was documented in the OU-1 FS Report, which was submitted to NYSDEC in September 2014 (O'Brien & Gere 2014). Following completion of the OU-1 FS, the NYSDEC and USEPA issued a Proposed Plan in October 2014, and upon conclusion of the public comment period, NYSDEC and USEPA issued a ROD in December 2014 that presented the selected remedy. The selected remedy for OU-1 included a series of cover systems. The ROD is included as **Exhibit 1**. The FS for OU-2 is currently being developed.

2. REMEDIAL DESIGN INVESTIGATIONS

A remedial design investigation was completed in April 2015 for surface soils in areas adjacent to the proposed Onondaga County Lakeview Amphitheater. A Sampling and Analysis Plan (O'Brien & Gere, 2015) for this work was submitted under a separate cover. Surface soil samples were collected and analyzed for Target Compound List/Target Analyte List (TCL/TAL) parameters. Sample results were compared to soil SCOs in order to evaluate the types, thickness and areal extent of cover systems that will be constructed as part of the Remedial Action in 2015. The sampling results and evaluation will be presented in the Remedial Action Work Plan (RAWP) for the first phase of the OU-1 remedy.

Additional remedial design investigations will be completed to confirm the existing cover thicknesses in parking areas associated with the New York State Fairgrounds and the areas adjacent to the Onondaga County's public recreation trail. Additional cover will be placed, if needed, to provide for at least a one foot thickness. Existing covers on other areas within the limits of the site, including the Crucible Landfill area vegetated covers/road beds associated with I-690/NY-695 and existing site roads/infrastructure, will also be confirmed during the remedial action.

Future phases of remedial design investigations, including additional sampling efforts (if required), will be submitted to NYSDEC as a Work Plan or Sampling and Analysis Plan addendum detailing the scope of the investigation(s).

3. REMEDIAL DESIGN/REMEDIAL ACTION

The RD/RA for the OU-1 remedy will be implemented in multiple phases due to cover material availability, material placement productivity rates, planting seasons for the optimal establishment of vegetative enhancements, and site usage by the property owners. A RAWP will be prepared and submitted for NYSDEC and EPA review and approval for the first phase of the OU-1 remedy and RAWP addenda will be submitted for subsequent phases. RAWP addenda are anticipated to be submitted on an annual basis.

Sustainability concepts will be evaluated and incorporated in the RAWP for the OU-1 remedy, including those presented in the NYSDEC's *DER-31-Green Remediation* and USEPA's *Superfund Green Remediation Strategy* (September 2010). To the extent practicable, use of renewable energy sources and locally produced/sourced materials and supplies, reduction/elimination of waste, efficient use of resources and energy, and other practices, with impacts on long-term Site stewardship will be incorporated into the implementation of the remedial action.

3.1 REMEDIAL ACTION WORK PLAN

A RAWP will be developed for the first phase of the RD/RA, and RAWP addenda will be submitted for each subsequent phase of work, as described below.

3.1.1 Remedial Action

The selected remedy to address Solvay waste and contaminated soil/fill materials present at the Site includes the following components:

- **One foot thick vegetated soil cover (passive recreational areas)**: In areas of anticipated passive recreational use, a 1-foot thick vegetated soil cover will be installed (**Figure 3, Section A**). This type of cover will apply to approximately 39 acres.
- **Two-foot thick vegetated soil cover (active recreational areas and ecological resource areas):** In areas of anticipated active recreational use and also areas where SCOs for the protection of ecological resources will apply and are exceeded, a 2-foot thick vegetated soil cover will be installed (**Figure 3, Section B**). In three upland staging areas where 6-inches of topsoil was applied as part of the IRM, an additional 1.5-feet of cover material will be installed to provide for 2-foot cover where protection of ecological resources SCOs are exceeded. This type of cover will apply to approximately 37 acres.
- **One-foot thick vegetated structural fill cover:** This cover will be applied to areas of anticipated New York State Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover will consist of a compacted mixture of aggregate and soil (**Figure 3, Section C**). This cover will be applied directly over existing soil/fill to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. This type of cover will apply to approximately 19 acres. In the fall of 2013 a pilot-scale demonstration test was conducted in the northwestern corner of the overflow parking area to evaluate the effectiveness of this cover type. The results of the pilot-scale test are presented as **Appendix A**.
- **Vegetative enhancement cover**: This cover will consist of wood fiber mulch/compost and fertilizer mixed with seed and will be applied to areas where surface soil concentrations are below applicable SCOs (**Figure 3, Section D**). This type of cover will apply to approximately 76 acres.

Representative cross-sections for each of the cover options described above are provided on **Figure 3**. Design drawings and specifications will be provided in the RAWP and subsequent RAWP addenda that will include sufficient detail for the construction of the remedy. The technical specifications will describe the conditions under which the work is to be conducted, including the materials to be incorporated into the work, and the standards for acceptance of the components of construction. Where appropriate, information will be provided on the design drawings, in lieu of technical specifications. The design drawings will include cover system areal extent and details, restoration details, and monitoring well protection, abandonment or modification details. Figures and supporting information pertaining to temporary construction facilities, emergency procedures,

traffic control, site access, equipment decontamination, water and imported material management will be also provided.

Waste management procedures will be developed and incorporated into the RAWP, as necessary.

3.1.2 Regulatory and Permitting Requirements

Potentially applicable regulatory programs and permitting (*e.g.*, 6 NYCRR Parts 608,661,663), including documenting substantive requirements, will be summarized in the RAWP, as necessary. See **Section 4** for additional information.

3.1.3 Institutional Controls

A description of the anticipated institutional controls will be developed for each phase of the work and presented in the RAWP and subsequent RAWP addendums.

3.1.4 Stormwater Pollution Prevention Plan (SWPPP)

A stormwater pollution prevention plan (SWPPP) will be prepared and will describe actions to be taken as part of NYSDEC's State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities, Permit No. GP-0-10-001.

The SWPPP will describe the erosion and sediment control (E&SC) practices that will be used to minimize sediment in stormwater discharges during construction activities, offer protective measures to minimize sediment transport, and identify potential sources of sediment that may affect the quality of stormwater discharges. The SWPPP will be amended, as required, for subsequent phases of work.

3.1.5 Community Health and Safety Plan (CHASP)

A CHASP will be developed to address health and safety procedures which will be implemented to address the protection of the local community and environment during the implementation of the Site remedy. The CHASP will include a Community Air Monitoring Plan (CAMP) that will address potential project air emissions into the off-site community.

The CAMP will describe the following components of the monitoring program:

- Objectives and needs
- Community receptors
- Approach and duration
- Parameters, methods, and action limits
- Quality assurance and quality control
- Data management and reporting

The air monitoring program will be developed using the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (gCAMP) (NYSDOH 2000) guidance for evaluation of potential airborne contaminant releases as a direct result of investigative and remedial work activities. The air monitoring program will consist of monitoring upwind and downwind, either at or within the remedial worksite perimeter for dust and odors. The site remedy does not include intrusive activities, therefore monitoring for volatile organic compounds (VOCs) is not anticipated. However, should intrusive activity be required or if unexplained odors are noticed, VOC monitoring will be conducted.

3.1.6 Health and Safety Plan (HASP)

A health and safety plan (HASP) will be prepared to address site hazards and will be developed in accordance the current applicable general industry standards, 29CFR1910, 29CFR1926, and the EPA Standard Operating Safety Guides, Publication 9285.1-03. Site contractors will be responsible for developing task specific job safety analyses prior to the start of work.

3.1.7 Sampling and Analysis Plan

Sampling and analysis plans (SAPs) will be developed detailing the sampling and analysis of imported fill materials.

Samples of imported fill materials will be collected and analyzed for geotechnical parameters and chemical constituents, as required by DER-10, prior to placement of cover materials. Sample results will be presented in the RAWP or RAWP addendum prepared for the respective phase of cover placement.

3.1.8 Post Construction Plans

A Construction Completion Report (CCR) and interim Site Management Plan (SMP) will be developed and modified as needed following each phase of the remedial action. The CCRs will describe the work completed during the respective phase of the site remedy. A Final Engineering Report will be provided when the final site remedy (both OU-1 and OU-2) has been completed. The interim SMP will address what is completed for the OU-1 remedy given the additional work to be completed in the subsequent phases. The interim SMP will guide future activities at the site by documenting institutional and engineering controls and by developing requirements for periodic site reviews, the implementation of required O&M activities for the selected remedy, and future development on the Site. A comprehensive SMP will be provided when the final site remedy (both OU-1 and OU-2) is completed.

3.1.9 Remedial Action Schedule

A project schedule will be developed and submitted as part of the RAWP and each RAWP addendum. The schedule will include project deliverable milestones and time frames as listed below:

- Submittal review periods
- Procurement activities
- Mobilization
- Construction durations
- Interim Site Management Plan
- Construction Completion Report.

The schedule for the RD/RA Work Plan through Phase 1A RAWP submittal to NYSDEC is provided in **Section 5.**

3.2 PROPERTY OWNER COORDINATION

Because the property subject to the selected remedy is owned by Onondaga County and the State of NY, Honeywell has established agreements with Onondaga County and the State of NY related to coordination of implementation of the remedy, and responsibilities relative to long-term inspection, maintenance and certification of remedial elements.

4. REGULATORY AND PERMIT REQUIREMENTS

The implementation of the OU-1 Remedial Action for Wastebeds 1-8 will require that the substantive requirements of state and local permits be complied with as required by 6 NYCRR § 375-1.12 (Permits). Substantive permit requirements for completion of the remedial action and the steps necessary to comply with them will be identified in the RAWP and RAWP addenda prepared for each phase of work.

5. SCHEDULE

A project schedule is included as **Figure 4.**

REFERENCES

New York State Department of Health (NYSDOH). 2000. *Generic Community Air Monitoring Plan Revision 1.* NYSDOH. http://www.dec.ny.gov/docs/regions_pdf/spldgair.pdf. June, 2000.

O'Brien & Gere. 2008a. *Shallow and Intermediate Groundwater Focused Feasibility Study Work Plan – Wastebeds 1-8, Geddes, New York*. February 28, 2008.

NYSDEC. 2010. *Technical Guidance for Site Investigation and Remediation (DER-10)*. May 3, 2010.

O'Brien & Gere. 2010a. *Final FFS Report - Wastebeds 1-8.* June 2010.

United States Environmental Protection Agency (USEPA). 2010. *Superfund Green Remediation Strategy.* http://www.epa.gov/superfund/greenremediation/sf-gr-strategy.pdf. September 2010.

O'Brien & Gere. 2011b. *Revised Baseline Ecological Risk Assessment (BERA) Work Plan*. March 7, 2011.

O'Brien & Gere. 2011a. *Revised Final Human Health Risk Assessment (HHRA) Work Plan*. April 26, 2011.

NYSDEC and USEPA. 2011. *The Response Action Document (RAD) for the Wastebeds 1-8 Site.*

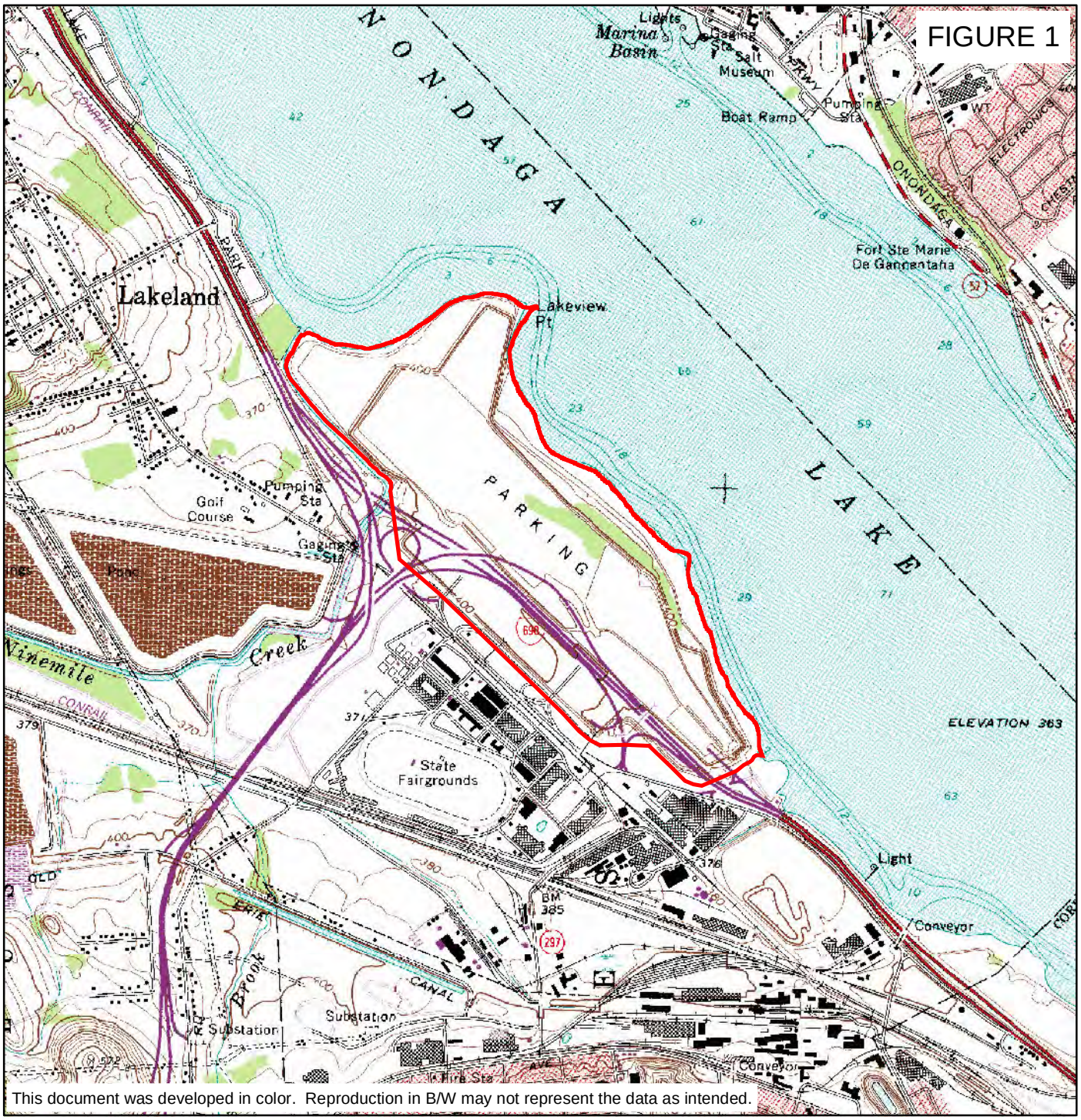
O'Brien & Gere. 2013b. *Integrated IRM, Mitigation Wetlands, and Remediation Area A Hydraulic Control System 100% Design Report, Wastebeds 1 through 8, Geddes, New York.* O'Brien & Gere Engineers, Inc., Syracuse, New York.

O'Brien & Gere. 2014. *Revised Final FS Report, Wastebeds 1 through 8, Operable Unit-1.* September 2014.

NYSDEC and USEPA. 2014. *Record of Decision – Operable Unit 1 of Solvay Wastebeds 1-8 Subsite of the Onondaga Lake Superfund Site, Town of Geddes, Onondaga County, New York.* December 2014.

O'Brien & Gere. 2015. *Wastebeds 1 through 8, Operable Unit-1 Sampling & Analysis Plan.* April 2015.

Figures



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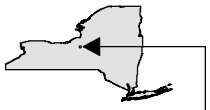
ADAPTED FROM: SYRACUSE WEST, NY USGS QUADRANGLE.

HONEYWELL
INTERNATIONAL INC.
OU-1 RD/RA WORK PLAN
WASTEBEDS 1-8
GEDDES, NEW YORK



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O'BRIEN & GERE

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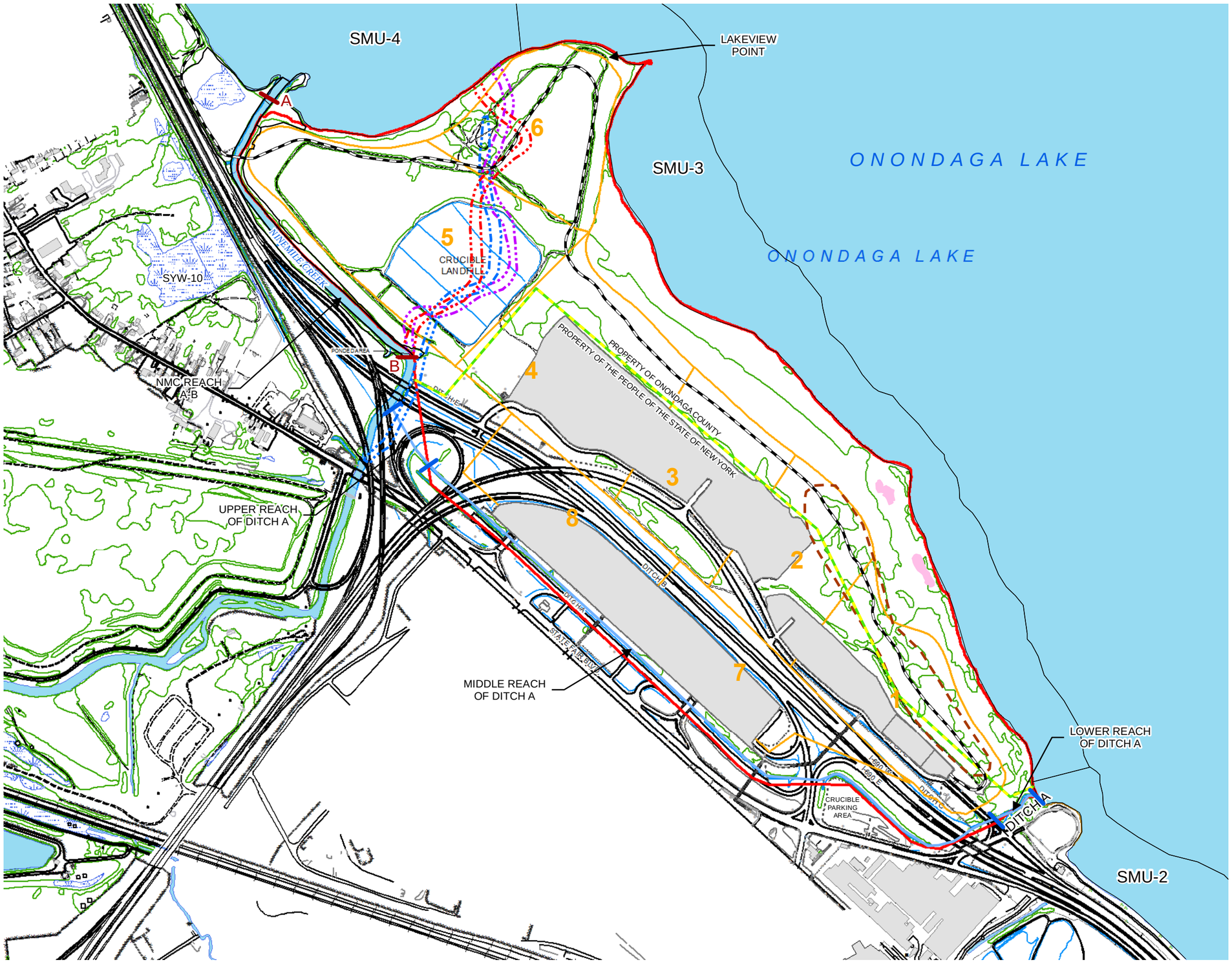
FIGURE 2



LEGEND

- ONONDAGA COUNTY WEST SHORE TRAIL
- SMU-2 ONONDAGA LAKE SEDIMENT MANAGEMENT UNIT BOUNDARY
- DELINEATED WETLANDS
- PARKING LOT
- WASTEBEDS 1-8 PROPERTY BOUNDARY (PEOPLE OF THE STATE OF NY AND ONONDAGA COUNTY)
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE
- BIOSOLIDS AREA FOOTPRINT

FORMER NINEMILE CREEK CHANNEL

- USGS TOPO MAP 1898
- THOMSEN ASSOCIATES
- ALLIED DRAWING 1937

HONEYWELL INTERNATIONAL INC.
OU-1 RD/RA WORK PLAN
WASTEBEDS 1- 8
GEDDES, NEW YORK

SITE PLAN

0 400 800 1,600
Feet

JANUARY 2015
1163.45176

O'BRIEN & GERE

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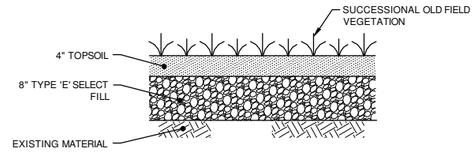
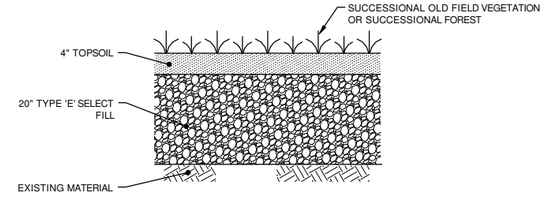


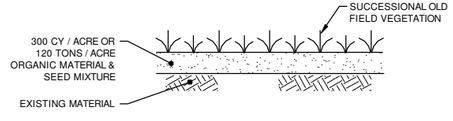
A 12" THICK VEGETATED SOIL COVER

NOT TO SCALE



B 24" THICK VEGETATED SOIL COVER

NOT TO SCALE

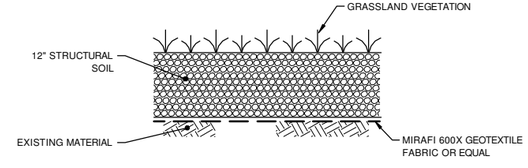


NOTE:

1. IN TRANSITIONAL AREAS BETWEEN ACTIVE AND PASSIVE RECREATIONAL AREAS AND AREAS WHERE THE VEGETATION ENHANCEMENT COVER WILL BE APPLIED, THE THICKNESS OF THE ORGANIC MATERIAL WILL BE TAPERED FROM THE 300 CY APPLICATION RATE TO MATCH THE THICKNESS OF THE RESPECTIVE VEGETATED SOIL COVER.

D VEGETATION ENHANCEMENT COVER

NOT TO SCALE



NOTE:

1. STRUCTURAL SOIL SHALL BE 80% GRADED CRUSHED STONE AND 20% SOIL.

C 12" THICK VEGETATED STRUCTURAL FILL COVER

NOT TO SCALE

HONEYWELL INTERNATIONAL INC.

WASTEBEDS 1-8 OU-1
RD / RA

TYPICAL COVER
CROSS-SECTIONS

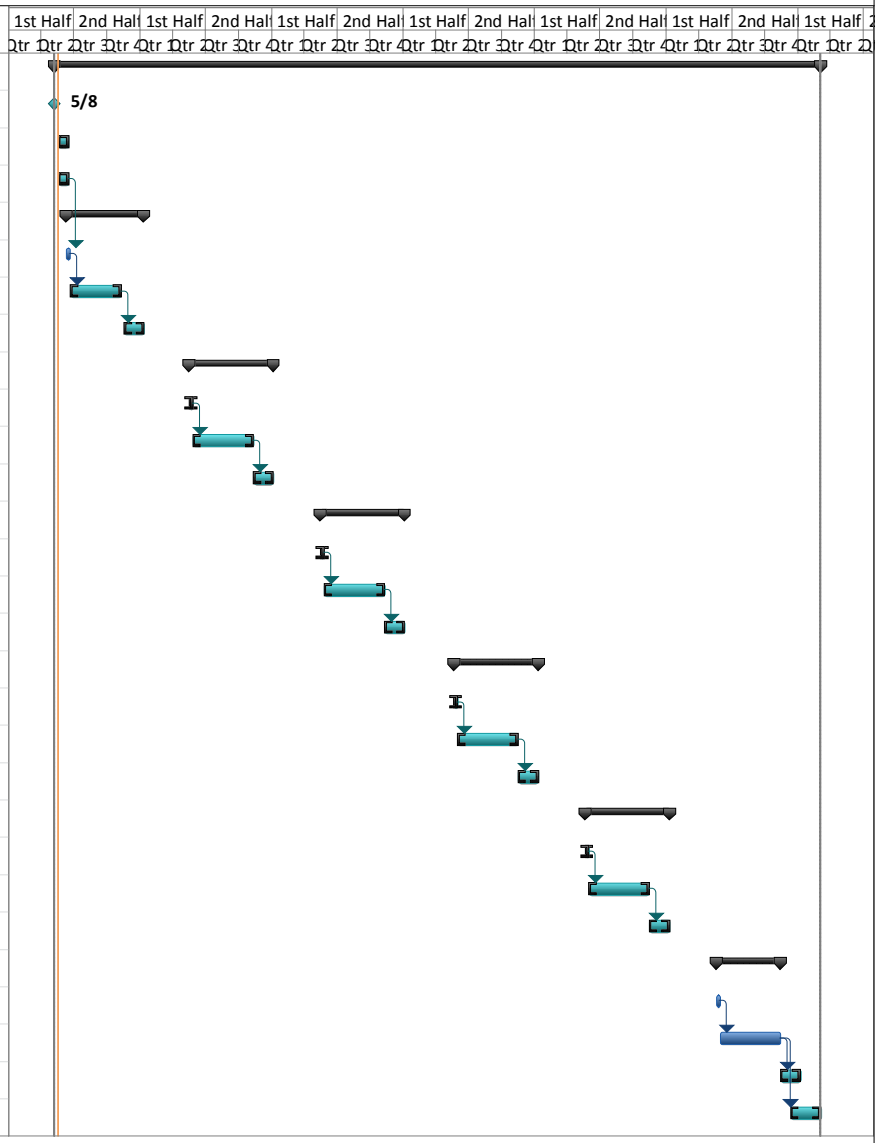
FILE NO. 1163.60388-FIG1
APRIL 2015

O'BRIEN & GERE

I:\Honeywell.1163\60388.Wastebeds-1-8-O\Docs\DWG\Figures\Figure 3.dwg

Figure 4 - Project Schedule
WBs 1-8 OU-1 Remedial Design/Remedial Action

ID		Task Mode	Task Name	Duration	Start	Finish
1			**WBs 1-8 OU-1: Phase 1 Final Cover**	**1519 days**	**Fri 5/8/15**	**Wed 3/3/21**
2			WBs 1-8 OU-1 Consent Order Signed	0 days	Fri 5/8/15	Fri 5/8/15
3			NYSDEC Review & Approve RD/RA Work Plan	20 days	Wed 5/20/15	Tue 6/16/15
4			NYSDEC Review & Approve RA Work Plan	20 days	Wed 5/20/15	Tue 6/16/15
5			**2015 - Phase 1 Remedial Action**	**154 days**	**Wed 6/10/15**	**Mon 1/11/16**
6			2015 Mobilization	8 days	Wed 6/10/15	Fri 6/19/15
7			2015 Remedial Action	101 days	Mon 6/22/15	Mon 11/9/15
8			2015 Construction Completion Report	40 days	Tue 11/17/15	Mon 1/11/16
9			**2016 - Remedial Action**	**168 days**	**Mon 5/16/16**	**Wed 1/4/17**
10			2016 Mobilization	8 days	Mon 5/16/16	Wed 5/25/16
11			2016 Remedial Action	120 days	Thu 5/26/16	Wed 11/9/16
12			2016 Construction Completion Report	40 days	Thu 11/10/16	Wed 1/4/17
13			**2017 - Remedial Action**	**168 days**	**Mon 5/15/17**	**Wed 1/3/18**
14			2017 Mobilization	8 days	Mon 5/15/17	Wed 5/24/17
15			2017 Remedial Action	120 days	Thu 5/25/17	Wed 11/8/17
16			2017 Construction Completion Report	40 days	Thu 11/9/17	Wed 1/3/18
17			**2018 - Remedial Action**	**168 days**	**Mon 5/21/18**	**Wed 1/9/19**
18			2018 Mobilization	8 days	Mon 5/21/18	Wed 5/30/18
19			2018 Remedial Action	120 days	Thu 5/31/18	Wed 11/14/18
20			2018 Construction Completion Report	40 days	Thu 11/15/18	Wed 1/9/19
21			**2019 - Remedial Action**	**168 days**	**Mon 5/20/19**	**Wed 1/8/20**
22			2019 Mobilization	8 days	Mon 5/20/19	Wed 5/29/19
23			2019 Remedial Action	120 days	Thu 5/30/19	Wed 11/13/19
24			2019 Construction Completion Report	40 days	Thu 11/14/19	Wed 1/8/20
25			**2020 - Remedial Action**	**128 days**	**Mon 5/18/20**	**Wed 11/11/20**
26			2020 Mobilization	8 days	Mon 5/18/20	Wed 5/27/20
27			2020 Remedial Action	120 days	Thu 5/28/20	Wed 11/11/20
28			Prepare Site Management Plan	40 days	Thu 11/12/20	Wed 1/6/21
29			Prepare Final Engineering Report	60 days	Thu 12/10/20	Wed 3/3/21



Project: Figure 4.mpp
Date: Wed 5/20/15

Task	External Tasks	Manual Task	Finish-only
Split	External Milestone	Duration-only	Deadline
Milestone	Inactive Task	Manual Summary Rollup	Progress
Summary	Inactive Milestone	Manual Summary	
Project Summary	Inactive Summary	Start-only	

Appendix A and Exhibit 1

Appendix A

Pilot-Scale Demonstration Summary

MEMORANDUM

TO:	File	**cc:**	Chris Kriegner
FROM:	Tony Eallonardo		Jen Reymond
RE:	Summary of Appendix A of OU-2 FS Report		Clare Leary
FILE:	45176		Brad Kubiak
DATE:	June 25, 2015		Michael Broschart

The purpose of this memo is to summarize the results of the Wastebeds 1 through 8 Site Cover System Pilot Study which included vegetation management plots in undeveloped areas of the site and the test plots of vegetated structural fill located on the northwest corner of the NY State Fair Orange Lot overflow parking area. These studies took place to evaluate the performance of cover systems intended to increase substrate stabilization and evapotranspiration (ET) and the resiliency of various fill thicknesses to vehicle parking, respectively. These studies were conducted in accordance with the *Cover System Pilot Study Work Plan* (O'Brien & Gere, 2011) and *Cover System Pilot Study Work Plan Addendum – Wastebeds 1 through 8* (O'Brien & Gere, 2013).

The program comprises three studies (**Figure 1**):

1. Vegetation management studies in *Undeveloped Areas*
2. In New York State Fair overflow *Parking Areas*, evaluation of
    a. Manufactured grass protection technologies (*i.e.*, root protection mesh and geo blocks)
    b. Vegetated structural fill parking area

VEGETATATION MANAGEMENT STUDIES IN UNDEVELOPED AREAS

As documented in NYSDEC's and USEPA's Record of Decision (ROD) (NYSDEC & USEPA, 2014) vegetative cover systems are the selected remedy for Operable Unit-1 at the Wastebeds 1-8 Site (Site). Effective vegetative cover systems increase substrate stabilization, reduce exposed waste material, and increase evapotranspiration (ET) (thereby reducing percolation and leachate generation). Prior to implementing the selected remedy, it was necessary to study the effectiveness of organic matter, nutrient addition, and re-vegetation at establishing suitable and sustainable vegetative cover that achieves the remedy objectives.

The pilot study for this work took place between 2011 and 2014 and included four experimental blocks, each containing eight different treatment combinations of nutrients (Nitrogen-Phosphorus-Potassium fertilizer [NPK] at 430 or 1300 lbs/acre) and mulch (hydromulch and organic matter; **Table 1, Figure 2**). Hydromulch was Flexterra®, a bonded-fiber material, while the organic matter treatment was EcoBlanket™, a compost mix including locally-sourced yard waste and manure. Flexterra® was applied in accordance with the manufacturers recommendation of 3,050 pounds per acre on flat areas, and 3,500 pounds per acre on slopes ranging from 3H:1V to 2H:1V. The resulting application thickness for Flexterra® was approximately 1 inch. EcoBlanket™ was applied in accordance with the manufacturer's recommendation of two-inch thickness,

A seed mix was consistently applied to each treatment plot, except for the unmodified control plots. During the study, both biotic and abiotic measurements were recorded to assess vigor, total cover, and for use in the development of ET estimates. Analysis of Variance (ANOVA) was performed to identify the impacts of mulch and fertilizer addition on the response variables.

Organic matter treatments were observed to have the highest average percent cover compared to other plots in each treatment year. Application of fertilizer at either 430 or 1300 lbs/acre had negligible effects on the percent cover in the organic mulch treatments and only a slightly positive effect in the hydromulch treatments compared to the control. Continuous yearly decreases in exposed fill were only observed for organic matter treatments. Organic matter treatments also had significantly higher ET rates than all other treatments; however, fertilizer addition did not have a consistent effect on ET.

Table 1. Eight treatments applied to each of the four experimental blocks

Control	Seed	Hydromulch (3000 lbs/ac)	Organic Matter (*ca.* 1-inch depth)
No Amendment	No Amendment	Seed	Seed
		Seed + NPK @ 430 lbs/acre	Seed + NPK @ 430 lbs/acre
		Seed + NPK @ 1300 lbs/acre	Seed + NPK @ 1300 lbs/acre

The consistent result that has emerged from this study is that the organic matter treatment was superior to hydromulch in enhancing substrate stabilization and ET. While the organic matter had a longer structural lifespan (0% exposed soil/fill material after three winters and two growing seasons), organic matter also appeared to facilitate greater vegetation productivity in terms of cover and ET. Across all fertilizer levels treatments, ET rates in the organic matter treatment tended to be approximately 20% higher than the hydromulch, control and seed treatments. In general, this study demonstrates that simple vegetation management measures, such as the addition of soil amendments and seed, can be implemented to improve Site cover and ecological services such as soil stabilization and ET.

NEW YORK STATE FAIR OVERFLOW PARKING AREA STUDIES

Another aspect of the study examining the resiliency of vegetative cover systems took place in the overflow parking lot of the New York State Fair. This area is characterized by unshaded expanses of hard packed soil and gravel, with portions vegetated by maintained lawn and field grasses. This study evaluated the ability of areas vegetated by seeding to thrive following vehicle traffic and parking during the New York State Fair.

Initially, in 2012, grass protection technologies (*i.e.*, Tenax® Grass Protection (GP) Mesh and Presto GeoSystems GeoBlock® 5150 Porous Pavement System) were evaluated relative to vegetation growth and structural stability in light of NYS Fair traffic and parking. Initial results from this effort showed that vegetation growth was not greatly enhanced from existing conditions and both grass protection technologies showed significant wear and damage after only one Fair season. Therefore, this study was discontinued in favor of a revised approach, based on structural fill, for the parking area.

Structural fill is an engineered soil mix designed to provide the structural capacity to support periodic vehicle parking and the rooting habitat to support vegetation. This material was mixed and applied on site at four different thicknesses (6”, 12”, 18”, and 24”) during the fall/winter of 2013/2014. Three seed mixes (alvar, fescue, and successional old field; **Table 2**) were applied to each of the fill depths. The structural fill used for each lift thickness consisted of crushed stone (80%), clay loam (20%), and potassium propenoate-propenamide copolymer. These materials were homogenized, placed on station, and compacted in 6” increments to achieve a 90-95% maximum dry density. Plant seed mixes (alvar grassland, synthetic grassland, and tall fescue communities) were selected based on tolerance, high rate of productivity, and ET given rocky substrates and amenability to periodic mowing and use as a public space. Seed was applied with a 1”organic matter treatment across all structural fill plots

Table 2. Treatments of the Cover System Pilot Study Expansion Design

Experimental Block	6-Inch Lift	12-Inch Lift	18-Inch Lift	24-Inch Lift
A	Synthetic Mix	Alvar Mix	Synthetic Mix	Fescue Mix
B	Alvar Mix	Fescue Mix	Alvar Mix	Synthetic Mix
C	Fescue Mix	Synthetic Mix	Fescue Mix	Alvar mix

Vegetation coverage within the first year following seeding was over 80% with a significant proportion of native species (Photographs 1 and 2). Observations made before, during, and after the fair indicated that damage due to vehicle use was minimal to moderate and that the lift thicknesses all performed equally well with the exception of the lesser performance of the 6" lift perhaps as a result of rain-water saturation leading to distressed initial vegetation response and subsequent traffic impacts. No significant differences in resiliency were observed between seed mix types. The vegetated structural fill pilot study area is currently being used daily to support Amphitheater construction personnel parking and is performing well given this intensive use.

SUMMARY AND RECOMMENDATIONS

Based upon the findings of the cover system pilot study, full-scale implementation should include the application of an organic matter treatment—minimum of one inch depth (134 cy per acre) as applied for the Cover System Pilot Study. The recommended organic matter application rate for the site remedy, 300 cy per acre, has been developed based on the pilot study results, the recommended compost blanket application rates presented in Table 2 of AASHTO's Standard Specification for Compost for Erosion/Sediment Control for average annual rainfall, and a conservative factor of safety (2.2) to account for site soil conditions.

Application depths that are too thick (*e.g.*, six inches to one foot) may cause poor vegetation productivity by increasing the root growth needed for new germinants to reach mineral substrates, can promote excessive moisture in the root zone in wet areas stressing plants and potentially causing root rot, can cause stem tissue stress and may lead to the development of insect damage, disease, or stem girdling in existing woody species, and by potentially creating zones of anaerobic conditions in low portions of the organic matter profile. However, in transition zones between cover types, zones of increased organic matter depth may be appropriate to provide buffering of edge conditions where increased recreational activity may occur.

Given the pilot test results, the organic matter treatment will increase vegetative productivity relative to untreated areas thereby reducing exposed fill and increasing ecological services such as soil stabilization and ET. This is based on four years of observation now associated with the Cover System Pilot Study.

The results of the test plots in the parking area indicate that a minimum structural fill thickness of 12 inches with a mowed vegetated cover is appropriate for traffic and parking during the NY State Fair.

Photographs 1 and 2: (1) Plant community development one year after seeding in the Cover System Pilot Study Expansion (six-inch structural fill treatment in the foreground); (2) native forbs in the structural fill plots.

REFERENCES

NYSDEC and USEPA. 2014. *Record of Decision – Operable Unit 1 of Solvay Wastebeds 1-8 Subsite of the Onondaga Lake Superfund Site, Town of Geddes, Onondaga County, New York.* December 2014.

O'Brien & Gere. 2011*. Cover System Pilot Study Work Plan.* August 16, 2011.

O'Brien & Gere. 2013. *Cover System Pilot Study Work Plan Addendum – Wastebeds 1 through 8.* March 26, 2013

Exhibit 1

Record of Decision

RECORD OF DECISION

Operable Unit 1 of the Solvay Wastebeds 1-8 Subsite
of the Onondaga Lake Superfund Site
Town of Geddes, Onondaga County, New York

New York State Department of Environmental Conservation
and
United States Environmental Protection Agency
Region II
December 2014

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Operable Unit 1 of the Solvay Wastebeds 1-8 Subsite of the Onondaga Lake Superfund Site
Geddes, Onondaga County, New York
Superfund Site Identification Number: NYD986913580
Operable Unit: 22

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the New York State Department of Environmental Conservation (NYSDEC) and U.S. Environmental Protection Agency's (EPA's) selection of a remedy for Operable Unit (OU) 1 of the Solvay Wastebeds 1-8 subsite (Subsite) of the Onondaga Lake Superfund site, chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP). This decision document explains the factual and legal basis for selecting a remedy to address the Solvay waste and contaminated soil/fill materials associated with the Subsite. The attached index (see Appendix III) identifies the items that comprise the Administrative Record upon which the selected remedy is based.

NYSDEC is the lead agency for this Subsite and has prepared the remedy selected in this ROD. The EPA has determined that the selected remedy meets the requirements for a remedial action as set forth in CERCLA Section 121, 42 USC § 9621. As such, for the purpose of satisfying this remedy selection criterion of the NCP, NYSDEC, on behalf of New York State, supports the selected remedy. NYSDOH also supports the selection of this remedy; its letter of concurrence is attached (see Appendix IV)."

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants or contaminants from this Subsite.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy (Alternative 3) for the Solvay Wastebeds 1-8 Subsite to address the Solvay waste and contaminated soil/fill materials includes the following components:

One-foot thick vegetated soil cover (for passive recreation areas) - approximately 39 acres: In areas of anticipated passive recreational use (regardless of whether 6 NYCRR Part 375-6 soil cleanup objectives (SCOs) for commercial use are exceeded or not), a 1-foot thick vegetated soil

cover will be installed.

Two-foot thick vegetated soil cover (for active recreation areas or where ecological SCOs in surface soil are exceeded) - approximately 27 acres: In areas of anticipated active recreational use (regardless of whether the restricted residential SCOs are exceeded or not) and also where SCOs for protection of ecological resources will apply and are exceeded, a two-foot thick vegetated soil cover will be installed.

One and a half-foot thick vegetated soil cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover will be applied to the three upland staging areas associated with the Interim Remedial Measure (IRM).[1] Restoration of these areas as part of the IRM consisted of a six-inch topsoil cover. The additional 1.5-feet of cover material will provide for a two-foot cover over this area where protection of ecological resources SCOs are exceeded.

One-foot thick vegetated structural fill cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover will be applied to areas of anticipated New York State (NYS) Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover will consist of a compacted mixture of aggregate and soil. This cover will be placed directly over existing soil/fill to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost-estimating purposes) to be one foot, the actual thickness and locations where it will be placed will be determined during remedial design.

Vegetation enhancement cover (over the remaining areas) - approximately 76 acres: This cover will consist of wood fiber mulch/compost and fertilizer mixed with seeds and will be applied to areas where surface soil concentrations are below applicable SCOs. While the thickness of the mulch and seed application is assumed (for cost estimate purposes) to be approximately 4 inches, the actual thickness and locations will be determined during remedial design.

Any fill material brought to the Subsite will need to meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Native species will be used for the vegetative component of covers. For the purpose of developing cost estimates, the seed application is anticipated to consist of a grassland seed mix native to NYS and selected for its ability to attain relatively high growth rates and ecological function.

Structures, such as buildings, pavement, or sidewalks, as part of the future development at OU1 could serve as acceptable substitutes for any of the vegetated cover types described above.

Approximately 58 acres (where SCOs for protection of commercial use are not exceeded in surface soil) of the 77 acres of the Subsite used as parking lots associated with the New York State

[1] The IRM is described in the "Interim Remedial Measure" section.

Fairgrounds are already covered with an estimated two to seven feet of imported fill, including at least one-foot of gravel/fill at the surface. The existing cover thickness will be confirmed during remedial design and additional cover will be placed, if needed, to provide for at least a one foot thickness. Existing parking lot surfaces, the County's public paved recreation trail, the Crucible landfill area, and vegetated covers/road beds associated with the I-690/NY-695 corridor, and other Subsite roads/infrastructure will also be maintained.

Clean fill staging areas, which support the IRM, Ninemile Creek, and Onondaga Lake site remediation projects, were constructed using a minimum of 6 inches of crushed stone. Restoration of the clean fill staging areas will consist of placement of 6 inches of vegetated, clean fill over the top of the crushed stone in order to provide for a one-foot cover over these areas.

Institutional controls, such as environmental easements, will be used to ensure that any intrusive activities in areas where contamination remains are in accordance with a NYSDEC-approved Site Management Plan, which will include the following:

- Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the remedy and details the steps and media-specific requirements necessary to ensure the following institutional and engineering controls remain in place and effective:

    - environmental easements and/or an environmental notice;
    - Site cover systems described above;
    - excavation plan which details the provisions for management of future excavations in areas of remaining contamination;
    - descriptions of the provisions of the institutional controls including any land use restrictions;
    - provision that future on-Site construction should include vapor intrusion sampling and/or installation of mitigation measures, if necessary;
    - provisions for the management and inspection of the identified engineering controls;
    - maintaining Subsite access controls and Department notification; and
    - steps necessary for periodic reviews and certification of the institutional and/or engineering controls.

- Monitoring Plan to assess the performance and effectiveness of the remedy. The plan will include, but may not be limited to, monitoring for vapor intrusion for any buildings developed on the Subsite, as may be required by the Institutional and Engineering Control Plan discussed above.

The selected remedy includes continued monitoring and maintenance associated with the IRM components relating to soil, sediment, fill, and Solvay waste (*e.g.*, shoreline stabilization system, mitigation wetlands, the vegetative cover, and access roads constructed to support the IRM). Maintenance and monitoring for the IRM mitigation wetlands and cover systems will include monitoring to document that success criteria are met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may include repair of cover cross-

sections in areas of disturbance or re-application of vegetation in areas of non-survivorship.

The remedial design program will provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program. The need for a demarcation layer between the soil cover and the underlying substrate will be evaluated during design.

Green remediation techniques, as detailed in NYSDEC's Green Remediation Program Policy - DER-31,[2] and the EPA Region 2's Clean and Green policy[3] will be considered for the preferred alternative to reduce short-term environmental impacts. Green remediation best practices such as the following may be considered:

- Use of renewable energy and/or purchase of renewable energy credits to power energy needs during construction and/or operation and maintenance of the remedy.
- Reduction in vehicle idling, including both on and off road vehicles and construction equipment during construction and/or operation and maintenance of the remedy.
- Design of cover systems, to the extent possible, to be usable for alternate uses, require minimal maintenance (*e.g.*, less mowing), allow for infiltration of storm water and/or be integrated with the planned use of the property. For example, the use of vegetated structural fill to create parking surfaces as identified in both Alternatives 2 and 3, will address storm water management in these areas, while resulting in a surface usable for current and intended land use in these areas.
- Beneficial reuse of material that will otherwise be considered a waste.
- Use of Ultra Low Sulfur Diesel (ULSD).

Because this alternative will result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, remedial actions may be evaluated to remove, treat, or contain the contaminated soils remaining at OU1.

DECLARATION OF STATUTORY DETERMINATIONS

Part 1- Statutory Requirements

The selected remedy meets the requirements for remedial actions set forth in CERCLA in Section 121, 42 U.S.C. § 9621, because as implemented : 1) it is protective of human health and the environment; 2) it meets a level of standard of control of the hazardous substances, pollutants, and contaminants which at least attains the legally applicable or relevant and appropriate requirements under the federal and State laws; 3) it is cost-effective; and 4) it utilizes permanent solutions and

[2] See http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf.

[3] See http://epa.gov/region2/superfund/green_remediation.

alternative treatment technologies to the maximum extent practicable.

Part 2- Statutory Preference for Treatment

CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances as a principal element (or justify not satisfying the preference). For the Solvay waste and contaminated soil/fill materials of the Site, NYSDEC and the EPA do not believe that treatment is practicable or cost effective given the widespread nature of the Solvay waste and soil contamination and the high volume of Solvay waste and soils that would need to be addressed.

Part 3- Five-Year Review Requirements

Because this remedy is anticipated to result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The ROD contains the remedy selection information noted below. More details may be found in the Administrative Record file for Operable Unit 1 of the Solvay Wastebeds 1-8 Subsite.

- Contaminants of concern and their respective concentrations in the "Summary of Site Characteristics" section;

- Baseline risk represented by the contaminants of concern in the "Summary of Subsite Risks" section;

- Cleanup levels established for contaminants of concern and the basis for these levels in the "Remedial Action Objectives" section;

- Manner of addressing source materials constituting principal threats in the "Principal Threat Waste" section;

- Potential land and groundwater use that will be available at the Subsite as a result of the selected remedy in the "Expected Outcomes of the Selected Remedy" section;

- Estimated capital, annual operation and maintenance, and present-worth costs; discount rate; and the number of years over which the remedy cost estimates are projected in the "Description of the Selected Remedy" section; and

- Key factors used in selecting the remedy (*i.e.*, how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) in the "Summary of the Rationale for the Selected Remedy"

section.

AUTHORIZING SIGNATURES

December 2, 2014

Robert W. Schick P.E., Director
Division of Environmental Remediation
NYSDEC

Date

December 2, 2014

Walter E. Mugdan, Director
Emergency and Remedial Response Division
EPA, Region 2

Date

DECISION SUMMARY

Operable Unit 1 of the Solvay Wastebeds 1-8 Subsite
of the Onondaga Lake Superfund Site
Town of Geddes, Onondaga County, New York

New York State Department of Environmental Conservation
and
United States Environmental Protection Agency
Region II
December 2014

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SUBSITE NAME, LOCATION, AND DESCRIPTION

On June 23, 1989, the Onondaga Lake site was added to the New York State Registry of Inactive Hazardous Waste Disposal Sites. On December 16, 1994, Onondaga Lake, its tributaries, and the upland hazardous waste sites which have contributed or are contributing contamination to the lake (subsites) were added to the U.S. Environmental Protection Agency's (EPA's) National Priorities List (NPL). This NPL listing means that the lake system is among the nation's highest priorities for remedial evaluation and response under the federal Superfund law for sites where there has been a release of hazardous substances, pollutants, or contaminants.

Since many Superfund sites are complex and have multiple contamination problems and/or areas, they are often divided into several operable units (OUs) for the purpose of managing the site-wide response actions. The NCP (at Section 300.5) defines an OU as "a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of OUs, depending on the complexity of the problems associated with the site. OUs may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."

The New York State Department of Environmental Conservation (NYSDEC) and the EPA have, to date, organized the work for the Onondaga Lake NPL site[1] into discrete subsites. These subsites are also considered by the EPA to be OUs of the NPL site. One of the subsites is the Solvay Wastebeds 1-8 subsite (Subsite). The Subsite consists of two OUs: OU1, which addresses the Solvay waste and contaminated soil/fill materials and is the subject of this Record of Decision; and OU2, which will address the contaminated groundwater and impacted media in a surface water drainage ditch, Ditch A in the future. A remedial investigation (RI)[2] has been completed and a feasibility study (FS)[3] is currently underway for OU2. A Proposed Plan for OU2 will be released following the development of the FS.

The 404-acre Subsite includes eight irregularly shaped wastebeds that extend roughly 1.5 miles along the shore, with a maximum width of 0.5 miles. The wastebeds consist primarily of inorganic waste materials (Solvay waste) from the production of soda ash (sodium carbonate) using the Solvay process. Other contaminants (*e.g.*, benzene, toluene, ethylbenzene, and xylenes [BTEX], naphthalene and assorted polycyclic aromatic hydrocarbons [PAHs], phenolic compounds, polychlorinated biphenyls [PCBs] pesticides, and inorganics), which are not related to soda ash production, are also present at the Subsite. A surface water drainage feature, Ditch A, runs along the southern and eastern Subsite boundaries and discharges stormwater from roads, parking areas

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[1] The Onondaga Lake Superfund Site's Superfund site Identification Number is NYD986913580. NYSDEC is the lead agency for this OU; the EPA is the support agency.
[2] An RI determines the nature and extent of the contamination at a site and evaluates the associated human health and ecological risks.
[3] An FS identifies and evaluates remedial alternatives to address the contamination at a site.

and the overland surface flow from the Subsite to Ninemile Creek and Onondaga Lake. Subsite elevations range from approximately 363 feet above mean sea level (MSL) at the shores of Onondaga Lake to 430 feet above MSL. The Subsite location is shown on Figure 1, and a Site Plan is included as Figure 2.

Interstate 690 (I-690) and interchanges associated with New York State (NYS) Route 695 (NY-695), NYS Fairgrounds parking lots, access roads for the parking lots, and foot bridges are present and in use at the Subsite. The NYS Fairgrounds parking lots (approximately 77 acres) consist of over two feet of gravel and fill material placed over the Subsite's soil/fill/Solvay waste material. Other infrastructure and development present include the approximate 2.5-mile Onondaga County West Shore Trail Extension (a public recreation trail) and a 20-acre permitted, closed landfill formerly operated by Crucible Specialty Metals (Crucible). An approximate 17-acre Biosolids Area used by the City of Syracuse and Onondaga County for sewage sludge disposal is located near the southeastern end of the Subsite over portions of Wastebeds 1 and 2. Lakeview Point, which generally comprises Wastebed 6, forms one of the Subsite's more prominent features--a peninsula that extends into Onondaga Lake near the northern end of the Subsite.

The portion of the property that is developed as parking lots and roadways is, in general, owned by NYS, and there are property easements for highway and stormwater drainage features. The remaining portion of the Subsite is owned by Onondaga County. The County-owned portion is largely undeveloped, characterized by varying degrees of vegetation ranging from sparsely vegetated areas to stands of mature trees. The County-owned property is deed-restricted to "park purposes" use. Figure 2 depicts the approximate property boundaries.

SUBSITE HISTORY AND ENFORCEMENT ACTIVITIES

The lowering of the lake level in 1822 to the same level as the Seneca River resulted in the formation of the Geddes Marsh. The wastebeds were constructed and operated over the Geddes Marsh by a series of companies, of which Honeywell International Inc. is the successor. The Subsite is composed primarily of Solvay waste, a material consisting largely of calcium carbonate, calcium silicate, and magnesium hydroxide and which in an unweathered state has elevated pH levels. These wastes were generated at the former Solvay Process Main Plant as part of soda ash production using the Solvay process. Soda ash production began in 1884 and continued until 1986. The Solvay waste was hydraulically placed in the wastebeds in slurry form.

In addition to wastes generated from soda ash production, waste materials from other nearby manufacturing facilities were likely disposed of at the Subsite. Chlorinated benzene production at the nearby Willis Avenue plant occurred between 1918 and 1977. Additional operations reportedly took place at the Willis Avenue plant from 1918 to 1977, including production of hydrochloric acid, caustic soda, caustic potash, and chlorine gas. The Benzol plant operated from 1915 to 1970 at the nearby Main Plant. This plant produced benzene, toluene, xylenes, and

naphthalene by the fractional distillation of coke "light oil." The Solvay Process Company operated a coke plant from 1892 through 1923. A phenol production plant operated from 1942 to 1946. Materials associated with these operations may have been disposed of in Wastebeds 1-8 with the Solvay waste slurry or by alternative means, although there are no records or reports to confirm this.

Wastebeds 1-6 were in use before 1926 and may have become operational as early as 1916, although no definitive construction date is available. Ninemile Creek was rerouted to the north to permit the construction of Wastebeds 5 and 6, and the former creek channel was buried. Wastebeds 7 and 8 were not utilized until after 1939 and remained in use with Wastebeds 1-6 until 1943. The location of each wastebed is included on Figure 2.

Subsequent uses of the Subsite included construction of a 1.2-mile stretch of I-690 prior to 1958, construction of the I-690 and NY-695 interchange between 1973 and 1978, and the operation of a landfill on a portion of Wastebed 5 by Crucible Specialty Metals from 1973 to 1988. The Crucible Landfill covers an area of approximately 20 acres and contains an estimated 225,100 cubic yards (CY) of non-hazardous and hazardous wastes. NYSDEC approved the Crucible Landfill closure plan in 1986, and the landfill was closed with a cap in 1988. Long-term monitoring of the Crucible Landfill is performed annually consistent with the landfill closure requirements. The City of Syracuse and Onondaga County utilized a portion of the wastebeds as a biosolids disposal area from 1925 to 1978 for municipal sewage sludge.

A portion of the Subsite was used for NYS Fairgrounds parking over 50 years ago, and this use continues to the present day. While the parking lots are not paved, they have received gravel and fill over the years, and currently over two feet, and as much as seven feet of gravel and fill overlay the Solvay waste in these areas.

In 2004, Honeywell and NYSDEC entered into an Order on Consent (Index #D-7-0002-02-08) to conduct a Preliminary Site Assessment and RI/FS.

Interim Remedial Measure

An Interim Remedial Measure (IRM)[4] is being implemented at the Subsite in order to prevent the continued migration of contaminants into Ninemile Creek and Onondaga Lake. The IRM is supported by a Streamlined Risk Evaluation (SRE) conducted as part of a 2010 Focused Feasibility Study (FFS). The FFS evaluated areas of the Subsite where contaminant migration

[4] The use of the term "Interim Remedial Measure" throughout this document is not intended to mean that this removal action is a "remedial action" as that term is defined in the federal law, CERCLA. An IRM is an activity that is necessary to address either emergency or non-emergency site conditions, which in the short-term need to be undertaken to prevent, mitigate, or remedy environmental damage or the consequences of environmental damage attributable to a site. An IRM is equivalent to a non-time critical removal under the CERCLA removal program pursuant to 40 CFR Section 300.415(b)(2).

was documented or likely to occur, and the SRE provided a concise evaluation of potential risks to human and ecological receptors from those limited areas of the Subsite. Specifically, it was determined in the SRE and the FFS that there is a potential threat to human health and the environment from contaminant migration from eastern shore shallow and intermediate groundwater, as well as from seeps, surface Solvay waste along the eastern shore, and surface water/sediment/Solvay waste in the lower reach of Ditch A. It was concluded, therefore, that an IRM was needed to address migration of contaminants from these media via several measures discussed in more detail below.

Coincident with the planning for the IRM, several additional response elements were identified and added to the scope of the IRM. Specifically, a wetlands mitigation project, a hydraulic groundwater control system along the northern shoreline, and restoration and cleaning in the middle reach of Ditch A were incorporated into the IRM design. The objective of the mitigation wetlands is to compensate for the loss of wetland functions and values related to actions at the Subsite and the nearby Wastebed B/Harbor Brook subsite, and for the loss of lake surface area resulting from placement of a barrier wall and light weight fill off-shore of the nearby Willis Avenue subsite. An objective for the hydraulic control of groundwater in the area of Onondaga Lake adjacent to the northern shoreline of the Subsite is to reduce groundwater upwelling velocities that may impact the isolation cap to be placed in that area of the lake as part of the separate Lake Bottom OU remedy selected for Onondaga Lake itself. The objective of sediment removal and maintenance of the Middle Reach of Ditch A is to mitigate transport of soil/fill material substrate and sediment to Onondaga Lake and to Ninemile Creek.

Construction of the IRM began in 2011 and is anticipated to be completed by December 2014. The IRM includes:

- Shoreline stabilization system (*i.e.,* vegetated on-shore revetment) – A shoreline stabilization system was installed along a portion of the Northern and Eastern Shorelines. A vegetated on-shore revetment was installed along the steep cliffs to reduce erosion from wind-wave and ice action, and to provide habitat enhancement.

- Groundwater and seep collection trenches, including pump stations and associated forcemain piping – Groundwater trenches (including passive wells) and seep collection trenches were installed throughout the Subsite along Ninemile Creek and the Eastern and Northern shorelines. Upon collection, the groundwater and seep water are conveyed to the Willis Avenue Groundwater Treatment Plant (GWTP).

- Ditch A – Work associated with Lower Ditch A included culvert installation, substrate excavation, and installation of a low permeability habitat layer. Additional work within Ditch A included culvert rehabilitation in the upper reach of Ditch A and sediment removal and maintenance in the middle reach of Ditch A.

- Mitigation wetlands establishment consisting of aquatic habitat connected to Onondaga

Lake and inland wetlands - 9.5 acres of mitigation wetlands are being constructed, of which 2.3 acres will be connected wetlands and 7.2 acres will be inland wetlands, within the low-lying Eastern Shoreline.

- Vegetative Cover - A vegetative cover system is being constructed on the Eastern Shoreline in areas not occupied by other elements of the IRM (*i.e.*, mitigation wetlands, stormwater features, berms, and access pathways).

The IRM-related monitoring will be performed to document that success criteria (*e.g.*, vegetation establishment, wildlife observations) are being met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may consist of repair of cover cross-sections in areas of disturbance or re-application of vegetation in areas of non-survivorship. Maintenance of IRM-related access roadways will also be included in the cover system maintenance.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS report and a Proposed Plan supporting this OU1 remedy were released to the public for comment on September 17, 2014. These documents were made available to the public via the NYSDEC's website and at information repositories maintained at the Solvay Library, the Onondaga County Public Library, Atlantic States Legal Foundation, NYSDEC Region 7 office located in Syracuse, New York, and the NYSDEC Division of Environmental Remediation office located in Albany, New York. A NYSDEC listserv bulletin notifying the public of the availability for the above-referenced documents, the comment period start, completion dates, and the date of the planned public meeting was issued on September 17, 2014. A notice providing the same information was published in the *Syracuse Post-Standard* on September 18, 2014. The public comment period ran from September 17, 2014 to October 17, 2014.

On September 30, 2014, NYSDEC conducted a public meeting at the Martha Eddy Room in the Art and Home Center at the NYS Fairgrounds to inform local officials and interested citizens about the Superfund process, to present the Proposed Plan for the Subsite, including the preferred remedy, to respond to questions, and to accept comments. There were approximately 40 attendees. Responses to the questions and comments received at the public meeting and to comments submitted in writing during the public comment period are included in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF THE OPERABLE UNIT

Operable Units within the Solvay Wastebeds 1-8 Subsite

As discussed on page 1, the Solvay Wastebeds 1-8 Subsite is an OU of the Onondaga Lake NPL site. NYSDEC and EPA have, to date, organized the work for the Onondaga Lake NPL site into

11 subsites. These subsites, which are historical and/or current sources of contamination to Onondaga Lake, are also considered by EPA to be operable units of the NPL site. The media of concern at this Subsite are being addressed through two OUs. OU1 of the Subsite includes the Solvay waste and contaminated soil/fill materials. OU2 includes Subsite groundwater and impacted media in a surface water drainage ditch, Ditch A. OU1 also includes the shoreline stabilization system, mitigation wetlands, vegetative cover and access roads constructed to support part of the IRM described above.

As discussed below in the "Summary of Subsite Risks" section of this ROD, the human health risk assessment (HHRA) and baseline ecological risk assessment (BERA) for the Subsite identified unacceptable risks associated with the Subsite for human and ecological receptors. Although both risk assessments were conducted for the Solvay Wastebeds 1-8 Subsite as a whole, the exposure assessments utilized varying subareas of the Solvay Wastebeds 1-8 Subsite, depending on the route of exposure and the receptor being assessed. The HHRA and BERA are applicable to both OUs 1 and 2 of the Solvay Wastebeds 1-8 Subsite.

SUMMARY OF SUBSITE CHARACTERISTICS

The RI activities that were conducted at the Solvay Wastebeds 1-8 Subsite included geological and hydrogeological investigations, an ecological assessment, wetlands delineation and the collection of samples from the surface soil (top two feet of soil), subsurface soil (below two feet), groundwater, surface water, and sediment.

Based upon the results of the RI, the primary contaminants of concern (COCs) include benzene, toluene, ethylbenzene, and xylene (BTEX), naphthalene and other assorted PAHs, PCBs, phenolic compounds, pesticides, and inorganics (*e.g.*, arsenic, barium, chromium, mercury, nickel). The results of the RI are summarized below.

Site Geology and Hydrogeology

The Subsite geology consists of seven distinct layers including fill/Solvay waste, marl/peat, silt and clay, silt and fine-grained sand, basal sand and gravel, basal till, and bedrock (Vernon Shale). The Subsite hydrogeology consists of an Upper Groundwater System and a Lower Groundwater System separated by a confining silt and clay layer which is present across much of the Subsite.

The Upper Groundwater System consists of the anthropogenic fill/Solvay waste and the native marl/peat, as well as deltaic deposits associated with the former, buried Ninemile Creek channel in a portion of the Subsite. The Lower Groundwater System consists of the silt and fine grained sand deposits, the basal sand and gravel deposits, and a bedrock zone. The water table is typically 20 to 35 feet below ground surface (bgs) on top of the upper wastebed tiers, and 10 to 18 feet bgs on the lower wastebed tiers adjacent to Ninemile Creek. As mentioned above, Subsite groundwater will be addressed under a subsequent OU2 FS.

Shallow groundwater generally flows radially from the wastebeds toward Onondaga Lake, Ninemile Creek, and drainage ditches. Some groundwater flows along the buried, former Ninemile Creek channel deltaic deposits toward Onondaga Lake and Ninemile Creek.

Surface Soil/Fill Material/Solvay Waste (0 to 2 feet bgs)

Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, PCBs, and inorganics were detected in surface soil/fill material/Solvay waste at OU1. Surface soil/fill material/Solvay waste contaminant levels for the Parking lot, Upland, and Lakeshore Areas are presented in Tables 1A, 1B, and 1C, respectively.

VOCs detected above unrestricted SCOs in surface soil included acetone, methylene chloride, and xylenes. Detected levels of these VOCs ranged from 2.5 to 400 micrograms per kilogram (µg/kg). SVOCs detected above unrestricted SCOs included benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzofuran, dibenzo(a,h)anthracene, hexachlorobenzene, indeno(1,2,3-cd)pyrene, and naphthalene. Detected levels of these SVOCs ranged from 36 to 25,000 µg/kg. Pesticides detected above unrestricted SCOs included 4,4'-DDT, 4,4'-DDE, 4,4'-DDD, alpha-chlordane, and dieldrin. Detected levels of these pesticides ranged from 0.40 to 1,600 µg/kg. PCBs were detected at concentrations above the unrestricted SCO in the Upland and Lakeshore Areas. Detected levels of PCBs ranged from 1.6 to 33,000 µg/kg. The highest levels of PCBs were detected in the Biosolids Area. PCBs were not detected at levels above the SCO in the parking lot area. Inorganic contaminants detected above unrestricted SCOs included arsenic, barium, cadmium, chromium, copper, hexavalent chromium, lead, manganese, mercury, nickel, selenium, silver, and zinc. Detected levels of these inorganic contaminants ranged from 10 to 14,000,000 µg/kg. There is no evident distribution pattern of inorganic or organic constituents in surface soil within the parking area, the upland area or the lakeshore area of OU1 with the exception of higher concentrations of chromium, nickel, and selenium in the western half of the upper parking lot area adjacent to the Crucible Landfill and higher levels of metals and PCBs in the Biosolids Area relative to other parts of the upland area.

In existing or planned commercial use areas of OU1 (*e.g.*, walking trails, parking lots), data were compared to the SCOs for commercial use (which includes passive recreational use). A total of approximately 24 acres of existing or planned commercial use areas at OU1 exceed commercial use SCOs in the top 2 feet.

In areas of OU1 that include proposed development (*e.g.*, lawn seating areas within the amphitheater footprint), data were compared to the SCOs for restricted residential use (which includes active recreational use). Based on information provided by the County, the amphitheater may be constructed within/proximal to the Lakeview Point portion of OU1. Because the exact location of the amphitheater is unknown, samples within the footprint of Wastebed 6 and areas extending to the shoreline of Onondaga Lake around Wastebed 6 were evaluated using these more

stringent SCOs. There were no contaminants of potential concern (COPCs) in surface soils which exceeded the restricted residential use SCOs (applicable for active recreational use) in this area.

In areas of OU1 that are heavily wooded, steeply sloped, or not planned for active or passive uses, surface soil data (within the top 2 feet) were compared to the SCOs for protection of ecological resources. The locations of the majority of ecological protection SCO exceedances, which consisted of metals, pesticides, PCBs and SVOCs, are located within the footprint of the Biosolids Area and within the footprint of the IRM (eastern shoreline, staging areas, and clean fill staging area near the upper parking lot). Approximately 30 acres of the Subsite that are heavily wooded, steeply sloped, or not planned for active or passive recreational uses exceed ecological use SCOs in surface soil in these areas.

Subsurface Soil/Fill Material/Solvay Waste (at depths greater than 2 feet bgs)

During the RI, subsurface soil samples (deeper than 2 feet) were collected from soil borings and test pits. Based on Subsite data, VOCs, SVOCs, pesticides, PCBs and/or inorganics were detected in subsurface soil/fill materials/Solvay waste throughout OU1 at levels above the relevant SCOs for unrestricted use (See Table 1D). VOCs detected above unrestricted SCOs in subsurface soil included 2-butanone, acetone, benzene, ethylbenzene, methylene chloride, toluene, and xylenes. Detected levels of these VOCs ranged from 0.35 to 500,000 µg/kg. The highest VOC concentrations were found at depths of over 70 feet bgs. SVOCs detected above unrestricted SCOs included 2-methylphenol, 4-methylphenol, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzofuran, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, and phenol. Detected levels of these SVOCs ranged from 0.74 to 1,700,000 µg/kg. The location and depth of SVOCs vary by individual compound; however, in general, the higher concentrations of SVOCs found at OU1 were located in excess of 40 feet bgs. The samples that exhibited the highest concentrations of organic contaminants are found within a layer of stained Solvay waste that is located within the footprints of Wastebeds 1-4. This stained Solvay waste was typically encountered in a defined layer of orange-brown to dark brown colored Solvay waste, below the white to medium gray unstained Solvay waste. The thickness of the stained material ranges from 3 to 17 feet, and it is located above native material at a depth range of approximately 40 to 70 feet bgs. Pesticides detected above unrestricted SCOs included 4,4'-DDD, alpha-chlordane, and dieldrin. Detected levels of these pesticides ranged from 0.33 to 240 µg/kg. PCBs were detected at concentrations above the unrestricted SCO for PCBs. Detected levels of PCBs ranged from 9.4 to 4,300 µg/kg. Inorganic contaminants detected above unrestricted SCOs included arsenic, barium, cadmium, chromium, copper, hexavalent chromium, cyanide, lead, manganese, mercury, nickel, selenium, silver, and zinc. Detected levels of these inorganics ranged from 4 to 7,110,000 µg/kg.

Transport of Constituents from Soil to Groundwater

Analytical results obtained during the RI and prior investigations suggest that certain constituents are being leached from the soil. Compounds detected in soils and groundwater at the greatest

frequency included BTEX, phenolic compounds, PAHs, dieldrin and DDT, and inorganic constituents (*e.g.*, arsenic, barium, chloride, lead, manganese, mercury, selenium, sodium, and sulfate). BTEX, naphthalene and assorted PAHs, phenolic compounds, pesticides, and inorganics (*e.g.*, arsenic, barium, chromium, mercury, and nickel) have been detected at levels in Subsite groundwater above applicable standards and/or guidance values.

Transport of Constituents from Soil to Surface Water Bodies via Surface Water

Transport of constituents from soils to surface water bodies via surface water runoff may have occurred from areas in close proximity to Onondaga Lake, Ninemile Creek, and the drainage ditches. Transport potentially occurred in areas where surface water bodies and Subsite ditches are adjacent to steeply sloped berms with poor vegetative cover, which allowed for runoff down slope to the adjacent Ninemile Creek, Onondaga Lake, and Subsite ditches. Berms with established vegetation, terraced construction, or both potentially reduced this soil erosion and limited the transport of soils to surface water. Onondaga Lake potentially received soil via runoff from the sparsely vegetated portions of the berms along Wastebeds 3, 4, and 6, with some transport also potentially occurring along the northern berms of Wastebeds 1 and 2. This surface runoff has been addressed by the IRM and is not considered a current transport pathway in these areas. Minimal surface water runoff is expected from the central areas of the Subsite and areas of flat relief along the wastebed berms because of vegetation and little topographic relief, which reduces runoff and promotes evapotranspiration. Also, the porous fill material associated with the parking lots limits the scouring of soils and promotes infiltration rather than overland flow.

Transport of Constituents from Soil/ Groundwater to Soil Vapor

Soil vapor samples were collected from the shallow subsurface soil (0-8 feet bgs) during the RI. Among the most frequently detected analytes were gasoline type components (toluene, trimethylbenzene, ethylbenzene, xylene, and benzene). Also detected were methylene chloride, acetone, carbon disulfide, naphthalene, trichloroethene, chloroform, carbon tetrachloride, 1,1,1-trichloroethane, and chloromethane. Benzene and trichloroethene in soil vapor samples were detected in exceedance of EPA shallow soil gas guidance values.

The analytes detected in soil vapor were consistent with those detected in shallow groundwater and Subsite soils, with the exception of trichloroethene. The constituents present in soil vapor, and their presence in shallow groundwater and subsurface soils suggest that consideration of vapor intrusion mitigative actions will be required if future construction takes place on the Subsite. In particular, the presence of trichloroethene and benzene at concentrations above the guidance values indicate that future building construction may need to address potential vapor intrusion.

IRM Staging Areas

Excavation spoils (materials excavated from groundwater collection trenches, regrading, etc.)

were staged in three designated staging areas on the Subsite during construction of the IRM. Staging Areas A, B, and C are situated near the northern shoreline, Ninemile Creek shoreline, and within the former County Biosolids Area, respectively (see Figure 3). Staging Areas A and B are each approximately 2 acres in size and contain approximately 5,000 and 9,000 CY, respectively, and Staging Area C is approximately 6 acres in size and contains approximately 20,000 CY. Characterization sampling and analysis were performed during the placement of materials within the staging areas to document that materials being placed within these footprints did not exhibit hazardous waste characteristics, as per the IRM design, so that it could potentially be managed consistent with the material below and adjacent to it. Soil/fill material/Solvay waste that was placed within Staging Areas A, B, and C contained contaminant concentrations that exceeded the SCOs for protection of ecological resources. These areas are included in the approximately 30 acres of OU1 that exceed the ecological use SCOs in the areas described above.

Conclusions

Based on the results of the RI, the following conclusions have been drawn:

- Contaminants include BTEX, naphthalene and other assorted PAHs, PCBs, phenolic compounds, pesticides, and inorganics (*e.g.*, arsenic, barium, chromium, mercury, nickel).
- Two areas of stained materials, which contain organic compounds (*e.g.* benzene, naphthalene) and have odors, are present along the lakeshore on the eastern side of Lakeview Point and along the southeastern lakeshore of the Subsite. The stained materials vary in thickness and are generally found within 12 feet of the ground surface. Concentrations of benzene and naphthalene in these materials were reported as high as 20,000 µg/kg and 180,000 µg/kg, respectively. It is important to note that the stained materials are not necessarily representative of the highest contaminant concentrations present in the lakeshore area.
- A layer of stained Solvay waste (described above) is present at the base of Wastebeds 1-4 approximately 60 feet bgs. This deep layer may be the source of BTEX, naphthalene, other PAHs, and phenol concentrations along the lakeshore and southeastern portions of the Subsite.
- Contaminated soil/fill/Solvay waste, groundwater and surface water from the Subsite have the potential to directly impact sediment, surface water, and fish in the lake.

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land Use

The Subsite is zoned for industrial use and is bounded by commercial and industrial properties to the south and west, which include the NYS Fairgrounds, the Crucible Specialty Metals facility, and State Fair Boulevard. The current and reasonably anticipated future land uses for the Subsite

are commercial and recreational, and to provide areas which are protective of and which can sustain valuable ecological resources.

Current uses of the State-owned lands include overflow parking lots for the NYS Fairgrounds and venues for outdoor events, such as recreational vehicle vendor shows. The NYS properties that are part of the Subsite also include approximately 1.2 miles of I-690, and interchanges associated with I-690 and NY-695. The anticipated future use for NYS lands is not anticipated to change at this time.

Onondaga County owned lands feature a public recreation trail and the closed Crucible Landfill. The anticipated future use of the portion of the Subsite owned by the County includes the continued use of the existing public recreation trail and the use of the northwestern portion of the Subsite, near Lakeview Point, for an amphitheater to be constructed in 2015. The remainder of the property owned by Onondaga County may be subject to future development as opportunities become available.

Summary of Existing Soil Covers and Infrastructure

Approximately 254 acres of the 404-acre Subsite have cover materials or infrastructure located on it. These areas are:

- Approximately 90 acres of vegetated covers and road beds associated with the I-690/NY-695 corridor and other Subsite roads/infrastructure.
- Approximately 77 acres used as parking lots associated with the NYS Fairgrounds are already covered with an estimated two to seven feet of imported fill, including at least one foot of gravel/fill at the surface.
- Approximately 58 acres of soil/fill/Solvay waste material in the lake shoreline areas where the IRM is being implemented exhibit contaminant concentrations above SCOs for the protection of ecological resources. Vegetated covers, seep aprons, shoreline stabilization and constructed wetlands are elements of the IRM. Vegetated covers and constructed wetlands incorporate soil covers and/or liner thicknesses that are two feet thick. Seep aprons consist of a total thickness of 18 inches of material (rock and soil), and a liner, which are considered adequate barriers to ecological receptors. This also includes the clean fill staging areas that currently support the IRM, Ninemile Creek, and Onondaga Lake site remediation, and that were constructed using a minimum of 6 inches of crushed stone.
- Approximately 20 acres occupied by the Crucible Landfill, which is a permitted landfill that was closed in 1988 with a cap constructed in accordance with landfill closure requirements specified in 6 NYCRR Part 360. Long-term monitoring is performed annually consistent with the landfill closure requirements.
- Approximately nine acres of the Onondaga County West Shore Trail Extension (public recreation trail), which is a paved walking and biking trail.

SUMMARY OF SUBSITE RISKS

As part of the RI process, baseline quantitative risk assessments were conducted for the Subsite to estimate the risks to human health (under current and reasonably anticipated future land uses) and the environment. Baseline risk assessments, consisting of an HHRA, which evaluates potential risks to people, and a BERA, which evaluates potential risks to the environment, analyze the potential for adverse effects caused by hazardous substance releases from a site assuming no further actions to control or mitigate exposure to these hazardous substances are taken. The risk assessments for this Subsite (see associated HHRA and BERA Reports discussed below) are available in the information repositories discussed above in Highlights of Community Participation.

The HHRA and BERA are applicable to both OU1 and OU2.

Human Health Risk Assessment

The 2011 baseline HHRA considered a number of current and future exposure scenarios for different receptors, including a transient trespasser, lunchtime trespasser, utility worker, commercial worker, all-terrain-vehicle (ATV) rider, construction worker, state fair attendee, ditch maintenance worker, fisherperson, and resident. Exposure media considered in both current and future scenarios include soil, sediment (seep and ditch sediment), surface water (including seep water), groundwater, and ambient air. As discussed previously, fill material and Solvay waste are found throughout the Subsite; the risk assessment also considered exposure to these materials. Receptors that may be exposed to surface soils (0-2 feet bgs) include trespassers, commercial/industrial workers, state fairgrounds maintenance workers, and state fairgrounds attendees. Construction workers, commercial/industrial workers, and utility/sewer workers may contact upper soils (0-10 feet bgs). Trespassers, utility/sewer workers, construction workers, and ditch maintenance workers may be exposed to surface sediment (0–1 foot bgs). Trespassers, utility workers, construction workers, and ditch maintenance workers may be exposed to surface water. Construction workers, utility/sewer workers, and commercial/industrial workers may contact shallow ground water (0-10 feet bgs). A summary of the exposure scenarios evaluated in the HHRA is included in Table 2.

Potential unacceptable risks related to human exposures to soil/fill material/Solvay waste were limited to non-cancer risks driven by inhalation of metals in dust. Chemical specific information, such as the exposure point concentration and toxicity information for the risk driving chemicals, is presented in Tables 3 – 5.

It should be noted that the HHRA found no unacceptable risks for most Subsite visitors and exposure scenarios (*e.g.*, transient trespasser, lunchtime trespasser, State Fair attendee, or fisherperson/trespasser). For Subsite visitors, the only receptors and exposure scenarios for which risks or hazards were potentially unacceptable were for recreational receptors engaging in specific activities (*e.g.*, ATV recreators), or receptors that would be involved in intrusive work such as a

construction worker. This information is presented in Table 6. Specifically, the reasonable maximum exposure (RME) non-cancer human health hazard index (HI) is 7 for the older child trespasser/ATV recreator, with the hazard primarily driven by inhalation exposure to nickel and manganese in particulate matter in outdoor air.

RME non-cancer hazards attributable to exposure to fugitive dust and dermal exposure to groundwater exceeded the acceptable threshold for construction workers. Therefore, a construction worker can and should employ measures (*e.g.*, use of personal protective clothing and equipment) in accordance with Site-specific Health and Safety plans to ensure worker protection while engaging in on-Site construction activities. It should be noted that this ROD does not address shallow groundwater. Therefore, the HI for the construction worker exposed only to the fugitive dust were considered, and this value exceeds 1, with manganese and nickel as the most significant contributors, as shown in Table 6.

Also, a 2009 EPA human health risk assessment which examined potential risks associated with the bike trail indicated that risks and hazards to receptors using the bike trail as intended were within acceptable regulatory limits, and a 2014 Supplemental Human Health Risk Evaluation conducted by the EPA found that risks and hazards associated with amphitheater attendees and maintenance workers were within acceptable risk ranges and targets. For amphitheater construction workers, non-cancer hazards may exceed the threshold value (as discussed above). Therefore, an amphitheater construction worker can and should employ safety measures as discussed above for the construction worker who engages in on-Site construction activities

The vapor intrusion pathway was evaluated qualitatively in the HHRA for the commercial/ industrial worker. Screening for the indoor air exposure was conducted through two separate analyses. First, concentrations of volatile constituents in shallow groundwater were compared to the EPA groundwater-to-indoor air criteria to determine if these constituents in groundwater could pose a risk attributable to indoor air vapor intrusion. The maximum concentration of five constituents exceeded screening levels. The ratios of the five retained constituents to the selected screening value are: bis(2-ethylhexyl)phthalate (1,016); naphthalene (39); benzene (2,800); toluene (6); and vinyl chloride (1). The second analysis to assess potential risk to the potential future commercial/industrial worker from the indoor air pathway was to screen the available soil vapor data consistent with the EPA Region 2 screening guidance for indoor air. This comparison suggested the potential for exceedances of the 10^{-6} risk threshold for benzene, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene. Based on the conclusions of these two assessments, a vapor intrusion evaluation is warranted prior to the construction of buildings at the Subsite, and preventative measures may be warranted in the design and construction of buildings at the Subsite to mitigate the risk of exposure to soil gas. Such measures may include the use of a vapor barrier or the installation of a venting system.

A full discussion of the HHRA evaluation and conclusions is presented in the HHRA Report, the Wastebeds 1-8 Bike Trail Risk Assessment, and the Wastebeds 1-8 Lakeview Amphitheater Supplemental Human Health Risk Evaluation.

Ecological Risk Assessment

The majority of estimated ecological risk at this Subsite is associated with terrestrial exposure. Potential unacceptable risks to terrestrial ecological receptors (American robin, shrew, Red-tailed hawk and fox) were associated with potential exposures to metals (*e.g.*, chromium, cadmium, vanadium, thallium, and mercury), pesticides, SVOCs, and PCBs in soil/fill/Solvay waste material. The calculated risk estimates (*i.e.*, ecological hazard quotients [HQs]) for ecological receptors were based on both the no-observed-adverse-effect level (NOAEL), representing the highest chemical of concern (COC) concentration at which no adverse effects are seen, and the lowest-observed-adverse-effect level (LOAEL), representing the lowest COC concentration shown to produce adverse effects. Food chain calculations yielded 56 NOAEL-based ecological HQs and 32 LOAEL-based ecological HQs that were greater than one, which is the threshold value above which adverse ecological effects may occur. The majority of the metals contamination is associated with the Biosolids Area. To a lesser extent than metals, organic constituents including BTEX compounds, naphthalene, phenols, and several other compounds detected at low frequencies but retained for their bioaccumulative properties presented potential risk to terrestrial ecological receptors exposed to soil/fill/Solvay waste.

A full discussion of the BERA evaluation and conclusions is presented in the 2011 BERA Report.

Summary of Human Health Risks and Ecological Risks

The results of the human health risk assessment indicate that the contaminated soil/fill/Solvay waste present an unacceptable human exposure risk and the ecological risk assessment indicates that the contaminated soil/fill/Solvay waste pose an unacceptable ecological exposure risk.

Based upon the results of the RI and the risk assessments, the EPA has determined that actual or threatened releases of hazardous substances present at this Subsite, if not addressed by the selected remedy or one of the other active measures considered, may present a current or potential threat to human health and the environment.

Basis for Action

Based upon the quantitative human-health risk assessment and ecological evaluation, the EPA has determined that actual or threatened releases of hazardous substances from the Subsite, if not addressed by the response action selected in this ROD, may present a current or potential threat to human health and the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as

applicable or relevant and appropriate requirements (ARARs), to-be-considered (TBC) guidance, and site-specific risk-based levels established using the risk assessments. The following RAOs have been established for OU1:

- Prevent, ingestion/direct contact with soil/fill material/Solvay waste in surface and subsurface soil above levels that would result in unacceptable human exposure.
- Prevent or minimize inhalation of or exposure to contaminants volatilizing from contaminated soil/fill material/Solvay waste that would result in unacceptable human exposure. In the event that buildings are constructed, mitigate impacts to public health resulting from soil vapor intrusion into those buildings, as may be warranted.
- Prevent or minimize, adverse ecological impacts to biota from ingestion/direct contact with soil/fill material/Solvay waste causing toxicity or impacts from bioaccumulation through the terrestrial food chain.
- Prevent or minimize, the further migration of contaminants that would result in groundwater, sediment, or surface water contamination.

NYSDEC's SCOs have been identified as remediation goals to help address these RAOs. SCOs are risk-based criteria which are protective of human health, ecological exposure, or groundwater depending upon the existing and anticipated future use of a site. While the land use of the Subsite has historically been industrial/commercial, current and reasonably anticipated future Subsite uses of some areas are recreational, and several areas include valuable ecological resources. Thus, the restricted-residential use, commercial use, and the protection of ecological resources SCOs have been identified to help address the direct-contact RAOs, and the protection of groundwater SCOs have been identified to address the migration RAO. (See Table 7.)

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective, comply with ARARs, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. CERCLA Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. CERCLA Section 121(d), 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains federal and state ARARs, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4).

Detailed descriptions of the remedial alternatives for addressing the contamination associated with the Subsite can be found in the FS report. The FS report presents five alternatives.

The construction time for each alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure contracts for design and construction.

The remedial alternatives are:

Alternative 1 - No Action

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no-action remedial alternative does not include any physical remedial measures that address the problem of soil and sediment contamination at OU1.

Because this alternative would result in contaminants remaining above levels that would otherwise allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, additional remedial actions may be evaluated to remove, treat, or contain the contaminated soils.

Capital Cost:	$0
Annual Operation and Maintenance (O&M) Cost:	$0
Present-Worth Cost:	$0
Construction Time:	0 years

Alternative 2 - Cover System

This alternative was developed to be integrated with the IRM actions which address soil, sediment, fill, and Solvay waste in the areas of the Subsite where the IRM is being implemented (*e.g.*, shoreline stabilization, mitigation wetlands establishment, and associated vegetative cover) and relies on existing cover material where it provides adequate protection on portions of the Subsite. These IRM actions address direct-contact exposure at 58 acres of the Subsite. The IRM also addresses the potential for contaminant migration at perimeter boundaries of the Subsite. Because the potential for contaminant migration is primarily being addressed by the IRM, and protective cover materials which provide adequate protection are already present on other areas of the Subsite, the additional measures below focus primarily on direct-contact exposures associated with the remaining 171 acres of the Subsite which were not addressed under the IRM and which presently do not have adequate cover material, and potential vapor intrusion.

Solvay wastes, soils, and fill material (to as deep as 70 feet bgs) would be managed in place.

This alternative includes the placement of several types of vegetated cover systems in discrete areas. The specific cover type for a given area is based on remediation goals (SCOs) in surface soil, and current and reasonably anticipated future land uses at the given Subsite area. The cover systems would be applied over 171 acres of the Subsite in areas which do not have existing covers or infrastructure located on them and other areas which need additional cover material, (*e.g.*, the upland staging areas associated with the IRM and a portion of the parking lot areas). The extent and type of covers included in this alternative are shown on Figure 4 and are described below**:**

Cover Types

One-foot thick vegetated soil cover (where commercial use SCOs in surface soil are exceeded) - approximately 5 acres: In areas of anticipated passive recreational use (for OU1 these activities could potentially include walking trails or buffer zones along trails and parking areas) where SCOs for commercial use are exceeded.

Two-foot thick vegetated soil cover (where restricted residential use or ecological SCOs in surface soil are exceeded) - approximately 20 acres: In areas of anticipated active recreational use (for OU1 these activities could potentially include lawn seating areas and playing fields) where SCOs for restricted residential use are exceeded or where SCOs for protection of ecological resources would apply and are exceeded.

One and a half-foot thick vegetated soil cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover would be applied to the three upland staging areas associated with the IRM. Restoration of these areas under the IRM currently consists of a six-inch topsoil cover. The additional 1.5 feet of cover material would provide for a two-foot cover over this area where protection of ecological resources SCOs are exceeded.

One-foot thick vegetated structural fill cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover would be applied to areas of anticipated NYS Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover would consist of a compacted mixture of aggregate and soil. This cover would be placed directly over existing soil/fill/Solvay waste to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost estimate purposes) to be 1 foot, the actual thickness and locations where it will be placed would be determined during remedial design.

Vegetation enhancement cover (where surface soil SCOs are not exceeded) - approximately 117 acres: This cover would consist of wood fiber mulch/compost and fertilizer mixed with seeds and would be applied to areas where surface soil concentrations are below applicable SCOs. While the thickness of the mulch and seed application is assumed (for cost estimate purposes) to be approximately 4 inches, the actual thickness and locations would be determined during remedial design. The placement of a vegetation enhancement cover would help to stabilize surface

soil and reduce the potential for erosion which may result in potential exposure to contaminants in subsurface soil. Based on Subsite data, VOCs, SVOCs, pesticides, PCBs and/or inorganics were detected in subsurface soil/fill materials/Solvay waste throughout the Subsite at levels above SCOs for unrestricted use.

Any fill material brought to the Subsite would need to meet the requirements for the identified Subsite use as set forth in 6 NYCRR Part 375-6.7(d). Native species would be used for the vegetative component of covers. For the purpose of developing cost estimates, the seed application is anticipated to consist of a grassland seed mix native to NYS and selected for its ability to attain relatively high growth rates and ecological function.

Structures, such as buildings, pavement, and sidewalks which may be developed would serve as acceptable substitutes for any of the vegetated soil cover types described above.

Approximately 58 acres (where SCOs for protection of commercial use are not exceeded in surface soil) of the 77 acres of the Subsite used as parking lots associated with the New York State Fairgrounds are already covered with an estimated 2 to 7 feet of imported fill, including at least one foot of gravel/fill at the surface. The existing cover thickness would be confirmed during remedial design, and additional cover would be placed, if needed, to provide for at least a one-foot thickness. Existing parking lot surfaces, the County's public paved recreation trail, the Crucible landfill area, and vegetated covers/road beds associated with the I-690/NY-695 corridor, and other Subsite roads/infrastructure would also be maintained.

Clean fill staging areas, which support the IRM, Ninemile Creek, and Onondaga Lake Subsite remediation, were constructed using a minimum of 6 inches of crushed stone. Restoration for these areas would consist of placement of 6 inches of vegetated, clean fill over the top of the crushed stone in order to provide for a 1-foot cover over these areas.

Institutional controls would be used to ensure that any intrusive activities in areas where contamination remains are in accordance with a NYSDEC-approved Site Management Plan, which would include the following:

- Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for OU1 and details the steps and media-specific requirements necessary to ensure the following institutional and engineering controls remain in place and effective:

    - environmental easements and/or an environmental notice;
    - Subsite cover systems described above;
    - excavation plan which details the provisions for management of future excavations in areas of remaining contamination;
    - descriptions of the provisions of the institutional controls including any land use restrictions;

- provision that future on-site construction should include vapor intrusion sampling and/or installation of mitigation measures, if necessary;
- provisions for the management and inspection of the identified engineering controls;
- maintaining Subsite access controls and NYSDEC notification; and
- steps necessary for periodic reviews and certification of the institutional and/or engineering controls.

- Monitoring Plan to assess the performance and effectiveness of the remedy. The plan would include, but may not be limited to, monitoring for vapor intrusion for any buildings developed on the Subsite, as may be required by the Institutional and Engineering Control Plan.

The alternative includes continued monitoring and maintenance associated with IRM elements which pertain to the shoreline stabilization system, mitigation wetlands, the vegetative cover, and Subsite access roads constructed to support the IRM. Maintenance and monitoring for the IRM mitigation wetlands and cover systems would include monitoring to document that success criteria are met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may consist of cover repair in areas of disturbance or re-application of vegetation in areas of non-survivorship.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, additional remedial actions may be evaluated to remove, treat, or contain the contaminated soils.

Capital Cost:	$14,300,000
Annual Operation and Maintenance (O&M) Cost (years one to five):	$129,000[5]
Annual Operation and Maintenance (O&M) Cost (years six to 30):	$99,000
Present-Worth Cost:	$16,600,000
Construction Time:	6 years

[5] The annual O&M cost estimates associated with monitoring of the vegetative cover for the first five-year period following completion of the IRM were included in the cost estimates developed for the IRM. The annual O&M cost estimates associated with monitoring of the vegetative cover between years six to 30, for maintenance of the vegetative cover, and for monitoring and maintenance of the other IRM elements cited here are included in the cost estimates for this alternative.

Alternative 3 - Enhanced Cover System

This alternative is identical to Alternative 2, except: (a) in areas where the current or planned use is active recreation (*e.g.*, lawn seating areas and playing fields), a two-foot thick vegetated soil cover would be installed regardless of whether the restricted residential SCOs are exceeded in surface soil or not, and (b) in areas where current or planned use is passive recreation (*e.g.*, walking trails or buffer zones along trails and parking areas) a one-foot thick vegetated soil cover would be installed, regardless of whether the commercial use SCOs are exceeded in surface soil or not. In passive and active recreation areas where SCOs are not exceeded, the one- or two-foot cover, respectively, replaces the vegetated enhancement cover that would have been provided under Alternative 2 in these areas. The thicker covers in these recreational areas where SCOs are not exceeded in surface soil would further reduce potential human exposure to contamination in subsurface soil. The estimated acreages corresponding to the respective cover types are listed below and shown on Figure 5.

One-foot thick vegetated soil cover (for passive recreation areas) - approximately 39 acres: In areas of anticipated passive recreational use (regardless of whether the commercial use SCOs are exceeded or not), a one-foot thick vegetated soil cover would be installed.

Two-foot thick vegetated soil cover (for active recreation areas or where ecological SCOs in surface soil are exceeded) - approximately 27 acres: In areas of anticipated active recreational use (regardless of whether the restricted residential SCOs are exceeded or not) and also where SCOs for protection of ecological resources would apply and are exceeded, a two-foot thick vegetated soil cover would be installed.

One and a half-foot thick vegetated soil cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover would be applied to the three upland staging areas associated with the IRM. Restoration of these areas under the IRM consisted of a six-inch topsoil cover. The additional 1.5-feet of cover material would provide for a two-foot cover over this area where protection of ecological resources SCOs are exceeded.

One-foot thick vegetated structural fill cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover would be applied to areas of anticipated NYS Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover would consist of a compacted mixture of aggregate and soil. This cover would be placed directly over existing soil/fill to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost estimate purposes) to be one-foot, the actual thickness and locations where it would be placed would be determined during remedial design.

Vegetation enhancement cover (over the remaining areas) - approximately 76 acres: This cover would consist of wood fiber mulch/compost and fertilizer mixed with seeds. While the thickness

of the mulch and seed application is assumed (for cost estimate purposes) to be approximately four inches, the actual thickness and locations would be determined during remedial design.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, additional remedial actions may be evaluated to remove, treat, or contain the contaminated soils.

Capital Cost:	$17,800,000
Annual Operation and Maintenance (O&M) Cost (years one to five):	$128,000
Annual Operation and Maintenance (O&M) Cost (years six-30):	$98,000
Present-Worth Cost:	$20,000,000
Construction Time:	8 years

Alternative 4A – Excavation and Off-Site Disposal/Treatment/Reuse (Full Removal)

Under this alternative, the Subsite would be restored to pre-disposal conditions through the excavation of all soil/fill/Solvay waste. This would include temporary relocation and removal of the portions of I-690 and interchanges associated with NY-695 that traverse the Subsite in order to access the underlying material.

The estimated volume of soil/fill/Solvay waste that would be excavated is approximately 26 million CY, representing fill material placed on the former Geddes Marsh and deeper contaminated soil, with estimated excavation depths of 5 to 70 feet bgs. It is assumed that a portion of the excavated soil/fill/Solvay waste would require stabilization prior to off-site transport for disposal or beneficial reuse; therefore, the estimated volume of material that would require off-site management is 26.6 million CY. Potential beneficial reuses might include fill material, landfill cover, or as aggregate. Additionally, it was assumed for cost-estimating purposes that 1.7 million CY of stained material (indicative of elevated concentrations of VOCs) would require *ex-situ* thermal treatment prior to disposal at an existing non-hazardous waste disposal facility or reuse.

In addition to the 26 million CY of soil/fill/Solvay waste material to be excavated, approximately 70,000 CY of construction and demolition (C&D) material associated with demolition of the existing highways and exchanges would require removal and off-site disposal at a C&D landfill.

The excavated areas would be backfilled and restored as a marsh along Onondaga Lake. This would require the use of an estimated 1.9 million CY of clean backfill soils. The removed portions

of I-690 and interchanges associated with NY-695 would be replaced. Long-term maintenance of vegetated areas would be included in this option. This alternative would take approximately 30 years to implement due to the large volume of soil/fill material requiring excavation and off-site management.

Capital Cost:	$6,135,000,000
Annual Operation and Maintenance (O&M) Cost (years one to five):	$1,360,000
Annual Operation and Maintenance (O&M) Cost (years six-30):	$170,000
Present-Worth Cost:	$6,142,000,000
Construction Time:	30 years

Alternative 4B – Partial Excavation and Off-Site Disposal/Treatment/Reuse (Partial Removal)

Under this alternative, the Subsite would be restored to pre-disposal conditions through the excavation of all soil/fill/Solvay waste with the exception of the areas underlying the portions of I-690 and interchanges associated with NY-695 that traverse the Subsite and, as determined by geotechnical analysis, immediately adjacent areas where excavation would result in conditions which would potentially undermine the stability of the roadways. Any immediately adjacent areas which may not be excavated because of stability concerns would receive a cover of suitable type and thickness, as may be appropriate, consistent with surface and subsurface soil conditions and the current and future anticipated land use of the adjacent areas.[6]

The estimated volume of soil/fill/Solvay waste that would be excavated is approximately 23 million CY. It is assumed that a portion of the excavated soil/fill/Solvay waste would require stabilization prior to off-site transport for disposal or beneficial reuse; therefore, the estimated volume of material that would require off-site management is 23.5 million CY. Potential beneficial reuses might include fill material, landfill cover, or as aggregate. Additionally, it was assumed for cost-estimating purposes that 1.7 million CY of stained soil (indicative of elevated concentrations of VOCs), would require *ex-situ* thermal treatment prior to disposal at an existing non-hazardous waste disposal facility or reuse.

A Site Management Plan, periodic reviews, and institutional controls would be included in this alternative.

[6] The cost estimate for this alternative assumes that excavation would occur in areas up to the roadways.

This alternative would take approximately 27 years to implement due to the large volume of soil/fill material requiring excavation and off-site management.

Because this alternative would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, additional remedial actions may be evaluated to remove, treat, or contain the contaminated soils.

Capital Cost:	$5,124,000,000
Annual Operation and Maintenance (O&M) Cost (years one to five):	$1,172,000
Annual Operation and Maintenance (O&M) Cost (years six-30):	$157,000
Present-Worth Cost:	$5,130,000,000
Construction Time:	27 years

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considered the factors set out in CERCLA §121, 42 U.S.C. § 9621, by conducting a detailed analysis of the viable remedial response measures pursuant to the NCP, 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01. The detailed analysis consisted of an assessment of the individual response measured against each of the nine evaluation criteria in the FS report. This section profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other alternatives under consideration.

Threshold Criteria *- The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet to be eligible for selection as a remedy.*

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1. **Overall Protection of Human Health and the Environment**

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Alternative 1 would not provide protection of human health and the environment, whereas Alternatives 2, 3, 4A and 4B would each be protective of human health and the environment. Alternative 4A provides protectiveness through full removal of the soil/fill/Solvay waste and Alternative 4B provides protectiveness through a combination of removal and site management of remaining soil/fill/Solvay waste. Alternatives 2 and 3 provide protectiveness through covering the soil/fill/Solvay waste and site management in order to prevent exposures/reduce risks.

Alternative 1 does not meet the RAOs. Alternatives 2, 3, 4A, and 4B meet the RAOs. Alternative 3 provides added protectiveness as compared to Alternative 2 through added thickness of vegetated covers for areas of OU1 reasonably anticipated to be used for active or passive recreational uses.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121 (d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4). Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for an invoking waiver.

Chemical-, location-, and action-specific ARARs/TBCs identified for consideration are summarized in Table 8. Alternative 1 does not achieve chemical-specific ARARs/TBCs (SCOs).

Exposures to soil/fill/Solvay waste exceeding chemical-specific ARARs/TBCs would be managed through the cover systems and institutional controls in Alternatives 2 and 3. Under Alternatives 4A and 4B, exposures to soil/fill/Solvay waste exceeding chemical-specific ARARs/TBCs would be managed through excavation of soil/fill/Solvay waste or partial excavation in conjunction with a Site Management Plan and institutional controls. The substantive requirements of Title 6 NYCRR Part 360 that would apply to Alternatives 2 and 3 would be met by the cover systems. The more robust cover system under Alternative 3 (in areas where the reasonably anticipated land uses are active or passive recreation) would more reliably contain and prevent exposure to the underlying Solvay waste.

Construction methods would be implemented to adhere to the location- and action-specific ARARs/TBCs identified for Alternatives 2, 3, 4A and 4B. No action- or location-specific ARARs/TBCs were identified for Alternative 1, the no action alternative. Alternatives 2, 3, and 4B would comply with the action-specific ARARs/TBCs. Specifically, institutional controls would be implemented under Alternatives 2, 3, and 4B in conformance with NYSDEC's guidance DER-33, Institutional Controls: A Guide to Drafting and Recording Institutional Controls. Additionally, the cover systems in Alternatives 2 and 3 would prevent erosion and exposure to soil/fill/Solvay waste. Cover systems would be implemented in conformance with NYSDEC's guidance DER-10, Technical Guidance for Site Investigation and Remediation. Construction and O&M activities in Alternatives 2, 3, 4A and 4B would be conducted in compliance with Occupational Safety and Health Administration requirements.

Primary Balancing Criteria *- The next five criteria, criteria 3 through 7, are known as "primary balancing criteria." These criteria involve the assessment of factors between response measures so that the best option will be chosen, given site-specific data and conditions*

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3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on site following remediation and the adequacy and reliability of controls.

Alternative 1 would not provide long-term effectiveness and permanence, whereas Alternatives 2, 3, 4A and 4B would. Alternative 4A provides for the most reliable long-term effectiveness and permanence through removal of soil/fill/Solvay waste. Alternative 4B provides a similar degree of long term effectiveness and permanence except that the soil/fill/Solvay waste that would not be excavated would rely upon site management and the institutional controls in order to ensure effectiveness and permanence for the soil/fill/Solvay waste that would not be excavated. Alternatives 2 and 3 also rely on site management and institutional controls to ensure long-term effectiveness, but the less robust cover provided under Alternative 2 in areas where

the reasonably anticipated uses are active or passive recreation would be expected to need repair/replacement more frequently over the long term compared to Alternative 3.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

There would be no reduction in toxicity, mobility, or volume provided in Alternative 1. Alternatives 2 and 3 would reduce mobility associated with erosion and infiltration of contaminants in soil/fill/Solvay waste through vegetated cover systems but involve no treatment. Alternative 3 would provide for greater reduction in mobility of soil/fill/Solvay waste constituents as compared to Alternative 2 because of placement of a cover in portions of OU1 where only vegetation enhancement is included in Alternative 2. Alternatives 4A and 4B would reduce toxicity, mobility, and volume of contaminants in soil/fill/Solvay waste through the excavation, treatment (of a portion of the excavated materials) and off-site management of materials.

5. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternative 1 does not include any physical measures in any areas of contamination and, therefore, would not present any potential adverse impacts to remediation workers or the community as a result of its implementation. Alternatives 2, 3, 4A and 4B would be constructed using proper protective equipment to manage potential risks to on-site workers, and proper precautions and monitoring would be utilized to be protective of the general public and the environment. Alternatives 2 and 3 would meet the RAOs related to preventing direct contact exposures once the cover is placed. Placement of cover materials over the entire Subsite under Alternative 2 is estimated to take six years and for Alternative 3, placement of cover materials is estimated to take eight years. Alternatives 4A and 4B would require a significantly longer timeframe to implement as excavation is estimated to take place over approximately 30 and 27 years, respectively.

Excavation of anticipated volumes would be very difficult. Excavation considerations that limit the implementability of Alternatives 4A and 4B include construction water management, air quality concerns, and odors. Construction water management is anticipated to be significant during the excavation of the approximately 5 to 70-foot thick area of 280 to 340 acres (including excavation below the groundwater table) anticipated in Alternatives 4A and 4B. The treatment capacity is assumed to be available through repurposing of the Lake Bottom Sediment Containment Area treatment plant. However, the viability of this option would require further

evaluation. Air quality and odors would be controlled during construction. However, given the elevated concentrations of VOCs in the stained material, volatilization of VOCs and generation of odors may hinder productivity and, thus, may result in significant delays to the implementation timeframe of this alternative. Because of the volume of soil/fill/Solvay waste requiring excavation and off-site management and the estimated construction duration, Alternatives 4A and 4B would result in substantially greater impacts to the community and the environment associated with transporting, via truck, excavated materials for off-site disposal and/or beneficial reuse, and there would be significant adverse traffic impacts related to temporary relocations and restrictions of the impacted section of I-690 and interchanges associated with NY-695.

Impacts to the community resulting from the construction of Alternatives 2, 3, 4A and 4B would primarily be due to increased truck traffic and noise for the duration of construction. Because of the increased quantity of materials and enhanced cover associated with Alternative 3, there could be slightly increased impacts to the community relative to truck traffic and noise during the construction of Alternative 3 as compared to Alternative 2. Construction of Alternative 4A and 4B would result in substantial, long-term community impacts because of construction-related noise, odors, dust, and most notably traffic. As it relates to traffic, transportation of excavated materials under Alternatives 4A and 4B is anticipated to require 1.3 to 1.5 million truck trips over 27 to 30 years to and from the Subsite as compared to 9,000 to 12,000 large trucks necessary for construction of Alternatives 2 and 3. The increased traffic associated with Alternatives 4A and 4B would present a more significant risk to worker and community safety than would Alternatives 2 and 3. Also, reconstruction of the highway under Alternative 4A would likely cause significant traffic impacts.

Dust, emissions and surface water runoff controls would be implemented during construction phase activities associated with each of the active remedial alternatives. Only limited clearing and grubbing would be required under Alternative 2, while Alternative 3 would require some additional clearing and grubbing of existing vegetation to support the implementation of the soil cover systems. Comparatively, Alternatives 4A and 4B would require clearing and grubbing of existing vegetation for nearly the entire Subsite to support excavation activities. Installation of cover systems in Alternatives 2 and 3 and replacement of the pre-existing marshes (that existed prior to the creation of Wastebeds 1-8) in Alternatives 4A and 4B, would result in enhancements to existing ecological habitats.

Short-term environmental impacts resulting from construction of Alternatives 2 and 3 would be minimal; however, because of the increased quantity of materials and increased acreage of surfaces requiring clearing under Alternative 3, there is a slightly increased environmental footprint associated with Alternative 3 as compared to Alternative 2. Substantial negative short-term environmental impacts would result from soil/fill/Solvay waste excavation, transportation and off-site management activities associated with Alternatives 4A and 4B, compared to cover system construction activities associated with Alternatives 2 and 3. Alternative 4A would result in a greater environmental impact as compared to Alternative 4B because of the additional removals and reconstruction of portions of I-690 and NYS Route 695.

The cover system included in Alternatives 2 and 3 would be consistent with current and reasonably anticipated future land use of the Subsite. Alternatives 1, 4A and 4B would not be consistent with the current and reasonably anticipated future land use. Alternatives 4A and 4B would require removal of land mass at the location of the existing NYS Fairgrounds parking lots and public recreation trail and at the site of the proposed amphitheater and related facilities.

While the excavation and removal of soil/fill/Solvay waste included in Alternatives 4A and 4B would attain RAOs, the impacts to the community and environment, current and anticipated future land use, and the duration (*e.g.*, approximately 30 years) of these alternatives as compared to Alternatives 2 and 3 render them highly disadvantageous in relation to short-term impacts. These areas would become a restored "Geddes Marsh" along the banks of Onondaga Lake and would no longer be available for their current land uses, which include overflow parking areas for events at the State Fairgrounds.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternatives 2 and 3 can be readily constructed and operated and the materials necessary for their construction are reasonably available. The cover systems in Alternatives 2 and 3 would incorporate constructible and reliable technologies. Monitoring the effectiveness of Alternatives 2 and 3 would be accomplished through cover system inspections and maintenance to verify continued cover integrity, visual signs of erosion, and condition of the cover.

The excavation and off-site management of 23 to 26 million CY of soil/fill/Solvay waste associated with Alternatives 4A and 4B would be much more difficult to implement than Alternatives 2 and 3. Specifically, there are significant implementability limitations associated with excavation, transportation, disposal, and reuse capacity of this volume of material. These include:

- Transportation of anticipated volumes presents significant hazards and disruption to the community. Transportation considerations that severely limit the implementability of Alternatives 4A and 4B include significantly increased traffic, fuel usage and adverse effects on air quality and community safety. It is estimated that approximately 896,000 CY of material would be shipped off-site each year in 50,000 truckloads (180 truck-loads per day). During an 8-hour work day, this would equate to approximately 1 truck entering or leaving the Subsite every 3 minutes. In addition to the potentially significant effects on local air quality and community traffic patterns, traffic of this magnitude is anticipated to result in significant effects on conditions of roadways.

- Sufficient capacity for the disposal of the anticipated volumes of waste may not exist. Because of the volume anticipated to be excavated, off-site disposal capacity for excavated materials would be a critical factor and may significantly limit the implementability of this alternative. An estimated 26.6 and 23.4 million CY (estimated to be approximately 32.0 and 28.1 million tons) would require off-site disposal. Given the magnitude of this volume, multiple commercial landfill facilities would be necessary. While disposal within 200 miles of the Subsite has been assumed for cost estimation purposes, given the timeframe of approximately 30 and 27 years to implement Alternatives 4A and 4B, respectively, it is not possible to reliably predict that disposal capacity for this volume of material would exist within the assumed distance from the Subsite. Lack of landfill capacity would result in significant delays to the implementation timeframe of this alternative.

- Because of the volume anticipated to be excavated, reuse opportunities for excavated materials are anticipated to be a critical factor for Alternatives 4A and 4B and may significantly limit their implementability. It should be noted that the physical and geotechnical characteristics of this material would restrict potential options for its reuse. Notwithstanding these limitations based on physical characteristics and given the magnitude of this volume, it is anticipated that multiple end-use facilities would be necessary. While reuse within 400 miles of the Subsite has been assumed for cost estimation purposes, it is unlikely that reuse capacity for this volume of material would exist given the timeframe of approximately 27 to 30 years to implement these alternatives. Lack of reuse capacity may result in an even longer timeframe for implementation of this alternative.

Each alternative would require coordination with other agencies, including NYSDOH, New York State Department of Transportation, New York State Department of Agriculture and Markets (NYS Fairgrounds), Onondaga County, and the Town of Geddes. The necessary equipment and specialists would be available for each alternative. Cover system construction materials are anticipated to be available; however, material sources and availability of cover system materials would be further evaluated during the design. Because of the temporary relocations and restrictions of the existing highways and interchanges, Alternative 4A would be even more difficult to implement than Alternative 4B.

7. Cost

Includes estimated capital and O&M costs, and net present worth value of capital and O&M costs.

The present-worth costs were calculated using a discount rate of seven percent and a thirty-year time interval for post-construction monitoring and maintenance period.

The estimated capital, annual O&M, and present-worth costs for each of the alternatives are presented in the table below. The estimated costs for the action alternatives are directly related to the given alternative's corresponding total volumes of soil and sediments to be excavated.

Alternatives	**Capital**	**Annual O&M[7]**	**Total Present Worth**
1 – No Action	$0	$0	$0
2 – Cover System	$14.3 million	$99,000-$129,000	$16.6 million
3 – Enhanced Cover System	$17.8 million	$98,000-$128,000	$20 million
4A – Full Removal	$6.1 billion	$170,000-$1,362,000	$6.1 billion
4B – Partial Excavation	$5.1 billion	$157,000-$1,172,000	$5.1 billion

Modifying Criteria *- The final criteria 8 and 9, are known as "modifying criteria." Community and support agency acceptance are factors that are assessed by reviewing comments received during the public comment period, including new information made available after publication of the proposed plan that significantly changes basic features of the remedy with respect to scope, performance, or cost.*

8. State Acceptance

Indicates whether, based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response measure.

NYSDEC is the lead agency for this Subsite and has prepared the remedy selected in this ROD. The EPA has determined that the selected remedy meets the requirements for a remedial action as set forth in CERCLA Section 121, 42 USC § 9621. As such, for the purpose of satisfying this remedy selection criterion of the NCP, NYSDEC, on behalf of New York State, supports the selected remedy. NYSDOH also supports the selection of this remedy; its letter of concurrence is attached (see Appendix IV)."

9. Community Acceptance

Summarizes the public's general response to the response measures described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has reservations about.

[7] The higher end of the range of annual O&M cost estimates represent the cost estimates in years one to five, and the lower end of the range of annual O&M cost estimates represent the cost estimates in years six to 30.

Comments received during the public comment period are summarized and addressed in the Responsiveness Summary, which is attached as Appendix V to this document.

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that the EPA will use treatment to address the principal threats posed by a site, wherever practicable (NCP Section 300.430 (a)(1)(iii)(A)). The principal threat concept is applied to the characterization of source materials at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for the migration of contamination to groundwater, surface water, or air, or act as a source for direct exposure. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or will present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of alternatives, using those remedy-selection criteria that are described above. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

NYSDEC and EPA have not identified material at this Subsite as principal threat wastes.

SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, NYSDEC and EPA have determined that Alternative 3 - Enhanced Cover System, best satisfies the requirements of CERCLA Section 121, 42 U.S.C. § 9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria, set forth at 40 CFR § 300.430(e)(9).

Alternatives 2, 3, 4A, and 4B (the action alternatives) would each be protective of human health and the environment and would address the RAOs. However, Alternatives 4A and 4B would be technically and administratively difficult to implement, would present significant short-term impacts to the surrounding community during the lengthy construction phase, would result in substantial environmental impacts, would not be consistent with current and reasonably anticipated future land uses, and would take significantly longer to implement as compared to Alternatives 2 and 3.

While Alternatives 2 and 3 would both achieve protectiveness of human health and the environment and achieve the RAOs, and are consistent with current and reasonably anticipated future use of the Subsite, Alternative 3 would provide increased cover thicknesses relative to

Alternative 2 in approximately 41 acres of the Subsite where visitors would attend events at the planned amphitheater facilities and/or engage in other recreational activities. The additional cover thicknesses prescribed under Alternative 3 in these areas would provide added long-term effectiveness and permanence relative to that offered by the cover system associated with Alternative 2 by further reducing potential human exposure to contamination in subsurface soil. Based on information currently available, NYSDEC and EPA believe that the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. NYSDEC and EPA expect the selected remedy to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element (or justify not meeting the preference).

NYSDEC and EPA have determined that the selected remedy is protective of human health and the environment; provides the greatest long-term effectiveness; is able to achieve cleanup objectives more quickly than other alternatives; and is cost-effective. The selected remedy utilizes permanent solutions, alternative treatment technologies, and resource-recovery technologies to the maximum extent practicable.

Description of the Selected Remedy

The selected remedy (Alternative 3) for the Solvay Wastebeds 1-8 Subsite to address the Solvay waste and contaminated soil/fill materials includes the following components:

One-foot thick vegetated soil cover (for passive recreation areas) - approximately 39 acres: In areas of anticipated passive recreational use (regardless of whether the commercial use SCOs are exceeded or not), a one-foot thick vegetated soil cover will be installed.

Two-foot thick vegetated soil cover (for active recreation areas or where ecological SCOs in surface soil are exceeded) - approximately 27 acres: In areas of anticipated active recreational use (regardless of whether the restricted residential SCOs are exceeded or not) and also where SCOs for protection of ecological resources will apply and are exceeded, a two-foot thick vegetated soil cover will be installed.

One and a half-foot thick vegetated soil cover (where ecological SCOs in surface soil are exceeded) - approximately 10 acres: Additional soil cover will be applied to the three upland staging areas associated with the IRM. Restoration of these areas as part of the IRM consisted of a six-inch topsoil cover. The additional 1.5-feet of cover material will provide for a two-foot cover over this area where protection of ecological resources SCOs are exceeded.

One-foot thick vegetated structural fill cover (where commercial use SCOs in surface soil are exceeded) - approximately 19 acres: This cover will be applied to areas of anticipated NYS

Fairgrounds overflow parking (passive recreational use) where SCOs for commercial use are exceeded. The structural fill cover will consist of a compacted mixture of aggregate and soil. This cover will be placed directly over existing soil/fill to support vehicle traffic and provide water holding capacity, rooting volume and growing conditions to support vegetation. While the thickness of the structural fill layer is assumed (for cost estimating purposes) to be one-foot, the actual thickness and locations where it will be placed will be determined during remedial design.

Vegetation enhancement cover (over the remaining areas) - approximately 76 acres: This cover will consist of wood fiber mulch/compost and fertilizer mixed with seeds and will be applied to areas where surface soil concentrations are below applicable SCOs. While the thickness of the mulch/compost and seed application is assumed (for cost estimate purposes) to be approximately 4 inches, the actual thickness and locations will be determined during remedial design.

Any fill material brought to the Subsite will need to meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d). Native species will be used for the vegetative component of covers. For the purpose of developing cost estimates, the seed application is anticipated to consist of a grassland seed mix native to NYS and selected for its ability to attain relatively high growth rates and ecological function.

Structures, such as buildings, pavement, or sidewalks, as part of the future development at OU1 could serve as acceptable substitutes for any of the vegetated cover types described above.

Approximately 58 acres (where SCOs for protection of commercial use are not exceeded in surface soil) of the 77 acres of the Subsite used as parking lots associated with the New York State Fairgrounds are already covered with an estimated two to seven feet of imported fill, including at least one-foot of gravel/fill at the surface. The existing cover thickness will be confirmed during remedial design and additional cover will be placed, if needed, to provide for at least a one foot thickness. Existing parking lot surfaces, the County's public paved recreation trail, the Crucible landfill area, and vegetated covers/road beds associated with the I-690/NY-695 corridor, and other Subsite roads/infrastructure would also be maintained.

Clean fill staging areas, which support the IRM, Ninemile Creek, and Onondaga Lake site remediation projects, were constructed using a minimum of six inches of crushed stone. Restoration of the clean fill staging areas will consist of placement of six inches of vegetated, clean fill over the top of the crushed stone in order to provide for a one-foot cover over these areas.

Institutional controls, such as an environmental easement, will be used to ensure that any intrusive activities in areas where contamination remains are in accordance with a NYSDEC-approved Site Management Plan, which will include the following:

- Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the remedy and details the steps and media-specific requirements

necessary to ensure the following institutional and engineering controls remain in place and effective:

- environmental easements and/or an environmental notice;
- cover systems described above;
- excavation plan which details the provisions for management of future excavations in areas of remaining contamination;
- descriptions of the provisions of the institutional controls including any land use restrictions;
- provision that future on-Site construction should include vapor intrusion sampling and/or installation of mitigation measures, if necessary;
- provisions for the management and inspection of the identified engineering controls;
- maintaining Subsite access controls and NYSDEC notification; and
- steps necessary for periodic reviews and certification of the institutional and/or engineering controls.

- Monitoring Plan to assess the performance and effectiveness of the remedy. The plan will include, but may not be limited to, monitoring for vapor intrusion for any buildings developed on the Subsite, as may be required by the Institutional and Engineering Control Plan discussed above.

The selected remedy includes continued monitoring and maintenance associated with the IRM components relating to soil, sediment, fill, and Solvay waste (*e.g.*, shoreline stabilization system, mitigation wetlands, the vegetative cover, and access roads constructed to support the IRM). Maintenance and monitoring for the IRM mitigation wetlands and cover systems will include monitoring to document that success criteria are met and to identify the need for corrective action(s), as warranted. Corrective actions for cover types/zones may include repair of cover cross-sections in areas of disturbance or re-application of vegetation in areas of non-survivorship.

The remedial design will provide the details necessary for the construction, operation, maintenance and monitoring of the remedial action. The need for a demarcation layer between the soil cover and the underlying substrate will be evaluated during design.

Green remediation techniques, as detailed in NYSDEC's Green Remediation Program Policy - DER-31,[8] and the EPA Region 2's Clean and Green policy[9] will be considered for the preferred alternative to reduce short-term environmental impacts. Green remediation best practices such as the following may be considered:

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[8] See http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf

[9] See http://epa.gov/region2/superfund/green_remediation

- Use of renewable energy and/or purchase of renewable energy credits to power energy needs during construction and/or operation and maintenance of the remedy.
- Reduction in vehicle idling, including both on and off road vehicles and construction equipment during construction and/or operation and maintenance of the remedy.
- Design of cover systems, to the extent possible, to be usable for alternate uses, require minimal maintenance (*e.g.*, less mowing), allow for infiltration of storm water and/or be integrated with the planned use of the property. For example, the use of vegetated structural fill to create parking surfaces as identified in both Alternatives 2 and 3 will address storm water management in these areas, while also resulting in a surface usable for current and intended land use in these areas.
- Beneficial reuse of material that will otherwise be considered a waste.
- Use of Ultra Low Sulfur Diesel (ULSD).

Because this alternative will result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, CERCLA requires that the remedy be reviewed at least once every five years. If justified by the review, remedial actions may be evaluated to remove, treat, or contain the contaminated soils remaining at OU1.

Summary of the Estimated Remedy Costs

The estimated capital cost of the selected remedy is $17,800,000; the annual O&M is $98,000 (for years one to five) and $128,000 (for years six to 30); and the total present-worth costs (using a seven percent discount rate) is $20,000,000. Table 9 provides the basis for the cost estimates for Alternative 3.

It should be noted that these cost estimates are expected to be within +50 to -30 percent of the actual project cost. These cost estimates are based on the best available information regarding the anticipated scope of the selected remedy.

Expected Outcomes of the Selected Remedy

The results of the HHRA indicate that the Subsite, if not remediated, presents a potentially unacceptable noncancer hazard for recreational receptors engaging in specific activities (*e.g.*, ATV riding), or receptors that would be involved in intrusive work such as a construction worker. The results of the BERA indicate that the Subsite, if not remediated, poses an unacceptable ecological exposure risk.

The State of New York, Onondaga County, and the City of Syracuse have jointly sponsored the preparation of a land-use master plan to guide future development of the Onondaga Lake area (Syracuse-Onondaga County Planning Agency, 1998). The primary objective of land-use planning efforts is to enhance the quality of the Onondaga Lake area for recreational and commercial uses. Implementation of the remedy will aid this long-term planning effort by reducing or eliminating concerns related to human exposure to contaminated sediments, soils,

and surface water, and by providing and/or maintaining open space for recreational and commercial use.

Under the selected remedy, potential risks to human health and the environment will be reduced to acceptable levels.

STATUTORY DETERMINATIONS

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a site.

For the reasons discussed below, DEC and the EPA have determined that the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The results of the risk assessment indicate that, if no action is taken, the OU1 area poses an unacceptable increased future ecological and human health risk.

The selected remedy will adequately protect human health and the environment by eliminating the direct contact exposure pathway risk to human and environmental receptors. In addition, the alternative will eliminate the possibility of Subsite contamination from spreading to surface water bodies or soil in the future. This action will result in the reduction of exposure levels to acceptable risk levels within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} for carcinogens and at or below a HI of 1 for non-carcinogens. Implementation of the Selected Remedy will not pose unacceptable short-term risks or adverse cross-media impacts.

Compliance with ARARs and Other Environmental Criteria

The selected remedy will comply with the location-, chemical- and action-specific ARARs identified.

The ARARs, TBCs, and other guidelines for the selected remedy are provided in Table 8.

Cost-Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (NCP Section 300.430(f)(1)(ii)(D)). Overall effectiveness is based on the evaluations of the following: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Based on the comparison of overall effectiveness (discussed above) to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective and will achieve the cleanup levels in the same amount of time in comparison to the more costly alternatives.

Each of the alternatives underwent a detailed cost analysis. In that analysis, capital and annual O&M costs were estimated and used to develop present-worth costs. In the present-worth cost analysis, annual O&M costs were calculated for the estimated life of the alternatives and related monitoring using a seven percent discount rate and a 30-year interval. The estimated capital, annual O&M, and total present-worth costs for the selected remedy, assuming local disposal, are $17,800,000, $98,000 (for years one to five) and $128,000 (for years six to 30), and $20,000,000, respectively.

Both Alternatives 2 and 3 would effectively achieve the SCOs. Although Alternative 3 is more expensive than Alternative 2, Alternative 3 would provide increased cover thicknesses relative to Alternative 2 in approximately 41 acres of the Subsite where visitors would attend events at the planned amphitheater facilities and/or engage in other recreational activities. The additional cover thicknesses prescribed under Alternative 3 in these areas would provide added protectiveness relative to that offered by the cover system associated with Alternative 2.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in NCP Section 300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Subsite.

The selected remedy will reduce mobility associated with erosion and infiltration of contaminants in soil/fill/Solvay waste through vegetated cover systems but involve no treatment. The selected remedy will permanently address the contamination associated with OU1.

Preference for Treatment as a Principal Element

CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity or mobility of hazardous substances as a principal element (or justify not satisfying the preference). The selected remedy does not include treatment. NYSDEC and the EPA do not believe that treatment of the materials contained within the

wastebeds is practicable or cost effective given the large volume of materials that would need to be addressed.

Five-Year Review Requirements

The selected remedy, once fully implemented, will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. Consequently, a statutory review will be conducted within five years after initiation of remedial action, and at five year intervals thereafter, to ensure that the remedy is, or will be, protective of human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan, released for public comment on September 17, 2014, identified Alternative 3, Enhanced Cover System as the preferred remedy for Solvay waste and contaminated soil/fill materials. Based upon its review of the written and verbal comments submitted during the public comment period, the NYSDEC and the EPA determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

RECORD OF DECISION FACT SHEET
EPA REGION II

Site

Site name:	Onondaga Lake Site; Operable Unit 1 of the Solvay Wastebeds 1-8 Subsite
Subsite location:	Geddes, Onondaga County, New York
Site HRS score:	50.00
Listed on the NPL:	December 16, 1994

Record of Decision

Date signed:	December 2, 2014
Selected remedy:	Placement of a cover system that will be protective for current and/or reasonably anticipated future land uses (*e.g.*, active and passive recreational uses). In general, the remedy consists of a two-foot thick soil cover over areas where active recreation is planned or where appropriate to protect ecological resources and a one-foot thick soil cover where passive recreation is planned. Other areas of the Subsite will be covered with a vegetation enhancement layer to promote growth of vegetation. A Site Management Plan and institutional controls will also be included.
Capital cost:	$17,800,000
Annual operation and maintenance cost:	$98,000-$128,000*
Present-worth cost:	$20,000,000

Lead NYSDEC

Primary Contact:	Tracy Alan Smith, Project Manager, (518) 402-9676
Secondary Contact:	Donald Hesler, Section Chief, (518) 402-9676

Main PRPs Honeywell International, Inc.

Waste

Waste types:	Benzene, toluene, ethylbenzene, and xylenes (BTEX), naphthalene and other assorted polycyclic aromatic hydrocarbons, PCBs, phenolic compounds, pesticides, and inorganics (*e.g.*, arsenic, barium, chromium, mercury, nickel).
Waste origin:	Local waste disposal activities
Contaminated media:	Soil

_____

* The higher end of the range of Annual O&M cost estimates represents the cost estimates in years one to five, and the lower end of the range of Annual O&M cost estimates represents the cost estimates in years six to 30.

OPERABLE UNIT 1 OF THE SOLVAY WASTBEDS 1-8 SUBSITE
OF THE ONONDAGA LAKE SUPERFUND SITE
RECORD OF DECISION

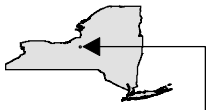
APPENDIX I

FIGURES

This document was developed in color. Reproduction in B/W may not represent the data as intended.

ADAPTED FROM: SYRACUSE WEST, NY USGS QUADRANGLE.

HONEYWELL
WASTEBEDS 1 - 8
OU-1 FEASIBILITY STUDY
WASTEBEDS 1-8
GEDDES, NEW YORK



QUADRANGLE LOCATION

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SITE LOCATION

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Feet

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SEPTEMBER 2014
1163.45176

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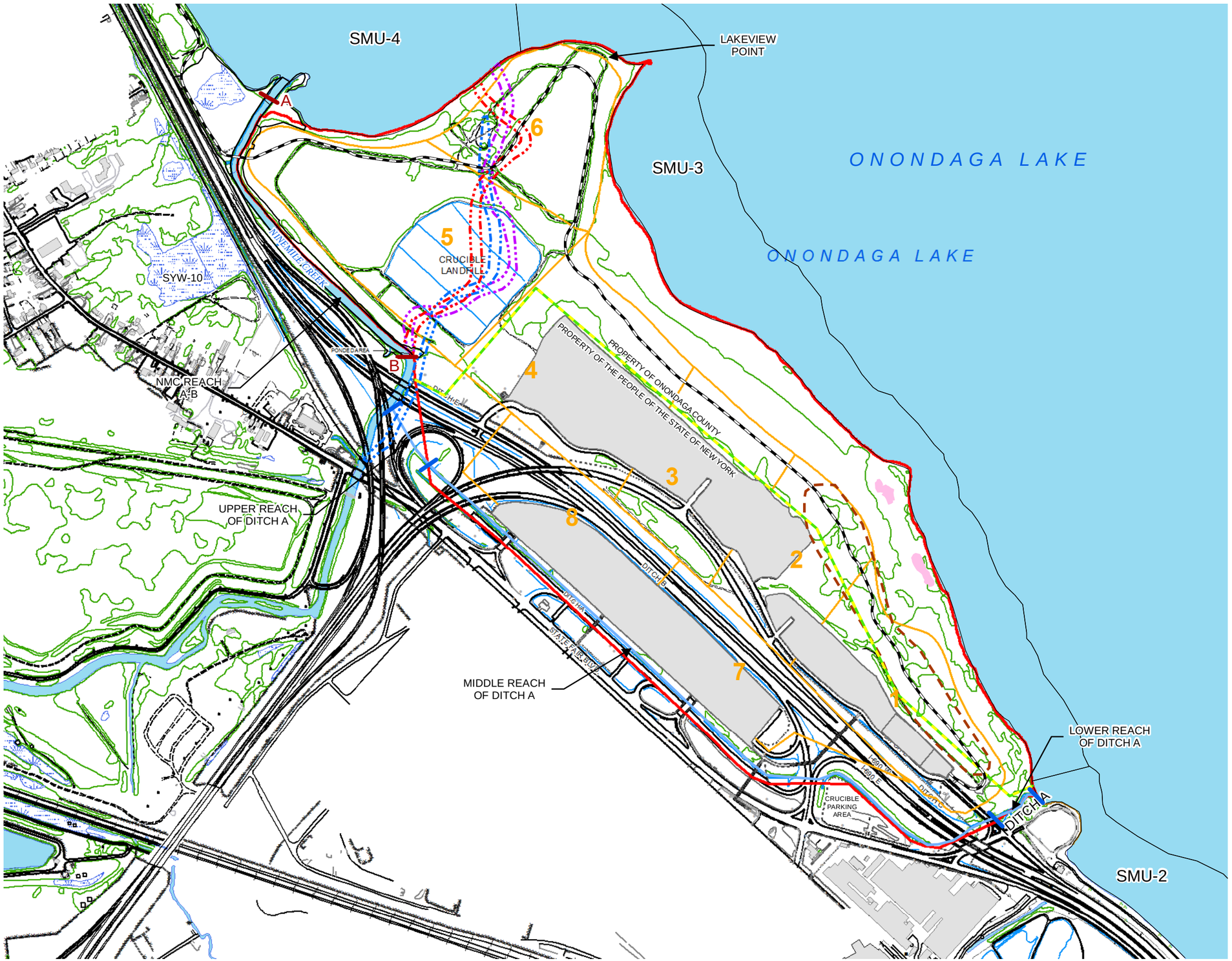
FIGURE 2



This document was developed in color. Reproduction in B/W may not represent the data as intended.

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LEGEND

- ONONDAGA COUNTY WEST SHORE TRAIL
- SMU-2 ONONDAGA LAKE SEDIMENT MANAGEMENT UNIT BOUNDARY
- DELINEATED WETLANDS
- PARKING LOT
- WASTEBEDS 1-8 PROPERTY BOUNDARY (PEOPLE OF THE STATE OF NY AND ONONDAGA COUNTY)
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE
- BIOSOLIDS AREA

FORMER NINEMILE CREEK CHANNEL

- USGS TOPO MAP 1898
- THOMSEN ASSOCIATES
- ALLIED DRAWING 1937

HONEYWELL INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

SITE PLAN

0 400 800 1,600
Feet

SEPTEMBER 2014
1163.45176

O'BRIEN & GERE

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FIGURE 3

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LEGEND

- SEEP COLLECTION TRENCH
- GROUNDWATER COLLECTION TRENCH
- DITCH A IRM
- ACCESS PATHWAYS
- REVETMENT
- SEEP APRON
- VEGETATIVE COVER / RESTORED AREA / SHORELINE STABILIZATION / WET SWALE
- MITIGATION WETLAND
- BIOSOLIDS AREA
- WASTEBEDS 1-8 SITE

HONEYWELL INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

INTEGRATED IRM COMPONENTS

0 350 700 1,400
Feet

SEPTEMBER 2014
1163.45176

O'BRIEN & GERE

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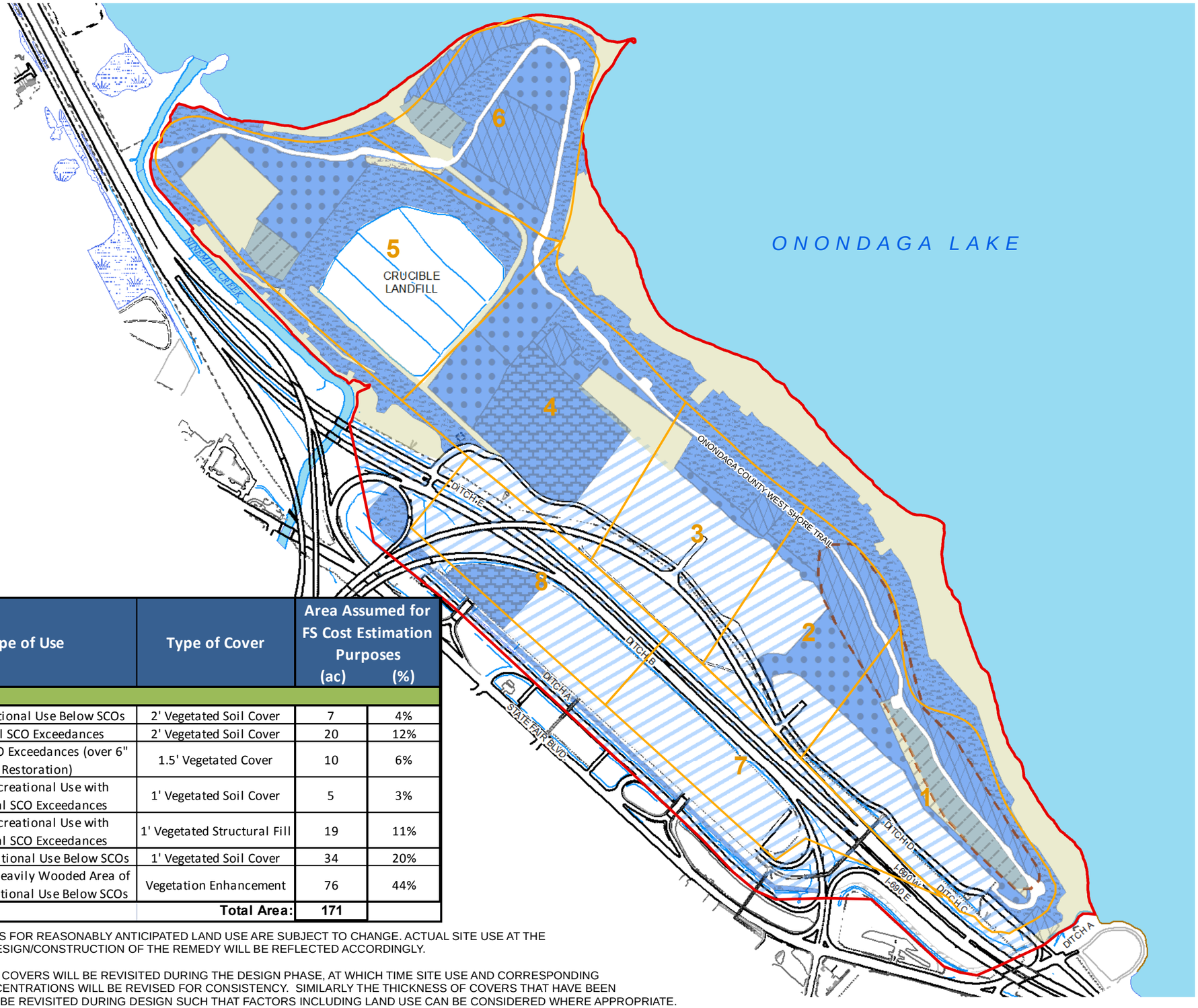
FIGURE 4



Type of Use	Type of Cover	Area Assumed for FS Cost Estimation Purposes (ac)	(%)
Active Recreational Use Below SCOs	2' Vegetated Soil Cover	7	4%
Ecological SCO Exceedances	2' Vegetated Soil Cover	20	12%
Ecological SCO Exceedances (over 6" IRM Restoration)	1.5' Vegetated Cover	10	6%
Passive Recreational Use with Commercial SCO Exceedances	1' Vegetated Soil Cover	5	3%
Passive Recreational Use with Commercial SCO Exceedances	1' Vegetated Structural Fill	19	11%
Passive Recreational Use Below SCOs	1' Vegetated Soil Cover	34	20%
Steep Slopes/Heavily Wooded Area of Limited Recreational Use Below SCOs	Vegetation Enhancement	76	44%
	Total Area:	**171**	

[1] ASSUMED AREAS FOR REASONABLY ANTICIPATED LAND USE ARE SUBJECT TO CHANGE. ACTUAL SITE USE AT THE TIME OF THE DESIGN/CONSTRUCTION OF THE REMEDY WILL BE REFLECTED ACCORDINGLY.

[2] THE EXTENT OF COVERS WILL BE REVISITED DURING THE DESIGN PHASE, AT WHICH TIME SITE USE AND CORRESPONDING SURFACE CONCENTRATIONS WILL BE REVISED FOR CONSISTENCY. SIMILARLY THE THICKNESS OF COVERS THAT HAVE BEEN ASSUMED WILL BE REVISITED DURING DESIGN SUCH THAT FACTORS INCLUDING LAND USE CAN BE CONSIDERED WHERE APPROPRIATE.

N

LEGEND

- NO FURTHER ACTION AREAS (EXISTING FILL) TO BE CONFIRMED AS PART OF OU-1 FS DESIGN[2] (118 ac)
- ALTERNATIVE 3 FOOTPRINT (171 ac)
- AREAS RESTORED AS PART OF INTEGRATED IRM (71 ac)
- STAGING AREAS ADDRESSED AS PART OF INTEGRATED IRM AND OU-1 FS
- EXISTING VEGETATION ENHANCEMENT
- BIOSOLIDS AREA FOOTPRINT
- APPROXIMATE WASTEBED BOUNDARY
- WASTEBEDS 1-8 SITE

TYPE OF COVER[1,2]

- 1' VEGETATED SOIL COVER[1,2]
- 1' VEGETATED STRUCTURAL FILL[1,2]
- 1.5' VEGETATED SOIL COVER[1,2]
- 2' VEGETATED SOIL COVER[1,2]
- VEGETATION ENHANCEMENT[1,2]

HONEYWELL INTERNATIONAL INC.
OU-1 FEASIBILITY STUDY
WASTEBEDS 1- 8
GEDDES, NEW YORK

SELECTED REMEDY: ALTERNATIVE 3 - ENHANCED VEGETATED COVER SYSTEM

0 350 700 1,400
Feet

SEPTEMBER 2014
1163.45176

O'BRIEN & GERE

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OPERABLE UNIT 1 OF THE SOLVAY WASTBEDS 1-8 SUBSITE OF THE ONONDAGA LAKE SUPERFUND SITE RECORD OF DECISION

APPENDIX II

TABLES

Table 1A Detected Parking Lot Area Surface Soil CPOIs						
Parameter	**No. of Samples**	**No. of Detects**	**Mean Detected Conc.[2]**	**Maximum Detected Conc.**	**No. of Exceedances[1]**	**NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives**
Volatile Organic Compounds (µg/kg)						
Acetone	29	2	48.8	95.0	1	50
Semivolatile Organic Compounds (µg/kg)						
Benzo(B)fluoranthene	28	18	768	3,900	4	1,000
Benzo(A)pyrene	28	16	898	4,100	4	1,000
Benzo(K)fluoranthene	28	15	783	3,300	4	800
Indeno(1,2,3-CD)pyrene	28	12	530	1,700	4	500
Chrysene	28	19	749	3,700	3	1,000
Benzo(A)anthracene	28	17	759	3,600	3	1,000
Dibenzo(A,H)anthracene	28	9	310	1,100	3	330
Fluoranthene	28	22	979	5,000	0	100,000
Phenanthrene	28	20	617	3,000	0	100,000
Pyrene	28	20	1,277	7,500	0	100,000
Benzo(G,H,I)perylene	28	13	581	2,000	0	100,000
Anthracene	28	11	332	970	0	100,000
Acenaphthylene	28	10	285	1,100	0	100,000
Fluorene	28	7	166	370	0	30,000
Naphthalene	28	7	210	540	0	12,000
2-Methylnaphthalene	28	10	137	380	NA	NC
Bis(2-ethylhexyl)phthalate	28	9	107	340	NA	NC
Pesticides (µg/kg)						
Dieldrin	28	14	195	900	9	5
4,4'-DDT	28	11	9.38	34.0	7	3.3
4,4'-DDD	28	1	6.10	6.10	1	3.3
PCBs (µg/kg)						
Aroclor-1268	28	8	21.7	79.0	0	100

Table 1A Detected Parking Lot Area Surface Soil CPOIs						
Parameter	**No. of Samples**	**No. of Detects**	**Mean Detected Conc.[2]**	**Maximum Detected Conc.**	**No. of Exceedances[1]**	**NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives**
Aroclor-1254	28	6	16.4	21.0	0	100
Aroclor-1260	28	5	10.4	25.0	0	100
Inorganics (mg/kg)						
Calcium	28	28	143,725	280,000	28	100(a)
Magnesium	28	28	38,839	96,000	28	600(a)
Potassium	28	27	1272	3,390	26	400(a)
Chromium	38	38	660	14,000	23	30
Aluminum	28	28	5714	17,200	15	4,800(c)
Nickel	28	28	609	9,800	15	30
Hexavalent Chromium	10	6	5.08	6.60	6	1
Antimony	28	22	1.19	16.0	4	0.6(a)
Copper	28	28	60.0	750	3	50
Lead	28	28	32.5	160	3	63
Manganese	28	28	674	5,100	3	1,600
Selenium	28	19	3.95	35.0	3	3.9
Thallium	28	3	3.17	3.90	3	0.1(a)
Zinc	28	28	47.3	120	2	109
Arsenic	28	28	5.08	19.0	1	13
Mercury	28	28	0.06	0.19	1	0.18
Barium	28	28	84.3	200	0	350
Beryllium	28	28	0.33	0.87	0	7.2
Sodium	28	27	123	260	0	750(a)
Cyanide	28	6	0.66	1.00	0	27
Cadmium	28	5	0.17	0.51	0	2.5
Silver	28	1	0.51	0.51	0	2
Cobalt	28	28	50.9	780	NA	NC

Table 1A Detected Parking Lot Area Surface Soil CPOIs						
Parameter	**No. of Samples**	**No. of Detects**	**Mean Detected Conc.[2]**	**Maximum Detected Conc.**	**No. of Exceedances[1]**	**NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives**
Iron	28	28	23,311	180,000	NA	NC
Vanadium	28	28	63.2	830	NA	NC

Notes:
1 – Exceeds NYSDEC (2006) Part 375.6 Table 6.8(a) Unrestricted Use Soil Cleanup Objectives.
2 – Mean concentration values have been rounded.
NA = not applicable as no criterion is available. NC = no criterion (SCO).
(a) - Background values established by McGovern, 1988.; (c) Typical concentrations in Solvay Waste, Calocerinos & Spina, 1980.

Table 1B Detected Upland Area Surface Soil CPOIs						
Parameter	No. of Samples	No. of Detects	Mean Detected Conc.[2]	Maximum Detected Conc.	No. of Exceedances[1]	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives
Volatile Organic Compounds (µg/kg)						
Methylene chloride	59	6	34.7	80.0	1	50
Semivolatile Organic Compounds (µg/kg)						
Indeno(1,2,3-CD)pyrene	59	36	1,078	5,400	25	500
Chrysene	59	46	1,906	18,000	24	1,000
Benzo(A)pyrene	59	42	1,875	17,000	23	1,000
Benzo(A)anthracene	59	42	2,009	19,000	21	1,000
Benzo(B)fluoranthene	59	42	1820	18,000	21	1,000
Benzo(K)fluoranthene	59	40	1,633	15,000	21	800
Dibenzofuran	59	18	346	2,900	7	7,000
Hexachlorobenzene	61	5	1,562	2,700	5	330
Fluoranthene	59	51	3,199	30,000	0	100,000
Pyrene	59	50	3,016	33,000	0	100,000
Phenanthrene	59	42	2,686	32,000	0	100,000
Benzo(G,H,I)perylene	59	36	1,241	4,400	0	100,000
Acenaphthylene	59	30	690	6,300	0	100,000
Anthracene	59	30	1,015	7,700	0	100,000
Naphthalene	59	18	516	3,800	0	12,000
Acenaphthene	59	16	418	2,700	0	20,000
Fluorene	59	16	899	8,600	0	30,000
Dibenzo(A,H)anthracene	59	21	536	2,300	NA	330
Carbazole	59	19	322	2,000	NA	NC
Bis(2-ethylhexyl)phthalate	59	21	781	2,300	NA	NC
2-Methylnaphthalene	59	17	465	4,000	NA	NC
1-Phenyl-1-(2,4-	22	13	563	2,100	NA	NC

Table 1B Detected Upland Area Surface Soil CPOIs						
Parameter	No. of Samples	No. of Detects	Mean Detected Conc.[2]	Maximum Detected Conc.	No. of Exceedances[1]	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives
Dimethylphenyl)ethane						
4-Chloroaniline	59	12	5,625	16,000	NA	NC
Pesticides (µg/kg)						
Dieldrin	59	17	378	1,600	17	5
4,4'-DDT	59	15	20.2	120	6	3.3
Alpha-chlordane	59	8	111	290	4	94
4,4'-DDE	59	2	84	160	2	3.3
PCBs (µg/kg)						
Aroclor-1260	59	21	4,637	33,000	13	100
Aroclor-1254	59	14	88.7	250	4	100
Aroclor-1268	59	4	24.7	44	0	100
Aroclor-1248	59	1	19.0	19.0	0	100
Inorganics (mg/kg)						
Aluminum	59	59	8538	20,100	59	4,800(c)
Calcium	59	59	176092	370,000	59	100(a)
Magnesium	59	59	18261	33,500	59	600(a)
Chromium	80	80	280	2,150	39	30
Potassium	59	44	1,351	3,430	35	400(a)
Nickel	59	59	74.5	281	30	30
Sodium	59	53	1,310	3,300	28	750(a)
Mercury	61	61	1.89	11.5	24	0.18
Lead	59	59	293	1,670	22	63
Copper	59	59	284	1,980	18	50
Zinc	59	59	978	8,880	16	109
Cadmium	59	27	57.5	203	15	2.5
Silver	59	15	48.8	80.2	15	2

Table 1B Detected Upland Area Surface Soil CPOIs						
Parameter	No. of Samples	No. of Detects	Mean Detected Conc.[2]	Maximum Detected Conc.	No. of Exceedances[1]	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives
Arsenic	59	59	12.8	74.3	14	13
Barium	59	59	184	817	13	350
Thallium	59	13	1.28	2.20	13	0.1(a)
Antimony	59	32	2.03	16.5	9	0.6(a)
Hexavalent Chromium	21	6	37.7	124	6	1
Selenium	59	36	1.71	4.00	1	3.9
Manganese	59	59	431	784	0	1600
Beryllium	59	46	0.86	5.40	0	7.2
Cyanide	51	41	7.91	20.0	0	27
Iron	59	59	15,026	35,400	NA	NC
Vanadium	59	58	25.2	83.0	NA	NC
Cobalt	59	50	11.5	65.6	NA	NC

Notes:
1 – Exceeds NYSDEC (2006) Part 375.6 Table 6.8(a) Unrestricted Use Soil Cleanup Objectives.
2 – Mean concentration values have been rounded.
NA = not applicable as no criterion is available. NC = no criterion (SCO).
(a) - Background values established by McGovern, 1988.; (c) Typical concentrations in Solvay Waste, Calocerinos & Spina, 1980.

Table 1C Detected Lakeshore Area Surface Soil CPOIs						
Parameter	**No. of Samples**	**No. of Detects**	**Mean Detected Conc.[2]**	**Maximum Detected Conc.**	**No. of Exceedances[1]**	**NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives**
Volatile Organic Compounds (µg/kg)						
Xylenes, total	28	8	104	400	1	260
Acetone	28	2	60.5	100	1	50
Toluene	28	16	14.1	45.0	0	700
Benzene	27	7	10.8	33.0	0	60
2-Butanone	27	6	4.75	6.20	0	120
Semivolatile Organic Compounds (µg/kg)						
Naphthalene	28	20	1674	25,000	1	12,000
Fluoranthene	28	23	115	300	0	100,000
Pyrene	28	22	83.1	270	0	100,000
Chrysene	28	17	56.2	170	0	1,000
Phenanthrene	28	17	167	1,800	0	100,000
Benzo(A)anthracene	28	15	39.3	100	0	1,000
Benzo(B)fluoranthene	28	15	57.7	160	0	1,000
Benzo(A)pyrene	28	14	36.9	110	0	1,000
Benzo(G,H,I)perylene	28	14	29.9	75.0	0	100,000
Indeno(1,2,3-CD)pyrene	28	14	27.3	68.0	0	500
Dibenzofuran	28	13	78.1	870	0	7,000
Anthracene	28	12	12.4	34.0	0	100,000
Acenaphthylene	28	11	14.4	36.0	0	100,000
Acenaphthene	28	9	3.22	6.60	0	20,000
Dibenzo(A,H)anthracene	28	9	7.50	23.0	0	330
1-Phenyl-1-(2,4-Dimethylphenyl)ethane	14	14	882	5,000	NA	NC
1-Phenyl-1-(4-Methylphenyl)ethane	14	14	147	1,000	NA	NC

Table 1C Detected Lakeshore Area Surface Soil CPOIs						
Parameter	**No. of Samples**	**No. of Detects**	**Mean Detected Conc.[2]**	**Maximum Detected Conc.**	**No. of Exceedances[1]**	**NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives**
Di-N-butyl phthalate	28	13	7.10	14.0	NA	NC
2-Methylnaphthalene	28	12	522	5,300	NA	NC
Benzaldehyde	14	11	78.2	220	NA	NC
Caprolactam	14	11	24.4	50	NA	NC
Carbazole	28	8	4.91	11.0	NA	NC
1,1'-Biphenyl	14	6	99.7	530	NA	NC
Acetophenone	14	3	154	390	NA	NC
Pesticides (µg/kg)						
4,4'-DDD	14	1	3.70	3.70	1	3.3
4,4'-DDE	14	1	5.90	5.90	1	3.3
Delta-bhc	14	4	3.28	7.30	0	40
4,4'-DDT	14	3	1.18	2.50	0	3.3
PCBs (µg/kg)						
Aroclor-1260	14	8	41.4	250	1	100
Inorganics (mg/kg)						
Calcium	28	28	315,893	420,000	28	100(a)
Magnesium	28	28	13,389	36,000	28	600(a)
Sodium	28	28	1,455	5,700	24	750(a)
Mercury	28	28	0.28	2.20	14	0.18
Aluminum	28	28	4,718	9,600	13	4,800(c)
Thallium	28	8	1.82	3.10	8	0.1(a)
Chromium	33	33	29.1	340	7	30
Potassium	28	22	343	1290	7	400(a)
Barium	28	28	361	2350	5	350
Nickel	28	28	16.0	47.0	3	30
Copper	28	28	16.6	190	1	50

Table 1C Detected Lakeshore Area Surface Soil CPOIs

Parameter	No. of Samples	No. of Detects	Mean Detected Conc.[2]	Maximum Detected Conc.	No. of Exceedances[1]	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives
Lead	28	28	23.9	260	1	63
Zinc	28	28	60.2	1,000	1	109
Cadmium	28	20	1.20	16.0	1	2.5
Silver	28	15	0.93	10.0	1	2
Hexavalent Chromium	5	1	3.6	3.6	1	30
Arsenic	28	28	7.43	13.0	0	13
Cyanide	28	28	3.53	20.0	0	27
Manganese	28	28	203	520	0	1,600
Beryllium	28	23	0.44	1.10	0	7.2
Antimony	28	9	0.42	0.58	0	0.6(a)
Selenium	28	7	0.49	0.65	0	3.9
Iron	28	28	4,858	9,600	NA	NC
Vanadium	28	28	11.5	27.3	NA	NC
Cobalt	28	25	2.38	8.10	NA	NC

Notes:
1 – Exceeds NYSDEC (2006) Part 375.6 Table 6.8(a) Unrestricted Use Soil Cleanup Objectives.
2 – Mean concentration values have been rounded.
NA = not applicable as no criterion is available. NC = no criterion (SCO).
(a) - Background values established by McGovern, 1988.; (c) Typical concentrations in Solvay Waste, Calocerinos & Spina, 1980.

Table 1D Detected Subsurface Soil CPOIs						
Parameter	**No. of Samples**	**No. of Detects**	**Mean Detected Conc.[2]**	**Maximum Detected Conc.**	**No. of Exceedances[1]**	**NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives**
Volatile Organic Compounds (µg/kg)						
Benzene	203	105	6,099	210,000	79	60
Toluene	203	90	18,003	420,000	52	700
Acetone	202	67	330	3,300	48	50
Xylenes, total	117	55	8,132	120,000	46	260
2-Butanone	20	95	167	1,400	38	120
Xylenes, m & p	86	43	57,749	500,000	31	260
o-Xylene	86	41	18,852	180,000	26	260
Ethylbenzene	203	74	2,178	26,000	18	1,000
Methylene chloride	202	54	54.9	260	17	50
Carbon disulfide	202	43	16.8	130	NA	NC
Isopropylbenzene	152	33	4,343	24,000	NA	NC
Methylcyclohexane	152	32	889	5,800	NA	NC
Semivolatile Organic Compounds (µg/kg)						
Naphthalene	203	111	104,183	1,700,000	37	12,000
Phenol	175	88	526	3,400	37	330
4-Methylphenol	175	82	611	5,200	29	330
2-Methylphenol	171	67	173	930	9	330
Chrysene	203	36	372	6,800	3	1,000
Benzo(A)pyrene	203	26	369	4,500	3	1,000
Benzo(K)fluoranthene	203	11	722	4,100	3	800
Benzo(B)fluoranthene	203	34	283	4,400	2	1,000
Indeno(1,2,3-CD)pyrene	203	19	261	2,400	2	500
Dibenzofuran	203	61	944	7,800	1	7,000
Benzo(A)anthracene	203	29	361	5,200	1	1,000
Fluorene	203	23	4,020	34,000	1	30,000

Table 1D Detected Subsurface Soil CPOIs						
Parameter	No. of Samples	No. of Detects	Mean Detected Conc.[2]	Maximum Detected Conc.	No. of Exceedances[1]	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives
Dibenzo(A,H)anthracene	203	5	330	1,400	1	330
1,2-Dichlorobenzene	51	1	1,500	1,500	1	1,100
Phenanthrene	203	91	1,161	21,000	0	100,000
Fluoranthene	203	72	433	14,000	0	100,000
Pyrene	203	58	503	16,000	0	100,000
2-Methylnaphthalene	203	80	12,769	120,000	NA	NC
Bis(2-ethylhexyl)phthalate	203	59	614	21,000	NA	NC
1,1'-Biphenyl	150	47	1,240	8,500	NA	NC
1-Phenyl-1-(2,4-Dimethylphenyl)ethane	82	44	19,755	620,000	NA	NC
Acetophenone	150	43	124	1,800	NA	NC
1-Phenyl-1-(4-Methylphenyl)ethane	82	42	14,616	310,000	NA	NC
Benzaldehyde	146	33	135	560	NA	NC
Pesticides (µg/kg)						
Dieldrin	136	5	80.1	240	3	5
4,4'-DDD	136	2	74.5	130	2	3.3
Alpha-chlordane	136	5	40.1	110	1	94
PCBs (µg/kg)						
Aroclor-1260	136	10	1,299	3,600	7	100
Aroclor-1248	136	2	2,215	4,300	2	100
Aroclor-1254	136	1	20.0	20.0	0	100
Aroclor-1268	136	1	7.90	7.90	0	100
Inorganics (mg/kg)						
Calcium	203	203	239,382	429,000	203	100(a)
Magnesium	203	203	20,319	57,000	203	600(a)
Sodium	203	203	4,832	31,400	193	750(a)

Table 1D Detected Subsurface Soil CPOIs

Parameter	No. of Samples	No. of Detects	Mean Detected Conc.[2]	Maximum Detected Conc.	No. of Exceedances[1]	NYSDEC Part 375.6 Unrestricted Use Soil Cleanup Objectives
Potassium	203	154	990	4,390	130	400(a)
Aluminum	203	203	5,322	23,400	126	4,800(c)
Barium	203	203	268	7,110	25	350
Thallium	203	19	1.06	3.30	19	0.1(a)
Mercury	203	109	0.26	7.70	13	0.18
Chromium	215	213	22.6	1330	12	30
Arsenic	203	192	6.47	77.3	12	13
Copper	203	200	20.7	600	8	50
Cyanide	203	140	8.90	53.0	7	27
Nickel	203	161	12.2	87.0	6	30
Antimony	203	25	0.63	2.70	6	0.6(a)
Lead	203	162	23.6	1,000	5	63
Cadmium	203	57	2.96	56.0	5	2.5
Zinc	203	184	38.4	980	4	109
Silver	203	36	3.03	38.0	4	2
Hexavlent Chromium	12	3	32.3	72.6	3	30
Selenium	203	48	1.07	5.80	2	3.9
Manganese	203	203	321	2,530	1	1,600
Beryllium	203	89	0.34	0.94	0	7.2
Iron	203	203	8,126	32,000	NA	NC
Vanadium	203	161	11.1	44.6	NA	NC
Cobalt	203	110	3.88	39.0	NA	NC

Notes:
1 – Exceeds NYSDEC (2006) Part 375.6 Table 6.8(a) Unrestricted Use Soil Cleanup Objectives.
2 – Mean concentration values have been rounded.
NA = not applicable as no criterion is available. NC = no criterion (SCO).
(a) - Background values established by McGovern, 1988.; (c) Typical concentrations in Solvay Waste, Calocerinos & Spina, 1980.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface soil (0-2 ft bgs)	Surface soil	Surface soil throughout Exposure Unit 1	Transient trespasser	Older child (6 -18 yrs)	Ingestion	Quantitative	Transient trespassers on-site may incidentally ingest surface soil during the course of their activities.
						Dermal	Quantitative	Transient trespassers using the Site may have dermal contact with surface soil during the course of their activities.
		Fugitive dust	Outdoor ambient air	Transient trespasser	Older child (6 -18 yrs)	Inhalation	Quantitative	Transient trespassers may inhale fugitive dust as a result of normal activities in this exposure unit.
		Volatile emissions	Outdoor ambient air	Transient trespasser	Older child (6 -18 yrs)	Inhalation	Quantitative	The transient tresspasser may be exposed to constituents volatilized from surface soil in this exposure unit.
	Sediment (0-1 ft bgs)	Ponded Area and Ditch A - South	Ponded Area and Ditch A - South	Transient trespasser	Older child (6 -18 yrs)	Dermal	Quantitative	Transient trespassers using the Site may have dermal contact with sediment during the course of their activities.
		Seep sediment	Site seeps	Transient trespasser	Older child (6 -18 yrs)	Ingestion	Quantitative	Transient trespassers using the Site may incidentally ingest seep sediment during the course of their activities.
						Dermal	Quantitative	Transient trespassers using the Site may have dermal contact with seep sediment during the course of their activities.
	Surface water	Ponded Area and Ditch A - South	Ponded Area and Ditch A - South	Transient trespasser	Older child (6 -18 yrs)	Dermal	Quantitative	Transient trespassers may have dermal contact with surface water from the Ponded Area during the course of their activities.
		Seep surface water	Site seeps	Transient trespasser	Older child (6 -18 yrs)	Dermal	Quantitative	Transient trespassers using the Site may have dermal contact with seep surface water during the course of their activities.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface soil (0-2 ft bgs)	Surface soil	Surface soil throughout Exposure Unit 2	Lunchtime trespasser	Adult (> 18 yrs)	Ingestion	Quantitative	Lunchtime trespassers on the site may incidentally ingest surface soil during the course of their activities.
						Dermal	Quantitative	Lunchtime trespassers on the site may have dermal contact with surface soil during the course of their activities.
		Fugitive dust	Outdoor ambient air	Lunchtime trespasser	Adult (> 18 yrs)	Inhalation	Quantitative	Lunchtime trespassers may inhale fugitive dust as a result of normal activities in this exposure unit.
		Volatile emissions	Outdoor ambient air	Lunchtime trespasser	Adult (> 18 yrs)	Inhalation	Quantitative	Lunchtime trespassers may be exposed to constituents volatilized from surface soil in this exposure unit.
	Surface and subsurface soil (0-10 ft bgs)	Surface and subsurface soil	Surface and subsurface soil throughout Exposure Unit 2	Utility/sewer worker	Adult (> 18 yrs)	Ingestion	Quantitative	Utility or sewer workers performing excavation activities may be exposed to and incidentally ingest surface and subsurface soil.
						Dermal	Quantitative	Utility or sewer workers performing excavation activities may be exposed to and have dermal contact with surface and subsurface soil.
		Fugitive dust	Outdoor ambient air	Utility/sewer worker	Adult (> 18 yrs)	Inhalation	Quantitative	Utility or sewer workers may inhale fugitive dust as a result of normal activities in this exposure unit.
		Volatile emissions	Outdoor ambient air	Utility/sewer worker	Adult (> 18 yrs)	Inhalation	Quantitative	Utility or sewer workers may be exposed to constituents volatilized from surface and subsurface soil in this exposure unit.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Sediment (0-1 ft bgs)	Seep sediment	Site seeps	Lunchtime trespasser	Adult (> 18 yrs)	Ingestion	Quantitative	Lunchtime trespassers using the Site may incidentally ingest seep sediment during the course of their activities.
						Dermal	Quantitative	Lunchtime trespassers using the Site may have dermal contact with seep sediment during the course of their activities.
				Utility/sewer worker	Adult (> 18 yrs)	Ingestion	Quantitative	Utility workers could ingest seep sediment originating from soil excavations as part of repairing or installing on-site utilities.
						Dermal	Quantitative	Utility workers may have dermal contact with seep sediment originating from soil excavations as part of repairing or installing on-site utilities.
	Seep surface water	Seep surface water	Site seeps	Lunchtime trespasser	Adult (> 18 yrs)	Dermal	Quantitative	Lunchtime trespassers using the Site may have dermal contact with seep surface water during the course of their activities.
				Utility/sewer worker	Adult (> 18 yrs)	Dermal	Quantitative	Utility or sewer workers using the Site may have dermal contact with seep surface water during the course of their activities.
	Surface soil (0-2 ft bgs)	Surface soil	State fairgrounds parking area	Commercial/ industrial worker	Adult (> 18 yrs)	Ingestion	Quantitative	If future buildings were constructed, a commercial/industrial worker may incidentally ingest soil while performing his/her duties outside.
						Dermal	Quantitative	If future buildings were constructed, a commercial/industrial worker may have dermal exposure to soil while performing his/her duties outside.
		Fugitive dust	Outdoor ambient air	Commercial/ industrial worker	Adult (> 18 yrs)	Inhalation	Quantitative	A commercial/industrial worker could inhale fugitive dust while performing his/her duties outside.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface and subsurface soil (0-10 ft bgs)	Volatile emissions	Outdoor ambient air	Commercial/ industrial worker	Adult (> 18 yrs)	Inhalation	Quantitative	A commercial/industrial worker could inhale vapors while performing his/her duties outside.
		Air	Indoor air - vapor intrusion	Commercial/ industrial worker	Adult (> 18 yrs)	Inhalation	Qualitative	Vapors originating from soil VOCs may enter building workspace. When soil vapor data is available, detected constituents are screened using the framework presented in USEPA (2004) Developing Indoor Air Decision Matrices for Screening and Interim Actions. When soil vapor data is unavailable, shallow ground water data will be evaluated against USEPA OSWER (2002) ground water to indoor air criteria.
Current/Future	Surface soil (0-2 ft bgs)	Surface soil	Surface soil throughout Exposure Unit 3	Trespasser/ATV recreator	Older child (12-18 yrs) and young adult (18-30 yrs)	Ingestion	Quantitative	Trespassers using ATVs at the Site may incidentally ingest surface soil during the course of their activities. The trespasser/ATV recreator scenario is considered to be protective of the recreator/bike path user.
						Dermal	Quantitative	Trespassers using ATVs at the Site may have dermal contact with surface soil during the course of their activities. The trespasser/ATV recreator scenario is considered to be protective of the recreator/bike path user.
		Fugitive dust	Outdoor ambient air	Trespasser/ATV recreator	Older child (12-18 yrs) and young adult (18-30 yrs)	Inhalation	Quantitative	Fugitive dust may be generated as a result of operating an ATV. The trespasser/ATV recreator scenario is considered to be protective of the recreator/bike path user.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
		Volatile emissions	Outdoor ambient air	Trespasser/ATV recreator	Older child (12-18 yrs) and young adult (18-30 yrs)	Inhalation	Quantitative	The trespasser/ATV recreator may be exposed to constituents volatilized from surface soil. The trespasser/ATV recreator scenario is considered to be protective of the recreator/bike path user.
	Sediment (0-1 ft bgs)	Seep sediment	Site seeps	Trespasser/ATV recreator	Older child (12-18 yrs) and young adult (18-30 yrs)	Ingestion	Quantitative	Trespassers using ATV at the Site may incidentally ingest seep sediment during the course of their activities. The trespasser/ATV recreator scenario is considered to be protective of the recreator/bike path user.
						Dermal	Quantitative	Trespassers using ATV at the Site may have dermal contact with seep sediment during the course of their activities. The trespasser/ATV recreator scenario is consiered to be protective of the recreator/bike path user.
	Surface water	Seep surface water	Site seeps	Trespasser/ATV recreator	Older child (12-18 yrs) and young adult (18-30 yrs)	Dermal	Quantitative	Trespassers using ATVs in this exposure area may have dermal contact with seep surface water during the course of their activities; however, seep flow is intermittent throughout the year. The trespasser/ATV recreator scenario is considered to be protective of the recreator/bike path user.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface and subsurface soil (0-10 ft bgs)	Surface and subsurface soil	Surface and subsurface soil throughout Exposure Unit 3	Construction worker	Adult (> 18 yrs)	Ingestion	Quantitative	Construction and excavation in this exposure unit may contribute to incidental ingestion of surface soil.
						Dermal	Quantitative	Construction and excavation in this exposure unit may contribute to dermal contact with surface soil.
		Fugitive dust	Outdoor ambient air	Construction worker	Adult (> 18 yrs)	Inhalation	Quantitative	Construction activities could cause fugitive dust to become airborne, facilitating inhalation of Site constituents.
		Volatile emissions	Outdoor ambient air	Construction worker		Inhalation	Quantitative	Construction workers may be exposed to volatile emissions from Site soils during on-grade construction and/or excavation activities.
	Sediment (0-1 ft bgs)	Seep sediment	Site seeps	Construction worker	Adult (> 18 yrs)	Ingestion	Quantitative	Construction of structures in the Lakeshore portion of this exposure unit may contribute to incidental ingestion of seep sediment.
						Dermal	Quantitative	Construction of structures in the Lakeshore portion of this exposure unit may contribute to dermal contact with seep sediment.
	Surface water	Seep surface water	Site seeps	Construction worker	Adult (> 18 yrs)	Dermal	Quantitative	Construction of structures in the Lakeshore portion of this exposure unit may contribute to dermal contact with seep surface water.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface and subsurface soil (0-10 ft bgs)	Surface and subsurface soil	Surface and subsurface soil throughout Exposure Unit 3	Construction worker	Adult (> 18 yrs)	Ingestion	Quantitative	Construction and excavation in this exposure unit may contribute to incidental ingestion of surface soil.
						Dermal	Quantitative	Construction and excavation in this exposure unit may contribute to dermal contact with surface soil.
		Fugitive dust	Outdoor ambient air	Construction worker	Adult (> 18 yrs)	Inhalation	Quantitative	Construction activities could cause fugitive dust to become airborne, facilitating inhalation of Site constituents.
		Volatile emissions	Outdoor ambient air	Construction worker		Inhalation	Quantitative	Construction workers may be exposed to volatile emissions from Site soils during on-grade construction and/or excavation activities.
	Sediment (0-1 ft bgs)	Seep sediment	Site seeps	Construction worker	Adult (> 18 yrs)	Ingestion	Quantitative	Construction of structures in the Lakeshore portion of this exposure unit may contribute to incidental ingestion of seep sediment.
						Dermal	Quantitative	Construction of structures in the Lakeshore portion of this exposure unit may contribute to dermal contact with seep sediment.
	Surface water	Seep surface water	Site seeps	Construction worker	Adult (> 18 yrs)	Dermal	Quantitative	Construction of structures in the Lakeshore portion of this exposure unit may contribute to dermal contact with seep surface water.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface soil (0-2 ft bgs)	Surface soil	State fairgrounds parking area	State fairgrounds attendee	Adult, older child (12-18 yrs), and younger child (0-6 yrs)	Ingestion	Quantitative	Persons attending events at the state fairgrounds may incidentally ingest surface soil from the parking area.
						Dermal	Quantitative	Persons attending events at the state fairgrounds may have dermal contact with surface soil from the parking area.
				State fairgrounds maintenance worker	Adult (> 18 yrs)	Ingestion	Quantitative	Periodic maintenance occuring on the grounds may contribute to incidental ingestion of surface soil.
						Dermal	Quantitative	Periodic maintenance occuring on the grounds may contribute to dermal contact with surface soil.
		Fugitive dust	Outdoor ambient air	State fairgrounds attendee	Adult, older child (12-18 yrs), and younger child (0-6 yrs)	Inhalation	Quantitative	Persons attending events may be exposed to fugitive dust.
				State fairgrounds maintenance worker	Adult (> 18 yrs)	Inhalation	Quantitative	Maintenance workers may be exposed to fugitive dust.
		Volatile emissions	Outdoor ambient air	State fairgrounds attendee	Adult, older child (12-18 yrs), and younger child (0-6 yrs)	Inhalation	Quantitative	Persons attending events could be exposed to volatile emissions from Site soils.
				State fairgrounds maintenance worker	Adult (> 18 yrs)	Inhalation	Quantitative	Maintenance workers may be exposed to volatile emissions from Site soils.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Sediment (0-1 ft bgs)	Ditch and seep sediment	Site ditches	Ditch maintenance worker	Adult (> 18 yrs)	Ingestion	Quantitative	Periodic maintenance necessary to keep ditches functioning may contribute to incidental ingestion of ditch sediment.
						Dermal	Quantitative	Periodic maintenance necessary to keep ditches functioning may contribute to dermal contact with ditch sediment.
	Surface water	Ditch and seep water	Site ditches	Ditch maintenance worker	Adult (> 18 yrs)	Dermal	Quantitative	Periodic maintenance necessary to keep ditches functioning may contribute to dermal contact with standing ditch surface water.
						Inhalation	Qualitative	No default approach to model volatilization from surface water currently exists. A discussion will be added to the uncertainty section of the HHRA Report.
Current/Future	Surface soil (0-2 ft bgs)	Surface soil	Surface soil throughout Exposure Unit 6	Trespasser/ fisherperson	Adult (> 18 yrs)	Ingestion	Quantitative	Trespassers such as fisherpersons may visit the EU-6 to access Onondaga Lake and incidentally ingest surface soil. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.
						Dermal	Quantitative	Trespassers such as fisherpersons may visit the EU-6 to access Onondaga Lake and have dermal contact with surface soil. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
		Volatile emissions	Outdoor ambient air	Trespasser/ fisherperson	Adult (> 18 yrs)	Inhalation	Quantitative	The trespasser/fisherperson may be exposed to constituents volatilized from surface soil in this exposure area.
	Sediment (0-1 ft bgs)	Ditch A - South sediment	Ditch A - South	Trespasser/ fisherperson	Adult (> 18 yrs)	Dermal	Quantitative	Trespassers such as fisherpersons may visit Ditch A - South to access Onondaga Lake and have dermal contact with sediment. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.
		Seep sediment	Site seeps	Trespasser/ fisherperson	Adult (> 18 yrs)	Ingestion	Quantitative	Trespassers such as fisherpersons may visit the Lakeshore Area to access Onondaga Lake and incidentally ingest seep sediment. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.
						Dermal	Quantitative	Trespassers such as fisherpersons may visit the Lakeshore Area to access Onondaga Lake and have dermal contact with seep sediment. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Surface water	Ditch A - South surface water	Ditch A - South	Trespasser/ fisherperson	Adult (> 18 yrs)	Dermal	Quantitative	Trespassers such as fisherpersons may visit the Lakeshore Area to access Onondaga Lake and have dermal contact with Ditch A - South surface water. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.
		Seep surface water	Site seeps	Trespasser/ fisherperson	Adult (> 18 yrs)	Dermal	Quantitative	Trespassers such as fisherpersons may visit the Lakeshore Area to access Onondaga Lake and have dermal contact with seep surface water. Hazard and risks associated with the trespasser/fisherperson recreator scenario is protective of waterfowl hunters.
Current/Future	Shallow ground water (0-10 ft bgs)	Site wide shallow ground water	Utility or sewer excavations within EU-2	Utility/sewer worker	Adult (> 18 yrs)	Ingestion	None	Incidental ingestion of ground water is unlikely and considered *de minimis*.
						Dermal	Quantitative	Utility or sewer workers performing subsurface excavation activities may be exposed to and have dermal contact with ground water
Future	Shallow ground water (0-10 ft bgs)	Site wide shallow ground water	Construction excavations within EU-3	Construction worker	Adult (> 18 yrs)	Ingestion	None	Incidental ingestion of ground water is unlikely and considered *de minimis*.
						Dermal	Quantitative	Construction workers performing subsurface excavation activities may be exposed to and have dermal contact with ground water

Table 2
Selection of Exposure Pathways

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Ground water	Site wide drinking water*	Potable water sites	Resident	Child (0-6 yrs)	Ingestion	Quantitative	Child residents may ingest ground water during the course of normal activities, such as drinking potable water.
						Dermal	Quantitative	Child residents may have dermal contact with ground water during the course of normal activities, such as bathing/showering.
						Inhalation	Quantitative	Child residents may inhale ground water during the course of normal activities, such as bathing/showering.
					Adult (> 18 yrs)	Ingestion	Quantitative	Adult residents may ingest ground water during the course of normal activities, such as drinking potable water.
						Dermal	Quantitative	Adult residents may have dermal contact with ground water during the course of normal activities, such as bathing/showering.
						Inhalation	Quantitative	Adult residents may inhale ground water during the course of normal activities, such as bathing/showering.
	Shallow ground water (0-10 ft bgs)	Air	Indoor air - vapor intrusion within EU-2	Commercial/ industrial worker	Adult (> 18 yrs)	Inhalation[1]	Quantitative	Constituents in ground water also have the potenial to migrate to the occupational workspace. When sub-surface soil vapor data are unavailable, ground water data will be evaluated with respect to USEPA OSWER (2002) ground water to indoor air critieria.

Table 3
Summary of Chemicals of Concern and
Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-2 ft bgs)

Exposure Point	Chemical of Concern	Concentration Detected Average	Concentration Detected Maximum	Concentration Units	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Exposure Unit 3	Manganese	4.32E+02	5.10E+03	mg/kg	6.75E+02	mg/kg	95% C
	Nickel	1.92E+02	9.80E+03	mg/kg	8.08E+02	mg/kg	97.5% C

95% C = 95% Chebyshev (Mean, Sd) UCL

97.5% C = 97.5 % Chebyshev (Mean,Sd) UCL

Table 4
Non-Cancer Toxicity Data Summary

Pathway: Ingestion/Dermal

Chemicals of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Absorp. Efficiency (Dermal)	Adjusted RfD (Dermal)	Adj. Dermal RfD Units	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Dates of RfD
Manganese	Chronic	1.40E-01	mg/kg-day	0.04	5.60E-03	mg/kg-day	CNS	1	IRIS	2/1/2008
Nickel	Chronic	2.00E-02	mg/kg-day	4.00E-02	8.00E-04	mg/kg-day	Body Weight	300	IRIS	2/1/2008

Pathway: Inhalation

Chemicals of Concern		Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD (If available)	Inhalation RfD Units (If available)	Primary Target Organ	Combined Uncertainty /Modifying Factors	Sources of RfD Target Organ	Dates of RfC
Manganese		Chronic	5.00E-05	mg/m3	1.43E-05	mg/kg-day	CNS	1000	IRIS	1/22/2008
Nickel		Chronic	9.00E-05	mg/m3	2.57E-05	mg/kg-day	Respiratory	30	ATSDR	9/1/2005

CNS: Central Nerviou System

Sources:

Tier 1 - IRIS - United States Environmental Protection Agency (USEPA) Integrated Risk Information System (Available at: http://www.epa.gov/iris).

Tier 2 - PPRTV - USEPA Provisional Peer Reviewed Toxicity Values from the Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC).

Tier 3 - Tox values approved by Superfund Technical Support Center. ATSDR - Agency for Toxic Substances and Disease Registry Minimal Risk Levels (MRLs, Available at: http://www.atsdr.cdc.gov/mrls/index.html);

Table 5
Cancer Toxicity Data Summary

Pathway: Ingestion/ Dermal

Chemical of Concern	Oral Cancer Slope Factor	Units	Adjusted Cancer Slope Factor (for Dermal)	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date
Manganese	NA	NA	NA	NA	D	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline	Source	Date
Manganese	NA	NA	NA	NA	D	NA	NA
Nickel	2.60E-01	per mg/m3	9.10E-01	per mg-kg-day	A	CalEPA	4/29/2008

NA: Toxicity values are not available

Codes for Weight of Evidence: A - Human Carcinogen; B - Probable Human Carcinogen; C - Possible Human Carcinogen; D - Not Classifiable as to Human Carcinogenicity;

E - Evidence of Non-Carcinogenicity in Humans.

Sources:

Tier 1 - IRIS - United States Environmental Protection Agency (USEPA) Integrated Risk Information System (Available at: http://www.epa.gov/iris).

Tier 2 - PPRTV - USEPA Provisional Peer Reviewed Toxicity Values from the Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center.

Tier 3 - Tox values approved by Superfund Technical Support Center. ATSDR - Agency for Toxic Substances and Disease Registry Minimal Risk Levels (MRLs, Available at: http://www.atsdr.cdc.gov/mrls/index.html);

CALEPA - California Environmental Protection Agency toxicity criteria database (Available at: htp://www.oehha.ca.gov/risk/chemicalDB//index.asp);

HEAST - USEPA Health Effects Assessment Summary Tables from the USEPA STSC; Memo from Southerland. OSWER Directive 9285.7-75. USEPA (1993) Provisional Guidance for Quantitative Risk

NCEA - National Center for Environmental Assessment;USEPA (2003).

Assessment of Polycyclic Aromatic Hydrocarbons, EPA/600/R-93/089).

Table 6
Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Current/Future
Receptor Population: Trespasser/ATV Recreator
Receptor Age: Older Child

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Outdoor Air	Exposure Unit 3	Manganese	CNS		3		3
			Nickel	Respiratory		2		2
			Chemical Total					7
		Exposure Point Total						7

Total Nervous System Effects HI Across All Media = 3 E+00
Total Nasal/Respiratory Effects HI Across All Media = 4 E+00

Scenario Timeframe: Future
Receptor Population: Adult
Receptor Age: Construction Worker

Medium	Exposure Medium	Exposure Point	Chemical Of Concern	Primary target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Outdoor Air	Exposure Unit 3	Manganese	CNS		3		3
			Nickel	Respiratory		1		1
			Chemical Total					5
		Exposure Point Total						5

Total Nervous System Effects HI Across All Media = 3 E+00
Total Nasal/Respiratory Effects HI Across All Media = 1 E+00

Table 7 Wastebeds 1-8 Remediation Goals				
Parameter	Part 375 Protection of Groundwater[1]	Part 375 Restricted Residential[1]	Part 375 Commercial[1]	Part 375 Protection of Ecological Resources[1]
Volatile Organic Compounds (μg/kg)				
Acetone	50	100,000	500,000	2,200
Benzene	60	4,800	44,000	70,000
2-Butanone	120	100,000	500,000	100,000
Ethylbenzene	1,000	41,000	390,000	NS
Methylene Chloride	50	100,000	500,000	12,000
Toluene	700	100,000	500,000	36,000
Xylenes, M & P	1,600	100,000	500,000	260
Xylene, O	1,600	100,000	500,000	260
Xylenes, Total	1,600	100,000	500,000	260
Semivolatile Organic Compounds (μg/kg)				
Benzo(a)anthracene	1,000	1,000	5,600	NS
Benzo(a)pyrene	22,000	1,000	1,000	2,600
Benzo(b)fluoranthene	1,700	1,000	5,600	NS
Benzo(k) fluoranthene	1,700	3,900	56,000	NS
Chrysene	1,000	3,900	56,000	NS
Dibenzo(a,h)anthracene	1,000,000	330	560	NS
Dibenzofuran	210,000	59,000	350,000	NS
1,2-Dichlorobenzene	1,100	100,000	500,000	NS
Fluorene	386,000	100,000	500,000	30,000
Hexachlorobenzene	3,200	1,200	6,000	NS
Indeno(1,2,3-cd)pyrene	8,200	500	5,600	NS
2-Methylphenol	330	100,000	500,000	NS
4- Methylphenol	330	100,000	500,000	NS
Naphthalene	12,000	100,000	500,000	NS

Table 7 Wastebeds 1-8 Remediation Goals				
Parameter	Part 375 Protection of Groundwater[1]	Part 375 Restricted Residential[1]	Part 375 Commercial[1]	Part 375 Protection of Ecological Resources[1]
Phenol	330	100,000	500,000	30,000
Pesticides (µg/kg)				
Alpha-Chlordane	2,900	4,200	24,000	1,300
4,4'-DDD	14,000	13,000	92,000	3.3
4,4'-DDE	17,000	8,900	62,000	3.3
4,4'-DDT	136,000	7,900	47,000	3.3
Dieldrin	100	200	1,400	6
PCBs (µg/kg)				
Aroclor-1248	3,200	1,000	1,000	1,000
Aroclor -1254	3,200	1,000	1,000	1,000
Aroclor -1260	3,200	1,000	1,000	1,000
Inorganic Compounds (mg/kg)				
Arsenic	16	16	16	13
Barium	820	400	400	433
Cadmium	7.5	4.3	9.3	4
Chromium	NS	180	1,500	41
Copper	1,720	270	270	50
Cyanide	40	27	27	NS
Hexavalent Chromium	19	110	400	1
Lead	450	400	1,000	63
Manganese	2,000	2,000	10,000	1,600
Mercury	0.73	0.81	2.8	0.18
Nickel	130	310	310	30
Selenium	4	180	1,500	3.9
Silver	8.3	180	1,500	2

Table 7 Wastebeds 1-8 Remediation Goals				
Parameter	Part 375 Protection of Groundwater[1]	Part 375 Restricted Residential[1]	Part 375 Commercial[1]	Part 375 Protection of Ecological Resources[1]
Zinc	2,480	10,000	10,000	109

Notes:
1 - NYSDEC (2006) Part 375.6 Table 6.8 Soil Cleanup Objectives.
NS = Not developed for this parameter.

Source: O'Brien & Gere

TABLE 8 - POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS					
Medium/Location/ Action	**Citation**	**Requirements**	**Comments**	**Potential ARAR**	**Potential TBC**
Potential chemical-specific ARARs and TBCs					
Soil/fill material	6 NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives	Promulgated state regulation that provides guidance for soil cleanup objectives for various restricted property uses (industrial, commercial, restricted residential, and residential), for the protection of groundwater and ecological resources, and for unrestricted property use. Commercial use includes passive recreational use that refers to recreational uses with limited potential for soil contact, such as: (1) artificial surface fields; (2) outdoor tennis or basketball courts; (3) other paved recreational facilities used for roller hockey, roller skating, shuffle board, etc.; (4) outdoor pools; (5) indoor sports or recreational facilities; (6) golf courses; and (7) paved (raised) bike or walking paths (DER-10 (NYSDEC 2010)). Restricted residential includes active recreational use that refers to recreational activities with a reasonable potential for soil contact, such as: (1) designated picnic areas; (2) playgrounds; or (3) natural grass sports playing fields, including surrounding unpaved spectator areas (DER-10 (NYSDEC 2010)).	Soil cleanup objectives for restricted use (Restricted residential and commercial) are potentially relevant and appropriate to site soil/fill material for areas where reasonably anticipated future property use includes active recreational use and passive recreational use, respectively. Soil cleanup objectives for the protection of ecological resources are potentially relevant and appropriate to site soil/fill material for areas other than where conditions of the land (*e.g.* , paved, covered by impervious surfaces, buildings or other structures) preclude the existence of ecological resources. Soil cleanup objectives for the protection of groundwater may not be applicable, relevant or appropriate because migration of shallow/intermediate groundwater is currently being controlled, however, they are being considered for this FS.	Yes	
Potential location-specific ARARs and TBCs					
Construction of Buildings	NYSDOH's October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York	Guidance document that provides thresholds for indoor air and subslab soil vapor above which vapor mitigation is required.	Not currently applicable, because no buildings are present on the Site. Potentially applicable if future buildings are constructed at the Site.	No	Yes
Water Bodies	33 CFR 320 - 330	Regulatory policies and permit requirements for work affecting waters of the United States and navigable waterways.	Substantive, non-administrative requirements potentially applicable to work affecting Ninemile Creek or Onondaga Lake.	Yes	No
Wetlands	6 NYCRR 663 - Freshwater wetland permit requirements	Actions occurring in a designated freshwater wetland (within 100 ft) must be approved by NYSDEC or its designee. Activities occurring adjacent to freshwater wetlands must: be compatible with preservation, protection, and conservation of wetlands and benefits; result in no more than insubstantial degradation to or loss of any part of the wetland; and be compatible with public health and welfare.	Delineated wetlands at the site are on the eastern shore, and are not within the footprint of upland portions of the site to be addressed in the FS. However, substantive requirements are potentially applicable for activities being implemented in proximity of delineated wetlands at the site.	Yes	No
	Clean Water Act Section 404 33 CFR Parts 320 - 330	Regulatory policies and permit requirements for work affecting waters of the United States, including wetlands.	Delineated wetlands at the site are on the eastern shore, and are not within the footprint of upland portions of the site to be addressed in the FS. However, substantive requirements are potentially applicable for activities being implemented in proximity of delineated wetlands at the site.	Yes	No
	Clean Water Act Section 404 40 CFR Parts 230-231	Provides for restoration and maintenance of integrity of waters of the United States, including wetlands, through the control of dredged or fill material discharge.	Delineated wetlands at the site are on the eastern shore, and are not within the footprint of upland portions of the site to be addressed in the FS. However, substantive requirements are potentially applicable for activities being implemented in proximity of delineated wetlands at the site.	Yes	No
	Executive Order 11990 - Protection of Wetlands	Executive order requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or loss of wetlands if a practical alternative exists.	Delineated wetlands at the site are on the eastern shore, and are not within the footprint of upland portions of the site to be addressed in the FS. However, potentially applicable for activities being implemented in proximity of delineated wetlands at the site.	Yes	No
Wetlands & Floodplains	Policy on Floodplains and Wetland Assessments for CERCLA Actions (OSWER Directive 9280.0-2; 1985)	Policy and guidance requiring Superfund actions to meet substantive requirements of Executive Orders 11988 and 11990. Describes requirements for floodplain assessment during remedial action planning.	Not applicable or relevant and appropriate if during OU-1 remedy design it is confirmed that all OU-1 remedial activities will occur outside the 100-year and 500-year floodplains as defined by FEMA. A floodplain and wetland assessment was completed for the shorelines of the site. If an additional floodplain assessment is required for the OU-1 remedy area based on remedial design findings, a floodplain assessment would be completed. The assessment would document a description of the proposed OU-1 remedial actions and other remedial alternatives considered, the effects of the proposed action and other remedial alternatives on the floodplain, and measures to mitigate potential impacts to the floodplain. Upland portions of the site addressed in the FS are not within the 100-year floodplain or delineated wetlands at the site.	No	Yes
	Policy on Flood Plains and Wetland Assessments for CERCLA Actions (OSWER Directive 9280.0-02)	Federal guidance that provides requirements for wetlands and floodplain assessments.	Not applicable or relevant and appropriate if during OU-1 remedy design it is confirmed that all OU-1 remedial activities will occur outside the 100-year and 500-year floodplains as defined by FEMA. A floodplain and wetland assessment was completed for the shorelines of the site. If an additional floodplain assessment is required for the OU-1 remedy area based on remedial design findings, a floodplain assessment would be completed consistent with OSWER Directive 9280.0-02). Upland portions of the site addressed in the FS are not within the 100-year floodplain or delineated wetlands at the site.	No	No

TABLE 8 - POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS					
Medium/Location/ Action	**Citation**	**Requirements**	**Comments**	**Potential ARAR**	**Potential TBC**
Potential location-specific ARARs and TBCs (continued)					
Floodplains	6 NYCRR 373-2.2 - Location standards for hazardous waste treatment, storage, and disposal facilities -100-yr floodplain	Hazardous waste treatment, storage, or disposal facilities located in a 100-yr floodplain must be designed, constructed, operated and maintained to prevent washout of hazardous waste during a 100-yr flood.	Not applicable or relevant and appropriate. Wetland and 100-yr floodplain are not present within upland portions of the site to be addressed in the FS. Further, no hazardous waste treatment, storage, or disposal facilities are planned to be located on site.	No	No
	40 CFR Part 264.18(b) - Location Standards - Floodplains	Hazardous waste treatment, storage, or disposal facilities located in a 100-yr floodplain must be designed, constructed, operated and maintained to prevent washout of hazardous waste during a 100-yr flood.	Not applicable or relevant and appropriate. Wetland and floodplain are not present within upland portions of the site to be addressed in the FS. Further, no hazardous waste treatment, storage, or disposal facilities are planned to be located on site.	No	No
	Executive Order 11988 - Floodplain Management	USEPA is required to conduct activities to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupation or modification of floodplains. The procedures also require USEPA to avoid direct or indirect support of floodplain development wherever there are practicable alternatives and minimize potential harm to floodplains when there are no practicable alternatives.	Not applicable or relevant and appropriate if during OU-1 remedy design it is confirmed that all OU-1 remedial activities will occur outside the 100-year and 500-year floodplains as defined by FEMA and wetlands. Wetland and floodplain are not believed to be present within upland portions of the site to be addressed in the FS. If, during design, portions of the OU-1 remedy are found to be within the floodplain or a wetland, remedial activities will be conducted in a manner so as to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupation or modification of floodplains.	No	No
	6 NYCRR 500 - Floodplain Management Regulations Development Permits	Promulgated state regulations providing permit requirements for development in areas of special flood hazard (floodplain within a community subject to a one percent or greater chance of flooding in any given year).	Not applicable or relevant and appropriate if during OU-1 remedy design it is confirmed that all OU-1 remedial activities will occur outside the 100-year and 500-year floodplains as defined by FEMA and wetlands. Wetland and floodplain are not believed to be present within upland portions of the site to be addressed in the FS. If, during design, portions of the OU-1 remedy are found to be within the floodplain or a wetland, remedial activities would be conducted in accordance with the statutory requirements of flood-associated permits.	No	No
	Town of Geddes Flood Protection Ordinance	Permit requirements for work in areas of special flood hazard.	Not applicable or relevant and appropriate if during OU-1 remedy design it is confirmed that all OU-1 remedial activities will occur outside the 100-year and 500-year floodplains as defined by FEMA and wetlands. Floodplain is not believed to be present within upland portions of the site to be addressed in the FS. If, during design, portions of the OU-1 remedy are found to be within the floodplain or a wetland, remedial activities would be conducted in accordance with the statutory requirements of Town of Geddes Flood Protection Ordinances.	No	No
Within 61 meters (200 ft) of a fault displaced in Holocene time	40 CFR Part 264.18(a) - Location Standards - Seismic considerations	New treatment, storage, or disposal of hazardous waste is not allowed.	Not applicable or relevant and appropriate. Site is not located within 200 ft of a fault displaced in Holocene time, as listed in 40 CFR 264 Appendix VI. None listed in New York State.	No	No
Within salt dome or bed formation, underground mine, or cave	40 CFR Part 264.18 (c) - Location standards; salt dome formations, salt bed formations, underground mines and caves.	Placement of non-containerized or bulk liquid hazardous waste is not allowed.	Not applicable or relevant and appropriate. No salt dome formations, salt bed formations, underground mines or caves present at site.	No	No
Habitat of an endangered or threatened species	6 NYCRR 182	Promulgated state regulation that provides requirements to minimize damage to habitat of an endangered species.	Not applicable or relevant and appropriate. No endangered or threatened wildlife species, rare plants or significant habitats were identified at the site. One threatened plant within 2 miles of site on north shore of Onondaga Lake not anticipated to be impacted by site activities.	No	No
	Endangered Species Act	Provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction.	Not applicable or relevant and appropriate. No endangered or threatened wildlife species, rare plants or significant habitats were identified at the site. One threatened plant within 2 miles of site on north shore of Onondaga Lake not anticipated to be impacted by site activities.	No	No
	50 CFR Part 17 - Endangered and Threatened Wildlife and Plants and 50 CFR Part 402 - Interagency Cooperation	Promulgated federal regulation that requires that federal agencies ensure authorized, funded, or executed actions will not destroy or have adverse modification of critical habitat.	Not applicable or relevant and appropriate. No endangered or threatened wildlife species, rare plants or significant habitats were identified at the site. One threatened plant within 2 miles of site on north shore of Onondaga Lake not anticipated to be impacted by site activities.	No	No

TABLE 8 - POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS					
Medium/Location/ Action	**Citation**	**Requirements**	**Comments**	**Potential ARAR**	**Potential TBC**
Potential location-specific ARARs and TBCs (continued)					
Historical property or district	National Historic Preservation Act 36 CFR 800- Preservation of Historic Properties Owned by a Federal Agency	Remedial actions are required to account for the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register of Historic Places.	Potentially applicable. A draft Phase 1 assessment identified the potential for prehistoric and historic resources in and in the vicinity of the Site.	Yes	No
	National Historic Preservation Act 36 CFR Part 65 - National Historic Landmarks Program	Promulgated federal regulation requiring that actions must be taken to preserve and recover historical/archeological artifacts found.	Potentially applicable. A draft Phase 1 assessment identified the potential for prehistoric and historic resources in and in the vicinity of the Site.	Yes	No
	New York State Historic Preservation Act of 1980 9 NYCRR Parts 426 - 428	State law and regulations requiring the protection of historic, architectural, archeological and cultural property.	Potentially applicable. A draft Phase 1 assessment identified the potential for prehistoric and historic resources in and in the vicinity of the Site.	Yes	No
Wilderness area	Wilderness Act 50 CFR Part 35 - Wilderness Preservation and Management	Provides for protection of federally-owned designated wilderness areas.	Not applicable or relevant and appropriate. Site not located in wilderness area.	No	No
Wild, scenic, or recreational river	Wild and Scenic Rivers Act	Provides for protection of areas specified as wild, scenic, or recreational.	Not applicable or relevant and appropriate. Site not located near wild, scenic or recreational river.	No	No
Coastal zone	Coastal Zone Management Act	Requires activities be conducted consistent with approved State management programs.	Not applicable or relevant and appropriate. Site not located in coastal zone.	No	No
Coastal barrier	Coastal Barrier Resources Act	Prohibits any new Federal expenditure within the Coastal Barrier Resource System.	Not applicable or relevant and appropriate. Site not located in coastal barrier.	No	No
Protection of waters	33 U.S.C. 1341 - Clean Water Act Section 401, State Water Quality Certification Program	States have the authority to veto or place conditions on federally permitted activities that may result in water pollution.	Potentially applicable to site.	Yes	Yes
Potential action-specific ARARs and TBCs					
Institutional controls	NYSDEC DER-33 Institutional Controls: A Guide to Drafting and Recording Institutional Controls, December 2010	Technical guidance document that provides guidelines for proper development and recording of institutional controls as part of a site remedial program.	Potentially applicable TBC when institutional controls are implemented as a component of the selected remedy.	No	Yes
Cover systems	NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, May 2010	Technical guidance document that provides guidelines for cover thicknesses as they relate to property use in areas where exposed surface soil exceeds NYCRR Part 375 soil cleanup objectives. Specifically, where the exposed surface soil at the site exceeds the applicable SCO for protection of human health and/or ecological resources, the soil cover for restricted residential use, is to be two feet; for commercial or industrial use, is to be one foot; or when an ecological resource has been identified is to be a minimum of two feet; and when such a concern is identified by DEC, consideration should be given to supplementing the demarcation layer to serve as an impediment to burrowing.	Potentially applicable TBC for cover alternatives.	No	Yes
Landfilling of solid wastes	40 CFR Part 257 - Criteria for Classification of Solid Waste Disposal Facilities and Practices	Promulgated federal regulation that provides criteria for solid waste disposal facilities to protect health and the environment.	Landfilling of wastes may be applicable for the site.	Yes	No
Generation and management of solid waste	6 NYCRR 360 - Solid Waste Management Facilities	Promulgated state regulation that provides requirements for management of solid wastes, including disposal and closure of disposal facilities.	Potentially applicable to alternatives including disposal of residuals generated by treatment processes as well as capping alternatives.	Yes	No

TABLE 8 - POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS					
Medium/Location/ Action	**Citation**	**Requirements**	**Comments**	**Potential ARAR**	**Potential TBC**
Potential action-specific ARARs and TBCs (continued)					
Land disposal	6 NYCRR 376 - Land Disposal Restrictions	Promulgated federal and state regulations that provide treatment standards to be met prior to land disposal of hazardous wastes.	Potentially applicable.	Yes	No
	40 CFR Part 268 - Land Disposal Restrictions				
	62 CFR 25997 - Phase IV Supplemental Proposal on Land Disposal of Mineral Processing Wastes				
Beneficial use	6 NYCRR 360 - General Provisions, Beneficial Use	Promulgated federal and state regulations that provide criteria for beneficial use and recycling of solids wastes and soils. Provisions for case-specific beneficial use and recycling are also identified.	Potentially applicable to alternatives including beneficial use of excavated soil/fill material.	Yes	No
	60 CFR 261 - Solid Waste Recycling/Reuse				
Green remediation	NYSDEC DER-31 Green Remediation Program Policy, January 2011	State and federal technical guidance documents that provide guidelines for the development of site remediation strategies in a manner that minimizes environmental impacts and applies green remediation concepts (e.*g.,* reduction in green house gas emissions, energy consumption and resource use, promotion of recycling of materials and conservations of water, land and habitat).	Potentially applicable TBC	No	Yes
	Superfund Green Remediation Strategy, September 2010				
General excavation	6 NYCRR 257 - Air Quality Standards	Promulgated state regulation that provides specific limits on generation of SO_2, particulates, CO_2, photochemical oxidants, hydrocarbons (non-methane), NO_2, fluorides, beryllium and H2S from point sources.	No air emissions sources anticipated as part of alternatives.	No	No
	40 CFR Part 50.1 - 50.12 - National Ambient Air Quality Standards	Promulgated federal regulation that provides air quality standards for pollutants considered harmful to public health and the environment. The six principle pollutants are carbon monoxide, lead, nitrogen dioxide, particulates, ozone, and sulfur oxides.	Potentially applicable to alternatives during which dust generation may result, such as during earth moving, grading, and excavation.	Yes	No
	NYS TAGM 4031 - Dust Suppressing and Particle Monitoring at Inactive Hazardous Waste Disposal Sites	State guidance document that provides limitations on dust emissions.	To be considered material where more stringent than air-related ARARs.	No	Yes
Construction	29 CFR Part 1910.120 - Occupational Safety and Health Standards - Hazardous Waste Operations and Emergency Response	Promulgated federal regulation requiring that remedial activities must be in accordance with applicable OSHA requirements.	Potentially applicable for construction activities.	Yes	No
	29 CFR Part 1926 - Safety and Health Regulations for Construction	Promulgated federal regulation requiring that remedial construction activities must be in accordance with applicable OSHA requirements.	Potentially applicable for construction activities.	Yes	No
Transportation	6 NYCRR 364 - Waste Transporter Permits	Promulgated state regulation requiring that hazardous waste transport must be conducted by a hauler permitted under 6 NYCRR 364.	Potentially applicable.	Yes	No
	49 CFR 107, 171-174 and 177-179 - Department of Transportation Regulations	Promulgated federal regulation requiring that hazardous waste transport to offsite disposal facilities must be conducted in accordance with applicable DOT requirements.	Potentially applicable.	Yes	No

Notes:

ARARs - Applicable or Relevant and Appropriate Requirements
CERCLA - Comprehensive Environmental Response, Compensation, and Liability
Act CFR - Code of Federal Regulations
DOT - Department of Transportation
FEMA - Federal Emergency Management Agency
FS - Feasibility Study
FT - Feet or Foot
IRM - Interim Remedial Measure
NYCRR - New York Code of Rules and Regulations
NYSDEC - New York State Department of Environmental Conservation
NYSDOH - New York State Department of Environmental Conservation
OSHA - Occupational Safety and Health Administration
OSWER - Office of Solid Waste and Emergency Response
OU - Operable Unit
RI - Remedial Investigation
SCO - Soil Cleanup Objectives
SPDES - State Pollutant Discharge Elimination System
SVOCs - Semi Volatile Organic Compounds
TAGM - Technical and Administrative Guidance Memorandum
TBC - To be Considered
TOGS - Technical and Operational Guidance Series
USC - United States Code
USEPA or EPA - United States Environmental Protection Agency
USFWS - United States Fish and Wildlife Service
Shaded cells - not identified as Potential ARARs or TBCs

TABLE 9 - SELECTED REMEDY (ALTERNATIVE 3 ENHANCED VEGETATED COVER SYSTEM) COST ESTIMATE

COST ESTIMATE SUMMARY

Site:	Honeywell Wastebeds 1 - 8	171	Acres	
Location:	Geddes, NY	8	Construction Seasons	
Phase:	Feasibility Study			
Base Year:	2014			

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST	NOTES
Direct Capital Costs					
General Conditions	WK	250	$9,500	$2,375,000	Trailer, fuel, small tools, consumables and safety
Mobilization	LS	8	$54,000	$432,000	One per construction season
Air Monitoring	WK	168	$7,500	$1,260,000	Active construction periods only
Surveys	WK	168	$3,000	$504,000	Active construction periods only
Irrigation	WK	32	$5,000	$160,000	Germination periods only/ 4 wks per year
Environmental Easement	LS	1	$30,000	$30,000	
Site Management Plan	LS	1	$50,000	$50,000	
Site Preparation					
Access Roadways	LF	3,000	$20	$60,000	For currently inaccessible areas only
Clearing and Grubbing	AC	66	$3,200	$211,200	2-ft and 1-ft Vegetative cover areas
Rough Grading	AC	95	$800	$76,000	
Mixing Area	EA	3	$32,000	$96,000	50-ft by 50-ft
QA/QC					
Materials QA/QC Testing - Topsoil	EA	132	$230	$30,314	1/500 cy of imported materials
Materials QA/QC Testing - Fill and Stone	EA	287	$70	$20,104	1/500 cy of imported materials
Erosion and Sediment Control	LF	145,000	$2.75	$398,750	Reinforced silt fence
Structural Soil Cover - 1-ft					*Assume 19 acres total parking and travel lanes*
Seeding	AC	14.0	$13,000	$182,000	Modified old field successional with fertilizer and hydromulch
Structural Stone - 1-ft thickness	CY	22,700	$30	$681,000	NYSDOT Type 3A Stone
Topsoil	CY	4,550	$28	$127,400	20% by volume of 1-ft thickness
Structural Soil Mixing	CY	27,250	$6	$163,500	Mechanically mix stone and topsoil by loader/excavator
Structural Soil Placement	CY	22,700	$8	$181,600	Includes placement and compaction
Geogrid	SY	24,000	$3.25	$78,000	Placed beneath travel areas only
Travel Lanes	CY	8,000	$28	$224,000	12-inches Crusher Run gravel, Geogrid; 15-ft width; approx 4.6 acres
Vegetative Soil Cover, 2-ft					*Assume 27 acres total*
Place Topsoil to 6-inch depth	CY	21,800	$45	$981,000	Placement by conventional equipment in 6-inch lifts
Place Imported Fill to 18-inch depth	CY	65,300	$32	$2,089,600	Placement by conventional equipment in 6-inch lifts
Seeding	AC	27	$13,000	$351,000	Modified old field successional with fertilizer and hydromulch
Vegetative Soil Cover, 1.5-foot					*Assume 10 acres total*
Place Topsoil to 6-inch depth	CY	8,050	$45	$362,250	Placement by conventional equipment in 6-inch lifts
Place Imported Fill to 12-inch depth	CY	16,100	$32	$515,200	Placement by conventional equipment in 6-inch lifts
Seeding	AC	10	$13,000	$130,000	Modified old field successional with fertilizer and hydromulch
Vegetative Soil Cover, 1-foot					*Assume 39 acres total*
Place Topsoil to 6-inch depth	CY	31,500	$45	$1,417,500	Placement by conventional equipment in 6-inch lifts
Place Imported Fill to 6-inch depth	CY	31,500	$32	$1,008,000	Placement by conventional equipment in 6-inch lifts
Seeding	AC	39	$13,000	$507,000	Modified old field successional with fertilizer and hydromulch
Vegetative Enhancement, 4-inches					*Assume 76 acres total*
Hydromulch installation	CY	40,900	$42	$1,717,800	Mulch/Seed placement by blown-in methods
Seeding	AC	76	$3,000	$228,000	Raw seed cost only; installed with solid media.
			SUBTOTAL (rounded):	**$16,650,000**	

TABLE 9 - SELECTED REMEDY (ALTERNATIVE 3 ENHANCED VEGETATED COVER SYSTEM) COST ESTIMATE

COST ESTIMATE SUMMARY

Site:	Honeywell Wastebeds 1 - 8	171	Acres
Location:	Geddes, NY	8	Construction Seasons
Phase:	Feasibility Study		
Base Year:	2014		

ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	ESTIMATED COST		NOTES
				TOTAL DIRECT CAPITAL COST (rounded):	**$16,650,000**	
				ENGINEERING/MANAGMENT, CONSTRUCTION OVERSIGHT, OBG OH&P	**$3,163,500**	6%, 8%, and 5% respectively
				CONTINGENCY (15%)	**$2,497,500**	Scope Contingency
Annual Operation and Maintenance Costs						
Annual						
Cover inspection - vegetated covers	MH	128	$120	$15,360		Assumes 2 scientists/engineers, 4 days, 8 hours/day; Twice annually
Reporting	EA	1	$10,000	$10,000		
Years 1-5						
Vegetation maintenance	AC	16.6	$3,000	$49,800		Spot seeding; 10% of all areas annually
Soil Cover maintenance and incidental repairs	AC	76	$225	$17,100		Topsoil repair, 5 cy per acre annually
Vegetative enhancement maintenance/repair	AC	0.8	$25,600	$19,456		Reinstallation over eroded areas; 4-inches of hydromulch over 1% enhanced areas annually
Structural cover maintenance/repair	AC	14.0	$1,100	$15,400		Spot stone fill 10 cy per acre annually; regrade/reseed 10% annually
Structural cover travel lane repair	AC	0.10	$4,600	$460		Resurface (1-inch crushed stone) and regrade travel lanes; 10% annually
Years 6-30						
Cover inspection - veg. covers and Int. IRM	MH	224	$120	$26,880		Assumes 2 scientists/engineers, 7 days, 8 hours/day; Twice annually
Vegetation Maintenance	AC	1.7	$3,000	$4,980		Spot seeding; 1% of all areas annually
Soil Cover maintenance and incidental repairs	AC	76	$225	$17,100		Topsoil repair, 5 cy per acre annually
Vegetative enhancement maintenance/repair	AC	0.8	$25,600	$19,456		Reinstallation over eroded areas; 4-inches of hydromulch over 1% enhanced areas annually
Structural Cover maintenance/repair	AC	14.0	$1,100	$15,400		Spot stone fill 10 cy per acre annually; regrade/reseed 10% annually
Structural Cover travel lane repair	AC	0.10	$4,600	$460		Resurface (1-inch crushed stone) and regrade travel lanes; 10% annually
Spot Repair of Integrated IRM covers	SF	31,365	$0.12	$3,764		5% of cover annually; years 1-5 carried in 2010 FFS
Years 5, 10, 15, 20, 25, 30						
Five Year Review	EA	1	$15,000	$15,000		
Maintenance of Integrated IRM paths	SY	57,525	$10	$575,250		Place and grade 6-inch resurface; 20% of Total Area; commencing Yr 10

Present Worth Analysis Years (1-30)		Discount Factor	**Present Worth ($)**	
Cost Type	Cost	Df=7	**(rounded)**	
Capital Cost - Year 0	22,310,000	$0.799	**$17,820,000**	Phased construction. Assumed over 8 construction seasons; average discount years 0-7
Annual O&M - Years 1-5	127,576	$0.820	**$520,000**	Average discount factor for years 1-5
Annual O&M - Years 6-30	98,040	$0.332	**$810,000**	Average discount factor for years 6-30
Periodic O&M - Years 5, 10, 15, 20, 25, 30	15,000	$0.360	**$32,000**	Average discount factor for years 5, 10, 15, 20, 25 and 30
Periodic O&M - Years 10, 15, 20, 25, 30	575,250	$0.289	**$850,000**	Average discount factor for years 10, 15, 20, 25 and 30
		TOTAL PRESENT WORTH ESTIMATED ALTERNATIVE COST (rounded):	**$20,000,000**	