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**Final Sediment Demonstration of  
Compliance and Maintenance Plan**

W.R. Grace Superfund Site  
Acton-Concord, Massachusetts

April 2012



DRAFT

**Final Sediment Demonstration  
of Compliance and  
Maintenance Plan**

W.R. Grace Superfund Site  
Acton-Concord, Massachusetts

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Date:  
April 2012



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Infrastructure · Water · Environment · Buildings

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INDUSTRIAL

Subject:

*Final Sediment Demonstration of Compliance and Maintenance Plan* and  
Responses to USEPA Comments regarding the *Draft Sediment Demonstration of  
Compliance and Maintenance Plan*, dated November 2011  
W.R. Grace Superfund Site, Acton, Massachusetts

Date:

April 10, 2012

Contact:

Jeffrey S. Holden

Dear Mr. Golden and Ms. McWeeney:

Phone:

860.533.9906

On behalf of Remedium Group, Inc., enclosed please find the *Final Sediment  
Demonstration of Compliance and Maintenance Plan (SDCMP)* for the referenced  
site. The SDCMP describes how compliance has been demonstrated with regards  
the sediment cleanup up levels and sediment Applicable, Relevant and Appropriate  
Requirements, as defined in the *(100%) Sediment Remedial Design Report*  
(ARCADIS 2011). The purpose of the SDCMP is to ensure the long-term  
protectiveness and effectiveness of the sediment remedial actions in Sinking Pond  
and the North Lagoon Wetlands.

Email:

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Our ref:

B0077208.0000

Attached to this letter are responses to the USEPA comments regarding the  
November 2011 *Draft Sediment Demonstration of Compliance and Maintenance  
Plan*, which were provided in a letter to **de maximis, inc.** dated February 27, 2012.

As required by Section IX of the SOW, three copies of the *SDCMP* are being  
provided to the USEPA and one copy (electronic only) to the Massachusetts  
Department of Environmental Protection. An electronic version (Word file) of the text  
has been separately submitted to the USEPA.

Imagine the result

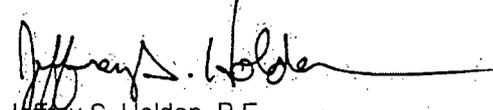
ARCADIS

Mr. Derrick Golden  
Ms. Jennifer McWeeney  
April 10, 2012

Please feel free to contact me at 860.533.9906 or Mr. Thor Helgason of *de maximis, inc.* (781.642.8775) with any questions regarding this submittal.

Sincerely,

ARCADIS U.S., Inc.



Jeffrey S. Holden, P.E.  
Principal Engineer

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(\* electronic copy only)

## RESPONSES TO USEPA COMMENTS ON THE DRAFT SEDIMENT DEMONSTRATION OF COMPLIANCE AND MAINTENANCE PLAN

### SPECIFIC COMMENTS

**Comment #1 – Section 3.1.1, Page 10, first paragraph.** *The proposed general approach for vegetative monitoring is acceptable however the monitoring could potentially miss large areas not meeting the performance standards. In addition to the few detailed data plots proposed in each area, please add to the monitoring a general visual inspection of the restored wetland to identify portions of areas greater than 50 square feet that do not exhibit 80% or greater cover (see comment on second bullet, below). In addition, please include photo-documentation of the restored wetland areas from fixed photo locations in both the North Lagoon Wetland and Sinking Pond.*

**Response:** The SDCMP has been revised to indicate that, in addition to monitoring quadrats, the inspections will include a more general review of the area to identify areas greater than 50 square feet that do not exhibit at least 80% ground cover.

**Comment #2 – Section 3.1.1, Page 10, first bullet.** *In accordance with Part 3.08(C) of the Final (100%) Sediment Remedial Design Report, Specification Section 32 72 00 -Site Restoration (SRDR; ARCADIS, March 14, 2011), all planted trees and shrubs are warranted for 1 year, and should be replaced with the same species and size plant. After the first year, the 85% survivorship, based on the total number of trees planted, can be used to determine the need to replace trees and shrubs. Please revise the first bullet to incorporate this information.*

**Response:** To address this comment (and related comments below), the SDCMP has been revised to include a new Section 3.2 that describes the maintenance activities that will be performed to facilitate achievement of the established performance standards. Please note that the performance standards for vegetation were established in Section 5.1 of the 100% Design Report, and are applicable at the completion of the monitoring period. The specification in Part 3.08(B) of Section 32 72 00 established a more stringent standard for the purpose of the contract between W.R. Grace and the Contractor, and applies only to the first growing season following completion of the work. This more stringent requirement of the Contract (i.e., requiring the Contractor to reseed any areas greater than 50 square feet where 80% ground cover was not established) was intended to increase the likelihood of meeting the overall 80% groundcover requirement at the completion of the monitoring period, and was not intended to supersede the performance standards established in Section 5.1 of the design report.

**Comment #3 – Section 3.1.1, Page 10, second bullet.** *Part 3.08(B) of Section 32 72 00 of the SRDR indicated that in addition to achieving 80% cover by non-invasive species overall, areas greater than 50 square feet that do not exhibit 80% or greater cover must be reseeded. Please revise the second bullet to incorporate this information.*

# ARCADIS

**Response:** The SDCMP has been revised to address this comment consistent with the response to Comment #2 above.

**Comment #4 – Section 3.1.1, Page 11, first bullet at top of the page.** Part 3.08(B) of Section 32 72 00 of the SRDR indicated that in addition to achieving 80% cover by non-invasive species overall, areas or portions of areas greater than 50 square feet that do not exhibit 80% or greater cover must be reseeded. Please revise the first bullet to incorporate this information.

**Response:** The SDCMP has been revised to address this comment consistent with the response to Comment #2 above.

**Comment #5 – Section 3.1.1, Page 11. Add a bullet.** Part 3.08(E) of Section 32 72 00 of the SRDR also called for the control of invasive species. Please add a bullet indicating the maintenance responsibilities for control of invasive species in accordance with the specification.

**Response:** A performance standard for control of invasive species was added to Section 3.1.1 and 3.2 of the SDCMP (see also the response to Comment #2 above).

**Comment #6 – Section 3.1.2, Page 12, first bullet.** In accordance with Part 3.08(C) of Section 32 72 00 of the SRDR, all planted trees and shrubs are warranted for 1 year, and should be replaced with the same species and size plant. After the first year, the 85% survivorship, based on the total number of trees planted, can be used to determine the need to replace trees and shrubs. Please revise the first bullet to incorporate this information.

**Response:** The SDCMP has been revised to address this comment consistent with the response to Comment #2 above.

**Comment #7 – Section 3.1.2, Page 12, second bullet.** Part 3.08(B) of Section 32 72 00 of the SRDR indicated that in addition to achieving 80% cover by non-invasive species over all of the seeded areas of the site, areas greater than 50 square feet that do not exhibit 80% or greater cover must be reseeded. Please revise the second bullet to incorporate this information.

**Response:** The SDCMP has been revised to address this comment consistent with the response to Comment #2 above.

**Comment #8 – Section 3.1.2, Page 12. Additional bullet.** Part 3.08(E) of Section 32 72 00 of the SRDR also called for the control of invasive species. Please add a bullet indicating the maintenance responsibilities for control of invasive species in accordance with the specification.

# ARCADIS

**Response:** Section 3.1.2 applies to upland areas. The control of hydrophytes, as discussed in Section 5.1 of the 100% Design Report, applies to wetland areas only.

**Comment #9 – Section 3.2.1, Page 14.** *This paragraph states that the samples collected from the North Lagoon Wetland in support of the next (2014) Five Year Review will be compared to the cleanup levels and the range of concentrations detected in the backfill soil materials. Please clarify that the comparison of the sediment data to the cleanup levels will be through the calculation of a 95 percent upper confidence level (95% UCL) of the mean of the 15 samples as this is the agreed-upon metric used to determine compliance with cleanup levels.*

**Response:** Comparison of the sediment analytical data to the cleanup levels will be made by calculating the 95% UCL of the mean for the arsenic and manganese datasets using USEPA's ProUCL software. The resulting values will be compared to the assumed backfill concentrations that were used during the remedial design (i.e., 20 and 300 mg/kg arsenic and manganese, respectively, based on MassDEP's published background values). If the calculated 95% UCL values for these constituents are at or below these previously assumed concentrations, it can be concluded that the design basis remains valid and the cleanup goals continue to be met. In the unanticipated event that the UCL values for either constituent exceeds the assumed values, the original design calculations could be revisited by substituting the new 95% UCL values in place of the previously assumed values to assess whether the area-wide cleanup levels are met using the revised values. In consideration of this approach, the comparison to detected backfill concentrations is unnecessary and has been eliminated from the SDCMP.

**Comment #10 – Section 3.2.2, Page 15, 1st full paragraph; Figure 2.** *Five sediment samples are planned for collection from the human accessible areas of Sinking Pond in support of the next Five Year Review. Though this paragraph states that the data will be evaluated using ProUCL to determine the 95% UCL of the mean and the calculated level compared to the arsenic cleanup goal of 42 mg/kg, it is unlikely that ProUCL will be able to provide a 95% UCL that is less than the maximum detected concentration using only 5 data points. ProUCL typically requires 8 to 10 samples in order to calculate a 95% UCL. Additional data collection from the human accessible areas of the pond is necessary to demonstrate that the 95% UCL of the data is less than 42 mg/kg. Therefore 3 to 5 additional samples from the human accessible areas will be needed in order to achieve the stated goal.*

**Response:** A total of 20 sediment samples will be collected from Sinking Pond in support of the Five Year Review, including an additional five sediment samples within the human accessible areas of Sinking Pond (i.e., total of 10 samples within this portion). This comment has been addressed in Section 3.3.2 (note new section number) and Figure 2 of the SDCMP.

# ARCADIS

**Comment #11 – Section 4.3, Page 17, 2nd paragraph.** *This paragraph proposes a due date of July 31, 2014 for submission of a data report on sampling to be performed to support the next Five Year Review. EPA needs to have the Five Year Review fully drafted no later than the end of July to meet a signature date of September 30, 2014, allowing time for EPA internal review/revisions as well as MassDEP review of the draft document. EPA therefore requests that the data report be submitted no later than June 30, 2014.*

**Response:** The SDCMP has been revised accordingly.

**Comment #12 – Figure 4.** *All of the monitoring locations within the North Lagoon Wetland are in the center of the wetland. In order to give a better characterization of the success of the vegetative restoration, plots need to be located along transects across the wetlands. See also comment #1, regarding the limited number of plots proposed to characterize the vegetation.*

**Response:** Within the Sedge Marsh, the two monitoring locations were revised along one transect across the marsh (perpendicular to flow), with one quadrat in the approximate center and one quadrat near the edge of the marsh. The monitoring locations within the Wooded Swamp (including the channel) were revised to be more spatially distributed along three transects, which include quadrants within the center and along the edges of the Wooded Swamp. Figure 4 has been revised accordingly.

**Comment #13 – Figure 5.** *There is no aquatic vegetation monitoring locations shown and there is no monitoring proposed in the inlet area of Sinking Pond. Please add monitoring quadrats to the inlet area, as well as along the elevations of the pond corresponding to the BVW restoration area.*

**Response:** Figure 5 did include three quadrats within the BVW area, but did not include a quadrat where aquatic vegetation is expected to occur in the Inlet. To maintain the target quadrat frequency of 10 per acre (consistent with Section 3.1.1 of the SDCMP and Section 5 of the 100% Design Report), one of the upland points was relocated to the central portion of the Inlet. The revised distribution represents the approximate acreage of each habitat type indicated on the legend on Figure 5. The Inlet is the only area requiring aquatic vegetation monitoring and is addressed via revised Figure 5 of the SDCMP, so the note referring to aquatic vegetation monitoring locations not being shown has been removed.

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**DRAFT  
Acronyms and  
Abbreviations**

ARAR	Applicable or Relevant and Appropriate Requirement
cy	cubic yards
MassDEP	Massachusetts Department of Environmental Protection
mg/kg	milligrams per kilogram
NGVD	National Geodetic Vertical Datum of 1929
PEC	Probable Effects Concentration
RAO	response action objective
RD/RA SOW	Remedial Design/Remedial Action Statement of Work
ROD	September 2005 Record of Decision
SDCMP	Sediment Demonstration of Compliance and Maintenance Plan
SEL	Severe Effects Level
USEPA	United States Environmental Protection Agency
W.R. Grace	W.R. Grace & Co. – Conn
100% Design Report	Final (100%) Sediment Remedial Design Report



## 1. Introduction

### 1.1 Purpose and Scope

On behalf of W.R. Grace & Co. – Conn (W.R. Grace), this Final Sediment Demonstration of Compliance and Maintenance Plan (SDCMP) has been prepared as required under Section VII.B.3 of Remedial Design/Remedial Action Statement of Work (RD/RA SOW; United States Environmental Protection Agency [USEPA] 2006) for the W.R. Grace (Acton Plant) Superfund Site located in Acton and Concord, Massachusetts (site; Figure 1). According to the RD/RA SOW (USEPA 2006), the purposes of this SDCMP are:

1. Ensure the long-term continued effectiveness of each component of the sediment remedial action.
2. Define how compliance will be determined with regard to the sediment cleanup levels and sediment-related Applicable or Relevant and Appropriate Requirements (ARARs) identified in the September 2005 Record of Decision (ROD; USEPA 2005).

The sediment remedial action, and therefore the provisions of this SDCMP, applies to two areas of the site where sediment remediation was required under the ROD (USEPA 2005). These include Sinking Pond and the North Lagoon Wetland, both of which are shown on Figure 1. Sinking Pond is a kettle pond located in the southwestern portion of the site (GeoTrans, Inc. 2005a) that receives discharges from an active groundwater treatment system and does not have an outlet. North Lagoon Wetland is a wetland area between the former North Lagoon and the perennial stream, Fort Pond Brook (Wetlands Preservation Inc. 2007).

In general, this SDCMP focuses on the measures to be implemented to ensure the long-term effectiveness of each component of the sediment remedial action (i.e., the first objective indicated above). This includes sampling and monitoring activities to verify compliance with remedial goals and the effectiveness of site restoration activities. Information on how the remedial design is intended to accomplish sediment cleanup levels and ARARs (i.e., the second objective indicated above) was provided in the Final (100%) Sediment Remedial Design Report (100% Design Report; ARCADIS 2011). In summary, the remedial design for both Sinking Pond and the North Lagoon Wetland included removal limits, implementation methods, confirmatory sampling methods, data evaluation measures and maintenance activities that were intended to substantively comply with the ROD-specified cleanup



levels and ARARs. Reference to the 100% Design Report (ARCADIS 2011) is provided for additional details of how the design targets the applicable cleanup levels and ARARs.

As stated in the 100% Design Report (ARCADIS 2011) and summarized in Section 2 of this SDCMP, remedial activities for Sinking Pond target achievement of the long-term cleanup level (i.e., 42 milligrams per kilogram [mg/kg] arsenic or less in the applicable portions of the pond as determined using USEPA's Pro-UCL statistical software). The 100% Design Report recognized that alternative outcomes (e.g., additional removal, capping or achievement of the short-term cleanup goal in lieu of the targeted long-term goal) may be required if the long-term cleanup level cannot be achieved following initial sediment removal activities. However, based on the results of the construction activities implemented to date, the long-term goal will be achieved such that additional or alternative measures are not anticipated. Accordingly, this SDCMP does not include monitoring for provisional components that are no longer expected to be necessary, such as sand cover in portions of Sinking Pond or monitoring to demonstrate a reducing trend in arsenic concentrations toward 42 mg/kg (since that objective will have already been achieved).

A draft version of the SDCMP was submitted to the USEPA in November 2011. USEPA comments on that draft version were provided to *de maximis, inc.* on February 27, 2012. This final version incorporates revisions addressing USEPA and Massachusetts Department of Environmental Protection (MassDEP) comments on the prior draft. The "DRAFT" header is retained per the requirements of Section IX.B of the SOW pending final USEPA approval.

## 1.2 Document Organization

Following this introduction, the remainder of this SDCMP is organized as follows:

- *Section 2* summarizes the scope of the remedial design, including the response action objectives, sediment cleanup levels and selected remedial scope for both the North Lagoon Wetland and Sinking Pond.
- *Section 3* outlines the vegetation monitoring and maintenance procedures, as well as sediment quality sampling to be performed at the North Lagoon Wetland and Sinking Pond.
- *Section 4* identifies anticipated reporting requirements and schedule-related considerations.



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Final Sediment  
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W.R. Grace Superfund Site  
Acton-Concord, Massachusetts

- *Section 5* lists the references cited within this SDCMP.

Various figures are also included at the end of this SDCMP; references to these items are cited within the text where appropriate.



## 2. Summary of Remedial Action

This section summarizes the ROD-specified response action objectives (RAOs) and sediment cleanup levels, and provides an overview of the selected remedial approach for the Sinking Pond and North Lagoon Wetland areas. Reiteration of the RAOs and cleanup levels is pertinent to understanding the basis for the remedial components and for determining the type of maintenance and monitoring activities that may be necessary pending completion of the remedy implementation.

This draft SDCMP was prepared concurrent with completing the remedial construction activities. While the SOW called for submittal of the document prior to completion of the construction activities, W.R. Grace requested – and USEPA concurred – that the document could more appropriately be developed to focus on the scope of completed remedial activities if the submittal was delayed until the final scope of the completed remedy was defined. In addition to summarizing the scope of the remedial design, this section also discusses the status of remedial activities at the time of this draft submittal.

### 2.1 Response Action Objectives

The RAOs for sediment for the protection of human health and the environment, as set forth in the ROD (USEPA 2005; page 47), are as follows:

- Control discharge of treated effluent groundwater to prevent unacceptable impacts to sediment and surface water in Sinking Pond.
- Protect future residents from exposure to sediment in Sinking Pond and North Lagoon Wetland that poses an excess cancer risk above  $10^{-4}$  to  $10^{-6}$  or a hazard index of 1.
- Prevent exposure to contaminants in sediment that presents an unacceptable risk to the environment.

These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health and the environment and are based on the current and reasonably anticipated future land use.



## 2.2 Sediment Cleanup Levels

Unacceptable risks to potential future recreational receptors (i.e., waders) were identified and attributed to arsenic in sediment in Sinking Pond and North Lagoon Wetland. Sediment cleanup levels were established to protect potential human receptors. Unacceptable risks to the environment were also identified and attributed to arsenic in portions of Sinking Pond and arsenic and manganese in North Lagoon Wetland. Sediment cleanup levels that are protective of human health and the environment are presented below for Sinking Pond and North Lagoon Wetland, as set forth in the Section IV of the RD/RA SOW (USEPA 2006).

### *Sediment Cleanup Levels for the Protection of Human Health for Sinking Pond & North Lagoon Wetlands<sup>(1)</sup>*

Location	Chemical Name	Sediment Cleanup Level (mg/kg)
Sinking Pond	Arsenic	42
North Lagoon Wetland	Arsenic	28

<sup>(1)</sup>Applies only to sediment that is accessible to humans.



*Sediment Cleanup Levels for the Protection of Ecological Receptors for Sinking Pond & North Lagoon Wetlands*

Location	Chemical Name	Area	Sediment Cleanup Level (mg/kg)
Sinking Pond	Arsenic	Sediment with elevated arsenic, copper, iron, and manganese concentrations in the Inlet and within the pond where the ground slope is relatively shallow (defined as areas SPBK-1 through SPBK-4 on ROD Figure 13) and that is consistently covered by less than twelve-feet of water. <sup>1,2</sup>	42 <sup>a</sup>
Sinking Pond	Arsenic	Sediment with elevated arsenic, copper, iron, and manganese concentrations within the pond but outside the areas specified above that is consistently covered by less than twelve feet of water. <sup>1,3</sup>	42 <sup>a</sup>
North Lagoon Wetland	Arsenic	Sediment 0-12 inches in depth with elevated arsenic concentrations.	28
North Lagoon Wetland	Manganese	Sediment 0-12 inches in depth with elevated manganese concentrations.	2,030

<sup>(1)</sup> Sediment located between an elevation of 144.5 feet NGVD (maximum surface water elevation observed in the pond) and 128 feet NGVD (twelve feet below the minimum surface water elevation) will be evaluated.

<sup>(2)</sup> Short-term goal is to remediate areas with arsenic greater than 730 mg/kg or where the four chemicals of concern (arsenic, copper, iron, and manganese) exceed their Probable Effects Concentration (PEC) or Severe Effects Level (SEL) within the areas defined. Arsenic PEC=33 mg/kg, copper PEC=149 mg/kg, iron SEL=43,766 mg/kg, and manganese SEL=1,100 mg/kg.

<sup>(3)</sup> Short-term goal is to identify areas with arsenic greater than 730 mg/kg and the following three metals: copper, iron, and manganese exceed their PEC or SEL and then to evaluate the need to remediate such areas based on risks, feasibility and implementability. Copper PEC=149 mg/kg, iron SEL= 43,766 mg/kg and manganese SEL=1,100 mg/kg.

<sup>(a)</sup> Compliance will be met by long term monitoring to demonstrate a trend in sediment arsenic concentrations toward the maximum background concentration of 42 mg/kg within the top two inches of sediment.

As indicated in the preceding table, the long-term cleanup level for Sinking Pond is based on achieving an arsenic concentration of 42 mg/kg in the portion of the pond that lies between an elevation of 144.5 feet NGVD 29 (maximum surface-water elevation observed in Sinking Pond) and 128 feet NGVD 29 (12 feet below the minimum surface-water elevation, which is the approximate thermocline elevation). However, ecologically

based short-term goals are also provided and vary based on the ecological significance of each area as a partial function of the slope of the sediment surface. Considering the varying cleanup levels, Sinking Pond was divided into removal areas based on ecological significance and human accessibility. The areas of Sinking Pond within which the various cleanup levels apply are shown on Figure 2 and include the following:

- *Inlet and SPBK Areas (five)*. Select portions of Sinking Pond with flat or shallow slopes that are consistently covered by less than 12 feet of water are likely to be the most biologically active areas; these include the Inlet and areas SPBK-1 through SPBK-4.
- *ECO Areas (three)*. These areas include portions of Sinking Pond above the thermocline, excluding the Inlet and SPBK areas.
- *Human Accessible Areas*. These areas include the Inlet and portions of the SPBK and ECO areas that are covered by no more than 2 feet of water (at the low water level) and represent areas where people may potentially access the pond for recreational purposes. It also includes adjacent areas that recreators may wade to, once in the pond.

### 2.3 Overview of Selected Remedy

The sediment remedial design was developed over the course of several SOW-related design deliverables, including a concept design, draft final (95%) design and final (100%) design submittals. The 100% Design Report (ARCADIS 2011), incorporating comments and approval conditions specified by the USEPA based on review of prior submittals, was issued in March 2011 in conjunction with the contractor procurement process. The remedial approaches for both the Sinking Pond and North Lagoon Wetland areas, as presented in the 100% Design Report (ARCADIS 2011), are summarized below.

To the extent possible, the SPBK, ECO and Human Accessible Areas shown on Figure 2 are consistent with those developed in consultation with the USEPA following the pre-design topographic survey and presented on Figure 4 of the Sediment Concept Design Report (ARCADIS 2009). The topography and bathymetry shown within and immediately surrounding the pond on Figure 2 reflect the more detailed survey performed by the remediation contractor prior to sediment removal. The differences in pre-design versus pre-removal topography/bathymetry were not considered significant enough to warrant modification of the human accessible areas or the boundaries between SPBK and ECO areas. Therefore, these areas are consistent with those

previously presented on Figure 4 of the Sediment Concept Design Report, except that they have trimmed or extended, where needed, to match the pre-removal configurations of the high water mark and thermocline (elevations 144.5 and 128 feet NGVD, respectively).

### 2.3.1 North Lagoon Wetland

The selected remedial approach for the North Lagoon Wetland area included removal "in the dry" of 1 foot of soil within the limits identified in the 100% Design Report (ARCADIS 2011) based on statistical evaluation of the existing characterization data. This included removal in the sedge marsh, channel and wooded swamp portions of the North Lagoon Wetland (Figure 3), with a total target volume of approximately 1,750 in-situ cubic yards (cy). Excavated material was subject to off-site disposal at an appropriately licensed commercial facility. Following removal to the target limits, the approach called for backfill of 1 foot of clean soil to re-establish initial grade (to the extent possible), with seeding and restoration to facilitate re-establishment of the wetland characteristics.

The statistical evaluation used to define the extent of removal during the design process assumed that the soil backfill to be re-placed into North Lagoon Wetland excavation areas contained concentrations of arsenic and manganese at or below 20 and 300 mg/kg, respectively. As demonstrated by the analytical data for backfill soils that have been submitted to the USEPA during the course of the work (and will be included with the Sediment Construction Summary Report), the average concentrations in fill materials are below these assumed values. Accordingly, the statistical evaluations presented in the design represent conservative estimates, as the post-construction area-wide concentrations are lower than were predicted using the assumed values from the design.

### 2.3.2 Sinking Pond

The selected remedial approach for Sinking Pond included removal of soil/sediment within the inlet portion of the pond, and within the limits of the pond extending from the high water mark (elevation 144.5 feet) to the thermocline (as defined by elevation 128 feet) (Figure 2). These limits were developed based on statistical evaluation of the Sinking Pond characterization data. With a target removal depth of 1 foot in the majority of the removal area and 2 feet in one discrete area (with a total target volume of 4,890 in-situ cy), the design objective was to target a post-removal condition that meets the long-term cleanup goal for the pond (42 mg/kg arsenic) rather than meeting the SOW-stated short-term goals for the non-human-accessible portions of the pond



and then implementing a monitoring program to demonstrate a trend toward 42 mg/kg arsenic. As described in the 100% Design Report, achievement of the target concentration of 42 mg/kg arsenic in the applicable portion of the pond is based on a statistical evaluation using USEPA's ProUCL software, and does not require that each point be below this target value. Rather, the 95% upper confidence limit for the mean – as determined using the ProUCL software – must be below the target concentration when considering:

1. Only the human accessible portion of the pond, and
2. The entire portion of the pond between the thermocline (elevation 128') and the high water mark (elevation 144.5').

Recognizing the inherent limitations and complexities of sediment dredging, the design also included contingency measures in the event that removal to the target limits did not achieve the long-term cleanup goal. Such measures included additional dredging where feasible, placement of a sand cover, and/or other appropriate measures to be determined in consultation with USEPA based on the site conditions and post-removal confirmation sample data following removal to the initial limits. The design also called for restoration of the inlet area, the banks between the current water level and the historical high water level, plus other areas adjacent to the pond affected by the remedy implementation.

#### 2.4 Remedial Status

Sediment remedial activities were initiated in June 2011 and are currently underway. The status of remedial activities in each area as of the end of October 2011 is summarized below:

- *North Lagoon Wetland.* The remedial action at the North Lagoon Wetland has been substantially completed, including backfilling and restoration measures (e.g., seeding, planting, removal of access roads). Existing erosion and sedimentation controls will remain in place until vegetative growth becomes established during the 2012 growing season.
- *Sinking Pond.* The removal action at Sinking Pond has been completed to the target limits within the pond. Based on the results of post-removal confirmation sampling, W.R. Grace directed the contractor to perform additional removal in a portion of Sinking Pond where confirmation samples collected following the initial removal indicated arsenic concentrations above the long-term target cleanup goal



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(on an individual rather than statistical basis). The additional sediment removal has also been completed, and confirmation sampling throughout the pond indicate that the target removal objective (discussed above) has been met by the removal activities. Accordingly, additional contingent measures (i.e., additional dredging or sand cover) are not anticipated. Restoration activities have been initiated and are nearly complete around the perimeter of the pond and Inlet.

As discussed above, the monitoring and maintenance activities described in Section 4 reflect those that are potentially foreseeable based on the completed scope of remedial activities in both the North Lagoon Wetland and Sinking Pond.



### 3. Monitoring and Maintenance Procedures

This section summarizes the anticipated monitoring and maintenance activities to be performed to ensure the continued effectiveness of the completed remedial activities. This includes the following activities:

- Post-implementation monitoring of restored areas to confirm adequate survival and coverage of vegetative species.
- Sampling and analysis that may be required to support remedy effectiveness evaluation in support of the USEPA's 5-year review (North Lagoon Wetland and Sinking Pond).

#### 3.1 Vegetation Monitoring

As discussed in the 100% Design Report (ARCADIS 2011), post-construction monitoring will be performed to assess the survival of vegetative species in restored areas to evaluate the effectiveness of the remedy. Based on the current and anticipated final restored conditions, modifications to the monitoring program described in the 100% Design Report (ARCADIS 2011) are not anticipated. Accordingly, the post-construction vegetation monitoring plans for restored wetland and upland areas are reiterated below.

The vegetation monitoring events will include taking photographs of the restored wetland and upland areas to document conditions and to provide a record of vegetation development over time. A minimum of 10 fixed locations (covering representative wetland and upland areas) will be established in the field during the initial monitoring event and photographed during each monitoring event to provide a general overview of each restored vegetative community. Photographs with captions describing the location and direction of the photograph will be provided in a photo log attachment to the annual monitoring report, which is further described in Section 4 of this plan.

##### 3.1.1 Restored Wetland Areas

Monitoring of the restored wetland areas associated with North Lagoon Wetland (Figure 4) and Sinking Pond (Figure 5) will be conducted semiannually (spring and summer) beginning in the first full growing season after completing restoration activities. Monitoring of wetland areas will continue for at least five years, or until the performance standards listed below are achieved (if longer). Monitoring will include general inspections of the entire restored wetland areas, as well as more detailed



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inspections of specific monitoring quadrats to evaluate the health and progress of seeded and planted vegetation and to respond to maintenance needs. In addition, monitoring for signs of erosion or bank failure will be performed concurrently with the vegetation inspections. The purpose of the general inspections will be to identify any areas greater than 50 square feet that do not exhibit 80% or greater cover and do not correspond to an established monitoring quadrat.

The following performance standards have been established for restored vegetation in the wetland resources:

- Replace dead trees or shrubs to maintain 85 percent of the planted stem density of the woody plants.
- Reseed or replant to maintain a minimum of 80 percent cover by noninvasive hydrophytes in emergent wetlands.
- Control undesirable plant (e.g., invasive or exotic) species to maintain a maximum of 20 percent cover by invasive hydrophytes in emergent wetlands.
- Reseed or replant to maintain a minimum of 60 percent cover by noninvasive hydrophytes of which at least 15 percent are woody species in scrub-shrub and forested cover types.
- Implement bank stabilization measures to prevent erosion.

The density of woody plants in the restored wetland habitats will be evaluated during the spring monitoring event. All surviving woody plantings and naturally recruited native woody species will be tallied during a reconnaissance of each restoration area. The number of woody plants observed will be compared to the original number of woody plants planted to determine if the 85 percent stem density performance standard is met. If the performance standard is not being met, supplemental planting may be initiated using adaptive management techniques where species and/or sizes of plants that are better adapted to site conditions are selected for replacement plantings.

The percent cover by herbaceous species in restored wetland habitats will be evaluated during the summer monitoring event using standard 1-square-meter sampling quadrats. Representative quadrats at a density of 10 per acre are shown on Figures 4 and 5. Note that the specific locations are subject to change based on site conditions at the time the first event is performed (e.g., based on actual versus



planned areas of disturbance, etc.). Once a quadrat is established, efforts will be made to utilize that specific location during subsequent events.

Data collected from each quadrat will consist of identifying all species present in the quadrat, visually estimating the percent cover by all species in the quadrat and determining the percent cover of each species in the quadrat. The observed percent ground cover of all quadrats in a restored habitat will be combined to calculate the average percent cover of the restored habitat. If the observed percent cover is less than the minimum 80 percent cover performance standard, supplemental seeding may be implemented to attain a minimum 80 percent cover by the end of the 5-year monitoring period.

All restored banks will be inspected for excessive erosion. Any areas that require maintenance or repair will be identified and repaired prior to the next monitoring event.

As described in Section 4, an annual monitoring report will be prepared at the end of each monitoring year to present the vegetation monitoring results. If all performance standards for restored wetland areas are met by the end of the fifth monitoring year, all monitoring and maintenance requirements will have been met and no further monitoring or maintenance will be performed. If a performance standard is not met by the end of the fifth monitoring year, maintenance and monitoring will continue until the performance standard is met.

### 3.1.2 Restored Upland Areas

The restored upland areas associated with North Lagoon Wetland (Figure 4) and Sinking Pond (Figure 5) will be monitored once following the first full growing season after completing restoration activities. The monitoring will evaluate the growth of seeded and planted vegetation and respond to maintenance needs. Corrective actions will be implemented based upon the following performance standards:

- Replace dead trees or shrubs to maintain 85 percent of the planted stem density of the woody plants.
- Reseed or replant to maintain a minimum of 80 percent herbaceous cover in seeded or planted upland areas.

The density of woody plants in the restored upland habitats will be evaluated during the spring monitoring inspection. All surviving woody plantings and naturally recruited native woody species will be tallied during a reconnaissance of each restoration

area. The number of woody plants observed will be compared to the original number of woody plants planted to determine if the 85 percent stem density performance standard is met. If the performance standard is not being met, supplemental planting may be initiated using adaptive management techniques where species and/or sizes of plants that are better adapted to site conditions are selected for replacement plantings.

The percent cover by herbaceous species in restored upland habitats will be evaluated during the summer monitoring event using standard 1-square-meter sampling quadrats. Representative quadrats at a density of 10 per acre are shown on Figures 4 and 5. Note that the specific locations are subject to change based on site conditions at the time the first event is performed (e.g., based on actual versus planned areas of disturbance, upland access roads being left in place rather than restored, etc.). Once a quadrat is established, efforts will be made to utilize that specific location during subsequent events.

Data collected from each quadrat will consist of identifying all species present in the quadrat, visually estimating the percent cover by all species in the quadrat and determining the percent cover of each species in the quadrat. The observed percent ground cover of all quadrats in a restored habitat will be combined to calculate the average percent cover of the restored habitat. If the observed percent cover is less than the minimum 80 percent cover performance standard, supplemental seeding may be implemented to attain a minimum 80 percent cover.

As described in Section 4, an annual monitoring report will be prepared at the end of each monitoring year to present the vegetation monitoring results. If all performance standards for restored upland areas are met by the end of the first monitoring year, all monitoring and maintenance requirements will have been met and no further monitoring or maintenance will be performed. If a performance standard is not met by the end of the first monitoring year, maintenance and monitoring will continue until the performance standard is met.

### **3.2 Vegetation Maintenance and Adaptive Management**

Maintenance activities will be performed to facilitate achievement of performance standards for the wetland and upland areas (identified above) at or before the end of the planned monitoring periods. As a component of the contract with the Remediation Contractor (via Section 32 72 00 of the Technical Specifications in the 100% Design Report), W.R. Grace included provisions for the Contractor to perform the following



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activities during the first growing season following remedy implementation (i.e., in 2012):

- Replace dead trees and shrubs within the one-year nursery warranty period with the same species and size plant.
- Reseed or replant areas greater than 50 square feet that do not exhibit 80 percent or greater ground cover.
- Achieve a minimum of 80% survival for plugs planted in the Inlet to Sinking Pond, with replanting to 100% of the original number if survival drops below 80%.
- Control the propagation and spread of undesirable plant (e.g., invasive or exotic) species using conventional measures such as mowing, physical removal and restricted hand application of herbicides. Invasive species of hydrophytes are: Common Reed (*Phragmites australis*), Purple Loosestrife (*Lythrum salicaria*), Reed Canary Grass (*Phalaris arundinacea*), Olives (*Elaeagnus spp.*), Multiflora Rose (*Elaeagnus spp.*), Japanese Knotweed (*Polygonum cuspidatum*) and Buckthorn (*Rhamnus frangula*).
- Maintain sediment and erosion controls until sufficient growth is established.

In the event that periodic inspections indicate additional measures are required beyond the first growing season, W.R. Grace would undertake appropriate measures to ensure that performance standards are met by the end of the planned monitoring periods. Such measures may include replanting/reseeding, additional plantings of trees or shrubs, and control of invasive species in wetland areas. This would include the use of adaptive management, as appropriate, in response to identified maintenance needs. For example, adaptive management would be applied to address observed tree or shrub mortality. Species that show greater survivability may be used in a greater density in replacement plantings than originally specified to improve long-term survivability. Although plant species were selected based on the anticipated hydrologic conditions in which they were planted, some plant species may exhibit better survival for undetermined reasons, such as genetics, variable quality in stock, non-palatability to herbivores, etc. Observations of species-specific survival characteristics in the various habitats during monitoring activities will assist in the design of the replanting effort, if needed.



USEPA and MassDEP will be notified of any maintenance activities to be performed prior to implementation as part of a corrective action plan, which is further described in Section 4.2 of this plan.

### **3.3 Sediment Monitoring**

The USEPA has indicated that soil/sediment sampling will be required in both the North Lagoon Wetland and Sinking Pond in support of the USEPA's 5-year review of the site (per Part III Section F of the RD/RA SOW [USEPA 2006]). The need for monitoring in support of subsequent 5-year reviews will be assessed based on the results of the initial event.

As cited in the Sediment Concept Design Report (ARCADIS 2009) and summarized in Section 4.2.2.5 of the 100% Design Report (ARCADIS 2011), sediment quality monitoring (beyond that associated with the initial 5-year review in 2014) is not anticipated for the North Lagoon Wetland.

The results of the post-dredging confirmatory sampling program (which have been submitted to the USEPA over the course of the work), indicate that 75 of 76 confirmatory sampling locations were below the long-term cleanup goal of 42 mg/kg arsenic, and the statistical results indicate that the upper confidence level of the mean meets the target cleanup level for both the human accessible areas and for the entire area of the pond between the thermocline and the high water mark. Accordingly, the ROD-specified long-term cleanup level has been achieved, and a monitoring program to demonstrate a trend toward 42 mg/kg arsenic is not needed. Note also that, although not needed to achieve compliance with the target cleanup level, W.R. Grace did attempt to reduce the one location exhibiting a concentration above 42 mg/kg arsenic, as this location was in the area that was subject to further removal after the initially targeted removal limits had been achieved. The results of the statistical evaluations will be further presented in the Sediment Construction Summary Report.

The remainder of this section identifies the proposed scope of sediment monitoring programs for the North Lagoon Wetland and Sinking Pond. Note also that sampling, analytical and quality assurance/quality control measures (e.g., field duplicate samples) implemented in conjunction with the sediment monitoring program would be performed consistent with established procedures, as described in the Quality Assurance Project Plan portion of the Project Operations Plan (GeoTrans, Inc. 2000) (as amended).



### 3.3.1 North Lagoon Wetland

Proposed North Lagoon Wetland soil sampling in support of the first 5-year review includes collection of samples at the 15 locations depicted on Figure 3. These locations provide for spatial coverage of the removal area, including samples within the restored sedge marsh, channel and wooded swamp portions of the North Lagoon Wetland. At each location, samples will be collected from the uppermost 12 inches of soil using Lexan<sup>®</sup> tubing, a hand auger or another similar method (depending on field and soil/sediment conditions). The sample collected from the 0- to 12-inch interval will be analyzed for arsenic and manganese, according to USEPA SW846 Method 6010B.

The resulting analytical data will be compared to SOW-specified (USEPA 2006) cleanup levels for arsenic and manganese by calculating the 95% UCL of the mean for the dataset using USEPA's ProUCL software. The resulting values will be compared to the assumed backfill concentrations that were used during the remedial design (i.e., 20 and 300 mg/kg arsenic and manganese, respectively, based on MassDEP's published background values). If the calculated 95% UCL values for these constituents are at or below these previously assumed concentrations, it will be concluded that the design basis remains valid and the cleanup goals continue to be met. In the unanticipated event that the UCL values for either constituent exceeds the assumed values, the original design calculations could be revisited by substituting the new 95% UCL values in place of the previously assumed values to assess whether the area-wide cleanup levels are met using the revised values.

### 3.3.2 Sinking Pond

The proposed scope of post-remediation monitoring in Sinking Pond in support of a 5-year review is described below.

Sediment sampling is proposed at the 20 locations depicted on Figure 2. These locations correspond to certain of the 76 locations used to for post-excavation confirmatory sampling activities during the remedial action. The selected locations provide spatial coverage throughout the pond, including 10 samples in the human accessible portion of the pond (to facilitate 95% UCL calculations for this specific area), and focus on those locations where additional removal was performed based on the results of confirmation sampling following removal to the initial design limits. Data from the post-removal confirmatory sampling will serve as the baseline against which subsequent 5-year review support sampling will be compared.



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At each location, the sediment samples will be collected from the 0- to 12-inch interval using Lexan® tubing, a hand auger or another similar method (depending on field and soil/sediment conditions). Sediment cores will be photographed and described using the Unified Soil Classification System. Penetration depth and sediment recovery, as well as the time and location of each core, will be noted in the field log books. Sample locations will be surveyed prior to or during collection (using either a global positioning system or conventional techniques, as field conditions dictate) to confirm they are reasonably close to the target locations (to the extent possible).

Each sample collected will be analyzed for arsenic using USEPA SW846 Method 6010B. Consistent with the design approach and the evaluation of post-removal confirmatory samples, the data will be evaluated using ProUCL to determine the 95% upper confidence level of the mean, and that value will be compared to the cleanup goal to assess continued effectiveness of the remedy. Also, consistent with the 100% Design Report (ARCADIS 2011), the dataset is representative of only those locations within the Human Accessible Areas of the pond (Figure 2) will be evaluated to ensure that this sub-area of the pond meets its associated cleanup level (42 mg/kg arsenic).



#### 4. Reporting and Schedule

##### 4.1 Reporting

W.R. Grace will prepare the following reports after completion of the monitoring programs:

- An annual monitoring report for the wetland and upland areas will be prepared at the end of each monitoring year to present the monitoring results. The annual monitoring report will include vegetation data summaries and comparisons to performance standards for each type of area. Any maintenance activities performed during the year will be reported and photographs will be included to document the progress of the vegetation in restored areas. The annual monitoring report will address required monitoring activities for a given year. Once the minimum monitoring duration is complete for a given area (i.e., five years for wetland and one year for upland areas) and the performance standards have been met in that area, vegetative monitoring will be discontinued and subsequent annual monitoring reports will address only those areas where monitoring activities continue.
- A summary report will be prepared for each soil/sediment quality monitoring event performed for the North Lagoon Wetland and/or Sinking Pond. This report will present the scope and purpose of the event, summarize the resulting data, evaluate the 95% UCL of the mean for the respective datasets, compare to RD/RA SOW-specified (USEPA 2006) cleanup levels and include a statistical comparison of the data to the established baseline. Based on these evaluations, the summary report will include W.R. Grace's recommendations of the need for additional or modified monitoring or remedial actions, as appropriate.

##### 4.2 Corrective Action Approval and Implementation

Whenever corrective action (including repair of erosional areas and supplemental planting) is required based on the results of monitoring activities, W.R. Grace will submit a corrective action plan and an implementation schedule to the USEPA for approval, with opportunity for review and comment by the MassDEP. Such plans will be submitted within 30 days of the applicable monitoring or inspection. Within 30 days of implementing any corrective action, W.R. Grace will submit to the USEPA (with opportunity for review and comment by the MassDEP) for approval a report describing the corrective action and any required follow-up measures, inspections or monitoring.



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#### 4.3 Schedule

Based on the current status of the project, W.R. Grace anticipates that the monitoring activities described above will be initiated during the 2012 growing season, with the spring monitoring targeting a May time period. Plans for corrective measures will be submitted within 30 days of an identified maintenance need. Annual reports summarizing upland and wetland monitoring, will be submitted within 90 days of completing the final field inspection for that year.

The next scheduled 5-year review is expected in September 2014. W.R. Grace will target field sampling in support of that 5-year review to occur in mid-April to mid-May 2014. The report of that sampling event will be submitted to the USEPA by June 30, 2014.



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**5. References**

ARCADIS. 2009. W.R. Grace Superfund Site Sediment Concept Design Report. Prepared for Remedium Group, Inc. Superfund Site, Acton & Concord, MA. June 2009.

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GeoTrans, Inc. 2000. Project Operations Plan (Revised) Operable Unit Three W.R. Grace Superfund Site Acton, Massachusetts. Prepared for W.R. Grace and Co – Conn. March.

GeoTrans, Inc. 2005a. Public Review Draft Feasibility Study Operable Unit 3 W.R. Grace Superfund Site, Acton, Massachusetts. July 1, 2005.

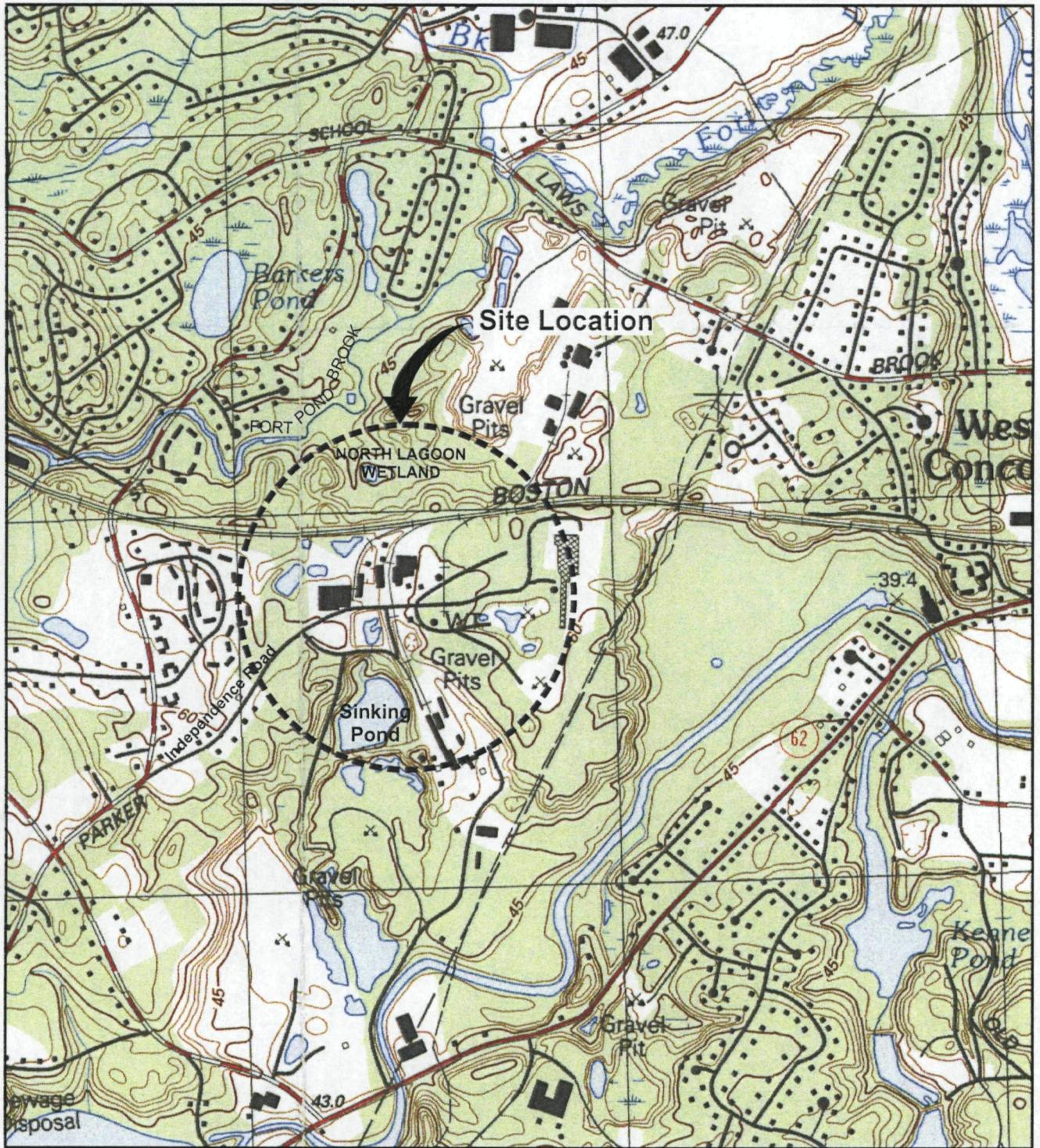
United States Environmental Protection Agency. 2005. Record of Decision W.R. Grace & Co. (Acton Plant) Superfund Site Operable Unit Three, Towns of Acton and Concord, Middlesex County, Massachusetts. September 30, 2005.

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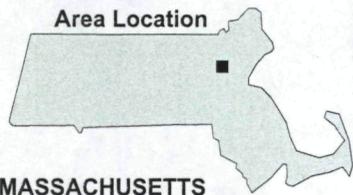
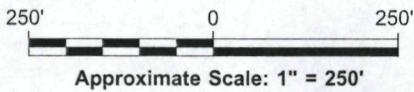
United States Environmental Protection Agency. 2010. Conditional Approval of the Final (100%) Sediment Design Report, dated September 13, 2010, W.R. Grace (Acton Plant) Superfund Site, Acton & Concord, Massachusetts. September 30, 2010.

Wetlands Preservation Inc. 2007. Wetland Delineation Report 51 Independence Road Acton, Massachusetts. Job # 3340.2. July 2007.

Figures



REFERENCE: BASE MAP USGS 7.5 MIN. QUAD., MASSACHUSETTS GEOGRAPHIC INFORMATION SYSTEM, 1987, at <http://www.mass.gov/mgis/>



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MASSACHUSETTS

W.R. GRACE SUPERFUND SITE  
 ACTON-CONCORD, MASSACHUSETTS  
**SEDIMENT DEMONSTRATION OF  
 COMPLIANCE AND MAINTENANCE PLAN**

**SITE LOCATION MAP**



FIGURE  
**1**

CITY: SYRACUSE-NY DIV: GROUP: 141: NEW DB: B: GETTIS P: LISTER R: BASSETT LD: PIC: PM: TM: LYRONI: OFF: REF: G:\ENV\CAD\SYRACUSE\ACT180078800000000000000370\W\GIS\DC\M788000302.dwg LAYOUT: 2 SAVED: 3/2/2012 8:59 AM ACADVER: 18.15 (LMS TECH) PAGES: 18 PLOT: 3/2/2012 8:59 AM BY: GETTIS, BRIAN



- LEGEND:**
- SINKING POND
  - THERMOCLINE (EL. 128)
  - HIGH WATER ELEVATION OF POND (ELEV. 144.5) - UPPER EXTENT OF REMOVAL UNLESS OTHERWISE INDICATED
  - CONTOUR
  - REMEDIATED AREA
  - HUMAN ACCESSIBLE AREA
  - SPBK/ECO BOUNDARY
  - SEDIMENT SAMPLE LOCATION

- NOTES:**
1. SEDIMENT SAMPLE LOCATIONS AND NUMBERING ARE CONSISTENT WITH THOSE USED FOR CONFIRMATORY SAMPLING DURING THE REMEDIAL ACTION (2011). A SUBSET OF THE POST-REMOVAL CONFIRMATORY SAMPLE LOCATIONS ARE PLANNED FOR SAMPLING IN SUPPORT OF 5-YEAR REVIEW.
  2. TOPOGRAPHY AND BATHYMETRY REVISED CONSISTENT WITH THE PRE-CONSTRUCTION SURVEY PERFORMED BY THE ASSOCIATES ON JULY 29, 2011.
  3. HORIZONTAL COORDINATE SYSTEM: STATE PLANE MASSACHUSETTS MAINLAND NAD 83 FEET. VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD 29).

SEDIMENT SAMPLE LOCATIONS		
SAMPLE LOCATION	NORTHING	EASTING
SP-1	2989715.23	675705.79
SP-5	2989663.41	675727.43
SP-9	2989598.60	675767.60
SP-16	2989525.60	675771.50
SP-18	2989464.40	675704.80
SP-23	2989376.30	675660.10
SP-24	2989333.20	675573.00
SP-27	2989284.70	675509.60
SP-34	2989121.10	675523.10
SP-37	2989057.14	675526.50

SEDIMENT SAMPLE LOCATIONS		
SAMPLE LOCATION	NORTHING	EASTING
SP-38	2989008.74	675559.52
SP-39	2989039.60	675578.90
SP-45	2989064.50	675747.40
SP-49	2989108.60	675855.90
SP-54	2989137.30	675938.80
SP-57	2989240.50	675967.40
SP-63	2989448.60	676078.10
SP-71	2989627.40	675921.80
SP-72	2989609.60	675920.20
SP-75	2989605.80	675799.50

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GRAPHIC SCALE

W.R. GRACE SUPERFUND SITE  
 ACTON-CONCORD, MASSACHUSETTS  
 SEDIMENT DEMONSTRATION OF COMPLIANCE  
 AND MAINTENANCE PLAN

**SINKING POND -  
 SEDIMENT SAMPLE LOCATIONS**





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 XREFS: 78900001 78900002 78900000  
 IMAGES: PROJECTNAME



- LEGEND:**
- UPLANDS RESTORATION AREA (0.46 ACRES)
  - SEDGE MARSH RESTORATION AREA (0.23 ACRES)
  - BW/WETLANDS RESTORATION AREA (0.81 ACRES)
  - VEGETATION MONITORING QUADRANT (1M<sup>2</sup>)

- NOTES:**
1. VEGETATION MONITORING QUADRANT LOCATIONS SUBJECT TO CHANGE BASED ON SITE CONDITIONS AT FIRST MONITORING EVENT.
  2. VEGETATION MONITORING QUADRANTS SHOWN AT A DENSITY OF 10 PER ACRE.

PROPOSED VEGETATION MONITORING LOCATIONS		
SAMPLE LOCATION	NORTHING	EASTING
NLW-MR-01	2991573.1508	675680.1790
NLW-MR-02	2991532.3627	675650.8318
NLW-UR-01	2991533.3248	675969.1659
NLW-UR-02	2991656.5943	675765.0499
NLW-UR-03	2991605.9139	675690.7826
NLW-UR-04	2991786.4246	675565.1668
NLW-UR-05	2991463.1398	675611.5552
NLW-WR-01	2991626.6137	675626.5241
NLW-WR-02	2991859.9462	675487.4736
NLW-WR-03	2991861.5447	675607.6715
NLW-WR-04	2991926.2615	675589.4960
NLW-WR-05	2992021.8880	675517.0194
NLW-WR-06	2991646.2864	675496.2343
NLW-WR-07	2991725.2372	675450.3992
NLW-WR-08	2991783.2357	675422.3680

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W.R. GRACE SUPERFUND SITE  
 ACTON-CONCORD, MASSACHUSETTS  
 SEDIMENT DEMONSTRATION OF COMPLIANCE  
 AND MAINTENANCE PLAN

**NORTH LAGOON WETLAND -  
 VEGETATION MONITORING AREAS**



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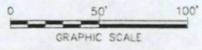


- LEGEND:**
- ..... BORDERING VEGETATED WETLAND (BVW) BOUNDARY (310 CMR 10.55)
  - ..... BANK (310 CMR 10.54) AND BVW BOUNDARY (310 CMR 10.55)
  - THERMOCLINE (EL. 128)
  - [Pattern] PERMANENT CHECK DAM
  - [Pattern] UPLANDS RESTORATION AREA (0.97 ACRES)
  - [Pattern] INLET RESTORATION AREA (0.09 ACRES)
  - [Pattern] BVW/WETLANDS RESTORATION AREA (0.32 ACRES)
  - ◆ VEGETATION MONITORING QUADRANT (1m<sup>2</sup>)

- NOTES:**
1. VEGETATION MONITORING QUADRANT LOCATIONS SUBJECT TO CHANGE BASED ON SITE CONDITIONS AT FIRST MONITORING EVENT.
  2. VEGETATION MONITORING QUADRANTS SHOWN AT A DENSITY OF 10 PER ACRE.

PROPOSED VEGETATION MONITORING LOCATIONS		
SAMPLE LOCATION	NORTHING	EASTING
SP-UR-01	2989666.8062	675710.1837
SP-UR-01	2989683.0432	675789.1109
SP-UR-02	2989688.7837	675866.9180
SP-UR-03	2989485.1088	676094.5403
SP-UR-04	2989250.7680	676036.5736
SP-UR-05	2989109.0822	675958.3959
SP-UR-06	2989010.3853	675564.1449
SP-UR-07	2989305.4526	675517.3891
SP-UR-08	2989469.6372	675687.6472
SP-UR-09	2989675.6443	675673.2088
SP-WR-01	2989587.4916	675759.2378
SP-WR-02	2989370.1727	676113.3780
SP-WR-03	2989094.6491	675928.0147

**DRAFT**



W.R. GRACE SUPERFUND SITE  
 ACTON-CONCORD, MASSACHUSETTS  
 SEDIMENT DEMONSTRATION OF COMPLIANCE  
 AND MAINTENANCE PLAN

**SINKING POND -  
 VEGETATION MONITORING AREAS**

