



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION III

FINAL PERMIT
FOR CORRECTIVE ACTION

WASHINGTON RESEARCH CENTER
7500 GRACE DRIVE
COLUMBIA, MARYLAND 21044
EPA ID NO. MDD074933961

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FINAL PERMIT
FOR CORRECTIVE ACTION;
PURSUANT TO THE RESOURCE CONSERVATION AND RECOVERY ACT
AS AMENDED BY THE HAZARDOUS AND SOLID WASTE
AMENDMENTS OF 1984**

Permittee: W. R. Grace & Co.-Conn.

Permit Number: MDD074933961

Facility Location: Washington Research Center
7500 Grace Drive
Columbia, Maryland 21044

The United States Environmental Protection Agency (EPA) under the authority of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. § 6901 et seq., and regulations promulgated thereunder and set forth at 40 C.F.R. Parts 260-271, has prepared the Permit for Corrective Action (Final Permit) for the facility owned and operated by W. R. Grace & Co.-Conn. (W.R. Grace or Permittee) and located at 7500 Grace Drive in Columbia, Maryland (Facility). A map depicting the Facility location and key features, including the Facility boundary subject to this Final Permit, is provided as Attachment A.

On July 10, 1992, EPA issued a HSWA Corrective Action Permit (EPA I.D. # MDD074933961) to the Permittee under RCRA Section 3004(u), 42 U.S.C. § 6924(u) (Original Permit). Conditions of the Original Permit, which on its terms expired on August 14, 2002, were administratively continued under 40 C.F.R. Section 270.51. EPA issued two subsequent permit modifications in 2007 and 2016, respectively. The 2007 Permit Modification became effective on November 30, 2007 (First Permit Modification) and the 2016 Permit Modification (Second Permit Modification) became effective on January 1, 2016. The Original Permit, as modified by the First and Second Permit Modifications, expired on November 30, 2017. The Original Permit was administratively continued until the Final Permit for the Facility became effective.

The Draft Permit for Corrective Action (Draft Permit) was published for public comment on November 30, 2017. The forty-five (45) day public comment period ended on January 14, 2018. During the comment period, EPA received one set of comments, a letter dated January 12, 2018 from W.R. Grace & Co.-Conn. With this final permit decision, EPA has prepared the enclosed "Response to Comments", which in accordance with 40 C.F.R. § 124.17, describes and responds to all significant comments and specifies which provisions of the Draft Permit and Draft Statement of Basis have been changed in the Final Permit decision.

This Permit is effective on June 14, 2018 and shall remain in effect until June 14, 2028 unless revoked and reissued, modified or terminated in accordance with 40 C.F.R. § 270.41.

INTRODUCTION

The United States Environmental Protection Agency (EPA) under the authority of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA), 42 U.S.C. §§ 6901-6992k, and regulations promulgated thereunder and set forth at 40 C.F.R. Parts 260-271, is hereby issuing a RCRA Corrective Action Permit (Corrective Action Permit or Permit) for the facility owned and operated by W. R. Grace & Co.-Conn. (hereinafter Grace or Permittee) located at 7500 Grace Drive in Columbia, Maryland 21044 at 76° 54' 13" West Longitude and 39° 11' 34" North Latitude (Facility).

As of the date of issuance of this Permit, the State has not received authorization to administer the corrective action provisions of HSWA. This Permit, which addresses corrective action provisions of HSWA for which EPA is the implementing authority in Maryland, will be enforced by EPA.

This Permit consists of the conditions contained herein (Parts I and II and Attachments A and B) and the applicable federal regulations, including 40 C.F.R. Parts 260 through 264, Part 266, Part 268, Part 270, Part 273 and Part 124. The Permittee shall comply with all terms and conditions set forth in this Corrective Action Permit. Nothing in this Corrective Action Permit shall limit EPA's authority to undertake, or require any person to undertake, response action or corrective action under any law, including, but not limited to, Sections 104 and 106 of CERCLA, 42 U.S.C. §§ 9604 and 9606, and Section 7003 of RCRA, 42 U.S.C. § 6973. Nor shall any permit condition relieve the Permittee of any obligations under any law, including, but not limited to, Section 103 of CERCLA, 42 U.S.C. § 9603, to report releases of hazardous wastes, constituents, or substances to, at, or from the Facility.

This Permit is based on information provided to EPA by the Permittee. Section 3005(c)(3) of RCRA provides EPA the authority to review and amend the Permit at any time. Any inaccuracies found in the information submitted by the Permittee may be grounds for the termination, modification or revocation and reissuance of this permit (see 40 C.F.R. §§ 270.41, 270.42 and 270.43). The Permittee must inform EPA of any deviation from or changes in the information submitted by the Permittee that would affect the Permittee's ability to comply with the applicable statutes, regulations or Permit conditions.

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LIST OF ATTACHMENTS

The following Attachments are incorporated, in their entirety, by reference into this Permit. These incorporated attachments contain enforceable conditions of this Permit.

Attachment A: RCRA Permitted Facility and Key Features

Attachment B: Sampling and Reporting Plan

PART I – STANDARD FACILITY CONDITIONS

A. PERMIT ACTIONS

This Corrective Action Permit may be modified, revoked and reissued, or terminated for cause as specified in 40 C.F.R. §§ 270.41, 270.42 and 270.43. The filing of a request for a permit modification, revocation and reissuance, or termination or the notification of planned changes or anticipated noncompliance on the part of the Permittee, does not stay the applicability or enforceability of any permit condition (40 C.F.R. § 270.30(f)). Review of any application for a permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable regulations and laws.

B. STANDARD DUTIES AND REQUIREMENTS

1. Duty to Comply

The Permittee shall comply with all conditions of this Corrective Action Permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit issued under 40 C.F.R. § 270.61 or the analogous provisions of the State's authorized hazardous waste management regulations. Any other permit noncompliance constitutes a violation of RCRA and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. (40 C.F.R. § 270.30(a))

2. Duty to Reapply

If the Permittee wishes to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee must apply for and obtain a new permit. (40 C.F.R. § 270.30(b))

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit. (40 C.F.R. § 270.30(c))

4. Duty to Mitigate

In the event of noncompliance with this Permit, the Permittee shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment. (40 C.F.R. § 270.30(d))

5. Duty to Properly Operate and Maintain

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Permit. (40 C.F.R. § 270.30(e))

6. Duty to Provide Information

The Permittee shall furnish, within the specified time, any relevant information which the EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this Corrective Action Permit. The Permittee shall also furnish to EPA, upon request, copies of records required to be kept by this Corrective Action Permit. (40 C.F.R. §§ 270.30(h) and 264.74(a))

7. Duty to Allow Inspection and Entry

Pursuant to 40 C.F.R. § 270.30(i), the Permittee shall allow the Regional Administrator, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and
- d. Sample or monitor, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by RCRA, any substances or parameters at any location.

8. Duty to Monitor and Record Results

Pursuant to 40 C.F.R. § 270.30(j), the Permittee shall comply with the following requirements:

- a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. All sampling and analyses shall be of adequate quality, scientifically valid, of known precision and accuracy, and of acceptable completeness, representativeness and comparability. Laboratory analysis of each sample must be performed using an appropriate method for testing the parameter(s) of interest taking into account the sample matrix. The test methods found in the EPA publication Test Methods for Evaluating Solid Waste. Physical/Chemical Methods (SW-846), 3rd Edition, as updated, shall be used for: the Toxicity Characteristic analytes (40 C.F.R. § 261.24); the Free Liquids Test (Method 9095) used to determine if free liquid is a component of a waste as a specific requirement for bulk and containerized wastes (40 C.F.R. § 264.314(c)); and the chemical analysis of wastes for hazardous waste incineration permits. (40 C.F.R. § 270.62(b)(2)(i)(C))
- b. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this Permit, the certification required by 40 C.F.R. § 264.73(b)(9) and records of all data used to complete the application for this Permit for a period of at least three (3) years from the date of the sample, measurement, report, certification or application. This period may be extended by request of the Regional Administrator at any time and are automatically extended during the course of any unresolved enforcement action regarding this Facility. (40 C.F.R. § 264.74) The Permittee shall maintain records from all groundwater monitoring wells and associated groundwater surface elevations for the active life of the Facility, and for disposal facilities, for the post-closure care period as well. (40 C.F.R. § 270.30(j))
- c. Records of monitoring information shall specify:
 - (1) The date, exact place, and time of sampling or measurements;
 - (2) The individual(s) who performed the sampling or measurements;
 - (3) The date(s) analyses were performed;
 - (4) The individual(s) who performed the analyses;
 - (5) The analytical techniques or methods used; and
 - (6) The results of such analyses.

9. Duty to Submit Certified Documents

- a. Except for submissions for which the Permittee is asserting a business confidentiality claim pursuant to Paragraph 9.d. and e., below, one (1) hardcopy of all draft and final plans, reports, notifications or other documents which are required by this Permit to be submitted to the Regional Administrator, shall be sent Certified Mail, Return Receipt Requested, overnight mail, or hand-carried to:

Ms. Catherine McGoldrick, Project Manager
c/o Associate Director
U.S. EPA Region III
Office of Remediation (3LC20)
1650 Arch Street
Philadelphia, PA 19103-2029

One electronic copy shall be transmitted via e-mail or sent Certified Mail, Return Receipt Requested, overnight mail, or hand-carried to:

Ms. Catherine McGoldrick, Project Manager
U.S. EPA Region III
Office of Remediation (3LC20)
1650 Arch Street
Philadelphia, PA 19103-2029
mcgoldrick.catherine@epa.gov

In addition, one copy of such submission shall be sent, by regular mail, to:

Waste Management Administration
Hazardous Waste Program
Maryland Department of the Environment
1800 Washington Blvd.
Baltimore, MD 21230-1719
(410) 537 - 3344

- b. Each report, notification or other submission shall reference the Permittee's name, permit number and Facility address.
- c. All applications, reports or other information submitted to EPA shall be signed and certified as described in 40 C.F.R. §§ 270.11 and 270.30(k).
- d. The Permittee may assert a business confidentiality claim covering all or part of any information submitted to EPA pursuant to this Permit in the manner described in 40 C.F.R. § 2.203(b). Any assertion of confidentiality shall be adequately substantiated by the Permittee when the assertion is made in accordance with 40

C.F.R. § 2.204(e)(4). Information subject to a confidentiality claim shall be disclosed only to the extent allowed by, and in accordance with, the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such confidentiality claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to the Permittee. The Permittee shall not assert any confidentiality claim with regard to any physical, sampling, monitoring, or analytical data.

- e. One hardcopy of all submissions for which the Permittee is asserting a business confidentiality claim pursuant to Paragraph 9.d, above, shall be sent Certified Mail, Return Receipt Requested, overnight mail, or hand-carried to:

Office of Remediation (3LC20)
EPA Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103

10. Duty to Maintain Documents at the Facility

Pursuant to 40 C.F.R. § 264.73, the Permittee shall maintain at the Facility (or other location approved by the Regional Administrator) during the term of this Permit, including any reissued permit, all documents and raw data, such as laboratory reports, drilling logs, and other supporting information generated from investigations required by this permit including amendments, revisions and modifications to these documents.

11. Duty to Minimize Waste

The Permittee shall certify no less often than annually that the Permittee has a program in place to reduce the volume and toxicity of hazardous waste that the Permittee generates to the degree determined by the Permittee to be economically practicable; and the proposed method of treatment, storage or disposal is the practicable method currently available to the Permittee which minimizes the present and future threat to human health and the environment. The Permittee shall maintain each such certification of waste minimization at the Facility until closure of such Facility. (40 C.F.R. § 264.73(b)(9))

12. Duty to Comply with the Land Disposal Restrictions

All activities of the Permittee which involve the land disposal of hazardous waste are subject to the provisions of RCRA § 3004(b)-(m), 42 U.S.C. § 6924(b)-(m), and applicable regulations thereunder at 40 C.F.R. Part 268.

13. Reporting Requirements

a. Planned Changes

The Permittee shall give notice to the Regional Administrator, as soon as possible, of any planned physical alterations or additions to the Facility. (40 C.F.R. § 270.30(l)(1))

b. Anticipated Noncompliance

The Permittee shall give advance notice to the Regional Administrator of any planned changes in the Facility or activity which may result in noncompliance with permit requirements. (40 C.F.R. § 270.30(l)(2))

c. Monitoring Reports

Monitoring reports shall be reported at the intervals specified elsewhere in this Permit. (40 C.F.R. § 270.30(l)(4))

d. Noncompliance with Schedules for Interim and Final Requirements

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Permit shall be submitted no later than fourteen (14) days following each schedule date. (40 C.F.R. § 270.30(l)(5))

e. Twenty-four Hour Reporting

The Permittee shall report to the Regional Administrator any noncompliance which may endanger health or the environment within 24 hours from the time the Permittee becomes aware of the circumstances. The report shall contain the information listed in 40 C.F.R. § 270.30(l)(6).

f. Manifest Discrepancy Report

If a significant discrepancy in a manifest is discovered, the Permittee must attempt to reconcile the discrepancy. If not resolved within fifteen (15) days, the Permittee shall submit a letter report including a copy of the manifest, to the Regional Administrator. (40 C.F.R. § 270.30(l)(7))

g. Unmanifested Waste Report

The Permittee shall submit a report to the Regional Administrator within 15 days of receipt of unmanifested waste. (40 C.F.R. § 270.30(l)(8))

h. Biennial Report

The Permittee shall submit a biennial report covering Facility activities during odd numbered calendar years. (40 C.F.R. § 270.30(1)(9))

i. Other Noncompliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above, at the time monitoring reports are submitted. The reports shall contain the information listed in 40 C.F.R. § 270.30(1)(6). (40 C.F.R. § 270.30(1)(10))

j. Failure to Submit Relevant and/or Accurate Information

Whenever the Permittee becomes aware that it failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, the Permittee shall notify the Regional Administrator of such failure within seven (7) days of becoming aware of such deficiency or inaccuracy. The Permittee shall submit the correct or additional information to the Regional Administrator within thirty (30) days of becoming aware of the deficiency or inaccuracy (40 C.F.R. § 270.30(1)(11)). Failure to submit the information required in this Permit or misrepresentation of any submitted information is grounds for termination of this Permit. (40 C.F.R. § 270.43)

C. APPROVAL OF SUBMISSIONS; INCORPORATION INTO PERMIT

All plans, reports, schedules, and other submissions required by the terms of this Corrective Action Permit are, upon approval by EPA, incorporated into this Corrective Action Permit. Any noncompliance with such approved schedules, plans, reports, or other submissions shall be deemed noncompliance with this Corrective Action Permit. In the event of unforeseen circumstances beyond the control of the Permittee which could not be overcome by due diligence, the Permittee may request a change, subject to EPA approval, in the previously approved plans, reports, schedules or other submissions. This request may result in a modification of the Corrective Action Permit.

D. DISPUTE RESOLUTION

Except as otherwise provided in this Permit in the event the Permittee disagrees, in whole or in part, with EPA disapproval of any submission required by this Permit, the Permittee shall notify EPA in writing of its objections, and the basis therefore, within twenty-one (21) days of receipt of EPA's disapproval.

Such notice shall set forth the specific matters in dispute, the basis for the Permittee's

belief that its position is consistent with the permit requirements, and any supporting documentation.

EPA and the Permittee shall have an additional twenty-one (21) days from EPA receipt of the notification to meet or confer to resolve any dispute. In the event agreement is reached, the Permittee shall submit the revised submission and implement the same in accordance with such agreement.

In the event EPA and the Permittee are not able to reach agreement within this twenty-one (21)-day period, the Permittee shall have the opportunity to submit written comments regarding EPA's disapproval, and receive a written decision from the EPA Regional Administrator or his delegate (e.g., the Division Director or the Office Director) regarding the Permittee's objection. EPA will notify the Permittee in writing of its decision and the Permittee shall comply with the terms and conditions of EPA's decision. The Permittee does not waive its right to assert any and all available defenses in a proceeding to enforce this permit, nor does it waive any statutory or regulatory rights it may have, if any, to affirmatively challenge EPA's decision in the dispute.

E. EFFECT OF PERMIT

1. This Permit authorizes only the management of hazardous waste expressly described in this Permit and does not authorize any other management of hazardous waste.
2. Issuance of this Permit does not convey property rights of any sort or any exclusive privilege, nor does it authorize any injury to persons or property, or invasion of other private rights, or any infringement of State or local laws or regulations. (40 C.F.R. §§ 270.30(g) and 270.4(b) and (c)). Compliance with this Permit during its term constitutes compliance with Subtitle C of RCRA, except for those requirements not included in the Permit which are described in 40 C.F.R. § 270.4(a)(1)(i)-(iv). However, compliance with the terms of this Permit does not constitute a defense to any action brought under Section 7003 of RCRA, 42 U.S.C. § 6973, Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended 42 U.S.C. §9606(a) (commonly known as Superfund), or any other law governing protection of public health or welfare or the environment.
3. Nothing contained herein shall in any way be deemed to waive the Permittee's obligation to comply with 40 C.F.R. Part 270, Subpart C, and applicable regulations set forth at 40 C.F.R. Part 124.

F. MODIFICATION, REVOCATION AND REISSUANCE

1. This Permit may be modified, revoked and reissued, or terminated for cause. This Permit is based on information provided to EPA by the Permittee and MDE. Section 3005(c)(3) of RCRA provides EPA the authority to review and amend the Permit at any time. Any inaccuracies found in the information submitted by the Permittee may be grounds for the termination, modification or revocation and reissuance of this Permit (see 40 C.F.R. §§ 270.41, 270.42 and 270.43). The Permittee must inform EPA of any deviation from or changes in the Permittee-submitted information that would affect the Permittee's ability to comply with the applicable statutes, regulations or permit conditions.
2. In the event that information becomes available to EPA identifying solid waste management units that require corrective measures, EPA will modify this Corrective Action Permit. This paragraph does not limit EPA's authority to otherwise modify this Corrective Action Permit in accordance with 40 C.F.R. Part 270, Subpart D.

G. TRANSFER OF PERMIT

1. This Corrective Action Permit is not transferable to any person, except after notice to EPA (40 C.F.R. § 270.30(l)(3)). This Corrective Action Permit may be transferred by the Permittee to a new owner or operator only if the Corrective Action Permit has been modified or revoked and reissued under 40 C.F.R. § 270.40(b) or 270.42(b)(2) to identify the new permittee and incorporate such other requirements as may be necessary under the appropriate Act. (40 C.F.R. § 270.40) The Regional Administrator may require modification or revocation and reissuance of the Permit to change the name of the Permittee and incorporate such other requirements as may be necessary under RCRA. (40 C.F.R. § 270.30(l)(3))
2. Before transferring ownership or operation of the Facility during its operating life, the Permittee transferring its interest in the Facility shall notify the new owner or operator in writing of the requirements of 40 C.F.R. Parts 264 and 270. (40 C.F.R. § 264.12(c))

H. PERMIT EXPIRATION AND CONTINUANCE

1. Pursuant to 40 C.F.R. § 270.50, this Permit shall be effective for a fixed term not to exceed ten years. Pursuant to 40 C.F.R. § 270.51, this Permit and all conditions herein will remain in effect beyond the Permit's expiration date if the Permittee has submitted a timely and complete application for a new permit (see 40 C.F.R. §§ 270.10 and 270.13 - 270.29) and, through no fault of the Permittee, the Director has not issued a new permit under 40 C.F.R. § 124.15 on or before the expiration date of this permit. In addition, each permit for a land disposal facility shall be reviewed by the Regional Administrator five years after the date of permit issuance or reissuance and shall be modified as necessary, as provided in 40 C.F.R. § 270.41 (40 C.F.R. § 270.50(d)).

2. If the Permittee wishes to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee must submit a complete application for a new permit at least 180 days before this Permit expires, unless permission for a later date has been granted by the Regional Administrator (40 C.F.R. §§ 270.10(h) and 270.30(b)).
3. The corrective action obligations contained in this Permit shall continue regardless of whether the Permittee continues to operate or ceases operation and closes the Facility. The Permittee is obligated to complete Facility-wide corrective action under the conditions of a RCRA permit regardless of the operational status of the Facility. The Permittee must submit an application for a new permit at least one hundred eighty (180) days before this Permit expires pursuant to 40 C.F.R. § 270.10(h), unless the Permit has been modified to terminate the corrective action schedule of compliance and the Permittee has been released from the requirements for financial assurance for corrective action.

I. SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby. (40 C.F.R. § 124.16(a)(2))

PART II – SPECIFIC FACILITY CONDITIONS

- A. CORRECTIVE ACTION FOR CONTINUING RELEASES; PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT
 1. Section 3004(u) of RCRA, 42 U.S.C. § 6924(u), and regulations codified at 40 C.F.R. § 264.101, provide that all permits issued after November 8, 1984 must require corrective action as necessary to protect human health and the environment for all releases of hazardous waste or hazardous constituents from any solid waste management unit (SWMU), regardless of when waste was placed in the unit.
 2. Under Section 3004(v) of RCRA, 42 U.S.C. § 6924(v), and 40 C.F.R. § 264.101(c), EPA may require that corrective action at a permitted facility be taken beyond the facility boundary where necessary to protect human health and the environment, unless the owner or operator of the facility concerned demonstrates to the satisfaction of EPA that, despite the owner or operator's best efforts, the owner or operator was unable to obtain the necessary permission to undertake such action.
 3. Section 3005(c)(3) of RCRA, 42 U.S.C. § 6925(c)(3), and 40 C.F.R. § 270.32(b) provide that each permit shall contain such terms and conditions as EPA determines necessary to protect human health and the environment.

B. REMEDY IMPLEMENTATION

1. On September 14, 2006, EPA selected a Final Remedy for the Facility in a Final Decision and Response to Comments under RCRA Section 3004(u) (FDRTC). The First Permit Modification incorporates the Final Remedy and provides for its implementation pursuant to 40 C.F.R. § 270.41. Subsequently in 2014, EPA approved the temporary (eighteen (18) month) shutdown of the groundwater recovery and treatment system as part of the Interim Monitoring Plan to assess changes in site groundwater conditions during the discontinuation of the groundwater extraction/treatment at the Facility. The temporary shutdown also allowed evaluation of the appropriateness of transitioning to a monitoring only program. Data collected during the eighteen (18) month Interim Monitoring Plan demonstrated that monitoring only may be an appropriate remedy for Facility and the operation of the pump and treat system in this area may no longer be warranted.
2. Commencing on the effective date of this Permit and thereafter, the Permittee shall implement the corrective actions at the Facility as follows:
 - a. The Permittee shall continue to implement a Facility-wide groundwater monitoring program in accordance with the Sampling and Reporting Plan, approved by EPA on February 13, 2017 and included herein as Attachment B. The Permittee may propose in writing to terminate or modify the Facility-wide groundwater monitoring program if sampling rounds show that Groundwater Cleanup Standards have been achieved.
 - b. The Permittee shall continue to implement the Facility-wide groundwater monitoring program until EPA provides prior-written approval that such program may be terminated or issues a written determination outlining necessary or appropriate alternative sampling and reporting requirements or corrective actions and the reasons therefor.
 - c. The Permittee shall abide by the Title Notice prohibition as set forth within Attachment B, which includes groundwater use restrictions prohibiting the development of onsite wells at the Facility for drinking water or other domestic uses. The Title Notice shall remain in effect for as long as necessary to minimize potential exposure and until EPA provides prior-written approval that such Title Notice may be terminated.

C. FINANCIAL ASSURANCE

1. Within 30 days of the effective day of this Permit, the Permittee shall provide assurances of financial responsibility for completing the Final Remedy as required by Section 3004(u) of RCRA, 42 U.S.C. § 6924(u).
2. Permittee shall annually adjust the Cost Estimate for inflation and for changes in the corrective actions required under Part II "Remedy Implementation" until such corrective actions are completed. By January 31st of each year, Permittee shall submit each annual Cost Estimate to EPA for review.

3. By March 31st of each year, the Permittee shall demonstrate compliance with financial assurance to EPA in accordance with 40 C.F.R. § 264.143 for completing the Final Remedy in accordance with 40 C.F.R. § 264.101(b). Within thirty (30) calendar days of approval of any revised cost estimate and the draft financial assurance instruments, the Permittee shall demonstrate to EPA financial assurance for the updated cost estimates.
4. Permittee's inability or failure to establish or maintain financial assurance for completion of the Final Remedy shall in no way excuse performance of any other requirements of this Permit.

D. EMERGENCY RESPONSE, RELEASE REPORTING

1. Emergencies

If, at any time during the term of this permit, the Permittee discovers that a release of hazardous waste or hazardous constituents at or from the Facility is presenting or may present an imminent and substantial endangerment to human health or the environment, the Permittee shall:

- a. Notify EPA as soon as practicable of the source, nature, extent, location and amount of such release, the endangerment posed by such release and the actions taken and/or to be taken, to the extent known, to address such release. Such notification shall be confirmed in writing within three (3) calendar days of discovery of such release; and
- b. Unless otherwise directed by EPA, immediately take such actions as are necessary and appropriate to address such release.

E. GUIDANCE DOCUMENTS

All work to be performed at the Facility pursuant to this Permit shall be in general accordance with applicable EPA RCRA corrective action guidance available at: <https://www.epa.gov/hwcorrectiveactionsites/corrective-action-resources-specific-epas-region-3>

F. RECORDKEEPING

Upon completion of closure of any current or future SWMU, the Permittee shall maintain in the Facility operating record, documentation of the closure measures taken.

G. ACCESS FOR CORRECTIVE ACTION OVERSIGHT


EPA and its authorized representatives shall have access to the Facility at all reasonable times for the purpose of monitoring compliance with the provisions of this Corrective Action Permit. The Permittee shall use best efforts to obtain access to property beyond the boundaries of the Facility, if needed, for: (1) itself and any contractor of the Permittee for the purpose complying with the provisions of this Corrective Action Permit; and (2) EPA and its authorized representatives for the purpose of monitoring compliance with the provisions of this Corrective Action Permit. Best efforts shall include, but not be limited to, agreement to reasonable conditions for access and/or the payment of reasonable fees.

H. EFFECTIVE DATE

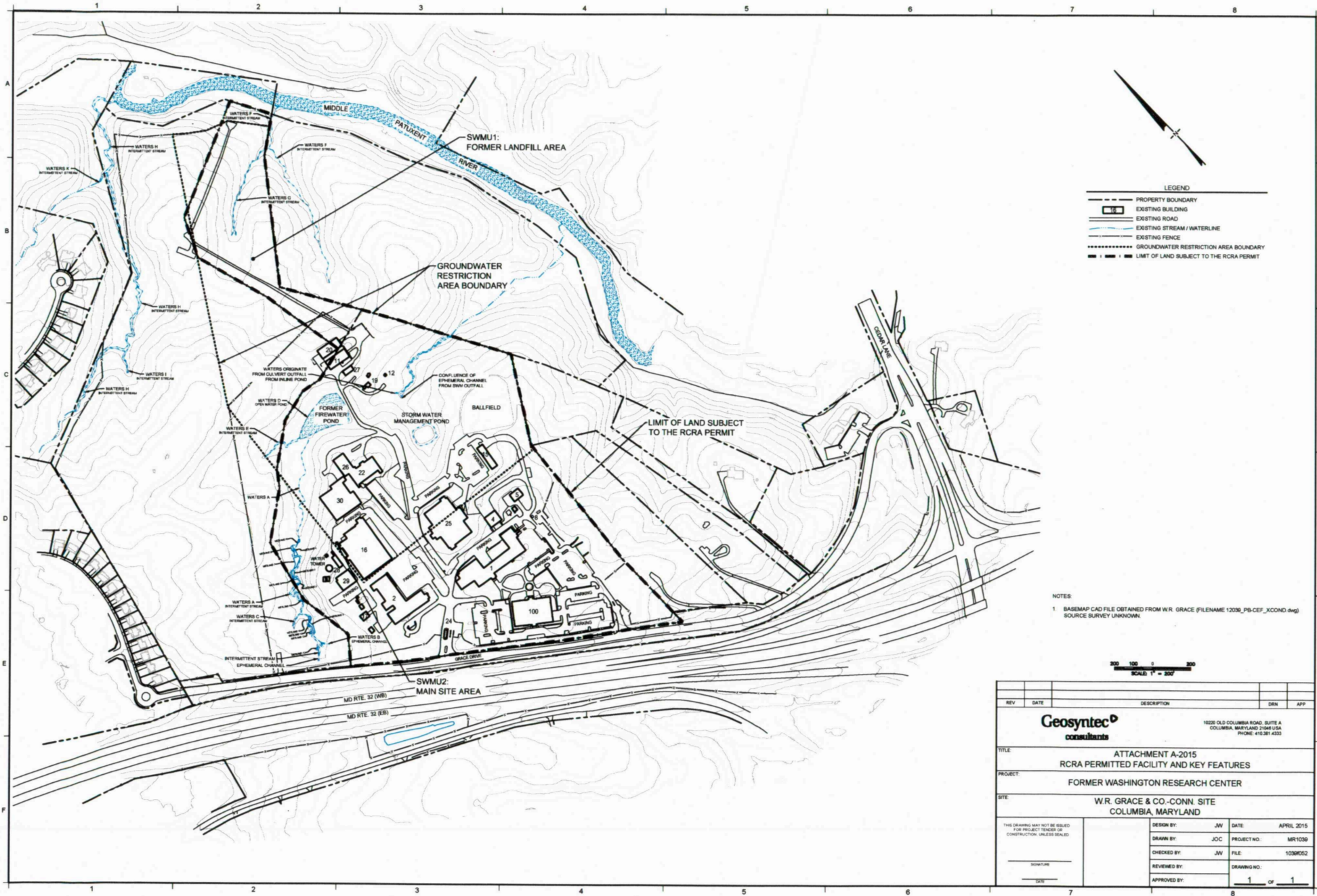
This Corrective Action Permit is effective on 6/14/2018 and shall remain in effect until 6/14/2028 unless revoked and reissued, modified, or terminated in accordance with 40 C.F.R. §§ 270.41, 270.42 and 270.43 or continued in accordance with 40 C.F.R. § 270.51(a).

I. SIGNATURE

Date: 5.15.18



John A. Armstead, Director
Land and Chemicals Division
U.S. Environmental Protection Agency, Region III



REV	DATE	DESCRIPTION	DIN	APP
<small>1022 OLD COLUMBIA ROAD, SUITE A COLUMBIA, MARYLAND 21046 USA PHONE: 410.381.4333</small>				
TITLE ATTACHMENT A-2015 RCRA PERMITTED FACILITY AND KEY FEATURES				
PROJECT FORMER WASHINGTON RESEARCH CENTER				
SITE W.R. GRACE & CO.-CONN SITE COLUMBIA, MARYLAND				
<small>THIS DRAWING MAY NOT BE REPRODUCED OR USED FOR ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF GEOSYNTEC CONSULTANTS.</small>		DESIGN BY: JW DRAWN BY: JOC CHECKED BY: JW REVIEWED BY: APPROVED BY:	DATE: APRIL 2015 PROJECT NO.: MR1039 FILE: 1039002 DRAWING NO.: 1 of 1	

OBG

FINAL

SAMPLING AND REPORTING PLAN

CORRECTIVE ACTION PERMIT NO. MDD 07-493-3961

**7500 Grace Drive
Columbia, MD**

W.R. Grace & Co. – Conn.

January 2017



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1	Land Records Howard County 2008
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INTRODUCTION

W. R. Grace & Co.-Conn. (Grace) is implementing a Resource Conservation and Recovery Act (RCRA) Corrective Action project (Corrective Action Permit No. MDD 07-493-3961 [the Permit]) at the approximately 108-acre facility located at 7500 Grace Drive, Columbia, MD (the Facility). The RCRA Site is an approximately 62-acre portion of the Facility as shown in Figure “A-2015”.¹ The Facility is the current location of Grace’s corporate headquarters.

Background information regarding the Grace property, regulatory measures, and previous investigations are summarized in the *RCRA Facility Investigation / Corrective Measures Study - Final Draft Report* (O’Brien & Gere Engineers, Inc., February 1999). Key historical cleanup activities included:

1. Excavation and off-site disposal of soil and debris at the Former Landfill Area (Solid Waste Management Unit [SWMU] 1), an action completed in 1984; and
2. Soil vapor extraction in the vicinity of Building 16 within the Main Site Area (SWMU 2), completed in 1996.

Groundwater pump and treat operations in the Main Site Area and groundwater monitoring in the Former Landfill Area have since been conducted under the Permit. The Permit set forth these corrective measures and the clean-up standards for groundwater constituents of concern (COCs), as follows:

Table 1 – Site Constituents of Concern and Their Maximum Contaminant Level

Constituent	Maximum Contaminant Level (ug/L)
Trichloroethene (TCE)	5
1,1-dichloroethene (1,1-DCE)	7
1,1,1-trichloroethane (1,1,1-TCA)	200
trans-1,2-dichloroethene (trans-1,2-DCE)	100
Tetrachloroethene (PCE)	5
1,1,2,2-tetrachloroethane (PCA)	Not Applicable
Vinyl Chloride	2

The pump and treat and groundwater monitoring actions were implemented in accordance with the *Corrective Measures Implementation (CMI) Work Plan* (O’Brien & Gere, 2008) as approved by the United States Environmental Protection Agency (USEPA) in June 2008. The CMI Work Plan included the procedures for groundwater and surface water sampling and analysis; groundwater elevation monitoring; remediation system operation, inspections, and sampling; and reporting.

In April 2014, USEPA approved a request from Grace to shut-down the groundwater extraction remediation system based on an analysis of site conditions. The USEPA approval was conditioned on implementation of an Interim Monitoring Plan (IMP) that monitored groundwater conditions with time. The IMP was approved by USEPA in June 2014. At the conclusion of the IMP implementation period the USEPA agreed that: the remedy of

¹ The Site definition was revised to that shown in the referenced figure through the Second Permit Modification to the HSWA Corrective Action Permit (ID No. MDD074933961) issued November 18, 2015 and effective January 1, 2016.

pump and treat system in the Main Site Area has been successful and shutdown of the system has not caused a rebound in site COCs; that there is no risk to receptors from site COCs in the groundwater beneath the Former Landfill Area; and that monitoring of groundwater conditions and institutional controls is the appropriate remedy.

This Sampling and Reporting Plan presents the planned continued monitoring of groundwater quality and institutional controls at the site; including the methodology, sample schedule, and reporting requirements.

SAMPLING AND ANALYSIS PLAN

The objective of the ongoing corrective measures is to monitor groundwater quality until the cleanup standards have been achieved. Groundwater and surface water will be monitored to gather groundwater head/elevation data and COC concentrations of sufficient quality to enable groundwater flow to be detailed and trends in concentrations evaluated.

A network of six monitoring wells remains at the Main Site for the purpose of groundwater monitoring and sample collection. The wells monitor both the overburden and bedrock groundwater conditions and are summarized on Table 2 below and illustrated on Figure 1 (attached). Available well logs are provided in Appendix A.

Table 2 - Summary of Main Site Area Monitoring Wells

<i>Well #</i>	<i>Well depth in feet below grade</i>	<i>Aquifer</i>
MW5	300	bedrock
MW8	63	overburden
MW18	206	bedrock
MW22	300	bedrock
MW25	280	bedrock
MW26	130	bedrock

A network of nine monitoring wells remains at the Former Landfill Area for the purpose of groundwater monitoring and sample collection. The wells monitor both the overburden and bedrock groundwater conditions and are summarized on Table 3 below and illustrated on Figure 1. Available well logs are provided in Appendix A.

Table 3 - Summary of Former Landfill Area Monitoring Wells

<i>Well #</i>	<i>Well depth in feet below grade</i>	<i>Aquifer</i>
MW12	148	bedrock
MW15	205	bedrock
MW19	48	overburden
MW1407	29	overburden
MW1408	25	overburden
MW2182	61	bedrock
MW2235	38	overburden
MW20	203	bedrock
MW21	48	overburden

Consistent with the objectives of the corrective measures, sampling of groundwater monitoring wells and selected surface water sampling locations will be conducted every fifteen months. A sample interval of this timeframe will allow representation of seasonal effects every five years. This Sampling Program will include the measurement of groundwater depths at the remaining nine monitoring wells at the Former Landfill Area and the six monitoring wells at the Main Site. Once depth to groundwater measurements have been obtained, groundwater samples will be collected from three monitoring wells at the Main Site Area and eight groundwater monitoring wells at the Former Landfill Area; in addition, two surface water samples will be collected from locations (one at the Main Site Stream [SWS 24] and one at the Former Landfill Area stream [SWS 29]) as presented in Table 4 below.

Table 4 - List of Monitoring Wells included in Sampling and Analysis Program

<i>Former Landfill Well #</i>	<i>Main Site Well #</i>	<i>Surface Water Location</i>
MW12	MW5	SWS 24
MW15	MW8	SWS 29
MW19	MW18	
MW1407		
MW1408		
MW2182		
MW2235		
MW20		

Historical data from remaining wells and the two surface water locations are presented in tables (Table B-1 for Main Site data and Table B-2 for Former Landfill Area data) presented in Appendix B.

SAMPLING PROCEDURES

Passive diffusion sampling bags have been utilized at the Grace facility since September 2001 to collect groundwater samples from monitoring wells to be analyzed for volatile organic compounds (VOCs). The diffusion sampling bags utilized at the site will be one inch in diameter and two-feet in length. Diffusion bags will be pre-filled by the laboratory and shipped inside a Mylar pouch that acts as a moisture and oxygen barrier. For each well to be sampled, the diffusion bag will be installed at the predetermined depth utilizing a diffusion hanging apparatus made entirely of stainless steel and consisting of a line, carabiners, a weight, and a locking clip. Diffusion apparatus will be dedicated to individual wells, to eliminate the possibility of cross contamination from the apparatus between wells. Each bag will be left in place for a minimum of three weeks, during which time VOCs present in formation water, if any, will equilibrate with the water contained in the diffusion bag. Table 5, below, summarizes the identified fracture zones and diffusion bag depths for the Grace site.

Table 5 - Summary of Fracture Zones and Diffusion Sample Bag Depth

Well #	Total Well Depth (ftbg)	Fracture/Water Bearing Zone Depth (ftbg)	Depth of Top of Diffusion Bag (ftbg)
MW5	300	67	66
MW8	63	36-56*	42
MW12	148	128-140	133
MW15	203	177-177.5	176
MW18	206	184-185	183.5
MW19	48	40-48*	42
MW20	203	197-198	196.5
MW21	48	40-42*	40#
MW22	300	285-287	285#
MW25	280	260-270	264#
MW26	130	55	54#
MW1407	29	26*	25
MW1408	25	23*	22
MW2235	38	31*	30
MW2182	65	55-60	57

ftbg Indicates feet below grade

* indicates well is screened in the unconfined, overburden shallow aquifer, and therefore, the hydraulic interval is not a water-bearing fracture.

Indicates well is not included in sampling program; Depth noted is placement depth during prior sampling programs.

PROCUREMENT OF EQUIPMENT

Diffusion bag hanging apparatus, dedicated to each well, have been purchased from ALS Environmental (ALS) in Houston, Texas. The hanging apparatus were assembled by ALS at their facility. Each apparatus is equipped with a locking plastic clip at the selected length to provide accurate placement of the diffusion bag within the well. If new hanging apparatus are required they will come secured in a plastic bag, ready for installation.

Diffusion sample bags will also be purchased from ALS. The diffusion sample bags will be filled with de-ionized water by ALS at their facility, and shipped to OBG in Mylar pouches. Diffusion sample bags will remain in the Mylar pouch until installation in the well.

INSTALLATION OF DIFFUSION BAGS

The following procedures will be implemented for installation of diffusion sample bags.

1. Don a new pair of nitrile gloves.
2. Open well and gauge depth to groundwater using a decontaminated electronic probe capable of measuring water levels to the nearest 0.01ft.
3. Remove diffusion hanging apparatus from inside well.

4. Verify that depth of top of diffusion bag placement will be deeper than the depth to water reading.
5. Don a new pair of nitrile gloves.
6. Open Mylar pouch containing diffusion bag, immediately install diffusion bag onto apparatus utilizing locking clips set at predetermined depth.
7. Carefully lower the diffusion apparatus into the well taking care to prevent chafing on sides of well casing.
8. Lock diffusion apparatus at correct depth by aligning white depth marker with top of casing at well. Close and lock well with white depth marker at the top of casing.
9. Record information in field book, including any notes on apparatus condition (i.e. wire has become frayed recommend replacement prior to next sampling event, etc.).
10. Repeat procedure at each well.

DIFFUSION BAG SAMPLE COLLECTION

The following procedures will be implemented for collection of groundwater samples from the diffusion sample bags:

1. Allow a minimum of three weeks from date of diffusion bag installation before sample collection.
2. Don a new pair of nitrile gloves.
3. Carefully remove diffusion hanging apparatus from well taking care to prevent chafing on sides of well casing.
4. Carefully cut a small slit into the diffusion bag utilizing a stainless steel razor blade or scissor.
5. Fill appropriate number of sample containers taking care to minimize headspace.
6. Immediately place filled and properly labeled VOC vials into ice filled cooler.
7. Measure pH, temperature, specific conductivity, dissolved oxygen, and oxygen reduction potential (ORP) directly from within the well using a YSI multi-parameter meter and record measurements in field book.
8. Return remaining water, if any, from diffusion bag back to the well and dispose used diffusion bag.
9. Return diffusion apparatus into well
10. Close and lock well
11. Ship cooler(s) to lab under chain-of-custody for analysis of VOCs by USEPA Method 624.

SURFACE WATER SAMPLING

Surface water samples will be collected to evaluate surface water condition discharging from the Site. Surface water samples will be collected from established sampling points following procedures outlined below:

1. Don a new pair of nitrile gloves.
2. Enter streambed downgradient of sample location, facing upstream, to minimize the introduction of disturbed sediment to the sample.
3. Facing upstream, fill appropriate sample containers directly from stream flow in area of visible flow (not stagnant). Take care to minimize headspace and not to overfill the sample container and thus dilute the preservative.
4. Obtain aliquot of water to measure and record pH, temperature, and specific conductivity.
5. Ship cooler(s) to lab under chain-of-custody for analysis of VOCs by USEPA Method 624.

QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

In order to evaluate data quality characteristics of precision, accuracy, representativeness, completeness and comparability quality assurance/quality control (QA/QC) sampling will be obtained. QA/QC samples include the

collection and analysis of a matrix spike (MS), matrix spike duplicate (MSD), and duplicate. QA/QC samples will be collected at the rate of one per sample event.

A trip blank will be included in each cooler that transports VOC samples. The trip blank is provided by the laboratory and remains with the cooler throughout the sampling event. A field blank is not necessary during this program as sampling equipment is dedicated and cross contamination through handling and improper decontamination is not expected.

Prior to use, meters will be calibrated in accordance with manufacturers' procedures. Meters to measure pH will be calibrated to 4.0 and 7.0 buffers.

SAMPLE HANDLING AND MANAGEMENT

Sample containers should only be handled while donning a clean, dedicated pair of nitrile gloves. Groundwater and surface water samples will be analyzed for VOCs by USEPA Method 624. Groundwater will be collected in 40 mL glass vials provided by the laboratory with appropriate labeling. Each vial will be preserved in the laboratory with hydrochloric acid (HCl) to a pH less than 2 (S.U.). Filled vials will be secured with minimum headspace and placed in chilled coolers for shipment. Samples will be shipped to Eurofins Lancaster Laboratory in Lancaster PA. Shipment coolers will be preserved with ice to 4°C. Samples will remain chilled to 4°C until time of analysis. Samples must be analyzed by the laboratory within fourteen days of sample collection (sample holding time).

INVESTIGATION DERIVED WASTES

Investigation derived wastes (IDW) will be limited to personal protection equipment (PPE), such as nitrile gloves, plastic bags from the diffusion bags and paper towels. Water level probes will be decontaminated using paper towels moistened with dissolved Alconox (non-phosphate detergent) followed by a distilled water rinse, discharged to ground. Solid IDW, such as nitrile gloves, plastic bags and paper towels will be disposed of through the on-site solid waste management and disposal program.

INSTITUTIONAL CONTROLS

Groundwater at the site is subject to a use restriction within the boundary shown on Figure A-2015. No on-site wells may be installed or used in the Restriction Area for drinking water or other domestic uses to the extent and for as long as necessary to prevent exposure while the plume is being remediated. The use restriction was filed with the Land Records of Howard County in 2008 (see Exhibit 1).

On an annual basis while COCs are present above clean-up criteria in the monitoring well network, Grace will confirm that the groundwater use restriction is available at the Recorder's Office and that wells have not been installed within the Groundwater Use Restriction Area.

REPORTING

Grace will report to the USEPA annually. Copies of the reports will be provided to Maryland Department of the Environment (MDE) and Howard County. For those years which sampling is not conducted, the report will consist of a review of the institutional controls. For years when sampling is conducted, the reports will include the following information, as appropriate:

- A description of the efforts, and results of same, to confirm that the use restriction is available at the Recorder's Office and that no wells have been installed for drinking water or other domestic uses within the Groundwater Use Restriction Area;
- Groundwater contour map for a) overburden flow regime of Former Landfill Area; b) bedrock flow regime for Former Landfill Area; c) bedrock flow regime for Main Site;
- Laboratory Analytical results and tabular summary;
- Trend graphs of COCs versus time;
- Recommendations, as appropriate based on the data, to revise the sampling program.

KEY PERSONNEL

Table 6, below, provides the organization and contact information for the facility's RCRA Corrective Action program, as well as individual responsibilities.

Table 6 - Summary of Key Personnel, Contact Information, and Responsibilities

<i>Name</i>	<i>Title</i>	<i>Organization</i>	<i>Contact Information</i>	<i>Responsibility</i>
Paul Bucens, PE	Project Manager	W.R. Grace	617-899-0354	Remediation Project Manager. Oversees and directs remediation project; Primary point of contact; responsible for compliance with RCRA Permit. Reviews and approves reports.
Tina Bickerstaff, CPG	Managing Scientist	OBG	301-731-1157	Contractor Project Manager. Project consultant point of contact. Oversees and directs sampling and analysis; reporting.
Erich Weissbart, PG	Project Manager	USEPA	410-305-2779	RCRA Project Manager. Reviews and approves reports; confirms project deliverables and schedules are compliant with the RCRA Permit.
Ed Hammerberg	Resource Management Program	MDE	410-537-3356	Administrates the State hazardous waste program. Receives copies of reports issued under the RCRA Permit.
Niti Blackwell	Engineering Specialist III	Howard County Bureau of Environmental Services	410-313-6418	Howard County point of contact. Receives copies of reports issued under the RCRA Permit.

REFERENCES

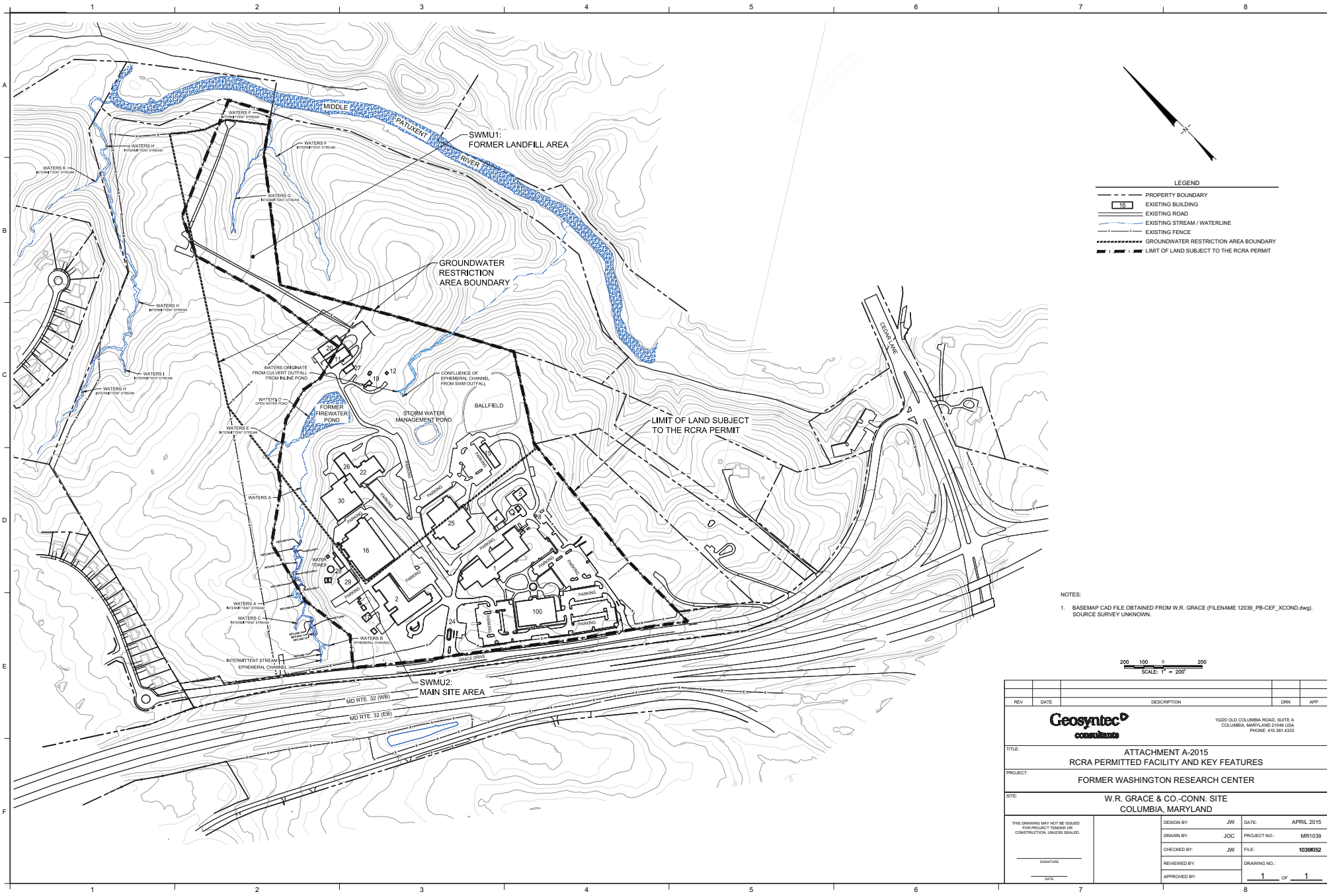
RCRA Facility Investigation / Corrective Measures Study - Final Draft Report; O'Brien & Gere Engineers, Inc., February 1999

Corrective Measures Implementation Work Plan – Permit #MDD 07-493-3961; O'Brien & Gere Engineers, Inc., May 2008

Interim Monitoring Plan; Geosyntec Consultants, May 2014

FIGURES –

- A-2015 RCRA Permitted Facility and Key Features
- 1 Site Map with Monitoring Well Locations




LEGEND

- PROPERTY BOUNDARY
- ▭ EXISTING BUILDING
- EXISTING ROAD
- EXISTING STREAM / WATERLINE
- EXISTING FENCE
- GROUNDWATER RESTRICTION AREA BOUNDARY
- LIMIT OF LAND SUBJECT TO THE RCRA PERMIT

NOTES:
 1. BASEMAP CAD FILE OBTAINED FROM W.R. GRACE (FILENAME 12039_PB-CEP_XCOND.dwg). SOURCE SURVEY UNKNOWN.

200 100 0 200
 SCALE: 1" = 200'

REV	DATE	DESCRIPTION	DRN	APP
 10200 OLD COLUMBIA ROAD, SUITE A COLUMBIA, MARYLAND 21046 USA PHONE: 410.381.4333				
TITLE: ATTACHMENT A-2015 RCRA PERMITTED FACILITY AND KEY FEATURES				
PROJECT: FORMER WASHINGTON RESEARCH CENTER				
SITE: W.R. GRACE & CO.-CONN. SITE COLUMBIA, MARYLAND				
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION, UNLESS SEALED:		DESIGN BY: JW	DATE: APRIL 2015	
		DRAWN BY: JOC	PROJECT NO.: MR1039	
		CHECKED BY: JW	FILE: 1039052	
		REVIEWED BY:	DRAWING NO.:	
		APPROVED BY:	1 OF 1	









DRAWN BY WASHINGTON RESEARCH CENTER

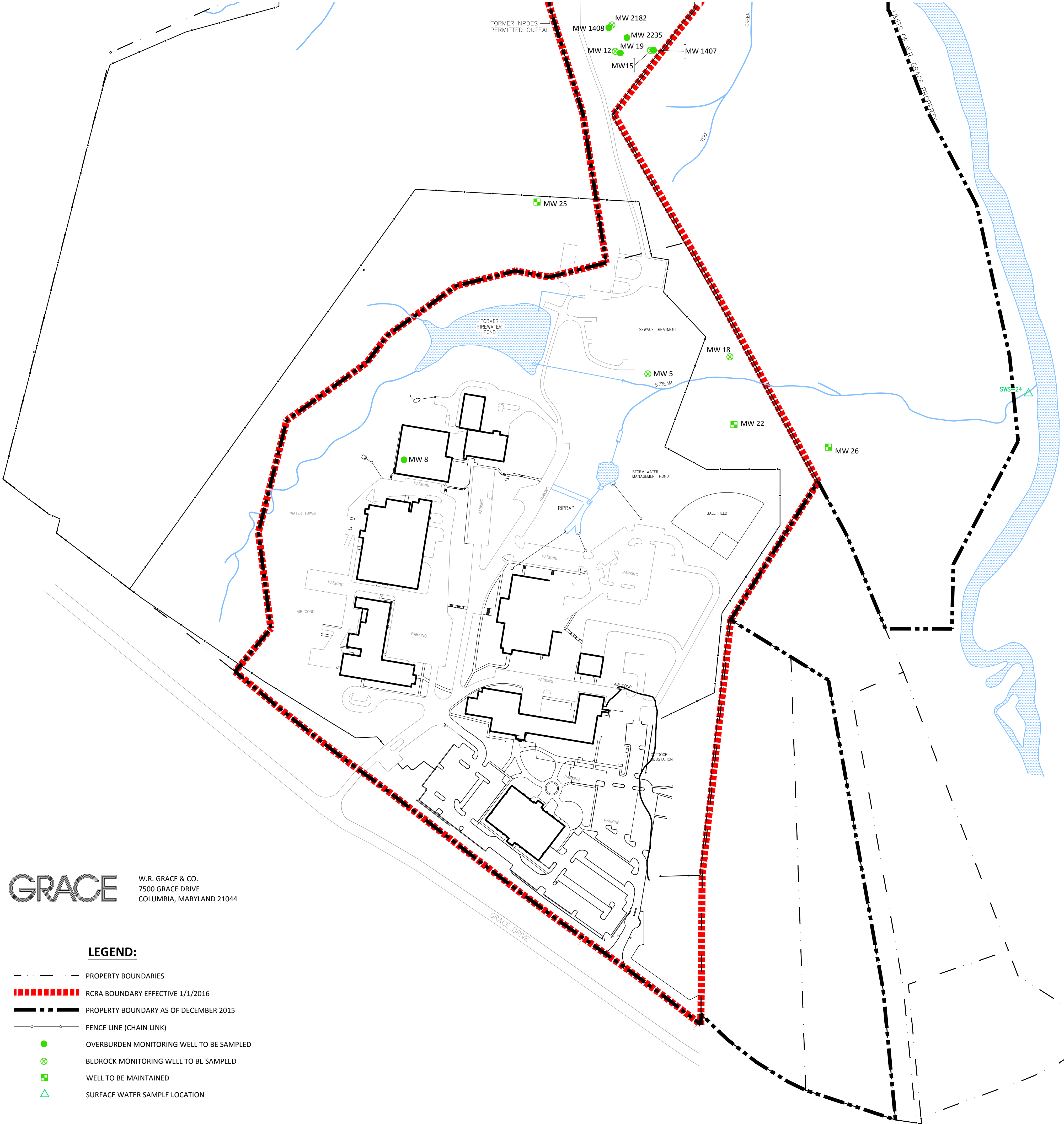
I:\W-R-Grace\3963\62854\Imp-Sampling-Fe\Docs\DWG\Sheets\Figure 1- Site Plan With Well Locations_July 2016.dwg

GRACE

W.R. GRACE & CO.
7500 GRACE DRIVE
COLUMBIA, MARYLAND 21044

LEGEND:

-  PROPERTY BOUNDARIES
-  RCRA BOUNDARY EFFECTIVE 1/1/2016
-  PROPERTY BOUNDARY AS OF DECEMBER 2015
-  FENCE LINE (CHAIN LINK)
-  OVERBURDEN MONITORING WELL TO BE SAMPLED
-  BEDROCK MONITORING WELL TO BE SAMPLED
-  WELL TO BE MAINTAINED
-  SURFACE WATER SAMPLE LOCATION



O'BRIEN & GERE
O'BRIEN & GERE ENGINEERS, INC
BOWIE, MARYLAND

FIGURE 1
SITE PLAN WITH WELL LOCATIONS
JANUARY 2017

SCALE: 1"=150'
150 0 150 300

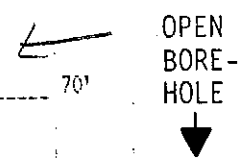
REVISION DATE: 06-29-2016

APPENDIX A –
Available Well Logs of Remaining Wells

O'BRIEN & GERE ENGINEERS, INC.		TEST BORING LOG	REPORT OF BORING NO. MW5	SHEET 1 OF 4
PROJECT LOCATION: WA GRACE WASHINGTON RESEARCH CENTER		SAMPLER	GROUND WATER DEPTH	DATE DATE
CLIENT: VENABLE, BAETJER & HOWARD		TYPE: HAMMER: FALL:	ELEV. ELEV.	FILE NO.: 3625.001.590

BORING CO.: LF EASTERDAY, INC.	BORING LOCATION: NEAR SEWAGE TREATMENT PLANT
FOREMAN: WESLEY	GROUND ELEVATION:
LOGS GEOLOGIST: DEBORAH WRIGHT	DATES: STARTED: 7/10/87 ENDED: 7/13/87

DEPTH	SAMPLE				SAMPLE DESCRIPTION	STRATUM CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R K S*
	No.	DEPTH	DRELLING RATE	PENETR/RECOVERY				"N" VALUE	SAL. 0/00	SO. COND.	
					SAPROLITE - Brown, weathered SCHIST						
-5											
-10											
-15											
-20											
-25											
-30											
-35											
-40											
-45											
-50											
-53					QUARTZ MONZONITE - Tan, m/c grained	53'					
-55											
-60											
-65											
-67					(water zone at 67')						
-70					QUARTZ MONZONITE - Tan, f/m grained	70'					
-75											



OVERMAN & BERG ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING NO. MWS	SHEET 2 OF 4
PROJECT LOCATION: WA GRADE WASHINGTON FEDERAL CENTER CITY: VENUE, BENTLEY & HOWARD	SAMPLER	GROUND WATER DEPT. DATE ELEV. DEPT. DATE ELEV.	FILE NO.: 3625.001.590

BOHRING CO.: F. SARTERDAY, INC. ADDRESS: 1215 W. 12TH AVE. DENVER, CO. 80202	BORING LOCATION: NEAR SEWAGE TREATMENT PLANT GROUND ELEVATION: DATE: STARTED: 7/10/87	ENDED: 7/13/87
--	---	----------------

DEPTH	SAMPLE				SAMPLE DESCRIPTION	STARTUP CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING				
	NO.	DEPT.	COLLECTING RATE	RECOVERY/ RECOVERY				WATER TEMP.	COND.	PH	RES.	
0												
10												
20												
30												
40												
50												
60												
70												
80												
90												
100												
110												
120												
130												
140												
150												

50'
 QUARTZ PORZONITE - Tan/gray, micaceous, little QUARTZ
 PORZONITE

120'
 QUARTZ PORZONITE - Tan, w/c grained
 (yield at 120' - 1/2 gal)

← yield @ 120' = 1/2 gpm

(f/u grained at 135')
 135'
 QUARTZ PORZONITE - Gray, f/c grained, little
 QUARTZ

145'
 QUARTZ PORZONITE - Gray, w/c grained, quartz
 fragments

150'
 QUARTZ PORZONITE - Tan, w/c grained

SAMPLE

GROUND WATER

DATE DATE ELEV. ELEV.

FILE NO. 3825 (01159)

NEAR SEWAGE TREATMENT PLANT

ENDED: 7 1947

FIELD TESTING R

SAMPLE IDENTIFICATION

EQUIPMENT

90. 95. 1. 5*

Qtz monzonite - Tan m/c grainat, some feldspar

150' Qtz fragments

Qtz monzonite - Tan m/c grainat, some feldspar and quartz fragments

105' Qtz monzonite gray f/m grainat mica muscovite

more feldspar @ 175'

more feldspar @ 170'

(yield at 180' - 1.5 gpm - likely from 170')

← yield @ 180' - 1.5 gpm (likely from 170')

Qtz monzonite - Orange/gray + black, feldspar, quartz, mica, some monzonite

185' Pegmatite - Orange/gray + black, feldspar, Qtz some monzonite

Qtz monzonite - Tan m/c grainat, some feldspar

200' Qtz monzonite fine grained trace biotite

Qtz monzonite + schist gray

210'

← yield @ 212' - 1.5 gpm

schist gray Qtz fragments

215'

220'

some schist

Qtz monzonite - gray f/m grainat some schist/micaeous

230'

Schist-gray (micaeous)

NEAR EDWARDS TREATMENT PLANT
 FIELD TESTING

Qtz monzonite - gray f/m grained 235'

Yield at 240' = 1.75 gpm
 ← yield @ 240' - 1.75 gpm

Qtz Monzonite m/c 245'

some feldspar w/Qtz

Very coarse grained feldspar 250'

Qtz micaceous 260'

265'

Qtz monzonite, f/m grained
 little feldspar

Yield at 300' = 2.5 gpm

← yield @ 300' 2.5 gpm

300'

305'

O'BRIEN & GERE ENGINEERS, INC. TEST BORING LOG REPORT OF BORING NO. MW-8 SHEET 1 OF 5

PROJECT LOCATION: Columbia, MD. CLIENT: W.R. Grace

TYPE: Split-Spoon SAMPLER
HAMMER: 140 lbs.
FALL: 30"

BORING CO.: ATEC FOREMAN: Bernie
ORG GEOLOGIST: Mike Wittner

BORING LOCATION: North of Bldg. 1b
GROUND ELEVATION:
DATES: STARTED: 7/08/87 ENDED: 7/03/87

GROUND WATER DEPTH DATE ELEV.
DEPTH DATE ELEV.
FILE NO.: 3625.001

DEPTH	SAMPLE					SAMPLE DESCRIPTION	STARTUP CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R M K S*
	No.	DEPTH	BLOWS /6"	PENETRAN/ RECOVERY	"N" VALUE				SAL. 0/00	SP. COND.	PHU	
0	1	0-2	1-6-8-8	24/20	14	Light brown-tan, damp, micaceous silty SAND, (3" of topsoil).						(1)
2	2	2-4	5-7-8-9	24/18	15	Same as sample 1.						(1)
4	3	4-6	7-8-7-7	24/14	15	Light brown-tan, dry, micaceous silty SAND, coarser texture.						(1)
6	4	6-8	5-9-10-11	24/18	19	Tan, dry, micaceous, silty SAND.						(1)
8	5	8-10	8-10-15-17	24/18	25	Tan, dry, micaceous silty SAND, biotite/muscovite present in sheets.						(1)
10	6	10-12	10-21-42-39	24/20	63	Tan, dry, decayed MICR SCHIST, original bedding present.						(1)
12	7	12-14	35-100/6"	12/12	---	Same as sample 6.						(1)
14	8	14-16	27-57-64-58	24/16	121	Same as sample 6.						(1)

* Water table at 30 ft. below surface.
Auger refusal at 68' 3" ft. below surface.
Lab analysis: sample 25=8 pob TCE.
sample 32=10 pob TCE.

O'BRIEN & GERE ENGINEERS, INC. PROJECT LOCATION: Columbia, MD. CLIENT: W. R. Grace	TEST BORING LOG TYPE: Split-Spoon HAMMER: 140 lbs. FALL: 30"	REPORT OF BORING NO. MW-8 SHEET 2 OF 5 GROUND WATER DEPTH DATE ELEV. DEPTH DATE ELEV. FILE NO.: 3625.001
---	--	--

BORING CO.: ATEC FOREMAN: Bernise OBS GEOLOGIST: Mike Wittner	BORING LOCATION: North of Bldg. 10 GROUND ELEVATION: DATES: STARTED: 7/08/87 ENDED: 7/09/87
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DEPTH	SAMPLE					SAMPLE DESCRIPTION	STATUS CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R M K S*	
	No.	DEPTH	BLOWS /6"	PENETRAN/ RECOVERY	"N" VALUE				SAL. 0/00	SP. COND.	HNH		
16	9	16-18	22-52-46-32	24/18	98	Same as sample 6.							(1)
18	10	18-20	12-16-13-14	24/19	29	Tan. dry, decayed MICA SCHIST, one 3" layer of friable weathered white quartz.							(1)
20	11	20-22	8-45-58-39	24/22	103	White, dry, friable weathered quartz with some tan dry, decayed MICA SCHIST, large (1 cm.) angular chunks of quartz present.							(1)
22	12	22-24	40-41-35-48	24/24	76	Top portion of spoon same as sample 11, then dirty tan, dry, decayed MICA SCHIST, more biotite.							(1)
24	13	24-26	32-65-82-79	24/18	147	White, dry, friable weathered quartz (upper 15"), then dirty brown, dry decayed MICA SCHIST.							(1)
26	14	26-28	68-77- 91-100	24/24	168	Dirty tan, dry, decayed MICA SCHIST (upper 18"), then white-orange tan, damp, friable quartz and muscovite with original bedding.							(1)
28	15	28-30	31-53-39-48	24/24	92	Dirty tan, dry decayed MICA SCHIST, friable- hardly any original bedding.							(1)
30	16	30-32	10-10-13-18	24/20	23	Dirty brown, decayed MICA SCHIST (upper 10"), then soft white-tan crumbly sandy SILT.							(1)

PROJECT LOCATION: Columbia, MD.

SAMPLER

GROUND WATER

DEPTH

DATE

ELEV.

DEPTH

DATE

ELEV.

CLIENT: W.R. Grace

TYPE: Split-Spoon
HAMMER: 140 lbs.
FALL: 30"

FILE NO.: 3625.001

BORING CO.: ATEC
FOREMAN: Bernie
OBS GEOLOGIST: Mike Wittner

BORING LOCATION: North of Bids. 1b
GROUND ELEVATION:
DATES: STARTED: 7/08/87

ENDED: 7/09/87

DEPTH	SAMPLE					SAMPLE DESCRIPTION	STRATUM CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R M K S*	
	No.	DEPTH	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE				SAL. 0/00	SP. COND.	HNU		
32	17	32-34	37-54-44-48	24/24	98	Dirty dark brown decayed MICA SCHIST (upper 14"); then almost pure white, damp, friable quartz and muscovite; silty texture.							(1)
34	18	34-36	13-19-22-37	24/24	41	Salt and pepper white, damp, decayed QUARTZ MONZONITE; 4" layer of large quartz crystals at bottom of spoon; thin biotite seams every 2-4 ft. in monzonite.							4
36	19	36-38	42-36-21-18	24/24	57	Salt and pepper white, wet decayed QUARTZ MONZONITE.							5
38	20	38-40	10-12-17-21	24/20	29	Same as sample 19.							8
40	21	40-42	8-9-16-29	24/24	25	Same as sample 19.							8
42	22	42-44	13-15-23-37	24/24	39	Dirty tan, wet, medium SAND (upper 10"); then 1-2" layer of quartz crystals, then salt pepper white, wet, decayed QUARTZ MONZONITE.							6
44	23	44-46	17-25-24-33	24/20	54	Dirty tan, wet, medium SAND grading down into clayey SAND (upper 10"); then decayed QUARTZ MONZONITE, then decayed MICA SCHIST (lower 2")							6
46	24	46-48	37-100/5"	11/11	---	Salt and pepper white, wet, decayed QUARTZ MONZONITE (upper 3"); then brown, wet, decayed MICA SCHIST.							8

BORING CO.: ATEC FOREMAN: Bernie DBS GEOLOGIST: Mike Wittner	BORING LOCATION: North of Bldg. 1b GROUND ELEVATION: DATES: STARTED: 7/08/87
ENDED: 7/09/87	

DEPTH	SAMPLE					SAMPLE DESCRIPTION	STATUS CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R M K 5*	
	No.	DEPTH	BLOWS /6"	PENETR/RECOVERY	"N" VALUE				SAL. O/100	SP. COND.	PH.		
48	25	48-50	34-100/4"	10/10	----	Gray, wet, decayed MICA SCHIST.							6
50	26	50-52	62-100/4"	10/10	----	Same as sample 25.							7
52	27	52-54	47-100/4"	10/10	----	Same as sample 25.							6
54	28	54-56	81-100/3"	9/9	----	Same as sample 25, with iron staining present.							3
56	29	56-58	100/5.5"	5.5/5.5	----	Same as sample 28.							13
58	30	58-60	100/4"	4/4	----	Same as sample 28, but finer texture; only damp, not wet.							7 1/2
60	31	60-62	62-100/3"	9/9	----	Same as sample 30, back to normal, coarser texture.							4
62	32	62-64	100/5"	5/5	----	Same as sample 31.							

*

D'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING NO. MW-8 SHEET 5 OF 5
PROJECT LOCATION: Columbia, MD.	SAMPLER	GROUND WATER DEPTH DATE ELEV. DEPTH DATE ELEV.
CLIENT: W.R. Grace	TYPE: Split-Spoon HAMMER: 140 lbs. FALL: 30"	FILE NO.: 3625.001
BORING CO.: ATEC FOREMAN: Bernie GEG GEOLOGIST: Mike Wittner	BORING LOCATION: North of Bldg. 1b GROUND ELEVATION: DATES: STARTED: 7/08/87	ENDED: 7/09/87

DEPTH	SAMPLE					SAMPLE DESCRIPTION	STATUS CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R M K S*
	No.	DEPTH	BLOWS /6"	PENETR/ RECOVERY	"N" VALUE				SAL. 0/00	SP. COND.	PH	
64	33	64-66	68-87-100/4	16/16	----	Same as sample 31.						1
66	34	66-68	23-14-16-31	24/18	30	Gray, dry, decayed MICA SCHIST (top); then wedge of dry, decayed QUARTZ MONZONITE (from 0-2" thick)(middle); then rusty tan, dry, decayed-MICA SCHIST-finer, silty texture (bottom).						2
68	35	68-70	100/4"	4/4	----	Mixture of tan CLAY, with friable white pure quartz chunks (not individual crystals).						4

*

O'BRIEN & GERE ENGINEERS, INC.					TEST BORING LOG	
Project Location: Columbia, MD					Well MW12	
Client: W.R. Grace						
Boring Co.: L. F. Easterday Foreman: Wes Bloomquist OBG Geologist: M. Wittner (11/17/89); S. Mogilnicki (11/18/89)						
Depth	Sample				Sample Description	
	No	Depth	Blows /6"	Penetr/Recovery		"N" Value
		0-35				Dry, tan, fine to medium SAND with micaceous silt; chemical odor
		35-53				Wet, brown, fine to medium SAND and micaceous silt; chemical odor; grading into monzonite through a saprolitic zone
		53-128				Moist fragments of bluish-grey MONZONITE, weathered; no odor
		128-140				Wet, weathered, blue SCHIST; some schist fragments are rounded; no chemical odor
						----- Bottom of Boring: 140' (air rotary)
Completed as open rock well; surface casing to 53 ft						

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No.: MW-15 Sheet 1 of 1
Project Location: Columbia, MD	SAMPLER - none	
Client: Venable Baetjer/W.R. Grace		File No.: 3625.001.975

Boring Co.: L.F. Easterday
Foreman: Wes Bloomquist
OBG Geologist: Mike Wittner

Boring Location: adjacent to MW-1407
Dates: Started: 6/4/91
Ended: 6/4/91

Depth	Sample				Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing			Remarks*
	No	Depth	Blows /6"	Penetr/ Recovry				"N" Value	sample time	screen time	
0-22					SAPROLITE of schist and quartz monzonite origin; mostly quartz monzonite; dry, tan to light brown, fine sand, slightly micaceous						
22-30					WEATHERED SCHIST: dry, dark brown, micaceous silt with fine sand						
30-45					SCHIST: light grey; competent bedrock encountered at 30 ft						
45-55					QUARTZ MONZONITE: white						
55-65					SCHIST: dark brown						
65-90					QUARTZ MONZONITE: white to brown						
90-130					SCHIST: brown to grey to dark grey						
130-170					QUARTZ MONZONITE: grey to white						
170-177					SCHIST: dark grey						
177-200					QUARTZ MONZONITE: grey to white to dark grey; water-bearing zone from 177-177.5; very soft; large quartz crystals; yield = 5 gpm						
200-203					QUARTZ MONZONITE and SCHIST: significant amounts of both biotite, muscovite, and quartz crystals						
					Bottom of Boring: 203 ft; air rotary method						

O'Brien & Gere Engineers, Inc.		SOIL BORING LOG			Report of Boring No. MW 18 Sheet 1 of 1	
Project Location: Columbia, MD		SAMPLER			Ground Water Depth	
Client: W.R. Grace		Type: Drill Cuttings			File No. 3883.014	
Drill Type: Air Rotary		Hammer:			Fall:	
Boring Co.: L.F. Easterday Drilling					Dates:	
Foreman: Wes Bloomquist					Started: 2/24/95 Ended: 2/27/95	
OBG Geologist M. Louth						
Depth	Sample				Sample Description	Monitoring Well Specifications
	Depth	Blows / 6"	Penetr/ Recovery	PID Value		
0-8					Saprolite of schist. Light brown, fine sand, micaceous. Competent bedrock encountered at 8 feet.	<p>8" Casing</p> <p>Grouted</p> <p>8' to competent bedrock</p> <p>Total Depth 300'</p> <p>28' Bottom of 6" casing</p> <p>Open hole 6" well</p>
8-30					Schist; tan, muscovite and biotite.	
30-46					Quartz monzonite; gray, large quartz crystals.	
46-142					Schist; tan to brown.	
142-184					Quartz monzonite; gray.	
184-205					Schist; tan to gray. Water-bearing zone at 184-185 feet. Yield = 2 gpm.	
205-300					Quartz monzonite; gray.	

O'Brien & Gere Engineers, Inc.		Boring Log/Protective Casing Well			Report of Boring No. MW 19 Sheet 1 of 1	
Project Location Client: W.R. Grace Drilling Type: Hollow Stem/ Air Rotary		SAMPLER Type: Pushed 3" O.D. Split Spoon Hammer: Fall:			Ground Water Depth File No. 3963.014	
Boring Co.: L.F. Easterday Drilling Foreman: Wes Bloomquist OBG Geologist: M. Louth				Dates: Started: 2/22/95 Ended: 2/22/95		
Depth (ft.)	Sample				Sample Description	Monitoring Well Specifications
	Depth (ft.)	Blows /8"	Penetr/ Recovery	PID Value		
5	5-7		24/18	0	Tan to olive green, silty sand with some micaceous (muscovite) material. Dry.	
10	10-12		24/20	0	Tan to light olive green, silty sand with some micaceous (muscovite) material. Coarse, subangular quartz grains.	
15	15-17		24/22	0	Tan with black-white schist matrix. Silty sand with some micaceous (muscovite) material. Coarse, subangular quartz. Dry. No odor.	
20	20-22		24/22	0	Olive green silty clay grading to silty sand, micaceous. Iron staining.	
25	25-27		24/22	0	Brown to tan, silty sand, increased proportion of muscovite material. Iron staining.	
30	30-32		12/6	0	Silty clay. Brown to tan with some coarse sands interbedded. Micaceous material prominent. Iron staining.	
33					Auger refusal, switch to air rotary to drill to depth.	
40					Brown-tan, silty sand, micaceous, medium to coarse. Wet.	
45					Weathered schist, friable silty sand. Wet.	
48					Encountered competent bedrock, schist.	

O'Brien & Gere Engineers, Inc.	SOIL BORING LOG	Report of Boring No. MW20 Sheet 1 of 1
Project Location: Columbia, MD Client: W.R. Grace Drill Type: Air Rotary	SAMPLER Type: Drill Cuttings Hammer: Fall:	Ground Water Depth File No. 3983.014
Boring Co.: L.F. Easterday Drilling Foreman: Wes Bloomquist OBG Geologist M. Louth		Dates: Started: 2/23/95 Ended: 2/24/95

Depth	Sample				Sample Description	Monitoring Well Specifications
	Depth	Blows / 8"	Penetr/ Recovery	PID Value		
0-50					Saprolite of schist and quartz monzonite. Tan to brown, fine sand, slightly micaceous. Dry. Competent bedrock encountered at 50 feet.	<p>The diagram shows a vertical well casing. The top section is labeled '8" Casing'. Below the casing, there is a section labeled 'Grouted'. A vertical arrow indicates a distance of '50' to competent bedrock'. The casing ends at a point labeled '70" Bottom of 8" casing'. Below this, there is an 'Open hole 8" well'. A vertical arrow on the left indicates the 'Total Depth 203''.</p>
50-85				Quartz monzonite, gray to white quartz crystals. Water-bearing zone at 83-85'. Yield = 2 gpm.		
85-120				Schist. Tannish, brown, muscovite and biotite.		
120-140				Quartz monzonite; gray to white, large quartz crystals.		
140-188				Schist; gray to tan, muscovite and biotite.		
188-203				Quartz monzonite, gray. Water-bearing zone at 197-198 feet. Yield = 5 gpm.		
				End of boring at 203 feet.		

O'Brien & Gere Engineers, Inc.		Boring Log/Protective Casing Well			Report of Boring No. MW21 Sheet 1 of 1	
Project Location: <u>Amble, MD</u> Client: <u>W.R. Grace</u> Drilling Type: <u>Hollow Stem/ Air Rotary</u>		SAMPLER Type: <u>Pushed 3" O.D. Split Spoon</u> Hammer: _____ Fall: _____			Ground Water Depth File No. <u>3983.014</u>	
Boring Co.: <u>L.F. Easterday Drilling</u> Foreman: <u>Wes Bloomquist</u> OBG Geologist: <u>M. Louth</u>				Dates: Started: <u>2/22/95</u> Ended: <u>2/22/95</u>		
Depth (ft.)	Sample				Sample Description	Monitoring Well Specifications
	Depth (ft.)	Blows /6"	Penetr/ Recovery	PID Value		
5	5-7		24/20	0	Tannish-orange silty sand with micaceous material. Dry. Sand is medium to coarse, subangular, loose.	
10	10-12		24/22	0	Tannish-orange, silty sand with micaceous material (muscovite). Dry. Sand is medium to coarse, subangular, loose.	
15	15-17		24/22	0	Tannish-orange, silty sand with micaceous (muscovite) material. Dry. Sand is medium to coarse, subangular, loose.	
20	20-22		24/22	0	Grayish-cream, silty sand with micaceous material (muscovite). Dry. Sand is medium, subangular, loose.	
25	25-27		24/22	0	Grayish-tan, silty sand. Micaceous material. Dry. Sand is medium, subangular, loose. 1" diameter quartz in sample.	
30	30-32		24/12	0	Brownish-tan, sandy silt. Micaceous. Fine to medium sand. Dry.	
35	35-37		24/10	0	Brownish-tan, sandy silt. Micaceous. Fine to medium sand. Dry.	
38					Auger refusal. Switch to air rotary to drill to depth.	
40					Water encountered in saprolite 5-10 gpm. Sandy, micaceous silt with friable fractured iron stained quartz.	
42					Flow of water reduced to 2-3 gpm. Sandy, micaceous silt. Tan. Wet.	
46					Sandy, micaceous silt. Tan. Water-producing. 5 gpm.	
48					Competent bedrock (quartz monzonite).	

O'Brien & Gere Engineers, Inc.		SOIL BORING LOG			Report of Boring No. MW22 Sheet 1 of 1	
Project Location: Columbia, MD Client: W.R. Grace Drill Type: Air Rotary		SAMPLER Type: Drill Cuttings Hammer: Fall:			Ground Water Depth File No. 3963.014	
Boring Co.: L.F. Easterday Drilling Foreman: Wes Bloomquist OBG Geologist M. Louth		Dates: Started: 2/28/95 Ended: 2/28/95				
Depth	Sample				Sample Description	Monitoring Well Specifications
	Depth	Blows / 6"	Penetr/ Recovery	PID Value		
0-18					Saprolite of schist and quartz monzonite. Tannish brown, fine sands. Dry. Competent bedrock encountered at 18 feet.	<p>6" Casing</p> <p>Grouted</p> <p>18' to competent bedrock</p> <p>Total Depth 300'</p> <p>38' Bottom of 6" casing</p> <p>Open hole 6" well</p>
18-54					Quartz monzonite; gray.	
54-117					Schist; light gray, muscovite, biotite	
117-205					Quartz, monzonite. Large quartz crystals	
205-255					Schist; tan to gray, biotite and muscovite.	
255-300					Quartz monzonite; gray, quartz crystals. Water-bearing zone at 285-287 feet. Yield = 2 gpm.	
					Boring end at 300 feet.	

O'BRIEN & GERE ENGINEERS, INC.		TEST BORING LOG		REPORT OF BORING NO. MW-2182 SHEET 1 OF 1	
PROJECT LOCATION: WR Grace Washington Research Center CLIENT: Venable, Baetjer & Howard		SAMPLER		GROUND WATER DEPTH	ELEV. ELEV.
		TYPE: HAMMER: FALL:		DATE DATE	FILE NO.:
BORING CO.: LF Easterday, Inc. FOREMAN: Bob DBS GEOLOGIST: Mike Wittner			BORING LOCATION: Old landfill area GROUND ELEVATION: DATES: STARTED: 7 /15/ 87		
			ENDED: 7 /15/ 87		

DEPTH	SAMPLE					SAMPLE DESCRIPTION	STARTUP CHANGE DEPTH	EQUIPMENT INSTALLED	EQUIPMENT INSTALLED	R M K S*
	No.	DEPTH	DRILLING RATE	PENETR/RECOVERY	"N" VALUE					
						SAPROLITE- Brown, weathered SCHIST and QUARTZ MONZONITE				
5										
10										
15										
20										
25										
30										
35										
40										
42'						QUARTZ MONZONITE- Gray, f/c grained	42'			
45										
50										
55						(55' water)				
60						(yield at 60' - 8 gpm)				
61'						Bottom of well	61'			
								OPEN BORE- HOLE ↓		

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	REPORT OF BORING NO. MW-2235 SHEET 1 OF 1									
PROJECT LOCATION: Columbia, MD. CLIENT: W. R. Grace	SAMPLER TYPE: Split-Spoon HAMMER: 140 lbs. FALL: 30"	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="3" style="text-align: center;">GROUND WATER</td> </tr> <tr> <td style="width:33%;">DEPTH</td> <td style="width:33%;">DATE</td> <td style="width:33%;">ELEV.</td> </tr> <tr> <td>DEPTH</td> <td>DATE</td> <td>ELEV.</td> </tr> </table> FILE NO.: 3625.000	GROUND WATER			DEPTH	DATE	ELEV.	DEPTH	DATE	ELEV.
GROUND WATER											
DEPTH	DATE	ELEV.									
DEPTH	DATE	ELEV.									

BORING CO.: ATCO FOREMAN: Tony LOGG GEOLOGIST: Mike Wittner	BORING LOCATION: Old Landfill GROUND ELEVATION: DATES: STARTED: 7/16/87 ENDED: 7/17/87
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DEPTH	SAMPLE					SAMPLE DESCRIPTION	STATUS CHANGE DEPTH	EQUIPMENT INSTALLED	FIELD TESTING			R M K S*	
	No.	DEPTH	B. LWS / 6"	PENETRY/ RECOVERY	"N" VALUE				SAL. 0/100	SP. COND.	PH		
3 1/2	1	3 1/2/5	7-9-9	18/18	18	Reddish brown, dry, sandy SILT (less than 1" of topsoil).							
6 1/2	2	6 1/2/10	5-6-6	18/18	12	Rusty tan, dry, decayed QUARTZ MONZONITE.							
13 1/2	3	13 1/2/15	13-17-14	18/18	31	Rusty tan, dry, decayed QUARTZ MONZONITE; several large, well formed quartz crystals present.							
18 1/2	4	18 1/2/20	19-38-40	18/17	78	Tan, dry, decayed MICA SCHIST.							
23 1/2	5	23 1/2-25	40-100/3"	18/10	----	A layer of tan, dry, decayed MICA SCHIST above a layer of gray, dry, decayed QUARTZ MONZONITE							
28 1/2	6	28 1/2-30	75-100/3"	18/12	----	A layer of gray, wet, decayed MICA SCHIST above a layer of gray, wet, decayed QUARTZ MONZONITE.							
33 1/2	7	33 1/2-35	100/2"	18/12	----	Gray-brown, wet, decayed MICA SCHIST; original bedding present.							

* Water table at 27 ft. below surface.
 Auger refusal at 35 ft. below surface.

APPENDIX B –

Historical Well Data Summary Tables:

B1 – Main Site

B2 – Former Landfill Area

TABLE B-1 Notes
W. R. Grace & Co.-Conn, Washington Research Center, Columbia, MD
Main Site Area
Summary of Groundwater & Surface Water Analytical Results (in ug/l)
For Remaining Wells/Locations

Notes: Analyses - USEPA Method 601/602. Beginning Fall 2004, USEPA Method 624 utilized.
Trace concentrations of infrequently detected compounds not included in this table, but noted below.
MW__ = monitoring well; SWS-__ = surface water sample location
TCE = trichloroethene
1,1,2,2-PCA = 1,1,2,2-tetrachloroethane
1,1-DCE = 1,1-dichloroethene
1,1,1-TCA = 1,1,1-trichloroethane
1,2-DCE = 1,2-dichloroethene
"- " = not analyzed (in the case of early analyses of 1,2-DCE isomers, or not previously detected)

Superscripts:

- 3- also detected 1,2-dichloroethane
 - in MW8 (3/17/98) concentration = 3ug/L
 - in MW8 (3/21/01) concentration = 1 ug/L
 - in MW8 (3/27/02) concentration = 1 ug/L
- 4- also detected benzene
 - in MW5 (3/10/99) concentration = 6 ug/L
 - in MW22 (3/18/99) concentration = 6 ug/L (<1 ug/L in duplicate sample)
 - in MW26 (3/18/99) concentration = 4 ug/L
 - in MW26 (3/27/01) concentration = 1 ug/L
- 6- also detected chloroform
 - in MW8 (3/17/98) concentration = 2ug/L (lab contam)
 - in MW8 (3/00) concentration = 1ug/L
 - in MW8 (3/27/02) concentration = 1 ug/L
 - in MW8 (9/17/02) concentration = 1 ug/L
 - in MW8 (8/20/08) concentration = 1.01 ug/L
 - in MW8 (5/14/09) concentration = 1.86 ug/L
 - in MW8 (4/1/10) concentration = 2.49 ug/L
 - in MW8 (12/3/10) concentration = 1.6 ug/L
 - in MW8 (8/24/11) concentration = 3.1 ug/L
 - in MW8 (5/19/12) concentration = 1.5 ug/L
 - in MW22 (8/20/08) concentration = 1.19 ug/L
 - in MW22 (4/1/10) concentration = 1.25 ug/L
 - in MW22 (12/3/10) concentration = 1.5 ug/L
 - in MW22 (8/24/11) concentration = 1.5 ug/L
 - in MW26 (3/00) concentration = 2 ug/L
 - in MW22 (3/2/13) concentration = 2 ug/l
 - in MW8 (11/26/13) concentration = 2 ug/l
 - in MW5 (11/26/13) concentration = 1 ug/l
 - in MW22 (11/26/13) concentration = 2 ug/l
 - in MW8 (8/27/14) concentration = 2 ug/l
 - in MW22 (8/27/14) concentration = 2 ug/l
 - in MW22 (3/03/15) concentration = 3 ug/l
 - in MW8 (6/28/15) concentration = 1 ug/l
 - in MW22 (6/28/15) concentration = 2 ug/l
 - in MW5 (11/30/15) concentration = 1 ug/l
 - in MW22 (11/30/15) concentration = 3 ug/l
 - in MW5 (2/29/16) concentration = 0.5 ug/l
 - in MW8 (2/29/16) concentration = 2 ug/l
 - in MW22 (2/29/16) concentration = 3ug/l
- 8 - also detected chloroethane
 - in MW5 (9/17/02) concentration = 10 ug/L
 - in MW22 (9/17/02) concentration = 5 ug/L
- 9 - Special note for 5 Year Remediation Site Evaluation - August 2008
 - At request of USEPA, three depths were sampled for MW8
 - MW8-1 depth = 38 ft bg: TCE = 6.0 ug/L; no other VOCs detected
 - MW8-2 depth = 42 ft bg: TCE = 9.25 ug/L; no other VOCs detected
 - MW8-3 depth = 50ft bg: TCE = 16.4 ug/L; Cis1,2-DCE = 1.86 ug/L; no other VOCs detected, as presented on Table 4-1
- 10 - Special note for 8/25/15 - Passive Diffusion Bag could not be retrieved from well, no sample obtained.

TABLE B-2
 W. R. Grace & Co.-Conn, Washington Research Center, Columbia, MD
Former Landfill Area
 Summary of Groundwater & Surface Water Analytical Results (in ug/l)
 For Remaining Wells/Locations

Sample Location (Well Depth, in feet)	Date Sampled	TCE	PCE	1,1,2,2-PCA	1,1-DCE	cis 1,2-DCE	trans 1,2-DCE	1,1,1-TCA	Toluene	Benzene
MW-20 (203)	03/95	9	<10	4	<1	-	2	-	-	-
	04/95	-	-	18	<1	-	1	-	-	-
	03/11/97	5	<1	15	<1	<1	<1	-	-	-
	09/11/97	12	10	22	<1	1	<1	-	-	-
	03/11/98	7	3	9	<1	2	<1	<1	3	<1
	10/15/98 ^{1,3}	10	7	25	<1	2	<1	<1	9	<1
	03/08/99	8	8	27	<1	<1	<1	<1	1	8
	09/24/99 ^{1,3}	11	7	27	<1	3	<1	<1	18	<1
	03/20/00	3	1	4	<1	<1	<1	<1	<1	<1
	09/28/00	6	4	8	<1	2	<1	<1	<1	<1
	03/19/01 ¹	4	3	11	<1	1	<1	<1	<1	<1
	09/24/01	6	7	13	<1	<1	<1	<1	<1	<1
	03/25/02	11	15	26	<1	2	<1	<1	<1	<1
	09/17/02 ²	8	6	17	<1	2	<1	<1	<1	<1
	03/18/03	6	5	7	<1	3	<1	<1	<1	<1
	10/03/03	<1	<1	<1	<1	<1	<1	<1	<1	<1
	04/09/04	<1	<1	<1	<1	<1	<1	<1	<1	<1
	10/13/04	1.9	1.7	3	<1	<1	<1	<1	<1	<1
	04/13/05	2	3	5	<1	1	<1	<1	<1	<1
	10/27/05	2.27	2.24	4.72	<1	<1	<1	<1	<1	<1
	04/03/06	1.1	<1	1.5	<1	<1	<1	<1	<1	<1
	10/03/06	1.34	1.31	2.15	<1	<1	<1	<1	<1	<1
	04/03/07	1.18	1.29	1.60	<1	<1	<1	<1	<1	<1
	10/04/07	2.17	2	4.32	<1	<1	<1	<1	<1	<1
	08/20/08	1.96	2.1	2.93	<1	1.03	<1	<1	<1	<1
	05/13/09	3.86	5.11	5.75	<1	2.86	<1	<1	<1	<1
	04/01/10	1.16	1.33	1.37	<1	1.18	<1	<1	<1	<1
	12/02/10	2.4	4.0	4.4	<1	<1	<1	<1	<1	<1
	08/24/11	1.0	1.8	1.4	<1	<1	<1	<1	<1	<1
	05/19/12	<1	<1	<1	<1	<1	<1	<1	<1	<1
	03/02/13	1	2	2	<1	2	<1	<1	<1	<1
	11/25/13	1	3	2	<0.9	<1	<1	<1	<1	<0.8
	08/27/14	<1	<1	<1	<0.9	1	<1	<1	<1	<0.8
06/28/15	2	1	<1	<0.9	2	<1	<1	<1	<0.8	
02/29/16	3	2	0.9	<1	2	<1	<1	<1	<1	
MW21 (48)	03/95	2	<10	1	<1	-	<1	-	-	-
	04/95	<5	<5	<5	<5	-	<5	-	-	-
	03/11/97	3	2	8	<1	<1	<1	-	-	-
	09/10/97	3	5	11	<1	<1	<1	-	-	-
	03/19/98	2	2	5	<1	<1	<1	<1	<1	<1
	10/15/98	3	4	11	<1	<1	<1	<1	<1	<1
	03/08/99	8	10	24	<1	<1	<1	<1	<1	<1
	09/24/99	8	10	20	<1	<1	<1	<1	<1	<1
	03/20/00	1	1	4	<1	<1	<1	<1	<1	<1
	09/28/00	<1	2	4	<1	<1	<1	<1	1	<1
	03/19/01	<1	<1	2	<1	<1	<1	<1	<1	<1
	09/24/01	<1	<1	4	<1	<1	<1	<1	<1	<1
	03/25/02	5	7	18	<1	<1	<1	<1	<1	<1
	09/17/02	<1	<1	3	<1	<1	<1	<1	<1	<1
	03/18/03	<1	<1	<1	<1	<1	<1	<1	<1	<1
	10/03/03	<1	<1	<1	<1	<1	<1	<1	<1	<1
	04/09/04	<1	<1	<1	<1	<1	<1	<1	<1	<1
	10/13/04	2.1	2.8	5.0	<1	<1	<1	<1	<1	<1
	04/13/05	<1	<1	<1	<1	<1	<1	<1	<1	<1
	10/27/05	1.75	2.34	5.42	<1	<1	<1	<1	<1	<1
	04/03/06	<1	<1	<1	<1	<1	<1	<1	<1	<1
	10/03/06	1.13	1.46	2.55	<1	<1	<1	<1	<1	<1
	04/03/07	<1	<1	<1	<1	<1	<1	<1	<1	<1
	10/04/07	3.24	3.54	8.4	<1	<1	<1	<1	<1	<1
	08/20/08	<1	<1	1.6	<1	<1	<1	<1	<1	<1
	05/13/09	<1	<1	<1	<1	<1	<1	<1	<1	<1
	04/01/10	<1	<1	<1	<1	<1	<1	<1	<1	<1
	12/02/10	1.7	3.1	3.8	<1	<1	<1	<1	<1	<1
	08/24/11	<1	1.4	1.2	<1	<1	<1	<1	<1	<1
	05/19/12	<5	<5	<5	<5	<5	<5	<5	<5	<5
	03/02/13	<1	<1	<1	<1	<1	<1	<1	<1	<1
	11/25/13	1	3	3	<0.9	<1	<1	<1	<1	<0.8
	08/27/14	<1	<1	<1	<0.9	<1	<1	<1	<1	<0.8
06/28/15	<1	<1	<1	<0.9	<1	<1	<1	<1	<0.8	
02/29/16	<1	<1	<1	<1	<1	<1	<1	<1	<1	
MW1407 (27)	02/05/90	23	20	<1	-	<1	-	-	-	-
	3/95	13	-	46	<1	-	<1	-	-	-
	03/11/97	10	6	7	1	8	<1	-	-	-
	09/09/97	10	14	22	<1	<1	<1	2	-	-
	03/10/98	8	10	19	<1	<1	<1	<1	1	<1
	03/16/99 ³	3	3	15	<1	<1	<1	<1	<1	<1
	03/23/00	18	44	89	<2	<2	<2	<2	3	<2
	09/27/00	16	58	120	<2	<2	<2	<2	<2	<2
	03/23/01	13	52	110	<5	<5	<5	<5	6	<5
	09/25/01	16	68	100	<2	<2	<2	<2	<2	<2
	03/25/02	14	50	94	<2	<2	<2	<2	<2	<2
	03/18/03	11	49	77	<2	<2	<2	<2	<2	<2
	04/09/04	15	16	15	<1	<1	<1	<1	<1	<1
	04/13/05	17	37	43	<1	<1	<1	<1	<1	<1
	04/03/06	11	13	13	<1	<1	<1	<1	<1	<1
	04/03/07	7.66	12.1	9.89	<1	<1	<1	<1	<1	<1
	08/20/08	4.54	21.2	18.9	<1	<1	<1	<1	<1	<1
	05/13/09	3.71	25.2	22.3	<1	<1	<1	<1	<1	<1
	04/01/10	1.54	26.9	11.4	<1	<1	<1	<1	<1	<1
	12/02/10	2.3	32	20	<1	<1	<1	<1	<1	<1
	08/24/11	2.0	38	15	<1	<1	<1	<1	<1	<1
	05/19/12	1.3	17	12	<1	<1	<1	<1	<1	<1
	03/02/13	1	15	9	<1	<1	<1	<1	<1	<1
	11/25/13	1	10	9	<0.9	<1	<1	<1	<1	<0.8
	08/27/14	<1	19	5	<0.9	<1	<1	<1	<1	<0.8
	06/28/15	<1	11	2	<0.9	<1	<1	<1	<1	<0.8
	02/29/16	<1	6	2	<1	<1	<1	<1	<1	<1

TABLE B-2
 W. R. Grace & Co.-Conn, Washington Research Center, Columbia, MD
Former Landfill Area
 Summary of Groundwater & Surface Water Analytical Results (in ug/l)
 For Remaining Wells/Locations

Sample Location (Well Depth, in feet)	Date Sampled	TCE	PCE	1,1,2,2-PCA	1,1-DCE	cis 1,2-DCE	trans 1,2-DCE	1,1,1-TCA	Toluene	Benzene	
MW1408 (22.5)	08/03/87	29	-	30	<1	-	<1	-	-	-	
	08/07/87	47	-	37	<1	-	<1	-	-	-	
	08/08/88	26	-	26	<1	-	<1	-	-	-	
	01/23/90	9	15	<1	<1	-	<1	-	-	-	
	02/05/90	9	10	<1	<1	-	<1	-	-	-	
	04/95	3	-	13	<1	-	<1	-	-	-	
	03/11/97	25	23	48	<1	3	<1	-	-	-	
	10/03/97	<10	11	<10	<10	<10	<10	460	<10	<10	
	03/11/98	<10	12	20	<10	<10	<10	180	<10	<10	
	10/15/98	<10	11	<10	<10	<10	<10	80	<10	<10	
	03/15/99	1	12	3	<1	<1	<1	37	<1	<1	
	09/24/99	<1	10	<1	<1	<1	<1	54	<1	<1	
	03/22/00 ^{3,6}	<1	2	<1	<1	<1	<1	<1	<1	<1	
	09/28/00	<2	4	<2	<2	<2	<2	62	<2	<2	
	03/19/01	<2	4	<2	<2	<2	<2	41	<2	<2	
	09/24/01	<1	5	<1	<1	<1	<1	29	<1	<1	
	03/25/02 ⁷	<1	3	<1	<1	<1	<1	17	<1	<1	
	09/17/02	<1	2	<1	<1	<1	<1	17	<1	<1	
	10/03/03	<1	2	<1	<1	<1	<1	3	<1	<1	
	10/13/04	<1	3.4	<1	<1	<1	<1	1.9	<1	<1	
	10/27/05	<1	3.21	<1	<1	<1	<1	1.27	<1	<1	
	10/03/06	<1	1.01	<1	<1	<1	<1	<1	<1	<1	
	10/04/07	<1	1.71	<1	<1	<1	<1	<1	<1	<1	
	08/20/08	<1	1.59	<1	<1	<1	<1	<1	<1	<1	
	05/13/09	<1	2.23	<1	<1	<1	<1	<1	<1	<1	
	04/01/10 ¹	<1	2.03	<1	<1	<1	<1	<1	<1	<1	
	12/02/10	<1	2.7	<1	<1	<1	<1	<1	<1	<1	
	08/24/11	<1	3.9	<1	<1	<1	<1	<1	<1	<1	
	05/19/12	<5	<5	<5	<5	<5	<5	<5	<5	<5	
	03/02/13	<1	3	<1	<1	<1	<1	<1	<1	<1	
	11/25/13	<1	2	<1	<0.9	<1	<1	<1	<0.8	<0.9	
	08/27/14	<1	2	<1	<0.9	<1	<1	<1	<0.8	<0.9	
	06/28/15	<1	4	<1	<0.9	<1	<1	<1	<0.8	<0.9	
	02/29/16	<1	3	<1	<1	<1	<1	<1	<1	<1	
	MW2182 (61)	08/03/87	84	-	130	<1	-	23	-	-	-
		08/13/87	120	-	140	<1	-	29	-	-	-
		08/08/88	70	-	110	<1	-	13	-	-	-
		01/23/90	70	44	92	<1	-	8	-	-	-
		02/05/90	57	32	82	<1	-	6	-	-	-
		07/02/91	62	34	76	<1	-	6	-	-	-
04/01/95		6	2	15	<1	-	3	-	-	-	
03/11/97		27	29	51	<1	3	<1	-	-	-	
09/09/97		7	12	4	<1	3	<1	-	-	-	
03/11/98 ²		17	17	23	<1	3	<1	<1	<1	<1	
10/15/98 ²		12	17	25	<1	2	<1	<1	<1	<1	
03/10/99 ²		9	13	20	<1	1	<1	<1	<1	<1	
09/24/99		6	9	10	<1	<1	<1	<1	<1	<1	
03/22/00		11	15	17	<1	2	<1	<1	3	<1	
09/28/00 ²		11	15	20	<1	1	<1	<1	<1	<1	
03/19/01		8	13	19	<1	1	<1	<1	<1	2	
09/24/01		9	15	14	<1	<1	<1	1	<1	<1	
03/25/02		5	9	7	<1	<1	<1	1	<1	<1	
09/17/02		4	7	4	<1	<1	<1	<1	<1	<1	
03/18/03		6	10	7	<1	<1	<1	<1	<1	<1	
10/03/03		4	12	5	<1	<1	<1	<1	<1	<1	
04/09/04		4	18	7	<1	<1	<1	<1	<1	<1	
10/13/04 ²		4.3	15	6.9	<1	<1	<1	<1	<1	<1	
04/13/05 ²		6.0	18	16	<1	<1	<1	<1	<1	<1	
10/27/05 ²		4.89	14.9	10.2	<1	<1	<1	<1	<1	<1	
04/03/06 ²		5.5	11	13	<1	<1	<1	<1	<1	<1	
10/3/06 ²		4.95	11.6	9.1	<1	<1	<1	<1	<1	<1	
04/03/07 ²		5.35	12.4	10.1	<1	1.03	<1	<1	<1	<1	
10/04/07 ²		4.32	7.95	8.07	<1	<1	<1	<1	<1	<1	
08/20/08		3.2	7.88	5.31	<1	<1	<1	<1	<1	<1	
05/13/09		3.21	6.41	2.94	<1	<1	<1	<1	<1	<1	
04/01/10		2.66	8.00	1.62	<1	<1	<1	<1	<1	<1	
12/02/10		2.9	6.3	1.6	<1	<1	<1	<1	<1	<1	
08/24/11		3.8	6.2	1.6	<1	<1	<1	<1	<1	<1	
05/19/12		3.0	4.4	1.7	<1	<1	<1	<1	<1	<1	
03/02/13		4.0	4.0	1	<1	<1	<1	<1	<1	<1	
11/25/13		5	8	2	<0.9	<1	<1	<1	<0.8	<0.9	
08/27/14		3	8	<1	<0.9	<1	<1	<1	<0.8	<0.9	
06/28/15		3	6	<1	<0.9	<1	<1	<1	<0.8	<0.9	
02/29/16		4	5	0.5	<1	1	<1	<1	<1	<1	
MW2235 (35)	08/03/87	57	-	140	<1	-	1.2	-	-	-	
	08/13/87	110	-	210	<1	-	4.8	-	-	-	
	08/08/88	41	-	76	<1	-	<1	-	-	-	
	01/23/90	31	23	40	<1	-	<1	-	-	-	
	02/05/90	32	34	50	1	-	<1	-	-	-	
	04/01/95	35	-	190	<1	-	<1	-	-	-	
	03/11/97	8	5	12	<1	1	<1	-	-	-	
	03/11/98	34	73	260	<10	<10	<10	<10	<10	<10	
	03/15/99	36	99	320	<10	<10	<10	<10	<10	<10	
	03/20/00	73	92	460	<10	<10	<10	<10	<10	<10	
	03/23/01	26	58	290	<10	<10	<10	<10	<10	<10	
	03/26/02	20	19	250	<10	<10	<10	<10	<10	<10	
	03/18/03	12	52	86	<5	<5	<5	<5	<5	<5	
	04/09/04	5	16	19	<1	<1	<1	<1	<1	<1	
	04/13/05	20	41	150	<1	2	<1	<1	<1	<1	
	04/03/06	5.1	27	31	<1	<1	<1	<1	<1	<1	
	04/03/07	6.1	14	34.4	<1	<1	<1	<1	<1	<1	
	08/20/08	10.6	33.8	80.8	<1	<1	<1	<1	<1	<1	
	05/13/09	10	36.4	67	<5	<5	<5	<5	<5	<5	
	04/01/10	7.28	22.0	55.4	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	
	12/02/10	6.7	9.5	44	<1	<1	<1	<1	<1	<1	
	08/24/11	6.4	19	35	<1	<1	<1	<1	<1	<1	
	05/19/12	2.4	7.0	15	<1	<1	<1	<1	<1	<1	
	03/02/13	4	10	20	<1	<1	<1	<1	<1	<1	
	11/25/13	3	7	17	<0.9	<1	<1	<1	<0.8	<0.9	
08/27/14	1	7	3	<0.9	<1	<1	<1	<0.8	<0.9		
06/28/15	<1	5	2	<0.9	<1	<1	<1	<0.8	<0.9		
02/29/16	3	10	10	<1	<1	<1	<1	<1	<1		

TABLE B-2 Notes
W. R. Grace & Co.-Conn, Washington Research Center, Columbia, MD
Former Landfill Area
Summary of Groundwater & Surface Water Analytical Results (in ug/l)
For Remaining Wells/Locations

Notes: Analyses - USEPA Method 601/602. Beginning Fall 2004, USEPA Method 624 utilized.
Trace concentrations of infrequently detected compounds not included in this table, but noted below.
MW__ = monitoring well; SWS-__ = surface water sample location
MW19 serves as a replacement for the damaged MW13 (since 1995)
TCE = trichloroethene
PCE = tetrachloroethene (or perchloroethene)
1,1,2,2-PCA = 1,1,2,2-tetrachloroethane
1,1-DCE = 1,1-dichloroethene
1,1,1-TCA = 1,1,1-trichloroethane
1,2-DCE = 1,2-dichloroethene
1,1-DCA = 1,1-Dichloroethane
- = not analyzed (in the case of earlier analyses of the 1,2-DCE isomers), or not previously detected
* = stream dry, no sample collected

Superscripts

- 1- also detected 1,1-DCA
MW12 (9/24/99) concentration = 2 ug/L
MW12 (9/00) concentration = 2 ug/l
MW12 (3/22/01) concentration = 2 ug/l
MW12 (9/21/01) concentration = 1 ug/l
MW15 (3/10/98) concentration = 2 ug/L
MW15 (10/16/98) concentration = 2 ug/L
MW15 (3/9/99) concentration = 3 ug/L
MW15 (9/24/99) concentration = 1 ug/L
MW15 (3/00) concentration = 1 ug/l
MW20 (10/15/98) concentration = 1 ug/l
MW20 (9/24/99) concentration = 2 ug/L
MW20 (3/19/01) concentration = 1 ug/l
MW1408 (4/1/10) concentration = 1.11 ug/L
- 2- also detected 1,1,2-TCA
MW12 (9/21/01) concentration = 1 ug/l
MW19 (3/95) concentration = 17 ug/L
MW19 (4/1/10) concentration = 1.05 ug/L
MW20 (9/02) concentration = 1 ug/l
MW2182 (3/11/98) concentration = 4 ug/L
MW2182 (10/15/98) concentration = 2 ug/L
MW2182 (3/10/99) concentration = 2 ug/L
MW2182 (9/00) concentration = 1 ug/l
MW2182 (10/04) concentration = 1.5ug/l
MW2182 (4/05) concentration = 2.1ug/l
MW2182 (10/05) concentration = 1.57 ug/l
MW2182 (4/3/06) concentration = 1.65 ug/L
MW2182 (10/3/06) concentration = 1.30 ug/L
MW2182 (4/3/07) concentration = 1.39 ug/L
MW2182 (10/04/07) concentration = 1.25 ug/l
- 3- also detected Chloroform
MW12 (3/00) concentration = 2 ug/l;
MW20 (10/15/98)concentration = 1 ug/L
MW20 (9/24/99) concentration = 1 ug/l
MW1408 (3/00) concentration = 51 ug/l
MW15 (2/29/16) concentration = 0.5 ug/l
- 4- also detected 1,2-DCA
MW12 (3/22/01) concentration = 1 ug/l
MW15 (3/10/98) concentration = 1 ug/l
- 5- also detected Trichlorofluoromethane
MW1407 (3/16/99) concentration = 2 ug/l
- 6- also detected Bromodichloromethane/Dibromochloromethane
MW1408 (3/00) concentration = 8 ug/l / 1 ug/l;
- 7- also detected chloroethane
MW19 (9/02) concentration = 7ug/l
MW1408 (3/02) concentration = 1 ug/l

Exhibit 1 -
Land Records Howard County 2008

TITLE NOTICE

This Title Notice ("Notice") is made this 7th day of April, 2008, by W. R. Grace & Co.-Conn. (the "Permittee");

WITNESSETH:

WHEREAS, Permittee is the fee simple owner of 7500 Grace Drive in Columbia, Maryland, identified on Howard County Tax Map 35 at Parcel 145 and being the property conveyed to Permittee by deed recorded in 1955 in the Land Records of Howard County, Maryland, more particularly described in Exhibit A, attached hereto, and incorporated by reference (the "Facility");

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WHEREAS, the United States Environmental Protection Agency issued to Permittee a Permit under the Resource Conservation and Recovery Act as amended by the Hazardous and Solid Waste Amendments of 1984 (the "RCRA Permit") effective November 30, 2007; and

WHEREAS, the "RCRA Permit" includes a requirement at Part III.A.4. that Permittee record a notice (this Notice) to inform all successors-in-title that the Facility is subject to a RCRA Corrective Action Permit and to recite the prohibition against the development of onsite wells for drinking water or other domestic use at the Facility. The prohibition will be effective to the extent and for as long as necessary to prevent exposure while the plume referenced in the RCRA Corrective Action Permit is being remediated;

WHEREAS, the portion of the Facility for which groundwater use is to be restricted (the "Restriction Area") is depicted in Exhibit B;

NOW, THEREFORE, Permittee states as follows:

1. Restriction of Groundwater Use: No on-site wells may be installed or used in the Restriction Area for drinking water or other domestic uses to the extent and for as long as necessary to prevent exposure while the plume is being remediated.
2. Restriction Runs with the Land: The groundwater use restriction imposed by this Notice shall run with the land and is binding upon all subsequent owners of the Facility.
3. Controlling Law: The interpretation and performance of this instrument shall be governed by the laws of State of Maryland.
4. No Forfeiture: Nothing contained herein will result in a forfeiture or reversion of Permittee's title in any respect.
5. Captions: The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

IN WITNESS WHEREOF, Permittee has caused this Notice to be signed in its name.

Executed this 7th day of April, 2008.

W. R. Grace & Co.-Conn.

By: William M. Corcoran

Name: William M. Corcoran

Its: Vice President

STATE OF MARYLAND, ss

~~HARFORD~~
Howard County

On this 7 day of April, 2008, before me, the undersigned, a Notary Public in and for the State of Maryland, duly commissioned and sworn, personally appeared William M. Corcoran, known to be the Vice President of W.R. Grace + Co. the corporation that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they are authorized to execute said instrument.

Witness my hand and official seal hereto affixed the day and year written above.

CANDACE L. WALKER
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires June 21, 2011

Candace Walker
Notary Public in and for the
State of Maryland

My Commission Expires: 6/21/11

- Attachments: Exhibit A - Legal Description of the Facility
- Exhibit B - Boundary of the Restriction Area

EXHIBIT A

Legal Description of the Facility – Howard County Tax Map 35, Parcel 145

BEGINNING FOR THE SAME at a pipe set at the beginning of the hereinafter referred to 175.75 acre tract and running thence with bearings referred to the Maryland State Plane Grid System, with the first through the fourth and part of the fifth lines thereof, (1) South 37 degrees 35 minutes no seconds East 778.80 feet to a stone found, coordinates North 496,489.80, East 828,658.75, (2) South 54 degrees 55 minutes no seconds West 382.11 feet to a stone found, (3) South 37 degrees 57 minutes 50 seconds West 678.24 feet to a stone found, (4) South 29 degrees 46 minutes 10 seconds East 629.60 feet to a stone found, (5) South 28 degrees 11 minutes no seconds East 623.33 feet to a pipe found, on said fifth line at the beginning of a 22.594 acre conveyance, a part of the hereinafter referred to 85.18 acre tract, from the said C. Lawrence O'Donnell et ux, to George Raymond Wolff, et al, by deed dated September 20, 1952, and recorded among said Land Records in Liber M.W.B. No. 236, folio 425, thence leaving said fifth line and running reversely with the eleventh or last line and the tenth and part of the ninth lines of said conveyance to Wolff, (6) South 32 degrees 18 minutes 10 seconds West 487.86 feet to a pipe found, (7) South 6 degrees 23 minutes 50 seconds West 764.15 feet to a pipe found, (8) South 0 degrees 21 minutes no seconds West 804.15 feet, passing over a pipe found at the end of 792.32 feet thereon, to intersect the North line of the Simpsonville-Clarksville Road, 40 feet wide, thence with the North line of said Road as now located, the following four courses and distances, (9) along the arc of a curve to the right having a radius of 795.00 feet, a distance of 253.19 feet, chord North 63 degrees 56 minutes 45 seconds West 252.12 feet (10) North 54 degrees 49 minutes 20 seconds West 638.32 feet to the beginning of a curve to the left having a radius of 3840.00 feet, thence (11) along the arc of said curve 524.06 feet, chord, North 58

degrees 43 minutes 55 seconds West 523.66 feet, (12) North 62 degrees 38 minutes 30 seconds West 990.16 feet to intersect the fourth or last line of a 5.000 acre conveyance, a part of the hereinafter referred to 90.57 acre tract, from the said C. Lawrence O'Donnell, et ux, to R.H. Wood, Jr., et ux, by deed dated August 27, 1954, and recorded among the said Land Records in Liber M.W.B. No. 260, folio 67, thence leaving the North line of said Road and running reversely with a part of the fourth line and the third line thereof, (13) North 14 degrees 24 minutes 30 seconds East 1099.97 feet to a pipe, (14) North 62 degrees 20 minutes 30 seconds West 200.00 feet to a pipe on the fifteenth line of the aforesaid 175.75 acre tract, North 14 degrees 24 minutes 30 seconds East 1102.80 feet from a stone found at the end of 17.20 feet on said line, thence running with the remainder of said fifteenth line, (15) North 14 degrees 24 minutes 30 seconds East 921.88 feet to a pipe at the end thereof, thence running with the sixteenth line, as now corrected, and with the seventeenth and eighteenth line thereof, (16) North 66 degrees 10 minutes 30 seconds East 1075.71 feet to a pipe, (17) North 30 degrees 10 minutes no seconds East 743.16 feet to a pipe, (18) North 74 degrees 25 minutes no seconds East 405.24 feet to the place of beginning, containing 147.369 acres of land, more or less.

BEING part of a 175.75 acre tract as described in a conveyance from Richard B. Owings and wife to Samuel Scott and wife, by deed dated November 27, 1916, and recorded among the Land records of Howard County in Liber H.B.N No. 102, folio 448, etc., which tract was subsequently conveyed to the said C. Lawrence O'Donnell and Genevieve E. O'Donnell, his wife, by two deeds, (1) from Wallace D. Blick and wife, dated July 9, 1935 and recorded among the Land Records Howard County in Liber B.M. Jr. No. 152, folio 244, etc., containing 90.57 acres, and

(2) from Rudolph W. Maurer, dated November 21, 1934, and recorded among the said Land Records in Liber B.M.Jr. No. 150, folio 261, etc., containing 85.18 acres.

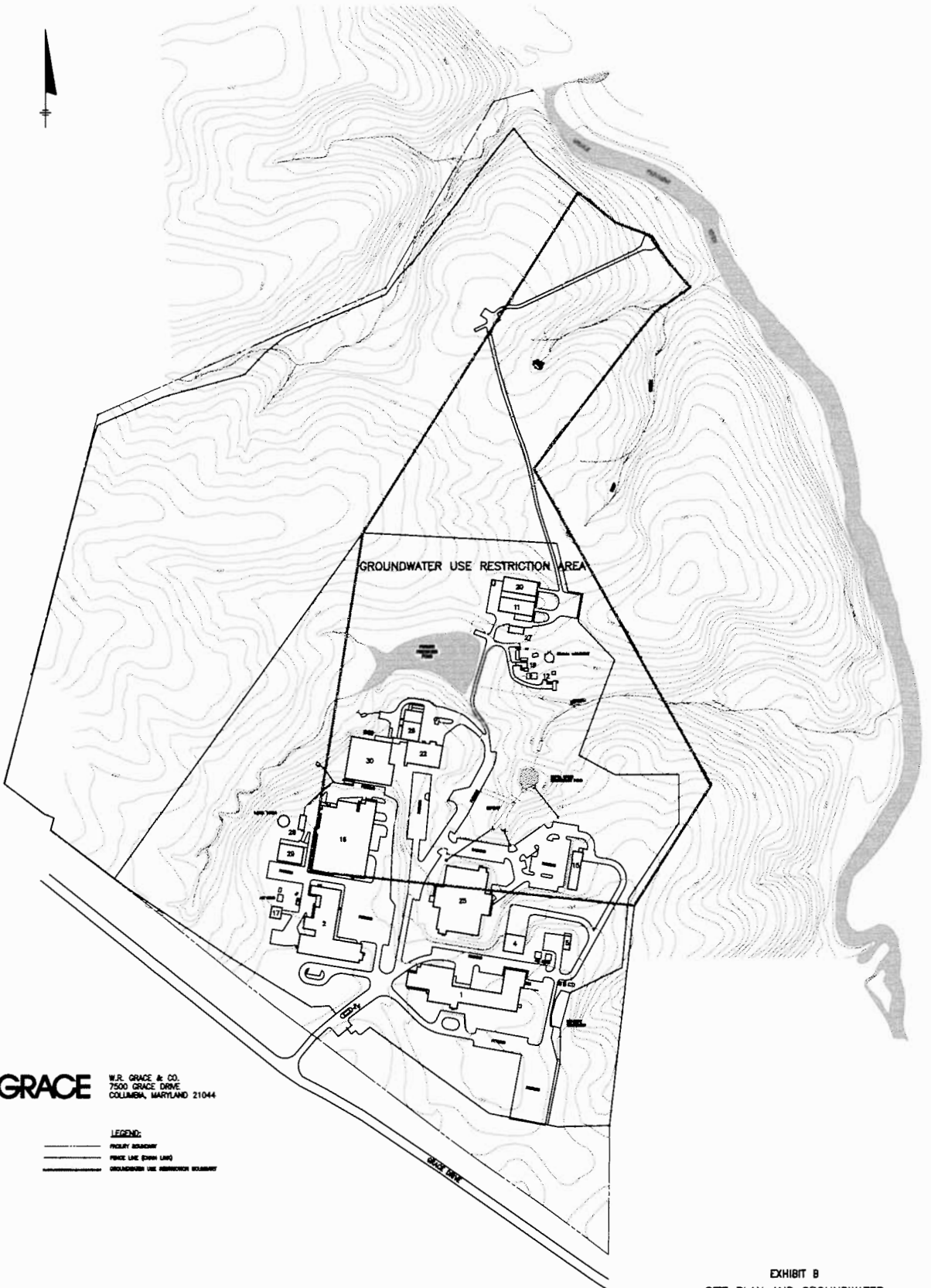
SAVING AND EXCEPTING THEREFROM all that property which was granted and conveyed by Deed dated September 21, 1994 from W. R. Grace & Co.-Conn. to the State of Maryland to the use of the State Highway Administration and recorded among the Land Records of Howard County on September 22, 1994 in Liber 3347, folio 408; and further

SAVING AND EXCEPTING THEREFROM all that property which was granted and conveyed by Deed dated May 21, 1999 from W. R. Grace & Co.-Conn. to Howard County, Maryland and recorded among the Land Records of Howard County on June 29, 1999 in Liber 4799, folio 89, but saving and excepting from this conveyance, in perpetuity, the right to lay construct, maintain, and repair a sewer main and appurtenances and services in, on, over, across, and through a portion of said property described as a "20' private sewer & utility easement" as shown as Exhibit B on said deed.

BEING part of the same property conveyed to W. R. Grace & Co. by Deed dated October 4, 1955 from C. Lawrence O'Donnell and Genevieve E. O'Donnell, his wife, and recorded among the Land Records of Howard County on October 4, 1955 in Liber 273, folio 186.

IMP FD SURE \$	20.00
RECORDING FEE	20.00
TOTAL	40.00
Recd# H003	Acct# 61201
MDR NYC	BLK # 1147
Apr 03, 2000	02:39 PM

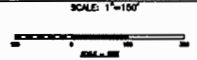
FILE: \\P:\PROJECTS\3043 Drawn\1163-04-001.dwg Plot Date: 12/15/04 10:00 AM



GRACE W.R. GRACE & CO.
 7500 GRACE DRIVE
 COLUMBIA, MARYLAND 21044

LEGEND:
 _____ FENCE BOUNDARY
 _____ FENCE LINE (DASH LINE)
 _____ GROUNDWATER USE RESTRICTION BOUNDARY

EXHIBIT B
 SITE PLAN AND GROUNDWATER
 USE RESTRICTION AREA



PLT DATE: 12/15/04 10:00 AM



Pointer 39°11'32.37" N, 76°54'06.12" W elev 381 ft Streaming 100% Eye all 5187 ft