Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

PUBLIC NOTICE
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER RESOURCES/ SURFACE WATER DISCHARGE PERMIT PROGRAM
1 WINTER STREET
BOSTON, MA 02108
TEL#: (617) 292 -5500

Notice is hereby given that the following Tentative Determination to Issue Antidegradation Authorization To Discharge To an Outstanding Resource Water is being processed and the following actions being proposed thereon pursuant to the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§ 26-53) and 314 CMR 2.06, 3.00 and 4.00:

NAME OF SITE : BASF Plainville
SITE OWNER : BASF Corporation
SITE OPERATOR
(if different than owner) : Groundwater & Environmental Services, Inc. (GES)
NPDES PERMIT NUMBER
ASSIGNED BY EPA : MAG910016
MASSDEP TRANSMITTAL
NUMBER : X275635
NAME OF RECEIVING WATER(S)
AND TOWN : Turnpike Lake, Plainville, MA
PERMIT AUTHORITY FOR DISCHARGE : NPDES Remediation General Permit (RGP), effective April 8, 2017

PROPOSED ACTION: Tentative determination to issue Antidegradation Authorization to discharge to an Outstanding Resource Water discharge under the Remediation General Permit (RGP). Discharge is from ongoing and long term groundwater treatment with discharge to Turnpike Lake, an Outstanding Resource Water.

A copy of the Notice of Intent (NOI), applicant's justification for authorization, and Tentative Determination to Issue Antidegradation Authorization To Discharge To an Outstanding Resource Water

(draft decision by MassDEP) are available here: https://www.mass.gov/service-details/massdep-public-hearings-comment-opportunities under "MassDEP Permits & Approvals".

Comments on the proposed action or requests for a public hearing thereon pursuant to 314 CMR 2.07 must be filed with MassDEP either by U.S. mail to: MassDEP, Regulatory Comment Box, 1 Winter Street, 5th floor, Boston, MA 02108, or by email to dep.talks@mass.gov (include "BASF Plainville RGP" in the subject line). All comments should include the sender's full name and address. Comments must be submitted by January 25, 2019. The public comment period is thirty (30) days after publication of this notice.

Lealdon Langley, Director
Wetlands and Wastewater Program
Department of Environmental Protection

Tentative Determination to Issue Antidegradation Authorization To Discharge To an Outstanding Resource Water Fact Sheet

I. APPLICANT, FACILITY INFORMATION, and DISCHARGE INFORMATION

Name and Address of site:

36 Taunton Street
Plainville, MA 02762

Name and Address of Site Owner:

BASF Corporation
100 Park Avenue
Florham Park, NJ 07932

Discharge Information:

Discharge from the Site has been ongoing under NPDES Remediation General Permits (RGPs) since 2005. Following EPA Authorization according to the 2017 RGP, the groundwater treatment system will continue to discharge to Turnpike Lake, which discharges to the Wading River. The Massachusetts Surface Water Quality Standards (MASWQS) at 314 CMR 4.05 and 4.06 designate Turnpike Lake as an Inland Water, Class A Public Water Supply, which is protected as an Outstanding Resource Water (ORW).

II. LIMITATIONS AND CONDITIONS

Discharge permit limitations are as listed in the 2017 RGP and are in conformance with 314 CMR 4.00, MASWQS.

The applicant has demonstrated that an Antidegradation Authorization To Discharge To an Outstanding Resource Water (314 CMR 4.04(3)) may be issued by the Department of Environmental Protection pursuant to 314 CMR 4.04(5)(b).

III. MASSDEP AUTHORIZATION BASIS AND PERMITTING REQUIREMENT

MASWQS and the RGP state that discharges to ORWs in Massachusetts are ineligible for coverage unless an Antidegradation Authorization is granted by MassDEP. Therefore, as described in the Request for Authorization letter dated July 26, 2018, Roux Associates on behalf of BASF submitted a description of how the project would demonstrate compliance with the MASWQS requirements for Antidegradation Authorization listed in 314 CMR 4.04(5)(a)(2) through 4.04(5)(a)(4).

Coverage under the 2017 RGP is required for this discharge in accordance with the Massachusetts Clean Water Act, M.G.L. c. 21, §§ 26-53; 314 CMR 3.03; and 314 CMR 4.00.

EPA's Authorization to discharge includes effluent limitations based on the location of discharge, aquatic life and human health protection criteria, and the MASWQS.

IV. COMMENT PERIOD, HEARING REQUESTS, AND PROCEDURES FOR FINAL DECISIONS

The public comment period for this authorization was published in the MEPA Environmental Monitor on December 26, 2018 and will extend until January 25, 2019. The public comment period is thirty (30) days following the date of publication.

A final decision on the issuance/denial of this permit will be made after the public notice period, and review of any comments received during this period.

V. STATE CONTACT INFORMATION

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m. Monday through Friday excluding holidays, from:

Jennifer Wood
MassDEP
Bureau of Water Resources
1 Winter Street
Boston, MA 02108
617-654-6536
Jennifer.Wood@state.ma.us

Lealdon Langley, Director
Wetlands and Wastewater Program
Department of Environmental Protection

_____
DATE

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Commissioner

[Draft for Public Comment Only]

TENTATIVE DETERMINATION TO ISSUE ANTIDEGRADATION AUTHORIZATION TO DISCHARGE TO AN OUTSTANDING RESOURCE WATER

NAME OF SITE	: BASF Plainville
SITE OWNER	: BASF Corporation
SITE OPERATOR (if different than owner)	: Groundwater & Environmental Services, Inc. (GES)
NPDES PERMIT NUMBER ASSIGNED BY EPA	: MAG910016
MASSDEP TRANSMITTAL NUMBER	: X275635
NAME OF RECEIVING WATER(S) AND TOWN	: Turnpike Lake, Plainville, MA
PERMIT AUTHORITY FOR DISCHARGE	: NPDES Remediation General Permit (RGP), effective April 8, 2017

The 2017 RGP was issued by both the Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) on March 9, 2017, with an effective date of April 8, 2017 and is available for sites located in Massachusetts and New Hampshire that discharge 1.0 million gallons per day or less as a result of remediation activities from eight general categories including collection structure dewatering/remediation.

As required by the RGP, Roux Associates Inc. (Roux Associates) on behalf of BASF Corporation (BASF) submitted a Notice of Intent (NOI) on July 7, 2017 requesting discharge to Turnpike Lake, which MassDEP classifies as an Outstanding Resource Water (ORW). Section 1.3 of the 2017 RGP states that discharges to ORWs are ineligible for coverage unless an Antidegradation Authorization is granted by MassDEP, and therefore MassDEP was required to perform an additional review in accordance with the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards (314 CMR 4.04) and MassDEP policy, “Implementation Procedures For The Antidegradation Provisions of the Massachusetts

Surface Water Quality Standards, 314 CMR 4.00" ("the Policy") prior to Antidegradation Authorization of the discharge. Also, according to 314 CMR 4.04(5)(c), "Where an authorization is at issue, the Department shall circulate a public notice in accordance with 314 CMR 2.06. Said notice shall state an authorization is under consideration by the Department, and indicate the Department's tentative determination. The applicant shall have the burden of justifying the authorization. Any authorization granted pursuant to 314 CMR 4.04 shall not extend beyond the expiration date of the permit."

Based on the NOI and additional information dated July 26, 2018, provided by Roux Associates on behalf of BASF and pursuant to the authority granted by Chapter 21, Sections 26-53 of the Massachusetts General Laws, as amended, 314 CMR 2.00, and 314 CMR 4.00, MassDEP has tentatively determined to issue the following Antidegradation Authorization To Discharge To an ORW.

MassDEP's Antidegradation Authorization does not provide final authorization for the discharge. With the completion of Antidegradation Authorization, the US EPA can proceed with Authorization to discharge under the 2017 RGP.

Project Description

As described in the NOI, BASF operates a groundwater extraction and treatment system at 36 Taunton Street in Plainville, Massachusetts ("the Site") to treat volatile organic compounds (VOCs) present in groundwater at the Site. Coverage under the RGP was initially issued by the United States Environmental Protection Agency (EPA) on September 22, 2005 for discharges associated with the treatment system. This is an ongoing long term discharge with a design flow of 75 gallons per minute (gpm). The average effluent flow from July 2010 to May 2016 was 37.3 gpm. The NOI is proposing the continued operation of the groundwater extraction, treatment system, and associated discharge.

The NOI states the following:
"Remedial activities being conducted at the Site are being performed in accordance with applicable United States Environmental Protection Agency (EPA) requirements. BASF is required by an Administrative Consent Order with USEPA to perform these activities as a Groundwater Stabilization Measure. The system has been in operation under several General Permits and in compliance from 1998 to present."

"The existing treatment system consists of a groundwater treatment system that treats groundwater extracted from six extraction wells as shown on Figure 1. Extracted groundwater is treated for chlorinated volatile organic compounds and certain metals via a clarifier, air stripper, bag filters, liquid phase activated carbon, and an ion exchange resin prior to discharge to Turnpike Lake. Sludge removed from the system is drummed and disposed off-site and air discharge off gas resulting from the air stripper is treated with vapor phase activated carbon before being discharged to the atmosphere. Chemical feed systems are available but infrequently utilized."

"Sodium hydroxide is kept on site to aid in metals removal via the metals removal system. However, with the introduction of the ion exchange resin to remove metals, the metals removal system is used

very infrequently (less than one to two times per year). Sulfuric acid is used only as needed to adjust pH in the effluent before discharge. However, with the infrequent use of sodium hydroxide, sulfuric acid is infrequently required to balance pH. The materials are stored with compatible materials in accordance with the storage requirements specified in the respective reagents' MSDSs."

Project Site

Discharge from the onsite treatment system flows into Turnpike Lake, which drains to the Wading River. According to Massachusetts Surface Water Quality Standards 314 CMR 4.05 and 4.06 (MASWQS), the Wading River is classified an Inland Water, Class A Public Water Supply, and is protected as an ORW.

Jurisdiction

The 2017 RGP authorization will include pollutant effluent limits based on submitted groundwater data and water quality criteria for freshwater in the MASWQS (which reference USEPA's *National Water Quality Criteria: 2002*, and available dilution at the point of discharge. The 2017 NOI included a dilution factor of 1 for the point of discharge because the receiving water body is a lake with a very low 7Q10.

In the previous EPA authorization for this Site dated June 17, 2011 ("2011 EPA Authorization"), EPA allowed the Site to discharge according to the RGP issued on September 9, 2010 ("2010 RGP"). Since an NOI was submitted for the 2017 RGP, the Site continues to operate according to the requirements put forth in the 2011 EPA Authorization. The 2011 EPA Authorization included monthly effluent limitations or monitoring for inorganics, VOCs, metal, fuel-related, and other parameters. The 2011 EPA Authorization is located at the following web link: https://www3.epa.gov/region1/npdes/remediation/noi/2011/BASFPlainville2011AuthorizationLetter.pdf.

MASWQS and the RGP state that discharges to ORWs in Massachusetts are ineligible for coverage unless an Antidegradation Authorization is granted by MassDEP. As described in the Request for Authorization letter dated July 26, 2018, Roux Associates on behalf of BASF submitted a description of how the project would demonstrate compliance with the MASWQS requirements for Antidegradation Authorization listed in 314 CMR 4.04(5)(a)(2) through 4.04(5)(a)(4). These responses are paraphrased below.

- Item 1, based on 314 CMR 4.04(5)(a)(2):
  Are there less environmentally damaging alternative sites for the discharge, sources of disposal, or methods to eliminate the discharge that are reasonably available or feasible?
  - Response: Shutting down the treatment system is not possible at this time. Groundwater is extracted to hydraulically control the transport of VOCs and prevent off-site migration of impacted groundwater. BASF is undertaking remediation actions to reduce and eliminate the source(s) of VOCs to the groundwater, including utilizing in-situ chemical oxidation injection methods. These activities are ongoing and BASF intends to shut down the Groundwater

Treatment Plant (GWTP) and eliminate the discharge to Turnpike Lake as soon as VOC sources to groundwater are adequately eliminated or controlled and EPA approves shut down of the GWTP. However, BASF must continue to extract groundwater and operate the GWTP until VOC sources to groundwater are eliminated or controlled. BASF anticipates operating the GWTP plant for up to three to five more years, contingent upon the outcome of active remediation measures and approvals by EPA.

Modifying the discharge of the treatment system to release the effluent to the Publicly Owned Treatment Works (POTW), as opposed to Turnpike Lake, is infeasible. Roux Associates contacted Mr. Dennis Morton of the Town of Plainville Water Department to determine if the POTW is able to receive the GWTP effluent. After reviewing the average, maximum, and design flows of the GWTP system, Mr. Morton stated that the Town of Plainville does not have the capacity to accept those types of volumes in its system.

There are no other feasible alternatives to discharging the treatment system effluent to other locations, via other means (e.g., land application), or treating the water at another location, especially considering BASF's intention to discontinue the discharge as soon as possible based on active remediation outcomes. Discharging treatment system effluent back to groundwater on-Site would risk compromising the remedial effectiveness of the groundwater extraction system. Specifically, water discharged on-Site would simply recirculate through the extraction system and impair the system's ability to depress the groundwater table, which would risk overwhelming the system and allowing off-Site migration of impacted groundwater. Developing an off-site discharge location for the treatment system effluent is inconsistent with the anticipated amount of time the treatment system is expected to operate. The extensive amount of time required to design, permit, and construct an alternative off-Site discharge location likely exceeds the operational life of the groundwater extraction system.

During the life of the GWTP operation BASF has undertaken various measures to reduce the volume of groundwater treated by the system through improved process controls and facility operation. Wells in the groundwater extraction system are outfitted with transducers and variable frequency drives to modulate the rate of groundwater extraction and ensure only the volume required to achieve remedial objectives is treated by the treatment system. In other words, the groundwater extraction wells are not pumping at a constant rate at all times. Furthermore, unnecessary components of the treatment system have been taken offline to reduce the need to modify pH of the discharge water and minimize, to the extent possible, the need to amend the treated groundwater with chemicals to meet discharge requirements. There are no additional feasible alternative methods to reduce flow into the treatment system or modify the treatment system operation that would not adversely impact the effectiveness of the groundwater remedy or negatively impact the quality of the treatment system effluent.

- Item 2, based on 314 CMR 4.04(5)(a)(3):

To the maximum extent feasible, are the discharge and activity designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices?

- Response: All reasonable efforts have been implemented to minimized environmental impacts of the treatment system discharge. Groundwater represents the only input to the GWTP and groundwater extraction cannot be further reduced without potentially adversely impacting the groundwater extraction system's ability to control the transport of contaminated groundwater, as discussed in response to Item 1.

  The GWTP treats groundwater almost exclusively through physical processes (i.e., air stripping, carbon adsorption) and therefore there is no opportunity to modify the system processes in a way that would reduce or eliminate the use of pollutants in the treatment process. The only chemical additions that currently take place are minor additions of sulfuric acid to the treated water before the water is discharged to Turnpike Lake to ensure that the pH of the discharge water is consistent with the permit requirements. Furthermore, pH adjustments are infrequent, and typically only occur in the 1-2 days after activated carbon is replaced in the treatment system. Therefore, usage of sulfuric acid is well below the 10,000 pound "otherwise used" and the 25,000 pound "processed" thresholds under the Toxics Release Inventory (TRI) regulations. Additionally, no wastes are generated as the result of use of sulfuric acid in the treatment system because it is fully neutralized during the treatment process.

- Item 3, based on 314 CMR 4.04(5)(a)(4):
  Will the discharge impair existing uses of the receiving water or result in a level of water quality less than the specified for the Class?
  - Response: The GWTP does not discharge toxic pollutants that have or will lead to a degradation of the water body, in accordance with 314 CMR 4.05(5)(e) which states that "all surface water bodies shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife."

    Data show that the release of toxic pollutants is insufficient to impair uses of Turnpike Lake as either a drinking water resource or for ecological purposes. Only three measurements in 2017 exceeded any of the standards/criteria. PCE was detected slightly above the RGP limits and drinking water standards in March and May 2017. As will be discussed further in response to Item 4, these exceedances were short term, resulted from equipment damage, and were eliminated upon repair of the equipment. Furthermore, these two PCE exceedances represent the only PCE exceedances over the entire period covered by the 2010 RGP. The only other exceedance was the exceedance of nickel (13.4 µg/L) above the MassDEP Ecological Risk-Based Target Value in Surface Water (8 µg/L) in March 2018. The nickel concentration in this single measurement was abnormally high compared to other treatment system effluent samples, but was still below all actionable standards, including the 2010 RGP discharge limit. All nickel measurements are also below USEPA's Ambient Water Quality Criteria for Aquatic Life level, which is the level US EPA identifies as potentially deleterious to aquatic life.

In addition to toxic pollutants, Massachusetts Surface Water Quality Standards require consideration of the following additional criteria, all of which are met by the discharge from the GWTP: Dissolved Oxygen (DO), Temperature, pH, bacteria, solids, color and turbidity, oil and grease, and taste and odor.

In the approximately 20 years that the GWTP has operated, the effluent from the GWTP has not impaired Turnpike Lake. The GWTP effluent is consistent with the high water quality expectations of a discharge to an Outstanding Resource Water and, if continuing discharge is approved, will continue to meet those high water quality expectations.

- Item 4
  Since expiration of the previous RGP on September 9, 2015, did discharge from the facility meet the requirements of the 2010 NOI?
  - Response: The facility met all performance requirements of the 2010 RGP from issuance of the 2010 RGP through the most recent sampling event for which data is available (June 4, 2018) except for two minor exceedances of tetrachloroethene (PCE) on March 6, 2017 and May 1, 2017 as described above.

    The March 2017 and May 2017 exceedances were attributed to minor damage to the air stripper component of the treatment system which removes the majority of the VOCs in the groundwater. The resulting exceedances of RGP PCE standard of 5.0 µg/L were 5.7 µg/L (March 2017) and 6.9 µg/L (May 2017). Following the May 2017 exceedance, the air stripper damage was identified and was promptly repaired. No PCE has been detected in the GWTP effluent above 0.3 µg/L in the 13 months since the air stripper repairs were completed. The periodic maintenance program for the GWTP was updated in response to these exceedances to include inspections of additional components of the air stripper, including the portion of the air stripper that required repair in May 2017. No additional measures are required to ensure that the facility remains in compliance.

Conclusion

The NOI and Request for Authorization have sufficiently defined the nature and general elements of the project for the purposes of MassDEP review and demonstrated that impact on the ORW will be minimized to the extent practicable. Based on review of the documents provided and comments received, MassDEP determined that the discharge meets the requirements for authorization listed in 314 CMR 4.04(5)(b) and 314 CMR 4.04(5)(a)2-4 and is proposing to authorize the discharge, subject to the terms and conditions of EPA's authorization to discharge under the RGP.

Lealdon Langley, Director
Wetlands and Wastewater Program
Department of Environmental Protection

[Date]

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES, INC.
12 GILL STREET, SUITE 4700
WOBURN, MASSACHUSETTS 01801 TEL 781-569-4000 FAX 781-569-4001

July 7, 2017

U.S. Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code OEP06-4
Boston, Massachusetts 02109-3912

Re: Notice of Intent for 2016 Remediation General Permit
BASF Corporation
36 Taunton Street, Plainville, Massachusetts
Remediation General Permit No. MAG910016

To Whom It May Concern:

On behalf of BASF Corporation (BASF), Roux Associates Inc. (Roux Associates) respectfully submits this National Pollution Discharge Elimination System (NPDES) Remediation General Permit (RGP) Notice of Intent (NOI) for continued coverage of discharges associated with remedial activities being conducted at the BASF Corporation facility (formerly known as Engelhard Corporation and BASF Catalysts, LLC) located at 36 Taunton Street in Plainville, Massachusetts (the Site).[1] Remedial activities being conducted at the Site are being performed in accordance with applicable United States Environmental Protection Agency (EPA) requirements. BASF is required by an Administrative Consent Order with USEPA to perform these activities as a Groundwater Stabilization Measure. The system has been in operation under several General Permits and in compliance from 1998 to present. Currently, remedial activities include the operation of a groundwater pump and treat system, which involves the extraction of impacted groundwater from six on-Site extraction wells to remove volatile organic compounds (VOCs) and certain metals. Groundwater treatment consists of metals and sludge removal systems, an air stripper, bag filters, and activated liquid-phase carbon. Air stripper off-gas is treated with activated vapor-phase carbon. Treated groundwater is discharged to Turnpike Lake (see Figures 1 and 2 attached). This discharge was previously covered under RGP number MAG910016, which expired on September 9, 2015. The system discharge has continued after expiration of the 2010 RGP in accordance with EPA's administrative continuance of coverage under the 2010 RGP.

Roux Associates is submitting this NOI for coverage under the 2016 RGP in order to continue the existing system discharge. The following information is attached in support of this NOI:

1. Suggested Form for Notice of Intent (NOI) for the Remediation General Permit;

[1] The Site has historically also used the addresses 30 and 32 Taunton Street.

2. Figure 1 - Site Plan (with discharge location) and Figure 2 - System Schematic of the Groundwater Treatment Plant;
3. Additional information in support of the NOI, including:
    a. Receiving Water Information: Part B, Sections 1, 2, 4, and 7
    b. Discharge Information: Part D, Section 4
    c. Chemical and Additive Information: Part F, Section 2
    d. Endangered Species Act Eligibility Determination: Part G, Section 1
    e. National Historic Preservation Act Eligibility Determination, Part H, Section 1
4. StreamStats Output for 7Q10 Determination;
5. Table 1 – Influent Water Summary Table and Table 2 – Receiving Water Summary Table;
6. Copy of Entered Data for Influent and Receiving Waters;
7. Copy of Fresh Water Results from Entered Data;
8. Laboratory Sampling Data;
9. MSDSs; and
10. Endangered Species Act Eligibility Determination Letter

If you have any questions or comments regarding the attached NOI, please do not hesitate to contact the undersigned at (781) 569-4000.

Sincerely,

ROUX ASSOCIATES, INC.

Melissa Wilson
Staff Engineer

Chase Gerbig
Senior Engineer

JR Taormina
Principal Engineer

cc: Mr. Ed Vanyo, BASF
Mr. James Marshall, Superintendent, Plainville Water and Sewer Department
Ms. Catherine Vakalopoulos, Massachusetts Department of Environmental Protection

ATTACHMENTS

ATTACHMENT 1

Remediation Permit Notice of Intent

II. Suggested Format for the Remediation General Permit Notice of Intent (NOI)

A. General site information:

<table>
<tr><td rowspan="2">1. Name of site:
BASF Plainville</td><td colspan="3">Site address: 36 Taunton Street
Street:</td></tr>
<tr><td>City: Plainville</td><td>State: MA</td><td>Zip: 02762</td></tr>
<tr><td rowspan="4">2. Site owner
BASF Corporation

Owner is (check one): ☐ Federal ☐ State/Tribal ■ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Ed Vanyo</td></tr>
<tr><td colspan="2">Telephone: 215-740-0886</td><td>Email: ed.vanyo@basf.com</td></tr>
<tr><td colspan="3">Mailing address: 100 Park Avenue
Street:</td></tr>
<tr><td>City: Florham Park</td><td>State: NJ</td><td>Zip: 07932</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
Groundwater & Environmental Services, Inc. (GES)</td><td colspan="3">Contact Person: Meghan Proia</td></tr>
<tr><td colspan="2">Telephone: 800-220-6119, ext 3589</td><td>Email: MProia@gesonline.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 364 Littleton Road, Suite 4</td></tr>
<tr><td>City: Westford</td><td>State: MA</td><td>Zip: 01886</td></tr>
<tr><td>4. NPDES permit number assigned by EPA:
MAG910016

NPDES permit is (check all that apply: ■ RGP ☐ DGP ☐ CGP
☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:</td><td colspan="3">5. Other regulatory program(s) that apply to the site (check all that apply):
☐ MA Chapter 21e; list RTN(s):

☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:

☐ CERCLA
☐ UIC Program
☐ POTW Pretreatment
☐ CWA Section 404</td></tr>
</table>

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Turnpike Lake	MAG62198	A

Receiving water is (check any that apply): ■ Outstanding Resource Water ☐ Ocean Sanctuary ☐ territorial sea ☐ Wild and Scenic River

2. Has the operator attached a location map in accordance with the instructions in B, above? (check one): ■ Yes ☐ No

Are sensitive receptors present near the site? (check one): ■ Yes ☐ No

If yes, specify: Turnpike Lake is identified as a Public Water Supply

3. Indicate if the receiving water(s) is listed in the State's Integrated List of Waters (i.e., CWA Section 303(d)). Include which designated uses are impaired, and any pollutants indicated. Also, indicate if a final TMDL is available for any of the indicated pollutants. For more information, contact the appropriate State as noted in Part 4.6 of the RGP. Not Listed

4. Indicate the seven day-ten-year low flow (7Q10) of the receiving water determined in accordance with the instructions in Appendix V for sites located in Massachusetts and Appendix VI for sites located in New Hampshire.	0.063 cfs
5. Indicate the requested dilution factor for the calculation of water quality-based effluent limitations (WQBELs) determined in accordance with the instructions in Appendix V for sites in Massachusetts and Appendix VI for sites in New Hampshire.	1.0

6. Has the operator received confirmation from the appropriate State for the 7Q10and dilution factor indicated? (check one): ■ Yes ☐ No

If yes, indicate date confirmation received: Receiving water is a lake. Dilution factor was not granted.

7. Has the operator attached a summary of receiving water sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No

C. Source water information:

1. Source water(s) is (check any that apply):

■ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	☐ Potable water; if so, indicate municipality or origin: ☐ Other; if so, specify:

2. Source water contaminants: Chlorinated volatile organic compounds and certain metals	
a. For source waters that are contaminated groundwater or contaminated surface water, indicate are any contaminants present that are not included in the RGP? (check one): ☐ Yes ■ No If yes, indicate the contaminant(s) and the maximum concentration present in accordance with the instructions in Appendix VIII.	b. For a source water that is a surface water other than the receiving water, potable water or other, indicate any contaminants present at the maximum concentration in accordance with the instructions in Appendix VIII? (check one): ☐ Yes ☐ No
3. Has the source water been previously chlorinated or otherwise contains residual chlorine? (check one): ☐ Yes ■ No	

D. Discharge information

1.The discharge(s) is a(n) (check any that apply): ■ Existing discharge ☐ New discharge ☐ New source	
Outfall(s): Groundwater treatment plant effluent discharge	Outfall location(s): (Latitude, Longitude) 42° 01' 0.92" N 71°18' 39.50" W
Discharges enter the receiving water(s) via (check any that apply): ■ Direct discharge to the receiving water ☐ Indirect discharge, if so, specify: ☐ A private storm sewer system ☐ A municipal storm sewer system If the discharge enters the receiving water via a private or municipal storm sewer system: Has notification been provided to the owner of this system? (check one): ☐ Yes ☐ No Has the operator has received permission from the owner to use such system for discharges? (check one): ☐ Yes ☐ No, if so, explain, with an estimated timeframe for obtaining permission: Not Applicable Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ☐ No	
Provide the expected start and end dates of discharge(s) (month/year): Start: Existing; to begin under this permit 07/2017. End: 07/2022 under this permit. Indicate if the discharge is expected to occur over a duration of: ☐ less than 12 months ■ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

<table>
<tr><td>2. Activity Category: (check all that apply)</td><td colspan="2">3. Contamination Type Category: (check all that apply)</td></tr>
<tr><td rowspan="5">☐ I – Petroleum-Related Site Remediation
■ II – Non-Petroleum-Related Site Remediation
☐ III – Contaminated Site Dewatering
☐ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
☐ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

■ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
■ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
■ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td></tr>
<tr><td colspan="2">b. If Activity Category III, IV, V, VI, VII or VIII: (check either G or H)</td></tr>
<tr><td>☐ G. Sites with Known Contamination</td><td>☐ H. Sites with Unknown Contamination</td></tr>
<tr><td>c. If Category III-G, IV-G, V-G, VI-G, VII-G or VIII-G: (check all that apply)

☐ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td><td>d. If Category III-H, IV-H, V-H, VI-H, VII-H or VIII-H Contamination Type Categories A through F apply</td></tr>
</table>

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia	✓		1	4500NH3	75	< 75	< 75	Report mg/L	---
Chloride		✓	1	300	500	92100	92100	Report µg/l	---
Total Residual Chlorine	✓		1	4500CL-D	20	< 20	< 20	0.2 mg/L	11 µg/L
Total Suspended Solids		✓	1	2540D	5000	<5000	<5000	30 mg/L	---
Antimony	✓		1	200.8	4	< 4	< 4	206 µg/L	640 µg/L
Arsenic	✓		1	200.8	1	< 1	< 1	104 µg/L	10 µg/L
Cadmium		✓	1	200.8	0.2	0.67	0.67	10.2 µg/L	0.2040 µg/L
Chromium III	✓		1	N/A	10	< 10	< 10	323 µg/L	63.1 µg/L
Chromium VI	✓		1	7196A	10	< 10	< 10	323 µg/L	11.4 µg/L
Copper		✓	1	200.8	1	2.51	2.51	242 µg/L	6.7 µg/L
Iron		✓	1	200.7	50	131	131	5,000 µg/L	1000 µg/L
Lead	✓		1	200.8	0.5	< 0.5	< 0.5	160 µg/L	1.96 µg/L
Mercury	✓		1	245.1	0.2	< 0.2	< 0.2	0.739 µg/L	0.91 µg/L
Nickel		✓	1	200.8	2	40.29	40.29	1,450 µg/L	37.8 µg/L
Selenium	✓		1	200.8	5	< 5	< 5	235.8 µg/L	5.0 µg/L
Silver	✓		1	200.8	0.4	< 0.4	< 0.4	35.1 µg/L	2.0 µg/L
Zinc	✓		1	200.8	10	< 10	< 10	420 µg/L	86.7 µg/L
Cyanide	✓		1	4500CN	5	< 5	< 5	178 mg/L	5.2 µg/L
B. Non-Halogenated VOCs									
Total BTEX	✓		0					100 µg/L	---
Benzene	✓		0					5.0 µg/L	---
1,4 Dioxane	✓		0					200 µg/L	---
Acetone	✓		0					7.97 mg/L	---
Phenol	✓		0					1,080 µg/L	300 µg/L

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride		✓	1	8260C	10	< 10	< 10	4.4 µg/L	1.6 µg/L
1,2 Dichlorobenzene	✓		1	8260C	50	< 50	< 50	600 µg/L	---
1,3 Dichlorobenzene	✓		1	8260C	50	< 50	< 50	320 µg/L	---
1,4 Dichlorobenzene	✓		1	8260C	50	< 50	< 50	5.0 µg/L	---
Total dichlorobenzene	✓		1	8260C	50	< 50	< 50	763 µg/L in NH	---
1,1 Dichloroethane		✓	1	8260C	15	15	15	70 µg/L	---
1,2 Dichloroethane		✓	1	8260C	10	< 10	< 10	5.0 µg/L	---
1,1 Dichloroethylene		✓	1	8260C	10	12	12	3.2 µg/L	---
Ethylene Dibromide	✓		1	504.1	0.0105	< 0.0105	< 0.0105	0.05 µg/L	---
Methylene Chloride		✓	1	8260C	60	< 60	< 60	4.6 µg/L	---
1,1,1 Trichloroethane		✓	1	8260C	10	370	370	200 µg/L	---
1,1,2 Trichloroethane		✓	1	8260C	15	< 15	< 15	5.0 µg/L	---
Trichloroethylene		✓	1	8260C	10	70	70	5.0 µg/L	---
Tetrachloroethylene		✓	1	8260C	10	1300	1300	5.0 µg/L	3.3 µg/L
cis-1,2 Dichloroethylene		✓	1	8260C	10	72	72	70 µg/L	---
Vinyl Chloride		✓	1	8260C	20	< 20	< 20	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✓		0					190 µg/L	---
Diethylhexyl phthalate	✓		0					101 µg/L	2.2 µg/L
Total Group I PAHs	✓		0					1.0 µg/L	---
Benzo(a)anthracene	✓		0					As Total PAHs	0.0038 µg/L
Benzo(a)pyrene	✓		0						0.0038 µg/L
Benzo(b)fluoranthene	✓		0						0.0038 µg/L
Benzo(k)fluoranthene	✓		0						0.0038 µg/L
Chrysene	✓		0						0.0038 µg/L
Dibenzo(a,h)anthracene	✓		0						0.0038 µg/L
Indeno(1,2,3-cd)pyrene	✓		0						0.0038 µg/L

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
Total Group II PAHs	✓		0					100 µg/L	---
Naphthalene	✓		0					20 µg/L	---
E. Halogenated SVOCs									
Total PCBs	✓		1	608	0.269	<0.269	<0.269	0.000064 µg/L	---
Pentachlorophenol	✓		0					1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✓		0					5.0 mg/L	---
Ethanol	✓		0					Report mg/L	---
Methyl-tert-Butyl Ether	✓		0					70 µg/L	20 µg/L
tert-Butyl Alcohol	✓		0					120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✓		0					90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
pH		✓	1	4500H+-B	--	6.1	6.1		
Temperature		✓	1	--	--	59 °C	59°C		
Hardness		✓	1	SM 2340B	660	68,300	68,300		

E. Treatment system information

1. Indicate the type(s) of treatment that will be applied to effluent prior to discharge: (check all that apply)

☐ Adsorption/Absorption ☐ Advanced Oxidation Processes ■ Air Stripping ■ Granulated Activated Carbon ("GAC")/Liquid Phase Carbon Adsorption

■ Ion Exchange ■ Precipitation/Coagulation/Flocculation ■ Separation/Filtration ☐ Other; if so, specify:

Note that precipitation/coagulation/flocculation only used as needed.

2. Provide a written description of all treatment system(s) or processes that will be applied to the effluent prior to discharge.

The existing treatment system consists a groundwater treatment system that treats groundwater extracted from six extraction wells as shown on Figure 1. Extracted groundwater is treated for chlorinated volatile organic compounds and certain metals via a clarifier, air stripper, bag filters, liquid phase activated carbon, and an ion exchange resin prior to discharge to Turnpike Lake. Sludge removed from the system is drummed and disposed off-site and air discharge off gas resulting from the air stripper is treated with vapor phase activated carbon before being discharged to the atmosphere. Chemical feed systems are available but infrequently utilized (1-2 times per year).

Identify each major treatment component (check any that apply):

☐ Fractionation tanks■ Equalization tank ☐ Oil/water separator ■ Mechanical filter ☐ Media filter

■ Chemical feed tank ■ Air stripping unit ■ Bag filter ■ Other; if so, specify: Carbon Filters

Indicate if either of the following will occur (check any that apply):

☐ Chlorination ☐ De-chlorination

3. Provide the **design flow capacity** in gallons per minute (gpm) of the most limiting component. Indicate the most limiting component: Ion Exchange Resin Vessel Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	75 GPM
Provide the proposed maximum effluent flow in gpm.	75 GPM
Provide the average effluent flow in gpm. Mean flow rate July 2010-May 2016	37.3 GPM
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	

4. Has the operator attached a schematic of flow in accordance with the instructions in E, above? (check one): ■ Yes ☐ No

F. Chemical and additive information

1. Indicate the type(s) of chemical or additive that will be applied to effluent prior to discharge or that may otherwise be present in the discharge(s): (check all that apply)

☐ Algaecides/biocides ☐ Antifoams ☐ Coagulants ☐ Corrosion/scale inhibitors ☐ Disinfectants ☐ Flocculants ■ Neutralizing agents ☐ Oxidants ☐ Oxygen ☐ scavengers ☐ pH conditioners ☐ Bioremedial agents, including microbes ☐ Chlorine or chemicals containing chlorine ☐ Other; if so, specify:

2. Provide the following information for each chemical/additive, using attachments, if necessary:

Sodium Hydroxide and Sulfuric Acid (for neutralization) are used only on a contingent basis. MSDS's are attached.

a. Product name, chemical formula, and manufacturer of the chemical/additive;
b. Purpose or use of the chemical/additive or remedial agent;
c. Material Safety Data Sheet (MSDS) and Chemical Abstracts Service (CAS) Registry number for each chemical/additive;
d. The frequency (hourly, daily, etc.), duration (hours, days), quantity (maximum and average), and method of application for the chemical/additive;
e. Any material compatibility risks for storage and/or use including the control measures used to minimize such risks; and
f. If available, the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)).

3. Has the operator attached an explanation which demonstrates that the addition of such chemicals/additives may be authorized under this general permit in accordance with the instructions in F, above? (check one): ■ Yes ☐ No; if no, has the operator attached data that demonstrates each of the 126 priority pollutants in CWA Section 307(a) and 40 CFR Part 423.15(j)(1) are non-detect in discharges with the addition of the proposed chemical/additive? (check one): ☐ Yes ☐ No

G. Endangered Species Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

☐ **FWS Criterion A**: No endangered or threatened species or critical habitat are in proximity to the discharges or related activities or come in contact with the "action area".

■ **FWS Criterion B**: Formal or informal consultation with the FWS under section 7 of the ESA resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by FWS on a finding that the discharges and related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation). Has the operator completed consultation with FWS? (check one): ■ Yes ☐ No; if no, is consultation underway? (check one): ☐ Yes ☐ No

☐ **FWS Criterion C**: Using the best scientific and commercial data available, the effect of the discharges and related activities on listed species and critical habitat have been evaluated. Based on those evaluations, a determination is made by EPA, or by the operator and affirmed by EPA, that the discharges and related activities will have "no effect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the FWS. This determination was made by: (check one) ☐ the operator ☐ EPA ☐ Other; if so, specify:

☐ **NMFS Criterion**: A determination made by EPA is affirmed by the operator that the discharges and related activities will have "no effect" or are "not likely to adversely affect" any federally threatened or endangered listed species or critical habitat under the jurisdiction of NMFS and will not result in any take of listed species. Has the operator previously completed consultation with NMFS? (check one): ☐ Yes ☐ No

2. Has the operator attached supporting documentation of ESA eligibility in accordance with the instructions in Appendix I, and G, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written concurrence or finding provided by the Services? (check one): ■ Yes ☐ No; if yes, attach.

H. National Historic Preservation Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

■ **Criterion A**: No historic properties are present. The discharges and discharge-related activities (e.g., BMPs) do not have the potential to cause effects on historic properties.

☐ **Criterion B**: Historic properties are present. Discharges and discharge related activities do not have the potential to cause effects on historic properties.

☐ **Criterion C**: Historic properties are present. The discharges and discharge-related activities have the potential to have an effect or will have an adverse effect on historic properties.

2. Has the operator attached supporting documentation of NHPA eligibility in accordance with the instructions in H, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (TPHO), or other tribal representative that outlines measures the operator will carry out to mitigate or prevent any adverse effects on historic properties? (check one): ☐ Yes ☐ No

I. Supplemental information

Describe any supplemental information being provided with the NOI. Include attachments if required or otherwise necessary.

Please find attached the Groundwater Treatment Plant Schematic, laboratory analytical reports and chain of custody, supporting influent and effluent calculations, MSDS's, Endangered Species Act eligibility determination, and documentation of NHPA eligibility.

Has the operator attached data, including any laboratory case narrative and chain of custody used to support the application? (check one): ■ Yes ☐ No

Has the operator attached the certification requirement for the Best Management Practices Plan (BMPP)? (check one): ■ Yes ☐ No

J. Certification requirement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

BMPP certification statement: A BMPP meeting the requirements of this general permit has been developed and implemented.	
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ■ No ☐
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ☐ No ☐ NA ■
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ☐ No ☐ NA ■
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ☐ No ☐ NA ■
Signature: Edward Vanyo	Date: 07/07/2017
Print Name and Title: Ed Vanyo, Remediation Specialist	

ATTACHMENT 2

Figures

MH5
MH4
MH3
MH2
MH1
BUILDING 11 (GWTP)
BUILDINGS 8 AND 10
FORMER BUILDING
EW–6
EW–5
EW–4
EW–3
EW–2
EW–1
HDPE BARRIER WALL
ACCESS VAULT
APPROXIMATE SYSTEM DISCHARGE
TURNPIKE LAKE
TAUNTON STREET (ROUTE 152)
N

LEGEND:

- MH1 ACCESS MANHOLE
- PUMPING/EXTRACTION WELL
- PROPERTY BOUNDARY OF FORMER BASF FACILITY
- LOT/PROPERTY LINES IN AREA

100' 0 100'

Title:

SITE PLAN
AREA OF GROUNDWATER STABILIZATION MEASURE

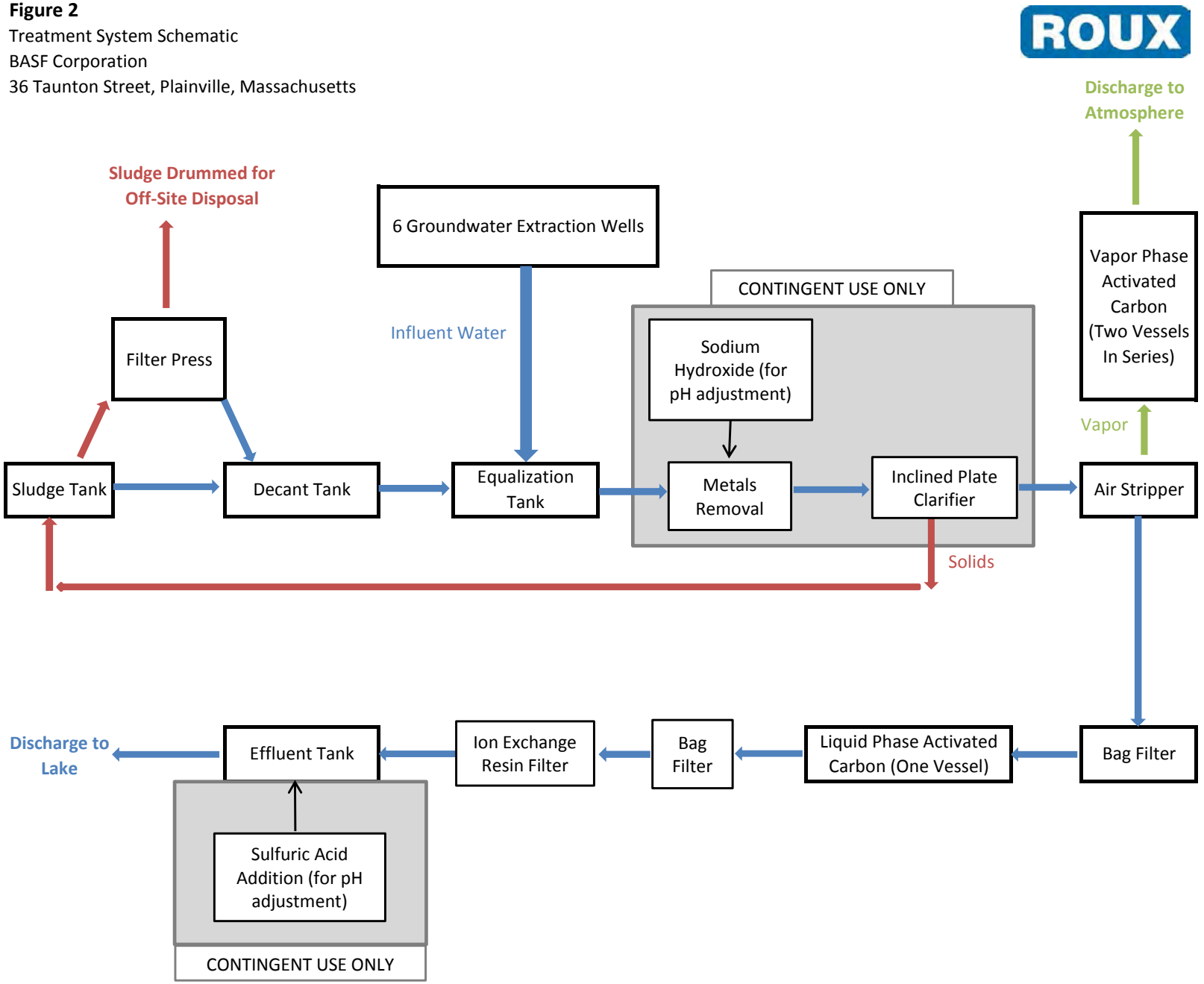
32 TAUNTON STREET
PLAINVILLE, MASSACHUSETTS

Prepared For:
BASF CHEMICAL CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: JT	Date: JUNE 2017	FIGURE
Prepared by: WH/CC	Scale: AS SHOWN	1
Project Mgr: JT	Office: MA	
File No: BF0010002	Project: 0251.0020.M015	

Figure 2
Treatment System Schematic
BASF Corporation
36 Taunton Street, Plainville, Massachusetts



ATTACHMENT 3

Additional Information in Support of NOI

Additional Information in Support of NOI
BASF Corporation
36 Taunton Street, Plainville, Massachusetts

The following information has been provided in support of the NOI provided herein for the BASF Corporation (BASF) facility located at 36 Taunton Street in Plainville, Massachusetts:

B. Receiving Water Information
Section 1 and 2.
Turnpike Lake is classified as an Outstanding Resource Water (ORW) and identified as a Public Water Supply (PWS) because it is a tributary to the Wading River ORW/PWS. Roux Associates has confirmed this designation with multiple MassDEP sources. On behalf of BASF, Roux is currently corresponding with Ms. Catherine Vakalopoulos of the Massachusetts Department of Environmental Protection regarding this designation. Roux has provided Ms. Vakalopoulos with the 2010 RGP and NOI approval, MassDEP water quality determination of Turnpike Lake, orders of condition, and supplemental information pertaining to recent dredging work completed in Turnpike Lake to expedite MassDEP's review of the 2016 NOI.

Section 4.
A 7Q10 value of 0.063 cfs was calculated by StreamStats, which, based on the system discharge, would result in a dilution factor of 1.71. However, no dilution factor is used in the determination of effluent discharge limits. MassDEP did not grant a dilution factor because the receiving water body is a lake.

Section 7.
Attached Tables 1 and 2 provide a summary of the sampling results for the influent groundwater and receiving water body.

D. Discharge Information
Section 4.
Due to the high concentration of tetrachloroethylene (PCE), the halogenated VOCs analytes were diluted 20 times. Because of this dilution, it was not possible to reach the Minimum Levels (MLs) for all halogenated VOCs. The laboratory sampling results (Attachment 8) contain a narrative to support this reasoning. In regards to the sampling methods used by Alpha Analytical, the EPA granted Alpha Analytical permission to continue using methods 8260 and 8270 with the 2016 RGP. Documentation of the approval is also attached.

The Entered Data and Fresh Water Results calculated using the Fillable Electronic Format provided, are attached.

F. Chemical and additive information
Section 2.
Sodium hydroxide is kept on site to aid in metals removal via the metals removal system. However, with the introduction of the ion exchange resin to remove metals, the metals removal system is used very infrequently (less than one to two times per year). Sulfuric acid is used only as needed to adjust pH in the effluent before discharge. However, with the infrequent use of

sodium hydroxide, sulfuric acid is infrequently required to balance pH. The MSDSs for sodium hydroxide and sulfuric acid are attached. The materials are stored with compatible materials in accordance with the storage requirements specified in the respective reagents' MSDSs.

G. Endangered Species Act Eligibility Determination

Section 1.

FWS Criterion B has been selected. The IPaC system identified the Northern long-eared bat as an endangered species, but there are no federally listed endangered or threatened species for Norfolk County as found in Appendix II Summary of Endangered Species Act Listings and Essential Fish Habitat Designations. A "No Species Present" letter obtained from the FWS under section 7 of the ESA has been attached.

H. National Historic Preservation Act Eligibility Determination

Section 1.

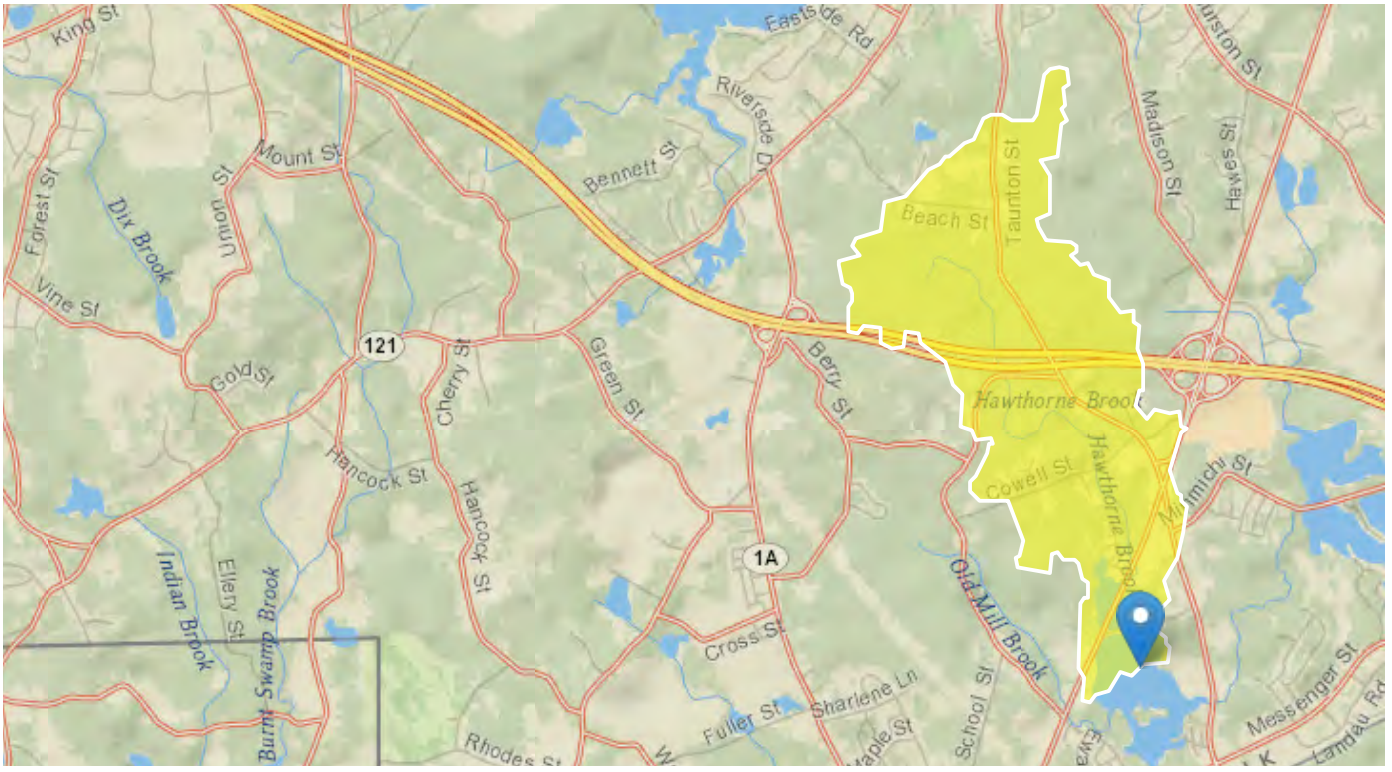
Plainville, Massachusetts is not listed as having any Historic Places on the National Register.

ATTACHMENT 4

StreamStats Output

StreamStats Report - BASF Plainville

Region ID:
MA
Workspace ID:
MA20170612103910441000
Clicked Point (Latitude, Longitude):
42.01699, -71.31256
Time:
2017-06-12 10:39:50 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.02	square miles
BSLDEM250	Mean basin slope computed from 1:250K DEM	2.174	percent
DRFTPERSTR	Area of stratified drift per unit of stream length	0.19	square mile per mile
MAREGION	Region of Massachusetts 0 for Eastern 1 for Western	0	dimensionless

Low-Flow Statistics Parameters [100 Percent (2.02 square miles) Statewide Low Flow WRIR00 4135]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

DRNAREA	Drainage Area	2.02	square miles	1.61	149
BSLDEM250	Mean Basin Slope from 250K DEM	2.174	percent	0.32	24.6
DRFTPERSTR	Stratified Drift per Stream Length	0.19	square mile per mile	0	1.29
MAREGION	Massachusetts Region	0	dimensionless	0	1

Low-Flow Statistics Flow Report [100 Percent (2.02 square miles) Statewide Low Flow WRIR00 4135]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	SE	SEp
7 Day 2 Year Low Flow	0.164	ft^3/s	0.0534	0.482	49.5	49.5
7 Day 10 Year Low Flow	0.063	ft^3/s	0.0164	0.226	70.8	70.8

Low-Flow Statistics Citations

Ries, K.G., III,2000, Methods for estimating low-flow statistics for Massachusetts streams: U.S. Geological Survey Water Resources Investigations Report 00-4135, 81 p. (http://pubs.usgs.gov/wri/wri004135/)

ATTACHMENT 5

Laboratory Summary Tables

Table 1 - Influent Sampling Summary
Groundwater Analytical Results
BASF Corporation
36 Taunton Street, Plainville, Massachusetts
NPDES Permit MAG910016

Analyte	Sample ID	INFLUENT	
	Sample Date	5/23/2017	6/14/2017
	Lab Sample ID	L1716822-01	L1719873-01
Inorganics	**Units**		
Ammonia	ug/l	< 75	--
Chloride	ug/l	**92100**	--
Total Residual Chlorine	ug/l	< 20	--
Total Suspended Solids	ug/l	< 5000	--
Antimony	ug/l	< 4	--
Arsenic	ug/l	< 1	--
Cadmium	ug/l	**0.67**	--
Chromium III	ug/l	< 10	--
Chromium VI	ug/l	< 10	--
Copper	ug/l	**2.51**	--
Iron	ug/l	**131**	--
Lead	ug/l	< 0.5	--
Mercury	ug/l	< 0.2	--
Nickel	ug/l	**40.29**	--
Selenium	ug/l	< 5	--
Silver	ug/l	< 0.4	--
Zinc	ug/l	< 10	--
Cyanide	ug/l	< 5	--
Halogenated VOCs			
Carbon tetrachloride	ug/l	< 10	--
1,2-Dichlorobenzene	ug/l	< 50	--
1,3-Dichlorobenzene	ug/l	< 50	--
1,4-Dichlorobenzene	ug/l	< 50	--
1,1-Dichloroethane	ug/l	**15**	--
1,2-Dichloroethane	ug/l	< 10	--
1,1-Dichloroethene	ug/l	**12**	--
Ethylene Dibromide	ug/l	< 0.0105	--
Methylene chloride	ug/l	< 60	--
1,1,1-Trichloroethane	ug/l	**370**	--
1,1,2-Trichloroethane	ug/l	< 15	--
Trichloroethene	ug/l	**70**	--
Tetrachloroethene	ug/l	**1300**	--
cis-1,2-Dichloroethene	ug/l	**72**	--
Vinyl chloride	ug/l	< 20	--
Halogenated SVOCs			
Aroclor 1016	ug/l	< 0.269	--
Aroclor 1221	ug/l	< 0.269	--
Aroclor 1232	ug/l	< 0.269	--
Aroclor 1242	ug/l	< 0.269	--
Aroclor 1248	ug/l	< 0.269	--
Aroclor 1254	ug/l	< 0.269	--
Aroclor 1260	ug/l	< 0.215	--
Other			
Total Hardness	ug/l	--	**68,300**
pH	SU	--	6.1
Temperature	°F	--	59 *

Notes:

ug/L indicates microgram per liter

< indicates compound is below laboratory reporting limit

* indicates parameter was field determined

Bold indicates compound was detected in sample

Table 2 - Receiving Water Sampling Summary
Turnpike Lake Water Results
BASF Corporation
36 Taunton Street, Plainville, Massachusetts
NPDES Permit MAG910016

Analyte	**Sample ID** **Sample Date** **Lab Sample ID**	RECEIVING WATER 5/23/2017 L1716822-02
Inorganics	**Units**	
Ammonia	ug/L	< 75
Antimony	ug/L	< 4
Arsenic	ug/L	< 1
Cadmium	ug/L	**0.2**
Chromium III	ug/L	< 10
Chromium VI	ug/L	< 10
Copper	ug/L	< 1
Iron	ug/L	**1190**
Lead	ug/L	**0.51**
Mercury	ug/L	< 0.2
Nickel	ug/L	< 2
Selenium	ug/L	< 5
Silver	ug/L	< 0.4
Zinc	ug/L	**41.19**
Other		
Total Hardness	ug/L	**31600**
pH	SU	6.3
Temperature	°F	72.1 *

Notes:
ug/L indicates microgram per liter
< indicates compound is below laboratory reporting limit
* indicates parameter was field determined
Bold indicates compound was detected in sample

ATTACHMENT 6

Influent and Receiving Water Entered Data

Enter number values in green boxes below

Enter values in the units specified

↓

0	Q_R = Enter upstream flow in **MGD**
0.0576	Q_P = Enter discharge flow in **MGD**
0	Downstream 7Q10

Enter a dilution factor, if other than zero

↓

0

Enter values in the units specified

↓

68.3	C_d = Enter influent hardness in **mg/L** $CaCO_3$
31.6	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

Enter **receiving water** concentrations in the units specified

↓

6.3	pH in **Standard Units**
22.3	Temperature in **°C**
0	Ammonia in **mg/L**
31.6	Hardness in **mg/L** $CaCO_3$
0	Salinity in **ppt**
0	Antimony in **µg/L**
0	Arsenic in **µg/L**
0.2	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
0	Copper in **µg/L**
1190	Iron in **µg/L**
0.51	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
41.19	Zinc in **µg/L**

Enter **influent** concentrations in the units specified

↓

0	TRC in **µg/L**
0	Ammonia in **mg/L**
0	Antimony in **µg/L**
0	Arsenic in **µg/L**
0.67	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
2.51	Copper in **µg/L**
131	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
40.29	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
0	Zinc in **µg/L**
0	Cyanide in **µg/L**
0	Phenol in **µg/L**
0	Carbon Tetrachloride in **µg/L**
1300	Tetrachloroethylene in **µg/L**
0	Total Phthalates in **µg/L**
0	Diethylhexylphthalate in **µg/L**
0	Benzo(a)anthracene in **µg/L**
0	Benzo(a)pyrene in **µg/L**
0	Benzo(b)fluoranthene in **µg/L**
0	Benzo(k)fluoranthene in **µg/L**
0	Chrysene in **µg/L**
0	Dibenzo(a,h)anthracene in **µg/L**
0	Indeno(1,2,3-cd)pyrene in **µg/L**
0	Methyl-tert butyl ether in **µg/L**

Notes:

Freshwater: Q_R equal to the 7Q10; enter alternate Q_R if approved by the State; enter 0 if no dilution factor approved

Saltwater (estuarine and marine): enter Q_R if approved by the State; enter 0 if no entry

Discharge flow is equal to the design flow or 1 MGD, whichever is less

Only if approved by State as the entry for Q_R; leave 0 if no entry

Saltwater (estuarine and marine): only if approved by the State

Leave 0 if no entry

Freshwater only

pH, temperature, and ammonia required for all discharges

Hardness required for freshwater

Salinity required for saltwater (estuarine and marine)

Metals required for all discharges if present and if dilution factor is > 1

Enter 0 if non-detect or testing not required

if >1 sample, enter maximum

if >10 samples, may enter 95th percentile

Enter 0 if non-detect or testing not required

ATTACHMENT 7

Fresh Water Results from Entered Data

Dilution Factor	1.0					
A. Inorganics	TBEL applies if bolded		WQBEL applies if bolded		Compliance Level applies if shown	
Ammonia	**Report**	mg/L	---			
Chloride	**Report**	µg/L	---			
Total Residual Chlorine	0.2	mg/L	**11**	µg/L	50	µg/L
Total Suspended Solids	**30**	mg/L	---			
Antimony	**206**	µg/L	640	µg/L		
Arsenic	**104**	µg/L	10	µg/L		
Cadmium	10.2	µg/L	**0.2040**	µg/L		
Chromium III	**323**	µg/L	63.1	µg/L		
Chromium VI	**323**	µg/L	11.4	µg/L		
Copper	**242**	µg/L	6.7	µg/L		
Iron	**5000**	µg/L	1000	µg/L		
Lead	**160**	µg/L	1.96	µg/L		
Mercury	**0.739**	µg/L	0.91	µg/L		
Nickel	1450	µg/L	**37.8**	µg/L		
Selenium	**235.8**	µg/L	5.0	µg/L		
Silver	**35.1**	µg/L	2.0	µg/L		
Zinc	**420**	µg/L	86.7	µg/L		
Cyanide	**178**	mg/L	5.2	µg/L	---	µg/L
B. Non-Halogenated VOCs						
Total BTEX	**100**	µg/L	---			
Benzene	**5.0**	µg/L	---			
1,4 Dioxane	**200**	µg/L	---			
Acetone	**7970**	µg/L	---			
Phenol	**1,080**	µg/L	300	µg/L		
C. Halogenated VOCs						
Carbon Tetrachloride	**4.4**	µg/L	1.6	µg/L		
1,2 Dichlorobenzene	**600**	µg/L	---			
1,3 Dichlorobenzene	**320**	µg/L	---			
1,4 Dichlorobenzene	**5.0**	µg/L	---			
Total dichlorobenzene	**---**	µg/L	---			
1,1 Dichloroethane	**70**	µg/L	---			
1,2 Dichloroethane	**5.0**	µg/L	---			
1,1 Dichloroethylene	**3.2**	µg/L	---			
Ethylene Dibromide	**0.05**	µg/L	---			
Methylene Chloride	**4.6**	µg/L	---			
1,1,1 Trichloroethane	**200**	µg/L	---			
1,1,2 Trichloroethane	**5.0**	µg/L	---			
Trichloroethylene	**5.0**	µg/L	---			
Tetrachloroethylene	5.0	µg/L	**3.3**	µg/L		
cis-1,2 Dichloroethylene	**70**	µg/L	---			
Vinyl Chloride	**2.0**	µg/L	---			
D. Non-Halogenated SVOCs						
Total Phthalates	**190**	µg/L	---	µg/L		
Diethylhexyl phthalate	**101**	µg/L	2.2	µg/L		

Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---			
Benzo(a)anthracene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Chrysene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.0038	µg/L	---	µg/L
Total Group II Polycyclic Aromatic Hydrocarbons	**100**	µg/L	---			
Naphthalene	**20**	µg/L	---			
E. Halogenated SVOCs						
Total Polychlorinated Biphenyls	**0.000064**	µg/L	---		0.5	µg/L
Pentachlorophenol	**1.0**	µg/L	---			
F. Fuels Parameters						
Total Petroleum Hydrocarbons	**5.0**	mg/L	---			
Ethanol	**Report**	mg/L	---			
Methyl-tert-Butyl Ether	**70**	µg/L	20	µg/L		
tert-Butyl Alcohol	**120**	µg/L	---			
tert-Amyl Methyl Ether	**90**	µg/L	---			

ATTACHMENT 8

Laboratory Sampling Data

ANALYTICAL REPORT

Lab Number:	L1716822
Client:	Roux Associates 12 Gill Street Suite 4700 Woburn, MA 01801
ATTN:	Chase Gerbig
Phone:	(781) 270-4027
Project Name:	BASF PLAINVILLE
Project Number:	0251.0020M015
Report Date:	06/28/17

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1716822-01	INFLUENT	WATER	PLAINVILLE, MA	05/23/17 12:45	05/23/17
L1716822-02	RECEIVING WATER	WATER	PLAINVILLE, MA	05/23/17 13:15	05/23/17
L1716822-03	TRIP BLANK	WATER	PLAINVILLE, MA	05/23/17 00:00	05/23/17

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1716822
Project Number:	0251.0020M015	**Report Date:**	06/28/17

Case Narrative (continued)

Report Submission

This report replaces the report issued May 31, 2017. A narrative has been added for the Volatile Organics analysis.

Sample Receipt

A Trip Blank was received in the laboratory, but not listed on the Chain of Custody, and was not analyzed.

Volatile Organics

L1716822-01: The sample has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample (tetrachloroethene).

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Melissa Cripps Melissa Cripps

Title: Technical Director/Representative Date: 06/28/17

ORGANICS

VOLATILES

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-01
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA

Matrix: Water
Analytical Method: 14,504.1
Analytical Date: 05/30/17 12:52
Analyst: NS

Date Collected: 05/23/17 12:45
Date Received: 05/23/17
Field Prep: Not Specified
Extraction Method: EPA 504.1
Extraction Date: 05/30/17 10:32

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Microextractables by GC - Westborough Lab							
1,2-Dibromoethane	ND		ug/l	0.011	--	1	A

Project Name: BASF PLAINVILLE
Lab Number: L1716822
Project Number: 0251.0020M015
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-01 D
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA

Date Collected: 05/23/17 12:45
Date Received: 05/23/17
Field Prep: Not Specified

Matrix: Water
Analytical Method: 1,8260C
Analytical Date: 05/30/17 13:56
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by GC/MS - Westborough Lab						
Methylene chloride	ND		ug/l	60	--	20
1,1-Dichloroethane	15		ug/l	15	--	20
Carbon tetrachloride	ND		ug/l	10	--	20
1,1,2-Trichloroethane	ND		ug/l	15	--	20
Tetrachloroethene	1300		ug/l	10	--	20
1,2-Dichloroethane	ND		ug/l	10	--	20
1,1,1-Trichloroethane	370		ug/l	10	--	20
Vinyl chloride	ND		ug/l	20	--	20
1,1-Dichloroethene	12		ug/l	10	--	20
Trichloroethene	70		ug/l	10	--	20
1,2-Dichlorobenzene	ND		ug/l	50	--	20
1,3-Dichlorobenzene	ND		ug/l	50	--	20
1,4-Dichlorobenzene	ND		ug/l	50	--	20
cis-1,2-Dichloroethene	72		ug/l	10	--	20

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	109		70-130
Toluene-d8	99		70-130
4-Bromofluorobenzene	104		70-130
Dibromofluoromethane	99		70-130

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 14,504.1
Analytical Date: 05/30/17 11:25
Analyst: NS

Extraction Method: EPA 504.1
Extraction Date: 05/30/17 10:32

Parameter	Result	Qualifier	Units	RL	MDL	
Microextractables by GC - Westborough Lab for sample(s): 01 Batch: WG1008016-1						
1,2-Dibromoethane	ND		ug/l	0.010	--	A

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 05/30/17 11:44
Analyst: PD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1008380-5					
Methylene chloride	ND		ug/l	3.0	--
1,1-Dichloroethane	ND		ug/l	0.75	--
Carbon tetrachloride	ND		ug/l	0.50	--
1,1,2-Trichloroethane	ND		ug/l	0.75	--
Tetrachloroethene	ND		ug/l	0.50	--
1,2-Dichloroethane	ND		ug/l	0.50	--
1,1,1-Trichloroethane	ND		ug/l	0.50	--
Vinyl chloride	ND		ug/l	1.0	--
1,1-Dichloroethene	ND		ug/l	0.50	--
Trichloroethene	ND		ug/l	0.50	--
1,2-Dichlorobenzene	ND		ug/l	2.5	--
1,3-Dichlorobenzene	ND		ug/l	2.5	--
1,4-Dichlorobenzene	ND		ug/l	2.5	--
cis-1,2-Dichloroethene	ND		ug/l	0.50	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	108		70-130
Toluene-d8	102		70-130
4-Bromofluorobenzene	107		70-130
Dibromofluoromethane	100		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1716822

Report Date: 06/28/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Microextractables by GC - Westborough Lab	Associated sample(s): 01		Batch: WG1008016-2						
1,2-Dibromoethane	93		-		70-130	-			A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1008380-3 WG1008380-4								
Methylene chloride	94		95		70-130	1		20
1,1-Dichloroethane	97		99		70-130	2		20
Carbon tetrachloride	75		75		63-132	0		20
1,1,2-Trichloroethane	95		97		70-130	2		20
Tetrachloroethene	93		96		70-130	3		20
1,2-Dichloroethane	96		97		70-130	1		20
1,1,1-Trichloroethane	75		79		67-130	5		20
Vinyl chloride	99		100		55-140	1		20
1,1-Dichloroethene	96		100		61-145	4		25
Trichloroethene	92		94		70-130	2		25
1,2-Dichlorobenzene	93		96		70-130	3		20
1,3-Dichlorobenzene	93		97		70-130	4		20
1,4-Dichlorobenzene	91		95		70-130	4		20
cis-1,2-Dichloroethene	92		95		70-130	3		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	103		101		70-130
Toluene-d8	102		102		70-130
4-Bromofluorobenzene	103		105		70-130
Dibromofluoromethane	101		100		70-130

Matrix Spike Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1716822

Report Date: 06/28/17

Parameter	*Native Sample*	*MS Added*	*MS Found*	*MS %Recovery*	*Qual*	*MSD Found*	*MSD %Recovery*	*Qual*	*Recovery Limits*	*RPD*	*Qual*	*RPD Limits*	*Column*
Microextractables by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1008016-3 QC Sample: L1716907-01 Client ID: MS Sample													
1,2-Dibromoethane	ND	0.257	0.241	94		-	-		65-135	-		20	A
1,2-Dibromo-3-chloropropane	ND	0.257	0.234	91		-	-		65-135	-		20	A

PCBS

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1716822
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-01
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA

Matrix: Water
Analytical Method: 5,608
Analytical Date: 05/30/17 06:17
Analyst: HT

Date Collected: 05/23/17 12:45
Date Received: 05/23/17
Field Prep: Not Specified
Extraction Method: EPA 608
Extraction Date: 05/26/17 06:54
Cleanup Method: EPA 3665A
Cleanup Date: 05/27/17
Cleanup Method: EPA 3660B
Cleanup Date: 05/27/17

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
Polychlorinated Biphenyls by GC - Westborough Lab							
Aroclor 1016	ND		ug/l	0.269	--	1	B
Aroclor 1221	ND		ug/l	0.269	--	1	B
Aroclor 1232	ND		ug/l	0.269	--	1	B
Aroclor 1242	ND		ug/l	0.269	--	1	B
Aroclor 1248	ND		ug/l	0.269	--	1	B
Aroclor 1254	ND		ug/l	0.269	--	1	B
Aroclor 1260	ND		ug/l	0.215	--	1	B

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	81		30-150	B
Decachlorobiphenyl	67		30-150	B

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Method Blank Analysis
Batch Quality Control

Analytical Method: 5,608
Analytical Date: 05/30/17 05:21
Analyst: HT

Extraction Method: EPA 608
Extraction Date: 05/26/17 06:54
Cleanup Method: EPA 3665A
Cleanup Date: 05/27/17
Cleanup Method: EPA 3660B
Cleanup Date: 05/27/17

Parameter	Result	Qualifier	Units	RL	MDL	Column
Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1007295-1						
Aroclor 1016	ND		ug/l	0.250	--	B
Aroclor 1221	ND		ug/l	0.250	--	B
Aroclor 1232	ND		ug/l	0.250	--	B
Aroclor 1242	ND		ug/l	0.250	--	B
Aroclor 1248	ND		ug/l	0.250	--	B
Aroclor 1254	ND		ug/l	0.250	--	B
Aroclor 1260	ND		ug/l	0.200	--	B

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	81		30-150	B
Decachlorobiphenyl	68		30-150	B

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1716822

Report Date: 06/28/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 Batch: WG1007295-2									
Aroclor 1016	91		-		30-150	-		30	B
Aroclor 1260	85		-		30-150	-		30	B

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	80				30-150	B
Decachlorobiphenyl	66				30-150	B

Matrix Spike Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1716822

Report Date: 06/28/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits	Column
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1007295-3 QC Sample: L1716907-01 Client ID: MS Sample													
Aroclor 1016	ND	3.81	3.63	95		-	-		40-126	-		30	B
Aroclor 1260	ND	3.81	3.27	86		-	-		40-127	-		30	B

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	84				30-150	B
Decachlorobiphenyl	47				30-150	B

Lab Duplicate Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits	
Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1007295-4 QC Sample: L1716822-01 Client ID: INFLUENT							
Aroclor 1016	ND	ND	ug/l	NC		30	B
Aroclor 1221	ND	ND	ug/l	NC		30	B
Aroclor 1232	ND	ND	ug/l	NC		30	B
Aroclor 1242	ND	ND	ug/l	NC		30	B
Aroclor 1248	ND	ND	ug/l	NC		30	B
Aroclor 1254	ND	ND	ug/l	NC		30	B
Aroclor 1260	ND	ND	ug/l	NC		30	B

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	81		88		30-150	B
Decachlorobiphenyl	67		73		30-150	B

METALS

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1716822
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-01
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA
Matrix: Water
Date Collected: 05/23/17 12:45
Date Received: 05/23/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Arsenic, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Cadmium, Total	0.00067		mg/l	0.00020	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Chromium, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Copper, Total	0.00251		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Iron, Total	0.131		mg/l	0.050	--	1	05/24/17 11:00	05/25/17 19:12	EPA 3005A	19,200.7	PS
Lead, Total	ND		mg/l	0.00050	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Mercury, Total	ND		mg/l	0.00020	--	1	05/25/17 14:45	05/26/17 19:22	EPA 245.1	3,245.1	EA
Nickel, Total	0.04029		mg/l	0.00200	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Selenium, Total	ND		mg/l	0.00500	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Silver, Total	ND		mg/l	0.00040	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
Zinc, Total	ND		mg/l	0.01000	--	1	05/24/17 11:00	05/25/17 10:32	EPA 3005A	3,200.8	BV
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		05/25/17 10:32	NA	107,-	

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1716822
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-02
Client ID: RECEIVING WATER
Sample Location: PLAINVILLE, MA
Matrix: Water
Date Collected: 05/23/17 13:15
Date Received: 05/23/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.00400	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Arsenic, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Cadmium, Total	0.00020		mg/l	0.00020	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Chromium, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Copper, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Iron, Total	1.19		mg/l	0.050	--	1	05/24/17 11:00	05/25/17 22:29	EPA 3005A	19,200.7	PS
Lead, Total	0.00051		mg/l	0.00050	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Mercury, Total	ND		mg/l	0.00020	--	1	05/25/17 14:45	05/26/17 19:24	EPA 245.1	3,245.1	EA
Nickel, Total	ND		mg/l	0.00200	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Selenium, Total	ND		mg/l	0.00500	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Silver, Total	ND		mg/l	0.00040	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Zinc, Total	0.04119		mg/l	0.01000	--	1	05/24/17 11:00	05/25/17 10:46	EPA 3005A	3,200.8	BV
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	31.6		mg/l	0.660	NA	1	05/24/17 11:00	05/25/17 22:29	EPA 3005A	19,200.7	PS
General Chemistry - Mansfield Lab											
Chromium, Trivalent	ND		mg/l	0.010	--	1		05/25/17 10:46	NA	107,-	

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1716822
Report Date: 06/28/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1006543-1										
Iron, Total	ND		mg/l	0.050	--	1	05/24/17 11:00	05/25/17 18:35	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01-02 Batch: WG1006543-1										
Hardness	ND		mg/l	0.660	NA	1	05/24/17 11:00	05/25/17 18:35	19,200.7	PS

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1006546-1										
Antimony, Total	ND		mg/l	0.00400	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Arsenic, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Cadmium, Total	ND		mg/l	0.00020	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Chromium, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Copper, Total	ND		mg/l	0.00100	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Lead, Total	ND		mg/l	0.00050	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Nickel, Total	ND		mg/l	0.00200	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Selenium, Total	ND		mg/l	0.00500	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Silver, Total	ND		mg/l	0.00040	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV
Zinc, Total	ND		mg/l	0.01000	--	1	05/24/17 11:00	05/25/17 10:22	3,200.8	BV

Prep Information

Digestion Method: EPA 3005A

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1716822
Report Date: 06/28/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1007045-1										
Mercury, Total	ND		mg/l	0.00020	--	1	05/25/17 14:45	05/26/17 18:59	3,245.1	EA

Prep Information

Digestion Method: EPA 245.1

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1716822

Report Date: 06/28/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1006543-2								
Iron, Total	105		-		85-115	-		
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 Batch: WG1006543-2								
Hardness	96		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1006546-2								
Antimony, Total	94		-		85-115	-		
Arsenic, Total	100		-		85-115	-		
Cadmium, Total	109		-		85-115	-		
Chromium, Total	97		-		85-115	-		
Copper, Total	101		-		85-115	-		
Lead, Total	98		-		85-115	-		
Nickel, Total	99		-		85-115	-		
Selenium, Total	104		-		85-115	-		
Silver, Total	99		-		85-115	-		
Zinc, Total	104		-		85-115	-		
Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1007045-2								
Mercury, Total	104		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-3 QC Sample: L1716645-01 Client ID: MS Sample												
Iron, Total	0.076	1	1.12	104		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-3 QC Sample: L1716645-01 Client ID: MS Sample												
Hardness	302	66.2	350	**72**	Q	-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-7 QC Sample: L1716822-01 Client ID: INFLUENT												
Iron, Total	0.131	1	1.16	103		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-7 QC Sample: L1716822-01 Client ID: INFLUENT												
Hardness	74.9	66.2	134	89		-	-		75-125	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006546-3 QC Sample: L1716822-01 Client ID: INFLUENT												
Antimony, Total	ND	0.5	0.5068	101		-	-		70-130	-		20
Arsenic, Total	ND	0.12	0.1262	105		-	-		70-130	-		20
Cadmium, Total	0.00067	0.051	0.05508	107		-	-		70-130	-		20
Chromium, Total	ND	0.2	0.2079	104		-	-		70-130	-		20
Copper, Total	0.00251	0.25	0.2627	104		-	-		70-130	-		20
Lead, Total	ND	0.51	0.5089	100		-	-		70-130	-		20
Nickel, Total	0.04029	0.5	0.5432	100		-	-		70-130	-		20
Selenium, Total	ND	0.12	0.1273	106		-	-		70-130	-		20
Silver, Total	ND	0.05	0.04983	100		-	-		70-130	-		20
Zinc, Total	ND	0.5	0.5385	108		-	-		70-130	-		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1007045-3 QC Sample: L1716838-01 Client ID: MS Sample												
Mercury, Total	ND	0.005	0.00298	**60**	Q	-	-		70-130	-		20

Matrix Spike Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1007045-5 QC Sample: L1716965-01 Client ID: MS Sample									
Mercury, Total	0.00878	0.005	0.01419	108	-	-	70-130	-	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-4 QC Sample: L1716645-01 Client ID: DUP Sample						
Iron, Total	0.076	0.081	mg/l	6		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-4 QC Sample: L1716645-01 Client ID: DUP Sample						
Hardness	302	308	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006543-8 QC Sample: L1716822-01 Client ID: INFLUENT						
Iron, Total	0.131	0.129	mg/l	2		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1006546-4 QC Sample: L1716822-01 Client ID: INFLUENT						
Antimony, Total	ND	ND	mg/l	NC		20
Arsenic, Total	ND	ND	mg/l	NC		20
Cadmium, Total	0.00067	0.00064	mg/l	5		20
Chromium, Total	ND	ND	mg/l	NC		20
Copper, Total	0.00251	0.00259	mg/l	3		20
Lead, Total	ND	ND	mg/l	NC		20
Nickel, Total	0.04029	0.03991	mg/l	1		20
Selenium, Total	ND	ND	mg/l	NC		20
Silver, Total	ND	ND	mg/l	NC		20
Zinc, Total	ND	ND	mg/l	NC		20
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1007045-4 QC Sample: L1716838-01 Client ID: DUP Sample						
Mercury, Total	ND	ND	mg/l	NC		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1007045-6 QC Sample: L1716965-01 Client ID: DUP Sample					
Mercury, Total	0.00878	0.00866	mg/l	1	20

INORGANICS
&
MISCELLANEOUS

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-01
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA
Matrix: Water

Date Collected: 05/23/17 12:45
Date Received: 05/23/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/25/17 04:40	121,2540D	VB
Cyanide, Total	ND		mg/l	0.005	--	1	05/24/17 16:30	05/24/17 21:52	121,4500CN-CE	ML
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/23/17 19:05	121,4500CL-D	AS
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	05/24/17 23:45	05/30/17 23:41	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/23/17 20:30	05/23/17 20:53	1,7196A	AS
Anions by Ion Chromatography - Westborough Lab										
Chloride	92.1		mg/l	5.00	--	10	-	05/28/17 04:47	44,300.0	JC

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

SAMPLE RESULTS

Lab ID: L1716822-02
Client ID: RECEIVING WATER
Sample Location: PLAINVILLE, MA
Matrix: Water

Date Collected: 05/23/17 13:15
Date Received: 05/23/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	6.3		SU	-	NA	1	-	05/23/17 23:01	121,4500H+-B	AS
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	05/24/17 23:45	05/30/17 23:41	121,4500NH3-BH	AT
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/23/17 20:30	05/23/17 20:54	1,7196A	AS

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1716822
Report Date: 06/28/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1006336-1										
Chlorine, Total Residual	ND		mg/l	0.02	--	1	-	05/23/17 19:05	121,4500CL-D	AS
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1006354-1										
Chromium, Hexavalent	ND		mg/l	0.010	--	1	05/23/17 20:30	05/23/17 20:52	1,7196A	AS
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1006594-1										
Cyanide, Total	ND		mg/l	0.005	--	1	05/24/17 16:30	05/24/17 21:41	121,4500CN-CE	ML
General Chemistry - Westborough Lab for sample(s): 01-02 Batch: WG1006756-1										
Nitrogen, Ammonia	ND		mg/l	0.075	--	1	05/24/17 23:45	05/30/17 23:30	121,4500NH3-BH	AT
General Chemistry - Westborough Lab for sample(s): 01 Batch: WG1006773-1										
Solids, Total Suspended	ND		mg/l	5.0	NA	1	-	05/25/17 04:40	121,2540D	VB
Anions by Ion Chromatography - Westborough Lab for sample(s): 01 Batch: WG1008197-1										
Chloride	ND		mg/l	0.500	--	1	-	05/28/17 00:47	44,300.0	JC

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1716822

Report Date: 06/28/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1006336-2								
Chlorine, Total Residual	109		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1006354-2								
Chromium, Hexavalent	96		-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG1006388-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1006594-2								
Cyanide, Total	99		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02 Batch: WG1006756-2								
Nitrogen, Ammonia	96		-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 Batch: WG1008197-2								
Chloride	101		-		90-110	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1006336-4 QC Sample: L1716822-01 Client ID: INFLUENT												
Chlorine, Total Residual	ND	0.248	0.24	97		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1006354-4 QC Sample: L1716822-01 Client ID: INFLUENT												
Chromium, Hexavalent	ND	0.1	0.103	103		-	-		85-115	-		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1006594-4 QC Sample: L1716874-01 Client ID: MS Sample												
Cyanide, Total	0.011	0.2	0.196	92		-	-		90-110	-		30
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1006756-4 QC Sample: L1716938-02 Client ID: MS Sample												
Nitrogen, Ammonia	ND	4	3.77	94		-	-		80-120	-		20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1008197-3 QC Sample: L1716977-06 Client ID: MS Sample												
Chloride	28.3	4	31.2	**73**	Q	-	-		90-110	-		18

Lab Duplicate Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1006336-3 QC Sample: L1716822-01 Client ID: INFLUENT						
Chlorine, Total Residual	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1006354-3 QC Sample: L1716822-01 Client ID: INFLUENT						
Chromium, Hexavalent	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG1006388-2 QC Sample: L1716822-02 Client ID: RECEIVING WATER						
pH (H)	6.3	6.2	SU	2		5
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1006594-3 QC Sample: L1716874-01 Client ID: DUP Sample						
Cyanide, Total	0.011	0.011	mg/l	1		30
General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG1006756-3 QC Sample: L1716938-02 Client ID: DUP Sample						
Nitrogen, Ammonia	ND	0.114	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1006773-2 QC Sample: L1716853-01 Client ID: DUP Sample						
Solids, Total Suspended	110	120	mg/l	9		29
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1008197-4 QC Sample: L1716977-06 Client ID: DUP Sample						
Chloride	28.3	28.3	mg/l	0		18

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1716822-01A	Vial HCl preserved	A	N/A	N/A	5.6	Y	Absent		8260(14)
L1716822-01B	Vial HCl preserved	A	N/A	N/A	5.6	Y	Absent		8260(14)
L1716822-01C	Vial HCl preserved	A	N/A	N/A	5.6	Y	Absent		8260(14)
L1716822-01D	Vial Na2S2O3 preserved	A	N/A	N/A	5.6	Y	Absent		504(14)
L1716822-01E	Vial Na2S2O3 preserved	A	N/A	N/A	5.6	Y	Absent		504(14)
L1716822-01F	Plastic 500ml HNO3 preserved	A	<2	<2	5.6	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1716822-01G	Plastic 950ml unpreserved	A	7	7	5.6	Y	Absent		CL-300(28),HEXCR-7196(1),TRC-4500(1)
L1716822-01H	Plastic 500ml H2SO4 preserved	A	<2	<2	5.6	Y	Absent		NH3-4500(28)
L1716822-01I	Plastic 950ml unpreserved	A	7	7	5.6	Y	Absent		TSS-2540(7)
L1716822-01J	Plastic 250ml NaOH preserved	A	>12	>12	5.6	Y	Absent		TCN-4500(14)
L1716822-01K	Amber 1000ml Na2S2O3	A	7	7	5.6	Y	Absent		PCB-608(7)
L1716822-01L	Amber 1000ml Na2S2O3	A	7	7	5.6	Y	Absent		PCB-608(7)
L1716822-02A	Plastic 250ml unpreserved	A	7	7	5.6	Y	Absent		HEXCR-7196(1),PH-4500(.01)
L1716822-02B	Plastic 500ml H2SO4 preserved	A	<2	<2	5.6	Y	Absent		NH3-4500(28)
L1716822-02C	Plastic 500ml HNO3 preserved	A	<2	<2	5.6	Y	Absent		CD-2008T(180),NI-2008T(180),ZN-2008T(180),CU-2008T(180),FE-UI(180),HARDU(180),AG-2008T(180),AS-2008T(180),HG-U(28),SE-2008T(180),CR-2008T(180),PB-2008T(180),SB-2008T(180)
L1716822-03A	Vial HCl preserved	A	N/A	N/A	5.6	Y	Absent		HOLD-8260(14)
L1716822-03B	Vial HCl preserved	A	N/A	N/A	5.6	Y	Absent		HOLD-8260(14)
L1716822-03D	Vial Na2S2O3 preserved	A	N/A	N/A	5.6	Y	Absent		HOLD-504/8011(14)
L1716822-03E	Vial Na2S2O3 preserved	A	N/A	N/A	5.6	Y	Absent		HOLD-504/8011(14)

*Values in parentheses indicate holding time in days

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1716822
Report Date: 06/28/17

Container Information

Container ID	***Container Type***	***Cooler***	***Initial pH***	***Final pH***	***Temp deg C***	***Pres***	***Seal***	***Frozen Date/Time***	***Analysis(*)***

*Values in parentheses indicate holding time in days

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1716822
Project Number:	0251.0020M015	**Report Date:**	06/28/17

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: Data Usability Report

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1716822
Project Number:	0251.0020M015	**Report Date:**	06/28/17

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1716822
Project Number:	0251.0020M015	**Report Date:**	06/28/17

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

3 Methods for the Determination of Metals in Environmental Samples, Supplement I. EPA/600/R-94/111. May 1994.

5 Methods for the Organic Chemical Analysis of Municipal and Industrial Wastewater. Appendix A, Part 136, 40 CFR (Code of Federal Regulations).

14 Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water. EPA/600/4-88/039, Revised July 1991.

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.

107 Alpha Analytical - In-house calculation method.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E.**

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

ALPHA ANALYTICAL

PAGE OF

Westborough, MA
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA
TEL: 508-822-9300
FAX: 508-822-3288

Date Rec'd in Lab: 5/23/17

ALPHA Job #: L1716822

Project Information

Project Name: BASF PLAINVILLE

Project Location: PLAINVILLE, MA

Project #: 0251.0020M015

Project Manager: MELISSA WILSON
CHASE GERBIG

ALPHA Quote #: 3083

Client Information

Client: ROUX ASSOCIATES

Address: 12 GILL STREET
SUITE 4700

Phone: 781-569-4000

Fax:

Email: MEWILSON@ROUXINC.COM

☐ These samples have been Previously analyzed by Alpha

Turn-Around Time

☒ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Report Information Data Deliverables

☐ FAX ☒ EMAIL

☒ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program | Criteria

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☒ No Are MCP Analytical Methods Required?

☐ Yes ☒ No Is Matrix Spike (MS) Required on this SDG? (If yes see note in Comments)

☐ Yes ☒ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:
(If MS is required, indicate in Sample Specific Comments which samples and what tests MS to be performed. (Note: All CAM methods for inorganic analyses require MS every 20 soil samples)

1. Comply with Detection and Reporting Limits in Appendix VII of 2016 NPDES RGP
2. Analyze and Report Only the Analytes listed in the Work Authorization
3. *EPA 8260C only to be used if Alpha has Approval for the 2016 RGP

SAMPLE HANDLING
Filtration
☐ Done
☒ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ANALYSIS

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	EDB & DBCP - EPA 504	Volatile Organics - EPA 8260C *	Total Iron - EPA 200.7	Total Metals - EPA 200.8	Chloride by IC - EPA 300.0	Hexavalent Chromium - EPA 7196	Total Mercury - EPA 245.1	SM 4500	PCB - EPA 608	Total Suspended Solids - SM 2540	Total Hardness - 2340B		Sample Specific Comments	TOTAL # BOTTLES
16822.01	~~INF 05232017~~ CG Influent	5/23/17	1245	GW	CG	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐		12
.02	~~REC 05232017~~ CG Receiving water	5/23/17	1315	GW	CG	☐	☐	☒	☒	☐	☒	☒	☒	☐	☐	☒	☐		3
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
						☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		
Container Type						V	V	P	P	P	P	P	P	A	P	P	-		
Preservative						H	B	C	C	A	A	C	E	H	A	C	-		

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	5-23-17 1458	[signature] AAL	5/23/17 14:58

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

FORM NO: 01-01(I) (rev. 20-JAN-2010)

ANALYTICAL REPORT

Lab Number:	L1719873
Client:	Roux Associates 12 Gill Street Suite 4700 Woburn, MA 01801
ATTN:	Melissa Wilson
Phone:	(781) 270-6600
Project Name:	BASF PLAINVILLE
Project Number:	0251.0020M015
Report Date:	06/16/17

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), NJ NELAP (MA935), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-14-00197).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1719873-01	INFLUENT	WATER	PLAINVILLE, MA	06/14/17 13:35	06/14/17

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Melissa Cripps

Title: Technical Director/Representative Date: 06/16/17

METALS

Project Name: BASF PLAINVILLE
Lab Number: L1719873
Project Number: 0251.0020M015
Report Date: 06/16/17

SAMPLE RESULTS

Lab ID: L1719873-01
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA
Matrix: Water
Date Collected: 06/14/17 13:35
Date Received: 06/14/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab											
Hardness	68.3		mg/l	0.660	NA	1	06/15/17 10:50	06/16/17 10:55	EPA 3005A	19,200.7	PS

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015
Lab Number: L1719873
Report Date: 06/16/17

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Hardness by SM 2340B - Mansfield Lab for sample(s): 01 Batch: WG1013394-1										
Hardness	ND		mg/l	0.660	NA	1	06/15/17 10:50	06/16/17 11:22	19,200.7	MC

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1719873

Report Date: 06/16/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 Batch: WG1013394-2								
Hardness	99		-		85-115	-		

Matrix Spike Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1013394-3 QC Sample: L1719616-01 Client ID: MS Sample												
Hardness	220	66.2	275	83		-	-		75-125	-		20
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1013394-7 QC Sample: L1719935-01 Client ID: MS Sample												
Hardness	345	66.2	411	100		-	-		75-125	-		20

Lab Duplicate Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Hardness by SM 2340B - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1013394-8 QC Sample: L1719935-01 Client ID: DUP Sample						
Hardness	345	338	mg/l	2		20

INORGANICS
&
MISCELLANEOUS

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

SAMPLE RESULTS

Lab ID: L1719873-01
Client ID: INFLUENT
Sample Location: PLAINVILLE, MA
Matrix: Water

Date Collected: 06/14/17 13:35
Date Received: 06/14/17
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
pH (H)	6.1		SU	-	NA	1	-	06/15/17 03:34	121,4500H+-B	VB

Lab Control Sample Analysis

Batch Quality Control

Project Name: BASF PLAINVILLE

Project Number: 0251.0020M015

Lab Number: L1719873

Report Date: 06/16/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1013282-1								
pH	100		-		99-101	-		5

Lab Duplicate Analysis
Batch Quality Control

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1013282-2 QC Sample: L1719977-01 Client ID: DUP Sample						
pH	6.4	6.4	SU	0		5

Project Name: BASF PLAINVILLE
Project Number: 0251.0020M015

Lab Number: L1719873
Report Date: 06/16/17

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	*Custody Seal*
A	Absent

Container Information

Container ID	*Container Type*	*Cooler*	*Initial pH*	*Final pH*	*Temp deg C*	*Pres*	*Seal*	*Frozen Date/Time*	*Analysis(*)*
L1719873-01A	Plastic 60ml unpreserved	A	7	7	3.9	Y	Absent		PH-4500(.01)
L1719873-01B	Plastic 250ml HNO3 preserved	A	<2	<2	3.9	Y	Absent		HARDU(180)

*Values in parentheses indicate holding time in days

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1719873
Project Number:	0251.0020M015	**Report Date:**	06/16/17

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A	- Spectra identified as "Aldol Condensation Product".
B	- The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related

Report Format: Data Usability Report

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1719873
Project Number:	0251.0020M015	**Report Date:**	06/16/17

Data Qualifiers

projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

ND - Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report

Project Name:	BASF PLAINVILLE	**Lab Number:**	L1719873
Project Number:	0251.0020M015	**Report Date:**	06/16/17

REFERENCES

19 Inductively Coupled Plasma Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes. Appendix C, Part 136, 40 CFR (Code of Federal Regulations). July 1, 1999 edition.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
EPA 300: DW: Bromide
EPA 6860: NPW and SCM: Perchlorate
EPA 9010: NPW and SCM: Amenable Cyanide Distillation
EPA 9012B: NPW: Total Cyanide
EPA 9050A: NPW: Specific Conductance
SM3500: NPW: Ferrous Iron
SM4500: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
SM5310C: DW: Dissolved Organic Carbon

Mansfield Facility
SM 2540D: TSS
EPA 3005A NPW
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**
EPA 624: Volatile Halocarbons & Aromatics,
EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E.**

Mansfield Facility:

Drinking Water
EPA 200.7: Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1** Hg.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL

Westborough, MA TEL: 508-898-9220 FAX: 508-898-9193
Mansfield, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 6/14/17

ALPHA Job #: L1719873

Project Information

Project Name: BASF PLAINVILLE

Project Location: PLAINVILLE, MA

Project #: 0251.0020M015

Project Manager: MELISSA WILSON
CHASE GERBIG

ALPHA Quote #: 3282

Turn-Around Time

☐ Standard ☒ Rush (ONLY IF PRE-APPROVED)

Due Date: 06/19/2017 Time: 08:00 AM

Client Information

Client: ROUX ASSOCIATES

Address: 12 GILL STREET

SUITE 4700

Phone: 781-569-4000

Fax:

Email: MEWILSON@ROUXINC.COM

☐ These samples have been Previously analyzed by Alpha

Report Information Data Deliverables

☐ FAX ☒ EMAIL
☒ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program | Criteria

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☒ No Are MCP Analytical Methods Required?
☐ Yes ☒ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:
Comply with detection and reporting limits in Appendix VII of the 2016 NPDES RGP

ANALYSIS

SAMPLE HANDLING
Filtration
☐ Done
☐ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Total Hardness - 2340B	pH - SM 4500H+-B	Sample Specific Comments	TOTAL # BOTTLES
19873.01	Influent	6/14/17	1335	GW	AG	☒	☒		

	Container Type	Preservative
Total Hardness - 2340B	-	-
pH - SM 4500H+-B	-	-

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

FORM NO: 01-01(I) (rev. 5-JAN-12)

Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	6.14.17/1406	[signature] AAL	6/14/17 1406
[signature]	6/14/17	[signature]	6/14/17 2020
[signature]	6/14/17 21:20	[signature]	6/14/17 2120

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

Melissa Wilson

From: Karyn Raymond <kraymond@alphalab.com>
Sent: Tuesday, May 23, 2017 7:54 AM
To: Melissa Wilson
Subject: Test Methods for the New RGP Permit / Requirements -
Attachments: EPA RGP response.pdf

Hi Melissa,

No worries, ask away! Since this went into effect there have been plenty of questions. As its been over a month now since the switch we are well versed in all the answers!

Attached is our letter of approval from back in 2005 that is noted in email below. As noted in email we are approved (and are the only lab that is currently) to continue use the 8260 and 8270. Please let me know if you need anything else.

Sincerely,
Karyn

On Thu, Apr 20, 2017 at 12:31 PM, Mary Davis <mdavis@alphalab.com> wrote:

Hi All

Here is the Update we received from the EPA Regarding NPDES RGP Sampling :

Jim,

Since nothing has significantly changed since the 2005 memo was written, and the fact that EPA Region 1 has no idea as to when the MUR will be promulgated, I believe that the attached memo provides documentation that Alpha Labs can use 8260 and 8270 for the RGP for MA and NH (see specifically, EPA answers to comments 1,2,4, and 5).

Note: Once the MUR has been promulgated, Alpha Labs will be required to use EPA Methods 624.1 and 625.1 (within the EPA and state designated implementation period).

Please let me know if you have any questions regarding this email.

Steve DiMattei

Laboratory Certification Program Manager

USEPA

11 Technology Drive

North Chelmsford, MA 01863

Tel.# (617)918-8369

Fax# (617)918-8269

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Karyn Raymond
Project Manager

Email: kraymond@alphalab.com
Direct: 508-439-5186
Main: 508-898-9220

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U.S. ENVIRONMENTAL PROTECTION AGENCY

EPA NEW ENGLAND
OFFICE OF ENVIRONMENTAL MEASUREMENT & EVALUATION
11 TECHNOLOGY DRIVE, NORTH CHELMSFORD, MA 01863-2431

MEMORANDUM

DATE: November 3, 2005

SUBJ: Response to Questions/Concerns regarding the Remediation General Permit (RGP), E mail from Ellen M. Collins, Corporate QA Officer, Alpha Woods Hole Lab, October 18, 2005

FROM: Dick Siscanaw, Chemist

TO: Doug Corb, EPA Environmental Scientist

THRU: Gerry Sotolongo, EPA Quality Assurance Manager

RFA: 06026

FILE: alphalab1.doc

1. All samples should utilize an EPA approved method to achieve the effluent limits in Appendix III. The method should be approved as per 40CFR Part 136. (Per Page 26 of RGP.)

EPA Response.

EPA/QAU concurs with this comment. Methods listed in 40 CFR 136 may be used as long as the effluent limits listed in Appendix III are achieved. If the method is not listed in Appendix VI, the laboratory must retain supporting data for 5 years to demonstrate the method's minimum level (ML) satisfies the effluent limits (Appendix III). The following data should be kept on file: laboratory standard operation procedure (SOP), initial calibration data with the lowest standard at or below the required effluent limit, effluent spike recoveries, initial demonstration of capability (IDC), and a method detection limit study (MDL).

2. If we are able to achieve the listed effluent limit by an EPA approved method, which will be accepted under the regulation, we do not need to utilize the methodology listed in Appendix VI.

EPA Response.

EPA/QAU concurs with the comment. See response #1.

3. If we are unable to achieve the effluent limits in Appendix III, we should refer to Appendix VI and achieve the lowest listed ML by an EPA approved method. (Either one of the methods listed or one found in 40CFR Part 136.) However, we only need to achieve the effluent limit by that method.

a. TRC: we will be analyzing via 330.1 (not 330.5 as listed in Appendix VI) to achieve 20 ug/L.

EPA Response.

In Appendix VI the ML for method 330.5 is 20 ug/L. Method 330.1 is approved for NPDES, but the EPA is concern with the method's ML. Alpha labs must retain supporting data to demonstrate the ML at 20 ug/L to use this method (see response #1).

b. Ethylene dibromide: we will be analyzing via EPA 504.1 to achieve 0.05 ug/L, per our discussion, however this is still unclear.

QUESTION: Can we analyze EDB by 8260? If so, what limit of detection will be accepted for analysis/reporting?

QUESTION: Why are method 618 and 524.2 listed if those MLs will not be accepted?

EPA Response.

Ethylene dibromide (EDB) should be analyzed by method 504.1 to meet the ML of 0.05 ug/L, Appendix III, unless there are higher levels are present in the effluent. The Method 618, <u>Determination of Volatile Pesticides in Municipal and Industrial Wastewaters by Gas Chromatography</u> is an old hexane extraction that is an older version of 504.1 and is not recommended by EPA/QAU. The purge and trap methods (8260, 624, and 524.2) may be used when EDB is present at higher levels and the laboratory has the supporting data. QAU agrees with Alpha that Appendix VI is misleading because the MLs are above the effluent limits. This is clarified in Section 1.d of the RGP.

4. Section D of the RGP states that EPA Methods 8260C and 8270D will be allowed in lieu of utilizing 624 and 625. Per our discussion, we will be utilizing EPA 8260B and 8270C at this time, as they are the most recently promulgated methods.

EPA Response.

EPA methods 8260B and 8270C are the final promulgated SOPs by RCRA. These methods may be used. The EPA/QAU position is to use the most recent RCRA methods that are posted on the RCRA site. There is a 2 – 5 year delay in the final promulgated version. These RCRA draft methods, 8260C and 8270D, have passed the RCRA workgroup, available on the RCRA webpage, and are in the process of promulgation.

5. Regarding 8270, the RGP also notes that the analysis 'must' be preceded by EPA 3520C or 3535. Why is 3510C not allowed? Separatory funnel liquid-liquid extraction is part of EPA Method 625 and its application should be allowed via EPA 3510C. Per our discussion, we will utilize EPA 3510C as the extraction method for the Semivolatile Organic compounds.

EPA Response.

EPA QAU concurs with this suggestion. The Separatory Funnel Liquid-Liquid Extraction, Method 3510C is allow for EPA method 8270 along with method 3520 (continuous extraction) and method 3535 (solid phase extraction).

6. Method 200.8 is not listed as an available alternative method for the analysis of metals with the exception of Chromium. Why? Will this method be allowed for the other metals in Appendix III?

EPA Response.

The Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma – Mass Spectrometry (ICP/MS), Method 200.8 has not been finalized in 40 CFR 136 and in the proposed stage, April 6, 2004. RCRA Inductively Coupled Plasma – Mass Spectrometry , Method 6020A, is in the draft stage. The EPA/QAU accepts the ICP/MS methods, 200.8 and 6020A, for the analyses of metals as long as the laboratory can satisfy the effluent limits, Appendix III, with the supporting data (see response 1).

7. Appendix VI: Item No. 39: Methods 624 and 8260 are listed as alternative procedures for the analysis of Total Phenols.

EPA Response.

Item 39, the Total Phenols should use EPA manual method 420.1 or the automated method 420.2. Methods 624 and 8260 can not measure phenols and methods 625 and 8270 measure a subset of the total phenols.

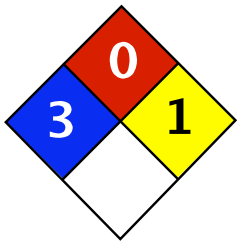
8. Appendix III: Item No. 34 and 35: Bis (2-ethylhexyl) phthalate has an effluent limit of 6.0 ug/L, however Total Phthalates have a limit of 3.0 ug/L.

EPA Response.

The monthly average for the total phthalates is 3.0 ug/L and the daily maximum effluent limt for Bis (2-ethylhexyl) phthalate is 6.0 ug/L. Alpha Laboratory is correct one can not evaluate the monthly average for the total phthalates is 3.0 ug/L when the method's ML is 5 ug/L. In many risk assessments one uses half the ML so method 625 and 8270 should be adequate. The concern is the background phthalate contamination for the required methods, 625 and 8270, are at the effluent limits. The laboratory must be very careful to clean the glassware to achieve the 5 ug/L ML.

ATTACHMENT 9

MSDS's



Health	3
Fire	0
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Sodium hydroxide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium hydroxide

Catalog Codes: SLS3298, SLS1081, SLS2503, SLS3925, SLS1705

CAS#: 1310-73-2

RTECS: WB4900000

TSCA: TSCA 8(b) inventory: Sodium hydroxide

CI#: Not available.

Synonym: Caustic Soda

Chemical Name: Sodium Hydroxide

Chemical Formula: NaOH

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	100

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to mucous membranes, upper respiratory tract, skin, eyes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: metals

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Slightly explosive in presence of heat.

Fire Fighting Media and Instructions: Not available

Special Remarks on Fire Hazards:
sodium hydroxide + zinc metal dust causes ignition of the latter.

Under proper conditions of temperature, pressure and state of division, it can ignite or react violently with acetaldehyde, ally alcohol, allyl chloride, benzene-1,4-diol, chlorine trifluoride, 1,2 dichlorethylene, nitroethane, nitromethane, nitroparaffins, nitropropane, cinnamaldehyde, 2,2-dichloro-3,3-dimethylbutane.
Sodium hydroxide in contact with water may generate enough heat to ignite adjacent combustible materials.
Phosphorous boiled with NaOH yields mixed phosphines which may ignite spontanously in air.
sodium hydroxide and cinnamaldehyde + heat may cause ignition.
Reaction with certain metals releases flammable and explosive hydrogen gas.

Special Remarks on Explosion Hazards:
Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate.
Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aquesous sodium hydroxide, under vacuum distillation, residue darkened and exploded.
Sodium Hydroxde + impure tetrahydrofuran, which can contain peroxides, can cause serious explosions.
Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C.
Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Corrosive solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic. Deliquescent.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
STEL: 2 (mg/m3) from ACGIH (TLV) [United States]

TWA: 2 CEIL: 2 (mg/m3) from OSHA (PEL) [United States]
CEIL: 2 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Deliquescent solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 40 g/mole

Color: White.

pH (1% soln/water): 13.5 [Basic.]

Boiling Point: 1388°C (2530.4°F)

Melting Point: 323°C (613.4°F)

Critical Temperature: Not available.

Specific Gravity: 2.13 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture, moist air

Incompatibility with various substances:
Highly reactive with metals.
Reactive with oxidizing agents, reducing agents, acids, alkalis, moisture.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process.
Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahyrofuran is very exothermic, a mild explosion being noted on one occassion.

Reactive with water, acids (mineral, non-oxidizing, e.g. hydrochloric, hydrofluoric acid, muriatic acid, phosphoric), acids (mineral, oxidizing e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), acids (organic e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, foraldehyde), carbamates (e.g. carbanolate, carbofuran), esters (e.g. butyl acetate, ethyl acetate, propyl formate), halogenated organics (dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (acetone, acetophenone, MEK, MIBK), acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, powdered metals and metals (i.e aluminum, tin, zinc, hafnium, raney nickel), metals (alkali and alkaline e.g. cesium, potassium, sodium), metal compounds (toxic e.g. berylium, lead acetate, nickel carbonyl, tetraethyl lead), mitrides (e.g. potassium nitride, sodium nitride), nitriles (e.g. acetonitrile, methyl cyanide), nitro compounds (organic e.g. nitrobenzene, nitromethane), acetic anhydride, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrosulfuric acid, oleum, propiolactone, acylonitrile, phorosous pentoxide, chloroethanol, chloroform-methanol, tetrahydroborate, cyanogen azide, 1,2,4,5 tetrachlorobenzene, cinnamaldehyde.
Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen.

Special Remarks on Corrosivity: Very caustic to aluminum and other metals in presence of moisture.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive).
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose:
LDL [Rabbit] - Route: Oral; Dose: 500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material. Investigation as a mutagen (cytogenetic analysis)

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sodium hydroxide, solid UNNA: 1823 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Sodium hydroxide
Illinois chemical safety act: Sodium hydroxide
New York release reporting list: Sodium hydroxide
Rhode Island RTK hazardous substances: Sodium hydroxide
Pennsylvania RTK: Sodium hydroxide
Minnesota: Sodium hydroxide
Massachusetts RTK: Sodium hydroxide
New Jersey: Sodium hydroxide
Louisiana spill reporting: Sodium hydroxide
California Director's List of Hazardous Substances: Sodium hydroxide
TSCA 8(b) inventory: Sodium hydroxide
CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):
R35- Causes severe burns.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37/39- Wear suitable gloves and eye/face protection.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Synthetic apron.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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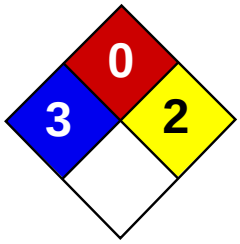

Material Safety Data Sheet
Sulfuric acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sulfuric acid

Catalog Codes: SLS2539, SLS1741, SLS3166, SLS2371, SLS3793

CAS#: 7664-93-9

RTECS: WS5600000

TSCA: TSCA 8(b) inventory: Sulfuric acid

CI#: Not applicable.

Synonym: Oil of Vitriol; Sulfuric Acid

Chemical Name: Hydrogen sulfate

Chemical Formula: H2-SO4

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sulfuric acid	7664-93-9	95 - 98

Toxicological Data on Ingredients: Sulfuric acid: ORAL (LD50): Acute: 2140 mg/kg [Rat.]. VAPOR (LC50): Acute: 510 mg/m 2 hours [Rat]. 320 mg/m 2 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged

contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion:
Products of combustion are not available since material is non-flammable. However, products of decompostion include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Fire Hazards in Presence of Various Substances: Combustible materials

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of oxidizing materials.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Metal acetylides (Monocesium and Monorubidium), and carbides ignite with concentrated sulfuric acid. White Phosphorous + boiling Sulfuric acid or its vapor ignites on contact. May ignite other combustible materials. May cause fire when sulfuric acid is mixed with Cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phorphorous (III) oxide, and oxidizing agents such as chlorates, halogens, permanganates.

Special Remarks on Explosion Hazards:
Mixturesofsulfuricacidandanyofthefollowingcanexplode:p-nitrotoluene,pentasilver trihydroxydiaminophosphate, perchlorates, alcohols with strong hydrogen peroxide, ammonium tetraperoxychromate, mercuric nitrite, potassium chlorate, potassium permanganate with potassium chloride, carbides, nitro compounds, nitrates, carbides, phosphorous, iodides, picratres, fulminats, dienes, alcohols (when heated) Nitramide decomposes explosively on contact with concentrated sulfuric acid. 1,3,5-Trinitrosohexahydro-1,3,5-triazine + sulfuric acid causes explosive decompositon.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage:
Hygroscopic. Reacts. violently with water. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 STEL: 3 (mg/m3) [Australia] Inhalation TWA: 1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 1 STEL: 3 (mg/m3) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 1 (mg/m3) from NIOSH [United States] Inhalation TWA: 1 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Thick oily liquid.)

Odor: Odorless, but has a choking odor when hot.

Taste: Marked acid taste. (Strong.)

Molecular Weight: 98.08 g/mole

Color: Colorless.

pH (1% soln/water): Acidic.

Boiling Point:
270°C (518°F) - 340 deg. C Decomposes at 340 deg. C

Melting Point: -35°C (-31°F) to 10.36 deg. C (93% to 100% purity)

Critical Temperature: Not available.

Specific Gravity: 1.84 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 3.4 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Easily soluble in cold water. Sulfuric is soluble in water with liberation of much heat. Soluble in ethyl alcohol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability:
Conditions to Avoid: Incompatible materials, excess heat, combustible material materials, organic materials, exposure to moist air or water, oxidizers, amines, bases. Always add the acid to water, never the reverse.

Incompatibility with various substances:
Reactive with oxidizing agents, reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper, of stainless steel(316). Highly corrosive in presence of stainless steel(304). Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Hygroscopic. Strong oxidizer. Reacts violently with water and alcohol especially when water is added to the product. Incompatible (can react explosively or dangerously) with the following: ACETIC ACID, ACRYLIC ACID, AMMONIUM HYDROXIDE, CRESOL, CUMENE, DICHLOROETHYL ETHER, ETHYLENE CYANOHYDRIN, ETHYLENEIMINE, NITRIC ACID, 2-NITROPROPANE, PROPYLENE OXIDE, SULFOLANE, VINYLIDENE CHLORIDE, DIETHYLENE GLYCOL MONOMETHYL ETHER, ETHYL ACETATE, ETHYLENE CYANOHYDRIN, ETHYLENE GLYCOL MONOETHYL ETHER ACETATE, GLYOXAL, METHYL ETHYL KETONE, dehydrating agents, organic materials, moisture (water), Acetic anhydride, Acetone, cyanohydrin, Acetone+nitric acid, Acetone + potassium dichromate, Acetonitrile, Acrolein, Acrylonitrile, Acrylonitrile +water, Alcohols + hydrogen peroxide, ally compounds such as Allyl alcohol, and Allyl Chloride, 2-Aminoethanol, Ammonium hydroxide, Ammonium triperchromate, Aniline, Bromate + metals, Bromine pentafluoride, n-Butyraldehyde, Carbides, Cesium acetylene carbide, Chlorates, Cyclopentanone oxime, chlorinates, Chlorates + metals, Chlorine trifluoride, Chlorosulfonic acid, 2-cyano-4-nitrobenzenediazonium hydrogen sulfate, Cuprous nitride, p-chloronitrobenzene, 1,5-Dinitronaphthlene +

sulfur, Diisobutylene, p-dimethylaminobenzaldehyde, 1,3-Diazidobenzene, Dimethylbenzylcarbinol + hydrogen peroxide, Epichlorohydrin, Ethyl alcohol + hydrogen peroxide, Ethylene diamine, Ethylene glycol and other glycols, , Ethylenimine, Fulminates, hydrogen peroxide, Hydrochloric acid, Hydrofluoric acid, Iodine heptafluoride, Indane + nitric acid, Iron, Isoprene, Lithium silicide, Mercuric nitride, Mesityl oxide, Mercury nitride, Metals (powdered), Nitromethane, Nitric acid + glycerides, p-Nitrotoluene, Pentasilver trihydroxydiaminophosphate, Perchlorates, Perchloric acid, Permanganates + benzene, 1-Phenyl-2-methylpropyl alcohol + hydrogen peroxide, Phosphorus, Phosphorus isocyanate, Picrates, Potassium tert-butoxide, Potassium chlorate, Potassium Permanganate and other permanganates, halogens, amines, Potassium Permanganate + Potassium chloride, Potassium Permanganate + water, Propiolactone (beta)-, Pyridine, Rubidium aceteylene carbide, Silver permanganate, Sodium, Sodium carbonate, sodium hydroxide, Steel, styrene monomer, toluene + nitric acid, Vinyl acetate, Thalium (I) azidodithiocarbonate, Zinc chlorate, Zinc Iodide, azides, carbonates, cyanides, sulfides, sulfites, alkali hydrides, carboxylic acid anhydrides, nitriles, olefinic organics, aqueous acids, cyclopentadiene, cyano-alcohols, metal acetylides, Hydrogen gas is generated by the action of the acid on most metals (i.e. lead, copper, tin, zinc, aluminum, etc.). Concentrated sulfuric acid oxidizes, dehydrates, or sulfonates most organic compounds.

Special Remarks on Corrosivity:
Non-corrosive to lead and mild steel, but dillute acid attacks most metals. Attacks many metals releasing hydrogen. Minor corrosive effect on bronze. No corrosion data on brass or zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2140 mg/kg [Rat.]. Acute toxicity of the vapor (LC50): 320 mg/m3 2 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH. May cause damage to the following organs: kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
Mutagenicity: Cytogenetic Analysis: Hamster, ovary = 4mmol/L Reproductive effects: May cause adverse reproductive effects based on animal data. Developmental abnormalities (musculoskeletal) in rabbits at a dose of 20 mg/m3 for 7 hrs.(RTECS) Teratogenecity: neither embryotoxic, fetoxic, nor teratogenetic in mice or rabbits at inhaled doses producing some maternal toxicity

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes severe skin irritation and burns. Continued contact can cause tissue necrosis. Eye: Causes severe eye irritation and burns. May cause irreversible eye injury. Ingestion: Harmful if swallowed. May cause permanent damage to the digestive tract. Causes gastrointestial tract burns. May cause perforation of the stomach, GI bleeding, edema of the glottis, necrosis and scarring, and sudden circulatory collapse(similar to acute inhalation). It may also cause systemic toxicity with acidosis. Inhalation: May cause severe irritation of the respiratory tract and mucous membranes with sore throat, coughing, shortness of breath, and delayed lung edema. Causes chemical burns to the repiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Cause corrosive action on mucous membranes. May affect cardiovascular system (hypotension, depressed cardiac output, bradycardia). Circulatory collapse with clammy skin, weak and rapid pulse, shallow respiration, and scanty urine may follow. Circulatory shock is often the immediate cause of death. May also affect teeth(changes in teeth and supporting structures - erosion, discoloration). Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect behavior (muscle contraction or spasticity), urinary system (kidney damage), and cardiovascular system, heart (ischemic heart leisons), and respiratory system/lungs(pulmonary edema, lung damage), teeth (dental discoloration, erosion). Skin: Prolonged or repeated skin contact may cause dermatitis, an allergic skin reaction.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 49 mg/l 48 hours [bluegill/sunfish].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Sulfuric acid may be placed in sealed container or absorbed in vermiculite, dry sand, earth, or a similar material. It may also be diluted and neutralized. Be sure to consult with local or regional authorities (waste regulators) prior to any disposal. Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sulfuric acid UNNA: 1830 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Sulfuric acid New York release reporting list: Sulfuric acid Rhode Island RTK hazardous substances: Sulfuric acid Pennsylvania RTK: Sulfuric acid Minnesota: Sulfuric acid Massachusetts RTK: Sulfuric acid New Jersey: Sulfuric acid California Director's List of Hazardous Substances (8 CCR 339): Sulfuric acid Tennessee RTK: Sulfuric acid TSCA 8(b) inventory: Sulfuric acid SARA 302/304/311/312 extremely hazardous substances: Sulfuric acid SARA 313 toxic chemical notification and release reporting: Sulfuric acid CERCLA: Hazardous substances.: Sulfuric acid: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R35- Causes severe burns. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30- Never add water to this product. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:
-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

Other Special Considerations: Not available.

Created: 10/09/2005 11:58 PM

Last Updated: 11/06/2008 12:00 PM

ATTACHMENT 10

Endangered Species Act Eligibility Determination Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

January 20, 2017

To Whom It May Concern:

This project was reviewed for the presence of federally listed or proposed, threatened or endangered species or critical habitat per instructions provided on the U.S. Fish and Wildlife Service's New England Field Office website:

http://www.fws.gov/newengland/EndangeredSpec-Consultation.htm (accessed January 2017)

Based on information currently available to us, no federally listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under section 7 of the Endangered Species Act is not required. No further Endangered Species Act coordination is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your cooperation. Please contact Maria Tur of this office at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

July 26, 2018

Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program, c/o Jennifer Wood
1 Winter Street
Boston, Massachusetts 02108

Re: Response to MassDEP June 26, 2018 Letter
NPDES RGP Notice of Intent for BASF Corporation
36 Taunton Street, Plainville, Massachusetts 02762

Dear Ms. Wood:

On behalf of BASF Corporation (BASF), Roux Associates Inc. (Roux Associates) is providing responses to the four questions posed by the Massachusetts Department of Environmental Protection (MassDEP) in their June 26, 2018 letter (**Attachment 1**) regarding the National Pollution Discharge Elimination System (NPDES) Remediation General Permit (RGP) Notice of Intent (NOI) submission for the BASF facility located at 36 Taunton Street in Plainville, Massachusetts (the Site).

BASF operates a groundwater extraction and treatment system at the Site to hydraulically control the transport of volatile organic compounds (VOCs) present in Site groundwater and discharges the treated groundwater to Turnpike Lake. Groundwater extraction is being conducted in accordance with a United States Environmental Protection Agency (USEPA) Administrative Order on Consent (RCRA Docket No. I-92-1051). Discharge to Turnpike Lake has been authorized under several successive RGPs, including the 2010 RGP. The GWTP discharge continued after expiration of the 2010 RGP in accordance with EPA's administrative continuance of coverage under the 2010 RGP, pending approval of BASF's July 7, 2017 NOI to discharge under the most recent RGP which became effective on April 8, 2017 (MAG910000).

MassDEP's four requests for additional information are stated below (in italicized text), and each question is followed by a response from Roux Associates on behalf of BASF (in plain text).

1. Are there less environmentally damaging alternative sites for the discharge, sources for disposal, or methods to eliminate the discharge that are reasonable available or feasible? This demonstration must include an analysis of the reuse and conservation of discharge water, relocation of the activity, land application of discharge water or use of closed systems, alternatives methods of production or operation, improved process controls, improved discharge water treatment facility operation, alternative methods of treatment and treatment beyond applicable technology requirements of the Federal Clean Water Act. Technologically feasible alternatives must be compared with the potential environmental degradation.

There are no other less environmentally damaging alternatives to the operation of the GWTP and discharge to Turnpike Lake that are reasonably available or feasible.

Shutting down the GWTP is not possible at this time. Groundwater is extracted to hydraulically control the transport of VOCs and prevent off-Site migration of impacted groundwater. BASF is undertaking remediation actions to reduce and eliminate the source(s) of VOCs to the groundwater, including utilizing in-situ chemical oxidation injection methods. These activities are ongoing and BASF intends to shut

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California ■ Illinois ■ Massachusetts ■ New Jersey ■ New York ■ Texas

down the GWTP and eliminate the discharge to Turnpike Lake as soon as VOC sources to groundwater are adequately eliminated or controlled and USEPA approves shut down of the GWTP. However, BASF must continue to extract groundwater and operate the GWTP until VOC sources to groundwater are eliminated or controlled. BASF anticipates operating the GWTP plant for no more than three to five more years (and ideally much less than that), contingent upon the outcome of active remediation measures and approvals by USEPA.

Modifying the discharge of the GWTP to release the effluent to the Publicly Owned Treatment Works (POTW), as opposed to Turnpike Lake, is infeasible. Roux Associates engaged Mr. Dennis Morton of the Town of Plainville Water Department to determine if the POTW is able to receive the GWTP effluent. After reviewing the average, maximum, and design flows of the GWTP system, Mr. Morton stated that "The Town of Plainville does not have the capacity to accept those types of volumes in our system." The correspondence with the Town of Plainville is included as **Attachment 2**.

There are no other feasible alternatives to discharging the GWTP effluent to other locations, via other means (e.g., land application), or treating the water at another location, especially considering BASF's intention to discontinue the discharge as soon as possible based on active remediation outcomes. Discharging GWTP effluent back to groundwater on-Site would risk compromising the remedial effectiveness of the groundwater extraction system. Specifically, water discharged on-Site would simply recirculate through the extraction system and impair the system's ability to depress the groundwater table, which would risk overwhelming the system and allowing off-Site migration of impacted groundwater. Developing an off-site discharge location for the GWTP effluent is inconsistent with the anticipated amount of time the GWTP is expected to operate because the extensive amount of time required to design, permit, and construct an alternative off-Site discharge location likely exceeds the operational life of the groundwater extraction system. Furthermore, even if such alternative discharge options were available or technically feasible there would be no need to pursue them because the GWTP effluent is not contributing to impairment of Turnpike Lake via discharge of toxic pollutants or exceeding other Massachusetts Surface Water Quality Standards. Refer to the response to Question 3 for a more detailed evaluation of the GWTP discharge relative to Massachusetts Surface Water Quality Standards.

During the life of the GWTP operation BASF has undertaken various measures to reduce the volume of groundwater treated by the system through improved process controls and facility operation. Wells in the groundwater extraction system are fit with transducers and variable frequency drives to modulate the rate of groundwater extraction and ensure only the volume required to achieve remedial objectives is treated by the GWTP. In other words, the groundwater extraction wells are not pumping at a constant rate at all times. Furthermore, unnecessary components of the GWTP have been taken offline to reduce the need to modify pH of the discharge water and minimize, to the extent possible, the need to amend the treated groundwater with chemicals to meet discharge requirements. There are no additional feasible alternative methods to reduce flow into the GWTP or modify the GWTP operation that would not adversely impact the effectiveness of the groundwater remedy or negatively impact the quality of the GWTP effluent.

2. To the maximum extent feasible, are the discharge and activity designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices? All reasonable efforts to minimize the environmental impacts of the proposed discharge must be made. Emphasis is placed on source reduction. This includes investigation of changes in plant production processes or raw materials that reduce, avoid, or eliminate the use of pollutants, including, but not limited to, nutrients, toxics and hazardous substances, or generation of pollution by-product per unit product, so as to reduce overall risks to the environment. Compliance with M.G.L. Ch 21I (the Toxics Use Reduction Act) is required.

All reasonable efforts have been implemented to minimized environmental impacts of the GWTP discharge. Groundwater represents the only input to the GWTP and groundwater extraction cannot be

further reduced without potentially adversely impacting the groundwater extraction system's ability to control the transport of contaminated groundwater, as discussed in response to Question 1.

The GWTP treats groundwater almost exclusively through physical processes (i.e., air stripping, carbon adsorption) and therefore there is no opportunity to modify the system processes in a way that would reduce or eliminate the use of pollutants in the treatment process. The only chemical additions that currently take place are minor additions of sulfuric acid to the treated water before the water is discharged to Turnpike Lake to ensure that the pH of the discharge water is consistent with the permit requirements. Furthermore, pH adjustments are infrequent, and typically only occur in the 1-2 days after activated carbon is replaced in the treatment system. Therefore, usage of sulfuric acid is well below the 10,000 pound "otherwise used" and the 25,000 pound "processed" thresholds under the TRI regulations. Additionally, no wastes are generated as the result of use of sulfuric acid in the GWTP because it is fully neutralized during the treatment process.

3. Will the continued discharge impair existing uses of the receiving water or result in a level of water quality less than that specified for the Class?

No, continued discharge will not impair existing uses of the receiving water or result in a level of water quality less than that specified for the Class.

Massachusetts Surface Water Quality Standards (314 CMR 4.00) specify that surface water bodies must meet a variety of criteria that are established to be protective of the resource. The discharge from the GWTP is consistent with all of the surface water criteria for Turnpike Lake, a Class A water body and an Outstanding Resource Water. The following discussion first addresses the GWTP discharge with respect to the toxic pollutants requirements for the water body, and is then followed by a discussion of the other criteria relevant to the water body.

The GWTP does not discharge toxic pollutants that have or will lead to a degradation of the water body, in accordance with 314 CMR 4.05(5)(e) which states that "all surface water bodies shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." **Table 1** compares GWTP effluent in 2016 and 2017 to five standards or screening criteria to evaluate potential effects of the discharge to human and ecological receptors – one based on the 2010 RGP, two drinking water based, and two ecological receptor based. Specifically, the standards/criteria are:

- 2010 RGP Effluent Limits
- USEPA Drinking Water Maximum Contaminant Levels (MCLs). MCLs are human health risk-based standards.
- USEPA Ambient Water Quality Criteria (AWQC) for Aquatic Life. Note that there are no AWQC – Aquatic Life for VOCs.
- Massachusetts Contingency Plan (MCP) GW-1 standards, which apply to groundwater that is a current drinking water resource or a potential future source of drinking water. Note that the MCP GW-1 standards adopt Massachusetts' existing drinking water standards and guidelines where such standards are available.
- The Ecological Risk-Based Target Value in Surface Water which underlies the MCP GW-3 standards. MCP GW-3 standards "address the adverse ecological effects that could result from

discharge of oil or hazardous material to surface water"[1] via contaminated groundwater. MCP GW-3 standards for groundwater are based on two general pieces of data: (1) the Ecological Risk-Based Target Value in Surface Water and (2) dilution factors associated with groundwater and surface water transport and mixing. The comparison utilized herein compares the "undiluted" Ecological Risk-Based Target Value in Surface Water to the GWTP discharge.[2] The Ecological Risk-Based Target Value in Surface Water do not represent actionable standards, but are incorporated principally because there are no AWQC – Aquatic Life for VOCs.

These data show that the release of toxic pollutants is insufficient to impair uses of Turnpike Lake as either a drinking water resource or for ecological purposes. Only three measurements over the period covered by **Table 1** exceed any of the standards/criteria. PCE was detected slightly above the RGP limits and drinking water standards in March and May 2017. As will be discussed further in response to Question 4, these exceedances were short term, resulted from equipment damage, and were eliminated upon repair of the equipment. Furthermore, these two PCE exceedances represent the only PCE exceedances over the entire period covered by the 2010 RGP. The only other exceedance was the exceedance of nickel (13.4 µg/L) above the MassDEP Ecological Risk-Based Target Value in Surface Water (8 µg/L) in March 2018. The nickel concentration in this single measurement was abnormally high compared to other GWTP effluent samples, but was still below all actionable standards, including the 2010 RGP discharge limit. All nickel measurements are also below USEPA's Ambient Water Quality Criteria for Aquatic Life level, which is the level USEPA identifies as potentially deleterious to aquatic life. The comprehensive analysis of the data in **Table 1** shows that the discharge of the GWTP is not contributing toxic pollutants that will impair Turnpike Lake.

In addition to toxic pollutants, Massachusetts Surface Water Quality Standards require consideration of the following additional criteria, all of which are met by the discharge from the GWTP:

Dissolved Oxygen: The GWTP effluent is expected to be fully oxygen saturated. The GWTP removes VOCs through a shallow tray air stripper in which groundwater and air run countercurrent to one another. The process is designed to extract VOCs from the water but also has the effect of saturating the water with dissolved oxygen. Dissolved oxygen is not a parameter that is monitored in the GWTP effluent, but the physical GWTP process ensures that the effluent is fully oxygen saturated and does not impair Turnpike Lake.

Temperature: As stated in the RGP Notice of Intent, the influent water to the GWTP is 59°F. The GWTP includes no temperature modification steps (i.e., no thermal processes are employed for treatment), and the water is held for a relatively short time period in the GWTP before discharge. There is no reasonable expectation that the GWTP effluent temperature could impair Turnpike Lake.

pH: As shown in **Table 1**, the 2010 RGP limits for pH are more conservative than other standards/criteria. The GWTP effluent has continuously met the pH standards of the 2010 RGP and will continue to meet those standards.

Bacteria: The GWTP discharge is comprised of extracted groundwater, which has no known bacteriological inputs. Furthermore, no nutrients are added to the system that would promote bacterial growth during the short period of time in which the groundwater is treated by the GWTP.

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[1] MassDEP. December 2017. MCP Numerical Standards. Page 32. Accessible at: https://www.mass.gov/files/documents/2017/12/27/MCP%20Numerical%20Standards%20-%20Derivation.pdf

[2] Additional information about the Ecological Risk-Based Target Value in Surface Water, including the numerical derivations, technical basis, and application to GW-3 standards can be reviewed at: MassDEP. December 2017. MCP Numerical Standards. Page 32-34 and citations therein.

Although bacteriological loading of the effluent has not been measured, there is no reasonable expectation that bacterial loading from the GWTP could impair Turnpike Lake.

Solids: The total suspended and total dissolved solids loading shown in **Table 1** indicates that solids discharge from the GWTP is low and will not contribute to impairment of Turnpike Lake.

Color and Turbidity: Groundwater, which is low in color and turbidity, comprises the entire source of water to the GWTP. As shown by the solids loading in the GWTP effluent (**Table 1**), the solids concentrations are low, and therefore the turbidity is also expected to be low. Although color and turbidity are not directly measured in the GWTP effluent, there is no reasonable expectation that color and turbidity in the GWTP effluent couple impair Turnpike Lake.

Oil and Grease: There are no known sources of oil and grease to the groundwater treated by the GWTP and nothing in the GWTP introduces potential oil and grease contamination. Furthermore, chemical markers of petroleum hydrocarbon contamination in the GWTP effluent (e.g., benzene, toluene) are consistently below all standards/criteria examined in **Table 1**.

Taste and Odor: The GWTP effluent adds only minor concentrations of sulfuric acid to adjust pH before discharge. There are no components of the GWTP process that negatively impact taste and odor of the effluent water and therefore the GWTP effluent is not contributing to impairment of Turnpike Lake.

In the approximately 20 years that the GWTP has operated, the effluent from the GWTP has not impaired Turnpike Lake. The GWTP effluent is consistent with the high water quality expectations of a discharge to an Outstanding Resource Water and, if continuing discharge is approved, will continue to meet those high water quality expectations.

4. Since expiration of the previous RGP in September 9, 2015, did discharge from the facility meet the requirements of the RGP issued on September 9, 2010 "2010 RGP"? Note that cumulative degradation resulting from a discharger's noncompliance may warrant further investigation. If the facility has been in noncompliance, explain how the facility plans to return to compliance.

The facility met all performance requirements of the 2010 RGP from issuance of the 2010 RGP through the most recent sampling event for which data is available (June 4, 2018) except for two minor exceedances of tetrachloroethene (PCE) on March 6, 2017 and May 1, 2017.[3] **Table 1** shows effluent data from 2016 and 2017. **Attachment 4** addresses the third and fourth quarters of 2015 (the 2010 RGP expired in September 2015), and notes that "No exceedances of the RGP or MassDEP Policy WSC 94-150 occurred during this reporting period."

The March 2017 and May 2017 exceedances were attributed to minor damage to the air stripper component of the GWTP which removes the majority of the VOCs in the groundwater. The resulting exceedances of RGP PCE standard of 5.0 µg/L were 5.7 µg/L (March 2017) and 6.9 µg/L (May 2017). Following the May 2017 exceedance, the air stripper damage was identified and was promptly repaired. No PCE has been detected in the GWTP effluent above 0.3 µg/L in the 13 months since the air stripper repairs were completed. The periodic maintenance program for the GWTP was updated in response to these exceedances to include inspections of additional components of the air stripper, including the

[3] The semi-annual report for the January 1, 2017 through June 30, 2017 period describes the May 1, 2017 exceedance [GES. January 18, 2018. Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report No. SA10 Year 20 – 1st and 2nd Quarter (Q77 & Q 78) (January 1, 2017 through June 30, 2017)]. The report is being revised to also include a description of the March 6, 2017 exceedance and will be resubmitted to USEPA.

portion of the air stripper that required repair in May 2017. No additional measures are required to ensure that the facility remains in compliance.

If you have any questions or comments regarding these responses, please do not hesitate to contact the undersigned at (781) 569-4000.

Sincerely,

ROUX ASSOCIATES, INC.

Melissa Wilson
Staff Engineer

Chase Gerbig, Ph.D.
Senior Engineer

JR Taormina
Principal Engineer

Enclosures

Table 1: Groundwater Treatment Plant Effluent Analytical Results, January 2017 – June 2018
Attachment 1: MassDEP June 26, 2018 Letter
Attachment 2: Correspondence with Dennis Morton, Town of Plainville, MA Water Sewer Operations Supervisor
Attachment 3: Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, January 2017 – June 30, 2017
Attachment 4: Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, July 2016 – December 2016

cc: Mr. Ed Vanyo, BASF, via email
Mr. Stephen Graham, LSP, AEI Consultants, via email
Ms. Meghan Prio, PE, Groundwater & Environmental Services, Inc., via email
Ms. Shauna Little, USEPA Region 1, via email

TABLES

Groundwater Treatment Plant Effluent Analytical Results,
January 2017 – June 2018

Table 1. Groundwater Treatment Plant Effluent Analytical Results
BASF Corporation
36 Taunton Street, Plainville, MA

Analytical Parameter	2010 RGP Effluent Limits (µg/L)	MassDEP Method 1 GW-1 Standard[1] (µg/L)	MassDEP Ecological Risk-Based Target Value in Surface Water (basis for GW-3 Standard)[2] (µg/L)	USEPA Drinking Water MCL[3] (µg/L)	USEPA Ambient Water Quality Criteria for Aquatic Life[4] CCC (Chronic) (µg/L)	Groundwater Treatment Plant Effluent (ug/L)									
						01/13/17	02/06/17	03/06/17	03/20/17	04/03/17	05/01/17	05/11/17	05/22/17	06/12/17	07/10/17
Volatile Organic Compounds (VOCs)															
Benzene	5	5	460	5	NS	0.5 BRL	0.50 BRL	0.50 BRL	0.50 BRL	0.50 BRL	0.50 BRL	0.50 BRL	0.50 BRL	0.50 BRL	0.50 BRL
Toluene	See Note 5	1,000	1,400	1,000	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
Ethylbenzene	See Note 5	700	181	700	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
meta-Xylene and para-Xylene (m,p-Xylenes)	See Note 6	NS	NS	NS	NS	2 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL
ortho-Xylene (o-Xylene)	See Note 6	NS	NS	NS	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
Total Xylenes (m,p,o Xylenes)	See Note 7	10,000	200	10,000	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total BTEX	100	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-Butyl Ether (MTBE)	70	70	100,000	NS	NS	2 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL
tert-Butyl Alcohol (TBA)	See Note 8	NS	NS	NS	NS	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL
tert-Amyl Methyl Ether (TAME)	See Note 8	NS	NS	NS	NS	2 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL
1,1,1-Trichloroethane (1,1,1-TCA)	200	200	900	200	NS	1 BRL	1.0 BRL	**5.9**	**3.1**	**2.4**	**3.5**	**2.7**	1.0 BRL	1.0 BRL	1.0 BRL
1,1-Dichloroethane (1,1-DCA)	70	70	990	NS	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
1,2-Dichloroethane (1,2-DCA)	5	5	990	5	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
1,1-Dichloroethene (1,1-DCE)	3.2	7	1,200	7	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
cis-1,2-Dichloroethene (cis-1,2-DCE)	70	70	14,000	70	NS	1 BRL	1.0 BRL	**2.5**	**2.0**	**1.7**	**2.1**	**1.9**	1.0 BRL	1.0 BRL	1.0 BRL
Dichloromethane (Methylene Chloride)	4.6	5	6,700	5	NS	2 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL	2.0 BRL
Tetrachloroethene (PCE)	5	5	1,100	5	NS	1 BRL	1.0 BRL	**5.7**	**4.1**	**3.4**	**6.9**	**4.5**	1.0 BRL	1.0 BRL	1.0 BRL
Trichloroethene (TCE)	5	5	190	5	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
1,1,2-Trichloroethane	5	5	15,000	5	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
Acetone	See Note 8	6,300	3,400	NS	NS	5 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL
1,4-Dioxane	See Note 8	0.3	990,000	NS	NS	250 BRL *	250 BRL *	250 BRL *	250 BRL *	250 BRL *	250 BRL *	250 BRL *	250 BRL *	250 BRL *	250 BRL *
1,4-Dichlorobenzene	5	5	310	75	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
Carbon Tetrachloride	4.4	5	200	5	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL
Vinyl Chloride	2	2	41,000	2	NS	1 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL	1.0 BRL

Analytical Parameter	2010 RGP Effluent Limits (mg/L)	MassDEP Method 1 GW-1 Standard [1] (mg/L)	MassDEP Ecological Risk-Based Target Value in Surface Water (basis for GW-3 Standard) [2] (mg/L)	USEPA Drinking Water MCL [3] (mg/L)	USEPA Ambient Water Quality Criteria for Aquatic Life [4] CCC (Chronic) (mg/L)	Groundwater Treatment Plant Effluent (mg/L)									
						01/13/17	02/06/17	03/06/17	03/20/17	04/03/17	05/01/17	05/11/17	05/22/17	06/12/17	07/10/17
pH **	6.5 - 8.3	NS	NS	NS	6.5 - 9	7.2	7.2	7.4	NA	7.3	7.1	NA	NA	7.3	6.9
Solids															
Total Suspended Solids	30	NS	NS	NS	NS	5.0 BRL	5.0 BRL	5 BRL	NA	5.0 BRL	5.0 BRL	NA	NA	5.0 BRL	5.0 BRL
Total Dissolved Solids	See Note 9	NS	NS	NS	NS	**250**	**200**	**170**	NA	**220**	**220**	NA	NA	**220**	**210**
Metals															
Iron, Total	1	NS	NS	NS	1	0.050 BRL	0.050 BRL	0.05 BRL	NA	0.050 BRL	0.050 BRL	NA	NA	0.050 BRL	0.050 BRL
Copper, Total	0.0052	NS	NS	1.3 - See Note 10	0.0031 - See Note 11	0.010 BRL *	0.010 BRL *	0.01 BRL *	NA	0.010 BRL *	0.010 BRL *	NA	NA	0.010 BRL *	0.010 BRL *
Nickel, Total	0.029	0.1	0.008	NS	0.052	0.025 BRL *	0.025 BRL *	0.025 BRL *	NA	0.025 BRL *	0.025 BRL *	NA	NA	0.025 BRL *	0.025 BRL *
Zinc, Total	0.0666	5	0.036	NS	0.12	0.050 BRL *	0.050 BRL *	0.05 BRL *	NA	0.050 BRL *	0.050 BRL *	NA	NA	0.050 BRL *	0.050 BRL *
Manganese, Total	See Note 9	NS	NS	NS	NS	**0.016**	0.010 BRL	0.01 BRL	NA	0.010 BRL	0.010 BRL	NA	NA	0.010 BRL	0.010 BRL
Inorganic Anions															
Chloride	See Note 8	NS	NS	NS	230	**105**	**81.6**	**87**	NA	**91.6**	**91.2**	NA	NA	**78.8**	**82.8**

Notes:
Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes
BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution
ND = Concentration, if any, is below reporting limit for each individual analyte
J = Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
NA = Not Analyzed
NR= Not Reported
NS = No Standard available
MCL = Maximum Contaminant Level
CCC = Criterion Continuous Concentration
Bold indicates a detection
Orange highlighting indicates a detected exceedance of the Site's 2010 RGP limit, MassDEP Method 1 GW-1, and EPA Drinking Water MCL.
Yellow highlighting indicates a detected exceedance of the MassDEP Ecological Risk-Based Target Values.
* Indicates the BRL exceeds the 2010 RGP Effluent Limit, MassDEP's GW-1 Standard, MassDEP Ecological Risk-Based Target Value, or USEPA Ambient Water Quality for Aquatic Life.
** pH measurements collected by field personnel using a calibrated pH meter. Units are standard pH units.
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3. United States Environmental Protection Agency (USEPA) Drinking Water Maximum Contaminant Levels (MCLs
4. USEPA's Aquatic Life Criteria represent "the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species in a given environment." (Source: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table). Chronic criteria is utilized to be conservative.
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Table 1. Groundwater Treatment Plant Effluent Analytical Results
BASF Corporation
36 Taunton Street, Plainville, MA

Analytical Parameter	2010 RGP Effluent Limits (µg/L)	MassDEP Method 1 GW-1 Standard[1] (µg/L)	MassDEP Ecological Risk-Based Target Value in Surface Water (basis for GW-3 Standard)[2] (µg/L)	USEPA Drinking Water MCL[3] (µg/L)	USEPA Ambient Water Quality Criteria for Aquatic Life[4] CCC (Chronic) (µg/L)	Groundwater Treatment Plant Effluent (µg/L)																	
						08/07/17		09/18/17		10/16/17		11/06/17		12/04/17		01/08/18		02/05/18		03/05/18		04/02/18		05/14/18		06/04/18	
Volatile Organic Compounds (VOCs)																									
Benzene	5	5	460	5	NS	0.50	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
Toluene	See Note 5	1,000	1,400	1,000	NS	1.0	BRL	0.1	BRL	0.1	BRL	**0.2**	J	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
Ethylbenzene	See Note 5	700	181	700	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
meta-Xylene and para-Xylene (m,p-Xylenes)	See Note 6	NS	NS	NS	NS	2.0	BRL	0.1	BRL	0.1	BRL	**0.1**	J	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
ortho-Xylene (o-Xylene)	See Note 6	NS	NS	NS	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
Total Xylenes (m,p,o Xylenes)	See Note 7	10,000	200	10,000	NS		ND		ND		ND	**0.1**	J		ND		ND		ND		ND		ND		ND		ND
Total BTEX	100	NS	NS	NS	NS		ND		ND		ND	**0.3**	J		ND		ND		ND		ND		ND		ND		ND
Methyl-tert-Butyl Ether (MTBE)	70	70	100,000	NS	NS	2.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
tert-Butyl Alcohol (TBA)	See Note 8	NS	NS	NS	NS	10	BRL		NR		NR		NR		NR		NR	4.0	BRL	4.0	BRL	4.0	BRL	4.0	BRL	4.0	BRL
tert-Amyl Methyl Ether (TAME)	See Note 8	NS	NS	NS	NS	2.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
1,1,1-Trichloroethane (1,1,1-TCA)	200	200	900	200	NS	1.0	BRL	**0.1**	J	**0.3**	J	**0.2**	J	0.1	BRL	**0.2**	J	**0.2**	J	**0.2**	J	**0.2**	J	**0.2**	J	0.1	BRL
1,1-Dichloroethane (1,1-DCA)	70	70	990	NS	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
1,2-Dichloroethane (1,2-DCA)	5	5	990	5	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
1,1-Dichloroethene (1,1-DCE)	3.2	7	1,200	7	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
cis-1,2-Dichloroethene (cis-1,2-DCE)	70	70	14,000	70	NS	1.0	BRL	**0.1**	J	**0.2**	J	**0.2**	J	0.1	BRL	**0.1**	J	**0.1**	J	**0.1**	J	**0.3**	J	**0.2**	J	0.1	BRL
Dichloromethane (Methylene Chloride)	4.6	5	6,700	5	NS	2.0	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL	0.2	BRL
Tetrachloroethene (PCE)	5	5	1,100	5	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	**0.1**	J	**0.1**	J	**0.1**	J	**0.3**	J	**0.3**	J	0.1	BRL
Trichloroethene (TCE)	5	5	190	5	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
1,1,2-Trichloroethane	5	5	15,000	5	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
Acetone	See Note 8	6,300	3,400	NS	NS	5.0	BRL	3.0	BRL	3.0	BRL	**50.0**		**3.6**	J	**7.7**		**3.0**	J	**7.6**		**4.6**	J	**24**		**3.1**	J
1,4-Dioxane	See Note 8	0.3	990,000	NS	NS	250	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *	20	BRL *
1,4-Dichlorobenzene	5	5	310	75	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
Carbon Tetrachloride	4.4	5	200	5	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL
Vinyl Chloride	2	2	41,000	2	NS	1.0	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL	0.1	BRL

Analytical Parameter	2010 RGP Effluent Limits (mg/L)	MassDEP Method 1 GW-1 Standard [1] (mg/L)	MassDEP Ecological Risk-Based Target Value in Surface Water (basis for GW-3 Standard) [2] (mg/L)	USEPA Drinking Water MCL [3] (mg/L)	USEPA Ambient Water Quality Criteria for Aquatic Life [4] CCC (Chronic) (mg/L)	Groundwater Treatment Plant Effluent (mg/L)																	
						08/07/17		09/18/17		10/16/17		11/06/17		12/04/17		01/08/18		02/05/18		03/05/18		04/02/18		05/14/18		06/04/18	
pH **	6.5 - 8.3	NS	NS	NS	6.5 - 9	7.3		7.6		7.8		7.6		7.9		7.8		7.7		8.3		7.8		7.7		7.8	
Solids																									
Total Suspended Solids	30	NS	NS	NS	NS	5.0	BRL	1.00	BRL	1.00	BRL	1.00	BRL	1.00	BRL	1.00	BRL	3.43	BRL	**1.04**	J	1.00	BRL	1.00	BRL	1.00	BRL
Total Dissolved Solids	See Note 9	NS	NS	NS	NS	**190**		**252**		**260**		**257**		**235**		**238**		**241**		**246**		**293**		**309**		**254**	
Metals																									
Iron, Total	1	NS	NS	NS	1	0.050	BRL	0.0805	BRL	0.0805	BRL	**0.230**	J	0.0805	BRL	0.0805	BRL	0.0805	BRL	**0.4030**		0.0805	BRL	0.0805	BRL	**0.122**	J
Copper, Total	0.0052	NS	NS	1.3 - See Note 10	0.0031 - See Note 11	0.010	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *	0.0040	BRL *
Nickel, Total	0.029	0.1	0.008	NS	0.052	0.025	BRL *	0.0040	BRL	0.0040	BRL	**0.0047**	J	0.0040	BRL	0.0040	BRL	**0.0042**	J	**0.0134**	J	**0.0050**	J	0.0040	BRL	0.0040	BRL
Zinc, Total	0.0666	5	0.036	NS	0.12	0.050	BRL *	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL	0.0065	BRL
Manganese, Total	See Note 9	NS	NS	NS	NS	**0.011**		**0.0815**		**0.0016**	J	**0.0733**		**0.0039**	J	**0.0254**		**0.0408**		**0.1480**		**0.0257**		**0.0040**	J	**0.0060**	J
Inorganic Anions																									
Chloride	See Note 8	NS	NS	NS	230	**80.4**		**81.6**		**90.6**		**137**		**85.7**		**83.3**		**88.4**		**96.8**		**121**		**107**		**95.0**	

Notes:
Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes
BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution
ND = Concentration, if any, is below reporting limit for each individual analyte
J = Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
NA = Not Analyzed
NR= Not Reported
NS = No Standard available
MCL = Maximum Contaminant Level
CCC = Criterion Continuous Concentration
Bold indicates a detection
Orange highlighting indicates a detected exceedance of the Site's 2010 RGP limit, MassDEP Method 1 GW-1, and EPA Drinking Water MCL.
Yellow highlighting indicates a detected exceedance of the MassDEP Ecological Risk-Based Target Values.
* Indicates the BRL exceeds the 2010 RGP Effluent Limit, MassDEP's GW-1 Standard, MassDEP Ecological Risk-Based Target Value, or USEPA Ambient Water Quality for Aquatic Life.
** pH measurements collected by field personnel using a calibrated pH meter. Units are standard pH units.
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ATTACHMENTS

1. MassDEP June 26, 2018 Letter
2. Correspondence with Dennis Morton, Town of Plainville, MA Water Sewer Operations Supervisor
3. Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, January 2017 – June 30, 2017
4. Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, July 2016 – December 2016

ATTACHMENT 1

MassDEP June 26, 2018 Letter

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

June 26, 2018

Ed Vanyo
BASF Corporation
100 Park Avenue
Florham Park, NJ 07932

And

Meghan Proia
Groundwater & Environmental Services, Inc. (GES)
364 Littleton Road, Suite 4
Westford, MA 01886

Dear M. Vanyo and M. Proia,

The Massachusetts Department of Environmental Protection (MassDEP) and the U.S. Environmental Protection Agency (US EPA) have received your Notice of Intent (NOI) for coverage under the 2017 Remediation General Permit ("2017 RGP"). You are requesting coverage for a discharge to Turnpike Lake, a tributary to the Wading River public water supply, which is an Outstanding Resource Water (ORW). Section 1.3 of the 2017 RGP states that discharges to ORWs are ineligible for coverage unless an authorization is granted by MassDEP, and therefore MassDEP is required to perform an additional review in accordance with the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards (314 CMR 4.00) and MassDEP policy, "Implementation Procedures For The Antidegradation Provisions of the Massachusetts Surface Water Quality Standards, 314 CMR 4.00" ("the Policy") prior to State Authorization of the discharge. Once MassDEP has issued State Authorization, the US EPA can proceed with authorization to discharge under the 2017 RGP.

Per 314 CMR 4.05(3), Turnpike Lake is classified as an Inland Water, Class A. These waters are designated as excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation, even if not allowed. These waters shall have excellent aesthetic value.

While we understand that your facility's discharge has been covered under previous versions of the RGP, MassDEP regulations at 314 CMR 4.04(5)(c) require State Authorization for discharge to an ORW each time the permit is re-issued. The 2017 RGP will expire on April 8, 2022.

In order to proceed with State Authorization, 314 CMR 4.04(5)(b) requires the applicant to demonstrate compliance with MassDEP regulations 314 CMR 4.04(5)2 through 314 CMR 4.04(5)4 and the Policy. To facilitate this process, we request a response with explanation to each of the questions listed below.

1. Are there less environmentally damaging alternative sites for the discharge, sources for disposal, or methods to eliminate the discharge that are reasonably available or feasible? This demonstration must include an analysis of the reuse and conservation of discharge water, relocation of the activity, land application of discharge water or use of closed systems, alternative methods of production or operation, improved process controls, improved discharge water treatment facility operation, alternative methods of treatment and treatment beyond applicable technology requirements of the Federal Clean Water Act. Technologically feasible alternatives must be compared with the potential environmental degradation.

2. To the maximum extent feasible, are the discharge and activity designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices? All reasonable efforts to minimize the environmental impacts of the proposed discharge must be made. Emphasis is placed on source reduction. This includes investigation of changes in plant production processes or raw materials that reduce, avoid, or eliminate the use of pollutants, including, but not limited to, nutrients, toxics and hazardous substances, or generation of pollution by-product per unit product, so as to reduce overall risks to the environment. Compliance with M.G.L. Ch. 21I (the Toxics Use Reduction Act) is required.

3. Will the continued discharge impair existing uses of the receiving water or result in a level of water quality less than that specified for the Class?

4. Since expiration of the previous RGP in September 9, 2015, did discharge from the facility meet the requirements of the RGP issued on September 9, 2010 "2010 RGP"? Note that cumulative degradation resulting from a discharger's noncompliance may warrant further investigation. If the facility has been in noncompliance, explain how the facility plans to return to compliance.

Please send responses to these questions to:

Massachusetts Department of Environmental Protection
Surface Water Discharge Permit Program, c/o Jennifer Wood
1 Winter Street
Boston, MA 02108
e-mail: jennifer.wood@state.ma.us

Please send your response within 30 days of the date of this letter. Your continued authorization to discharge is contingent upon receipt of your response.

Following receipt of your response, we will reach out to you if additional information is needed. Once all necessary information is obtained, MassDEP will make a tentative determination regarding State Authorization and then publish the tentative authorization in the Environmental Monitor for public

comment. Once the public comment period is closed, MassDEP will issue a final decision about State Authorization. Once MassDEP has issued State Authorization, the US EPA can proceed with authorization to discharge under the 2017 RGP.

If you have any questions about this process, please contact Jennifer Wood at 617-654-6536 or at the above e-mail address.

Sincerely,

Susannah King
NPDES Section Chief

Cc: Chase Gerbig, Roux Associates, via e-mail
Melissa Wilson, Roux Associates, via e-mail
Joseph Taormina, Roux Associates, via e-mail
James Marshall, Superintendent, Plainville Water and Sewer Department, via e-mail
Shauna Little, EPA Region 1, via e-mail

ATTACHMENT 2

Correspondence with Dennis Morton, Town of Plainville, MA Water Sewer Operations Supervisor

Chase Gerbig

From: Dennis Morton <dmorton@plainville.ma.us>
Sent: Thursday, July 26, 2018 10:01 AM
To: Chase Gerbig
Subject: Re: BASF Discharge to Municipal Wastewater System

Hi Chase

The Town of Plainville dose not have the capacity to accept those type of volumes in our system.

Dennis

On Tue, Jul 24, 2018 at 4:01 PM, Chase Gerbig <cgerbig@rouxinc.com> wrote:

> Dennis,
>
> Thank you for taking the time to speak with me. As discussed on the phone, I am trying to understand whether or not the municipal sewer system that Plainville is connected to is able to accept treated groundwater originating from the BASF facility located at 36 Taunton Street. Currently groundwater is extracted, treated, and discharged to Turnpike Lake. BASF is prepared to continue to treat the groundwater and discharge it to Turnpike Lake, but MassDEP has requested that in order for BASF to continue its discharge to Turnpike Lake they must first evaluate the feasibility of other discharge options. The only other option that is potentially viable is discharge to the municipal system. Based on other discussions with the Town we have the understanding that Attleboro's current system is not capable of receiving the quantity of water BASF is generating with the groundwater treatment system. Based on the operational data below, can you please tell me if discharging treated groundwater to the municipal system is even feasible? Note that the flow rates are slightly different than what I recalled off the top of my head when we spoke.
>
> Average Daily Flow, 2016-2017: 73,200 gallons per day
>
> Maximum Daily Flow, 2016-2017: approximately 95,000 gallons per day
>
> Design Flow of the system: 108,000 gallons per day
>
> The groundwater treatment system treats the water for volatile organic compounds and metals before discharging the water to Turnpike Lake. The attached table shows the concentrations of volatile organic compounds and metals in the effluent discharge from 2017 to present, and is typical of the system effluent.
>
> As discussed, we need to provide a response to MassDEP as soon as possible. I would appreciate a response tomorrow, if at all possible, as to whether or not it is feasible for BASF to even consider discharge of treated groundwater to the municipal system. BASF recognizes that extensive sampling, permitting, planning, etc. would be required in the event

that the Town is capable of receiving the treated groundwater. In order to continue the discharge to Turnpike Lake, BASF only needs to know at this time if other discharge options might exist.

Thank you for your time and please don't hesitate to call me at any of the numbers below.

c

Chase Gerbig, Ph.D. | Senior Engineer | Roux Associates, Inc.
12 Gill Street, Woburn, Massachusetts 01801
Main: 781.569.4000 | Direct: 781.569.4027 | Mobile: 585.704.8167
Email: cgerbig@rouxinc.com | Website: www.rouxinc.com

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Dennis Morton
Town of Plainville
Water Sewer Operations Supervisor

ATTACHMENT 3

Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, January 2017 – June 30, 2017

Groundwater Treatment Plant Operation and Maintenance Semi- Annual Report No. SA10 Year 20 – 1st and 2nd Quarters (Q77 & Q 78)

(January 1, 2017 through June 30, 2017)

Prepared for:

BASF Corporation
32 Taunton Street
Plainville, Massachusetts 02762

Prepared by:

Groundwater & Environmental Services, Inc.
364 Littleton Road, Suite 4
Westford, Massachusetts 01886

Lydia Erickson
2018.01.19
14:59:04
-05'00'

Digitally signed by Meghan Proia
DN: cn=Meghan Proia, o=GES, ou, email=mproia@gesonline.com, c=US
Date: 2018.01.19 16:58:26 -05'00'

Digitally signed by
Brian Horan
Date: 2018.01.19
14:51:45 -05'00'

Lydia Erickson
Junior Environmental Scientist

Meghan D. Proia, PE
Project Engineer

Brian J. Horan, LSP
Senior Project Manager

January 18, 2018

TABLE OF CONTENTS

TABLES

APPENDICES

1.0 INTRODUCTION

Groundwater & Environmental Services, Inc. (GES), on behalf of BASF Corporation (BASF, formerly known as Engelhard Corporation and BASF Catalysts, LLC), has prepared this Groundwater Treatment Plant (GWTP) Semi-Annual/Year 20 Operation and Maintenance (O&M) Status Report (semi-annual status report) for the GWTP located at the former Engelhard Corporation Plainville facility. This facility is located at 36 Taunton Street (Route 152) in Plainville, Massachusetts (hereafter the Site). The Site is currently owned by BASF. Construction of the GWTP was performed between June and November 1997, with system start-up occurring in December 1997. This semi-annual status report (SA10) summarizes the O&M activities performed during the first and second quarters of 2017 (Q77 and Q78 of GWTP operation), specifically, the period from January 1, 2017 through June 30, 2017 (reporting period).

The GWTP O&M Manual, completed by Foster Wheeler in March 1998 and updated by GES in 2017, and prior GWTP O&M status reports provide specific information regarding the activities that are performed as part of the GWTP O&M. Note that information in the GWTP O&M Manual was updated subsequent to pertinent GWTP system modifications, and the associated Groundwater Stabilization System Piping and Instrumentation Diagram Sheets are up to date and reflect the current GWTP configuration. Information regarding the O&M activities performed during this reporting period is provided herein and in the GWTP operator's logbook maintained in the control room at the GWTP.

2.0 SUMMARY

This section of the semi-annual status report provides a summary of notable items regarding GWTP O&M conducted during the first and second quarters of 2017 (Year Twenty).

- ***GWTP System Operation and Maintenance*** – During the first and second quarters of 2017, the GWTP maintained consistent and continuous operation ("normal" operation) during approximately 91% of the available run time and treated approximately 12.6 million gallons of contaminated groundwater. In total, 19 scheduled GWTP shutdowns were conducted to perform one or more of the following O&M activities: extraction well submersible pump/motor assembly service, repair, and replacement; air stripper cleaning and tray maintenance; a liquid phase activated carbon (LGAC) change out; LGAC backwashing; and three National Grid power outages.

  In addition to these scheduled GWTP shutdowns, nine unscheduled GWTP shutdowns occurred during this period, four related to issues with clogged bag filters. The increase in solids accumulation first discussed in the SA6 report continued to be observed within the GWTP components, including the bag filters, throughout the first and second quarters of this reporting period. Accordingly, additional Site visits were conducted during the first and second quarters to change out bag filters at an increased frequency and to clean various float switches to prevent the system from shutting down. Additional unscheduled shutdowns were resolved by making necessary repairs to certain GWTP components as required. The remaining shutdowns were associated with power outages. The four unscheduled shutdowns associated with the bag filters have been grouped below for ease

of review. Three additional unscheduled shutdowns were associated with power outages and are also grouped further below. Note that for most unscheduled shutdowns, the resolution took place on a same day Site visit.

Unscheduled Shutdowns associated with Bag Filters

- On February 15, 2017 the GWTP shut down due to a clogged bag filter. GES visited the Site that same day, replaced the bag filters, and restarted the system.
- On March 5, 2017, the GWTP shut down due to a clogged bag filter. GES visited the Site that same day, replaced the bag filters, and restarted the system.
- On May 2, 2017, the GWTP shut down due to a clogged bag filter. GES visited the Site that same day, replaced the bag filters, and restarted the system.
- On June 30, 2017, the GWTP shut down due to a clogged bag filter. GES visited the Site that same day, replaced the bag filters, and restarted the system.

Unscheduled Shutdowns associated with Power Outages

- On April 24, 2017, the GWTP shut down due to a National Grid power outage. GES visited the Site when power had been restored to the building and restarted the system on April 26, 2017.
- On May 8, 2017, the GWTP shut down due to a National Grid power outage. Power was restored within two hours. The system was restarted the same day.
- On June 11, 2017, the GWTP shut down due to a National Grid power outage. GES restarted the system on the same day.

Unscheduled Shutdowns associated with GWTP Component Repairs

- On February 3, 2017, the GWTP shut down due to a leaking fitting in the EW-2 conveyance piping vault. GES replaced the fitting and restarted the system the same day.
- On June 12, 2017, the GWTO was shut down to repair the air stripper trays. The trays were brought to Cyn Environmental Services (Cyn) of Stoughton, Massachusetts for welding repairs. The repaired trays were reinstalled on June 14, 2017, and the system was restarted.

- ***Remediation General Permit*** – On September 9, 2015, the Remediation General Permit (RGP) expired. However, according to the EPA: "For current projects that have been authorized to discharge under the RGP, coverage is administratively continued." The new RGP was finalized and BASF is preparing a Notice of Intent (NOI) to discharge under the new RGP. Until BASF is authorized under the new RGP, the GWTP will continue to be operated, sampled, and monitored in accordance with the 2010 RGP indefinitely.

3.0 SYSTEM OPERATION, MAINTENANCE, & MONITORING ACTIVITIES

- During this reporting period, both routine and non-routine system operation, maintenance, and monitoring (OMM) activities were completed by GES and/or subcontractor(s) under GES' oversight. A summary of the OMM activities completed this reporting period are outlined below:

1. On January 3, 2017, GES met Roux Associates, Inc. (Roux) of Woburn, Massachusetts onsite to transition system operation.

2. On January 9, 2017, January 16, 2017, and January 19, 2017, troubleshooting of the submersible pump in EW-2 was conducted including: pulling the submersible pump for inspection, replacing the splice, and ultimately replacing the motor and lead. The EW-2 pump troubleshooting activities were conducted by GES, Roux, and Geosearch.

3. On January 12, 2017, GES repaired the insulation on the exterior groundwater discharge piping.

4. On February 3, 2017, GES identified a leak in the vault between EW-2 and EW-3. GES determined the leak originated from the EW-1 conveyance piping. On February 8, 2017, GES replaced two unions in the EW-1 conveyance piping near the vault.

5. On February 6, 2017, R.E. Erickson of Walpole Massachusetts, under GES oversight, removed, serviced, and reinstalled the EW-1 flow transmitter.

6. On February 15, 2017, March 5, 2017, May 2, 2017, and June 30, 2017, GES responded to a high level in the air stripper. GES changed the bag filters and restarted the system.

7. On March 3, 2017, GES responded to the site to change the bag filters before the system went into an alarm condition.

8. On March 6, 2017, R.E. Erickson of Walpole Massachusetts, under GES' oversight, calibrated the system flow meters.

9. On April 26, 2017, the extraction well EW-1 and EW-3 pump/motor assembly and downwell components were removed and cleaned. The work was conducted by GES and Geosearch. The pump/motor assembly was reinstalled in the well and returned to operation the same day.

10. On March 6, 2017 and June 19, 2017, GES collected water samples from all six individual extraction well sampling ports (EW-1, EW-2, EW-3, EW-4, EW-5, and EW-6) located at the well manifold inside the GWTP building. These samples, which are collected on a quarterly schedule to evaluate water quality, were submitted to the laboratory for VOC analysis by USEPA Method 8260. Analytical results of the

samples collected on March 6, 2017 indicated that dissolved-phase total VOC concentrations ranged from 167 micrograms per liter (µg/l) in the sample from EW-1 to 4,280 µg/l in the sample from EW-3. Analytical results of the samples collected on June 19, 2017 indicated that dissolved-phase total VOC concentrations ranged from 170.5 µg/l in the sample from EW-1 to 4,070 µg/l in the sample from EW-2. The analytical laboratory results for the aqueous samples collected from the individual extraction wells during this reporting period are presented in Appendix A.

11. On March 13, 2017 and June 6, 2017, GES collected first and second quarter groundwater level measurements. As part of this work, GES used a water level meter to measure the water level in 37 and 39 selected wells/piezometers respectively. The designated 58 wells could not be measured due to construction occurring to the south and southeast of Buildings 8 and 10. The water table elevations and overburden and bedrock groundwater elevation contours for these gauging events are presented in Appendix B and C, respectively.

12. On March 20, 2017 and June 5, 2017, the air stripper was disassembled, cleaned, and reassembled. On June 14, 2017, the air stripper trays were removed and delivered to Cyn for welding repairs. The trays were reinstalled on June 16, 2017, and the system was restarted.

13. On January 16, 2017, February 13, 2017, April 26, 2017, April 27, 2017, May 22, 2017, and June 12, 2017, the floor sump and sump pump were inspected and cleaned. The floor sump, float switch, and pump were tested and verified to be functional.

14. On February 6, 2017, March 6, 2017, March 27, 2017, April 3, 2017, May 1, 2017, and June 12, 2017, the effluent tank pH probe and the metals removal system pH probe were cleaned and calibrated.

15. On May 15, 2017, a carbon change out of LGAC vessel LP-1 was completed using reactivated carbon. The work was completed by GES and Carbon Filtration Systems, Inc. (CFS) of Johnston, Rhode Island. On June 19, 2017, CFS removed two sacks of spend carbon from the Site.

4.0 SUMMARY OF ANALYTICAL RESULTS & PERMIT COMPLIANCE

The Site GWTP operates under a Remediation General Permit (RGP). The RGP specifies water sampling and testing requirements including the collection of influent and effluent samples and the analysis of these samples. GES (operator) and BASF (owner) are authorized to discharge under the current 2010 RGP per an EPA Notice of Change - Reduction in Monitoring Requirements letter dated May 8, 2012.[1] During this reporting period, monthly water quality samples were collected and analyzed (tested) in accordance with the RGP (monthly compliance – aqueous effluent). In addition, MassDEP Policy WSC 94-150 Point Source Discharge of Remedial Air Emissions (vapor effluent) applies to the discharge of air from the VGAC treatment system which treats the air stripper off-gas (see below).

[1] The May 8, 2012 EPA letter is presented in the Q58 quarterly status report dated September 5, 2012.

Effluent dissolved-phase total VOC concentrations were below RGP effluent limits during this reporting period, with the exception of the May 1, 2017 effluent sample, which has concentrations of tetrachloroethene (PCE) above effluent limits. On May 11, 2017, GES notified the USEPA about the RGP effluent limit exceedance for PCE (6.9 ug/L versus a effluent limit of 5.0 ug/L). Dissolved-phase PCE concentrations were below permit limits in the effluent samples collected on May 11, 2017 and May 22, 2017. GES completed a LGAC changeout event on May 15, 2017.

The treatment system has been effective in the removal of dissolved-phase VOCs from the influent stream. During this reporting period, monthly GWTP influent dissolved-phase total VOC concentrations ranged from 568 µg/l to 3,375 µg/l with a monthly average of 2,425 µg/l. Historical GWTP operational data from start of operation, Q1 (1998), to the present are included in Table 1. The approximate total pounds of VOCs extracted from the groundwater are also presented in Table 1 and are plotted in Chart 1 (Appendix D). Quarterly average GWTP influent total VOC concentrations are plotted in Chart 2 (Appendix D). Influent total suspended solids (TSS) and metals concentrations were consistent and low during this reporting period, while the effluent TSS and metals concentrations were all less than their respective permit limits during this reporting period. The analytical laboratory results for the aqueous samples collected from the GWTP during this reporting period are presented in Appendix E.

Air samples from the influent, midpoint, and effluent of the VGAC system, which treats the air stripper off-gas, were field analyzed using both a calibrated photoionization detector (PID) on a minimum monthly basis and laboratory analysis during this reporting period. The PID readings and laboratory analytical results indicated removal efficiencies between 96% and 100% during air monitoring events conducted this reporting period which satisfies the vapor effluent guideline of 95% or greater removal efficiency. The field PID readings and the laboratory analytical results for the air samples collected during this reporting period are presented in Appendix F. Carbon usage to date for the GWTP (liquid and vapor) is presented in Appendix G. Ion exchange resin usage to date for the GWTP is presented in Appendix H.

5.0 GROUNDWATER STABILIZATION MEASURE PERFORMANCE OBJECTIVE

The GWTP system fulfills the Site Groundwater Stabilization Measure (GSM) as defined by the EPA Administrative Order on Consent (RCRA Docket No. I-92-1051). The main objective of the Site GSM is to maintain a GWTP system "that utilizes pumping wells to significantly reduce migration of contaminated groundwater off-site by causing a reversal of the natural hydraulic gradient in the bedrock and overlying unconsolidated saturated zones along an approximately 540 foot line."

Since 2008, BASF and their environmental consultants have been working to improve the performance of the GSM, specifically to increase extraction from EW-2. EW-2 was targeted most importantly because the highest VOC concentrations have historically been detected in EW-2 when compared to the other extraction wells. Significant improvements have been made to the EW-2 well and extraction equipment over the years, such as well deepening, increasing the

transmission piping diameter, and installation of a larger pump/motor assembly. Additional details regarding EW-2 improvements are provided in previous status reports.

Site data indicates that a significant reduction in migration of VOC contaminated groundwater off-site has been accomplished at the Site due mainly to the continued groundwater extraction from the extraction wells. Furthermore, in general, during this reporting period, groundwater pumped as part of the Site GSM maintained a potentiometric head in bedrock groundwater near extraction well EW-2 that created a reversal of the hydraulic gradient east of the GSM (i.e., east to west instead of west to east). This is illustrated on the bedrock groundwater elevation contours presented in Appendix C.

6.0 COST SUMMARY

For the first and second quarters of 2017, GES labor costs were $42.9K and direct costs were $44.6K resulting in a total semi-annual cost of $87.5K.

Sincerely,

Groundwater & Environmental Services, Inc.

Meghan D. Proia
Digitally signed by Meghan Proia
DN: cn=Meghan Proia, o=GES, ou, email=mproia@gesonline.com, c=US
Date: 2018.01.19 17:01:54 -05'00'

for

Lydia Erickson
Jr Remediation Scientist

Meghan D. Proia
Digitally signed by Meghan Proia
DN: cn=Meghan Proia, o=GES, ou, email=mproia@gesonline.com, c=US
Date: 2018.01.19 17:01:03 -05'00'

Meghan D. Proia, PE
Project Engineer

TABLES

Table 1: GWTP Operational Data
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Quarterly Report Number	Operation Period	Report Date	Percent Online	Operating Hours	Average Flow Rate (gpm)	Total Gallons Pumped (MG)	Approx. lbs. of Total VOCs Removed	Total VOC Influent (ug/l)				Total VOC Effluent (ug/l)		
								3-Month Average	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
Q1	Jan 1 - Mar 31, 1998	Mar 1998	71%	1,533	44.9	4.1	246	7,181	8,776	9,851	2,915	2.7	4	0.5
Q2	Apr 1 - Jun 30, 1998	Nov 1998	93%	2,033	54.1	6.5	220	4,051	3,845	3,613	4,695	0	2.7	10.7
Q3	Jul 1 - Sep 30, 1998	Nov 1998	87%	1,915	47.7	5.7	371	7,802	9,151	8,603	5,652	0	0	1
Q4	Oct 1 - Dec 31, 1998	Mar 1999	79%	1,748	32.6	4.1	302	8,824	7,510	11,094	7,869	9	236	0
Q5	Jan 1 - Mar 31, 1999	Apr 1999	97%	2,087	51.5	6.5	311	5,726	4,653	5,924	6,602	0	0	0
Q6	Apr 1 - Jun 30, 1999	Oct 1999	93%	2,040	43.3	5.7	254	5,330	5,786	8,085	2,118	0	0	0
Q7	Jul 1 - Sep 30, 1999	Dec 1999	95%	2,075	35.8	4.7	246	6,260	7,870	6,234	4,675	0	0	0
Q8	Oct 1 - Dec 31, 1999	Jun 2000	92%	2,031	45.8	5.9	232	4,720	4,571	3,380	6,208	0	0	0
Q9	Jan 1 - Mar 31, 2000	Oct 2000	98%	2,135	48.8	6.3	263	5,002	4,130	6,421	4,454	0	0	0
Q10	Apr 1 - Jun 30, 2000	Dec 2000	94%	2,059	45.2	5.9	221	4,487	3,414	3,922	6,125	0	0	0
Q11	Jul 1 - Sep 30, 2000	Jan 2001	93%	2,062	38.2	5.1	201	4,734	4,245	4,296	5,661	0	0	0
Q12	Oct 1 - Dec 31, 2000	Mar 2001	93%	2,058	37.3	4.9	188	4,593	4,277	5,314	4,189	0	0	0
Q13	Jan 1 - Mar 31, 2001	Apr 2001	98%	2,107	45.3	5.8	199	4,116	3,514	5,759	3,075	0	0	0
Q14	Apr 1 - Jun 30, 2001	Aug 2001	83%	1,802	39.1	5.1	128	3,006	1,835	3,648	3,535	0	0	0
Q15	Jul 1 - Sep 30, 2001	Dec 2001	88%	1,936	36.4	4.8	195	4,866	3,496	7,060	4,041	0	0	0
Q16	Oct 1 - Dec 31, 2001	Feb 2002	90%	1,989	28.2	3.7	165	5,330	4,375	7,904	3,712	0	0	0
Q17	Jan 1 - Mar 31, 2002	May 2002	92%	1,981	36.7	4.7	130	3,308	3,172	2,970	3,782	0	0	0
Q18	Apr 1 - Jun 30, 2002	Aug 2002	97%	2,117	48.4	6.3	153	2,912	3,000	2,426	3,309	0	0	0
Q19	Jul 1 - Sep 30, 2002	Nov 2002	86%	1,890	32.8	4.3	185	5,153	4,468	6,117	4,874	0	0	0
Q20	Oct 1 - Dec 31, 2002	Mar 2003	99%	2,178	42.2	5.6	208	4,446	3,986	5,791	3,562	0	0	0
Q21	Jan 1 - Mar 31, 2003	Jun 2003	99%	2,134	47.2	6.1	177	3,476	3,461	3,926	3,041	0	0	0
Q22	Apr 1 - Jun 30, 2003	Sep 2003	93%	2,014	48.1	6.1	165	3,241	2,774	3,553	3,397	0	0	0
Q23	Jul 1 - Sep 30, 2003	Dec 2003	85%	1,879	42.5	5.6	164	3,508	2,838	3,234	4,451	0	0	0
Q24	Oct 1 - Dec 31, 2003	Mar 2004	99%	2,188	44.0	5.8	169	3,486	4,533	4,205	1,721	0	0	0
Q25	Jan 1 - Mar 31, 2004	Jun 2004	97%	1,826	44.4	5.9	143	2,903	2,812	3,261	2,637	0	0	0
Q26	Apr 1 - Jun 30, 2004	Nov 2004	93%	2,027	45.2	5.9	142	2,894	3,896	2,607	2,179	0	0	0
Q27	Jul 1 - Sep 30, 2004	Jan 2005	99%	2,180	38.7	5.1	179	4,206	4,144	4,341	4,132	0	0	0
Q28	Oct 1 - Dec 31, 2004	Mar 2005	96%	2,115	41.2	5.4	188	4,164	4,226	4,240	4,027	0	0	0
Q29	Jan 1 - Mar 31, 2005	May 2005	93%	2,009	40.4	5.1	150	3,524	3,892	3,180	3,501	0	0	0
Q30	Apr 1 - Jun 30, 2005	Nov 2005	95%	2,076	38.5	4.6	101	2,629	3,046	2,535	2,307	0	0	0
Q31	Jul 1 - Sep 30, 2005	Feb 2006	69%	1,526	23.5	2.8	122	5,228	2,418	3,093	10,172	1	1	0
Q32	Oct 1 - Dec 31, 2005	Mar 2006	92%	2,036	42.9	5.5	270	5,886	6,456	4,554	6,649	0	0	0
Q33	Jan 1 - Mar 31, 2006	Apr 2006	96%	2,064	38.1	4.5	234	6,237	2,377	6,778	9,556	0	0	0
Q34	Apr 1 - Jun 30, 2006	Sep 2006	81%	1,774	44.4	5.2	271	6,244	6,199	6,150	6,383	0	0	2
Q35	Jul 1 - Sep 30, 2006	Jan 2007	91%	2,019	43.1	5.3	234	5,294	5,797	5,509	4,576	0	0	0
Q36	Oct 1 - Dec 31, 2006	Apr 2007	94%	2,082	36.2	4.6	225	5,867	5,636	7,579	4,385	0	0	0
Q37	Jan 1 - Mar 31, 2007	May 2007	93%	2,017	43.9	5.4	274	6,076	5,877	5,504	6,846	4	0	0
Q38	Apr 1 - Jun 30, 2007	Oct 2007	96%	2,101	46.1	5.7	192	4,034	2,891	4,668	4,544	0	0	0
Q39	Jul 1 - Sep 30, 2007	Dec 2007	81%	1,797	30.2	3.8	157	4,959	5,785	2,331	6,761	0	0	0
Q40	Oct 1 - Dec 31, 2007	Mar 2008	84%	1,859	33.9	4.3	234	6,512	6,953	6,216	6,367	0	0	0

Table 1: GWTP Operational Data
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Quarterly Report Number	Operation Period	Report Date	Percent Online	Operating Hours	Average Flow Rate (gpm)	Total Gallons Pumped (MG)	Approx. lbs. of Total VOCs Removed	Total VOC Influent (ug/l)				Total VOC Effluent (ug/l)		
								3-Month Average	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
Q41[1]	Jan 1 - Mar 31, 2008	Jun 2008	47%	1,031	23.6	3.0	73	2,918	284	3,480	4,990	1	0	0
Q42[2]	Apr 1 - Jun 30, 2008	Aug 2008	80%	1,745	42.1	4.5	186	4,943	5,220	4,670	4,940	0	0	0
Q43[2]	Jul 1 - Sep 30, 2008	Nov 2008	54%	1,182	19.7	2.2	69	3,772	4,930	3,403	2,984	0	0	0
Q44	Oct 1 - Dec 31, 2008	Feb 2009	98%	2,164	49.7	5.5	213	4,602	5,490	4,560	3,756	0	0	0
Q45	Jan 1 - Mar 31, 2009	Apr 2009	99%	2,148	50.8	5.7	202	4,273	4,838	4,981	3,000	0	0	0
Q46	Apr 1 - Jun 30, 2009	Aug 2009	94%	2,051	53.3	5.8	269	5,526	5,736	5,070	5,773	0	0	0
Q47	Jul 1 - Sep 30, 2009	Feb 2010	97%	2,144	49.5	5.3	89	2,017	3,180	992	1,880	0	0	0
Q48	Oct 1 - Dec 31, 2009	Apr 2010	97%	2,132	48.5	5.2	139	3,197	4,130	2,890	2,570	0	0	0
Q49	Jan 1 - Mar 31, 2010	Jul 2010	99%	2,141	49.9	5.1	129	3,059	3,620	3,400	2,158	0	0	0
Q50	Apr 1 - Jun 30, 2010	Nov 2010	94%	2,060	44.4	5.5	176	3,859	2,650	2,730	6,198	16	0	0
Q51	Jul 1 - Sept 30, 2010	Mar 2011	96%	2,128	41.1	5.3	244	5,567	4,560	5,940	6,200	0	0	0
Q52	Oct 1 - Dec 31, 2010	April 2011	99%	2,186	38.9	4.9	137	3,344	7,300	1,521	1,211	0	0	0
Q53	Jan 1 - Mar 31, 2011	May 2011	94%	2,033	37.5	4.4	82	2,266	1,274	1,265	4,260	0	0	0
Q54	Apr 1 - Jun 30, 2011	Oct 2011	90%	1,970	40.9	5.2	279	6,465	6,200	6,700	6,494	0	0	0
Q55	Jul 1 - Sept 30, 2011	Feb 2012	86%	1,899	43.3	4.9	284	6,955	7,743	4,573	8,550	0	0	0
Q56	Oct 1 - Dec 31, 2011	May 2012	83%	1,843	40.5	4.1	137	4,039	5,830	3,476	2,812	0	0	0
Q57	Jan 1 - Mar 31, 2012	June 2012	92%	2,016	44.4	4.8	227	5,703	4,215	6,813	6,080	0	0	0
Q58	Apr 1 - Jun 30, 2012	Aug 2012	93%	2,020	37.1	4.7	150	3,858	2,561	5,109	3,905	0	0	0
Q59	Jul 1 - Sept 30, 2012	Feb 2013	87%	1,920	34.8	4.5	146	3,858	3,560	4,964	3,050	0	0	0
Q60	Oct 1 - Dec 31, 2012	Feb 2013	89%	1,961	43.1	5.5	151	3,297	3,459	3,482	2,950	0	0	0
Q61	Jan 1 - Mar 31, 2013	Aug 2013	91%	1,966	44.1	5.3	112	2,544	3,629	1,041	2,963	0	0	0
Q62	Apr 1 - Jun 30, 2013	Aug 2013	96%	2,101	50.9	6.2	186	3,604	3,330	3,997	3,485	0	0	0
Q63[3]	Jul 1 - Sept 30, 2013	Jan 2015	73%	1,618	32.4	3.7	63	2,068	3,799	1,789	615	0	0	0
Q64[3]	Oct 1 - Dec 31, 2013	Jan 2015	0%	0	0.0	0.0	0	-	-	-	-	0	0	0
Q65[3]	Jan 1 - Mar 31, 2014	June 2015	1.6%	35	17.2	0.057	2	3,594	-	-	3,594	0	0	0
Q66	Apr 1 - Jun 30, 2014	June 2015	71%	1,561	27.1	3.1	118	4,519	4,323	5,652	3,583	0	0	0
Q67	Jul 1 - Sept 30, 2014	Nov 2015	83%	1,822	25.1	3.3	129	4,665	3,235	5,206	5,555	0	0	0
Q68	Oct 1 - Dec 31, 2014	Nov 2015	92%	2,039	34.0	4.2	147	4,161	3,660	4,758	4,066	0	0	0
Q69	Jan 1 - Mar 31, 2015	Feb 2016	83%	1,784	26.8	3.3	120	4,341	4,155	5,456	3,412	0	0	0
Q70	Apr 1 - Jun 30, 2015	Feb 2016	99%	2,153	43.4	5.0	163	3,904	3,079	3,413	5,221	0	0	0
Q71	Jul 1 - Sept 30, 2015	May 2016	94%	2,084	35.4	4.4	204	5,552	5,581	5,784	5,290	0	0	0
Q72	Oct 1 - Dec 31, 2015	May 2016	75%	1,653	25.1	2.5	85	4,081	3,872	5,240	3,131	0	0	0
Q73	Jan 1- Mar 31, 2016	Apr 2017	91%	1,977	56.3	6.6	174	3,165	4,043	2,868	2,583	0	0	0
Q74	April 1 - June 30, 2016	Apr 2017	98%	2,139	57.3	6.4	126	2,366	2,680	1,994	2,423	0	0	0
Q75	July 1 - Sept 30, 2016	Sept 2017	81%	1,781	34.4	4.5	114	3,037	2,969	3,290	2,852	0	0	0
Q76	Oct 1 - Dec 31, 2016	Sept 2017	94%	2,079	47.5	5.9	116	2,363	1,776	2,645	2,669	0	0	0
Q77	Jan 1 - Mar 31, 2017	Jan 2018	93%	1,986	52.6	6.1	120	2,361	3,375	3,140	568	0	0	9.2
Q78[4]	Apr 1 - Jun 30, 2017	Jan 2018	89%	1,922	56.9	6.5	135	2,497	2,492	2,500	2,473	5.8	0	0
Total to Date:				**148,973**		**381.4**	**13,705**							
Average to Date:			**87%**	**1,910**	**40.3**	**4.9**	**176**	**4,289**						

Notes:

1. The system operation parameters displayed in this table for First Quarter 2008 (Q41) are lower than usual due to system down time for the treatment of groundwater from a hotspot excavation and the subsequent associated system cleaning and maintenance
2. The system operation parameters displayed in this table for Second Quarter 2008 (Q42) and Third Quarter 2008 (Q43) are lower than usual due to system down time for both the LFR geophysical investigation and the cleaning of the GWTP, extraction wells, and associated pumps and piping
3. The system operation parameters displayed in this table for Third Quarter 2013 (Q63), Fourth Quarter 2013 (Q64), and First Quarter of 2014 (Q65) are lower than usual due to the GWTP shutdown required by the ISCO injections
4. Total VOC Effluent for the 2nd month in the period from April 1- June 30, 2017 is an average of three Effluent samples taken

APPENDICES

APPENDIX A

GWTP Individual Extraction Well Aqueous Analytical Results (SA10)
January through June 2017

A: GWTP Individual Extraction Well Aqueous Analytical Results
rough June 2017
poration - Groundwater Treatment Plant
MA

arameter	3/6/2017						6/19/2017					
	EW-1	EW-2	EW-3	EW-4	EW-5	EW-6	EW-1	EW-2	EW-3	EW-4	EW-5	EW-6
anic Compounds (ug/l)												
	0.5 BRL	25 BRL	25 BRL	10 BRL	2.5 BRL	1.0 BRL	0.5 BRL	25 BRL	25 BRL	10 BRL	2.5 BRL	1.0 BRL
	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL
	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL
nd para-Xylene (m,p-Xylenes)	2.0 BRL	100 BRL	100 BRL	40 BRL	10 BRL	4.0 BRL	2.0 BRL	100 BRL	100 BRL	40 BRL	10 BRL	4.0 BRL
(o-Xylene)	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL
s (m,p,o-Xylenes)	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butyl Ether (MTBE)	2.0 BRL	100 BRL	100 BRL	40 BRL	10 BRL	4.0 BRL	2.0 BRL	50 BRL	40 BRL	20 BRL	10 BRL	2.0 BRL
cohol (TBA)	10 BRL	500 BRL	500 BRL	200 BRL	50 BRL	20 BRL	10 BRL	250 BRL	200 BRL	100 BRL	50 BRL	10 BRL
thyl Ether (TAME)	2.0 BRL	100 BRL	100 BRL	40 BRL	10 BRL	4.0 BRL	2.0 BRL	50 BRL	40 BRL	20 BRL	10 BRL	2.0 BRL
roethane (1,1,1-TCA)	86	990	1700	310	89	160	36	1,000	200	280	48	120
ethane (1,1-DCA)	3.0	50 BRL	50 BRL	41	5.0 BRL	2.0 BRL	2.8	25 BRL	20 BRL	34	5.0 BRL	5.1
ethane (1,2-DCA)	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	25 BRL	20 BRL	10 BRL	5.0 BRL	1.0 BRL
ethene (1,1-DCE)	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	12	1.0 BRL	25 BRL	20 BRL	10 BRL	5.0 BRL	9.0
oroethene (cis-1,2-DCE)	57	180	260	35	24	3.0	30	140	45	26	5.2	2.1
ene (Methylene Chloride)	2.0 BRL	100 BRL	100 BRL	40 BRL	10 BRL	4.0 BRL	2.0 BRL	50 BRL	40 BRL	20 BRL	10 BRL	2.0 BRL
hene (PCE)	17	2900	2100	1000	370	95	44	2,800	2,000	1,200	560	100
ne (TCE)	4.4	150	220	73	19	24	7.7	130	98	65	9.6	20
roethane	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	25 BRL	20 BRL	10 BRL	5.0 BRL	1.0 BRL
	5.0 BRL	250 BRL	250 BRL	100 BRL	25 BRL	10 BRL	5.0 BRL	120 BRL	100 BRL	50 BRL	25 BRL	5.0 BRL
	250 BRL	12000 BRL	50 BRL	5000 BRL	1200 BRL	500 BRL	250 BRL	62,000 BRL	40 BRL	2,500 BRL	1,200 BRL	250 BRL
benzene	1.0 BRL	50 BRL	50 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	25 BRL	20 BRL	10 BRL	5.0 BRL	1.0 BRL
chloride	1.0 BRL	50 BRL	12000 BRL	20 BRL	5.0 BRL	2.0 BRL	1.0 BRL	25 BRL	20 BRL	10 BRL	5.0 BRL	1.0 BRL
de	1.0	50 BRL	50 BRL	30 BRL	5.0 BRL	2.0 BRL	1.0 BRL	25 BRL	20 BRL	10 BRL	5.0 BRL	1.0 BRL
Total VOCs Concentration	**167**	**4,220**	**4,280**	**1,459**	**502**	**294**	**170.5**	**4,070**	**2,343**	**1,605**	**622.8**	**256.2**

raction well samples were collected from the respective sampling ports at the manifold.
= sum of Benzene, Toluene, Ethylbenzene, and total Xylenes
tration, if any, is below reporting limit for each individual analyte
ntration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution

APPENDIX B

Water Table Evaluations (SA10) – Comparison of Elevations form the First Quarter 2016 through the Second Quarter 2017

Appendix B: Water Table Elevations (SA10)
Comparison of First Quarter 2016 through Second Quarter 2017
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Well ID	Well Casing Elevation	2016				2017	
		3/28/2016	6/21/2016	11/9/2016	12/28/2016	3/13/2017	6/20/2017
		Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation
P10	193.89	177.72	174.78	170.94	171.05	176.38	179.22
P10A	194.01	178.16	174.56	183.21	174.64	176.4	179.15
MW3	196.59	177.52	172.76	171.21	170.97	175.96	179.4
MW14	197.27	178.08	174.41	169.74	169.77	176.51	179.24
MW16	197.84	176.41	173.44	167.32	167.70	175.23	178.29
P8	198.51	178.07	174.61	173.29	173.36	176.58	179.13
P8A	198.10	176.37	173.45	169.53	171.80	174.93	177.96
P7	198.69	178.11	174.61	173.28	173.35	176.58	179.31
P7A	198.11	175.13	172.44	166.68	167.08	173.59	177.25
P6	199.30	179.19	176.36	174.27	174.26	178.18	180.49
P6A	198.78	182.90 *	182.95 *	169.16	168.63	174.18	177.06
P5	198.24	179.22	176.43	175.06	174.02	177.88	180.5
P5A	196.75	175.35	NM	167.88	167.53	173.8	177.38
MW12A	197.70	184.15	177.43	176.30	175.62	182.89	185.91
MW12B	197.79	178.39	169.81	172.05	171.96	176.08	179.94
P15	197.30	178.74	177.38	174.80	174.47	176.32	179.39
P15A	197.44	172.44	169.33	164.10	164.14	179.43	176.13
MW4	200.99	176.64 *	176.61 *	176.34	176.45 *	176.36	176.98
MW15	200.84	174.99	172.51	171.34	170.2	174.48	176.41
MW17R	200.86	171.27	169.24	160.23	154.26	165.67	176.43
P4	201.84	175.56	173.54	174.84	175.44	175.06	176.66
P4A	201.43	165.18	162.84	161.17	159.23	164.57	165.81
P3	200.64	178.43	177.2	176.94	176.77 *	177.01	179.83
P3A	200.62	172.18	172.29	172.06	172.12 *	172.04	172.08
P13	199.18	177.41	176.07	178.24	176.68	178.28	178.9
P13A	199.43	163.25	161.64	163.71	161.23	165.29	165.8
MW25A	202.89	182.64	181.31	182	180.74	182.46	183.58
MW25B	202.41	175.47	174.23	175.23	174.01	176.01	176.73
MW25C	200.00	175.33	174.05	175.07	173.85	175.87	176.58
P9	199.04	183.48	181.74	184.18	181.61	--	185.27
P9A	198.85	181.1	179.83	182.27	179.99	--	182.43
MW44A	197.31	184.41	184.81	182.96	182.87	184.32	185.04
P16	201.7	176.38	174.62	174.96	174.47	176.13	177.57
P16A	201.12	175.12	173.8	173.91	173.51	175.17	175.99
P16C	201.37	201.12	NM	147.67	155.18	160.84	164.85
P17A	200.93	176.6	174.9	173.14	172.81	175.48	180.14
MW40A	194.81	175.14	173.86	173.8	173.96	174.93	175.65

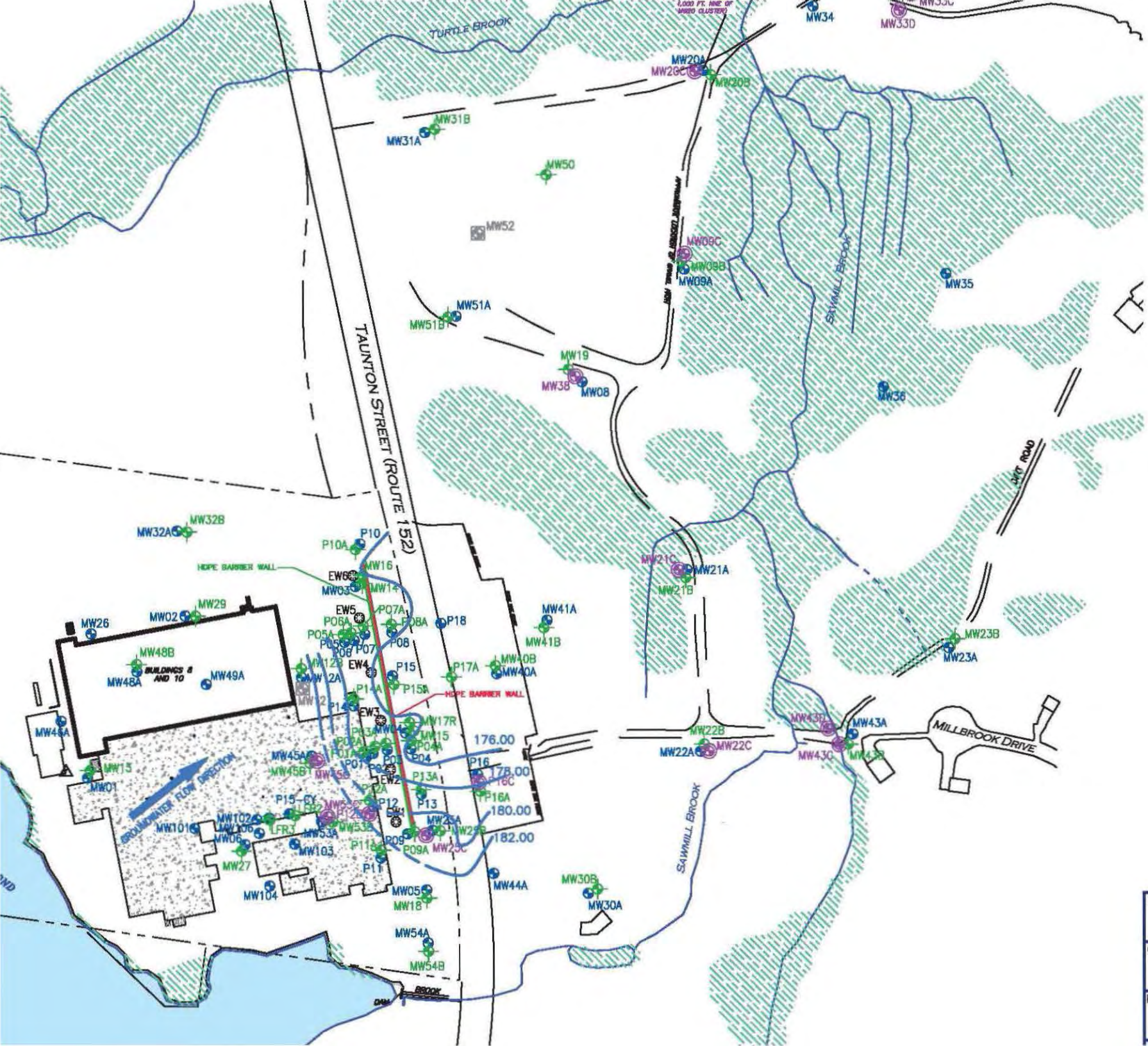
Appendix B: Water Table Elevations (SA10)
Comparison of First Quarter 2016 through Second Quarter 2017
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Well ID	Well Casing Elevation	2016				2017	
		3/28/2016	6/21/2016	11/9/2016	12/28/2016	3/13/2017	6/20/2017
		Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation
MW40B	194.54	173.27	172.51	172.25	172.33	173.07	173.51
P18	199.06	177.8	173.76	172.76	172.76	175.62	178.54
MW5	199.8	192.03	190.04	189.58	NA	NA	NA
MW18	199.31	191.89	188.8	188.75	NA	NA	NA
P11	203.8	193.49	192.56	188.78	NA	NA	NA
P11A	203.93	193.06	192.35	189.50	NA	NA	NA
MW53A	203.82	194.58	193.8	189.42	NA	NA	NA
MW53B	203.75	180.30	167.95	165.99	NA	NA	NA
MW53C	203.63	156.92	153.92	154.82	NA	NA	NA
P12	203.49	192.89 *	192.59 *	192.44	NA	NA	NA
P12A	203.83	162.45	160.92	162.56	NA	NA	NA
P12B	203.92	157.54	155.85	156.61	NA	NA	NA
P1	203.94	191.22	189.75	188.17	NA	NA	NA
P1A	203.89	165.46	162.89	160.44	NA	NA	NA
P2	204.57	185.35 *	185.33 *	185.33 *	NA	NA	NA
P2A	204.28	169.25	167.7	164.17	NA	NA	NA
MW45A	203.9	193.9	185.92	190.21	NA	NA	NA
MW45B	203.87	186.72	193.3	182.81	NA	NA	NA
MW45C	203.26	157.54	155.69	154.98	NA	NA	NA
P14	204.01	181.12	179.28	176.73	NA	NA	NA
P14A	203.9	172.23	170.19	162.17	NA	NA	NA

Notes:
-Elevations displayed are in feet mean sea level (msl)
-Water table level measurements are measured from the highest point casing if no inner PVC casing in presen on the top of the inner PVC casing, or the highest point on the top of the oute steel
-Well casing elevations for wells MW17R, P16C, P17A, P18, MW53A, MW53B, MW53C, P12B, and MW4 a survey conducted by Hancock Associates on August 5, 2009
-The well casing elevation for P16 was generated by a survey by LFR on October 22, 2009 prior to the Octob gauging event
-The well casing elevation for P16A was generated by a survey conducted by Hancock Associates on Sepcter
-P16A was installed by New Hampshire Boring, Inc. under Environ oversight and completed on September 1
-Well casing elevations for other wells not listed in the three notes above were generated by a survey conduct Allen & Major Associates, Inc. between March 20 and March 26, 2006
* Well was dry during this gauging event at the elevation indicated, which represents the approximate elevatic of this well (the water table elevation is less than the elevation indicated)
-- Data was not collected
(1) Well was unable to be accessed due to construction

APPENDIX C

Figure 1: Overburden Groundwater Elevation Contours – March 2017
Figure 2: Bedrock Groundwater Elevation Contour – March 2017
Figure 1: Overburden Groundwater Elevation Contours – June 2017
Figure 2: Bedrock Groundwater Elevation Contours – June 2017


TURTLE BROOK
TAUNTON STREET (ROUTE 152)
SAWMILL BROOK
MILLBROOK DRIVE
HOPE BARRIER WALL
GROUNDWATER FLOW DIRECTION
BUILDINGS 6 AND 10
MW01
MW02
MW03
MW04
MW05
MW06
MW08
MW09A
MW09B
MW09C
MW10A
MW10B
MW11A
MW11B
MW12A
MW12B
MW13
MW14
MW15
MW16
MW17R
MW18
MW19
MW20A
MW20B
MW21A
MW21B
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MW31A
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MW33D
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MW40A
MW40B
MW41A
MW41B
MW43A
MW43B
MW43C
MW44A
MW45A
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MW54A
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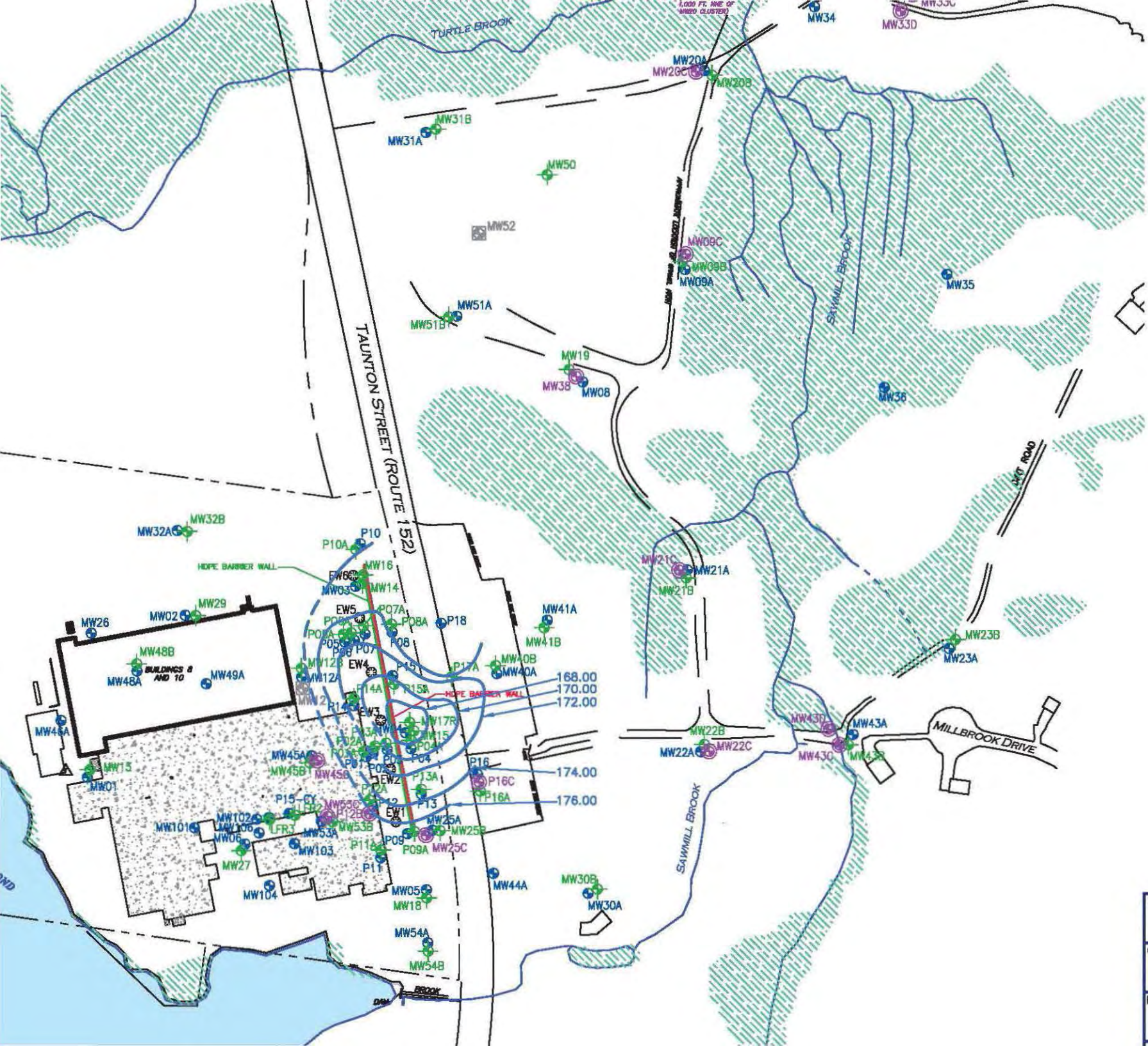

LEGEND

PROPERTY B
OVERBURDEN
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NOTES:

P03A WAS DRY.

P15A AND MW15 HAD ANOMA AND WERE NOT UTILIZED TO GROUNDWATER CONTOURS.

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REVIEWED BY:	30 PLAIN
	Groundwater


(179.40)
MW03
MW49A
(180.50)
P05
P06
(180.49)
(179.31)
P07
P08
(179.13)
P18
(178.54)
MW41A
MW12A
(185.91)
P15
(179.39)
(NG)
P14
(175.65)
MW40A
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HDPE BARRIER WALL
MW45A
MW04
(176.98)
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P03
(NG)
P01
P02
(NG)
(176.66)
P04
GATE
P16(177.57)
178.00
MW102
P15-CY
MW106
MW53A
(NG)
MW06
P12
(NG)
P13
(176.90)
MW103
180.00
P09
(185.27)
MW25A
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P11
MW104
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(NG)
(185.04)
MW44A
MW30A
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W.G.S.
OVERBURDEN
CHECKED BY:


MW29
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MW16
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P07A
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P06A
P05A
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MW40B
HDPE BARRIER WALL
MW17R
(176.43)
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P03A
P02A
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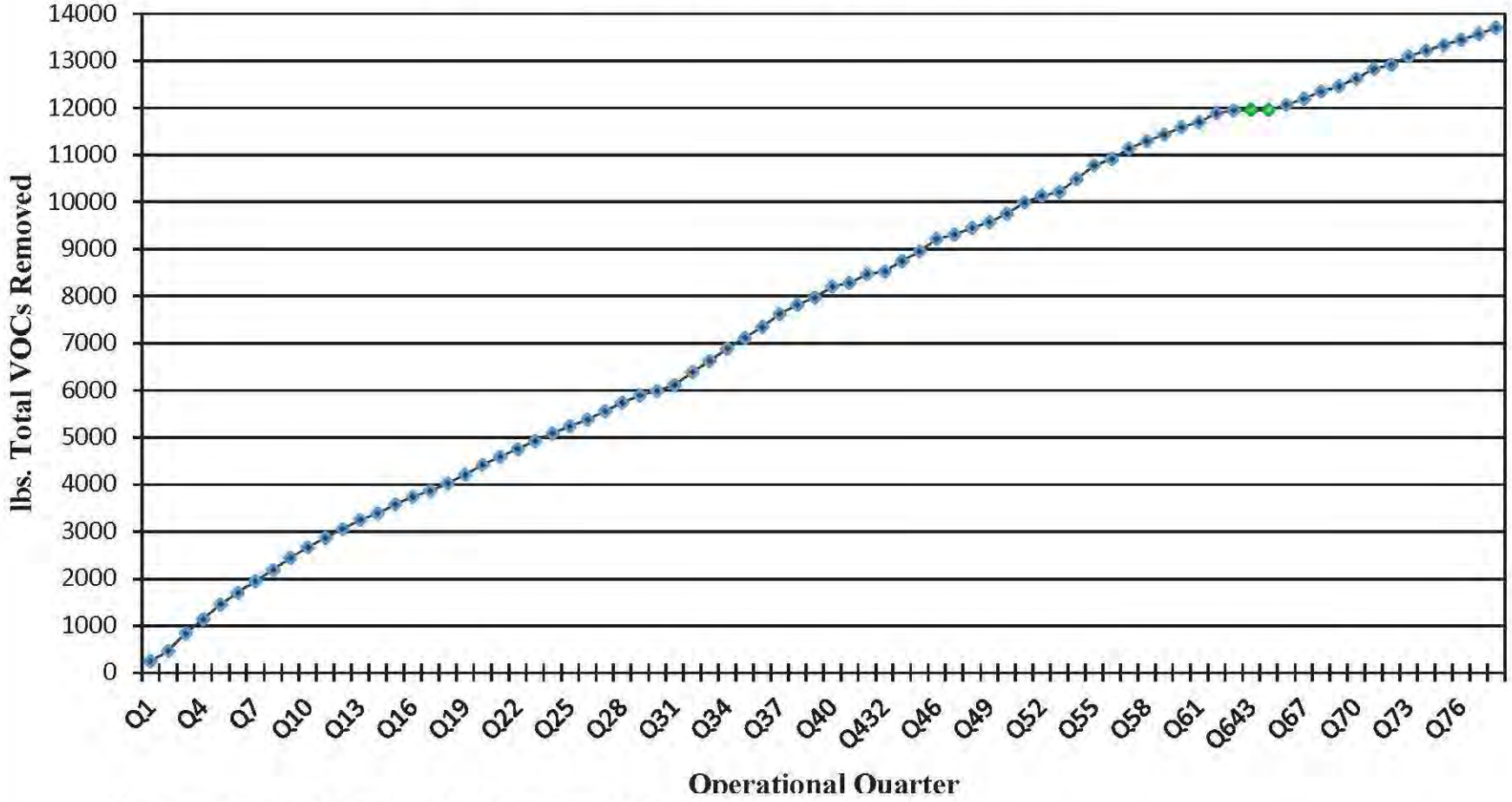
MW18
MW30B
MW54B
DRAFTED BY:
W.G.S.
BEDROCK G
CHECKED BY:

APPENDIX D

Chart 1: GWTP Total VOCs Removed
Chart 2: Quarterly Average Influent VOCs

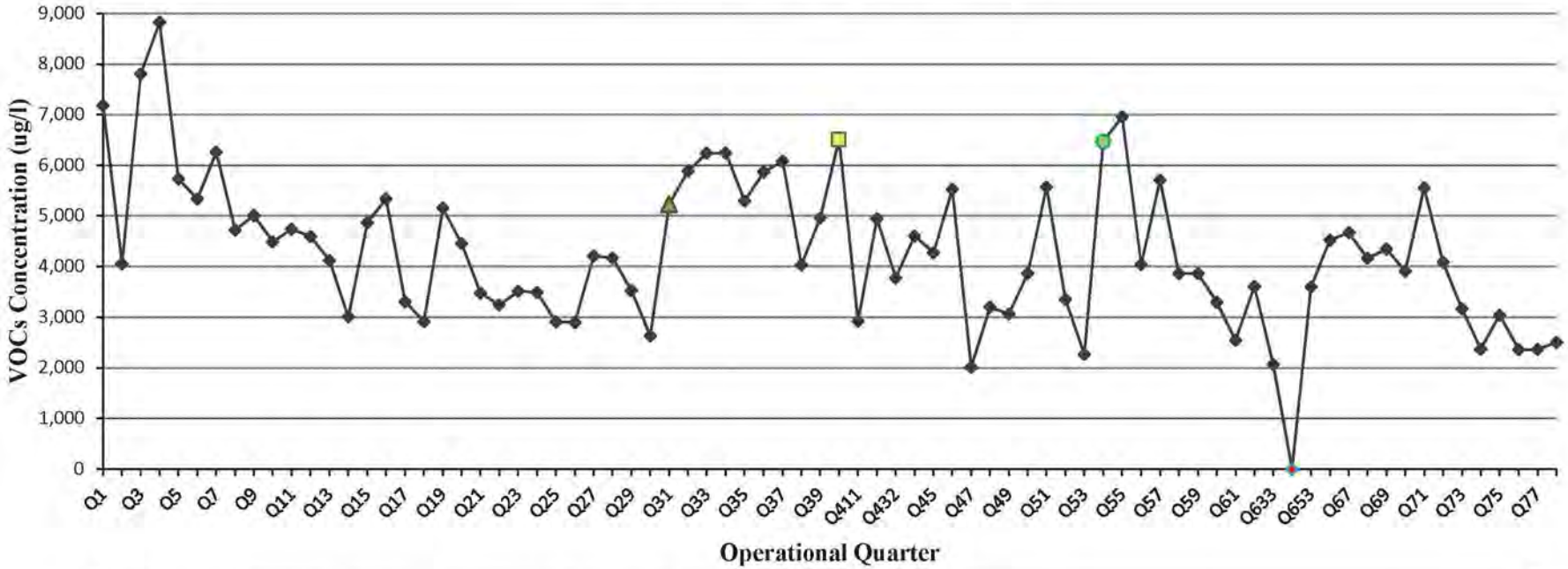
Chart 1: GWTP total VOCs Removed



Compounding total pounds of VOCs removed per quarter

Q64 and Q65 - The pounds of total VOCs removed are negligible during this quarter due to the GWTP shutdown required by

Chart 2: Quarterly Average Influent VOCs



3- Month Average Influent VOC concentration (avergae influent VOC concentration)

Q31 - The avergae influent VOC concentration inclreased because the EW-2 flow rate increased (larger pump/motor assembly installed) and the EW-6 flow rate decreaed (smaller pump/motor assembly installed)

Q40 - The avergae influent VOC concentration increaded because the GTWP was treating dewatering water from courtyard excavation

Q54 - The avergae influent VOC concentration increased because EW-2 flow rate increased (manifold improvements and larger pump/motor assembly placed into the well which was deepened from 200 to 302 ft bgs in September 2010)

Q64 - The average influent VOC concentration is negligible during this quarter due to the GWTP shutdown required by the ISCO

APPENDIX E

GWTP Aqueous Analytical Results (SA10) – January through June 2017

	Effluent Limit	Minimum Level*	01/13/17		02/06/17		03/06/17		03/22/17	04/03/17	
			INF	EFF	INF	EFF	INF	EFF	EFF	INF	
	5 µg/l	2 µg/l	5 BRL	0.5 BRL	12 BRL	0.50 BRL	5 BRL	0.50 BRL	0.50 BRL	10 BRL	0
	See Note 1	2 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	See Note 1	2 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
s)	See Note 2	2 µg/l	20 BRL	2 BRL	50 BRL	2.0 BRL	20 BRL	2.0 BRL	2.0 BRL	40 BRL	
	See Note 2	2 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	See Note 3	2 µg/l	ND	ND	ND	ND	ND	ND	ND	ND	
	100 µg/l	2 µg/l	ND	ND	ND	ND	ND	ND	ND	ND	
	70.0 µg/l	10 µg/l	20 BRL	2 BRL	50 BRL	2.0 BRL	20 BRL	2.0 BRL	2.0 BRL	40 BRL	
	See Note 4	10 µg/l	100 BRL	10 BRL	250 BRL	10 BRL	100 BRL	10 BRL	10 BRL	200 BRL	
	See Note 4	10 µg/l	20 BRL	2 BRL	50 BRL	2.0 BRL	20 BRL	2.0 BRL	2.0 BRL	40 BRL	
	200 µg/L	5 µg/l	1500	1 BRL	890	1.0 BRL	160	5.9	3.1	590	
	70 µg/L	5 µg/l	34	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20	
	5.0 µg/L	5 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	3.2 µg/L	3.2 µg/l	21	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	70 µg/L	5 µg/l	250	1 BRL	130	1.0 BRL	24	2.5	2.0	94	
	4.6 µg/L	4.6 µg/l	20 BRL	2 BRL	50 BRL	2.0 BRL	20 BRL	2.0 BRL	2.0 BRL	40 BRL	
	5.0 µg/L	5 µg/l	1400	1 BRL	2000	1.0 BRL	360	**5.7**	4.1	1700	
	5.0 µg/L	5 µg/l	170	1 BRL	120	1.0 BRL	24	1.0 BRL	1.0 BRL	88	
	5.0 µg/l	5 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	See Note 4	50 µg/l	50 BRL	5 BRL	120 BRL	5.0 BRL	50 BRL	5.0 BRL	5.0 BRL	100 BRL	
	See Note 4	50 µg/l	2500 BRL	250 BRL	6200 BRL	250 BRL	2500 BRL	250 BRL	250 BRL	5000 BRL	
	5.0 µg/l	5 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	4.4 µg/l	4.4 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
	2.0 µg/l	2.0 µg/l	10 BRL	1 BRL	25 BRL	1.0 BRL	10 BRL	1.0 BRL	1.0 BRL	20 BRL	
TOTAL VOCs Concentration:			**3375**	**0**	3140	0.0	**568**	**14.1**	**9.2**	**2492**	

Notes:

Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes

INF = GWTP Influent

EFF = GWTP Effluent

BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted

ND = Concentration, if any, is below reporting limit for each individual analyte

NR= Not Reported

* Minimum Level (ML) is defined in the 2010 RGP #MAG910016 as the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the measured with a known level of confidence

1. Analytical Parameter is selected for monitoring in the 2010 RGP #MAG910016 and is limited as Total BTEX (which has an effluent limit of 100 ug/l)

2. Analytical Parameter is not specified in the 2010 RGP #MAG910016 and is limited as Total Xylenes ((m,p,o) Xylenes)

3. Analytical Parameter is specified in the 2010 RGP #MAG910016 but not selected for monitoring. The analytical

	Effluent Limit	Minimum Level*	05/01/17		05/11/17	05/22/17	06/12/17	
			INF	EFF	EFF	EFF	INF	EFF
	5 µg/l	2 µg/l	12 BRL	0.50 BRL	0.50 BRL	0.50 BRL	5.0 BRL	0.50 BRL
	See Note 1	2 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
	See Note 1	2 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
s)	See Note 2	2 µg/l	50 BRL	2.0 BRL	2.0 BRL	2.0 BRL	20 BRL	2.0 BRL
	See Note 2	2 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
	See Note 3	2 µg/l	ND	ND	ND	ND	ND	ND
	100 µg/l	2 µg/l	ND	ND	ND	ND	ND	ND
	70.0 µg/l	10 µg/l	50 BRL	2.0 BRL	2.0 BRL	2.0 BRL	20 BRL	2.0 BRL
	See Note 4	10 µg/l	250 BRL	10 BRL	10 BRL	10 BRL	100 BRL	10 BRL
	See Note 4	10 µg/l	50 BRL	2.0 BRL	2.0 BRL	2.0 BRL	20 BRL	2.0 BRL
	200 µg/L	5 µg/l	720	3.5	2.7	1.0 BRL	590	1.0 BRL
	70 µg/L	5 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	17	1.0 BRL
	5.0 µg/L	5 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
	3.2 µg/L	3.2 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	13	1.0 BRL
	70 µg/L	5 µg/l	94	2.1			81	1.0 BRL
	4.6 µg/L	4.6 µg/l	50 BRL	2.0 BRL	2.0 BRL	2.0 BRL	20 BRL	2.0 BRL
	5.0 µg/L	5 µg/l	1600	**6.9**	4.5	1.0 BRL	1,700	1.0 BRL
	5.0 µg/L	5 µg/l	86	1.0 BRL	1.0 BRL	1.0 BRL	72	1.0 BRL
	5.0 µg/l	5 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
	See Note 4	50 µg/l	120 BRL	5.0 BRL	5.0 BRL	5.0 BRL	50 BRL	5.0 BRL
	See Note 4	50 µg/l	6200 BRL	250 BRL	250 BRL	250 BRL	2,500 BRL	250 BRL
	5.0 µg/l	5 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
	4.4 µg/l	4.4 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
	2.0 µg/l	2.0 µg/l	25 BRL	1.0 BRL	1.0 BRL	1.0 BRL	10 BRL	1.0 BRL
TOTAL VOCs Concentration:			**2500**	**12.5**	**7.2**	**0.0**	**2,473**	**0.0**

Notes:

Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes

INF = GWTP Influent

EFF = GWTP Effluent

BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution

ND = Concentration, if any, is below reporting limit for each individual analyte

NR= Not Reported

* Minimum Level (ML) is defined in the 2010 RGP #MAG910016 as the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence

1. Analytical Parameter is selected for monitoring in the 2010 RGP #MAG910016 and is limited as Total BTEX (which has an effluent limit of 100 ug/l)

2. Analytical Parameter is not specified in the 2010 RGP #MAG910016 and is limited as Total Xylenes ((m,p,o) Xylenes)

APPENDIX F

Vapor Phase Carbon Air Sampling Results (SA10)
January through June 2017

Appendix F: Vapor Phase Carbon Air Sampling Results
January 2017 Through June 2017
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	eV lamp	Sample Location	Total VOC Concentration (ppmv)	Removal Efficiency
01/16/17	10.2	Carbon Influent	6.8	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
01/23/17	10.2	Carbon Influent	8.6	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
01/30/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
02/06/17	10.2	Carbon Influent	7.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
02/13/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
02/20/17	10.2	Carbon Influent	8.2	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
02/27/17	10.2	Carbon Influent	7.6	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
03/06/17	10.2	Carbon Influent	7.8	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
03/13/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
03/20/17	10.2	Carbon Influent	7.9	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
03/27/17	10.2	Carbon Influent	7.2	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
04/03/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
04/03/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
04/18/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
04/24/17	10.2	Carbon Influent	7.8	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%

Appendix F: Vapor Phase Carbon Air Sampling Results
January 2017 Through June 2017
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	eV lamp	Sample Location	Total VOC Concentration (ppmv)	Removal Efficiency
05/01/17	10.2	Carbon Influent	8.6	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
05/08/17	10.2	Carbon Influent	7.8	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
05/22/17	10.2	Carbon Influent	7.8	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
05/30/17	10.2	Carbon Influent	10.2	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
06/05/17	10.2	Carbon Influent	9.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%
06/19/17	10.2	Carbon Influent	8.4	
		Carbon Mid	0.0	100%
		Carbon Effluent	0.0	100%

Notes:
Total VOC Concentration = Total volatile organic compounds concentration
ppmv = parts per million by volume
Total VOC Concentration measured using a photoionization detector (PID) unless otherwise noted
1. Total VOC Concentration measured using laboratory analysis by EPA Method TO-15 of vapor samples collected in 1.0-liter suma cans

APPENDIX G

GWTP Carbon Usage Summary (SA10)

Appendix G: GWTP Carbon Usage Summary (SA8)
BASF Corporation - Groundwater Treatment Plant

Plainville, MA Date	Vessel(s) Changed Out	Lbs GAC Replaced	Lbs GAC Replaced to Date
03/20/98	LP-2	2,000	2,000
07/15/98	LP-1 &LP-2	4,000	6,000
09/18/98	VP-1	1,800	7,800
11/23/98	LP-1 & LP-2	4,000	11,800
02/16/99	VP-2	1,800	13,600
06/10/99	VP-1	1,800	15,400
12/09/99	VP-2	1,800	17,200
12/20/99	LP-2	1,000	18,200
04/20/00	VP-1	1,800	20,000
01/05/01	VP-1 & VP-2	3,600	23,600
12/07/01	VP-2	1,800	25,400
12/07/01	LP-2	1,000	26,400
07/23/02	LP-1 & LP-2	2,000	28,400
07/23/02	VP-1	1,800	30,200
02/11/03	VP-2	1,800	32,000
07/03/03	VP-1	1,800	33,800
11/20/03	VP-2	1,800	35,600
01/23/04	LP-2	1,000	36,600
04/27/04	VP-1	1,800	38,400
11/11/04	VP-2	1,800	40,200
11/11/04	LP-2	2,150	42,350
03/30/05	VP-1	1,800	44,150
08/23/05	LP-2	2,000	46,150
08/23/05	VP-2	1,800	47,950
08/23/05	VP-1	1,800	49,750
07/10/06	LP-2	2,000	51,750
07/10/06	VP-1	1,800	53,550
07/10/06	VP-2	1,800	55,350
02/22/07	LP-1 & LP-2	2,000	57,350
02/22/07	VP-1	1,800	59,150
02/22/07	VP-2	1,800	60,950
11/29/07	VP-1	1,800	62,750
11/29/07	VP-2	1,800	64,550
04/08/08	LP-1	2,000	66,550
04/08/08	VP-1	1,800	68,350
04/08/08	VP-2	1,800	70,150
11/25/08	VP-1	1,800	71,950
04/09/09	LP-1	1,800	73,750
04/09/09	VP-2	1,800	75,550
07/09/09	VP-1	1,800	77,350
07/09/09	VP-2	1,800	79,150
02/12/10	VP-1	1,800	80,950
05/12/10	LP-1	2,000	82,950
05/12/10	VP-1	1,500	84,450
05/12/10	VP-2	1,500	85,950
11/08/10	VP-1	1,800	87,750
11/08/10	VP-2	1,800	89,550
06/07/11	VP-1	1,800	91,350
06/07/11	LP-1	2,000	93,350
07/26/11	LP-2	2,000	95,350
10/26/11	LP-1	2,000	97,350
10/26/11	LP-2	2,000	99,350
10/26/11	VP-2	1,800	101,150

Appendix G: GWTP Carbon Usage Summary (SA8)
BASF Corporation - Groundwater Treatment Plant

Plainville, MA			
06/07/12	VP-1	1,800	102,950
06/07/12	VP-1	1,800	104,750
06/07/12	VP-2	1,800	106,550
06/07/12	LP-1	2,000	108,550
09/17/12	VP-1	1,800	110,350
12/18/12	LP-1	2,000	112,350
12/18/12	VP-2	1,800	114,150
04/16/13	VP-1	1,800	115,950
07/12/13	VP-2	1,800	117,750
07/23/13	LP-1	1,000	119,750
07/23/13	VP-1	1,800	121,550
08/11/14	LP-1	2,000	123,550
10/06/14	VP-2	1,800	125,350
01/26/15	LP-1	2,000	127,350
02/23/15	VP-1	1,800	129,150
09/04/15	VP-1	1,800	130,950
09/04/15	VP-2	1,800	132,750
09/24/15	LP-2	2,000	134,750
04/04/16	VP-2	1,800	136,550
06/27/16	VP-1	1,800	138,350
05/15/17	LP- 1	2,000	140,350

Notes:
GAC= Granular Activated Carbon
LP= Liquid Phase
VP= Vapor Phase

APPENDIX H

GWTP Ion Exchange Resin Usage Summary (SA10)

Appendix H: GWTP Ion Echange Resin Usage Summary (SA10)
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	CF Resin Replaced	CF Resin Replaced To Date
8/31/2012	30	30
4/29/2013	30	60
5/5/2014	30	90
7/13/2015	30	120
9/6/2016	30	150

Notes:
CF = Cubic Feet

AATTACHMENT 4

Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, July 2016 – December 2016

September 13, 2017

GROUNDWATER TREATMENT PLANT OPERATION AND MAINTENANCE SEMI-ANNUAL REPORT - NO. SA9 YEAR 19 - 3RD & 4TH QUARTERS (Q75 & Q76)

July 1, 2016 through December 31, 2016

Prepared for

BASF CORPORATION
36 Taunton Street
Plainville, Massachusetts 02762

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

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1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates), on behalf of BASF Corporation (BASF, formerly known as Engelhard Corporation and BASF Catalysts, LLC), has prepared this Groundwater Treatment Plant (GWTP) Semi-Annual/Year 19 Operation and Maintenance (O&M) Status Report (semi-annual status report) for the GWTP located at the former Engelhard Corporation Plainville facility. This facility is located at 36 Taunton Street (Route 152) in Plainville, Massachusetts (hereafter the Site). The Site is currently owned by BASF. Construction of the GWTP was performed between June and November 1997, with system start-up occurring in December 1997. This semi-annual status report (SA9) summarizes the O&M activities performed during the third and fourth quarters of 2016 (Q75 and Q76 of GWTP operation), specifically, the period from July 1, 2016 through December 31, 2016 (reporting period).

The GWTP O&M Manual, completed by Foster Wheeler, dated March 1998, and prior GWTP O&M status reports provide specific information regarding the activities that are performed as part of the GWTP O&M. Note that information in the GWTP O&M Manual was updated subsequent to pertinent GWTP system modifications, and the associated Groundwater Stabilization System Piping and Instrumentation Diagram Sheets are up to date and reflect the current GWTP configuration. Information regarding the O&M activities performed during this reporting period is provided herein and in the GWTP operator's logbook maintained in the control room at the GWTP.

2.0 SUMMARY

This section of the semi-annual status report provides a summary of notable items regarding GWTP O&M conducted during the third and fourth quarters of 2016 (Year Nineteen).

- ***GWTP System Operation and Maintenance*** – During the third and fourth quarters of 2016, the GWTP maintained consistent and continuous operation ("normal" operation) during approximately 88% of the available run time and treated approximately 10.4 million gallons of contaminated groundwater. In total, twelve scheduled GWTP shutdowns were conducted to perform one or more of the following O&M activities: Equalization Tank (EQ-Tank), Metals Removal System (MRS), and Inclined Plate Clarifier (Clarifier) cleaning; extraction well reconditioning; extraction well submersible pump/motor assembly service, repair, and replacement; lateral water transmission piping jetting and cleaning; air stripper cleaning and maintenance; a vapor phase granular activated carbon (VGAC) change out; a liquid phase granular activated carbon (LGAC) change out; an ion exchange resin vessel replacement; LGAC backwashing; and National Grid scheduled maintenance on the 23,000-kV overhead electric service on Taunton Street.

  In addition to these scheduled GWTP shutdowns, ten unscheduled GWTP shutdowns occurred during this reporting period, three related to issues with clogged bag filters. The increase in solids accumulation first discussed in the SA6 report continued to be observed within the GWTP components, including the bag filters, throughout this reporting period. Accordingly, additional Site visits were conducted during this reporting period to change out bag filters at an increased frequency and to clean various float switches to prevent the system from shutting down. This increased attention resulted in a decrease in unscheduled shutdowns associated with clogged bag filters and float switches this reporting period (compared to previous reporting periods). Additional unscheduled shutdowns were resolved by making necessary repairs to certain GWTP components as required. The remaining shutdowns were associated with power outages. The ten unscheduled shutdowns are grouped below for ease of review. Roux responded to each unscheduled shutdown as soon as possible, usually on a same day Site visit. Note that in some cases, the resolution for the unscheduled shutdown may have taken place on a separate Site visit from the initial response.

  Unscheduled Shutdowns associated with Bag Filters

  - On July 30, 2016, the GWTP shut down due to a clogged bag filter. Roux Associates visited the Site that same day and replaced the bag filters and restarted the system.

  - On August 12, 2016, the GWTP shut down due to a clogged bag filter. Roux Associates visited the Site that same day and replaced the bag filters and restarted the system.

  - On August 21, 2016, the GWTP shut down due to a clogged bag filter. Roux Associates visited the Site that same day and replaced the bag filters and restarted the system.

Unscheduled Shutdowns associated with GWTP Component Repairs

- On July 4, 2016, the GWTP shut down due to a cracked collar on a ball valve on the LGAC backwash piping. In response, Roux visited the Site within 24 hours to replace the broken collar with a replacement collar. The ball valve with the replacement collar was reinstalled into the LGAC backwash piping, and the system was restarted on July 5, 2016.

- On July 18, 2016, the GWTP shut down due to an issue associated with the system's programmable logic controller (PLC). On July 19, 2016, R.E. Erickson of Walpole Massachusetts, under Roux Associates' oversight, visited the Site and determined that an analog input module of the PLC failed and required replacement. A replacement input module was ordered and on July 21, 2016, Roux Associates oversaw R.E. Erickson replace the input module for PLC rack 1 slot 8 and subsequently restarted the system.

- On August 27, 2016, the GWTP shut down due to a malfunctioning sump pump float switch. A replacement float switch was ordered and on August 29, 2016, Roux Associates oversaw R.E. Erickson troubleshoot the sump pump float switch and controls. The sump pump float switch was replaced and the system was restarted that same day.

- On August 30, 2016, the GWTP shut down due to malfunctioning high and low floats in the air stripper. In response, Roux visited the Site within 24 hours and evaluated the floats and determined that the malfunctions were related to their contacts starting to fail. Roux Associates restarted the system that same day and ordered replacement floats. On September 6, 2016, the high and low floats in the air stripper were removed and replaced and the system was restarted that same day.

- On December 19, 2016, the GWTP shut down due to a leaking cam lock fitting. The leaking fitting was located upstream of the inlet ball valve for the bag filter apparatus located directly before the ion exchange resin vessel. In response, Roux visited the Site that same day and replaced the fitting and restarted the system.

Unscheduled Shutdowns associated with Power Outages

- On July 22, 2016, the GWTP shut down due to power interruptions in the town of Plainville. In response, Roux Associates restarted the system remotely within 12 hours of the power being restored.

- On December 30, 2016, the GWTP shut down due to a snow storm causing power interruptions in the town of Plainville. In response, Roux Associates visited the Site that same day and restarted the system.

- ***GWTP Component Cleaning*** – On August 8, 2016, Roux Associates drained the EQ-Tank for inspection. Accumulated solids observed within the EQ-Tank were removed using a drum vacuum unit. The removed materials were placed into five 55-gallon DOT-approved drums. The EQ-Tank was then cleaned via rinsing with potable water and the rinsate was pumped into the sludge tank. Upon completion of

EQ-Tank cleaning, Roux Associates then drained the MRS and the Clarifier by utilizing a large submersible pump to decant water into the EQ-Tank. Accumulated solids observed within the MRS and the Clarifier were removed using a drum vacuum unit. The removed materials were placed into five 55-gallon DOT-approved drums.[1] The MRS and Clarifier were then cleaned via rinsing with potable water and the rinsate was pumped into the sludge tank.

- ***GWTP Extraction Well Reconditioning*** – Between September 26 and October 5, 2016, extraction well reconditioning services were performed on EW-1, EW-2, and EW-3. The work was conducted by Roux Associates and Geosearch over eight field days; all wells were returned to service upon completion of extraction well reconditioning activities.

  These extraction well reconditioning services were deemed necessary and implemented at BASF's request as materials had accumulated in the bottoms of extraction wells EW-1, EW-2, and EW-3 and were determined to be contributing directly to the increased solids accumulation observed within the GWTP components. The materials consisted of sediment, rock fragments, rock flour, scale, and iron fouling (materials, hereafter). The thicknesses of the materials in the three wells were measured as 14.4, 15.2, and 8.9 feet, respectively. Reconditioning efforts were taken to improve GWTP up time and flow rates; extend the operational life for the submersible pump/motor assemblies; decrease labor efforts; decrease expenditure of consumables such as filter bags; and minimize sludge and filter cake generation, management, and associated disposal costs.

Extraction wells EW-1, EW-2, and EW-3 were reconditioned by:

1. Subsequent to removal of downwell components (transducer, downwell water transmission piping, electrical lead, and submersible pump/motor assemblies), compressed air was utilized for the physical removal of accumulated materials from the well bottom;

2. Mechanical scrubbing of the stainless steel well casing and screens (if present), as well as the open rock boreholes, using a well brush and subsequent flushing for removal of gross encrustation;

3. Chemical treatment by application of liquid acid descaler which removed bacterial "slime" and iron oxide scale accumulated on the well casing and screens (if present),

[1] The 10 total drums of removed material collected during this GWTP component cleaning event were labeled as non-hazardous waste and stored within the GWTP containment berm. Water was periodically decanted from these drums and processed through the filter press. Due to the removal of liquid from these drums, each of the drums was only partially filled. Accordingly, they were placed underneath the filter press to collect filter cake until the drums had accumulated approximately 55-gallons of material. Upon being properly filled, the drum lid(s) were secured in place and the accumulation completion date was written onto the drum label(s). The drums were subsequently shipped from the Site as non-hazardous waste for disposal at a licensed waste disposal facility.

as well as the open rock boreholes. The safety data sheet and technical data catalog documentation for the liquid acid descaler are presented as Attachments 1 and 2;[2]

4. Rescrubbing of the well screens and casing subsequent to chemical addition;

5. Agitation and surging of the descaler chemical mixture in the wells (reaction period), per the manufacturer's recommendations, with a deep submersible pump. This promoted reaction with groundwater, scale and biological residue; as well as ensured full coverage;

6. EW-1, EW-2, and EW-3 were allowed between 48 and 72 hours subsequent to the reaction period to allow for any residual reactions;

7. Purging/development of the wells to remove groundwater, chemical residuals, and settled materials;

8. Additionally, downwell (vertical) water transmission piping segments were internally and externally cleaned via flushing with a high-pressure water stream prior to reinstallation;

9. And finally, the pump and motor assemblies were cleaned, serviced, and tested prior to reinstallation into the wells.

The materials, residual chemical, and accompanying groundwater (development water, hereafter) removed from the wells during these activities were collected at the ground surface within a tub placed around the well head. The development materials were then pumped from the tub into one 5,000-gallon poly storage tank (well field storage tank). The well field storage tank was secured onto a lowboy trailer and staged near the well field prior to filling. Three times, the well field storage tank was transported via the lowboy trailer and a dump truck to the GWTP building where the development materials were pumped into two additional 5,000-gallon poly storage tanks staged inside the GWTP building. Upon completion of well development activities, the well field storage tank was emptied, cleaned, and placed inside the GWTP building. Approximately, 6,650 gallons of development water were collected and stored in the poly storage tanks. The poly storage tanks were plumbed with fittings for ease of use. The sodium hydroxide chemical feed system was temporarily utilized to balance development water pH within the poly storage tanks. After the pH was verified to be neutralized, the development water was treated through the sludge processing system (sludge tank, filter press, and decant tank). All accumulated solids were drummed for off-Site disposal and the water was introduced into the GWTP for treatment and discharge.

Due to the application of the descaler (an acid) to the groundwater aquifer for the purposes of reconditioning these three wells, pH monitoring of the groundwater was conducted to verify that the descaler mixture was adequately removed from the aquifer. Groundwater pH readings were collected from the three extraction wells and adjacent downgradient monitoring wells using spectral pH indicator strips. Prior to the application of the descaler, baseline pH readings were recorded and periodic monitoring events continued subsequent to descaler application. All pH monitoring results may be reviewed in the table below.

[2] This is the specific product successfully utilized in third quarter 2008.

Well ID	Baseline	During Addition*	Directly After Addition	7 Days After Addition	14 Days After Addition	Return to Baseline
	09/26/16		10/05/16	10/07/16	10/18/16	10/25/16
EW-1	5.00	3.00	4.50	5.00	5.00	5.00
MW-25A	5.00	4.00	5.50	5.50	6.00	5.00
MW-25B	7.00	7.50	7.00	7.00	7.00	7.00
MW-25C	5.00	5.00	5.00	5.50	5.50	5.00
EW-2	5.00	2.00	4.80	5.00	5.00	5.00
P13	5.00	5.00	5.00	5.00	4.50	5.00
P13A	5.00	5.00	5.00	5.00	6.00	5.00
P04	6.00	4.50	5.00	5.00	5.00	5.00
P04A	5.00	5.00	4.80	5.00	5.00	5.00
EW-3	5.00	3.50	5.00	5.00	5.00	5.00
MW-4	5.00	5.00	5.00	dry	dry	dry
MW-15	5.00	5.50	5.00	5.50	5.00	5.00
MW-17	6.00	4.50	5.00	5.00	6.00	5.50

Notes:

Liquid acid descaler was added to extraction wells EW-1, EW-2, and EW-3.
pH measurements were collected from extraction wells EW-1, EW-2, and EW-3 and adjacent downgradient monitoring wells.

All pH measurements collected in the field by Roux personnel using pH paper indicator strips.

* Liquid acid descaler was applied to EW-2 on 09/26/16; EW-1 on 09/27/16; and EW-3 on 10/3/16.

- ***Persulfate Monitoring –*** In response to additional rounds of in situ chemical oxidation (ISCO) injections conducted at the Site by others on behalf of BASF, Roux Associates conducted qualitative and quantitative oxidant testing on the extraction wells at BASF's request throughout this reporting period. This monitoring was performed to verify oxidant was not present in the influent groundwater. The testing was conducted periodically and the samples were collected from the individual extraction well sampling ports located at the well manifold inside the GWTP building. Testing results collected throughout this reporting period indicated that oxidant was not detected in the extracted groundwater.

- ***Remediation General Permit*** – On September 9, 2015, the Remediation General Permit (RGP) expired. However, according to the EPA: "For current projects that have been authorized to discharge under the RGP, coverage is administratively continued." The new RGP was finalized and BASF submitted a Notice of Intent (NOI) to discharge under the new RGP on July 7, 2017. EPA acknowledged receipt of the NOI in an email on July 12, 2017 and indicated that as an existing discharge, BASF's previous coverage is administratively continued until EPA makes a determination of coverage under the new permit. Accordingly, the GWTP continued to be operated, sampled, and monitored in accordance with the 2010 RGP throughout this reporting period.

- ***GWTP Operator Transition*** – On December 31, 2016, BASF transitioned the GWTP operator responsibilities from Roux Associates to Groundwater & Environmental Services, Inc. (GES) of Westford, Massachusetts.

3.0 SYSTEM OPERATION, MAINTENANCE, & MONITORING ACTIVITIES

This section of the semi-annual status report provides a summary of significant O&M activities completed at the Site during this reporting period.

- ***System Operation, Maintenance & Monitoring –*** During this reporting period, both routine and non-routine system operation, maintenance, and monitoring (OMM) activities were completed by Roux Associates and/or subcontractor(s) under Roux Associates' oversight. A summary of the OMM activities completed this reporting period are outlined below:

    1. On July 11 and 25, August 13 and 29, September 19, October 17, November 21 and 29, and December 19 and 27, 2016, the floor sump and sump pump were inspected and cleaned. The floor sump, float switch, and pump were tested and verified to be functional.

    2. On July 18, August 1 and 22, October 31, November 21, and December 5, 2016, the effluent tank pH probe and the metals removal system pH probe were cleaned and calibrated.

    3. On July 25, 2016, a carbon change out of VGAC vessel VP-2 was completed. Subsequently, the valves for the two VGAC vessels were manipulated so that VP-1 was valved as the primary vessel and VP-2 as the secondary vessel in series. That same day, a carbon change out of LGAC vessel LP-2 was completed using reactivated carbon. The work was conducted by Roux Associates and Evoqua, reactivated carbon was utilized, and the GWTP was returned to operation on July 26, 2016. Evoqua removed the spent carbon for regeneration off-Site.

    4. On August 15, 2016, the air stripper was disassembled, cleaned, and reassembled.

    5. On September 6, 2016, an ion exchange resin vessel change out was completed by Evoqua by exchanging the existing vessel with a replacement vessel.

    6. On September 23, 2016, the three previously discussed 5,000-gallon poly storage tanks were delivered to the Site and were offloaded into Building 11. BASF procured these three tanks totaling 15,000-gallons in capacity for temporary water storage at the Site, as needed. Roux Associates outfitted these three tanks with camlock fittings.

    7. On September 26, 2016, the extraction well EW-2 pump/motor assembly and downwell components were removed to allow for implementation of the well reconditioning activities. The pump was cleaned and reinstalled and the motor was replaced with a new motor (Franklin model 7.5HP/460V/3-Phase/4-Wire motor). The work was conducted by Roux Associates and Geosearch and the pump/motor assembly was reinstalled into the well and returned to operation on October 5, 2016 (upon completion of the extraction well reconditioning activities).

    8. On October 4, 2016, D&D Electric of Cranston, Rhode Island, under Roux Associates oversight, installed a replacement sine wave filter for the EW-2 variable frequency drive (VFD). EW-2 was returned to operation that same day. On October 8, 2016, the EW-2 pump stopped functioning. It was evaluated by Roux Associates on October 10, 2016 and it was determined that the pump was non-functional and required replacement. At

BASF's request a replacement pump was procured (and later installed on November 1, 2016 as discussed further below). On October 10, 2016[3] and December 5, 2016, Roux Associates collected water samples from the six individual extraction well sampling ports located at the well manifold inside the GWTP building. These samples, which are collected on a quarterly schedule to evaluate water quality, were submitted to the laboratory for VOC analysis by EPA Method 8260. Analytical results for the third quarter 2016 sampling event indicated that dissolved-phase total VOC concentrations ranged from583 micrograms per liter (µg/l) in the sample from EW-5 to 6,940 µg/l in the sample from EW-3. Analytical results for the fourth quarter 2016 sampling event indicated that dissolved-phase total VOC concentrations ranged from 418 µg/l in the sample from EW-5 to 5,220 µg/l in the sample from EW-2. The analytical laboratory results for the aqueous samples collected from the individual extraction wells during this reporting period are presented in Appendix A.

9. From October 31 through November 2, 2016, Roux Associates and Geosearch removed the EW-1, EW-2, and EW-3 pump/motor assemblies and downwell components and cleaned the associated lateral water transmission piping (lateral piping) in-place via jet-rod flushing with water. The lateral piping for EW-1 and EW-2 were cleaned from the access vault to the respective well heads through their pitless adapters, and to/from the access vault to the well field manhole (MH1). The lateral piping for EW-3 was cleaned from MH1 to the EW-3 well head through its pitless adapter. Furthermore, the lateral piping for these three wells were cleaned from MHI to the corner manhole (MH2), and from MH2 to/from manhole MH4. Upon completion, a new EW-1 motor was installed (Franklin model 3HP/460V/3-Phase/4-Wire motor); as well as new EW-1 and EW-2 pump ends (Grundfos models 16S30-24 and 40S75-18, respectively). The three extraction wells were returned to service on November 2, 2016.

10. On November 9, 2016, Ramboll Environ, Inc. (Ramboll) collected third quarter groundwater level measurements as part of the Site annual groundwater monitoring/sampling program. On December 28, 2016, Roux Associates collected the fourth quarter groundwater level measurements utilizing a water level meter to measure the water level in 58 selected wells/piezometers. Note that 19 out of the 58 wells were not gauged during the fourth quarter gauging event because they were inaccessible as they were contained within the Radiologically Controlled Area (RCA) associated with the radiological sampling, excavation, dredging, and demolition project being conducted at the Site by others. The water table elevations and groundwater elevation contours for these gauging events are presented in Appendix B and C,[4] respectively.

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[3] Note that the EW-2 sample was collected on November 2, 2016 for the third quarter sampling event since the EW-2 pump was offline on October 10, 2016.

[4] Per BASF's request, Roux Associates received the November 9, 2016 groundwater elevation data and contour maps from Ramboll Environ for the third quarter event.

11. On November 14, 2016, Roux Associates and Geosearch removed the EW-1 pump/motor assembly and other downwell components. Repairs were made to the electrical connection to the motor and, subsequent to testing that verified functionality, the pump/motor assembly and downwell components were reinstalled into the well and the extraction well was returned to operation that same day.

12. On November 21, 2016, R.E. Erickson, under Roux Associates oversight, replaced the flow transmitter for the extraction well EW-6 flow meter; and performed service and calibration on the eight remaining extraction well and GWTP flow meters.

13. From November 30 through December 2, 2016, National Grid shut down the Site electric service in order to perform maintenance on the 23,000-kV overhead electric service on Taunton Street.

4.0 SUMMARY OF ANALYTICAL RESULTS & PERMIT COMPLIANCE

The Site GWTP operates under a Remediation General Permit (RGP). The RGP specifies water sampling and testing requirements including the collection of influent and effluent samples and the analysis of these samples. Roux Associates (operator) and BASF (owner) are authorized to discharge under the current 2010 RGP per an EPA Notice of Change - Reduction in Monitoring Requirements letter dated May 8, 2012.[5] During this reporting period, monthly water quality samples were collected and analyzed (tested) in accordance with the RGP (monthly compliance – aqueous effluent). In addition, MassDEP Policy WSC 94-150 Point Source Discharge of Remedial Air Emissions (vapor effluent) applies to the discharge of air from the VGAC treatment system which treats the air stripper off-gas (see below). No exceedances of the RGP or MassDEP Policy WSC 94-150 occurred during this reporting period.

Based on the analytical results of the system sampling conducted during this reporting period, no effluent water discharge exceedances occurred this reporting period. The treatment system has been effective in the removal of dissolved-phase VOCs from the influent stream. During this reporting period, monthly GWTP influent dissolved-phase total VOC concentrations ranged from 1,776 µg/l to 3,290 µg/l with a monthly average of 2,700 µg/l. Effluent dissolved-phase total VOC concentrations were all below RGP effluent limits during this reporting period. Historical GWTP operational data from start of operation, Q1 (1998), to the present are included in Table 1. The approximate total pounds of VOCs extracted from the groundwater are also presented in Table 1 and are plotted in Chart 1 (Appendix D). Quarterly average GWTP influent total VOC concentrations are plotted in Chart 2 (Appendix D). Influent total suspended solids (TSS) and metals concentrations were consistent and low during this reporting period, while the effluent TSS and metals concentrations were all less than their respective permit limits during this reporting period. The analytical laboratory results for the aqueous samples collected from the GWTP during this reporting period are presented in Appendix E.

[5] The May 8, 2012 EPA letter is presented in the Q58 quarterly status report dated September 5, 2012.

Air samples from the influent, midpoint, and effluent of the VGAC system, which treats the air stripper off-gas, were field analyzed using a calibrated photoionization detector (PID) on a minimum monthly basis during this reporting period. The PID readings indicated removal efficiencies of 100% during air monitoring events conducted this reporting period which satisfies the vapor effluent guideline of 95% or greater removal efficiency. The field PID readings for the air samples collected during this reporting period are presented in Appendix F. Carbon usage to date for the GWTP (liquid and vapor) is presented in Appendix G. Ion exchange resin usage to date for the GWTP is presented in Appendix H.

5.0 GROUNDWATER STABILIZATION MEASURE PERFORMANCE OBJECTIVE

The GWTP system fulfills the Site Groundwater Stabilization Measure (GSM) as defined by the EPA Administrative Order on Consent (RCRA Docket No. I-92-1051). The main objective of the Site GSM is to maintain a GWTP system "that utilizes pumping wells to significantly reduce migration of contaminated groundwater off-site by causing a reversal of the natural hydraulic gradient in the bedrock and overlying unconsolidated saturated zones along an approximately 540 foot line."

Since 2008, Roux Associates has worked with BASF and other environmental consultants working at the Site to improve the performance of the GSM, specifically to increase extraction from EW-2. EW-2 was targeted most importantly because the highest VOC concentrations have historically been detected in EW-2 when compared to the other extraction wells. Significant improvements have been made to the EW-2 well and extraction equipment over the years, such as well deepening, increasing the transmission piping diameter, and installation of a larger pump/motor assembly. Additional details regarding EW-2 improvements are provided in previous status reports.

Site data indicates that a significant reduction in migration of VOC contaminated groundwater off-site has been accomplished at the Site due mainly to the continued groundwater extraction from the extraction wells. Furthermore, in general, during this reporting period, groundwater pumped as part of the Site GSM maintained a potentiometric head in bedrock groundwater near extraction well EW-2 that created a reversal of the hydraulic gradient east of the GSM (i.e., east to west instead of west to east). This is illustrated on the bedrock groundwater elevation contours presented in Appendix C.

6.0 COST SUMMARY REPORT

For the third and fourth quarters of 2016, Roux Associates' labor costs were $113.0K and direct costs were $110.7K resulting in a total semi-annual cost of $223.7K. Note that costs associated with the fourth quarter include three non-routine maintenance projects requested by BASF (extraction well reconditioning; extraction well pump/motor assembly service, repairs, and replacement; and additional GWTP component cleaning and line jetting) in addition to the routine O&M costs. A summary of costs incurred through the nineteenth year (2016) of operation is presented in Appendix I.

Sincerely,

ROUX ASSOCIATES, INC.

Kate Hardock
Staff Geologist

JR Taormina
Principal Engineer

TABLE

Table 1: GWTP Operational Data
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Quarterly Report Number	Operation Period	Report Date	Percent Online	Operating Hours	Average Flow Rate (gpm)	Total Gallons Pumped (MG)	Approx. lbs. of Total VOCs Removed	Total VOC Influent (ug/l)				Total VOC Effluent (ug/l)		
								3-Month Average	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
Q1	Jan 1 - Mar 31, 1998	Mar 1998	71%	1,533	44.9	4.1	246	7,181	8,776	9,851	2,915	2.7	4	0.5
Q2	Apr 1 - Jun 30, 1998	Nov 1998	93%	2,033	54.1	6.5	220	4,051	3,845	3,613	4,695	0	2.7	10.7
Q3	Jul 1 - Sep 30, 1998	Nov 1998	87%	1,915	47.7	5.7	371	7,802	9,151	8,603	5,652	0	0	1
Q4	Oct 1 - Dec 31, 1998	Mar 1999	79%	1,748	32.6	4.1	302	8,824	7,510	11,094	7,869	9	236	0
Q5	Jan 1 - Mar 31, 1999	Apr 1999	97%	2,087	51.5	6.5	311	5,726	4,653	5,924	6,602	0	0	0
Q6	Apr 1 - Jun 30, 1999	Oct 1999	93%	2,040	43.3	5.7	254	5,330	5,786	8,085	2,118	0	0	0
Q7	Jul 1 - Sep 30, 1999	Dec 1999	95%	2,075	35.8	4.7	246	6,260	7,870	6,234	4,675	0	0	0
Q8	Oct 1 - Dec 31, 1999	Jun 2000	92%	2,031	45.8	5.9	232	4,720	4,571	3,380	6,208	0	0	0
Q9	Jan 1 - Mar 31, 2000	Oct 2000	98%	2,135	48.8	6.3	263	5,002	4,130	6,421	4,454	0	0	0
Q10	Apr 1 - Jun 30, 2000	Dec 2000	94%	2,059	45.2	5.9	221	4,487	3,414	3,922	6,125	0	0	0
Q11	Jul 1 - Sep 30, 2000	Jan 2001	93%	2,062	38.2	5.1	201	4,734	4,245	4,296	5,661	0	0	0
Q12	Oct 1 - Dec 31, 2000	Mar 2001	93%	2,058	37.3	4.9	188	4,593	4,277	5,314	4,189	0	0	0
Q13	Jan 1 - Mar 31, 2001	Apr 2001	98%	2,107	45.3	5.8	199	4,116	3,514	5,759	3,075	0	0	0
Q14	Apr 1 - Jun 30, 2001	Aug 2001	83%	1,802	39.1	5.1	128	3,006	1,835	3,648	3,535	0	0	0
Q15	Jul 1 - Sep 30, 2001	Dec 2001	88%	1,936	36.4	4.8	195	4,866	3,496	7,060	4,041	0	0	0
Q16	Oct 1 - Dec 31, 2001	Feb 2002	90%	1,989	28.2	3.7	165	5,330	4,375	7,904	3,712	0	0	0
Q17	Jan 1 - Mar 31, 2002	May 2002	92%	1,981	36.7	4.7	130	3,308	3,172	2,970	3,782	0	0	0
Q18	Apr 1 - Jun 30, 2002	Aug 2002	97%	2,117	48.4	6.3	153	2,912	3,000	2,426	3,309	0	0	0
Q19	Jul 1 - Sep 30, 2002	Nov 2002	86%	1,890	32.8	4.3	185	5,153	4,468	6,117	4,874	0	0	0
Q20	Oct 1 - Dec 31, 2002	Mar 2003	99%	2,178	42.2	5.6	208	4,446	3,986	5,791	3,562	0	0	0
Q21	Jan 1 - Mar 31, 2003	Jun 2003	99%	2,134	47.2	6.1	177	3,476	3,461	3,926	3,041	0	0	0
Q22	Apr 1 - Jun 30, 2003	Sep 2003	93%	2,014	48.1	6.1	165	3,241	2,774	3,553	3,397	0	0	0
Q23	Jul 1 - Sep 30, 2003	Dec 2003	85%	1,879	42.5	5.6	164	3,508	2,838	3,234	4,451	0	0	0
Q24	Oct 1 - Dec 31, 2003	Mar 2004	99%	2,188	44.0	5.8	169	3,486	4,533	4,205	1,721	0	0	0
Q25	Jan 1 - Mar 31, 2004	Jun 2004	97%	1,826	44.4	5.9	143	2,903	2,812	3,261	2,637	0	0	0
Q26	Apr 1 - Jun 30, 2004	Nov 2004	93%	2,027	45.2	5.9	142	2,894	3,896	2,607	2,179	0	0	0
Q27	Jul 1 - Sep 30, 2004	Jan 2005	99%	2,180	38.7	5.1	179	4,206	4,144	4,341	4,132	0	0	0
Q28	Oct 1 - Dec 31, 2004	Mar 2005	96%	2,115	41.2	5.4	188	4,164	4,226	4,240	4,027	0	0	0
Q29	Jan 1 - Mar 31, 2005	May 2005	93%	2,009	40.4	5.1	150	3,524	3,892	3,180	3,501	0	0	0
Q30	Apr 1 - Jun 30, 2005	Nov 2005	95%	2,076	38.5	4.6	101	2,629	3,046	2,535	2,307	0	0	0
Q31	Jul 1 - Sep 30, 2005	Feb 2006	69%	1,526	23.5	2.8	122	5,228	2,418	3,093	10,172	1	1	0
Q32	Oct 1 - Dec 31, 2005	Mar 2006	92%	2,036	42.9	5.5	270	5,886	6,456	4,554	6,649	0	0	0
Q33	Jan 1 - Mar 31, 2006	Apr 2006	96%	2,064	38.1	4.5	234	6,237	2,377	6,778	9,556	0	0	0
Q34	Apr 1 - Jun 30, 2006	Sep 2006	81%	1,774	44.4	5.2	271	6,244	6,199	6,150	6,383	0	0	2
Q35	Jul 1 - Sep 30, 2006	Jan 2007	91%	2,019	43.1	5.3	234	5,294	5,797	5,509	4,576	0	0	0
Q36	Oct 1 - Dec 31, 2006	Apr 2007	94%	2,082	36.2	4.6	225	5,867	5,636	7,579	4,385	0	0	0
Q37	Jan 1 - Mar 31, 2007	May 2007	93%	2,017	43.9	5.4	274	6,076	5,877	5,504	6,846	4	0	0
Q38	Apr 1 - Jun 30, 2007	Oct 2007	96%	2,101	46.1	5.7	192	4,034	2,891	4,668	4,544	0	0	0
Q39	Jul 1 - Sep 30, 2007	Dec 2007	81%	1,797	30.2	3.8	157	4,959	5,785	2,331	6,761	0	0	0
Q40	Oct 1 - Dec 31, 2007	Mar 2008	84%	1,859	33.9	4.3	234	6,512	6,953	6,216	6,367	0	0	0

Table 1: GWTP Operational Data
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Quarterly Report Number	Operation Period	Report Date	Percent Online	Operating Hours	Average Flow Rate (gpm)	Total Gallons Pumped (MG)	Approx. lbs. of Total VOCs Removed	Total VOC Influent (ug/l)				Total VOC Effluent (ug/l)		
								3-Month Average	1st Month	2nd Month	3rd Month	1st Month	2nd Month	3rd Month
Q41[1]	Jan 1 - Mar 31, 2008	Jun 2008	47%	1,031	23.6	3.0	73	2,918	284	3,480	4,990	1	0	0
Q42[2]	Apr 1 - Jun 30, 2008	Aug 2008	80%	1,745	42.1	4.5	186	4,943	5,220	4,670	4,940	0	0	0
Q43[2]	Jul 1 - Sep 30, 2008	Nov 2008	54%	1,182	19.7	2.2	69	3,772	4,930	3,403	2,984	0	0	0
Q44	Oct 1 - Dec 31, 2008	Feb 2009	98%	2,164	49.7	5.5	213	4,602	5,490	4,560	3,756	0	0	0
Q45	Jan 1 - Mar 31, 2009	Apr 2009	99%	2,148	50.8	5.7	202	4,273	4,838	4,981	3,000	0	0	0
Q46	Apr 1 - Jun 30, 2009	Aug 2009	94%	2,051	53.3	5.8	269	5,526	5,736	5,070	5,773	0	0	0
Q47	Jul 1 - Sep 30, 2009	Feb 2010	97%	2,144	49.5	5.3	89	2,017	3,180	992	1,880	0	0	0
Q48	Oct 1 - Dec 31, 2009	Apr 2010	97%	2,132	48.5	5.2	139	3,197	4,130	2,890	2,570	0	0	0
Q49	Jan 1 - Mar 31, 2010	Jul 2010	99%	2,141	49.9	5.1	129	3,059	3,620	3,400	2,158	0	0	0
Q50	Apr 1 - Jun 30, 2010	Nov 2010	94%	2,060	44.4	5.5	176	3,859	2,650	2,730	6,198	16	0	0
Q51	Jul 1 - Sept 30, 2010	Mar 2011	96%	2,128	41.1	5.3	244	5,567	4,560	5,940	6,200	0	0	0
Q52	Oct 1 - Dec 31, 2010	Apr 2011	99%	2,186	38.9	4.9	137	3,344	7,300	1,521	1,211	0	0	0
Q53	Jan 1 - Mar 31, 2011	May 2011	94%	2,033	37.5	4.4	82	2,266	1,274	1,265	4,260	0	0	0
Q54	Apr 1 - Jun 30, 2011	Oct 2011	90%	1,970	40.9	5.2	279	6,465	6,200	6,700	6,494	0	0	0
Q55	Jul 1 - Sept 30, 2011	Feb 2012	86%	1,899	43.3	4.9	284	6,955	7,743	4,573	8,550	0	0	0
Q56	Oct 1 - Dec 31, 2011	May 2012	83%	1,843	40.5	4.1	137	4,039	5,830	3,476	2,812	0	0	0
Q57	Jan 1 - Mar 31, 2012	Jun 2012	92%	2,016	44.4	4.8	227	5,703	4,215	6,813	6,080	0	0	0
Q58	Apr 1 - Jun 30, 2012	Aug 2012	93%	2,020	37.1	4.7	150	3,858	2,561	5,109	3,905	0	0	0
Q59	Jul 1 - Sept 30, 2012	Feb 2013	87%	1,920	34.8	4.5	146	3,858	3,560	4,964	3,050	0	0	0
Q60	Oct 1 - Dec 31, 2012	Feb 2013	89%	1,961	43.1	5.5	151	3,297	3,459	3,482	2,950	0	0	0
Q61	Jan 1 - Mar 31, 2013	Aug 2013	91%	1,966	44.1	5.3	112	2,544	3,629	1,041	2,963	0	0	0
Q62	Apr 1 - Jun 30, 2013	Aug 2013	96%	2,101	50.9	6.2	186	3,604	3,330	3,997	3,485	0	0	0
Q63[3]	Jul 1 - Sept 30, 2013	Jan 2015	73%	1,618	32.4	3.7	63	2,068	3,799	1,789	615	0	0	0
Q64[3]	Oct 1 - Dec 31, 2013	Jan 2015	0%	0	0.0	0.0	0	-	-	-	-	0	0	0
Q65[3]	Jan 1 - Mar 31, 2014	Jun 2015	1.6%	35	17.2	0.06	2	3,594	-	-	3,594	0	0	0
Q66	Apr 1 - Jun 30, 2014	Jun 2015	71%	1,561	27.1	3.1	118	4,519	4,323	5,652	3,583	0	0	0
Q67	Jul 1 - Sept 30, 2014	Nov 2015	83%	1,822	25.1	3.3	129	4,665	3,235	5,206	5,555	0	0	0
Q68	Oct 1 - Dec 31, 2014	Nov 2015	92%	2,039	34.0	4.2	147	4,161	3,660	4,758	4,066	0	0	0
Q69	Jan 1 - Mar 31, 2015	Feb 2016	83%	1,784	26.8	3.3	120	4,341	4,155	5,456	3,412	0	0	0
Q70	Apr 1 - Jun 30, 2015	Feb 2016	99%	2,153	43.4	5.0	163	3,904	3,079	3,413	5,221	0	0	0
Q71	Jul 1 - Sept 30, 2015	May 2016	94%	2,084	35.4	4.4	204	5,552	5,581	5,784	5,290	0	0	0
Q72	Oct 1 - Dec 31, 2015	May 2016	75%	1,653	25.1	2.5	85	4,081	3,872	5,240	3,131	0	0	0
Q73	Jan 1 - Mar 31, 2016	Apr 2017	91%	1,977	56.3	6.6	174	3,165	4,043	2,868	2,583	0	0	0
Q74	Apr 1 - Jun 30, 2016	Apr 2017	98%	2,139	57.3	6.4	127	2,366	2,680	1,994	2,423	0	0	0
Q75	Jul 1 - Sept 30, 2016	Sep 2017	81%	1,781	34.4	4.5	113	3,037	2,969	3,290	2,852	0	0	0
Q76	Oct 1 - Dec 31, 2016	Sep 2017	94%	2,079	47.5	5.9	117	2,363	1,776	2,645	2,669	0	0	0

Total to Date:		**145,065**		**368.8**	**13,449**	
Average to Date:	**87%**	**1,909**	**40.0**	**4.9**	**177**	**4,338**

Notes:

1. The system operation parameters displayed in this table for First Quarter 2008 (Q41) are lower than usual due to system down time for the treatment of groundwater from a hotspot excavation and the subsequent associated system cleaning and maintenance
2. The system operation parameters displayed in this table for Second Quarter 2008 (Q42) and Third Quarter 2008 (Q43) are lower than usual due to system down time for both the LFR geophysical investigation and the cleaning of the GWTP, extraction wells, and associated pumps and piping
3. The system operation parameters displayed in this table for Third Quarter 2013 (Q63), Fourth Quarter 2013 (Q64), and First Quarter of 2014 (Q65) are lower than usual due to the GWTP shutdown required by the ISCO injections

APPENDICES

APPENDIX A

GWTP Individual Extraction Well Aqueous Analytical Results (SA9)
July through December 2016

Appendix A: GWTP Individual Extraction Well Aqueous Analytical Results (SA9)
July through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Analytical Parameter	10/10/2016						12/05/2016					
	EW-1	EW-2*	EW-3	EW-4	EW-5	EW-6	EW-1	EW-2	EW-3	EW-4	EW-5	EW-6
Volatile Organic Compounds (ug/l)												
Benzene	12 BRL	2.0 BRL	25 BRL	5.0 BRL	2.5 BRL	5.0 BRL	5.0 BRL	2.0 BRL	20 BRL	10 BRL	2.0 BRL	5.0 BRL
Toluene	19 BRL	2.0 BRL	38 BRL	7.5 BRL	3.8 BRL	7.5 BRL	7.5 BRL	2.0 BRL	30 BRL	15 BRL	2.0 BRL	7.5 BRL
Ethylbenzene	12 BRL	2.0 BRL	25 BRL	5.0 BRL	2.5 BRL	5.0 BRL	5.0 BRL	2.0 BRL	20 BRL	10 BRL	2.0 BRL	5.0 BRL
meta-Xylene and para-Xylene (m,p-Xylenes)	25 BRL	2.0 BRL	50 BRL	10 BRL	5.0 BRL	10 BRL	10 BRL	2.0 BRL	40 BRL	20 BRL	2.5 BRL	10 BRL
ortho-Xylene (o-Xylene)	25 BRL	2.0 BRL	50 BRL	10 BRL	5.0 BRL	10 BRL	10 BRL	2.0 BRL	40 BRL	20 BRL	2.5 BRL	10 BRL
Total Xylenes (m,p,o Xylenes)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total BTEX	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-Butyl Ether (MTBE)	25 BRL	10 BRL	50 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	40 BRL	20 BRL	10 BRL	10 BRL
tert-Butyl Alcohol (TBA)	250 BRL	10 BRL	500 BRL	100 BRL	50 BRL	100 BRL	100 BRL	10 BRL	400 BRL	200 BRL	25 BRL	100 BRL
tert-Amyl Methyl Ether (TAME)	50 BRL	10 BRL	100 BRL	20 BRL	10 BRL	20 BRL	20 BRL	10 BRL	80 BRL	40 BRL	10 BRL	20 BRL
1,1,1-Trichloroethane (1,1,1-TCA)	440	1,200	3,700	320	230	260	690	1,200	2,400	270	200	220
1,1-Dichloroethane (1,1-DCA)	20	26	52	40	8.6	11	27	26 BRL	52	33	7.2	11
1,2-Dichloroethane (1,2-DCA)	12 BRL	5.0 BRL	25 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	20 BRL	10 BRL	5.0 BRL	5.0 BRL
1,1-Dichloroethene (1,1-DCE)	12 BRL	20	48	10	6.5	19	9.7	20	36	10 BRL	5.4	18
cis-1,2-Dichloroethene (cis-1,2-DCE)	120	200	350	36	6.0	8.5	160	200	350	36	6.7	8.1
Dichloromethane (Methylene Chloride)	75 BRL	4.6 BRL	150 BRL	30 BRL	15 BRL	30 BRL	30 BRL	4.6 BRL	120 BRL	60 BRL	7.5 BRL	30 BRL
Tetrachloroethene (PCE)	810	3,600	2500	1,000	310	340	830	3,600	1,500	840	180	340
Trichloroethene (TCE)	78	200	290	80	22	50	130	200	270	79	19	49
1,1,2-Trichloroethane	19 BRL	5.0 BRL	38 BRL	7.5 BRL	5.0 BRL	7.5 BRL	7.5 BRL	5.0 BRL	30 BRL	15 BRL	5.0 BRL	7.5 BRL
Acetone	120 BRL	50 BRL	250 BRL	50 BRL	50 BRL	50 BRL	50 BRL	50 BRL	200 BRL	100 BRL	50 BRL	50 BRL
1,4-Dioxane	6,200 BRL	250 BRL	12,000 BRL	2,500 BRL	1,200 BRL	2,500 BRL	2,500 BRL	250 BRL	10,000 BRL	5,000 BRL	620 BRL	2,500 BRL
1,4-Dichlorobenzene	62 BRL	5.0 BRL	120 BRL	25 BRL	12 BRL	25 BRL	25 BRL	5.0 BRL	100 BRL	50 BRL	6.2 BRL	25 BRL
Carbon Tetrachloride	12 BRL	4.4 BRL	25 BRL	5.0 BRL	4.4 BRL	5.0 BRL	5.0 BRL	4.4 BRL	20 BRL	10 BRL	4.4 BRL	5.0 BRL
Vinyl Chloride	25 BRL	5.4	50 BRL	10 BRL	5.0 BRL	10 BRL	10 BRL	5.4 BRL	40 BRL	20 BRL	2.5 BRL	10 BRL
Total VOCs Concentration	**1,468**	**5,251**	**6,940**	**1,486**	**583**	**689**	**1,847**	**5,220**	**4,608**	**1,258**	**418**	**646**

Notes:
Individual extraction well samples were collected from the respective sampling ports at the manifold
Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes
ND = Concentration, if any, is below reporting limit for each individual analyte
BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution
* EW-2 was sampled on November 2, 2016 for the third quarter sampling event since the EW-2 pump was offline on October 10, 2016

APPENDIX B

Water Table Elevations (SA9)
Comparison of Elevations from Third Quarter through Fourth Quarter 2016

Appendix B: Water Table Elevations (SA9)
Comparison of Elevations from Third Quarter 2015 through Fourth Quarter 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Well Number	Well Casing Elevation	2015		2016			
		09/28/15	12/08/15 [1]	03/28/16	06/21/16	11/9/2016 [1]	12/28/16
		Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation
P10	193.89	176.90	178.06	177.72	174.78 *	170.94	171.05
P10A	194.01	176.99	179.17	178.16	174.56	183.21 *	174.64
MW3	196.59	176.97	177.69	177.52	172.76 *	171.21	170.97 *
MW14	197.27	177.02	179.10	178.08	174.41	169.74	169.77
MW16	197.84	176.03	177.79	176.41	173.44	167.32	167.70
P8	198.51	176.81	178.07	178.07	174.61	173.29	173.36
P8A	198.10	176.14	177.67	176.37	173.45	169.53	171.80
P7	198.69	176.83	178.08	178.11	174.61	173.28	173.35
P7A	198.11	175.59	198.11	175.13	172.44	166.68	167.08
P6	199.30	177.19	178.56	179.19	176.36	174.27	174.26
P6A	198.78	176.03	177.10	182.90 *	182.95 *	169.16	168.63
P5	198.24	177.71	179.64	179.22	176.43	175.06	174.02
P5A	196.75	175.81	179.44	175.35	NM	167.88	167.53
MW12A	197.70	178.93	179.98	184.15	177.43	176.30	175.62
MW12B	197.79	178.03	179.54	178.39	169.81	172.05	171.96
P15	197.30	177.23	178.65	178.74	177.38	174.80	174.47
P15A	197.44	175.54	177.54	172.44	169.33	164.10	164.14
MW4	200.99	176.59 *	176.61	176.64 *	176.61 *	176.34	176.45 *
MW15	200.84	173.42	175.95	174.99	172.51	171.34	170.20
MW17R	200.86	175.24	177.47	171.27	169.24	160.23	154.26
P4	201.84	174.81	176.30	175.56	173.54	174.84	175.44
P4A	201.43	162.63	169.82	165.18	162.84	161.17	159.23
P3	200.64	177.04 *	174.55	178.43	177.20	176.94	176.77 *
P3A	200.62	172.32 *	174.27	172.18	172.29	172.06	172.12 *
P13	199.18	176.26	179.16	177.41	176.07	178.24	176.68
P13A	199.43	161.51	186.05	163.25	161.64	163.71	161.23
MW25A	202.89	180.35	183.39	182.64	181.31	182.00	180.74
MW25B	202.41	175.96	176.55	175.47	174.23	175.23	174.01
MW25C	200.00	171.32	176.35	175.33	174.05	175.07	173.85
P9	199.04	180.38	186.08	183.48	181.74	184.18	181.61
P9A	198.85	179.10	184.00	181.10	179.83	182.27	179.99
MW44A	197.31	183.22	184.90	184.41	184.81	182.96	182.87
P16	201.70	174.13	176.05	176.38	174.62	174.96	174.47
P16A	201.12	173.31	175.32	175.12	173.80	173.91	173.51
P16C	201.37	167.83	158.65	201.12	NM	147.67	155.18
P17A	200.93	175.74	176.68	176.60	174.90	173.14	172.81
MW40A	194.81	173.39	174.73	175.14	173.86	173.80	173.96
MW40B	194.54	172.09	173.17	173.27	172.51	172.25	172.33
P18	199.06	174.86	178.58	177.80	173.76	172.76	172.76
MW5	199.80	187.28	191.39	192.03	190.04	189.58	NA
MW18	199.31	186.33	190.62	191.89	188.80	188.75	NA
P11	203.80	189.31	191.96	193.49	192.56	188.78	NA
P11A	203.93	189.56	192.34	193.06	192.35	189.50	NA
MW53A	203.82	190.40	192.71	194.58	193.80	189.42	NA
MW53B	203.75	164.40	172.80	180.30	167.95	165.99	NA
MW53C	203.63	154.46	161.83	156.92	153.92	154.82	NA
P12	203.49	193.49 *	192.83 *	192.89 *	192.59 *	192.44	NA
P12A	203.83	160.25	167.81	162.45	160.92	162.56	NA
P12B	203.92	155.38	164.02	157.54	155.85	156.61	NA
P1	203.94	187.29	188.94	191.22	189.75	188.17	NA

Appendix B: Water Table Elevations (SA9)
Comparison of Elevations from Third Quarter 2015 through Fourth Quarter 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Well Number	Well Casing Elevation	2015		2016			
		09/28/15	12/08/15 [1]	03/28/16	06/21/16	11/9/2016 [1]	12/28/16
		Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation	Water Table Elevation
P1A	203.89	162.61	169.79	165.46	162.89	160.44	NA
P2	204.57	185.16 *	184.30 *	185.35 *	185.33 *	185.33 *	NA
P2A	204.28	168.06	172.65	169.25	167.70	164.17	NA
MW45A	203.90	190.54	192.41	193.90	185.92	190.21	NA
MW45B	203.87	184.26	185.46	186.72	193.30	182.81	NA
MW45C	203.26	155.24	161.93	157.54	155.69	154.98	NA
P14	204.01	179.48	180.92	181.12	179.28	176.73	NA
P14A	203.90	175.58	177.72	172.23	170.19	162.17	NA

Notes:

NM = Water level not measured

NA = Not Accessible. During the fourth quarter gauging event (12/28/2016), these monitoring wells were inaccessible as they were contained within the Radiologically Controlled Area (RCA) associated with the radiological sampling, excavation, dredging, and demolition project being conducted at the site by others

Elevations displayed are in feet mean sea level (msl)

Water table level measurements are measured from the highest point on the top of the inner PVC casing, or the highest point on the top of the outer steel casing if no inner PVC casing is present

Well casing elevations for wells MW17R, P16C, P17A, P18, MW53A, MW53B, MW53C, P12B, and MW45C were generated by a survey conducted by Hancock Associates on August 5, 2009

The well casing elevation for well P16 was generated by a survey conducted by LFR on October 22, 2009 prior to the October 22, 2009 gauging event

The well casing elevation for well P16A was generated by a survey conducted by Hancock Associates on September 28, 2010. P16A was installed by New Hampshire Boring, Inc. under Environ oversight and completed on September 1, 2010

Well casing elevations for other wells not listed in the three notes above were generated by a survey conducted by Allen & Major Associates, Inc. between March 20 and March 26, 2006

* Well was dry during this gauging event at the elevation indicated, which represents the approximate elevation of the bottom of this well (the water table elevation is less than the elevation indicated)

[1.] Roux Associates utilized available depth to groundwater data in order to calculate groundwater elevations for the December 2015 and November 2016 data sets.

APPENDIX C

Figure 1: Over Burden Groundwater Elevation Contours - November 2016
Figure 2: Shallow Bedrock Groundwater Elevation Contours - November 2016
Figure 3: Deep Bedrock Groundwater Elevation Contours - November 2016

Figure 1: Inferred Overburden Groundwater Elevation Contours – December 2016
Figure 2: Inferred Bedrock Groundwater Elevation Contours – December 2016

Monitoring Wells

Inferred Groundwater Flow Direction

Inferred Groundwater Elevation Contour in Feet

Site Boundary

N

MW34 169.34
MW33A 169.25
MW20A 168.77
MW31A 174.16
MW09A 169.47
MW35 169.92
MW51A 176.18
MW08 171.81
MW36 170.06
MW07 193.31
MW32A 180.83
P10 170.94
MW03 171.21
MW02 181.14
MW21A 172.12
MW41A 172.87
P18 172.76
P06 174.27
P07 173.28
P08 173.29
MW23A 171.79
MW26 192.65
MW48A 190.96
MW49A 184.2
MW12A 176.3
MW40A 173.8
P14 176.73
P15 174.8
MW46A 191.87
MW43A 172.41
P04 174.84
MW22A 172.76
MW45A 190.21
MW01 191.64
P03 176.94
P02 0
P16 174.96
P12 192.44
P13 178.24
MW102 190.48
MW53A 189.42
MW101 191.19
MW06 190.77
P11 188.78
MW106 190.64
MW25A 182
MW44A 182.96
MW104 190.78
MW05 189.58
MW30A 175.33
MW54A 190.15

184 182 180 178 176 174 172 170 186 188 190 192

0 200 Feet

Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

RAMBOLL ENVIRON

DRAFTED BY: CWD | DATE: 2/17/2017

Overburden Groundwater Elevation Contours - 11/9/16

BASF Facility

36 Taunton Street, Plainville, Massachusetts

FIGURE 1

PROJECT: XX-XXXXXX

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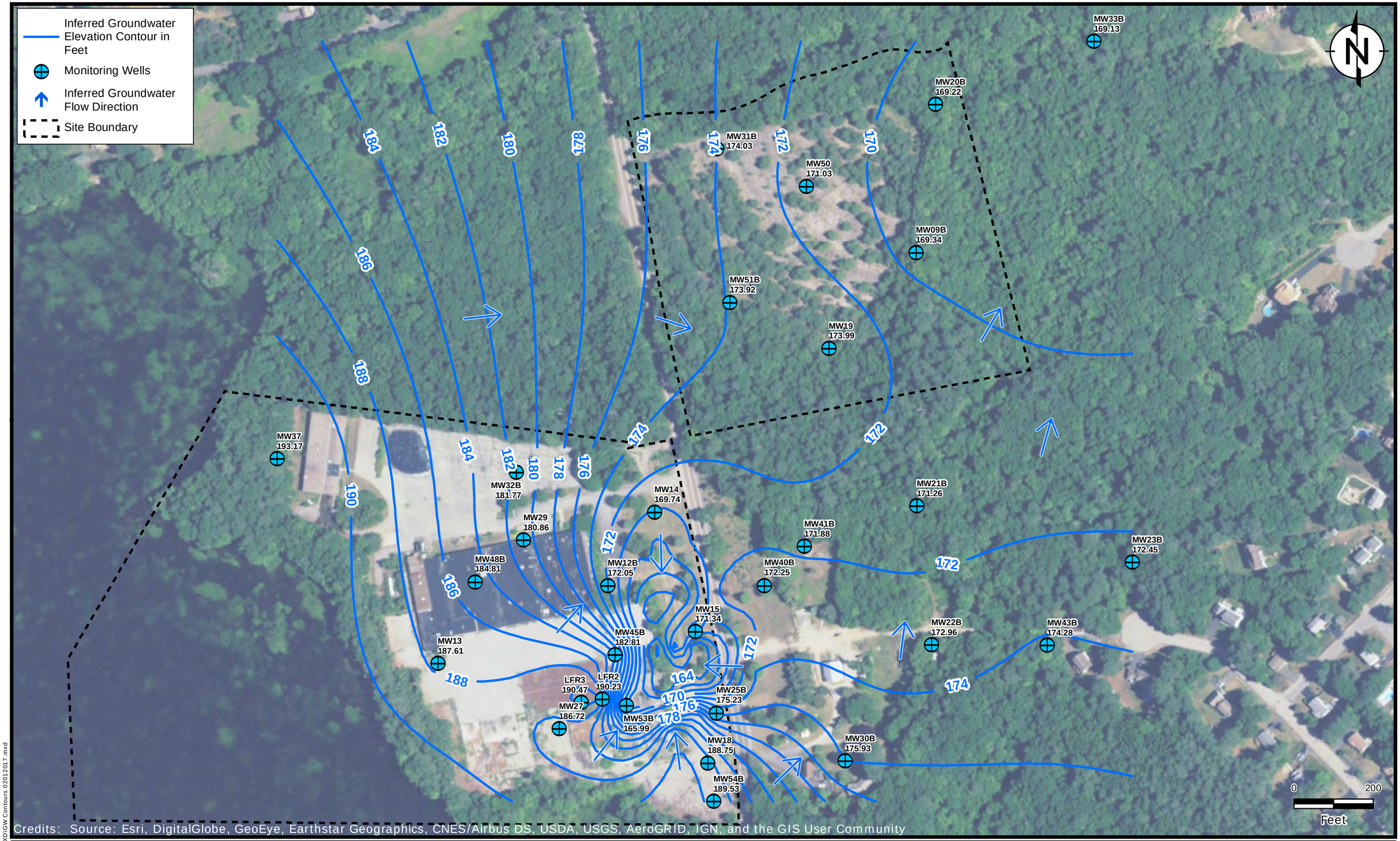


RAMBOLL ENVIRON

DRAFTED BY: CWD | DATE: 2/17/2017

Shallow Bedrock Groundwater Elevation Contours - 11/9/16

BASF Facility

36 Taunton Street, Plainville, Massachusetts

FIGURE 2

PROJECT: XX-XXXXXX

M:\BASF Plainville\GIS\MXD\GW Contours 02012017.mxd

Monitoring Well

Inferred Groundwater Flow Direction

Inferred Groundwater Elevation Contour in Feet

Site Boundary

Note:
Only monitoring wells with screened or open hole intervals between 60 to 100 feet bgs were included in this figure.

MW20C
169.6

MW09C
169.54

MW16
167.32

MW17R
160.23

MW25C
175.07

MW21C
171.69

MW43C
173.76

168

170

164

166

172

174

N

0 200
Feet

Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

M:\BASF Plainville\GIS\MXD\GW Contours 01232017.mxd

RAMBOLL ENVIRON

DRAFTED BY: CWD | DATE: 2/17/2017

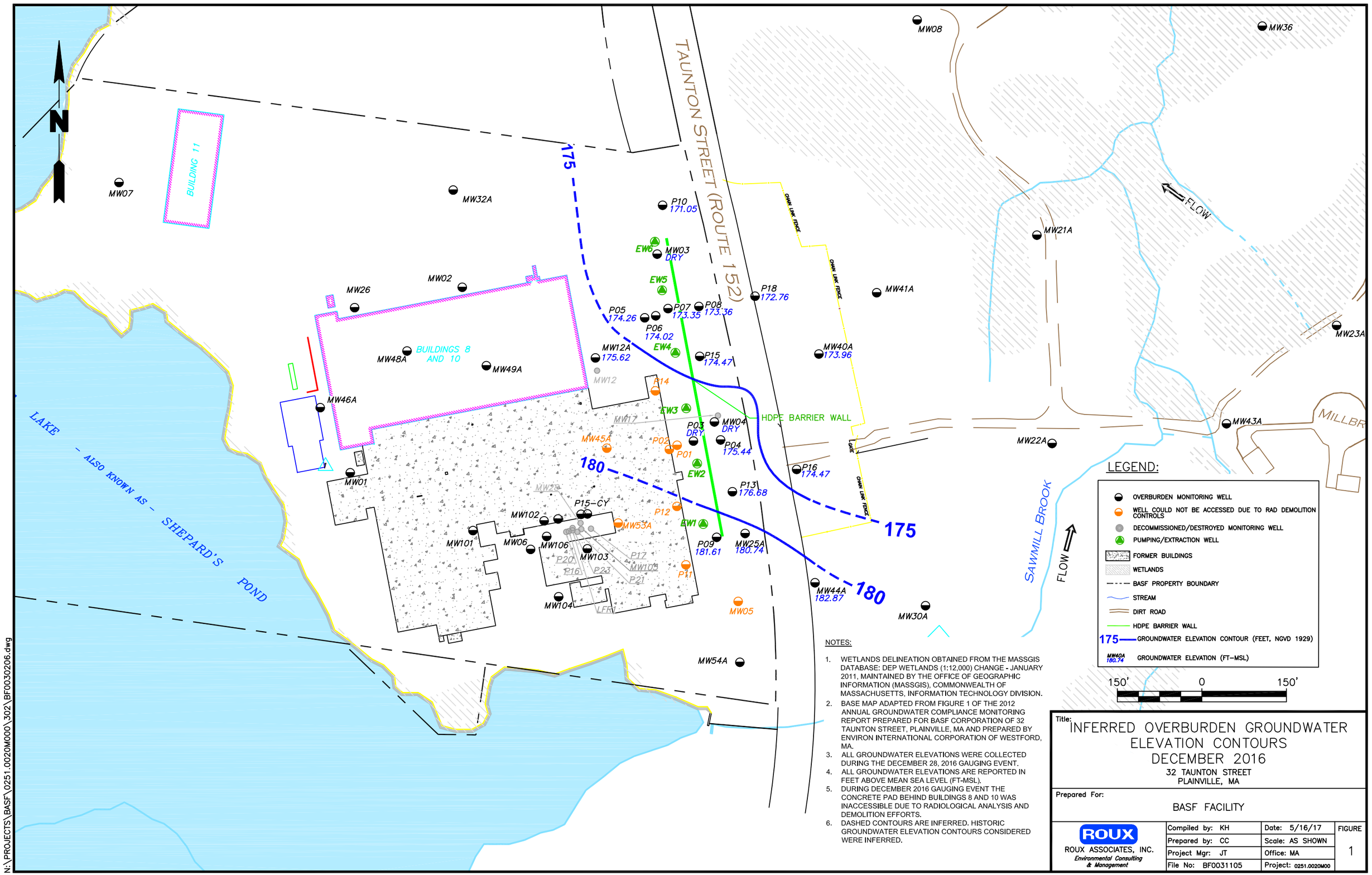
Deep Bedrock Groundwater Elevation Contours - 11/9/16

BASF Facility

36 Taunton Street, Plainville, Massachusetts

FIGURE
3

PROJECT: XX-XXXXXX



NOTES:

1. WETLANDS DELINEATION OBTAINED FROM THE MASSGIS DATABASE: DEP WETLANDS (1:12,000) CHANGE - JANUARY 2011, MAINTAINED BY THE OFFICE OF GEOGRAPHIC INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS, INFORMATION TECHNOLOGY DIVISION.
2. BASE MAP ADAPTED FROM FIGURE 1 OF THE 2012 ANNUAL GROUNDWATER COMPLIANCE MONITORING REPORT PREPARED FOR BASF CORPORATION OF 32 TAUNTON STREET, PLAINVILLE, MA AND PREPARED BY ENVIRON INTERNATIONAL CORPORATION OF WESTFORD, MA.
3. ALL GROUNDWATER ELEVATIONS WERE COLLECTED DURING THE DECEMBER 28, 2016 GAUGING EVENT.
4. ALL GROUNDWATER ELEVATIONS ARE REPORTED IN FEET ABOVE MEAN SEA LEVEL (FT-MSL).
5. DURING DECEMBER 2016 GAUGING EVENT THE CONCRETE PAD BEHIND BUILDINGS 8 AND 10 WAS INACCESSIBLE DUE TO RADIOLOGICAL ANALYSIS AND DEMOLITION EFFORTS.
6. DASHED CONTOURS ARE INFERRED. HISTORIC GROUNDWATER ELEVATION CONTOURS CONSIDERED WERE INFERRED.

Title:
INFERRED OVERBURDEN GROUNDWATER ELEVATION CONTOURS DECEMBER 2016

32 TAUNTON STREET
PLAINVILLE, MA

Prepared For:

BASF FACILITY

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: KH	Date: 5/16/17	FIGURE	
Prepared by: CC	Scale: AS SHOWN	1	
Project Mgr: JT	Office: MA		
File No: BF0031105	Project: 0251.0020M00		

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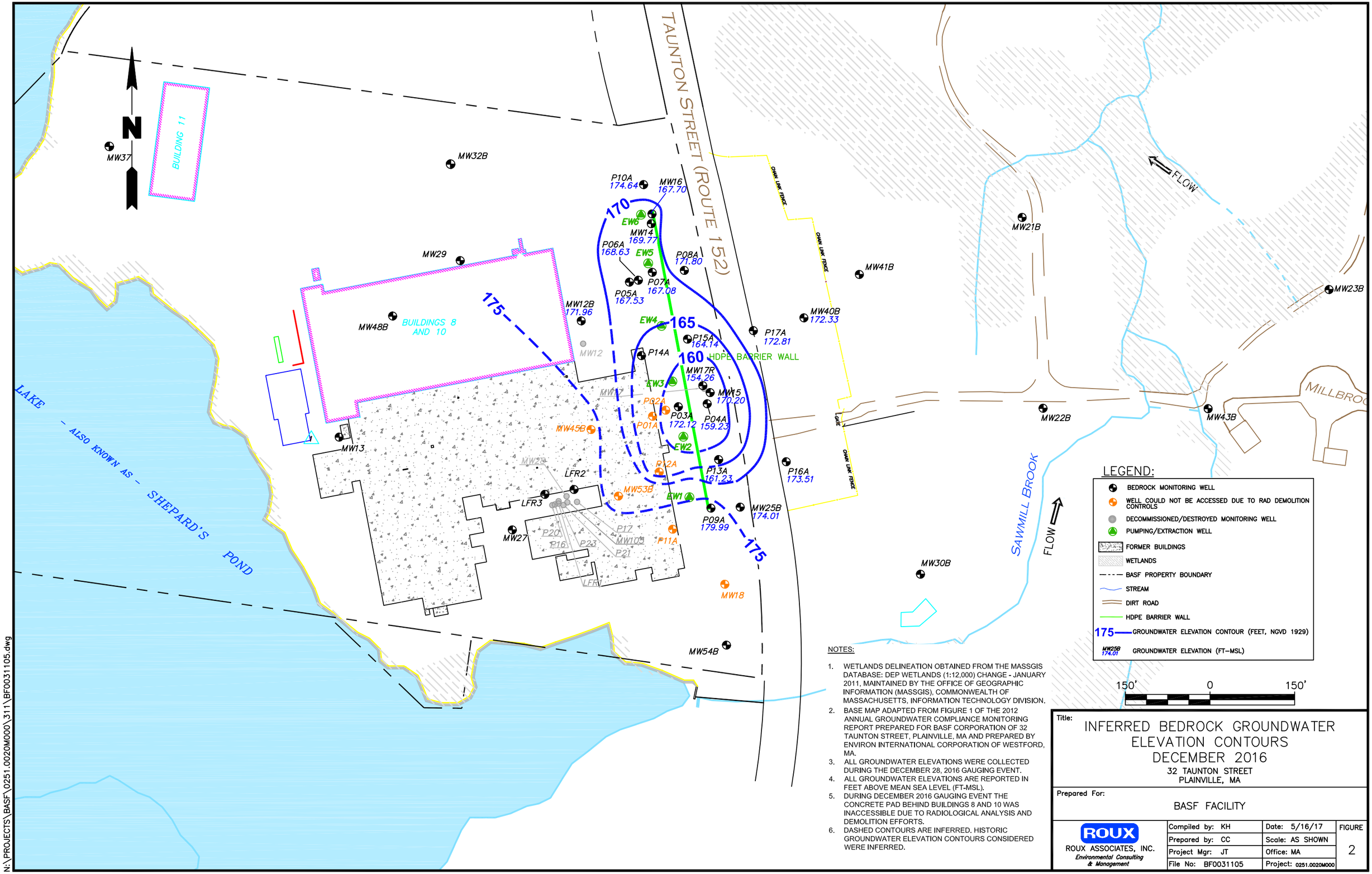

LEGEND:

- BEDROCK MONITORING WELL
- WELL COULD NOT BE ACCESSED DUE TO RAD DEMOLITION CONTROLS
- DECOMMISSIONED/DESTROYED MONITORING WELL
- PUMPING/EXTRACTION WELL
- FORMER BUILDINGS
- WETLANDS
- BASF PROPERTY BOUNDARY
- STREAM
- DIRT ROAD
- HDPE BARRIER WALL
- 175 — GROUNDWATER ELEVATION CONTOUR (FEET, NGVD 1929)
- MW25B 174.01 — GROUNDWATER ELEVATION (FT-MSL)

150' 0 150'

NOTES:

1. WETLANDS DELINEATION OBTAINED FROM THE MASSGIS DATABASE: DEP WETLANDS (1:12,000) CHANGE - JANUARY 2011, MAINTAINED BY THE OFFICE OF GEOGRAPHIC INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS, INFORMATION TECHNOLOGY DIVISION.
2. BASE MAP ADAPTED FROM FIGURE 1 OF THE 2012 ANNUAL GROUNDWATER COMPLIANCE MONITORING REPORT PREPARED FOR BASF CORPORATION OF 32 TAUNTON STREET, PLAINVILLE, MA AND PREPARED BY ENVIRON INTERNATIONAL CORPORATION OF WESTFORD, MA.
3. ALL GROUNDWATER ELEVATIONS WERE COLLECTED DURING THE DECEMBER 28, 2016 GAUGING EVENT.
4. ALL GROUNDWATER ELEVATIONS ARE REPORTED IN FEET ABOVE MEAN SEA LEVEL (FT-MSL).
5. DURING DECEMBER 2016 GAUGING EVENT THE CONCRETE PAD BEHIND BUILDINGS 8 AND 10 WAS INACCESSIBLE DUE TO RADIOLOGICAL ANALYSIS AND DEMOLITION EFFORTS.
6. DASHED CONTOURS ARE INFERRED. HISTORIC GROUNDWATER ELEVATION CONTOURS CONSIDERED WERE INFERRED.

Title:

INFERRED BEDROCK GROUNDWATER ELEVATION CONTOURS DECEMBER 2016

32 TAUNTON STREET
PLAINVILLE, MA

Prepared For:

BASF FACILITY

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: KH	Date: 5/16/17	FIGURE
Prepared by: CC	Scale: AS SHOWN	2
Project Mgr: JT	Office: MA	
File No: BF0031105	Project: 0251.0020M000	

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APPENDIX D

Chart 1: GWTP Total VOCs Removed
Chart 2: Quarterly Average Influent VOCs

Chart 1: GWTP Total VOCs Removed

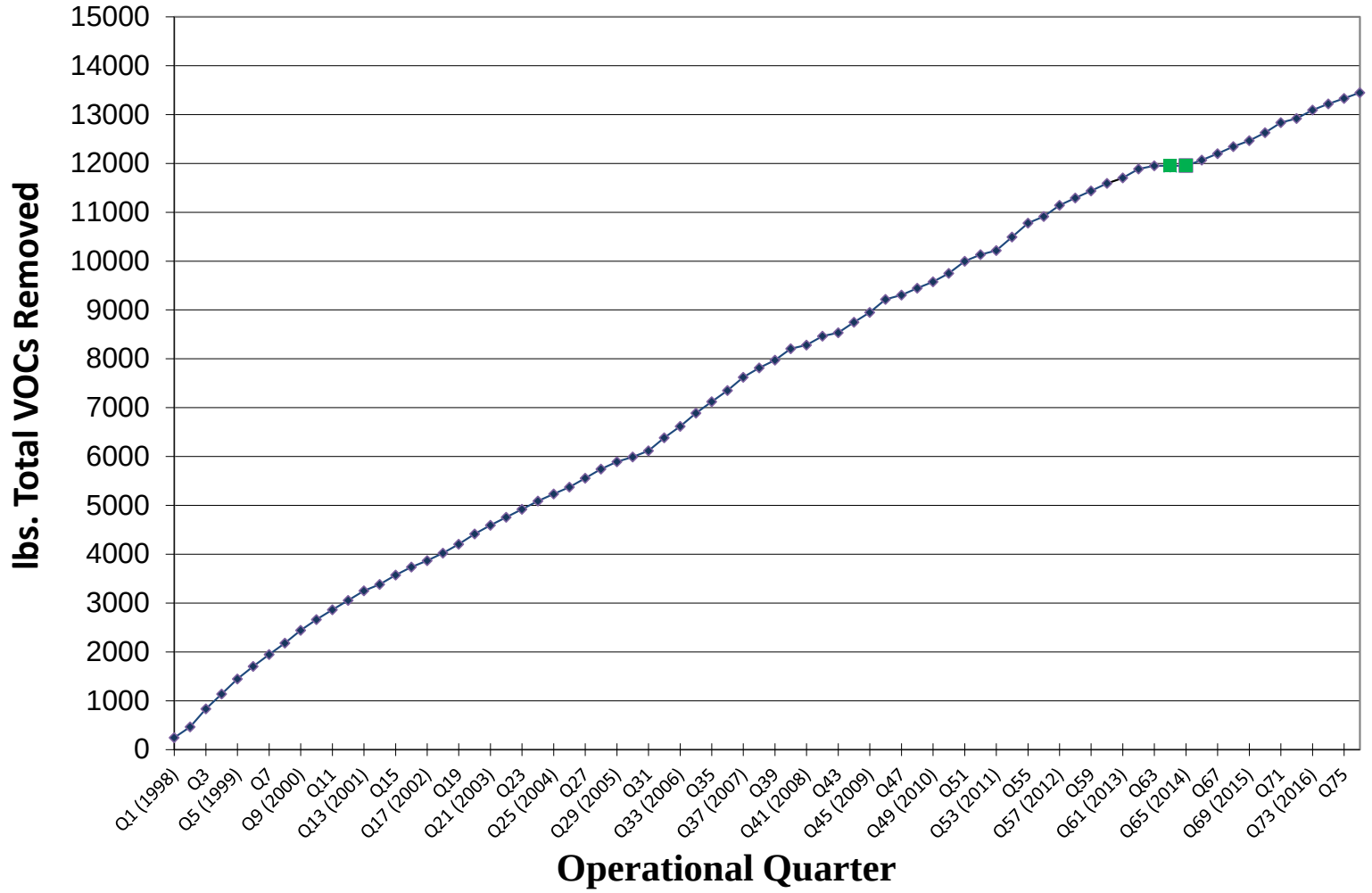
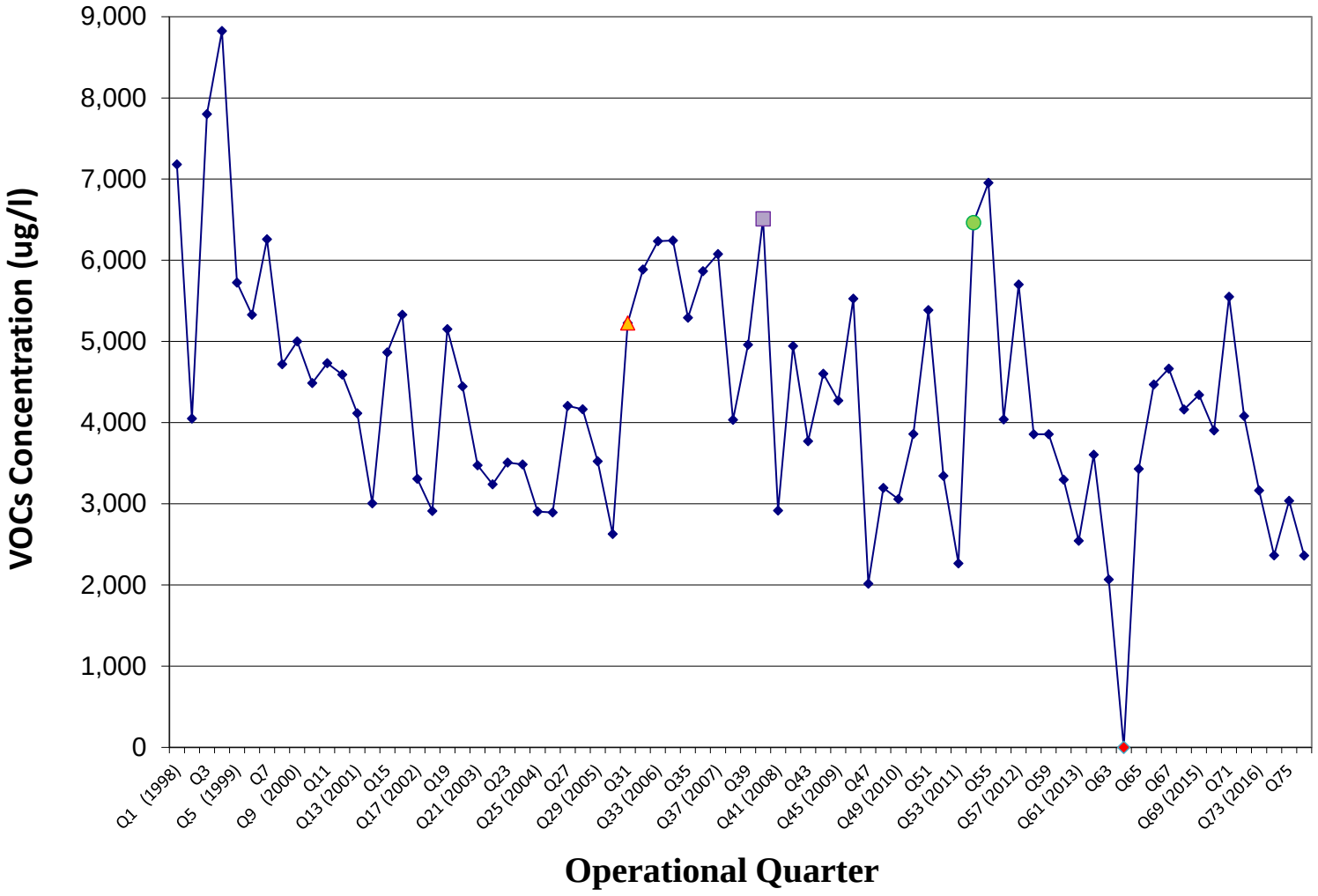


Chart 2: Quarterly Average Influent VOCs



3-Month Average Influent VOC concentration (average influent VOC concentration)

Q31 - The average influent VOC concentration increased because the EW-2 flow rate increased (larger pump/motor assembly installed) and the EW-6 flow rate decreased (smaller pump/motor assembly installed)

Q40 - The average influent VOC concentration increased because the GWTP was treating dewatering water from the courtyard excavation

Q54 - The average influent VOC concentration increased because the EW-2 flow rate increased (manifold improvements and larger pump/motor assembly placed into the well which was deepened from 200 to 302 ft bgs in September 2010)

Q64 - The average influent VOC concentration is negligible during this quarter due to the GWTP shutdown required by the ISCO injections (the GWTP was offline for the entire quarter)

APPENDIX E

GWTP Aqueous Analytical Results (SA9)
July through December 2016

Appendix E: GWTP Aqueous Analytical Results (SA9)
July 2016 through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Analytical Parameter	Effluent Limit	Minimum Level*	07/24/16		08/22/16		10/10/16**		10/31/16		11/21/16		12/05/16	
			INF	EFF	INF	EFF	INF	EFF	INF	EFF	INF	EFF	INF	EFF
Volatile Organic Compounds (ug/l)														
Benzene	5.0 µg/l	2.0 µg/l	2.0 BRL	2.0 BRL	20 BRL	2.0 BRL	10 BRL	2.0 BRL	12 BRL	2.0 BRL	12 BRL	2.0 BRL	10 BRL	2.0 BRL
Toluene	See Note 1	2.0 µg/l	3.0 BRL	2.0 BRL	30 BRL	2.0 BRL	15 BRL	2.0 BRL	19 BRL	2.0 BRL	19 BRL	2.0 BRL	15 BRL	2.0 BRL
Ethylbenzene	See Note 1	2.0 µg/l	86	2.0 BRL	20 BRL	2.0 BRL	10 BRL	2.0 BRL	12 BRL	2.0 BRL	12 BRL	2.0 BRL	10 BRL	2.0 BRL
meta-Xylene and para-Xylene (m,p-Xylenes)	See Note 2	2.0 µg/l	4.0 BRL	2.0 BRL	40 BRL	2.0 BRL	20 BRL	2.0 BRL	25 BRL	2.0 BRL	25 BRL	2.0 BRL	20 BRL	2.0 BRL
ortho-Xylene (o-Xylene)	See Note 2	2.0 µg/l	4.0 BRL	2.0 BRL	40 BRL	2.0 BRL	20 BRL	2.0 BRL	25 BRL	2.0 BRL	25 BRL	2.0 BRL	20 BRL	2.0 BRL
Total Xylenes (m,p,o Xylenes)	See Note 3	2.0 µg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total BTEX	100 µg/l	2.0 µg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl-tert-Butyl Ether (MTBE)	70.0 µg/l	10 µg/l	10 BRL	10 BRL	40 BRL	10 BRL	20 BRL	10 BRL	25 BRL	10 BRL	25 BRL	10 BRL	20 BRL	10 BRL
tert-Butyl Alcohol (TBA)	See Note 4	10 µg/l	40 BRL	10 BRL	400 BRL	10 BRL	200 BRL	10 BRL	250 BRL	10 BRL	250 BRL	10 BRL	200 BRL	10 BRL
tert-Amyl Methyl Ether (TAME)	See Note 4	10 µg/l	10 BRL	10 BRL	80 BRL	10 BRL	40 BRL	10 BRL	50 BRL	10 BRL	50 BRL	10 BRL	40 BRL	10 BRL
1,1,1-Trichloroethane (1,1,1-TCA)	200 µg/L	5.0 µg/l	1,100	5.0 BRL	860	5.0 BRL	1,100	5.0 BRL	630	5.0 BRL	760	5.0 BRL	810	5.0 BRL
1,1-Dichloroethane (1,1-DCA)	70 µg/L	5.0 µg/l	22	5.0 BRL	30 BRL	5.0 BRL	30	5.0 BRL	22	5.0 BRL	27	5.0 BRL	20	5.0 BRL
1,2-Dichloroethane (1,2-DCA)	5.0 µg/L	5.0 µg/l	5.0 BRL	5.0 BRL	20 BRL	5.0 BRL	10 BRL	5.0 BRL	12 BRL	5.0 BRL	12 BRL	5.0 BRL	10 BRL	5.0 BRL
1,1-Dichloroethene (1,1-DCE)	3.2 µg/L	3.2 µg/l	21	3.2 BRL	20 BRL	3.2 BRL	32	3.2 BRL	17	3.2 BRL	18	3.2 BRL	19	3.2 BRL
cis-1,2-Dichloroethene (cis-1,2-DCE)	70 µg/L	5.0 µg/l	130	5.0 BRL	120	5.0 BRL	140	5.0 BRL	140	5.0 BRL	130	5.0 BRL	120	5.0 BRL
Dichloromethane (Methylene Chloride)	4.6 µg/L	4.6 µg/l	12 BRL	4.6 BRL	120 BRL	4.6 BRL	60 BRL	4.6 BRL	75 BRL	4.6 BRL	75 BRL	4.6 BRL	60 BRL	4.6 BRL
Tetrachloroethene (PCE)	5.0 µg/L	5.0 µg/l	1500	5.0 BRL	2200	5.0 BRL	1400	5.0 BRL	870	5.0 BRL	1600	5.0 BRL	1600	5.0 BRL
Trichloroethene (TCE)	5.0 µg/L	5.0 µg/l	110	5.0 BRL	110	5.0 BRL	150	5.0 BRL	97	5.0 BRL	110	5.0 BRL	100	5.0 BRL
1,1,2-Trichloroethane	5.0 µg/l	5.0 µg/l	5.0 BRL	5.0 BRL	30 BRL	5.0 BRL	15 BRL	5.0 BRL	19 BRL	5.0 BRL	19 BRL	5.0 BRL	15 BRL	5.0 BRL
Acetone	See Note 4	50 µg/l	50 BRL	50 BRL	200 BRL	50 BRL	100 BRL	50 BRL	120 BRL	50 BRL	120 BRL	50 BRL	100 BRL	50 BRL
1,4-Dioxane	See Note 4	50 µg/l	50 BRL	50 BRL	120 BRL	50 BRL	60 BRL	50 BRL	75 BRL	50 BRL	75 BRL	50 BRL	60 BRL	50 BRL
1,4-Dichlorobenzene	5.0 µg/l	5.0 µg/l	10 BRL	5.0 BRL	100 BRL	5.0 BRL	50 BRL	5.0 BRL	62 BRL	5.0 BRL	62 BRL	5.0 BRL	50 BRL	5.0 BRL
Carbon Tetrachloride	4.4 µg/l	4.4 µg/l	4.4 BRL	4.4 BRL	20 BRL	4.4 BRL	10 BRL	4.4 BRL	12 BRL	4.4 BRL	12 BRL	4.4 BRL	10 BRL	4.4 BRL
Vinyl Chloride	2.0 µg/l	2.0 µg/l	4.0 BRL	2.0 BRL	40 BRL	2.0 BRL	20 BRL	2.0 BRL	25 BRL	2.0 BRL	25 BRL	2.0 BRL	20 BRL	2.0 BRL
TOTAL VOCs Concentration			**2,969**	**0**	**3,290**	**0**	**2,852**	**0**	**1,776**	**0**	**2,645**	**0**	**2,669**	**0**

Notes:
Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes
INF = GWTP Influent
EFF = GWTP Effluent
BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution
ND = Concentration, if any, is below reporting limit for each individual analyte
* Minimum Level (ML) is defined in the 2010 RGP #MAG910016 as the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence
** September sampling event was postponed because the GWTP was offline due to extraction well reconditioning activities from September 26 - October 5, 2016
1. Analytical Parameter is selected for monitoring in the 2010 RGP #MAG910016 and is limited as Total BTEX (which has an effluent limit of 100 ug/l)
2. Analytical Parameter is not specified in the 2010 RGP #MAG910016 and is limited as Total Xylenes ((m,p,o) Xylenes)
3. Analytical Parameter is specified in the 2010 RGP #MAG910016 but not selected for monitoring. The analytical parameter is limited as Total BTEX
4. Analytical Parameter is selected in the 2010 RGP #MAG910016 as Monitor Only with no effluent limit specified

Appendix E: GWTP Aqueous Analytical Results (SA9)
July 2016 through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Analytical Parameter	Effluent Limit	Minimum Level*	07/24/16		08/22/16		10/10/16***		10/31/16		11/21/16		12/05/16	
			INF	EFF	INF	EFF	INF	EFF	INF	EFF	INF	EFF	INF	EFF
pH**	6.5 - 8.3	NA	6.43	7.94	6.59	7.16	6.6	7.15	6.52	6.74	6.75	7.05	6.68	6.97
Solids (mg/l)														
Total Suspended Solids	30 mg/l	5 mg/l	6.0	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL	5.0 BRL
Total Dissolved Solids	See Note 1	See Note 1	180	230	200	220	190	200	220	220	220	220	210	230
Metals (mg/l)														
Iron, Total	1 mg/l	0.020 mg/l	2.0 BRL	0.05 BRL	0.244	0.05 BRL	0.07	0.05 BRL	0.869	0.05 BRL	0.681	0.05 BRL	0.312	0.05 BRL
Copper, Total	0.0052 mg/l	0.0052 mg/l	0.00493	0.001 BRL	0.004	0.001 BRL	0.0053	0.001 BRL	0.0036	0.0015	0.003	0.001 BRL	0.0031	0.001 BRL
Nickel, Total	0.029 mg/l	0.020 mg/l	0.1109	0.002 BRL	0.0863	0.002 BRL	0.1184	0.002 BRL	0.0669	0.002 BRL	0.0633	0.002 BRL	0.0657	0.002 BRL
Zinc, Total	0.0666 mg/l	0.015 mg/l	0.01 BRL	0.01 BRL	0.01 BRL	0.01 BRL	0.01	0.01 BRL	0.0102	0.01 BRL	0.01 BRL	0.01 BRL	0.01 BRL	0.01 BRL
Manganese, Total	See Note 1	See Note 1	0.6045	0.01248	0.6087	0.0119	1.095	0.0162	2.479	0.0234	1.084	0.0069	0.9667	0.0436
Inorganic Anions (mg/l)														
Chloride	See Note 2	0.1 mg/l	83.7	97.6	78.9	86.7	83	84.4	99.6	93.4	94.7	93.9	94	91.9

Notes:
NA = Not Applicable
INF = GWTP Influent
EFF = GWTP Effluent
BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution
ND = Concentration, if any, is below reporting limit for each individual analyte
* Minimum Level (ML) is defined in the 2010 RGP #MAG910016 as the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence
** pH measurements collected in the field by Roux personnel using a calibrated pH meter
*** September sampling event was postponed because the GWTP was offline due to extraction well reconditioning activities from September 26 - October 5, 2016
1. Analytical Parameter is not specified in the 2010 RGP #MAG910016 and is analyzed as an operational measure
2. Analytical Parameter is selected in the 2010 RGP #MAG910016 as Monitor Only with no effluent limit specified

Appendix E: GWTP Aqueous Analytical Results (SA9)
July 2016 through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Analytical Parameter	Minimum Level*	07/24/16	08/22/16	10/10/16**	10/31/16	11/21/16	12/05/16
		ASEFF	ASEFF	ASEFF	ASEFF	ASEFF	ASEFF
Volatile Organic Compounds (ug/l)							
Benzene	2 ug/l	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL
Toluene	2 ug/l	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL
Ethylbenzene	2 ug/l	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL
meta-Xylene and para-Xylene (m,p-Xylenes)	2 ug/l	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL
ortho-Xylene (o-Xylene)	2 ug/l	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL
Total Xylenes (m,p,o Xylenes)	2 ug/l	ND	ND	ND	ND	ND	ND
Total BTEX	2 ug/l	ND	ND	ND	ND	ND	ND
Methyl-tert-Butyl Ether (MTBE)	10 ug/l	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL
tert-Butyl Alcohol (TBA)	10 ug/l	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL
tert-Amyl Methyl Ether (TAME)	10 ug/l	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL	10 BRL
1,1,1-Trichloroethane (1,1,1-TCA)	5 ug/l	13	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
1,1-Dichloroethane (1,1-DCA)	5 ug/l	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
1,2-Dichloroethane (1,2-DCA)	5 ug/l	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
1,1-Dichloroethene (1,1-DCE)	3.2 ug/l	3.2 BRL	3.2 BRL	3.2 BRL	3.2 BRL	3.2 BRL	3.2 BRL
cis-1,2-Dichloroethene (cis-1,2-DCE)	5 ug/l	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
Dichloromethane (Methylene Chloride)	4.6 ug/l	4.6 BRL	4.6 BRL	4.6 BRL	4.6 BRL	4.6 BRL	4.6 BRL
Tetrachloroethene (PCE)	5 ug/l	16	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
Trichloroethene (TCE)	5 ug/l	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
1,1,2-Trichloroethane	5 ug/l	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
Acetone	50 ug/l	50 BRL	50 BRL	50 BRL	50 BRL	50 BRL	50 BRL
1,4-Dioxane	50 ug/l	50 BRL	50 BRL	50 BRL	50 BRL	50 BRL	50 BRL
1,4-Dichlorobenzene	5 ug/l	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL	5 BRL
Carbon Tetrachloride	4.4 ug/l	4.4 BRL	4.4 BRL	4.4 BRL	4.4 BRL	4.4 BRL	4.4 BRL
Vinyl Chloride	2.0 ug/l	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL	2 BRL
TOTAL VOCs Concentration:		**29**	**0**	**0**	**0**	**0**	**0**

Notes:

ASEFF = Air Stripper Effluent (Aqueous)

Total BTEX = sum of Benzene, Toluene, Ethylbenzene, and total Xylenes

BRL = Concentration, if any, is below reporting limit for analyte. Reporting limit is the lowest concentration that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample size and dilution.

ND = Concentration, if any, is below reporting limit for each individual analyte

* Minimum Level (ML) is defined in the 2010 RGP #MAG910016 as the lowest level at which the analytical system gives recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence

** September sampling event was postponed because the GWTP was offline due to extraction well reconditioning activities from September 26 - October 5, 2016

APPENDIX F

Vapor Phase Carbon Air Sampling Results (SA9)
July through December 2016

Appendix F: Vapor Phase Carbon Air Sampling Results (SA9)
July 2016 Through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	Sample Location	Total VOC Concentration (ppmv)	Removal Efficiency
07/11/16	Carbon Influent	7.8	
	Carbon Mid	0.8	90%
	Carbon Effluent	0.0	100%
07/24/16	Carbon Influent	12.1	
	Carbon Mid	0.6	95%
	Carbon Effluent	0.0	100%
07/26/16	Carbon Influent	11.2	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
08/01/16	Carbon Influent	8.9	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
08/08/16	Carbon Influent	9.3	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
08/15/16	Carbon Influent	7.8	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
08/22/16	Carbon Influent	9.1	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
08/29/16	Carbon Influent	8.9	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
09/06/16	Carbon Influent	10.2	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
09/13/16	Carbon Influent	6.8	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
09/19/16	Carbon Influent	2.1	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
10/10/16	Carbon Influent	3.7	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
10/17/16	Carbon Influent	3.1	
	Carbon Mid	0.4	87%
	Carbon Effluent	0.0	100%
10/31/16	Carbon Influent	6.2	
	Carbon Mid	2.6	58%
	Carbon Effluent	0.0	100%
11/07/16	Carbon Influent	8.1	
	Carbon Mid	0.1	99%
	Carbon Effluent	0.0	100%

Appendix F: Vapor Phase Carbon Air Sampling Results (SA9)
July 2016 Through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	Sample Location	Total VOC Concentration (ppmv)	Removal Efficiency
11/14/16	Carbon Influent	10.4	
	Carbon Mid	0.1	99%
	Carbon Effluent	0.0	100%
11/21/16	Carbon Influent	8.5	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
11/29/16	Carbon Influent	8.4	
	Carbon Mid	0.2	98%
	Carbon Effluent	0.0	100%
12/05/16	Carbon Influent	7.8	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
12/12/16	Carbon Influent	8.2	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%
12/19/16	Carbon Influent	9.1	
	Carbon Mid	0.0	100%
	Carbon Effluent	0.0	100%

Notes:
Total VOC Concentration = Total volatile organic compounds concentration
ppmv = parts per million by volume
Total VOC Concentration measured using a photoionization detector (PID) unless otherwise noted

APPENDIX G

GWTP Carbon Usage Summary (SA9)

Appendix G: GWTP Carbon Usage Summary (SA9)
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	Vessel(s) Changed Out	Lbs GAC Replaced	Lbs GAC Replaced To Date
03/20/98	LP-2	2,000	2,000
07/15/98	LP-1 & LP-2	4,000	6,000
09/18/98	VP-1	1,800	7,800
11/23/98	LP-1 & LP-2	4,000	11,800
02/16/99	VP-2	1,800	13,600
06/10/99	VP-1	1,800	15,400
12/09/99	VP-2	1,800	17,200
12/20/99	LP-2	1,000	18,200
04/20/00	VP-1	1,800	20,000
01/05/01	VP-1 & VP-2	3,600	23,600
12/07/01	VP-2	1,800	25,400
12/07/01	LP-2	1,000	26,400
07/23/02	LP-1 & LP-2	2,000	28,400
07/23/02	VP-1	1,800	30,200
02/11/03	VP-2	1,800	32,000
07/03/03	VP-1	1,800	33,800
11/20/03	VP-2	1,800	35,600
01/23/04	LP-2	1,000	36,600
04/27/04	VP-1	1,800	38,400
11/11/04	VP-2	1,800	40,200
11/11/04	LP-2	2,150	42,350
03/30/05	VP-1	1,800	44,150
08/23/05	LP-2	2,000	46,150
08/23/05	VP-2	1,800	47,950
08/23/05	VP-1	1,800	49,750
07/10/06	LP-2	2,000	51,750
07/10/06	VP-1	1,800	53,550
07/10/06	VP-2	1,800	55,350
02/22/07	LP-1/LP-2	2,000	57,350
02/22/07	VP-1	1,800	59,150
02/22/07	VP-2	1,800	60,950
11/29/07	VP-1	1,800	62,750
11/29/07	VP-2	1,800	64,550
04/08/08	LP-1	2,000	66,550
04/08/08	VP-1	1,800	68,350
04/08/08	VP-2	1,800	70,150
11/25/08	VP-1	1,800	71,950
04/09/09	LP-1	1,800	73,750
04/09/09	VP-2	1,800	75,550
07/09/09	VP-1	1,800	77,350
07/09/09	VP-2	1,800	79,150
02/12/10	VP-1	1,800	80,950
05/12/10	LP-1	2,000	82,950
05/12/10	VP-1	1,500	84,450
05/12/10	VP-2	1,500	85,950
11/08/10	VP-1	1,800	87,750
11/08/10	VP-2	1,800	89,550
06/07/11	VP-1	1,800	91,350
06/07/11	LP-1	2,000	93,350
07/26/11	LP-2	2,000	95,350
10/26/11	LP-1	2,000	97,350
10/26/11	LP-2	2,000	99,350
10/26/11	VP-2	1,800	101,150
02/02/12	VP-1	1,800	102,950
06/07/12	VP-1	1,800	104,750
06/07/12	VP-2	1,800	106,550
06/07/12	LP-1	2,000	108,550

Appendix G: GWTP Carbon Usage Summary (SA9)
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	Vessel(s) Changed Out	Lbs GAC Replaced	Lbs GAC Replaced To Date
09/17/12	VP-1	1,800	110,350
12/18/12	LP-1	2,000	112,350
12/18/12	VP-2	1,800	114,150
04/16/13	VP-1	1,800	115,950
07/12/13	VP-2	1,800	117,750
07/23/13	LP-1	2,000	119,750
07/23/13	VP-1	1,800	121,550
08/11/14	LP-1	2,000	123,550
10/06/14	VP-2	1,800	125,350
01/26/15	LP-1	2,000	127,350
02/23/15	VP-1	1,800	129,150
09/04/15	VP-1	1,800	130,950
09/04/15	VP-2	1,800	132,750
09/24/15	LP-2	2,000	134,750
04/04/16	VP-2	1,800	136,550
06/27/16	VP-1	1,800	138,350
07/25/16	VP-2	1,800	140,150
07/25/16	LP-2	2,000	142,150

Notes:
GAC = Granular Activated Carbon
LP = Liquid Phase
VP = Vapor Phase

APPENDIX H

GWTP Ion Exchange Resin Usage Summary (SA9)

Appendix H: GWTP Ion Exchange Resin Usage Summary (SA9)
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Date	CF Resin Replaced	CF Resin Replaced To Date
08/31/12	30	30
04/29/13	30	60
05/05/14	30	90
07/13/15	30	120
09/06/16	30	150

Notes:
CF = Cubic Feet

APPENDIX I

Cost Summary Report - GWTP Operation and Maintenance
Year 19 - January through December 2016

Appendix I: Cost Summary Report - GWTP Operation and Maintenance
Year 19 - January through December 2016
BASF Corporation - Groundwater Treatment Plant
Plainville, MA

Cost Description	Original Budget	Actual Costs - 2016				Total
		1st Quarter Jan-Mar	2nd Quarter Apr-Jun	3rd Quarter Jul-Sep	4th Quarter * Oct-Dec	
Labor Costs						
Labor Hours		552.25	446.00	398.3	698.00	2,094.5
Labor Total		$49,968	$42,899	$39,014	$74,047	$205,928
Subtotal Labor Costs	**$166,030**	**$49,968**	**$42,899**	**$39,014**	**$74,047**	**$205,928**
		30%	**26%**	**23%**	**45%**	**124%**
Direct Costs						
Chemicals & Bag Filters		$1,972	$0.0	$0.0	$0.0	$1,972
Lab Analysis		$1,340	$3,719.1	$1,702.8	$3,801.6	$10,563
Maintenance, Calibration, & Repair		$3,835	$5,542.8	$3,324.9	$45,293.8	$57,996
Spare Parts, Tools, & Equipment		$4,143	$5,145.2	$6,291.1	$19,815.8	$35,395
Health & Safety Supplies			$0.0	$0.0	$0.0	$0
Carbon/Resin		$3,331	$6,428.1	$23,036.0	$3,331.0	$36,126
Sludge			$0.0	$0.0	$0.0	$0
ODCs		$1,758	$1,474.8	$1,170.4	$2,961.9	$7,365
Subtotal Direct Costs	**$100,803**	**$16,378**	**$22,310**	**$35,525**	**$75,204**	**$149,418**
		16%	**22%**	**35%**	**75%**	**148%**
Total						
	$266,833	**$66,346.73**	**$65,209**	**$74,539**	**$149,250**	**$355,345**
		25%	**24%**	**28%**	**56%**	**133%**

Notes:
ODCs = Other Direct Costs
* Note that costs associated with the fourth quarter include three non-routine maintenance projects requested by BASF (extraction well reconditioning; extraction well pump/motor assembly service, repairs, and replacement; and additional GWTP component cleaning and line jetting) in addition to the routine O&M costs

ATTACHMENTS

ATTACHMENT 1

Liquid Acid Descaler Safety Data Sheet

Safety Data Sheet

COTEY CHEMICAL CORP.
Solving Water Well Production Problems Since 1949

Liquid Acid Descaler

Issue Date: 03-Oct-2007 **Revision Date:** July 15, 2015 **Version** 1

1. IDENTIFICATION

Product Identifier
Product Name Liquid Acid Descaler

Other means of identification
SDS # CCH-005

UN/ID No UN1760

Recommended use of the chemical and restrictions on use
Recommended Use Descaling Acid.

Details of the supplier of the safety data sheet
Supplier Address
Cotey Chemical Corporation
4410 M.L.K. Blvd.
Lubbock, TX 79408

Emergency Telephone Number
Company Phone Number 806-747-2096
Emergency Telephone (24 hr) INFOTRAC 1-352-323-3500 (International)
1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Appearance Pale yellow liquid **Physical State** Liquid **Odor** Burnt Sugar

Classification

Acute toxicity - Oral	Category 4
Skin corrosion/irritation	Category 1 Sub-category B
Eye damage/eye irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3

Signal Word
Danger

Hazard Statements
Harmful if swallowed
Causes skin burns and eye damage
May cause respiratory irritation. May cause drowsiness or dizziness

NSF Certified to NSF/ANSI 60

Precautionary Statements - Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapors/spray
Wear protective gloves/protective clothing/eye protection/face protection

Precautionary Statements - Response
Immediately call a poison center or doctor/physician
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a poison center or doctor/physician
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a poison center or doctor/physician
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Do not induce vomiting

Precautionary Statements - Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No	Weight-%
Hydrochloric acid	7647-01-0	>60

If Chemical Name/CAS No is "proprietary" and/or Weight-% is listed as a range, the specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. FIRST-AID MEASURES

First Aid Measures

General Advice Provide this SDS to medical personnel for treatment.

Eye Contact IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor/physician.

Skin Contact IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a poison center or doctor/physician. Wash contaminated clothing before reuse.

Inhalation IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a poison center or doctor/physician.

Ingestion IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. Do not induce vomiting.

Most important symptoms and effects

Symptoms Harmful if swallowed. Causes severe skin burns and eye damage. May cause respiratory irritation. May cause drowsiness or dizziness.

Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Carbon dioxide (CO2). Water spray or fog. Dry chemical. Foam.

Unsuitable Extinguishing Media Not determined.

Specific Hazards Arising from the Chemical
Corrosive material. Keep containers cool with water spray to prevent container rupture due to steam buildup.

Hazardous Combustion Products Smoke, fumes or vapors, and oxides of carbon.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation, especially in confined areas.

Environmental Precautions See Section 12 for additional Ecological Information.

Methods and material for containment and cleaning up

Methods for Containment Prevent further leakage or spillage if safe to do so.

Methods for Clean-Up Wash small spills to sanitary sewer. Large spills-confine spill, soak up with approved absorbent, and shovel product into approved container for disposal. Dispose of contents/container to an approved waste disposal plant.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Avoid breathing dust/fume/gas/mist/vapors/spray. Wear protective gloves/protective clothing and eye/face protection. Wash face, hands, and any exposed skin thoroughly after handling. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep container tightly closed and store in a cool, dry and well-ventilated place. Store locked up.

Incompatible Materials Strong oxidizers. Strong acids. Strong alkalis.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Hydrochloric acid 7647-01-0	Ceiling: 2 ppm	(vacated) Ceiling: 5 ppm (vacated) Ceiling: 7 mg/m^3 Ceiling: 5 ppm Ceiling: 7 mg/m^3	IDLH: 50 ppm Ceiling: 5 ppm Ceiling: 7 mg/m^3
Ethylene Glycol Monobutyl Ether 111-76-2	TWA: 20 ppm	TWA: 50 ppm TWA: 240 mg/m^3 (vacated) TWA: 25 ppm (vacated) TWA: 120 mg/m^3 (vacated) S* S*	IDLH: 700 ppm TWA: 5 ppm TWA: 24 mg/m^3

Appropriate engineering controls

Engineering Controls Apply technical measures to comply with the occupational exposure limits. Showers. Eyewash stations. Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Goggles or safety glasses with side shields.

Skin and Body Protection Neoprene or rubber gloves with cuffs. Coveralls, apron or other equipment should be worn to minimize skin contact.

Respiratory Protection None required while threshold limits are kept below maximum allowable concentrations; if TWA exceeds limits, NIOSH approved respirator must be worn. Respiratory protection must be provided in accordance with OSHA regulations (29 CFR1910.134) or European Standard EN 149, as applicable.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Wash contaminated clothing before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid		
Appearance	Pale yellow liquid	**Odor**	Burnt Sugar
Color	Not determined	**Odor Threshold**	Not determined

Property	Values	Remarks • Method
pH	<1.0	
Melting Point/Freezing Point	Not determined	
Boiling Point/Boiling Range	100 °C 212 °F	
Flash Point	Not determined	
Evaporation Rate	<1	(Water = 1)
Flammability (Solid, Gas)	Liquid- Not Applicable	
Upper Flammability Limits	Not determined	
Lower Flammability Limit	Not determined	
Vapor Pressure	17 mm Hg	@ 20°C (68°F)
Vapor Density	>1	(Air=1)
Specific Gravity	1.190	(Water = 1)
Water Solubility	Completely soluble	
Solubility in other solvents	Not determined	
Partition Coefficient	Not determined	
Auto-ignition Temperature	Not determined	

Decomposition Temperature	Not determined	
Property	**Values**	**Remarks • Method**
Kinematic Viscosity	Not determined	
Dynamic Viscosity	Not determined	
Explosive Properties	Not determined	
Oxidizing Properties	Not determined	
Additional Information	Volatile by volume 100%	

10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions.

Chemical Stability
Stable.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to Avoid
Keep out of reach of children.

Incompatible Materials
Strong oxidizers. Strong acids. Strong alkalis.

Hazardous Decomposition Products
Decomposition will not occur if handled and stored properly. In case of fire, oxides of carbon, hydrocarbons, fumes or vapors, and smoke may be produced.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Eye Contact Causes eye damage.

Skin Contact Causes skin burns.

Inhalation Do not inhale.

Ingestion Harmful if swallowed.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Hydrochloric acid 7647-01-0	= 700 mg/kg (Rat)	> 5010 mg/kg (Rabbit)	= 3124 ppm (Rat) 1 h
Hydroxyacetic acid 79-14-1	-	-	= 7100 µg/m^3 (Rat) 4 h
Ethylene Glycol Monobutyl Ether 111-76-2	= 470 mg/kg (Rat)	= 2270 mg/kg (Rat) = 220 mg/kg (Rabbit)	= 2.21 mg/L (Rat) 4 h = 450 ppm (Rat) 4 h

Information on physical, chemical and toxicological effects

Symptoms Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity Group 3 IARC components are "not classifiable as human carcinogens".

Chemical Name	ACGIH	IARC	NTP	OSHA
Hydrochloric acid 7647-01-0		Group 3		
Ethylene Glycol Monobutyl Ether 111-76-2	A3	Group 3		

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)

A3 - Animal Carcinogen

IARC (International Agency for Research on Cancer)

Group 3 IARC components are "not classifiable as human carcinogens"

STOT - single exposure May cause respiratory irritation. May cause drowsiness or dizziness.

Numerical measures of toxicity

Not determined

12. ECOLOGICAL INFORMATION

Ecotoxicity

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Component Information

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Hydrochloric acid 7647-01-0		282: 96 h Gambusia affinis mg/L LC50 static		
Hydroxyacetic acid 79-14-1		5000: 96 h Brachydanio rerio mg/L LC50 static		
Alkyloxypolyethyleneoxyethanol 84133-50-6		3.2: 96 h Pimephales promelas mg/L LC50		3.2: 48 h water flea mg/L EC50
Ethylene Glycol Monobutyl Ether 111-76-2		1490: 96 h Lepomis macrochirus mg/L LC50 static 2950: 96 h Lepomis macrochirus mg/L LC50		1698 - 1940: 24 h Daphnia magna mg/L EC50 1000: 48 h Daphnia magna mg/L EC50

Persistence/Degradability

Not determined.

Bioaccumulation

Not determined.

Mobility

Chemical Name	Partition Coefficient
Hydroxyacetic acid 79-14-1	-1.11
Ethylene Glycol Monobutyl Ether 111-76-2	0.81

Other Adverse Effects

Not determined

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT

UN/ID No	UN1760
Proper Shipping Name	Corrosive liquid, n.o.s., (hydrochloric acid, hydroxyacetic acid)
Hazard Class	8
Packing Group	II

IATA

UN/ID No	UN1760
Proper Shipping Name	Corrosive liquid, n.o.s., (hydrochloric acid, hydroxyacetic acid)
Hazard Class	8
Packing Group	II

IMDG

UN/ID No	UN1760
Proper Shipping Name	Corrosive liquid, n.o.s., (hydrochloric acid, hydroxyacetic acid)
Hazard Class	8
Packing Group	II

15. REGULATORY INFORMATION

International Inventories

Chemical Name	TSCA	DSL	NDSL	EINECS	ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Hydrochloric acid	Present	X		Present		Present	X	Present	X	X

Legend:

TSCA *- United States Toxic Substances Control Act Section 8(b) Inventory*

DSL/NDSL *- Canadian Domestic Substances List/Non-Domestic Substances List*

EINECS/ELINCS *- European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances*

ENCS *- Japan Existing and New Chemical Substances*

IECSC *- China Inventory of Existing Chemical Substances*

KECL *- Korean Existing and Evaluated Chemical Substances*

PICCS *- Philippines Inventory of Chemicals and Chemical Substances*

AICS *- Australian Inventory of Chemical Substances*

US Federal Regulations

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Hydrochloric acid 7647-01-0	5000 lb	5000 lb	RQ 5000 lb final RQ RQ 2270 kg final RQ

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS No	Weight-%	SARA 313 - Threshold Values %
Hydrochloric acid - 7647-01-0	7647-01-0	60-65	1.0
Ethylene Glycol Monobutyl Ether - 111-76-2	111-76-2	<1	1.0

CWA (Clean Water Act)

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Hydrochloric acid	5000 lb			X

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Hydrochloric acid 7647-01-0	X	X	X
Ethylene Glycol Monobutyl Ether 111-76-2	X	X	X

16. OTHER INFORMATION

NFPA	**Health Hazards**	**Flammability**	**Instability**	**Special Hazards**
	Not determined	Not determined	Not determined	Not determined
HMIS	**Health Hazards**	**Flammability**	**Physical Hazards**	**Personal Protection**
	2	0	0	Not determined

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Revision Note: New format

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

ATTACHMENT 2

Liquid Acid Descaler Technical Data Catalog Documentation

LIQUID DESCALER

Use LIQUID DESCALER to:

- remove biofilm produced by slime-forming bacteria, such as that produced by iron-oxidizing and sulfate-reducing bacteria.
- act as an excellent chelating agent (tie up) on iron sulfates and iron chlorides.
- dissolve carbonate, sulfate, magnesium and iron deposits (mineral deposits).
- keep dissolved solids in suspension more efficiently than other mineral acids improving well rinse-out.
- descale shop equipment corroded with iron scale.

How to use LIQUID DESCALER:

Descale equipment in water wells by using to 5 to 10 gallons per 100 gallons of water inside casing. (See table on next page for calculation)

LIQUID DESCALER should remain in the well for 24-36 hours and should be agitated every few hours. If a rig is over the hole agitate with a bailer, surge block or other tool. Dry ice can be used to agitate the chemical if rig or pump are not available.

Pump or bail the hole clean, develop and test. Initial water after treatment contains spent chemicals and should be pumped to waste.

For best results:

- Brush the well with the COTEY WELL CLEANING BRUSH prior to chemical treatment. Brushing the well can remove interior screen deposits ensuring more uniform chemical access into the formation.
- Agitate the well with a tight-fitting surge block or other isolation tool (the Cotey WELL CLEANING BRUSH, for example). This dislodges material softened by the chemical treatment and pushes the chemical solution further into areas it may otherwise not be able to reach.

  (note: The combination of both chemical and mechanical energy is important for penetrating and removing the plugging material)
- Monitor the pH during acid treatment. When acidizing a water well it is best to check the pH frequently. With pH levels above 3.0 the acid is losing strength and productivity. Check the pH after each agitation. If the pH rises above 3.0 add more acid. This process allows for a more accurate chemical treatment.

How to dispose of LIQUID DESCALER:

Waste resulting from treatment with LIQUID DESCALER contains a surface-active agent and, depending on quantity used and condition of the well treated, may be near neutral to very acidic. Cotey therefore recommends that waste be pumped to sewage, barrow ditches for natural evaporation and biodegradation, or to local pits for evaporation and consequent filling provided infiltration will not contaminate a local aquifer. In all cases waste should be thoroughly diluted. (Local, State and Federal regulations should be adhered to.)

CAUTION:

DO NOT MIX LIQUID DESCALER WITH OTHER CHEMICALS!

When using this product, wear eye goggles or safety glasses.

LIQUID DESCALER is a blend of liquid acids, polymers, surfactants and inhibitors. Thus, skin or eyes should be flushed with water if contact occurs and medical attention should be secured, particularly for the eyes. Avoid breathing spray or mist. If ingested drink large amounts of liquid such as tea, coffee, water or milk and raw eggs if available. Secure immediate medical aid.

LIQUID DESCALER is safe on all common metals in well equipment except for prolonged contact with aluminum or galvanized equipment. Use DRY ACID® SPECIAL and BIOCLEAN for descaling aluminum or galvanized equipment.

LIQUID DESCALER is packaged in 1-gallon, 5-gallon and 55-gallon containers.

Diameter of Casing or hole (inches)	Gallons per foot of depth
3.0	0.37
3.5	0.50
4.0	0.65
4.5	0.83
5.0	1.02
5.5	1.23
6.0	1.47
7.0	2.00
8.0	2.61
9.0	3.31
10.0	4.08
11.0	4.94
12.0	5.88
13.0	6.90
14.0	8.00
15.0	9.18
16.0	10.00
17.0	11.79
18.0	13.22
19.0	14.73
20.0	16.32
22.0	19.75
24.0	23.50
26.0	27.58
28.0	31.99
30.0	36.72
32.0	41.78

NSF

Certified to ANSI-NSF 60