



Pfizer Inc.
100 Route 206 North, MS 420
Peapack, NJ 07977
Tel: 908-413-0811

December 6, 2021

Mr. Kevin Barrett
Supervising Environmental Analyst
Waste Engineering and Enforcement Division
Bureau of Materials Management and Compliance Assurance
Department of Energy and Environmental Protection
79 Elm Street
Hartford, Connecticut 06106-5127

**Re: Stewardship Permit Application Renewal
Permit No. DEEP/SWF/CS-072-021
Solid Waste Land Disposal Facility
Pfizer Inc Closed Landfill
215 Stoddards Wharf Road
Ledyard, Connecticut 06339**

Dear Mr. Barrett:

Please find attached a Permit Application for renewal of the existing Stewardship Permit referenced above for the Pfizer Inc. Closed Landfill located at 215 Stoddards Wharf Road in Ledyard, Connecticut.

If you need further information, please contact me at 908-413-0811.

Sincerely,

A handwritten signature in cursive script that reads 'Russell Downey'.

Russell Downey
Director, Environmental Engineering, Remediation & Transactions
Pfizer Global Engineering
Pfizer Inc.

cc: F. Allyn, Town of Ledyard
G. Calkins, Ledge Light Health Department
G. Vassallo, Pfizer
C. Clark, Pfizer
R. Schott, Pfizer
E. Schmidt, AECOM
J. Brogden, AECOM

Attachments: Permit Application



**Connecticut Department of
Energy & Environmental Protection**

CPPU USE ONLY

App #: _____

Doc #: _____

Check #: _____

Permit Application Transmittal Form

Please complete this transmittal form in accordance with the instructions in order to ensure the proper handling of your application(s) and the associated fee(s). Print legibly or type.

Part I: Applicant Information:

- **If an applicant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, applicant's name shall be stated exactly as it is registered with the Secretary of State.*
- *If an applicant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*

Applicant: **Pfizer Inc.**

Mailing Address: **100 Route 206 North**

City/Town: **Peapack** State: **NJ** Zip Code: **07977**

Business Phone: **908-901-6079** ext.:

Contact Person: **Russell Downey** Phone: **908-413-0811** ext.

E-Mail: **russell.g.downey@pfizer.com**

Applicant (check one): individual *business entity federal agency state agency municipality tribal
 *If a business entity, list type (e.g., corporation, limited partnership, etc.): **Corporation**

Check if any co-applicants. If so, attach additional sheet(s) with the required information as supplied above.

Please provide the following information to be used for *billing purposes only*, if different:

Company/Individual Name: _____

Mailing Address: _____

City/Town: _____ State: _____ Zip Code: _____

Contact Person: _____ Phone: _____ ext. _____

Part II: Project Information

Brief Description of Project: *(Example: Development of a 50 slip marina on Long Island Sound)*

This application is being submitted to renew the Stewardship Permit pertaining to post-closure care obligations for the closed landfill.

Location (City/Town): **Ledyard**

Other Project Related Permits *(not included with this form)*:

Permit Description	Issuing Authority	Submittal Date	Issuance Date	Denial Date	Permit #

Part III: Individual Permit Application and Fee Information

New, Mod. or Renew	Individual Permit Applications	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
	New Source Review <input type="checkbox"/> Revision <input type="checkbox"/> minor mod	\$940.00			1 + 0
	Title V Operating Permits <input type="checkbox"/> Revision <input type="checkbox"/> minor mod <input type="checkbox"/> non-minor mod	none			1 + 0
	Title IV	none			1 + 0
	Clean Air Interstate Rule (CAIR)	none			1 + 0
	WATER DISCHARGES				
	To Groundwater	\$1300.00			1 + 1
	To Sanitary Sewer (POTW)	\$1300.00			1 + 1
	To Surface Water (NPDES)	\$1300.00			1 + 1
	WATER PLANNING AND MANAGEMENT				
	Dam Safety	none			1 + 2
	Domestic Sewage Treatment Works (For municipal and private sewage treatment facilities discharging to surface waters)	\$1300.00/ Mod = \$940			1 + 1
	Water Diversion (consumptive) and Registrations	★			1 + 5
	LAND AND WATER RESOURCES				
	Flood Management Certification	none			1 + 1
	Flood Management Certification Exemption	none			1 + 1
	Inland Wetlands and Watercourses (State Agencies Only)	none			1 + 5
	Inland 401 Water Quality Certification	none			1 + 5
	FERC- Hydropower Projects- 401 Water Quality Certification	none			1 + 5
	Water Diversion (non-consumptive)	★			1 + 5
	Certificate of Permission	\$375.00			1 + 2
	Coastal 401 Water Quality Certification	none			1 + 2
	Structures and Dredging/and Fill/Tidal Wetlands	\$660.00			1 + 2
	WASTE MANAGEMENT				
	Aerial Pesticide Application	★			1 + 2
	Aquatic Pesticide Application	\$200.00			1 + 0
	CGS Section 22a-454 Waste Facilities	★			1 + 1
	Disruption of a Solid Waste Disposal Area	\$0			1 + 1
	Hazardous Waste Treatment, Storage and Disposal Facilities	★			1 + 1
	Marine Terminal License	\$100.00			1 + 0
Renew	Stewardship	\$4000.00	1	\$4000.00	1 + 1
	Solid Waste Facilities	★			1 + 1
	Waste Transportation	★			1 + 0
		Subtotal →	1	\$4000.00	
	GENERAL PERMITS and AUTHORIZATIONS	Subtotals Page 3 & 4 →		\$0	
	Enter subtotals from Part IV, pages 3 - 6 of this form	Subtotals Page 5 →		\$0	
		Subtotals Page 6 →		\$0	
		TOTAL →	1	\$4000	
	<input type="checkbox"/> Indicate whether municipal discount or state waiver applies. Less Applicable Discount →				
	AMOUNT REMITTED →			\$4000	
Check # →	<input type="text"/>				
					Check or money order should be made payable to: "Department of Energy and Environmental Protection"

★ See fee schedule on individual application.

Part IV: General Permit Registrations and Requests for Other Authorizations
Application and Fee Information

<input checked="" type="checkbox"/> General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
AIR EMISSIONS				
<input type="checkbox"/> Limit Potential to Emit from Major Stationary Sources of Air Pollution	\$2760.00			1 + 0
<input type="checkbox"/> Diagnostic and Therapeutic X-Ray Devices (Medical X-Ray) Registration	\$190.00/Xray device			1 + 0
<input type="checkbox"/> Radioactive Materials and Industrial Device Registration (Ionizing Radiation)	\$200.00			1 + 0
<input type="checkbox"/> Emergency/Temporary Authorization	★★			★★
<input type="checkbox"/> License Revocation Request	\$0			★★
<input type="checkbox"/> Other, (please specify):				
WATER DISCHARGES				
Categorical Industry User to a POTW				
<input type="checkbox"/> Discharges ≥ 10,000 gpd	\$6250.00			1 + 0
<input type="checkbox"/> Discharges < 10,000 gpd	\$3125.00			
Comprehensive Discharges to Surface Water and Groundwater				
<input type="checkbox"/> Registration Only	\$625.00			1 + 0
<input type="checkbox"/> Approval of Registration by DEEP	\$1250.00			
<input type="checkbox"/> Domestic Sewage	\$625.00			1 + 0
<input type="checkbox"/> Food Service Establishment Wastewater	No Registration			
Groundwater Remediation Wastewater				
<input type="checkbox"/> Registration Only	\$625.00			1 + 0
<input type="checkbox"/> Approval of Registration by DEEP	\$1250.00			
Miscellaneous Discharges of Sewer Compatible Wastewater				
<input type="checkbox"/> Registration Only	\$500.00			1 + 0
<input type="checkbox"/> Approval of Registration by DEEP	\$1000.00			
<input type="checkbox"/> Nitrogen Discharges	No Registration			
<input type="checkbox"/> Point Source Discharges from Application of Pesticides	\$200.00			1 + 0
<input type="checkbox"/> Stormwater Associated with Commercial Activities	\$300.00			1 + 0
Stormwater Associated with Industrial Activities				
<input type="checkbox"/> No Exposure Certification	\$250.00			1 + 0
<input type="checkbox"/> <50 employees--see general permit for additional requirements	\$500.00			
<input type="checkbox"/> >50 employees--see general permit for additional requirements	\$1000.00			
<input type="checkbox"/> Stormwater & Dewatering Wastewaters-Construction Activities	★			1 + 0
<input type="checkbox"/> Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	\$625.00			1 + 0
<input type="checkbox"/> Stormwater from DOT Separate Storm Sewer Systems (DOT MS4)	\$0			1 + 0
<input type="checkbox"/> Subsurface Sewage Disposal Systems Serving Existing Facilities	★★			1 + 0
<input type="checkbox"/> Swimming Pool Wastewater - Public Pools and Contractors	\$500.00			1 + 0
Vehicle Maintenance Wastewater				
<input type="checkbox"/> Registration Only	\$625.00			1 + 0
<input type="checkbox"/> Approval of Registration by DEEP	\$1250.00			
<input type="checkbox"/> Emergency/Temporary Authorization - Discharge to POTW	\$1500.00			1 + 0
<input type="checkbox"/> Emergency/Temporary Authorization - Discharge to Surface Water	\$1500.00			1 + 0
<input type="checkbox"/> Emergency/Temporary Authorization - Discharge to Groundwater	\$1500.00			1 + 0
<input type="checkbox"/> Other, (please specify):				
Note: Carry subtotals over to Part III, page 2 of this form.		Subtotal →	0	\$0

★ See fee schedule on registration/application.

★★ Contact the specific permit program for this information
 (Contact numbers are provided in the instructions)

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

<input checked="" type="checkbox"/> General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
AQUIFER PROTECTION PROGRAM				
<input type="checkbox"/> Registration for Regulated Activities	\$625.00			1 + 0
<input type="checkbox"/> Permit Application to Add a Regulated Activity	\$1250.00			1 + 0
<input type="checkbox"/> Exemption Application from Registration	\$1250.00			1 + 0
WATER PLANNING AND MANAGEMENT				
<input type="checkbox"/> Dam Safety Repair and Alteration: Non Filing	No Registration			
<input type="checkbox"/> Dam Safety Repair and Alteration: Filing – No PE	\$100.00			1 + 0
<input type="checkbox"/> Dam Safety Repair and Alteration: Filing – PE	\$200.00			1 + 0
<input type="checkbox"/> Dam Safety Repair and Alteration: Approval of Filing	\$250.00			1 + 0
<input type="checkbox"/> Diversion of Remediation Groundwater	No Registration			
<input type="checkbox"/> Diversion of Water for Consumptive Use: Reauthorization Categories	\$2500.00			1 + 0
<input type="checkbox"/> Diversion of Water for Consumptive Use: Authorization Required	\$2500.00			1 + 4
<input type="checkbox"/> Diversion of Water for Consumptive Use: Filing Only	\$1500.00			1 + 1
<input type="checkbox"/> Water Resource Construction Activities	★			1 + 0
<input type="checkbox"/> Emergency/Temporary Authorization	★★			★★
<input type="checkbox"/> Notice of High Hazard Dam or a Significant Hazard Dam	\$0			1 + 0
<input type="checkbox"/> Other, (please specify):				
LAND AND WATER RESOURCES				
Minor Coastal Structures				
<input type="checkbox"/> 4/40 Docks/Access Stairs	\$700.00			1 + 1
<input type="checkbox"/> Beach Grading	No Registration			
<input type="checkbox"/> Buoys or Markers	No Registration			
<input type="checkbox"/> Experimental Activities/Scientific Monitoring Devices	No Registration			
<input type="checkbox"/> Harbor Moorings	No Registration			
<input type="checkbox"/> Non-harbor Moorings	\$250.00			1 + 1
<input type="checkbox"/> Osprey Platforms and Perch Poles	No Registration			
<input type="checkbox"/> Pump-out Facilities	No Registration			
<input type="checkbox"/> Swim Floats	No Registration			
Coastal Maintenance				
<input type="checkbox"/> Backflow Prevention Structure	No Registration			
<input type="checkbox"/> Beach Grading/Raking	No Registration			
<input type="checkbox"/> Catch Basin Cleaning	No Registration			
<input type="checkbox"/> Coastal Remedial Activities Required by Order	\$700.00			1 + 1
<input type="checkbox"/> Coastal Restoration	No Registration			
<input type="checkbox"/> DEEP Boat Launch Infrastructures	No Registration			
<input type="checkbox"/> DOT Infrastructures	No Registration			
<input type="checkbox"/> Marina and Mooring Field Reconfiguration	\$700.00			1 + 1
<input type="checkbox"/> Minor Seawall Repair	No Registration			
<input type="checkbox"/> Placement of Cultch	No Registration			
<input type="checkbox"/> Reconstruction of Legally Existing Structure/Obstruction/Encroachment	\$300.00			1 + 1
<input type="checkbox"/> Removal of Derelict Structures	No Registration			
<input type="checkbox"/> Residential Flood Hazard Mitigation	\$100.00			1 + 1
<input type="checkbox"/> Temporary Access of Construction Vehicles/Equipment	No Registration			
<input type="checkbox"/> Programmatic General Permit	★			1 + 1
<input type="checkbox"/> Emergency/Temporary Authorization				
<input type="checkbox"/> Other, (please specify):				
Note: Carry subtotals over to Part III, page 2 of this form.		Subtotal	0	\$0

★ See fee schedule on registration/application.

★★ Contact the specific permit program for this information.
(Contact numbers are provided in the instructions)

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

<input checked="" type="checkbox"/> General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original Requir. Copie
WASTE MANAGEMENT				
<input type="checkbox"/> Addition of Grass Clippings at Registered Leaf Composting Facilities	\$500.00			1 + 0
<input type="checkbox"/> Beneficial Use Determination	★			1 + 0
<input type="checkbox"/> Collection and Storage of Post Consumer Paint	\$0			1 + 0
<input type="checkbox"/> Connecticut Solid Waste Demonstration Project	\$1000.00			1 + 0
Construct and Operate a Commercial Facility for the Management of Recyclable Materials and Certain Solid Wastes (Commercial GP)				
<input type="checkbox"/> Asbestos Containing Materials	\$1,250.00/\$ 625			1 + 0
<input type="checkbox"/> Ash Residue	\$1,250.00/\$ 625			1 + 0
<input type="checkbox"/> Clean Wood: Tier III	\$500.00/\$250			1 + 0
<input type="checkbox"/> Clean Wood: Tier II	\$250.00/\$125			1 + 0
<input type="checkbox"/> Construction and Demolition Waste: Tier III	\$1,250.00/\$625			1 + 0
<input type="checkbox"/> Construction and Demolition Waste: Tier II	\$500.00/\$250			1 + 0
<input type="checkbox"/> Non-RCRA Hazardous Waste/Compatible Solid Wastes	\$1,250.00/\$625			1 + 0
<input type="checkbox"/> Recyclables	\$500.00/\$250			1 + 0
<input type="checkbox"/> Universal Wastes/Compatible Solid Wastes	\$1,250.00/\$625			1 + 0
Contaminated Soil and/or Staging Management (Staging/Transfer)				
<input type="checkbox"/> New Registrations	\$250.00			1 + 0
<input type="checkbox"/> New Approval of Registrations	\$1500.00			1 + 0
<input type="checkbox"/> Renewal of Registrations	\$250.00			1 + 0
<input type="checkbox"/> Renewal of Approval of Registrations	\$750.00			1 + 0
<input type="checkbox"/> Disassembling Used Electronics	\$2000.00			1 + 0
<input type="checkbox"/> Leaf Composting Facility	\$0			1 + 1
<input type="checkbox"/> Municipal Transfer Station	\$800.00			1 + 1
<input type="checkbox"/> One Day Collection of Certain Wastes and Household Hazardous Waste	\$1000.00			1 + 0
<input type="checkbox"/> Sheet Leaf Composting Notification	\$0			★★
Special Waste Authorization				
<input type="checkbox"/> Landfill or RRF Disposal	\$660.00			
<input type="checkbox"/> Asbestos Disposal	\$300.00			1 + 0
<input type="checkbox"/> homeowner	\$0			
<input type="checkbox"/> Storage and Processing of Asphalt Roofing Shingle Waste	\$2500.00			1 + 0
<input type="checkbox"/> Storage and Processing of Scrap Tires for Beneficial Use	\$1250.00			1 + 0
<input type="checkbox"/> Emergency/Temporary Authorization	★★			★★
<input type="checkbox"/> Other, (please specify):				
REMEDIATION				
<input type="checkbox"/> In Situ Groundwater Remediation: Enhance Aerobic Biodegradation	★			1 + 2
<input type="checkbox"/> In Situ Groundwater Remediation: Chemical Oxidation	\$500.00			1 + 0
<input type="checkbox"/> Emergency/Temporary Authorization	★			★★
Note: Carry subtotals over to Part III, page 2 of this form.		Subtotal	0	\$0

★ See fee schedule on registration/application.

★★ Contact the specific permit program for this informat
(Contact numbers are provided in the instructions)

Affirmative Action, Equal Employment Opportunity and Americans with Disabilities

The Connecticut Department of Energy and Environmental Protection is an Affirmative Action/Equal Opportunity Employer that is committed to complying with the requirements of the Americans with Disabilities Act (ADA). Please contact us at (860) 418-5910 or deep.accommodations@ct.gov if you: have a disability and need a communication aid or service; have limited proficiency in English and may need information in another language; or if you wish to file an ADA or Title VI discrimination complaint.



Permit Application for a Stewardship Permit

Please complete this form in accordance with the instructions (DEP-STWD-INST-500) to ensure the proper handling of your application. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the initial fee along with this form.

DEP USE ONLY	
Application No.	_____
Permit No.	_____

Part I: Application Type

Check the appropriate box identifying the application type.

<p>This application is for (check one):</p> <p><input type="checkbox"/> A new application</p> <p><input checked="" type="checkbox"/> A renewal of an existing permit</p> <p><input type="checkbox"/> A modification of an existing permit</p>	<p>Please identify any previous or existing permit number in the space provided.</p> <p>Existing permit number: DEEP/SWF/CS-072-021</p> <p>EPA Identification number:</p>
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Part II A: Permit Type and Fee Information

Type of Stewardship Permit Check all that apply:	Initial Fee (Application Fee)	Annual Fee	Renewal Fee
<input type="checkbox"/> Closure and Corrective Action	\$4,000.00	\$3,000.00	\$4,000.00
<input type="checkbox"/> Corrective Action	\$4,000.00	\$3,000.00	\$4,000.00
<input type="checkbox"/> Long-term Obligations	\$4,000.00	\$3,000.00	\$4,000.00
<input type="checkbox"/> RCRA Hazardous Waste Land Disposal Facility	\$4,000.00	\$3,000.00	\$4,000.00
<input checked="" type="checkbox"/> Solid Waste Land Disposal Facility	\$4,000.00	\$4,000.00 for MSW \$2,950.00 for Special or Bulky Waste	\$4,000.00
<input type="checkbox"/> Corrective Action Management Unit (CAMU)	\$4,000.00	\$3,000.00	\$4,000.00

Part II B: Permit Modification and Fee Information

Note: If you are seeking a permit modification, you should consult with the Bureau of Materials Management and Compliance Assurance at (860) 424-3372 for specific requirements on modifications prior to submitting a permit application to determine what materials you will be required to submit for your type of modification.

Type of Permit Modification for a Stewardship Permit Check the appropriate box:	Initial fee
<input type="checkbox"/> Class I Permit Modification Not Requiring Approval of the Commissioner	\$470.00
<input type="checkbox"/> Class I Permit Modification Requiring Approval of the Commissioner	\$940.00
<input type="checkbox"/> Class II or Class III Permit Modification	\$4,000.00

Part III: Applicant Information

1. **Applicant:** Complete the information on the Applicant as indicated on the *Permit Application Transn Form* (DEP-APP-001):

Name: **Pfizer Inc.**

Mailing Address: **100 Route 206 North**

City/Town: **Peapack**

State: **NJ**

Zip Code: **07977**

Business Phone: **908-413-0811**

ext. **NA**

Fax: **212-499-3957**

Contact Person: **Russell Downey**

Title: **Director, PGE**

Email address: **russell.g.downey@pfizer.com**

Property Interest: Check the appropriate boxes that represents the Applicant's interest in property a which the proposed activity is to be located:

site owner option holder lessee

easement holder operator other (specify)

Check here if there are co-applicants. If so, label and attach additional sheet(s) with the required information as requested above.

2. Primary contact for this application if not contact person named in (1) above (e.g., environmental consultant, engineer, etc.):

Firm Name: **NA**

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.

Fax:

Contact Person:

Title:

Email address:

3. List attorney or other representative, if applicable:

Firm Name: **NA**

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.

cell:

Fax:

Attorney Name:

Email address:

4. List the owner of the site, if applicable:

Name: **NA**

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.

Fax:

Contact Person:

Title:

Email address:

Part III: Applicant Information (continued)

5. List any engineer(s) or other consultant(s) employed or retained to assist in preparing the application or in designing or constructing the activity.

Firm Name: **AECOM**

Mailing Address: **500 Enterprise Drive, Suite 1A**

City/Town: **Rocky Hill**

State: **CT**

Zip Code: **06067**

Business Phone: **860-263-5765**

ext. **NA**

Fax: **NA**

Contact Person: **John Brogden**

Title: **Project Manager**

Email address: **john.brogden@aecom.com**

Service Provided: **Environmental Consulting**

Check here if additional sheets are necessary, and label and attach them to this sheet.

Part IV: Site Information

1. SITE NAME AND LOCATION

Name of Site(if applicable): **Pfizer Inc Closed Landfill**

Street Address or Location Description: **215 Stoddards Wharf Road**

City/Town: **Ledyard**

State: **CT**

Zip Code: **06339**

Latitude and longitude of the exact location of the proposed activity in degrees, minutes, and seconds:

Latitude: **41° 51' 58"**

Longitude: **72° 27' 55"**

Method of determination (check one): GPS USGS Map

Other (please specify): **Approved Closure Plan**

If a USGS Map was used, provide the quadrangle name:

2. **INDIAN LANDS:** Is or will the facility be located on federally recognized Indian lands? Yes No

3. **COASTAL AREA:** Is the proposed activity located within the coastal boundary as delineated on DEP approved coastal boundary maps? Yes No

If yes, and this application is for a new facility or modification for an existing facility, you must submit a *Coastal Consistency Review Form* (DEP-APP-004) with your application as Attachment D.

4. **ENDANGERED OR THREATENED SPECIES:** Is the project site located within an area identified as a habitat for endangered, threatened or special concern species as identified on the "State and Federal Listed Species and Natural Communities Map"? Yes No Date of Map: **June 2021**

If yes, complete and submit a *Connecticut Natural Diversity Data Base* (CT NDDDB) *Review Request Form* (DEP-APP-007) to the address specified on the form. **Please note NDDDB review generally takes 4 to 6 weeks and may require additional documentation from the applicant. DEP strongly recommends that applicants complete this process before submitting the subject application.**

When submitting this application form, include copies of any correspondence to and from the NDDDB, including copies of the completed *CT NDDDB Review Request Form*, as Attachment E.

For more information visit the DEP website at www.ct.gov/dep/endorangeredspecies (Review/Data Requests)
or call the NDDDB at 860-424-3011.

Part IV: Facility Information (continued)

5. **AQUIFER PROTECTION AREAS:** Is the site located within a town required to establish Aquifer Protection Areas, as defined in section 22a-354a through 354bb of the General Statutes (CGS)?

Yes No

If yes, is the site within an area identified on a Level A or Level B map? Yes No

To view the applicable list of towns and maps visit the DEP website at www.ct.gov/dep/aquiferprotectio

To speak with someone about the Aquifer Protection Areas, call 860-424-3020.

6. **CONSERVATION OR PRESERVATION RESTRICTION:** Is the property subject to a conservation or preservation restriction? Yes No

If Yes, proof of written notice of this application to the holder of such restriction or a letter from the holder of such restriction verifying that this application is in compliance with the terms of the restriction, must be submitted as Attachment F.

Part V: Site History/ Waste Management History

If an Environmental Conditions Assessment Form (ECAF) has been submitted to the DEP or EPA within the two years, the information required by this part of the application can be satisfied by noting the date the ECAF was submitted and attaching a copy of the form submitted as Attachment S.

Date ECAF submitted: NA

Copy of form included as Attachment S

You must refer to the application instructions (DEP-STWD-INST-500) for specific details on how to complete this section.

1. Summarize the Industrial/Commercial history of the site (including present and former use(s), including dates and NAIC or SIC codes) (attach additional sheets as necessary):

Wastes were disposed of at the site between 1953 and 1994. Site history is detailed on Page 1 of 2 of the "Additional Sheets" attachment, which immediately follows this application form.

2. List the hazardous substances or petroleum products presently or formerly handled at the site (including management methods associated with the materials):

Between 1953 and 1965, Pfizer estimates 1,000,000 gallons of solvent waste was disposed at the site. No documentation of the specific character of the solvent waste exists.

From 1965 to 1994, only non-hazardous, non-petroleum products were disposed at the site.

Additional detail is included on Pages 1 and 2 of 2 of the "Additional Sheets" attachment, which immediately follows this application form.

3. a. RCRA Notifier Status (check one): Treatment, Storage or Disposal Facility
 Large Quantity Generator
 Small Quantity Generator
- b. RCRA Permit Status (check one): Interim Status Facility
 RCRA Part B Operating Permit

Part V: Site History/ Waste Management History (continued)

4. Have releases been reported to the CT DEP Emergency Response and Spills Prevention Division?

Yes No

If yes, list the date of the release, the material and quantity released:

5. Have transfer forms been previously filed with the CT DEP Property Transfer Program? Yes No

If yes, list form(s) and date submitted:

6. List the CT DEP staff involved with the environmental investigation and/or remediation of the site:

Jessica Stefanowicz, Bureau of Water Protection & Land Reuse, Remediation Division, and Kevin Barrett and William Sigmund, Bureau of Materials Management & Compliance Assurance, Waste Engineering & Enforcement Division.

Check here if additional sheets are necessary, and label and attach them to this sheet.

Part VI: Environmental Investigation

This part of the application shall be completed by applicants who have completed an environmental investigation and are applying for either a "Closure and Corrective Action" or a "Corrective Action" Stewardship Permit. If the information requested in this part of the application has been previously submitted to the DEP or EF information required by this part of the application may be satisfied by providing a list of the documents already submitted as Attachment T.

1. Field Investigation / Environmental Assessment:

- a. Date(s) performed: Phase 1: See Attch. T Phase 2: Phase 3:
- b. Indicate **number of** potential release areas identified, tested and where a release was detected.
Identified: Tested: Release Detected:

2. Soil Investigation:

- a. Indicate the number of soil samples screened in the field for contaminants?
Indicate the number of soil samples analyzed by a State or EPA certified laboratory for contaminants?
- b. Specify the techniques used for surface soil investigation.
- c. Specify the techniques used for subsurface soil investigation :

3. Ground Water Investigation:

- a. Indicate the number of groundwater samples analyzed:
Indicate the number of rounds of sampling used in the investigation?
- b. Indicate the number of monitoring wells used to investigate the ground water?
For each well, list the well number, type of well, and geologic unit that the well is screened in or open to. Check here if additional sheets are necessary, and label and attach them to this sheet.

Well Number	Well Type	Geologic Unit
Example: MW_1	2 inch	screened from 15 ft to 25 ft

Part VI: Environmental Investigation (continued)

c. Indicate the number of other types of wells used to investigate groundwater?

Provide the type, address, and geologic unit for each well.

Well Type and Number

Well Address

Geologic Unit

Example: DW-1 6 inch domestic well

15 Main Street

Bedrock

d. Is the extent of each ground water plume resulting from releases at the site fully characterized?

Yes No

e. What techniques were used to investigate the groundwater? (check all that apply)

Ground water quality testing

Pump testing

Geophysical logging

Other techniques (specify):

4. Indicate the phases of remediation completed to date and the date each phase was completed:

Investigation

Date completed:

Remedial Design

Date completed:

Remediation

Date completed:

Post-remedial Monitoring

Date completed:

Part VII: Supporting Documents

Please check the attachments submitted as verification that *all* applicable attachments have been submitted with this application form. When submitting any supporting documents, please label the documents as indicated on this part (e.g., Attachment A, etc.) and be sure to include the applicant's name as indicated on the *Permit Application Transmittal Form*. Refer to Appendix A of the application instructions (DEP-STWD-INST-500) for a list of supporting documents required to be submitted for each class of Stewardship Permit.

- Attachment A: Executive Summary
- Attachment B: *Applicant Background Information* (DEP-APP-008)
- Attachment C: *Applicant Compliance Information* (DEP-APP-002)
- Attachment D: *Coastal Consistency Review Form* (DEP-APP-004), if applicable.
- Attachment E: CT NDDDB Information, if applicable.
- Attachment F: Conservation or Preservation Restriction Information, if applicable.
- Attachment G: Business Information
- Attachment H: Facility Plans:
 - An 8 1/2" X 11" copy of the relevant portion or a full-sized original of a USGS Quadrangle Map indicating the exact location of the facility or site and *Latitude Longitude* (DEP-APP-003). Indicate the quadrangle name on the map.
 - Facility Site Plan
- Attachment I: RCRA Hazardous Waste Part A Permit Application
- Attachment J: List of Solid Waste Management Units/Areas of Concern
- Attachment K: Closure Plan and Cost Estimate
- Attachment L: Post-Closure Plan and Cost Estimate
- Attachment M: Post-Remediation Groundwater Monitoring Plan and Cost Estimate
- Attachment N: Site Characterization Plan and Cost Estimate
- Attachment O: Remedial Action Plan(s) and Cost Estimate(s)
- Attachment P: Financial Assurance
- Attachment Q: Public Participation Plan
- Attachment R: Quality Assurance Project Plan or if previously approved, provide a copy of the ap issued by either the DEP or EPA.
- Attachment S: Copy of *Environmental Conditions Assessment Form (ECAF)*, if applicable
- Attachment T List of documents and dates previously submitted to support "Part VI: Environment Investigation" of this application, if applicable.

Part VIII: Applicant Certification


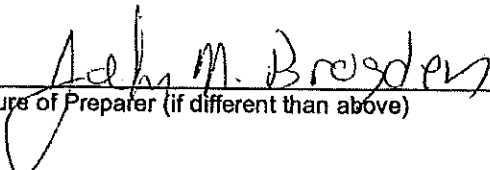
The applicant and the individual(s) responsible for actually preparing the application must sign this part. An application will be considered incomplete unless all required signatures are provided. If the applicant is the preparer, please mark N/A in the spaces provided for the preparer.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief.

I understand that a false statement in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the General Statutes, pursuant to section 53a-157b of the General Statutes, and in accordance with any other applicable statute.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I will comply with all notice requirements as listed in section 22a-6g of the General Statutes."

	12/6/2021
Signature of Applicant	Date
Christopher J. Clark (Pfizer)	Sr Dir, Env Eng, Rem & Transac
Name of Applicant (print or type)	Title (if applicable)
	12/6/2021
Signature of Preparer (if different than above)	Date
John M. Brogden (AECOM)	Project Manager
Name of Preparer (print or type)	Title (if applicable)

Check here if additional signatures are required. If so, please reproduce this sheet and attach signed copies to this sheet. You must include signatures of any person preparing any report or parts thereof required in this application (i.e., professional engineers, surveyors, soil scientists, consultants, etc.)

Note: Please submit the Permit Application Transmittal Form, Completed Application Form, Fee, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 79 ELM STREET
 HARTFORD, CT 06106-5127

Please remember to publish notice of the permit application immediately after submitting your completed application to DEP and send a copy of the notice to the chief elected official of the municipality in which the regulated activity is proposed, and provide DEP with the "Certification of Notice Form (DEP-APP-005A)" and an affidavit of publication from the newspaper.

Stewardship Permit Application

Pfizer 1
Additional She

**ADDITIONAL SHEETS
PERMIT APPLICATION**

Part V: Site History/Waste Management History:**1. Summary of Industrial/Commercial History: Summarize the Industrial/Commercial history of the site (including the present and former use(s), including dates and NAIC or SIC codes:¹**

Pfizer purchased a 219-acre² site along Stoddards Wharf Road in 1952, and, in 1953, began disposing of research and development and production waste generated at its facility in Groton, Connecticut at the site. Disposal was limited to a 12-acre portion of the site and was disposed of in a geological formation (depression) known as a glacial kettle hole in the surficial glacial outwash. Waste disposal activities continued through 1994. Operation of the site as an open-pit dump converted to a regularly covered landfill operation in the late sixties to early seventies.

Shortly before 1965, volatile organic compounds were detected at low levels in private wells downgradient of the landfill. Based on these findings, Pfizer discontinued disposal of organic solvents at the Ledyard landfill and installed a public water supply system to serve all of the residents in the vicinity of the landfill. From 1965 to 1994, only non-hazardous wastes were disposed in the landfill at a rate of approximately 30 tons per month.

Closure activities began in 1996 in accordance with the DEP-approved "Landfill Closure and Post-Closure Plan," dated April 12, 1996 (prepared by ERM-Northeast, Inc.). As part of these closure activities, the site was capped according to DEP-approved specifications and secured by a 6-foot high chain link fence equipped with three-strand barbed wire. Pfizer also constructed a storm drainage system and retention basin at the site. The landfill currently exists as an approximately 12-acre grassy sloped area.

Today the landfill is surrounded by approximately 207 acres of densely wooded areas with residential and conservation areas nearby. Access to the site and the interior detention basin is controlled by the chain-link fence with 3-strand barbed wire and locked gates.

2. List the hazardous substances or petroleum products presently or formerly handled at the site (include the management methods associated with the materials):

No specific historical documentation exists as to the specific materials disposed in the landfill. Pfizer estimates that between 1953 and 1965, approximately 1,000,000 gallons of solvent wastes generated at the Pfizer's Groton facility were disposed of at the landfill. Between 1953 and 1965, organic solvent wastes were disposed at the site. The wastes were transported to the site in drums via trucks, the contents of the drums were emptied at the landfill, and the drums were returned to the Groton Facility. From 1965 to 1994, non-hazardous wastes such as mycelium (a fungal byproduct of penicillin production), filtercake, iron ferrocyanide and diatomaceous earth were disposed in the landfill. The following table provides a listing of documented waste material and composition information for wastes trucked to the landfill through 1994. The

¹ The landfill was never operated as a commercial enterprise and has not in the past, nor does it currently report under any NAICS or SIC code.

² Town land records indicate that that parcel is 220.29 acres.

location of the now-capped and closed landfill area is depicted on the Site Location 1 included in Attachment H.

Waste Disposed of at Pfizer's Ledyard Landfill Since 1965

Product	Waste Name	Composition – Dry Basis
Citric Acid	Molasses Treatment Mud	20% filteraid, 74% gypsum, 6% iron ferrocyanide, trace mineral salts
Citric Acid	Citric Liquor Muds	40% gypsum, 55% filteraid, 2% carbon, 2% bentonite, <1% iron ferrocyanide
Citric Acid	Calox Cake	60% gypsum, 39% calcium oxalate, <1% BaSO ₄
Itaconic Acid	Plate and Frame Cake	60% carbon, 39% filteraid, 1% mineral salts
Glucona-Delta-Lactone	Plate and Frame Cake	45% carbon, 55% filteraid, trace mineral salts
Sodium Gluconate	Plate and Frame Cake	50% carbon, 50% filteraid, trace mineral salts
Utilities (Steam/Elec.)	Powerhouse Soot	Flyash, <1% minerals
Antibiotics & Citric Acid	Citron Solids	40-50% solids, 13-20% potassium, 2-5% sodium, <3% calcium, <2% nitrogen, <2% phosphorus

From the report "Landfill Closure and Post-Closure Plan, Pfizer, Inc. – Ledyard Landfill", prepared by ERM-Northeast, Inc. April 1996.

ATTACHMENT A

TABLE OF CONTENTS*

*Number of pages includes Attachment cover page

Transmittal Letter – 1 page

Permit Application Transmittal Form (DEP-APP-001) – 5 pages

Permit Application for a Stewardship Permit (DEP-STWD-APP-500) – 9 pages

Additional Sheets - Part V, Questions 1 & 2 – 3 pages

Executive Summary - Attachment A – 5 pages

Applicant Background Information – Attachment B – 6 pages

Additional Sheets – Corporation Section No. 2 and 3 – 2 pages

Applicant Compliance Information Form – Attachment C – 1 page

Coastal Consistency Review – Attachment D – 1 page

Natural Diversity Database Information – Attachment E – 1 page

Conservation or Preservation Restrictions – Attachment F – 1 page

Business Information - Attachment G – 4 pages

Facility Plans - Attachment H – 7 pages

- Figure 1 - Site Location Map
- Figure 2 - Landfill Parcel Layout
- Figure 12 - Zone of Influence Map
- Drawing No. 1 - Landfill Closure As-Built Landfill Area
- Drawing No. 2 - Landfill Closure As-Built Retention Basin
- Drawing No. 3 - Landfill Closure As-Built Details

RCRA Hazardous Waste Part A Permit Application - Attachment I – 1 page

List of Solid Waste Management Units/Areas of Concern – Attachment J – 2 pages

Closure Plan and Cost Estimate – Attachment K – 1 page

Post-Closure Plan and Cost Estimate - Attachment L - 28 pages

Post Remediation Groundwater Monitoring Cost Estimate - Attachment M – 1 page

Site Characterization Plan and Cost Estimate – Attachment N – 1 page

Remedial Action Plan(s) and Cost Estimate(s) – Attachment O – 1 page

Financial Assurance - Attachment P – 12 pages

Public Participation Plan - Attachment Q – 2 pages

Quality Assurance Project Plan (QAPP) – Attachment R – 53 pages

Environmental Condition Assessment Form – Attachment S – 2 pages

Environmental Investigations – Attachment T – 2 pages

PROJECT DESCRIPTION

The Pfizer closed landfill parcel, which consists of the closed landfill and undeveloped land surrounding the landfill, is located in Ledyard, Connecticut, south of Stoddards Wharf Road (State Route 214) and west of Avery Hill Road Extension. The parcel or "Site" is described on Town of Ledyard Property Information and Map Database as 215 Stoddards Wharf Road. Map/Block/Lot 50-2360-215. According to the Town database, the total parcel is 220.29 acres in size. The closed landfill area itself is 12 acres in size (referred to hereinafter as the "landfill").

The landfill was used by Pfizer from 1953 through 1994 for disposal of waste material associated with production and research and development activities from Pfizer's Groton, Connecticut manufacturing facility. Wastes disposed of in the landfill included solvents, iron ferrocyanide, diatomaceous earth, filtercake, mycelium (a fungal byproduct of penicillin production) and biosynthetic residues. The disposal of solvent wastes ceased in 1965; only non-hazardous wastes were disposed of after 1965. The landfill was closed in October 1996 in accordance with the Connecticut Solid Waste Regulations RSCA 22a-209-13 and pursuant to a DEP-approved closure plan. As part of the closure, the landfill was capped and secured by a 6-foot high chain link fence with locked gates equipped with three-strand barbed wire. No post-closure uses are planned for the site at this time.

Pfizer completed a Zone of Influence (ZOI) study for groundwater beneath and in the vicinity of the closed landfill. The ZOI is defined as the area of soil and groundwater beneath and within the vicinity of the landfill to which leachate discharge from waste and mixing of leachate with groundwater occurs and could reasonably be expected to affect water quality. The ZOI for the landfill is limited to the immediate area beneath the landfill and downgradient of the landfill to the west, all of which is located on land owned by Pfizer. Because the ZOI is controlled by hydrogeologic factors in the area of the landfill, and the source has been mitigated via the closure of the landfill, the ZOI is expected only to reduce in size and concentration via natural attenuation. The extent of the groundwater affected by the landfill leachate is understood and 37 years of groundwater data provide an understanding of the nature of the plume.

Pfizer also evaluated current and potential future receptors focusing on volatilization concerns and groundwater consumption, which are the potential pathways for exposure. Existing and potential future water supply wells in the area are not expected to capture or encounter affected groundwater from the site because of administrative and hydrogeologic controls. There are no current buildings on the Site, and a deed restriction prohibits the construction of buildings on the Site, thereby negating potential volatilization concerns. Based on the ZOI evaluation, there are no current and there are not expected to be any future users of groundwater impacted by the landfill leachate. The majority of the residential parcels in the area are connected to a public water supply, and measures are in place to monitor future drilling of potable and irrigation wells.

Pfizer is currently conducting post-closure care activities including inspections, repairs (as warranted) and groundwater monitoring. These post-closure care activities are being performed under the following permits and approvals:

- Landfill Closure Report prepared by ERM-Northeast dated November 19, 1996, as modified on September 4, 2009; and,
- Stewardship Permit DEEP/SWF/CS-072-021 dated June 7, 2012.

Permits LF0000015 (Permit to Discharge issued on March 15, 1982 as modified on December 11, 1998 and July 1, 2009) and 072-02L (Permit to Operate issued on March 15, 1982) have been superseded by Stewardship Permit No. DEEP/SWF/CS-072-021.

The purpose of the Stewardship Permit is to consolidate the post-closure care activities and reporting requirements for the closed landfill into one document (e.g., the Stewardship Permit). The post-closure care activities presented in the Stewardship Permit will supersede previous post-closure care activities as required by the above outlined permits and approvals. The renewed Stewardship Permit will cover a period of 10 years.

Stewardship Permit Application

Pfizer
Attachment
Applicant Background Informa

ATTACHMENT B



Connecticut Department of
Energy & Environmental Protection

Applicant Background Information

Check the box by the entity which best describes the applicant and complete the requested information. **You must choose one of the following:** corporation, limited liability company, limited partnership, general partnership, voluntary association and individual or business type. Be sure to include the signatory authority or authorized representative certifying the application.

Corporation

Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. Parent Corporation

Name: **Pfizer Inc.**

Mailing Address: 235 East 42nd Street

City/Town: New York

State: NY

Zip Code: 10017

Business Phone: 908-413-0811

ext.:

Contact Person: Russell Downey

Phone: 908-413-0811

ext.

E-mail: russell.g.downey@pfizer.com

2. Subsidiary Corporation:

Name: **NA**

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

3. Directors:

Name: **Albert Bourla**

Mailing Address: c/o Pfizer Inc 235 East 42nd Street

City/Town: New York

State: NY

Zip Code: 10017

Business Phone: 212-733-2323

ext.:

E-mail:

4. Officers:

Name: **Albert Bourla**

Mailing Address: c/o Pfizer Inc 235 East 42nd Street

City/Town: New York

State: NY

Zip Code: 10017

Business Phone: 212-733-2323

ext.:

E-mail:

Applicant Background Information (continued)

Limited Liability Company

Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to sheet with the required information.

1. List each member.

Name:

Mailing Address:

City/Town:

Business Phone:

E-mail:

State:

Zip Code:

ext.:

Name:

Mailing Address:

City/Town:

Business Phone:

E-mail:

State:

Zip Code:

ext.:

Name:

Mailing Address:

City/Town:

Business Phone:

E-mail:

State:

Zip Code:

ext.:

2. List any manager(s) who, through the articles of organization, are vested the management of the property and affairs of the limited liability company.

Name:

Mailing Address:

City/Town:

Business Phone:

E-mail:

State:

Zip Code:

ext.:

Name:

Mailing Address:

City/Town:

Business Phone:

E-mail:

State:

Zip Code:

ext.:

Name:

Mailing Address:

City/Town:

Business Phone:

E-mail:

State:

Zip Code:

ext.:

Applicant Background Information (continued)

Limited Partnership

Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information.

1. General Partners:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

2. Limited Partners:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Applicant Background Information (continued)

General Partnership

Check the box if additional sheets are necessary. If so, label and attach additional sheet(s) sheet with the required information.

1. General Partners:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Name:

Mailing Address:

City/Town:

State:

Zip Code:

Business Phone:

ext.:

Contact Person:

Phone:

ext.

E-mail:

Pfizer Inc. Board of DIRECTORS:

Ronald E. Blaylock	Susan Hockfield
Albert Bourla	Dan R. Littman
Susan Desmond-Hellmann	Shantanu Narayen
Joseph J. Echevarria	Suzanne Nora Johnson
Scott Gottlieb	James Quincey
Helen H. Hobbs	James C. Smith

Elected Corporate Officers

Albert Bourla, DVM, Ph.D.	Chairman and Chief Executive Officer
William Carapezzi	Executive Vice President, Glc Business Services and Transformation
Frank A. D'Amelio	Chief Financial Officer, Exec Vice President, Global Supply
Mikael Dolsten, M.D., Ph.D.	Chief Scientific Officer and President, Worldwide Research Development and Medical
Lidia Fonseca	Chief Digital and Technology Officer, Executive Vice President
Angela Hwang	Group President, Pfizer Biopharmaceuticals Group
Rady A. Johnson	Chief Compliance, Quality and Officer, Executive Vice Presi
Douglas M. Lankler	General Counsel, Executive Vi President
A. Rod MacKenzie, Ph.D.	Chief Development Officer, Ex Vice President
Aamir Malik	Chief Business Innovation Off Executive Vice President

Payal Sahni	Chief Human Resources Officer, Executive Vice President
Sally Susman	Chief Corporate Affairs Officer, Executive Vice President
John D. Young	Group President
Brian Byala	Senior Vice President and Treasurer
Jennifer Damico	Senior Vice President and Controller
Margaret M. Madden	Senior Vice President and Corporate Secretary

Appointed Officers

Thomas J. Hogan	Senior Vice President, Global Tax
Gordon Loh	Senior Vice President - Corporate Audit
Bryan Zielinski	Vice President - Intellectual Property
Mary Crotty	Assistant Secretary
Tara Gabbai	Assistant Secretary
Susan Grant	Assistant Secretary
Lori Hernando	Assistant Secretary
Colum Lane	Assistant Treasurer
Brian McMahan	Assistant Treasurer
Madelyn D. Purcell	Assistant Secretary
Suzanne Rolon	Assistant Secretary
Athena M. Rufo	Assistant Secretary
Shehzad Siddiqui	Assistant Secretary
David Smith	Assistant Secretary
Bryan Supran	Assistant Secretary
Eric Aaronson	Assistant Secretary

**ATTACHMENT C
APPLICANT COMPLIANCE INFORMATION FORM**

Not Applicable
(All previous activities have been permitted)

**ATTACHMENT D
COASTAL CONSISTENCY REVIEW FORM**

Not Applicable
(Site is not located in coastal area)

**ATTACHMENT E
NATURAL DIVERSITY DATABASE**

Not Applicable
(Site is not located in area identified as a habitat for endangered, threatened or special c
species)

ATTACHMENT F
CONSERVATION OR PRESERVATION RESTRICTION

Not Applicable
(Site is not located in a conservation or preservation area)

**ATTACHMENT G
DESCRIPTION OF DISPOSAL AREA**

Production Division
U. S. Pharmaceuticals Group
Pfizer Inc.
Eastern Point Road
Groton, CT 06340
Tel 860 441 4100



U. S. Pharmaceuticals

December 24, 1996

Town Clerk
Town Of Ledyard
P.O. Box 38
Ledyard, CT 06339

Re: Pfizer Landfill Closure Report

Dear Town Clerk:

Attached please find one (1) copy of a detailed description of the landfill disposal area owned and operated by Pfizer Inc, Groton, CT on Avery Hill Road Extension. This description was prepared per State of Connecticut Regulation (RCSA) Section 22a-209-13(g) - *Closing of Solid Waste Facilities* and the Connecticut Department of Environmental Protection's "Pfizer Ledyard Landfill Closure Approval" of May 9, 1996. As of October 1996, Pfizer Inc has discontinued landfill operations and closed the landfill per RCSA Section 22a-209.

A copy of this description must be recorded in the municipal land records for this property per RCSA Section 22a-209-13(g). A copy of this description, certified by the Town Clerk as a true copy, will be sent by Pfizer to the Commissioner of the Connecticut Department of Environmental Protection, along with a notation of the volume and page reference to the deed to the Pfizer Landfill property .

If you have any questions regarding this description, you may contact me at (860) 441-4443.

Sincerely,


Richard M. Davis
Manager, Environmental

map 1887
map 1888
map 1889

cc: N. W. Alderson
T. Swenson
W. Huhn
L. Treadway (Town of Ledyard)

VOL. 265 PAGE 938

DESCRIPTION OF DISPOSAL AREA

(per RCSA Section 22a-209-13(g) "Closing of Solid Waste Facilities")

For: Pfizer Landfill
Avery Hill Extension
Ledyard, CT 06339
December 24, 1996

Pfizer Inc, Groton, CT, owns 219 acres of property off Stoddards Wharf Road and Avery Hill Extension in Ledyard, CT. At this location (Latitude 41°51'58" north, Longitude 72°27'55" west), Pfizer operated a private, special waste landfill under State of Connecticut Solid Waste Permit No. 072-02L and Water Discharge Permit No. LF0000015. The landfill consisted of approximately 12 acres, including a gravel borrow area from which daily and weekly cover material was excavated. Landfill operations occurred at the property between 1953 and 1994. Only waste materials from Pfizer's facility in Groton, CT were disposed at the site. The landfill is surrounded by densely wooded areas.

Pfizer discontinued operations and closed the landfill as of October, 1996 per State of Connecticut Regulation 22a-209-13 - "Closing of Solid Waste Facilities". The fill area of the landfill was covered and capped with four successive layers: 6" of soil for bedding and gas venting, a 40 millimeter high density polyethylene (HDPE) impermeable layer, an 18" sand drainage layer, and a 9 inch top soil vegetative layer. The vegetative layer was seeded with perennial plants with fibrous and shallow roots. The extent of the cap is delineated by cap limit markers at the site.

Passive landfill gas vents have been installed into the bedding/gas venting layer for removal of any fill decomposition gases. A total of fifteen (15) gas vents were installed at the landfill.

Four (4) drainage swales consisting of a 6" base layer of crushed stone and a 12" top layer of 6" diameter stone were placed on top of the 40 millimeter impermeable HDPE liner to allow adequate drainage of stormwater. The stormwater from the swales is directed to an 800 ft long 36" diameter drainage pipe which discharges to a five (5) acre, unlined, gravel, stormwater retention basin designed to hold the equivalent precipitation from the 100 year largest storm event. The drainage basin contains three (3) stormwater drainage manholes which allow drainage of stormwater below the frost line. The drainage basin is located on Pfizer property, northwest of the landfill and on the south side of Stoddards Wharf Road.

A security fence consisting of six foot (6') high chain link surrounds 1) the former fill and borrow area and 2) the drainage basin. Locked gates are located at the north, south and southwest sides of the fill area and at the west side of the drainage basin.

Post closure care for the solid waste landfill will continue for a period of at least 30 years and will include regular inspection by Pfizer personnel and performance of maintenance and corrective action as needed. Post-closure landfill maintenance will include maintenance of the vegetative cover; reseeding and mulching as needed; elimination of burrows and deep rooted vegetation; cleaning of drainage swales, culverts, drainage pipe and basin of debris; monitoring of gas vents and removal of debris from vents; and inspection of security fences. Post closure monitoring of groundwater discharges will be conducted using the eighteen (18) existing groundwater monitoring wells as agreed to by Pfizer and the Connecticut Department of Environmental Protection. Pfizer intends to maintain the site as privately owned and no post-closure uses are planned. Should this condition change, a Post-Closure Use Plan will be submitted to the Connecticut Department of Environmental Protection prior to commencing any alternative use of the site.

RECEIVED FOR RECORD AT LEDYARD, CT;
ON 1-17-97 AT 11:03 A.M.,
ATTEST: PATRICIA KARNS, TOWN CLERK

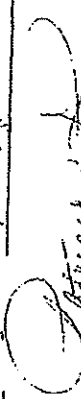
STATE OF CONNECTICUT
COUNTY OF NEW LONDON

s. s. LEDYARD Deputy 17 A.D. 1997

I, Patricia Karns, Town Clerk of said Town, duly appointed and qualified and having the custody of the records and seal thereof, hereby certify that the above and foregoing is a true and correct copy of said record as found in Ledyard Land Records,

Volume 265, Page 971.

In Witness Whereof, I have hereunto set my hand and affixed the seal of said Town this 17th day of JANUARY, 1997.

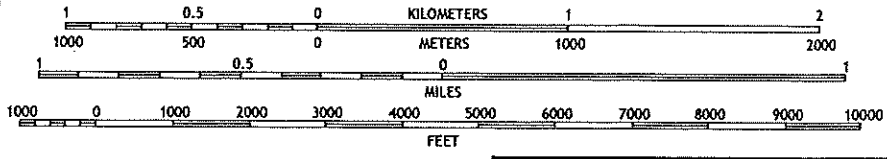
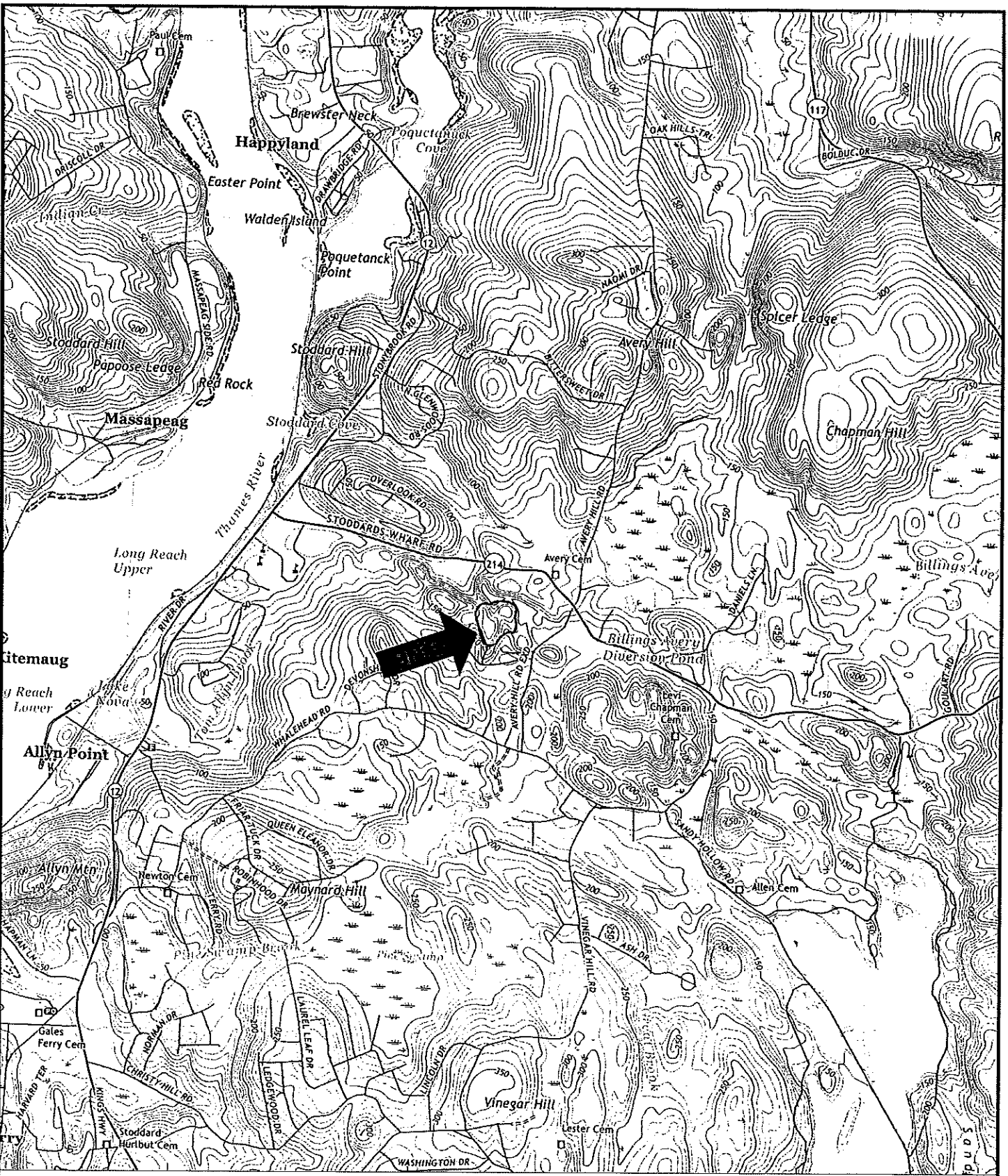

Patricia Karns, Town Clerk

Stewardship Permit Application

Pft
Attach
Facilit

ATTACHMENT H

File: C:\Users\baryk\OneDrive - AECOM\Directory\Working Jobs\Pfizer\Ledyard, CT\Fig 1.dwg Layout: Fig 1 User: BarryK Plotted: Oct 25, 2021 - 11:38am Xref's:



Source:
United States Geological Survey
North American Datum of 1983 (NAD83)

AECOM



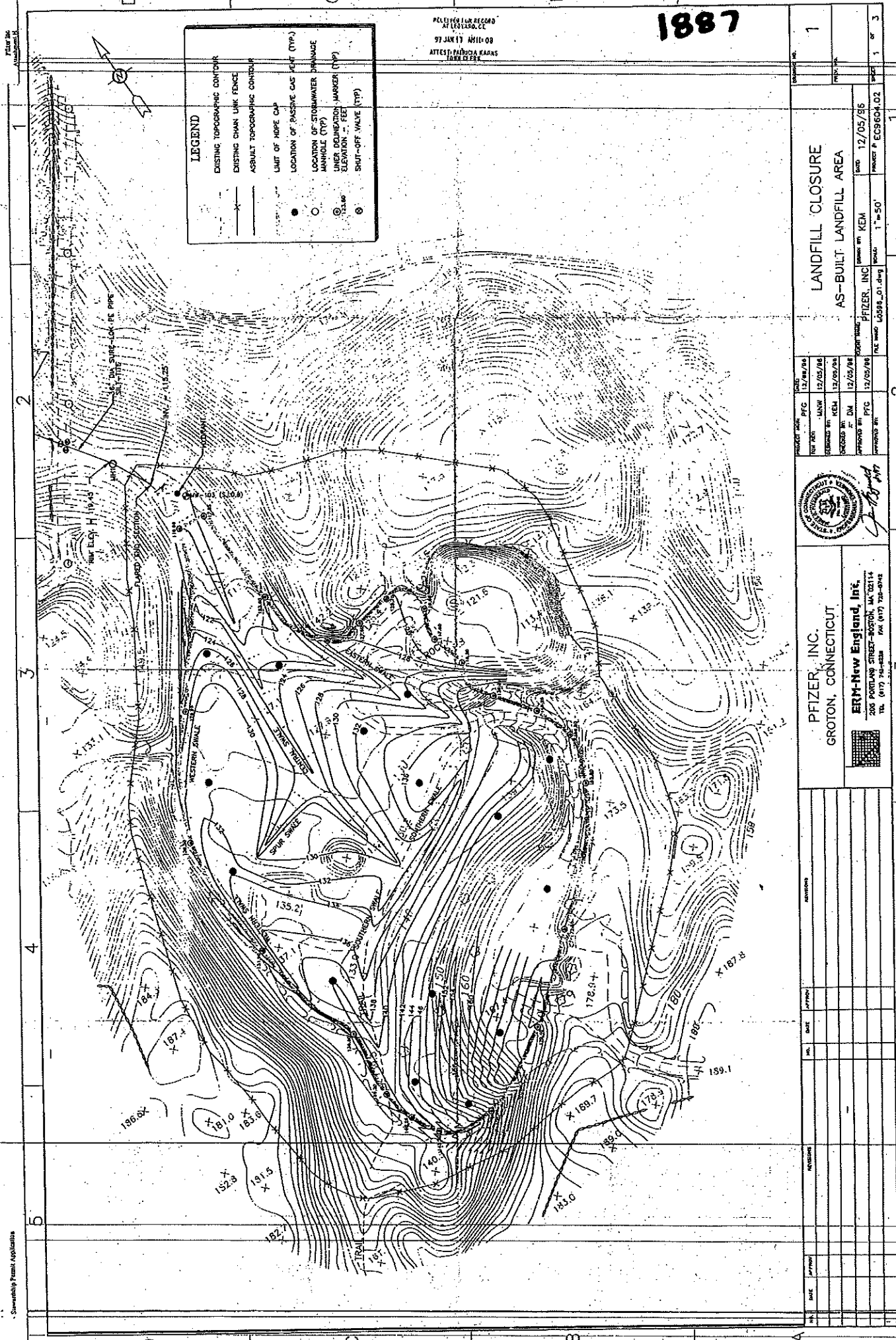
Pfizer Inc Closed Landfill Ledyard, Connecticut		Site Location Map	
DATE: 10/22/21	DRWN: K.P.B.	JOB No.: 60659135	Figure 1

1887

RELETTER FOR RECORD
AT 1821450.01
97 JUN 17 AM 11:00
ATTEN: PATRICIA KARAS
DUE 12/28

LEGEND

- EXISTING TOPOGRAPHIC CONTROL
- EXISTING CHAIN LINK FENCE
- AS-BUILT TOPOGRAPHIC CONTROL
- UNIT OF HOPE DAM
- LOCATION OF PASSIVE GAS AIRT (TYP.)
- LOCATION OF STORMWATER DRAINAGE MANHOLE (TYP.)
- UNDER REMEDIATION MARKER (TYP.)
- ELEVATION - FEET
- SHUT-OFF VALVE (TYP.)



LANDFILL CLOSURE
AS-BUILT LANDFILL AREA

PROJECT NO.	PFC	12/08/98
DESIGNED BY	MEM	12/05/98
CHECKED BY	MEM	12/05/98
APPROVED BY	MEM	12/05/98
DATE		12/05/98
PROJECT NO.	PFC	12/05/98
DATE		12/05/98



PFIZER, INC.
GROTON, CONNECTICUT

ERM-New England, Inc.
200 PASTLAW STREET, BOSTON, MA 02114
TEL: (617) 552-3333 FAX: (617) 702-8933

NO.	DATE	BY	REVISIONS

ATTACHMENT I
RCRA HAZARDOUS WASTE PART A PERMIT APPLICATION

Not Applicable
(Site is not a RCRA Hazardous Waste Facility)

Stewardship Permit Application

Pfizer
Attachm

List of Solid Waste Management Units/Areas of Cor

ATTACHMENT J

Stewardship Permit Application

Pfizer Inc.
Attachment J

List of Solid Waste Management Units/Areas of Concern

There is only one Solid Waste Management Unit/Area of Concern

- Closed Landfill

**ATTACHMENT K
CLOSURE PLAN AND COST ESTIMATE**

Not Applicable
(Landfill has been closed under DEEP approved closure plan)

ATTACHMENT L

Stewardship Permit Post-Closure Plan
Closed Pfizer Landfill
Ledyard, Connecticut

Project number: 60659135

October 1, 2021

Prepared for:

Pfizer, Inc.
Pfizer Global Manufacturing
100 Route 206 North
Peapack, NJ

Prepared by:

AECOM
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Rocky Hill, CT 06067
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1. Purpose and Scope

The purpose of this Post-Closure Plan ("Plan") is to outline Post-Closure Care Activities for the Pfizer Inc. (Pfizer) closed landfill ("landfill" or "Facility") located in Ledyard, Connecticut as required by Section II of the Stewardship Permit. Specifically, this Plan outlines procedures for the following activities:

- Post-Closure Maintenance;
- Water Quality Monitoring;
- Record Keeping;
- Quality Assurance and Quality Control; and,
- Reporting.

The Post-Closure Care Activities proposed in this Plan are based on the following:

- The URS report "Zone of Influence Study and Request for Modification to Post-Closure Monitoring Plan", dated September 11, 2009 on file with the Connecticut Department of Energy and Environmental Protection (CT DEEP);
- Groundwater water quality data since 1992;
- Twenty-five years of inspection data; and,
- The Stewardship Permit Post-Closure Care Plan Closed Pfizer Landfill, Ledyard, Connecticut document dated February 2012.

The CT DEEP approved the closure of the landfill in May 1996.

Post Closure Care Activities for the closed landfill will cover a period of at least 30 years since closure of the landfill, unless this time is lengthened or shortened by the Commissioner of the CT DEEP. The landfill was closed in October of 1996 and has been undergoing post-closure care since that time. The Post Closure Care Activities presented in the report will supersede previous Post-Closure Care Activities that have been performed for the landfill under the following permits and requirements:

- Landfill Closure Report prepared by ERM-Northeast dated November 19, 1996, as modified on September 4, 2009; and,
- Stewardship Permit No. DEEP/SWF/CS-072-021 dated June 7, 2012.

Permits LF0000015 (Permit to Discharge issued on March 15, 1982 as modified on December 11, 1998 and July 1, 2009) and 072-02L (Permit to Operate issued on March 15, 1982) have been superseded by Stewardship Permit No. DEEP/SWF/CS-072-021.

2. Facility Description and Background

The Facility consists of approximately 15.5 acres as depicted on Attachment 1 and consists of the fenced area around the closed landfill, the fenced area around the retention basin, the underground culvert channeling storm water runoff from the closed landfill to the retention basin, and monitoring wells MW-102B, MW-103S, MW-103I, MW-103D, MW-103B, MW-104S, MW-104D, MW-104B and MW-105S. The Facility is located within the parcel of land known as 215 Stoddards Wharf Road, located south of Stoddards Wharf Road and west of Avery Hill Extension in Ledyard, Connecticut (see Figure 1) and described in the Town of Ledyard Property Information and Map Database as Map/Block/Lot 50-2360-215.

The landfill parcel was purchased by Pfizer in 1953. The Ledyard Facility and surrounding undeveloped land were used by Pfizer from 1953 until 1994 for disposal of waste material associated with production activities from Pfizer's Groton, Connecticut, manufacturing facility. Wastes disposed in the landfill include solvents, iron ferrocyanides, diatomaceous earth, filtercake, mycelium (a fungal byproduct of penicillin production) and biosynthetic residues. The disposal of solvent wastes ceased in 1965, with only non-hazardous wastes disposed after 1965. The landfill was closed in October 1996 in accordance with the CT DEEP Solid Waste Regulations RSCA 22a-209-13. As part of the closure, the landfill was capped and then secured by a 6-foot high chain link fence and locked gates equipped with three-strand barbed wire.

Pfizer is currently conducting Post-Closure Care Activities including visual inspections, repairs (as warranted) and annual groundwater monitoring. Quarterly groundwater monitoring for solvents and annual monitoring for metals commenced in 1996. Groundwater monitoring in accordance with the requirements of Stewardship Permit No. DEEP/SWF/CS-072-021 commenced in 2012.

No post-closure uses are planned for the Facility. For additional information on the history and closure of the landfill, see ERM's Northeast "Landfill Closure Report", dated November 19, 1996 on file at the CT DEEP.

3. Post-Closure Maintenance

3.1 Cap Inspection and Maintenance/Schedule

During the Post-Closure Care Period, the structures/items discussed below will be inspected and maintained. The purpose of the visual inspections is to observe and repair conditions that may result in a release of solid waste.

All maintenance shall be performed in a timely manner. Any deterioration that may immediately lead or has led to an environmental hazard, as discussed in Section I. E. 16. of the Stewardship Permit shall be remediated immediately. Visual inspections will be performed on a semi-annual basis with maintenance and repairs performed as warranted.

3.1.1 Vegetative Cover for Landfill and Drainage Basin

The vegetative cover at the Facility has been established for many years. The visual inspections will ensure that the cover is maintained and that the established cover is cut to the proper length. Visual inspections will include observing the vegetative cover of the landfill and drainage basin for erosion, settling, animal burrows and for the growth of larger shrubs or trees. The inspector will confirm that solid waste is not exposed. In the event that the vegetative cover is observed to be compromised, appropriate maintenance activities including replacement of lost material, reseeding, the filling in of animal burrows and/or brush hogging will be performed.

3.1.2 Dust and Odors

The inspector will note the presence of dust or odors. Due to the established cover, dust and odors are not expected.

3.1.3 Slope Stability

Although not expected to occur due to the homogenous nature of the waste mass, the slopes will be monitored for differential settling and instability. The inspector will note irregular settlement, cracking or other issues that may affect the final cover on the slopes. The inspector will confirm that solid waste is not exposed. If warranted, slope instability issues will be corrected via re-grading and the re-establishment of the vegetative cover.

3.1.4 Drainage Swales and Structures

Drainage structures consist of swales, culverts and a retention/infiltration basin. The drainage swales and culverts and the basin will be inspected for obstructions, erosion and/or debris. If noted, the obstructions will be removed. If structures are damaged, they will be replaced.

3.1.5 Leachate Outbreaks

Although not expected, the inspector will inspect for the presence of leachate outbreaks.

3.1.6 Fencing and Gates

The fences and gates associated with the closed landfill will be inspected for integrity or damage. The gates will be inspected to assure that they are closed and locked. Should the fencing or gates be significantly damaged, they will be repaired. If the locks are not functioning properly, they will be replaced.

3.1.7 Signage

Signs indicating "No Trespassing, Private Property, Pfizer Inc." are posted at every gate and along the detention basin fencing. The signs will be inspected for damage and replaced if warranted.

3.1.8 Access Roads

There are three dirt roads that provide access to the Facility. The inspector will confirm that the road is in a condition that allow for access to and throughout the Facility. If warranted, the road(s) will be repaired.

3.1.9 Linear Delineation Markers

There are twenty-three reflective markers located around the perimeter of the landfill liner. These markers will be inspected and replaced if warranted.

3.2 Monitoring Well Visual Inspection and Maintenance

As described in Section 4.0 below, a network of both overburden and bedrock monitoring wells are sampled to monitor groundwater quality. The inspector will observe the monitoring wells to assure they are in a condition that provides representative groundwater quality data. The inspector will clear area to observe the condition of: the grout (to assure that there is no pathway (i.e.: cracks) for surface water to the groundwater through the well annulus); the well casings; the manhole covers or stand-up and that the caps and locks are secured. If warranted, corrective action will be taken to correct deficiencies.

3.3 Qualifications of the Inspector

Visual inspections will be performed by a Professional Engineer and/or his/or her designee.

3.4 Documentation

All visual inspections will be recorded on an Inspection Log (log). A copy of this log is included in Attachment 2. The log will note the inspector's name and company, the date of the inspection and the results of observations. Unacceptable results along with recommendations for repair/mitigation will be noted on the log. Confirmation of repairs will also be noted on the log along with the date of the follow-up inspection. If warranted, photographs will be taken to document the condition and repair.

4. Water Quality Monitoring Plan

A Zone of Influence (ZOI) study and a potential receptor study were conducted by Pfizer and documented in the report "Zone of Influence Study and Request for Modification to Post-Closure Monitoring Plan" dated September 11, 2009 (URS, 2009). This report is on file with the CT DEEP and provides rationale to support the water quality/groundwater monitoring plan established to support the existing Stewardship Permit No. DEEP/SWF/CS-072-021.

Groundwater monitoring completed over the past 10 years to comply with the existing Stewardship Permit has provided another body of data that can be used to characterize groundwater conditions at the Ledyard Facility beyond the data presented in the 2009 ZOI study. The groundwater monitoring included the sampling of monitoring wells in upgradient, source area and downgradient locations. Little if any change has been observed in the recent 10-year body of groundwater data. Constituents of concern (COCs) were not detected in the upgradient monitoring well MW-102B. Concentrations of COCs have remained consistent or have slightly decreased in the source area wells (MW-103 and MW-104 clusters). COCs were mostly absent in the two downgradient monitoring locations (MW-4 and MW-105S). The recent 10 years of groundwater data sufficiently documents the stability of the plume of impacted groundwater at the Facility and demonstrates that the plume is not migrating downgradient.

Based on the stability of the plume and that the downgradient monitoring locations continue to show little if any impact and are compliant with the Remediation Standard Regulations tabulated numeric criteria, groundwater at the Facility will be monitored during the period of the requested permit on an every other year basis as presented in the table below:

Table 1 Groundwater Monitoring Plan

Well ID	Frequency					COCs
	Year 2	Year 4	Year 6	Year 8	Year 10	
MW-4	Fall	Fall	Fall	Fall	Fall	VOCs/ Arsenic
MW-103 cluster (3 wells)	Fall	Fall	Fall	Fall	Fall	VOCs
MW-104 cluster (2 wells)	Fall	Fall	Fall	Fall	Fall	VOCs
MW-105S	Fall	Fall	Fall	Fall	Fall	VOCs/ Arsenic

The sampling program does not include the sampling of monitoring wells MW-102B, MW-103S or MW-104S. Based on review of historical data, information collected from these monitoring points are not necessary to continue to evaluate the potential for off-site migration of the groundwater plume. MW-102B is an upgradient background location which has been free of landfill COCs since sampling in 2003 and is unlikely, based on the trend of sampling data, to become impacted by landfill COCs after all these years. MW-103S and MW-104S are shallow wells that are much less impacted than deeper wells (which will continue to be sampled) in these two locations. The presence of greater constituents in the deeper wells indicates that shallow groundwater is not the primary migration route of landfill COCs. Therefore, there is no need to continue sampling these shallow wells in order to monitor the potential for off-site migration of the groundwater plume. The most downgradient monitoring wells will continue to be monitored.

Water quality monitoring will be conducted in accordance with the Quality Assurance/Quality Control (QAPP) included as Attachment 3.

5. Groundwater Management Buffer Zone

Subsequent to the performance of the ZOI study, a "Groundwater Management Buffer Zone" (buffer zone) was developed that encompasses land within 1,000 feet of the ZOI (Figure 2). The buffer zone as currently proposed is sufficiently protective to mitigate the potential for future exposure to groundwater affected by the closed landfill. The CT DEEP has reviewed the buffer zone study results and concurs with this conclusion. A buffer zone study was performed to identify properties within the buffer zone that either: 1) have existing potable wells; and/or 2) have the potential for a potable well to be installed in the future. All lots within the 1,000-foot buffer zone were identified and readily available information relative to the existing or possible presence of potable wells on each lot was obtained. This buffer zone study identified those building lots within the buffer zone that could be the site of future construction and, therefore, could also pose the possibility that a well could be drilled on one or more of the properties. It is highly unlikely that a well installed within the buffer zone would be impacted by the leachate underlying the closed landfill based on the results of the ZOI Study. However, as a further precaution in response to discussions with the Ledge Light Health District (LLHD), the 32 lots within the buffer zone will be "flagged" by the LLHD. The LLHD or well permit applicant, i.e., well owner, contractor, builder, etc., will arrange to sample the well water supply(s) relied on as a sole source of potable water for volatile organic compounds (VOCs) via EPA test method 524.2 and arsenic as part of the permit approval to install a well. For only those test parameters (VOCs and arsenic) and, with prior approval from Pfizer, Pfizer will pay for the cost of the analyses. Due to the potential for anthropogenic or natural sources of such parameters unrelated to the closed landfill, it is acknowledged that Pfizer's agreement to such payment does not constitute an admission that any such parameters as may be detected are related to the closed landfill. The well permit applicant will be responsible for arranging all other well water quality testing parameters related to the certificate of occupancy as required by Ledyard's land use offices.

On a semi-annual basis, Pfizer will contact the LLHD for the following information: (1) to inquire if the LLHD received permit applications to install water supply well(s) within the buffer zone; (2) whether an approval to install a well was granted by the LLHD; (3) if the LLHD or other "qualified individual" as defined in Section 19-13-B101 (a)(10) of the Connecticut Public Health Code sampled the well for VOCs and arsenic as part of the well installation permit condition; (4) the sampling results, if any; and (5) if the approved well has been installed. This information will be included in the annual report submitted to the CT DEEP.

6. Reporting/Submittals

Except as outlined in Section I.E.16(c), (d) or (e), and Section II.A.5 of the Stewardship Permit, an annual report will be submitted by January 15 of the calendar year following the previous calendar year's required groundwater sampling and/or visual inspections. The annual report for the years groundwater monitoring is not performed will include a discussion of potential new groundwater users within 1,000-foot buffer zone of the ZOI, the results of the semi-annual maintenance, visual inspections (well security, erosion, general Facility maintenance, etc.) and other information relevant to the project. Annual reports for the years groundwater monitoring is performed will include a discussion of the groundwater analysis results, including the results in tabular format, contaminant trend plots, a discussion of potential new groundwater users within 1,000-foot buffer zone of the ZOI, the results of the semi-annual maintenance visual inspections (well security, erosion, general Facility maintenance, etc.) and other information relevant to the project.

All reports or information submitted to the CT DEEP shall be signed by the person specified in, and contain the certification prescribed in this permit application certification (Part VIII of the application).

7. Recordkeeping

Records shall be retained for the timeframes outlined in the table below. Records will be maintained at the location indicated in Attachment A-1 of the permit.

Table 2. Document Retention Timeframes

Type Of Record	Retention Time	Comments
Landfill Visual Inspection Logs	3 years from the date of inspection	May be retained in electronic format
Water Quality Data	Until the Post-Closure Care Period is completed	
Equipment Calibration/Maintenance Records	Until the Post-Closure Care Period is completed	
Annual Reports	Until the Post-Closure Care Period is completed	
Records of All Data to Complete the Stewardship Permit Application	Until the Post-Closure Care Period is completed	Includes Post-Closure Care Cost Estimate

8. References

ERM-Northeast, "Landfill Closure and Post-Closure Plan", April 12, 1996.

ERM- Northeast, "Landfill Closure Report", November 19, 1996.

URS Corporation, "Zone of Influence Study and Request for Modification to Post-Closure Monitoring Plan", September 11, 2009.

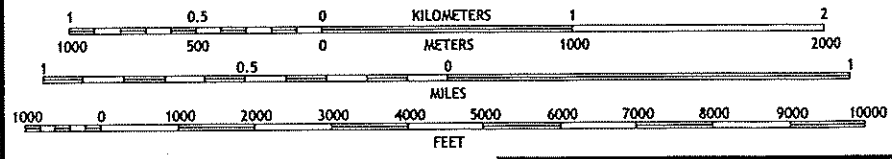
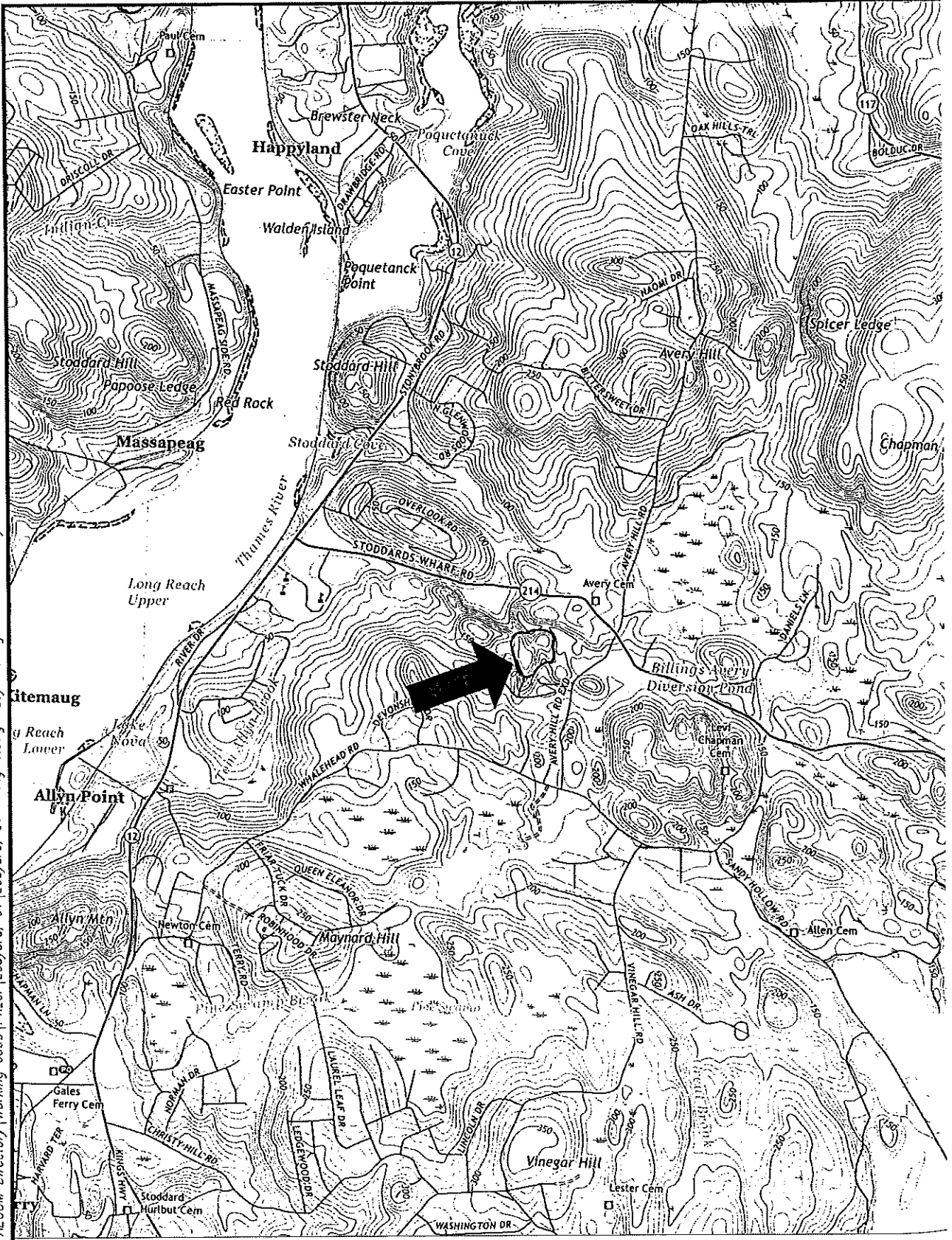
URS Corporation, "Stewardship Permit Post-Closure Plan Closed Pfizer Landfill Ledyard, Connecticut February 2012.

Stewardship Permit No. DEEP/SWF/CS-072-021

AECOM, Stewardship Permit DEEP/SWF/CS-072-021 2020 Annual Progress Report, January 2020

Figures

File: C:\Users\barryk\OneDrive - AECOM\Directory\Working Jobs\Pfizer\Ledyard, CT - Fig 1.dwg Layout: Fig 1 User: BarryK Plotted: Oct 25, 2021 - 11:38am Xref's:

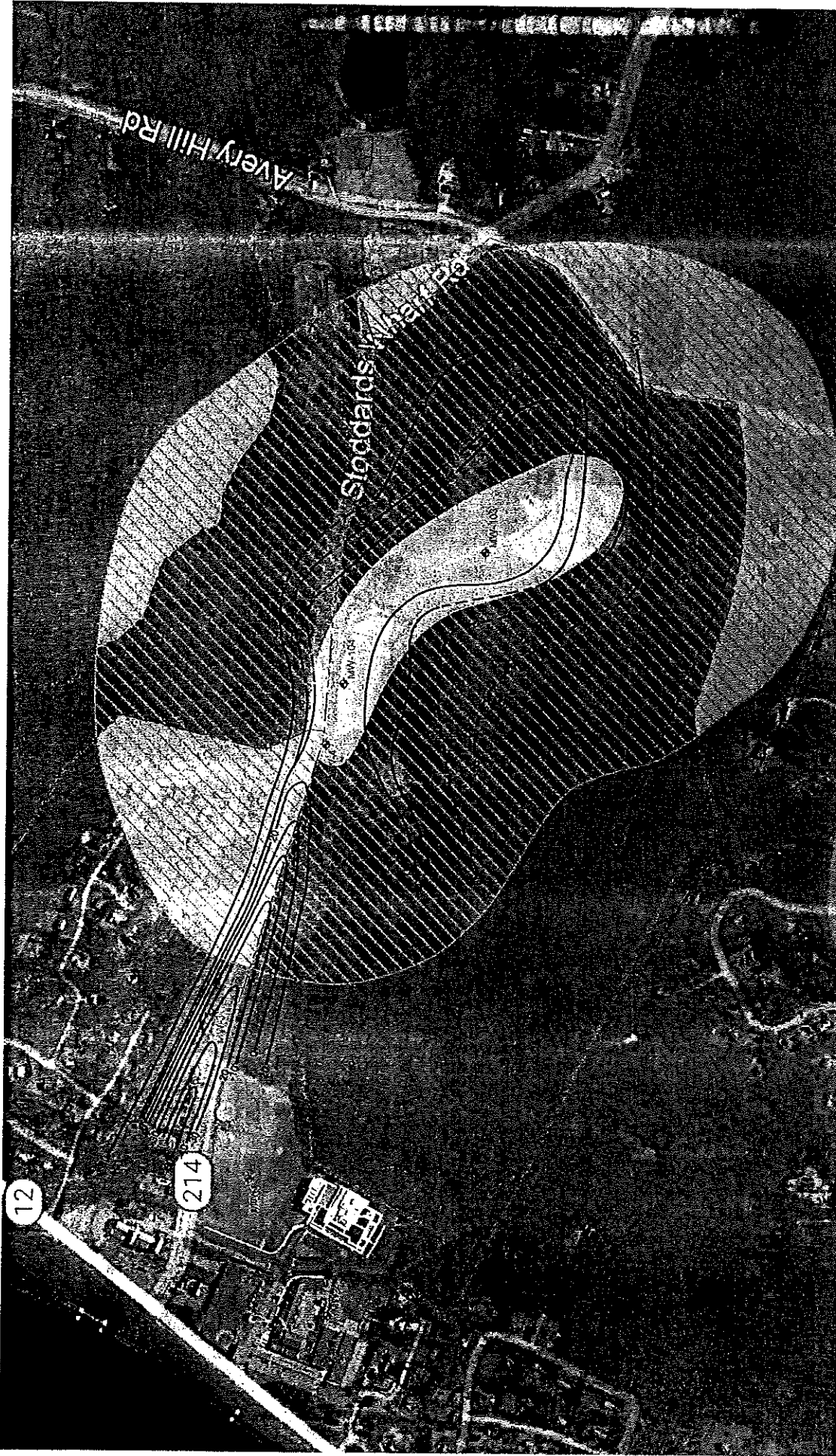


Source:
United States Geological Survey
North American Datum of 1983

AECOM



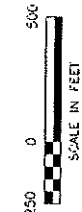
Pfizer Inc Closed Landfill Ledyard, Connecticut		Site Location M
DATE: 10/22/21	DRWN: K.P.B.	JOB No.: 60659135



SOURCE:
URS Corporation AES
Figure 2 - Groundwater
Management Buffer Zone

AECOM

- LEGEND**
- Property Owned by Pfizer
 - Bedrock Elevation (ft amsl)
 - Zone of Influence
 - Monitoring Well Location
 - Non-Pfizer Owned by Property
1,000' Groundwater Management
Buffer Zone



DATE: 10/25/23	DRAWN: N.P.B.	PROJECT: Pfizer Inc Closed Landfill Ledyard, Connecticut	GROUNDWATER MANAGEMENT BUFFER ZONE
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FIGURE 2

File: C:\Users\k\Documents\AECOM\Projects\Monitoring\AES\Pfizer\Ledyard, CT - Fig 2 - Groundwater Management Buffer Zone - 10/25/23 - 4/2/24.mxd

Attachment 1

Solid Waste Disposal Area Location

Attachment 2

Closed Landfill Visual Inspection Log

**PFIZER INC.
CLOSED LANDFILL, LEDYARD
SEMI-ANNUAL VISUAL INSPECTION LOG**

DATE _____ TIME _____

INSPECTOR(S) _____
COMPANY _____

ITEM	INSPECTION ELEMENT	ACCEPTABLE/ UNACCEPTABLE	COMMENTS	CORRECTIVE ACTION NEEDED (Y/N)	ESTIMATED DATE OF REPAIR COMPLETION	DATE COMPLETED	DATE OF MEMORANDUM DOCUMENTING CORRECTIVE ACTION
DRAINAGE BASIN	FENCE GATE CLOSED/LOCKED						
	FENCE CONDITION						
	DRAINAGE PIPE DISCHARGE END CLEAR OF DEBRIS						
	VEGETATION - SLOPES						
	VEGETATION - BASIN INTERIOR						
GRAVEL PIT (MW-4)	GATE CLOSED/LOCKED						
LANDFILL FENCE	MAIN GATE CLOSED/LOCKED						
	103 GATE CLOSED/LOCKED						
	102 GATE CLOSED/LOCKED						
	AVERY HILL RD GATE CLOSED/LOCKED						
	105 WELLS GATE CLOSED/LOCKED						
	FENCE CONDITION						
	MAIN GATE SIGNS						
ACCESS	ROAD CONDITION						

A = ACCEPTABLE; U = UNACCEPTABLE; Y = YES; N = NO

**PFIZER INC.
CLOSED LANDFILL, LEDYARD
SEMI-ANNUAL VISUAL INSPECTION LOG**

DATE _____ TIME _____

INSPECTOR(S) _____
COMPANY _____

ITEM	INSPECTION ELEMENT	ACCEPTABLE/ UNACCEPTABLE	COMMENTS	CORRECTIVE ACTION NEEDED (Y/N)	ESTIMATED DATE OF REPAIR COMPLETION	DATE COMPLETED	DATE OF MEMORANDUM DOCUMENTING CORRECTIVE ACTION
LINEAR DELINEATION MARKERS (23)	IN PLACE AND CONDITION						
DRAINAGE SYSTEM	INLET PIPE CLEAR OF DEBRIS						
	MANHOLE COVERS (3) IN PLACE						
DRAINAGE SWALES EASTERN CENTRAL	EROSION/CLEAR OF DEBRIS						
	EROSION/CLEAR OF DEBRIS						
SOUTHERN	EROSION/CLEAR OF DEBRIS						
WESTERN	EROSION/CLEAR OF DEBRIS						
SPUR	EROSION/CLEAR OF DEBRIS						
LANDFILL SLOPES	EROSION/RILLS						
	IRREGULAR SETTLEMENT						
	VEGETATIVE COVER - POORLY MOWED						
	NO SOLID WASTE EXPOSED						
	CLEAR OF ANIMAL BURROWS						
ODOR OR DUST	FREE OF ODOR OR DUST						
MONITORING WELLS	CAPS SECURED						
	GROUT IN GOOD CONDITION						
	CASING INTEGRITY						
	MANHOLE BOX OR STANDUP IN GOOD CONDITION						

ACCEPTABLE; U = UNACCEPTABLE; Y = YES; N = NO

ADDITIONAL COMMENTS

Attachment 3

Post-Closure Care Cost Estimate

Pfizer Inc.
Attachment L
Post-Closure Care
Cost Estimate

SUMMARY OF POST-CLOSURE CARE COSTS	
Estimated Annual Cost - With Groundwater Monitoring (Years 2, 4, 6, 8 and 10)	\$31,655.00
Estimated Annual Cost - Without Groundwater Monitoring (Years 1, 3, 5, 7 and 9)	\$23,158.00
ESTIMATED 10 YEAR COST	\$274,065.00

ESTIMATE OF ANNUAL POST-CLOSURE CARE COSTS - YEARS 2, 4, 6, 8 AND 10
Pfizer Closed Landfill
Ledyard, CT

Pfizer h
Attachment
Post-Closure Ca
Cost Estima

Role:	Principal	Project Manager	Senior Level	Senior Level	Senior Technician	Administrative
	Professional	Professional	Professional	Professional	Professional	Professional
Rate:	\$195	\$150	\$150	\$132	\$75	\$50
Task 1 Post-Closure Monitoring						
Kick-off and Planning						
Kick-off with Client	1.0	1.0	0.0	1.0	1.0	0.0
HASP Review	0.0	1.0	0.0	1.0	1.0	0.0
Technical planning with staff	0.0	2.0	0.0	0.0	1.0	0.0
Procurement/Subcontracting	0.0	3.0	0.0	0.0	0.0	4.0
Field Work						
Landfill Inspection Event 1 and 2						
Mobilization/ demobilization	0.0	0.0	0.0	0.0	2.0	0.0
Field Work	0.0	0.0	0.0	0.0	8.0	0.0
Moving Event 1						
Mobilization/ demobilization	0.0	0.0	0.0	0.0	2.0	0.0
Field Work	0.0	0.0	0.0	0.0	2.0	0.0
Landfill Inspection Event 2 and Groundwater Sampling						
Prep and/or Mobilization/ demobilization	0.0	0.0	0.0	0.0	8.0	0.0
Field Work	0.0	0.0	0.0	0.0	28.0	0.0
Mac. Technical Support (including field audits)	0.0	4.0	5.0	1.0	0.0	0.0
Maintenance & Repairs	0.0	0.0	0.0	0.0	8.0	0.0
Maintenance Subcontractor Coordination & Supervision (if repairs needed)	0.0	0.0	0.0	0.0	0.0	0.0
Reporting	1.0	20.0	1.0	2.0	3.0	2.0
Prepare draft report for client review	0.0	0.0	2.0	0.0	0.0	0.0
Issue draft and respond to client comments	0.0	3.0	0.0	0.0	0.0	0.0
Project Management	2.0	8.0	0.0	0.0	0.0	2.0
Client Meetings & P&I Support	1.0	2.0	0.0	0.0	0.0	0.0
Annual Cost Estimating and Financial Assurance	1.0	2.0	0.0	0.0	0.0	0.0
Total Hours	5.0	42.0	8.0	5.0	82.0	8.0
Extended Cost	\$965	\$6,300	\$1,200	\$650	\$4,850	\$400
Total Labor	\$14,255					

Cost Type: OOCs

Task 1	Post-Closure Monitoring	Quantity	Unit Rate	Total
	Low flow sampling equipment	3	\$ 300	\$ 900
	Truck Rental and Ops (per day, assumes one day for fence repair)	7	\$ 100	\$ 700
				Total \$1,600

Cost Type: Subs

Task 1	Post-Closure Monitoring	Quantity	Unit Rate	Total
	Laboratory	1	\$ 1,400	\$ 1,400
	Moving/maintenance	1	\$ 9,000	\$ 9,000
	Purge water disposal	1	-	-
	Tree Removal and Fence Repairs (estimated contingency)	1	\$ 4,500	\$ 4,500
				Total \$15,900

Cost Type: Pfizer Subs

Task 1	Post-Closure Monitoring	Quantity	Unit Rate	Total
	None anticipated	0	\$ -	\$ -
				Total \$0

Labor:	\$14,255
OOCs:	\$1,600
Subs:	\$15,900
Pfizer Subs (Estimated):	\$0
Total:	\$31,655

ESTIMATE OF ANNUAL POST-CLOSURE CARE COSTS - YEAR 1, 3, 5, 7 AND 9
Pfizer Closed Landfill
Ledyard, CT

Pfizer Inc
Attachment L
Post-Closure Care
Cost Estimate

	Principal	Project Manager	Senior Level	Senior Level	Senior Technician	Administrative
	Professional	Professional	Professional	Professional	Professional	Professional
Rate:	\$193	\$150	\$150	\$137	\$75	\$80
Task 1 Post-Closure Monitoring						
 Kick-off and Planning						
Kick-off with Client	1.0	1.0	0.0	1.0	1.0	0.0
HASP Review	0.0	1.0	0.0	1.0	1.0	0.0
Technical planning with staff	0.0	1.0	0.0	0.0	1.0	0.0
Procurement/Subcontracting	0.0	2.0	0.0	0.0	0.0	2.0
 Field Work						
 Landfill Inspection Event 1 and 2						
Mobilization/demobilization	0.0	0.0	0.0	0.0	4.0	0.0
Field Work	0.0	0.0	0.0	0.0	12.0	0.0
Misc. Technical Support	0.0	2.0	2.0	0.0	0.0	0.0
 Moving Event 1						
Mobilization/demobilization	0.0	0.0	0.0	0.0	2.0	0.0
Field Work	0.0	0.0	0.0	0.0	2.0	0.0
 Landfill Inspection Event 2 and Groundwater Sampling						
Prep and/or Mobilization/demobilization	0.0	0.0	0.0	0.0	0.0	0.0
Field Work	0.0	0.0	0.0	0.0	0.0	0.0
Misc. Technical Support (including field audits)	0.0	0.0	0.0	0.0	0.0	0.0
 Maintenance & Repairs						
Maintenance Subcontractor Coordination & Supervision (if repairs needed)	0.0	0.0	0.0	0.0	8.0	0.0
Reporting	0.0	0.0	0.0	0.0	0.0	0.0
Prepare draft report for client review	1.0	10.0	1.0	1.0	2.0	1.0
Peer review	0.0	0.0	1.0	0.0	0.0	0.0
Issue draft and respond to client comments	0.0	1.5	0.0	0.0	0.0	0.0
 Project Management						
Client Meetings & PM Support	1.0	6.0	0.0	0.0	0.0	1.0
Annual Cost Estimating and Financial Assurance	1.0	2.0	0.0	0.0	0.0	0.0
Total Hours	4.0	28.5	4.0	3.0	33.0	4.0
Extended Cost	\$772	\$3,975	\$600	\$399	\$2,475	\$240
Total Labor	\$8,458					

Cost Type: ODCs

Task 1	Post-Closure Monitoring	Quantity	Unit Rate	Total
	Truck Rental and Gas (per day, assumes one day for fence repair)	3	\$ 100	\$ 300
				Total
				\$300

Cost Type: Subs

Task 1	Post-Closure Monitoring	Quantity	Unit Rate	Total
	Moving/maintenance	1	\$ 9,000	\$ 9,000
	Tree Removal and Fence Repairs (estimated contingency)	1	\$ 4,500	\$ 4,500
				Total
				\$14,400

Cost Type: Pfizer Subs

Task 1	Post-Closure Monitoring	Quantity	Unit Rate	Total
	None anticipated	0	\$	\$
				Total
				\$0

Labor: \$8,458
ODCs: \$300
Subs: \$14,400
Pfizer Subs (Estimated): \$0
\$23,158

Attachment 4

Quality Assurance/Quality Control Plan

(See Attachment R of Stewardship Permit Application)

ATTACHMENT M
(Included in Attachment L)

ATTACHMENT N
SITE CHARACTERIZATION PLAN AND COST ESTIMATE

Not Applicable
(Site has been characterized as documented in reports listed in Attachment T)

ATTACHMENT O
REMEDIAL ACTION PLAN(S) AND COST ESTIMATE(S)

Not Applicable
(Remediation of the Site is not required as documented in reports listed in Attachmen

Stewardship Permit Application

Pfizer Inc.
Attachment P
Financial Assurance

ATTACHMENT P



Gareth J. Port
Manager
Environmental & Sustainability Law

Pfizer Inc.
235 East 42nd Street, New York, NY 10017
Tel 212 733 2814 Fax 646 487 9163
gareth.port@pfizer.com

April 8, 2021

BY FEDERAL EXPRESS

Katie Dykes
Commissioner
Connecticut Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106

Pfizer Inc.
c/o Russell Downey, Director
Global Engineering, Pfizer Inc.
100 Route 206 North
Peapack, NJ 07977

Re: Pfizer Inc. (Ledyard, CT)
Annual Solid Waste Disposal Area Financial Assurance
Intersection of Avery Hill Extension and Stoddards Wharf Road
Ledyard, Connecticut 06339
Stewardship Permit Number DEEP/SWF/CS-072-021

Dear Ms. Dykes and Mr. Downey:

Pfizer Inc. is writing to submit insurance provided by Blue Whale Re Ltd. of Burlington, Vermont to satisfy the above-referenced financial assurance requirement.

Please find enclosed the required instruments.

Ms. Katie Dykes and Mr. Russell Downey
April 8, 2021
Page 2

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read 'G. Port', with a long horizontal stroke extending to the right.

Gareth J. Port

Manager
Environmental & Sustainability Law, Pfizer Inc.

Enclosure(s)

cc: Robert C. Isner
Director, Waste Engineering and Enforcement Division
Connecticut Department of Energy & Environmental Protection
Bureau of Materials Management and Compliance Assurance
79 Elm Street
Hartford, CT 06106

**State of Connecticut
Solid Waste Management Facility
Certificate of Insurance
Closure and/or Post-Closure Care**

Name of Insurer (herein called the "Insurer"): Blue Whale Re Ltd.

Address: 76 St. Paul Street, Suite 500 Burlington, VT 05401

Name of Insured (herein called the "Insured"): Pfizer Inc.

Address: 235 East 42nd Street, New York, NY 10017

List for each facility covered:

Facility Permit Number: DEEP/SWF/CS-072-021

Name: Groton Ledyard Landfill

Address: Intersection of Avery Hill Extension and Stoddards Wharf Road, Ledyard, CT 06

The amount of insurance for

Closure Amount: \$0 Post-Closure Amount: \$192,247

(these amounts for all facilities covered must total the face amount shown below).

Face Amount: \$192,247

Policy Number: 361-21CPGRLL

Effective Date: 04/30/2021

The Insurer hereby certifies that it has issued to the Insured the policy of insurance identified above to provide financial assurance for closure for the facilities identified above. The Insurer further warrants that such policy conforms in all respects with the requirements of 40 CFR 264.143(e) and/or 265.145(e) as applicable and as such regulations were constituted on July 1, 1984, with certain wording changes made for consistency with the terms and requirements applicable to the Connecticut solid waste facility pursuant to section 22a-209-4(i) of the regulations of the Connecticut State Agencies. It is agreed that any provision of the policy inconsistent with such regulations is hereby amended to eliminate such inconsistency.

Whenever requested by the commissioner of Energy and Environmental Protection, the Insurer agrees to furnish to the commissioner a duplicate original of the policy listed above, including all endorsements thereon.

I hereby certify that the wording of this certificate is identical to the wording specified in 40 CFR 264.151(e), as such regulations were constituted on July 1, 1984, with certain wording changes made for consistency with the terms and requirements applicable to the Connecticut solid waste facility pursuant to section 22a-209-4(i) of the regulations of the Connecticut State Agencies.

Chryssa O'Toole
Authorized signature for Insurer

Chryssa O'Toole

Authorized Representative

Maie J. Madd
Signature of witness or notary

April 30, 2021

BLUE WHALE RE LTD.
76 ST. PAUL ST., SUITE 500
BURLINGTON, VERMONT 05401
"the Company"

CLOSURE / POST CLOSURE CARE POLICY

POLICY NUMBER 361-21CPGRLL

THIS IS A CLAIMS MADE POLICY. COVERAGE IS LIMITED TO LIABILITY FOR CLAIMS FIRST MADE AGAINST AN INSURED AND REPORTED TO THE COMPANY DURING THE POLICY PERIOD. PLEASE READ THE POLICY CAREFULLY.

DECLARATIONS

- Item 1. Named Insured:** Pfizer Inc. and/or all of its subsidiary and affiliated entities (including, but not limited to corporations, partnerships or joint ventures), including any former subsidiary, associated or financially controlled company, as may now or hereafter be constituted or acquired, including any other entity (including but not limited to any corporation, joint venture or partnership) for which the Named Insured has assumed control or responsibility.
- Item 2. Mailing Address:** 235 East 42nd Street
New York, NY 10017
- Item 3. Policy Period:** April 30, 2021 to April 30, 2022 at 12:01AM Standard Time at the Named Insured's address shown above.
- Item 4. Coverage:** This policy only provides coverage for Closure / Post Closure Care as set forth in the policy.
- Item 5. Covered Site:** Groton Ledyard Landfill
Intersection of Avery Hill Extension and Stoddards Wharf Road
Ledyard, CT 06339
Stewardship Permit Number DEEP/SWF/CS-072-021
- Item 6. Limits Of Insurance:**
- | | |
|--------------|-------------------------------|
| a) \$192,247 | Post Closure Costs |
| b) \$192,247 | Post Closure Care Face Amount |
- Item 7. Deductible:** \$ 0 Each Occurrence
- Item 8. Premium:** \$1,250

BLUE WHALE RE LTD.

By: Chryssa O'Toole
Authorized Representative

CLOSURE / POST CLOSURE CARE POLICY

THIS IS A "CLAIMS-MADE AND REPORTED" POLICY. THE POLICY REQUIRES THAT A CLAIM BE MADE UPON THE INSURED AND REPORTED TO THE COMPANY DURING THE POLICY PERIOD OR EXTENDED REPORTING PERIOD, IF ANY. PLEASE READ CAREFULLY.

In consideration of the payment of the premium, in reliance upon the statements in the Declarations and Application made a part hereof and subject to all the terms of this Policy, the Company agrees with the **Named Insured** as follows:

SECTION I. COVERAGES

1. Insuring Agreement.

The Company agrees to pay on behalf of the **Insured**, or the **Regulatory Agency**, subject to the limits of liability of this Policy, for **Closure Costs** and/or **Post-Closure Costs** that the **Insured** becomes legally obligated to pay by reason of **Closure** and/or **Post Closure Care** at **Hazardous Waste Facilities** designated in the Declarations. **Claims** by the **Insured**, or the **Regulatory Agency**, for such **Closure Costs** and/or **Post-Closure Costs** must be first reported in writing to the Company during the **Policy Period**. This coverage applies only to **Closure Costs** and/or **Post-Closure Costs** that first take place on or after the Retroactive Date shown in the Declarations.

SECTION II. EXCLUSIONS

This insurance does not apply to expenses, losses, liabilities, or damages of any kind incurred by, accruing to, or alleged to be liabilities of the **Insured**, by reason of:

- A. Any criminal or civil penalties imposed by reason of the violation of any law or regulation.
- B. Any third-party claims for **Bodily Injury** or **Property Damage**.
- C. Any expenses, charges or costs resulting from the defense and/or investigation of any liability or obligation for **Closure Costs** and/or **Post-Closure Costs** hereunder. However, this exclusion shall not apply to any investigations required for compliance with the **Closure** and/or **Post Closure Care Plan(s)** at **Covered Locations** including but not limited to investigation of groundwater quality, hydrogeology, chemical fate and transport.

SECTION III. CLAIMS PROVISIONS

- A. In the event the **Insured** receives a demand from a **Regulatory Agency** or information that **Closure** and/or **Post Closure Care** at **Hazardous Waste Facilities** is being considered or required by the **Regulatory Agency**, the **Insured** shall immediately forward to the Company any communication, demand or notice from the **Regulatory Agency** regarding the proposed or required **Closure/Post Closure Care** received by the **Insured** or its designated representative.
- B. The **Insured** shall cooperate with the Company and, upon the Company's request, assist in obtaining information relative to any **Claim** made. The **Insured** shall not, except at its own cost, voluntarily make or approve any payments, assume any obligations or incur any expenses relating to **Closure Costs** and/or **Post-Closure Costs** which are not in accordance with the **Closure Plan** and/or **Post-Closure Plan** without the Company's written permission.
- C. Any notices required by these conditions shall be sent to:

Blue Whale Re Ltd.
76 St. Paul Street, Suite 500
Burlington, VT 05401
- D. The Company, upon receipt of a **Claim**, shall review and issue payment to the **Insured** for all undisputed **Closure Costs** and/or **Post-Closure Costs** within thirty (30) days of receipt of a statement or bill of expenditures made for such costs and all necessary information verifying the amount of the **Closure Costs** and/or **Post-Closure Costs** for which reimbursement is being sought. The Company further agrees to notify

the **Insured** in writing within thirty (30) days of receipt of any statement or bill of expenditures made for **Closure Costs** and/or **Post-Closure Costs** what amount, if any, of the statement or bill of expenditures is in dispute and what back up information is needed to resolve the dispute. The Company and the **Insured** agree to cooperate to resolve any dispute, and if a dispute cannot be resolved promptly, to submit the same to binding arbitration upon the request of the **Insured** on or after the expiration of thirty (30) days after the submission of any statement or bill of expenditures for **Closure Costs** and/or **Post-Closure Costs** by the **Insured**, which arbitration shall be conducted, in accordance with the rules and regulations outlined in the American Arbitration Association guidelines.

SECTION IV. DEFINITIONS

- A. **Bodily Injury** means bodily injury, sickness, disease, fear of sickness or disease, mental anguish and mental injury, emotional distress, psychic injury, or disability including care, loss of services or death resulting therefrom.
- B. **Claim** means a request by the **Insured** or a **Regulatory Agency** for payment of a statement or bill of expenditures made for **Closure Costs** and/or **Post-Closure Costs** in accordance with the applicable **Closure Care Plan(s)** and/or **Post Closure Care Plan(s)** provided that such request is first reported in writing to the Company during the **Policy Period**.
- C. **Closure** means the partial or final closure of a **Hazardous Waste Facility** by closing, capping and otherwise managing one or more **Hazardous Waste Management Units** as required by a **Regulatory Agency** or in accordance with that facility's **Closure Care Plan**.
- D. **Closure Care Face Amount** means the amount of the most recent estimate of **Closure Costs** as determined in accordance with the **Closure Care Plan**, which is the total amount we are obligated to pay under the policy for closure care for a **Hazardous Waste Facility** scheduled in the Declarations of this Policy.
- E. **Closure Care Plan** means the written plan for closure of a **Hazardous Waste Facility** incorporated herein by reference, and prepared in order to comply with regulations promulgated under 40 CFR 264.143(e), 264.145(e), 265.143(d), and 265.145(d) or other applicable federal, state or local regulations regarding **Closure of Hazardous Waste Facilities**, and provided that such plan shall first have been approved by a **Regulatory Agency** or other applicable federal, state or local regulatory body.
- F. **Closure Costs** means all expenses specifically identified in or necessary to comply with the **Closure Care Plan** approved by a **Regulatory Agency** or other applicable federal, state local regulatory agency.
- G. **Hazardous Waste Facility** means the facility designated by legal description in the Declarations which has received authorization from a **Regulatory Agency** to engage in the treatment, storage or disposal of hazardous waste and includes one or more **Hazardous Waste Management Units**.
- H. **Hazardous Waste Management Unit** means a surface impoundment, waste pile, land treatment area, landfill cell, incinerator, tank (and associated piping), container storage area, and the underlying containment systems for any of these located on, within or under a **Hazardous Waste Facility**.
- I. **Insured** means the **Named Insured**, and any trustee, principal, member, director, officer, partner or employee thereof while acting within the scope of his/her duties as such, and any person or entity designated as an additional insured by an endorsement issued to form a part of this Policy.
- J. **Named Insured** means the person or entity designated as such in Item 1 of the Declarations.
- K. **Policy Period** means the period set forth in Item 2 of the Declarations, or any shorter period arising as a result of cancellation of this Policy.
- L. **Post-Closure** means the time period following **Closure** for which the **Named Insured** has responsibility for care and maintenance activities at a **Hazardous Waste Facility** in accordance with an approved **Post-Closure Care Plan**.
- M. **Post-Closure Care** means those actions that are required of the **Insured** or are conducted by a **Regulatory Agency** in accordance with the written plan(s) for **Closure at Hazardous Waste Facilities** prepared in order to comply with regulations promulgated under 40 CFR 264.143(e), 264.145(e), 265.143(d), and 265.145(d) or

other applicable federal, state or local regulations regarding **Closure and Post-Closure Care of Hazardous Waste Facilities**.

- N. **Post-Closure Face Amount** means the amount of the most recent estimate of **Post-Closure Costs** as determined in accordance with the **Post-Closure Care Plan**, and is the total amount we are obligated to pay under the policy for **Post-Closure Care** for the locations scheduled in the Declarations in this Policy.
- O. **Post-Closure Costs** means all expenses specifically identified in or necessary to comply with the **Post-Closure Care Plan** approved by a **Regulatory Agency** or other applicable federal, state local regulatory agency.
- P. **Post-Closure Care Plan** means the written plan incorporated herein by reference, and prepared in order to comply with regulations promulgated under 40 CFR 264.143(e), 264.145(e), 265.143(d), and 265.145(d) or other applicable federal, state or local regulations regarding **Post-Closure at Hazardous Waste Facilities**, and provided that such plan shall first have been approved by a **Regulatory Agency** or other applicable federal, state or local regulatory body.
- Q. **Property Damage** means:
1. physical injury to or destruction of tangible property, including the personal property of third parties; or
 2. loss of use of such property that has not been physically injured or destroyed; or
 3. diminished third party property value.
- R. **Regulatory Agency** means the US Environmental Protection Agency or any successor person or state agency designated by the Regional Administrator or any agency that becomes responsible for the supervision of the **Closure/Post Closure**.

SECTION V. LIMIT OF LIABILITY AND DEDUCTIBLE

- 1) With respect to scheduled **Hazardous Waste Facilities** shown in the Declarations, the Company's total liability for all **Closure Costs** and/or **Post-Closure Costs**:
- a. Shall not exceed the limit of liability shown in the Schedule as aggregate;
 - b. Subject to (a), the total policy liability for all **Closure Costs** and/or **Post-Closure Costs** at a scheduled **Hazardous Waste Facility** shall not exceed the limit of liability for that scheduled facility shown in the Schedule as the sum of the **Face Amount of Closure Costs** and the **Face Amount of Post-Closure Costs**
- regardless as to the number of:
- a. facilities shown in the Declarations;
 - b. **Insureds** under this policy; or
 - c. **Claims** made or suits brought.
- 2) The company shall pay any applicable deductible amount and upon notification to the **Insured** or the **Insured's** representative of such payment, the **Insured** shall promptly reimburse the Company for the amount so paid.

SECTION VI. CONDITIONS

- A. **Inspection and Audit** - The Company shall be permitted but not obligated to inspect, sample and monitor on a continuing basis a scheduled **Hazardous Waste Facility** at any time. Neither the Company's right to make inspections, sample and monitor, nor the actual undertaking thereof nor any report thereon, shall constitute an undertaking, on behalf of the **Insured** or others, to determine or warrant that the **Hazardous Waste Facility** or the operations at the **Hazardous Waste Facility** are safe, healthful or conform to acceptable engineering practice or are in compliance with any law, rule or regulation. The Company or its designee may examine and audit the **Insured's** books and records at any time during the **Policy Period** and extensions thereof, as far as

they relate to the subject matter of this insurance, and within any periods of **Closure** and/or **Post Closure** for which coverage is provided whether Insurance of this Policy has expired.

B. **Cancellation** - The Company may not cancel, terminate or fail to renew the policy except for failure to pay the premium. The automatic renewal of the policy must, at a minimum, provide the **Insured** with the option of renewal at the face amount of the expiring policy. If there is a failure to pay the premium, the Company may elect to cancel, terminate, or fail to renew the policy by sending notice by certified mail to the **Insured** and the **Regulatory Agency**. Cancellation, termination, or failure to renew may not occur, however, during the one hundred twenty (120) days beginning at the receipt of the notice by both the **Regulatory Agency** and the **Insured** as evidenced by return receipt. Cancellation, termination or failure to renew may not occur and the policy will remain in full force and effect in the event that on or before the date of expiration:

1. The **Regulatory Agency** deems the **Hazardous Waste Facility** abandoned; or
2. The permit for the **Hazardous Waste Facility** is terminated or revoked or a permit is denied; or
3. **Closure** is ordered by the **Regulatory Agency** or a US District Judge, or other court of competent jurisdiction; or
4. The **Insured** is named as a debtor in a voluntary or involuntary proceeding under Title II (Bankruptcy), US Code; or
5. The premium due is paid in full.

C. **Representations** - By acceptance of this Policy, the **Named Insured** agrees that the statements in the Declarations and Application(s) are their representations, that this Policy is issued in reliance upon the truth of such representations, and that this Policy embodies all agreements existing between the **Named Insured** and the Company or any of its agents relating to this insurance.

D. **Action Against Company** - No third-party action shall lie against the Company, unless as a condition precedent thereto, there shall have been full compliance with all of the terms of this Policy, nor until the amount of the **Insured's** obligation to pay shall have been finally determined either by judgment against the **Insured** after actual trial, expedited declaratory proceeding or by written agreement of the **Insured**, the claimant or **Regulatory Agency** and the Company, as applicable.

Any person or organization or the legal representative thereof who has secured such judgment or written agreement shall thereafter be entitled to recover under this Policy to the extent of the insurance afforded by the Policy. No person or organization shall have any right under this Policy to join the Company as a party to any action against the **Insured** to determine the **Insured's** liability, nor shall the Company be impleaded by the **Insured** or his legal representative. Bankruptcy or insolvency of the **Insured** or of the **Insured's** estate shall not relieve the Company of any of its obligations hereunder.

E. **Assignment** - This Policy may be assigned to another organization, corporate entity with the same parent or third-party corporate entity, with the consent of the Company, which consent shall not be unreasonably withheld, delayed, or denied.

F. **Changes** - Notice to any agent or knowledge possessed by any agent or by any other person shall not effect a waiver or a change in any part of this Policy or estop the Company from asserting any right under the terms of this Policy; nor shall the terms of this Policy be waived or changed, except by endorsement issued to form a part of this Policy.

G. **Other Insurance** - This insurance is primary with respect to other valid and collectible insurance available to the **Named Insured**.

H. **Mutual Construction** - The Company and all **Insured** agree that the rule of contract construction that ambiguities are to be construed against the drafter shall not apply to any dispute arising under this Policy. Any such ambiguity shall be construed to give effect to the mutual intent of the parties as expressed herein.

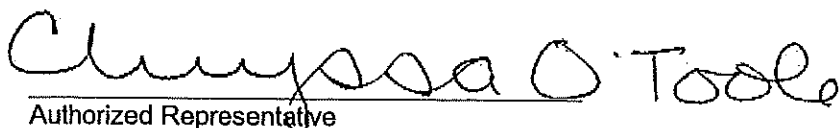
I. **Warranties** – The Company has issued this policy to provide financial assurance for **Closure Costs** and/or **Post-Closure Care Costs** for scheduled **Hazardous Waste Facilities**. The Company hereby warrants that;

- 1) the **Closure** funds will be available whenever **Closure** begins;
- 2) once **Closure** begins, we will be responsible for paying out funds up to an amount equal to the **Closure Costs Estimated Amount** for the **Hazardous Waste Facility**;
- 3) the **Post-Closure** funds will be available whenever the **Post-Closure** period begins;
- 4) once **Post-Closure** begins, we will be responsible for paying out funds up to an amount equal to the **Post-Closure Costs Estimated Amount** for the **Hazardous Waste Facility**;
- 5) the policy conforms in all respects with the requirements of 40 CFR 264.143(e), 264.145(e), 265.143(d), and 265.145(d), as applicable, and as such regulation was constituted on the inception date of the policy. It is agreed that any provision of the policy inconsistent with such regulation is hereby amended to eliminate such inconsistency, except that the limits of insurance shall not be amended.

SECTION VII. SERVICE OF SUIT

A. **Service of Suit** - It is agreed that in the event of any dispute under the Policy in which the **Regulatory Agency** or the **Named Insured** is a party, the Company, at the request of the **Regulatory Agency** or the **Named Insured**, will submit to the jurisdiction of the United States District Court, in the State of New Jersey. It is further agreed that service of process in such suit may be made upon Counsel, Legal Department, Blue Whale Re Ltd., 76 St. Paul Street, Suite 500, Burlington, VT 05401, or his or her representative, and that in any suit instituted against the Company upon this Policy, the Company, will abide by the final decision of such court or of any appellate court in the event of any appeal.

IN WITNESS WHEREOF, the Company has caused this Policy to be signed by a duly authorized representative or countersigned in states where applicable.


Authorized Representative

ENDORSEMENT NO. 1

LANGUAGE REPLACEMENT AND DEFINITION ENDORSEMENT

Pursuant to Connecticut Department of Energy and Environmental Protection §22a-209-4(i) the following terms will be substituted.

"hazardous waste" will be replaced with "solid or special waste"

"RCRA permit" will be replaced with "DEEP permit"

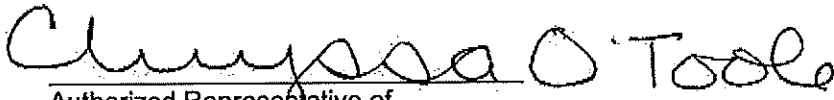
"Regional Administrator" will be replaced with "Commissioner"

"Environmental Protection Agency or EPA" will be replaced with "Department of Energy and Environmental Protection"

"EPA identification number" will be replaced with "stewardship permit number"

Pursuant to Connecticut Department of Energy and Environmental Protection §22a-209-4(i) the following changes to defined terms shall apply:

- 1) The term "closure plan" shall be defined as follows: "closure plan" means the facility plan for design, construction, and operation, including closure and post-closure maintenance and gas and water monitoring, required by Section 22a-209-4(b) (2) of these regulations.
- 2) Any reference to the Resource Conservation and Recovery Act or to a section of the federal regulations other than those incorporated herein by reference shall be deemed a reference to Sections 22a-209-1 through 22a-209-13 of the regulations of Connecticut State Agencies.
- 3) The definitions of "post-closure plan" and current post-closure cost estimate" shall be omitted
- 4) The term "region" shall be replaced with "municipality"



Authorized Representative of
Blue Whale Re Ltd.
76 St. Paul Street, Suite 500
Burlington, VT 05401

ATTACHMENT Q

PUBLIC PARTICIPATION PLAN

Pfizer Inc has developed this Public Participation Plan to present details of the planned public notice of Pfizer's intent to renew the Stewardship Permit for the Pfizer Inc Closed Ledyard Landfill.

Upon submittal of the Stewardship Permit application to the Department, Pfizer will:

1. Publish a notice in the New London Day newspaper indicating that Pfizer is applying for a Stewardship Permit for post-closure care of the closed landfill.
2. Erect a sign for thirty days on the closed landfill property informing the public of Pfizer's intent to renew the Stewardship Permit.
3. Pfizer will provide a copy of the newspaper public notice to the Mayor of Ledyard.
4. Pfizer will provide a certified copy of the newspaper notice to the Department via the Department's Certification of Notice Form - Notice of Application, form DEP-APP-005A.

ATTACHMENT R

Stewardship Permit
Quality Assurance Project
Plan
Closed Pfizer Landfill
Ledyard, Connecticut

Project number: 80699735

October 2021

Prepared for:

Pfizer, Inc.
Pfizer Global Manufacturing
100 Route 206 North
Peapack, NJ

Prepared by:

AECOM
500 Enterprise Drive
Rocky Hill, CT 06067
aecom.com

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Figure 1 – Facility Location Map, USGS Quadrangle

Attachments

Attachment 1 EPA Low Flow Sampling Procedures
Attachment 2 Sample Data Sheet

1. Introduction

1.1 Program Applicability

This Quality Assurance Project Plan (QAPP) has been prepared to present quality assurance/quality control (QA/QC) procedures that will be followed during the conductance of groundwater quality monitoring of the Closed Pfizer Landfill (Facility). For the purposes of this QAPP, "Facility" shall mean the approximately 15.5 acres of land consisting of the fenced area around the closed landfill, the fenced area around the retention basin, the underground culvert channeling storm water runoff from the closed landfill to the retention basin, and monitoring wells MW-4, MW-102B, MW-103S, MW-103I, MW-103D, MW-103I, MW-104S, MW-104D, MW-104B and MW-105S. The Facility is located within the parcel of land known as 215 Stoddards Wharf Road, located south of Stoddards Wharf Road and west of Avery Hill Extension in Ledyard, CT and described in the Town of Ledyard Property Information and Map Database as Map/Block/Lot 50-2360-215.

A Facility Location Map is included as Figure 1. This QAPP is applicable to the groundwater monitoring conducted under the regulatory guidance of Stewardship Permit No. DEP/SWF/CS-072-021 for the Facility.

The Stewardship Permit has been issued to Pfizer Inc. (Pfizer) to perform groundwater monitoring at the solid waste disposal facility in accordance with Connecticut General Statutes ("CGS") Sections 22a-6, 22a-208 and 22a-209, and 22a-209-13 of the Regulations of Connecticut State Agencies ("RCSA") as specified in the conditions set forth in the Stewardship Permit.

1.2 The Quality Assurance Project Plan

The purpose of the QAPP is to present specific methods and procedures that will be conducted and/or utilized to collect and review data as part of the field sampling activities at the Closed Pfizer Landfill. The QAPP provides detailed information on procedures and documentation requirements for field, laboratory, and data evaluation and management tasks and addresses required QA/QC program elements, including:

- Project Description Summary;
- Project Organization and Responsibility;
- Data Quality Objectives (DQOs);
- Personnel Training Requirements;
- Field Sampling Procedures;
- Equipment Calibration Procedures;
- Field QA/QC;
- Sample Custody and Management Procedures;
- Field Sampling Audits;
- Analytical Procedures;
- Laboratory QA/QC;
- Data Reduction, Validation, and Reporting;
- Corrective Action; and
- QA/QC Reports.

Specifically, the QAPP shall apply to proposed groundwater quality monitoring activities to be conducted at the Closed Pfizer Landfill as part of a Stewardship Permit Post Closure care. The procedures and protocols presented in the QAPP will assure that data collected are accurate, representative and usable, and that the results are consistent with project DQOs. The procedures outlined in the QAPP were prepared pursuant to applicable technical standards, regulatory programs and guidelines to document the QA/QC procedures.

The objective of the QA/QC program is to ensure that the data generated by the groundwater quality monitoring activities will be of a quality that will meet regulatory requirements and to ensure that the investigation and analysis of environmental media is adequate to effectively evaluate the nature and distribution of constituents in the groundwater. Specifically, the QAPP provides guidance to ensure that:

- Field analyses and laboratory analytical results are of known quality and will be consistent throughout the course of the project and can be compared to other data collected using similar protocols and procedures. This will be accomplished through the use of certified analytical methods, equipment maintenance and calibration, collection of QA/QC measurements, and performance of reviews and audits of activities conducted during the project.
- Samples are collected using appropriate, documented procedures, identified uniquely, and controlled through sample tracking systems and chain-of-custody protocols.
- Records are retained to document the collection, analysis, and tracking of samples and associated data generated during the project.
- Quality of generated data is appropriate for the intended use.
- Procedures and evaluation criteria are appropriate and consistent throughout the project.

1.3 Facility Description and History

The parcel was purchased by Pfizer in 1953. The landfill and surrounding undeveloped land were used by Pfizer from 1953 until 1994 for disposal of waste material generated by production activities at Pfizer's Groton, Connecticut, manufacturing facility. Wastes disposed in the landfill include solvents, iron ferrocyanides, diatomaceous earth and biosynthetic residues. The disposal of solvent wastes ceased in 1965, with only non-hazardous wastes disposed after 1965. The landfill was closed in October 1996 in accordance with the Connecticut Department of Energy and Environmental Protection (CT DEEP) Solid Waste Regulations RSCA 22a-209-13. As part of the closure, the landfill was capped and secured by a 6-foot high chain link fence equipped with three-strand barbed wire. Quarterly groundwater monitoring for solvents and annual monitoring for metals commenced in 1965. Pfizer is currently conducting post-closure maintenance activities including inspections, repairs (as warranted) and groundwater quality monitoring. No post-closure uses are planned for the Facility.

1.4 Project Description

This QAPP has been developed for the Closed Pfizer Landfill post-closure groundwater quality monitoring program implemented to support the associated Stewardship Permit. The post-closure groundwater quality monitoring shall include the monitoring of groundwater quality at select groundwater monitoring well locations at the Facility and surrounding land to monitor groundwater quality and assure compliance with the requirements of the Stewardship Permit. The groundwater quality monitoring is outlined in the Post-Closure Plan.

Groundwater quality monitoring program sampling procedures are presented in greater detail in Section 3.2.3 below.

1.5 Project Participants

The project will be administered and managed by Pfizer. Pfizer will identify a Project Manager who will be responsible for all day-to-day decisions on the project, as well as providing general project oversight.

The project QA/QC Officer will also be selected by Pfizer. The QA/QC Officer has the responsibility on the project to ensure that the QA/QC aspects of the project are performed in accordance with this QAPP, the project-specific work plan, and the project-specific work instructions. As specified in this QAPP, such oversight of activities may include review of data generated during the course of the project to evaluate whether or not the data quality is adequate for the intended use and meets the DQOs for the project. The QA/QC Officer or his or her designee will be responsible for the performance of field audits to evaluate adherence to the protocols outlined in this document, and for requiring appropriate actions to be taken should the results of the field audits indicate that such procedures are not being followed.

Field work implementation and quality control will be coordinated and managed by the person or consultant selected by Pfizer. It is the responsibility of the Project Manager to ensure effective coordination between the field team and office personnel. It is the responsibility of the Project Manager and the QA/QC Officer to ensure that project activities are performed in a manner that will result in the achievement of the DQOs for the project.

The performance of specific project tasks may be subcontracted to outside entities per Pfizer's discretion. Tasks that will be subcontracted include laboratory analysis of groundwater quality monitoring program samples.

2. Quality Assurance/Quality Control Program

2.1 Data Quality Objectives (DQOs)

The QA/QC program has been developed to assist with the achievement of the project DQOs. The DQOs of the QA/QC are to generate analytical data of a quality sufficient to evaluate groundwater quality conditions as required by the Stewardship Permit and to meet the requirements of regulatory agencies. More specifically, the DQOs consist of five major components as defined by the United States Environmental Protection Agency (EPA):

- **Precision:** A measurement of the reproducibility of data under a specified set of conditions, generally evaluated by comparing day-to-day variances in control sample data (e.g., split sample differences) to calculated average values;
- **Accuracy:** A measurement of the bias of a system, usually assessed through the evaluation of percent recoveries associated with reference samples (e.g., surrogate and matrix spike recoveries, reference standards);
- **Representativeness:** A qualitative measure used to determine the degree to which obtained data correlates to the population sampled, evaluated through QA/QC review of sampling and analysis plans and standard operating procedures (SOPs), and performance of QA/QC audits;
- **Completeness:** Defined as the percentage of total data collected that is determined, through EPA or other standard validation procedures, to be acceptable and valid for intended uses; and,
- **Comparability:** A qualitative measure assessing the confidence with which data sets obtained for similar samples can be correlated, taking into consideration factors such as short-term weather variations as well as longer-term seasonal conditions, test conditions, sampling and analytical methods, and laboratory conditions.

The procedures presented in this QAPP are designed to provide groundwater analytical data of sufficient quality to meet the above five components. Implementation and adherence to the individual QA/QC procedures presented in this QAPP will assure quality groundwater analytical data that will result in attainment of the DQOs.

2.2 QA/QC Elements

The QA/QC program contains several elements: field sampling QA/QC samples, field QA/QC procedures, documentation of field procedures, laboratory methods, laboratory QA/QC procedures and data management procedures. The specific elements of the QA/QC plan are described in the following sections of the QAPP.

3. Field Quality Assurance/Quality Control Procedures

3.1 Field Sampling QA/QC Samples

In order to evaluate several QA/QC aspects of the sampling and analysis program, such as representativeness of samples, accuracy and precision of laboratory analyses, and effectiveness of decontamination procedures and potential cross-contamination from external sources, several types of QA/QC samples will be collected during the performance of each groundwater quality monitoring event. These field-related QA/QC samples include trip blanks, replicate samples, field blanks and equipment blanks. These QA/QC samples are discussed in greater detail in the sections below.

3.1.1 Trip Blanks

Trip blanks will be collected at the rate of one (1) per sample cooler per day for each day of field sampling during which volatile organic compound (VOC) samples are to be collected. A separate trip blank will be included for each sample cooler which is utilized for storage and/or handling of VOC samples. Trip blanks will be analyzed for VOCs utilizing the same laboratory methodology and within the same laboratory batches as the primary groundwater samples.

3.1.2 Replicate Samples

Replicate samples will be collected at the rate of one (1) replicate groundwater sample per each sampling event. At a minimum, each parameter analyzed during each sampling event shall be replicated via the collection of one (1) or more replicate samples as necessary.

3.1.3 Equipment Blanks

At least one (1) equipment blank will be collected per each sampling event. The equipment blank will be collected from laboratory supplied blank water poured over or passed through the groundwater sampling equipment which contacts the groundwater samples. Equipment blanks shall not be collected from new clean dedicated equipment. Equipment blanks shall be collected from non-dedicated sampling equipment following decontamination procedures. The equipment blank shall be analyzed via the same EPA Methodologies as the primary groundwater samples collected during each sampling event.

3.2 Field QA/QC Procedures

3.2.1 Personnel Training

Field team personnel shall be fully trained in the conductance of the low flow groundwater sampling procedures and field QA/QC procedures to be implemented during the conductance of the groundwater quality monitoring program. Field team personnel shall be trained in the use of low flow groundwater monitoring equipment including use of pumps and groundwater field parameter monitoring equipment and sample collection techniques prior to working on this project. Field team members are required to review and be aware of all procedures presented in this QAPP. Field team members are required to review project-specific work instruction prior to the conductance of each groundwater quality monitoring program event. A copy of the QAPP and project-specific work instructions shall accompany the field team during the conductance of each groundwater quality monitoring event.

3.2.2 Instrument Calibration

Instrumentation utilized during the conductance of the groundwater quality monitoring shall be calibrated and/or checked for accuracy at specific intervals during the groundwater quality monitoring program as presented below.

- Electronic water level meter(s) utilized during the groundwater sample collection shall be checked for functionality and accuracy at the beginning of each sampling event and/or as necessary thereafter. The field team shall record the accuracy check on the field logs.
- Electronic water quality meters utilized to measure field parameters such as water temperature, specific conductivity, pH, oxidation reduction potential (ORP), dissolved oxygen (DO), turbidity, etc., shall be calibrated and/or checked for calibration at the beginning of each groundwater quality monitoring event. The calibration shall be checked against known standards (for all parameters readily possible) at the beginning of each subsequent day of each groundwater quality monitoring event. The field team shall record the calibration and/or accuracy check on the field logs.
- If a separate turbidity meter is utilized for the groundwater monitoring, the turbidity meter shall also be checked for calibration at the beginning of each groundwater quality monitoring event and each subsequent day of the monitoring. The field team shall record the accuracy check on the field logs.
- Other electronic equipment that may be utilized during the groundwater quality monitoring program shall be calibrated and/or checked for calibration at a frequency that will assure the programs DQOs. The field team shall record the calibration and/or accuracy check of such "other" equipment on the field logs.

3.2.3 Groundwater Sampling Procedures

Groundwater quality monitoring program sampling shall be conducted in general accordance with the procedures presented in the *Low Stress (Low Flow) Purging and Sampling Procedures for the Collection of Ground Water Samples From Monitoring Wells*, Revision Number 2, U.S. EPA, dated July 30, 1996, Revised September 19, 2017. A copy of which is included as Attachment 1.

3.2.3.1 Statement of Purpose

The purpose of low-flow (low-stress) sampling is to collect groundwater samples that are representative of groundwater quality under natural flow conditions. In particular, the presence and concentration of dissolved organic and inorganic pollutants as well as the pollutants associated with mobile particulates are most accurately revealed through low-flow sampling. Historic sample collection techniques often cause stress on an aquifer causing changes in the water chemistry and an inaccurate or incomplete analysis of groundwater conditions. Low-flow sampling techniques minimize stress on the aquifer by utilizing low pumping rates that result in minimal water-level drawdowns.

3.2.3.2 Low-Flow Approach

This guidance presents a generalized approach to low-flow sampling. For the purposes of this QAPP, it is assumed that the monitoring wells have been appropriately sited and screened in accordance with the DQOs of the groundwater quality monitoring program. Typically, screen lengths are limited to 10 feet and the pump intake is located at the midpoint of the saturated screen length. The location of the pump intake should be adjusted if strata of higher permeability or fractures, or areas of higher concentrations of pollutants can be identified. When possible, pump intakes should be located at least 2 feet above the bottom of the well in order to minimize the possibility of mobilizing sediment from the bottom of the well. Dedicated sampling equipment insures that samples are collected from the same location within the well during each sampling event. If dedicated equipment is not possible, the exact location of the pump intake must be identified and each sampling event must attempt to collect samples from that same location.

3.2.3.3 Project Specific Sampling Procedures

Groundwater sampling shall also be conducted in accordance with project-specific work instructions prepared for this project. The project-specific work instructions will be prepared for utilization by field sampling personnel to present specific procedures to be followed, monitoring locations to be sampled and groundwater sample analyses.

3.2.4 Groundwater Sample Collection and Handling Procedures

Following completion of the groundwater purging described above, groundwater samples shall be collected in the appropriate laboratory supplied sampling containers. Groundwater samples shall be collected directly from the dedicated sampling tubing into the laboratory containers.

To ensure proper documentation of the samples collected, the following sample-specific information will be marked on the label of each sample collected using a permanent waterproof pen:

- Sample Number;
- Sampling Date;
- Sampling Time;
- Preservative;
- Analyte(s); and
- Sampler's Initials.

Following collection and labeling, all samples intended for laboratory analysis will be stored in insulated coolers which contain cooling materials (commercial freezer packs or ice as necessary) to maintain a temperature of 6°C. The coolers will be kept in the possession of the sampling team or secured in a locked location until they are transported to the laboratory.

All samples collected will be documented on sample data sheet and chains-of-custody forms. The chain-of-custody will be completed by a member of the sampling team before the team leaves the Facility. The completed chain-of-custody will be placed in water-tight plastic bags and carried inside the sample cooler during transport to the laboratory.

3.2.5 Decontamination Procedures

Non-dedicated equipment and non-dedicated electronic water level meters (or any other equipment as necessary) shall be decontaminated as necessary between uses. The decontamination of equipment shall consist of the following procedures:

- Washing equipment with a soap solution utilizing non-phosphate "free rinsing" soap such as Alconox® brand or equivalent;
- Rinsing equipment with tap water;
- Rinsing equipment with distilled water; and
- Allowing equipment to air dry before use.

3.2.6 Field Audits

To ensure that procedures outlined in this QAPP are followed by the field sampling team, field audits of the sampling team will be conducted during the performance of activities by the QA/QC officer or his or her designee. Field audits will be performed at a rate of one audit per every year groundwater sampling occurs. An effort will be made to schedule the audit as early in the field program as possible in order that any deficiencies noted can be corrected within a reasonable time-frame to maintain the DQOs. At the discretion of the project manager and/or the technical lead for the project, additional auditing may be performed throughout the project to further ensure that proper procedures are being followed throughout the entire course of the project.

Records of each field audit will be maintained throughout the duration of the project. Should deficiencies be noted during any audit, corrective actions will be taken (demonstration/ explanation, re-training, etc.). Documentation of the corrective actions taken will be noted in the audit report, and a follow-up audit will

be performed to ensure that corrections have been made and proper procedures for sample collection and analysis are being performed.

3.3 Documentation of Field Activities

Field activities will be fully documented in daily field logs, sampling data sheet records, and chain-of-custody forms.

All field documentation will be reviewed by the project manager or his or her designee for completeness and accuracy within one to two days of generation. Corrections will be made as soon as issues are detected.

3.3.1 Field Logs

Daily field logs will be prepared by each field team member. Field logs shall be prepared in a format approved by the project manager. The field logs shall at a minimum contain the following information:

- Samplers name;
- Project name and project number;
- Date;
- Weather conditions;
- Brief description of activities conducted during the day;
- Work start time;
- Work completion time;
- Record on visitors to the Facility or conversations with officials or project managers;
- Significant issues of derivation from the sampling plan; and,
- List of sampling locations and sample times.

3.3.2 Sample Data Sheets

Sample data sheets will be prepared to document the groundwater monitoring well purging and sample collection activities. Sample data sheets shall be prepared in a format approved by the project manager. The sample data sheets shall at a minimum contain the following information:

- Name of company conducting the sampling;
- Project name and project number;
- Date and time of sample collection;
- Monitoring well location identification;
- Samplers name(s);
- Name of contract laboratory;
- Sample identification number;
- Analyses requested;
- Water level and well depth measurements;
- Low flow sampling field parameter measurements; and
- List of sampling containers collected.

An example sample data sheet is included in Attachment 2.

3.3.3 Chain-of-Custody Forms

Chain-of-custody forms shall be utilized to document the laboratory analyses as well as the sample collection time and laboratory QA/QC to be conducted on the groundwater monitoring well samples. The field team shall utilize the contract laboratory chain-of-custody. The field team shall complete all portions of the chain-of-custody as applicable to the project. The information recorded on the chain-of-custody should include the following:

- Project name and project number;
- Client address;
- Client contact name and contact information;
- Sample identification;
- Sample collection date and time;
- Type of sample containers and preservative;
- Number of bottles collected for each sample;
- Sample analysis turnaround time;
- Analyses to be performed;
- Laboratory QA/QC information;
- Signature of the person relinquishing the samples; and
- Date and time the samples were relinquished.

3.4 Laboratory Methods

Groundwater quality monitoring program groundwater samples shall be analyzed for the appropriate EPA methods as indicated in the table below. All trip blanks, replicate samples, field blanks and equipment blanks shall be analyzed for the same EPA methods as the corresponding primary samples. Analytical methods shall include the following:

Parameter	Analytical Method	Matrix Volume Container	Holding Times
Volatile Organic Compounds	US EPA Method SW-846 8260B	Two (2) 40 milliliter amber Teflon lined vials	14 days
Arsenic	US EPA Method SW-846 6020	One (1) 500-milliliter plastic bottle preserved with a citric acid.	6 months

Laboratory methods will be subject to the CT DEEP Reasonable Confidence Protocols (RCPs) as adopted by the Commissioner as guidance in the CT DEEP May 2009 document "Laboratory Quality Assurance and Quality Control, Data Quality Assessment and Data Usability Evaluation, Guidance Document".

4. Laboratory Quality Assurance/Quality Control Procedures

4.1 Laboratory QA/QC Procedures

The selected contract laboratory shall conduct standard internal laboratory QA/QC procedures. The selected contract laboratory shall also conduct and comply with the State of Connecticut Laboratory Quality Assurance and Quality Control Guidelines Reasonable Confidence Protocols Guidance Document dated November 2007. Laboratory data reports shall document the conductance and results of the internal QA/QC and RCP adherence.

The selected contract laboratory shall conduct the following internal QA/QC procedures to assure the quality of the groundwater sample analytical results are sufficient to meet the DQOs and the requirements of the RCPs:

- Conduct and document initial and continuing instrument calibration;
- Analyze internal laboratory duplicates of selected samples;
- Prepare and analyze method batch blanks;
- Prepare and analyze laboratory control samples;
- Prepare and analyze surrogates with each sample;
- Provide a consistent reporting limit for compounds specified in the RCPs;
- Laboratory reports shall include a laboratory certification form; and
- Laboratory reports shall include a case narrative as necessary which discusses each "No" answers on the laboratory certification form.

The project manager shall review laboratory data upon receipt to assure that the contract laboratory has complied with the laboratory QA/QC requirements presented in this QAPP.

5. Data Management

5.1 Project-Specific Work Instructions

Project-specific work instructions shall be prepared for each groundwater quality monitoring event. The project-specific work instructions will present an overview of the groundwater quality monitoring activities as well as specific information, requirements or activities to be completed during each monitoring event. Project-specific work instructions will be prepared by the project manager in advance of each groundwater quality monitoring event and shall at a minimum include the following information:

- Project number and/or charge number;
- Project field dates;
- Project manager name and contact information;
- Client contact;
- Facility contact;
- General overview of activities;
- List of groundwater monitoring wells to be sampled;
- Proposed groundwater sample analyses;
- Identified contract laboratory;
- Discussion of field QA/QC requirements;
- Presentation of instrument calibration and/or accuracy requirements;
- Health & safety requirements and/or a health & safety plan; and
- A plan illustrating the groundwater quality monitoring well locations.

A copy of the project-specific work instructions shall be retained in the project files under a groundwater quality monitoring event specific section.

5.2 Field Sampling Review

The project manager shall review all field work conducted by the field sampling team and be responsible for compliance with groundwater monitoring protocols, this QAPP and the project-specific work instructions. The project manager or his or her designee shall review each days groundwater monitoring activities through review of the field documents such as the daily field logs, sampling data sheets and chain-of-custody forms.

The project manager or his or her designee shall review the field documentation to assure the sampling procedures were followed. More specifically the field data will be reviewed to determine compliance with the low flow sampling procedures, sample analyses, field QA/QC procedures and QA/QC sample collection procedures and accuracy and completeness of the chain-of-custody forms.

Deficiencies identified during the field data review shall be rectified immediately to assure the data collection methods will allow for achievement of the DQOs and so deficiencies will not be repeated during a groundwater quality monitoring event. The project manager shall be responsible for documenting the conductance and results of the field data review. A record of the field sampling review shall be retained in the project files under a groundwater quality monitoring event specific section.

5.3 Laboratory Report Review

The project manager or his or her designee shall review laboratory analytical data for compliance with provision of this QAPP, internal laboratory procedures and compliance with the CT DEEP RCPs.

The laboratory report review shall include at a minimum a review of the following items;

- Confirmation of the receipt of analytical data for all samples submitted to the laboratory;
- Confirmation of the correct laboratory analyses for each sample;
- Review of the RCP laboratory certification form and case narrative;
- Adherence to the RCPs;
- Review of laboratory QA/QC samples and procedures;
- Review of laboratory reporting limits; and
- Review of analytical data results.

A record of the laboratory report review shall be retained in the project files under a groundwater quality monitoring event specific section.

5.4 Analytical Data Management

Laboratory analytical data generated by this project shall undergo several data management procedures. The data management procedures have been designed to assure the proper documentation and handling of analytical data once reported by the laboratory. Analytical data will be managed as follows:

- Upon receipt of an analytical data package from the laboratory, an electronic copy will be filed in the project discrete electronic project directory;
- The analytical data will be reviewed for accuracy by the project manager or his or her designee as discussed above in Section 5.3;
- The analytical data will be submitted for inclusion in the project specific electronic database management system;
- The electronic database will generate new data summary tables and/or revise existing analytical data summary tables with groundwater analytical data collected during each groundwater quality monitoring event;
- The database will electronically deliver the prepared data summary tables(s) to the project manager or his or her designee for further review; and
- An electronic copy of the generated electronic data summary table(s) will be filed in the project discrete electronic project directory.

5.5 Record Keeping Retention Procedures

Copies of relevant field records, instrument calibration records, chains-of-custody forms, internal review forms, laboratory data and electronic data summary tables will be maintained in accordance with the holding times set forth in the Post-Closure Plan.

Figures

Attachment 1

EPA Low Flow Sampling Procedures

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I**

**LOW STRESS (low flow) PURGING AND SAMPLING
PROCEDURE FOR THE COLLECTION OF
GROUNDWATER SAMPLES
FROM MONITORING
WELLS**

Quality Assurance Unit
U.S. Environmental Protection Agency – Region 1
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Prepared by: _____
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Approved by: _____
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Revision Page

Date	Rev #	Summary of changes	Sections
7/30/96	1	Finalized	
01/19/10	2	Updated	All sections
3/23/17	3	Updated	All sections
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1.0 USE OF TERMS

Equipment blank: The equipment blank shall include the pump and the pump's tubing. If tubing is dedicated to the well, the equipment blank needs only to include the pump in subsequent sampling rounds. If the pump and tubing are dedicated to the well, the equipment blank is collected prior to its placement in the well. If the pump and tubing will be used to sample multiple wells, the equipment blank is normally collected after sampling from contaminated wells and not after background wells.

Field duplicates: Field duplicates are collected to determine precision of the sampling procedure. For this procedure, collect duplicate for each analyte group in consecutive order (VOC original, VOC duplicate, SVOC original, SVOC duplicate, etc.).

Indicator field parameters: This SOP uses field measurements of turbidity, dissolved oxygen, specific conductance, temperature, pH, and oxidation/reduction potential (ORP) as indicators of when purging operations are sufficient and sample collection may begin.

Matrix Spike/Matrix Spike Duplicates: Used by the laboratory in its quality assurance program. Consult the laboratory for the sample volume to be collected.

Potentiometric Surface: The level to which water rises in a tightly cased well constructed in a confined aquifer. In an unconfined aquifer, the potentiometric surface is the water table.

QAPP: Quality Assurance Project Plan

SAP: Sampling and Analysis Plan

SOP: Standard operating procedure

Stabilization: A condition that is achieved when all indicator field parameter measurements are sufficiently stable (as described in the "Monitoring Indicator Field Parameters" section) to allow sample collection to begin.

Temperature blank: A temperature blank is added to each sample cooler. The blank is measured upon receipt at the laboratory to assess whether the samples were properly cooled during transit.

Trip blank (VOCs): Trip blank is a sample of analyte-free water taken to the sampling site and returned to the laboratory. The trip blanks (one pair) are added to each sample cooler that contains VOC samples.

2.0 SCOPE & APPLICATION

The goal of this groundwater sampling procedure is to collect water samples that reflect the total mobile organic and inorganic loads (dissolved and colloidal sized fractions) transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from sampling operations. This standard operating procedure (SOP) for collecting groundwater samples will help ensure that the project's data quality objectives (DQOs) are met under certain low-flow conditions.

The SOP emphasizes the need to minimize hydraulic stress at the well-aquifer interface by maintaining low water-level drawdowns, and by using low pumping rates during purging and sampling operations. Indicator field parameters (e.g., dissolved oxygen, pH, etc.) are monitored during purging in order to determine when sample collection may begin. Samples properly collected using this SOP are suitable for analysis of groundwater contaminants (volatile and semi-volatile organic analytes, dissolved gases, pesticides, PCBs, metals and other inorganics), or naturally occurring analytes. This SOP is based on Puls, and Barcelona (1996).

This procedure is designed for monitoring wells with an inside diameter (1.5-inches or greater) that can accommodate a positive lift pump with a screen length or open interval ten feet or less and with a water level above the top of the screen or open interval (Hereafter, the "screen or open interval" will be referred to only as "screen interval"). This SOP is not applicable to other well-sampling conditions.

While the use of dedicated sampling equipment is not mandatory, dedicated pumps and tubing can reduce sampling costs significantly by streamlining sampling activities and thereby reducing the overall field costs.

The goal of this procedure is to emphasize the need for consistency in deploying and operating equipment while purging and sampling monitoring wells during each sampling event. This will help to minimize sampling variability.

This procedure describes a general framework for groundwater sampling. Other site specific information (hydrogeological context, conceptual site model (CSM), DQOs, etc.) coupled with systematic planning must be added to the procedure in order to develop an appropriate site specific SAP/QAPP. In addition, the site specific SAP/QAPP must identify the specific equipment that will be used to collect the groundwater samples.

This procedure does not address the collection of water or free product samples from wells containing free phase LNAPLs and/or DNAPLs (light or dense non-aqueous phase

liquids). For this type of situation, the reader may wish to check: Cohen, and Mercer (1993) or other pertinent documents.

This SOP is to be used when collecting groundwater samples from monitoring wells at all Superfund, Federal Facility and RCRA sites in Region 1 under the conditions described herein. Request for modification of this SOP, in order to better address specific situations at individual wells, must include adequate technical justification for proposed changes. All changes and modifications must be approved and included in a revised SAP/QAPP before implementation in field.

3.0 BACKGROUND FOR IMPLEMENTATION

It is expected that the monitoring well screen has been properly located (both laterally and vertically) to intercept existing contaminant plume(s) or along flow paths of potential contaminant migration. Problems with inappropriate monitoring well placement or faulty/improper well installation cannot be overcome by even the best water sampling procedures. This SOP presumes that the analytes of interest are moving (or will potentially move) primarily through the more permeable zones intercepted by the screen interval.

Proper well construction, development, and operation and maintenance cannot be overemphasized. The use of installation techniques that are appropriate to the hydrogeologic setting of the site often prevent "problem well" situations from occurring. During well development, or redevelopment, tests should be conducted to determine the hydraulic characteristics of the monitoring well. The data can then be used to set the purging/sampling rate, and provide a baseline for evaluating changes in well performance and the potential need for well rehabilitation. Note: if this installation data or well history (construction and sampling) is not available or discoverable, for all wells to be sampled, efforts to build a sampling history should commence with the next sampling event.

The pump intake should be located within the screen interval and at a depth that will remain under water at all times. It is recommended that the intake depth and pumping rate remain the same for all sampling events. The mid-point or the lowest historical midpoint of the saturated screen length is often used as the location of the pump intake. For new wells, or for wells without pump intake depth information, the site's SAP/QAPP must provide clear reasons and instructions on how the pump intake depth(s) will be selected, and reason(s) for the depth(s) selected. If the depths to top and bottom of the well screen are not known, the SAP/QAPP will need to describe how the sampling depth will be determined and how the data can be used.

Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. Sample collection

may still take place provided the indicator field parameter criteria in this procedure are met. If after 2 hours of purging indicator field parameters have not stabilized, one of three optional courses of action may be taken: a) continue purging until stabilization is achieved, b) discontinue purging, do not collect any samples, and record in log book that stabilization could not be achieved (documentation must describe attempts to achieve stabilization), c) discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization (note: there is a risk that the analytical data obtained, especially metals and strongly hydrophobic organic analytes, may reflect a sampling bias and therefore, the data may not meet the data quality objectives of the sampling event).

It is recommended that low-flow sampling be conducted when the air temperature is above 32°F (0°C). If the procedure is used below 32°F, special precautions will need to be taken to prevent the groundwater from freezing in the equipment. Because sampling during freezing temperatures may adversely impact the data quality objectives, the need for water sample collection during months when these conditions are likely to occur should be evaluated during site planning and special sampling measures may need to be developed. Ice formation in the flow-through-cell will cause the monitoring probes to act erratically. A transparent flow-through-cell needs to be used to observe if ice is forming in the cell. If ice starts to form on the other pieces of the sampling equipment, additional problems may occur.

4.0 HEALTH & SAFETY

When working on-site, comply with all applicable OSHA requirements and the site's health/safety procedures. All proper personal protection clothing and equipment are to be worn. Some samples may contain biological and chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc.

5.0 CAUTIONS

The following cautions need to be considered when planning to collect groundwater samples when the below conditions occur.

If the groundwater degasses during purging of the monitoring well, dissolved gases and VOCs will be lost. When this happens, the groundwater data for dissolved gases (e.g., methane, ethene, ethane, dissolved oxygen, etc.) and VOCs will need to be qualified. Some conditions that can promote degassing are the use of a vacuum pump (e.g., peristaltic pumps), changes in aperture along the sampling tubing, and squeezing/pinching the pump's tubing which results in a pressure change.

When collecting the samples for dissolved gases and VOCs analyses, avoid aerating the groundwater in the pump's tubing. This can cause loss of the dissolved gases and VOCs in

the groundwater. Having the pump's tubing completely filled prior to sampling will avoid this problem when using a centrifugal pump or peristaltic pump.

Direct sun light and hot ambient air temperatures may cause the groundwater in the tubing and flow-through-cell to heat up. This may cause the groundwater to degas which will result in loss of VOCs and dissolved gases. When sampling under these conditions, the sampler will need to shade the equipment from the sunlight (e.g., umbrella, tent, etc.). If possible, sampling on hot days, or during the hottest time of the day, should be avoided. The tubing exiting the monitoring well should be kept as short as possible to avoid the sun light or ambient air from heating up the groundwater.

Thermal currents in the monitoring well may cause vertical mixing of water in the well bore. When the air temperature is colder than the groundwater temperature, it can cool the top of the water column. Colder water which is denser than warm water sinks to the bottom of the well and the warmer water at the bottom of the well rises, setting up a convection cell. "During low-flow sampling, the pumped water may be a mixture of convecting water from within the well casing and aquifer water moving inward through the screen. This mixing of water during low-flow sampling can substantially increase equilibration times, can cause false stabilization of indicator parameters, can give false indication of redox state, and can provide biological data that are not representative of the aquifer conditions" (Vroblesky 2007).

Failure to calibrate or perform proper maintenance on the sampling equipment and measurement instruments (e.g., dissolved oxygen meter, etc.) can result in faulty data being collected.

Interferences may result from using contaminated equipment, cleaning materials, sample containers, or uncontrolled ambient/surrounding air conditions (e.g., truck/vehicle exhaust nearby).

Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment and/or proper planning to avoid ambient air interferences. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

Clean and decontaminate all sampling equipment prior to use. All sampling equipment needs to be routinely checked to be free from contaminants and equipment blanks collected to ensure that the equipment is free of contaminants. Check the previous equipment blank data for the site (if they exist) to determine if the previous cleaning procedure removed the contaminants. If contaminants were detected and they are a concern, then a more vigorous cleaning procedure will be needed.

6.0 PERSONNEL QUALIFICATIONS

All field samplers working at sites containing hazardous waste must meet the requirements of the OSHA regulations. OSHA regulations may require the sampler to take the 40 hour OSHA health and safety training course and a refresher course prior to engaging in any field activities, depending upon the site and field conditions.

The field samplers must be trained prior to the use of the sampling equipment, field instruments, and procedures. Training is to be conducted by an experienced sampler before initiating any sampling procedure.

The entire sampling team needs to read, and be familiar with, the site Health and Safety Plan, all relevant SOPs, and SAP/QAPP (and the most recent amendments) before going onsite for the sampling event. It is recommended that the field sampling leader attest to the understanding of these site documents and that it is recorded.

7.0 EQUIPMENT AND SUPPLIES

A. Informational materials for sampling event

A copy of the current Health and Safety Plan, SAP/QAPP, monitoring well construction data, location map(s), field data from last sampling event, manuals for sampling, and the monitoring instruments' operation, maintenance, and calibration manuals should be brought to the site.

B. Well keys.

C. Extraction device

Adjustable rate, submersible pumps (e.g., centrifugal, bladder, etc.) which are constructed of stainless steel or polytetrafluoroethylene (PTFE, i.e. Teflon®) are preferred. PTFE, however, should not be used when sampling for per- and polyfluoroalkyl substances (PFAS) as it is likely to contain these substances.

Note: If extraction devices constructed of other materials are to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

If bladder pumps are selected for the collection of VOCs and dissolved gases, the pump setting should be set so that one pulse will deliver a water volume that is sufficient to fill a 40 mL VOC vial. This is not mandatory, but is considered a "best practice". For the proper operation, the bladder pump will need a minimum amount of water above the pump; consult the manufacturer for the recommended submergence. The pump's recommended submergence value should be determined during the planning stage, since it may influence well construction and placement of dedicated pumps where water-level fluctuations are significant.

Adjustable rate, peristaltic pumps (suction) are to be used with caution when collecting samples for VOCs and dissolved gases (e.g., methane, carbon dioxide, etc.) analyses. Additional information on the use of peristaltic pumps can be found in Appendix A. If peristaltic pumps are used, the inside diameter of the rotor head tubing needs to match the inside diameter of the tubing installed in the monitoring well.

Inertial pumping devices (motor driven or manual) are not recommended. These devices frequently cause greater disturbance during purging and sampling, and are less easily controlled than submersible pumps (potentially increasing turbidity and sampling variability, etc.). This can lead to sampling results that are adversely affected by purging and sampling operations, and a higher degree of data variability.

D. Tubing

PTFE (Teflon®) or PTFE-lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs and inorganics. As discussed in the previous section, PTFE tubing should not be used when sampling for PFAS. In this case, a suitable alternative such as high-density polyethylene tubing should be used.

PVC, polypropylene or polyethylene tubing may be used when collecting samples for metal and other inorganics analyses.

Note: If tubing constructed of other materials is to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

The use of 1/4 inch or 3/8 inch (inside diameter) tubing is recommended. This will help ensure that the tubing remains liquid filled when operating at very low pumping rates when using centrifugal and peristaltic pumps.

Silastic tubing should be used for the section around the rotor head of a peristaltic pump. It should be less than a foot in length. The inside diameter of the tubing used at the pump rotor head must be the same as the inside diameter of tubing placed in the well. A tubing connector is used to connect the pump rotor head tubing to the well tubing. Alternatively, the two pieces of tubing can be connected to each other by placing the one end of the tubing inside the end of the other tubing. The tubing must not be reused.

E. The water level measuring device

Electronic "tape", pressure transducer, water level sounder/level indicator, etc. should be capable of measuring to 0.01 foot accuracy. Recording pressure transducers, mounted above the pump, are especially helpful in tracking water levels during pumping operations, but their use must include check measurements with a water level "tape" at the start and end of each sampling event.

F. Flow measurement supplies

Graduated cylinder (size according to flow rate) and stopwatch usually will suffice.

Large graduated bucket used to record total water purged from the well.

G. Interface probe

To be used to check on the presence of free phase liquids (LNAPL, or DNAPL) before purging begins (as needed).

H. Power source (generator, nitrogen tank, battery, etc.)

When a gasoline generator is used, locate it downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate samples.

I. Indicator field parameter monitoring instruments

Use of a multi-parameter instrument capable of measuring pH, oxidation/reduction potential (ORP), dissolved oxygen (DO), specific conductance, temperature, and coupled with a flow-through-cell is required when measuring all indicator field parameters, except turbidity. Turbidity is collected using a separate instrument. Record equipment/instrument identification (manufacturer, and model number).

Transparent, small volume flow-through-cells (e.g., 250 mLs or less) are preferred. This allows observation of air bubbles and sediment buildup in the cell, which can interfere with the operation of the monitoring instrument probes, to be easily detected. A small volume

cell facilitates rapid turnover of water in the cell between measurements of the indicator field parameters.

It is recommended to use a flow-through-cell and monitoring probes from the same manufacturer and model to avoid incompatibility between the probes and flow-through-cell.

Turbidity samples are collected before the flow-through-cell. A "T" connector coupled with a valve is connected between the pump's tubing and flow-through-cell. When a turbidity measurement is required, the valve is opened to allow the groundwater to flow into a container. The valve is closed and the container sample is then placed in the turbidimeter.

Standards are necessary to perform field calibration of instruments. A minimum of two standards are needed to bracket the instrument measurement range for all parameters except ORP which use a Zobell solution as a standard. For dissolved oxygen, a wet sponge used for the 100% saturation and a zero dissolved oxygen solution are used for the calibration.

Barometer (used in the calibration of the Dissolved Oxygen probe) and the conversion formula to convert the barometric pressure into the units of measure used by the Dissolved Oxygen meter are needed.

J. Decontamination supplies

Includes (for example) non-phosphate detergent, distilled/deionized water, isopropyl alcohol, etc.

K. Record keeping supplies

Logbook(s), well purging forms, chain-of-custody forms, field instrument calibration forms, etc.

L. Sample bottles

M. Sample preservation supplies (as required by the analytical methods)

N. Sample tags or labels

O. PID or FID instrument

If appropriate, to detect VOCs for health and safety purposes, and provide qualitative field evaluations.

P. Miscellaneous Equipment

Equipment to keep the sampling apparatus shaded in the summer (e.g., umbrella) and from freezing in the winter. If the pump's tubing is allowed to heat up in the warm weather, the cold groundwater may degas as it is warmed in the tubing.

8.0 EQUIPMENT/INSTRUMENT CALIBRATION

Prior to the sampling event, perform maintenance checks on the equipment and instruments according to the manufacturer's manual and/or applicable SOP. This will ensure that the equipment/instruments are working properly before they are used in the field.

Prior to sampling, the monitoring instruments must be calibrated and the calibration documented. The instruments are calibrated using U.S Environmental Protection Agency Region 1 *Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction [ORP], and turbidity)*, March 23, 2017, or latest version or from one of the methods listed in 40CFR136, 40CFR141 and SW-846.

The instruments shall be calibrated at the beginning of each day. If the field measurement falls outside the calibration range, the instrument must be re-calibrated so that all measurements fall within the calibration range. At the end of each day, a calibration check is performed to verify that instruments remained in calibration throughout the day. This check is performed while the instrument is in measurement mode, not calibration mode. If the field instruments are being used to monitor the natural attenuation parameters, then a calibration check at mid-day is highly recommended to ensure that the instruments did not drift out of calibration. Note: during the day if the instrument reads zero or a negative number for dissolved oxygen, pH, specific conductance, or turbidity (negative value only), this indicates that the instrument drifted out of calibration or the instrument is malfunctioning. If this situation occurs the data from this instrument will need to be qualified or rejected.

9.0 PRELIMINARY SITE ACTIVITIES (as applicable)

Check the well for security (damage, evidence of tampering, missing lock, etc.) and record pertinent observations (include photograph as warranted).

If needed, lay out a sheet of clean polyethylene for monitoring and sampling equipment, unless equipment is elevated above the ground (e.g., on a table, etc.).

Remove well cap and if appropriate measure VOCs at the rim of the well with a PID or FID instrument and record reading in field logbook or on the well purge form.

If the well casing does not have an established reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the logbook (consider a photographic record as well). All water level measurements must be recorded relative to this reference point (and the altitude of this point should be determined using techniques that are appropriate to site's DQOs).

If water-table or potentiometric surface map(s) are to be constructed for the sampling event, perform synoptic water level measurement round (in the shortest possible time) before any purging and sampling activities begin. If possible, measure water level depth (to 0.01 ft.) and total well depth (to 0.1 ft.) the day before sampling begins, in order to allow for re-settlement of any particulates in the water column. This is especially important for those wells that have not been recently sampled because sediment buildup in the well may require the well to be redeveloped. If measurement of total well depth is not made the day before, it should be measured after sampling of the well is complete. All measurements must be taken from the established referenced point. Care should be taken to minimize water column disturbance.

Check newly constructed wells for the presence of LNAPLs or DNAPLs before the initial sampling round. If none are encountered, subsequent check measurements with an interface probe may not be necessary unless analytical data or field analysis signal a worsening situation. This SOP cannot be used in the presence of LNAPLs or DNAPLs. If NAPLs are present, the project team must decide upon an alternate sampling method. All project modifications must be approved and documented prior to implementation.

If available check intake depth and drawdown information from previous sampling event(s) for each well. Duplicate, to the extent practicable, the intake depth and extraction rate (use final pump dial setting information) from previous event(s). If changes are made in the intake depth or extraction rate(s) used during previous sampling event(s), for either portable or dedicated extraction devices, record new values, and explain reasons for the changes in the field logbook.

10.0 PURGING AND SAMPLING PROCEDURE

Purging and sampling wells in order of increasing chemical concentrations (known or anticipated) are preferred.

The use of dedicated pumps is recommended to minimize artificial mobilization and entrainment of particulates each time the well is sampled. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

A. Initial Water Level

Measure the water level in the well before installing the pump if a non-dedicated pump is being used. The initial water level is recorded on the purge form or in the field logbook.

B. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the appropriate depth (may not be the mid-point of the screen/open interval). The Sampling and Analysis Plan/Quality Assurance Project Plan should specify the sampling depth (used previously), or provide criteria for selection of intake depth for each new well. If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

Pump tubing lengths, above the top of well casing should be kept as short as possible to minimize heating the groundwater in the tubing by exposure to sun light and ambient air temperatures. Heating may cause the groundwater to degas, which is unacceptable for the collection of samples for VOC and dissolved gases analyses.

C. Measure Water Level

Before starting pump, measure water level. Install recording pressure transducer, if used to track drawdowns, to initialize starting condition.

D. Purge Well

From the time the pump starts purging and until the time the samples are collected, the purged water is discharged into a graduated bucket to determine the total volume of groundwater purged. This information is recorded on the purge form or in the field logbook.

Start the pump at low speed and slowly increase the speed until discharge occurs. Check water level. Check equipment for water leaks and if present fix or replace the affected equipment. Try to match pumping rate used during previous sampling event(s). Otherwise, adjust pump speed until there is little or no water level drawdown. If the

minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

Monitor and record the water level and pumping rate every five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" somewhat as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. If the initial water level is above the top of the screen do not allow the water level to fall into the well screen. The final purge volume must be greater than the stabilized drawdown volume plus the pump's tubing volume. If the drawdown has exceeded 0.3 feet and stabilizes, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are collected.

Avoid the use of constriction devices on the tubing to decrease the flow rate because the constrictor will cause a pressure difference in the water column. This will cause the groundwater to degas and result in a loss of VOCs and dissolved gasses in the groundwater samples.

Note: the flow rate used to achieve a stable pumping level should remain constant while monitoring the indicator parameters for stabilization and while collecting the samples.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (e.g., bladder, peristaltic), and/or the use of dedicated equipment. For new monitoring wells, or wells where the following situation has not occurred before, if the recovery rate to the well is less than 50 mL/min., or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. The project manager or field team leader will need to make the decision when samples should be collected, how the sample is to be collected, and the reasons recorded on the purge form or in the field logbook. A water level measurement needs to be performed and recorded before samples are collected. If the project manager decides to collect the samples using the pump, it is best during this recovery period that the pump intake tubing not be removed, since this will aggravate any turbidity problems. Samples in this specific situation may be collected without stabilization of indicator field parameters. Note that field conditions and efforts to overcome problematic situations must be recorded in order to support field decisions to deviate from normal procedures described in this SOP. If this type of problematic situation persists in a well, then water sample collection should be

changed to a passive or no-purge method, if consistent with the site's DQOs, or have a new well installed.

E. Monitor Indicator Field Parameters

After the water level has stabilized, connect the "T" connector with a valve and the flow-through-cell to monitor the indicator field parameters. If excessive turbidity is anticipated or encountered with the pump startup, the well may be purged for a while without connecting up the flow-through-cell, in order to minimize particulate buildup in the cell (This is a judgment call made by the sampler). Water level drawdown measurements should be made as usual. If possible, the pump may be installed the day before purging to allow particulates that were disturbed during pump insertion to settle.

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, DO) at a frequency of five minute intervals or greater. The pump's flow rate must be able to "turn over" at least one flow-through-cell volume between measurements (for a 250 mL flow-through-cell with a flow rate of 50 mLs/min., the monitoring frequency would be every five minutes; for a 500 mL flow-through-cell it would be every ten minutes). If the cell volume cannot be replaced in the five minute interval, then the time between measurements must be increased accordingly. Note: during the early phase of purging, emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments followed by stabilization of indicator parameters. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings are within the following limits:

- Turbidity** (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
- Dissolved Oxygen** (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
- Specific Conductance** (3%),
- Temperature** (3%),
- pH** (± 0.1 unit),
- Oxidation/Reduction Potential** (± 10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Samples for turbidity measurements are obtained before water enters the flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and

continue monitoring activities. Record start and stop times and give a brief description of cleaning activities.

The flow-through-cell must be designed in a way that prevents gas bubble entrapment in the cell. Placing the flow-through-cell at a 45 degree angle with the port facing upward can help remove bubbles from the flow-through-cell (see Appendix B Low-Flow Setup Diagram). Throughout the measurement process, the flow-through-cell must remain free of any gas bubbles. Otherwise, the monitoring probes may act erratically. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must remain submerged in water at all times.

F. Collect Water Samples

When samples are collected for laboratory analyses, the pump's tubing is disconnected from the "T" connector with a valve and the flow-through-cell. The samples are collected directly from the pump's tubing. Samples must not be collected from the flow-through-cell or from the "T" connector with a valve.

VOC samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

If the pump's flow rate is too high to collect the VOC/dissolved gases samples, collect the other samples first. Lower the pump's flow rate to a reasonable rate and collect the VOC/dissolved gases samples and record the new flow rate.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help ensure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use the following procedure to collect samples: collect non-VOC/dissolved gases samples first, then increase flow rate slightly until the water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate.

For bladder pumps that will be used to collect VOC or dissolved gas samples, it is recommended that the pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods

(e.g. EPA SW-846, 40 CFR 136, water supply, etc.) for additional information on preservation.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter (transparent housing preferred) is required, and the filter size (0.45 μm is commonly used) should be based on the sampling objective. Pre-rinse the filter with groundwater prior to sample collection. Make sure the filter is free of air bubbles before samples are collected. Preserve the filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in groundwater for human health or ecological risk calculations.

Label each sample as collected. Samples requiring cooling will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

G. Post Sampling Activities

If a recording pressure transducer is used to track drawdown, re-measure water level with tape.

After collection of samples, the pump tubing may be dedicated to the well for re-sampling (by hanging the tubing inside the well), decontaminated, or properly discarded.

Before securing the well, measure and record the well depth (to 0.1 ft.), if not measured the day before purging began. Note: measurement of total well depth annually is usually sufficient after the initial low stress sampling event. However, a greater frequency may be needed if the well has a "silting" problem or if confirmation of well identity is needed.

Secure the well.

11.0 DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well, and then following sampling of each subsequent well. Pumps should not be removed between purging and sampling operations. The pump, tubing, support cable and electrical wires which were in contact with the well should be decontaminated by one of the procedures listed below.

The use of dedicated pumps and tubing will reduce the amount of time spent on decontamination of the equipment. If dedicated pumps and tubing are used, only the initial sampling event will require decontamination of the pump and tubing.

Note if the previous equipment blank data showed that contaminant(s) were present after using the below procedure or the one described in the SAP/QAPP, a more vigorous procedure may be needed.

Procedure 1

Decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump and tubing. The pump may be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

Flush the equipment/pump with potable water.

Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

Optional - flush with isopropyl alcohol (pesticide grade; must be free of ketones {e.g., acetone}) or with methanol. This step may be required if the well is highly contaminated or if the equipment blank data from the previous sampling event show that the level of contaminants is significant.

Flush with distilled/deionized water. This step must remove all traces of alcohol (if used) from the equipment. The final water rinse must not be recycled.

Procedure 2

Steam clean the outside of the submersible pump.

Pump hot potable water from the steam cleaner through the inside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with end cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.

Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

12.0 FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the groundwater samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. Quality control samples include field duplicates, equipment blanks, matrix spike/matrix spike duplicates, trip blanks (VOCs), and temperature blanks.

13.0 FIELD LOGBOOK

A field log shall be kept to document all groundwater field monitoring activities (see Appendix C, example table), and record the following for each well:

Site name, municipality, state.

Well identifier, latitude-longitude or state grid coordinates.

Measuring point description (e.g., north side of PVC pipe).

Well depth, and measurement technique.

Well screen length.

Pump depth.

Static water level depth, date, time and measurement technique.

Presence and thickness of immiscible liquid (NAPL) layers and detection method.

Pumping rate, drawdown, indicator parameters values, calculated or measured total volume pumped, and clock time of each set of measurements.

Type of tubing used and its length.

Type of pump used.

Clock time of start and end of purging and sampling activity.

Types of sample bottles used and sample identification numbers.

Preservatives used.

Parameters requested for analyses.

Field observations during sampling event.

Name of sample collector(s).

Weather conditions, including approximate ambient air temperature.

QA/QC data for field instruments.

Any problems encountered should be highlighted.

Description of all sampling/monitoring equipment used, including trade names, model number, instrument identification number, diameters, material composition, etc.

14.0 DATA REPORT

Data reports are to include laboratory analytical results, QA/QC information, field indicator parameters measured during purging, field instrument calibration information, and whatever other field logbook information is needed to allow for a full evaluation of data usability.

Note: the use of trade, product, or firm names in this sampling procedure is for descriptive purposes only and does not constitute endorsement by the U.S. EPA.

15.0 REFERENCES

Cohen, R.M. and J.W. Mercer, 1993, *DNAPL Site Evaluation*; C.K. Smoley (CRC Press), Boca Raton, Florida.

Robert W. Puls and Michael J. Barcelona, *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, April 1996 (EPA/540/S-95/504).

U.S. Environmental Protection Agency, 1992, *RCRA Ground-Water Monitoring: Draft Technical Guidance*; Washington, DC (EPA/530-R-93-001).

U.S. Environmental Protection Agency, 1987, *A Compendium of Superfund Field Operations Methods*; Washington, DC (EPA/540/P-87/001).

U.S. Environmental Protection Agency, Region 1, *Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction [ORP], and turbidity)*, March 23, 2017 or latest version.

U.S. Environmental Protection Agency, EPA SW-846.

U.S. Environmental Protection Agency, 40 CFR 136.

U.S. Environmental Protection Agency, 40 CFR 141.

Vroblesky, Don A., Clifton C. Casey, and Mark A. Lowery, Summer 2007, Influence of Dissolved Oxygen Convection on Well Sampling, *Ground Water Monitoring & Remediation* 27, no. 3: 49-58.

APPENDIX A

PERISTALTIC PUMPS

Before selecting a peristaltic pump to collect groundwater samples for VOCs and/or dissolved gases, (e.g., methane, carbon dioxide, etc.) consideration should be given to the following:

- The decision of whether or not to use a peristaltic pump is dependent on the intended use of the data.
- If the additional sampling error that may be introduced by this device is NOT of concern for the VOC/dissolved gases data's intended use, then this device may be acceptable.
- If minor differences in the groundwater concentrations could affect the decision, such as to continue or terminate groundwater cleanup or whether the cleanup goals have been reached, then this device should NOT be used for VOC/dissolved gases sampling. In these cases, centrifugal or bladder pumps are a better choice for more accurate results.

EPA and USGS have documented their concerns with the use of the peristaltic pumps to collect water sample in the below documents.

- "Suction Pumps are not recommended because they may cause degassing, pH modification, and loss of volatile compounds" *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.
- "The agency does not recommend the use of peristaltic pumps to sample ground water particularly for volatile organic analytes" *RCRA Ground-Water Monitoring Draft Technical Guidance*, EPA Office of Solid Waste, November 1992.
- "The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and volatiles loss", *Low-flow (Minimal drawdown) Ground-Water Sampling Procedures*, by Robert Puls & Michael Barcelona, April 1996, EPA/540/S-95/504.
- "Suction-lift pumps, such as peristaltic pumps, can operate at a very low pumping rate; however, using negative pressure to lift the sample can result in the loss of volatile analytes", USGS Book 9 Techniques of Water-Resources Investigation, Chapter A4. (Version 2.0, 9/2006).

APPENDIX B

SUMMARY OF SAMPLING INSTRUCTIONS

These instructions are for using an adjustable rate, submersible pump or a peristaltic pump with the pump's intake placed at the midpoint of a 10 foot or less well screen or an open interval. The water level in the monitoring well is above the top of the well screen or open interval, the ambient temperature is above 32°F, and the equipment is not dedicated. Field instruments are already calibrated. The equipment is setup according to the diagram at the end of these instructions.

1. Review well installation information. Record well depth, length of screen or open interval, and depth to top of the well screen. Determine the pump's intake depth (e.g., mid-point of screen/open interval).
2. On the day of sampling, check security of the well casing, perform any safety checks needed for the site, lay out a sheet of polyethylene around the well (if necessary), and setup the equipment. If necessary a canopy or an equivalent item can be setup to shade the pump's tubing and flow-through-cell from the sun light to prevent the sun light from heating the groundwater.
3. Check well casing for a reference mark. If missing, make a reference mark. Measure the water level (initial) to 0.01 ft. and record this information.
4. Install the pump's intake to the appropriate depth (e.g., midpoint) of the well screen or open interval. Do not turn-on the pump at this time.
5. Measure water level and record this information.
6. Turn-on the pump and discharge the groundwater into a graduated waste bucket. Slowly increase the flow rate until the water level starts to drop. Reduce the flow rate slightly so the water level stabilizes. Record the pump's settings. Calculate the flow rate using a graduated container and a stop watch. Record the flow rate. Do not let the water level drop below the top of the well screen.

If the groundwater is highly turbid or discolored, continue to discharge the water into the bucket until the water clears (visual observation); this usually takes a few minutes. The turbid or discolored water is usually from the well-being disturbed during the pump installation. If the water does not clear, then you need to make a choice whether to continue purging the well (hoping that it will clear after a reasonable time) or continue to

the next step. Note, it is sometimes helpful to install the pump the day before the sampling event so that the disturbed materials in the well can settle out.

If the water level drops to the top of the well screen during the purging of the well, stop purging the well, and do the following:

Wait for the well to recharge to a sufficient volume so samples can be collected. This may take a while (pump may be removed from well, if turbidity is not a problem). The project manager will need to make the decision when samples should be collected and the reasons recorded in the site's log book. A water level measurement needs to be performed and recorded before samples are collected. When samples are being collected, the water level must not drop below the top of the screen or open interval. Collect the samples from the pump's tubing. Always collect the VOCs and dissolved gases samples first. Normally, the samples requiring a small volume are collected before the large volume samples are collected just in case there is not sufficient water in the well to fill all the sample containers. All samples must be collected, preserved, and stored according to the analytical method. Remove the pump from the well and decontaminate the sampling equipment.

If the water level has dropped 0.3 feet or less from the initial water level (water level measure before the pump was installed); proceed to Step 7. If the water level has dropped more than 0.3 feet, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are be collected.

7. Attach the pump's tubing to the "T" connector with a valve (or a three-way stop cock). The pump's tubing from the well casing to the "T" connector must be as short as possible to prevent the groundwater in the tubing from heating up from the sun light or from the ambient air. Attach a short piece of tubing to the other end of the end of the "T" connector to serve as a sampling port for the turbidity samples. Attach the remaining end of the "T" connector to a short piece of tubing and connect the tubing to the flow-through-cell bottom port. To the top port, attach a small piece of tubing to direct the water into a calibrated waste bucket. Fill the cell with the groundwater and remove all gas bubbles from the cell. Position the flow-through-cell in such a way that if gas bubbles enter the cell they can easily exit the cell. If the ports are on the same side of the cell and the cell is cylindrical shape, the cell can be placed at a 45-degree angle with the ports facing upwards; this position should keep any gas bubbles entering the cell away from the monitoring probes and allow the gas bubbles to exit the cell easily (see Low-Flow Setup Diagram). Note:

make sure there are no gas bubbles caught in the probes' protective guard; you may need to shake the cell to remove these bubbles.

8. Turn-on the monitoring probes and turbidity meter.

9. Record the temperature, pH, dissolved oxygen, specific conductance, and oxidation/reduction potential measurements. Open the valve on the "T" connector to collect a sample for the turbidity measurement, close the valve, do the measurement, and record this measurement. Calculate the pump's flow rate from the water exiting the flow-through-cell using a graduated container and a stop watch, and record the measurement. Measure and record the water level. Check flow-through-cell for gas bubbles and sediment; if present, remove them.

10. Repeat Step 9 every 5 minutes or as appropriate until monitoring parameters stabilized. Note: at least one flow-through-cell volume must be exchanged between readings. If not, the time interval between readings will need to be increased. Stabilization is achieved when three consecutive measurements are within the following limits:

Turbidity (10% for values greater than 5 NTUs; if three Turbidity values are less than 5 NTUs, consider the values as stabilized),

Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),

Specific Conductance (3%),

Temperature (3%),

pH (± 0.1 unit),

Oxidation/Reduction Potential (± 10 millivolts).

If these stabilization requirements do not stabilize in a reasonable time, the probes may have been coated from the materials in the groundwater, from a buildup of sediment in the flow-through-cell, or a gas bubble is lodged in the probe. The cell and the probes will need to be cleaned. Turn-off the probes (not the pump), disconnect the cell from the "T" connector and continue to purge the well. Disassemble the cell, remove the sediment, and clean the probes according to the manufacturer's instructions. Reassemble the cell and connect the cell to the "T" connector. Remove all gas bubbles from the cell, turn-on the probes, and continue the measurements. Record the time the cell was cleaned.

11. When it is time to collect the groundwater samples, turn-off the monitoring probes, and disconnect the pump's tubing from the "T" connector. If you are using a centrifugal or peristaltic pump check the pump's tubing to determine if the tubing is completely filled with water (no air space).

All samples must be collected and preserved according to the analytical method. VOCs and dissolved gases samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

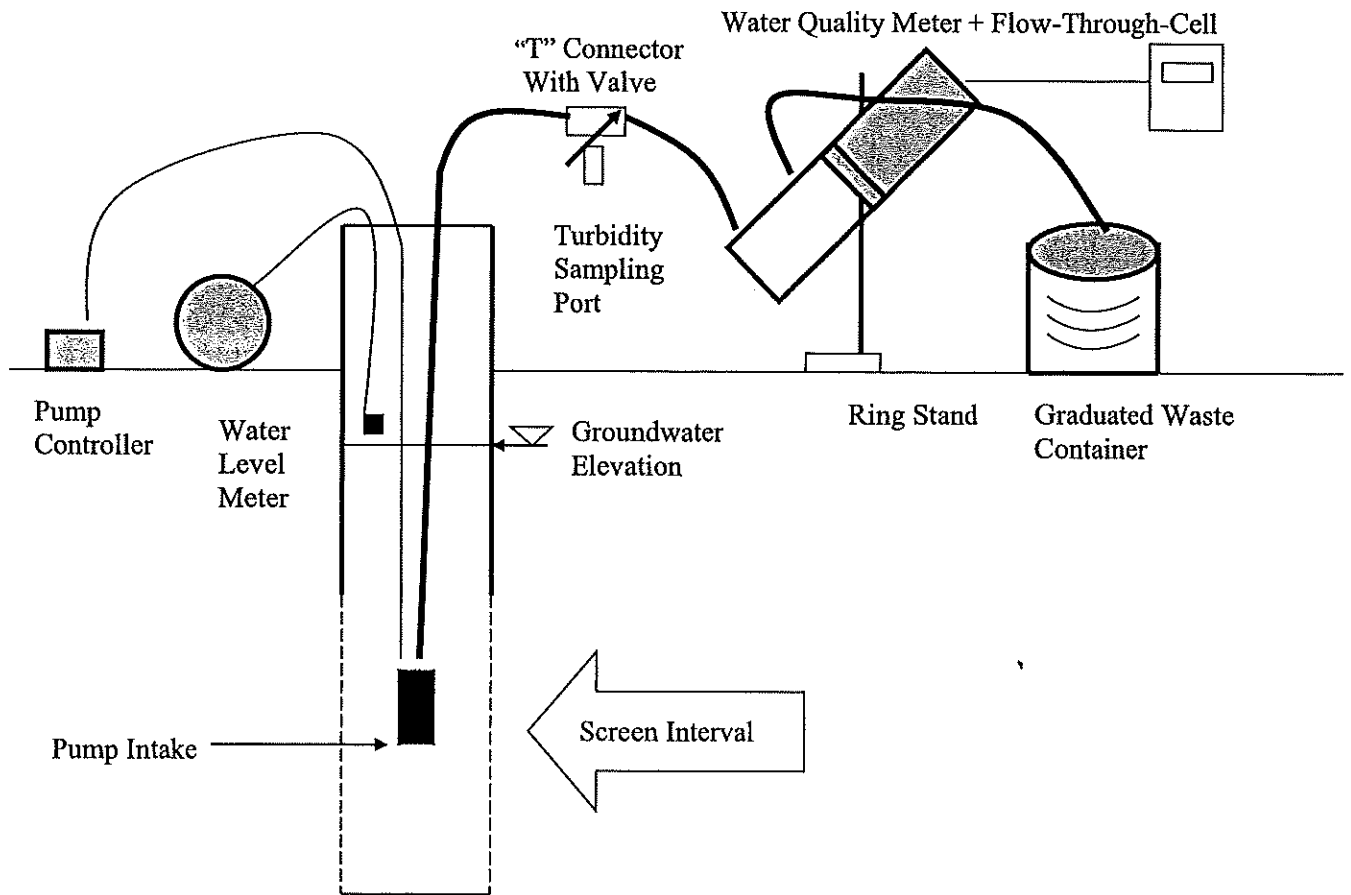
If the pump's tubing is not completely filled with water and the samples are being collected for VOCs and/or dissolved gases analyses using a centrifugal or peristaltic pump, do the following:

All samples must be collected and preserved according to the analytical method. The VOCs and the dissolved gases (e.g., methane, ethane, ethene, and carbon dioxide) samples are collected last. When it becomes time to collect these samples increase the pump's flow rate until the tubing is completely filled. Collect the samples and record the new flow rate.

12. Store the samples according to the analytical method.

13. Record the total purged volume (graduated waste bucket). Remove the pump from the well and decontaminate the sampling equipment.

Low-Flow Setup Diagram



Attachment 2

Sample Data Sheet

ATTACHMENT S

Stewardship Permit Application

Pfizer Inc.
Attachment S
Environmental Condition Assessment Form

An ECAF has not been submitted to DEEP or EPA. Information required by Section V of the Permit Application is included under the "Additional Sheets" section of the Application.

ATTACHMENT T

Stewardship Permit Application

Pfizer Inc.
Attachment T
Environmental Investigation

**LIST OF ENVIRONMENTAL REPORTS
(in lieu of completing Section VI of Application)**

- Groundwater Monitoring Reports 1989 through present.
- Ledyard Landfill Permit Renewal – September 1990, RECRA Environmental Inc.
- Pfizer Ledyard Land Fill Additional Hydrogeologic Investigation in Support of Application for State Discharge Permit, December 1991, RECRA Environmental Inc.
- Ledyard Landfill Closure & Post Closure Plan – April 12, 1996, ERM.
- Ledyard Landfill Closure Report – November 19, 1996, ERM.
- Zone of Influence Study – September 11, 2009, URS Corporation.
- Request for Modification to Post-Closure Groundwater Monitoring Plan – February 11, 2009 (Revised March 12, 2009), URS Corporation.

