APPENDIX 1

STATEMENT OF WORK FOR REMEDIAL DESIGN
NEW CASSEL/HICKSVILLE GROUNDWATER CONTAMINATION SUPERFUND SITE
NASSAU COUNTY, NEW YORK

OPERABLE UNIT 1

I. WORK TO BE PERFORMED

The Remedial Design ("RD") will consist of all activities necessary to complete pre-design investigation activities and the design of the major components of the remedy selected in the New Cassel/Hicksville Groundwater Contamination Superfund Site ("Site") Operable Unit 1 ("OU1") Record of Decision ("ROD"). All work required by this OU1 Statement of Work ("SOW") shall be conducted within the timeframes specified in Table 1 of this OU1 SOW. The remedy includes, but is not limited to, the following components:

- A combination of (a) in-situ treatment of groundwater via in-well vapor stripping and (b) extraction of groundwater via pumping and ex-situ treatment of extracted groundwater prior to discharge to a publicly owned treatment works or reinjection to groundwater (to be determined during design). The purpose is to establish containment and effectuate removal of contaminant mass where concentrations of total volatile organic compound ("VOC") concentrations are greater than 100 micrograms per liter ("µg/L");
- In-situ chemical treatment, such as in-situ chemical oxidation, to target high concentration contaminant areas, as appropriate;
- Implementation of long-term monitoring to track and monitor changes in groundwater contamination in OU1 to ensure the remedial action objectives are attained;
- Development of a Site Management Plan to ensure proper management of the remedy post-construction. The Site Management Plan will include provisions for any operation and maintenance and long-term monitoring required for the remedy, as well as periodic certifications; and
- Institutional controls consisting of any existing local requirements that prevent installation of drinking water wells, and informational devices to limit exposure to contaminated groundwater.

II. PERFORMANCE STANDARDS

The RD shall be prepared to achieve compliance with the performance standards, which shall be consistent with the requirements set forth in the OU1 ROD including the Remedial

Action Objectives ("RAOs"). The RD shall also be prepared such that the remedy will achieve compliance with all legally applicable and relevant or appropriate requirements ("ARARs") as set forth in the ROD.

III. PROGRESS REPORTS AND MEETINGS

In addition to the other deliverables set forth in the Settlement Agreement, Respondents shall collectively provide written progress reports and participate in meetings with EPA at major milestones in the design process. The monthly progress report shall be submitted on a monthly basis on or before the 15th day of each month following the Effective Date of the Settlement Agreement, or as otherwise requested by EPA.

Respondents' obligation to submit progress reports continues until EPA gives Respondents written notice pursuant to Section XXI of the Settlement Agreement that all of the Work, as this term is defined in the Settlement Agreement and Order on Consent, Index No. CERCLA-02-206-2012 ("Settlement Agreement"), has been carried out in accordance with the Settlement Agreement. At a minimum, these progress reports shall include the following:

1. A description of all actions which have been taken toward achieving compliance with the Settlement Agreement during the prior month;

2. A description of any violations of the Settlement Agreement and other problems encountered during the prior month;

3. A description of all corrective actions taken in response to any violations or problems which occurred during the prior month;

4. A summary of the results of all sampling, test results and other data received or generated by Respondents during the prior month relating to implementing the Work. Such results shall be validated in accordance with the approved Quality Assurance Project Plan ("QAPP") developed in conformity with Section V.1. below;

5. Identification of all plans, reports, and other deliverables required by the Settlement Agreement completed and submitted during the previous month in addition to correspondence and/or comments Respondents received from EPA;

6. A description of any modifications to the work plans or other schedules that Respondents have proposed to EPA or that have been approved by EPA since the last progress report, and a description of all plans, actions, and data scheduled for the next eight weeks. Also a description of all activities undertaken in support of the Community Relations Plan (only to the extent requested by EPA) during the previous month and those to be undertaken in the next eight weeks, if requested by EPA;

7. An estimate of the percentage of the Work required under the Settlement Agreement that has been completed as of the date of the progress report; and

8. An identification of all delays encountered or anticipated that may affect the future schedule for performance of Work, and all efforts made by Respondents to mitigate delays or anticipated delays.

IV. COMMUNITY INVOLVEMENT

EPA has the lead responsibility for developing and implementing community involvement activities at the Site. To the extent requested by EPA, Respondents shall provide information relating to the Work for EPA's use in developing and implementing a Community Relations Plan. As requested by EPA, Respondents shall participate in the preparation of appropriate information to be disseminated to the public and participate in public meetings, which may be held or sponsored by EPA, to explain activities at or concerning OU1 at the Site.

If requested by EPA, Respondents shall, within 15 days, designate and notify EPA of Respondents' Community Involvement Coordinator (Respondents' CI Coordinator). Respondents may hire a contractor for this purpose. Respondents' notice must include the name, title, and qualifications of the Respondents' CI Coordinator. Respondents' CI Coordinator is responsible for providing support regarding EPA's community involvement activities, including coordinating with EPA's CI Coordinator regarding responses to the public's inquiries about OU1 at the Site.

V. SUPPORTING DELIVERABLES

In accordance with the schedule set forth in Table 1 of this OU1 SOW, Respondents shall submit each of the following supporting deliverables to EPA for approval, except as specifically provided otherwise. Respondents shall develop the supporting deliverables in accordance with all applicable regulations, guidance and policies (see Section XIII-References, below). Respondents shall update each of these supporting deliverables as necessary or appropriate during the course of the Work, and/or as requested by EPA. EPA will either approve the supporting deliverables or otherwise respond pursuant to Section VI.D of the Settlement Agreement (Settlement Agreement – Plans and Reports Requiring EPA Approval).

1. Quality Assurance Project Plan. A QAPP shall be prepared consistent with the *Uniform Federal Policy for Quality Assurance Project Plans* ("UFP-QAPP"), Parts 1, 2 and 3, EPA-505-B-04-900A, B, and C, March 2005 or newer, and other guidance documents referenced in the aforementioned guidance documents sufficient to cover all Work. The UFP documents may be found at: http://www2.epa.gov/fedfac/assuring-quality-federal-cleanups. In addition, the guidance and procedures as well as other Office of Solid Waste and Emergency Response ("OSWER"), Office of Land and Emergency Response ("OLEM")

directives and EPA Region 2 quality assurance/quality control policies should be followed, as appropriate.

a. All sampling and analyses performed pursuant to the Settlement Agreement shall conform to EPA policy and guidance regarding sampling, quality assurance, quality control, data validation, and chain of custody procedures. Respondents shall incorporate these procedures into the QAPP in accordance with the *Uniform Federal Policy for Implementing Quality Systems* (UFP-QS), EPA-505-F-03-001, March 2005; and other guidance documents referenced in the aforementioned guidance documents. Subsequent amendments to the above, upon notification by EPA to Respondents of such amendments, shall apply only to procedures conducted after such notification.

b. The QAPP shall provide for collection of data sufficient to conduct all RD activities for all Work including pre-design investigations, treatability studies, pilot testing, and periodic groundwater monitoring.

c. The QAPP shall specifically include the following items:

(i) An explanation of the way(s) the sampling, analysis, testing, and monitoring will produce data for the RD;

(ii) A detailed description of the sampling, analysis, and testing to be performed including sampling methods, analytical and testing methods, sampling locations and frequency of sampling to be implemented to sample and analyze the contaminants found in groundwater, air, and soil, if necessary;

(iii) A map depicting sampling locations (to the extent that these can be defined when the QAPP is prepared); and

(iv) A schedule for performance of any field sampling activities.

d. The QAPP also must include procedures:

(i) To ensure that EPA and it authorized representative have reasonable access to laboratories used by Respondents in implementing the Settlement Agreement (Respondents' Labs);

(ii) To ensure the Respondents' Labs analyze all samples submitted by EPA pursuant to the QAPP for quality assurance monitoring;

(iii) To ensure that Respondents' Labs perform all analyses using EPA-accepted methods (i.e., the method documented in *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis*,

ILM05.4 (Dec. 2006); USEPA Contractor Laboratory Program Statement of Work for Organic Analysis, SOM01.2 (amended Apr. 2007); and *USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration)*, ISM01.2 (Jan. 2010)) or other methods acceptable to EPA;

(iv) To ensure that Respondents' Lab participate in an EPA-accepted quality assurance/quality control ("QA/QC") program or other program QA/QC acceptable to EPA;

(v) For submittal of sampling and monitoring data and base map in accordance with the following specifications:

(1) In standard regional Electronic Data Deliverable (EDD) format which can be found at http://www.epa.gov/superfund/region-2-superfund-electronic-data-submission. Other delivery methods may be allowed by EPA if electronic direct submission presents a significant burden or as technology changes.

(2) Spatial data, including spatially-referenced data and geospatial data, should be submitted: (1) in the ESRI File Geodatabase format; and (2) as unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at https://edg.epa.gov/EME/.

(3) Each file must include an attribute name for each site unit or sub-unit submitted. Consult http://www.epa.gov/geospatial/geospatial-policies-and-standards for any further available guidance on attribute identification and naming.

(4) Spatial data submitted by Respondents does not, and is not intended to, define the boundaries of OU1 at the Site.

(vi) For Respondents to provide EPA with notice at least 28 days prior to any sample collection activity;

(vii) For Respondents to provide all split samples and/or duplicate samples to EPA upon request; and

(viii) For Respondents to submit to EPA all sampling and tests results and other data in connection with the implementation of the Settlement Agreement.

e. In the event that additional sampling locations, testing, and analyses are required by EPA or requested by Relevant Respondents, other alterations of the QAPP are required, Relevant Respondents, as this term is defined in the Settlement Agreement, shall submit to EPA a memorandum documenting the need for additional data within thirty (30) days of identification. EPA in its sole discretion will determine whether the additional data will be collected by Relevant Respondents and whether it will be incorporated into plans, reports and other deliverables.

2. Health and Safety Plan ("HASP"). The HASP describes all activities to be performed to protect on site personnel and area residents from physical, chemical, and all other hazards posed by the Work. Respondents shall develop the HASP in accordance with EPA's Emergency Responder Health and Safety and Occupational Safety and Health Administration requirements under 29 C.F.R. §§ 1910 and 1926. EPA does not approve the HASP, but will review it to ensure that all necessary elements are included and that the plan provides for the protection of human health and the environment.

3. Investigation Derived Waste Disposal Plan ("IDWDP"). An IDWDP shall be prepared consistent with EPA's *Guide to Management of Investigation Derived Waste*, OSWER 9345.3-03FS (Jan. 1992). The IDWP shall include, at a minimum:

a. Proposed routes for off-site shipment of Waste Material, as this term is defined in the Settlement Agreement;

b. Identification of communities affected by shipment of Waste Material; and

c. Description of plans to minimize impacts on affected communities.

(i) Respondents may ship hazardous substances, pollutants, and contaminants related to the Work to an off-Site facility only if they comply with Section 121 (d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents will be deemed to be in compliance with CERCLA § 121 (d)(3) and 40 C.F.R. § 300.440 regarding a shipment if Respondents obtains a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b). Respondents may ship

Investigation Derived Wastes ("IDW") from the Site to an off-Site facility only if they comply with EPA's above-referenced *Guidance to Management of Investigation Derived Waste*.

(ii) Respondents may ship Waste Material related to the Work to an out-of-state waste management facility only if, prior to any shipment, they provide notice to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. This notice requirement will not apply to any off-Site shipments when the total quantity of all such shipments does not exceed 10 cubic yards. The notice must include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. Respondents also shall notify the state environmental official referenced above and the EPA Project Coordinator of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility. Respondents shall provide the notice before the Waste Material is shipped.

4. Quality of Life Plan ("QOLP"). A QOLP shall provide information related to measures that Respondents will implement to minimize the adverse effects to the community (e.g., noise, security, light pollution, hours of operation, etc.) resulting from the activities conducted pursuant to this OU1 SOW. The requirements of the QOLP shall be prepared consistent with federal, state, and local ordinances.

VI. PRE-DESIGN INVESTIGATION

1. Pre-Design Investigation Activities

The pre-design investigation ("PDI") activities to be conducted pursuant to the Settlement Agreement are provided in the Pre-Design Investigation work plan ("PDIWP"), attached as Attachment 1 to this OU1 SOW. The PDI activities shall be conducted by Respondents to gather sufficient information necessary to develop the RD fully for OU1 at the Site. The PDI activities include, but are not limited to, the following PDI Directives:

a. PDI Directive 1: Synoptic Water Level Gauging and Groundwater Sampling

(i) Round 1 of PDI Directive 1

(1) In accordance with PDI Directive 1, as this term is defined in the PDIWP, Group A Respondents, as this term is defined in the Settlement Agreement, shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at the following monitoring well locations, as provided on Figure 3 of

Attachment 1 to the OU1 SOW: FSMW-14A, FSMW-14B, FSMW-14C, FSMW-13A, FSMW-13B, FSMW-13C, MW-14, EX-1, MW-17S, and MW-17D.

(2) In accordance with PDI Directive 1, Group B Respondents, as this term is defined in the Settlement Agreement, shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at the following monitoring well locations, as provided on Figure 3 of Attachment 1 to the OU1 SOW: MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6.

(3) In accordance with PDI Directive 1, Group C Respondents, as this term is defined in the Settlement Agreement, shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at the following monitoring well locations, as provided on Figure 3 of Attachment 1 to the OU1 SOW: EX-2, MW-7, MW-8, MW-11S, MW-11D, MW-12, and MW-13.

(4) Following completion of PDI Directive 1, Respondents shall collectively submit a PDI Directive 1 Technical Memorandum providing all of the results from the first round of data collected pursuant to PDI Directive 1. This PDI Directive 1 Technical Memorandum shall include:

(A) A summary of the investigations performed;

(B) A summary of investigation results;

(C) A summary of validated data (i.e., tables and graphics);

(D) Data validation reports and laboratory data reports;

(E) A narrative interpretation of data and results;

(F) Results of statistical and modeling analyses, as necessary;

(G) Photographs documenting the work conducted; and

(H) Conclusions and recommendations for the PDI, including design parameters and criteria.

(ii) Round 2 of PDI Directive 1

(1) Subsequent to the installation of additional monitoring wells pursuant to PDI Directive 2, as defined in the PDIWP, and as outlined in

VI.1.b, below, Respondents shall perform a second round of sampling in accordance with PDI Directive 1 to include the additional monitoring wells installed as per PDI Directive 2, as described below in subparagraphs VI.1.a.(i)(2)-(4).

(2) In accordance with PDI Directive 1, Group A Respondents shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at the following monitoring well locations, as provided on Figure 3 of Attachment 1 to this OU1 SOW: FSMW-14A, FSMW-14B, FSMW-14C, FSMW-13A, FSMW-13B, FSMW-13C, MW-14, EX-1, MW-17S, MW-17D, MW-38, MW-40, MW-41, MW-42, MW-43, MW-44, and MW-45. If MW-37 and MW-39 are installed, Group A Respondents shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at these locations.

(3) In accordance with PDI Directive 1, Group B Respondents shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at the following monitoring well locations, as provided on Figure 3 of Attachment 1 to this OU1 SOW: MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-29, MW-30, MW-32, MW-34, MW-35, and MW-36. If MW-31and MW-33 are installed, Group B Respondents shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at these locations.

(4) In accordance with PDI Directive 1, Group C Respondents shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at the following monitoring well locations, as provided on Figure 3 of Attachment 1 to this OU1 SOW: EX-2, MW-7, MW-8, MW-11S, MW-11D, MW-12, MW-13, MW-20, MW-22, MW-23, MW-26, MW-27, and MW-28. If MW-19, MW-21, MW-24, and MW-25 are installed, Group C Respondents shall conduct groundwater level gauging and groundwater monitoring well purging, sampling, and analysis at these locations.

(5) Following completion of Round 2 sampling as per PDI Directive 1, Respondents shall collectively submit an addendum to the PDI Directive 1 Technical Memorandum providing all of the results of the PDI Directive 1 - Round 2 sampling event. This PDI Directive 1 Technical Memorandum Addendum must include the information identified in VI.1.a.(i)(4)(A) through (H), above.

b. <u>PDI Directive 2: VOC Concentration Groundwater Profiling and Monitoring Well Installation</u>

(i) In accordance with PDI Directive 2, Group A Respondents shall conduct VOC concentration profiling at the following locations, as provided on Figure 3 of Attachment 1 of this OU1 SOW: PDI-38, PDI-41, and PDI-44. Following the VOC concentration profiling, Group A Respondents shall install groundwater monitoring wells at the following locations, as provided on Figure 3 of Attachment 1 of this OU1 SOW: MW-38, MW-40, MW-41, MW-42, MW-43, MW-44, and MW-45. Following the VOC concentration profiling results, a determination will be made as to whether installation of MW-37 and MW-39 is necessary to obtain design parameters.

(ii) In accordance with PDI Directive 2, Group B Respondents shall conduct VOC concentration profiling at the following locations, as provided in Figure 3 of Attachment 1 to this OU1 SOW: PDI-30, PDI-32, PDI-33, and PDI-35. Following the VOC concentration profiling, Group B Respondents shall install groundwater monitoring wells at the following locations, as provided on Figure 3 of Attachment 1 to this OU1 SOW: MW-29, MW-30, MW-32, MW-34, MW-35, and MW-36. Following the VOC concentration profiling results, a determination will be made as to whether installation of MW-31 and MW-33 is necessary to obtain design parameters.

(iii) In accordance with PDI Directive 2, Group C Respondents shall conduct VOC concentration profiling at the following locations, as provided in Figure 3 of Attachment 1 of this OU1 SOW: PDI-19, PDI-20, PDI-21, PDI-22, PDI-23, PDI-27, and PDI-28. Following the VOC concentration profiling, the Group C Respondents shall install groundwater monitoring wells at the following locations, as provided on Figure 3 of Attachment 1 to this OU1 SOW: MW-20, MW-22, MW-23, MW-26, MW-27, and MW-28. Following the VOC concentration profiling results, a determination will be made as to whether installation of MW-19, MW-21, MW-24, and MW-25 is necessary to obtain design parameters.

(iv) Following completion of PDI Directive 2, Respondents shall collectively submit a PDI Directive 2 Technical Memorandum providing all of the results of PDI Directive 2. The PDI Directive 2 Technical Memorandum shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

(v) Following ~~Respondents~~Respondents' submission of the PDI Directive 2 Technical Memorandum, Respondents shall collectively submit a PDI Recommendations Report which shall include recommendations ~~for implementation of the remaining PDI Directives 3, 4, and/or 5.~~identifying which of the remaining PDI Directives 3, 4, and/or 5 shall be implemented. This Recommendation Report may also include an

additional recommendation of an alternative approach to achieve the remedial objectives for EPA consideration. Any request in the Recommendations Report for an alternative approach shall be accompanied by a schedule which is consistent with Table 1. The PDI Recommendations Report shall include a preliminary designation of the responsibility (i.e., Respondent Group) for each activity presented. Following ~~Respondents~~Respondents' submission of the PDI Recommendations Report, Respondents shall present in-person to EPA at Region 2's New York City office the results of PDI Directives 1 and 2 and Respondents recommendations for implementing the remaining PDI Directives 3, 4, and/or 5~~.~~ or, if proposed and accepted by EPA, the alternative approach

(vi) Following the submittal of the PDI Recommendations Report and the in-person meeting with EPA as per Paragraph VI.1.b.v., EPA will identify and notify the Relevant Respondents responsible for the activities related to PDI Directives 3, 4, or 5, referred to below.

c. PDI Directive 3: Groundwater Extraction Well Installation and/or- Aquifer Testing and Groundwater Extraction Effluent System Evaluation

(i) Relevant Respondents, as determined by EPA in its notification pursuant to Paragraph VI.1.b.vi. above, shall conduct work pursuant to PDI Directive 3 and shall notify EPA as to which aquifer testing option set forth in the PDIWP they will elect to use.

(ii) Following completion of PDI Directive 3, Relevant Respondents shall collectively submit a PDI Directive 3 Technical Memorandum providing all of the results obtained during the performance of PDI Directive 3. The PDI Directive 3 Technical Memorandum shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

(iii) If a Respondent Group(s) does not initially perform PDI Directive 3 in accordance with VI.1.c.(i) above, and if at any time EPA determines that such Respondent Group(s) shall perform PDI Directive 3 or if such Respondent Group(s) recommends a change in approach, then said Respondent Group(s) shall submit a PDI Directive 3 Work Plan Amendment to EPA in accordance with applicable guidelines and consistent with the procedures, methodology, and protocol contained in the PDIWP.

(iv) If, in accordance with VI.1.c.(iii), above, said Respondent Group(s) performs PDI Directive 3 and such performance is subsequent to the submission of the PDI Directive 3 Technical Memorandum required in VI.1.c.(ii), then such Respondent Group(s) shall submit a PDI Directive

3 Technical Memorandum Addendum that shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

d. PDI Directive 4: In-well Vapor Stripping Pilot System Installation and Testing

(i) Relevant Respondents, as determined by EPA in its notification pursuant to Paragraph VI.1.b.vi. above, shall conduct work pursuant to PDI Directive 4.

(ii) Following completion of PDI Directive 4, Relevant Respondents shall collectively submit a PDI Directive 4 Technical Memorandum providing all of the results obtained during the performance of PDI Directive 4. The PDI Directive 4 Technical Memorandum shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

(iii) If a Respondent Group(s) does not initially perform PDI Directive 4 in accordance with VI.1.d.(i) above, and if at any time EPA determines that such Respondent Group(s) shall perform PDI Directive 4 or if such Respondent Group(s) recommends a change in approach, then said Respondent Group(s) shall submit a PDI Directive 4 Work Plan Amendment to EPA in accordance with applicable guidelines and consistent with the procedures, methodology, and protocol contained in the PDIWP.

(iv) If, in accordance with VI.1.d.(iii), above, said Respondent Group(s) performs PDI Directive 4 and such performance is subsequent to the submission of the PDI Directive 4 Technical Memorandum required in VI.1.d.(ii), then such Respondent Group(s) shall submit a PDI Directive 4 Technical Memorandum Addendum that shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

e. PDI Directive 5: In-Situ Chemical Treatment Pilot System Installation and Testing

(i) Relevant Respondents, as determined by EPA in its notification pursuant to Paragraph VI.1.b.vi. above, shall conduct work pursuant to PDI Directive 5.

(ii) Following completion of PDI Directive 5, Relevant Respondents shall collectively submit a PDI Directive 5 Technical Memorandum providing all of the results obtained during the performance of PDI Directive 5. The PDI Directive 5 Technical Memorandum shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

(iii) If a Respondent Group(s) does not initially perform PDI Directive 5 in accordance with VI.1.e.(i) above, and if at any time EPA determines that such Respondent Group(s) shall perform PDI Directive 4 or if such Respondent Group(s) recommends a change in approach, then said Respondent Group(s) shall submit a PDI Directive 5 Work Plan Amendment to EPA in accordance with applicable guidelines and consistent with the procedures, methodology, and protocol contained in the PDIWP.

(iv) If, in accordance with VI.1.e.(iii), above, said Respondent Group(s) performs PDI Directive 5 and such performance is subsequent to the submission of the PDI Directive 5 Technical Memorandum required in VI.1.e.(ii), then such Respondent Group(s) shall submit a PDI Directive 5 Technical Memorandum Addendum that shall include the information identified in VI.1.a.(i)(4)(A) through (H), above.

2. Following Respondents' submission of the latter of the PDI Directive 3 Technical Memorandum, the PDI Directive 4 Technical Memorandum, the PDI Directive 5 Technical Memorandum, and/or any relevant Addenda, or unless otherwise directed by EPA, Respondents' shall collectively submit for EPA approval a RD Recommendations Report which shall include recommendations for implementation of the RD pursuant to Section VIII of this OU1 SOW. The RD Recommendations Report shall include a preliminary designation of the responsibility (i.e., Respondent Group) for each activity presented. Following Respondents' submission of the RD Recommendations Report, Respondents' shall present in-person to EPA at Region 2's New York City office the results of PDI Directives 3, 4, and 5, and Respondents' recommendations for implementing the RD.

3. EPA may require Respondents to supplement the PDI Technical Memorandum Report(s) and/or to perform additional pre-design studies.

VII. APPROVAL OF PRE-DESIGN DELIVERABLES

EPA will either approve the PDI deliverables identified herein or otherwise respond pursuant to Section VI.D. of the Settlement Agreement (Settlement Agreement – Plans and Reports Requiring EPA Approval).

VIII. REMEDIAL DESIGN ACTIVITIES

Relevant Respondents shall perform the RD activities for their respective Work (i.e., groundwater extraction and treatment, in-well vapor stripping, in-situ chemical treatment), as determined by EPA, after EPA's approval of the RD Recommendations Report, for incorporation into the common RD deliverables identified in this Section related to the remedy selected in the OU1 ROD.

1. Respondents shall develop and submit the following RD related deliverables:

a. Planning documents including work plans, activities, and schedules for conducting remedial design activities as necessary for the remedy. Activities shall include a Preliminary (30%) RD Report, an Intermediate (60%) RD Report, a Pre-Final (95%) RD Report, and a Final (100%) RD Report (collectively, RD Reports);

b. A Site Management Plan for OU1 ("SMP"), which will include provisions for the construction, operation, and maintenance of all remedy components including provisions for long-term monitoring and periodic certifications, as applicable. The SMP, shall include the following:

(i) An Institutional Control Implementation Assurance Plan ("ICIAP") to ensure institutional controls are implemented at OU1 of the Site such that groundwater use is restricted until Site-related contaminants in the aquifer are restored to the RAOs specified in the ROD. Respondents shall prepare an ICIAP which shall specify existing governmental and proposed informational institutional controls to ensure that the remedy is protective. The ICIAP shall include, but shall not be limited to:

(1) a description of the pathways for potential human exposure to hazardous substances that may remain during and/or after completion of construction of the remedial action;

(2) a description of the proposed institutional controls and their purpose (i.e., letters to local government);

(3) a description of the proposed duration of each institutional control and an explanation for such duration;

(4) a schedule for implementing each institutional control;

(5) a plan for monitoring, maintaining, and reporting on, the continued efficacy of the institutional controls, and

(6) a schedule for periodic certifications regarding whether the institutional controls remain in place, regarding whether the institutional controls have been complied with, and steps taken to address any problems with informational or governmental controls, as applicable;

2. Each remedial design deliverable shall include the following:

a. EPA's data, if EPA conducts data collection;

b. Evaluation of the need for air monitoring during construction activities. If

requested by EPA, plans to ensure that air emissions resulting from construction activities meet applicable or relevant and appropriate air emission requirements; and

c. Activities to identify how the construction, operation, and maintenance of the component of the remedy will be implemented using the principles specified in EPA Region 2's Clean and Green Policy (available at www.epa.gov/greenercleanups/epa-region-2-clean-and-green-policy) for all Work.

IX. REMEDIAL DESIGN WORK PLAN

1. Following EPA's approval of the RD Recommendations Report, and unless otherwise directed by EPA, Respondents shall submit to EPA a Remedial Design Work Plan ("RDWP") for the design of the Remedial Action at the Site. The RDWP shall provide a detailed plan for the remedy set forth in the OU1 ROD, in accordance with this OU1 SOW and for the achievement of the Performance Standards and other requirements set forth in the OU1 ROD, the Settlement Agreement, and this OU1 SOW.

2. The RDWP shall also be prepared in accordance with CERCLA and relevant EPA guidance, including the EPA document entitled, "Guidance on Oversight of Remedial Designs and Remedial Actions performed by Potentially Responsible Parties," (OSWER directive 9355.5-01, EPA/540/g-90-001), dated April 1990.

3. The RDWP shall include activities, work plans, field work and data collection, and schedules for implementation of the RD that are necessary to ensure compliance with performance standards, ARARs, or other requirements of the remedy selected in the OU1 ROD. The RDWP shall include, but not be limited to the following:

   a. Plans for implementing all RD activities identified in this OU1 SOW, in the RDWP, or required by EPA to be conducted to develop the RD;

   b. A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction, if applicable;

   c. A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the Remedial Action as necessary to implement the Work;

   d. Description of any proposed treatability study;

   e. A description of the responsibility and authority of all organizations and key personnel involved with the development of the RD;

f. A project schedule for all RD activities covered by this OU1 SOW in the form of a task/subtask activity bar chart or critical path method sequence of events;

g. A plan for the performance of air monitoring, if required by EPA, during construction activities at the Site to ensure that air emissions resulting from the construction activities meet applicable or relevant and appropriate air emission requirements;

h. Descriptions of known access and other approvals that Respondents will need in order to perform the Work under the Settlement Agreement. This description shall detail how such access and other approvals will be sought, and it shall include a schedule for obtaining all necessary access and other approvals. This description shall be updated, as appropriate, if subsequent approvals are required;

i. The RD Work Plan shall also include a description of how the RD will incorporate the principles found in EPA Region 2's Clean and Green Policy; and

j. The supporting deliverables identified in Table 1 and described in Section V., above (Supporting Deliverables).

X. APPROVAL OF REMEDIAL DESIGN WORK PLAN

EPA will either approve the RD Work Plan or otherwise respond pursuant to Section VI.D. of the Settlement Agreement (Settlement Agreement – Plans and Reports Requiring EPA Approval). Respondents shall implement the RDWP in accordance with the EPA-approved schedule.

XI. REMEDIAL DESIGN

Relevant Respondents shall:

1. Perform the RD activities for their respective Work in conformance with the RDWP approved by EPA and within the time frames specified in the RD schedule contained therein.

2. Preliminary (30%) RD Report. Respondents shall submit a Preliminary (30%) RD Report for EPA's comment. The Preliminary RD Report must include:

   a. A design criteria report, as described in the *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059 (June 1995);

   b. Preliminary drawings and specifications;

c. Descriptions of permit requirements, if applicable;

d. Preliminary Operation and Maintenance (O&M) Plan and O&M Manual;

e. A description of how the Remedial Action will be implemented in a manner that minimizes environmental impacts in accordance with EPA's *Principles for Greener Cleanups* (Aug. 2009);

f. A description of monitoring and control measures to protect human health and the environment, such as air monitoring and dust suppression, during implementation of the Remedial Action;

g. All supporting deliverables required to accompany the Preliminary RD Report as specified in the RD Schedule.

3. Intermediate (60%) RD Report. Respondents shall submit an Intermediate (60%) RD Report for EPA's comment. The Intermediate RD Report must:

   a. be a continuation and expansion of the Preliminary RD Report;

   b. address EPA's comments on the Preliminary RD Report;

   c. include the same elements as are required for the Preliminary RD Report; and

   d. include a preliminary Remedial Action Implementation Schedule.

4. Pre-Final (95%) RD Report. Respondents shall submit a Pre-final (95%) RD Report for EPA's comment. The Pre-final RD Report must be a continuation and expansion of the previous design submittal and must address EPA's comments on the Intermediate RD Report. The Pre-final RD Report will serve as the approved Final (100%) RD Report if EPA approves the Pre-final RD Report without comments. The Pre-final RD Report must include:

   a. A complete set of construction drawings and specifications that are: (1) certified by a registered professional engineer in the State of New York; (2) suitable for procurement; and (3) follow the Construction Specifications Institute's MasterFormat 2012;

   b. A survey and engineering drawings showing existing Site features, such as elements, property borders, easements, and Site conditions;

   c. Pre-Final versions of the same elements and deliverables as are required for the Preliminary and Intermediate RD Reports;

   d. A specification for photographic documentation of the Remedial Action; and

e. Updates of all supporting deliverables required to accompany the Preliminary (30%) RD.

5. Final (100%) RD Report. Respondents shall submit a Final (100%) RD Report for EPA approval. The Final RD Report must address EPA's comments on the Pre-final RD Report and must include final versions of all Pre-final RD Report deliverables.

XII. APPROVAL OF RD REPORTS

The Preliminary, Intermediate, Pre-final, and Final RD Reports will be submitted to EPA for review and comment. EPA will either approve the Final RD Report or otherwise respond pursuant to Section VI.D. of the Settlement Agreement (Settlement Agreement – Plans and Reports Requiring EPA Approval).

XIII. REFERENCES

1. A Compendium of Superfund Field Operations Methods, OSWER 9355.0-14, EPA/540/P-87/001a (Aug. 1987).

2. CERCLA Compliance with Other Laws Manual, Part I: Interim Final, OSWER 9234.1-01, EPA/540/G-89/006 (Aug. 1988).

3. Guidance for Conducting Remedial Investigations and Feasibility Studies, OSWER 9355.3-01, EPA/540/G-89/004 (Oct. 1988).

4. CERCLA Compliance with Other Laws Manual, Part II, OSWER 9234.1-02, EPA/540/G-89/009 (Aug. 1989).

5. Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, OSWER 9355.5-01, EPA/540/G-90/001 (Apr.1990).

6. Guidance on Expediting Remedial Design and Remedial Actions, OSWER 9355.5-02, EPA/540/G-90/006 (Aug. 1990).

7. Guide to Management of Investigation-Derived Wastes, OSWER 9345.3-03FS (Jan. 1992).

8. Permits and Permit Equivalency Processes for CERCLA On-Site Response Actions, OSWER 9355.7-03 (Feb. 1992).

9. Guidance for Conducting Treatability Studies under CERCLA, OSWER 9380.3-10, EPA/540/R-92/071A (Nov. 1992).

10. National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule, 40 C.F.R. Part 300 (Oct. 1994).

11. Guidance for Scoping the Remedial Design, OSWER 9355.0-43, EPA/540/R-95/025 (Mar. 1995).

12. Remedial Design/Remedial Action Handbook, OSWER 9355.0-04B, EPA/540/R-95/059 (June 1995).

13. EPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis, QA/G-9, EPA/600/R-96/084 (July 2000).

14. Operation and Maintenance in the Superfund Program, OSWER 9200.1-37FS, EPA/540/F-01/004 (May 2001).

15. Comprehensive Five-year Review Guidance, OSWER 9355.7-03B-P, 540-R-01-007 (June 2001).

16. Guidance for Quality Assurance Project Plans, QA/G-5, EPA/240/R-02/009 (Dec. 2002).

17. Institutional Controls: Third Party Beneficiary Rights in Proprietary Controls (Apr. 2004).

18. Quality management systems for environmental information and technology programs -- Requirements with guidance for use, ASQ/ANSI E4:2014 (American Society for Quality, February 2014).

19. Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A though 900C (Mar. 2005).

20. Superfund Community Involvement Handbook, SEMS 100000070 (January 2016) available at http://www.epa.gov/superfund/community-involvement-tools-and-resources.

21. EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G-4, EPA/240/B-06/001 (Feb. 2006).

22. EPA Requirements for Quality Assurance Project Plans, QA/R-5, EPA/240/B-01/003 (Mar. 2001, reissued May 2006).

23. EPA Requirements for Quality Management Plans, QA/R-2, EPA/240/B-01/002 (Mar. 2001, reissued May 2006).

24. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM05.4 (Dec. 2006).

25. USEPA Contract Laboratory Program Statement of Work for Organic Analysis, SOM01.2 (amended Apr. 2007).

26. EPA National Geospatial Data Policy, CIO Policy Transmittal 05-002 (Aug. 2008), available at http://www.epa.gov/geospatial/geospatial-policies-and-standards and http://www.epa.gov/geospatial/epa-national-geospatial-data-policy.

27. Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration, OSWER 9283.1-33 (June 2009).

28. Principles for Greener Cleanups (Aug. 2009), available at http://www.epa.gov/greenercleanups/epa-principles-greener-cleanups.

29. USEPA Contract Laboratory Program Statement of Work for Inorganic Superfund Methods (Multi-Media, Multi-Concentration), ISM01.2 (Jan. 2010).

30. Close Out Procedures for National Priorities List Sites, OSWER 9320.2-22 (May 2011).

31. Groundwater Road Map: Recommended Process for Restoring Contaminated Groundwater at Superfund Sites, OSWER 9283.1-34 (July 2011).

32. Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance," OSWER 9355.7-18 (Sep. 2011).

33. Construction Specifications Institute's MasterFormat 2012, available from the Construction Specifications Institute, http://www.csinet.org/masterformat.

34. Updated Superfund Response and Settlement Approach for Sites Using the Superfund Alternative Approach , OSWER 9200.2-125 (Sep. 2012)

35. Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001 (Dec. 2012).

36. Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02 (Dec. 2012).

37. EPA's Emergency Responder Health and Safety Manual, OSWER 9285.3-12 (July 2005 and updates), http://www.epaosc.org/_HealthSafetyManual/manual-index.htm.

38. Broader Application of Remedial Design and Remedial Action Pilot Project Lessons Learned, OSWER 9200.2-129 (Feb. 2013).

39. Guidance for Evaluating Completion of Groundwater Restoration Remedial Actions, OSWER 9355.0-129 (Nov. 2013).

40. Groundwater Remedy Completion Strategy: Moving Forward with the End in Mind, OSWER 9200.2-144 (May 2014).

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Table 1 – PDI and RD Schedule

	Description of Deliverable, Activity	SOW Section Ref.	Deadline	Responsible Respondent Group
1	Progress Reports	III	15th day of each month following the Effective Date of the Settlement Agreement	Common Work Element
Supporting Deliverables				
2	Quality Assurance Project Plan (QAPP)	V.1	60 days after EPA's approval of the Designated Project Coordinator under Section VII of the Settlement Agreement	Common Work Element
3	QAPP Addendum(s)	V.1	30 days after EPA's authorization to proceed with relevant PDI Directive	Group A, Group B, Group C
4	Health and Safety Plan (HASP)	V.2	60 days after EPA's approval of the Designated Project Coordinator under Section VII of the Settlement Agreement	Common Work Element
5	Investigation Derived Waste Disposal Plan (IDWDP)	V.3	60 days after EPA's approval of the Designated Project Coordinator under Section VII of the Settlement Agreement	Common Work Element
6	Quality Of Life Plan (QoLP)	V.4	60 days after EPA's approval of the Designated Project Coordinator under Section VII of the Settlement Agreement	Common Work Element

PDI Investigation (PDI)				
PDI Directive 1 Round 1		VI.1.a.i. (1)-(3)		Group A, Group B, Group C
7	PDI Directive 1 Technical Memorandum	VI.1.a.i.4	90 days after EPA's authorization to proceed with PDI Directive 1 Round 1	Common Work Element
PDI Directive 1 Round 2		VI.1.a.ii.1		Group A, Group B, Group C
8	PDI Directive 1 Technical Memorandum Addendum	VI.1.a.ii.5	75 days after EPA's authorization to proceed with PDI Directive 1 Round 2. EPA's authorization to proceed will occur during the course of implementation of PDI Directive 2.	Common Work Element
PDI Directive 2		VI.1.b.(i) -(iii)		Group A, Group B, Group C
9	PDI Directive 2 Technical Memorandum	VI.1.b.iv	12 months after EPA's authorization to proceed with PDI Directive 2	Common Work Element
10	PDI Recommendations Report	VI.1.b.v	30 days after Respondent's submission of the PDI Directive 2 Technical Memorandum	Common Work Element
11	Respondent's in-person PDI Recommendations Report presentation to EPA	VI.1.b.vi	30 days after Respondent's submission of the PDI Recommendations Report	Common Work Element
PDI Directive 3		VI.1.c.i		Group A and Group C, unless otherwise specified by EPA. Group B, based on data, Respondent recommendation, and as determined by EPA.

Aquifer Test Option 1, Aquifer Test Option 2, or Aquifer Test Option 3		VI.1.c.i		Group A and Group C, unless otherwise specified by EPA. Group B, based on data, Respondent recommendation, and as determined by EPA.
12	Aquifer Test Technical Memorandum 1, 2, or 3 (depending on which aquifer test option is evaluated)	VI.1.c.i	Option 1 or 2: 45 days after EPA's authorization to proceed with PDI Directive 3 Option 3: 150 days after EPA's authorization to proceed with PDI Directive 3	Group A and Group C, unless otherwise specified by EPA. Group B, based on data, Respondent recommendation, and as determined by EPA.
Effluent Discharge Evaluation Option 1, Option 2, Option 3, or Option 4		VI.1.c.i		Group A and Group C, unless otherwise specified by EPA. Group B, based on data, Respondent recommendation, and as determined by EPA.
13	Effluent Discharge Evaluation Option Technical Memorandum	VI.1.c.i	Option 1: 45 days after EPA's authorization to proceed with PDI Directive 3 Option 2: 90 days after EPA approval of QAPP amendment Option 3: 150 days after EPA's authorization to proceed Option 4: 45 days after EPA's authorization to proceed	Group A and Group C, unless otherwise specified by EPA. Group B, based on data collected during PDI Directives 2 and 3, Respondent recommendation, and as determined by EPA.
14	PDI Directive 3 Technical Memorandum	VI.1.c.ii	5 months after EPA's authorization to proceed following PDI Recommendations Report	Group A and Group C. Group B, based on data, Respondent recommendation, and as determined by EPA.
15	PDI work plan (PDIWP) Amendment - Directive 3	VI.1.c.iii	30 days after EPA's authorization to proceed	Group B, based on data, Respondent recommendation, and as determined by EPA.

16	Addendum to PDI Directive 3 Technical Memorandum	VI.1.c.iv	5 months after EPA's authorization to proceed	Group B, if performed subsequently to the submittal of the PDI Directive 3 Technical Memorandum.
PDI Directive 4		VI.1.d.i		Group B and Group C. Group A, based on data, Respondent recommendation, and as determined by EPA.
Pilot Test(s)		VI.1.d.i		Group B and Group C. Group A, based on data, Respondent recommendation, and as determined by EPA.
17	Pilot Test Status Report(s)	VI.1.d.i	To be submitted monthly for each pilot test	Group B and Group C. Group A, based on data, Respondent recommendation, and as determined by EPA.
18	PDI Directive 4 Technical Memorandum	VI.1.d.ii	5 months after EPA's approval of the QAPP amendment or after EPA's authorization to proceed if a QAPP amendment is not submitted	Group B and Group C. Group A, based on data, Respondent recommendation, and as determined by EPA.
19	PDIWP Amendment - Directive 4	VI.1.d.iii	30 days after EPA's authorization to proceed	Group A, based on data, Respondent recommendation, and as determined by EPA.
20	Addendum to PDI Directive 4 Technical Memorandum	VI.1.d.iv	5 months after EPA's authorization to proceed	Group A, based on data, Respondent recommendation, and as determined by EPA.
PDI Directive 5		VI.1.e.i		Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.

ISCO Target Zone Delineation		VI.1.e.i		Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
21	ISCO Target Zone Delineation Technical Memorandum	VI.1.e.i	6 months after EPA's authorization to proceed	Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
Bench Scale Testing		VI.1.e.i		Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
22	ISCO Bench Scale Testing Technical Memorandum	VI.1.e.i	120 days after EPA's authorization to proceed	Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
23	ISCO Pilot Test Work Plan	VI.1.e.i	120 days after EPA's authorization to proceed. Deliverable will be submitted concurrently with ISCO Bench Scale Testing Technical Memorandum	Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
ISCO Pilot Test		VI.1.e.i		Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
24	PDI Directive 5 Technical Memorandum	VI.1.e.ii	6 months after EPA's approval of the ISCO Bench Scale Testing Technical Memorandum or EPA's authorization to proceed	Group A. Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.

25	PDIWP Amendment - Directive 5	VI.1.e.iii	30 days after EPA's authorization to proceed	Group B and Group C, based on data, Respondent recommendation, and as determined by EPA.
26	Addendum to PDI Directive 5 Technical Memorandum	VI.1.e.iv	6 months after EPA's authorization to proceed	Group B or Group C, based on data, Respondent recommendation, and as determined by EPA.
Remedial Design (RD)				
27	RD Recommendations Report	VI.2	30 days after Respondent's submission of the latter of PDI Directive 3 Technical Memorandum, PDI Directive 4 Technical Memorandum, and PDI Directive 5 Technical Memorandum, or unless otherwise directed by EPA.	Common Work Element
28	Respondent's in-person RD Recommendations Report presentation to EPA	VI.2	15 days after Respondent's submission of the RD Recommendations Report	Common Work Element
29	Remedial Design Work Plan (RDWP)	IX and X	45 days after Respondent's in-person RD Recommendations Report presentation to EPA	Common Work Element
30	Treatability Study Work Plan	VIII.3.d	45 days after EPA approval of RDWP, if determined necessary by EPA	Based on data, Respondent recommendation, and as determined by EPA.
31	Site Management Plan	VIII.1.b	45 days after Respondent's in-person RD Recommendations Report presentation to EPA	Common Work Element
32	Preliminary (30%) RD	XI	90 days after EPA approval of RDWP	Common Work Element
33	Intermediate (60%) RD	XI	90 days after EPA comments on Preliminary RD, unless omitted by EPA	Common Work Element

34	Pre-final (95%) RD	XI	90 days after EPA comments on Intermediate RD if submitted, otherwise 120 days after EPA comments on the Preliminary RD	Common Work Element
35	Final (100%) RD	XI	30 days after EPA comments on Pre-final RD	Common Work Element