STATEMENT OF WORK

HOOKER CHEMICAL/RUCO POLYMER SUPERFUND SITE
TOWN OF OYSTER BAY, HICKSVILLE, NASSAU COUNTY, NEW YORK

I. WORK TO BE PERFORMED

Unless otherwise stated, capitalized terms set forth in this Statement of Work (SOW) shall have the meanings attributed to them in the Administrative Order, Index No. CERCLA-02-2001-2018 (Administrative Order)

All requirements for review, approval or other action by EPA or Respondents pursuant to this SOW shall be performed in accordance with the requirements set forth in the Administrative Order. This SOW shall not alter, change or affect the rights of the parties set forth in the Administrative Order.

The Work to be performed by Respondents pursuant to the Administrative Order for Operable Unit 3 at the Hooker Chemical Ruco Polymer Superfund Site (Site) shall, at a minimum, achieve the requirements of the Record of Decision issued on September 29, 2000 (2000 ROD) and be conducted in a manner consistent with the 2000 ROD, including its stated Remedial Action Objectives (RAOs).

RAOs are EPA's goals to protect human health and the environment. The following RAOs were established for the Site:

Protect human health from exposure (via ingestion, inhalation, and dermal contact) to contaminants in groundwater including vinyl chloride monomer (VCM), trichloroethylene (TCE), perchloroethylene (PCE) and tentatively identified compounds (TICs) in groundwater at concentrations in excess of New York State groundwater standards and Federal Maximum Contaminant Levels (MCLs).

Restore the aquifer to meet New York State Groundwater Standards and New York State and Federal MCLs in a timely manner.

The selected remedy, as documented in the 2000 ROD, addresses the downgradient commingled contaminated groundwater plume beyond the Hooker/Ruco Facility and also the contaminated groundwater beneath the Hooker/Ruco Facility which was previously included as part of the Operable Unit 1 1994 ROD at the Site. The selected remedy in the 2000 ROD includes in-situ treatment of the vinyl chloride monomer (VCM) subplume by bioremediation using biosparging (and supplemental nutrient addition, if necessary) to achieve Federal MCLs and prevent the need for supplemental treatment at the downgradient Northrop Treatment System.

The major components of the remedy include:

- The use of biosparging technology in an in-situ application to enhance the VCM degradation with the goal of achieving State drinking water standards or Federal maximum contaminant levels (MCLs). Biosparging is a form of bioremediation that involves the introduction of air/oxygen into the aquifer to increase the dissolved oxygen content in the aquifer, which will enhance aerobic degradation of the VCM subplume.

- Vertical injection wells will be installed in the area of the VCM subplume to a depth of 200 to 400 feet. Additives (air/oxygen, nutrients) will be forced into the formation using either static head within the well or using pump-supplied pressure.

- Vadose zone or unsaturated zone monitoring program will be implemented to ensure that air stripping of VOCs, particularly VCM, is not occurring as a result of biosparging.

- If necessary, the selected remedy will also utilize a supplemental aerobic bioremediation technology following the biosparging treatment. Supplemental bioremediation would involve the injection of nutrients (potentially including nitrogen and phosphorus along with suitable carbon sources such as methane) to enhance the growth and metabolic activities of indigenous microbial populations to effect the degradation of VCM in the aquifer. Supplemental bioremediation technology will also enhance the degradation of TCE, PCE and TICs.

- A monitoring program will be implemented to monitor groundwater quality in the area of the VCM subplume and to evaluate the fate and migration of VOCs southward and westward beyond the VCM subplume. New monitoring wells will be added to the existing network of monitoring wells to increase the network's area of coverage. The objective of the long-term monitoring program is to evaluate the effectiveness of the selected remedy.

The selected remedy is also based on the recognition that an existing groundwater extraction and treatment system (Northrop Treatment System) which is operating as an On-Site Containment System (ONCT) (formerly known as the Interim Remedial Measure) at the downgradient Northrop/Grumman Aerospace Corporation (Northrop) Site is containing and remediating a commingled plume of TCE and PCE contamination from the Northrop, Naval Weapons Industrial Reserve Plant and the Hooker/Ruco sites.

If it is determined during the implementation and monitoring of the selected remedy that the technology selected is not effective in adequately reducing the VCM concentrations in a reasonable time frame, then VCM subplume extraction and treatment would be implemented as a contingency remedy. Further, if either the Northrop treatment system or the VOC removal system ceases operation before the regional aquifer is restored, or if the Northrop Treatment

System is not capturing contaminants emanating from the Hooker/Ruco Facility, EPA will re-evaluate the protectiveness of the selected remedy.

As part of a groundwater monitoring program, groundwater samples will be collected and analyzed quarterly in order to verify that the level and extent of groundwater contaminants are declining and that conditions are protective of human health and the environment. In addition, biodegradation parameters (*e.g.*, oxygen, nitrate, sulfate, methane, ethane, ethene, alkalinity, redox potential, pH, temperature, conductivity, chloride, and total organic carbon) will be used to assess the progress of the degradation process.

If EPA determines, upon review of groundwater monitoring results, that there is not sufficient improvement in groundwater quality in a reasonable time frame, then the contingency remedy of extraction and treatment of groundwater may be implemented. The goal of the contingency remedy will be to achieve State drinking water standards or Federal MCLs within the area of the VCM subplume.

The components of the contingency remedy include:

- Extraction and treatment of groundwater within the area of the VCM subplume with a goal of achieving State drinking water standards or Federal MCLs.

- Extraction wells placed in the area of highest concentration of VCM and at the leading edge of the VCM subplume.

- Treatment of extracted water in an air stripping treatment system, which will be constructed within the vicinity of the Hooker/Ruco Facility.

- The treated effluent would be discharged to a recharge basin on the Hooker/Ruco Facility.

- A monitoring program will be developed to monitor groundwater quality in the area of the VCM subplume and to evaluate the fate and migration of VOCs southward and westward beyond the VCM subplume. New monitoring wells would be added to the existing network of monitoring wells to increase the network's area of coverage. The objective of the monitoring program would be to evaluate the effectiveness of the selected contingency remedy.

The Work to be performed by Respondents shall be designed to achieve the RAOs stated above. As described in greater detail below, the Work shall include, without limitation, the following elements:

1. Pre-remedial design (pre-RD) activities for the selected remedy;

2. Remedial Design (RD) of the selected remedy set forth in the 2000 ROD;

3. Remedial Construction of the selected remedy;

4. Continued Operation of the Remedial Action (RA) for the remediation of the groundwater;

5. Implementation of a groundwater monitoring program; and

6. Remedial Design and implementation of the contingency remedy, if necessary.

II. PERFORMANCE STANDARDS

Performance Standards are the cleanup standards and other measures to achieve the goals of the Remedial Action set forth in the 2000 ROD.

The remedy shall comply with all Applicable or Relevant and Appropriate Requirements (ARARs) as set forth herein and in the ROD. Specifically, the Performance Standards for aquifer restoration at the Site include, but are not limited, to the following:

- Federal and New York State Maximum Contaminant Levels (MCLs).
- New York State Water Classification and Quality Standards

Accordingly, the remedy will eliminate and reduce the risk to human health and the environment at the Site. Since the selected remedy is considered as an innovative technology, the Respondents shall develop performance criteria to measure the effectiveness of this technology at the Site during the remedial design phase.

III. PROJECT SUPERVISION/MANAGEMENT, PROJECT COORDINATOR

The pre-RD, RD, RA, operation and maintenance (O&M), and monitoring, and any other activities performed related to the Site will be under the direction and supervision of a qualified New York State-licensed professional engineer (hereinafter, Supervising Contractor) and will meet any and all requirements of applicable Federal, State and local laws. Within ten (10) days of the effective date of the Order, the Respondents shall notify EPA and the New York State Department of Environmental Conversation (NYSDEC), in writing, of the names, titles, and qualifications of the Supervising Contractor proposed to be used in the development and implementation of the work to be performed. Selection of any such engineer, contractor, or subcontractor shall be subject to approval by EPA.

IV. PRE-REMEDIAL DESIGN ACTIVITIES

The pre-RD activities to be performed in the implementation of the selected remedy for the Site include the following:

A. Refine the delineation of the VCM subplume and the geologic and hydrogeologic conditions in the area of the VCM subplume; and

B. Develop and initiate a monitoring program prior to the implementation of the selected remedy. This monitoring program will be implemented to monitor groundwater quality in the area of the VCM subplume and to evaluate the fate and migration of volatile organic compounds (VOCs) southward and westward beyond the VCM subplume.

V. REMEDIAL DESIGN ACTIVITIES

The RD activities to be performed in the implementation of the selected remedy for the Site include the following:

A. Develop plans and specifications for the installation of the in-situ bioremediation treatment system using biosparging and supplemental nutrient addition.

B. Determine the number, depth, injection rates, and location of the injection wells.

C. Determine the types and rate of additives (air/oxygen, nutrients) and the addition method (static head or pump-supplied pressure).

D. Develop the performance criteria for measuring the effectiveness of biosparging technology and supplemental nutrient addition.

E. Develop plans for the performance of air monitoring during implementation of the selected technology and for ensuring that air emissions resulting, if any, from the biosparging activities meet applicable or relevant and appropriate air emission requirments.

F. Make provisions for operating and maintaining the groundwater biosparging and supplemental nutrient addition technology.

G. Develop a monitoring program to monitor groundwater quality and to evaluate the effectiveness of the selected technology. The monitoring program should include the monitoring of the VCM subplume to evaluate the fate and migration of VOCs southward and westward beyond the VCM subplume.

VI. REMEDIAL DESIGN WORK PLAN

Within thirty (30) days of the date on which Respondents receives written notification from EPA of the approval of the Supervising Contractor, Respondents shall submit a detailed Remedial Design Work Plan (RD Work Plan) for the design of the selected remedy to EPA for review and

approval. The RD Work Plan shall provide for the collection of all data needed for performing the pre-RD and the necessary RD activities.

The Work Plan shall comply 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 and shall be in conformance, *inter alia*, with the *Superfund Remedial Design and Remedial Action Guidance*, dated June 1986, and other EPA guidance documents.

The Field Sampling Plan (FSP) or Work Plan (WP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HSP) approved by EPA for the RI/FS may be utilized with appropriate addenda or revisions to these plans, as necessary, to accomplish the pre-RD and RD tasks and be consistent with the following requirements. The RD Work Plan shall include plans and schedules for implementation of pre-RD and RD tasks, and shall include, but not be limited to, the following items, or as necessary, an FSP Addendum, a QAPP Addendum, and an HSP Addendum, and shall comply with the following requirements:

A. Quality Assurance/Quality Control Project Plan

A Quality Assurance/Quality Control Project Plan (QAPP) shall be prepared consistent with EPA *Requirements for Quality Assurance Project Plans for Environmental Data Operations*, (EPA QA/R-5, October 1998), and shall include the following elements:

1. A detailed description of the sampling, analysis, and monitoring that shall be performed during the pre-RD and RD phases and consistent with this SOW, the ROD, and the Administrative Order. At a minimum, the QAPP shall provide the following:

   a. A plan for the performance of air monitoring, including air monitoring prior to and during construction at the Site, as necessary, to ensure that any air emissions resulting from the installation of the biosparging and supplemental nutrient addition system meets applicable or relevant and appropriate air emission requirements; and

   b. A plan for the delineation of the VCM subplume and the geologic and hydrogeologic conditions in the area of the VCM subplume (see Section IV. A., above).

   c. A plan to develop and initiate a monitoring plan prior to the implementation of the selected remedy (see Section IV. B., above).

2. All sampling, analysis, data assessment, and monitoring shall be performed in accordance with the *Region II CERCLA Quality Assurance Manual*, Revision 1, EPA Region 2, dated October 1989, and any updates thereto and the guidelines set forth in the Administrative Order. All testing methods and procedures shall be fully documented and referenced to established methods or standards.

3. The QAPP shall also specifically include the following items:

   a. An explanation of the way(s) the sampling, analysis, and monitoring will produce data for the pre-RD and RD phase;

   b. 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;

   c. A map depicting sampling locations; and

   d. A schedule for performance of specific tasks.

4. In the event that additional sampling locations and analyses are utilized or required, Respondents shall submit to EPA an addendum to the QAPP for approval by EPA.

5. The QAPP shall address the following elements:

   Project Management

   a. Title and Approval Sheet
   b. Table of Contents and Document Control Format
   c. Distribution List
   d. Project/Task Organization and Schedule
   e. Problem Definition/Background
   f. Project/Task Description
   g. Quality Objectives and Criteria for Measurement Data
   h. Special Training Requirements/Certification
   i. Documentation and Records

   Measurement/Data Acquisition

   j. Sampling Process Design
   k. Sampling Methods Requirements
   l. Sample Handling and Custody Requirements
   m. Analytical Methods Requirements
   n. Quality Control Requirements

o. Instrument/Equipment Testing, Inspection, and Maintenance Requirements
p. Instrument Calibration and Frequency
q. Inspection/Acceptance Requirements for Supplies and Consumables
r. Data Acquisition Requirements (Non-Direct Measurements)
s. Data Management

Assessment/Oversight

t. Assessments and Response Actions
u. Reports to Management

Data Validation and Usability

v. Data Review, Validation, and Verification Requirements
w. Validation and Verification Methods
x. Reconciliation with Data Quality Objectives

6. In order to provide quality assurance and maintain quality control with respect to all samples to be collected, Respondents shall ensure the following:

   a. Quality assurance and chain-of-custody procedures shall be performed in accordance with standard EPA protocol and guidance, including the *Region II CERCLA Quality Assurance Manual, Revision 1*, EPA Region 2, dated October 1989, and any updates thereto, and the guidelines set forth in this Administrative Order.

   b. The laboratory to be used must be specified. If the laboratory participates in the Contract Laboratory Program (CLP) for the analysis to be performed for this investigation, then project specific Performance Evaluation (PE) samples will not be required, as CLP laboratories run EPA PEs on a quarterly basis. If the proposed laboratory does not participate in the CLP for the analyses required, PE samples must be analyzed to demonstrate the capability to conduct the required analysis prior to being approved for use. Once a non-CLP laboratory has been selected, the laboratory should submit a copy of its Laboratory Quality Assurance Program Plan to EPA for review and approval.

   For any analytical work performed, including that done in a fixed laboratory, in a mobile laboratory, or in on-Site screening analyses, Respondents must submit to EPA a "Non-CLP Superfund Analytical Services Tracking System" form for each laboratory utilized during a sampling event, within thirty (30) days after acceptance of the analytical results. Upon completion, such documents shall be submitted to the EPA Project Coordinator, with a copy of the form and transmittal letter to:

Regional Sample Control Center Coordinator
U.S. EPA, Region 2
Division of Environmental Science & Assessment
2890 Woodbridge Avenue, Bldg. 209, MS-215
Edison, NJ 08837

c. The laboratory utilized for analyses of samples must perform all analyses according to accepted EPA methods as documented in the *Contract Lab Program Statement of Work for Organic Analysis*, (OLM04.2) or the latest revision, and the *Contract Lab Program Statement of Work for Inorganic Analysis*, (ILM04.0) or the latest revision, or other EPA approved methods.

d. Unless indicated otherwise in the approved QAPP, all data will be validated upon receipt from the laboratory.

e. Submission of the validation package (checklist, report, and Form I containing the final data) to EPA, prepared in accordance with the provisions of Subparagraph g., below.

f. Assurance that all analytical data that are validated as required by the QAPP are validated according to the procedures stated in the *EPA Region II Contract Lab Program Organics Data Review and Preliminary Review* (SOP #HW-6, Revision 11), dated June 1996, or the latest revision, and the *Evaluation of Metals Data for the Contract Laboratory Program* (SOP #HW-2, Revision 11), dated January 1992 or the latest revision, or EPA-approved equivalent procedures. Region 2 Standard Operating Procedures are available at: http://www.epa.gov/region02/smb/sops.htm

g. Unless indicated otherwise in the approved QAPP, Respondents shall require deliverables equivalent to CLP data packages from the laboratory for analytical data. Upon the EPA's request, Respondents shall submit to the EPA the full documentation (including raw data) for this analytical data. EPA reserves the right to perform an independent data validation, data validation check, or qualification check on generated data.

h. Respondents shall insert a provision in its contract(s) with the laboratory utilized for analyses of samples, which will require granting access to EPA personnel and authorized representatives of the EPA for the purpose of ensuring the accuracy of laboratory results related to the Site.

B. Health and Safety Contingency Plan

A Health and Safety Contingency Plan (HSCP) for all activities performed under the Administrative Order shall be developed by Respondents to address the protection of public health and safety and the response to contingencies that could impact public health, safety, and the environment. The HSCP shall satisfy the requirements of the *Occupational Safety and Health Guidance for Hazardous Waste Site Activities*, (June 1990, Department of Health and Human Services, (DHHS) National Institute for Occupational Safety and Health (NIOSH) Publication No. 90-117), and the Occupational Safety and Health Administration, U.S. Department of Labor (OSHA) requirements cited below:

1. All Site activities shall be performed in such a manner as to ensure the safety and health of personnel so engaged. All Site activities shall be conducted in accordance with all pertinent general industry (29 CFR Part 1910) and construction (29 CFR Part 1926) OSHA standards, and EPA's *Standards Operating Safety Guides* (OSWER, 1988), as well as any other applicable State and municipal codes or ordinances. All Site activities shall comply with those requirements set forth in OSHA's final rule entitled *Hazardous Waste Operations and Emergency Response*, 29 CFR Part 1910.120, Subpart H.

2. The HSCP shall include, at a minimum, the following items:

   a. Plans showing the location and layout of any temporary facilities to be constructed on or near the Site;

   b. Description of the known hazards and evaluation of the risks associated with the Site and the potential health impacts related to the Site activities;

   c. List of key personnel and alternates responsible for Site safety, response operations, and protection of the public;

   d. Description of levels of protection (based on specified standards) to be utilized by all personnel;

   e. Delineation of Work, decontamination, and safe zones, and definitions of the movement of zones;

   f. Description of decontamination procedures for personnel and equipment, and handling and removal of disposable clothing or equipment;

   g. Incidental emergency procedures which address emergency care for personnel injuries and exposure problems, and containment measures. These procedures shall include: evacuation routes; internal and external communications

procedures for response to fire, explosion, or other emergencies; and the name of the nearest hospital and the route to that hospital; local agencies with the capability to respond to emergencies shall be identified and their capabilities shall be described. A description of the procedures for informing the community of these measures shall also be outlined;

h. Description of the personnel medical surveillance program in effect;

i. Description of monitoring for personnel safety;

j. Description of routine and special personnel training programs; and

k. Description of an air monitoring program to determine concentrations of airborne contaminants to which workers on-Site and persons near the Site boundary may be exposed. The results of work-zone air monitoring may be used as a trigger for implementing Site-boundary air monitoring.

C. Description of Pre-Remedial Design and Remedial Design Tasks

The RD Work Plan shall include a detailed description of all other pre-RD and RD tasks (see Sections IV. and V., above) to be performed, along with a schedule for performance of those tasks. Such tasks shall include, at a minimum, the preparation of the RD Reports required by Section VIII., below, and tasks necessary to ensure compliance with ARARs, as outlined herein and in the ROD. The Remedial Design Work Plan shall include an outline of the requirements of the RD Reports.

1. Access and Other Approvals

The RD Work Plan shall include descriptions of any approvals which Respondents will need to comply with the Administrative Order, with the exception of those approvals needed from the EPA. This description shall detail how such approvals will be sought, and shall include a schedule for obtaining all necessary approvals. Such approvals shall include the consent of owners of property at or near the Site regarding access to conduct sampling, monitoring or other activities, in accordance with the Administrative Order, and approval from any off-Site facility accepting waste materials from the Site. This description shall be amended if subsequent approvals are required.

2. RD Schedules, Draft Schedule for Remedial Action, O&M, and Monitoring

The RD Work Plan shall include a schedule covering all pre-RD and RD activities, including but not limited to, the submittal of the RD Reports listed in Section VIII., below. The RD Work Plan shall also include a draft schedule for Remedial Action (RA), O&M, and monitoring activities. The schedule shall be in

the form of a task/subtask activity bar chart or critical path method sequence of events. The schedules are dependent on EPA approval of project documents.

3. The draft schedule for RA and monitoring activities may be revised during the remedial process, subject to the EPA's approval.

4. The RD schedule shall provide for the completion and submittal to EPA of the Final Design Report within twelve (12) months of EPA's written notification of approval of the RD Work Plan .

5. The draft schedule for the RA shall provide for the completion of the construction of the full-scale biosparging system within six (6) months of EPA approval of the RA Work Plan (RAWP).

VII. APPROVAL OF RD WORK PLAN

EPA will either approve the RD Work Plan, or will require modification of such plan, in accordance with the procedures set forth in the Administrative Order. Respondents shall implement the EPA-approved RD Work Plan in accordance with the schedules contained therein.

VIII. REMEDIAL DESIGN

Respondents shall perform the pre-RD and RD activities in conformance with the RD Work Plan approved by the EPA and within the time frames specified in the RD schedule contained therein. The RD shall include the preparation of a Preliminary RD Report (35%), a pre-final RD Report (95% completion) and a Final RD Report (100% completion).

A. Remedial Design Reports

The RD Reports shall be submitted to the EPA and NYSDEC in accordance with the schedule set forth in the approved RD Work Plan. Each RD Report shall include a discussion of the design criteria and objectives, with emphasis on the capacity and ability to meet design objectives successfully. Each Report shall also include the plans and specifications that have been developed at that point in time, along with a design analysis. The design analysis shall provide the rationale for the plans and specifications, including results of all sampling and testing performed, supporting calculations and documentation of how these plans and specifications will meet the requirements of the ROD and shall provide a discussion of any impacts these findings may have on the RD. Each of the RD Reports shall also include the following items (to the extent that work has been performed regarding the items), as appropriate:

1. A technical specification for photographic documentation of the remedial construction work;

2. A discussion of the manner in which the RA will achieve the Performance Standards; and

3. A draft schedule for RA activities, and a preliminary schedule for monitoring activities.

B. Additional Preliminary Remedial Design Report Requirments

The Preliminary (35%) RD Report shall include the following:

1. Preliminary drawings showing general arrangement of all work proposed;

2. A discussion of the manner in which the pre-design components detailed in Section IV., above, for the Remedial Action will be considered;

3. Piping and instrumentation diagrams, as necessary, showing all equipment and control systems;

4. Table of Contents for the specifications, including a listing of items from the Construction Specifications Institute master format that are expected to be included in the construction specifications. This master format is presented in the Construction Specifications Institute's *Manual of Practice*, 1985 edition, available from the Construction Specifications Institute, 601 Madison Street, Alexandria, Virginia 22314;

5. Engineering plans representing an accurate identification of existing Hooker Ruco Facility conditions and an illustration of the work proposed. Typical items to be provided on such drawings include, at a minimum, the following:

   a. Title sheet including at least the title of the project, a key map, the name of the designer, date prepared, sheet index, and EPA/NYSDEC Project identification numbers;

   b. All property data including owners of record for all properties within 200 feet of the Hooker Ruco Facility;

   c. A Site survey including the distance and bearing of all property lines that identify and define the Hooker Ruco Facility;

   d. All easements, rights-of-way, and reservations for the Hooker Ruco Facility;

e. All buildings, structures, wells, facilities, and equipment (existing and proposed) if any on the Hooker Ruco Facility;

f. A topographic survey, including existing and proposed contours and spot elevations for all areas that will be affected by the remedial activities, based on U.S. Coast and Geodetic Survey data;

g. All utilities, existing and proposed;

h. Location and identification of all significant natural features including, *inter alia*, wooded areas, water courses, wetlands, flood hazard areas, and depressions;

i. Flood hazard data and 100-year and 500-year flood plain delineation;

j. North arrow, scale, sheet numbers and the person responsible for preparing each sheet;

k. Decontamination areas, staging areas, borrow areas and stockpiling areas;

l. Miscellaneous detail sheets;

m. Definitions of all symbols and abbreviations; and

n. A specification for a sign at the Site. The sign should describe the project, the name of the contractor performing the RD/RA work or the Respondents, state that the project is being performed under EPA oversight, and provide an EPA contact number for further information.

6. Survey work that is appropriately marked, recorded and interpreted for mapping, property easements and design completion;

7. Drawings of all proposed equipment, improvements, details and all other construction and installation items to be developed in accordance with the current standards and guidelines of the New York State Board of Professional Engineers and Land Surveyors. Drawings shall be of standard size, approximately 24" x 36". A list of drawing sheet titles will be provided;

8. Engineering plans (as necessary) indicating, at a minimum, the following:

   a. Site security measures;

   b. Roadways; and

   c. Electrical, mechanical, structural, and HVAC drawings, if required.

9. Any value engineering proposals.

C. Additional Pre-Final/Final RD Report Requirements

The pre-final and final RD reports shall also include the following:

1. Final plans and specifications;

2. An RA Operation and Maintenance (O&M) Plan shall be prepared in accordance with the *Superfund RD and RA Guidance*, dated June 1995, OSWER Directive 9355.0-4A. The RA O&M Plan shall include, but not be limited to, the following:

   a. a description of the personnel requirements, responsibilities, and duties, including a discussion for training, lines of authority;

   b. a description of all construction-related sampling, analysis, and monitoring to be conducted under the Administrative Order; and

   c. a description of all RA-related monitoring requirements associated with the biosparging and supplemental nutrient addition system.

3. A Construction Quality Assurance Project Plan (CQAPP), which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official (QA Official), independent of the Supervising Contractor, to conduct a quality assurance program during the construction phase of the project. The CQAPP shall address sampling, analysis, and monitoring to be performed during the remedial construction phase of the Work. Quality assurance items to be addressed include, at a minimum, the following:

   a. Inspection and certification of the Work;

   b. Measurement and daily logging;

   c. Field performance and testing;

   d. As-built drawings and logs;

   e. Testing of the Work to establish whether the design specifications are attained; and

   f. Testing methods appropriate to remedial construction including, at a minimum, testing of remedial construction materials, as necessary, prior to

use, and testing of constructed remedial components to ensure that they meet design specifications.

4. A report describing those efforts made to secure access and obtain other approvals and the results of those efforts (see Section VI. C., above). Legal descriptions of property or easements to be acquired shall be provided.

5. A final engineer's construction cost estimate, which may be provided under separate cover concurrent with submittal of the Final RD Report.

6. A plan for implementation of construction and construction oversight.

7. A method for selection of the construction contractor(s).

8. A proposed schedule for implementing all of the above.

IX. APPROVAL OF RD REPORTS

A. EPA will review and comment on the RD Reports. Respondents shall make those changes required by the EPA's comments/modifications in accordance with the procedures set forth in the Administrative Order.

B. Changes required by EPA's comments on the Preliminary Remedial Design Report shall be made in the subsequent RD Report. Changes required by EPA's comments on the pre-Final Remedial Design Report shall be made in the Final RD Report

C. EPA will either approve the Final RD Report or require modification of it, in accordance with the procedures set forth in the Administrative Order. The EPA-approved Final Design Report shall also be referred to as the "Final Design Report."

X. REMEDIAL ACTION

A Within twenty-one (21) days after approval of the Final Design Report by EPA, Respondents shall award a contract for the RA.

B. Within thirty (30) days of the award of the RA contract, Respondents shall submit a RAWP for remedial construction activities. The RAWP shall include, at a minimum, the following items:

1. If applicable, a "Request for Modification of Approved Final RD Report," including any requests for modification of the approved Final Design Report, based on construction methods identified by the contractor(s), or proposed modification of the construction schedule developed under Section VIII., above,

or any other requests for modification, subject to EPA approval in its sole discretion.

2. A Site Management Plan (SMP) for RA activities. The SMP for RA shall include, at a minimum, the following items:

   a. Tentative identification of the RA Project Team (including, but not limited to the Construction Contractor).

   b. A final schedule for the completion of the RA and all major tasks therein, as well as a schedule for completion of required plans, and other deliverables (see Section VI. C., above).

   c. Methodology for implementation of the Construction Quality Assurance Plan (developed during the RD).

   d. Methodology for implementation of the RA O&M Plan.

   e. Procedures and plans for the decontamination of construction equipment and the disposal of contaminated materials.

   f. Methods for satisfying any permitting requirements.

   g. Discussion of the methods by which construction operations shall proceed. Discussion shall include the following:

      (1) Timing of and manner in which activities shall be sequenced;

      (2) Preparation of the Site including security, utilities, decontamination facilities, construction trailers, and equipment storage;

      (3) Coordination of construction activities;

      (4) Site maintenance during the RA;

      (5) Coordination with local authorities regarding contingency planning and potential traffic obstruction; and

      (6) Entry and access to the Site during the construction period(s) and periods of inactivity, including provisions for decontamination, erosion control, and dust control.

   h. Discussion of construction quality control, including:

(1) Methods of performing the quality control inspections, including when inspections should be made and what to look for;

(2) Control testing procedures for each specific test. This includes information which authenticates that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards;

(3) Procedures for scheduling and managing submittals, including those of subcontractors, off-Site fabricators, suppliers, and purchasing agents; and

(4) Reporting procedures including frequency of reports and report formats.

3. A Quality Assurance/Quality Control Project Plan (QAPP) shall be prepared consistent with EPA *Requirements for Quality Assurance Project Plans for Environmental Data Operations*, (EPA QA/R-5, October 1998) (see Section VI. A., above, for these requirements).

4. An updated HSCP for the Remedial Construction phase of the Work (see Section VI. B., above, for these requirements). The HSCP shall address health and safety measures to be implemented and observed by construction personnel, as well as recommended health and safety measures for the adjacent community and general public, together with a description of the program for informing the community of these recommendations. The HSCP shall include the name of the person responsible in the event of an emergency situation, as well as the necessary procedures that must be taken in the event of an emergency, as outlined in the Administrative Order.

C. Approval of Remedial Action Work Plan

EPA will either approve the RAWP or require modification of it in accordance with the procedures set forth in the Administrative Order.

D. Performance of Remedial Construction

1. Upon EPA's written approval of the RAWP, Respondents shall initiate the remedial construction in accordance with the RAWP and the approved Final Design Report, which includes the approved remedial construction schedule.

2. During performance of the remedial construction, Respondents may identify and request EPA approval for field changes to the approved RAWP, Final Design Report and construction schedule, as necessary, to complete the work. EPA will either approve, disapprove, or require modification of any requests for field changes in accordance with the procedures set forth in the Administrative Order.

E. Operation and Maintenance Manual

1. No later than ninety (90) days prior to the scheduled completion date of the remedial construction phase, Respondents shall submit to the EPA an O&M Manual. The O&M Manual shall conform to the EPA guidelines contained in *Considerations for Preparation of Operation and Maintenance Manuals*, EPA 68-01-0341.

2. The O&M Manual shall include, at a minimum, the following:

   a. An amended QAPP consistent with Section VI.A., above.

   b. An HSCP for O&M activities consistent with Section VI.B., above.

   c. A discussion of potential operating problems and remedies for such problems.

   d. A discussion of alternative procedures in the event of system failure.

   e. A schedule for equipment replacement.

   f. An O&M and monitoring schedule.

3. EPA will either approve the O&M Manual or require modification of it, in accordance with the procedures set forth in the Administrative Order.

4. Proposed modifications to the approved O&M Manual may be submitted to EPA for consideration upon completion of construction or thereafter if Respondents can demonstrate that such modifications would enhance and/or maintain the environmental monitoring programs.

XI. PRE-FINAL AND FINAL INSPECTIONS, REMEDIAL ACTION REPORTS, NOTICE OF CONSTRUCTION COMPLETION

A. At least fourteen (14) days prior to the completion of construction, Respondents and their contractor(s) shall be available to accompany EPA personnel and/or their representatives on a pre-final inspection. The pre-final inspection shall consist of a walkover of the Site to determine the completeness of the construction and its consistency with the RD Reports, the Administrative Order, the ROD and applicable federal and state laws, rules, and regulations.

B. Following the pre-final inspection, EPA will either specify the necessary corrective measures to the construction phase of the Remedial Action, as appropriate, or determine that construction is complete. If EPA requires corrective measures, Respondents shall undertake the corrective measures according to a schedule approved by EPA. Within fourteen (14) days after completion of the construction of

the corrective measures, Respondents and their contractor(s) shall be available to accompany EPA personnel or their representatives on an inspection as provided for in the preceding paragraph. Said inspection will be followed by further directions and/or notifications by EPA as provided above in this paragraph. The Respondents shall submit a Draft Interim Remedial Action Report within thirty (30) days of the final inspection.

C. The Draft Interim Remedial Action Report and Draft Remedial Action Report set forth in Subsection B above, shall include the following sections:

1. Introduction

   a. Include a brief description of the location, size, environmental setting, and operational history of the Site.

   b. Describe the operations and waste management practices that contributed to contamination of the Site.

   c. Describe the regulatory and enforcement history of the Site.

   d. Describe the major findings and results of Site investigation activities.

   e. Describe prior removal and remedial activities at the Site.

2. Background

   a. Summarize requirements specified in the ROD. Include information on the cleanup goals, monitoring requirements, O&M requirements, and other parameters applicable to the design, construction, operation, and performance of the RA.

   b. Provide additional information regarding the basis for determining the RAOs, including planned future land use.

   c. Summarize the RD, including any significant regulatory or technical considerations or events which occurred during the preparation of the RD. Report

   d. Identify and briefly discuss any ROD amendments, explanation of significant differences, or technical impracticability waivers.

3. Construction Activities

a. Provide a step-by-step summary description of the activities undertaken to construct and implement the RA (*e.g.*, mobilization and Site preparatory work; construction of the treatment system; associated Site work, such as fencing, access and control; system operation and monitoring; and sampling activities).

b. Refer the reader to the Appendices for characteristics, Site conditions, and operating parameters for the system.

4. Chronology of Events

a. Provide a tabular summary that lists the major events for the remedial work, and associated dates of those events, starting with ROD signature.

b. Include significant milestones and dates, such as: remedial design submittal and approval; ROD amendments; mobilization and construction of the remedy; significant operational events, such as treatment system, application start-up, monitoring and sampling events, system modifications, operational down time, variances or noncompliance situations, and final shutdown or cessation of operations; final sampling and confirmation-of-performance results; required inspections; demobilization; and completion or startup of post-construction O&M activities.

c. Indicate when cleanup goals are projected to be achieved for the groundwater restoration.

5. Performance Standards and Construction Quality Control

a. Describe the overall performance of the technology in terms of comparison to the cleanup goals.

b. For treatment remedies, identify the quantity of material treated, the strategy used for collecting and analyzing samples, and the overall results from the sampling and analysis effort.

c. Provide an explanation of the approved construction quality assurance and construction quality control requirements or cite the appropriate reference for this material. Explain any substantial problems or deviations.

d. Provide an assessment of the performance data quality, including the overall quality of the analytical data, with a brief discussion of QA/QC procedures followed, use of a QAPP, comparison of analytical data with data quality objectives.

6. Final Inspection and Certifications

   a Report the results of the various RA contract inspections and identify noted deficiencies.

   b. Briefly describe adherence to health and safety requirements while implementing the RA. Explain any substantial problems or deviations.

   c. Describe results of pre-certification inspection.

   d. Include a certification statement, signed by a responsible corporate official of one or more of the Respondents or by the Respondent's Project Coordinator (s), which states the following:

   "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

7. Continued Operation and Maintenance Activities

   a Describe the general activities for post-construction O&M activities, such as monitoring, Site maintenance, and closure activities.

   b. Identify potential problems or concerns with such activities.

   c. Describe the future groundwater restoration activities to meet cleanup goals.

8. Summary of Project Costs

   a. Provide the actual final costs for the project. If actual costs are not available, provide estimated costs.

   b. Provide the costs previously estimated in the ROD for the selected remedy, including, as applicable, RA capital costs, RA operating costs, and number of years of operation. Adjust the estimates to the same dollar basis year as the actual project costs, and provide the index used.

   c. Compare actual RA costs to the adjusted ROD estimates. If the difference is outside the range of -30 to +50 percent, explain the reasons for such differences.

d. For treatment remedies, calculate unit costs based on the sum of the actual RA capital and RA operating costs divided by the quantity of material treated.

e. Refer the reader to the Appendix for a detailed breakdown of costs.

9. Observations and Lessons Learned

Provide Site-specific observations and lessons learned from the project, highlighting successes and problems encountered and how they were resolved.

10. Contact Information

Provide contact information (names, addresses, phone numbers, and contract/reference data) for the major design and remediation contractors, as applicable.

11. Appendices: Cost and Performance Summary

a. The specific parameters for documenting cost and performance information are presented in the *Guide to Documenting and Managing Cost and Performance Information for Remediation Projects*, EPA 542-B-98-007.

b. Identify the matrix characteristics and Site conditions that most affected the cost and performance, the corresponding values measured for each characteristic or condition, and the procedures used for measuring those characteristics or conditions.

c. Identify the operating parameters specified by the remediation contractor that most affected the cost and performance, the corresponding values measured for each parameter, and the procedures used for measuring those parameters.

d. Provide a detailed breakout of the actual RA capital costs, estimated RA operating costs (costs to operate and maintain the biosparging and supplemental nutrient addition treatment process).

e. Provide supplemental information in the appendices to the RA Report. This information could include a map of the Site and operable unit, a schematic of the treatment system, supplemental performance information, and a list of references.

D. EPA will either approve the Draft Interim RA Report and Draft RA Report, thus making them the Interim RA Report and the Final RA Report, require modifications of reports, and/or require corrective measures to fully and properly implement the Remedial Action, in accordance with Subsection B above, or XII B below.

XII. PERFORMANCE OF CONTINUED OPERATION OF THE REMEDIAL ACTION

A. Upon EPA's approval of the Interim RA Report in accordance with Section XI. D above, Respondents shall continue remedial action and monitoring activities in accordance with the approved O&M Manual.

B. Notice of Completion and Final Remedial Action Report for Remedial Work

1. Within thirty (30) days of the date that Respondents conclude that they have met the Performance Standards as specified in the ROD and this SOW for the third consecutive year (or a shorter period if approved by EPA in its sole discretion), or, if Alternative Remedial Strategies are authorized by EPA, within thirty (30) days of completion of those strategies, Respondents shall a schedule and conduct a final inspection to be attended by Respondents, EPA, NYSDEC, and/or their respective representatives. The final inspection will consist of a walk-through of the project to determine the completeness of the Remedial Action and its consistency with the ROD, this SOW, and the Administrative Order. EPA may direct Respondents to correct any deficiencies identified during the inspection. Respondents shall implement the tasks necessary to correct any deficiencies in accordance with the specifications and schedules established by EPA. Within fourteen (14) days of completion of the tasks, Respondents shall be available to accompany EPA and NYSDEC personnel and/or their respective representatives on a follow-up inspection. If, after the final inspection for Remedial Action (or the follow-up inspection, if required), Respondents still believes that the Remedial Action Performance Standards have been attained, within thirty (30) days of the final inspection (or the follow-up inspection, if required), Respondents shall submit a Notice of Completion and Draft Remedial Action Report (Refer to Subsection XI. C., above).

2. EPA will determine whether the RA (including any Alternative Remedial Strategies) has been completed in accordance with the standards, specifications and reports required by the Administrative Order. If EPA determines that they have not been so completed, EPA will notify Respondents in writing of those tasks which must be performed to complete the RA (including any Alternative Remedial Strategies). Respondents shall then implement the specified activities and tasks in accordance with the specifications and schedules established by EPA and shall then submit a further report on the specified activities and tasks and certification signed by a licensed professional engineer, within thirty (30) days after completion of the specified activities and tasks. Any modifications to the Draft RA Report for the RA required by EPA shall be in accordance with the procedures set forth in the Administrative Order.

3. Upon EPA's certification of completion of the RA (including any Alternative Remedial Strategies), Respondents shall perform post-remediation monitoring in accordance with the Post-Remediation Monitoring Plan, as set forth in Section XV., below.

C. Goal for Aquifer Restoration

1. As set forth in the ROD, the Performance Standards are designed to protect human health from exposure (via ingestion, inhalation, and dermal contact) to VCM, TCE, PCE and TICs in groundwater at concentrations in excess of New York State groundwater standards and Federal MCLs. In addition, the performance standard is designed to restore the aquifer to meet New York State Groundwater Standards and New York State and Federal MCLs in a timely manner and to eliminate the need for supplemental treatment for VCM at the Northrop Treatment System.. Respondents shall continue the remedial action related to the groundwater remediation system until the Performance Standards have not been exceeded for a period of three (3) consecutive years, or a shorter period if approved by EPA in its sole discretion.

2. Respondents may petition EPA in writing for authorization to amend the groundwater O&M Manual if, based on the results of groundwater monitoring, Respondents believe that some or all of the Performance Standards specified in the ROD will not be reached in the time period projected in the approved O&M Manual. Respondents shall not submit such a petition until they have performed O&M of the groundwater remediation system for at least three (3) years from the date of EPA's approval of the Interim RA Report, as set forth in Section XI. D., above, or a shorter period if approved by EPA in its sole discretion.

3. Respondents' petition for authorization to amend the groundwater O&M Manual shall include, at a minimum, the following information, as well as any other information and analyses EPA requests prior to or following submission of the petition:

   a. a list identifying each Performance Standard that has not been met along with an explanation of why;

   b. a description of any changes in the conceptual model for Site contamination since issuance of the ROD, including geological, hydrogeologic, and geochemical characterizations;

   c. comprehensive groundwater monitoring data relevant to the groundwater remedy implemented;

d. an analysis of the performance of the groundwater remedy which describes the spatial and temporal trends in groundwater contaminant concentrations within the groundwater plume (*e.g.*, whether contaminant migration has been effectively prevented, as well as any reduction or changes in the overall size or location of the groundwater plume, or stabilized (or very slow decreases in contaminant concentrations);

e. a description of any proposed contingency measures; and

f. a predictive analysis of the approximate time frame required to achieve the Performance Standards with both the existing groundwater remediation system and that to be implemented with any proposed contingency measures using methods appropriate for the data and Site-specific conditions. Such analysis shall also address the uncertainty, if any, inherent in these predictions. The petition shall not be deemed complete until all information and analyses required and/or requested by EPA are submitted by the Respondents.

D. If, based on the results of groundwater monitoring, EPA believes that one or more of the Performance Standards specified in the ROD will not be reached in the time period projected in the approved O&M Manual, EPA may require Respondents to implement contingency measures and to submit a Contingency Measures Plan (see Section XII E., below).

E. A Contingency Measures Plan shall be submitted to EPA by Respondents within sixty (60) days of receipt of EPA's written determination that contingency measures are appropriate. The Contingency Measures Plan shall:

1. Address design, construction, and O&M of the contingency measures, as appropriate;

2. Include an amended QAPP and HSCP for O&M activities, as appropriate; and

3. Include a schedule for the implementation of the contingency measures

F. EPA will either approve the Contingency Measures Plan or disapprove and/or require modification of such plan, in accordance with the procedures set forth in the Administrative Order.

G. Respondents shall commence implementation of the Contingency Measures Plan within thirty (30) days of receipt of EPA's written approval of the Contingency Measures Plan.

H. No action taken by EPA pursuant to this Section of the SOW, including EPA's decision on Respondents' petition(s), shall be subject to dispute resolution or judicial review.

XIII. CONTINGENCY REMEDY FROM THE ROD

A. If EPA determines during the implementation and long-term monitoring of the selected remedy that the technology selected is not effective in adequately reducing the VCM concentrations in a reasonable time frame, then Respondents shall implement a VCM subplume extraction and treatment as a contingency remedy as indicated in the ROD in order to achieve Federal and State MCLs. Further, if either the ONCT or the VOC removal system ceases operation before the regional aquifer is restored, or if the Northrop Treatment System is not capturing contaminants emanating from the Hooker/Ruco Facility, EPA will re-evaluate the protectiveness of the selected remedy.

B. If EPA determines that a groundwater extraction and treatment system is necessary, EPA will notify Respondents in writing. Within 30 days of receipt of EPA's notification, Respondents shall submit a RD Work Plan for the contingency remedy consistent with requirement of Section VI. Upon EPA's approval of the RD Work Plan for the contingency remedy, Respondents shall implement the remaining requirements of this SOW for the contingency remedy.

XIV. POST REMEDIATION MONITORING PLAN

A. Within thirty (30) Days of the date on which all designated groundwater monitoring points have recorded readings less than or equal to the Performance Standards specified in the ROD and this SOW for the third consecutive year (or a shorter period if approved by EPA in its sole discretion), or within sixty (60) days of the date that EPA determines, in its sole discretion, that one or more ARAR waivers have been granted and all other groundwater ARARs have been met and/or waived, Respondents shall submit to EPA a Post-Remediation Monitoring (PRM) Plan.

B. The PRM Plan shall include, at a minimum, the following:

1. A QAPP for PRM activities consistent with Section VI.A., above;

2. An HSCP for PRM activities consistent with Section VI.B., above;

3. A description of work to be performed under PRM activities; and

4. A PRM schedule that identifies the frequency of monitoring and when these activities will commence.

C. EPA will either approve the PRM Plan, or require modification of it, in accordance with the procedures set forth in the Administrative Order.

XV. POST-REMEDIATION MONITORING

A. Upon EPA's approval of the PRM Plan, Respondents shall commence with the PRM program for a period of three (3) years, in accordance with the PRM Plan, which includes the PRM schedule.

B. If groundwater contaminant concentrations increase above the Performance Standards (as specified in the ROD and this SOW), during post-remediation monitoring, EPA will evaluate the need, and may require Respondents to reinstate the remediation system.

C. Notice of Completion and Final Report for Post-Remediation Monitoring

1. Within five (5) days of the completion of post-remediation monitoring, Respondents shall submit to EPA a Notice of Completion for Post-Remediation Monitoring. The Notice of Completion for Post-Remediation Monitoring shall be signed by a licensed professional engineer meeting any and all requirements of applicable Federal, State, and local laws, and shall certify that the PRM activities have been completed in full satisfaction of the requirements of the Administrative Order, this SOW, and all plans, specifications, schedules, reports and other items developed hereunder.

2. Within thirty (30) days of the completion of post-remediation monitoring, Respondents shall submit to EPA a Final Report for Post-Remediation Monitoring. The Final Report for Post-Remediation Monitoring shall summarize the Work performed under the PRM Plan and the data so generated. Deliverables under the Final Report for Post-Remediation Monitoring shall be signed by a licensed professional engineer meeting any and all requirements of applicable Federal, State, and local laws, and shall certify that the PRM activities and report deliverables have been completed in full satisfaction of the requirements of the Administrative Order, this SOW, and all plans, specifications, schedules, reports and other items developed hereunder. Any modifications to the Final Report for Post-Remediation Monitoring required by EPA shall be in accordance with the procedures set forth in the Administrative Order.

3. EPA will determine whether the PRM activities or any portions(s) thereof have been completed in accordance with the standards, specifications, and reports required by the Administrative Order. If EPA determines that PRM activities have not been so completed, EPA will notify Respondents in writing of those tasks which must be performed to complete the post-remediation monitoring. Respondents shall then implement the specified activities and tasks in accordance

with the specifications and schedules established by EPA and shall then submit a further report on the specified activities and tasks, certified by a licensed professional engineer, within thirty (30) days after completion of the specified activities and tasks. EPA will notify Respondents in writing when PRM activities have been completed in accordance with the requirements of the Administrative Order.

XVI. CERTIFICATION OF COMPLETION OF THE WORK

Within thirty (30) Days after Respondents conclude that all phases of the Work required by the Administrative Order have been fully performed, Respondents shall schedule and conduct a pre-certification inspection to be attended by Respondents and EPA. If, after the pre-certification inspection, Respondents still believe that the Work has been fully performed, Respondents shall submit a written report by a New York State registered professional engineer stating that the Work has been completed in full satisfaction of the requirements of the Administrative Order. If, after review of the written report, EPA, after reasonable opportunity for review and comment by the State, determines that any portion of the Work has not been completed in accordance with the Administrative Order, EPA will notify Respondents in writing of the activities that must be undertaken by Respondents pursuant to the Administrative Order to complete the Work.

If EPA concludes, based on the initial or any subsequent request for Certification of Completion by Respondents and after a reasonable opportunity for review and comment by the State, that the Work has been performed in accordance with the Administrative Order, EPA will so notify Respondents in writing.