U.S. Environmental Protection Agency
Region 2

Response Action Contract

FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
FULTON AVENUE SUPERFUND SITE
OPERABLE UNIT 2
GARDEN CITY PARK, NEW YORK

JUNE 2006

Contract Number: 68-W-98-214

TETRA TECH EC, INC.

EPA WORK ASSIGNMENT NUMBER: 155-RICO-02LN
EPA CONTRACT NUMBER: 68-W-98-214
TETRA TECH EC, INC.
RAC II PROGRAM

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WORK PLAN
FULTON AVENUE SUPERFUND SITE
OPERABLE UNIT 2
GARDEN CITY PARK, NEW YORK

JUNE 2006

NOTICE

TETRA TECH EC, INC.

1 June 2006
RAC II-2006-092

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SUBJECT: USEPA RAC II CONTRACT NUMBER 68-W-98-214
WORK ASSIGNMENT NUMBER 155-RICO-02LN
FULTON AVENUE SUPERFUND SITE – OPERABLE UNIT 2
FINAL RI/FS WORK PLAN SUBMISSION

Dear Mr. Bachmann and Mr. Moncino:

The subject plan (enclosed) was prepared based on EPA's 17 May 2006 comments (received 22 May) on the 20 January 2006 Draft Work Plan.

If you have any questions or need additional information, please call me at (973) 630-8112 or Bob Cantagallo at (973) 630-8132.

Sincerely,

William R. Colvin, PMP, P.G., CHMM
RAC II Program Manager

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GARDEN CITY PARK, NEW YORK

JUNE 2006

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LIST OF ACRONYMS

AR	Authorized Requestor
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BTAG	Biological Technical Assistance Group
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
CLASS	Contract Laboratory Analytical Support Services
CLP	Contract Laboratory Program
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CPI	Characters per inch
CRP	Community Relations Plan
CSF	Cancer Slope Factor
CT	Central Tendency
DER	Data Evaluation Report
DESA	Division of Environmental Science and Assessment
DGPS	Differential Global Positioning System
DQO	Data Quality Objective
EC	Electric Conductivity
ECD	Electron Capture Detector
EFH	Exposure Factors Handbook
ELCR	Excess Lifetime Cancer Risks
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
EPIC	Environmental Photographic Interpretation Center
ERAGS	Ecological Risk Assessment Guidance for Superfund
ERM	Environmental Resources Management
FAR	Federal Acquisition Regulation
FDEMI	Frequency Domain Electromagnetic Induction
FID	Flame Ionization Detector
fpd	feet per day
FRI	Focused Remedial Investigation
FS	Feasibility Study
GC	Gas Chromatograph
GCPIA	Garden City Park Industrial Area
GCWD	Garden City Water District
GIS	Geographic Information System
gpm	gallon per minute
GPS	Global Positioning System
GRA	General Response Action
HASP	Health and Safety Plan
HEAST	Health Effects Assessment Summary Table

HI	Hazard Index
HQ	Hazard Quotient
Hz	Hertz
ILCR	Incremental Lifetime Cancer Risk
IDW	Investigation Derived Waste
IEUBK	Integrated Exposure Uptake Biokinetic
IRIS	Integrated Risk Information System
LDP	Locational Data Policy
LOE	Level-of-Effort
LQAP	Laboratory Quality Assurance Plan
MCL	Maximum Contaminant Level
MDC	Maximum Detected Concentration
mg/kg	milligrams per kilogram
MIP	Membrane Interface Probe
msl	mean sea level
NAD	North American Datum
NAVD	North American Vertical Datum
NCDH	Nassau County Department of Health
NCDPW	Nassau County Department of Public Works
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
ND	Non detect
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
ODC	Other Direct Cost
O&M	Operation and Maintenance
OU	Operable Unit
PAR	Pathways Analysis Report
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PID	Photoionization Detector
ppb	parts per billion
ppm	parts per million
PPRTV	Provisional Peer Reviewed Toxicity Values
POTW	Publicly Owned Treatment Works
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
PSA	Preliminary Site Assessment
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RAGS	Risk Assessment Guidelines for Superfund
RAO	Remedial Action Objective
RAS	Routine Analytical Services
RfC	Reference Concentration
RfD	Reference Dose

LIST OF ACRONYMS (Cont'd)

RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSCC	Regional Sample Control Center
RSCO	Recommended Soil Cleanup Objectives
SIM	Selective Ion Monitoring
SLERA	Screening Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SOW	Statement of Work
STR	Sampling Trip Report
STSC	Superfund Technical Support Center
SVOC	Semi-Volatile Organic Compound
TBC	To Be Considered
TCE	Trichloroethene
TCL	Target Compound List
TDEMI	Time Domain Electromagnetic Induction
TOC	Total Organic Carbon
TtEC	Tetra Tech EC, Inc.
UCL	Upper Confidence Limit
ug/kg	micrograms per kilogram
USCS	Unified Soil Classification System
ppb	micrograms per liter
UFP-QAPP	Uniform Policy for Quality Assurance Project Plans
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WACR	Work Assignment Closeout Report
WAM	Work Assignment Manager
WAF	Work Assignment Form
WET	Wetland Evaluation Technique

1.0 INTRODUCTION

A Remedial Investigation and Feasibility Study (RI/FS) of contaminated groundwater at the Fulton Avenue Superfund Site (the Site, OU-2) in Garden City Park, New York will be conducted by Tetra Tech EC, Inc. (TtEC). The RI/FS will be conducted in accordance with the Statement of Work (SOW) included as Attachment 1 to the Original Work Assignment Form (WAF) dated 2 August 2005 and WAF Amendment 1 dated 27 December 2005 issued by the United States Environmental Protection Agency (EPA) under EPA RAC II Contract Number 68-W-98-214. In addition, RI/FS activities will be based upon and consistent with EPA guidance, including the reference documents included in Section 5.0.

Five sections comprise this work plan. Section 1 consists of this general introduction, a statement of the purpose of the RI/FS, and a summary of the Site background (including brief summaries of the Site description and history). Section 2 is a summary of the site-related contamination. Section 3 describes the 16 tasks that will be performed for this RI/FS. These tasks are specified in the SOW in the Original WAF, as revised by WAF Amendment 1. This work plan also incorporates background information from documents provided by EPA and discussions with the EPA during the 24 August 2005 site visit and 6 December 2005 technical meeting. Section 4 presents TtEC's project management approach and proposed project schedule. Section 5 lists applicable references.

A Quality Assurance Project Plan (QAPP) and a Health and Safety Plan (HASP) will be submitted as separate Appendices (A and B, respectively) to this Work Plan (refer to Summary of Major Deliverables, Table 4-1 and Project Schedule, Figure 4-2). The Work Plan Budget Estimate, which contains an estimate of the labor effort and a proposed budget for this project was submitted under separate cover.

1.1 Purpose

This RI/FS is being performed to:

- Identify sources of the regional, TCE-dominant groundwater contamination problem;
- Determine the current and potential future human health and ecological risks posed by the contaminated groundwater and the sources of the contaminated groundwater; and
- Identify the most appropriate remedial alternatives for the contaminated groundwater and sources of groundwater contamination to eliminate, reduce, or control risks to human health and/or the environment.

The goal is to develop the minimum amount of data necessary to support the selection of an approach for site remediation and then to use the resulting data in a well-supported Record of Decision within thirty-six (36) months of approval of the final work plan.

1.2 Background

1.2.1 Site Location and Description

Operable Unit (OU)-1, located at 150 Fulton Avenue, is the former location of a cutting mill and dry cleaning facility. The contamination emanating from 150 Fulton Avenue creates a PCE-dominant contaminant plume, which overlies a regional TCE-dominant plume. This TCE-dominant plume is OU-2 for the Fulton Avenue Site.

At the present time, the OU-2 study area is bounded to the west by New Hyde Park Road, to the North By Hillside Avenue, to the east by Roslyn Road and to the south by Hempstead Turnpike in Nassau County, Long Island, New York. These boundaries may be adjusted by EPA depending on the results of the source location study.

1.2.2 Site History

The property located at 150 Fulton Avenue, Garden City Park, Nassau County, New York is owned by Gordon Atlantic Corporation. Flagg-Utica Corporation (Flagg) entered into a lease with the Gordon Atlantic Corporation on 29 October 1964 for the premises at 150 Fulton Avenue (hereafter referred to as "the Site"), the term of which ran from 1 January 1965 to 31 December 1974. On 2 January 1965, Genesco Inc., of Nashville, Tennessee (Genesco) became a successor-in-interest to the Site lease as a result of a merger with Flagg. An unincorporated division of Genesco, known as KnitFabs, operated a fabric-cutting mill at the Site from 1 January 1965 to 26 August 1969. During that time, KnitFabs owned a machine that used tetrachloroethene/perchloroethene (hereinafter referred to as "PCE") to perform dry cleaning of textiles and fabrics. The Site lease was assigned to Halperin Knitting Mills, Inc., an entity unrelated to Genesco, which continued a similar operation at the Site from 26 August 1969 through 31 December 1974. During 1975 - 1976, another company, known as Halknit Finishers, Inc. continued a similar operation at the Site.

The Nassau County Departments of Health (NCDH) and Public Works (NCDPW), as well as the New York State Department of Environmental Conservation (NYSDEC) undertook a series of investigations within, and in the vicinity of, the Garden City Park Industrial Area (GCPIA) between 1986 and 1996 to determine the source(s) of chlorinated volatile organic compound (VOC) impacts to a number of public supply wells (approximately 17) located downgradient (southwest) of, and at various other compass directions from the GCPIA. These wells are owned or operated by five water suppliers who serve a combined population of approximately 170,000 persons. At the present time, the impacted wells are either removed from service or treatment is employed to meet Federal and New York State Drinking Water Maximum Contaminant Levels (MCLs) and guidelines.

As a result of these investigations, ground water beneath and downgradient of the GCPIA was found to be primarily impacted by the following chlorinated VOCs: tetrachloroethene a.k.a. perchloroethene (PCE), trichloroethene (TCE), 1,2-dichloroethene (1,2-DCE) and 1,1,1-trichloroethane (1,1,1-TCA). The aforementioned public supply wells are impacted from one or more of the above-referenced VOCs.

1.2.3 Geology and Hydrogeology

1.2.3.1 Regional Geology

The Site is located in western Nassau County, Long Island. Long Island is situated within the Atlantic Coastal Plain physiographic province, which is underlain by a wedge of unconsolidated sediments that thickens and dips to the southeast toward the Atlantic Ocean.

The unconsolidated deposits, which underlie the Site, range in age from late Cretaceous (65 million years ago) to recent.

The principal deposits at land surface in the vicinity of the Site are Pleistocene (glacial) in age. In the western region of Nassau County, where the Site is located, the thickness of the unconsolidated deposits ranges from approximately 400 feet on the north shore of Long Island to greater than 1,500 feet on the south shore. The approximate thickness of the unconsolidated deposits in proximity of the Site is estimated to be 900 feet.

The unconsolidated deposits, from land surface downward, include glacial deposits of Pleistocene age (Pleistocene deposits); the Matawan Group-Magothy Formation (Magothy), undifferentiated, of late Cretaceous age; and the Lloyd sand and clay members of the Raritan Formation, also of late Cretaceous age. In this investigation, the two uppermost units (Pleistocene deposits and the Magothy Formation) are of primary interest because the Pleistocene deposits lie directly beneath land surface, and directly above the Magothy Formation. Both the Upper Glacial and Magothy are principal aquifers in the region.

The unconsolidated deposits rest unconformably on crystalline bedrock, consisting of Precambrian schist and gneiss, which is considered to be the bottom of the ground water reservoir on Long Island. The age of the bedrock beneath Long Island has been established as Precambrian. The geologic history of this region exceeds 575 million years. However, long periods of non-deposition and/or periods of large-scale erosion are responsible for limiting the rock record to the older Precambrian bedrock and younger Upper Cretaceous and Pleistocene sands, gravels and clays, which are believed to have been deposited during the last 125 million years.

1.2.3.1.1 Upper Pleistocene Deposits

The Pleistocene deposits are approximately 100 to 130 feet thick in the area of the Site and consist mostly of glacial outwash consisting of fine to coarse sand and gravel with thin local lenses of clay. These Pleistocene deposits contain the water table aquifer in this region of Long Island, which is referred to as the Upper Glacial aquifer. The depth to the water table on OU-2 varies, due to a number of factors, including topography, pumping withdrawals, precipitation trends, and local surface water features, including variations in recharge. The depth to the surface of the water table aquifer ranges between 38 and 75 feet bgs in the vicinity of the Site, and is, in general, closer to the ground surface moving south in OU-2.

There is no significant confining unit between the Upper Glacial and Magothy aquifers. However, data from previous soil borings performed at or in the near vicinity of the Site indicate the presence of a low permeability unit consisting of clayey and silty sand. The low permeability unit marks the transitional interface between the Pleistocene deposits and Magothy Formation. Based upon limited data, the low permeability unit ranges between 10 and 20 feet in thickness, and appears to be continuous beneath the Site.

1.2.3.1.2 Magothy Formation

The Magothy Formation ranges from 300 to 500 feet thick and occurs at approximately 110 to 140 feet below land surface. The unit consists mostly of fine to medium sand to clayey sand interbedded with lenses and layers of coarse sand and sandy to solid clay. Gravel is common in the basal zone and discontinuous layers of gray lignitic clay are common in the upper zones.

1.2.3.1.3 Raritan Formation

The Raritan Formation underlies the Magothy Formation and directly overlies the crystalline bedrock. The Raritan Formation comprises the Lloyd Sand Member and the Raritan clay member. Although present beneath the Site, none of the borings or wells installed during the RI (ERM, 2004) encountered the Raritan Formation.

1.2.3.2 Site-Specific Geology

The site-specific geology in the area of the plume is based on data collected from drilling of soil borings and monitoring wells during the RI, and was derived from information provided in the RI report (ERM, 2004).

The Upper Glacial aquifer consists of glacial till and glacial outwash deposited as a result of the Pleistocene ice advances. The flat areas along Long Island's south shore and between morainal areas are known as outwash plains and are composed of coalescing deltas deposited by glacial meltwaters. The sediments of the Upper Glacial aquifer consist of fine, medium, and coarse sands with fine to coarse gravels, and locally thin clay lenses. The Pleistocene deposits tend to have high iron content and are oxidized exhibiting a reddish orange staining in some areas. Soil samples collected from the borings drilled within the Site indicate the subsurface comprising the Upper Glacial aquifer generally consists of fine to medium quartz sand with trace fine to coarse quartz gravel and increasing amounts of silt that generally become finer with depth. The depth to the surface of the water table aquifer ranges between 38 and 75 feet bgs in the vicinity of the Site depending on local land surface elevation.

1.2.3.2.1 Magothy Aquifer

The Magothy aquifer is encountered immediately below the Upper Glacial aquifer. The Magothy contacts the Upper Glacial as an erosional unconformity in a south dipping surface contact (approximately 5 to -40 feet msl). There is no significant regional confining unit separating the Upper Glacial and Magothy aquifers.

There are distinctive differences between the Upper Glacial and Magothy aquifers with respect to depositional history, mineralogic content, configuration, and hydrogeology. The Magothy aquifer is a completely saturated groundwater system. The Magothy is composed of Cretaceous deltaic sediments deposited about 80 million years ago and represents nearshore and alluvial depositional environments.

In the vicinity of the Site, the Magothy Formation is estimated to be approximately 300 to 500 feet in thickness (Suter et. al., 1949). The Magothy consists of fine to medium sands and silts, clayey sands, sandy clays to solid clays and some coarse sand and gravel areas. In the upper to middle zones of the Magothy, discontinuous lenses of lignitic clays, consisting of brown to brownish black coals, woody plant fragments and fragile pyrite crystallization are observed locally, embedded within silty sand matrices. These varieties of sediments are clearly representative of a depositional environment characterized by shifting stream deposits, marked by well-sorted sands, silts and clays to poorly sorted sand, silt and clay mixtures. Moving laterally as well as vertically through the Magothy these shifts or “lenses” (geographically restricted members that terminate on all sides within the formation) of material occur readily and are locally correlative to distances approaching 500 to 1,000 feet. These discontinuous lenses of clays and silts of lower permeability create an inter-fingering or lattice pattern within the Magothy providing preferential flow pathways and cascading effects at depths within the aquifer system.

Correlative large clay beds were not confirmed from analysis of the geologic and natural gamma logs within the Site. At the basal Magothy, gravelly sands become more prominent. Testing conducted during the 2004 RI (ERM, 2004) extended to a maximum depth of 517 feet at the southern most extent of the Site (basal-Magothy and the top of the Raritan Clay).

1.2.3.3 Regional Hydrogeology

The Upper Glacial, Magothy, and Lloyd Sand Member aquifers are designated as Long Island's sole-source aquifer system with NYSDEC Class GA designations for use as a source(s) of potable water supply. For the purpose of this investigation, only the Upper Glacial aquifer and the Magothy aquifer will be discussed because the two aforementioned aquifers are the primary sources of water supply within Nassau County.

1.2.3.3.1 Upper Glacial Aquifer

The Pleistocene deposits contain the water table aquifer in this region of Long Island, which is referred to as the Upper Glacial aquifer. In the vicinity of the Site, depth to water ranges between 38 to 75 feet below land surface. Consequently, the saturated thickness of the Upper Glacial aquifer can range anywhere between 35 and 102 feet in the vicinity of the Site. Hydraulic conductivity values for the Upper Glacial aquifer range between 150 to 300 ft/day and averages about 270 ft/day. The average hydraulic gradient in the Upper Glacial aquifer within this area of Nassau County is 0.0017 ft/ft. The Upper Glacial aquifer provides ground water recharge to the underlying Magothy aquifer.

1.2.3.3.2 Magothy Aquifer

The Magothy Formation is fully saturated and, therefore, its entire thickness makes up the Magothy aquifer. Hydraulic conductivities for the Magothy aquifer average 40 and 70 ft/day and may range as high as 190 ft/day in the basal zone. The average hydraulic gradient in the Magothy aquifer within this area of Nassau County is 0.0019 ft/ft. The Magothy aquifer receives groundwater recharge from the overlying Upper Glacial aquifer (ERM, 2004).

1.2.3.4 Site Hydrogeology

Groundwater in the vicinity of the Site migrates through permeable sediments that comprise the Upper Glacial and Magothy aquifers. The direction of groundwater flow and hydraulic gradients were characterized using water level measurements recorded in permanent monitoring wells that have been installed in the vicinity of the Site and surveyed to a common datum. These wells are screened in the Upper Glacial or Magothy aquifers.

1.2.3.4.1 Horizontal Groundwater Flow

Regional groundwater flow patterns have been well documented in the literature and horizontal flow in the vicinity of the Site is generally in a south-southwesterly direction. Local flow gradients and directions were determined during the 2004 RI (ERM, 2004) using data recorded in monitoring wells. The public supply wells (e.g., Garden City Supply wells) influence the flow gradient and direction locally within the zone of influence of these wells.

1.2.3.4.2 Upper Glacial Aquifer

The saturated thickness of the Upper Glacial aquifer in the vicinity of the Site is approximately 55 to 75 feet. The groundwater flow patterns defined by the data are consistent with the regional flow direction.

1.2.3.4.3 Magothy Aquifer

Thirty monitoring wells were installed within the Magothy aquifer in the vicinity of the Site with screen zones set at various elevations in an effort to characterize groundwater quality. The average thickness of the Magothy investigated using these wells is approximately 350 feet.

Compared to flow patterns in the Upper Glacial aquifer, a change in flow direction to a more southerly direction is evident in approaching public water supply wells -03881, -08339, and -07058.

Consistent with flow patterns in the upper Magothy, flow in the deeper portion is also to a more southerly direction.

The change in flow direction observed in the Magothy monitoring wells located downgradient of the Site (to a more southerly direction) is attributed to hydraulic control imposed by the operation of three public supply wells located approximately 6,000 feet to the southwest of the Site.

1.2.3.4.4 Vertical Component of Groundwater Flow

Vertical flow potential was assessed using water level data recorded on 11-13 December 2001, 21-22 January 2002, and 4-5 April 2002 (ERM, 2004) at conventional monitoring well clusters (i.e., wells installed at the same location that screen different vertical intervals of the aquifer) in the vicinity of the Site.

The average hydraulic gradient for all of the comparisons shown is 0.014 ft/ft in a downward direction. The calculated gradients ranged from 0.070 ft/ft in an upward direction to 0.149 ft/ft in a downward direction.

The observed vertical hydraulic gradients vary by several orders of magnitude. Likely causes of both spatial and temporal variation in vertical hydraulic gradients within the Site include:

- Changes in the stratigraphic profile (aquifer heterogeneity) as ground water moves along through the aquifers;
- Changes in ground surface cover restricting or allowing more recharge; and
- Localized effects of pumping public supply wells.

In summary, the data confirms that the overall direction of ground water movement is downward as it moves south-southwest through the Site.

1.2.3.4.5 Groundwater Flow Velocity

Similar horizontal groundwater flow gradients for the Upper Glacial aquifer (0.0017 ft/ft), upper Magothy aquifer (0.0011 ft/ft) and deeper Magothy aquifer (0.0012 ft/ft) were calculated in the 2004 RI Report.

1.2.4 Surface Water Hydrology

Runoff from the Site area drains to municipal storm water drains. The municipal storm drain system conveys the storm water to recharge basins. Water collected in the basins is allowed to recharge to the Upper Glacial aquifer.

1.2.5 Topography

Topographically, the land surface of OU-2 Area, is characterized as relatively flat with, a gradual southward slope. The elevation of 105 feet above mean sea level (msl) in the northern portion of OU-2 to approximately 50 feet msl in the southern portion of OU-2.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Site Contamination

The summary of site contamination presented in the following subsections is based on data presented in the RIR (ERM, 2004). The primary contaminants identified in soil and groundwater were TCE and PCE.

The NCDH collected samples in1985 and 1986 from monitoring and public supply wells in the GCPIA. The GCPIA is located in Garden City Park, and is bounded by Park Avenue to the north, Herricks Road to the east, the Long Island Railroad corridor to the south, and Nassau Boulevard to the west. Results of sample analyses indicated the presence of VOCs exceeding the (previous) New York State standards and guidelines for drinking water in 9 of the 13 groundwater monitoring wells sampled. The primary contaminant detected was PCE.

In June 1991, the NCDPW and NCDH conducted a cooperative study. Results of the investigation confirmed the presence of high levels of VOCs in the groundwater. Industrial surveys were performed in the GCPIA as part of the study indicated there were several businesses within the industrial area that used the contaminants of concern, including PCE, TCE, and 1,1,1-TCA.

Dvirka and Bartilucci Consulting Engineers were contracted by the NYSDEC to conduct a Preliminary Site Assessment (PSA) for the GCPIA in April 1994. The results of the 1994 PSA investigation indicated that levels of TCE up to 1,900 μg/l were found in the vicinity of the Site.

Environmental Resources Management (ERM) was retained by Genesco (PRP for the Fulton Avenue Site) to conduct an RI under the Area of Concern (AOC) with the NYSDEC (ERM, 2004). The RI data identified VOC contamination other than PCE (predominantly TCE) in the Upper Glacial and Magothy aquifers whose origin is from other, unknown sources that are not related to 154 Fulton Avenue. ERM concluded that more than one VOC plume is evident from the data collected during the RI. This conclusion is based on a number of factors.

- Based on the observed groundwater flow patterns, the distribution of VOCs in groundwater indicate that they could not have originated from a single source.

- The conditions within the aquifer material do not promote, to a great extent, the degradation of PCE to its daughter products (i.e., TCE, DCE, etc.). Consequently, the distribution of PCE is a good indicator of the portion of the VOC plume that is attributable to 154 Fulton Ave.

- The ratio of PCE to TCE in groundwater shows a distinct change, both parallel and perpendicular to the direction of groundwater flow. Hence, the different chemical fingerprint illustrated by the ratio of PCE to TCE, is indicative of site-related contribution when the ratio is > 1.0 while a ratio of < 1.0 points to other potential VOC sources in the region.

Furthermore, ERM determined that there are just three public supply wells within the Garden City Water District (GCWD), -03881, -8339 and -07058, that lie directly in the trajectory of groundwater flow from the Site. Groundwater data from these three supply wells confirm that VOC impacts were apparent as early as 1979. The predominant VOC in the three wells was TCE, although the concentrations of PCE have been found to be increasing, and to become the predominant contaminant since 1999.

2.2 Preliminary Site Conceptual Model

The Site Preliminary Conceptual Model, Figure 2-1, provides a plan view of the known configuration of the TCE-dominant plume. The model is based on the information gathered during the Remedial Investigation (ERM, 2004). The model shows TtEC's current understanding of the Site, and provides a basis for the field investigation.

As the model indicates, the horizontal extent of the plume is unknown. In order to develop a better understanding of the extent of the plume, determining the location of potential source areas, will help support a more complete understanding of potential exposure scenarios for both human and ecological receptors. Groundwater, soil, and soil gas (air) all may serve as transport media. The migration of TCE from the source areas via the transport media results in soil, soil gas and groundwater all having the potential to be exposure media. Ecological and human receptors may be exposed to site-related contaminants from these media. The Field Investigation will provide the data for the evaluation of the potential for the environmental media at the Site to act as transport or exposure media.

The Preliminary Site Conceptual Model is a dynamic tool for understanding the Site conditions, and the model will evolve as the RI/FS process progresses. This model will serve as a guide for field activities and decisions and will be revised as new data is gathered, functioning as a key element in the Triad approach to the Field Investigation. This approach is a dynamic process, which allows for a streamlined investigation and decision-making process through collection of field-screening data and the ability to make real-time decision in the field to respond to new information gathered as the Field Investigation progresses.

3.0 TASK PLAN FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY

This section describes the following tasks that will be performed for this RI/FS:

Task 1	Project Planning and Support
Task 2	Community Relations
Task 3	Field Investigation
Task 4	Sample Analysis
Task 5	Analytical Support and Data Validation
Task 6	Data Evaluation
Task 7	Assessment of Risk
Task 9	Remedial Investigation Report
Task 10	Remedial Alternatives Screening
Task 11	Remedial Alternatives Evaluation
Task 12	Feasibility Study Report
Task 13	Post RI/FS Support
Task 16	Work Assignment Closeout

A detailed description of each task is presented in the following sections. Tasks 8 (Treatability Study and Pilot Testing), 14 (Negotiation Support), and 15 (Administrative Record), though typical RI/FS tasks, are not included in the Scope of Work for this project.

3.1 Task 1 - Project Planning and Support

This task includes the technical and management activities required to plan and execute this Work Assignment.

3.1.1 <u>Program and Project Administration (Subtasks 1.01.01 and 1.01.02)</u>

Program Administration Activities (Subtask 1.01.01) will include:

- Reviewing the Work Assignment (WA) technical status;
- Assisting the project manager in resource identification and scheduling;
- Statusing and monitoring the WA budget and actual expenditures on a monthly basis;
- Maintaining the program files for this project;
- Responding to questions from the EPA Project Officer and Contracting Officer; and
- Preparing the monthly vouchers for this WA.

Project Administration Activities (Subtask 1.01.02) will include:

- Preparing the monthly progress report and invoice;
- Reviewing weekly financial reports, projecting estimates to complete and estimates at completion for active tasks;
- Reviewing and updating the project schedule;
- Communicating with the EPA WAM;
- Preparating staffing plans; and
- Project file maintenance

3.1.2 Attend Scoping Meeting (Subtask 1.02)

A scoping meeting was held on 6 December 2005 at EPA's Office in New York, NY. Minutes summarizing the scoping meeting were prepared and submitted to the EPA on 8 December 2005.

3.1.3 Conduct Site Visit (Subtask 1.03)

A site visit was conducted by EPA and TtEC on 24 August 2005, to develop a conceptual understanding of the Site and observe current site conditions.

3.1.4 Develop Draft Work Plan and Associated Cost Estimate (Subtask 1.04)

This work plan has been developed to describe the activities that will be performed by TtEC during the performance of this RI/FS. This work plan includes: the technical approach and a detailed description of each task; a list of key project personnel, a project schedule, and a project organization. The Associated Cost Estimate (Work Plan Budget Estimate) has been submitted under separate cover and consists of the estimated costs and Level of Effort (LOE) hours to complete the tasks described in this work plan. The basis of the estimated costs and hours, the "P-levels," labor costs, other direct costs and total cost for each task/subtask are included in the budget estimate.

3.1.5 Negotiate and Revise Draft Work Plan (Subtask 1.05)

TtEC and EPA will participate in a work plan negotiation meeting to discuss and agree upon the estimated cost and level of effort required to complete the tasks detailed in this work plan. Agreements reached during the negotiation meeting will be included in the Final Work Plan and the Work Plan Budget Estimate will be revised based on the negotiations. This subtask also includes the loading of the revised budget estimate into TtEC's financial monitoring and tracking system.

3.1.6 Evaluate Existing Data and Documents (Subtask 1.06)

A review of the Site background documents provided by EPA was performed for the preparation of this Work Plan. These documents included: HRS Documentation (February 2004) and "Final Remediation Investigation Report, Grove Cleaners Site," TAMS Consultant and GZA Environmental, February 2002: Other documents reviewed included: Sanborn Maps and aerial photography.

3.1.7 Quality Assurance Project Plan (Subtask 1.07)

A site-specific QAPP will be prepared as an appendix to the Final Work Plan, and will be submitted to EPA within 21 calendar days after receipt of EPA's final comments on this Draft Work Plan. The QAPP will be prepared in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) (Final, Version 1, March 2005), the approved TtEC RAC II Program Generic Quality Assurance Project Plan (TtEC, 2006a) and other EPA Region 2 guidance and/or procedural requirements. The QAPP will describe the project objectives and organization, functional activities, field activities and protocols, and quality assurance/quality control (QA/QC) protocols used to achieve the desired Data Quality Objectives (DQOs). Draft and Final QAPPs will be prepared. Information to be provided in the QAPP includes:

- Project sampling objectives;
- A project organization chart;
- Standard Operating Procedures (SOPs) for the field investigation activities, including required sampling equipment;

- Quantitative and/or qualitative criteria to evaluate achievement of objectives;
- Sample documentation and chain-of-custody procedures;
- Sample handling, preservation, and shipment procedures;
- A table of sample numbers, matrices, locations, collection frequencies, and analytical methods;
- A breakout of samples to be analyzed via the EPA Contract Laboratory Program (CLP), the EPA Region 2 Division of Environmental Science and Assessment (DESA) Laboratory, and other Non-CLP providers;
- Calibration and maintenance procedures and requirements;
- QA/QC protocols for MIP investigations;
- QA/QC protocols and sample requirements;
- Requirements for project assessments/audits;
- Procedures for data reduction, validation, and reporting;
- Description of report deliverables; and
- Corrective action procedures.

3.1.8 Health and Safety Plan (Subtask 1.08)

A site-specific HASP will be prepared and provided as Appendix B to the Final Work Plan. The HASP will provide health and safety protection for field personnel in accordance with 29 Code of Federal Regulations (CFR) 1910.120 (l)(1) and (l)(2), 40 CFR 300.150, and other applicable codes and guidelines. The HASP will specify employee training, protective equipment, medical surveillance requirements, SOPs, and a contingency plan in accordance with 29 CFR 1910.120 (l)(1) and (l)(2). The HASP will also address field activities including but not limited to site reconnaissance, surveying, collection of environmental samples, Investigation Derived Waste (IDW) disposal, mobilization/ demobilization. In addition, the HASP will include a Community Action Monitoring Plan. The HASP will be updated, as warranted, if new conditions or tasks arise during the performance of field activities. A Field Change Request Form will be used to make modifications, based on site-specific conditions, to the HASP. Draft and Final HASPs will be prepared that will be based on EPA comments.

3.1.9 Non-RAS Analyses (Subtask 1.09)

Non-Routine Analytical Services (Non-RAS) will be required for this project for the following analyses: on-site groundwater screening using a field gas chromatograph (GC); water quality/natural attenuation parameters for groundwater; TOC and grain size for soil; and volatile organics in air samples. These analyses will be procured in accordance with the EPA Technical Memorandum "Procuring Analytical Services Through the DESA Laboratory and the CLP," (EPA, 2003a); the approved TtEC RAC II Program Delivery of Analytical Services Plan (TtEC, 1998); the TtEC RAC II Program Quality Management Plan (TtEC, 2006b); and the site-specific QAPP prepared under Subtask 1.07 (see Section 3.1.7). A brief summary of the Delivery of Analytical Services Plan will be provided as an attachment to the QAPP.

The on-site field GC screening will be performed by a TtEC chemist; see Section 3.3.2.2.2, Hydropunch Groundwater Sampling. The vapor samples for volatile organic analysis will be, if possible, requested from an EPA National Non-RAS contract laboratory. The other Non-RAS analyses listed above may be able to be provided by the EPA Region 2 DESA Laboratory in Edison, New Jersey. However, if either the EPA National Non-RAS contract laboratory and/or the DESA Laboratory is unable to accommodate these analytical services, or a portion thereof, at the time of the field investigation, a subcontracted laboratory will be required.

If a subcontract laboratory is required, TtEC will implement its EPA-approved laboratory quality assurance program. The program contains information on subcontractor laboratory oversight activities, including periodic performance evaluation sample analyses, operational audits, and corrective action procedures. During procurement of the subcontractor laboratory, TtEC will review and evaluate the Laboratory Quality Assurance Plans (LQAPs) submitted by the laboratories in response to the Laboratory Procurement SOW. The LQAPs will include information on sample preparation and analyses, laboratory chain of custody, data deliverables, quality control requirements, certifications, and results of performance evaluation analyses.

3.1.10 Meetings (Subtask 1.10)

TtEC will attend progress meetings during which the EPA will be informed of the status and progress of the project. For each of these meetings TtEC will prepare an agenda for the meeting, a short presentation of the work performed to date, and handouts, figures, or photographs, as warranted. After each meeting, the TtEC Project Manager will prepare, and submit to the EPA, draft meeting minutes, briefly summarizing the meeting. The draft meeting minutes will be finalized based on EPA comments. The progress meetings are included in the project schedule.

3.1.11 Subcontract Procurement (Subtask 1.11)

Subcontract procurement activities will be performed in accordance with TtEC's Government Procurement Procedures. These procedures are based on the Federal Acquisition Regulations (FARs) and are the basis of TtEC's Government-approved purchasing system. The following 11 subcontracts will be procured:

- Field Mobilization;
- Fence Installation;
- Geophysics;
- Drilling (including direct push, hollow-stem auger and mud rotary);
- Surveying;
- Soil gas survey;
- Non-RAS Analytical Laboratories (3);
- IDW Transportation and Disposal; and
- Microfilming.

3.1.12 Perform Subcontract Management (Subtask 1.12)

TtEC will perform subcontract management activities consisting of:

- Implementing procedures for subcontractor management;
- Monitoring of subcontractor progress and performance;
- Maintaining subcontracting systems and records;
- Issuing subcontract modifications (if warranted);
- Reviewing and approving subcontractor invoices;
- Maintaining subcontract files;
- Coordinating subcontractor activities with EPA; and
- Closing each subcontract.

All on-site subcontractor activities (such as drilling, surveying, soil gas survey, etc.) will be monitored on a daily basis by the TtEC Field Operations Leader and/or Health and Safety Manager, or their designee. Subcontractor activities performed off-site (such as Non-RAS laboratory services, IDW transportation and disposal, etc.) will be managed by the TtEC Project Manager or his designee.

Any changes to a subcontractor's scope of work will be reported to the TtEC procurement representative so that a proper determination can be made as to the subcontractor's entitlement and price. After an evaluation of the change by both TtEC technical and procurement personnel, and receipt of the EPA Contracting Officer's consent (if required), a subcontract modification may then be issued to effect the change. A change of work will not be made without a prior determination of entitlement and price, and subcontract modification.

All subcontractor invoices will be submitted to the TtEC procurement representative for review, approval, and distribution to the Project Manager and others, as appropriate, for their approval. When all approvals are obtained, the invoice will be submitted to the TtEC Accounting Department for payment.

3.1.13 Pathway Analysis Report (Subtask 1.13)

TtEC will prepare a Pathways Analysis Report (PAR) in accordance with OSWER Directive 9285.7-01D-1, dated 17 December 1997 entitled, "Risk Assessment Guidelines for Superfund, Part D" (RAGS Part D) and the Regional Risk Assessor for the Site. The PAR will be prepared in accordance with the aforementioned guidance; however, the focus of the PAR will be TCE, as per the objectives of this Remedial Investigation. Evaluation of COPCs will be an important consideration if COPCs other than TCE are identified during the investigation. The PAR will precede preparation of a Draft Baseline Human Health Risk Assessment (BHHRA) (Task 7.01) for the Site. The PAR will present the methodologies used for the background review, data evaluation, exposure assessment, toxicity assessment, and associated RAGS Part D tables required for the Draft BHHRA. Preparation of the Draft BHHRA, which is contingent upon approval of the PAR by EPA Region 2, is discussed in detail in Section 3.7.1 of this Work Plan. The following subsections discuss the components of the PAR.

Background Review

The background review will summarize the site history, current and future land use, and present the BHHRA Site Conceptual Model for the Site.

A site reconnaissance will be conducted and will include field reconnaissance and visual surveys to identify potential environmental migration pathways, potential human receptors, possible human exposure routes, and site conditions relevant to their assessment. The Site Reconnaissance is discussed in greater detail in Section 3.3.1. Information collected during the Site Reconnaissance activities will be incorporated into the PAR.

RAGS Part D Table 1 in the PAR entitled "Selection of Exposure Pathways," will present the BHHRA Conceptual Site Model that will be developed based on the background review and site reconnaissance work. Table 1 will identify the scenario time frame, exposure medium and exposure point, receptor populations and ages, and rationale for selecting or excluding an exposure pathway. Based on a preliminary review of available information, 8 exposure areas and 6 possible source areas will be evaluated. Exposures will be evaluated separately for each exposure area or source area. The exposure areas are indicated to be light industrial properties with occupied buildings. Exposures to commercial workers or residents will be evaluated at the 8 exposure areas, in accordance with the PAR as appropriate. Exposure to indoor air will be the primary focus of the assessment at these locations. At the 6 source areas, exposure to commercial workers, construction workers, utility workers, and residents will be evaluated, as appropriate. Exposures to surface soil and subsurface soil and groundwater will be the primary focus at these locations.

Data Evaluation
TtEC will review available information on the contaminants present in all soil, groundwater, soil gas, indoor air and ambient air in each exposure or source area as applicable and will identify the major Chemicals of Potential Concern (COPCs). Information to be used in identifying COPCs will be derived from site-specific findings made during the site reconnaissance and analytical results acquired during the RI.

Once the analytical data are compiled, a multi-step screening process will be used to identify the COPCs to be retained for the BHHRA. The specific steps followed in this process are described in EPA RAGS Part A (EPA, 1989) and presented below. Only validated data as defined in RAGS Part A (EPA, 1989) and the "Guidance for Data Useability in Risk Assessment (Part A)," (EPA, 1992b) will be used in the BHHRA.

The COPC selection process will be conducted as follows:

- **Comparison to Risk-Based Screening Criteria** - The maximum concentration of each chemical in each exposure or source area will be compared to a risk-based screening value. Chemicals whose maximum detected concentration (MDC) is below the screening value will be eliminated from the COPC list. Screening toxicity values will be derived from the EPA Region 9 Preliminary Remediation Goals (PRGs) for residential-use soil and tap water for groundwater (EPA, 2004a). The PRGs will correspond to the screening toxicity values associated with a 10^{-6} risk for carcinogenic effects or a noncarcinogenic hazard index of 0.1. (Note: Using 10 percent of the screening criteria for noncarcinogens (i.e., HI of 0.1) is recommended by EPA to protect against underestimation of noncancer hazards from multiple noncarcinogens (EPA, 2004b). EPA's "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils" (EPA, 2002) will also be considered in screening COPCs.

- **Frequency of Detection** - Constituents occurring at a low frequency of detection (less than 1 detection in 20 samples) will be eliminated from the COPC list in accordance with Section 5.9.3 of RAGS Part A guidance (EPA, 1989). If a constituent is eliminated from the COPC list on this basis, the rationale will be documented in the RAGS Part D Table 2 as either infrequently detected but below the screening level (IFD-BSL) or infrequently detected but above the screening level (IFD-ASL).

- **Known Human Carcinogens** - A chemical classified as a known human carcinogen (weight-of-evidence classification A) will be retained as a COPC, regardless of concentration or frequency of detection. EPA's weight-of-evidence classification system will be discussed in greater detail.

- **Essential Nutrients** - Naturally occurring elements considered essential for human nutrition (calcium, magnesium, potassium, and sodium) will be eliminated from the COPC list in accordance with RAGS Part A guidance (EPA, 1989).

- **Chemicals without Available Toxicological Data** - If there is no screening toxicity value for a detected chemical, that chemical will be retained as a COPC.

The resulting COPCs will be summarized in RAGS Part D Table 2 titled "Occurrence, Distribution, and Selection of Chemicals of Potential Concern." The following information will be included in the table: minimum and maximum concentrations, data qualifiers, units, detection frequency, range of detection limits, concentration used for screening, background value, screening toxicity value, potential Applicable or Relevant and Appropriate Requirement (ARAR)/To Be Considered (TBC) value, whether or not that chemical was selected as a COPC for this risk assessment (COPC flag), and the rationale for the chemical's deletion or selection.

Exposure Assessment

An exposure assessment will be performed to identify potentially exposed human populations and human exposure routes, and calculate magnitudes of actual or potential human exposures based on contaminant concentrations, frequency of occurrence, and duration of exposure. The exposure assessment addresses each potential current and future exposure pathway, focusing primarily on surface soil, subsurface soil, groundwater, and air at the exposure and source areas and shown in RAGS Part D Table 1.

Exposure point concentrations (EPCs) will be calculated for each exposure medium associated with each exposure and source area, as appropriate. The EPCs will be presented in RAGS Part D Table 3, " Medium-Specific Exposure Point Concentration Summary." The EPCs will represent the lesser of the maximum detected concentration or the calculated upper confidence limit (UCL) for the arithmetic mean concentration (if possible). The UCL will be calculated using the ProUCL software (EPA, 2004c), as recommended by EPA Region 2. The data distribution for each COPC will be determined and a UCL selected based on the recommendation of the software.

The exposure parameters for the proposed scenarios will be presented in RAGS Part D Table 4, "Values Used For Daily Intake Calculations." They will represent EPA's Reasonable Maximum Exposure (RME) and central tendency (CT) scenarios in order to facilitate risk management issues. Relevant equations for assessing intakes and exposure factors will be obtained from RAGS Part A (EPA, 1989), Exposure Factors Handbook (EFH) (EPA, 1997a), and EPA's most recent guidance on assessing risks to dermal exposures presented in RAGS Part E (EPA, 2004d). CT scenarios will be evaluated if the risk estimates exceed EPA's acceptable target risk criteria. The RME case will generally be based on default exposure factors and 95th percentile exposure values from the EFH (EPA, 1997a). The CT case will generally be based on the standard default exposure factors (EPA, 1991) and, where appropriate, the 50th percentile exposure values from the EFH (EPA, 1997a). Bioavailability of all constituents will be assumed to be 100 percent.

Fate and transport modeling will include modeling particulate and volatile emissions from soil and modeling VOC release during showering. The fate and transport model(s) to be used will be determined as additional site reconnaissance information and data become available. The screening level indoor air vapor intrusion pathway assessment will not involve site-specific transport modeling of specific buildings using the Johnson and Ettinger Model and property-specific site input parameters. The assessment will be conducted using appropriately selected attenuation factors determined using EPA's semi-site specific approach in consideration of depth to the subsurface contamination and dominant soil type. Each fate and transport model used to support the BHHRA will be identified and described in the PAR.

Toxicity Assessment

The COPCs will be evaluated based on their intrinsic toxicological properties as either non-carcinogens (i.e., systemic toxicants) or carcinogens. Quantitative toxicity indices that describe the relationship between exposure resulting in a calculated dose (chemical intake), and the likelihood of that exposure to result in adverse health effects (response), will be selected for use in the BHHRA. For non-carcinogens, the toxicity indices are reference doses (RfDs) or reference concentrations (RfCs). For carcinogens, the toxicity indices are cancer slope factors (CSFs). Toxicity data for the selected COPCs will be obtained from the EPA with the following hierarchy of sources: the Integrated Risk Information System (IRIS) (EPA, 2005), EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), and other toxicity values, including the Health Effects Assessment Summary Tables (HEAST) (EPA, 1997b). Chemicals without toxicity values will be forwarded to EPA risk assessors who may submit them to the Superfund Technical Support Center (STSC) of the National Center for Environmental Assessment (NCEA) for recommendations on possible provisional and surrogate values.

Oral RfDs and CSFs are typically based on administered dose (i.e., oral or inhalation exposure routes). The methodologies for evaluating dermal absorption are based on an estimation of absorbed dose. Therefore, for evaluating dermal exposures, oral toxicity factors will be adjusted to represent an absorbed rather than an administered dose. Consistent with the EPA guidance on dermal risk assessment (EPA, 2004d) and in consultation with EPA Region 2, an adjustment will be made when the following conditions are met:

- The toxicity factor from the critical study is based on an administered dose; and
- A scientifically defensible database demonstrates that the gastrointestinal absorption of the chemical is significantly less than 100% (i.e., 50%).

If these conditions are not met, no adjustment will be made and a default value of complete (i.e., 100%) absorption will be assumed.

3.2 Task 2 - Community Relations

TtEC will provide community relations support to EPA throughout the RI/FS in accordance with "Community Relations in Superfund - A Handbook," January 1992 (EPA, 1992a).

3.2.1 Community Interviews (Subtask 2.01)

In preparing for community interviews, TtEC will review background documents and make arrangements for, and provide technical support to, EPA during the conduct of community interviews with appropriate government officials (federal, state, county, township, city, etc.), environmental groups, local broadcast and print media, and any other relevant individuals or groups in person or via telephone. Draft interview questions will be prepared and submitted to EPA for review and comment. Final interview questions will incorporate comments on the draft interview questions made by the EPA. TtEC will assist EPA during the interviews and will summarize information gathered for inclusion in the Community Relations Plan (CRP).

3.2.2 Community Relations Plan (Subtask 2.02)

TtEC will develop a Draft and Final CRP that will include the following elements:

- Overview of Community Relations Plan;
- Capsule Site Description (site background including location, description, and history);
- Community Overview (community profile, chronology of community involvement, and key community concerns);
- Community Involvement Program Highlights (general objectives);
- Community Involvement Program Techniques (planned activities and schedule);
- Attachment A - Contacts and interested parties (mailing list);
- Attachment B - Information Repositories and Public Meeting Locations (name and address of the information repositories and public meeting facility locations);
- Attachment C - A list of acronyms; and
- Attachment D - A glossary.

3.2.3 Public Meeting Support (Subtask 2.03)

Community relations support will be provided for two public meetings/availability sessions/open houses (public meetings) to be held in a location to be specified in the vicinity of the Site. TtEC will perform the following activities:

- Arrange the two public meetings, including the selection and reservation of a meeting space as directed by the EPA;
- Provide recording and/or stenographic support, including reserving a court reporter, for the two public meetings. A full-page original and a "four on one" page copy (along with a CD) of the transcript of the meeting will be provided to the EPA, with additional copies placed in the information repositories as required. The CD will be provided in Word Perfect 9.0 or the most recent EPA-approved word processing format;
- Prepare one power point presentation up to 15 draft overhead transparencies, 10 slides and 150 handouts and subsequent final versions of these materials that incorporate EPA comments for each of two public meetings;
- Attend two public meetings and prepare draft and final meeting summaries; and
- Prepare and maintain a sign-in sheet for each public meeting.

3.2.4 Fact Sheet Preparation (Subtask 2.04)

Four information letters/updates/fact sheets (herein referred to as "fact sheets") will be prepared in accordance with the approved CRP for the Site. These fact sheets will each be four pages in length with three illustrations. TtEC will write, edit, design, and lay out and photocopy the draft fact sheets based on information provided by the EPA. The draft fact sheets will be provided to EPA for comment. EPA's comments will be incorporated in a subsequent final version of the fact sheets. TtEC will provide 150 copies of each fact sheet to EPA. Mailing labels will be attached to the final fact sheets prior to delivery to EPA, based on addresses provided by EPA. EPA will be the originator of any mailing of information to the community.

3.2.5 Proposed Plan Support (Subtask 2.05)

TtEC will assist EPA in the technical preparation of the draft and final Proposed Plan. The plan will summarize: 1) environmental conditions at the Site; 2) alternatives analyzed in the FS; 3) the preferred remedy and rationale for that preference; 4) any waivers to cleanup standards; and 5) any formal comments received from the support agency. TtEC personnel will provide technical clarification for discussions of the selected remedy and/or remedial alternatives, as identified in the FS. TtEC will also prepare graphic materials and/or maps that may be included in the Proposed Plan. The graphics will be based on graphics contained within the FS. The Proposed Plan will be published in 8.5 x 11 inch size format (comprised of 11 x 17 inch paper folded in half.) It will consist of a card stock cover (EPA may choose from a number of available colors) and will contain approximately 24 double-sided pages including graphics. The plan will be bound in a book-type format using staples placed along the central spine. TtEC will produce 275 copies of the final Proposed Plan for distribution by EPA.

3.2.6 Public Notices (Subtask 2.06)

Three newspaper announcement/public notices will be prepared, two to announce each of the two public meeting/site tours and a third to be prepared and published at the discretion of the EPA WAM. Each of the three notices will appear in two large circulation newspapers and one will appear in a local small newspaper. The notices will be submitted to EPA for review prior to placement in the newspapers.

- EPA will notify TtEC at least 28 days prior to the date of each public meeting TtEC will: develop a draft notice (to be provided within 5 business days after receipt of the request for the notice); receive comments from EPA (to be provided within 2 business days of receipt of the draft notice); incorporate comments into a final notice (within 2 days of receipt of EPA's comments); and then reserve space in which the notice will appear one time in two newspapers (depends upon individual newspaper deadlines - generally requires 1 to 2 weeks advance reservation). Each notice will appear in the newspapers approximately one week prior to each respective meeting date.

- EPA will notify TtEC at least 28 days prior to the date when EPA wishes the third notice to appear in the newspapers. TtEC will: develop a draft notice (to be provided within 5 business days after receipt of the request for the notice); receive comments from EPA (to be provided within 2 business days of receipt of the draft notice); incorporate comments into a final notice (within 2 days of receipt of EPA's comments); and then reserve space in which the notice will appear one time in one small-distribution newspaper (depends upon individual newspaper deadlines - generally requires 1 to 2 weeks advance reservation. Small-distribution newspapers often published weekly.)

- TtEC will provide three copies of each public notice will be provided to EPA 14 days before public meetings/events.

3.2.7 Information Repositories (Subtask 2.07)

TtEC will provide information to the EPA Community Involvement Coordinator (CIC) to update the information repositories. The CIC will ensure the repositories are updated. There will be two repository updates. EPA will maintain the Administrative Record. The two updates will occur following: 1) completion of the Final Remedial Investigation Report; and 2) completion of the Draft Feasibility Study Report and Proposed Plan.

3.2.8 Site Mailing List (Subtask 2.08)

The mailing list provided by EPA for the Site will be updated twice during the duration of the project and will contain 250 entries. TtEC will provide EPA with a copy of the mailing list on CD. TtEC will provide mailing labels to EPA or will affix the labels to materials to be mailed (e.g., fact sheets) and will then provide the labeled materials to EPA for mailing. Two copies of the site mailing list will be provided to EPA 14 days after the approval of the Final CRP. EPA will be the originator of any information to the community.

3.2.9 Responsiveness Summary Support (Subtask 2.09)

TtEC will prepare a responsiveness summary that presents a concise and complete summary of significant oral and written comments that EPA receives from the public during the public comment period of the Feasibility Study and Proposed Plan. TtEC will compile, organize, and summarize all written and verbal comments received during the public comment period and assist EPA in developing responses to 75 technical comments. Policy-oriented comments will be addressed by EPA.

Following receipt of all public comments from EPA (generally the last day of the public comment period), TtEC will submit a Draft Responsiveness Summary to EPA for review. The Final Responsiveness Summary will be submitted following receipt of EPA's comments on the Draft Responsiveness Summary.

3.3 Task 3 - Field Investigation

The field program will consist of a Site Reconnaissance (Task 3.01) and a Field Investigation (Tasks 3.02 through 3.08). Field activities will begin after access to properties where the activities will be conducted has been arranged by EPA. Based on the data obtained in the field effort described in this section, TtEC will make a recommendation to EPA as to whether or not additional field work (optional phase two field effort) will be necessary.

3.3.1 Site Reconnaissance (Subtask 3.01)

The purpose of the Site Reconnaissance is to obtain information to assist in the execution of the field investigation and will consist of two elements, a pre-field portion and a field portion. Prior to entering the field, the following tasks will be performed:

- A base map, which will consist of an aerial photograph and an overlay of tax map information will be prepared;
- Information regarding property ownership and utility right-of-ways will be obtained from the local municipalities and Nassau County;
- A desk-top well inventory, using information provided by Nassau County and results of prior field investigations; and
- Properties requiring access to complete the field investigation will be identified and tabulated.

Once property access has been obtained by EPA, mobilization, a well inspection, the ecological resources reconnaissance, utility mark-outs, and geophysical surveys of the sampling locations will be conducted.

3.3.1.1 Site Surveys (Subtask Activity 3.01.01)

The base map will be expanded and revised as necessary by a New York State licensed survey subcontractor utilizing industry standard methods (GPS, aerial photography etc.). Because the Site is approximately eight square miles in area, multiple maps will be prepared.

The local tax assessor's office will be contacted and an internet search conducted to obtain property tax maps for the Site. The tax map information and utility right-of-way information will be overlain on an aerial photograph. The resulting figure will be the base map, and will be used to identify properties to which EPA will obtain access for the conduct of the field investigation.

3.3.1.2 Well Inventory (Subtask Activity 3.01.02)

An assessment of existing monitoring wells and select off-site residential, commercial, and water supply wells, will be conducted to evaluate their suitability, both conceptually and technically, for the field investigation activities. The documentation (e.g., well construction diagrams) for the existing monitoring wells, water supply wells and residential wells, as well as the locations of the wells will be reviewed to determine their suitability for field investigation activities. An inventory of existing monitoring wells and water supply wells (public or private) that lie within the Site will be prepared. This inventory will be based upon a review of documents obtained from EPA, discussions with officials and file reviews at the county health department, and the results of an EDR well search. The availability of screened interval, depth information, well location, and accessibility will be evaluated.

3.3.1.3 Property Access (Subtask 3.01.03)

Tax maps of the Site area will be obtained, as described in Section 3.3.1.1. Locations for field activities will be identified, and ownership of those properties will be determined. TtEC will provide to EPA a list of properties for which access is needed for field portion of the Site Reconnaissance and the Field Investigation activities. EPA will obtain access to the properties to facilitate the Field Investigation.

3.3.1.4 Well Inspection (Subtask 3.01.04)

Once access has been obtained by EPA for those properties where potentially useful existing monitoring and water supply wells are located, each well will be inspected to determine its suitability for use in the field investigation. Approximately 36 wells will be inspected. The TtEC inspection will consist of the following tasks:

- Determination of the condition of the well (e.g., damaged, removed, or intact);
- Determination if the well is accessible;
- Measurement of the depth of the well to determine if redevelopment is required; and
- Lowering of a bailer to the bottom of each well to evaluate the integrity (e.g. obstructions or shifted casing) of the casing.

If the wells are found to be in acceptable condition they will be incorporated into the hydrogeological assessment and environmental sampling during the field investigation. If 50 percent of the length of the screened area of a selected well is occupied by silt, the well will be redeveloped during the Field Investigation (Section 3.3.2). The results of the inspection will be documented in a report summarizing well condition and usability.

3.3.1.5 Ecological Resources Reconnaissance (Subtask 3.01.05)

An ecological resources reconnaissance of the Site will be performed using the Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessment (EPA, 1997c and EPA, 1998). The ecological resources reconnaissance effort will include compilation of existing information and a limited field effort. The following subtasks will be performed:

- Desktop identification of the 100-year and 500-year floodplain adjacent to the Site;

- Consultation with federal and state resource agencies to identify the presence of any endangered, threatened, or species of special concern;

- A qualitative description of vegetation covertypes present within the site boundaries based on field inspection; and

- A qualitative wildlife survey based upon direct and indirect observations of wildlife within the site area.

The results of the ecological reconnaissance will be used in the screening level ecological risk assessment (Subtask 7.02) and the BERA, if performed (Section 3.7.2.2).

3.3.1.6 Geophysical Survey and Utility Markouts (Subtask 3.01.06)

A mark out (locate) of underground utilities will be performed for boring and monitoring well locations (approximately 152 locations) within the Site, as defined in Section 1.0. The locate will be obtained by requesting a regular locate from the New York Dig Safe center. A regular locate is performed when intrusive activities will begin no sooner than three business days after the request is made and no later than ten business days after the request is made. TtEC will obtain a confirmation number documenting the request. The locate is valid for 30 business days. A new locate request must be made prior to the expiration of the initial request when intrusive activities are planned that will continue beyond the 30 business day approval. The Dig Safe center notifies appropriate utility companies to mark the location of all their known utilities around boring and monitoring well locations.

A surface geophysical survey will be conducted at all soil boring locations. Prior to initiation of this survey, mobilization activities will be performed, as described in Section 3.3.2.1.1. The primary objective will be avoidance of subsurface utilities during drilling activities. A ten-foot radius around each soil boring location will be surveyed and any utilities detected will be marked out. The following list provides the three methods that will be used to clear each drilling location:

- Precision Utility Locator;
- Ground Penetrating Radar; and
- Time Domain Electromagnetic Induction (TDEMI) all metal detectors.

The geophysical survey for utility clearance will be conducted in accordance with State of New York and industry standards and guidelines such as the proposed ASCE Standard for the Clearance and Depiction of Existing Subsurface Utilities.

The following uniform color code, as identified in 16NYCRR Part 753 Section 4.7, will be utilized for staking and marking used to designate the location of underground facilities and excavation sites:

- Yellow - Gas, oil, petroleum products, steam, compressed air, compressed gases and all other hazardous liquid or gaseous materials except water;

- Red - Electric power lines or conduits;

- Orange - Communication lines or cables, including but not limited to telephone, telegraph, fire signals, cable television, civil defense, data systems, electronic controls and other instrumentation;

- Blue - Water; and

- Green - Storm and sanitary sewers including force mains and other non-hazardous materials.

Cultural features, debris, or the proximity of the drilling to utilities may result in complicated geophysical signatures for a number of locations, making interpretation difficult. Therefore, in those situations, soil boring locations will be cleared by soft-dig techniques to at least 4 feet.

The results of the geophysical survey, including a description of the data collected, will be included in the RI Report.

3.3.2 Field Investigation (Subtasks 3.02 through 3.08)

The Field Investigation will consist of a hydrogeological assessment, a soil boring program, and field sampling to identify sources of contamination in groundwater, determine fate and transport of site contaminants, support the ecological and human health risk assessments, and support the FS. Oversight of field activities will typically be conducted by one TtEC employee, unless multiple activities are conducted at separate locations. The Field Investigation is designed to provide a systematic program to use real-time data and field screening techniques, which allows critical decisions to be made in the field, with the involvement of EPA. This program is consistent with the Triad approach.

The hydrogeological assessment will consist of Membrane Interface Probe (MIP) screening, hydropunch sample collection, the installation of monitoring wells, groundwater monitoring, and hydraulic testing. Soil borings will be installed at potential source areas and background locations to collect data to be used for the human health and ecological risk assessments and to identify source areas. Boring logs will be provided to the Work Assignment Manager (WAM).

DQOs will be developed during the preparation of the QAPP. Screening data for parameters that are less critical to the project objectives will be generated by rapid, less precise methods of analysis and will achieve a data use for site and monitoring. The Triad approach will include the collection of field screening data (i.e., MIP, FID, PID, field GC, and water quality meter) that will not be used for the quantitative risk assessment. These data will be used to determine subsequent sampling locations and intervals and for health and safety monitoring. Definitive laboratory analytical data generated during the field investigation will be used to support project objectives (listed below), ecological and human health risk assessments, and remedial alternative screening.

Specifically, the data will be used to:

- Identify sources of the TCE-dominant groundwater plume;
- Determine the current and potential future human health and ecological risk posed by the sources of contaminated groundwater, soil and soil gases;
- Identify the most appropriate remedial alternative for the identified sources; and
- Obtain sufficient off-site laboratory data (i.e., greater than or equal to 95 percent complete) to use in conjunction with screening data to support the identification of the source areas.

3.3.2.1 Mobilization and Demobilization (Subtask 3.02)

3.3.2.1.1 Mobilization (Subtask 3.02.01)

Mobilization will be required for both the Site Reconnaissance and the Field Investigation. During mobilization, all the equipment and materials necessary for that portion of the field program will be procured and transferred to the Site. The necessary personnel, equipment and materials for conducting the field activities will be assembled during mobilization.

During mobilization, installation and setup of utilities and temporary facilities (i.e., site trailer, phone, electric, bathroom facilities, etc.), as well as setup of a temporary IDW storage area, will occur. It is currently anticipated all site mobilization and staging will occur in an area in the vicinity of the Site to be selected by EPA and TtEC. Temporary fencing will be installed. Additional details on the mobilization area, including health and safety zones and trailer locations, will be presented in the Site-specific QAPP and HASP. Mobilization will consist of the following:

- Prepare a list of required field equipment;
- Prepare requisitions to lease or purchase equipment, as necessary;
- Prepare requisitions to purchase expendable field supplies, as necessary;
- Set-up of Health and Safety Field Files;
- Arrange delivery, storage and setup of all equipment (as necessary);
- Coordinate and oversee mobilization/demobilization subcontractor (includes installation and setup of utilities, temporary facilities, and a temporary fence);
- Receive field activity and health & safety equipment;
- Perform general site preparation/organization;
- Conduct initial Health & Safety briefing for site personnel; and
- Set-up field computer equipment.

3.3.2.1.2 Demobilization (Subtask 3.02.02)

Upon completion of the Field Investigation, demobilization will occur. The following activities will be performed:

- Complete site restoration activities, including temporary fence removal;
- Arrange for the transportation and disposal of wastes, including IDW, from the Site;
- Return rental equipment;
- Discontinue garbage disposal, electric and telephone services;
- Remove sanitary facilities;
- Arrange for removal of the trailer;
- Coordinate efforts of mobilization/demobilization subcontractor (includes removal of utilities and temporary facilities);
- Demobilize field and computer equipment; and
- Perform site restoration and cleanup activities.

3.3.2.2 Hydrogeological Assessment (Subtask 3.03)

The hydrogeological assessment will include MIP screening, downhole geophysics, groundwater elevation measurement, hydraulic testing, and the installation of 18 monitoring wells (see Subtask 3.03.03) to supplement the existing monitoring well network. The hydrogeological assessment also includes groundwater sampling and analysis, as described in Section 3.3.2.4.3, Groundwater Sampling. These activities, with the exception of groundwater elevation measurement and groundwater sampling, will be performed by a subcontractor and will be overseen by a TtEC geologist.

The purpose of the hydrogeological assessment is to identify sources of the TCE-dominant groundwater plumes, to characterize groundwater contamination, to evaluate risks to the environment and to develop remedial alternatives for mitigation of source areas.

The area currently suspected to be impacted by the groundwater plume (i.e. site boundary) and proposed sample locations are shown on Figure 3-1. The locations presented are tentative and will be finalized based on the data obtained during the MIP/hydropunch groundwater sampling phase described in Section 3.3.2.2.2.

3.3.2.2.1 Membrane Interface Probe Screening (Subtask 3.03.01)

A direct-push MIP investigation will be conducted to determine potential sources of TCE to the groundwater. The MIP data will be used to further evaluate subsurface conditions and target sampling intervals for discrete groundwater sampling. The direct-push investigation will be conducted using MIP in conjunction with an electric conductivity (EC) probe. The EC probe will provide real-time stratigraphic data to supplement the MIP data. The MIP system provides real-time, *in situ,* qualitative borehole logging data utilizing an electron capture detector (ECD), a flame ionization detector (FID) and a photoionization detector (PID) to determine the presence of VOCs in the subsurface. A dipole array is built into the MIP probe and collects data on the soil type encountered. The EC of the soils reveals differences in grain size, and salinity. The EC is capable of distinguishing sands, silty sands, silts, and clays. The vertical profile will be used to map specific soil units and select locations that have higher permeability or water saturation allowing for easier water sampling. Therefore, soil stratigraphy at each borehole location and the relationship of this stratigraphy to the contaminant plume can be assessed in the field in real-time. Reporting in the field will consist of 3D visualization and mapping of the contaminant data, both vertically and horizontally.

MIP technology will be utilized at 98 locations along 11 transects to provide real-time field data. This will allow for tracking the source(s) of the plume and for more precise determination of groundwater sampling intervals and monitoring points (Figure 3-1). The data set will be maintained in real-time, facilitating the Triad approach, and allowing the project team access to up-to-date information for critical on-site decisions. Final determination of each MIP sampling location will be determined in the field by consideration of the existing screening data, and in consultation with EPA.

MIP is a semi-quantitative screening tool for the delineation of volatiles such as chlorinated solvents and is capable of distinguishing these associated contaminants from petroleum hydrocarbons. Diffusion occurs due to a concentration gradient between the contaminated matrix and a clean carrier gas directly behind the membrane. The carrier gas sweeps behind the membrane and transports the contaminants to the gas phase detectors at the surface. The FID is most responsive to straight-chained hydrocarbons (methane and butane), the PID is most responsive to aromatic hydrocarbons such as BTEX compounds, and the ECD is used for chlorinated compounds (TCE, PCE). By assessing the relative responses of the three detectors it is often possible to estimate the general chemical composition of the plume.

VOCs can be detected in groundwater and soil, using MIP technology including the vapor phase, adsorbed phase, and dissolved phase. The membrane is semi-permeable and is comprised of a thin film polymer impregnated into a stainless steel screen for support. The membrane is placed in a heated block attached to the probe. The block is heated to approximately 100 to 120°C, thus accelerating the diffusion of VOCs through the membrane.

The MIP will be driven into the subsurface using a direct-push rig. The MIP/EC probe will be advanced through unconsolidated material to a depth of no more than 200 feet bgs. Thirty-two of the MIP borings will be advanced to 200 feet bgs, 33 will be advanced to 100 feet bgs, and 33 will be advanced to 60 feet bgs. The resulting borehole logs will record the following information:

- Speed of penetration within the geological unit
- The changes in the EC within the subsurface
- The change in temperature
- PID response
- FID Response
- ECD response

The resulting data will be used to determine the appropriate intervals for subsequent direct-push groundwater sampling (see Figure 3-2), and to correlate the subsurface stratigraphy beneath the Site. The detector information and electrical conductivity of the soil will be entered into an on-site computer and graphed at the end of each day.

3.3.2.2.2 Hydropunch Groundwater Sampling (Subtask 3.03.02)

Hydropunch groundwater sampling will be conducted to identify potential sources. As part of the Triad approach, the rationale for selecting the hydropunch groundwater sampling intervals will be based primarily on the MIP/EC data. Specifically, the MIP data will be used to target groundwater sampling at the intervals of highest contamination. Hydropunch groundwater samples will also be collected at those locations where MIPs data does not indicate contamination, immediately below the water table, to verify that no contamination is present. Therefore, a minimum of one groundwater sample will be collected from each of the 98 direct-push MIP locations. Samples will be collected from a minimum of 60 feet and a maximum of 200 feet bgs. The MIP approach is to advance the MIP at locations along a transect. Groundwater samples will be collected from a depth corresponding to the highest measurable VOC response detected by the MIPs. Based on the decision matrix for hydropunch sample intervals, (Figure 3-3), there will be approximately 196 hydropunch groundwater samples collected. Table 3-1 provides a summary of the proposed sample program and the rationale for sampling the respective media. The hydropunch groundwater samples will be analyzed for VOCs on-site by a TtEC chemist using a field GC. Twenty-five percent, or approximately 49, of these samples will be split and sent to the RAS laboratory for analysis.

Groundwater sampling will be performed using a truck-mounted hydraulic hydropunch system. The hydropunch sampling probe will be advanced to the selected sample depth. The sampling probe will be comprised of a 1.0- to 1.4-in. outside diameter steel probe with 4-foot slotted screen sections and an attached expendable point.

Upon arrival at the Site, the hydropunch sampler will be decontaminated. At each sample location the hydropunch probe will be advanced to the pre-selected groundwater sampling depth based on the results of the MIP/EC probe investigation. Dedicated sample tubing, with a stainless steel bottom check valve, will be inserted into the direct-push probe to collect each groundwater sample. This process will be repeated for the remaining sampling intervals at each direct-push sampling location using a dedicated Teflon[c] sample tube for each sample. Reusable sampling equipment (such as the stainless steel bottom check valve) will be decontaminated between each borehole. Decontamination liquids will be containerized in 55-gallon U.S. Department of Transportation approved drums and staged on site for waste characterization sampling. The generation of drill cuttings is not expected during the direct-push groundwater sampling.

The groundwater samples will be transported on-ice to the field trailer where they will undergo analyses utilizing the on-site GC as described in Section 3.4.1.

3.3.2.2.3 Monitoring Well Installation (Subtask 3.03.03)

Up to 18 monitoring wells will be installed at potential source areas, identified during Sections 3.3.2.2.1 and 3.3.2.2.2, to evaluate groundwater quality at these locations, and to provide verification of source area contribution to the plume. Monitoring well locations and construction will be decided after consultation with EPA. The wells will be installed to a maximum depth of 400 feet bgs. As part of the Triad approach, the final locations of the wells and depth of wells will be determined in the field, dependant on the findings of the MIP screening and the hydropunch groundwater sampling (see Figure 3-4).

Monitoring well boreholes will be drilled using mud rotary or hollow stem auger methods, dependent upon the depth of the well. Soil samples will be collected by split-spoon sampling at 10-foot intervals until target depth is reached. The subsurface lithology will be logged by a TtEC geologist according the Unified Soil Classification System (USCS) and modified Burmeister methods. In addition, the USGS will be provided the opportunity to conduct geophysical logging of deep monitoring well boreholes prior to well construction.

The monitoring wells will be constructed with black steel riser and stainless steel screen inside the hollow-stem augers. Upon completion of the borehole to the desired depth, the monitoring well will be installed using 2-inch ID, flush joint, stainless steel. All the monitoring wells will be installed with at least 5 feet of 2-inch ID 0.010 inch (No.10) slot stainless steel screen with a bottom cap at the base and 2-inch black steel riser to the surface. The construction will be consistent with the existing monitoring well network. Centralizers will be placed on the riser to ensure that the well is positioned properly in the boring. A slurry of graded sand will be tremied down the annulus of the borehole to an elevation of approximately 2 feet above the top of the screen interval to form a sand pack. A bentonite slurry will be tremied down the annular space to form a 3-foot thick bentonite seal above the sand pack. The remaining annular space will then be tremied grouted with a cement-bentonite grout to within 3 feet of the ground surface.

Monitoring wells will be completed with flush mount protective casings set into concrete. The top of the protective casing will be finished approximately 1 inch above the surrounding grade. All monitoring wells will be developed no sooner than 48 hours and no longer than 2 weeks after completion.

3.3.2.2.4 Groundwater Elevation Measurements (Subtask 3.03.04)

Synoptic groundwater elevation measurements will be collected during each of the two sampling rounds from the 24 existing wells, and the 18 proposed monitoring wells. The first sampling round will occur upon completion of the monitoring well network and the second round will occur sometime in the Summer of 2007. The objective of measuring groundwater elevations is to collect sufficient data to prepare groundwater elevation maps and evaluate flow direction.

Each of the two synoptic groundwater level measurement events will be conducted in one day. All data will be recorded and presented in tabular form. Groundwater elevations will be measured from the surveyed inner casing measuring point using an electronic interface probe. Where no such point exists, (i.e., supply wells) elevations will be measured from a marked point which will be later surveyed.

3.3.2.2.5 Aquifer Testing (Subtask 3.03.05)

Aquifer testing will be conducted upon approval by EPA. The necessity of conducting aquifer testing will be evaluated after monitoring well installation.

Slug Tests

Slug tests will be conducted on the 18 newly installed monitoring wells. The testing will be performed to determine the aquifer characteristics. Slug tests are an in-situ measurement of hydraulic conductivity in the area surrounding the well screen and filter pack. Hydraulic conductivity is a measurement of a porous medium's ability to transmit water with units of distance divided by time.

The slug tests will be performed using a "rising head" test which is performed by removing a volume of water from a monitoring well and recording the recovery of the water level within the well. Following a manual static water level measurement, a pressure transducer and data logger will be placed within the well. The data logger will be programmed to record data on a logarithmic mode. Next, a dedicated, disposable bailer or a slug will be lowered into the well below the static water level. The bailer or slug will remain at this depth until the water level approaches the original static level. To start the test, the data logger is started and the bailer or slug is quickly removed in order to simulate instantaneous change in volume in the well. Time and pressure head measurements are then collected until the water level has recovered to within 90 percent of static conditions.

72-hour Pumping Test

A 72-hour pumping test will be conducted to provide information for potential groundwater modeling efforts and feasibility study. The 72-hour pumping test will be performed according to ASTM Method D4050-91.

A short-term step test will be performed prior to the full-scale aquifer test to determine the optimum pumping rate. Preliminary estimations will be performed to determine the anticipated pumping rate for the selected pumping well. The average hydraulic conductivity obtained from slug tests will be used to calculate the anticipated flow rate from the pumping well. Based on slug test data, an extraction well, sized or aquifer characteristics may be required. Any additional wells or piezometers required for design of the pumping test will be provided to EPA. The step test will be conducted using 3 to 5 steps of various pumping rates based on the calculation results. These rates may need to be adjusted depending on the response of the aquifer.

The pumping test will run for a minimum of 24 hours and an anticipated maximum of 72 hours. If a steady state cone of depression is reached, the test will be terminated prior to the 72 hours. The discharge from the aquifer test will be collected in frac tanks and transported for treatment and disposal. The aquifer recovery will also be monitored until water levels reach 90 percent of their original levels.

Pressure transducers are anticipated to be installed in the pumping well and approximately 10 observation wells. Manual measurements will be made periodically in wells that do not have a transducer in place. The transducer wells will be checked periodically with an electronic tape.

3.3.2.3 Soil Borings, Drilling and Testing (Subtask 3.04)

A soil boring program will be conducted to identify potential source areas. A maximum of 36 direct-push soil borings will be installed. The depth to which soil borings are to be advanced will be determined by the results of the MIPs (see Subtask 3.03.01) and hydropunch screening and their location will be determined in the field.

Three samples will be obtained from each of 36 borings, for a total of 108 subsurface samples. One soil sample will be obtained above the water table and one soil sample will be obtained from below the water table, based on visual examination and headspace analysis of the soil collected as the boring is advanced below the water table. In addition, one sample will be collected from the 2 to 10-foot interval to support the human health risk assessment. The headspace analysis is a field screening technique that consists of analyzing the headspace above an aliquot of a soil sample in a covered glass jar using a FID and/or PID. The soil samples will be submitted for analysis of TCL Organics, TAL Metals, and TOC. Approximately 20 percent of the samples will also be analyzed for grain size.

3.3.2.4 Environmental Sampling (Subtask 3.05)

Environmental sampling will be conducted to identify source areas and provide data for the human health and ecological risk assessments. Soil samples will only be collected at potential source areas, and at background locations to support the risk assessments.

3.3.2.4.1 Surface Soil Sampling (Subtask 3.05.01)

A total of 36 surface soil samples will be collected from 0 to 0.5 foot bgs at 6 locations at each of 6 potential source areas. These data will be used to aid in the ecological risk assessment. Additionally, 36 samples will be collected from a depth of 0 to 2 feet bgs at 6 locations at each of 6 potential source areas, to aid in the human health risk assessment. When no surface cover is present, sampling will commence at the surface. In cases where a surface cover is present, samples will be obtained from the 0 to 2 feet interval immediately below the surface cover material and associated bedding (i.e., gravel road base). The 36 surface soil samples will be submitted for analysis of TCL Organics, TAL metals and TOC. Samples will be collected using decontaminated stainless-steel hand trowels and Encore samplers (a disposable volumetric sampling device).

3.3.2.4.2 Background Soil Sampling (Subtask 3.05.02)

Six surface (0 to 2 feet bgs) and 6 subsurface soil samples (2 to 10 feet bgs or above the water table) will be collected off-site to determine background soil concentrations of various constituents for comparison to on-site levels to be used in the human health risk assessment. When no surface cover is present, sampling will commence at the surface. In cases where a soil cover is present, samples will be obtained from the interval immediately below the surface cover material and associated bedding (i.e., gravel road base). Background soil samples will be submitted for analysis of TAL Metals and TOC. The shallow borings will be completed using hand auger sampling techniques.

Three background ecological soil samples will be collected if the Screening Level Risk Assessment (SLERA) indicates a Baseline Ecological Risk Assessment (BERA) is warranted (samples will be collected from a depth of 0 to 0.5 foot bgs). The samples will be collected using decontaminated stainless steel trowels and encore samplers.

3.3.2.4.3 Groundwater Sampling (Subtask 3.05.03)

The purpose of this sampling is to determine source area contributions to the TCE-dominant plume, characterize the groundwater on the vicinity of the source areas, including natural attenuation parameters, and to provide the basis for developing an effective remedial strategy. Two rounds of groundwater samples will be collected. A total of 24 existing monitoring wells, and 18 newly-installed monitoring wells will be purged in accordance with the EPA Region 2 Low Stress Method. The groundwater samples will be screened in the field for indicator parameters (pH, temperature, specific conductivity, dissolved oxygen, turbidity and Eh) using a flow-through cell.

Groundwater purging operations and subsequent groundwater sampling will be conducted using an adjustable-rate stainless-steel bladder pump or submersible pump equipped with dedicated teflon tubing and a flow-through cell. Prior to sampling, a water level measurement will be recorded using an electronic water level indicator. These measurements are taken cautiously to the extent practicable, in order to cause minimum turbulence to the static water level. After the water level is recorded, groundwater in each monitoring well will be purged. The groundwater purging will be accompanied by the periodic measurement of field indicator parameters, including pH, temperature, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential (Eh) using a flow-through cell attached to the teflon tubing. Once the field parameters are considered to be stabilized within the limits specified in the EPA's Low Stress Method, groundwater samples will be collected directly from the teflon tubing into sampling vials/jars. The purged groundwater and the well headspace will also be field screened using a PID or FID.

Groundwater purging operations and subsequent groundwater sample collection for third-party wells (to be identified during the Site Reconnaissance) will be conducted by purging the well and piping for at least 15 minutes prior to sample collection. If a treatment system is present, purging and sampling of the well will occur from a tap or spigot receiving water prior to any treatment system and/or storage tank, if present. Purging will be conducted at a rate that does not produce turbulent or aerated flow from the tap or spigot. Prior to sample collection, the flow from the tap or spigot will be reduced to between 100 and 250 milliliters per minute. The purged groundwater and well headspace, if applicable, will be field screened using a PID or FID. The monitoring wells will be sampled and analyzed for low concentration Organics, TAL Metals and water quality parameters as described on Table 3-1.

3.3.2.4.4 Sample Location Survey (Subtask 3.05.04)

All soil sample and hydropunch sampling locations and monitoring wells described in this Work Plan will be surveyed and incorporated in the overall site survey. If practical, soil sample location will be surveyed using GPS technology. Sample locations at source areas, surface water, sediment and diffusion bag sample locations, staff gauges and monitoring well locations will be surveyed by a licensed New York State surveyor. Monitoring well locations will be surveyed to the nearest 1.0 foot, and ground surface elevation, outer casing elevation and inner casing elevation will be surveyed to the nearest 0.01 foot. Soil borings will be surveyed to the nearest 1.0 foot, and the soil borings will also have their ground surface elevation surveyed to the nearest 0.1 foot. Survey locations and elevations will be submitted electronically in Lotus format.

3.3.2.4.5 Vapor Intrusion Sampling (Subtask 3.05.05)

Soil gas sampling or vapor intrusion sampling (soil gas sampling, indoor air sampling and ambient air sampling) will be conducted in the vicinity of located sources of contamination. It is estimated that approximately eight properties in the vicinity of 150 Fulton Avenue will be sampled, to be determined during the field investigation. The soil gas sampling will be performed to assess whether VOCs present in the groundwater and soil are a potential health risk as a result of migration upward through the soil and subsequent intrusion into occupied structures where they may be inhaled by the occupants. The specific properties to be sampled will be determined in the field as source areas are located and access is obtained. Details on the specific procedures to be followed during the vapor intrusion sampling will be presented in the QAPP.

At the time of air sampling, property owners/occupants will be requested to provide information on the building (i.e., dimensions, foundation type, etc.), indoor air contaminant sources (i.e., location of storage cans, recent painting, new carpeting, etc.), and other miscellaneous items. This information shall be used to assist in the identification of non-site related sources of indoor air contamination, an shall be recorded either on a form or in the field log book.

Vapor intrusion sampling will be conducted using probes installed below the slab in occupied structures. Two soil gas samples will be collected from one location in each area, for a total of 16 soil gas samples. Soil gas will be collected from two depths, approximately 5 feet and 10 feet bgs.

The samples of soil gas will be withdrawn from the probe using 6-liter Summa® (or equivalent) canisters, which are leak-free, specially treated, stainless steel, pressure vessels that are certified clean by the laboratory. Once filled, the canisters will be shipped to an off-site laboratory for analysis of VOCs utilizing EPA Method TO-15 with Selective Ion Monitoring (SIM). This method will provide the low detection limits for VOCs required to support the analysis of the vapor intrusion pathway and assess potential inhalation risks.

At each of the eight locations, indoor air samples will be collected from a basement or crawlspace. In addition, two outdoor (ambient) air samples will be collected concurrently with the indoor air sampling to assist in the evaluation of the background contaminant levels. Prior to indoor and ambient air sampling, a list of instructions will be sent to the property owners/occupants, providing information regarding the air sampling and requesting that preparations for the sampling be conducted by the owner/occupant at least 48 hours prior to and during the sampling event. A copy of these instructions will be included in the QAPP.

Air sampling will be conducted using 6-liter Summa (or equivalent) canisters. Each canister will be equipped with a flow regulator. Basement/crawlspace samples will be obtained as close as possible to a potential source of vapor intrusion (e.g., crack, sump). Air sampling will be conducted over a 24-hour period. The field personnel will close the valve on the canisters and ship them for analysis of VOCs utilizing EPA Method TO-15 with SIM to obtain the lowest achievable detection limits.

Soil samples will not be collected from the properties to be sampled relative to potential vapor intrusion. Information about the soil type and stratigraphy in each area will be inferred from the borings completed and soil samples collected from nearby locations. Visual observations will be made in support of the vapor intrusion assessment (e.g., the type and extent of the ground cover, the characteristics of the occupied buildings, the presence or absence of basements).

3.3.2.5 Ecological Characterization (Subtask 3.06)

These subtasks are optional and are dependent on the results of the SLERA. These tasks will not be performed unless TtEC is directed by EPA to do so.

Biota/Population Surveys (Subtask 3.06.01)

A biota survey of the cosmopolitan habitats and areas of open space within the Site will be performed. The survey will consist of transect road surveys and discrete point survey techniques. A qualitative roadside survey will performed within the Site to identify ecological receptors (primarily birds and mammals) that inhabit the fragmented open space areas and urban settings present. The roadside surveys will encompass two north to south road survey transects within the Site. Direct visual observations and auditory identifications (for birds only) will be used to document the presence of wildlife within the study area. Tracks, roadside carcasses and middens will be used as indirect evidence to document any species present at the Site. In addition, discrete point surveys will be performed to document wildlife in areas of open space which may offer more significant opportunity for use by wildlife. At each point, an experienced ecologist will visually survey the open space area and record any evidence of wildlife presence or activity. Given that some of the open space appears to be private (i.e., golf courses), a point along the perimeter of the property will be surveyed. For each of the open space areas, four accessible points will be surveyed. The surveys of these areas will consist of visual and auditory observations for wildlife for a 10-minute period at each point. Open space areas to be surveyed could include golf courses, urban parkland, and water recharge basins within the Site. At each point, an experienced ecologist will survey the open space area and record any evidence of wildlife. All data recorded during the road transects and point surveys will be summarized in tabular format and integrated into the Screening Level Ecological Risk Assessment (SLERA) and the Site Conceptual Model for the Site.

Bioassays (Subtask 3.06.02)

Bioassays inclusive of toxicity tests may be proposed for soils at locations with potential exposure to terrestrial ecological receptors. Three surface soil samples from source areas and one background surface soil sample may be assessed for toxicity using the American Society for Testing and Materials (ASTM) methods for assessing toxicity in the earthworm, *Eisenia foetida*. Bulk surface soil samples collected from 0 to 0.5 ft.

interval will be sampled for both TCL and TAL contaminants and TOC. Selection of the sampling locations will be based upon the problem formulation process for the Baseline Ecological Risk Assessment (BERA).

Bioaccumulation Studies (Subtask 3.06.03)

Bioaccumulation studies may be proposed for soils with the potential for exposure to terrestrial ecological receptors. Three surface (0 to 0.5 ft.) soil samples from the source areas of the Site and one background surface soil sample may be assessed for 28 day bioaccumulation potential using the ASTM methods for the manure worm, *Eisenia foetida*. Bulk surface soil samples collected from 0 to 6 inch interval will be subsampled for both TCL and TAL contaminants and TOC before being placed in the exposure chambers. Selection of the sampling locations will be based upon the problem formulation process for the BERA. Following the 28 day exposure period, the worms will be harvested and sampled for body burden concentrations for percent lipids and bioaccumulating contaminants of potential ecological concern (COPECs) identified from the results of the SLERA. Body burden data will used in conjunction with analytical data for the surface soils evaluated to assess bioaccumulation potential for the COPECs identified.

3.3.2.6 Geophysical Survey (Subtask 3.07)

With the exception of the Meteorological subtask, the Geophysical Survey tasks will be conducted as part of the Site Reconnaissance (Task 3.01) and the Hydrogeological Assessment (Task 3.03). Meteorological data for the Site will be obtained from a third party (e.g., local airports or the Nassau County Department of Public Works) to document meteorological conditions during the field investigation. These data will be used to evaluate the effects of local weather on the field data (i.e., water levels) obtained during the investigation. This information will be included in the RI Report.

3.3.2.7 Investigation Derived Waste (IDW) Characterization and Disposal (Subtask 3.08)

TtEC will assist the EPA in arranging for a secure location to stage the IDW. The Waste Management Plan contained in the HASP will describe how the IDW generated during the field investigation will be managed (staging pad, fencing, tarping, marking, inspection requirements, etc.). IDW will include the following waste streams:

- Aquifer testing water;
- Monitoring well development and purge water;
- Soil cuttings;
- Decontamination fluids containing wash/rinse water and decontamination chemicals; and
- Contaminated debris including but not limited to personal protective clothing, plastic sheeting, and consumable sampling equipment.

IDW determined to be hazardous will be transported by an approved, licensed transporter to an approved treatment, storage, and disposal facility for disposal. It is anticipated that some of the soil cuttings, aquifer testing water and monitoring well development and purge water will be hazardous. TtEC will verify whether facilities to be used are currently approved by EPA Region 2. Only an EPA approved disposal facility will be used for disposal of hazardous IDW. TtEC will review the profiles and mainfests from the IDW contractor and will recommend a classification and a facility. This recommendation will then be forwarded to EPA for concurrence and approval.

3.4 Task 4 - Sample Analysis

3.4.1 Innovative Methods/Field Screening Sample Analysis (Subtask 4.01)

TtEC will perform on-site field screening (e.g., PID, FID) associated with the drilling of borings/installation of monitoring wells and collection of samples under Task 3. In addition, measurement of field screening parameters will be performed using a water quality meter (e.g., Horiba U-22 or equivalent) during the groundwater sampling.

TtEC will oversee a qualified subcontractor during the performance of the MIP field investigation. Further information on this screening is provided in Section 3.3.2.2.1.

The hydropunch groundwater sample analysis will be performed by a TtEC chemist using a portable GC in an on-site mobile laboratory. Qualifications of the operator and additional details on the portable GC methodology will be provided in the site-specific QAPP. A percentage of the hydropunch groundwater samples will be sent for off-site RAS laboratory analysis of Low Concentration VOCs for verification purposes.

3.4.2 Analytical Services Provided via CLP, DESA or EPA-ERT (Subtask 4.02)

TtEC will secure Routine Analytical Services (RAS) for the sample analyses available through either the EPA CLP and/or the EPA Region 2 DESA Laboratory in Edison, New Jersey. These analyses include TCL Organics, Low Concentration Organics and TAL Metals. Depending on availability, analytical services for water quality/natural attenuation parameters in groundwater, and total organic carbon (TOC) and grain size may be secured from the DESA Laboratory.

3.4.3 Non-Routine Analytical Services (Subtask 4.03)

Vapor intrusion samples will be analyzed for VOCs (EPA Method TO-15 with SIM) under the EPA National Non-RAS Contract (considered Tier 2 in accordance with the EPA Technical Memorandum "Procuring Analytical Services through the DESA Laboratory and the CLP" (EPA, 2003)). If required, due to availability restraints or other reasons, analysis of the vapor samples may be performed by a subcontractor laboratory.

In addition, other analytical services not available through the CLP or not able to be analyzed by the EPA Region 2 DESA Laboratory (due to analysis/methodology, capacity or scheduling) will be provided by a subcontractor laboratory. These analyses include: TOC, grain size MNA parameters and tissue analyses. These services will be performed in accordance with the approved TtEC RFC II Program Delivery of Analytical Services Plan (TtEC, 1998), the TtEC RAC II Program Quality Management Plan (TtEC, 2006b) and the site-specific QAPP prepared under Subtask 1.07. A brief summary of the Subcontract Laboratory Procurement Plan will be provided as an attachment to the site-specific QAPP.

3.5 Task 5 - Analytical Support and Data Validation

The TtEC Authorized Requestor (AR) will arrange with EPA sample management personnel for the analysis and validation of RAS and Non-RAS (if possible) environmental samples collected during the field investigation program in accordance with the EPA Technical Memorandum "Procuring Analytical Services through the DESA Laboratory and the CLP" (EPA, 2003). Analytical services will be procured utilizing the sequential decision tree provided in this memorandum. Sample slots for the CLP, the EPA Region 2 DESA Laboratory and/or EPA National Non-RAS contracts will be scheduled with the EPA Regional Sample Control Center (RSCC) office in Edison, New Jersey. If applicable, TtEC will arrange for the analysis, and perform the validation, of any Non-RAS samples analyzed via subcontract laboratories during the field investigation program. The following subsections describe the activities TtEC will perform associated with the analysis and validation of all field sample results.

3.5.1 Collect, Prepare and Ship Samples (Subtask 5.01)

During the field program, TtEC will prepare and ship all samples collected for off-site analysis under Task 3 in accordance with the procedures outlined in the site-specific QAPP (Appendix A) and the EPA CLP Guidance for Field Samplers (EPA, 2004e). A summary of the field samples, and associated QA/QC samples, to be collected will be provided in Table 6-1 of the QAPP (Appendix A).

Arrangements will be made for sample shipment and delivery schedules with the RSCC samples to be analyzed by CLP laboratories, the DESA Laboratory and/or the EPA National Non-RAS contract laboratory. TtEC will procure and provide the containers for these samples. The canisters for the vapor portion of the investigation will be supplied by the EPA National Non-RAS contract laboratory or TtEC's subcontract laboratory (as applicable). If a subcontractor laboratory is required for other portions of the field investigation (see Sections 3.4.2 and 3.4.3), the sample containers will be provided by the off-site subcontractor laboratory, and arrangements for container delivery and shipment will be made directly with the subcontractor laboratory.

EPA's Field Operations and Records Management System (Forms II Lite) will be used in the field for shipping documentation preparation.

The analyses associated with the optional ecological characterization (Subtask 3.06) will also be performed in this subtask, if directed.

3.5.2 Sample Management (Subtask 5.02)

TtEC will provide sample management functions, including chain of custody procedures, information management, and data storage/retention, in accordance with the procedures outlined in the site-specific QAPP (Appendix A) and its EPA-approved RAC II Program Delivery of Analytical Services Plan (TtEC, 1998). Communication will be maintained with the RSCC office; the Contract Laboratory Analytical Support Services (CLASS) office in Chantilly, Virginia; the EPA DESA Laboratory; and/or the subcontract laboratory(ies) regarding the scheduling, tracking, and oversight of the sample analyses and validation. Sampling Trip Reports (STRs), which provide information on completed analytical shipments, will be prepared and sent to the RSCC office in Edison, New Jersey.

TtEC will make split sampling available to other governmental agencies and municipalities during the field investigation. TtEC will not, however, supply bottleware, provide packing and shipping, or perform arranged for shipment or analysis of these samples.

Sample management associated with the optional ecological characterization (Subtask 3.06) will also be performed in this subtask, if directed.

3.5.3 Data Validation (Subtask 5.03)

CLP RAS data will be validated by EPA Region 2 Hazardous Waste Support Section personnel, with contractor support as required. Hard copy CLP data packages will be sent to the EPA WAM, who will forward a copy of the validated results to TtEC.

Results from vapor samples analyzed through the EPA National Non-RAS contract will be validated by EPA Region 2 Hazardous Waste Support Section or Environmental Services Assistance Team (ESAT) personnel in Edison, New Jersey. Hardcopy data packages will be sent to the EPA WAM, who will forward a copy of the validated results to TtEC.

Data analyzed by the EPA DESA Laboratory in Edison, New Jersey will be validated by DESA Laboratory personnel. DESA laboratory data packages will be sent directly to TtEC.

If subcontracted analyses are required, TtEC will provide data validation of the Non-RAS data analyzed by the subcontract laboratory(ies) (see Section 3.4.3), utilizing the Non-RAS laboratory SOWs, relevant sections of the most current EPA Region 2 Data Validation SOPs, applicable sections of the EPA National Functional Guidelines for Organic and Inorganic Data Validation, and best professional judgement.

Data validation associated with the optional ecological characterization (Subtask 3.06) will also be performed in this subtask, if directed.

TtEC data validators performing this task have been trained and are certified by EPA Region 2 in validating the parameters of interest associated with the project. All data validation reports will be summarized according to EPA Region 2 Data Validation SOPs. TtEC will submit copies of these reports to the EPA upon receipt by the TtEC Project Manager from the TtEC data validator.

3.6 Task 6 - Data Evaluation

This task includes the compilation and evaluation of field sampling data from the OU-2 investigation and an evaluation of the usability of the data. A Data Evaluation Report (DER) will be prepared that summarizes the results of the RI investigation at the Site. The report will include a discussion of the investigation activities, the analytical results, and any apparent trends and/or discrepancies within the data. The DER will also identify additional data requirements, if warranted.

3.6.1 Data Usability Evaluation (Subtask 6.01)

TtEC will evaluate (quantitatively and/or qualitatively) the usability of data obtained during this Work Assignment's investigatory phase by:

- Examining data validation summary reports and field logbooks, and verifying that the sampling procedures and analytical results were obtained following the applicable protocols; and

- Verifying that the data is of sufficient quality to satisfy DQOs, and can be relied upon for performing the Risk Assessments, the Feasibility Study, and subsequent remedial design activities.

- The usability evaluation of data acquired during the RI field effort will include review of the data validation summary reports; confirmation that sampling procedures were performed following applicable protocols; and confirmation that the analytical results were obtained following applicable protocols, are of sufficient quality to satisfy DQOs, and can be relied upon for performance of the Risk Assessments, the Feasibility Study, and subsequent remedial design activities.

- Evaluation of data associated with the optional ecological characterization (Subtask 3.06) will also be performed in this subtask, if directed.

The results of the data usability evaluations will be presented in the DER (see Section 3.6.4).

3.6.2 Data Reduction, Tabulation, and Evaluation (Subtask 6.02)

Validated data assessed to be usable and relevant to the project will be compiled and summarized in tabular format with an independent quality control verification at each step in the process to prevent transcription/typographical errors. The data will be entered into GIS\Key®, the data management/storage platform selected by TtEC for this project.

For reporting purposes, tables of analytical results will be organized by analytical fraction (e.g., VOCs, metals, etc.), matrix (e.g., soil, groundwater, etc.), and/or segregated according to specific contaminant source area and/or other unique areas, if warranted. Analytical tables will identify individual samples by a unique sample location/identification number that corresponds to the sample location maps. The tables will also include the sample collection dates, detection limits for parameters not detected, and laboratory and/or data validation qualifiers. Standard units for results reporting (e.g., milligrams per kilogram (mg/kg) for metals in soil/sediment, micrograms per liter (ug/L) for etc.) will be used in all tables, texts and figures which summarize the analytical results.

Within the DER (Section 3.6.4), the EPA protocol for eliminating field sampling analytical results based on laboratory/field blank contamination results will be clearly explained. The discussions of the sampling results will not be qualified by suggesting that a particular chemical is a common laboratory contaminant or was detected in a laboratory blank. If the reported result has passed QC procedures during validation, it will be considered valid and usable. Field rinsate blank analyses will be discussed in detail in the DER if decontamination solvents are believed to have contaminated field samples.

Graphical soil boring logs/well construction diagrams will be prepared during the data reduction phase to describe the subsurface conditions encountered during intrusive operations. Additional information on and requirements for borings logs are provided in Section 3.9.1. Soil interval information will be entered into the site database for use in generating cross-section figures.

Data reduction, tabulation and evaluation associated with the optional ecological characterization (Subtask 3.06) will be performed in this subtask, if directed.

3.6.3 Modeling (Subtask 6.03)

TtEC will evaluate the data collected during the field investigation and make an assessment of the need for modeling to complete an accurate characterization of the nature, extent, distribution and movement of site contamination, especially vapor intrusion. TtEC will prepare a Modeling Technical Memorandum summarizing the results of this evaluation and include recommendations concerning modeling. This memorandum will be submitted to EPA within 14 days after the completion of Subtask 6.02. If tasked by EPA, TtEC will prepare a work plan and budget addendum describing the scope and technical approach for performing a comprehensive modeling effort.

3.6.4 Technical Memorandum (Data Evaluation Report) (Subtask 6.04)

A DER, in the form of a Technical Memorandum, will be prepared and submitted to the EPA for review and approval within 30 days after completion of Subtask 6.02. This report will include:

- A discussion of the investigation activities conducted at the Site, including any approved deviations from this Work Plan and/or the site-specific QAPP;
- A summary of the results of the field effort, including any associated tables and/or figures;
- A determination of the usability of the data obtained during the RI (see Subtask 6.01);
- An assessment of the ability of the data to satisfy DQOs;
- A discussion of any apparent trends in the data, including any associated tables and/or figures;
- Additional data requirements, if warranted, recommended to be addressed (i.e., potential subsequent field investigation work);
- Graphical soil boring logs/monitoring well diagrams (see Subtask 6.02); and
- Tables of the analytical data acquired during the field program (see Subtask 6.02).
- A discussion of the information associated with the optional ecological characterization (Subtask 3.06) will also be performed in the subtask, if directed.

After submission of the DER, EPA and TtEC will meet to discuss the report contents. A revised DER will not be prepared; however, a response to comments and minutes of discussion letter will be developed. Any changes to the information provided in the DER based on the comments/discussion will be incorporated into the Draft RI Report (see Subtask 9.01). If additional field data are required to fill data gaps before proceeding with the RI Report following EPA's direction to do so, these data will be collected and an addendum to the DER will be submitted following the collection of the additional field data.

3.7 Task 7 - Assessment of Risk

3.7.1 <u>Baseline Risk Assessment (Human Health) (Subtask 7.01)</u>

TtEC will evaluate and assess the current and potential future risk to human health posed by exposure to soil (surface and subsurface), groundwater and air contaminants identified at the Site. The BHHRA will incorporate the information presented in the Draft PAR (Section 3.1.13) and information added or modified in response to EPA comments. Development of the BHHRA report is contingent on the approval of the PAR by EPA Region 2.

The BHHRA report will be prepared in accordance with the following EPA guidance documents: RAGS Parts A, D, and E (EPA, 1989, 2001, and 2004d, respectively) and the Exposure Factors Handbook (EPA, 1997) and guidance provided by EPA Region 2. The following subsections present the principal elements to be addressed in the Draft and Final BHHRA reports.

3.7.1.1 Draft Baseline Human Health Risk Assessment Report

The BHHRA will address the following as described in the PAR:

- <u>BHHRA Conceptual Site Model</u> - The cumulative analyses and results are synthesized to develop an overall model of the potential exposures and risks to the contaminated site media.

- <u>Hazard Identification</u> - Identifying which hazardous substances are present in the Site media and which constitute the major chemicals of potential concern (COPCs) due to potential exposures.

- <u>Characterization of Site and Potential Receptors</u> - Identifying and characterizing the human populations and exposure pathways (part of the Conceptual Site Model).

- Exposure Assessment - Identifying the magnitude of actual or potential human exposures, the frequency and duration of these exposures, and the routes by which these receptors are exposed. The exposure assessment will include an evaluation of the likelihood of such exposures occurring and will provide the basis for the development of acceptable exposure levels. Reasonable Maximum Exposure (RME) and Central Tendency (CT) estimates of exposure for both current and potential future use of the Site will be developed.

- Toxicity Assessment - Evaluating and characterizing the intrinsic toxicological properties of these COPCs.

Further, the BHHRA report will address the following aspects not previously described in the PAR:

- Risk Characterization - Combining contaminant-specific toxicity information with quantitative and qualitative information from the exposure assessment to develop estimates of risk that can be compared to EPA target levels established to indicate when site chemicals may potentially affect human health. The risk projections will be presented and interpreted with respect to naturally occurring compounds and which indicated risk drivers may justify remediation. The results will allow a separate evaluation of each exposure area to facilitate site management decision-making.

- Identification of Limitations/Uncertainties - Critically evaluating the principal assumptions and uncertainties in the BHHRA or in the interpretation of the results.

These two elements of the BHHRA (not addressed in the PAR) are described in greater detail below.

Risk Characterization

Chemical-specific toxicity information presented in the PAR in Tables 5.1 and 5.2 ("Non-Cancer Toxicity Data") and in Tables 6.1 and 6.2 ("Cancer Toxicity Data") will be combined with quantitative and qualitative data from the exposure assessment presented in PAR Tables 3 ("Medium-Specific EPC Summary") and 4 ("Values Used for Daily Intake Calculations"). Collectively, this information will be used to calculate non-carcinogenic and carcinogenic risks for individual receptors and exposure routes identified in the BHHRA Conceptual Site Model, PAR Table 1.

The operative EPA model for dose-response of non-carcinogenic COPCs assumes that a minimum threshold dose or intake exists below which adverse effects are not associated with exposure. Therefore, the potential for non-carcinogenic effects is calculated by dividing the chemical-specific chronic daily intake (CDI) by the reference dose (RfD) for each COPC. The resulting quotient or ratio is the hazard quotient (HQ) and is calculated for individual COPCs. HQs will be summed over all chemicals and all complete exposure pathways to estimate a cumulative hazard index (HI) for each receptor and will be presented in RAGS Part D Table 7 ("Calculation of Chemical Cancer Risks and Non-Cancer Hazards"). Since the units of the RfD are mg/kg-day and the units of the CDI are mg/kg-day, the HQ and HI are dimensionless. HI ratios less than or equal to 1.0 indicate that adverse non-carcinogenic health effects are unlikely. Ratios greater than 1.0 indicate the potential for adverse non-carcinogenic health effects to occur at that exposure level and additional evaluation may be warranted. However, a ratio greater than 1.0 does not mean that adverse effects will definitely be observed, since the RfDs used in the calculation of these ratios incorporate safety and modifying factors to reduce the potential that the likelihood of occurrence of adverse health effects will be underestimated. This procedure assumes that the risks from exposure to multiple chemicals are additive, an assumption that is probably valid for compounds that have the same target organ or cause the same toxic effect. HIs estimated to be in exceedance of 1.0 will be segregated and summed by target organ for further consideration.

Carcinogenic effects are expressed as excess lifetime cancer risks (ELCRs). Quantitative risk calculations for potentially carcinogenic COPCs estimate the potential ELCR for an individual in a specified population. This unit of risk refers to a potential cancer risk that is above the background cancer risk in unexposed individuals. For example, an ELCR of 1×10^{-6} indicates that an exposed individual has an increased probability of one in one million of developing cancer as a result of the projected exposure, over the course of their lifetime. ELCRs will be estimated as the product of the CDI and the cancer slope factor (CSF). Since the units of the CDI and CSF are mg/kg-day and kg-day/mg, respectively, the resulting ELCR is dimensionless. For quantitative estimation of risk, it is assumed that cancer risks from various exposure routes are additive. Estimated ELCR values will also be presented in RAGS Part D Table 7 (Calculation of Chemical Cancer Risks and Non-Cancer Hazards") and will be discussed relative to the 1×10^{-6} to 1×10^{-4} target risk range of ELCR values considered by the EPA to represent an acceptable (i.e., *de minimis*) risk.

As stated previously, the non-carcinogenic and carcinogenic health risks will be presented in RAGS Part D Table 7. The purposes of this table is summarized in the following items:

- To present the EPCs and CDIs used in the risk calculations;
- To present non-carcinogenic and carcinogenic risks calculated for each exposure route for each COPC; and
- To provide the total HIs and total ELCRs for all current and future exposure routes, environmental media of concern, and receptors.

All non-carcinogenic and carcinogenic risks presented in RAGS Part D Table 7 will be summarized in RAGS Part D Table 9 ("Summary of Receptor Risks and Hazards for COPCs") for each receptor, by environmental medium, exposure route, and exposure point. RAGS Part D Table 10 ("Risk Summary") will summarize only those non-carcinogenic and carcinogenic risks for each receptor, by environmental medium, exposure route, and exposure point that exceed the 1×10^{-6} ELCR level or the 1.0 HI level. RAGS Part D Tables 7, 9, and 10 will be presented for the CT exposure scenario only when the RME exposure scenario indicates potentially unacceptable risk. The Site does not have known radiological contamination, therefore RAGS Part D, Table 8 will not be presented.

Identification of Limitations/Uncertainties

Uncertainties are encountered throughout the process of performing a risk assessment. This component will address the sources of uncertainty inherent in the main components of the BHRRA to be performed for the Site. The following paragraphs briefly describe potential areas of uncertainties associated with each component of the BHHRA.

- *Sampling and Analysis*
  The development of a risk assessment depends on the reliability of, and uncertainties associated with, the analytical data available to the risk assessor. These, in turn, are dependent on the operating procedures and techniques applied to the collection of environmental samples in the field and their subsequent analyses in the laboratory. Any issues/problems identified during the sampling and analysis of the COPCs or geotechnical parameters (i.e., that could impact fate and transport modeling, and consequently, the BHHRA results), and highlighted during data evaluation and reduction will be discussed in this section. Key to the quality and usability of data will be discussions regarding precision and accuracy of the methods of analysis. Finally, considerations will be given to the

sufficiency of data to represent temporal and spatial characteristics of contamination at the Site with respect to exposure.

- *Selection of COPCs*
  The COPC screening criteria to be used in the PAR is described in Section 3.1.13. Uncertainties associated with the application of these criteria and their impacts on conducting the BHHRA will be discussed in this section.

- *Exposure Assessment*
  In performing exposure assessments, uncertainties arise from two main sources. First, uncertainties arise in estimating the fate of a compound in the environment, including estimating release and transport in a particular environmental medium. Second, uncertainties arise in the estimation of chemical intakes resulting from contact by a receptor with a particular medium. The latter uncertainties usually result from assumptions made regarding exposure events, exposure durations, and the corresponding assimilation of chemicals by the receptor. Both site-specific and EPA-default exposure factors will be used for calculating CDIs for each receptor at the Site. Default factors representing RME scenarios will be used that generally represent upper-bound exposure conditions in order to bias uncertainties toward health conservatism. These are factors that have been generated by the scientific community and have undergone review and approval by the EPA. Additionally, uncertainties with use of the RME and CT approach in deriving EPCs based on statistical distributions of data will be discussed.

- *Toxicological Assessment*
  In making quantitative estimates of the toxicity of varying dosages of compounds to human receptors, uncertainties arise from three sources. First, research data on human exposure and the subsequent effects are usually insufficient, if they are available at all. Human exposure data usually lack adequate concentration estimations and suffer from inherent temporal variability. Therefore, animal studies are often used and new uncertainties arise from the process of extrapolating animal results to humans. Second, to obtain observable effects with a manageable number of experimental subjects, high doses of a compound are often used. In this situation, a high dose means that high exposures are used in the experiment with respect to most environmental exposures. Therefore, when applying the results of the animal experiment to the human condition, the effects at the high doses must be extrapolated to approximate effects at lower doses. The effects of these considerations on the risk assessment, along with those resulting from applications of modifying and safety factors for COPCs believed to cause threshold effects (i.e., noncarcinogens), will be discussed as appropriate. Third, the use of surrogate chemicals, if any, will be discussed. In addition, recent evaluations of the toxicity of certain chemicals (i.e., TCE) has resulted in a relatively greater level of uncertainty in these toxicity factors. The uncertainty section will address the status of the science in this regard.

- *Risk Characterization*
  Uncertainties to be discussed regarding the characterization of risks may include assumptions of chemical additivity and the inability to predict synergistic or antagonistic interactions between COPCs. These uncertainties are inherent in any inferential risk assessment. Additionally, those constituents identified as COPCs due to a lack of toxicological data, and their impacts on uncertainties in estimating overall non-carcinogenic and carcinogenic risks, will be discussed in this section.

3.7.1.2 Final Baseline Human Health Risk Assessment Report

Following a review of the comments provided by EPA Region 2 on the Draft BHHRA report, any clarifications required will be discussed with the EPA Region 2 Risk Assessment staff. Following resolution of these comments, a Final BHHRA incorporating final EPA comments on the Draft BHHRA, will be submitted to EPA. The Final BHHRA will be submitted to EPA 14 days after the receipt of the final EPA comments.

3.7.2 Baseline Risk Assessment - Ecological Risk Assessment (Subtask 7.02)

TtEC will evaluate and assess the risk to the environment posed by site-related contaminants in surface soils (defined as 0-1 foot bgs), surface water and sediments associated with the Site. This evaluation and assessment will be performed in accordance with the Ecological Risk Assessment Guidance for Superfund (ERAGS) (EPA, 1997c) and Guidelines for Performing Ecological Risk Assessments (EPA, 1998). Consistent with the above guidance documents; a screening level ecological risk assessment (SLERA) will be performed to assist in focusing the investigation and to determine if risks warrant performance of a baseline ecological risk assessment.

3.7.2.1 Screening Level Ecological Risk Assessment Report (Subtask 7.02.01)

Consistent with the ERAGS guidance, TtEC will prepare a Draft SLERA technical memorandum report which will be submitted 45 days following submission of the Data Evaluation Report for the Site. The SLERA will address Steps 1 and 2 of the ERAGS process. This report will form the basis for documenting the initial evaluation of ecological risks for the Site sampled as part of the field investigation.

The SLERA will describe the environmental setting and preliminarily determine if ecological receptors are exposed to and potentially at risk as a result of exposure to contaminants in the environmental media associated with the Site. Screening criterion to be used to conduct the SLERA will be the following, in order of preference.

- Soils: USEPA Eco-SSLs (USEPA, 2000) for which screening values are available for the contaminants of potential ecological concern; and ORNL's Preliminary Remediation Goals for Ecological Endpoints (Efroymson et. a1. 1997) soil values.

- Surface Water: NYSDEC Ambient Water Quality Criteria; USEPA Ambient Water Quality Criteria; and ORNL's Preliminary Remediation Goals for Ecological Endpoints (Efroymson et. al. 1997) surface water values.

- Sediments: NYSDEC Technical Guidance for Screening Contaminated Sediments (NYSDEC, 1999); and, ORNL's Preliminary Remediation Goals for Ecological Endpoints (Efroymson et. al. 1997) sediment values.

The SLERA will provide a preliminary estimate of risk for consideration at the first Scientific Management Decision Point (SMDP #1), provide the basis to determine the need for continuing the risk process through the performance of a BERA (i.e., ERAGS Steps 3 through 7) and assist in identifying the assessment and measurement endpoints for the BERA. The draft SLERA memorandum will be submitted to EPA for review. If the determination is made by BTAG and EPA to accept the screening level analysis without further need for the BERA, a response to comments will be prepared. Following EPA concurrence with the TtEC responses, the draft SLERA will be finalized. EPA will review and approve the SLERA and determine whether a full Baseline Ecological Assessment is required.

3.7.2.2 Baseline Ecological Risk Assessment (BERA) (Subtask 7.02.02)

If EPA directs that a BERA be prepared, TtEC will prepare a work plan amendment for any additional field work will be prepared. Upon completion of additional field work, if needed, a Draft BERA Report will be prepared for the Site that addresses the following:

- *Refined Problem Formulation and Hazard Identification* - TtEC will review the results of the SLERA and other available information on the hazardous substances present and identify the Contaminants of Potential Ecological Concern (COPECs) as part of the problem formulation for the Site.

- *Refined BERA Site Conceptual Model* - A refined BERA conceptual model of the Site will be developed and presented based on the contaminants identified, the exposure and toxicity assessments, and the risk characterization.

- *Refined Toxicity Evaluation and Dose-Response Assessment* - The COPECs will be selected based on their intrinsic toxicological properties as evaluated from the available toxicological literature.
- *Characterization of Potential Receptors* - Environmental exposure pathways end receptor populations potentially affected will be characterized and verified.

- *Refined Assessment and Measurement End Points* - COPECs, ecological receptor species (i.e., species especially sensitive to environmental contaminants), and assessment and measurement end points will be developed and identified for application in the BERA.

- *Toxicity Assessment/Ecological Effects Assessment* - A toxicity and ecological effects assessment will be performed to identify the potential adverse environmental effects associated with chemical exposures to COPECs, the relationships between the magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity (e.g., weight of evidence for a chemical's toxicity).

- *Exposure Assessment* - An exposure assessment will be performed to identify the magnitude of actual or potential environmental exposures, their frequency of occurrence and duration, and the routes of exposure for the environmental receptors. This assessment will include the likelihood of occurrence, which will provide the basis for developing acceptable exposure levels, and reasonable maximum exposure estimates for current land use conditions at the Site.

- *Risk Characterization* - Chemical-specific toxicity information, combined with quantitative and qualitative data from the exposure assessment, will be compared to measured contaminant exposure levels and the levels predicted through environmental fate and transport modeling. These comparisons will be utilized to determine if concentrations of soil contaminants at or near the Site are affecting or could potentially affect ecological receptors.

- *Identification of Limitations/Uncertainties* - Critical assumptions (e.g., background concentrations and conditions) and uncertainties stated in the report will be discussed with respect to their impact on the risk characterization.

Focus and preparation of the BERA will rely upon results of the SLERA, the ecological characterization performed as part of the Reconnaissance Phase and site-specific studies required and scoped as part of the BERA development under a separate work plan amendment.

3.7.2.3 Final Baseline Ecological Risk Assessment Report

After the Draft BERA Report has been reviewed and commented on by EPA, TtEC will submit a written response to each comment to the EPA for review. Any further resolution/clarification of specific comments or of TtEC's responses will be rectified with the EPA prior to revising the draft report.

Once required revisions are finalized and agreed to by EPA, TtEC will revise the Draft BERA Report as warranted and submit a Final BERA as part of the RI Report to EPA.

3.8 Task 8 - Treatability Study and Pilot Testing - Not Applicable

3.9 Task 9 - Remedial Investigation Report

TtEC will collect environmental data required to determine the key contaminants of concern at the Site, to accurately establish the media contaminated, and to determine the horizontal and vertical extent of the contamination. Key contaminants will be selected on the basis of their persistence and mobility in the environment and by their degree of hazard to human and/or environmental receptors. These key contaminants will be evaluated for receptor exposure and an estimate of the contaminant levels reaching human or environmental receptors will be made. Existing standards and guidelines (e.g., drinking-water standards, water-quality criteria, and other criteria accepted by the EPA as appropriate for the situation) will be used for comparison with site data to evaluate potential effects to human receptors.

The RI Report will be written in accordance with "Guidance for Conducting Remedial Investigation/Feasibility Studies under CERCLA," OSWER Directive 9355.3-01, October 1988, Interim Final (or latest version) and "Guidance for Data Usability in Risk Assessment," (EPA/540/G-90/008), September 1990 (or latest version).

3.9.1 Draft Remedial Investigation Report (Subtask 9.01)

TtEC will submit a Draft RI Report pursuant to the RI/FS schedule presented in this Work Plan. The Draft RI Report will include, but will not be limited to, the following major categories:

- Site Background;
- Investigation;
- Site Characteristics;
- Nature and Extent of Contamination;
- Fate and Transport;
- Risk Assessment; and
- Summary and Conclusions.

Additional detail regarding the content and presentation requirements for each category is presented in the following sections.

Site Background

Summaries will be provided of available regional and site-specific information, including physical features, demographic information, current and historical land uses, cultural resources, and current or historic environmental investigations. These summaries may include the following:

- An index map showing where the Site is located within the State of New York.

- A regional map showing the location of the Site relative to nearby cultural or ecological features such as: residential, commercial and industrial areas; public water supply wells; schools; parks; wetlands; surface water bodies; other hazardous waste sites; etc.

- A site map (or maps) showing the locations of all present and historic structures and other pertinent features. Labels or a key will be used to explain the nature of each site feature. More than one map may be necessary to adequately represent operational changes over time.

- A topographic contour map presented at a sufficiently large scale (e.g., 1" = 20') and detail to allow sample locations to be plotted accurately in relation to site features. This may require that the site be divided into a number of maps to provide a sufficient level of detail. A smaller-scale index map will be provided to show the locations of the large scale maps relative to the entire site.

- Definitions of current and past hazardous materials practices at the Site. This will include a list of chemicals and hazardous materials produced, used, stored or disposed at the Site, as well as discussions of known methods of waste disposal.

- References to, and summaries of, all previous environmental studies and investigations involving the Site. These summaries will include discussions of the reasons for the investigation, as well as the key findings. Relevant data summaries, e.g., chemical analyses, contaminant plume maps, etc., will be provided either within the RI Report text or in appendices. The types of media that were analyzed, sampling dates, analytical parameters, and method detection limits for "non-detect" results will be provided, along with a summary of any significant sampling- or laboratory-related QA/QC problems. The parties responsible for all sampling and analytical events will also be identified.

- A map showing the location of all previous environmental sampling locations. In the event that locations are approximate (e.g., if they are determined from a written description or graphically transferred from an existing figure), this uncertainty will be noted.

- A discussion of the federal, state, and local regulatory history of the Site. This discussion will include references to pertinent correspondence, court orders, and/or other relevant documents relating to regulatory actions pertaining to the Site. A table may be used to summarize the regulatory history.

- The findings, if available, of EPA's aerial photograph analysis provided in the Environmental Photographic Interpretation Center (EPIC). The EPIC findings may be summarized in the RI Report text and/or included as an appendix.

- Ecological concerns such as sensitive habitats, wetlands, or threatened or endangered species.

Investigation

This portion of the RI report will provide the scope for or otherwise address the following major investigative topics:

- Field Investigation and Technical Approach;
- Chemical Analysis and Analytical Methods;
- Field Methodologies;
- Ecological Assessment;
- Soil Boring; and
- Soil Sampling.

Locational data acquired during the investigation will conform with the EPA LDP dated 8 April 1991.

Soil Boring Logs: Graphical soil boring logs will be prepared to describe the subsurface conditions encountered during intrusive operations. In developing final logs from rough field logs, there will be no attempt to simplify the logs by eliminating data or observations obtained in the field. If necessary, additional pages will be included to explain any drilling problems, unusual observations, detailed stratigraphic descriptions or any other information that would help to convey how the boring was installed and the nature of the subsurface conditions that were encountered, but will not fit into the standard boring log format.

Soil boring locations will be surveyed in the New York State Plane (Long Island Zone 3104) coordinate system, using the NAD 1983 horizontal datum and NAVD 88 vertical datum.

Geophysical Investigation Results: Maps will be prepared to show the locations of the geophysical stations/traverse lines and their relationship to potential contaminant source areas.

All details relating to the types of geophysical instruments employed, their calibration and use in the field (e.g., instrument spacing, QA/QC measurements, interferences, etc.) or to potential impacts to the interpretation or utility of the geophysical data (e.g., solar/magnetic storms) will be reported.

All raw, uninterpreted data used to support document conclusions will be provided in the appendices, along with a complete explanation of how the data were manipulated/corrected in developing the geophysical conclusions. A surveyor's report will also be included with the raw data if the geophysical stations or traverse lines are surveyed.

The effective depth of exploration and limitations for each geophysical method will be discussed. This discussion will include any requisite supporting calculations showing how the depth of exploration was determined.

The geophysical survey results will include discussion of the possible cause of all significant geophysical anomalies and their relationship to known or suspected contaminant source areas. Anomalies that correspond to sharp topographic changes or other known interferences will be identified and explained. An attempt will be made to correlate geophysical data with other data available for the Site.

Conditions Warranting Immediate Removal Action: It is possible that during the course of the field investigation, conditions that warrant an immediate removal action to protect human health and/or the environment may be discovered. Examples of this type of situation include leaking drums, leaking underground or aboveground storage tanks, a liquid-filled lagoon with a weakened berm, potentially explosive conditions, evidence of indoor air contamination, and evidence of contaminated drinking water wells. As much detail as possible will be provided in the report so that the feasibility of conducting an immediate removal action can be evaluated.

Site Characteristics

The RI report will include discussion of the following :

- Geology;
- Hydrogeology;
- Demographics and Land Use; and
- Ecological Assessment.

A discussion of the geology and hydrogeology will be accompanied by relevent cross sections as well as piezometric figures.

Nature and Extent of Contamination

This section of the RI Report will be divided into two major subsections: contaminant sources, and contaminant distribution and trends.

- Contaminant Sources - A full description of all potential contaminant source areas within the Site will be provided, utilizing all current and available pre-existing information. These discussions will include the following points: dimensions, depth below grade, depth to water table, waste volume, type of wastes/products, construction/demolition/closure dates, regulatory history, past/existing permits, historical changes in use or configuration, and available environmental sampling results.

- Contaminant Distribution and Trends - A full discussion of the horizontal and vertical extent of contamination in site soil will be presented.

Discussions of the nature and extent of contamination will focus on those contaminants that pose the most significant risk to human health and the environment and exceed state or federal ARARs, not necessarily those that are present at the highest concentrations.

Recent and historic sampling results will be quantitatively compared to sampling results from the RI investigation, only when the same or equivalent sample collection methods, analytical methods, QA/QC protocols, etc. were employed. If different methods, protocols, etc. were used, only qualitative comparisons will be made.

Physical and chemical properties of contaminants (e.g., density, solubility and mobility) exert significant effect on their distribution in the environment and their patterns of transport. Therefore, pertinent physical and chemical properties of site-related contaminants will be summarized in a table. Assumptions will not be made regarding the valence state of inorganic contaminants if only "total" analyses have been performed.

Site-specific background levels will be provided for soil using information that relates directly to the Site. This information will include the results of sampling and analyses conducted in the vicinity of the site. Due to natural variations in levels of inorganics and other constituents in soils, soil collected in background locations will be of the same type as the contaminated soil in the areas under investigation. Additional background information may potentially include location-specific data from sources such as the USGS, USDA and New York Geological Survey. A table will be used to summarize the background levels for the Site.

Isocentration maps, cross-sections, and a 3-D visualization of site-related contaminants in soil will be used to summarize the RI sampling results, and will illustrate the level and current extent of site-related contamination and may also illustrate potential future migration pathways. All applicable sampling information will be used in the development of the isoconcentration contour maps. Factors such as sampling and analytical protocols will be considered when comparing RI sampling results to sampling results from other sources.

The public water supply wells will be indicated on the contaminant isoconcentration maps.

The number and types of isoconcentration plots, e.g., maps and/or cross sections, required will depend on the nature of the Site contamination. Development of isoconcentration plots will be considered for any site-related contaminant (e.g., PCE) or contaminant class (e.g., total VOCs) that exceeds ARARs and/or poses a relatively high risk to human health or the environment.

Fate and Transport

This section of the RI Report will address three major issues.

- Contaminant Characteristics;
- Transport Processes; and
- Contaminant Migration Trends.

A qualitative assessment of the environmental fate and transport of site-related contaminants will be conducted on the basis of individual constituents, with the discussions grouped by contaminant class. In addition to consideration of the physical-chemical transport properties for individual constituents, this assessment will consider the potential for cosolvent effects on mobility. Site-specific properties of the environmental media will also be considered, including factors such as soil porosity, organic carbon fraction, and dry bulk density.

Summary and Conclusions

This section will focus upon integration of all available information to develop a comprehensive understanding, or "conceptual model," of the Site. As such, development of the conceptual model will require comparison of information derived from multiple sources, both current and historic, and from sampling and analysis of various environmental media, e.g., source materials, surface and subsurface soils, groundwater, etc. The intent will be to describe the current state of understanding of the link between the nature and magnitude (volume and mass) of source contamination, the applicable contaminant transport mechanisms, and the current nature and extent of site-related contamination. The summary will include an assessment of the limits of understanding, so that recommendations for additional sampling may be made to eliminate any critical data gaps. This model can then be used to predict future contaminant migration and to support decisions regarding remedial actions.

General Report Preparation Guidelines

The following guidelines will be used in preparing the Draft Remedial Investigation Report:

Figure Guidelines

- The original source of each figure will be referenced. If a pre-existing figure is modified, the new figure will reference both the pre-existing figure and its original source.
- The area of interest will be enlarged to fill as much of the available space on the page/plate as possible.

- All units, symbols, patterns, and scales used on figures will be fully explained in a key provided on the figure.
- Whenever possible, key figures/tables will be inserted in the text following the page on which they are first referenced, or provided at the end of each individual report section. Figure and table locations will be determined through consultation with the EPA.
- All text and symbols used on maps, tables, and figures will be legible. To avoid data loss during reproduction nothing in an original will be smaller than 17 characters per inch (CPI).
- Page numbers will be assigned to figures so that they can be easily located or replaced in the text.

Map Format

- All maps will include an accurate north arrow, scale, a title explaining the purpose of the map, and an explanation of all symbols/notations. A reference will be provided to the source of the map if it is based on a pre-existing map.
- The scale will include both a written scale and a graphical scale. The inclusion of a graphical scale is essential because its accuracy will be retained even if the map is enlarged or reduced through reproduction processes.
- At least one base map with an appropriate map scale (e.g., 1 inch equals 50 feet, 1 inch equals 100 feet) will be utilized to accurately show the location of environmental sampling locations relative to known source areas, topographic contours, site boundary, and other important features.
- The surveyor's reference point/benchmark will be identified on the map.
- Text and numbers will be oriented on the map so that the north arrow is pointing in an upward direction as one reads the map. The orientation of text and numbers relative to north will be consistent from map to map throughout the report.
- All units, symbols, and patterns used on the map will be fully described in an explanation included on the map. In addition, as applicable, the date that the data was collected will be indicated.
- The map title and figure/plate number will be shown in large bold type.
- Maps will be presented in an EPA-compatible format of Arc-GIS. The resulting maps will be AutoCad or GIS based, rectified maps.

Presenting Analytical Results

- Tables of analytical results will be organized in a logical manner (e.g., by sample location number, sampling zone, etc.). For example, surface and subsurface soil analyses may be separated according to site location or specific contaminant source areas.
- The sample location identification number will always be used as the primary reference for the analytical results. Analytical results will not be ordered by laboratory identification numbers.

- Analytical tables will indicate the sample collection dates.

- The detection limit will be indicated in instances where a parameter was not detected.

- Analytical results will be reported in the text, tables, and figures using a consistent convention, such as ug/L for groundwater analyses, ug/kg for organic soil analyses, and mg/kg for inorganic soil analyses.

- The applicable federal/state criteria for each constituent will be specified on the analytical tables, and exceedances of criteria will be highlighted. Any samples where the detection limit is greater than the applicable criteria will be identified, and an explanation will be provided.

Discussion of Laboratory/Field Blank Contamination

- The lead agency's protocol for eliminating field sample analytical results based on laboratory/field blank contamination will be clearly explained.

- Discussion of approved sampling results will not be qualified by suggesting that a particular chemical is a common laboratory contaminant or was detected in a laboratory blank. If the reported result was validated utilizing the criteria presented in Section 3.5.3, it will be considered valid and usable.

- Results from field equipment rinsate blank analyses will be discussed, as necessary, if decontamination solvents are believed to have contaminated field samples.

3.9.2 Final Remedial Investigation Report (Subtask 9.02)

After EPA review of the Draft RI Report, TtEC will incorporate final EPA comments and submit a Final RI Report.

3.10 Task 10 - Remedial Alternatives Screening

This task includes work efforts to develop appropriate remedial alternatives to undergo full evaluation. The alternatives will encompass a range including innovative treatment technologies consistent with the regulations outlined in the National Contingency Plan (NCP), 40 CFR Part 300, and the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OSWER Directive 9355.3-01) and other OSWER Directives, including 9355.4-03, October 18, 1989, and 9283.1-06, May 27, 1992, "Considerations in Ground Water Remediation at Superfund Sites", or more recent guidance, policies or procedures.

TtEC will investigate only those hazardous waste management alternatives that will remediate or control contaminated media (soils, groundwater and air) remaining at the Site, as deemed necessary in the RI, to provide adequate protection of human health and the environment. The potential alternatives will encompass, as appropriate, 1) a range of alternatives in which treatment is used to reduce the toxicity, mobility and/or volume of wastes but vary in the degree to which long-term management of residuals or untreated waste is required, 2) one or more alternative involving containment with little or no treatment, and 3) a no-action alternative. Four different alternatives for each contaminated media will be analyzed during the screening process.

3.10.1 Draft Technical Memorandum (Subtask 10.01)

TtEC will prepare a draft Technical Memorandum presenting the potential remedial alternatives and including the following:

- Establish Remedial Action Objectives (RAOs). Based on existing information, TtEC will identify site-specific RAOs which will be developed to protect human health and the environment. The objectives will specify the contaminant(s) and media of concern, the exposure route(s) and receptor(s), and an acceptable contaminant level or range of levels for each exposure route (i.e., preliminary remediation goals).

- Establish General Response Actions (GRAs). TtEC will develop GRAs for each medium of interest by defining contaminant, treatment, excavation, pumping, or other actions, singly or in combination to satisfy remedial action objectives. The response actions will take into account requirements for protectiveness as identified in the RAOs and the chemical and physical characteristics of the Site.

- Identify & Screen Applicable Remedial Technologies. TtEC will identify and screen technologies based on the developed GRAs. Hazardous waste treatment technologies will be identified and screened to ensure that only those technologies applicable to the contaminants present, their physical matrix, and other site characteristics will be considered. This screening will be based primarily on a technology's ability to effectively address the contaminants at the Site, but will also take into account a technology's implementability and cost. TtEC will select representative process options, as appropriate, to carry forward into alternative development. TtEC will identify the need for treatability testing for those technologies that are probable candidates for consideration during the detailed analysis.

- Develop Remedial Alternatives. TtEC will develop media-specific, or site-wide remedial alternatives, as appropriate, in accordance with the NCP. The developed alternatives will be defined with respect to size and configuration of the representative process options; time for remediation; rates of flow or treatment; spatial requirements; distances for disposal; required permits; imposed limitations; and other factors necessary to evaluate the alternatives.

- Screen Remedial Alternatives for Effectiveness, Implementability, and Cost. If many distinct, viable alternatives are developed, TtEC will screen the alternatives on a general basis with respect to their effectiveness, implementability and cost, to reduce the number of alternatives that will undergo detailed evaluation.

3.10.2 Final Technical Memorandum (Subtask 10.02)

After the EPA's review of the Draft Technical Memorandum, TtEC will incorporate EPA's comments and will submit the Final Technical Memorandum.

3.11 Task 11 - Remedial Alternatives Evaluation

This task includes efforts associated with the assessment of individual alternatives against each of the nine current evaluation criteria and a comparative analysis of all options against the criteria. The analysis will be consistent with the NCP and will consider the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA and other pertinent OSWER guidance. EPA will make the determination regarding the final selection of remedial alternatives.

The nine evaluation criteria are:

- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction in toxicity, mobility or volume through treatment
- Short-term effectiveness
- Implementability - technical and administrative
- Cost
- State acceptance
- Community acceptance

3.11.1 Draft Technical Memorandum (Subtask 11.01)

TtEC will prepare a Draft Technical Memorandum which addresses the following: 1) a technical description of each alternative that outlines waste management strategy involved and identifies the key ARARs associated with each alternative, and 2) a discussion that profiles the performance of each alternative with respect to the first seven evaluation criteria listed above. Once the individual analysis is complete, the alternatives will be compared and contrasted to one another with respect to the first seven evaluation criteria listed above. The evaluation of alternatives with respect to the last two criteria - State Acceptance and Community Acceptance - will be performed later in the Feasibility Study process (i.e., these evaluations are typically performed during preparation of the Proposed Plan and ROD).

3.11.2 Final Technical Memorandum (Subtask 11.02)

After the EPA's review of the Draft Technical Memorandum, TtEC will incorporate EPA's comments and will submit the Final Technical Memorandum.

3.12 Task 12 - Feasibility Study Report

TtEC will develop a FS Report consisting of a detailed analysis of alternatives and cost-effectiveness analysis in accordance with NCP 300.68(h)(3)(I)(2). The report will contain, in accordance with Chapters 3-7: 1) a summary of alternative remedial actions, 2) cost analysis, 3) institutional analysis, 4) public health analysis, 5) environmental analysis or the most recent applicable, or relevant and appropriate, requirements.

3.12.1 Draft Feasibility Study Report (Subtask 12.01)

TtEC will prepare a Draft FS that will contain the following:

- Summary of feasibility study objectives
- Summary of remedial action objectives (RAOs)
- Identification of general response actions (GRAs)
- Identification and screening of remedial action technologies, including innovative technologies
- Description of remedial alternatives
- Screening of remedial alternatives (if necessary)
- Detailed analysis of remedial alternatives
- Overall summary and conclusions

TtEC's technical feasibility considerations will include the careful study of any problems that may prevent a remedial alternative from mitigating site problems. Therefore, the characteristics from the RI will be kept in mind as technical feasibility of an alternative is studied. Specific items that will be addressed will include the reliability (operation over time), safety, operations and maintenance, ease with which the alternative can be implemented and time needed for implementation.

TtEC will include a floodplain assessment as part of the FS Report if remedial alternatives will be necessary within the 100-year or 500-year floodplain. The floodplain assessment will reference the RI's delineation of the floodplains in the project area, and include a description of the effects of potential remedial actions on both floodplains (including a brief description of the alternatives to the proposed action and their effects on the floodplains), and a description of measures that are proposed or necessary to minimize potential adverse impacts on both floodplains.

3.12.2 Final Feasibility Study Report (Subtask 12.02)

After EPA's review of the Draft FS Report, TtEC will incorporate EPA's comments and will submit the Final FS Report.

3.13 Task 13 - Post RI/FS Support

TtEC will provide technical support required for the preparation of the Record of Decision (ROD) for the Site, excluding those activities already addressed under Task 2 of this SOW.

3.13.1 Feasibility Study Addendum (Subtask 13.01)

TtEC will prepare a draft addendum to the FS, and finalize the addendum based on the EPA's comments on the draft addendum.

3.14 Task 14 - Negotiation Support - Not Applicable

3.15 Task 15 - Administrative Record - Not Applicable

3.16 Task 16 - Work Assignment Closeout

Upon notification from EPA that all technical work performed under this Work Assignment is complete, project closeout activities will be performed. These activities will include: closing out subcontracts, preparation of a technical and financial Work Assignment Closeout Report (WACR), indexing and consolidating project records and files, microfilming documents and returning the technical project files and microfilm to EPA. Further details of these activities are provided in the subsections that follow.

3.16.1 Work Assignment Closeout Report (WACR) (Subtask 16.01)

Final costs and LOE for all activities conducted by TtEC under this Work Assignment will be included in a WACR and provided as an electronic copy. Costs and LOE (by P-level) will be categorized in the same detail and format as the elements contained in the Work Plan and the SOW. The WACR will be submitted to EPA after the files and microfilm are ready to be sent to EPA.

3.16.2 Document Indexing (Subtask 16.02)

TtEC will organize the Work Assignment technical files in accordance with the approved EPA file index structure (e.g., Administrative Record Index, EPA Superfund Site File Index, and/or RAC II Guidelines for Closeout of Work Assignment, 15 August 2000). A file review will be performed to ensure that all file elements are present and are in order, and that any duplicate or draft technical report copies are removed from the project file.

3.16.3 Document Retention/Conversion (Subtask 16.03)

Following document indexing the project technical files will be microfilmed. The microfilm and hard copies of the project technical files will be sent to EPA. TtEC will retain a copy of the microfilm of the files (i.e. hard copies of the technical files will not be retained by TtEC).

4.0 PROJECT MANAGEMENT APPROACH

4.1 Project Organization

The project organizational structure is provided in Figure 4-1.

4.2 Key Personnel

William R. Colvin, PMP, P.G., is the Program Manager for the USEPA Region 2 Response Action Contract under which the Fulton Avenue Superfund Site RI/FS will be conducted.

The Project Manager is Robert Cantagallo. The Project Manager is responsible for the development of the Work Plan; acquisition of scientific, engineering, or additional specialized technical support; and other aspects of the day-to-day activities associated with the project. The Project Manager identifies staff requirements, directs and monitors progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

Project team members include project task leads and key technical personnel from various technical disciplines. They are: Lynn Arabia for environmental chemistry; Ronald Marnicio for human health risk assessment; John Schaffer for ecological risk assessment; Robert Chozick, Ph.D., P.E. for the feasibility study; Sydne Marshall, Ph.D. for community relations and cultural resources; Grey Coppi, CIH for health and safety; Jon Gabry for quality assurance and Mark Sielski for project quality control. Technical discipline leads will oversee activities related to their expertise and provide their input, as needed, to the Project Manager.

4.3 Project Schedule

A project scoping meeting was held on 6 December 2005 and a site visit performed on 24 August 2005. Table 4-1 lists the major project deliverables. Figure 4-2 is the overall baseline project schedule based on work plan and budget approval date of 17 March 2006. The total duration of the field work is estimated to be 70 weeks.

4.4 Cost Estimate

The estimated cost and LOE hours for completing the scope of work described in this Work Plan are included in the Work Plan Budget Estimate, which has been submitted under a separate cover.

5.0 REFERENCES

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TABLE 3-1 (Sheet 1 of 3)
FIELD INVESTIGATION FIELD SCREENING AND SAMPLING PROGRAM
RATIONALE AND ANALYSES
FULTON AVENUE SUPERFUND SITE OU-2 RI/FS

Sample Type	Location	Number	Rationale for Sampling	End Use of Data	Analysis*
MIP**	At approximately 98 locations along 11 transects	98	To locate potential source areas of TCE and in determining locations of wells	NE, GEO	Field Screening
Hydropunch	At each MIP location, number of samples from each location within transects to be determined by decision matrix (Figure 3-2). Approximately 2 hydropunch samples per location.	196	To confirm the absence or presence of groundwater contamination as preliminarily identified during the MIP investigation, to locate potential source areas of TCE, and to aid in determining the locations of monitoring wells	NE, GEO	VOCs (to be analyzed using a field GC)
HydroPunch confirmation samples	25% of HydroPunch samples to be split - sent to off-site RAS laboratory	49	To verify field GC screening results.	NE	Low Concentration VOCs (at least first 5 samples to be sent for 7-day TA with submission of preliminary, non-validated data to confirm GC methodology)
Subsurface Soil (1 sample 2-50 feet bgs or above water table and 1 sample below water table)	Potential source areas (6 borings at 6 locations, 2 samples each)	72	To evaluate subsurface soil as a source of groundwater contamination.	HH, NE	TCL Organics, TAL Metals, TOC, 20% for Grain Size as per work plan
Surface Soil (0-0.5 foot bgs)	High potential exposure areas at potential source areas (6 potential source areas, 6 samples at each)	36	To evaluate surface soil as an exposure media for ecological receptors	ECO, NE	TCL Organics, TAL Metals, TOC

TABLE 3-1 (Sheet 2 of 3)
FIELD INVESTIGATION FIELD SCREENING AND SAMPLING PROGRAM
RATIONALE AND ANALYSES
FULTON AVENUE SUPERFUND SITE OU-2 RI/FS

Sample Type	Location	Number	Rationale for Sampling	End Use of Data	Analysis*
Surface Soil (0-2 foot bgs)	High potential exposure areas at potential source areas (6 potential source areas, 6 samples at each)	36	To evaluate surface soil as an exposure media for human receptors	HH, NE	TCL Organics, TAL Metals, TOC
Subsurface Soil (2-10 feet bgs)	High potential exposure areas at potential source areas (6 potential source areas, 6 samples at each)	36	To evaluate subsurface soil as an exposure media for human receptors and as a transport medium. To determine extent of impacted soil.	HH, NE	TCL Organics, TAL Metals, TOC, 20% for Grain size
Monitoring wells*** on-site and off-site (two rounds)	Existing (24) and newly installed (18) monitoring wells	84	To confirm the absence or presence of groundwater contamination and to evaluate groundwater as an exposure media	NE, GEO, HH	Low Concentration Organics, TAL Metals, Water Quality Parameters
Surface Soil (0-2 foot bgs)	Off-site (Background) Locations 6 locations, 1 sample each location	6	To determine background surface soil concentrations of various constituents	HH, NE	TAL Metals, TOC
Subsurface Soil (2-10 feet bgs or above water table)	Off-site (Background) Locations 6 locations, 1 sample each location	6	To determine background subsurface soil concentrations of various constituents	HH, NE	TAL Metals, TOC
Surface Soil (0-0.5 foot bgs)	Off-site (Background locations) 3 locations, 1 sample each location	3	Will be collected only if needed for BERA, to determine background surface soil concentrations of various constituents	ECO, NE	TAL Metals, TOC
	Total Groundwater Samples **Total Soil Samples**	**329** **195**			

TABLE 3-1 (Sheet 3 of 3)
FIELD INVESTIGATION FIELD SCREENING AND SAMPLING PROGRAM
RATIONALE AND ANALYSES
FULTON AVENUE SUPERFUND SITE OU-2 RI/FS

Sample Type	Location	Number	Rationale for Sampling	End Use of Data	Analysis*
Soil Gas	8 locations. Soil gas samples to be collected at approximately 5 and 10 feet bgs. In addition, one indoor air sample to be collected at each location. Two ambient (outdoor) air samples will also be collected	26	Characterize exposure risks to residents and workers in community and to evaluate air as an exposure media and transport media	HH	VOCs, Non-RAS Laboratory
	Total Air samples	**26**			

NOTES:

* The table does not include QA/QC samples. These will be identified in the QAPP.

** A membrane interface probe and electrical conductivity sensor will be used for field screening at each of the approximately 98 geoprobe locations. The result of this screening will provide data to define the extent of the plume, and subsequent HydroPunch samples will be collected based on the results of this screening.

*** Existing Groundwater Wells will be evaluated to determine suitability for sampling, and 24 wells will be selected for sampling. In addition, the 18 newly installed monitoring wells will be sampled.

Acronyms /abbreviations include:

NE = Nature and Extent
ECO = Ecological Risk Assessment
GEO = Geology/Hydrogeology
HH = Human Health Risk Assessment
TCL = Target Compound List
Organics = VOCs, SVOCs and Pesticides/PCBs
PCB = Polychlorinated Biphenyl
TAL = Target Analyte List
SVOC = Semi-Volatile Organic Compound
VOC = Volatile Organic Compound
TOC = Total Organic Carbon

TABLE 4-1
FULTON AVENUE SUPERFUND SITE RI/FS, OU-2
SUMMARY OF MAJOR DELIVERABLES

WORK PLAN SUBTASK	DELIVERABLE	NO. OF COPIES	DUE DATE (Calendar Days)
1.04	Draft RI/FS Work Plan	3	45 days after scoping meeting
1.07	Draft QAPP	3	21 days after receipt of EPA final comments on draft work plan
1.07	Final QAPP	3	15 days after receipt of EPA final comments
1.08	Draft HASP	3	21 days after receipt of EPA final comment on draft work plan
1.08	Final HASP	3	15 days after receipt of EPA final comments
1.13	Pathways Analysis Report	3	21 days after approval of Data Evaluation Report
2.02	Draft Community Relations Plan (CRP)	2	60 days after completion of Community Interviews
2.02	Final CRP	2	14 days after final comments from EPA on Draft CRP
2.04	Fact Sheets	3	7 days prior to public meeting/event
2.06	Public Notices	3	14 days before public meeting/event
2.08	Site Mailing List	2	14 days after approval of Final CRP
5.03	Data Validation Reports	1	30 days after receipt of all analytical results from laboratory
6.03	Modeling Technical Memorandum	3	14 days after model is run
6.04	Data Evaluation Report	5	30 days after completion of the Data Reduction, Tabulation and Evaluation
7.01	Draft Baseline Risk Assessment Report	3	45 days after approval of the Pathways Analysis Report
7.01	Final Baseline Risk Assessment Report	3	14 days after receipt of EPA final comments
7.02	Screening Level Ecological Risk Assessment	3	45 days after submission of the Data Evaluation Report
9.01	Draft Remedial Investigation (RI) Report	6	90 days after EPA approval of Data Evaluation Report
9.02	Final RI Report	6	30 days after receipt of EPA final comments
10.01	Draft Remedial Alternatives Technical Memorandum	3	60 days after submission after final RI report submission
10.02	Final Remedial Alternatives Technical Memorandum	3	14 days after receipt of EPA final comments on Draft Remedial Alternatives Technical Memorandum
11.01	Draft Remedial Alternatives Evaluation Memorandum	3	30 days after Final Remedial Alternatives Technical Memorandum
11.02	Final Remedial Alternatives Evaluation Memorandum	3	14 days after receipt of EPA final comments on Draft Remedial Alternatives Evaluation Memorandum
12.01	Draft Feasibility Study Report	6	45 days after approval of Final Remedial Alternatives Evaluation Memorandum
12.02	Final Feasibility Study Report	6	30 days after receipt of EPA final comments
16.01	Work Assignment Completion Report	3	30 days after Work Assignment Closeout Notification from EPA

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

(To be submitted under separate cover)

APPENDIX B

HEALTH AND SAFETY PLAN

(To be submitted under separate cover)