REMEDIAL DESIGN WORK PLAN

CABOT CARBON SUPERFUND SITE

Site Identification Number FLD980709356

Submitted to:

U.S. Environmental Protection Agency

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Cabot Carbon Superfund Site
Hawthorn Remedy
US EPA ID No. FLD980709356
Gainesville, Florida

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ABBREVIATIONS AND ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
bgs	Below ground surface
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of Concern
CSM	Conceptual Site Model
CUG	Cleanup Goal
DQO	Data Quality Objective
FDEP	Florida Department of Environmental Protection
FFS	Focused Feasibility Study
FSAP	Field Sampling and Analysis Plan
GCTL	Groundwater Cleanup Target Level
GRU	Gainesville Regional Utilities
HASP	Health and Safety Plan
HG	Hawthorn Group
IC	Institutional Control
LHG	Lower Hawthorn Group
MCL	Maximum Contaminant Level
OU	Operable Unit
PDI	Pre-Design Investigation
POTW	Publicly Owned Treatment Works
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RSL	Risk Screening Level
SAP	Sampling and Analysis Plan
SOG	Standard Operating Guideline
SOW	Scope of Work
SPT	Standard Penetration Test
SRI	Supplemental Remedial Investigation
THA	Task Hazard Analysis
UFA	Upper Floridan Aquifer
UHG	Upper Hawthorn Group
US EPA	United States Environmental Protection Agency

1. INTRODUCTION

1.1 Overview

This Remedial Design (RD) Work Plan, prepared by Geosyntec Consultants (Geosyntec) on behalf of Cabot Corporation (Cabot), addresses the Cabot portion of the Cabot Carbon/Koppers Superfund Site located in Gainesville, Alachua County, Florida (Site). Cabot is performing supplemental remedial activities (RA) at the Site according to the Supplemental Remedial Investigation (SRI) and Focused Feasibility Study (FFS) Report dated January 2017 and United States Environmental Protection Agency's (US EPA's) conditional approval letter dated 10 April 2017. The SRI/FFS Report includes a summary of the result of additional soil and groundwater quality investigations and presents the following:

1. A preferred remedy, herein described as the Hawthorn Remedy, that addresses contamination in the Hawthorn Group (HG) formation.
2. A proposed assessment of the existing Surficial Aquifer Remedy to identify whether additional actions can be implemented in a cost-effective manner to accelerate the time required to reach groundwater cleanup goals in the surficial aquifer.

This RD Work Plan addresses specific requirements for Hawthorn Remedy RD and describes specific activities that will be conducted for the Hawthorn Remedy's supplemental pre-design investigation (PDI) and RD. This document establishes the scope of work and protocol to be used in performing the Hawthorn Remedy RD/RA activities in conformance with the US EPA guidance document entitled "*Remedial Design/Remedial Action Handbook*" (US EPA 1995). A Surficial Aquifer Remedy Optimization Evaluation Work Plan will be submitted by Gradient Corporation (Gradient) under a separate cover and will follow a separate track from the Hawthorn Remedy RD.

1.2 Problem Statement and Remedial Design Objectives

The Site comprises unsaturated and saturated soils, surficial aquifer groundwater, and HG formation groundwater that have been impacted by the historical operations, including the former pine tar processing facility and subsequent site development. Migration of the impacted groundwater in the surficial aquifer and the HG formation from the source areas is the primary concern. A remedy that addresses contamination in the surficial aquifer as specified in the 1990 ROD and was installed in 1995 and has proven very effective in addressing contamination in the Surficial Aquifer over its 22 years of operation. This remedy consists of a 2000 ft long groundwater interceptor trench that intercepts surficial aquifer groundwater flow from essentially the entire footprint of the former Cabot Carbon facility. The SRI/FFS Report presents results of supplemental investigations of soil and groundwater quality in the Hawthorn Group (HG) formation. To address the impacts to the HG formation, the remedy consisting of a source-area containment system and a downgradient groundwater extraction was developed and selected for the Site in the SRI/FFS Report.

The Hawthorn Remedy and the Surficial Aquifer Remedy Optimization Evaluation that were proposed in the SRI/FFS Report were approved by the US EPA in a conditional letter, dated 11 April 2017. The Hawthorn Remedy and the Surficial Aquifer Remedy are further described in Section 2.2.4.

The primary objectives of the Hawthorn Remedy RD are:

- gather supplemental information on the Site required for design of the selected Hawthorn Remedy;
- perform engineering design evaluations for the Hawthorn Remedy using existing and supplemental data and information; and
- prepare construction drawings and specifications necessary for implementing the Hawthorn Remedy.

As indicated above, the assessment for the Surficial Aquifer Remedy Optimization Evaluation will be performed under a separate design track and addressed in a remedy optimization evaluation work plan to be submitted under a separate cover.

1.3 Remedial Design Work Plan Organization

This RD Work Plan is prepared in accordance with applicable CERCLA guidance and addresses the Hawthorn Remedy requirements set forth in the SRI/FFS Report. Portions of this work plan including the existing project information, description of the selected remedy, and summary of requirements, are obtained from the SRI/FFS Report. This RD Work Plan is organized into seven sections.

- **Section 2 – Existing Project Information**. This section presents a physical description of the Site, the conceptual site model, the administrative framework for this RD, and remedy descriptions.
- **Section 3 – PDI Activities**. This section presents a summary of the supplemental investigations that will support the RD.
- **Section 4 – Engineering Design Process**. This section presents a list and detailed description of the tasks to be performed as they relate to the selected remedy and a summary of the information that will be produced as part of each task.
- **Section 5 – Remedial Design Deliverables**. This section presents a description of each design deliverable associated with the RD tasks. Each deliverable will be submitted to the US EPA.
- **Section 6 – Project Schedule**. This section presents the anticipated dates for completion of each RD activity and dates of submission of each RD deliverable along with information regarding timing, initiation and completion of all critical path milestones for each activity and/or deliverable.

- **Section 7 – References**. A listing of references used in the preparation of the RD Work Plan.

1.4 Remedial Design Team and Communication

The project organizational structure provided as Figure 1 shows the RD Team and relevant stakeholders. Below is a brief description of the RD Team.

- Cabot will perform or retain subcontractors to perform RD activities for the Hawthorn Remedy. Cabot will coordinate project deliverables and communications with the US EPA and disseminate any communications from the US EPA to the RD Team.
- Gradient is a consultant to Cabot and will continue to serve as Cabot's Supervising Contractor in accordance with the Consent Decree. Gradient prepared the SRI/FFS Report and will be the lead consultant for the Surficial Aquifer Remedy Optimization Evaluation preparing both the work plan and subsequent reports.
- Geosyntec Consultants, Inc. (Geosyntec) is contracted by Cabot as the design engineer and will be responsible for generating the RD Work Plan, gathering supplemental field data as part of the PDI, and preparing the various design deliverables (including calculations, specifications and drawings) for the selected remedy described in the SRI/FFS Report. Additionally, Geosyntec will be responsible for implementing the field investigation associated with the Surficial Aquifer Remedy Optimization Evaluation.
- Environmental Standards, Inc. is contracted by Cabot to perform routine Operation, Maintenance and Monitoring of the Surficial Aquifer remedy.
- Weston Solutions, Inc. is contracted by Cabot as the property and tenant liaison.

Cabot will provide and receive correspondences to/from US EPA for the project, and will distribute information to the RD team as necessary. At Cabot's direction, correspondences and reports may be provided to US EPA directly from Cabot's consultants. US EPA will be responsible for disseminating communications or information from Cabot to other stakeholders as necessary and consolidating stakeholder comments and providing them to Cabot. As in the past, Cabot will continue to accept a working group approach where direct communications between Cabot's consultant and various Stakeholders occurs in the interest of collaboration and expediency to advance specific matters. However, final decisions and directives will reside with US EPA, as the lead agency for the Site, and Cabot.

2. EXISTING PROJECT INFORMATION

2.1 Site Description

2.1.1 Geographic Location

The Site comprises approximately 34 acres, located in the northern section of the City of Gainesville, as shown on Figure 2, and is part of a larger 170-acre Superfund area known as the Cabot/Koppers Superfund area. The Cabot/Koppers Superfund area is comprised of two properties, the former Cabot Carbon property (referred to in this document as "the Site") and the Koppers property. The Site is located east of the Koppers property as shown on Figure 3. A mixture of commercially developed and undeveloped areas exists on and to the north of the Site.

The Site has been redeveloped for commercial use, consistent with land use in the area. Automobile dealerships are concentrated in this section of the city, particularly along North Main Street, which abuts the former Cabot Carbon property to the east. The Site is occupied by a shopping mall (referred to as the Northside Shopping Center) with several retail box store facilities, automobile and boat dealership and service shop locations, and several smaller office buildings. The northwestern portion of the Site is undeveloped; a storm water pond, associated with the shopping center, is also located in this area as shown on Figure 3.

2.1.2 Physiographic Setting

The Site is relatively flat with topographic elevations ranging from approximately 170 to 190 ft above mean sea level. Surface water drainage is controlled by the storm water pond located in the northwestern portion of the former Cabot Carbon property, a storm water pond north of NE 28th Place, and a concrete-lined drainage ditch that runs along North Main Street. The drainage ditch flows to the north until it intersects an east-west ditch (near NE 31st Avenue), which discharges into Springstead Creek and ultimately to Hogtown Creek.

2.1.3 Geology

A cross section showing the surficial aquifer and the HG formation is provided as Figure 4. The Site is underlain by a thick interbedded sequence of sands, silts, and clays, approximately 140 ft in thickness. The overburden deposits are underlain by dolomite limestone, referred to as the Floridan Aquifer, which serves as the City of Gainesville's water supply. The overburden units include the following from top to bottom (Gradient 2017):

- The Surficial Aquifer, which includes 1 to 2 ft of topsoil or fill materials and approximately 25 to 30 ft of silty to clayey sand.
- The Hawthorn Group formation, which consists of inter-bedded and intermixed clays, sands, and carbonate beds. The HG formation includes a few feet of a stiff plastic upper clay unit, approximately 25 to 30 ft of consolidated sand to silty to clayey sand, known as the Upper HG (UHG), approximately 10 to 20 ft of a stiff middle clay unit, 20 to 30 ft of semi-consolidated to consolidated silty to clayey sand with phosphate grains and indurated clasts cemented with dolomite, known as the Lower HG (LHG), and approximately 28 to 30 ft of a lower clay unit.

- The Floridan Aquifer, which is composed of dolomite limestone formations. The upper formation consists of the Upper Floridan Aquifer (UFA) which has an upper water bearing zone of friable, weathered limestone and a lower water bearing zone that consists of harder fractured limestone.

Additional details regarding Site geology are provided in Section 3.1 of the SRI/FFS Report.

2.1.4 Hydrogeology

Hydrologic units encountered during the RI coincide with the above-referenced geologic units. Groundwater in the surficial aquifer flows towards the north-northeast, and is influenced by the presence of the groundwater interceptor trench on the eastern side of the Site. Groundwater flow in the HG units is also towards the north-northeast, with a slightly more northerly component in the LHG than the UHG. Groundwater flow in the UFA is mainly towards the north (Gradient 2017).

Hydraulic conductivity estimates for the Site are available based on previous RI measurements, groundwater sampling, and well development purge rates. Hydraulic conductivity order of magnitude is 10^{-2} cm/s for the surficial aquifer, 10^{-4} cm/s for the UHG, and $5x10^{-3}$ cm/s for the LHG. Hydraulic conductivities indicate that the surficial aquifer and the LHG formation have a greater ability to transmit water compared to the UHG formation. The differences in hydraulic conductivities of the various water-bearing units and the implication on contaminant plume migration have been considered in the SRI/FFS Report as part of the remedy selection process.

Downward vertical hydraulic gradients are present at the Site. The potentiometric head difference between the surficial aquifer and the UHG water bearing zone is on the order of 5 to 10 ft. The potentiometric head difference between the UHG and the LHG units is on the order of 25 to 30 ft. COCs are primarily limited to the surficial aquifer and UHG, suggesting limited hydraulic communication between the UHG and LHG units due to a relatively thick (approximately 15 to 20 ft) and competent middle clay unit.

Additional details regarding Site hydrogeology are provided in Section 3.2 of the SRI/FFS Report.

2.1.5 Conceptual Site Model (CSM)

The CSM (Gradient 2017) integrates the chemical characterization results reported in the SRI/FFS Report with other findings and observations made during RIs and RAs to provide an overall understanding of Site impacts and COC migration and attenuation. Key elements of the CSM include:

- residual pine tar is present in unsaturated zone soils (approximately top 10 ft bgs) and in localized areas in saturated soils within the Former Lagoon Area;
- groundwater concentrations of key pine processing constituents increase with depth, indicating the potential presence of residual pine tar in the UHG;

- relatively high hydraulic conductivities in the surficial aquifer soils resulted in rapid transport, removal, and natural attenuation of contaminants;
- relatively low hydraulic conductivities of the UHG resulted in limited transportation and attenuation of constituent concentrations in a localized portion of the UHG;
- relatively low concentrations of constituents have been observed in a localized area of the LHG and are consistent with the dissolved-phase migration through the middle-clay because of downward flow gradients;
- higher hydraulic conductivities in the LHG, compared to the UHG, result in more rapid attenuation;
- no key pine processing constituents were detected at any depth in the UFA, confirming attenuation of the pine processing plume with depth; and
- Groundwater quality effects associated with the Former Processing and Storage Area are localized and attenuate within a short distance.

2.2 Administrative Framework

The historical investigations and evaluations undertaken at the Cabot Carbon Site characterized the nature and extent of contamination. Appropriate remedial actions were identified for the HG formation. These investigations and evaluations are summarized in the SRI/FFS Report, which was conditionally approved by the US EPA in a letter dated 10 April 2017. A summary of the investigations and a description of the Hawthorn Remedy are provided below.

2.2.1 Summary of Historical Investigations

A series of investigations were performed prior to the 1990 ROD to address environmental impacts due to associated with former pine processing operations at the Site. Vadose zone soil and surficial aquifer groundwater quality were characterized during these investigations and the Former Lagoon Area was identified as the primary source area (Gradient 2017). They included the following:

- a 1982 study, performed by the University of Florida and commissioned by the Cabot Foundation, to assess the environmental impacts associated with former Cabot Carbon operations (University of Florida 1982);
- the initial Superfund RI that was performed to characterize the quality of soil, groundwater, surface water, and sediment on and off the Site (IT Corp. 1987); and
- a supplemental RI undertaken to address data gaps, including the extent of soil and sediment contamination and the extent of off-site contamination of the groundwater plume (Hunter/ESE 1989).

Based on the initial investigations, a ROD was issued in 1990. Cabot executed the ROD-required actions, including the installation of a surficial aquifer groundwater interceptor trench in 1994 on the Cabot Carbon portion of the Site, and performed supplemental investigations.

Through discussions with US EPA and stakeholders, Cabot agreed to perform additional supplemental investigations. A series of HG investigations on the Cabot Carbon Site were performed between 2009 and 2016 culminating in the 2017 SRI/FFS that recommended a combined remedy that includes containment, groundwater extraction and treatment, and hydraulic controls for the HG formation. US EPA accepted the SRI/FFS and conditionally approved the Hawthorn Remedy in a letter to Cabot dated 10 April 2017.

2.2.2 Remedial Action Objectives

The RAOs for the Site were developed to guide the remedy evaluation and selection process, and to provide specific requirements to protect human health and the environment. The process for development of RAOs for the Site are described in the SRI/FFS. Soil and groundwater RAOs were developed based on current and expected continued future commercial use of the property. Institutional controls (ICs) will remain in place on the Site to control groundwater exposures.

Accordingly, the RAOs for the Site are:

- Eliminate direct contact with vadose zone soils in the Former Lagoon Area that may pose human health risks to potential receptors in the event of future redevelopment.
- Contain the Former Lagoon Area to control and eliminate migration of impacted groundwater from the source area. Containment of the source, rather than attainment of drinking water standards, was determined to be the appropriate RAO because of the significant and Site-specific implementation challenges associated with source treatment remedial alternatives.
- Reduce contaminant mass within the containment zone to limit the potential for lateral migration of impacted groundwater beyond the source area and vertical migration into underlying aquifers (*i.e.*, the LHG formation).
- Restore groundwater quality in the downgradient plume to achieve health-based criteria, as appropriate. Health-based criteria were used, depending on availability, in the following hierarchy: lower of US EPA Maximum Contaminant Levels (MCLs) and Florida Department of Environmental Protection (FDEP) MCLs, Groundwater Cleanup Target Levels (GCTLs), and US EPA Risk Screening Levels (RSLs).

An integral component of this RD and subsequent RA will be routine monitoring to evaluate progress towards the attainment of the RAOs. The effectiveness of the remedy in the context of groundwater RAOs will be evaluated based on its ability to reduce the footprint of the groundwater plume over time and decrease concentrations within the plume to eventually attain health-based criteria and meet GCTLs at the downgradient Site boundary. Downgradient monitoring wells will be monitored to track concentration temporal trends and ensure that the groundwater plume does not migrate beyond the downgradient Site boundary, which generally coincides with North Main Street.

2.2.3 ARARs and CUGs

Remedial actions will comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), applicable regulatory guidance, Applicable or Relevant and Appropriate Requirements (ARARs), and site cleanup goals (CUGs). Regulatory standards and guidance were evaluated and considered in the development of site-specific ARARs and CUGs, which are described in Section 4.2 of the SRI/FFS Report.

For the Hawthorn Remedy, location-specific regulations, action-specific regulations, and chemical-specific regulations identified as ARARs are provided in Tables 4.1, 4.2, and 4.3, respectively, of the SRI/FFS Report. Soil and groundwater contaminants of concern (COCs) and their respective health-based CUGs are provided in Tables 4.4 and 4.5 of the SRI/FFS Report. Cabot acknowledges that the conditional approval letter from the US EPA (US EPA 2017) proposed revisions to the ARARs and the list of groundwater COCs and CUGs, and will continue to work with the USEPA to develop consensus on the ARARs and CUGs applicable to the Hawthorn Remedy.

2.2.4 Proposed Remedy

The Hawthorn Remedy comprises two components, Part I and Part II, as described below. As previously mentioned, an evaluation of the existing surficial aquifer remedy is proposed; therefore, a description of the Surficial Aquifer Remedy Optimization Evaluation is provided. Additional details regarding the development of the Hawthorn Remedy and the Surficial Aquifer Remedy Optimization Evaluation are provided in the SRI/FFS Report.

Part I: Containment

The Hawthorn Remedy includes physical containment of the source area and concentrated portions of the related groundwater plume, and will be achieved using a low-permeability vertical barrier wall and a low-permeability cap. The vertical barrier wall will mitigate lateral migration of upgradient groundwater into the surficial aquifer and UHG below the former lagoons and concentrated portions of the groundwater plume, and prevent groundwater from these impacted areas of the surficial aquifer and UHG from migrating downgradient. A low-permeability cap will be installed over the footprint encompassed by the vertical barrier wall to reduce infiltration of precipitation into the containment zone. The surface of the cap will be graded to promote surface runoff and drainage. The existing storm water pond will be relocated. Several low-permeability cap options will be evaluated for usefulness, effectiveness of preventing infiltration, and meeting the remedy requirements.

The vertical barrier wall will key into the middle clay unit, approximately 65-ft below ground surface. As described below, a field investigation program will be performed to confirm the alignment and depth for the vertical barrier wall. This will be followed by a mix design study that will evaluate the strength, long-term compatibility, hydraulic conductivity, and chemical compatibility of the vertical barrier wall soil mixture.

Soil excavated during the installation of the vertical barrier wall and cap. The excavated soil will likely be reused for construction of the vertical barrier wall and any excess soil will be placed under the containment cap.

Part II: Groundwater Extraction

The groundwater extraction portion of the Hawthorn Remedy consists of groundwater extraction within the containment system (i.e., vertical barrier wall), and groundwater extraction downgradient and outside of the containment system. Extraction within the containment system will mitigate the vertical migration from the UHG into underlying aquifers, and allow for dissolved mass removal within the containment zone. Extraction downgradient and outside of a containment system will facilitate targeted contaminant mass removal from the UHG downgradient of the source area. Pumping wells will be utilized for the system within the containment area and either a pumping trench or pumping wells will be utilized for the portion of the system outside the containment area. Extracted groundwater will be sent to the Gainesville Regional Utility (GRU)-operated Publicly Owned Treatment Works (POTW) for treatment. The extraction system will operate until it meets performance metrics that will be established during the RD.

Groundwater quality in the LHG is expected to be restored in response to groundwater extraction from the UHG within the containment area, which will mitigate downward mass flux. LHG groundwater extraction and treatment will be used as a contingency measure in the unlikely event that concentrations in the LHG do not attenuate in response to the UHG remedy.

Part III: Surficial Aquifer Remedy Optimization Evaluation

The SRI/FFS proposed the existing surficial aquifer remedy be evaluated to determine if it can be optimized. The current remedy, in operation since the mid-1990s, is a groundwater extraction trench that intercepts the base flow of the surficial aquifer along a 2,000 ft wide path. It was originally designed to capture contaminated groundwater from the entire Cabot Carbon plant footprint. The trench has a long history of successful operation, has prevented migration of COCs downgradient in the surficial aquifer and has removed significant contaminant mass from the Site. During the SRI, a few discrete and localized potential source areas in the southern portion of the former Cabot Carbon property have been identified as overall groundwater quality within the surficial aquifer have improved. The optimization evaluation will evaluate if an alternative, enhanced or more refined capture or treatment approach is feasible, warranted and cost effective. The goal of the evaluation will be to assess whether additional actions can be implemented in these areas to accelerate the time required to achieve groundwater cleanup goals in the surficial aquifer. A separate work plan will be prepared to address the optimization evaluation of the surficial remedy.

3. PRE-DESIGN INVESTIGATION ACTIVITIES

3.1 Overview

This section describes the PDI activities that will be undertaken prior to and during the RD to provide information for developing the engineering design of the Hawthorn Remedy. Specifics of each PDI activity defined below will be provided in a forthcoming PDI Work Plan. The PDI results and relevant existing information will be incorporated into the RD as described in Section 4 of this RD Work Plan.

3.2 Review of Existing Information

As described in Section 2 above, Cabot, the US EPA and others have conducted multiple investigations to characterize Site conditions and to define the nature and extent of contamination. Geosyntec has reviewed the data, with specific regard to investigations related to the HG formation and design of the Hawthorn Remedy. The objective of the review was to gather knowledge that can be used in the RD and to identify gaps in the existing data that need to be addressed using supplemental investigations and testing.

3.3 Pre-Design Investigation Work Plan

The objective of the PDI Work Plan is to identify the PDI objectives, present the PDI scope of work, and provide the plans and procedures necessary for the data gathering activities including sample collection, sample analysis, and mix design. The PDI Work Plan will be submitted separately and will summarize the additional data and the PDI activities. The PDI work plan will be comprised of the following elements applicable to each PDI investigation activity:

- Objective of the PDI and how the resulting information will be incorporated into the RD.
- Description of the scope of field and laboratory work.
- Supplements to the existing Field Sampling and Analysis Plan (FSAP) and a Quality Assurance Project Plan (QAPP)[1]. Collectively, these documents will instruct the field team on how to execute the testing and collect the necessary data.
- Supplements to the Health and Safety Plan (HASP) which will be in effect during all field activities[2].
- Mix Design Work Plan which will describe the sampling and laboratory program for testing various mixtures for the barrier wall and selecting the mixture for the RD.
- The PDI Work Plan will include figures showing the proposed investigation locations, tables as needed to define the scopes of work.

[1] The existing FSAP and QAPP will not be included in the PDI Work Plan; however, supplemental procedures (e.g., standard operating guidelines - SOGs), plans, or descriptions of the work will be included as needed to perform the work.

[2] Task hazard analyses will be developed for each PDI activity, and will supplement the existing HASP. Revisions to the existing HASP will be performed at a later date, as needed.

The PDI Work Plan will describe the PDI activities listed below.

- Geotechnical Borings and Soil Sampling
    - Borings for Vertical Barrier Wall Design
    - Borings for Low-Permeability Cap Design
    - Borings for Stormwater Pond Design
- Aquifer Hydraulic Testing
- Mix Design

3.3.1 Supplements to the FSAP and QAPP

The supplements to the FSAP will define in detail the sampling and data-gathering methods, including sampling objectives, sample location (horizontal and vertical) and frequency, sampling equipment and procedures, and sample handling and analysis. Addenda to the FSAP and QAPP will be provided as necessary as sections or appendices of the PDI Work Plan. Supplemental information will include:

- Pre-Design Investigation Rationale and Objectives;
- Investigation Methods, Procedures, and Equipment;
- Sample Designation;
- Investigation Support Activity Procedures;
- Sample Handling; and
- Sample Analysis.

Standard Operating Procedures Guidelines (SOGs) will be included in an appendix to the PDI Work Plan. SOGs will guide the field team in the appropriate implementation of sample collection and field testing. SOGs may include field forms and other tools that will be used by the field team during PDI work.

The current QAPP describes the project data quality objectives (DQOs) and organization, functional activities, and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired DQOs by the sampling team and selected laboratory. The PDI Work Plan will include updates to the QAPP as necessary for new or modified testing (but not a rewrite of the QAPP).

3.3.2 Health and Safety Plan

The existing Site HASP will be supplemented for PDI activities using task-hazard analyses (THAs), which will be prepared for individual activities. The HASP and THAs will collectively describe the health and safety program that will be in effect during all field activities prior to construction. The HASP will be an overarching document that outlines Site-wide risks, medical monitoring, site control, health and safety protocols, reporting, etc. THAs will be PDI-focused documents that will address specific health and safety risks, procedures and mitigation measures

for an individual PDI activity or task. For example, a THA will be prepared for the task of drilling and sampling used to delineate the boundary of the slurry wall.

3.3.3 Mix Design Work Plan

The Mix Design Work Plan will be part of the PDI work plan. The Mix Design Work Plan will describe a laboratory program for the engineering materials which will be used for the construction of the vertical barrier wall. The objective of this plan is to describe the procedures, evaluations and bench scale testing required to select a mix design for the vertical barrier wall.

3.4 Supplemental Investigations and Testing

PDI investigations and testing will be performed in accordance with the activities described in the PDI Work Plan. Expected PDI activities introduced in Section 3.3 are summarized below according to the components of the Hawthorn Remedy.

3.4.1 Part I: Containment

Geotechnical borings, soil sampling, and the vertical barrier wall mix design will be performed to collect information for the containment system component of the Hawthorn Remedy. The objectives of the PDI activities are as follows:

- Borings for Vertical Barrier Wall Design: Geotechnical borings will be performed for defining the alignment of the vertical barrier (particularly the northwest portion of the Site and around the former western lagoon) based on visual evidence of pine tar (if any), obtaining soil descriptions and delineating lithology, and evaluating geotechnical properties for soils along the vertical barrier wall alignment. Samples will be collected for mix design testing.
- Borings for Low-Permeability Cap Design: Boring will be conducted for collecting samples of lagoon-bottom soils to assess their potential settlement under the load of the proposed cap.
- Borings for Stormwater Pond Design: Borings will be performed for assessing subsurface conditions above the water table in the proposed location for the relocated stormwater pond.
- Mix Design: A mix design laboratory program will be performed for defining the matrix of soil mixtures and associated testing that will be performed to select the backfill for the vertical barrier.

Collectively, the scope of these PDI activities includes:

- geotechnical borings every 150 feet along the perimeter of the proposed vertical barrier alignment, with:
    - visual inspections of the soil for pine tar to define the lateral extent of the vertical barrier wall (i.e., visual pine tar will be contained within the vertical barrier wall, a description of how to identify pine tar will be provided in the PDI Work Plan);

  - the program includes step-out borings if visual tar is observed;
  - Standard Penetration Tests (SPTs) during drilling to obtain data to correlate soil strength properties and obtain samples;
  - laboratory testing on samples to classify site soils; and
  - collection of samples for vertical barrier mix design testing in accordance with the Mix Design Plan;
- two borings at locations inside the proposed vertical barrier alignment and within the former lagoons to obtain data for the low-permeability cap design including:
  - one Shelby tube sample from each boring within the former lagoon bottom that will be used to assess settlement; and
  - field torvane testing on soils located within the former lagoon bottom to assess soil strength;
- four geotechnical borings with continuous SPT testing to a depth of 25-feet below the ground surface within the proposed footprint of the relocated storm water pond;
- laboratory testing to classify soils;
- survey of geotechnical borings and sample locations.

3.4.2 Part II: Groundwater Extraction

The groundwater extraction component of the RA is described in Section 2.4.2-Part I. The objective of the following PDI activities is to collect hydraulic data for the surficial aquifer and the UHG formation, which will be used to design both the groundwater extraction system to be installed inside the containment system and the extraction wells or trench to be installed downgradient of the vertical barrier.

Aquifer hydraulic testing is designed to collect this information and describe the following field testing:

- Step-drawdown testing at one surficial aquifer well (e.g., ITW-8 or SA-29) at three flowrates to evaluate well yield for extraction wells within the containment area.
- Step-drawdown testing at one well in the UHG (e.g., HG-28S) at three flow rates to estimate well yield for extraction wells or the extraction trench downgradient of the containment area.
- Approach for analyzing data to develop design criteria for both groundwater extraction systems.
- Alternative activities may be performed as part of the aquifer hydraulic testing to optimize the design of the extraction system design in both the surficial aquifer and the UHG. The scope of the alternative activities will be evaluated during preparation of the PDI Work Plan. The alternative activities include:

- install and survey location of two new 6-inch diameter extraction wells, one screened in the surficial aquifer and another screened in the UHG;
- perform step-drawdown tests at the two new extraction wells at three flow rates;
- perform a 48-hour constant flowrate pumping test in the surficial aquifer;
- perform a 36-hour constant flowrate pumping test in the UHG; and
- analyze data to develop design criteria for both groundwater extraction areas.

The Mix Design Work Plan will be executed after geotechnical borings along the perimeter of the proposed vertical barrier wall are completed. The Mix Design Work Plan will include the following objectives and scope of work:

- identify an appropriate trench low-permeability vertical barrier wall mix design or develop a one-pass trenching approach for the construction of the vertical barrier wall, based on the geotechnical information obtained from drilling;
- identify the percent bentonite, when mixed with native soils, required to achieve a backfill mix with a hydraulic conductivity of 1×10^{-7} cm/sec or slower;
- evaluate the long-term compatibility of the proposed backfill mixture with Site groundwater impacted with COCs; and
- assess contaminant leaching from the soil-bentonite mixture.

4. ENGINEERING DESIGN PROCESS

4.1 Overview

This section presents the proposed sequence for execution of the RD, and describes the engineering tasks that will be performed. RD Report submittals described in Section 5 will be used to present the RD and evaluate the RD against the RD/RA objectives described above. Cost Estimate and Constructability tasks will be performed to augment the RD. The RD schedule is presented in Section 6.

Design of the Hawthorn Remedy will be undertaken after PDI activities. Cabot requests US EPA approval of the following sequence for design:

- Following completion of the PDI, a meeting or conference call with US EPA will be held to discuss key findings from the PDI relevant to design and discuss preliminary design concepts for the vertical barrier wall alignment and depth, extent of cap, and stormwater pond location and piping. Geosyntec will prepare an agenda that will be distributed prior to the meeting/call. The agenda will include a summary of key PDI results and draft site plans showing the proposed vertical barrier, extent of cap, and stormwater pond location.
- Following US EPA's concurrence with the preliminary design concepts, design will then advance to a 50% stage.
- Engineering designs of the Hawthorn Remedy will be submitted to the US EPA for review at approximately 50% completion as described in Section 5.
- US EPA comments regarding the 50% Design Report will be discussed and any agreed upon design changes will be made in the Final Design (*i.e.*, 100% Design Report).

4.2 Design Tasks

4.2.1 Pre-Design Investigation Activities Results

The results of the data gathered during the PDI will be compiled, summarized, and submitted as part of the 50% RD package (i.e., the Intermediate (50%) Remedial Design Report) along with an analysis of the effect of the results on design activities (i.e., calculations). Data collected during the PDI will be compiled in appendices to the Intermediate (50%) Design Report. Germane information obtained from the PDI activities will be embedded into the 50% RD package drawings, figures and calculations.

4.2.2 Mix Design Results and Conclusions

Following completion of the mix design testing, results will be evaluated, summarized, and submitted as part of the 50% RD package. A summary of the testing and results will be included as an appendix to the Intermediate (50%) Design Report. The summary will include an evaluation of full-scale application of the vertical barrier technology, including an analysis identifying the key parameters affecting full-scale implementation, and a comparison of the test results with established Performance Standards. Key results from the mix design testing (i.e., the selected mixture) will be integrated into the 50% RD package drawings, calculations and specifications.

4.2.3 Containment Design

There are several objectives for the containment design including:

- contain surficial aquifer and UHG groundwater in the source area;
- reduce or minimize infiltration of surface water into the source area soils using a cap and relocating the existing storm water pond; and
- create a barrier to augment the groundwater extraction system.

The conceptual details regarding the design of the vertical barrier wall, low permeability cap, and the relocated storm water pond are described in Section 2.2.4-Part I. The activities associated with this component of the selected remedy include:

- evaluate the existing and supplemental subsurface soil and groundwater data;
- develop basis of design for the containment system components including required assumptions and input parameters for calculations that will be used for the design; the basis for design will address the following:
    - results of the Mix Design for the vertical barrier;
    - geotechnical considerations such as stability and cap loading requirements;
    - waste characterization and disposal requirements (if required);
    - volume of soil requiring treatment;
    - vertical barrier location, configuration, and maximum hydraulic conductivity;
    - low-permeability cap location, configuration, beneficial use, and maximum hydraulic conductivity;
    - storm water pond location and configuration;
    - materials and equipment required;
    - performance standards;
    - permitting requirements;
    - long-term monitoring requirements; and
    - physical location requirements (i.e., based on utilities, traffic control, site access, etc.).
- Design of the containment system will rely on the basis of design and data gathered during PDI activities. The design will include performing design calculations and development of design drawings and specifications that meet the requirements for design presented in the design calculations and assumptions.

4.2.4 Groundwater Extraction System Design

The objectives of the groundwater extraction system are the following:

- within the containment zone, reduce dissolved contaminant mass and mitigate the vertical migration of contaminants from the UHG into underlying aquifers; and
- downgradient and outside of a containment system, facilitate targeted contaminant mass removal from the UHG downgradient of the source area.

Conceptual details for this portion of the Hawthorn Remedy are discussed in Section 2.2.4-Part II above. The activities associated with the design of the groundwater extraction system include:

- evaluate the existing and supplemental subsurface soil and groundwater data;
- develop basis of design for the groundwater extraction system within the containment area and the system downgradient of the extraction area, based on the data evaluation. The basis of design includes any required assumptions and input parameters for calculations required to perform the design. The basis for design will address the following:
    - groundwater disposal requirements;
    - pretreatment requirements (if required or anticipated);
    - volume requiring treatment;
    - extraction well/trench locations, configuration, and estimated flow rates;
    - materials and equipment required;
    - performance standards;
    - permitting requirements;
    - long-term monitoring requirements; and
    - physical location requirements (i.e., based on utilities, traffic control, site access, etc.).

Data gathered during PDI activities will be used to design the groundwater extraction system; the design will include performing design calculations and development of design drawings and specifications. The 50% RD package will present the design with necessary appendices of field data and supporting calculations.

4.2.5 Project Documents

The Project Documents will be developed concurrently with the RD. These documents will collectively convey the RA and the RA requirements for the selected remedy. Design documents will include the following:

- Construction drawings will convey the physical layout of the remedy and relevant site information.

- Technical specifications will present the proposed material and equipment requirements and the methods for implementing the RA activities.
- The HASP will identify the health and safety requirements to execute the RA (i.e., during construction).
- The Community Relations Plan will summarize the requirements for community outreach.
- The Emergency Response Plan will summarize the emergency response requirements and plans in case of human or environmental safety.
- The Environmental Monitoring and Remediation Plan (EMP) will summarize the monitoring and remediation requirements relating to the ARARs and CUGs.
- The SAP will summarize sampling and analysis requirements established for the remedy, and includes the FSAP and the QAPP.
- Updated ARAR summary (see Section 4.2.6 below).

4.2.6 Permit Requirements

US EPA policy exempts CERCLA response actions conducted completely on-Site from the requirement to obtain Federal, State, and Local permits; however, the RA must meet the provisions of such permits that are ARARs (US EPA 1992). The RD Report will identify the environmental statutes applicable to the ARARs that will govern this RD/RA. The following will be included in the RD:

- any off-site disposal/discharge requirements;
- any construction/operating requirements;
- monitoring and/or compliance testing requirements; and
- actual agency regulations governing applications, exemptions, and variances.

4.2.7 Cost Estimate and Constructability Review

A cost estimate for the designed remedy will be conducted after the Intermediate (50%) Design Report to evaluate the logistical viability and economic feasibility. The estimate will include, but not be limited to, the following estimates:

- groundwater collection and treatment system construction and pumping rates;
- soil volumes needed for cap construction;
- soil volume to be relocated during construction (i.e., during the storm water pond relocation);
- quantity of materials required for construction of the remedy components;
- estimates for mobilization and demobilization; and

- Operations, Maintenance and Monitoring costs.

The Cost estimate will be used for Cabot's planning and budgeting purposes, and will not be included in the Final Design Report.

A constructability review will be performed by Cabot, Gradient, the design engineer, and potential remediation contractors who may perform the RA work. The review will identify potential construction challenges with the proposed design and evaluate the logistical and economic feasibility of the design. The constructability review will occur after the Intermediate (50%) Design Report. The design will be optimized based on discussions and comments from the constructability review, prior to issuing the Final Design Report.

4.2.8 Institutional Controls

In accordance with Section 4.7 of the SRI/FFS Report, institutional controls will be incorporated as part of the RD. A discussion of the ICs for the selected remedy will be presented in the Intermediate (50%) Design Report and Final Design Report.

5. REMEDIAL DESIGN DELIVERABLES

5.1 Overview

This section of the RD Work Plan describes the deliverables that will be prepared during the RD. They include progress reports, engineering evaluations, construction documents, and post-construction monitoring plans. Details of each RD deliverable are presented in the subsequent sections. As stated above, the PDI Work Plan described in Section 3 will be submitted under a separate cover.

5.2 Design Progress Reports

Monthly reports will be prepared by Gradient and/or Geosyntec, and will be issued to the US EPA in accordance with Section XII of the CD. The reports will include a summary of RD activities including:

- actions, plans, and procedures completed during the referenced period;
- updates regarding the progress of work underway, work completed, unresolved delays, etc.;
- results of sampling and testing; and
- other data received by Cabot during the work, which has been validated in accordance with the QAPP during the previous month.

5.3 Meetings

Monthly conference calls, organized by US EPA, are ongoing and will continue through the RD process. Cabot, Gradient, Weston and Geosyntec will participate in these calls. Additional conference calls and meetings will be held with the US EPA and other stakeholders at key milestones during the RD activities. The US EPA and the RD Team will agree on the frequency, date and location of the calls and meetings, and any other meetings as warranted. Internal meetings held by the RD Team will be held as needed to progress the RD.

5.4 Remedial Design Deliverables

The RD will progress in stages, with design deliverables marking the completion milestone for each stage. Deliverables will include an Intermediate (50%) Design Report and a Final (100%) Design Report. The RD Report will include each of the design processes described in Section 4 above. A discussion of the deliverables for each stage of the RD Report is provided below.

5.4.1 Intermediate (50%) Design Report

A 50% RD Report will be prepared to present the intermediate design for the groundwater extraction system and the containment system. The 50% RD Report will include:

- summary of test results from the applicable PDI activities;
- appendices containing boring logs, tabulated laboratory results, location figures, soil/groundwater data and laboratory reports from the PDI;

- narrative describing each remedy component, and basis of design;
- draft calculations for:
    - trench stability (if required);
    - analysis of groundwater step test data and pump rates for wells inside and outside the containment area;
    - predicted groundwater leakage through the vertical barrier;
    - storm water management feature sizing;
    - low-permeability cap settlement and drainage capacity; and
    - storm water management modeling (SWMM);
- statement of compliance with the ARARs;
- list of 50% design specifications to be incorporated into the final design;
- 50% design drawings;
- ARAR summary;
- description of institutional controls;
- updated stand-alone critical path project schedule; and
- revised HASP, draft EMP, Community Relations Plan, and Emergency Response Plan.

The Intermediate (50%) Design Report will not be stamped by a Professional Engineer, and will be submitted to the US EPA for review and comment. Comments returned to Cabot by the US EPA will be addressed as appropriate and incorporated into the Final (100%) Design Report.

5.4.2 Final (100%) Design Report

The Final (100%) Design Report will incorporate comments received from the US EPA on the Intermediate (50%) Design Report and be certified by a Professional Engineer in the State of Florida. In addition to the components listed in the intermediate design submittal, the Final (100%) Design Report will include the following:

- revisions to the Intermediate (50%) Design Report requested by the US EPA;
- updated design drawings;
- completed technical specifications;
- constructability review; and
- final critical path schedule.

6. REMEDIAL DESIGN CRITICAL PATH SCHEDULE

The Remedial Design Schedule is presented in Gantt Chart format in Appendix A. The schedule identifies major project tasks, milestones, and activities during the RD/RA process.

- The RD Tasks are presented in detail on the RD Schedule with anticipated initiation, duration, and end dates for each task.
- The Surficial Aquifer Remedy Optimization Evaluation work plan and field work schedule are included for reference and will occur concurrently with the PDI work plan and schedule; however, the schedule for data analysis and remedy evaluation/implementation will occur on a separate track and will be issued separately.
- The schedule assumes one round of comments from the US EPA on each deliverable, and that US EPA comments will incorporate comments from other stakeholders. Crucial or substantive comments or issues will be discussed with EPA or Stakeholders (e.g., see proposed conference calls/meetings associated with the 50% and 100% Design Reports), otherwise comments will be incorporated into the next submittal.
- Calendar dates for the start, completion, and duration of itemized tasks are provided in the Critical Path Schedule. However, dates will be adjusted based on the actual time it takes to complete a task (e.g., if the scope of a task if changed, a new task identified, an existing task eliminated or other factors affect the schedule). The Critical Path Schedule will be kept updated and provided to EPA with the Monthly Progress Report for the Cabot Carbon Site. Schedule changes will be discussed on the Monthly Stakeholder calls.

7. REFERENCES

Core Laboratories. 1996. "Cabot Carbon/Koppers Geoprobe analytical report." Report to Roy F. Weston, Inc., Norcross, GA. 107p., October 1.

ERM-South, Inc. 1996. "Results of chemical analyses of the Huffman samples [Cabot vs. Beazer East, Inc. et al., Gainesville, Florida.]" Submitted to Babst, Calland, Clements, and Zomnir; Beazer-East, Inc.; Wildman, Harrold, Allen, and Dixon; Koppers Industries, Inc. December 2.

Gradient Corporation (Gradient). 2009a. Letter Report from M. Sharma to S. Miller (US EPA Region IV) re: Groundwater Interceptor Trench Effectiveness Monitoring Report, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida. Report to Florida, Dept. of Environmental Protection, Tallahassee, FL. July 2.

Gradient. 2009b. "Hawthorn Group Sampling Results, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida." Report to Cabot Corp., Boston, MA. October 19.

Gradient. 2014. Email to S. Miller and B. O'Steen (US EPA Region IV) re: Scope of the proposed supplemental HG investigation at the Cabot portion of the Gainesville Site (Draft). 1p., March 7.

Gradient. 2017. “Supplemental Remedial Investigation and Focused Feasibility Study Report”, Cabot Carbon/Koppers Superfund Site Gainesville, Florida. Gainesville, FL. January 2017.

Gradient; Weston Solutions (Weston). 2009. "Hawthorn Group Sampling Results, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida." Report to Cabot Corp., Boston, MA. 62p., December 4.

Gradient; Weston. 2010. "Hawthorn Group Sampling Results Report and Revised Work Plan, Cabot Portion of Cabot Carbon/Koppers Superfund Site, Gainesville, Florida (Final)." Report to Cabot Corp. 24p., November 15.

Gradient; Weston. 2011. "Tar Removal Completion Report, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida (Final)." Report to Cabot Corporation. 178p., August.

Gradient; Weston. 2013. "Soil Gas Investigation, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida (Revised)." Report to Cabot Corp., Boston, MA. Submitted to US EPA Region IV. 132p., May 17.

Gradient; Weston; Geosyntec Consultants, Inc (Geosyntec). 2012. "Hawthorn Group Investigation, Work Plan, Cabot Carbon/Koppers, Superfund Site." Report to Cabot Corp. 29p., October 31.

Hunter/ESE, Inc. 1989. "Remedial Investigation/Risk Assessment at the Cabot Carbon/Koppers Site, Gainesville, Florida. Volume I: Remedial Investigation (Final)." Report to Cabot Corp., Waltham, MA; Beazer Materials and Services, Inc., Pittsburgh, PA. September

IT Corp. 1987. "Remedial Investigation Report, Cabot Carbon/Koppers Company Site, Gainesville, Florida. Volumes 1 and 2." Report to Florida Dept. of Environmental Regulation. May.

University of Florida. 1982. "Toxic Wastes & Phenolic Groundwater in the Upper Hogtown Creek Region." Dept. of Environmental Engineering Sciences. Report to Cabot Corp. Foundation, Inc. April.

University of Florida. 2005. "Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C (Final)." Center for Environmental & Human Toxicology. Report to Florida, Dept. of Environmental Protection, Division of Waste Management. February.

US EPA. 1990. "Superfund Record of Decision: Cabot/Koppers, FL. First Remedial Action - Final." EPA-ROD/R04-90-077, NTIS PB91-921449, 136p., September.

US EPA. 1992. Memorandum: Permits and Permit "Equivalency" Processes for CERCLA On-site Response Actions. Washington, DC. 19 February 1992.

US EPA. 1995. "Remedial Design/Remedial Action Handbook", Office of Emergency and Remedial Response. Washington, DC. June 1995.

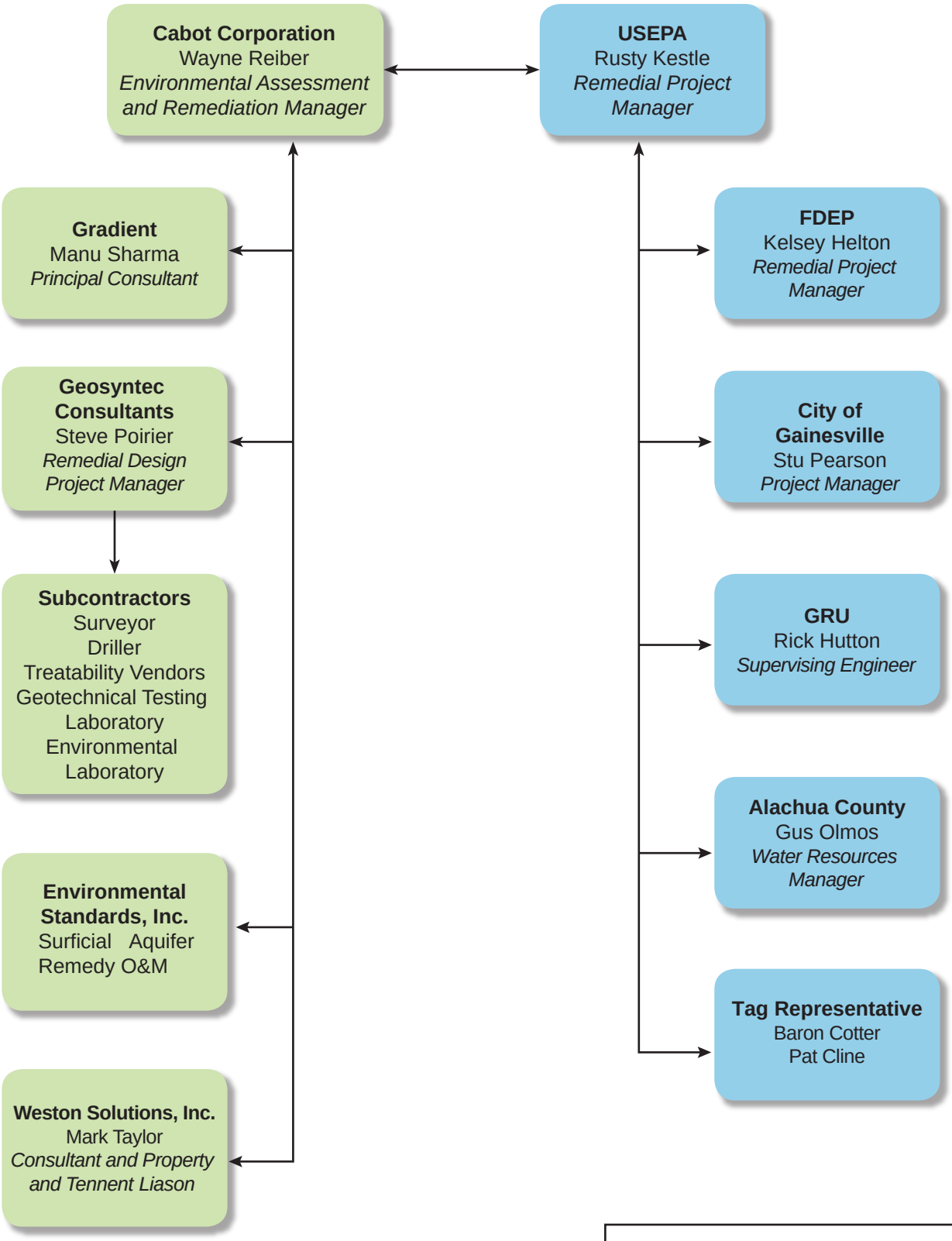
US EPA Region IV. 2011. "Superfund Record of Decision, Summary of Remedial Alternative Selection, Cabot Carbon/Koppers Superfund Site, Gainesville, Alachua County, Florida." 703p., February.

US EPA Region IV. 2017. Letter to W. Reiber (Cabot Corporation) re: US EPA review of January 2017 Supplemental Remedial Investigation/Focused Feasibility Study (SRI/FFS). 10 April 2017.

United States District Court. 1991. "Consent Decree: Civil Action No.: 91-10130. United States of America v. Cabot Corporation". United States District Court for the Northern District of Florida Gainesville Division. 12 September 1991.

Weston, Inc. (Weston). 1996. "Sampling location coordinates (Revised)." 1p., October 1.

FIGURES

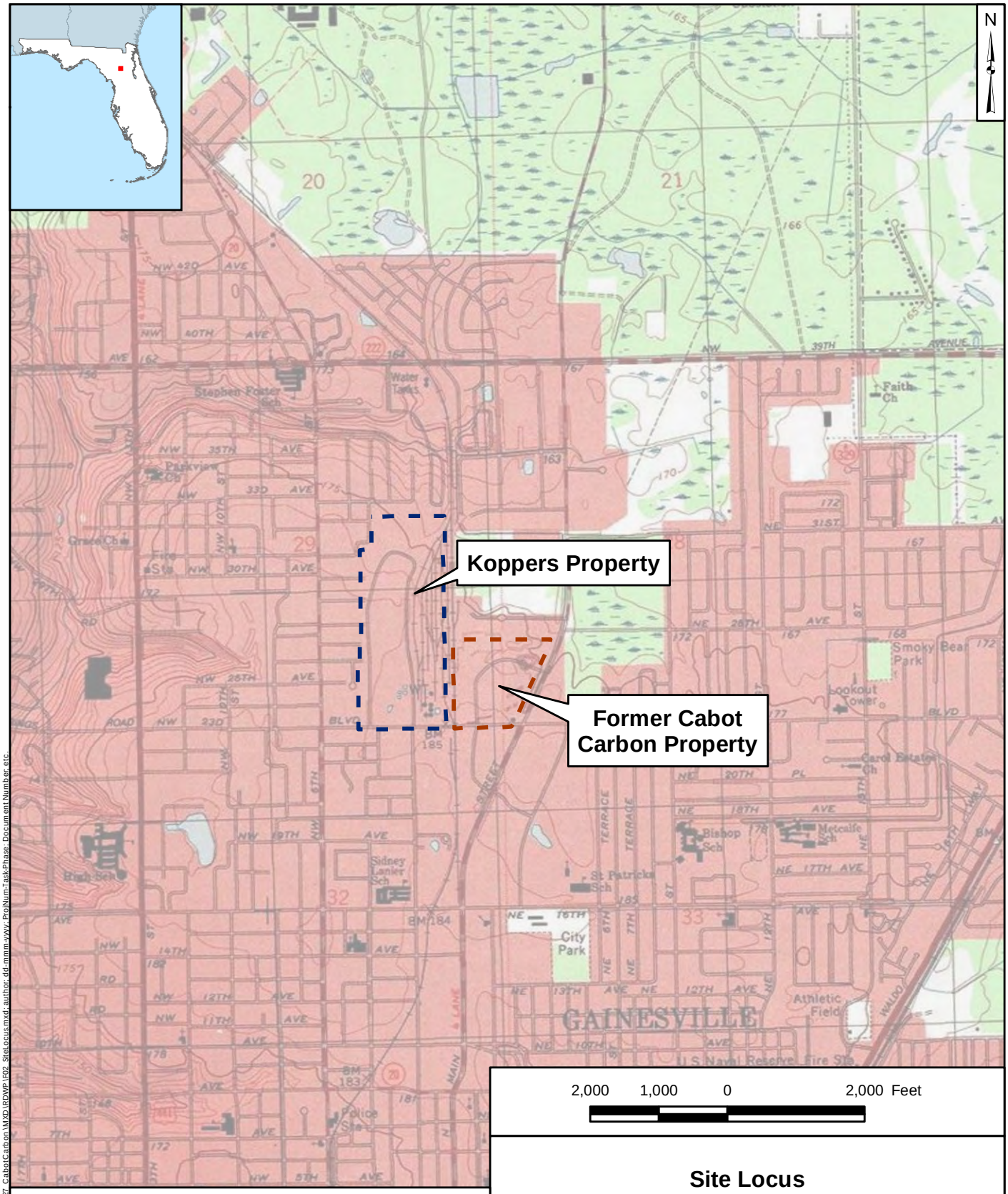


Remedial Design Team Organizational Chart
Cabot Carbon Superfund Site

Geosyntec consultants

FIGURE 1

Acton, Massachusetts | August, 2017



Legend

- Former Cabot Carbon Property
- Koppers Property

Source: USGS Gainesville East 7.5-Minute Quadrangle

Site Locus

Cabot Carbon Superfund Site
Gainesville, Florida

Geosyntec consultants

Acton, MA | August 2017

Figure 2

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300 150 0 300 Feet

Site Map

Cabot Carbon Superfund Site
Gainesville, Florida

Geosyntec consultants

Figure 3

2015 aerial obtained from USDA National Agriculture Imagery Program (NAIP).

Acton, MA | August 2017

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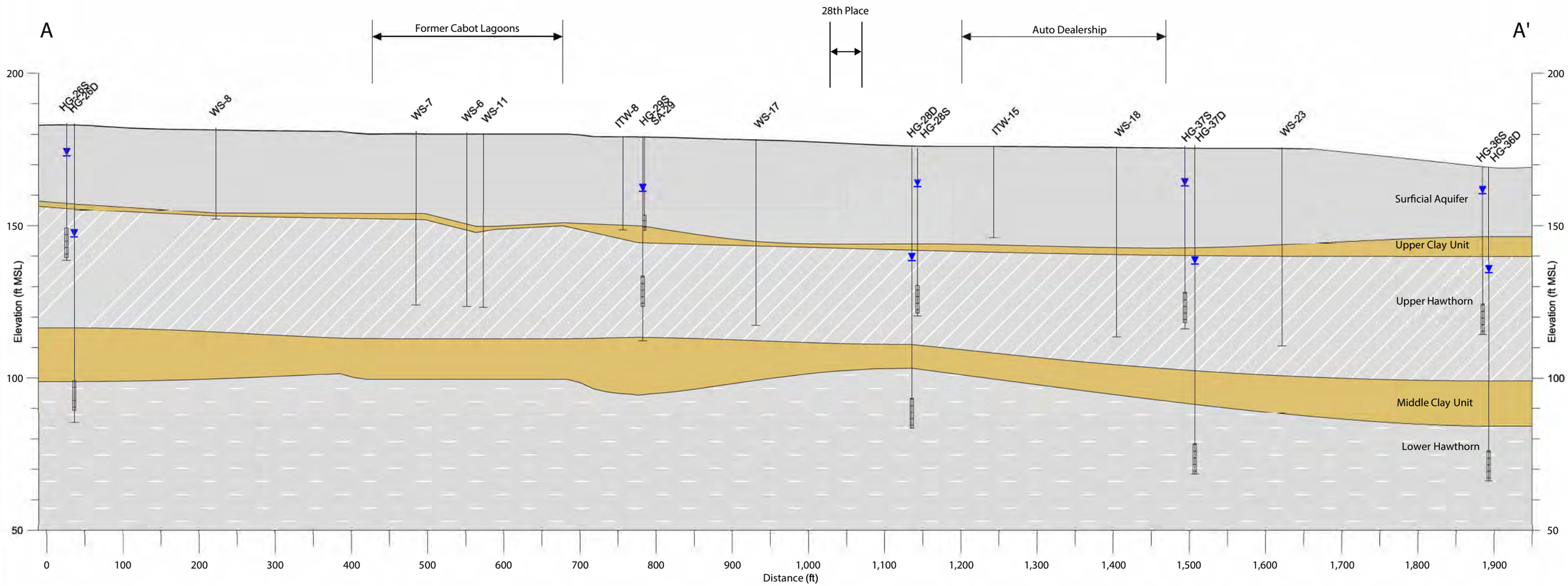
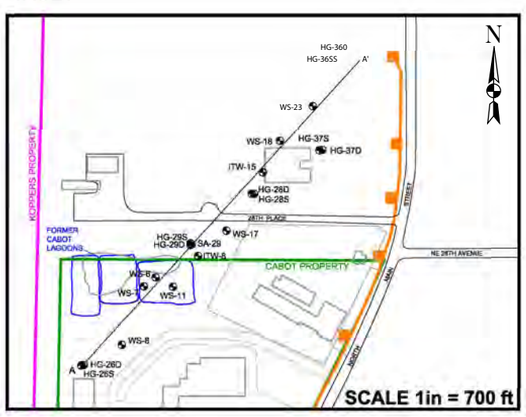


INSET



LEGEND

WS-7 Sample Location

Ground Surface

Water Level Measurement

Well Screen

Bottom of Boring

NOTES:
1) All of the borings/monitoring wells are projected onto the cross-section.
2) Vertical Exaggeration = 4x.
3) Vertical datum is NGVD29.
4) Stratigraphic contacts are interpolated from site wide information and refined locally based on known data.
5) All site features and locations are approximate.

Note:
1. This figure was obtained from Figure 3.1 presented in the Supplemental Remedial Investigation and Focused Feasibility Study Report, dated January 2017 and prepared by Gradient Corporation.

Geologic Cross-Section A-A'

Cabot Carbon Superfund Site

Geosyntec consultants

FIGURE 4

ACTON, MASSACHUSETTS | AUGUST 2017

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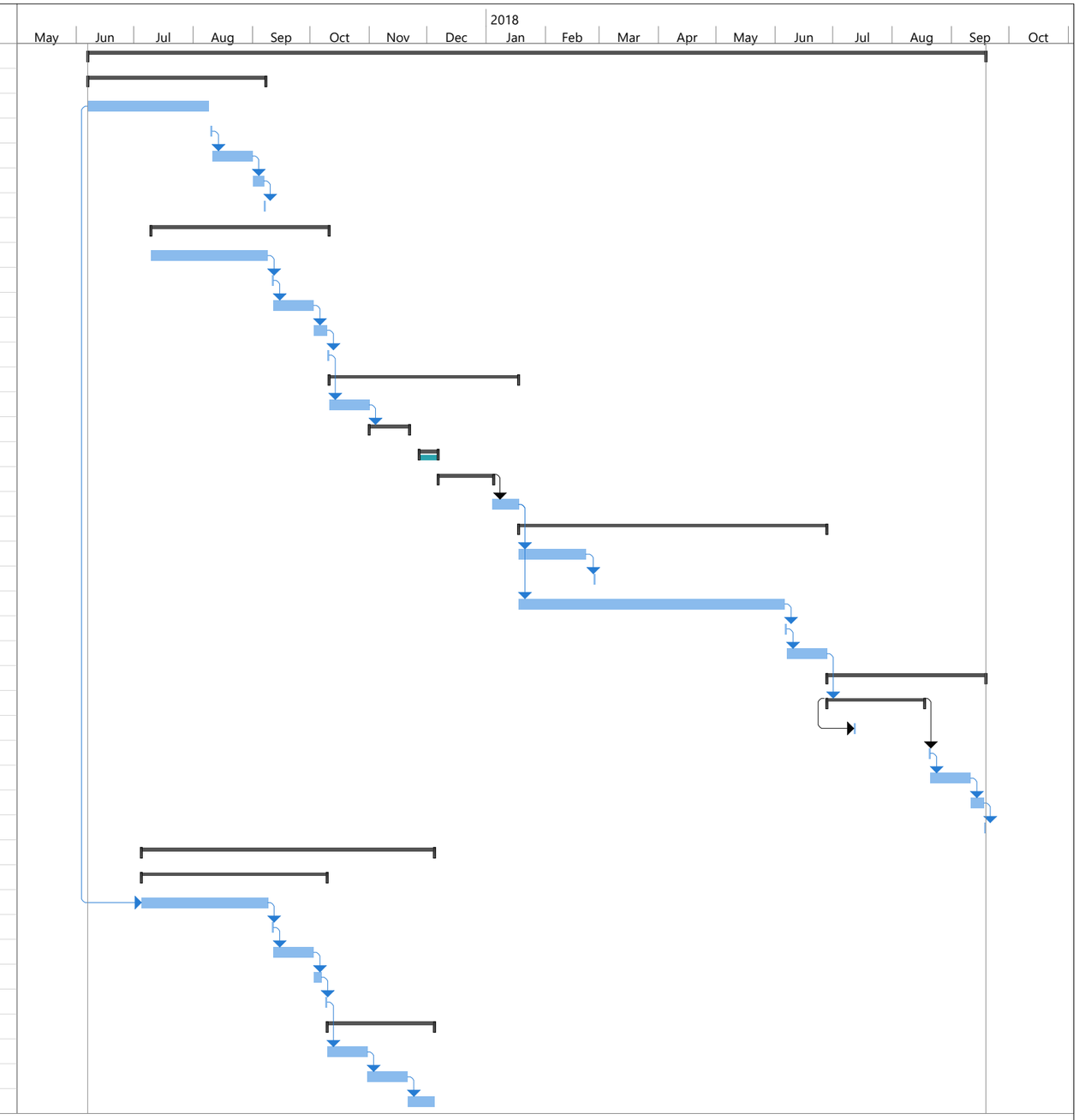
APPENDIX A

RD CRITICAL PATH SCHEDULE

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Hawthorn Remedy**	335 days	Wed 6/7/17	Tue 9/18/18
2		**Remedial Design Work Plan (RDWP)**	67 days	Wed 6/7/17	Thu 9/7/17
3		Prepare Draft RDWP	45 days	Wed 6/7/17	Tue 8/8/17
4		Submit Draft RDWP to USEPA	1 day	Thu 8/10/17	Thu 8/10/17
5		EPA Review and Comment	15 days	Fri 8/11/17	Thu 8/31/17
6		Revise RDWP (if needed)	4 days	Fri 9/1/17	Wed 9/6/17
7		Submit Final RDWP to USEPA	1 day	Thu 9/7/17	Thu 9/7/17
8		**Remedial Pre-Design Investigation (PDI) Work Plan**	67 days	Mon 7/10/17	Tue 10/10/17
9		Prepare Draft PDI Work Plan	45 days	Mon 7/10/17	Fri 9/8/17
10		Submit Draft to USEPA	1 day	Mon 9/11/17	Mon 9/11/17
11		EPA Review and Comment	15 days	Tue 9/12/17	Mon 10/2/17
12		Revise PDI Work Plan (if needed)	5 days	Tue 10/3/17	Mon 10/9/17
13		Submit Final PDI Work Plan to USEPA	1 day	Tue 10/10/17	Tue 10/10/17
14		**Implement PDI Work Plan**	71 days	Wed 10/11/17	Wed 1/17/18
15		Coordination/Mobilization	15 days	Wed 10/11/17	Tue 10/31/17
16		PDI Field Investigations – Geotechnical Borings and Soil Sampling	15 days	Wed 11/1/17	Tue 11/21/17
20		PDI Field Investigations – Aquifer Hydraulic Testing	8 days	Mon 11/27/17	Wed 12/6/17
23		PDI Field Investigations – Mix Design Study	21 days	Thu 12/7/17	Thu 1/4/18
27		PDI Field Activities Demobilization	10 days	Thu 1/4/18	Wed 1/17/18
28		**Intermediate (50%) Remedial Design Report**	115 days	Thu 1/18/18	Wed 6/27/18
29		Prepare Design Criteria/Basis of Design	25 days	Thu 1/18/18	Wed 2/21/18
30		Meeting/Conference Call with USEPA	1 day	Mon 2/26/18	Mon 2/26/18
31		Prepare Draft 50% Remedial Design Report	99 days	Thu 1/18/18	Tue 6/5/18
32		Submit Draft 50% Remedial Design Report to USEPA	1 day	Wed 6/6/18	Wed 6/6/18
33		USEPA Review and Comment	15 days	Thu 6/7/18	Wed 6/27/18
34		**Final (100%) Remedial Design Report**	59 days	Thu 6/28/18	Tue 9/18/18
35		Prepare Draft 100% Remedial Design Report	37 days	Thu 6/28/18	Fri 8/17/18
38		Meeting/Conference Call with USEPA	1 day	Thu 7/12/18	Thu 7/12/18
39		Submit Draft 100% Remedial Design Report to USEPA	1 day	Mon 8/20/18	Mon 8/20/18
40		USEPA Review and Comment	15 days	Tue 8/21/18	Mon 9/10/18
41		Revise 100% Remedial Design Report (if needed)	5 days	Tue 9/11/18	Mon 9/17/18
42		Submit Final 100% Remedial Design Report to USEPA	1 day	Tue 9/18/18	Tue 9/18/18
43		**Surficial Aquifer Remedy Optimization Evaluation**	109 days	Wed 7/5/17	Mon 12/4/17
44		**Work Plan and Field Work Schedule**	69 days	Wed 7/5/17	Mon 10/9/17
45		Prepare Draft Work Plan	48 days	Wed 7/5/17	Fri 9/8/17
46		Submit Draft Work Plan to USEPA	1 day	Mon 9/11/17	Mon 9/11/17
47		EPA Review and Comment	15 days	Tue 9/12/17	Mon 10/2/17
48		Revise Work Plan (if needed)	4 days	Tue 10/3/17	Fri 10/6/17
49		Submit Final Work Plan to USEPA	1 day	Mon 10/9/17	Mon 10/9/17
50		**Perform Field Work**	40 days	Tue 10/10/17	Mon 12/4/17
51		Coordination/Mobilization	15 days	Tue 10/10/17	Mon 10/30/17
52		Field Investigation for Optimization Evaluation	15 days	Tue 10/31/17	Mon 11/20/17
53		Field Activities Demobilization	10 days	Tue 11/21/17	Mon 12/4/17



Notes:
1) Proposed schedule is contingent on assumptions of review periods and subcontractor availability for field and laboratory work.
2) Deliverables from Cabot to US EPA will be provided in electronic (i.e., PDF) format.
3) US EPA will distribute draft and final documents to stakeholders and consolidate US EPA/Stakeholder comments on drafts into a single comment letter.

Project: Cabot Critical Path Project Schedule
Date: Thu 8/10/17

Task		Project Summary		Manual Task		Start-only		Deadline	
Split		Inactive Task		Duration-only		Finish-only		Progress	
Milestone		Inactive Milestone		Manual Summary Rollup		External Tasks		Manual Progress	
Summary		Inactive Summary		Manual Summary		External Milestone	