QUALITY ASSURANCE PROJECT PLAN /
SITE SAMPLING PLAN
QUARTERLY GROUNDWATER MONITORING

MILLS GAP

ASHEVILLE, BUNCOMBE COUNTY, NORTH CAROLINA

Revision 1

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has tasked the T N & Associates, Inc., (TN&A) Superfund Technical Assessment and Response Team (START) to conduct quarterly groundwater sampling under Technical Direction Document (TDD) Number (No.) TNA-05-003-0055 for the Mills Gap site (the site) located in Asheville, Buncombe County, North Carolina. The general purpose of this quarterly sampling is to monitor private drinking water wells in the vicinity of the site for the presence of site related contaminants. All activities and procedures discussed and described in this Quality Assurance Project Plan (QAPP), which contains the Site-specific Sampling Plan (SSP), will be presented and conducted in accordance with the TN&A QAPP and the EPA Region 4 Science and Ecosystem Support Division (SESD) *Field Branches Quality System and Technical Procedures* (FBQSTP) (Refs. 1, 2).

This QAPP documents the policies, the project organization, quality assurance (QA) requirements, and quality control (QC) procedures to be implemented for this quarterly sampling to ensure that the data are valid for use. This QAPP addresses all EPA requirements for a QAPP (QA-R5) with the elements of a field SSP so that field and laboratory activities are described in one document. It defines the QA/QC methods that must be implemented to ensure that data meets the requirements of the Data Quality Objectives (DQOs). The Health and Safety Plan (HASP), which is issued as a separate document, defines the preventative and protective procedures that will be implemented during the field investigation to ensure the safety of the field team.

Field activities will include well logging for several residential wells no longer in use and quarterly collection of groundwater samples. Following removal of pumps from the residential wells, personnel of the Response Engineering and Analytical Contract (REAC), in consultation with the EPA Environmental Response Team (ERT), will either conduct or supervise geophysical logging of these wells. START, in association with the North Carolina Department of Environment and Natural Conservation (NCDENR) and the Buncombe County Public Health Department, will collect groundwater samples from private residential wells on a quarterly basis. Analytical services will be provided by the EPA Contract Laboratory Program (CLP) facilities and will comply with CLP guidance (Ref. 3). START will provide a summary of field activities and results of the sampling in quarterly comprehensive Letter Reports.

The following sections provide the details of this QAPP:

- Section 2: Describes the project objectives and proposed field personnel;
- Section 3: Describes the technical approach;

- Section 4: Describes exceptions to the work assignment;
- Section 5: Summarizes the proposed field activities supporting the sampling event.

1.1 SITE DESCRIPTION

The Mills Gap site encompasses the former CTS of Ashville (CTS) property, located at 35º 29′ 36″ North latitude and 82º 30′ 22″ West longitude on Mills Gap Road, approximately 1 mile east of Skyland, Buncombe County, North Carolina, and potentially migrating groundwater contamination. The CTS property is relatively flat with elevations ranging from approximately 2,420 to 2,440 feet above mean sea level (amsl). The property consists of a 95,000 square foot (ft^2) brick veneer warehouse/light industrial building on an approximately 52-acre property. The former operations area of the facility, including the building, rests on a 9-acre fenced parcel. The remaining acreage has been redeveloped into residential lots.

Investigations at the CTS property have revealed the presence of trichloroethene (TCE) in soil and groundwater. TCE was used during electroplating operations at the facility to clean parts prior to plating. Springs and private wells used to supply nearby residences with drinking water have been found to be contaminated with TCE. EPA has provided and installed water filters on some existing wells, connected several residences to the municipal system, and has provided bottled water to others as a result of the contamination.

1.2 ENVIRONMENTAL SETTING

Relatively cold winters, mild summers, and abundant rainfall characterize the Asheville area. The average yearly temperature in Asheville is 55.4 degrees Fahrenheit (ºF). The average annual precipitation is approximately 37.32 inches, and the average annual relative humidity is approximately 58 percent. During the year, prevailing winds are from the north, with average monthly wind speed varying from about 6 miles per hour (mph) in June to approximately 10 mph from January through April (Ref. 4).

1.3 REGIONAL GEOLOGY AND HYDROGEOLOGY

The Mills Gap Road site is located in the Blue Ridge physiographic province of the State of North Carolina. The Blue Ridge is characterized by a central plateau of moderate relief surrounded by mountains (Ref. 5, p. 19). Elevations in the area range from approximately 1,010 feet amsl to

approximately 6,419 feet amsl (Ref. 5, pp. 19, 23). A region roughly corresponding to the Appalachian Mountains was folded, faulted, and uplifted into high mountains during the Appalachian orogeny and subsequently weathered down into a relatively flat surface. The present mountains are a result of more recent uplift and differential erosion of older surfaces (Ref. 5, p. 19). The rocks in the Asheville area are typically gneiss and schist, with subordinate occurrences of granitic rocks and basic intrusives, and minor occurrences of dolomite, quartzite, sandstone, and conglomerate (Ref. 5, p. 24).

The Brevard schist, which is generally a dark bluish gray rock with lenses and layers of light-gray quartzite and marble that weathers to a dull gray or brown underlies the property. More specifically, the property is directly underlain by a garnet-muscovite schist constituent of the Brevard schist (Ref. 5, pp. 27, 37). Across the area of interest, the Brevard schist trends toward the northeast. Most of the Brevard schist rocks weather readily and ridges are generally underlain by quartzite (Ref. 5, p. 38). Groundwater storage and yield capacity of crystalline rocks in the Asheville area are directly related to the size, number, and degree of interconnection of secondary openings, chiefly fractures and solution channels (Ref. 5, p. 42). According to publications studying the area, the average depth of wells in the Brevard schist is approximately 137 feet with an average well yield of approximately 14 gallons per minute (Ref. 5, p. 43). Wells installed in the area since the 1970 publication of Reference 5 are known to be deeper, on average, than 137 feet. Well depths in the Oaks Subdivision, for example, are known to be deeper than 700 feet. Springs are common in the area, mostly occurring in the hills (Ref. 5, p. 50).

No municipal water in Buncombe County is supplied by groundwater wells (Ref. 6). Based on a recent survey of the area, approximately 100 families within a 1-mile radius of the site are supplied drinking water via springs or wells located on residential properties.

1.4 SITE OPERATIONS

From October until December 1952, the CTS property was owned by Bibco, Inc. It is unknown what, if any, operations were conducted at the property during this time (Ref. 8). The on-site building was constructed in approximately 1952. The International Resistance Company (IRC) purchased and operated an electroplating facility on the property from 1952 until 1959 (Ref. 8). CTS of Asheville, Inc. (CTS of Asheville) purchased the property in 1964 (Refs. 5, p. 1; 9, p. 2). The facility was used by CTS of Asheville for the manufacture of electronic components utilized in automotive parts and hearing aids. CTS of Asheville ceased operations at the facility in April 1986 (Ref. 9, p. 2). In December 1985, Arden Electroplating purchased the plating and process equipment from CTS of Asheville and operated at the

property for approximately six months in 1986 (Ref. 8). Arden Electroplating was formed by two former CTS of Asheville employees who leased the property from and did most of their work for CTS (Ref. 9). In 1987, Mills Gap Road Associates purchased the property and is the current owner (Ref. 10).

1.5 REGULATORY HISTORY

In July 1980, CTS of Asheville filed a Part A Resource and Conservation Recovery Act (RCRA) permit with EPA (Ref. 11). In January 1986, CTS of Asheville applied for a change in RCRA classification from a generator to a small generator from the North Carolina Department of Human Resources Solid and Hazardous Waste Management Branch (Ref. 13). The State accepted the change in RCRA status on January 21, 1986 (Ref. 14).

1.6 PREVIOUS INVESTIGATIONS

On August 31, 1987, Law Engineering (Law) submitted a Report of Findings of Site Assessment Activities at the CTS property (Ref. 9). The site assessment was conducted at the request of CTS of Asheville to provide a general environmental liability status report of the facility prior to the sale of the property (Ref. 9, p. 1). The assessment included the collection of data to assess the environmental conditions within the building and the soils at the ground surface. Subsurface soil samples collected from areas outside the building indicated levels of TCE ranging from 6 micrograms per kilogram (µg/kg) to 380 µg/kg. Constituents including TCE, tetrachloroethylene (PCE), xylene, hexane, and decane were detected in sub-slab soil, wipe, and solid liquid waste samples collected from the inside of the building. These constituents were primarily detected in the plating and paint curing areas (Ref. 9, pp. 17-18).

On August 30, 1989, NUS Corporation (NUS) submitted a Phase I Screening Site Inspection (SSI) to the EPA for the CTS property, which consisted of a file review, a target survey, and an off-site reconnaissance (Ref. 15, p. 1). Based on the number of potentially affected targets, NUS recommended a high priority Phase II SSI at the facility (Ref. 15, p. 3).

On February 22, 1991, NUS submitted the Final Phase II SSI to EPA for the CTS property (Ref. 16). The Phase II SSI consisted of the collection of 18 environmental samples including six surface soil samples, four subsurface soil samples, five sediment samples, two surface water samples, and one private well sample (Ref. 16, p. 9). Sample results indicated elevated levels of vinyl chloride, 1,2-dichloroethene, and TCE in one sediment and surface water sample collected from the surface water migration pathway (Ref. 16, Table 6). Surface soil samples indicated elevated levels of inorganic constituents including

aluminum, arsenic, beryllium, cadmium, copper, iron, magnesium, manganese, silver, and vanadium (Ref. 16, Table 3). No elevated levels of organic constituents were detected in the surface or subsurface soil samples collected from the property (Ref. 16, Table 4).

In July 1999, the NCDENR Division of Water Quality (DWQ) conducted private well sampling of nine private wells in the area surrounding the CTS property (Ref. 17). The sampling was conducted as a follow-up action to a citizen complaint (Ref. 10). Analysis of the water samples revealed that one well located approximately 1,200 feet downgradient of the CTS property indicated the presence of TCE both in the pre-filter sample (270 micrograms per liter [µg/L]) and the post-filter sample (170 µg/L) (Ref. 17, pp. 1-5).

On August 16, 1999, NCDENR requested an immediate removal evaluation for the Mills Gap Road site by EPA (Ref. 18, p. 2). The request stated that new information regarding the location and contamination of nearby drinking water sources was available. Based on the new information, NCDENR requested that EPA consider financial assistance for residents to obtain municipal water supplies to their homes and that a determination be made regarding the site's eligibility for a removal action (Ref. 18, p. 3).

On August 20, 1999, EPA initiated a Delivery Order Request for Services as an Emergency Response action at the Mills Gap Road site (Ref. 19, pp. 1-2). The Statement of Work for the action included mobilizing Emergency and Rapid Response Services (ERRS) contractor CMC, Inc. (CMC) to the site to coordinate actions to connect four residences to the municipal water supply and supply potable water as needed and document site activities with written logbook notes and photographs (Ref. 19, p. 2).

On February 17, 2000, Tetra Tech EM Inc. (TTEMI), the START contractor, submitted a Trip Report to EPA for the Mills Gap Road site (Ref. 20). The Trip Report details the activities conducted during a multimedia sampling event at the property from November 9 through 11, 1999 (Ref. 20, p. 4). During the investigation, START collected 10 surface soil samples, 19 subsurface soil samples, and three sediment samples from 16 locations (Ref. 20, pp. 2, 6). Analytical results indicated the presence of inorganic constituents in the surface and subsurface soil samples including lead (maximum of 100 parts per million [ppm]), arsenic (4.8 ppm), and chromium (98 J ppm). Organic constituents including TCE (33,000 parts per billion [ppb]), bis(2-ethylhexyl) phthalate (14,000 ppb), and 2-methylnaphthalene (23,000 ppb) were also detected. Polychlorinated biphenyl (PCB) 1260 was detected at a maximum level of 240 ppb (Ref. 20, p. 7). Sediment samples indicated the presence of lead (37 ppm), mercury (0.63 ppm), zinc (640

ppm), 1,1,1-trichloroethane (120 J ppb), TCE (17 J ppb), methylcyclohexane (970 J ppb), 2-methlynaphthalene (9,500 ppb), and PCB 1260 (82 ppb) (Ref. 20, pp. 9-25, Appendix D).

In May 2000, NCDENR, on behalf of EPA, conducted an Expanded Site Investigation (ESI) at the CTS property. The ESI consisted of the collection of nine groundwater samples from potable wells in the area and four surface water and sediment samples from the eastern and western surface water migration pathways. Sample results indicated that one potable well contained TCE, and that the springs to the east of the CTS property contained elevated levels of TCE. The western surface water pathway indicated no elevated levels of site-attributable constituents (Ref. 21).

On December 20, 2000, Response Engineering and Analytical Contract (REAC) personnel submitted a Trip Report for the Mills Gap Road site to the EPA Environmental Response Team Center (ERTC) (Ref. 22). The report summarizes geophysical investigations and water sampling completed the week of August 14, 2000, and trenching operations completed on September 12, 2000. The geophysical survey was conducted to locate any potential buried contamination sources such as tanks, drums, product supply lines, or drain fields. The surveys were conducted in several areas: the unpaved portion of the north side of the building; the south side of the building; along the road near the rear of the site; and in the adjacent wooded area to the southeast (Ref. 22, p. 2). Surface water samples were collected from two springs located on the adjacent property east of the facility and indicated the presence of TCE (23 µg/L and 11,000 µg/L) and cis-1,2-dichloroethene (cis-1,2-DCE) (330 µg/L and 400 µg/L) (Ref. 17, p. 3). Standing water in a sump found on the property during the investigation was also sampled; however, no contaminants of concern were identified (Ref. 22, p. 3). Trenching operations were conducted in areas identified during the geophysical surveys; however, no debris or buried materials (drums) were discovered and low levels of contaminants of concern were identified (Ref. 22, p. 4).

On April 20, 2001, ERRS contractor CMC submitted a Contractor's Final Site Report for the Mills Gap Road site to the EPA (Ref. 23). ERRS activities conducted in September and October 1999, included providing residences with potable water and subsequently connecting four residences to the city water system (Ref. 23, p. 10).

On July 12, 2001, REAC submitted a Trip Report to EPA regarding the results of Geoprobe® coring activities at the Mills Gap Road site (Ref. 24). The investigation was conducted during the week of May 7, 2001 to determine whether a source of groundwater contamination was present beneath the building at on the CTS property (Ref. 24, p. 1). Ten borings were advanced through the concrete floor of the

building and two borings were advanced at locations outside the building. A photo-ionization detector (PID) was used to screen the open holes and the cores from the boring locations for organic vapors. Based on the PID readings, samples were collected and sent to a laboratory for analysis (Ref. 24, p. 2). TCE was detected in all of the soil samples collected during the investigation with the highest concentration at 830,000 µg/kg (Ref. 24, p. 2).

In April 2002, EPA approved an Action Memorandum that cleared the way to enter into negotiations with CTS of Asheville to initiate an enforcement-lead removal at the property.

In March, 2003, Weston Solutions, Inc (Weston) START-2 submitted a Removal Assessment Letter Report summarizing removal assessment activities at the Mills Gap Road site. The removal assessment activities were conducted from February 2–3, 2002 and consisted of the collection of five surface water and eight groundwater samples. Surface water samples were collected from four springs and one stream formed at the confluence of the four springs. Analytical results of the surface water samples indicated the presence of several volatile organic compounds (VOC) including TCE and related daughter compounds in all samples. Groundwater samples were collected from eight residential wells. Analytical results of the groundwater samples indicated that no VOC were detected above the method detection limit (MDL). Several inorganic (metals) constituents were detected in the private wells including lead (Ref. 26, pp. 6-14).

On March 4, 2004, MACTEC Engineering and Consulting, Inc. (MACTEC) submitted a Removal Action Pilot Study Plan (RAPSP) on behalf of CTS of Asheville to EPA to satisfy the requirements of the Administrative Order on Consent (AOC) for Removal Action between CTS of Asheville, Mills Gap Road Associates (MGRA) and EPA dated January 16, 2004 (Ref. 28). Based on comments by EPA, MACTEC submitted the RAPSP, Revision 1 on May 14, 2004 (Ref. 29). The RAPSP was prepared to present the conceptual plans for evaluating the feasibility of the removal activities at the site (source removal) to mitigate and prevent further groundwater and surface water contamination related to the site (Ref. 29, p. 4).

MACTEC performed the soil vapor extraction (SVE) pilot study at the site on August 19, 2004 and submitted the report of findings on behalf of CTS of Asheville to EPA on September 17, 2004. Prior to the study, MACTEC installed one SVE well (VE-1) and four observation wells at 5 feet, 12 feet, 18 feet, and 25 feet from the SVE well. A series of vacuums were applied to well VE-1 to determine the conditions needed to provide an effective removal system at the site. The report concluded that SVE was

a viable technique to remove the VOC from the unsaturated soils beneath and adjacent to the site building (Ref. 30, pp. 1-5).

On September 9, 2004, MACTEC submitted the Sampling and Analysis Plan (SAP) Report for the Mills Gap Groundwater Contamination site on behalf of CTS of Asheville to EPA (Ref. 31). During the field investigation, MACTEC performed a private well survey of the area located within 1-mile of the CTS property, performed a surface water discharge evaluation, and conducted soil sampling in order to delineate the vertical and horizontal extent of soil contamination at the site (Ref. 31). The SAP concluded that TCE was the most frequently encountered VOC in the site soils and the general location of the contamination seems to be beneath the on-site building (Ref. 31, Figure 6). Several other contaminants, mostly daughter compounds of TCE, were also detected in the general area of the TCE contamination (Ref. 31). The SAP sampling indicated that the alleged TCE pit on the property did not appear to be a viable source of the TCE in groundwater at the site and that the source of TCE within the contaminated soil at the site is unknown (Ref. 31).

On February 4, 2005, MACTEC submitted a Removal Action Plan on behalf of CTS of Asheville to EPA to satisfy the requirements of the AOC. The Removal Action Plan details the actions to be conducted by MACTEC including additional evaluation of nearby residential wells and the SVE system design and implementation (Ref. 32).

On August 18, 2006, MACTEC submitted a Removal Report on behalf of CTS of Asheville to EPA (Ref. 33). The Removal Report details the SVE removal system installation activities conducted in June and July 2006, and includes well construction details, as-built removal system drawings, and contains the proposed system operation and maintenance schedule (Ref. 33, p. 1). During the site activities, MACTEC installed 14 SVE wells, using a drill rig equipped with a nominal 4.25 inch (inner diameter) hollow-stem auger to install six of the wells, and a Geoprobe® equipped with a nominal 3.25 inch (inner diameter) hollow-stem auger to install eight of the wells (Ref. 33, p. 3). The wells were installed with 2 inch diameter poly-vinyl chloride (PVC) well screens and riser pipe (Ref. 33, p. 1). The SVE operational schedule is listed as 12 continuous hours per day for one to two years (Ref. 33, p. 4).

On September 26, 2007, NCDENR collected samples from the springs. Analysis indicated continuing impact to the springs. Higher levels than previously recorded were encountered in the small streams both east and west of the site.

In November and December 2007, NCDENR, EPA, and the Buncombe County Environmental Health Department conducted a groundwater sampling investigation at the site. Sixty-six (66) residential wells were sampled and analyzed for VOC. Three of the wells were also analyzed for semivolatile organic compounds (SVOC) and total metals. Analytical results indicated similar findings to previous investigations with one exception. TCE and cis-1,2-DCE were detected at elevated levels in one additional residential well. Bottled water was immediately supplied by the EPA to affected residents.

On December 20, 2007, TN&A START submitted an Interim Potable Water Sampling Report to EPA (Ref. 34). The report summarizes the confirmation sampling of one residential well located near the CTS property. The confirmation sampling was conducted at the request of EPA after a previous sample collected by NCDENR at the location indicated elevated levels of TCE. The confirmation sample confirmed that TCE is present in the residential well at a level greater than the Federal Maximum Contaminant Level (MCL) of 5 µg/L (Ref. 34).

In February 2008, TN&A START submitted a Potable Well Sampling Draft Report to EPA for the Mills Gap Road site (Ref. 10). The report summarized the results of the groundwater, surface water, and soil sampling conducted at Mills Gap by START, NCDENR, and Buncombe County. From November 2007 through January 2008, 75 potable wells located within a 1-mile radius of the CTS property were sampled by START and NCDENR for VOC at the residents' request. Thirteen surface water samples were collected from Robinson Creek, unnamed tributaries, and springs in the area surrounding the CTS property and analyzed for VOC. A total of 14 surface soil samples were collected and analyzed for VOC and SVOC. Three of the potable wells sampled during the investigation indicated the presence of TCE; two of the wells contained levels of TCE greater than the EPA MCL of 5 µg/L and the third well contained TCE at a level below the MCL. Additional constituents detected in the three wells included cis-1,2-DCE, a breakdown product of TCE. Surface water samples from nine locations indicated the presence of TCE and associated breakdown products ranging from 3.81 to 18,000 µg/L. None of the surface soil samples collected indicated the presence of VOC (Ref. 10).

On April 23, 2008, TN&A START submitted a Subsurface Soil and Groundwater Sampling Report to EPA (Ref. 36). During the investigation START collected 17 subsurface soil samples and eight groundwater samples from temporary monitoring wells (Ref. 36, pp. 6-7). Additionally, START performed oversight of the EPA Emergency Response Team (ERT) REAC contractor during a residential soil vapor study. During the soil vapor study, REAC collected 10 sub-slab air samples, 12 passive air (Summa®) samples, and an additional 18 "slam-bar" samples from off-site residential properties. Four

seep air samples were also collected by REAC near the springs located to the east of the CTS property (Ref. 36, p. 8). Subsurface soil sample results indicated the presence of inorganic constituents including arsenic, barium, chromium, and lead, and eight SVOC, primarily polycyclic aromatic hydrocarbons (PAH). No VOC were detected in the subsurface soil samples. Groundwater samples indicated the presence of several inorganic constituents including cyanide, barium, chromium, and lead. Additionally, the groundwater samples contained VOC including TCE, cis-1,2-DCE, and vinyl chloride (Ref. 36, p. 11). The soil vapor study revealed the presence of TCE in the passive air samples, all four seep samples, one sub-slab sample, and three soil gas samples (Ref. 36, p. 12).

On April 23 and 24, 2008, NCDENR collected 12 surface water samples from the springs located around the site area. Of the 12 spring samples, only the four previously contaminated springs continued to be contaminated. In addition, four residential potable wells, previously identified with contamination, were re-sampled. Analytical results indicated contamination in three of the four previously impacted wells.

In June 2008, TN&A START collected 15 groundwater samples from residential potable wells located in "The Oaks" subdivision near the former CTS property (Ref. 35). Results from the sampling event indicated that three residential wells in the subdivision contained TCE at levels greater than the Federal MCL of 5 µg/L (Ref. 35).

In September 2008, TN&A START collected 73 groundwater samples from residential potable wells located within a 1-mile radius from the CTS property. Samples were analyzed for target compound list (TCL) VOC, TCL SVOC, target analyte list (TAL) metals, and cyanide. Analytical results indicated TCE concentrations above the MCL of 5 µg/L in two of the residential wells located in "The Oaks" subdivision and the historically contaminated well. At the time of the sampling event, these wells were not being used by the residents for potable water. Municipal water lines had since been extended to these residences.

1.7 SOURCE AREAS

The source area at the site consists of 46,637 square feet of TCE-contaminated soil (Ref. 31, Figure 6).

2.0 PROJECT MANAGEMENT

2.1 PROJECT AND TASK ORGANIZATION

The proposed START Project Manager for all tasks under this work assignment is Ms. Stacy Kowalski. Ms. Kowalski will also advise the Field Project Leader during field investigation site activities. The Field Project Leader will be responsible for any field decisions and the overall field investigation including the following field activities:

- Ensure that all field activities are communicated and coordinated with the EPA Task Monitor (TM).
- Monitoring overall field project quality control.
- Coordinating field scheduling of work with field samplers.
- Overseeing and managing field technical resources including non-sampling field activities

The following START personnel will also be involved in the field investigation as follows:

- Ryan Stubbs (Jr. Sci.) Field Project Leader, Sampler
- Nairimer Berrios-Cartagena (Jr. Sci.) Forms II Lite® Coordinator, Sampler
- Dannena Bowman (Jr. Sci.) Geologist, Sampler

Additional staff will be assigned as needed to complete each task under this work assignment. Ms. Stacy Kowalski will provide technical guidance and assistance in development of the deliverables. The site safety officer will be responsible for monitoring health and safety of the sampling/investigative personnel. The field sampling crew is responsible for conducting all field activities according to the QAPP and for communicating problems to the Project Manager. Figure 3 in Appendix A presents the organizational structure for this sampling event.

2.2 TASK DESCRIPTION

The following subsections discuss tasks that START will perform to complete this work assignment allowing for modifications, as needed.

- Task 1 - Perform Project Management and Reporting
- Task 2 - Develop QAPP

- Task 3 - Perform Field Investigation Activities and Data Acquisition
- Task 4 - Prepare the letter reports
- Task 5 - Perform TDD Close-Out activities

If the statement of work changes because of an amended work assignment, START will revise this QAPP to incorporate changes in the scope and cost.

2.2.1 Task 1 - Perform Project Management and Reporting

START will perform general TDD management activities including communications with the EPA TM, managing and tracking costs using RCMS, and attending project meetings. The anticipated period of performance for this project is from December 18, 2007 through September 10, 2010. Specifically, START will prepare monthly progress reports (MPRs) in accordance with contract requirements; track costs in RCMS and submit 1900-55s as directed by the EPA TM; and prepare and submit monthly invoices. START will report costs and level of effort for the reporting period as well as cumulative amounts expended to date.

2.2.2 Task 2 - Develop QAPP

This QAPP has been developed to outline activities to be conducted in support of the quarterly groundwater sampling. The QAPP lists the tasks to be performed; discusses the technical approach for each task, including identifying DQO, determining sampling objectives and rationale for the field investigation activities, and ensuring that QA/QC measures are conducted to fulfill DQO; identifies key personnel to support this work assignment; and provides a schedule for completing each task and submitting deliverables as required by the TDD. START has reviewed available background documents relevant to the investigation, as provided by EPA, in order to achieve a familiarity with the site and support the development of the tasks.

All efforts will be made to provide the most cost-effective approach to supporting EPA in this work assignment. The QAPP will be amended as necessary to incorporate unforeseen future activities or changes in the scope of the work assignment.

2.2.3 Task 3 - Perform Field Investigation Activities and Data Acquisition

Field investigation activities will include well logging of six wells no longer used for potable water purposes and quarterly collection of well water samples from select private wells for VOC, SVOC, metals, and cyanide analysis.

Following removal of pumps from the domestic wells, REAC personnel, in consultation with EPA ERT, will supervise geophysical logging of these wells. The logging will be conducted by a professional wire-line logging company. The logging suite will include natural gamma-ray, fluid conductivity, borehole temperature, caliper, heat-pulse flow meter (HPFM), and a directional oriented acoustic or video log, depending on probe availability. The natural gamma-ray log is a passive measurement of the natural radioactivity of the rock units penetrated by the well and is generally used to determine rock type. Fluid conductivity and temperature logs are often useful in identifying zones of water entry or exit from a well. The caliper log measures borehole diameter where increases in hole diameter are usually indicative of low-angle fracture zones that may be groundwater pathways. The caliper log is also used to identify the depth of surface casing in an otherwise open-hole rock well. Flow meter logging with the HPFM may provide a vertical direction of flow (if any) in the well, and, unlike the other logging tools, is operated in a stationary mode at selected depths. HPFM logging may be conducted under both ambient borehole conditions and also under pumping conditions that better determine hydraulically active zones. Oriented logs, such as the acoustic televiewer or optical televiewer, provide a 360 degree image of the borehole referenced to magnetic north so that the true orientation of fracture zones or other structural features may be determined. The acoustic televiewer log can be operated only in a fluid filled borehole whereas the optical televiewer can be operated in either fluid or air. At the direction of the EPA Task Monitor, REAC may also elect to conduct conventional video logging of the wells within the limitations of the depth capacity of their equipment. The integrated interpretation of these logs will help determine the type and physical properties of the bedrock, fractures zones that may be groundwater pathways, vertical flow directions in each well, structural features that may be influencing groundwater flow and target zones for future packer testing and sampling.

START will perform quarterly collection of potable well water samples and information required to support the investigation in order to monitor the levels of contamination in the groundwater pathway from the site. This task will begin with EPA approval of the QAPP and will end with termination of the current START contract or the EPA decision to discontinue groundwater monitoring.

2.2.4 Task 4 - Prepare a Letter Report

START will prepare and submit quarterly letter reports summarizing the field investigation activities and describing the nature of groundwater contamination at the site. The letter report will provide all pertinent information to assist EPA with the monitoring of groundwater contamination at the site. Environmental and QA/QC analytical data will be evaluated and data tables will be attached to the report. Significant QA/QC issues regarding sample collection, handling, and analysis will be identified in the report.

2.2.5 Task 5 - Perform TDD Closeout Activities

START will perform the necessary activities to closeout the TDD in accordance with the contract requirements including packaging and returning documents to the U.S. government and duplicating, distributing, and storing files, as necessary.

2.3 DELIVERABLES AND INVESTIGATION SCHEDULE

The schedule by which START anticipates submitting the associated deliverables under this work assignment is listed in Table 4 located in Appendix B.

2.4 DATA QUALITY OBJECTIVES AND CRITERIA

START has identified DQO for the site in accordance with the EPA Guidance for the DQO Process, (U.S. EPA QA/G-4, 2000b), that will define study objectives, decisions to be made, and the criteria by which the data will be assessed. These data will then be used for decision making. DQO have been developed following these seven steps:

- Problem statement
- Identify the decisions
- Identify the inputs into the decision
- Define the boundaries of the study
- Develop decision rules
- Specify tolerable limits on decision errors
- Optimize the design for obtaining data

The information presented in the next several sections describes the DQO identified for this investigation.

2.4.1 Problem Statement

Previous investigations conducted at the CTS property and in nearby residential neighborhoods have indicated elevated concentrations of TCE and daughter compounds in the groundwater. Potable well water investigations have been conducted by NCDENR and EPA. During these investigations, TCE concentrations for potable well water samples collected ranged from non-detect (ND) to 929 µg/L (Ref. 31). This investigation will focus on the quarterly collection of groundwater samples from drinking water wells to monitor the private drinking water wells in the area.

2.4.2 Identify the Decisions

TCE contamination is known to be present in the groundwater at the site. Quarterly groundwater samples are being collected and analyzed to monitor the private drinking water wells in the area. This quarterly sampling will focus on monitoring the private drinking water wells within a 1 mile radius of the CTS property. Therefore, the following primary decisions have been identified: (1) Are site-attributable constituents of concern present in the private drinking water wells? (2) How is the level of contamination changing over time?

2.4.3 Decision Inputs

The primary inputs needed to support the decision making process are contaminant levels in private drinking water well water samples collected from the groundwater in the vicinity of the site. Analytical results used in the decision-making process will come from laboratory analyses for routine low-level TCL VOC, TCL SVOC, TAL metals, and cyanide parameters.

2.4.4 Study Boundaries

The media of interest is groundwater from residential drinking water wells located within a 1 mile radius of the CTS property. The study boundaries include the study area, sample depth, temporal boundaries such as field investigation dates and turnaround times on analytical results, and physical boundaries.

- The study area is the 1-mile radius from the property as shown in Figure 2 located in Appendix A.
- Potable well water will be sampled at the wellhead when possible. If a wellhead is not accessible, a water sample will be collected from an unfiltered tap. Each potable well will be purged for at least

15 minutes before a sample is collected. Temperature, pH, conductivity, and turbidity readings will be taken initially and at one minute intervals.

- Field investigation activities are scheduled on a quarterly basis (January, April, July and October) and will commence in January 2009. The field work is expected to last 3 days. A turnaround time of 14 days from sample submittal to a CLP laboratory will be requested. An additional turnaround time of 23 days from receipt of laboratory results by SESD is expected for data validation.

- Due to the nature of this investigation, the physical boundaries of the area of concern cannot be defined. However, only those properties, located within the study area, whose owners have agreed to allow access to their drinking water wells, are included in this assessment.

2.4.5 Decision Rule

The primary decision in the DQO process for the site relating to potable well water is: Are site related contaminants found in private drinking water wells within 1 mile of the CTS property?

All potable well water samples will be submitted to a CLP laboratory for routine analytical services parameters in accordance with the CLP Statement of Work (SOW) for Organics Analysis (SOM01.2) and Inorganic Analysis (ILM05.2) (Ref. 3). Analytical results will be used to monitor hazardous constituents in the groundwater in the vicinity of the site.

2.4.6 Error Limits

Section 2.5 will describe the error limits introduced through sample collection, mixing, storage, transportation, and analysis.

2.4.7 Optimize Sampling Design

Section 3.0 will describe the potable well water design in detail.

2.5 MEASUREMENT QUALITY OBJECTIVES

Measurement quality objectives can be expressed in terms of accuracy, precision, completeness, and sensitivity goals. Accuracy and precision are monitored through the analysis of QC samples (Section 3.4.2). Completeness is a calculated value. Sensitivity is monitored through instrument calibration and the determination of MDLs and reporting limits (Section 3.3). Qualitative quality objectives, expressed in

terms of comparability, are not addressed as part of this sampling design since sampling locations are biased and not random.

- **Accuracy** is defined as the degree of agreement between an observed value and an accepted reference value. Accuracy shall be measured through the collection of blanks, performance evaluation samples, and blind spike samples.
- **Precision** is defined as degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. Precision shall be measured through the collection of split field samples.
- **Completeness** is the amount of data collected as compared to the amount needed to ensure that the uncertainty or error is within acceptable limits. The goal for data completeness is 100%. However, the project will not be compromised if 99% of the samples collected are analyzed with acceptable quality.
- **Representativeness** is the degree to which data accurately and precisely represent a characteristic of a population. This is a qualitative assessment and is addressed primarily in the sample design, through the selection of sampling sites and procedures that reflect the project goals and environment being sampled. It is ensured in the laboratory through (1) the proper handling, homogenizing, compositing, and storage of samples and (2) analysis within the specified holding times so that the material analyzed reflects the material collected as accurately as possible.
- **Sensitivity** is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Sensitivity is addressed primarily through the selection of appropriate analytical methods, equipment, and instrumentation. The methods selected for this assessment were chosen to provide the sensitivity required for the end-use of the data. This is a quantitative assessment and is monitored through the instrument calibrations and calibration verification samples and the analysis of procedural blanks with every analytical batch.
- **Method Detection Limits** (MDL) for all analysis will be those identified through the CLP SOW methods identified above. The MDL for VOC analysis will be based on the low-level methodology used by CLP.
- **Reporting Limits** (RLs) for all analysis are based on a low calibration standard and are described in each CLP SOW method identified above. Sample-specific reporting limits will be calculated and reported with the final data. There may be numbers reported that are below the RL. These numbers must be flagged appropriately. When the analysis demonstrates a non-detect at the MDL, the data shall be flagged with a "U." The value reported is the MDL, adjusted by any dilution factor used in the analysis. When an analyte is detected between the lower quantitation limit and the MDL, the data shall be flagged with a "J." The value reported is an estimate.

2.6 SPECIAL TRAINING/CERTIFICATION

Documented training is required for each individual performing activities in support of environmental data collection or analysis. The procedures used to ensure that CLP staff training is current and documented is defined in the CLP laboratory SOPs. The laboratory manager is responsible for

determining specific training and certification needs, and for ensuring that any required training is documented.

Individuals implementing this QAPP must receive, at a minimum, orientation to the project's purpose, scope, and methods of implementation. This orientation is the responsibility of the Project Manager or designee. Any field team members involved with sample collection or handling will have received 40-hour hazardous waste operations and emergency response (HAZWOPER – 29 CFR 1910.120) training. The Health and Safety Officer will have received 8-hour supervisor training course (HAZWOPER – 29 CFR 1910.120). Any other safety-related training defined in the project HASP.

3.0 SAMPLE DESIGN, DATA GENERATION, AND ACQUISITION

3.1 SAMPLE DESIGN

START has developed a sampling design in accordance with the EPA *Guidance on Choosing a Sampling Design for Environmental Data Collection* (QA/G-5S) to ensure that DQO are fulfilled for the sampling investigation (Ref. 6). Specifically, the design takes into account data needs, key decisions, and environmental variables, such as physical and site constraints, and how the spatial and temporal boundaries of the contamination and population at risk will be identified. The sampling design presented in the following sections has been developed based on the results of the data obtained during previous sampling activities at the site and on information provided by EPA.

Private drinking water well sampling will be conducted in order to determine if site related contaminants are present in drinking water wells within 1 mile of the CTS property. Fifty-three (53) properties have been identified for inclusion into the groundwater monitoring plan. The sampling radius is illustrated in Figure 2 located in Appendix A.

Table 1, located in Appendix B identifies the sample numbers, types of samples proposed, and the rationale for each sampling location. START anticipates submitting a maximum of 53 potable well water samples to CLP laboratories for routine low-level TCL VOC, TCL SVOC, TAL metals, and cyanide analytical services (Ref. 3). Approximately 15 additional QA/QC samples including blanks, spikes, and split duplicates will be collected as required in FBQSTP SESDPROC-011-R2.

3.2 GENERAL SAMPLING PROCEDURES

3.2.1 Mobilization

START will provide the necessary personnel, equipment, supplies, materials, and facilities for the execution of the field investigation. Activities may include the mobilization of equipment and vehicles, and site access coordination with federal, state, local, and private entities.

3.2.2 Site Control and Access

The study area is comprised of approximately 53 residential properties. Written agreements have been obtained from the homeowners to allow START to access the property well for sampling purposes. No problems with unauthorized personnel interfering with site operations is anticipated; however, if, at any time, investigation activities cannot, in the opinion of the field project leader, safety officer, or sample team leaders, be conducted due to the proximity of unauthorized persons or other unforeseen conditions or situations, then operations will cease until such time as they can be safely resumed.

During the investigation, field vehicles will be located such that they do not interrupt or impede flow of traffic through the area. Keys to each vehicle will be located with team leaders, as appropriate. Each field vehicle will maintain a copy of this QAPP and the site specific HASP during all investigation activities.

3.2.3 Sample Collection and Handling Procedures

All samples will be collected, containerized, preserved, handled, and documented in accordance with the EPA FBQSTP and the EPA CLP Guidance for Field Samplers (CLPGFS) dated July 2007 (Refs. 2, 3). The following activity procedures will be followed during field sampling:

- Potable Water Supply Sampling SESDPROC-305-R1
- Sample and Evidence Management SESDPROC-005-R1
- Field Records (Logbooks) SESDPROC-010-R3
- Field Sampling Quality Control SESDPROC-011-R2
- Packing, Marking, Labeling, and Shipping of Environmental and Waste Samples SESDPROC-209-R1

Both hard and electronic copies of the referenced procedures, in addition to the site-specific HASP, will be maintained by the field project leader for reference during all phases of the field sampling activities. Any deviations in sampling procedures specified in this QAPP will be documented, including the reason for the deviation, in the field logbooks.

START will collect approximately 53 groundwater samples, not including QA/QC samples, from residential potable wells located within a 1-mile radius of the CTS property. Wells will be sampled at the wellhead when possible. If a wellhead is not accessible, the water sample will be collected from an unfiltered tap. Each potable well will be purged for at least 15 minutes before a sample will be collected. Temperature, pH, conductivity, and turbidity readings will be taken initially and at one minute intervals. Three pre-preserved 40-milliliter (mL) vials, two 1-Liter (L) poly bottles, and two 1-L amber bottles will be collected for VOC, metals and cyanide, and SVOC analysis, respectively, from each potable water well sampled. Information identifying the location and date/time will be written on each sample bottle. After the groundwater samples are containerized, they will be placed on ice, processed (see below), packaged for shipment, and submitted to a CLP laboratory for analysis.

Additional QA/QC samples will be collected as required in the FBQSTP SESDPROC-011-R2 and as outlined in Section 5.2 of this QAPP. All samples collected will be immediately preserved in accordance with FBQSTP SESDPROC-005-R1 and CLPGFS guidelines.

3.2.4 Chain of Custody

All chain-of-custody and record keeping procedures will be in accordance with FBQSTP SESDPROC-005-R1 and the CLP Guide for Field Samplers (CLPGFS). Chain-of-custody procedures are comprised of the following elements: 1) maintaining sample custody and 2) documentation of samples for evidence. Chain-of Custody forms will be completed and generated with Forms II Lite® software as per the current START contract requirements.

3.2.5 Sample Labels

Sample labels will be prepared and affixed to each sample container sent to the CLP laboratory. The labels will be prepared using waterproof, non-erasable ink as specified in FBQSTP SESDPROC-005-R1 and CLPGFS. Sample labels will be generated with Forms II Lite® software as per the current START contract requirements.

3.2.6 Sample Custody Seals

The samples collected and containerized will be sealed as soon as possible following collection as specified in the FBQSTP SESDPROC-005-R1 and CLPGFS. The sample custodian will write the date and their signature or initials on the seal.

3.2.7 Chain-of-Custody Record

The field Chain-Of-Custody Record is used to record the custody of all samples sent to the laboratory. All samples shall be accompanied by a Chain-Of-Custody Record, completed and maintained as specified in FBQSTP SESDPROC-005-R1. The Chain-Of-Custody Record documents transfer of custody of samples from the sample custodian to another person, the laboratory, or other organizational elements. To simplify the Chain-of-Custody Record and eliminate potential litigation problems, as few people as possible will have custody of the samples or physical evidence during the investigation.

The Chain-Of-Custody Record also serves as a sample logging mechanism for the laboratory sample custodian. Forms II Lite® software will be used to log samples and create a Chain-of-Custody Record for all samples or physical evidence collected. A separate Chain-of-Custody Record will be used for each final destination or laboratory utilized during the investigation.

3.2.8 Station and Sample Identification

Station IDs will be assigned as follows:

- MGPW###, where MG stands for Mills Gap site, PW stands for potable well, and the station numbers are those assigned to the well based on the September 2008 Special Study Investigation.

Sample identification numbers will be assigned using the following format:

- MG-GMP-##, where MG stands for Mills Gap, the GMP stands for Groundwater Monitoring Program, and the ## is the sample number beginning at -01.

3.2.9 Sampling Equipment and Sample Containers

Sampling equipment used during the field investigation will include a water quality meter. All equipment will be handled in accordance with the FBQSTP Equipment Inventory and Management procedure (SESDPROC-108-R2).

Sample containers for samples submitted to the CLP laboratory will be obtained from the START warehouse in Marietta, Georgia. The START warehouse obtains its sample containers directly from Environmental Sampling Supply and purchases only QC-quality containers that have independent analytical verification of cleanliness. All samples will be placed into QC-quality glass jars, and placed on ice in accordance with the requirements specified in the FBQSTP SESDPROC-209-R1 and CLPGFS.

3.2.10 Site Mapping

The location of all sampling stations has been collected using a Trimble® Global Position System (GPS) instrument. GPS coordinates were collected at each sampling location during previous field events. As specified in FBQSTP Global Positioning System procedure (SESDPROC-107-R1), stations will be located with one meter accuracy. Because the sampling stations have previously been identified and recorded in the Scribe® Database, the Station Location for the wells will be the primary identifier for the wells to ensure the protection of privacy.

3.2.11 Field Sampling Equipment Cleaning Procedures/ Investigation-Derived Waste Management

All investigation derived waste (IDW) will be managed according to the procedures found in the FBQSTP Management of Investigation-Derived Waste procedure (SESDPROC-202-R1). The following identifies the types of IDW that could be generated during the investigation. IDW will generally consist of personal protective equipment including disposable latex gloves and boot covers. Personal protective equipment are used mainly to prevent cross contamination, provide personnel protection, and provide sanitary conditions during sampling activities. If contact with concentrated wastes occurs, personal protective equipment will be secured in a 55-gallon drum on site, until sample analytical results are received. If, in the best professional judgment of the Field Team Leader, personal protective equipment can be rendered non-hazardous, it will be double-bagged and deposited in an industrial waste container, as directed in the FBQSTP SESDPROC-202-R1. All field sampling equipment will be cleaned and decontaminated according to the FBQSTP Field Equipment Cleaning and Decontamination procedures (SESDPROC-205-R1).

3.2.12 Demobilization

START will remove all equipment and restore all site sampling locations which may have been disturbed during the field investigation.

3.3 SAMPLE ANALYSIS AND VALIDATION

Samples will be submitted to EPA CLP laboratories for routine analytical services parameters in accordance with the CLP SOW for Organics Analysis (SOM01.2) and Inorganic Analysis (ILM05.4) (Ref. 3). CLP Data is compliant with EPA Order 5360.1 A2, which requires data to withstand independent review and confirmation.

Laboratory QA/QC procedures and method detection limits will be in accordance with the SOW procedures mentioned above.

Validation of analytical data will be conducted by the EPA Analytical Services Branch (ASB) through the Sample Management Office (SMO). SMO will perform data assessment on laboratories' hardcopy and electronic deliverables based on contractual and technical requirements outlined in the SOW, Request for Proposal (RFP), and in accordance with the National Functional Guidelines (NFG) and Data Validation Standard Operating Procedures for CLP Routine Analytical Services Version 2.1 (Refs. 2; 3). SMO will assess data for completeness, compliance, recalculation checks, and instrument output. A case narrative and data qualifier report will be generated for each set of lab data. The case narrative provides a summary of any deficiencies associated with each lab data set. The data qualifier report alerts the project leader of quality control problems identified during the data validation process. The field project leader will review the data qualifier report to determine any data limitations and the impact of any qualified data on overall data usability for the project. Detailed guidance for data assessment may be found in the *Guidance for Data Quality Assessment* (EPA QA/G-9 2000).

3.4 QUALITY ASSURANCE

QA procedures must begin in the planning stage and continue through sample collection, analyses, reporting and final review. The methods used to ensure data quality are discussed below.

3.4.1 ORGANIZATION AND RESPONSIBILITIES

The field project leader has overall responsibility for field QA. Off-site laboratory analyses for samples collected will be conducted by CLP. The precision, comparability and accuracy of sample analyses will be addressed in accordance with the CLP NFG for Organic and Inorganic Data Review.

3.4.2 FIELD QA/QC SAMPLES

The following sections describe the number and types of QC samples that will be collected and submitted to the CLP laboratory during the field investigation. Appendix B, Table 2 details the QA/QC samples to be collected and Table 3 presents the appropriate sample containers and preservatives to be used per sample type. Approximately 10 additional QA/QC samples including blanks, spikes, and splits will be collected as required in the FBQSTP SESDPROC-011-R2. All samples will be preserved as needed and immediately be placed on ice in accordance with the FBQSTP SESDPROC-011-R2.

Cooler Blanks

A cooler (temperature) blank will be placed in a cooler so that the temperature of each cooler can be measured accurately upon receipt at the laboratory without compromising sample integrity. Cooler blanks are not assigned a unique field sample identification number.

Trip Blank

One trip blank per cooler containing samples for VOC analysis will be collected. START anticipates submitting four trip blank samples (one per day of sampling). Trip blank samples will be identified as MG-GMPTB-## where ## is a sequential number beginning at -01.

Preservative Blank

Preservative blank samples are collected when preservation of samples is required. Therefore, one preservative blank sample will be collected during the investigation to check for possible contamination associated with the nitric acid and sodium hydroxide preservatives used for metals and cyanide samples. The preservative blank sample will be identified as MG-GMPPB-01.

Metals Blank

Metals blanks are required when collecting aqueous samples. Therefore, one metals blank sample will be submitted for analysis during this investigation. Metals blank samples are provided by CLP and will be identified as MG-GMPMB-01.

Matrix Spike/Matrix Spike Duplicate

Samples for laboratory quality control analyses such as the matrix spike/matrix spike duplicate (MS/MSD) will be designated as specified in SESDPROC-011-R2. One MS/MSD sample will be

designated for every 20 samples submitted to the CLP laboratory. START anticipates submitting three MS/MSD samples.

Duplicate Samples

Co-located duplicate samples will be collected at 10% of the groundwater sample locations. Following collection of the initial sample, the duplicate sample will be re-collected from the same location using clean sampling equipment. The duplicate sample will be identified with a sequential sample number and identified on the regional copy of the chain of custody so that there is no indication to the laboratory that the sample is a duplicate. The sample will be submitted to the CLP laboratory for analysis along with the other samples collected during the investigation. START anticipates collecting six field duplicate samples.

3.5 DATA MANAGEMENT/DOCUMENT CONTROL

START will prepare and submit a quarterly letter report summarizing the field investigation activities; and describing the nature of groundwater contamination at the site. Environmental and QA/QC analytical data will be evaluated and data tables will be attached to the report. Significant QA/QC issues regarding sample collection, handling, and analysis will be identified in the report.

The TN&A internal QC process requires that all project deliverables be reviewed to promote technical adequacy and completeness. The TN&A QA manager or designee will perform internal QC checks of work assignment activities. Internal QC checks will address adherence to this QAPP and the TN&A QAPP for START.

START will retain all file information related to the site in the Marietta, Georgia TN&A office. Upon EPA request, the entire site file, including all documents generated under the work assignment, will be inventoried and submitted to EPA or to an EPA-designated location within three weeks of the request. In addition, START will provide digital copies of all documents generated under the work assignment, including reports, e-mails, and figures if requested by EPA. All documents generated for the work assignment are the property of EPA and will be retained as part of EPA files. All EPA files will be delivered to EPA at the conclusion of the START contract.

The quarterly Letter Reports will be submitted to EPA for EPA review and comment within 30 days following receipt of final and validated analytical results from CLP. If needed, a final version of the

quarterly Letter Report will be submitted within two weeks following receipt of comments by EPA. Laboratory data will be released to the EPA TM as it becomes available, if desired. Section 3.0 lists the schedule for the deliverables and investigation.

4.0 EXCEPTIONS TO THE ASSIGNMENT OR ANTICIPATED PROBLEMS

This QAPP details the tasks described in the TDD, the anticipated deliverable and field investigation schedule. Additionally, this QAPP specifically addresses activities and procedures associated with anticipated soil sampling; and QA/QC measures to be adhered to in order to ensure that DQO are fulfilled. START will notify EPA as quickly as possible if exceptions or problems are foreseen or occur. START can modify this QAPP or the schedule within at the request of EPA.

5.0 FIELD WORK SUMMARY

REAC will perform well logging activities in January 2009. START will begin conducting quarterly field activities in January 2009, following well logging activities, and anticipates sampling activities to take approximately 4 days. Access to 53 residential wells has been obtained prior to the commencement of quarterly sampling. EPA reserves the right to conduct oversight during field activities.

START will conduct sampling activities after the QAPP/SSP has been approved by EPA and access to the sample locations has been obtained. Field activities will be conducted and QA samples will be collected, in accordance with procedures documented in the FBQSTP SESDPROC-011-R2 and SESDPROC-300-R1. The proposed START health and safety protocol to be followed during the investigation is described in the site HASP, which will be submitted under separate cover.

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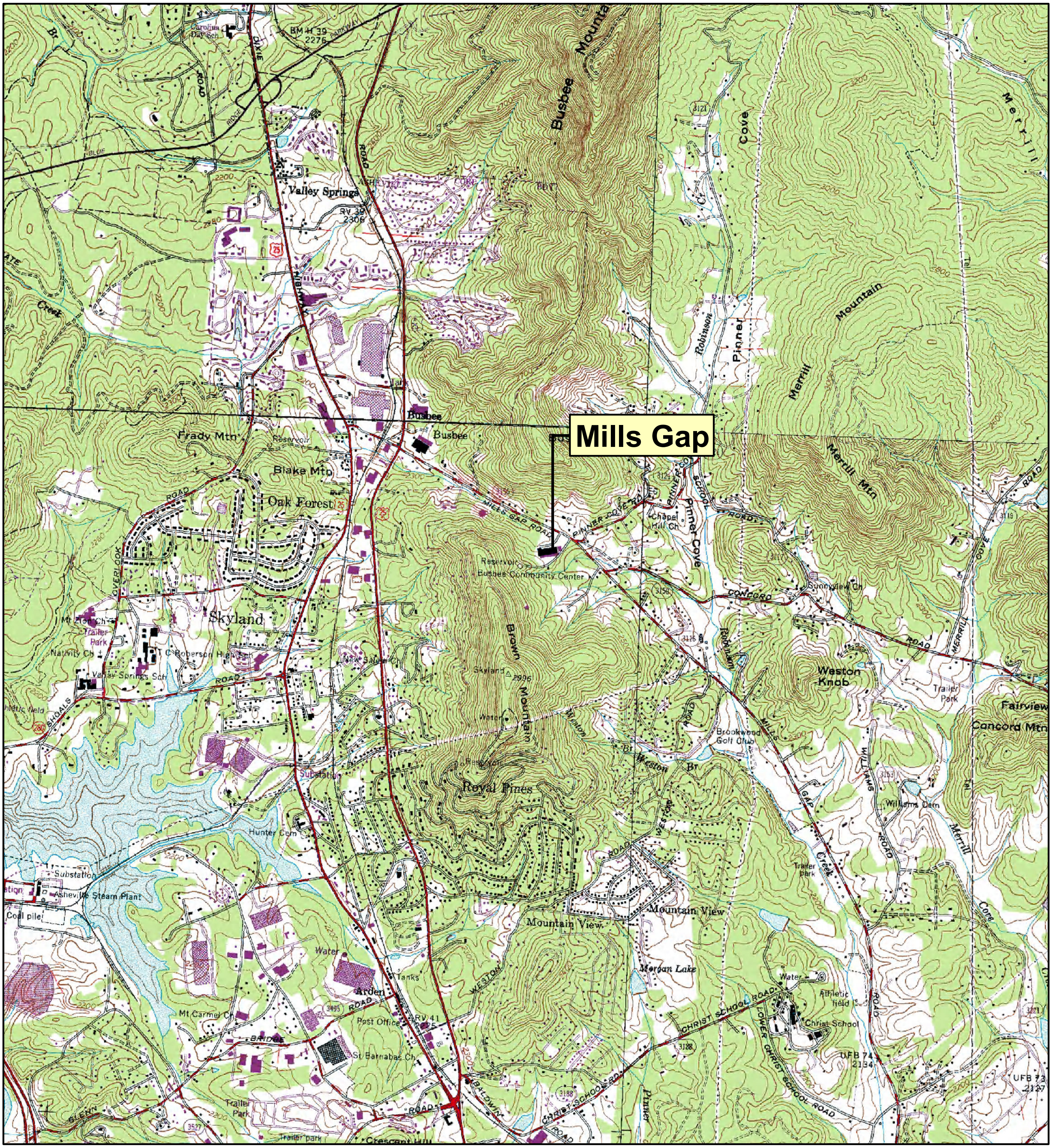
APPENDIX A

FIGURES



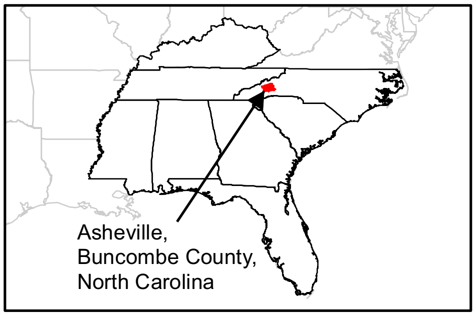
C:\GIS_Workspace\Mills Gap\mxds\Figure-1.mxd

Disclaimer: This map is intended for visual orientation use only.
In no way is this map to be used for precise locational use.

SOURCE: Modified From United States Geological Service 7.5 Minute Quadrangles: Asheville, Oteen, Fruitland, & Skyland

N

0 0.25 0.5 1
Miles

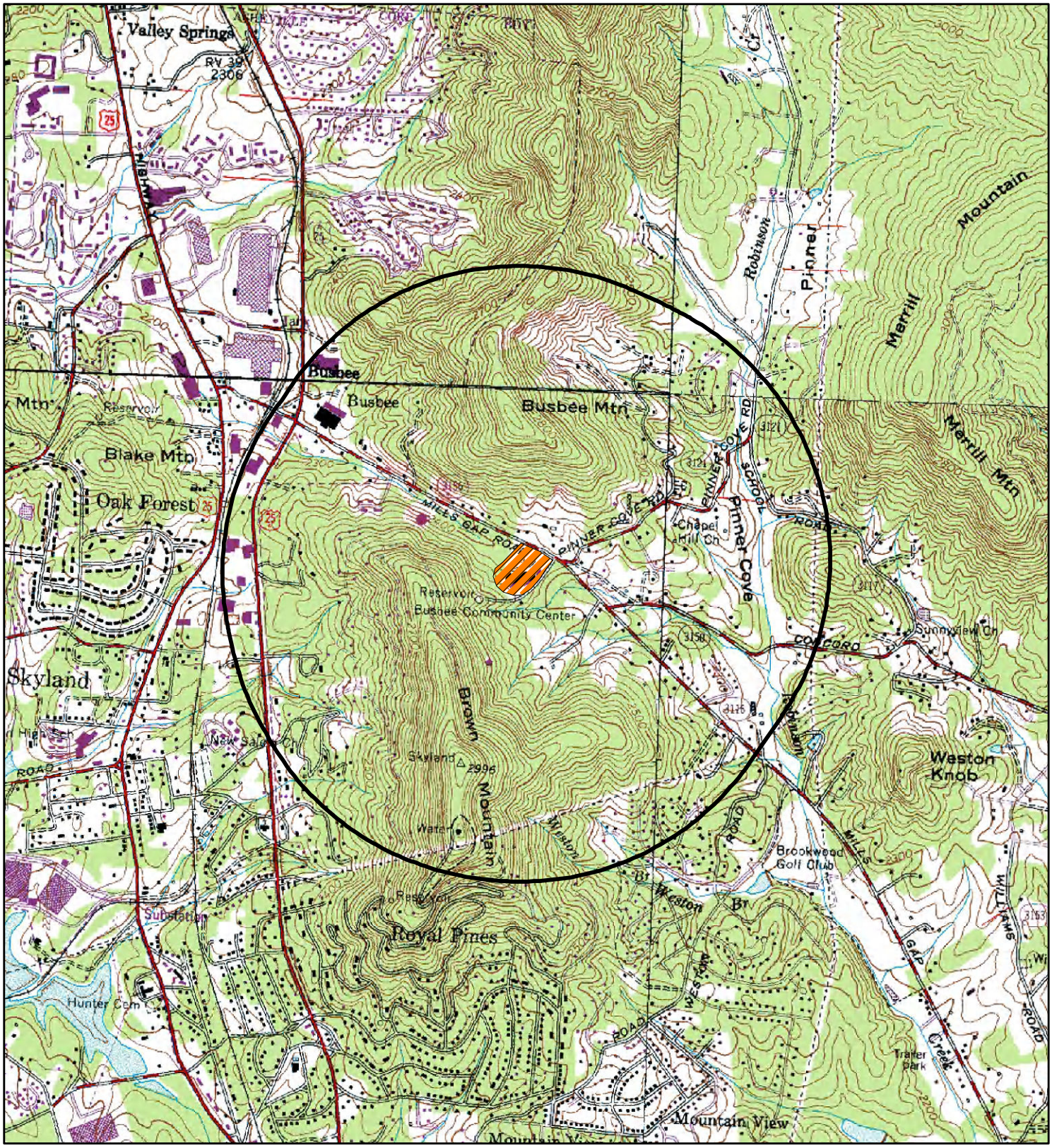


United States Environmental Protection Agency

MILLS GAP
ASHEVILLE, BUNCOMBE COUNTY, NORTH CAROLINA
TDD No. TNA-05-003-0055

FIGURE 1
TOPOGRAPHICAL MAP

T N & Associates, Inc.
EPA Region 4 START
In association with Shaw E&I and Aerostar



Disclaimer: This map is intended for visual orientation use only. In no way is this map to be used for precise locational use.

C:\GIS_Workspace\Mills Gap\mxds\Figure-1.mxd

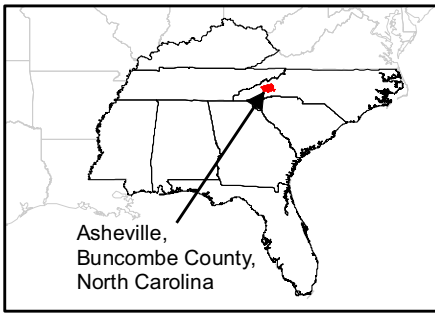
Legend

- 1 Mile Site Radius
- Site Location

SOURCE: Modified From United States Geological Service 7.5 Minute Quadrangles: Asheville, Oteen, Fruitland, & Skyland

0 0.125 0.25 0.5
Miles

N



United States Environmental Protection Agency

MILLS GAP
ASHEVILLE, BUNCOMBE
COUNTY, NORTH CAROLINA
TDD No. TNA-05-003-0055

FIGURE 2
1 MILE SITE RADIUS

T N & Associates, Inc.
EPA Region 4 START
In association with Shaw E&I and Aerostar

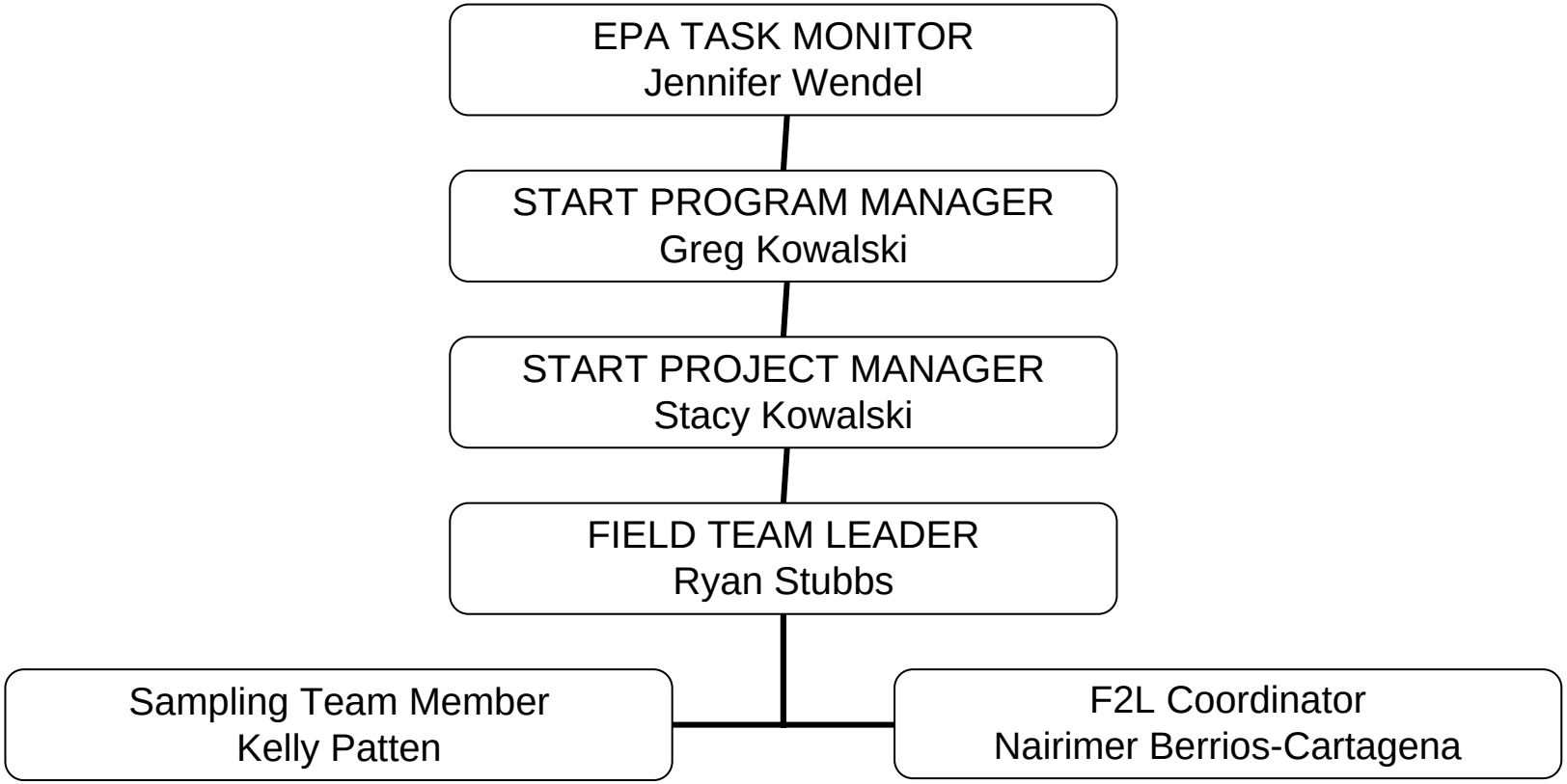


FIGURE 3
ORGANIZATIONAL CHART

MILLS GAP
Asheville, Buncombe County, NC
TDD: TNA-05-003-0055

T N & Associates, Inc.
EPA Region 4 START
In association with Shaw E&I and Aerostar

APPENDIX B

TABLES

TABLE 1
QUARTERLY GROUNDWATER MONITORING
SAMPLE LOCATIONS
MILLS GAP

Station ID	Sample Number	Location	Rationale
MGPW021	MG-GMP-##	16 Bethel Drive	Groundwater monitoring
MGPW037	MG-GMP-##	3 Brae Burn Drive	Groundwater monitoring
MGPW038	MG-GMP-##	2 Brae Burn Way	Groundwater monitoring
MGPW036	MG-GMP-##	10 Brae Burn Way	Groundwater monitoring
MGPW028	MG-GMP-##	33 Chapel Hill Church Road	Groundwater monitoring
MGPW016	MG-GMP-##	42 Chapel Hill Church Road	Groundwater monitoring
MGPW007	MG-GMP-##	56 Chapel Hill Church Road	Groundwater monitoring
MGPW039	MG-GMP-##	19 Chipping Green Drive	Groundwater monitoring
MGSSI80	MG-GMP-##	10 Concord Road	Groundwater monitoring
MGPW055	MG-GMP-##	32 Concord Road	Groundwater monitoring
MGPW045	MG-GMP-##	42 Concord Road	Groundwater monitoring
MGPW013	MG-GMP-##	50 Concord Road	Groundwater monitoring
MGPW008	MG-GMP-##	110 Concord Road	Groundwater monitoring
MGPW027	MG-GMP-##	1 Forest Run Drive	Groundwater monitoring
MGPW074	MG-GMP-##	8 Forest Run Drive	Groundwater monitoring
MGPW023	MG-GMP-##	15 Forest Run Drive	Groundwater monitoring
MGPW061	MG-GMP-##	112 Mills Gap Road	Groundwater monitoring
MGPW022	MG-GMP-##	501 Mills Gap Road	Groundwater monitoring
MGPW010	MG-GMP-##	2 Moriah Lane	Groundwater monitoring
MGPW001	MG-GMP-##	15 Moriah Lane	Groundwater monitoring
MGPW073	MG-GMP-##	20 Moriah Lane	Groundwater monitoring
MGPW072	MG-GMP-##	21 Moriah Lane	Groundwater monitoring
MGPW071	MG-GMP-##	22 Moriah Lane	Groundwater monitoring
MGPW064	MG-GMP-##	23 Moriah Lane	Groundwater monitoring
MGPW015	MG-GMP-##	24 Moriah Lane	Groundwater monitoring

TABLE 1 (Continued)
QUARTERLY GROUNDWATER MONITORING
SAMPLE LOCATIONS
MILLS GAP

Station ID	Sample Number	Location	Rationale
MGPW011	MG-GMP-##	27 Moriah Lane	Groundwater monitoring
MGPW063	MG-GMP-##	28 Moriah Lane	Groundwater monitoring
MGPW017	MG-GMP-##	24 Pinners Cove Road	Groundwater monitoring
MGPW012	MG-GMP-##	26 Ratman Lane	Groundwater monitoring
MGPW049	MG-GMP-##	108 Russett Lane	Groundwater monitoring
MGPW014	MG-GMP-##	114 Russett Lane	Groundwater monitoring
MGPW046	MG-GMP-##	117 Russett Lane	Groundwater monitoring
MGPW054	MG-GMP-##	591 School Road	Groundwater monitoring
MGPW053	MG-GMP-##	613 School Road	Groundwater monitoring
MGPW060	MG-GMP-##	619 School Road	Groundwater monitoring
MGPW032	MG-GMP-##	3184 Sweeten Creek Road	Groundwater monitoring
MGPW048	MG-GMP-##	24 Walsh Trace Drive	Groundwater monitoring
MGPW047	MG-GMP-##	35 Walsh Trace Drive	Groundwater monitoring
MGPW004	MG-GMP-##	260 Williams Road	Groundwater monitoring
MGPW005	MG-GMP-##	274 Williams Road	Groundwater monitoring
MGPW006	MG-GMP-##	296 Williams Road	Groundwater monitoring
MGPW057	MG-GMP-##	12 Wineberry Lane	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring

TABLE 1 (Continued)
QUARTERLY GROUNDWATER MONITORING
SAMPLE LOCATIONS
MILLS GAP

Station ID	Sample Number	Location	Rationale
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring
MGPW0**	MG-GMP-##	TBD	Groundwater monitoring

Notes:

MG - Mills Gap
PW - Potable Water
GMP - Groundwater Monitoring Program
- Sequential number beginning at -01
** - Sequential number based on well location
TBD - Address to be determined based on access agreement receipt

TABLE 2
QUARTERLY GROUNDWATER MONITORING
QUALITY ASSURANCE/QUALITY CONTROL SAMPLES
MILLS GAP

Station ID	Sample Number	Location	Rationale
Station ID for original sample	MG-GMP-111 MG-GMP-112 MG-GMP-113 MG-GMP-114 MG-GMP-115 MG-GMP-116	Duplicate drinking water well sample; To be determined in the field	Verify laboratory precision
#R4DART#	MG-GMPMB-01	Metals Blank	Verify laboratory accuracy
#R4DART#	MG-GMPPM-01	Preservative Blank	Verify possible contamination associated with the metals and cyanide preservatives
#R4DART#	MG-GMPTB-01 MG-GMPTB-02 MG-GMPTB-03 MG-GMPTB-04	Water Trip Blank (Day 1) Water Trip Blank (Day 2) Water Trip Blank (Day 3) Water Trip Blank (Day 4)	Determine previously existing volatile contaminants present in the sampling jars

Notes:

GMP	Groundwater Monitoring Program
MB	Metals Blank
MG	Mills Gap
PW	Potable Well
TB	Trip Blank
PB	Preservative Blank

TABLE 3
QUARTERLY GROUNDWATER MONITORING
ANALYTICAL METHODOLOGY, SAMPLE CONTAINERS, AND PRESERVATIVES
MILLS GAP

Matrix	Analysis	EPA Method	Sample Container	Preservative
Groundwater	Low-Level TCL VOC	CLP	Three 40-mL glass jars with septum lids	HCl to pH < 2, Cool to 4 ^{o}C
	TCL SVOC		Two 1-L amber glass jars	Cool to 4 ^{o}C
	TAL Metals		One 1-L poly jar	HNO_3 to pH < 2, Cool to 4 ^{o}C
	Cyanide		One 1-L poly jar	NaOH to pH > 12 Cool to 4 ^{o}C

Notes:

^{o}C	Degree Celsius
<	Less Than
CLP	Contract Laboratory Program
HCl	Hydrochloric acid
mL	Milliliter
VOC	Volatile Organic Compounds
HNO_3	Nitric acid
NaOH	Sodium Hydroxide
SVOC	Semivolatile Organic Compounds
L	Liter
TCL	Target Compound List
TAL	Target Analyte List

TABLE 4
QUARTERLY GROUNDWATER MONITORING
SCHEDULE OF DELIVERABLES
MILLS GAP

DELIVERABLE	DUE DATE
MPR	25th of every month
QAPP/SSP, Rev. 0	December 1, 2008
QAPP/SSP, Rev. 1	February 17, 2009
CLP Data Package from SESD	27 day Turnaround Time
Quarterly Letter Reports	30 days after receipt of Final analytical data

Notes:

MPR	Monthly Progress Reports
QAPP/SSP	Quality Assurance Project Plan/ Site Sampling Plan
Rev.	Revision