PHASE II SUPPLEMENTAL INVESTIGATION WORK PLAN

Prepared for

Owens Corning
Anderson, South Carolina

October 12, 2009

OWENS CORNING WORLD HEADQUARTERS
ONE OWENS CORNING PARKWAY
TOLEDO, OHIO 43659
419.248.8152 FAX 419.325.4152
INTERNET: alan.lake@owenscorning.com

ALAN S. LAKE
MANAGER, ENVIRONMENTAL SERVICES

October 12, 2009

Ms. D. Karen Knight, CHMM
Corrective Action Section, Chief RUST Branch
RCRA Division EPA R4, 10th Floor
Atlanta Federal Center
Atlanta, Georgia 30303

Subject: Phase II Supplemental RFI Work Plan
Owens Corning - Anderson, South Carolina

Dear Ms. Knight:

Please find the enclosed Phase II Supplemental RFI Work Plan for the subject facility. As discussed with you and your project team at our August 26, 2009 meeting in Atlanta, this Work Plan focuses on additional groundwater investigation to define the limits of the chlorinated solvent plume and to further characterize groundwater concentrations near SWMU-9.

We have designed the planned scope of work to respond completely to EPA and SCDHEC comments on the Supplemental RFI Report submitted on January 31, 2009 as well as comments received during the aforementioned meeting. We anticipate that data from this investigation work will support the design and installation of an interim measures hydraulic containment system at our downgradient property boundary.

We would appreciate the opportunity to meet with you to answer any questions you may have and to finalize this Work Plan. Mr. Smith indicated that he could turn around his review in 10 days, thus I can be in Atlanta the week of October 19th or 26th to meet with you.

Please contact me at (419) 248-8152 or alan.lake@owenscorning.com if you have any questions.

Respectfully submitted,

Alan S. Lake
Manager, Environmental Services

Enclosure

cc: Rodney Wingard, SCDHEC
ecc: Steve Tenry, Owens Corning
Roy Loftis, Owens Corning
Paul Lewandowski, Owens Corning
Jim Claffey, Brown and Caldwell

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Owens Corning
Anderson, South Carolina

October 12, 2009

Reinhard Ruhmke, P.G.

PROJECT NUMBER 136868

BROWN AND CALDWELL

990 Hammond Drive, Suite 400
Atlanta, Georgia 30328

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1. INTRODUCTION

This Phase II Supplemental Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan (Work Plan) has been prepared by Brown and Caldwell (BC) on behalf of Owens Corning (OC) to perform additional investigation activities at their Anderson, South Carolina facility (Site). OC and BC project personnel met with representatives from the United States Environmental Protection Agency (EPA) and South Carolina Department of Health and Environmental Control (SCDHEC) on August 26, 2009 to discuss and agree upon action items for OC's future plans for managing groundwater issues at the site including:

- Additional plume delineation
- Residential well monitoring program
- Surface water monitoring
- Groundwater migration control (i.e., hydraulic containment) at the downgradient property boundary.

This Work Plan describes OC's proposed investigation activities as discussed and agreed to during the August 26th meeting attended by EPA, SCDHEC, OC, and BC personnel. These proposed activities are designed to achieve various objectives, including but not limited to providing direct responses to EPA's letter dated June 16, 2009 in which EPA and SCDHEC provided comments on the January 2009 Supplemental RCRA Facility Investigation Report (SRFIR). As discussed at the meeting a separate document is being prepared to address EPA's request for interim measures and the installation of a hydraulic containment system at the property boundary. Because the hydraulic containment interim measure approach depends on data that will be obtained from the activities outlined in this Work Plan, it will be submitted to EPA after those activities are completed.

For investigative purposes, the Site has been divided into three distinct areas, namely the Solid Waste Management Unit (SWMU)-9 Area (source area), the Intermediate Area (i.e., the portion of the plume that exists between SWMU-9 and roughly groundwater monitoring well MW-19, and the Northeast Area, which extends from MW-19 to the property boundary and beyond. A Site Map is provided as Figure 1.

1.1 Objectives

The objectives of this Work Plan were developed based on a review of existing Site information and reports, consideration of potential off-Site receptors, and discussions with EPA and SCDHEC. The primary objective is to provide additional groundwater and surface water data to further characterize the Site bedrock lithology and hydrogeology and to define groundwater impacts at and beyond the downgradient OC property boundary. This information will be used to support Site corrective action efforts which will include the identification, evaluation, design and implementation of appropriate interim and corrective measures designed to protect public health and the environment. Specifically, the activities in this Work Plan will help the facility achieve and or maintain compliance with Environmental Indicators CA725 (human exposure) and CA750 (contaminant migration) as well make progress toward CA400 (remedy selection). Due to the critical nature of corrective action decisions another objective of this Work Plan is to assure that the work is conducted in a manner that meets acceptable standards for producing valid environmental data (i.e., data quality objectives).

Accordingly, this Work Plan includes Site-specific background, a Sampling and Analysis Plan (SAP) (Section 2), and a Quality Assurance Project Plan (QAPP) (Section 3) that are necessary to complete the additional

investigation in accordance with EPA's RFI Guidance Document, Interim Final (EPA 530/SW-89-031), May 1989. In addition, the Site investigation will follow the procedures and requirements of EPA's Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), November 2001, EPA's Ecosystem Support Division Groundwater Sampling Procedure (SESDPROC-301-RO), February 2007 and SCDHEC Well Standards, April 2002.

1.2 Site History

The Owens Corning Anderson, South Carolina facility is subject to the RCRA corrective action provisions for previous and existing SWMUs and areas of concern (AOCs), based upon the date(s) that former permitted hazardous waste management facilities were closed. EPA and their contractor identified 45 SWMUs and 5 AOCs (50 total) during the RCRA Facility Assessment (RFA) in 1988; however, most of these were placed into the no further action (NFA) category. In October 1989, OC and the EPA entered into an Administrative Order of Consent pursuant to Section 3008(h) of RCRA. The Consent Order requires OC to perform a RCRA Facility Investigation (RFI), Corrective Measures Study (CMS) and, if necessary, to implement corrective measures. The order required OC to investigate eight SWMUs and OC added a ninth SWMU.

Owens Corning submitted their final RFI report to EPA in December 1995. The results of the RFI determined that three (SWMUs 1, 5 and 9) of the nine SWMUs required further investigation and/or corrective measures. At some point during the planning and execution of the RFI, SWMU-9 [former Hydrofluoric Acid (HF) Neutralization Pit] was added to the scope of work. SWMU-9 had been an earthen pit (15 feet square by 14 feet deep) filled with limestone/dolomite and used to neutralize spent HF used to clean bushings. In 1980 the pit area was excavated to a depth of 25 feet and then backfilled and paved. During the RFI, SWMUs 1 and 9 were identified as the principal contributors of volatile organic compounds (VOCs) to groundwater in both the interconnected saprolite and fractured bedrock. SWMU-1 was known as the abandoned sludge lagoon. Potential receptors of interest were identified as on-Site workers, off-Site groundwater users, and Betsy Creek (a groundwater discharge point). Potentiometric data indicated that groundwater flow at the Site was generally from southwest to northeast. The highest VOC groundwater concentrations in both the saprolite and the bedrock in 1993 were measured at SWMU-9; fluoride was also detected at various points in the saprolite and bedrock groundwater. The most prevalent VOCs in groundwater were 1,1-dichloroethene (1,1–DCE) and 1,1,1–trichloroethane (1,1,1-TCA); these were also detected in Betsy Creek. The estimated lateral extent of VOCs in groundwater was greater in the bedrock than in the overlying saprolite based on the detection of 1,1-DCE below the MCL in an off-Site (Gladden) bedrock well.

Also during 1995, OC successfully closed the permitted hazardous waste incinerator and storage facilities, and removed sludge and collected confirmation samples from SWMU-1 to close that unit. In 1996, OC also closed SWMU-5, the former Parts Stripping Room Drum Storage Area. Both SWMUs 1 and 5 received NFA letters from EPA. Therefore, based upon the conclusions of the RFI, there remains only SWMU-9 for which corrective measures are not complete.

Since 1996 OC has conducted extensive investigation work to assess the migration and extent of the VOC groundwater plume emanating from SWMU-9. This included a residential well survey and monitoring event conducted in December 2006 as well as a membrane interface probe (MIP) investigation that was conducted in May 2007 to assess the source area. OC performed additional investigation activities in 2008 that were documented in the SRFIR. The activities described in this Work Plan are a continuation of those efforts and are intended for the development and evaluation of potential remedial alternatives that might be applied at the Site.

2. SAMPLING AND ANALYSIS PLAN

This SAP describes Site-specific field activities including sampling procedures, field documentation, equipment decontamination procedures, work schedule, and health and safety procedures that will be followed during the various Site investigation activities. All field activities will be conducted in accordance with EPA's EISOPQAM and SESDPROC-301-RO and SCDHEC Well Standards. The QAPP is discussed in Section 3 of this Work Plan. It is anticipated that the initial investigation activities will require up to 4 months to complete following EPA's approval of this Work Plan.

2.1 Northeast Area Investigation

The objective of the Northeast Area Investigation is to generate bedrock lithology and hydrogeology characterization data supplemental to the SRFIR and other historical Site documents and to define the horizontal and vertical impacts of VOCs within the bedrock aquifer so that appropriate groundwater corrective action activities may be developed, evaluated, and implemented. Figure 2 shows the proposed locations of new groundwater monitoring wells that will be completed within the bedrock aquifer. The final locations may be adjusted based on field conditions including accessibility, underground utilities, and/or structures. Those changes, if necessary, will be discussed with EPA before well installation activities commence.

The scope of work for the Northeast Area has been modified from that proposed by OC in the SRFIR with the intent of being responsive to EPA's June 16, 2009 comments on that proposed work, which was discussed further during the August 26, 2009 meeting. EPA's comments are integrated into the presentation of the proposed scope of work in this Work Plan to establish linkage and demonstrate responsiveness.

2.1.1 Bedrock Well Installation

The following bedrock aquifer wells are proposed for the Northeast Area.

Install Bedrock Well MW-38. This well is located on Owens Corning property, adjacent to existing well MW-34 and has been selected to define the vertical dimension of the plume at the property boundary so that an appropriate design basis for corrective measures may be developed. The borehole will be drilled by air rotary methods. Groundwater will be sampled at approximately 40-foot vertical intervals through a 20-foot packer placed at the midpoint of each vertical interval. The first interval will extend 40 feet below the bottom of the surface casing and will continue until vertical delineation has been achieved. All samples will be analyzed for the focused list of VOCs (Table 1). Following review of the VOC analytical and potentiometric data, the well will be completed and screened as either a nested or single-zoned well. The well will be incorporated into the Northeast Area quarterly monitoring program and the data will be reported to EPA and SCDHEC in the semiannual and annual groundwater monitoring reports submitted each January and July.

As discussed during the August 2009 stakeholder meeting, OC does not plan to abandon well MW-34 at this time despite the installation problems. This well be used to obtain hydraulic head information only from the five vertical zones. In the future, VOC data will be collected from the new well MW-38 which will be used as the onsite vertical plume delineation well.

This work is proposed in response to EPA's Comment No. 6 – MW-34 Abandonment and Comment No. 2 – Page ES-2 Aquifer Pump Test.

Install Bedrock Well MW-39. The goal for the proposed well MW-39 is to adequately define the horizontal dimension of the VOC plume to the southeast. This well will not be located on Owens Corning property but will be located approximately 700 feet southeast of existing well MW-37. Given the scale of the plume in the Northeast Area and the distance from MW-39 to the nearest known potential water supply well the proposed location for MW-39 is expected to be protective of potential receptors and may serve as a sentinel well, assuming the sample concentrations are below EPA Maximum Contaminant Levels (MCLs).

In the case where MCLs are not exceeded in MW-39, OC does not believe that an additional well located closer to the plume axis would add value to the site characterization efforts. For example, if MW-39 samples reveal 1,1 DCE at 10 μg/L (greater than the 1,1 DCE MCL of 7 μg/L) then per EPA comment another well would be required. As stated above, the purpose of MW-39 is to adequately define the plume width so that appropriate corrective measures and performance monitoring criteria, including interim measures, may be identified and implemented. Criteria for additional wells should not be absolute but rather should be flexible and developed within the context of incorporating new data into the conceptual site model, which takes into account groundwater flow rates and direction, relative VOC concentrations, potential risk to receptors, natural attenuation impacts, etc.

The borehole will be drilled at least two feet into bedrock by air-rotary methods and the surface casing will be set. The open hole will then be advanced in approximately 40-foot intervals within the bedrock and each interval will be sampled for site VOCs using packers as describe previously. The well will be drilled to a depth that is consistent with observations made in nearby MW-37 where data indicated the presence of 1,1 DCE at a concentration of 7.4 μg/L (May 2009) at 272 feet bgs. If any site VOC is detected above an MCL then drilling will be discontinued and an alternative location for this delineation well will be considered and discussed with EPA.

Geophysical logging including fluid temperature, fluid resistivity, optical televiewer, acoustic televiewer, caliper, natural gamma and heat pulse flowmeter will be performed on the entire length of bedrock within the borehole. Geophysical logs and data will be evaluated so that an appropriate well completion strategy may be selected for the well. This information will be shared and discussed with EPA and SCDHEC before the well is completed. This well will also be incorporated into the quarterly monitoring program.

This work is proposed in response to EPA's Comment No. 4 – Proposed Well between MW-37 and Hanson Quarry and Comment No. 8(a) – Offsite Groundwater Investigation.

Install Bedrock Well MW-40. This well will be located approximately 300 feet northwest of well MW-35 and installed to a depth that adequately defines the vertical dimension of the plume. The goal is to select a location that does not incur artesian conditions. The borehole will be drilled using air-rotary methods to approximately 165 feet bgs and surface casing will be set. Groundwater samples will be collected and analyzed in a manner identical to those previously described starting at 165 feet bgs. Geophysical logging starting at 165 feet will be performed as stated above. Data evaluation will follow as stated above so that the appropriate well completion may be selected for the well. This well will be included in the quarterly monitoring program.

This proposed work is in response to EPA's Comment No. 5 – Vertical Extent of Contamination at MW-35.

Install Bedrock Well MW-41. This well location was selected to define the downgradient limits of the groundwater plume. It will not be located on OC property but will be located approximately 2,000 feet northeast of MW-35. The surface casing for the well will be extended at least two feet into bedrock and the open hole advanced using air-rotary methods to a depth that adequately defines the vertical dimension of the plume. Groundwater samples will be collected by packers as described above and analyzed for VOCs. The geophysical logs and data will be evaluated so that the appropriate well completion may be selected for the

well. This well will be included in the quarterly monitoring program. If Site VOC concentrations in this well are greater than the their respective MCL, then an additional well may be necessary to define the horizontal extent of the plume.

This proposed work is in response to EPA's Comment No. 8(b) – Off-site Groundwater Investigation.

Install Bedrock Well MW-42. This well location was selected to define the lateral or cross-gradient width of the groundwater plume to the north. It will not be located on Owens Corning property but will be located approximately 1,000 feet north of existing well MW-35 on the north side of Betsy Creek. The surface casing for the well will be extended at least two feet into bedrock and the open hole advanced using air-rotary methods to a depth that adequately defines the vertical dimension of the plume. Groundwater samples will be collected by packers as described above and analyzed for VOCs. The geophysical logs and data will be evaluated so that the appropriate well completion may be selected for the well. This well will be included in the quarterly monitoring program.

This proposed work is in response to EPA's Comment No. 8(d) – Off-site Groundwater Investigation.

2.1.2 Surface Water Sampling

Owens Corning will collect a surface water sample from Betsy Creek at the previous flow monitoring location SFM-7. The surface water sample will be collected in a manner consistent with the other surface water sampling locations and will be analyzed for the focused list of VOCs.

This proposed work is in response to EPA's Comment No. 9 – Section 2.7 Betsy Creek Flow Monitoring.

2.1.3 Residential Well Monitoring

Select residential wells will be sampled semiannually as part of the Residential Well Monitoring Program starting in November 2009. This program will continue until the interim measures system is installed and operating in the northeast area, at which time an interim measures system performance monitoring plan may be developed and implemented in its stead.

The select wells for the Residential Well Monitoring Program will be those that are completed and operating within the overburden and bedrock aquifers at the Site. They will also be those that are within the plume's known footprint or reasonably projected flow path (e.g., to the northeast but not southwest). In addition, ongoing efforts will be made to sample the northeast residential wells that were identified during previous residential well sampling events but could not be sampled due to absent homeowners. The residential wells included in the residential well sampling program are listed in Table 2 and shown on Figure 3. The number of residential wells included in the semiannual sampling program may change depending on the analytical data results from the new bedrock wells planned herein. All samples will be analyzed for the focused list of VOCs and the results will be reported to residents. Wells that were declared "out of service" during previous residential well sampling events will not be revisited.

To provide ongoing plume monitoring data for the assessment of plume stability and to support the residential well monitoring program for protection of private water supply wells, OC will continue to conduct quarterly monitoring for northeast area wells MW-15, MW-22, MW-29R, MW-35, MW-36 and MW-37. It is also appropriate at this time to include the new groundwater monitoring wells MW-38, MW-39, MW-40, MW-41 and MW-42 in the quarterly program. Lastly, OC proposes to remove MW-33 from the quarterly monitoring program as this well is targeted to be the pumping well for the interim measures hydraulic

containment system and the data provided from this well is of relatively low value given the number of other wells, including the new MW-38, in the immediate vicinity. If the plume is adequately defined using the new well data then OC anticipates that MW-39, MW-41, and MW-42 will be recategorized and transitioned from delineation wells to sentinel wells that will be used to assure protection of downgradient public water supplies.

This proposed work is in response to EPA's Comment No. 10 – Quarterly Groundwater Monitoring.

2.2 SWMU-9 Area

Additional investigation at SWMU-9 has been planned to refine the current understanding of groundwater impacts beneath Factory A. Specifically, it is of interest from a corrective measures evaluation perspective to augment existing source area data that has been used to depict the plume core and to approximate the area where the water table aquifer plume and bedrock intersect. The data generated from this additional investigation will be used to support the evaluation of potential corrective measures at the Site.

Downgradient of Boring GP-38. Depending on accessibility within the interior of Factory A up to six Geoprobe® borings/temporary wells (GP-40 through GP-45) will be installed to approximately 80 feet bgs or maximum Geoprobe penetration depth. Figure 4 shows the proposed boring locations. Groundwater samples will be collected at 10-foot intervals starting at the water table and extending to the bottom of the borehole; samples will be analyzed for the focused list of VOCs. Select soil samples will be collected based on photoionization detector (PID) field screening data. These samples will be analyzed for fractional organic carbon content and the focused list of VOCs so that soil-groundwater distribution or partitioning coefficients may be calculated and used to estimate the total mass of VOCs within the source area.

This proposed work is in response to EPA's Comment Nos. 11(a)(b) and 12– SWMU #9 Factory A.

2.3 Intermediate Area

EPA's comments on the SRFIR include a request to install a transect of Geoprobe borings to bedrock at a location 200 to 300 feet northeast of GP-22 to determine if 1,1-DCE is entering the bedrock at this location. The overburden aquifer at the northern property boundary along True Temper Road was profiled during the SRFIR field work. This data showed that the plume was not present at this location, thus verifying potentiometric map interpretations that suggested the plume veers off of its northerly path from SWMU-9 and toward the northeast area and Betsy Creek. At this time the boring work proposed for SWMU-9 is considered sufficient to assess the plume's intersection with bedrock as those borings will be in areas of significantly higher groundwater concentrations and correspondingly higher mass flux. Lower concentration areas are not currently viewed as high priority targets for corrective action given the vision toward hydraulic containment at the northeast area property boundary.

This is in response to EPA's Comment No. 11(c) – SWMU #9 Factory A.

2.4 Investigative Derived Waste Handling

The investigative derived waste (IDW) generated during the field activities will be contained in 55-gallon drums or tanks on-Site and then disposed of in accordance with applicable regulations. This material may include drill cuttings, drilling fluids, decontamination water and waste, purge water, disposable sampling equipment, and personal protective equipment (PPE).

Disposable sampling equipment and used PPE will be discarded as nonhazardous solid waste. Drill cuttings may be contained at each drilling location in a 55-gallon drum. Composite soil samples, consisting of aliquots from different IDW locations will be collected. The composite samples will be tested by toxicity

characteristic leaching procedure (TCLP) methods for VOCs, SVOCs, and RCRA metals to determine if the cuttings can be characterized as nonhazardous waste. Drilling, development, purge, sampling, and decontamination water will be stored in 55-gallon drums at a central staging area away from traffic areas. Groundwater sample analytical results will be used to identify the appropriate disposal option for the purge water. Based on analytical results for soil and groundwater, disposal will be in accordance with applicable regulations.

2.5 Decontamination Procedures

Soil and groundwater sampling devices will be decontaminated prior to each use at a decontamination station and all procedures will follow EPA EISOPQAM for cleaning/decontamination. The various drill rigs (Air Rotary and Geoprobe) and other equipment will be steam-cleaned and in good operating condition prior to initiating the field program. Any part of the drill rig that may come into contact with soil or groundwater will be steam cleaned at a decontamination station during the drilling program if the field team leader determines that there is a potential for cross contamination.

Decontamination water and waste generated at the decontamination station will be contained and transferred to a 55-gallon drum used to store sampling and development water and disposed of in accordance with applicable regulations.

2.6 Surveying

A South Carolina Registered Land Surveyor will establish the horizontal and vertical locations of the new monitoring wells and boring locations. Each well location will be surveyed for ground surface elevation and top of well casing. The survey information will be provided on a scaled Site base map.

2.7 Sample Container, Preservation and Custody

Soil and groundwater samples will be placed in the appropriate containers prepared by the analytical laboratory. The laboratory will also specify appropriate preservatives and recommend maximum holding times for samples in accordance with the published method protocol.

In the field, each sample container will be marked with the sampling location, date, time of sample collection, and the sampler's name. Sample containers will be securely packed in a cooler on ice in preparation for delivery to the laboratory.

Upon receipt of the samples, the laboratory will immediately notify the project manager if conditions or problems are identified that require immediate resolution. Such conditions include container breakage, missing or improper chain-of-custody, exceeded holding times, missing or improper sample labeling, or frozen water samples.

For each sample to be submitted to the analytical laboratory for analysis, an entry will be made on a chain-of-custody form supplied by the laboratory. One chain-of-custody form will be completed for each day of sampling. The information recorded on the chain-of-custody form includes the sampling date and time, sample identification number, requested analyses and methods, and sampler's name. The field supervisor will maintain custody of the samples until they are relinquished to the laboratory or courier.

The field supervisor will retain the chain-of-custody form until the end of the day, when each party will sign the chain-of-custody form signifying custody/receipt. Custody seals will be used on each sample container to provide assurance that the samples are not tampered with during transport or storage.

2.8 Field Documentation

All field documentation will conform to EPA EISOPQAM documentation procedures. The field supervisor responsible for directing drilling and sampling activities will maintain the following field documentation:

- A field log book will be used to record field activities and pertinent data, including general Site conditions, daily weather, arrival and departure of subcontractors, equipment used on Site, equipment problems, handling and disposal of IDW, and other relevant information.
- Lithologic log for each boring describing and classifying the lithology and indicating the samples collected.
- Sample container labels and chain-of-custody forms.
- Health and safety documentation as required by the Site-specific Health and Safety Plan (HASP).
- Visitors log showing the name (if obtained), date, time, and location of each inquiry or observer.
- Photograph log.
- Water sampling data sheet that records the following:
  - sampling date, time, and water quality field parameter measurements;
  - well number;
  - sample identification as written on container labels, with blind QC samples identified and referenced to the respective primary sample or collection location;
  - QC type (S = primary sample, D = duplicate sample, TB = Trip Blank, EB = Equipment Blank;
  - other observations or comments such as sample odor, or color; and
  - Water level measurement and purge volume calculation.

The majority of the information above will be recorded in a field logbook that will be dedicated to the project.

2.9 Drilling

A South Carolina licensed drilling company will complete all drilling activities at the Site.

2.10 Laboratory

All laboratory work will be completed by a lab that is certified by SCDHEC and or the South Carolina Department of Health.

2.11 Field Work Schedule

The proposed scope of work is expected to continue for up to 4 months. An estimate of the schedule for the overall project, including foreseeable phases that can be planned beyond this phase of the RFI, is shown in Figure 5.

2.12 Health and Safety

A Site-specific HASP will be prepared in accordance with 29 CFR 1910.120 and will address the known chemical and physical hazards present at the Site. The HASP will contain the following information:

- A summary of the scope of work for the project
- Health and safety responsibilities of Brown and Caldwell project staff
- A description of known chemical and physical hazards at the Site
- An exposure monitoring plan
- PPE requirements
- Site control procedures
- Decontamination procedures
- Safe work practices
- An emergency response plan
- Training and medical surveillance requirements
- Recordkeeping requirements.

Site personnel during field activities will use the HASP.

3. QUALITY ASSURANCE PROJECT PLAN

3.1 Purpose

The purpose of this Quality Assurance Project Plan (QAPP) is to designate and document the procedures and methods that will be employed to establish technical accuracy and precision, statistical validity, and documentary evidence of the data generated during the site assessment. The QAPP will ensure that the data collected during this site assessment will be accurate, reliable, and defensible. The QAPP will serve as the quality control document for the activities described in this work plan, principally the laboratory analytical activities to be performed by a South Carolina Certified Analytical Laboratory.

3.2 Data Quality Objectives

Data Quality Objectives (DQOs) have been developed for the sampling and analysis activities specified herein and the work will be conducted and documented in a manner whereby data is sufficient and of adequate quality for intended use. The DQOs for the project shall be appropriate for the identification of COCs in soil and groundwater and for the evaluation of remedial alternatives.

3.3 Data Categories

The two general categories of data are defined as screening data and definitive data. Field screening, including water quality parameter measurements and PID screening, will be used to direct field activities, identify select soil samples for analysis, and provide general information. Results from field screening methods will be recorded in appropriate field logbooks using indelible ink. Definitive data is generated using rigorous analytical methods, such as those established as industry standard methods by EPA or ASTM. This data is analyte specific, will have standardized QC and documentation requirements, and will be generated by a certified laboratory.

3.4 Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity

In the absence of laboratory-specific precision and accuracy limits, the QC requirements described in this section must be met.

Precision measures the reproducibility of repetitive measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the sample process under similar conditions. Analytical precision is a measurement of the variability associated with duplicate or replicate analyses of the same sample in the laboratory and is evaluated by analysis of laboratory quality control samples, such as duplicate control samples, matrix spike/matrix spike duplicates, or sample duplicates. If the recoveries of analytes in the specified control samples are comparable within method established control limits, then precision will be deemed acceptable.

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systematic error. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Accuracy of laboratory analyses will be

assessed by laboratory control samples, surrogate standards, matrix spikes, initial and continuing calibrations of instruments. Laboratory accuracy is expressed as the percent recovery (%R). If the %R is determined to be outside of method acceptance criteria, data will be qualified as described in the applicable validation procedure. Field accuracy will be assessed through the analysis of trip blanks. Analysis of blanks will monitor errors associated with field decontamination procedures, sample preservation, and sample handling. The DQO for field equipment and trip blanks is that all values are less than the reporting limit for each analyte. If contamination is reported in a trip blank, data will be qualified as described in the applicable validation procedure.

Representativeness is the degree to which data accurately and precisely represent selected characteristics of the media sampled. Representativeness is considered by proper numbers and locations of samples; incorporating appropriate sampling methodologies; specifying proper sample collection techniques and decontamination procedures; selecting appropriate laboratory and establishing proper field and laboratory QA/QC procedures.

Completeness is the amount of valid data obtained compared to the amount that was expected under ideal conditions. The number of valid results divided by the number of possible results, expressed as a percentage, determines the completeness of the data set. The objective for completeness is to recover at least 90 percent of the planned data to support the site characterization and remedial alternatives development processes.

Comparability is an expression of confidence with which one data set can be compared to another. The objective of comparability is to ensure that data developed during the investigation is comparable to site knowledge and adequately addresses applicable criteria or standards established by EPA.

Sensitivity is a measure of the analytical detection or quantification limits. A detection is the minimum amount of analyte that can be consistently measured and reported with a high degree of confidence that the analyte concentration is above background response. A quantification limit (reporting limit) is that amount that can be consistently quantified with acceptable precision and accuracy. The reporting limits for this project must be below the MCLs for the COCs in groundwater.

3.5 Quality Control Elements

The chemical data collected during implementation of this Work Plan will be used to evaluate the extent of contamination at the Site. As such, it is critical that the chemical data be of the highest confidence and quality. Consequently, strict QA/QC procedures will be adhered to and include the following:

- Adherence to strict protocols for field sampling and decontamination procedures.
- Use of appropriate field blanks to monitor for contamination of samples in the field or the laboratory.
- Use of matrix spike, matrix spike duplicate, and blind duplicate samples to evaluate analytical precision and accuracy.
- Attainment of completeness goals.

The South Carolina certified lab will maintain strict QA/QC procedures that are documented in their written laboratory QAPP and that address the following:

- Holding Time Compliance
- Quality Assurance and Quality Control Samples
- Standard Materials
- Laboratory Reagent Blanks
- Matrix Spike
- Duplicate Spike Samples

- Field Duplicate Samples
- Performance Evaluation Samples.

3.6 Analytical Procedures

The analytical methods used for this project are the Site-specific focused list of VOCs by EPA Method 8260B.

3.7 Data Reporting

This section presents reporting requirements relevant to the data produced during project analytical activities.

3.7.1 Field Data

Field observations and measurements will be recorded in field notebooks using indelible ink and on required field forms as applicable. The field data will be reviewed by the project manager or qualified designee to evaluate completeness of the field records and appropriateness of the field methods employed. Field records will be retained in the project files.

3.7.2 Laboratory Data

The laboratory data report is to be consistent with EPA Level II documentation and, at a minimum, is to include the following data and summary forms:

- narrative, cross reference, chain-of-custody, and method references
- analytical results
- surrogate recoveries (as applicable)
- blank results
- laboratory control sample recoveries
- sample spike recoveries
- duplicate sample results or duplicate spike recoveries
- results of Method of Standard Additions, as applicable.

Data will be subject to validation to assess for bias and to review for completeness, representativeness, and acceptable levels of precision and accuracy.

3.8 Data Validation

Analytical data generated during this work will be validated to evaluate its reliability and defensibility. Data validation involves reviewing the data against a known set of criteria to verify data validity prior to its use. The data validation criteria are derived from the EPA National Functional Guidelines for Organic Data Review (EPA, 1994b) and EPA National Functional Guidelines for Inorganic Data Review (EPA, 1994c). Data validation flags will be applied to those analytical results that fall outside of the DQO tolerance limits established for the project.

The following summarizes the areas of data validation:

- data completeness
- holding times
- blanks
- laboratory control samples
- matrix spike/matrix spike duplicates
- surrogates
- field duplicates.

3.9 Preventive Maintenance

The Field Supervisor is responsible for documenting the maintenance of all field equipment prescribed in the manufacturer's specifications. Trained personnel will perform scheduled maintenance. The analytical laboratory is responsible for all analytical equipment calibration and maintenance as described in their laboratory QA Plan. Subcontractors are responsible for maintenance of all equipment needed to carry out subcontracted duties.

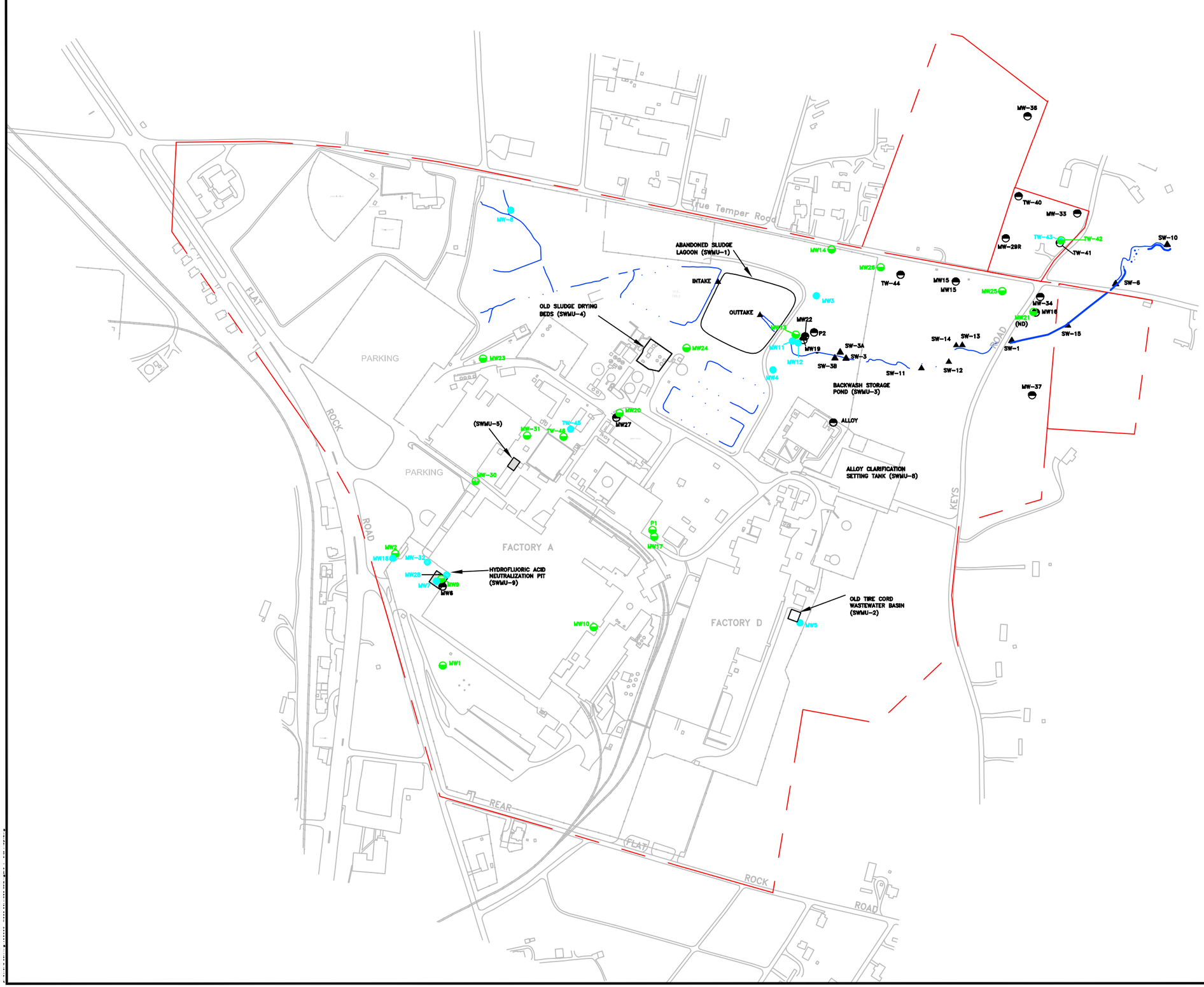
4. REFERENCES

South Carolina Department of Health and Environmental Control, R.61-71, *South Carolina Well Standards,* Bureau of Water, 2600 Bull Street, Columbia, South Carolina, April 26, 2002.

U.S. EPA, 2001, U.S. EPA Region 4, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, U.S. EPA Region 4, 980 College Station Road, Athens, Georgia 30605.

United States Environmental Protection Agency, *Groundwater Sampling Procedures*, Science and Ecosystem Support Division, February 2007.

United States Environmental Protection Agency, *RFI Guidance Document*, Interim Final, May 1989.



LEGEND

- PROPERTY BOUNDARY
- OVERBURDEN WELLS
- TOP OF ROCK WELLS
- BEDROCK WELLS
- SURFACE WATER MONITORING LOCATION

0 400 800

SCALE IN FEET

DATE OF PHOTOGRAPHY 1-27-97

FIGURE 1
SITE MAP
OWENS CORNING
ANDERSON, SOUTH CAROLINA

Prepared For: OWENS CORNING	DATE: 12/03/08
	SCALE: 1"=400'
BROWN AND CALDWELL	DRAWN BY: TCB
	PROJ. 135809

MW-41
MW-42
MW-36
MW-40
MW-35
TW-40
MW-33
MW-29R
TW-41
TW-44
MW15
MW-34
MW22
MW-38
P2
MW16
MW19
MW-37
ALLOY
MW27
MW-39
MW6

LEGEND

OWENS CORNING PROPERTY BOUNDARY

BEDROCK WELLS

PROPOSED BEDROCK WELL

0 400 800

SCALE IN FEET

DATE OF PHOTOGRAPHY USED TO DRAFT SITE MAP 1-27-1997
DATE OF BACKGROUND PHOTOGRAPHY 3-5-2006

FIGURE 2
PROPOSED BEDROCK WELLS
OWENS CORNING
ANDERSON, SOUTH CAROLINA

Prepared For: OWENS CORNING

BROWN AND CALDWELL

DATE:	06/29/09
SCALE:	1"=400'
DRAWN BY:	JBM
PROJ.	136868-800

Sep 25, 2009 - 7:48pm terrymon
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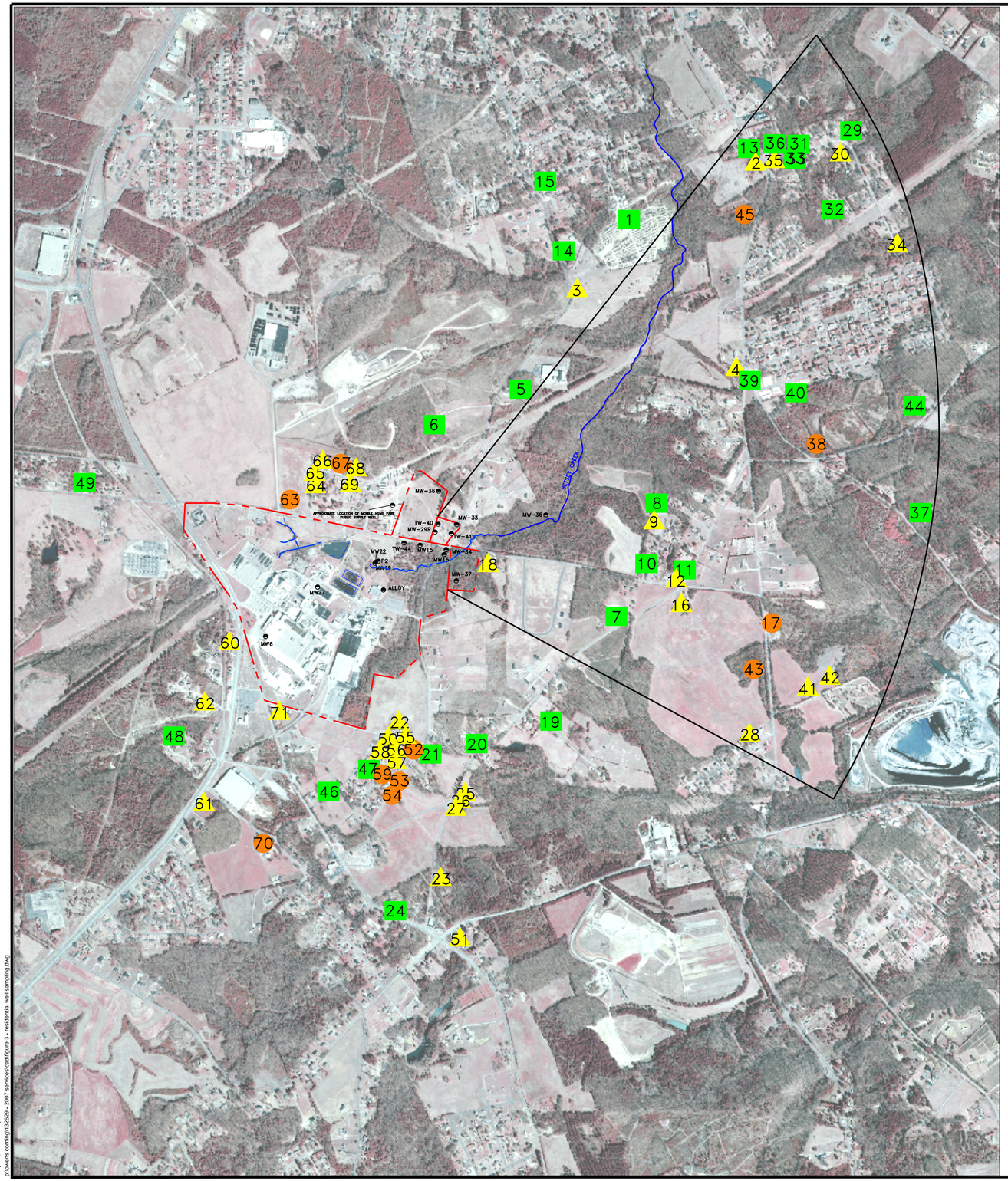

LEGEND

- SEMIANNUAL RESIDENTIAL WELL SAMPLING BOUNDARY
- PROPERTY BOUNDARY
- BEDROCK WELLS
- RESIDENTIAL WELL SAMPLED
- RESIDENTIAL WELL OBSERVED
- RESIDENTIAL WELL OUT OF SERVICE

ID	Address
1	3715 Mabry Street
2	634 Airline Road
3	3735 Keys Street
4	1100 Airline Road
5	3721 Keys Street
6	4004 Keys Street
7	605 Clinkscales Road
8	134 Friendship Lane
9	138 Friendship Lane
10	200 Friendship Lane
11	721 Clinkscales Road
12	711 Clinkscales Road
13	628 Airline Road
14	3731 Keys Street
15	3713 Keys Street
16	624 True Temper Road
17	1501 Airline Road
18	240 True Temper Road
19	408 Clinkscales Road
20	401 Clinkscales Road
21	4515 Keys Street
22	305 Harry Drive
23	150 Clinksdale Road
24	943 Flat Rock Road
25	325 Clinkscales Road
26	322 Clinkscales Road
27	321 Clinkscales Road
28	137 Knowlandwood Circle

ID	Address
29	412 Kaye Drive
30	Vacant Lot Across from 412 Kaye Drive
31	311 Kaye Drive
32	117 Faye Drive
33	303 Kaye Drive
34	End of Kaye Drive
35	217 Kaye Drive
36	200 Kaye Drive
37	335 Elrod Road
38	215 Elrod Road
39	115 Elrod Road
40	119 Cloverhill Road
41	122 Kayle Drive
42	138 Kayle Drive
43	1802 Airline Road
44	1303 Clinkscales Road
45	House Between 811 and 901 Airline Road
46	300 Jones Road
47	5104 Johnson Street
48	104 Herbs Lane
49	203 Travis Road
50	107 Jones Road
51	303 Flat Rock Road
52	4518 Keys Street
53	4606 Keys Street
54	4610 Keys Street
55	5005 Johnson Street
56	5009 Johnson Street

ID	Address
57	5010 Johnson Street
58	5014 Johnson Street
59	5101 Johnson Street
60	4906 Highway 81 South
61	5305 Highway 81 South
62	116 Young Road
63	201 True Temper Road
64	106 Pickens Circle
65	110 Pickens Circle
66	123 Pickens Circle
67	127 Pickens Circle
68	131 Pickens Circle
69	136 Pickens Circle
70	206 Wesley Court
71	104 Harry Drive

0 800 1600
SCALE IN FEET

DATE OF PHOTOGRAPHY USED TO DRAFT SITE MAP 1-27-1997
DATE OF BACKGROUND PHOTOGRAPHY 3-5-2006

FIGURE 3
SEMIANNUAL RESIDENTIAL WELL SAMPLING PROGRAM
OWENS CORNING
ANDERSON, SOUTH CAROLINA

Prepared For: OWENS CORNING

BROWN AND CALDWELL

DATE:	1/5/09
SCALE:	1"=800'
DRAWN BY:	TCB
PROJ.	135809

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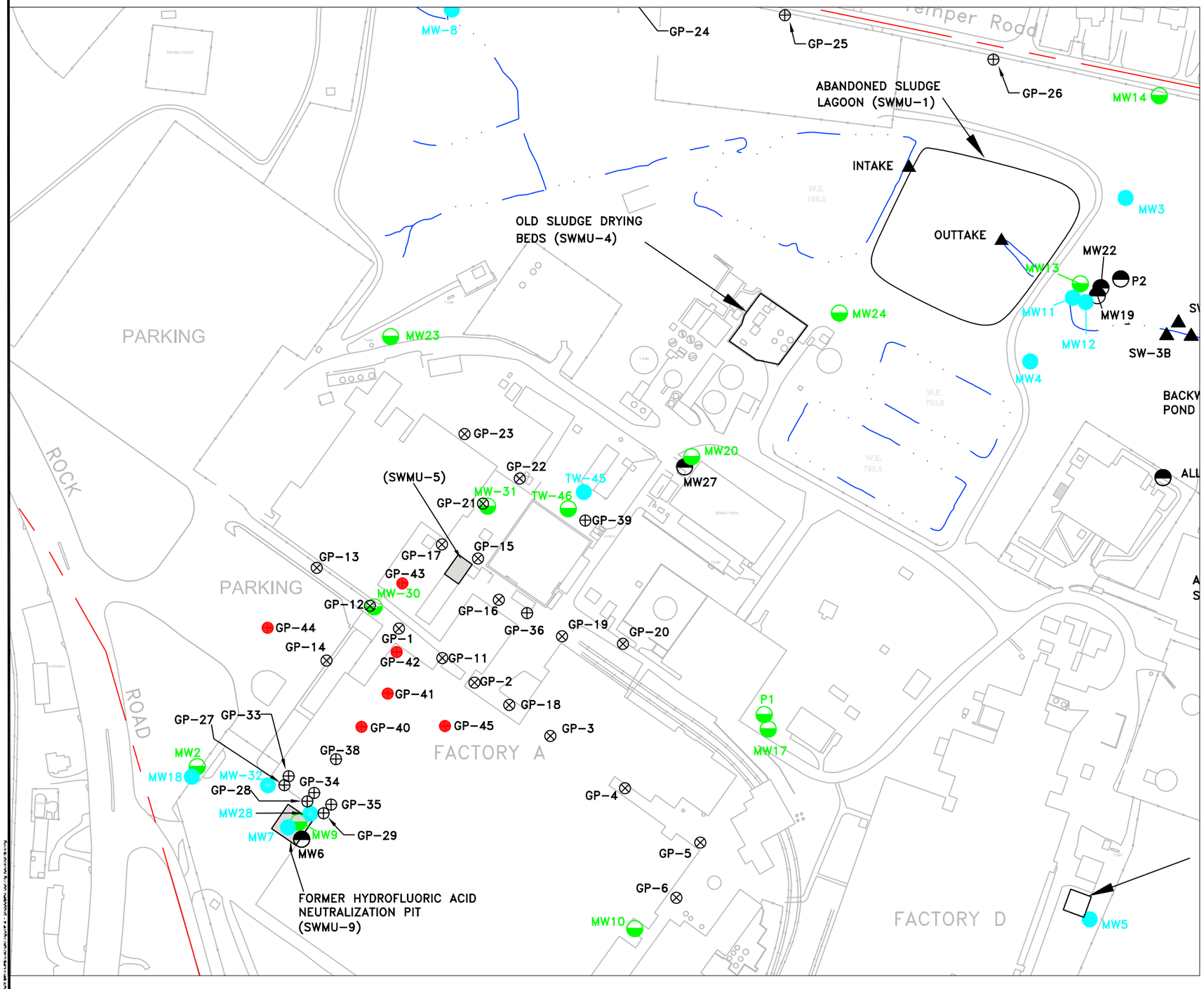


LEGEND

- OVERBURDEN WELLS
- TOP OF ROCK WELLS
- BEDROCK WELLS
- GEOPROBE BORING LOCATIONS INSTALLED IN 2004 AND 2006
- GEOPROBE BORING LOCATIONS INSTALLED IN 2008
- PROPOSED BORING/TEMPORARY WELL LOCATIONS

0 200 400

SCALE IN FEET

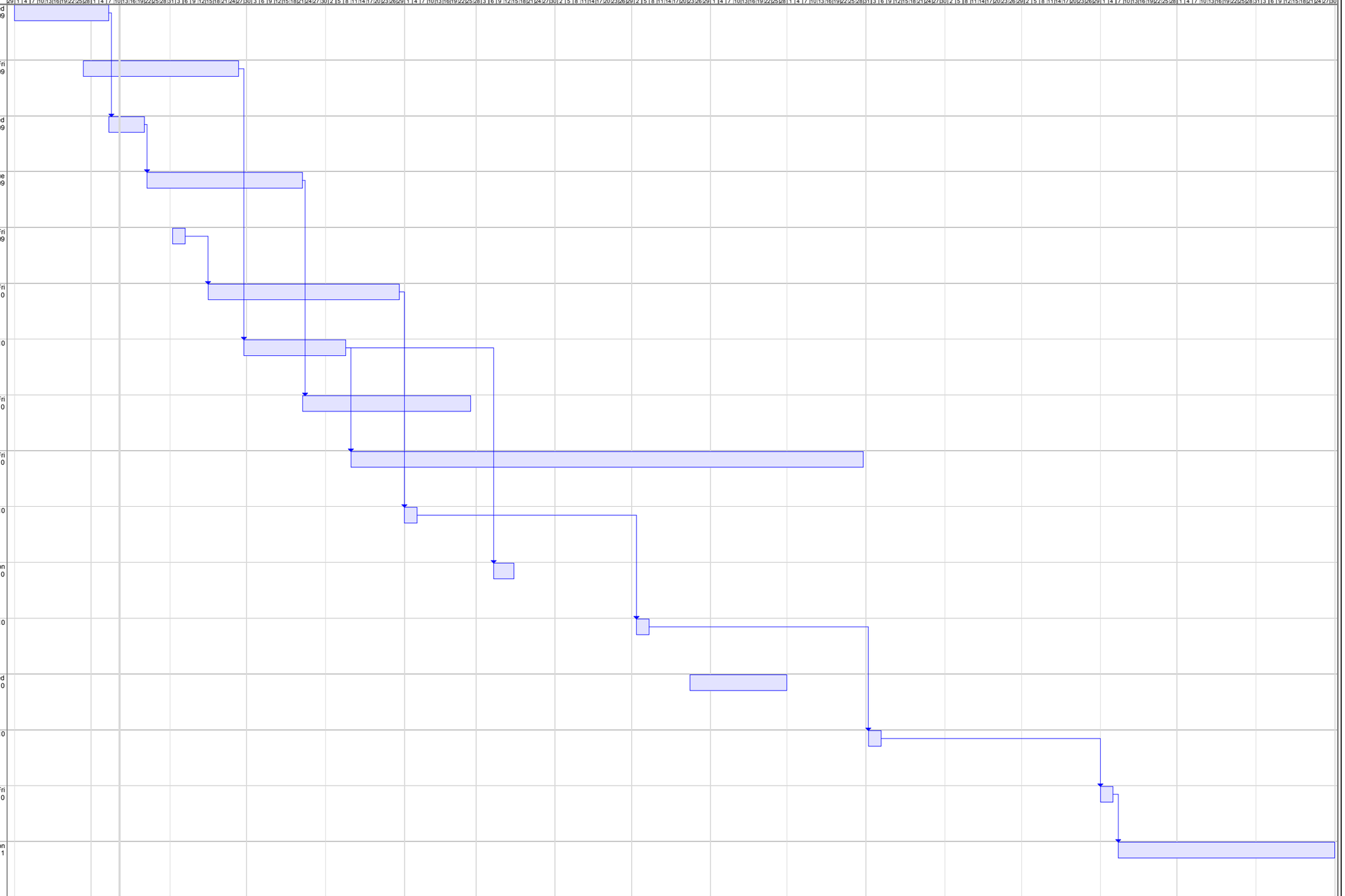
DATE OF PHOTOGRAPHY 1-27-97

FIGURE 4
PROPOSED BORING/TEMPORARY WELL LOCATIONS
OWENS CORNING
ANDERSON, SOUTH CAROLINA

Prepared For: OWENS CORNING	DATE: 07/02/09
	SCALE: 1"=200'
BROWN AND CALDWELL	DRAWN BY: TCB
	PROJ. 136868

Figure 5 - Phase II RFI Schedule
Owens Corning Starr, SC
RCRA Corrective Action Program Schedule 2009-2010

ID	Task Name	Duration	Start	Finish
1	RFI Phase 2 Work Plan	27 days	Tue 9/1/09	Wed 10/7/09
7	Interim Measures Work Plan (IMWP)	45 days	Mon 9/28/09	Fri 11/27/09
2	EPA Review of RFI Phase 2 Work Plan	10 days	Thu 10/8/09	Wed 10/21/09
4	RFI Phase 2 Fieldwork	43 days	Fri 10/23/09	Tue 12/22/09
3	Annual Surface Water & Groundwater Sampling	5 days	Mon 11/2/09	Fri 11/6/09
5	Annual Surface Water and Groundwater Report	55 days	Mon 11/16/09	Fri 1/29/10
8	EPA Review of IMWP	30 days	Mon 11/30/09	Fri 1/8/10
6	RFI Phase 2 Report	49 days	Wed 12/23/09	Fri 2/26/10
11	IMWP Implementation	146 days	Mon 1/11/10	Fri 7/30/10
9	Quarterly Groundwater Monitoring	5 days	Mon 2/1/10	Fri 2/5/10
10	Community Meeting	6 days	Mon 3/8/10	Mon 3/15/10
12	Quarterly Groundwater Monitoring	5 days	Mon 5/3/10	Fri 5/7/10
13	Semiannual Groundwater Report	28 days	Mon 5/24/10	Wed 6/30/10
14	Quarterly Groundwater Monitoring	5 days	Mon 8/2/10	Fri 8/6/10
15	Annual Surface Water and Groundwater Sampling	5 days	Mon 11/1/10	Fri 11/5/10
16	Annual Surface Water and Groundwater Report	61 days	Mon 11/8/10	Mon 1/31/11



Project: Project Schedule_083109.mp
Date: Mon 10/12/09

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Table 1. Focused List of VOCs Owens Corning, Anderson, South Carolina		
Paramater	MCL (ug/L)	Laboratory Reporting Limit (ug/L)
1,1,1-Trichloroethane	200	5
1,1-Dichloroethane	-	5
1,1-Dichloroethene	7	5
1,2-Dichloroethane	5	5
Benzene	5	5
Carbon tetrachloride	5	5
Chloroform	-	5
cis-1,2-Dichloroethene	70	5
Ethylbenzene	700	5
Methylene chloride	5	5
Tetrachloroethene	5	5
Toluene	1,000	5
trans-1,2-Dichloroethene	100	5
Trichloroethene	5	5
Vinyl chloride	2	2
Xylenes, total	10,000	5

Table 2. Northeast Area Residential Wells - Semiannual Monitoring Program Owens Corning, Anderson, South Carolina			
Map ID	**Address**	**Owner**	**Comments**
2	634 Airline Road	Daniel Mullins	The property is connected to Starr-Iva. They have a well on the property; however, it is out of service.
4	1100 Airline Road	Donna Huckaby	The property is connected to Starr-Iva. The well does not operate.
7	605 Clinkscales Road	James Hall	The property is connected to Starr-Iva and operates a well which is used for irrigation. According to the property owner, the well is 30 feet deep.
8	134 Friendship Lane	Eloise Smith	The property is not connected to Starr-Iva. They operate a 50-foot deep well for their primary drinking water source. The well was installed by Hughes Drilling.
9	138 Friendship Lane	Jettie Nelson	The well is 60 feet deep and has not operated for at least 18 years.
10	200 Friendship Lane	Edward Herren	The property is connected to Starr-Iva and has a well which is 35 feet deep and is used for irrigation.
11	721 Clinkscales Road	Curtis Geer	The property is not connected to Starr-Iva. They operate a well which is their only water source.
12	711 Clinkscales Road	George Pruitt	The property is connected to Starr-Iva. They have a well which is out of service.
13	628 Airline Road		The property is connected to Starr-Iva. The well is used for irrigation and is 38 feet deep.
14	3731 Keys Street		The property has two wells but only one of them was sampled because the pump was not working in the other one.
15	3713 Keys Street	Layton Whitten	The property is not connected to Starr-Iva. They operate a well which is their only water source. Mr. Whitten stated the well is 245 feet deep.
16	624 True Temper Road		The property is connected to Starr-Iva. They formerly had a well which no longer operates.
17	1501 Airline Road	Jefferson Chapel	DHEC tested the tap water which confirmed positive for chlorine. It is believed that the property is on Starr-Iva.
18	240 True Temper Road	Donna Kelly	The property is connected to Starr-Iva. They formerly had a well which no longer operates.
19	408 Clinkscales Road	Hugh Smith	They operate a well for all home uses (drinking, landscaping, etc.) that was installed in 1958 by Hughes Drilling. The resident does not know the depth of the well.
20	401 Clinkscales Road	Imogene Bouchillon	They operate an 85-foot well as their primary drinking water source. The well was installed in 1959.

Table 2. Northeast Area Residential Wells - Semiannual Monitoring Program Owens Corning, Anderson, South Carolina			
Map ID	**Address**	**Owner**	**Comments**
21	4515 Keys Street	Ruth and Hazel Elrod	They operate a 195-foot well as their primary drinking water source. The drilled well is approximately 40 years old and can pump at a rate of 18 gal/min. There is also an old dug well on the property that is caved in. The residents previously dug four wells on their property before finding water.
22	305 Harry Drive	Drake Ruth, Dean Yon Life Est	This property is connected to Starr-Iva. A hand-dug well is located on the property; it hasn't been used in 30 years and has caved in. The well was dug in 1950 by Harry Drake.
23	150 Clinkscales Road	Dickie and Patricia McAllister	This property is connected to Starr-Iva. There are two old wells on the property, neither of which are operational. One of these wells has caved in. The resident has lived on the property for 10 years.
24	943 Flat Rock Road		They operate a 65-foot well as their primary drinking water source. The residents have been on the property for 12 to 13 years.
25	325 Clinkscales Road	Louie Harrison McBride	This property is connected to Starr-Iva. There are two 30-foot wells on the property. Both wells have been dry since Fall of 2007. The wells are approximately 50 years old.
26	322 Clinkscales Road	June Shuler	There is one 35- to 40-foot well on the property that has been dry since April 2008. The well water was used for landscaping purposes only. This property is connected to Starr-Iva.
27	321 Clinkscales Road	Alejandro and Claudia Maragliano	A well house was observed on the property. According to the neighbors, the well is most likely dry. The residents are out of town for an extended period of time.
28	137 Knowlandwood Circle	Wachovia Bank	A nonoperational well was observed in the backyard. According to several neighbors, this well may have provided drinking water for the entire neighborhood before residents were connected to Starr-Iva.
29	412 Kaye Drive	Donnie Wiley	The property operates a well which is their only water source.
30	Vacant lot across from 412 Kaye Drive		There is no house on the property.
31	311 Kaye Drive	Daniel Rowe	The well is cased to 45 feet with a total depth is 305 feet. The well was installed in 2004.
32	117 Faye Drive	Cara Crawford	
33	303 Kaye Drive	Sheila Lance	The well is 325 feet deep and cased to 35 feet. It was installed in 2006 and reportedly has a pumping rate of 10 gpm.
34	End of Kaye Drive		The well is shallow-bored, approximately 20 feet deep. It is not currently in use, and there is an abandoned trailer on property.
35	217 Kaye Drive	Marvin Wood	The well is 50 feet deep and is not operational.

Table 2. Northeast Area Residential Wells - Semiannual Monitoring Program Owens Corning, Anderson, South Carolina			
Map ID	**Address**	**Owner**	**Comments**
36	200 Kaye Drive	Jackie Hawley	The well is 400 feet deep.
37	335 Elrod Road	Steve Hicks	
38	215 Elrod Road		
39	115 Elrod Road	Ronnie Shead	They use the well to water grass and for animals. The property is connected to Starr-Iva.
40	119 Cloverhill Drive	Stephen Rash	The property has two wells but only one of them was sampled because the pump did not work in the other one. The well that was sampled is 200 feet deep and the other one is 400 feet deep.
41	122 Kayle Drive	Jean Byrom	The well went dry in the summer of 2008. The property is connected to Starr-Iva.
42	138 Kayle Drive	Lucille Todd	The well went dry in the summer of 2008. The property is connected to Starr-Iva.
43	1802 Airline Road		The owner did not want us to sample well.
44	1303 Clinkscales Road	Barbara Epps	The well is 85 feet deep.
45	House between 811 and 901 Airline Road		No one is living at this house.