COMPREHENSIVE GROUNDWATER ASSESSMENT PLAN

Kuhlman Electric Corporation
Crystal Springs, Mississippi

Prepared for

BorgWarner Inc.

October 2004

GeoEnvironmental Associates, LLC | MARTIN & SLAGLE

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1.0 INTRODUCTION

Kuhlman Electric Corporation (KEC) owns and operates a transformer manufacturing plant in Crystal Springs, Mississippi (Figure 1). In response to the Mississippi Commission on Environmental Quality Order No. 4449-02, which was issued to Kuhlman Electric Corporation on July 23, 2002, a preliminary groundwater assessment was conducted in March and April 2004 to determine if groundwater, beneath the plant site, was impacted by chemical constituents previously detected in site soils. Chlorinated and non-chlorinated organic compounds were detected in groundwater samples collected during the preliminary groundwater assessment. The source of these detected compounds has not yet been determined.

As the result of MDEQ's review of the preliminary groundwater assessment Martin & Slagle GeoEnvironmental Associates, L.L.C. prepared, on behalf of BorgWarner Inc. and KEC, this Comprehensive Groundwater Assessment Work Plan for review and approval by the Mississippi Department off Environmental Quality (MDEQ). This *Comprehensive Groundwater Assessment Work Plan* describes the processes and procedures that will be implemented to determine the nature and extent of impacted groundwater at the KEC plant site. The Comprehensive Groundwater Assessment Work Plan will be implemented in a staged approach. The first stage involves the sampling and analysis of groundwater within the uppermost aquifer, the second stage concentrates on plume delineation and the third stage incorporates the installation and sampling of additional monitoring wells to monitor the characteristics and movement of an identified plume. At the end of each stage data will be evaluated to determine whether to proceed with the next stage of the investigation.

1.1 Site Description

The Kuhlman plant is located at 101 Kuhlman Drive, Crystal Springs, Copiah County, MS 39059, at latitude N 31° 15' 20" and longitude W 90° 21' 20". The plant site is located within the town limits of Crystal Springs. The town center is located south of the plant approximately 0.25 miles (Figure 1). The Kuhlman property is bordered to the south by commercial businesses and residences located across Lee Street, to the west by a railroad line and residences. Across Fulgham Avenue to the northwest is a vacant lot formerly occupied by an icehouse and to the northeast, residences. East of the plant and abutted to the property are residences and one funeral home. The residences are all single-family dwellings with individual yards. The single-family dwellings extend for several blocks in all directions except north. At least one church and a public swimming pool are located within two blocks of the site to the east. The predominant land-uses in the surrounding area are commercial, former industrial, institutional, and residential.

The KEC property consists of a manufacturing plant building situated on about 15 acres of land. This site has been used for industrial manufacturing purposes since the mid-1950s. The future use of the property is anticipated to remain industrial.

1.2 Background

The KEC plant in Crystal Springs, Mississippi was constructed and has been owned and operated as a transformer manufacturing plant since the 1950s by KEC or its predecessors (collectively "KEC"). KEC continued to own and operate the plant in March 1999 when BorgWarner Inc. purchased the stock of Kuhlman Corporation, the parent of KEC, and thereafter as well. Seven months later, on October 5, 1999, Kuhlman Corporation sold KEC's stock to KEC Acquisition Corporation. BorgWarner and Kuhlman Corporation indemnified KEC, KEC Acquisition Corporation and their affiliates for historic contamination at the site and have, under the purchase agreement, exercised their right to control any remediation of such contamination.

On April 19, 2000, BorgWarner received notification from KEC, in accordance with the purchase agreement, that areas of contaminated soil had been found in Crystal Springs, Mississippi. BorgWarner responded by sending a representative to meet with KEC plant representatives and a representative from MDEQ, Eric Dear, on April 25, 2000. During this meeting all parties were briefed on the existing situation at the plant and MDEQ's expectations regarding assessment of the site.

Soil assessments conducted on the KEC property and surrounding residential properties confirmed that the PCB Aroclor 1260 and chlorinated benzenes were present in site soils and that offsite areas have been impacted by PCBs through the transport of contaminated soils by stormwater runoff from the KEC property.

1.3 Summary of Previous Work Performed at the KEC Plant

Results of the plant site soil assessments are included in the *Preliminary Site Characterization Report* (July 2000) and the *Addendum to the Site Characterization Report* (February 2001) submitted to MDEQ and the United States Environmental Protection Agency (USEPA). Impacted soils and paving materials were remediated from June 2002 to June 2004. Site remediation is described in the *Plant Site Remediation Report* (June 2004).

1.3.1 Preliminary Groundwater Assessment Summary

During the preliminary groundwater assessment eight permanent monitoring wells were installed in areas that were found during the plant site soil assessment to contain the highest concentrations of PCBs. During installation of the monitoring wells soil, perched groundwater, and groundwater from the uppermost aquifer were sampled and analyzed for the presence of PCBs, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs).

Perched groundwater and the upper aquifer have detectable concentrations of organic constituents, which exceed the Target Remediation Goals (TRG) limits established by MDEQ. Samples from six of the eight monitoring wells have detectable concentrations of VOCs. 1,1-dichloroethene (1,1-DCE) was detected at concentrations ranging from 4.85 μg/l to 87.7 μg/l in samples from six of the eight monitoring wells. The MDEQ TRG for 1,1-DCE is 7.0 μg/l. MDEQ TRG limits were exceeded in perched groundwater for 1,1-dichloroethene, n-propylbenzene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene. MDEQ has not established a limit for trans-1,3-dichloropropene, which was also detected.

1.4 Groundwater Assessment Objectives

The general groundwater assessment objectives for this site are to:

1. Identify the source of groundwater contamination;
2. Determine the vertical and horizontal extent of impact to groundwater in the uppermost aquifer;
3. Determine the vertical and horizontal extent of impact to perched groundwater;
4. Identify potential receptors;
5. Determine exposure risks to potential receptors;
6. Implement interim corrective measures if an imminent threat to potential receptors exists.
7. Propose a program to monitor the characteristics and movement of an identified plume.

2.0 FIELD SAMPLING PLAN

This comprehensive groundwater assessment plan was prepared in accordance with the guidance published in the USEPA, Region IV *Environmental Investigations Standard Operating Procedure and Quality Assurance Manual,* November 2001 (EISOPQAM). The field sampling plan details the activities to determine the extent of impacted groundwater at the KEC plant site and potentially the source. Fieldwork will be conducted in stages. Each stage will develop the necessary data for the implementation of each subsequent stage. The first stage will be focused on groundwater flow data and groundwater analytical data. Groundwater sampling locations will be identified downgradient of the areas initially sampled during the preliminary groundwater assessment activities. The analytical results from the new groundwater samples will be used to focus the second stage of the investigation to the downgradient extent of the groundwater contamination. The third stage will involve the installation and sampling of key positioned groundwater monitoring wells to monitor plume characteristics and movement. At the end of each stage data will be evaluated to determine whether to proceed with the next stage of the investigation.

2.1 Regional Geology

Published literature indicates that sediments consisting of fine-grained sands with local lenses of clay and gravel underlie Crystal Springs and the surrounding area. These red and orange sediments comprise the Citronelle Formation. The Citronelle Formation covers approximately 30 percent of Copiah County and is present at ground surface at Crystal Springs. Gravel, mainly consisting of chert and quartz, is present throughout the formation near Crystal Springs and is heavily mined in the surrounding area. The thickness of this formation ranges from a few feet to a maximum of 100 feet with average depths ranging from 20 to 80 feet. Thickness of the unit is controlled by erosion of surface soils. The thinner segments are located in washes and drainage channels, while the thicker portions are located on topographically high areas. In the vicinity of Crystal

Springs, the Citronelle formation lies unconformably over the Catahoula Formation. The base elevations of this Citronelle range from 375 to about 430 feet mean sea level (msl).

The surficial aquifer is under phreatic conditions. No extensive clay confining units were identified above this first aquifer during the preliminary groundwater assessment activities.

2.2 Regional Hydrogeology

According to published literature, the uppermost aquifer in the area of Crystal Springs exists under phreatic conditions (unconfined) and rises into the Citronelle Formation. Groundwater generally exists near the base of the Citronelle. Depth to groundwater ranges from 20 to greater than 100 feet with more than half of the water levels measured in wells deeper than 50 feet.

Average rainfall totals 57.2 inches per year in the Copiah County area. Precipitation that does not evaporate (approximately 44 inches evaporation per year) or runs off into streams and drainages recharges the surficial aquifer. Precipitation infiltrates vertically through the upper sediments to a saturated zone near the bottom of the Citronelle Formation. Groundwater occupies the voids or pore spaces between sand grains. Groundwater moves either vertically into the lower aquifer or horizontally, discharging from springs and into streams, or is stored in the aquifer.

2.3 Site Geology

The site geology, as determined by soil samples collected during the installation of the monitoring wells, consists of interlayered orange, pink, and tan silty, clayey and gravelly sands and sandy gravels to a depth of about 25 to 30 feet. The top of a discontinuous, hard, gray clay unit is present at this depth. The thickness of the clay layer ranges from

20 feet at monitoring well MW-1 to 5 feet at MW-6 but is absent at MW-7 and MW-5. Beneath the clay layer are interlayered sands and gravels to at least 73 feet below grade at MW-1. The cross sections included in Figures 3 and 4 show an interpretation of the geologic subgrade.

2.4 Site Hydrogeology

Groundwater was encountered in all site borings. Perched groundwater was present in six of the eight well locations. The top of the perched groundwater ranged in depth from 15 to 24 feet below ground surface (bgs). In all locations where perched groundwater was found, the clay layer was also present. Neither MW-5 nor MW-7 had perched groundwater.

The upper aquifer was detected in all monitoring wells, except for MW-5, at depths ranging from 50 to 61 feet bgs. This appears to be the unconfined aquifer that rises into the Citronelle Formation as described in the literature. Site data indicates that the upper aquifer is under phreatic conditions. Groundwater flows from northeast to southwest across the site based on groundwater level measurements from the monitoring wells.

The groundwater level measured in MW-5 was at 20 feet bgs and appeared consistent with the perched groundwater levels across the site. However, the clay unit was absent at this location to a depth of 42 feet bgs indicating that groundwater mounding from an artificial water source may be the cause of the high groundwater elevation in this area.

First Stage: Source Identification and Groundwater Sampling

2.5 Source Identification

The source of constituents detected in the groundwater at the KEC plant site is not known. Records reviewed to date by MSGA do not indicate historical use of 1,1-dichloroethene by KEC.

The proposed sample point layout should give a reasonable indication of a source, if one exists, inside or beneath the plant building. In addition to evaluating the data from Profiler samples (discussed below), a search of other potential off-site sources will be conducted. Businesses that may be potential sources include dry-cleaners, automotive repair shops, and dyers and finishers of synthetic fiber textiles.

2.6 Groundwater Sampling

The first stage of this assessment will update the existing information from the monitoring wells that were installed at the KEC site, during the Preliminary Groundwater Assessment activities. The new information will pinpoint sample locations for plume delineation. Work that will be completed as part of the first stage is as follows:

- Groundwater levels will be measured in existing wells and the potentiometric map will be revised based on the current measurements.
- A piezometer will be installed in the parking area south of the maintenance building. Water levels will be measured and will be used in conjunction with other water level information to update the potentiometric map. The location of the proposed piezometer is shown on Figure 2.
- Groundwater from existing monitoring wells will be sampled and analyzed by the on-site laboratory for VOCs and chlorinated benzenes by EPA method 8260B and

8082. At least 10% of the samples will be sent to the off-site laboratory for quality control purposes.

Information obtained from the work items described above will be used to determine groundwater sampling locations and depths during the first stage of the assessment. Based on updated groundwater level and analytical data, groundwater sampling will proceed downgradient of the existing monitoring wells. Nine proposed sampling locations for the first stage of the groundwater sampling are shown on Figure 2. These nine locations may be adjusted based on evaluation of information collected from water level measurements and analytical data from existing wells.

Groundwater characterization will be conducted, at the nine proposed locations, using a Waterloo Profiler (Profiler) data acquisition system. The Profiler system will:

1. Collect groundwater samples at predetermined depth intervals,
2. Measure an index of hydraulic conductivity, and
3. Measure pH, specific conductance, dissolved oxygen, oxidation/reduction potential, and temperature (field parameters).

The Profiler uses direct push technology to advance a probe similar to a cone penetrometer into the subgrade. The profiling tip, which will be driven to desired sampling depths using a Geoprobe® 66-Series direct push rig, is equipped with sixteen recessed and screened inlet ports through which water passes. As the tip is driven into soil, analyte-free water is discharged through the ports into the formation. The water discharge flow rate is monitored to determine the "Index of Hydraulic Conductivity" (I_k), a unitless parameter used to identify relatively high and low hydraulic conductivity (K) hydrostratigraphic units. This tool will be useful in identifying clay (low K), sand, and gravel (high K) units in each borehole.

At specified intervals, after reaching either perched water or the water table associated with the upper aquifer, groundwater samples will be drawn into the profiling tip using a gas drive pump. The groundwater will be pushed to the ground surface where samples will be collected in preserved 40 mil septum vials for VOC analysis and a one litter amber container for chlorinated benzene analysis. At the same time, field parameters will be measured for each sample. Since the saturated zone within the perched water is thin, less than 5 feet, only one sample will be collected from this zone. Samples of perched water will be sent to the on-site laboratory for analysis of VOCs and chlorinated benzenes. At least 10% of those samples will be sent off-site for confirmation analysis. Once the probe reaches the upper aquifer water table samples will be collected at five-foot intervals and sent to the on-site laboratory for analysis of VOCs and chlorinated benzenes. At least 10% of those samples will be sent off-site for confirmation analysis. This vertical profile sampling will continue in each location until either the bottom of contamination is reached or until the top of the confining unit is reached.

The depth of sampling has the potential to exceed 90 to 120 feet. If the direct push rig cannot push rods to this depth due to hard gravel or sandy gravel units, rotary augers will be used to drill to near the top of the watertable before the Geoprobe® is used to drive the rods. The Geoprobe® 6610 rig is equipped with a rotary auger unit.

Data obtained, during the first stage, from the nine proposed sampling locations will be evaluated along with the revised groundwater flow map, field parameters, and the latest analytical results from the existing monitoring wells. If impacted groundwater is detected downgradient of the plant in the nine-sample locations, work will proceed to the second stage. Second stage sampling locations will be sited based on the distribution of analytical constituents detected in the first stage samples.

2.7 Groundwater Sampling Procedure

Two different methods will be employed for groundwater sampling. Groundwater from all existing monitoring wells on the KEC plant site and the new piezometer that will be installed during the first stage will be sampled. Groundwater will also be sampled using the Waterloo Profiler. The two methods employed for sampling groundwater are described below. However, sample-handling procedures will be identical for both sampling methods.

Prior to sample collection from monitoring wells, water levels in all wells will be measured and recorded in a bound fieldbook. Water levels will be converted to mean sea level elevations.

All wells will be purged of three well volumes calculated by using current water level measurements. The wells will be purged by either pumping with a submersible pump or bailing with disposable bailers.

Each well will be sampled as soon as it is capable of yielding a sufficient volume of water. Samples will be collected in certified clean containers supplied by the laboratory. Each sample container will be marked with well number, date, time, presence of preservatives, analytical parameters, and initials of the sampler. Once sealed, all sample containers will be placed in a cooler with ice, and cooled to 4° C for transport to the laboratory.

The method used by the Profiler involves the collection of groundwater samples from uncased boreholes through ports in the stainless steel tip of the Profiler using a gas driven pump to move groundwater to the ground surface. The groundwater sample will be collected in four 40-mil preserved septum vials manifolded in series along the Profiler discharge piping. At approximately five-foot intervals and depending on the results of the index of hydraulic conductivity, advancement of the probe will be stopped and the zone immediately surrounding the tip will be purged. Purging will continue until the temperature, pH, and specific conductance stabilize. In addition to the field parameters described above, dissolved oxygen and oxidation/reduction potential values will be determined for each sample. Based on experience in similar environments, the volume of water necessary to adequately purge the zone around the tip is between 500 and 1,000 milliliters. When purging is complete, the sample will be collected. The groundwater samples will be immediately placed in a cooler with ice and transported to the on-site laboratory, logged in, and placed in a refrigerator to await analysis and transportation to the off-site laboratory for the confirmation samples. The sampler and all internal plumbing will be back-flushed between samples with deionized water.

All data and all samples will be collected as the Profiler tip is advanced. The rods are only removed from the borehole when the last sample from each borehole is collected. This eliminates the possibility of cross-contamination between samples. The borehole will be pressure grouted from the bottom up as the sampler and rods are removed. Grout will be pumped through the direct push rods and the sampling tip the full length of the borehole.

All sampling equipment and direct push rods will be decontaminated between boreholes.

2.8 Perched Groundwater Sampling Procedure

Perched groundwater, or water that is trapped by impervious clay or silt layers at levels above the saturated zone, is classified by the State of Mississippi as groundwater and is, therefore subject to the same rules as any aquifer system within the state.

If perched water is encountered while sampling with the Profiler, a sample will be collected using the same procedure as described above. Probing will continue downward in the same borehole after the perched groundwater sample is collected. If drilling a pilot hole is required, a surface casing will be seated to a level immediately below the depth of the perched groundwater sample. The borehole will be purged of drill cuttings and water, and drilling or probing will proceed inside the surface casing.

2.9 Field Measurement Procedure

During sampling of existing wells a separate container will be filled with a portion of the groundwater sample. Field parameters including pH, specific conductance, turbidity and temperature will be measured. Measurements will be made using a Horiba U-10 Water Quality Checker or a meter of equal make and quality.

Water level measurements will be made with a Keck water level indicator, or another instrument of equal make and quality, attached to a clean fiberglass measuring tape with 1/100th foot graduations. Water levels will be measured from the top of each well casing.

2.10 Investigative Derived Waste Management Procedure

Management of investigative derived waste (IDW) will be the responsibility of the Field Manager. IDW includes but is not limited to, soil cuttings, well development water, purge water, decontamination solutions and water, personal protective clothing, gloves, and any other material generated by field activities.

All solid IDW will be placed in open-top drums or designated roll off box and stored in a secure location until removal to an appropriate disposal facility. Purge water will be placed in a designated polyethylene tank for storage until profiled and properly disposed of. The IDW will be profiled for disposal by either, direct sampling and analysis of the material or by using current existing analytical data from the assessment activities. Drums and roll off boxes will be placed at the temporary storage area, catalogued, and labeled with date and contents. Drums and roll off boxes will be removed to a disposal facility within 90 days of final accumulation of the IDW. Properly containerized IDW will be manifested and disposed under KEC's EPA I.D. number.

Second Stage: Plume Delineation and Aquifer Testing

2.11 Plume Delineation

Second stage sampling involves the systematic sampling of groundwater while moving downgradient until the edge of the impacted groundwater is located. The sampling procedure for the second stage will be the same as the one for the first stage. Sampling locations will be selected and distributed down gradient of points exhibiting detections of contaminants of concern based on first stage data. The Field Manager will layout a series of transects perpendicular to the groundwater flow direction. An array of sampling points extending from the water table in the upper aquifer to the bottom of the plume or to the top of the confining unit will be situated along the transects extending to the lateral edges of the plume. Transects will extend downgradient until the edge of the plume is identified. If perched groundwater is detected in any of the sample locations, a sample will be collected and analyzed.

The distance between transects and sampling points along transects will be determined after reviewing first stage data. If the plume is large and/or deep, the sample points will be widely spaced. Likewise, if the plume is compact, the sample points will be closely spaced.

2.12 Aquifer Testing

Aquifer testing will be conducted on existing monitoring wells. Slug tests will be performed on three wells to determine the hydraulic conductivity of the hydrostratigraphic unit near the water table. Both a rising and falling head slug test will be performed. A pressure transducer connected to a data logger will be installed in the well to be tested. When the water in the well has been allowed to equilibrate following insertion of the transducers, a PVC blank or slug of known volume will be carefully lowered to the bottom of the well, which will cause the water level in the well casing to rise. Data will be recorded by the data logger as the water level in the well casing returns over time to its original level. As soon as the water level returns to normal, the slug will be quickly removed, leaving a void in the well screen. The data logger will record data as recharge occurs. Following slug testing on the three wells, data will be reduced and evaluated to determine the values of hydraulic conductivity for each well. The hydraulic conductivity and the hydraulic gradient, determined from the on-site water level measurements, will be used to calculate the average groundwater flow velocity.

Third Stage: Additional Monitoring Well Installation and Sampling

2.13 Monitoring Well Installation

The use of the Profiler does not allow for long term groundwater monitoring since no permanent sampling devices are installed. Therefore, upon completion of plume delineation using the Profiler and to the extent that the source of the groundwater contamination is attributed to activities at the KEC site, a monitoring system consisting of permanent nested wells to monitor the extent and movement of the plume will be proposed.

Monitoring wells will be installed by a qualified, State of Mississippi licensed drilling contractor. Each borehole will be drilled into the water table using rotary augers. Continuous soil sampling will be conducted along the entire borehole of the deepest well in each well nest using a split-spoon sampler. A log of the borehole will be developed from soil samples described and classified under the supervision of a qualified geologist registered in the State of Mississippi.

The plant site Aroclor 1260 remediation goal was 100 ppm and concentrations up to 25 ppm may exist on-site in areas where monitoring wells are located. In order to prevent the transport of PCBs and possible contamination present in perched groundwater deeper into the subgrade, surface casings will be advanced through the upper soil zone and seated into the clay layer at about 25 feet bgs to isolate surficial soils, and allow drilling to advance without carrying surface soils to deeper levels. Once the casing is set in place, the annulus between the borehole and the outer casing will be grouted using a lean cement and bentonite mixture consisting of a 30% solids pure bentonite grout with a minimum density of 10 lbs/gallon of water. Once in place the bentonite grout will be allowed to cure for 24 hours.

If groundwater is present inside the surface casing it will be pumped out prior to further advancing the borehole. After the borehole is advanced to the desired depth a five-foot long well screen will be inserted into the borehole. The 0.010 inch slotted manufactured well screen will be set in the bottom of the borehole and a sand pack placed around the screen to a depth of 2 feet above the top of the screen. Bentonite pellets will be placed to 2 feet above the filter pack. The bentonite will be allowed to hydrate for 8 hours. The number of wells and elevations at which well screens will be set will be determined after evaluating the Profiler sampling data. Proposed well locations and screen depths will be submitted to MDEQ for approval prior to beginning this stage of work.

The riser from the top of the well screen to the ground surface will consist of 2-inch diameter schedule 40 polyvinyl chloride (pvc) pipe. The annulus between casing and the well screen will be grouted in place to within 2 feet of the ground surface using the same lean cement/grout mixture described above. A concrete collar and lockable, protective outer casing will be installed on each well.

A horizontal and vertical survey of all wells will be conducted to within 0.01 feet. Elevations will be determined for the ground surface as well as the top of casing at each well.

3.0 ANALYTICAL PROGRAM

The groundwater TRGs established by MDEQ for volatile organic compounds (VOCs) and various chlorinated benzenes are:

sec-Butylbenzene	243 µg/L
tert-Butylbenzene	243 µg/L
Chlorobenzene	100 µg/L
1,3-Dichlorobenzene	5.48 µg/L
1,4-Dichlorobenzene	75 µg/L
1,1-Dichloroethane	798 µg/L
1,1-Dichloroethene	7.0 µg/L
trans-1,3-Dichloropropene	0.0842 µg/L
Ethylbenzene	700 µg/L
Isopropylbenzene	679 µg/L
Pentachlorobenzene	29.2 µg/L
n-Propylbenzene	243 µg/L
1,2,4,5-Tetrachlorobenzene	11 µg/L
1,1,1-Trichloroethane	200 µg/L
1,2,3 -Trichlorobenzene	N/A
1,3,5 -Trichlorobenzene	N/A
1,2,4-Trichlorobenzene	70.0 µg/L
1,2,3,4-tetrachlorobenzene	N/A
1,2,4-Trimethylbenzene	12.3 µg/L
1,3,5-Trimethylbenzene	12.3 µg/L
m-, p-, o-xylene	12,000 µg/L

Groundwater samples will be analyzed by the on-site laboratory for the above VOCs and chlorinated benzenes. The reporting limits established for water analysis by the on-site laboratory are 1.0 µg/L for VOCs and 0.025 µg/L for chlorinated benzenes. At least 10%

of the samples will be sent to the off-site laboratory for quality control purposes. Groundwater contamination delineation will proceed based on the on-site lab results.

Both the on-site and off-site laboratory will use EPA method 8260B to analyze groundwater for VOCs. The on-site laboratory will use EPA method 8082 and the off-site laboratory will use EPA method 8121 to analyze all groundwater samples for chlorinated benzenes.

Groundwater samples will be stored in a cooler on ice upon collection and transported to the on-site laboratory. Groundwater samples sent to the off-site laboratory will be stored in a refrigerator until shipped. The Quality Assurance/Quality Control Project Plan is included in Section 4.

4.0 QUALITY ASSURANCE /QUALITY CONTROL PLAN

As established by the MDEQ guidelines, all work related to the groundwater assessment on the KEC plant site will be performed in accordance with the USEPA, Region IV *Environmental Investigations, Standard Operating Procedures and Quality Assurance Manual,* November 2001 (EISOPQAM). Copies of relevant and applicable portions of the EISOPQAM will be maintained on site during all field activities and all field personnel will be trained in its implementation.

4.1 Sampling Objectives

The groundwater sampling objective for the assessment work is to determine the extent of VOCs and chlorinated benzenes in groundwater beneath the site. Groundwater samples will be collected, by the field geologist, from the existing eight (8) monitoring wells located on the KEC property and from the Waterloo Profiler investigation at the proposed locations and frequencies prescribed in Section 2 of this work plan.

4.2 Analytical Methods

Groundwater samples will be analyzed for VOCs and chlorinated benzenes by the on-site laboratory, Environmental Chemistry Consulting Services (ECCS) of Madison, Wisconsin. The on-site laboratory will analyze the groundwater samples using EPA Method 8260B for VOCs, mono- and di-chlorobenzenes, and 8082 for all other chlorinated benzenes. The procedure incorporates all the quality control rigors of the full 8082/8260B method including quantification based on 6-point calibration with continuing calibration verification, surrogate method performance monitoring, method blanks, laboratory control samples (LCS), and matrix spike/matrix spike duplicate (MS/MSD) samples. The reporting limits established for water analysis by the on-site laboratory are 0.025 μg/L for the chlorinated benzenes and 1.0 μg/L for VOCs which are below the established TRGs except for trans-1,3-Dichloropropene which has a TRG of 0.0842 μg/L.

At least 10% of all samples sent to the off-site laboratory will be split samples and the off-site laboratory will analyze the same parameters as the on-site laboratory to verify the on-site lab results.

The off-site laboratory will analyze all groundwater samples using EPA method 8260B for VOCs , mono- and di- chlorobenzenes, EPA method 8121 for all other chlorinated benzenes.

Both EPA methods 8082 (used by the on-site lab) and 8121 (used by the off-site lab) are electron capture detector (ECD) methods and will yield comparable results.

4.3 Key Personnel

The following is the list of key personnel dedicated to this project:

Project Manager:	Robert Martin, Martin & Slagle GeoEnvironmental Associates, LLC
Duties:	Responsible for overall management of project including all field coordination efforts.
Field Manager:	Robert Martin, Martin & Slagle GeoEnvironmental Associates, LLC
Duties:	Field oversight of remedial activities. Collection of samples. Maintenance of all field logs and records.

On-Site Laboratory

Manager: Richard Johnson, ECCS

Duties: Responsible for accepting custody of samples from the field personnel. Maintenance of laboratory records. Analyze samples.

QA/QC Coordinator: Christine Slagle, Martin & Slagle GeoEnvironmental Associates, LLC

Duties: Review daily sample logs. Confirm that QC samples are collected and sampling protocols are met. Assure that data quality objectives are met.

4.4 Quality Assurance Objectives for Data

The data quality objectives are pre-defined for the ECCS data in that Mississippi considers all on-site lab data screening level data. ECCS uses the same equipment and methodologies as the off-site lab with the exception of the mini extraction modification for chlorinated benzenes. A total of 10% of the samples collected will be split and submitted to Paradigm Analytical for confirmation analysis. Following this procedure, the data will qualify as screening data with definitive confirmation under USEPA Region IV EISOPQAM guidelines.

Samples designated for further VOCs and chlorinated benzene analysis by Paradigm will be delivered to the on-site lab in appropriate sample containers and stored in a refrigerator until shipped. If possible, six preserved VOC vials will be collected per sample to insure adequate sample volume for off-site and on-site laboratory analysis.

Equipment rinsates will be collected for evaluation of cross-contamination potential. These will be prepared by pouring distilled water over the sampling equipment after decontamination of equipment, and collecting and preserving the rinsate generated.

Field blanks will be collected. The field blanks will be prepared by filling sampling containers, which have been kept in the transition zone with distilled water. Trip blanks will be shipped with each cooler that is used to transport VOC samples to the off-site lab.

Blind duplicate samples will be collected for analysis and sent to both the on-site and off-site labs. Blind duplicates will be collected by filling extra sample containers. Blind sample containers will be submitted to each laboratory for analysis. The origin, date, and time of sampling for each blind duplicate sample will be recorded in the field logbook.

4.5 Sample Control and Field Records

4.5.1 Sample Identification

Each sample will be assigned a unique alpha-numeric identifier that will be clearly recognizable by both laboratories. Sample labels will conform to the labeling requirements under section 3.2.1 of the EISOPQAM.

4.5.2 Chain of Custody Procedures

The field geologist will record the sample ID, date, and time sampled in the field logbook at the time of collection. Samples will be placed in a cooler on ice and transferred by the field geologist to the on-site laboratory. Upon arrival at the on-site lab, the samples will be transferred to the ECCS laboratory manager who will log each sample on ECCS chain of custody forms. Each sample will be assigned a unique ECCS internal ID for tracking purposes. After analysis, the samples will be transferred to a sample refrigerator in the on-site lab until they are either sent to Paradigm for confirmation analysis or disposed of. For samples sent to Paradigm the field geologist will fill out a new chain of custody form.

4.5.3 Field Records

Field records will be kept in accordance with procedures specified in section 3.5 of EISOPQAM.

4.6 Laboratory QA/QC

QA/QC for both labs is identical. Summaries of each laboratory's procedures follow.

On-Site Laboratory, ECCS:

- Continuing calibration standards analyzed every ten samples or less and at the end of a run (GC/MS criteria follows method specific tuning requirements per EPA 8260B).
- Blank and LCS samples analyzed every twenty samples or less with a minimum of one per day.
- MS/MSD samples analyzed every twenty samples or less with a minimum of one per day.

Off-Site Laboratory, Paradigm:

- Continuing calibration standards analyzed at least once every 12-hour shift plus a minimum of every 20 samples (GC/MS criteria follows method specific tuning requirements per EPA 8260B).

- Blank and LCS samples analyzed every twenty sample or less with a minimum of one per day.
- MS/MSD samples analyzed every twenty samples or less with a minimum of one per day.

4.7 Data Review and Validation

All laboratory reports will be reviewed for reporting accuracy and consistency with laboratory QA/QC protocols. The primary validation of the on-site lab data will be accomplished through comparison with the data from the off-site lab. The relative percent difference (RPD) between the laboratory's results for split samples will be calculated and compared to a 50% RPD acceptability threshold.

5.0 REPORT

Within 60 days of completion of the Comprehensive Groundwater Assessment, a report will be prepared and submitted to MDEQ. The report will describe the assessment findings and will include the details of the work that was preformed; the analytical results of all groundwater samples collected; maps showing the direction of groundwater flow and velocity; and the geometry of the plume, if one exists. The report will also include the laboratory data sheets, the chain of custody forms, the groundwater well completion records and associated boring logs.

6.0 REFERENCES

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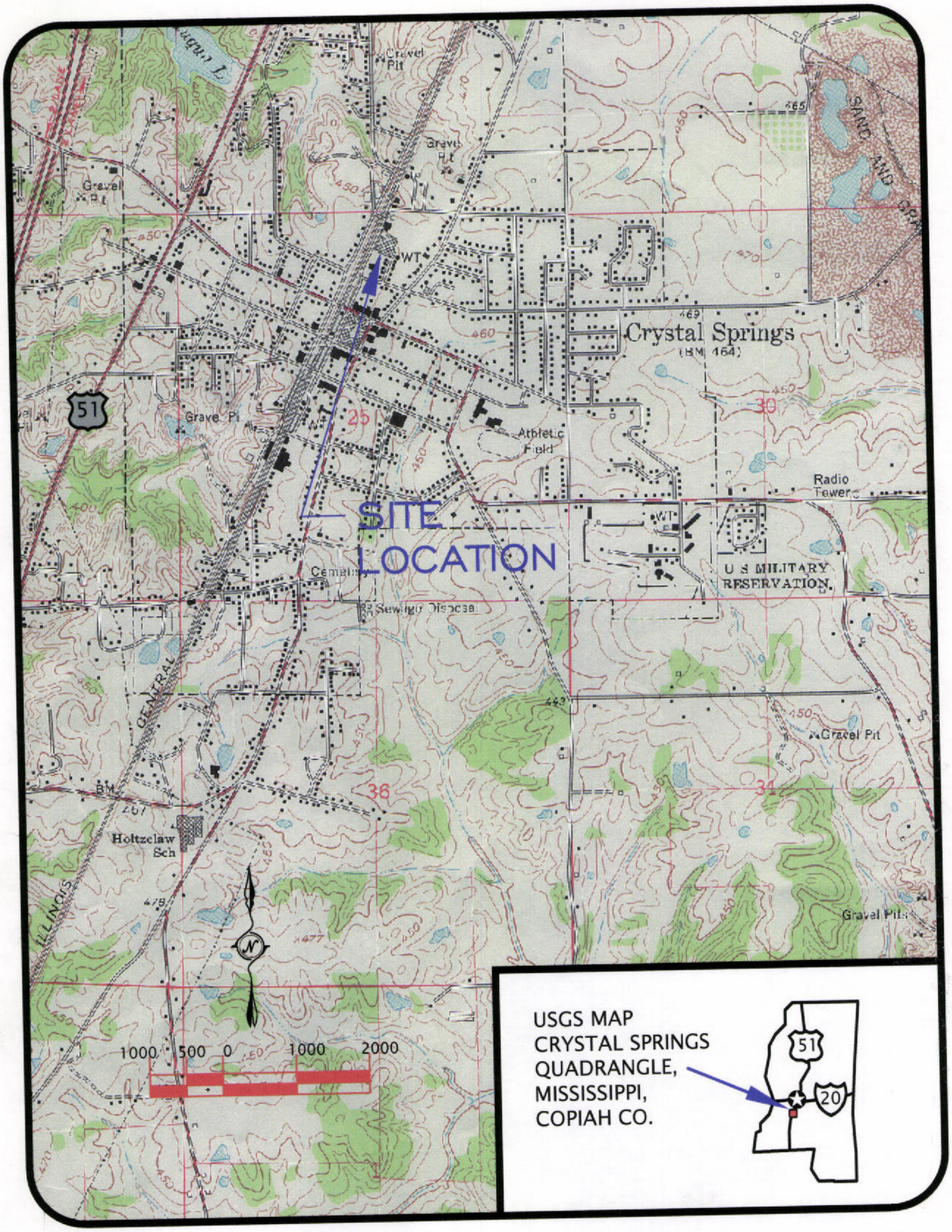

MARTIN&SLAGLE GeoEnvironmental Associates, LLC PO Box 1023 Black Mountain NC 28711 828.669.3929 828.669.5289	SCALE = 1":2000' REV: 0 DATE: 7/28/04 DR: DGR CHK: RLM	VICINITY MAP KUHLMAN ELECTRIC CORPORATION 101 KUHLMAN DRIVE CRYSTAL SPRINGS, MS
	PREPARED FOR: **BorgWarner Inc.**	FIGURE 1

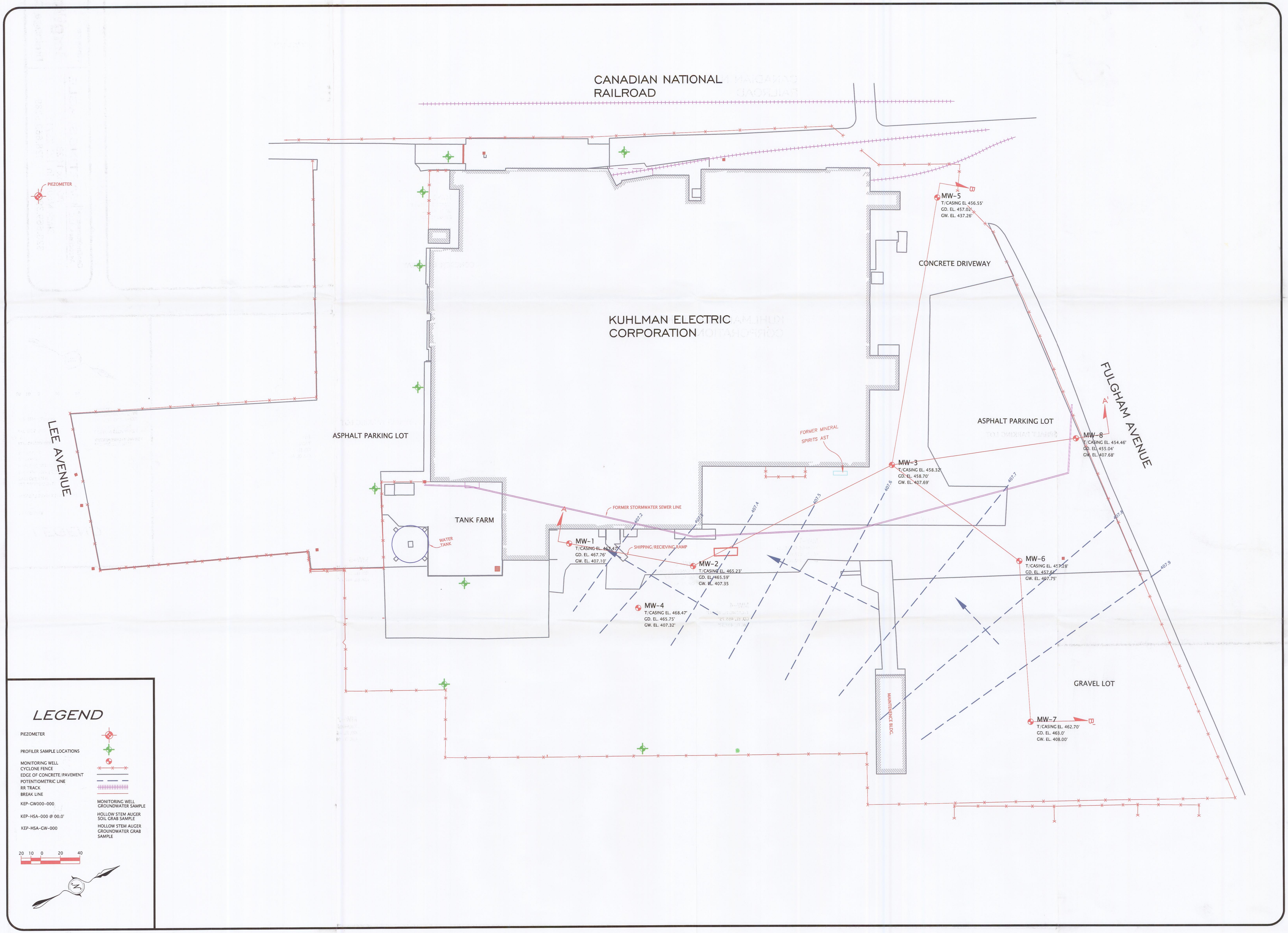

FIGURE 2

SITE MAP

KUHLMAN ELECTRIC CORPORATION
101 KUHLMAN DRIVE
CRYSTAL SPRINGS, MS

SCALE 1"=40'
DR: DGR
CHK: RLM
REV: 0
DATE: 9/28/04

DRAWING NAME: KEC\GROUND WATER COMPREHENSIVE ASSESSMENT WORK PLAN\F2.dwg

REV	
1	
2	
3	
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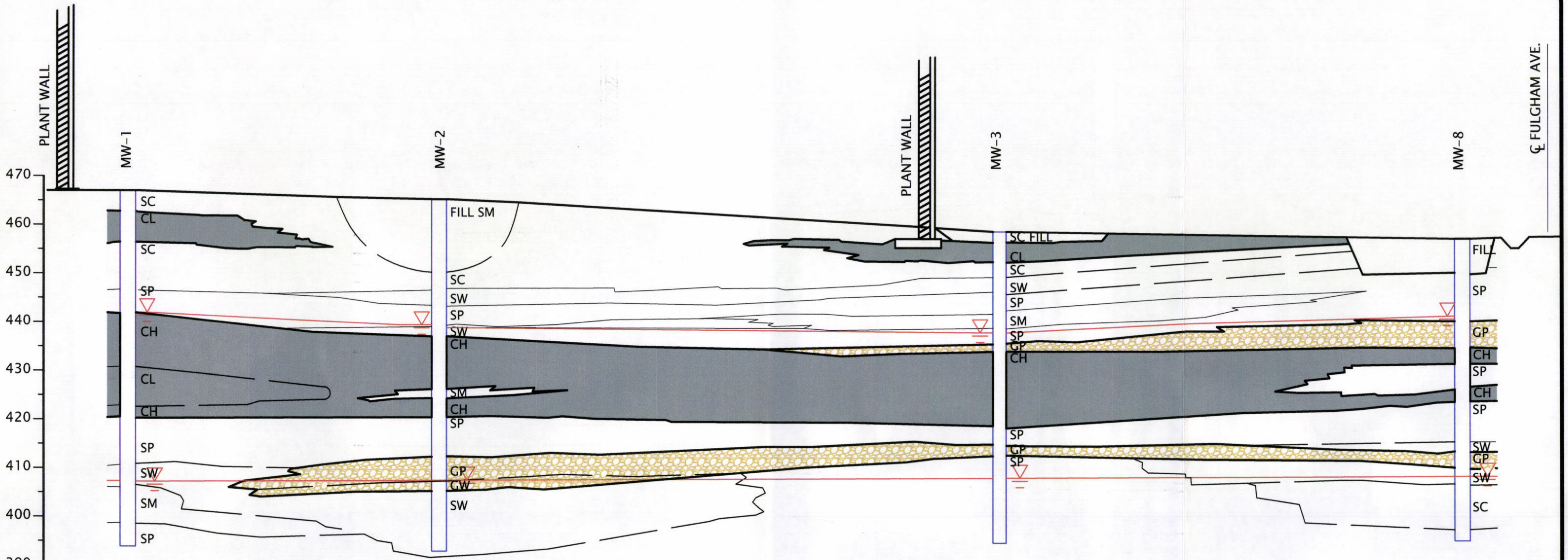
7	

PREPARED FOR:
BorgWarner Inc.
Drainage Channel

GeoEnvironmental Associates, LLC
MARTIN&SLAGLE
PO Box 1023
Black Mountain NC 28711
828.669.3929 828.669.5289



SECTION A-A'

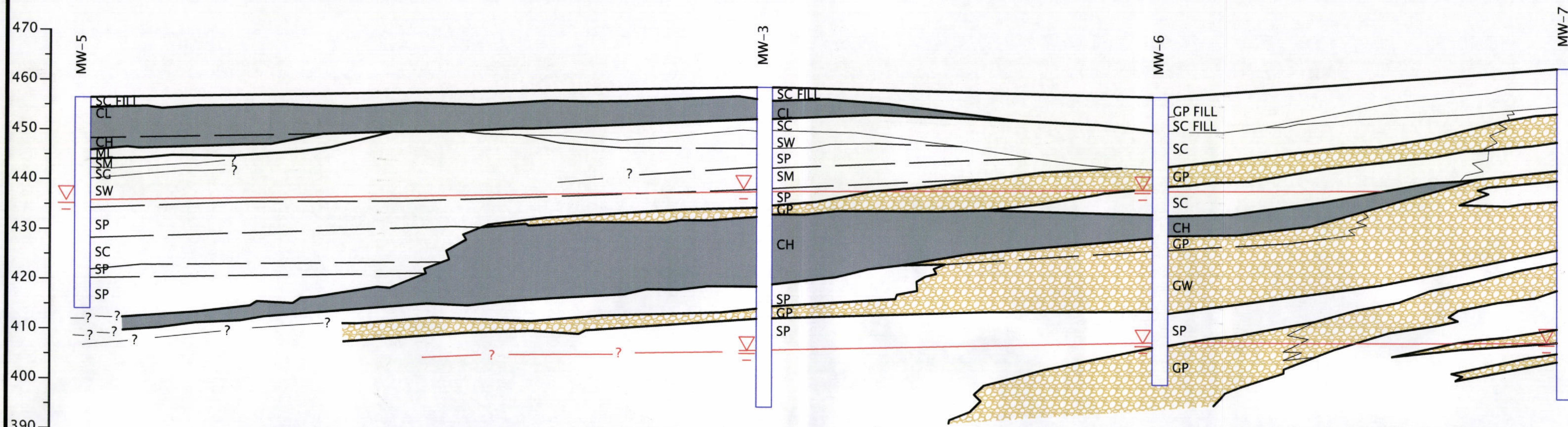
H:1"=40'

V:1"=20'

KEY

CL- CLAY NON-PLASTIC
CH- CLAY PLASTIC
ML- SILT
SP- SAND- POORLY GRADED
SW- SAND- WELL GRADED
SC- CLAYEY SAND
GP- GRAVEL- POORLY GRADED
GW- GRAVEL- WELL GRADED

GeoEnvironmental Associates LLC MARTIN&SLAGLE PO Box 1023 Black Mountain NC 28711 828.669.3929 828.669.5289	PREPARED FOR: **BorgWarner Inc.** DRAWING NAME: COMP ASSESSMENT WORKPLAN\GCS.dwg	REV 1 REV 2 REV 3 REV 4 REV 5	SCALE H:1"=40' V:1"=20' DR: DGR CHK: RLM REV: 0 DATE: 7/18/04	**GEOLOGIC CROSS SECTION A-A'**	**3** **FIGURE**



SECTION B-B'

H:1"=40'

V:1"=20'

KEY

CL- CLAY NON-PLASTIC

CH- CLAY PLASTIC

ML- SILT

SP- SAND- POORLY GRADED

SW- SAND- WELL GRADED

SC- CLAYEY SAND

GP- GRAVEL- POORLY GRADED

GW- GRAVEL- WELL GRADED

GeoEnvironmental Associates LLC MARTIN&SLAGLE PO Box 1023 Black Mountain NC 28711 828.669.3929 828.669.5289	PREPARED FOR: BorgWarner Inc. DRAWING NAME: COMP ASSESSMENT WORKPLAN\GCS.dwg	REV 1 REV 2 REV 3 REV 4 REV 5	SCALE H:1"=40' V:1"=20' DR: DGR CHK: RLM REV: 0 DATE: 7/18/04	GEOLOGIC CROSS SECTION B-B'	4 FIGURE