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REPORT

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SUPPLEMENTAL INVESTIGATION REPORT
CHAMPION TECHNOLOGIES INC. SITE ABATEMENT (AP-14)
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

PREPARED

BY

ENVIRONMENTAL STRATEGIES CONSULTING LLC

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A QUANTA TECHNICAL SERVICES COMPANY

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Acronym List

ASTM	American Society for Testing and Materials
bgs	below the ground surface
CD-ROM	compact disc – read only memory
cm/s	centimeters per second
COC	chemical of concern
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
IDW	investigation-derived waste
MCAWW	Methods for Chemical Analysis of Water and Wastes
mg/kg	milligram per kilogram
mg/l	milligram per liter
mV	millivolt
NCDC	National Climatic Data Center
NMAC	New Mexico Administrative Code
NMOCD	New Mexico Oil Conservation Division
NMOSE	New Mexico Office of the State Engineer
ORP	oxidation-reduction potential
VOC	volatile organic compound
WQCC	Water Quality Control Commission

1.0 Introduction

On behalf of Champion Technologies, Inc. (Champion), Environmental Strategies Consulting LLC has prepared this supplemental site investigation report for the Champion site located at 4001 South Highway 18, Hobbs, New Mexico. This report summarizes the findings collected pursuant to the Supplemental Site Investigation Workplan (Workplan), dated March 29, 2005, and subsequent correspondence with the New Mexico Oil Conservation Division (NMOCD). The site has an NMOCD-approved Discharge Plan, GW-199, and has had various Stage 1 and Stage 2 abatement activities already completed. This report summarizes the site conditions and past abatement activities, and presents the data collected to demonstrate natural attenuation as the groundwater remedial action. Natural attenuation processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These *in-situ* processes include biodegradation, dispersion, dilution, sorption, volatilization, radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants (EPA, 1999). This site has favorable conditions for physical natural attenuation processes.

2.0 Site Background Information

2.1 Site Description

The approximately 7-acre site is located in the southeastern quadrant of Section 15 Township 19 South, Range 38 East (Figure 1). The site is within the Hobbs Pool oil and gas field, and approximately 5 miles east of the Monument Pool (Wright, 1941). Regionally, the practice of disposing produced water into unlined pits began with the first oil and gas exploration in the early 1940s, with great expansion during World War II. Produced water in the region is known to be highly saline. In 1967, the New Mexico Oil Conservation Commission issued Order R-3221, which called for all disposal of produced water, except for some *de minimus* quantities, into unlined pits or in any other manner which would cause a hazard to fresh water to cease by October 31, 1967 (LCWUA, 2000). In the 1970s, groundwater throughout Lea County had salinity concentrations between 1,000 milligrams per liter (mg/l) and 3,000 mg/l (USGS, 1972) and the chloride concentration in groundwater within the Permian formations in the Northwestern Shelf, within 10 miles of the site was 2,900 mg/l to 32,000 mg/l (NMBMMR, 1975).

Champion has operated at the site for at least 30 years. Most of the facility is unpaved, and there are two buildings and other facilities, such as aboveground storage tanks and secondary containment structures (Figure 2). Champion stores and distributes oilfield chemicals, such as corrosion inhibitors. Among the chemicals stored at the site are alcohols, amines, aromatics, ammonium chloride, corrosives, and, formerly, may have included hexavalent chromium. There was a prior commercial or industrial occupant at the site, believed to be a trucking company.

A pit, located in the northern-central part of the site, was identified in the Stage 1 abatement activities. Of the three aerial photographs reviewed as part of a site history review, only the 1967 aerial photograph showed pond-like features in what is referred to as Areas 2 and 3. This suggests the pit may have been used by others since some time after the next earlier aerial photograph, taken in 1954 (Enercon, 2000). Currently, there is a commercial oil field services operation to the north; vacant land to the west and east, each with oil or gas wells and pipelines; and a residence to the south; the residence has a water supply well located approximately 30 feet south of the site boundary.

2.2 Environmental Setting

This section describes the topographic, geologic, and hydrogeologic conditions at the site.

2.2.1 Topography and Surface Drainage

Regionally, the land undulates with numerous depressions throughout. There are many apparent playas in sections 16, 17 and 18 directly west of the site (USGS, 1979a and USGS, 1979b). The ground cover at the unpaved areas of the site consists of a coarse silty gravel caliche fill which has a moderately high hydraulic conductivity, between 4.56 x 10^{-5} and 1.46 x 10^{-4} centimeters per second (cm/s) (NOVA, 2005). The site is relatively flat with no concentrated stream flows or ponds, with a mild crowning at the central part of the site and a gentle slope to the west. Such conditions would allow surface drainage to sheet-flow to the property's perimeter only when high-intensity rainfall exceeds the surface fill's infiltrative capacity. Normal-intensity rainfall would percolate into the surface fill, a large portion of which would evaporate. Storm water collected in the bulk tanks' secondary containment is generally allowed to evaporate. The average annual precipitation in the Hobbs area is approximately 16 inches per year, with 27 days per year with 0.1 inch or more of precipitation, and only 5 days per year with 1 inch or more (WRCC, 2003). Evaporation in the region is approximately 79 inches per year and over 95 percent of all precipitation is lost by direct evaporation; typical recharge to the aquifer is approximately 0.5 inch/year (USGS, 2000).

2.2.2 Site Geology

The vadose zone at the site is mostly silty caliche. Boring logs and excavations at the site indicate a 5-foot thick, hard caliche layer from approximately 20 to 25 feet below the ground surface (bgs) throughout most of the site, and a second hard caliche layer from approximately 50 to 56 feet bgs (Enercon, 2000 and ETGI, 2003a). Environmental Strategies' findings, as documented on soil borings and monitoring well construction diagrams (Appendix A), were consistent with the historical information.

2.2.3 Site Hydrogeology

The site is within the limits of the Lea County Basin, as declared by the New Mexico Office of the State Engineer (NMOSE). In the Lea County Basin, the sole source of drinking water is the Ogallala Aquifer. The depth to groundwater at the site is approximately 50 to 60 feet bgs, and NMOSE records indicate the depth to groundwater generally decreases to the west. Water levels in Sections 16 and 17 are 20 to 30 feet bgs, and there are no well records for Section 18. In the Southern High Plains area, which includes the Ogallala, approximately 95 percent of the groundwater recharge occurs in playas that cover approximately 5 percent of the land surface; within the playas, up to 80 percent of the recharge occurs through macropores, such as cracks and burrow holes, and the remaining 20 percent, through interstitial spaces in the soil (Wood, et al, 1997 and USGS, 2000). Based on these data, the estimated infiltration rate for the general land area is approximately 360 times slower than that which occurs in playas, and the typical infiltration rate through the vast majority of the land would be approximately 0.03 inch per year.

Between August 2002 and March 2004, the groundwater elevations onsite dropped at an average rate of approximately 0.7 to 1.2 feet per year, since the monitoring at the site began (NOVA, 2005). Between March 2004 and April 2006, elevations exhibited an arrested decline, then a rebound of approximately 1 foot. Historic groundwater elevations are presented on Table 1 and Graph 1. Water-use records available from NMOSE for sections 14 and 15 indicate that withdrawal for irrigation was more than 200 acre-feet per year in 2001 and 2002, declining to between 100 and 138 acre-feet per year in 2003, 2004 and 2005. Precipitation data available from the National Climatic Data Center (NCDC) for the local weather stations indicate that rainfall was variable, with approximately 13.5, 21.8, 7.2, 31.8 and 19.4 inches per year between 2001 and 2005. As stated earlier, the typical recharge in the Southern High Plains is approximately 0.5 inch per year, thus in a year having twice the normal rainfall, the recharge would be on the order of 1 inch per year, far less than the groundwater fluctuations observed. Thus, groundwater elevations are primarily influenced by the local withdrawal rate and, to a lesser degree, rainfall. No perched water has been observed in soil borings and excavations, confirming low infiltration.

As represented in the well log for the onsite supply well, the local water bearing zone is a sandy aquifer ranging from approximately 44 to 138 feet bgs (Eades, 1993). Environmental Strategies' findings, as documented on monitoring well construction diagrams (Appendix A), are consistent with the historical information. The recent slug and pumping tests indicate the hydraulic conductivity is approximately $3x10^{-3}$ cm/s (NOVA, 2005). There appears to be very low silt content in the aquifer sand. Using an empirical formula that estimates hydraulic conductivity for clean sand based on grain-size, Environmental Strategies calculated the conductivity of the water-bearing sand to be between 1×10^{-2} and 3×10^{-2} cm/s, consistent with finding by the Texas Water Development Board for western Gaines County, approximately 3.5 miles east of the site (TWDB, 1984). The hydraulic gradient has been consistent at approximately 0.003 feet/foot, toward the east at a bearing of approximately S 85° E (Figures 3A to 3D). The resulting seepage velocity is between 37 and 370 feet per year.

2.3 Summary of Historic Stage 1 and Stage 2 Abatement Activities

The areas addressed by previous investigations and remediation are depicted on Figure 2. In the previous abatement plans and reports (Enercon, 2000; ETGI, 2003a and 2004; NOVA, 2005) the areas addressed by abatement activities are referred to as follows:

- Area 1- a small area in the north-central part of the site, incorporated into Area 2
- Area 2 – a former waste pit located in the north-central part of the site and incorporates the former Area 1 and Area 4
- Area 3 – an area that had high chloride concentrations in soil, located in the southwestern quadrant of the site
- Area 4 - the northern half of the bulk tank area, incorporated into Area 2
- Area 5 - centered around a soil boring that had high chloride concentrations in soil, located near Champion's water supply well.

The post-abatement conditions of the vadose zone in each area are described below and the groundwater quality is discussed in Section 3.

Champion's contractor excavated soil and debris between July 2002 and February 2003, during Stage 2 abatement activities at Area 2. In January 2003, the Area 2 excavation was extended into the northern half of Area 4 and stained soil under Area 4 was removed to the extent practicable. The Area 2 excavation also completely removed Area 1. The overall excavation at Areas 1, 2, and 4 measured approximately 200 feet by 150 feet and 18 feet deep, totaling 20,000 cubic yards. The excavation removed a significant amount of the contaminant mass, but some residual chemicals of concern (COCs) are present in the remaining soil and within fractures of the caliche bottom, at approximately 18 to 20 feet bgs. During the excavation, a pipe running from the warehouse into the pit was discovered and removed. The COCs in Area 2 soils include chloride up to 11,000 milligrams per kilogram (mg/kg), chromium up to 13.4 mg/kg, and total petroleum hydrocarbons up to 30,000 mg/kg. NMOCD approved the backfilling of the Area 2 excavation on May 8, 2003 (NMOCD, 2003a). Between September 3 and 29, 2003, the excavation was backfilled with soil and caliche from an offsite source. As part of the backfill, a 2-foot thick clay layer was placed from 5 feet to 7 feet bgs, between September 12 and 19, 2003 (NOVA, 2005). Much of the area has since been constructed over.

Based on a review of precipitation data from the closest weather station with a continuous record for the period, approximately 19 inches of precipitation fell between July 2002 and September 2003 (NCDC, 2004). Thus, during the Stage 2 abatement activities, direct precipitation and runoff from adjacent land areas and building rooftops may have collected in the excavation, of which a significant fraction may have infiltrated into the temporary man-made, playa-like features.

Champion's contractor also completed a 20-foot deep excavation at Area 3, approximately 40 feet by 80 feet, beginning in July 2002 and backfilled it in September 2003. NMOCD approved the backfilling of the Area 3 excavation on August 13, 2003 (NMOCD, 2003c). The deepest part of the Area 3 excavation extended to a hard caliche caprock layer at 20 feet bgs. Chloride-containing soil remains in Area 3, up to 11,900 mg/kg at a depth of approximately 18 feet bgs. However, soil samples collected beneath the caprock contained low chloride concentrations (less than 100 mg/kg) and the excavation was backfilled with soil and caliche from onsite, and caliche from an offsite source (ETGI, 2004).

The Area 5 soils containing elevated chloride were excavated to a depth of approximately 2 feet bgs; the maximum concentration of remaining chloride was detected in a soil sample at a concentration of 3,680 mg/kg. The stockpile of soil excavated from Area 3 and Area 5 was lined with plastic sheeting. In late 2003, ETGI injected diluted molasses into the MW-6 area as a pilot test, which was halted before completion. (NOVA, 2005).

As identified in the Workplan and subsequent correspondence with NMOCD, COCs for the current site investigation were: chromium, chloride, barium, manganese, 1,1-dichloroethane (1,1-DCA), perchloroethylene (PCE), and vinyl chloride.

3.0 Investigation Findings

3.1 Description of Investigation Activities

Between July 19 and 25, 2005, five soil borings, one deep monitoring well, and three shallow monitoring wells were completed by Eades Drilling and Pump Service, a New Mexico-licensed well driller. The locations are shown on Figure 2. Four of the soil borings (ESCSB-01, ESCSB-02, ESCSB-03, and ESCSB-05) were drilled upgradient of MW-13 to confirm the lack of a large onsite source area of chromium. A total of 28 soil samples were collected from these borings. Boring ESCSB-05 was advanced approximately 20 feet into the saturated zone and converted into monitoring well, MW-19. The fifth soil boring (ESCSB-04) was drilled through the backfill in the Area 3 excavation, from which five soil samples were collected. Undisturbed samples were collected from the vadose zone soil using a 24-inch long split spoon, with a 2.5-inch inner diameter.

Monitoring well MW-20 was installed on private property, approximately 100 feet east of MW-10; MW-21 was installed near the eastern fence of the facility, approximately 160 ft east of MW-8; and the deep monitoring well, MW-4D, was installed approximately 5 feet from MW-4. These wells were constructed of 2-inch diameter Schedule 40 polyvinyl chloride risers and 0.010-inch slotted screen. MW-19 and MW-20 have 20 feet of screen, MW-21 has 20 feet and MW-4D has 65 feet. The top of the screens for all these wells were placed approximately 5 feet above the saturated zone as encountered during construction or overlapping the hard calcrete layer immediately above the water-bearing sand layer; the total depth and screen intervals are shown on the well construction diagrams in Appendix A. A 12-20 sand filter pack was placed around each well-screen, from the bottom to 2 feet above. Hydrated bentonite was used to create a seal on top of the sand filter pack. Portland cement concrete was used to seal the remainder of the borehole to the ground surface and to set a traffic-rated water-tight protective steel cover. The wells were fitted with a locking well cap. The newly installed wells were developed to remove drilling fluids and sediment accumulation. The new and existing wells were surveyed by John West Surveying Co., a New Mexico-licensed land surveyor.

As prescribed in the Workplan and subsequent correspondence with NMOCD, selected wells were sampled for analysis for specific COCs in July 2005, October 2005, January 2006, and April 2006. The wells were purged of three times the borehole volume and field parameters (temperature, conductivity, oxidation-reduction potential [ORP], dissolved oxygen [DO], and pH) were monitored for stability, according to Environmental Strategies' Standard Operating Procedures. The metals samples were filtered before analysis to measure the dissolved fraction, consistent with the Water Quality Control Commission (WQCC) regulations and standards found in Title 20 of the New Mexico Administrative Code, Chapter 6, Part 6.2.3103 (20.6.2.3103 NMAC). As part of the July and October 2005 sampling, supplemental samples were collected for total organic carbon, total dissolved solids, sulfide and sulfate analyses. Environmental Strategies also measured ferrous iron in the field using Hach® Accuvac® vials and a DR890 colorimeter in those sampling events. The samples were analyzed using the following EPA methods:

- 160.1 (total dissolved solids)
- 300.0A (chloride and sulfate)
- 415.1 (total organic carbon)
- 6010B (metals)
- 8260B (VOCs)
- 9030B/9034 (sulfides)

In October 2005, the pilot-test injection well and six monitoring points were plugged and abandoned, and MW-6, -12, -16, -17 and P-1 and P-2 were retrofitted with flush-mounted covers, to accommodate increased truck traffic at the facility. These wells were resurveyed by John West Surveying Co.

Wherever using dedicated sampling supplies was not practical, sampling tools and equipment were decontaminated before collecting each sample. All investigation-derived waste (IDW) was contained and disposed of at the Controlled Recovery, Inc., facility in western Lea County, New Mexico. The stockpile of soil from the Area 3 and Area 5 excavations was disposed of along with the IDW. Copies of the waste disposal records are presented on a CD-ROM in Appendix B.

3.2 Soil Findings

As described in Section 2.2.2, the soils encountered by Environmental Strategies were consistent with the soils identified in the previous investigations. Boring logs and excavations at the site indicate a 5-foot thick, hard caliche layer from approximately 20 to 25 feet bgs throughout most of the site, and a second hard caliche or sandstone layer from approximately 50 to 56 feet bgs that has been consistently encountered throughout all site investigations reviewed to date. Boring logs and well construction diagrams are presented in Appendix A.

The 28 samples collected in the MW-13 area were analyzed for chromium, pH, and chloride by EPA methods 6010B, 9045C and 9056, respectively. The five samples collected in the Area 3 backfill were analyzed for chloride and one representative sample was also analyzed for hydraulic conductivity, by ASTM D5084. The results of the chemical analyses are presented in Table 2. The maximum chromium result was 10 mg/kg and pH results range from 7.9 to 9.6. In the MW-13 area, the chloride concentrations ranged from 10 mg/kg to 2,600 mg/kg, all less than the highest confirmation sample result from the Area 5 excavation described in Section 2.3.1. In general, the chloride concentrations decrease laterally with distance from the Area 5 excavation but have no distinct vertical pattern, except that the maximum and average concentration in samples collected below the hard caliche layer (found at approximately 50 ft) are at least one order-of-magnitude lower than those above it. This indicates that the primary mass of chloride in the area has been removed during the Area 5 excavation and that the caliche/sandstone layer at approximately 50 ft may serve to limit migration of chloride from the upper vadose zone to groundwater.

The chloride results in Area 3 backfill range from 58 to 790 mg/kg, with an average of 324 mg/kg. The hydraulic conductivity of the backfill was measured as 2.39 x 10^{-6} cm/s, which is at least four times less permeable than the solid waste landfill cover specifications required by the New Mexico solid waste landfill regulations (20.9.1.500 NMAC). The backfill soil closely resembles the native soil encountered at other soil borings, so the conductivity of the native soils is likely similar in magnitude.

Copies of the analytical reports are included on a CD-ROM in Appendix C.

3.3 Groundwater Findings

Representative concentrations for chromium, chloride, and volatile organic compounds (VOCs) from relevant wells for the current and past investigations are presented in Tables 3 through 5; graphical representations of the historical data are presented in Graphs 2 through 6.

Barium and manganese were not regularly included in the past analyses so only the current data are considered in this report.

The chromium concentrations are generally exhibiting a decreasing or stable trend. In the April 2006 sampling, all of the onsite wells in the historical chromium plume area had dissolved chromium concentrations below the WQCC standard of 0.05 mg/L. Furthermore, the supply wells (both onsite and the well located at 4027 South Eunice Highway) have never had chromium detected above one-eighth the WQCC standard. In April 2006, upgradient well MW-7 was analyzed for dissolved chromium to investigate anomalous results (discussed below); it contained 0.058 mg/L, slightly higher than the WQCC standard but less than the New Mexico drinking water standard of 0.1 mg/L adopted in 20.7.10.100 NMAC. The current investigation results for dissolved chromium are depicted on Figures 4A though 4D.

The chloride concentrations are generally exhibiting a decreasing or stable trend, with some wells exhibiting increasing trends. Most of the wells, including those upgradient of the facility, have chloride concentrations above the WQCC standard of 250 mg/L. The current investigation results for chloride are depicted on Figures 5A though 5D.

The current results of VOC analyses are depicted on Figure 6; no VOC was detected above its respective WQCC standards. The concentrations of 1,1-DCA and PCE are currently less than the maximum levels historically detected and overall are exhibiting decreasing trends; vinyl chloride has not been detected.

Although barium and manganese were occasionally detected above WQCC standards in previous investigations, they were not detected in the current investigation at or above the WQCC standards; the current investigation results are depicted on Figure 7.

Geochemical parameters relating to secondary lines of evidence for chemical reduction of chromium and reductive dechlorination of the VOCs are summarized in Table 6. The measurements indicate the aquifer is mildly oxidizing; the average ORP is 54 millivolts (mV) and the average DO is 4.7 mg/L, and the groundwater is neutral to slightly alkaline with an average pH of 7.3. As would be expected in an aquifer with these conditions, ferrous iron, organic matter, and reduced sulfur compounds are not present in significant concentrations and reductive reactions are not likely occurring. This indicates that the declining chromium and VOC plumes observed are caused by physical natural attenuation, primarily dispersion and dilution. Of all the natural attenuation processes, these physical processes are the least susceptible to alter over time.

Copies of the analytical reports are included on a CD-ROM in Appendix C.

4.0 Conclusions

This section presents an interpretation of the findings to date, with respect to COCs grouped by chemical similarity or behavior. The goal of this investigation was to demonstrate: 1) the site conditions do not constitute a *hazard to public heath*, as defined in 19.15.1.7 NMAC, so that no further abatement is warranted, and/or 2) natural attenuation is occurring such that protective concentrations of COCs may be attained within a reasonable distance from the site and within a reasonable period of time.

The definition of *hazard to public health* applies only to chemicals that either have *human health standards* listed in 20.6.2.3103(A) NMAC or are listed as *toxic pollutants* 20.6.2.7(VV) NMAC. Chloride does not have a human health standard nor is it listed as a toxic pollutant. The only COC that currently exceeds WQCC standards and to which hazard to public health applies is chromium. The definition of hazard to public health includes the language: "In determining whether a release would cause a hazard to public health to exist, the Director shall investigate and consider the purification and dilution reasonably expected to occur from the time and place of the release to the time and place of withdrawal for use as human drinking water." The natural attenuation processes that are occurring at the site are physical, including dispersion and dilution.

As stated in 19.15.1.19 NMAC, the purpose of NMOCD Rule 19, pertaining to groundwater, is to abate the vadose zone so that the contaminants in the vadose zone will not with reasonable probability contaminate groundwater above the WQCC standards. The Stage 2 activities completed to date have addressed the vadose zone and the current investigation further delineated the inferred source area of chromium above the WQCC standard in the southern part of the site.

The underlying purpose of this supplemental investigation was to obtain NMOCD approval to terminate the abatement plan for the site. As required in Rule 19(K), a completion report shall be prepared upon completion of the work in this investigation plan for submittal to the NMOCD. The purpose of the investigation and report is to document the data that support the hypotheses presented in this plan which would allow for termination of the abatement activity at the site. The primary hypotheses presented in the Workplan were:

- The source area of the chromium plume does not require further abatement to prevent a *hazard to public health*
- Due to natural dilution and purification, the chromium concentrations in groundwater would not require further abatement to attain the site-specific action level of 0.040 mg/l at a reasonably expected point of withdrawal
- The chloride concentrations in regional offsite groundwater exceed the WQCC standard making onsite abatement to attain the standard at the site infeasible. Additionally, the Stage 2 chloride abatement activity, already completed, has substantially removed the onsite chloride source area and will control the potential migration pathway. It should be noted, that the chloride concentrations onsite are consistent with the Hydrus-1D model that was approved by NMOCD
- The VOCs and metals (other than chromium) identified in previous investigations do not require further abatement.

During the course of the current investigation, additional hypotheses were developed, including:

- If there was an onsite source of chromium in groundwater, it has abated to concentrations indistinguishable from background soil and, thus, will not continue to contribute an elevated chromium loading to groundwater. Offsite, upgradient sources of chromium in groundwater may also be present.
- Chloride concentrations are increasing in background groundwater, indicating an offsite, upgradient source or sources.

Consideration of the historical data is necessary in the interpretation of the COC behavior in groundwater at this site. When evaluating the potential for natural attenuation, it is important to look at the primary lines of evidence. Primary lines of evidence are data from historical samples that demonstrate a clear and meaningful trend of declining contaminant mass and/or concentrations at appropriate monitoring or sampling points. Primary lines of evidence are used to determine whether plumes are expanding, shrinking, or stable. The data are also compared to the predictive results from the Hydrus-1D model presented in the 2003 Comprehensive Status Report and the BIOCHLOR model in the 2005 Workplan. These models were conservatively applied to the data with the assumption that only natural dilution and dispersion are occurring with no decay of contaminant mass.

4.1 Chromium

The southeastern quadrant of the site has had historic chromium in groundwater above the WQCC standard of 0.05 mg/L. The investigations since 2000 included a total of 37 soil samples collected from 11 soil borings and 2 trenches in this area, which have yet to identify a source of chromium contamination. The results were less than the mean concentration for the western United States of 41 mg/kg (USGS, 1984) and for southeastern New Mexico of 20 to 22 mg/kg (USGS, 2001). As of April 2006, the onsite groundwater concentrations in the historical plume area have declined to below the WQCC standard; nonetheless, the concentration in MW-20 exhibited anomalous fluctuation and has been above the WQCC standard, but has been consistently below the New Mexico drinking water standard.

In its May 8, 2003 letter, NMOCD required the following system of point-of-compliance and point-of-exposure regarding chromium: "If dissolved chromium reaches or exceeds the site-specific action level of 0.040 mg/l in adjoining property residential wells or onsite active water wells, then immediate corrective action and public protection plan will be implemented and a new domestic water supply well will be installed to provide potable water." The site-specific action level has never been exceeded at the neighboring residential well nor in the onsite water supply well, thus, active remediation is not warranted to address the presence of chromium.

4.2 Chloride

In the WQCC regulations, chloride is not a *toxic pollutant* nor does it have a *human health standard.* Furthermore in 20.6.2.3109(D) NMAC, the New Mexico Environmental Department allows discharges to leach non-toxic pollutants from the vadose zone (except for solution mining, industrial/commercial effluent treatment, storage or disposal, and cooling water lakes). The historic site use did not likely include any of these sources. Regionally, high chloride concentrations in groundwater are likely caused in large part by the historical use of unlined evaporation pits for oil and gas exploration and production brine disposal. Additionally, septic systems and playas may leach naturally occurring chloride from the vadose zone into groundwater, but over time the chloride content in the wetted vadose zone will decrease to a negligible amount. More importantly, residences that use water softeners and septic drain fields may be a continuing source of chloride (likely hundreds of pounds per year for the hard water that is typical in the region) and certain agricultural operations generally discharge chlorides.

The excavations have already reduced the majority of the known chloride mass in the soil, and clayey soil has been placed as the Area 2 and Area 3 backfill to reduce infiltration. A concrete containment structure has been constructed over approximately 50 percent of Area 2, thus, further minimizing infiltration in this area of the site. The data indicate that the three upgradient wells, (MW-7, -9, and -15) have had chloride concentrations above the WQCC standard of 250 mg/l, either chronically or acutely, indicating regionally high chloride concentrations with some local variability. As defined in 19.15.1.7(B) NMAC, *background*, means the amount of groundwater contaminants naturally occurring from undisturbed geologic sources, or water contaminants occurring from a source other than the responsible person's facility. The data with respect to chloride suggest both of these conditions apply to the local groundwater, including the upgradient water having concentrations above the WQCC standard.

The onsite chloride impacts attributable to the site operations, detected at MW-4D and MW-8, are finite; and the conditions that would cause contamination of groundwater from the vadose zone have been abated by excavation, backfill, and construction of impermeable structures. Eventually, such finite masses of contaminants will, by dispersion and dilution, have negligible impact at a reasonably foreseeable time and place of withdrawal, including at the original place of release. At MW-4D, the increase of chloride was most likely caused by the circulation of drill cutting and drilling fluids in contact with the silty caliche in the vadose zone that may have contained elevated chloride concentrations. Despite having pumped out approximately three-times the estimated volume of drilling fluids lost to the formation during the installation and development of MW-4D, chloride ions may have diffused beyond the diameter captured by the development pump. The background concentration approaching the site from the west (MW-7) has exceeded 250 mg/L; in the current investigation it was as high as 3,000 mg/L. The impact detected at MW-8 is likely caused by the temporary man-made playa-like feature created during excavation of Area 2. The background water encroaching the site's western boundary, as represented by MW-9, is chronically above 250 mg/L while water leaving the site's eastern boundary (MW-21) averages less than 250 mg/L. The most reasonable compliance stations are at the eastern property boundary (MW-21 and MW-4D).

Scenarios 3 and 4 of the Hydrus 1D model most closely simulate the type of release to groundwater thought to have occurred at the Area 2 excavation and during the installation of MW-4D; the model predicts that concentrations will return to background levels asymptotically in 15 to 20 years, but did not account for increasing background concentrations. Extrapolation of the upper-bound detections indicate the concentrations will decrease to the higher of the background level or the WQCC standard, approximately in February 2017 at MW-8 and July 2007 at MW-4 and -4D (Graphs 4 and 6).

Furthermore, the best available technologies to remove chloride involve pump-and-treat technology, which can exacerbate the migration of the upgradient chloride. The treatment systems (reverse osmosis, electro-dialysis, and distillation) are all energy intensive and are very expensive; the preliminary cost estimate for this site is $1,500,000 of which $650,000 is capital cost. These technologies also produce a large volume of concentrated brine waste, typically 20 percent of the treated volume resulting in the depletion of a significant amount of groundwater. The difficulty of distinguishing the encroaching high chloride background water from the finite on-site impacts will complicate determining the termination criteria for such a treatment system. It is not feasible to implement such remediation because the extracted groundwater would simply be replaced by an unknown quantity of contaminated groundwater migrating from upgradient sources.

4.3 Barium and Manganese

During the current investigation, dissolved barium and manganese have not been detected at concentrations above the WQCC standards and, thus, should not be considered COCs.

4.4 VOCs

The concentrations of VOCs in and downgradient of the inferred source area, represented by MW-17, are currently less than the WQCC standards. The downgradient well, MW-18, has never had VOCs detected above WQCC standards. Furthermore, the data for both wells clearly exhibit declining trends. VOCs should no longer be considered COCs at this site.

The results are consistent with the fate and transport modeling Environmental Strategies completed in the Workplan, using EPA's BIOCHLOR model, to evaluate the VOC data from monitoring wells MW-6/17 and MW-18. The calibrated model indicates that the plume is in steady-state and that there is no significant biological degradation of these compounds occurring under current conditions, hence, there is no significant formation of vinyl chloride. This means that dispersion and dilution are in effect to reduce concentrations. The model simulated migration for 100 years past the date of release to groundwater and predicts the maximum concentration that would be present at the downgradient property boundary would be 0.012 mg/l of 1,1-DCA and 0.006 mg/L of PCE, which are below the WQCC standards of 0.025 mg/l and 0.02 mg/l, respectively. The site data and modeling results indicate that the original concentrations at the time of release were far below the level that would indicate a non-aqueous phase release. The excavation of Area 2 has substantially removed the source while the clay backfill and recent construction greatly reduce infiltration, and the overall declining trend observed in the wells nearest the inferred source area confirms that the model is conservative.

5.0 Recommendations

Given the findings and conclusions presented in this report, the following recommendations are proposed:

a) Terminate abatement activity with respect to 1,1-DCA, PCE, and vinyl chloride.

b) Terminate abatement activity with respect to barium and manganese.

c) Terminate abatement activity with respect to chloride because the chloride concentrations downgradient of the site are generally lower than the background levels, and the finite on-site impacts will naturally attenuate to background concentrations in a reasonable timeframe.

d) Confirm that a hazard to public health does not exist with respect to dissolved chromium concentrations in groundwater potentially attributable to the site operations, by monitoring MW-13, MW-4D and MW-20, demonstrated when two consecutive periodic sampling events (3 to 6 months apart) exhibiting concentrations less than or equal to the WQCC standard in MW-20. Chromium is also present above the WQCC standard in background well MW-7.

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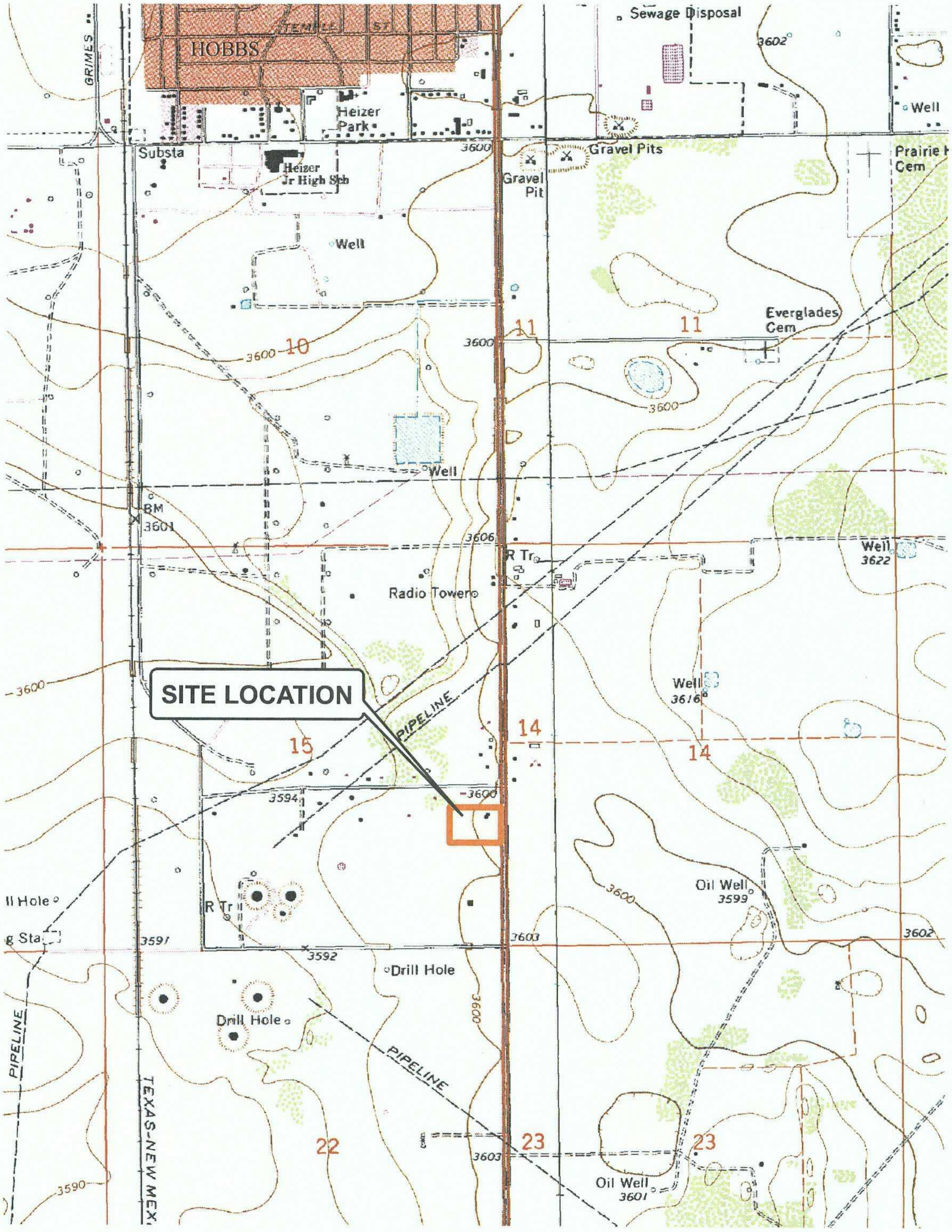
Figures



N

0 1,000 2,000 Feet

Reference: USGS, 1979a and USGS, 1979b

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Figure 1
Site Location
Champion Technologies Inc.
Hobbs, New Mexico

Map Document: (Q:\Champion Technologies\Hobbs\GIS_Projects\ARCGIS\Site_Loc_Topo.mxd)
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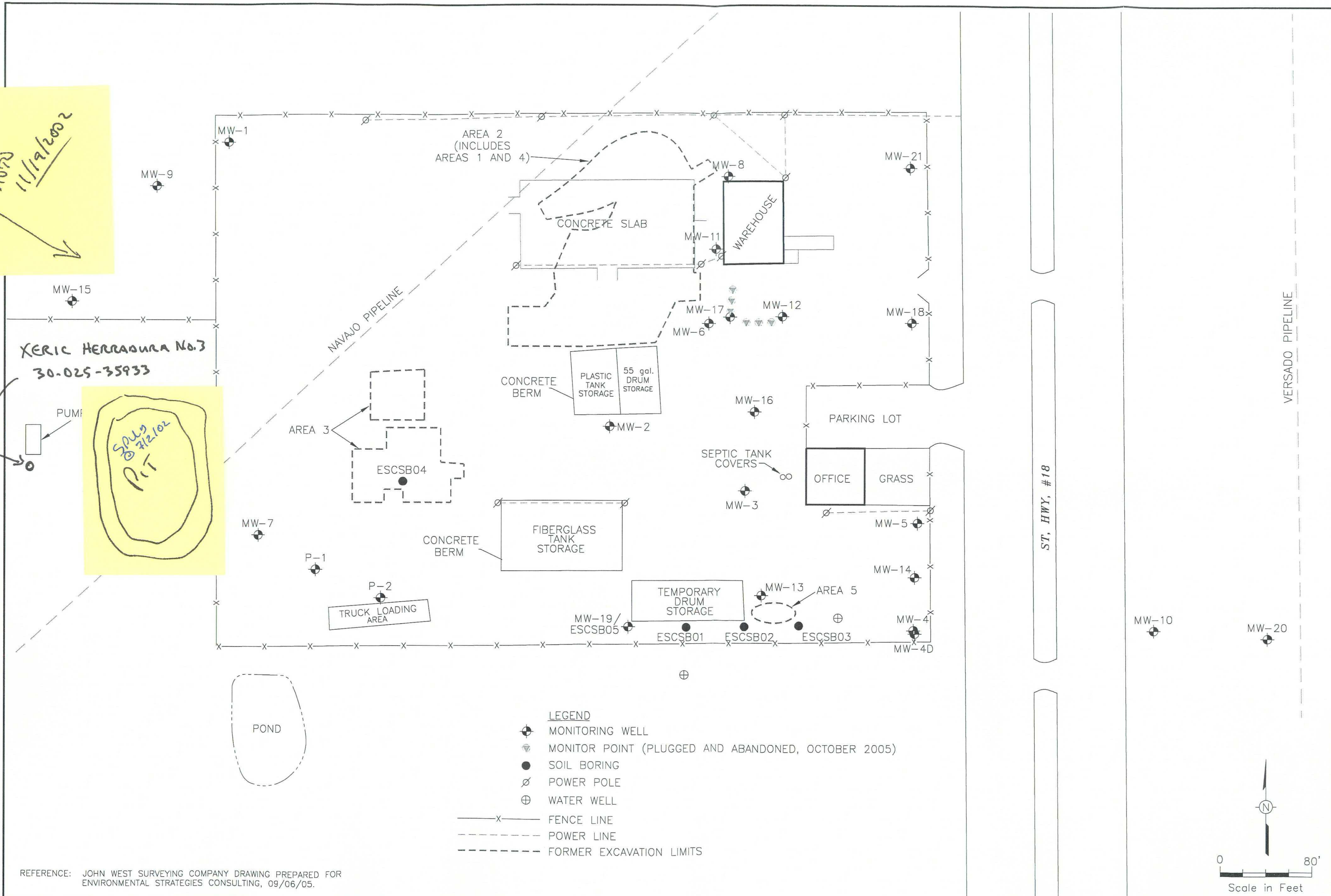

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Figure 2
Site Plan
Champion Technologies Inc.
Hobbs, New Mexico

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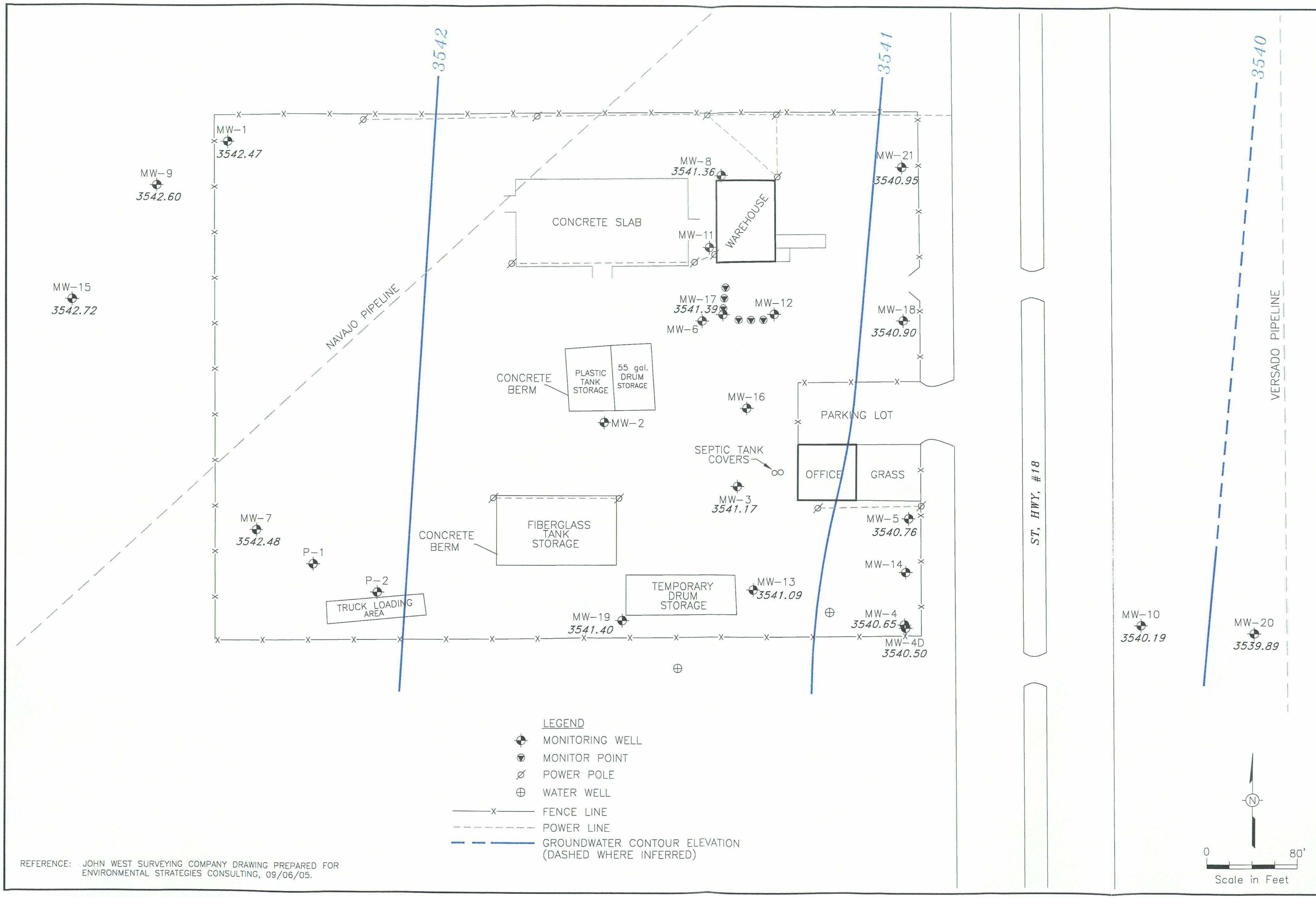

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Figure 3A
Groundwater Elevation - July 2005
Champion Technologies Inc.
Hobbs, New Mexico

13104202.DWG

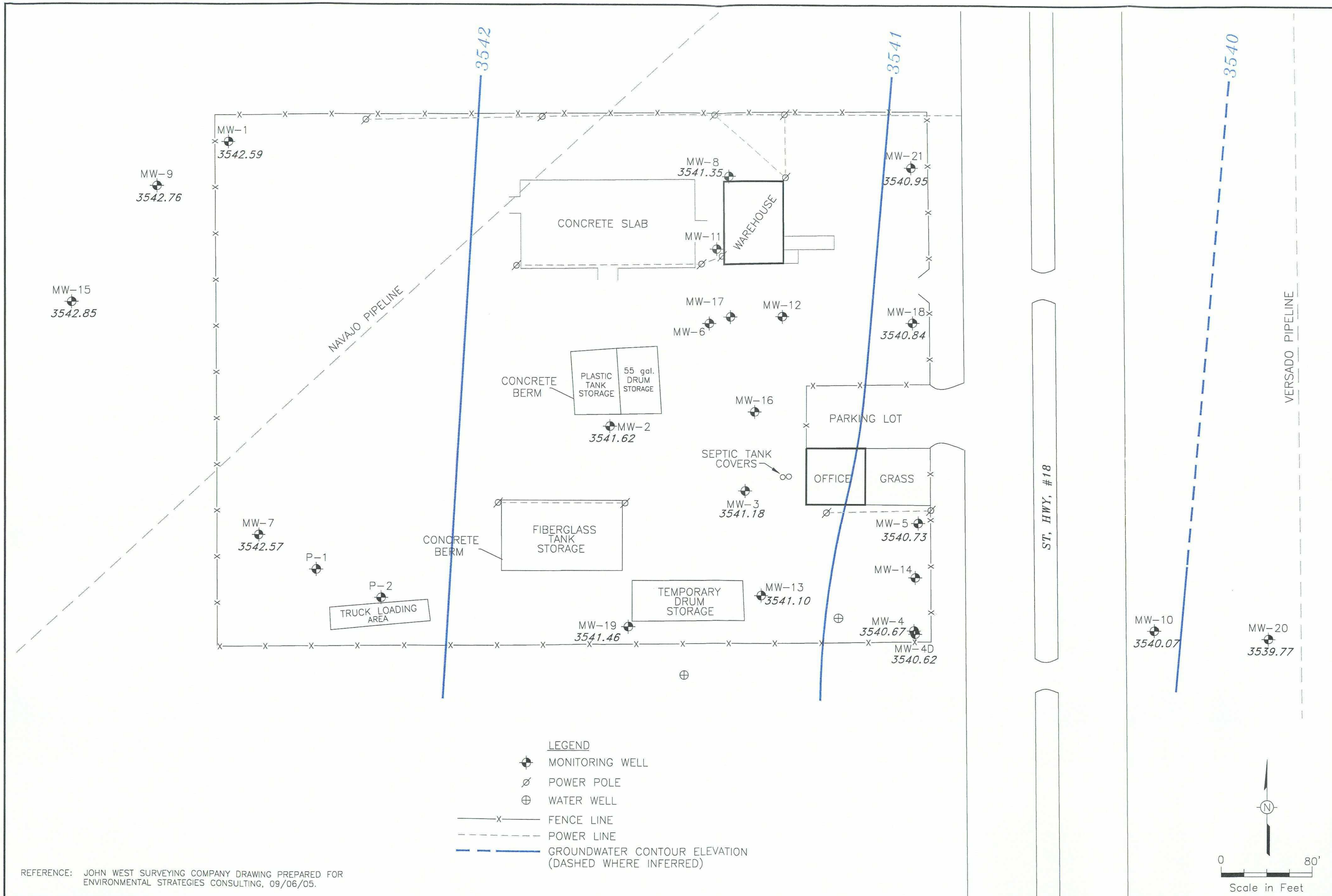

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Figure 3B
Groundwater Elevation - October 2005
Champion Technologies Inc.
Hobbs, New Mexico

13104203.DWG

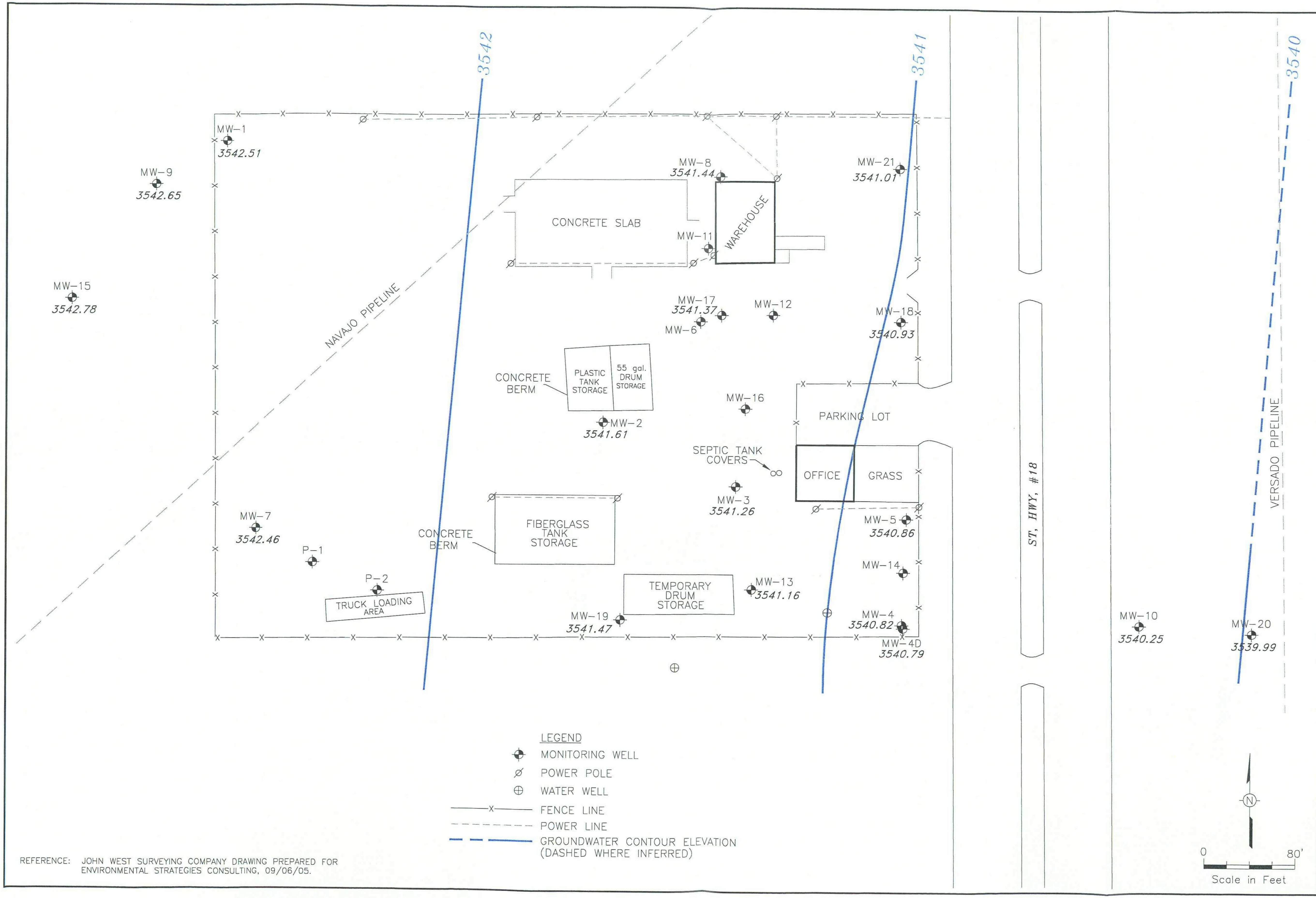

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Figure 3C
Groundwater Elevation - January 2006
Champion Technologies Inc.
Hobbs, New Mexico

13104209.DWG

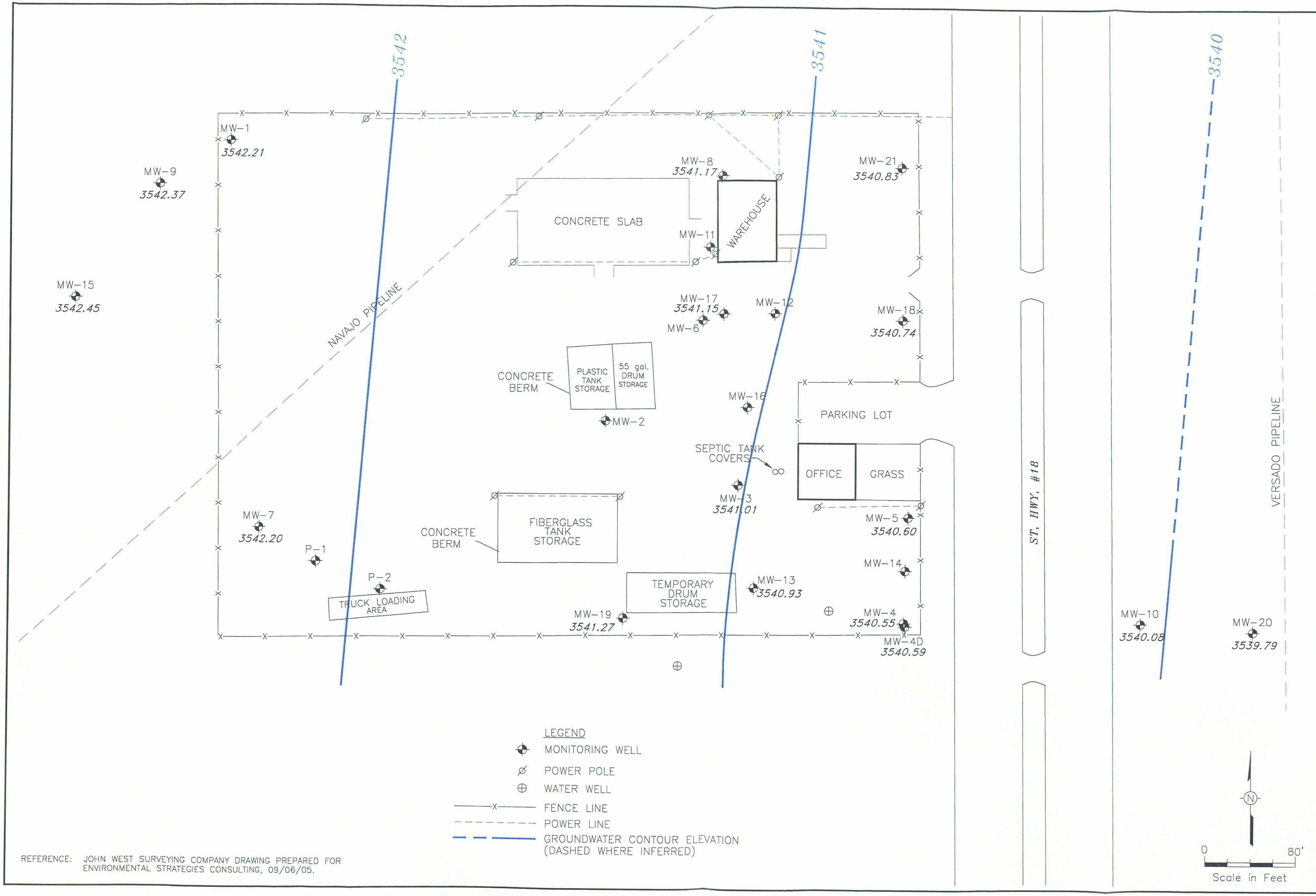

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Figure 3D
Groundwater Elevation - April 2006
Champion Technologies Inc.
Hobbs, New Mexico

1310421S.DWG

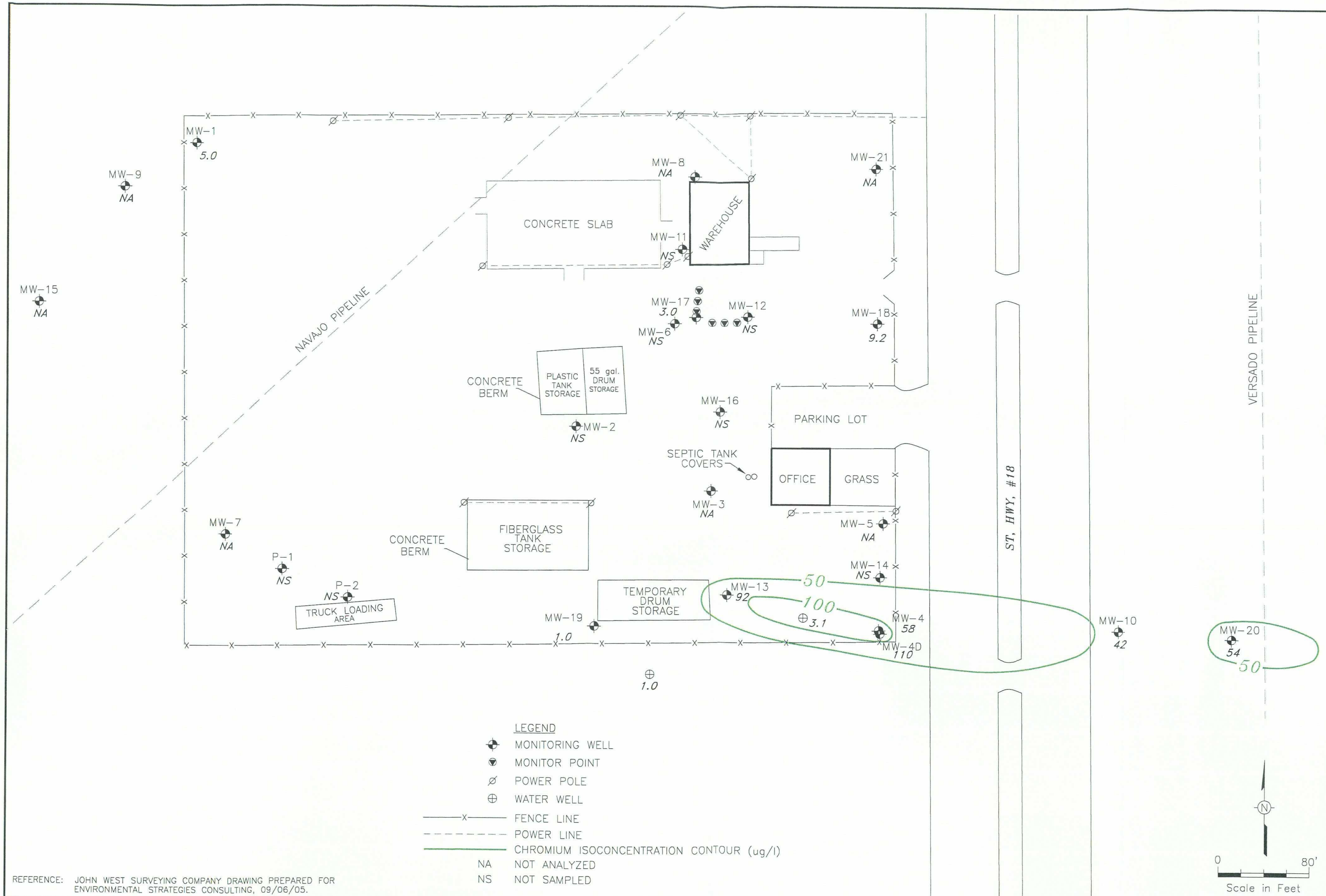

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Figure 4A
Chromium Concentrations (ug/l) July 2005
Champion Technologies Inc.
Hobbs, New Mexico

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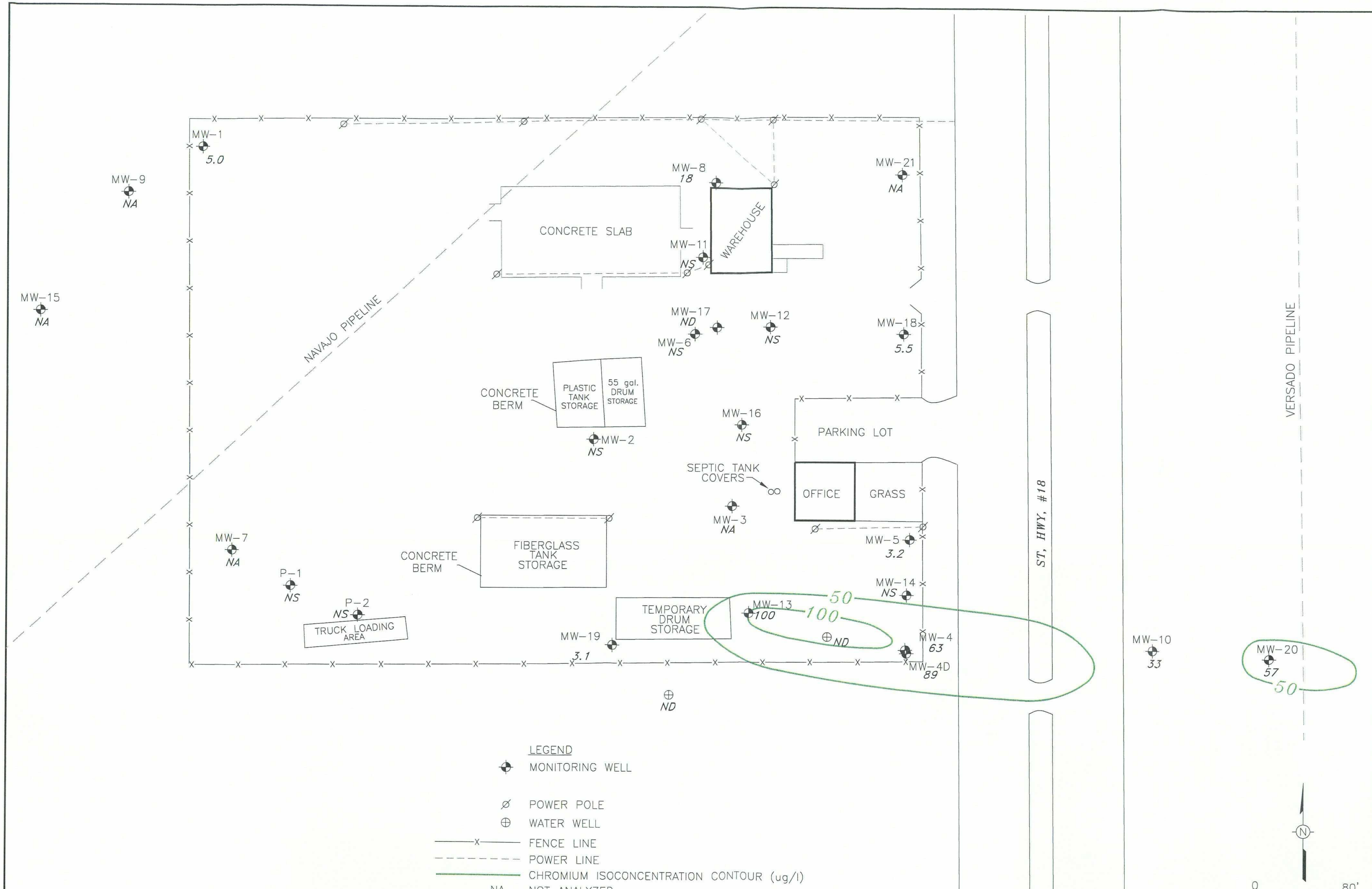

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Figure 4B
Chromium Concentrations (ug/l) October 2005
Champion Technologies Inc.
Hobbs, New Mexico

1310420S.DWG

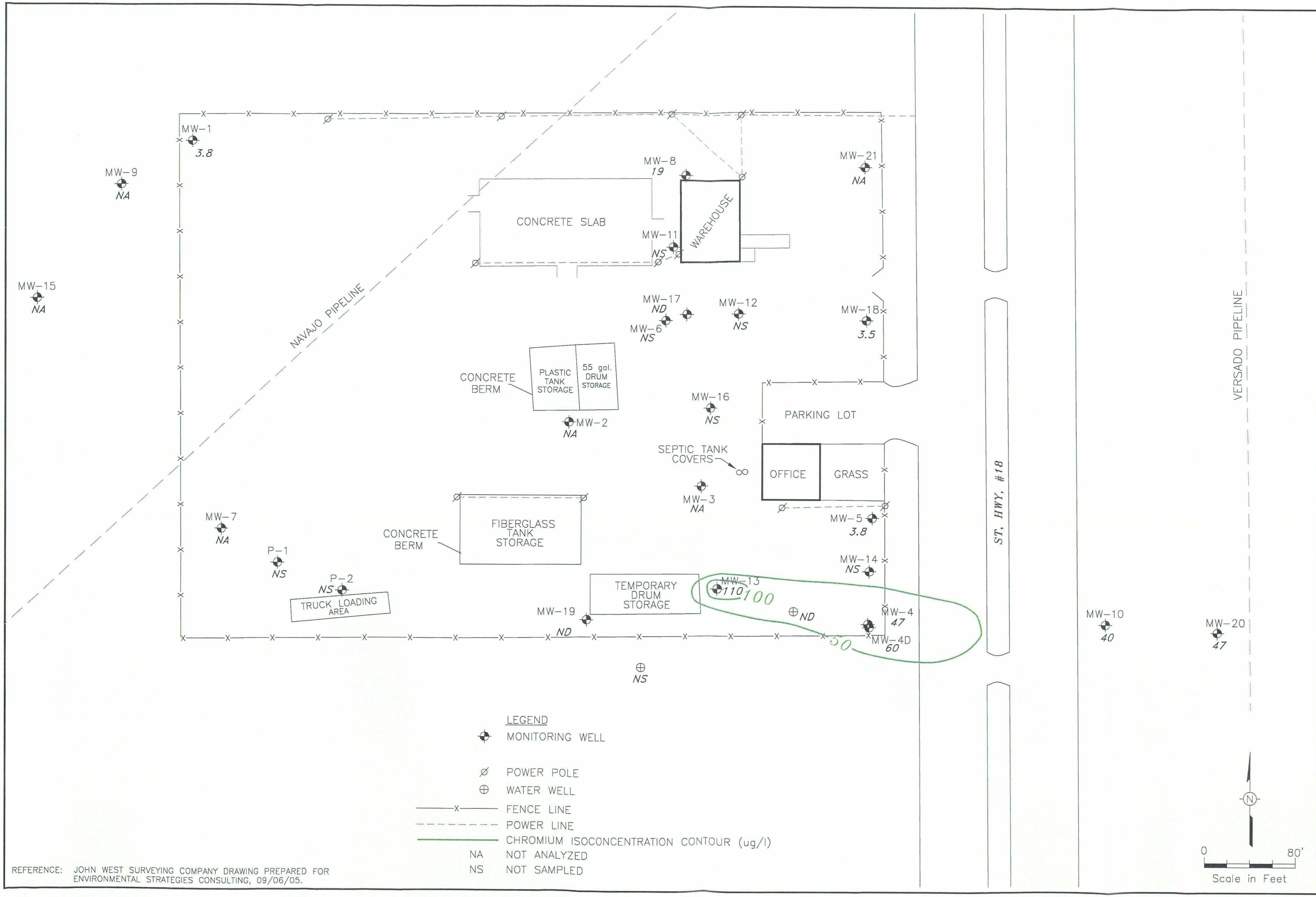

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Figure 4C
Chromium Concentrations (ug/l) January 2006
Champion Technologies Inc.
Hobbs, New Mexico

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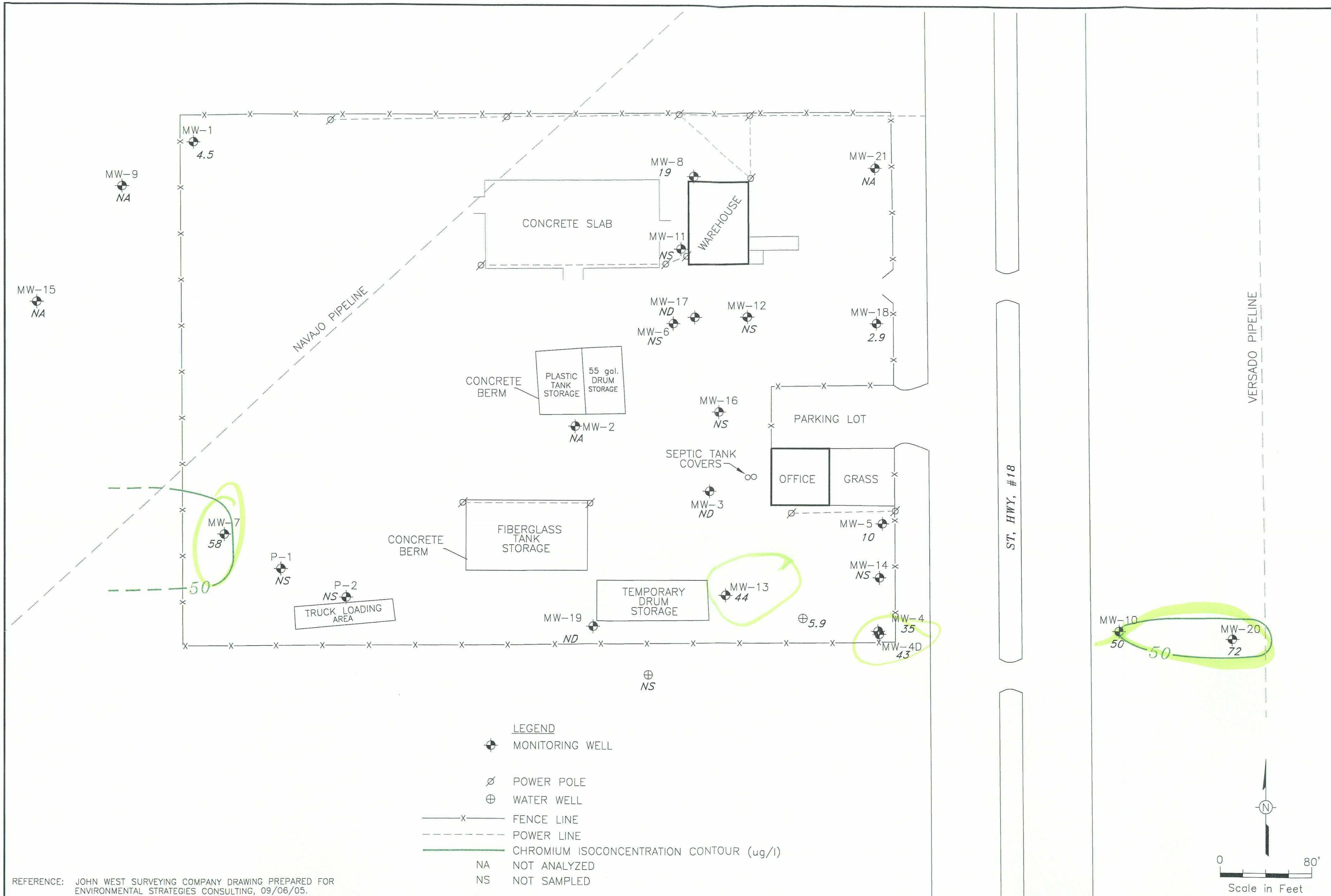

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Figure 4D
Chromium Concentrations (ug/l) April 2006
Champion Technologies Inc.
Hobbs, New Mexico

1310421G.DWG

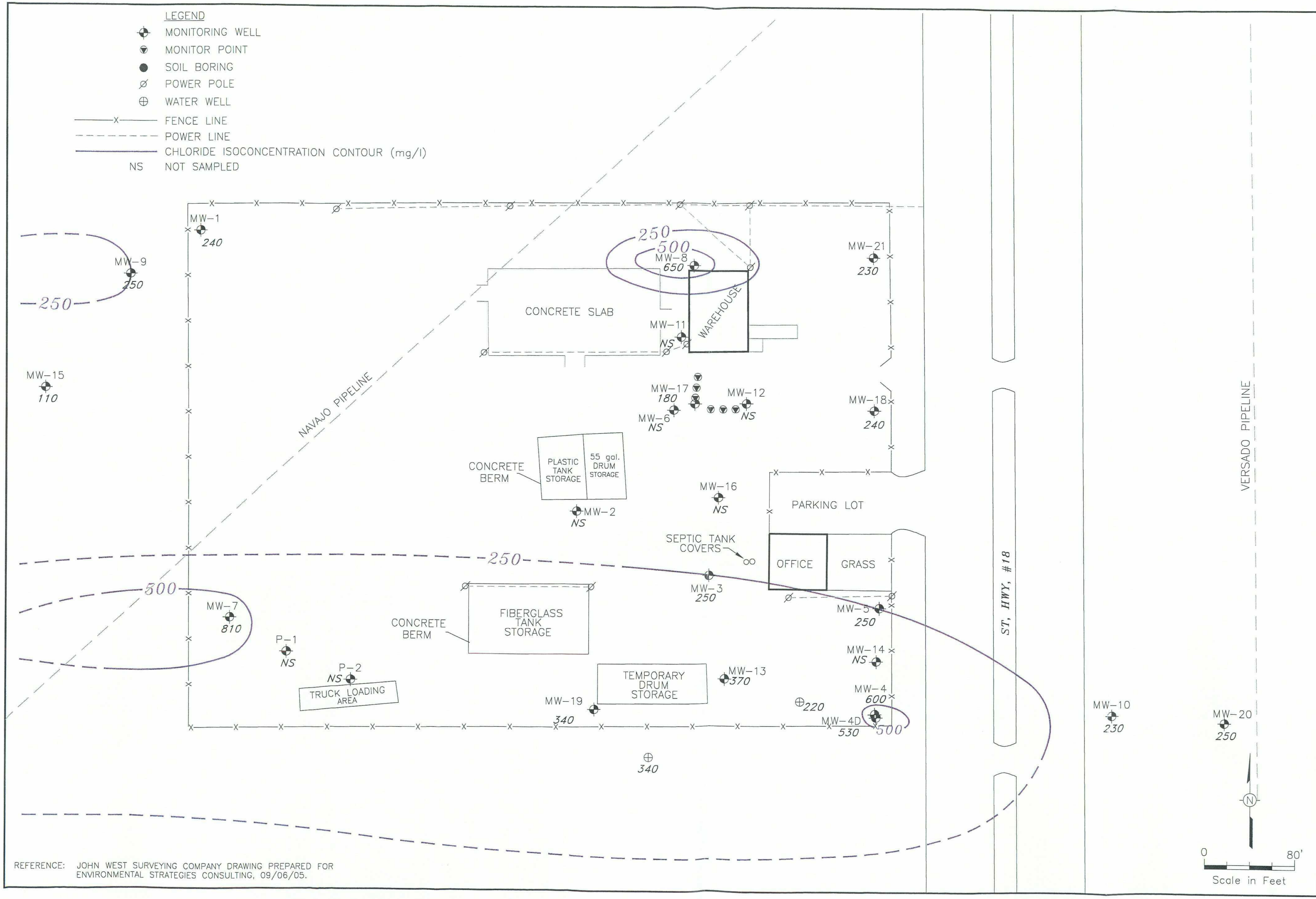

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Figure 5A
Chloride Concentrations (mg/l) July 2005
Champion Technologies Inc.
Hobbs, New Mexico

1310420б.DWG

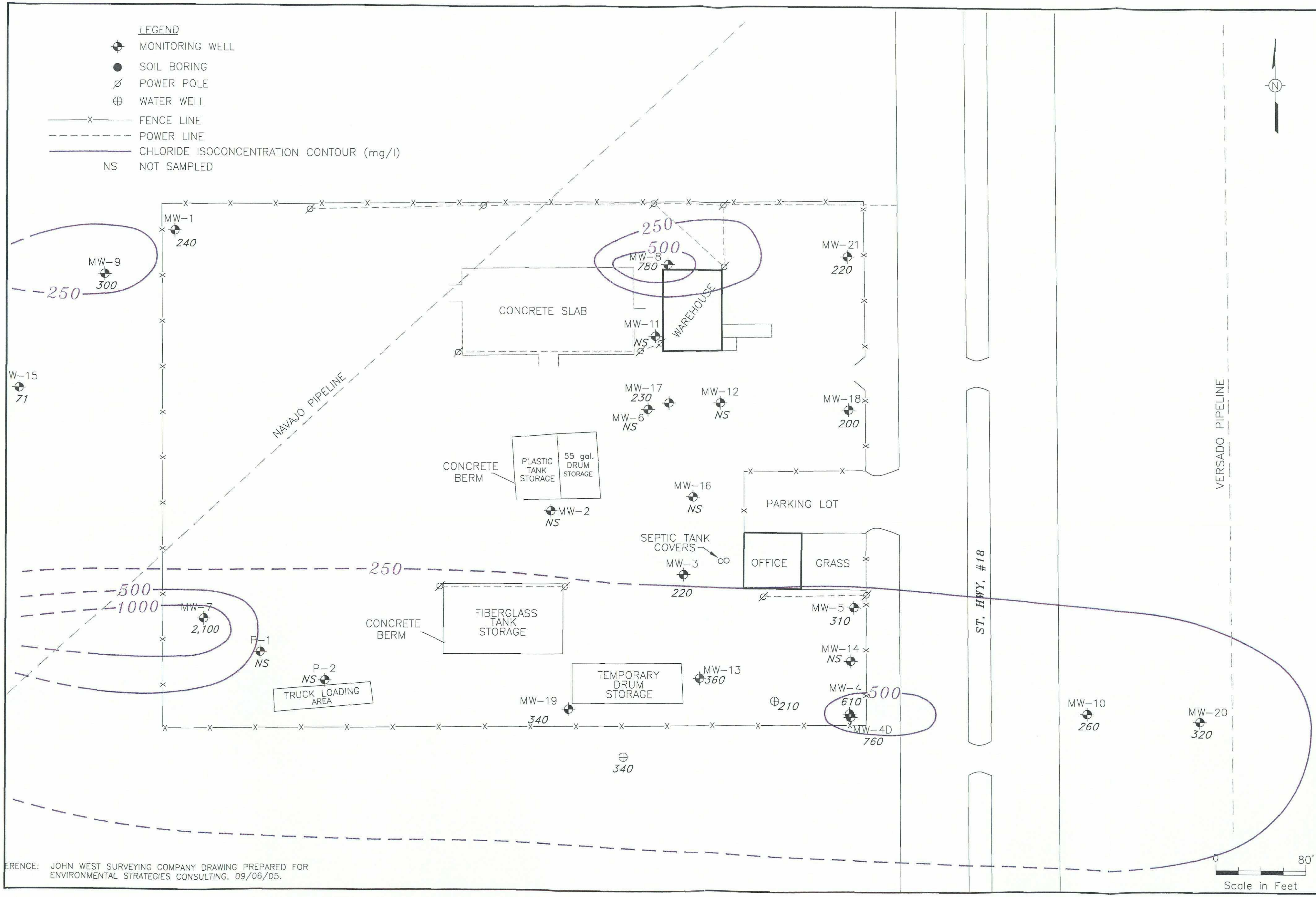

Figure 5B
Chloride Concentrations (mg/l) October 2005
Champion Technologies Inc.
Hobbs, New Mexico

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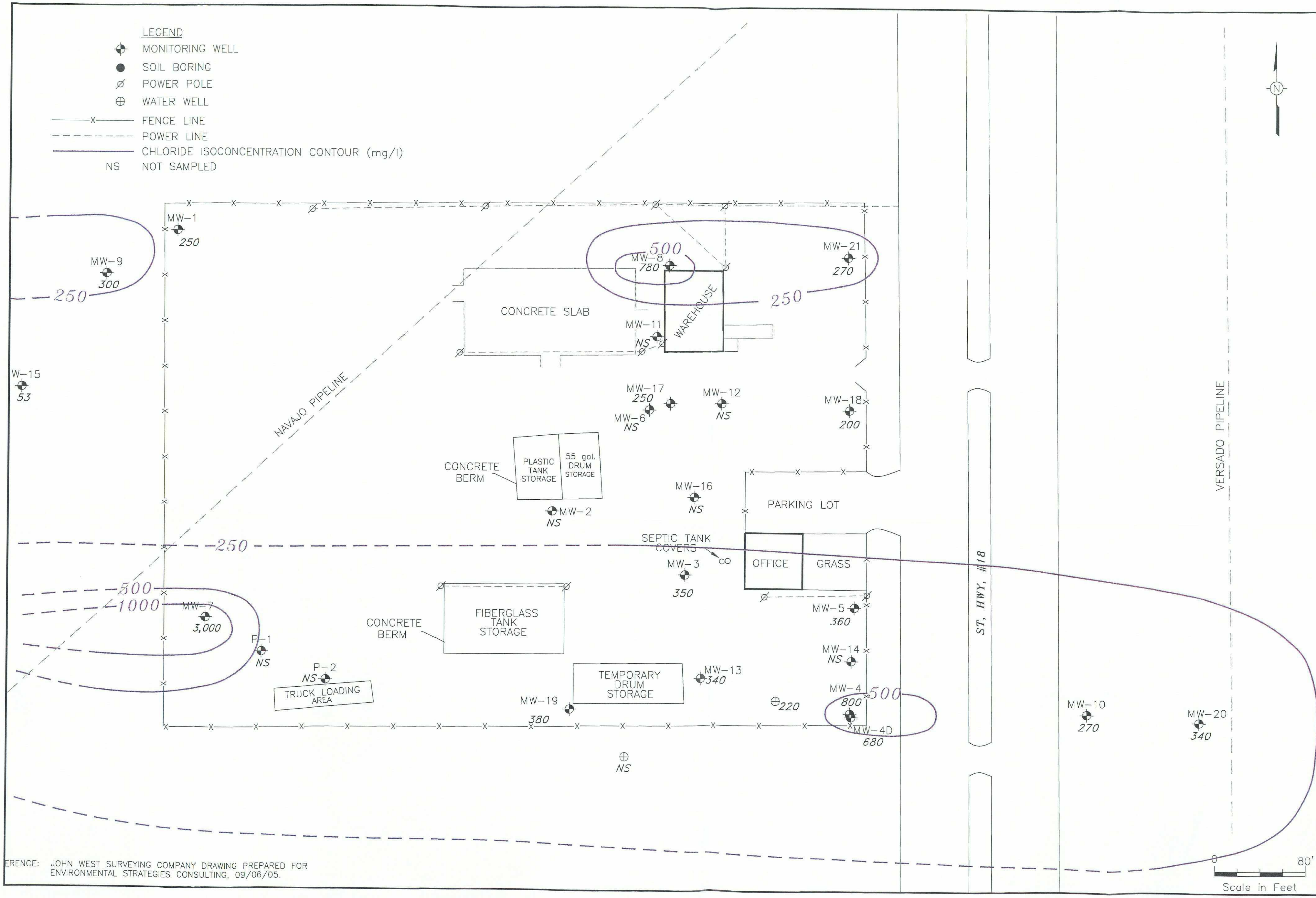

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Figure 5C
Chloride Concentrations (mg/l) January 2006
Champion Technologies Inc.
Hobbs, New Mexico

131042II.DWG

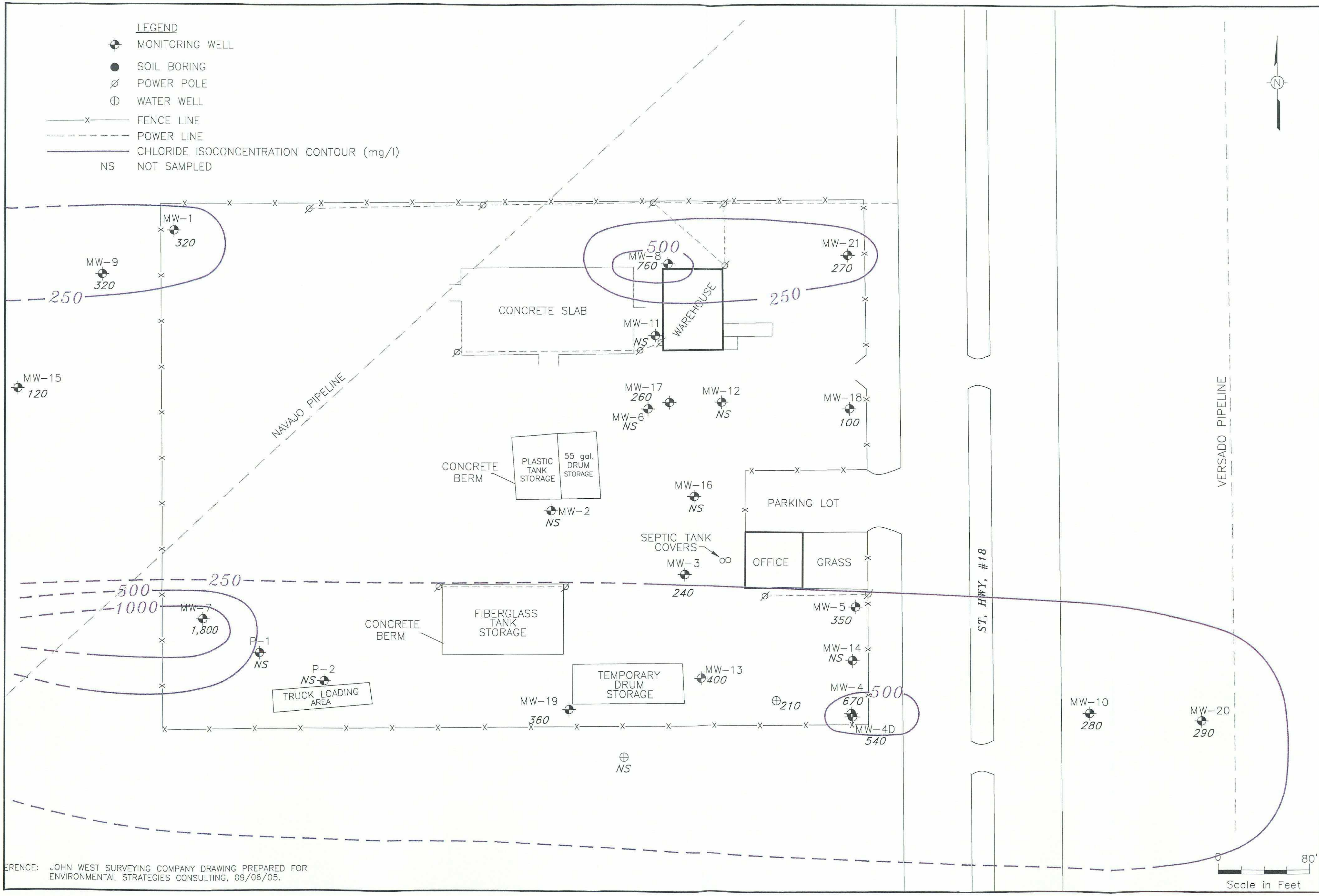

Figure 5D
Chloride Concentrations (mg/l) April 2006
Champion Technologies Inc.
Hobbs, New Mexico

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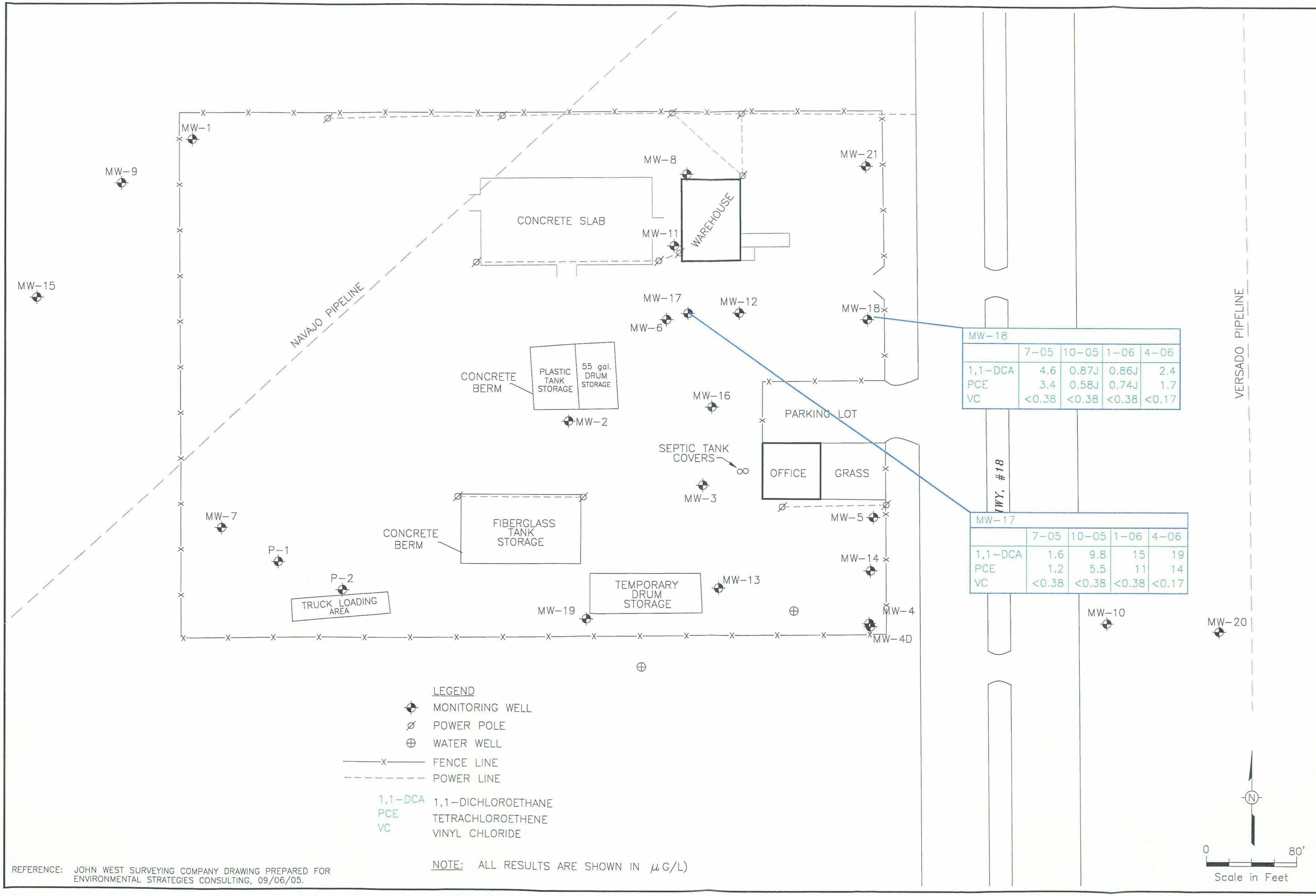
13104217.DWG



MW-18	7-05	10-05	1-06	4-06
1,1-DCA	4.6	0.87J	0.86J	2.4
PCE	3.4	0.58J	0.74J	1.7
VC	<0.38	<0.38	<0.38	<0.17

MW-17	7-05	10-05	1-06	4-06
1,1-DCA	1.6	9.8	15	19
PCE	1.2	5.5	11	14
VC	<0.38	<0.38	<0.38	<0.17

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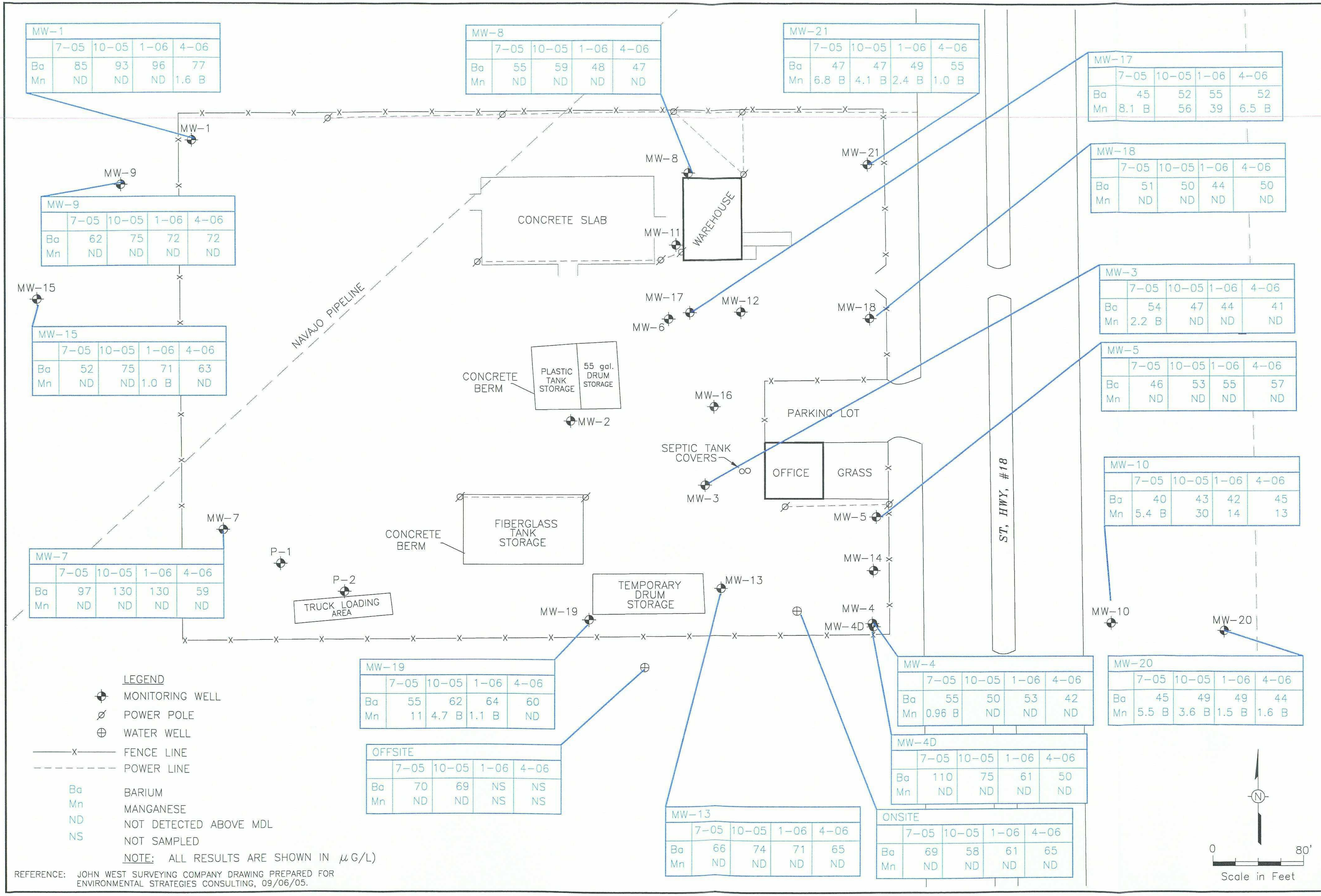
Figure 6
VOC Concentrations
Champion Technologies Inc.
Hobbs, New Mexico

13104219.DWG



Well		7-05	10-05	1-06	4-06
MW-1	Ba	85	93	96	77
MW-1	Mn	ND	ND	ND	1.6 B
MW-8	Ba	55	59	48	47
MW-8	Mn	ND	ND	ND	ND
MW-21	Ba	47	47	49	55
MW-21	Mn	6.8 B	4.1 B	2.4 B	1.0 B
MW-17	Ba	45	52	55	52
MW-17	Mn	8.1 B	56	39	6.5 B
MW-9	Ba	62	75	72	72
MW-9	Mn	ND	ND	ND	ND
MW-18	Ba	51	50	44	50
MW-18	Mn	ND	ND	ND	ND
MW-15	Ba	52	75	71	63
MW-15	Mn	ND	ND	1.0 B	ND
MW-3	Ba	54	47	44	41
MW-3	Mn	2.2 B	ND	ND	ND
MW-5	Ba	46	53	55	57
MW-5	Mn	ND	ND	ND	ND
MW-10	Ba	40	43	42	45
MW-10	Mn	5.4 B	30	14	13
MW-7	Ba	97	130	130	59
MW-7	Mn	ND	ND	ND	ND
MW-19	Ba	55	62	64	60
MW-19	Mn	11	4.7 B	1.1 B	ND
MW-4	Ba	55	50	53	42
MW-4	Mn	0.96 B	ND	ND	ND
MW-20	Ba	45	49	49	44
MW-20	Mn	5.5 B	3.6 B	1.5 B	1.6 B
OFFSITE	Ba	70	69	NS	NS
OFFSITE	Mn	ND	ND	NS	NS
MW-4D	Ba	110	75	61	50
MW-4D	Mn	ND	ND	ND	ND
MW-13	Ba	66	74	71	65
MW-13	Mn	ND	ND	ND	ND
ONSITE	Ba	69	58	61	65
ONSITE	Mn	ND	ND	ND	ND

1310421B.DWG

Figure 7
Barium and Manganese Concentrations
Champion Technologies Inc.
Hobbs, New Mexico

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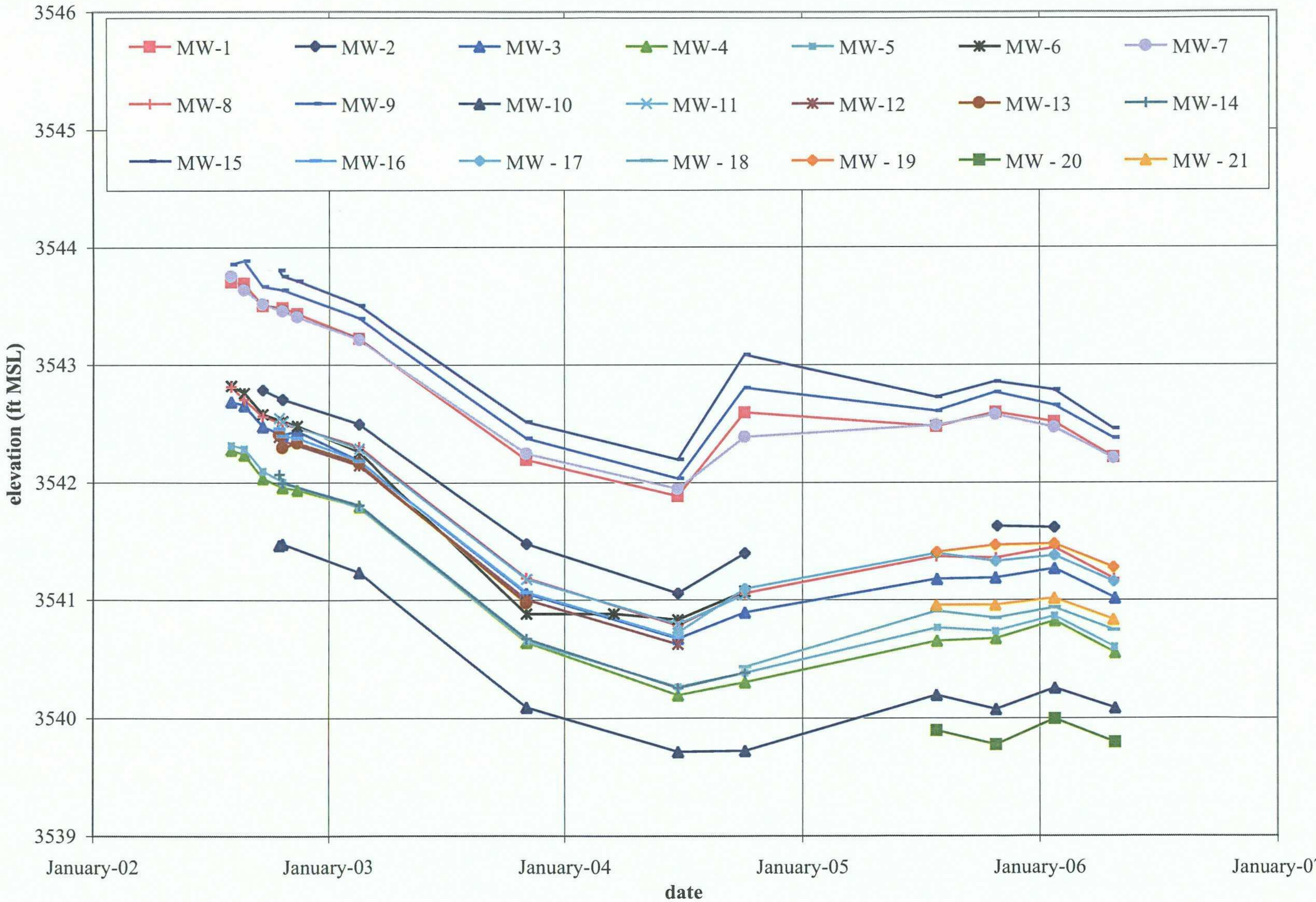
Graphs

Graph 1

Groundwater Elevations
Champion Technologies, Inc. Site
Hobbs, New Mexico

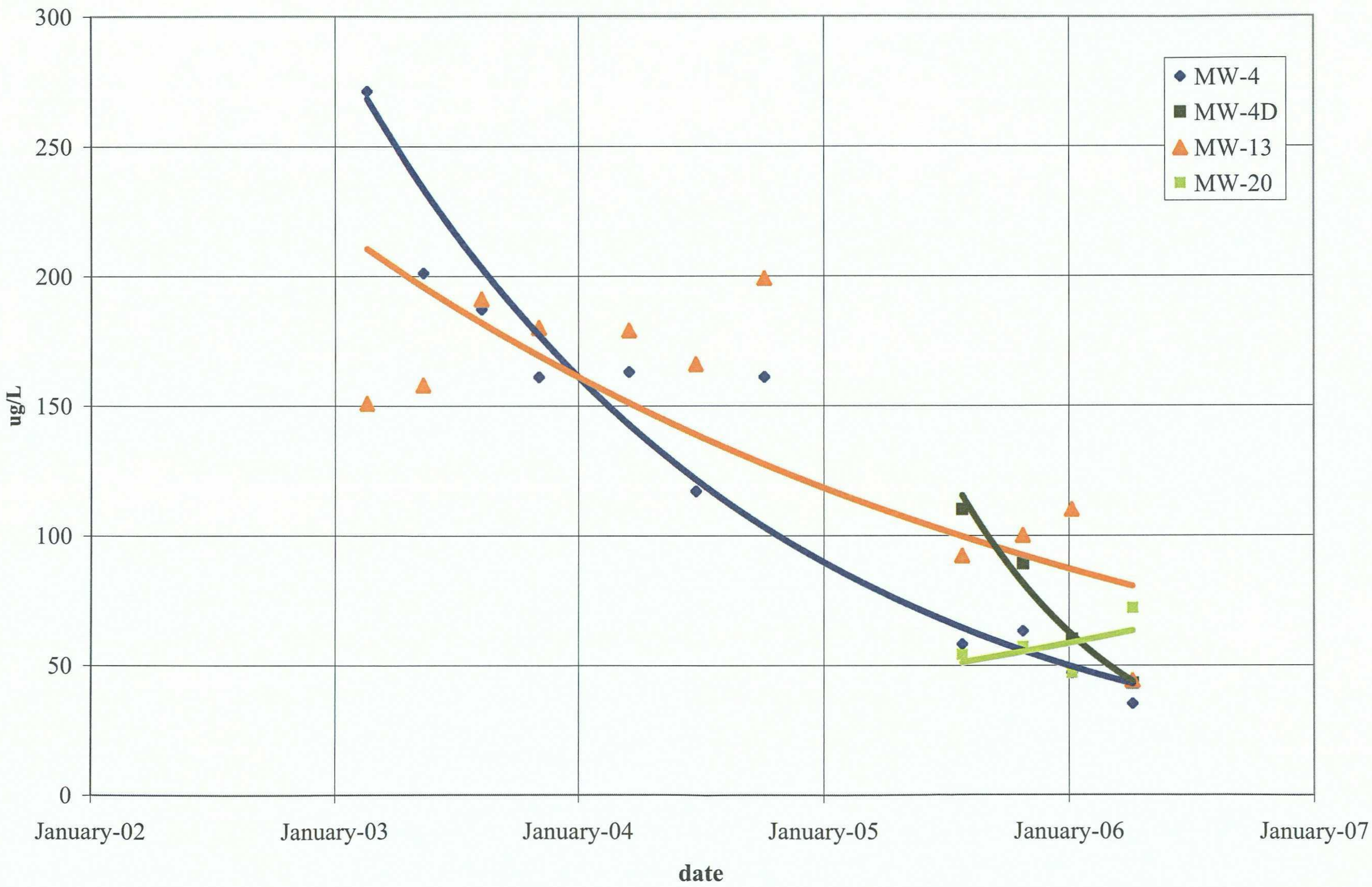


Environmental Strategies Consulting LLC
Q:\Champion Technologies\Hobbs\Report\Final\Elevations\elev graph

June 28, 2006

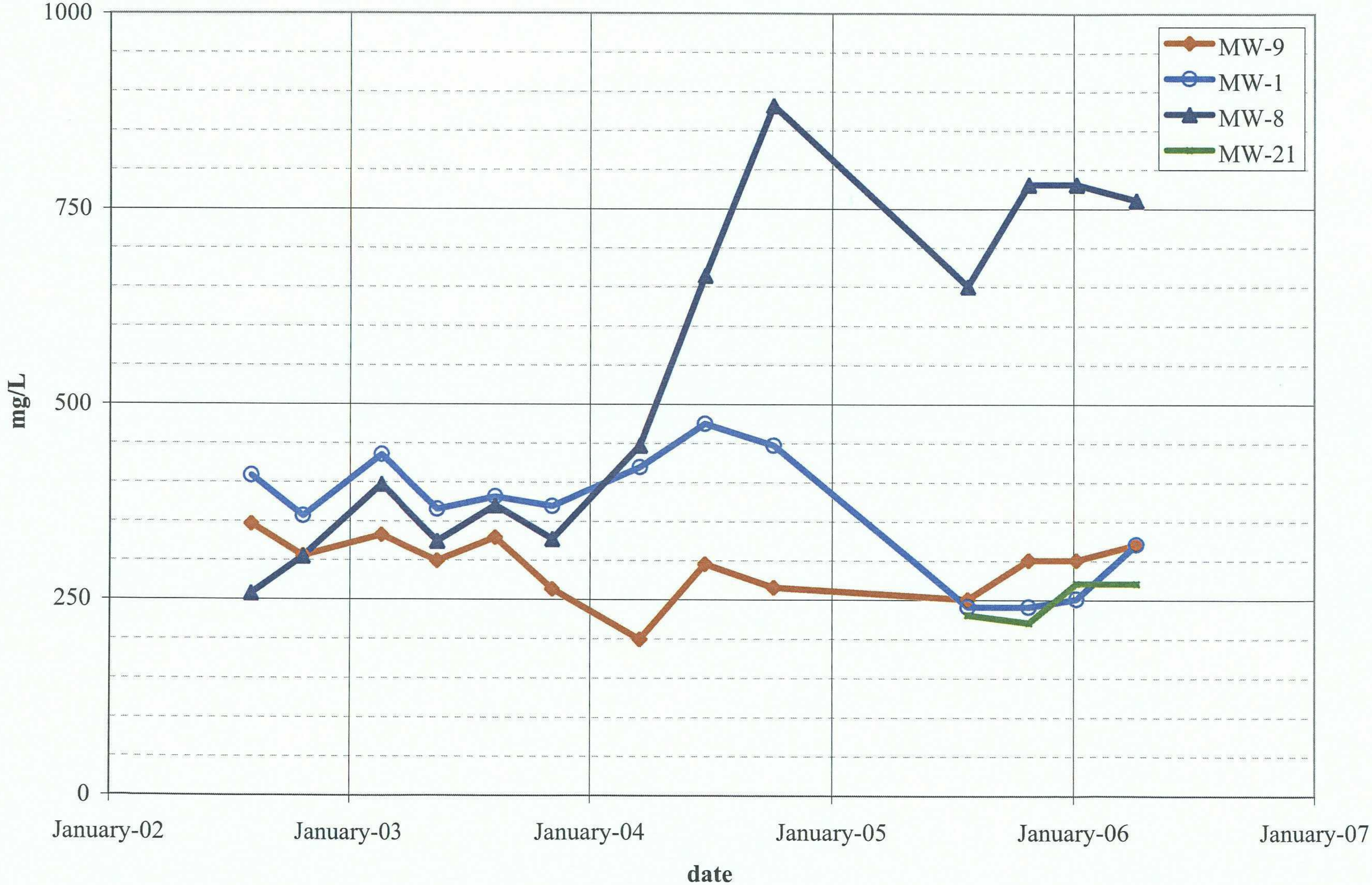
Graph 2

Groundwater Analytical Results - Chromium
Champion Technologies, Inc. Site
Hobbs, New Mexico



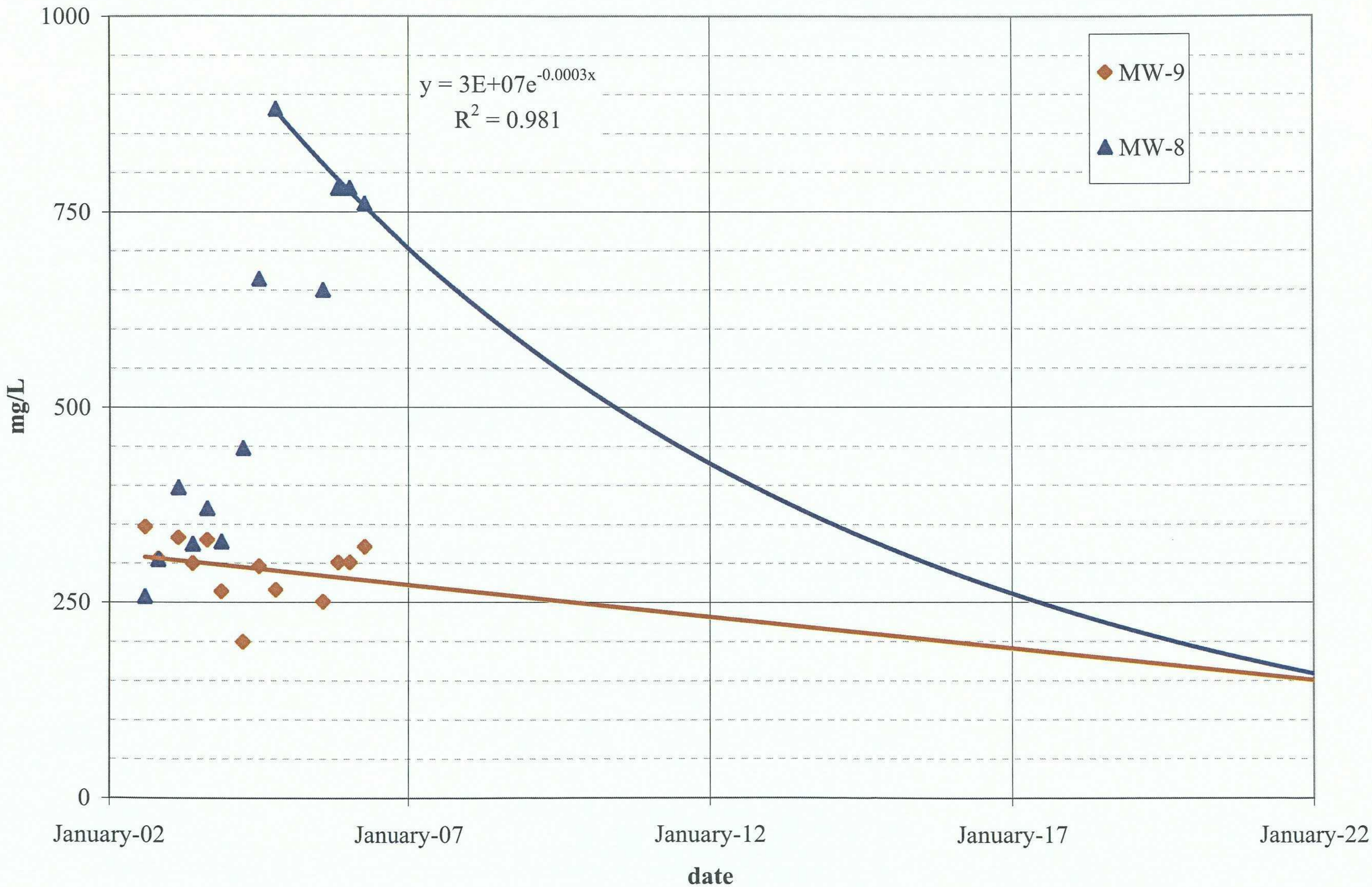
Graph 3

Groundwater Analytical Results (North) - Chloride
Champion Technologies, Inc. Site
Hobbs, New Mexico



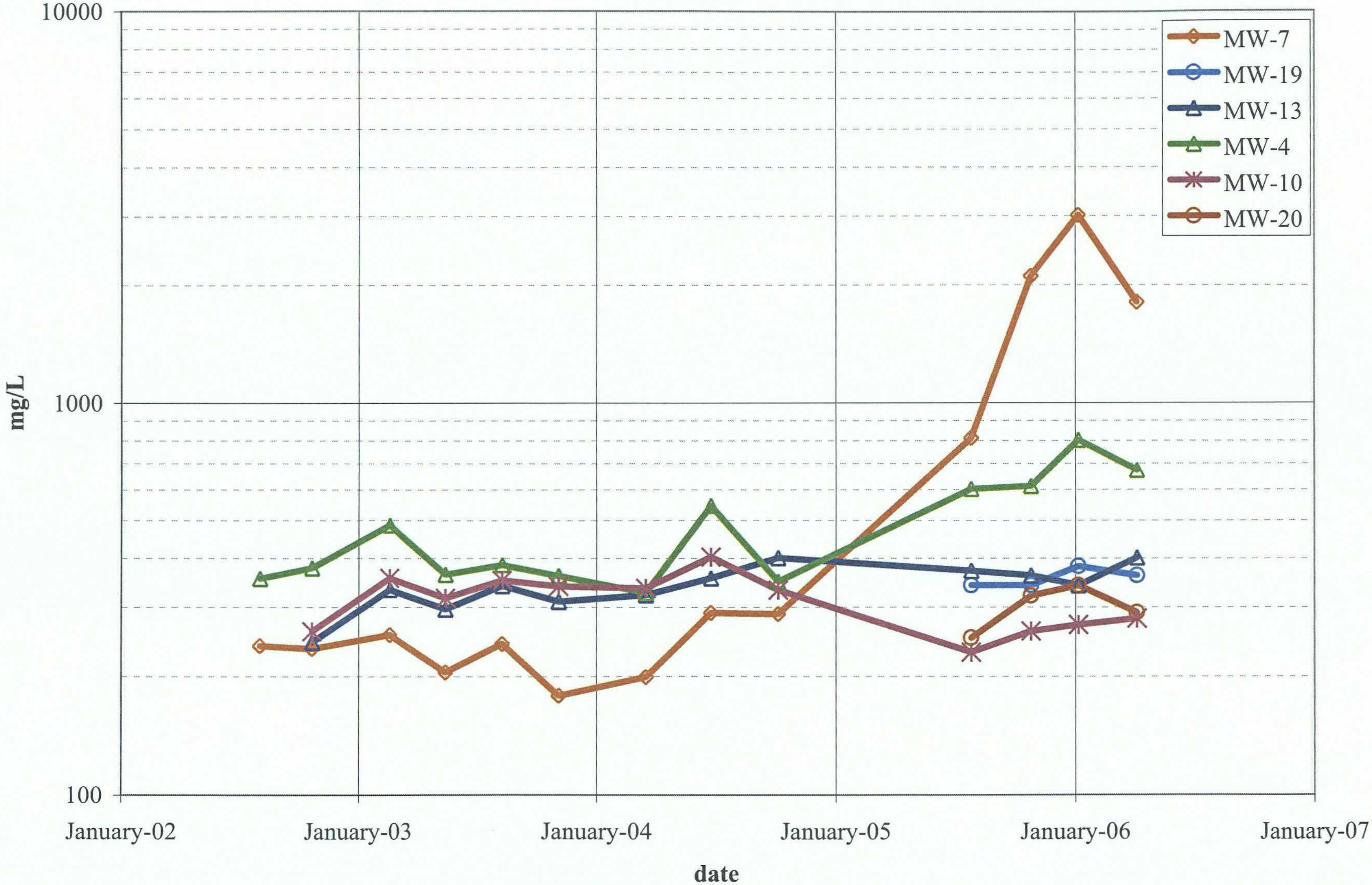
Graph 4

Extrapolated Concentrations (MW-8 and MW-9) - Chloride
Champion Technologies, Inc. Site
Hobbs, New Mexico



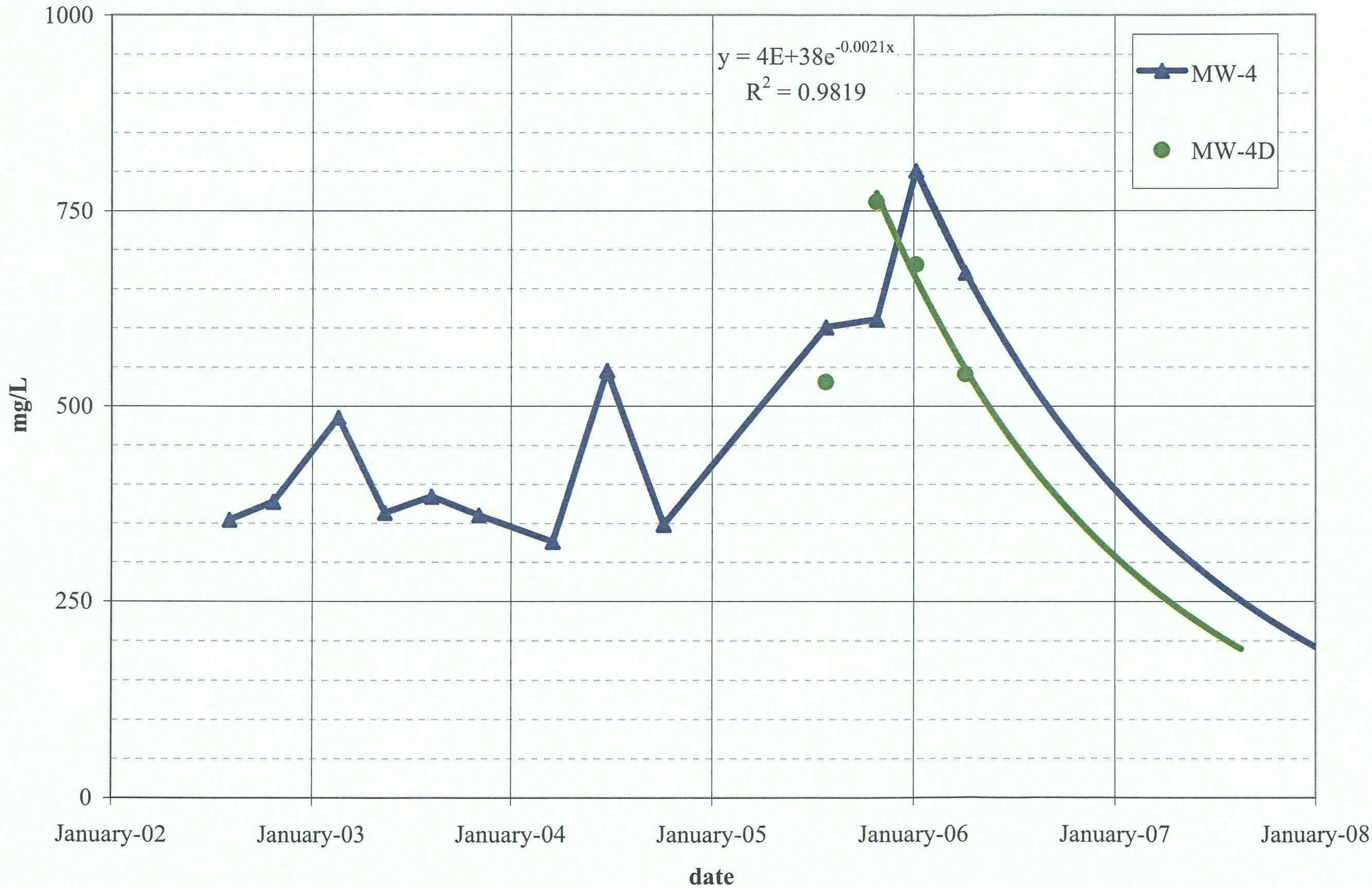
Graph 5

Groundwater Analytical Results (South) - Chloride
Champion Technologies, Inc. Site
Hobbs, New Mexico



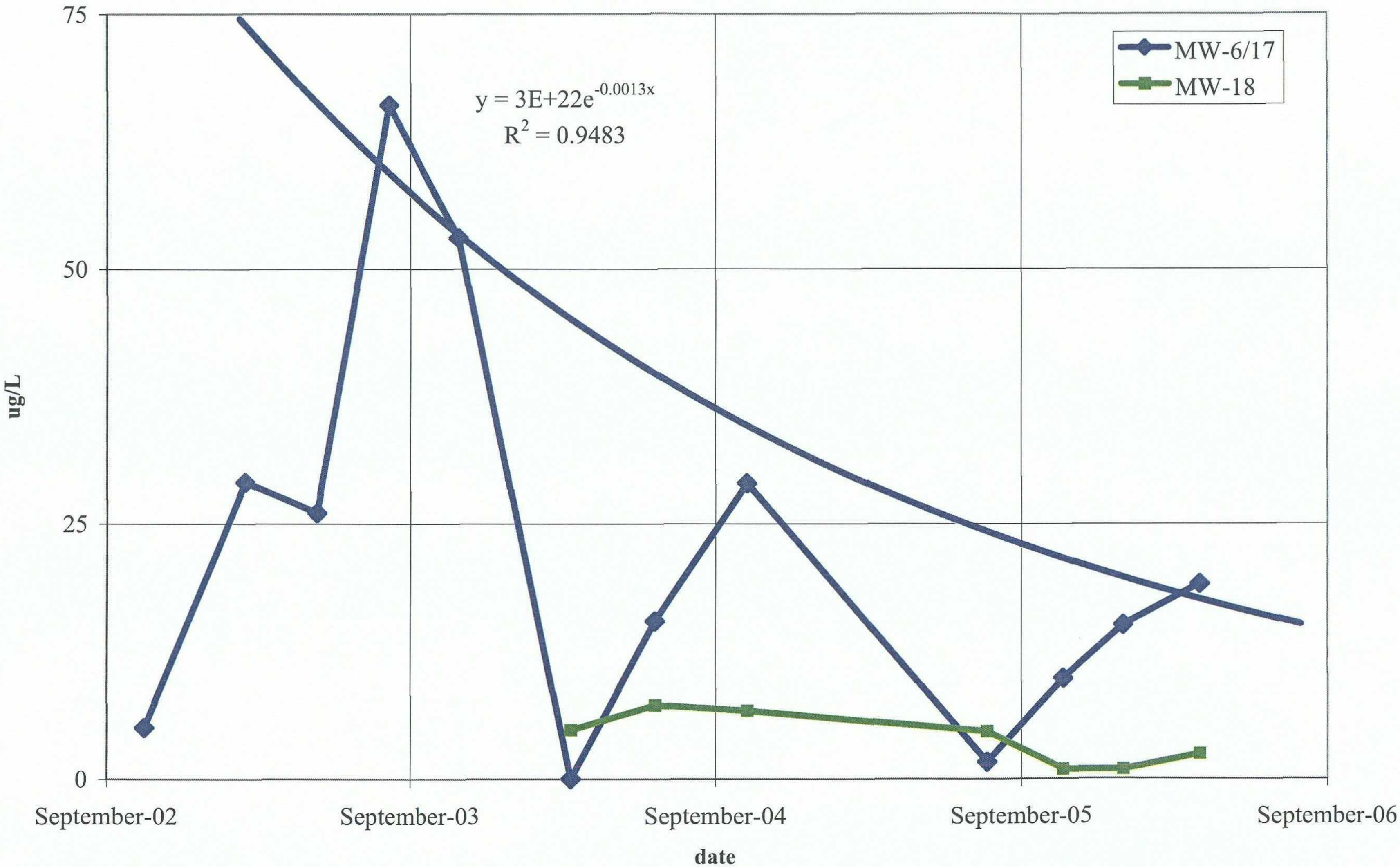
Graph 6

Extrapolated Groundwater Concentrations (MW-4 and MW-4D) - Chloride
Champion Technologies, Inc. Site
Hobbs, New Mexico



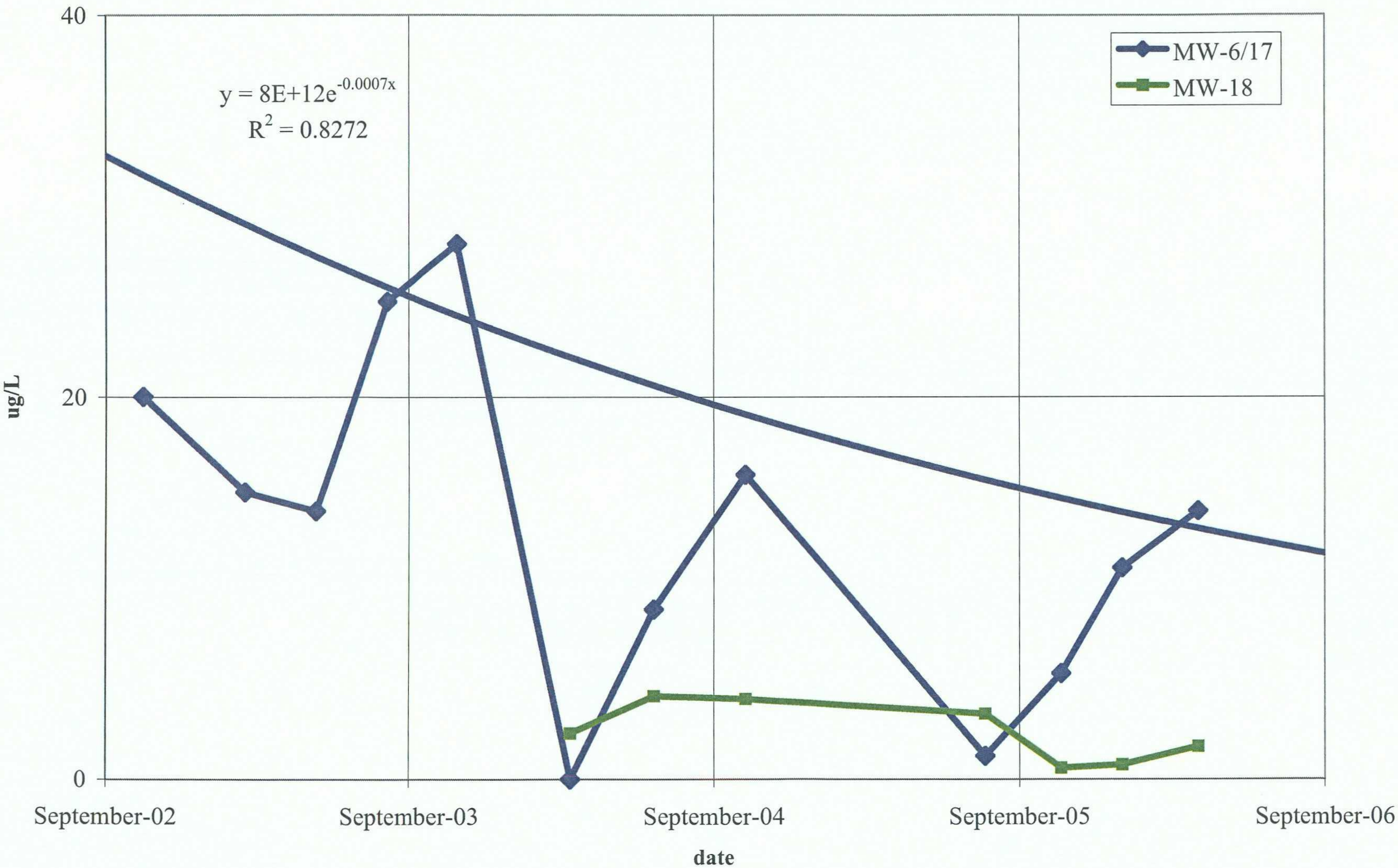
Graph 7

Groundwater Analytical Results - 1,1-DCA
Champion Technologies, Inc. Site
Hobbs, New Mexico



Graph 8

Groundwater Analytical Results - PCE
Champion Technologies, Inc. Site
Hobbs, New Mexico



Tables

Table 1

Groundwater Elevations
Champion Technologies, Inc. Site
Hobbs, New Mexico

Well Location	Date Measured	Casing Elevation	Depth to Water	Elevation
MW-1	8/2/02	3594.44	50.74	3543.70
	8/22/02		50.75	3543.69
	9/20/02		50.94	3543.50
	10/21/02		50.96	3543.48
	11/13/02		51.01	3543.43
	2/18/03		51.22	3543.22
	11/4/03		52.25	3542.19
	6/24/04		52.56	3541.88
	10/5/04		51.85	3542.59
	7/26/05	3594.44	51.97	3542.47
	10/26/05		51.85	3542.59
	1/24/06		51.93	3542.51
	4/25/06		52.23	3542.21
MW-2	9/20/02	3602.78	60.00	3542.78
	10/21/02		60.08	3542.70
	2/18/03		60.29	3542.49
	11/4/03		61.31	3541.47
	6/24/04		61.73	3541.05
	10/5/04		61.39	3541.39
	7/26/05	3602.65	NM	
	10/28/05		61.03	3541.62
	1/24/06		61.04	3541.61
	4/25/06		NM	
MW-3	8/2/02	3599.49	56.81	3542.68
	8/22/02		56.84	3542.65
	9/20/02		57.02	3542.47
	10/21/02		57.09	3542.40
	11/13/02		57.06	3542.43
	2/18/03		57.31	3542.18
	11/4/03		58.44	3541.05
	6/24/04		58.82	3540.67
	10/5/04		58.60	3540.89
	7/27/05	3599.42	58.25	3541.17
	10/25/05		58.24	3541.18
	1/24/06		58.16	3541.26
	4/27/06		58.41	3541.01

Note: Source for August 2002 to October 2004 - NOVA, 2005.

Table 1

Groundwater Elevations
Champion Technologies, Inc. Site
Hobbs, New Mexico

Well Location	Date Measured	Casing Elevation	Depth to Water	Elevation
MW-4	8/2/02	3599.40	57.13	3542.27
	8/22/02		57.17	3542.23
	9/20/02		57.37	3542.03
	10/21/02		57.45	3541.95
	11/13/02		57.47	3541.93
	2/18/03		57.61	3541.79
	11/4/03		58.76	3540.64
	6/24/04		59.21	3540.19
	10/5/04		59.10	3540.30
	7/27/05	3599.35	58.70	3540.65
	10/26/05		58.68	3540.67
	1/25/06		58.53	3540.82
	4/27/06		58.80	3540.55
MW-4D	7/27/05	3599.36	58.86	3540.50
	10/26/05		58.74	3540.62
	1/25/06		58.57	3540.79
	4/27/06		58.77	3540.59
MW-5	8/2/02	3599.28	56.97	3542.31
	8/22/02		57.00	3542.28
	9/20/02		57.19	3542.09
	10/21/02		57.28	3542.00
	2/18/03		57.50	3541.78
	11/4/03		58.63	3540.65
	6/24/04		59.02	3540.26
	10/5/04		58.90	3540.38
	7/27/05	3599.22	58.46	3540.76
	10/25/05		58.49	3540.73
	1/24/06		58.36	3540.86
	4/26/06		58.62	3540.60
MW-6	8/2/02	3599.20	56.38	3542.82
	8/22/02		56.44	3542.76
	9/20/02	3603.56	60.98	3542.58
	10/21/02		61.04	3542.52
	11/13/02		61.08	3542.48
	2/18/03		61.30	3542.26
	11/4/03		62.68	3540.88
	3/17/04		62.68	3540.88
	6/24/04		62.73	3540.83
	10/5/04		62.49	3541.07
	11/16/05	3599.17	NM	

Note: Source for August 2002 to October 2004 - NOVA, 2005.

Table 1

Groundwater Elevations
Champion Technologies, Inc. Site
Hobbs, New Mexico

Well Location	Date Measured	Casing Elevation	Depth to Water	Elevation
MW-7	8/2/02	3596.91	53.16	3543.75
	8/22/02		53.28	3543.63
	9/20/02		53.40	3543.51
	10/21/02		53.46	3543.45
	11/13/02		53.51	3543.40
	2/18/03		53.70	3543.21
	11/4/03		54.67	3542.24
	6/24/04		54.97	3541.94
	10/5/04		54.53	3542.38
	7/26/05	3596.90	54.42	3542.48
	10/25/05		54.33	3542.57
	1/24/06		54.44	3542.46
	4/25/06		54.70	3542.20
MW-8	8/2/02	3602.68	59.87	3542.81
	8/22/02		59.98	3542.70
	9/20/02		60.12	3542.56
	10/21/02		60.18	3542.50
	2/18/03		60.38	3542.30
	11/4/03		61.50	3541.18
	6/24/04		61.90	3540.78
	10/5/04		61.63	3541.05
	7/26/05	3602.63	61.27	3541.36
	10/26/05		61.28	3541.35
	1/24/06		61.19	3541.44
	4/26/06		61.46	3541.17
MW-9	8/2/02	3597.00	53.15	3543.85
	8/22/02		53.12	3543.88
	9/20/02		53.34	3543.66
	10/21/02		53.37	3543.63
	2/18/03		53.61	3543.39
	11/4/03		54.63	3542.37
	6/24/04		54.97	3542.03
	10/5/04		54.20	3542.80
	7/26/05	3596.98	54.38	3542.60
	10/25/05		54.22	3542.76
	1/24/06		54.33	3542.65
	4/25/06		54.61	3542.37

Note: Source for *August 2002* to *October 2004* - *NOVA, 2005.*

Table 1

Groundwater Elevations
Champion Technologies, Inc. Site
Hobbs, New Mexico

Well Location	Date Measured	Casing Elevation	Depth to Water	Elevation
MW-10	10/16/02	3600.84	59.38	3541.46
	10/21/02		59.37	3541.47
	2/18/03		59.61	3541.23
	11/4/03		60.75	3540.09
	6/24/04		61.13	3539.71
	10/5/04		61.12	3539.72
	7/26/05	3600.81	60.62	3540.19
	10/26/05		60.74	3540.07
	1/25/06		60.56	3540.25
	4/27/06		60.73	3540.08
MW-11	10/16/02	3599.63	57.09	3542.54
	10/21/02		57.12	3542.51
	2/18/03		57.35	3542.28
	11/4/03		58.46	3541.17
	6/24/04		58.84	3540.79
	10/5/04		58.59	3541.04
MW-12	10/16/02	3602.80	60.42	3542.38
	10/21/02		60.45	3542.35
	2/18/03		60.66	3542.14
	11/4/03		61.80	3541.00
	6/24/04		62.18	3540.62
	10/5/04		61.96	3540.84
MW-13	10/16/02	3602.68	60.28	3542.40
	10/21/02		60.39	3542.29
	11/13/02		60.35	3542.33
	2/18/03		60.52	3542.16
	11/4/03		61.71	3540.97
	6/24/04		62.08	3540.60
	10/5/04		61.85	3540.83
	7/27/05	3602.61	61.52	3541.09
	10/26/05		61.51	3541.10
	1/25/06		61.45	3541.16
	4/27/06		61.68	3540.93
MW-14	10/16/02	3599.23	57.17	3542.06
	10/21/02		57.24	3541.99
	2/18/03		57.43	3541.80
	11/4/03		58.56	3540.67
	6/24/04		58.98	3540.25
	10/5/04		58.85	3540.38

Note: Source for August 2002 to October 2004 - NOVA, 2005.

Table 1

Groundwater Elevations
Champion Technologies, Inc. Site
Hobbs, New Mexico

Well Location	Date Measured	Casing Elevation	Depth to Water	Elevation
MW-15	10/16/02	3597.06	53.26	3543.80
	10/21/02		53.31	3543.75
	11/13/02		53.35	3543.71
	2/18/03		53.56	3543.50
	11/4/03		54.55	3542.51
	6/24/04		54.87	3542.19
	10/5/04		53.98	3543.08
	7/26/05	3597.02	54.30	3542.72
	10/25/05		54.17	3542.85
	1/24/06		54.24	3542.78
	4/25/06		54.57	3542.45
MW-16	10/16/02	3602.56	60.11	3542.45
	10/21/02		60.17	3542.39
	11/13/02		60.19	3542.37
	2/18/03		60.38	3542.18
	11/4/03		61.50	3541.06
	6/24/04		61.88	3540.68
	10/5/04		61.63	3540.93
MW - 17	6/24/04		62.19	3540.72
	10/5/04		61.82	3541.09
	7/26/05	3602.91	61.52	3541.39
	10/25/05	3599.69	58.37	3541.32
	1/24/06		58.32	3541.37
	4/25/06		58.54	3541.15
MW - 18	6/24/04		61.99	3540.26
	10/5/04		61.82	3540.43
	7/26/05	3602.25	61.35	3540.90
	10/25/05		61.41	3540.84
	1/24/06		61.32	3540.93
	4/25/06		61.51	3540.74
MW - 19	7/27/05	3599.10	57.70	3541.40
	10/25/05		57.64	3541.46
	1/24/06		57.63	3541.47
	4/25/06		57.83	3541.27
MW - 20	7/26/05	3601.16	61.27	3539.89
	10/26/05		61.39	3539.77
	1/25/06		61.17	3539.99
	4/27/06		61.37	3539.79
MW - 21	7/26/05	3599.07	58.12	3540.95
	10/25/05		58.12	3540.95
	1/24/06		58.06	3541.01
	4/25/06		58.24	3540.83

Note: Source for August 2002 to October 2004 - NOVA, 2005.

Table 2

Soil Analytical Results
Champion Technologies, Inc. Site
Hobbs, New Mexico

Sample ID	Sample Date	Chromium (mg/kg)	pH	Chloride (mg/kg)
ESCSB-01-0'-2'	7/21/2005	1.2	8.8	12
ESCSB-01-5'-7'	7/21/2005	10	9.6	10
ESCSB-01-10'-12'	7/21/2005	6.0	9.6	49
ESCSB-01-15'-17'	7/21/2005	2.7	8.8	140
ESCSB-01-25'-27'	7/21/2005	2.7	8.8	120
ESCSB-01-35'-37'	7/21/2005	2.6	8.9	110
ESCSB-01-54'-56'	7/21/2005	5.4	8.7	59
ESCSB-02-0'-2'	7/20/2005	2.0	8.1	2600
ESCSB-02-5'-7'	7/20/2005	9.7	8.3	550
ESCSB-02-10'-12'	7/20/2005	1.9	7.9	1700
ESCSB-02-15'-17'	7/20/2005	3.7	8.3	500
ESCSB-02-25'-27'	7/20/2005	1.9	8.3	470
ESCSB-02-35'-37'	7/20/2005	3.3	8.4	350
ESCSB-02-53'-55'	7/20/2005	4.9	8.3	190
ESCSB-03-0'-2'	7/20/2005	1.5	8.4	1200
ESCSB-03-5'-7'	7/20/2005	1.2	8.6	490
ESCSB-03-10'-12'	7/20/2005	2.6	8.0	1400
ESCSB-03-15'-17'	7/20/2005	4.0	8.1	1000
ESCSB-03-25'-27'	7/20/2005	3.0	8.3	300
ESCSB-03-35'-37'	7/20/2005	2.5	8.5	88
ESCSB-03-55'-57'	7/20/2005	4.4	9.0	25
ESCSB-04-0'-2'	7/19/2005	NA	NA	58
ESCSB-04-5'-7'	7/19/2005	NA	NA	160
ESCSB-04-10'-12'	7/19/2005	NA	NA	790
ESCSB-04-15'-17'	7/19/2005	NA	NA	380
ESCSB-04-20'-22'	7/19/2005	NA	NA	230
ESCSB-05-0'-2'	7/21/2005	2.4	8.5	130
ESCSB-05-5'-7'	7/21/2005	< 1.0	8.0	180
ESCSB-05-10'-12'	7/21/2005	5.5	8.7	300
ESCSB-05-15'-17'	7/21/2005	1.6	8.5	130
ESCSB-05-25'-27'	7/21/2005	3.5	8.6	190
ESCSB-05-35'-37'	7/21/2005	3.9	8.5	190
ESCSB-05-55'-57'	7/21/2005	2.6	8.7	47

Samples prepared and analyzed by EPA Methods 6010B, 9045C, and 9056.

NA = not analyzed

Table 3

Groundwater Analytical Results - Metals
Champion Technologies, Inc. Site
Hobbs, New Mexico

ANALYTE	WQCC Standard	DATE	MW-1	MW-3	MW-4	MW-4D	MW-5	MW-7	MW-8	MW-9	MW-10
Barium	**1000**	July-05	85	54	55	110	46	97	55	62	40
		October-05	93	47	50	75	53	130	59	75	43
		January-06	96	44	53	61	55	130	48	72	42
		April-06	77	41	42	50	57	59	47	72	45
Chromium	**50**	February-03	ND	12	**271**	-	ND	ND	ND	ND	16
		May-03	ND	11	**201**	-	ND	ND	24	ND	22
		August-03	ND	ND	**187**	-	ND	ND	25	ND	22
		November-03	ND	ND	**161**	-	ND	ND	19	ND	21
		March-04	ND	ND	**163**	-	ND	ND	12	ND	48
		June-04	ND	ND	**117**	-	ND	ND	8	ND	**55**
		October-04	ND	8	**161**	-	ND	ND	12	ND	**55**
		July-05	5.0 B	NA	**58**	**110**	NA	NA	NA	NA	42
		October-05	5.0 B	NA	**63**	**89**	3.2	NA	18	NA	33
		January-06	3.8 B,J	NA	47 J	**60** J	3.8 B,J	NA	19 J	NA	40 J
		April-06	4.5 B	ND	35	43	10	**58**	19	NA	**50**
Manganese	**200**	July-05	ND	2.2 B	0.96 B	ND	ND	ND	ND	ND	5.4 B
		October-05	ND	ND	ND	ND	ND	ND	ND	ND	30
		January-06	ND	ND	ND	ND	ND	ND	ND	ND	14
		April-06	1.6 B	ND	ND	ND	ND	ND	ND	ND	13

Notes:

Source of data February 2003 to October 2004 - NOVA, 2005. Metals samples in 2002 were not filtered - ETGI, 2003a.

All samples were prepared according to EPA analytical method SW846 6010B.

B: Estimated result. Result is less than the reporting limit.

J: Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NA: Not analyzed.

ND: Not detected.

NS: Not sampled. Property owner shut off power to well.

All values reported in µg/L.

- : Well not installed as of this date.

Table 3

Groundwater Analytical Results - Metals
Champion Technologies, Inc. Site
Hobbs, New Mexico

ANALYTE	WQCC Standard	DATE	MW-13	MW-15	MW-17	MW-18	MW-19	MW-20	MW-21	Offsite Supply Well	Onsite Supply Well
Barium	**1000**	July-05	66	52	45	51	55	45	47	70	69
		October-05	74	75	52	50	62	49	47	69	58
		January-06	71	71	55	44	64	49	49	NS	61
		April-06	65	63	52	50	60	44	55	NS	65
Chromium	**50**	February-03	**151**	ND	-	-	-	-	-	ND	ND
		May-03	**158**	ND	-	-	-	-	-	ND	ND
		August-03	**191**	ND	-	-	-	-	-	ND	ND
		November-03	**180**	ND	-	-	-	-	-	ND	ND
		March-04	**179**	ND	ND	22	-	-	-	ND	ND
		June-04	**166**	ND	ND	17	-	-	-	ND	ND
		October-04	**199**	ND	ND	25	-	-	-	ND	ND
		July-05	**92**	NA	3.0 B	9.2 B	1.0 B	**54**	NA	1.0 B	3.1 B
		October-05	**100**	NA	ND	5.5 B	3.1 B	**57**	NA	ND	ND
		January-06	**110** J	NA	ND	3.5 B,J	ND	47 J	NA	NS	ND
		April-06	44	NA	NA	2.9 B	ND	**72**	NA	NS	5.9 B
Manganese	**200**	July-05	ND	ND	8.1 B	ND	11	5.5 B	6.8 B	18	ND
		October-05	ND	ND	56	ND	4.7 B	3.6 B	4.1 B	5.7 B	ND
		January-06	ND	1.0 B	39	ND	1.1 B	1.5 B	2.4 B	NS	ND
		April-06	ND	ND	6.5 B	ND	ND	1.6 B	1 B	NS	ND

Notes:

Source of data February 2003 to October 2004 - NOVA, 2005. Metals samples in 2002 were not filtered - ETGI, 2003a.

All samples were prepared according to EPA analytical method SW846 6010B.

B: Estimated result. Result is less than the reporting limit.

J: Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NA: Not analyzed.

ND: Not detected.

NS: Not sampled. Property owner shut off power to well.

All values reported in µg/L.

- : Well not installed as of this date.

Table 4

Groundwater Analytical Results - Chloride
Champion Technologies, Inc. Site
Hobbs, New Mexico

ANALYTE	WQCC Standard	DATE	MW-1	MW-3	MW-4	MW-4D	MW-5	MW-7	MW-8	MW-9	MW-10	MW-13
Chloride	250	August-02	408	381	354	-	346	239	257	346	-	-
		October-02	356	464	377	-	508	235	304	305	260	244
		February-03	435	658	485	-	476	255	397	332	355	332
		May-03	365	510	363	-	329	205	324	299	316	296
		August-03	381	359	384	-	430	242	370	329	351	340
		November-03	369	432	360	-	432	179	327	263	339	310
		March-04	419	223	326	-	377	199	447	199	335	322
		June-04	475	313	545	-	389	290	664	295	402	355
		October-04	447	302	348	-	348	288	881	265	331	400
		July-05	240 J,Q	250 J,Q	600 J,Q	530 J,Q	250 J,Q	810 J,Q	650 J,Q	250 J,Q	230 J,Q	370 J,Q
		October-05	240 Q	220 Q	610 Q	760 Q	310 Q	2,100 Q	780 Q	300 Q	260 Q	360 Q
		January-06	250 Q	350 Q	800 Q	680 Q	360 Q	3,000 Q	780 Q	300 Q	270 Q	340 Q
		April-06	320 Q	240 Q	670 Q	540	350 Q	1,800 Q	760 Q	320 Q	280	400 Q

Notes:

Sources of data: August and October 2002 - ETGI, 2003a; February 2003 to October 2004 - NOVA, 2005.

All values reported in mg/L.

All samples prepared according to EPA analytical method MCAWW 300.0A.

J: Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Q: Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

NS: Not Sampled. Property owner shut power off to well.

- : Well not installed as of this date.

Table 4

Groundwater Analytical Results - Chloride
Champion Technologies, Inc. Site
Hobbs, New Mexico

ANALYTE	WQCC Standard	DATE	MW-15	MW-17	MW-18	MW-19	MW-20	MW-21	Offsite Supply Well	Onsite Supply Well
Chloride	**250**	August-02	-	-	-	-	-	-	**372**	**319**
		October-02	156	-	-	-	-	-	**386**	**290**
		February-03	221	-	-	-	-	-	**479**	**347**
		May-03	205	-	-	-	-	-	**383**	**258**
		August-03	165	-	-	-	-	-	**397**	**295**
		November-03	174	-	-	-	-	-	**299**	**377**
		March-04	185	**301**	**333**	-	-	-	**382**	240
		June-04	127	224	**291**	-	-	-	**397**	236
		October-04	**433**	**328**	**254**	-	-	-	**383**	**254**
		July-05	110 J	180 J,Q	240 J,Q	**340** J,Q	250 J,Q	230 J,Q	**340** J,Q	220 J,Q
		October-05	71 Q	230 Q	200 Q	**340** Q	**320** Q	220 Q	**340** Q	210 Q
		January-06	53 Q	250 Q	200 Q	**380** Q	**340** Q	**270** Q	NS	220 Q
		April-06	120 Q	**260** Q	100 Q	**360** Q	**290** Q	**270** Q	NS	210 Q

Notes:

Sources of data: August and October 2002 - ETGI, 2003a; February 2003 to October 2004 - NOVA, 2005.

All values reported in mg/L.

All samples prepared according to EPA analytical method MCAWW 300.0A.

J: Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Q: Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

NS: Not Sampled. Property owner shut power off to well.

- : Well not installed as of this date.

Table 5

Groundwater Analytical Results - VOCs
Champion Technologies, Inc Site
Hobbs, New Mexico

ANALYTE	WQCC Standard	DATE	MW-6/17	MW-18
1,1-Dichloroethane	**25**	October-02	5	-
		February-03	**29**	-
		May-03	**26**	-
		August-03	**66**	-
		November-03	**53**	-
		March-04	ND	4.78
		June-04	15.4	7.19
		October-04	**28.9**	6.64
		July-05	1.6	4.6
		October-05	9.8	0.87 J
		January-06	15	0.86 J
		April-06	19	2.4
Tetrachloroethene	**20**	October-02	**20**	-
		February-03	15	-
		May-03	14	-
		August-03	**25**	-
		November-03	**28**	-
		March-04	ND	2.38
		June-04	8.84	4.33
		October-04	15.9	4.18
		July-05	1.2	3.4
		October-05	5.5	0.58 J
		January-06	11	0.74 J
		April-06	14	1.7
Vinyl Chloride	**1**	October-02	< 1.0	
		February-03	< 1.0	
		May-03	< 1.0	-
		August-03	< 1.0	-
		November-03	< 1.0	-
		April-04	< 10.0	< 1.0
		August-04	< 1.0	< 1.0
		November-04	< 1.0	< 1.0
		July-05	< 0.38	< 0.38
		October-05	< 0.38	< 0.38
		January-06	< 0.38	< 0.38
		April-06	<0.17	<0.17

Notes:

Sources of data: October 2002 - ETGI, 2003a; February 2003 to October 2004 - NOVA, 2005.

All values reported in µg/L.

All samples prepared according to EPA analytical method SW846 8260 B.

NA: Not analyzed.

J: Estimated result. Result is less than the reporting limit.

- : Well not installed as of this date.

Table 6

Geochemical Indicators
Champion Technologies, Inc. Site
Hobbs, New Mexico

PARAMETER	DATE	MW-1	MW-3	MW-4	MW-4D	MW-5	MW-7	MW-8	MW-9	MW-10	MW-13	MW-15	MW-17	MW-18	MW-19	MW-20	MW-21	Offsite Supply Well	Onsite Supply Well
T (°C)	July-05	19.7	18.4	19.4	18.9	18.2	19.7	19.5	19.0	21.8	18.7	19.6	21.1	20.2	18.7	20.9	20.9	20.5	21.4
	October-05	18.2	19.1	20.3	20.4	19.5	13.0	18.6	18.0	18.3	19.6	16.7	20.7	21.2	20	19.7	18.6	19.1	18.4
	January-06	18.48	19.11	19.21	19.24	18.93	18.98	19.05	18.54	20.18	19.06	18.9	19.05	19.03	19.01	19.4	18.85	NS	12.75
	April-06	17.82	18.33	19.28	19.36	17.92	18.35	19.04	18.42	19.74	19.15	18.08	19.37	19.15	18.63	19.54	19.01	NS	20.61
pH	July-05	7.45	7.48	7.81	7.88	7.69	7.59	7.25	7.29	8.16	7.66	7.63	8.04	7.82	8.29	7.86	8.39	7.40	8.01
	October-05	7.19	7.69	7.40	7.05	7.46	7.39	7.10	7.25	7.40	7.30	7.10	7.37	7.65	7.70	6.61	7.69	7.46	7.20
	January-06	6.53	7.59	6.65	6.52	6.88	6.65	6.56	6.71	6.60	6.56	6.85	6.93	6.93	6.84	6.92	6.84	NS	7.20
	April-06	6.99	7.59	7.17	7.18	7.33	7.68	6.91	7.12	7.27	7.24	7.29	7.23	7.48	7.26	7.28	7.18	NS	7.28
ORP (mV)	July-05	20	7	-12	-51	-5	6	16	56	-21	12	29	-22	-34	-20	-19	-56	23	34
	October-05	38	26	88	100	24	37	52	51	-100	72	55	11	19	18	47	26	17	-24
	January-06	145.5	148.5	117.6	49.6	93.3	144.6	152.8	141.9	70.1	110.8	138.5	9.7	121.7	102.3	104.5	154.9	NS	178.8
	April-06	93.8	55.7	74.4	61.1	68	103.3	85.1	70.6	67.5	50.4	70	51.6	84.3	83	74.7	82.4	NS	107.9
DO (mg/L)	July-05	4.00	4.20	4.70	4.00	4.50	3.80	2.70	4.40	4.00	4.20	4.40	2.50	3.70	4.60	4.20	4.70	4.00	5.50
	October-05	2.10	1.60	3.00	5.65	5.54	2.90	1.30	5.82	3.70	3.60	4.50	0.20	3.30	3.25	3.30	1.60	NM	NM
	January-06	6.53	6.26	7.51	7.21	6.27	6.50	4.05	6.20	6.66	7.49	6.59	3.14	5.49	7.14	7.77	8.05	NS	3.91
	April-06	NM	NM	6.17	5.98	NM	NM	3.87	NM	6.03	6.11	5.62	NM	NM	NM	6.29	NM	NS	NM
Fe^{2+} (mg/L)	July-05	0.00	0.01	0.32	0.60	0.52	0.00	0.05	0.65	0.00	0.16	0.00	0.00	0.10	0.23	0.00	0.04	0.00	0.06
	October-05	0.00	0.00	0.24	0.38	0.09	0.06	0.00	0.20	0.03	0.00	0.33	0.00	0.29	0.00	0.25	0.00	0.00	0.00

Notes:
T - temperature; ORP - oxidation-reduction potential; DO - dissolved oxygen; Fe^{2+} - ferrous iron (HACH Colorimeter)
T, pH, ORP measured with Myron L Ultrameter 07/05 and 10/05 and YSI 556 01/06 and 04/06.
NM: Not Measured
NS: Not Sampled. Property owner shut power off to well.

Table 6

Geochemical Indicators
Champion Technologies, Inc. Site
Hobbs, New Mexico

PARAMETER	DATE	MW-1	MW-3	MW-4	MW-4D	MW-5	MW-7	MW-8	MW-9	MW-10	MW-13	MW-15	MW-17	MW-18	MW-19	MW-20	MW-21	Offsite Supply Well	Onsite Supply Well
Iron (mg/L)	July-05	< 0.021	NM	< 0.021	< 0.021	NM	NM	NM	NM	< 0.021	< 0.021	NM	0.026	< 0.021	< 0.021	< 0.021	NM	< 0.021	< 0.021
	October-05	< 0.021	NM	< 0.021	< 0.021	NM	NM	NM	NM	< 0.021	< 0.021	NM	< 0.021	< 0.021	< 0.021	< 0.021	NM	< 0.021	< 0.021
TOC (mg/L)	July-05	3.8	NM	2.1	3.9	NM	NM	2.0	NM	2.1	1.2	NM	1.9	1.6	2.4	2.6	NM	1.2	0.42
	October-05	1.4	NM	ND	0.55	NM	NM	1.2	NM	ND	1.9	NM	1.5	1.8	2.7	2.2	NM	1.2	0.83
TDS (mg/L)	July-05	NM	NM	1,900	1,900	NM	NM	1,900	1,200	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	October-05	NM	NM	1,800	1,900	NM	NM	2,100	1,300	NM	NM	NM	NM	NM	NM	NM	NM	720	NM
Sulfate (mg/L)	July-05	110	NM	290	260	NM	NM	200	NM	200	230	NM	250	160	230	190	NM	230	92
	October-05	110	NM	240	280	NM	NM	230	NM	200	210	NM	160	160	230	170	NM	220	100
Sulfide (mg/L)	July-05	0.80	NM	0.64	0.64	NM	NM	0.64	NM	ND	ND	NM	ND	0.64	0.64	0.64	NM	0.64	ND
	October-05	0.80	NM	0.64	0.64	NM	NM	0.64	NM	0.96	0.64	NM	0.64	ND	ND	0.64	NM	0.80	0.64

Notes:
ND - not detected; NM -not measured; TOC - total organic carbon; TDS - total dissolved solids
Dissolved iron analyzed by EPA Method 6010B, TOC by MCAWW 415.1; TDS by MCAWW 160.1; sulfate by MCAWW 300.0A; sulfide by EPA Method 9030B/9034.

Appendix A – Soil Boring Logs and Well Construction Diagrams

Boring Log: ESCSB-01

Project: Champion Technologies

Project No.: 131042/1 **Surface Elevation (feet AMSL*):**

Location: Hobbs, NM **Total Depth (feet):** 56

Completion Date: July 21, 2005 **Borehole Diameter (inches):** 8

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
	1			75		Asphalt / topsoil.
						Caliche, white to light orangish-brown, dry, weakly cemented.
	2			100		Caliche, white to light orangish-brown, dry, weakly cemented.
	3			100		Caliche, white to light orangish-brown, dry, weakly cemented.
	4			25		Caliche, white to light gray, dry, moderately cemented.
20						Caliche, white to light gray, moderately cemented.
	5			100		Caliche with silt, white to tan.
	6			100		
40						Caliche with silt, white to tan.
						Silty sand, orange-brown, dry, weakly cemented, contains calcareous concretions.
						Calcrete, hard, well cemented.
	7			100		Silty sand, tan-brown, calcareous concretions
60						Bottom of Boring at 56 feet Soil boring, no well installed. Samples collected with 24" split spoon samplers. Boring was filled with hydrated bentonite to surface upon completion.

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: ESCSB-02

Project: Champion Technologies

Project No.: 131042/1 **Surface Elevation (feet AMSL*):**

Location: Hobbs, NM **Total Depth (feet):** 55

Completion Date: July 20, 2005 **Borehole Diameter (inches):** 8

Sample Data					Subsurface Profile	
Depth	**Sample/Interval**	**PID/OVM (ppm)**	**Blow Count**	**% Recovery**	**Lithology**	**Description**
						Ground Surface
	1			100		Asphalt / topsoil.
						Caliche with silt, white to brown, weakly cemented, dry.
	2			100		Silt, orange-brown, well sorted.
	3			75		Silt, white to orange-brown, calcareous concretions, dry.
	4			75		
20						Silt, white to orange-brown, calcareous concretions, dry.
	5			100		Caliche with sandy silt, white to gray tan, very well sorted, dry, weakly cemented.
	6			100		
40						Caliche with sandy silt, white to gray tan, very well sorted, dry, weakly cemented.
						Calcrete, very well cemented.
	7			100		Silty sand, brown. - Saturated at 55' bgs.
60						Bottom of Boring at 55 feet Soil boring, no well installed. Samples collected with 24" split spoon samplers. Boring was filled with hydrated bentonite to surface upon completion.

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: ESCSB-03

Project: Champion Technologies

Project No.: 131042/1

Location: Hobbs, NM

Completion Date: July 20, 2005

Surface Elevation (feet AMSL*):

Total Depth (feet): 57

Borehole Diameter (inches): 8

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
	1			75		Asphalt / topsoil.
						Caliche with pebbley sandy silt, white to light grayish-tan, moderately hard, weakly cemented.
	2			15		Caliche with pebbley sandy silt, white to light grayish-tan, moderately hard, weakly cemented.
	3			90		Caliche with silt, orange-brown, calcareous crust between grains.
	4			100		Caliche with silty sand, tannish-white, very well sorted, dry, weakly cemented.
20	5			5		Caliche with sandy silt, very well cemented, dry.
	6			5		Caliche with sandy silt, very well cemented, dry.
	7			100		Caliche with silt, white to tan,very well sorted, dry.
	8			100		Caliche with silt, gray to tan, very well sorted, dry.
40	9			100		Caliche with silt, gray to tan, very well sorted, dry.
	10			100		Caliche with silt, gray to tan, very well sorted, dry.
						Calcrete, gray to tan, very hard, dry.
	11			100		Silty sand, white to light tan, less than 5% calcareous concretions. - Saturated at 55.5' bgs.
60						Bottom of Boring at 57 feet Soil boring, no well installed. Samples collected with 24" split spoon samplers. Boring was filled with hydrated bentonite to surface upon completion.

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: ESCSB-04

Project: Champion Technologies

Project No.: 131042/1 **Surface Elevation (feet AMSL*):**

Location: Hobbs, NM **Total Depth (feet):** 22

Completion Date: July 19, 2005 **Borehole Diameter (inches):** 8

Sample Data					Subsurface Profile	
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description
						Ground Surface
	1			100		Caliche with silty sand, white to orange-brown, dry, weakly cemented, concretions in lower 2".
	2			100		
	4			33		Caliche, silt sized material encrusted with calcareous material, dry, indurated.
	3					
	6			40		Caliche with silty sand, brown-orange to white, dry, indurated.
	5			40		
	7			50		Caliche, silt sized material, white-tan, dry, weakly cemented.
	8			50		
20	10			38		Caliche, silt sized material, white-tan, dry, weakly cemented.
	9			38		
						Bottom of Boring at 22 feet Soil boring, no well installed. Samples collected with 24" split spoon samplers. Boring was filled with hydrated bentonite to surface upon completion.
40						
60						

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: ESCSB-05/MW-19

Project: Champion Technologies
Project No.: 131042/1
Location: Hobbs, NM
Completion Date: July 21, 2005

Surface Elevation (feet AMSL*):
TOC Elevation (feet AMSL*):
Total Depth (feet): 77
Borehole Diameter (inches): 8

Sample Data					Subsurface Profile		
Depth	**Sample/Interval**	**PID/OVM (ppm)**	**Blow Count**	**% Recovery**	**Lithology**	**Description**	**Well Details**
						Ground Surface	
	1			100		Asphalt / topsoil.	
						Caliche, white to tan, dry, weakly cemented.	
	2			100		Caliche, white to tan, dry, weakly cemented.	
	3			100		Caliche with silt, orange-brown to white, weakly cemented.	
	4			10		Caliche, white, well cemented. Very hard at 20' bgs.	
20							
	5			75		Caliche with silt, white to light brown, dry, weakly cemented.	
	6			100		Caliche with silt, white to light brown, dry, weakly cemented.	
						Caliche, white to orange brown, dry, weakly cemented.	
40							
						Calcrete, very well cemented siliceous material, very hard.	
	7			100		Silty sand, tan brown, contains calcareous concretions. - Saturated at 58' bgs.	
60							

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: ESCSB-05/MW-19

Project: Champion Technologies

Project No.: 131042/1

Location: Hobbs, NM

Completion Date: July 21, 2005

Surface Elevation (feet AMSL*):

TOC Elevation (feet AMSL*):

Total Depth (feet): 77

Borehole Diameter (inches): 8

Sample Data					Subsurface Profile		
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description	Well Details
						Silty sand, tan brown, contains calcareous concretions. - Saturated at 58' bgs. *(continued)*	
80						Bottom of Boring at 77 feet 2" SCH 40 PVC riser, 0.010 slot PVC screen, flush mount construction.	
100							
120							

Geologist(s): David Carstens

Subcontractor: Eades Drilling

Driller/Operator: Adam

Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: MW-20

Project: Champion Technologies
Project No.: 131042/1
Location: Hobbs, NM
Completion Date: July 21, 2005

Surface Elevation (feet AMSL*):
TOC Elevation (feet AMSL*):
Total Depth (feet): 77
Borehole Diameter (inches): 8

Sample Data					Subsurface Profile		
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description	Well Details
						Ground Surface	
						Caliche with silt, white, well cemented.	
						Caliche with silty sand, white to orange.	
						Caliche with silty sand, white to orange, well cemented nodules ~ 40%. Well consolidated layer from 9' to 9.5' bgs.	
20						Caliche with silty sand, white to orange, well cemented nodules ~ 40%.	
						Caliche with silty sand, white to orange, well cemented nodules ~ 20%.	
40						Caliche with silty sand, white to orange, well cemented nodules ~ 5%.	
						Caliche with clayey silt, tannish-white, low to medium plasticity.	
						Calcrete, very hard.	
						Sandy silt, tan-brown, weakly cemented.	
60						Silty sand, tan-brown, weakly cemented. - Saturated at 58' bgs.	

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: MW-20

Project: Champion Technologies
Project No.: 131042/1
Location: Hobbs, NM
Completion Date: July 21, 2005

Surface Elevation (feet AMSL*):
TOC Elevation (feet AMSL*):
Total Depth (feet): 77
Borehole Diameter (inches): 8

Sample Data					Subsurface Profile		
Depth	**Sample/Interval**	**PID/OVM (ppm)**	**Blow Count**	**% Recovery**	**Lithology**	**Description**	**Well Details**
						Silty sand, tan-brown, weakly cemented. - Saturated at 58' bgs. *(continued)*	
80						Bottom of Boring at 77 feet 2" SCH 40 PVC riser, 0.010 slot PVC screen, flush mount construction.	
100							
120							

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: MW-21

Project: Champion Technologies

Project No.: 131042/1

Location: Hobbs, NM

Completion Date: July 19, 2005

Surface Elevation (feet AMSL*):

TOC Elevation (feet AMSL*):

Total Depth (feet): 70.45

Borehole Diameter (inches): 8

Sample Data					Subsurface Profile		
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description	Well Details
						Ground Surface	
						Asphalt / topsoil.	
						Caliche with pebbley sand, tan to white, weakly cemented, dry. Sand - fine grained. Pebbles - angular.	
						Silty pebbley sand, tannish-orange, soft, dry, loose. Sand - very fine grained.	
						Caliche, white, pebble sized nodules with little cementation.	
						Caliche, sand and pebble sized grains surrounded by white calcareous crust. Increased cohesion from 16' to 17' bgs.	
20						Caliche with pebbley sand, buff to tan, dry, moderately hard to hard. Sand - very fine grained, well sorted.	
						Caliche with pebbley silt, very light whitish-tan, dry, loose. Pebbles - ~ 15%, angular to sub-rounded. Pebble concentration increases from 28' to 34' bgs to ~ 45%.	
40						Caliche, tannish white, silt sized material, very well sorted, dry. Moderately hard from 34' to 39' bgs. Becomes hard from 39' to 45' bgs.	
						Calcrete, white to dark tan siliceous layer with calcareous crust. Very hard. Softens from 48' to 50' bgs as silica content decreases from ~ 70% to ~ 20%. Dry.	
60						Caliche, whitish-tan, dry, very well sorted. - Saturated at 57' bgs.	

Geologist(s): David Carstens

Subcontractor: Eades Drilling

Driller/Operator: Adam

Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: MW-21

Project: Champion Technologies

Project No.: 131042/1

Location: Hobbs, NM

Completion Date: July 19, 2005

Surface Elevation (feet AMSL*):

TOC Elevation (feet AMSL*):

Total Depth (feet): 70.45

Borehole Diameter (inches): 8

Sample Data					Subsurface Profile		
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description	Well Details
						Sand, tan, very fine to fine-grained, saturated.	
						Bottom of Boring at 70.45 feet 2" SCH 40 PVC riser, 0.010 slot PVC screen, flush mount construction.	
80							
100							
120							

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

AMSL = Above mean sea level

Boring Log: MW-4D

Project: Champion Technologies	**Surface Elevation (feet AMSL*):**		
Project No.: 131042/1	**TOC Elevation (feet AMSL*):**		
Location: Hobbs, NM	**Total Depth (feet):** 119.5		
Completion Date: July 25, 2005	**Borehole Diameter (inches):** 8		

Sample Data					Subsurface Profile		
Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description Ground Surface	Well Details
						Asphalt / brown sandy topsoil.	
						Caliche with pebbley silt, whitish-brown, dry, weakly cemented.	
						Caliche with pebbley silt, orange-brown, dry, friable, contains ~ 10% white pebble sized concretions from 5' to 7.5' bgs, ~ 50% white pebble sized concretions from 7.5' to 12' bgs.	
						Pebbley silt, white, ~ 40% angular pebbles. Hardens at 14' bgs. Very hard at 17' bgs.	
20						Caliche with gravelly sand, white, weakly cemented, dry. Sand - fine to medium grained.	
						Caliche with silt, orange brown to whitish-tan. Hard layer from 28' to 30' bgs.	
40							
						Caliche with pebbley silt, tan-white, contains less than 20% pebble to gravel sized concretions.	
						Calcrete, white to gray brown, very hard.	
						Silt, brown, dry, very well sorted.	
						Calcrete, white to gray brown, very hard.	
						Silt, brown, dry, very well sorted.	
						Brown silty sand, very well sorted, dry, weakly cemented. - Saturated at 58' bgs.	
60							

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Boring Log: MW-4D

Project: Champion Technologies
Project No.: 131042/1
Location: Hobbs, NM
Completion Date: July 25, 2005

Surface Elevation (feet AMSL*):
TOC Elevation (feet AMSL*):
Total Depth (feet): 119.5
Borehole Diameter (inches): 8

Depth	Sample/Interval	PID/OVM (ppm)	Blow Count	% Recovery	Lithology	Description	Well Details
80						Brown silty sand, very well sorted, dry, weakly cemented. - Saturated at 58' bgs. *(continued)*	
100						Hard drilling at 98' to 105' bgs, contains ~20% caliche material.	
						Silty clay, dark reddish-brown, contains ~ 10% caliche fragments.	
120						Brown sand, fine-grained, hard drilling from 110' to 120' bgs, contains ~10% caliche material.	

Bottom of Boring at 119.5 feet
2" SCH 40 PVC riser, 0.010 slot PVC screen, flush mount construction.

Geologist(s): David Carstens
Subcontractor: Eades Drilling
Driller/Operator: Adam
Method: Air Rotary

**AMSL = Above mean sea level*

Appendix B - Waste Disposal Documentation

Appendix C – Laboratory Reports