Atex 394(Allsup

On-Site Investigation Report
NMED USTR §1206B
~~Allsups #294~~-615 Grand Avenue
Las Vegas, New Mexico

Prepared for
New Mexico Environment Department

prepared by
Billings & Associates, Inc.
November 1993

BILLINGS & ASSOCIATES, INC. • 3816 Academy Pkwy. North-N.E. • Albuquerque, NM 87109 • (505) 345-1116

The undersigned individual has prepared this report and is personally familiar with the information submitted.

Jim Griswold
Billings & Associates, Inc.

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1.0
Executive Summary

The following report presents and discusses technical information relevant to an on-site investigation of a release of petroleum hydrocarbons from an underground storage tank system located at 615 Grand Avenue in Las Vegas, New Mexico. The facility is generally known as Allsups #294 and is presently operated by Allsups Convenience Stores, Inc. of Clovis, New Mexico. The summary points based on recent data and a review of available historic site information are as follows:

- The present investigation was prompted by failed tank tightness testing and documentation indicating an inventory loss occurring in early 1991. Tightness testing in September, 1991 and June, 1992 did not indicate underground tank or line failures. Prior to April, 1993 the UST system was owned and operated by ATEX Oil Company, which was thus responsible for compliance with applicable laws.

- Another potential source of contamination within the immediate vicinity (Ross Texaco) was investigated by another firm during the 1993. The NMED has communicated the strong potential of the situation being handled in the future on a "state-lead" basis.

- Investigation activities began on October 6, 1993 following pre-approval of a Minimum Site Investigation workplan by the NMED under the GWPA reimbursement regulations.

- The shallow lithology encountered was composed of silts and clays with discontinuous thin sand lenses overlying a weathered shale of Cretaceous origin.

- Based on comparison of visual indications, field headspace data, and laboratory soil

analysis, it appears that most hydrocarbon contamination within the vadose zone predominately exists as vapors within the available pores rather than hydrocarbon adsorbed to sediment grains.

• Horizontal definition of the soil contamination has been reasonably defined in areas south and west of the UST system. Complete definition in areas north and east of the probable release area was not possible due to the proximity of property boundaries.

• No highly contaminated soils were encountered during the investigation.

• Shallow ground water in the area seems to be at least partially confined beneath the shale at an average depth of 20 feet below ground surface. The static water level was observed to rise to an average depth 16 feet below surface and appears to have risen 0.35 feet since May of 1993.

• The use of normal interface-type monitoring wells at this site is problematic due to the possible confined nature of the aquifer. Such a situation could have influence on the observed organic water chemistry.

• Ground water beneath the facility appears impacted in the northeast portion of the site, but it is indeterminate as to what extent a release on the Allsups property may have contributed.

• Ground water does not appear impacted above state standards in the area immediately west of the UST system.

• Present indications are that ground-water flow in the area trends east with an average gradient of 0.010 ft/ft, but these data may also be suspect due to well construction across a confining layer.

• No free-phase hydrocarbon product has been observed in any of the on-site monitoring wells.

• No significant vapor problems appear to be impacting subsurface utilities or on-site structures.

• The nearest surface water course (Pecos Arroyo) is more than 500 feet from the facility and does not appear to have been impacted.

2.0
Introduction

This report is presented to provide pertinent information as required by §1206B of the Underground Storage Tank Regulations (USTRs) with respect to the results of an on-site investigation conducted at a gasoline dispensing operation located at 615 Grand Avenue in Las Vegas, New Mexico operated by Allsups Convenience Stores, Inc. (Allsups). This facility is generally known as Allsups #294, and shall be referred as such in this report. Billings & Associates, Inc. (BAI) became involved at the site in April of 1993 after a release of petroleum hydrocarbons was confirmed by the New Mexico Environment Department (NMED) after a review of inventory records. Prior verbal and/or written reports (per §1204) have been provided to the NMED for this facility.

Drilling activities commenced at the site for the on-site investigation on October 6, 1993 subsequent to approval by Mr. Jerry Schoeppner of the NMED/USTB of the investigation workplan. As defined by §1205 of the USTRs, the intent of the on-site investigation is to establish the horizontal and vertical extent of soil contamination, determine if ground water has been impacted, assess any impacts to adjacent utility corridors and subsurface structures, and identification of surface water courses within a 1/2 mile radius.

3.0
Prior History

This section will present a synopsis of events concerning the site based on a review of available files. A base map showing surface features, borings, and monitor well locations is presented as Figure 1.

Tightness testing of a product line servicing the 10,000 gallon regular gasoline tank (one of three located at the facility) performed on May 5, 1991 indicated a failure somewhere in the line. Subsequently, a damp union was found and repaired. Line testing was again performed on September 16, 1991 and the product line passed. A review of inventory records indicated a loss of 907 gallons during the month of January, 1991. BAI has no documentation of any investigation of the release at that time.

Beginning on June 22, 1992 tracer-type tank tightness testing was performed on the three USTs. On July 15, 1992 a report of such testing was submitted which did not indicate that any of the tanks or associated product lines were leaking.

During April, 1993 a court settlement was effected which shifted management of the site from ATEX Oil to Allsups. On April 5, 1993 the NMED requested that Allsups conduct further investigation of the old release.

During May, 1993 a single boring/ground-water monitoring well was advanced in the northeast corner of the Allsups facility by Glorieta Geoscience in the context of an investigation of a gasoline release from the Ross Texaco station located immediately across Grand Avenue to the northeast.

On August 11, 1993 written 72-Hour and 7-Day Reports per USTR §1204 for the Allsups facility were submitted to the NMED by BAI. On September 1, 1993 a workplan for completion of a Minimum Site Assessment was submitted for pre-approval under the policies of the GWPA reimbursement program. Approval of this workplan was granted in writing by the NMED on September 14, 1993.

Within that approval the NMED requested that the On-Site Investigation Report be

submitted no later than October 15, 1993. Due to the unavailability of drilling subcontractors, a request for a time extension was submitted on September 24, 1993. Approval of this request was granted by the NMED in writing on September 29 extending the deadline for report submission to November 15, 1993.

Indications from representatives of the NMED are that once this initial investigation has been completed, that this facility may be included with the Ross Texaco facility (and any other identified releases in the immediate area) as a "state lead" site in terms of future corrective action. Investigation activities commenced at the site on October 6, 1993 after appropriate location of subsurface utilities.

4.0
Shallow Lithology and Distribution of Soil Contamination

A motorized auger rig was subcontracted for use in obtaining soil samples. Splitspoon samples were driven at five foot intervals in each of five borings beginning at a depth of 5 feet below ground surface. Each spoon sample was split for field headspace analysis and possible laboratory verification.

Headspace samples were gathered into one quart mason jars and immediately sealed with aluminum foil. The samples were then allowed to warm in the sun (average ambient temperature >85 deg. F) and were periodically shaken by hand. A photoionization detector (PID) with a 100 eV lamp set to a 1.0 benzene response factor was then used to obtain a reading of the developed aromatic hydrocarbon concentration. The highest stable vapor concentration was noted for each sample. The PID was calibrated twice daily against a 100 ppm-v isobutylene-in air standard. All headspace data can be found in Appendix A.

Split samples were gathered into clean 4 oz. jars with septum caps provided by the laboratory and kept on ice until delivery. Hall Environmental Analysis Laboratory in Albuquerque, New Mexico was used to perform EPA Method 8015 Modified on a selected subset of samples. Laboratory results can also be found in Appendix A.

Copies of the laboratory soil report can be found in Appendix B.

The initial boring (B-1) was placed approximately 100 feet south of the tank/dispenser area, alongside the convenience store. There was a surface treatment at this location of asphalt underlain by about 5" of reinforced concrete. Below this surface layer to a depth of 9 feet was observed a clayey silt with a maximum clay content of 40% at 5 feet. From depths of 9 to 14 feet below ground surface was encountered a medium to fine-grained sand with less than 10% silt. From 14 to 16 feet was observed an altered clay with 10-20% silt. From 16 to 25 feet (total boring depth) there was observed and altered shale/mudstone. The shale was later identified by comparison to a regional outcrop as likely being a "Graneros" shale of Upper Cretaceous origin. Boring logs can be found as Appendix C.

No olfactory or headspace indications of gasoline contamination were noted throughout the boring's depth. No samples from this boring were submitted for laboratory analysis. No indications of ground water were noted above a depth of 20 feet. The boring was allowed to sit open at a depth of 20 feet for approximately one-half hour with no indications of ground-water encroachment. Once the boring was completed to a depth of 25 feet, it was again allowed to sit open and checked for the presence of ground water at intervals of 30 and 60 minutes. Depth to water measurements in the open bore of about 15.84 feet below ground surface were made. This boring was not completed as a monitoring well.

Boring B-2 (completed as monitoring well W-1) was placed near the property boundary adjacent to University Avenue, immediately north of the convenience store. A surface treatment of 3" reinforced concrete was initially penetrated. Below this to a depth of 14 feet was encountered a clayey silt (30% clay) without hydrocarbon vapors. Below 14 feet to about 20 feet was observed a silty to altered clay with shale fragments. This interval had no hydrocarbon vapors. A soil sample from a depth of 15 feet was submitted for lab analysis. This sample did not have detectable gasoline hydrocarbons at or greater than a detection limit of 10 ppm. From 20 to 25 feet (total depth) below surface was noted a weathered and altered shale. Monitoring well W-1 was then

completed within this bore.

Boring B-3 (completed as well W-2) was next advanced near the eastern property boundary along Grand Avenue, and immediately east of the underground tanks. A 2" layer of reinforced concrete was penetrated, below which was encountered the clayey silt seen elsewhere but only to a depth of 6 feet. The clay content was approximately 25% with no odors or vapors. From depths of 6 to 8.5 feet was observed a fine to medium-grained quartz sand with less than 10% silt. From 8.5 to 15 feet a clayey silt was re-encountered with 20 to 40% clays. The clay content increased with depth over the interval. From 15 to 18 feet in depth an altered clay/mudstone was observed which had a hydrocarbon odor but no discoloration. A headspace reading of 303 ppm-v was measured in the 15 foot sample, but subsequent lab analysis did not reveal detectable gasoline hydrocarbons. From 18 to 20 feet (boring total depth) the competent Graneros shale was encountered with a slight odor and headspace reading of 57.7 ppm-v. A fractured sample from this depth was submitted to the lab but did not contain detectable hydrocarbons. This boring was completed as monitoring well W-2.

On October 7, 1993 boring was begun again in an area immediately northeast of the dispensers (B-4) near the Glorieta Geoscience well. Below a surface treatment of 5" reinforced concrete to a depth of 9 feet was observed the same clayey silt as in prior borings (30% clay, constant with depth). Some hydrocarbon odor was noted within this interval, although the 5 foot sample had a headspace reading of only 4.2 ppm-v. From 9 to 22 feet below surface was then encountered a clay to silty clay. Silts were noted predominately at the upper contact with less than 10% silt at depths greater than 15 feet. Headspace measurements yielded vapor concentrations of 58.9 ppm-v at 10 feet, 1134 ppm-v at 15 feet, and 164 ppm-v at 20 feet. Laboratory analysis of the 5 and 10 foot samples did not yield detectable gasoline hydrocarbons, while the 15 foot sample was analyzed at 22 ppm, and the 20 foot sample at 54 ppm. Consolidated shale was met at 22 feet (total depth of boring) and no sample could be obtained.

B-5, the final boring, was advanced immediately north of the tanks adjacent to the property boundary along University Avenue. There was a surface treatment of

approximately 6" of reinforced concrete at this location. The clayey silt was observed here to an approximate depth of 9.5 feet containing 20 to 30% clay increasing with depth. A slight odor was noted with a headspace reading of 620 ppm-v at 5 feet. From 9.5 to 21 feet an altered clay was encountered. Shale inclusions became numerous at depths greater than 16 feet with strong color banding. At an approximate depth of 19 feet, a thin (0.2 foot) layer of very fine grained quartz sand was noted. A headspace reading of 602 ppm-v at the 10 foot depth was noted. Headspace samples from 15 and 20 feet yielded values of 27.3 ppm-v and 25.2 ppm-v, respectively. Laboratory analysis of the 10 and 15 foot samples did not yield detectable hydrocarbon. Continued boring from 21 to 22.5 feet encountered a medium to fine-grained sand with less than 10% silts. From 22.5 to 23 feet was an altered clay as in the 16 to 21 foot interval, with weathered shale. From 23 to 23.5 (total depth) feet consistent weathered shale was observed. A headspace reading of the 23 foot sample yielded 20.3 ppm-v.

Information as to lithology, headspace, and laboratory soil analysis obtained during the installation of MW-9/W-3 by Glorieta Geoscience can be found in Appendix D. The headspace and lab analysis data are included with that from the other borings in Appendix A. The lithology described therein is that a "silty, sandy clay" was noted from below the surface treatment to a depth of 4 feet. From 4 to 9 feet is noted a clayey silt with minor gravels. From 9 to 14 feet was encountered a silty clay. "Clayey slit with calcareous nodules" was logged from 14 to 15 feet. Below that from 15 to 16 feet a shale, from 16 to 19 feet a "shaley gravel", and from 19 to 24 feet shale with sand and limestone gravel. Headspace readings were taken at 5 foot intervals from 5 to 20 feet, with a 15 foot reading of 70 ppm, and 190 ppm at 20 feet. Laboratory analysis of the 15 foot sample by EPA Method 8015 yielded less than 5 ppm of hydrocarbon, while the 20 foot sample yielded 23 ppm.

Figure 2 gives a spatial representation of headspace and laboratory soil data. Based on headspace data, soil contamination is bounded horizontally to the west and south of the probable release area, but is not bounded in areas northeast of the UST system (towards Ross Texaco). However, visual and laboratory information suggest that

headspace data greater than 100 ppm-v are predominately due to the presence of vapors rather than adsorbed contamination with liquid hydrocarbons. Continued boring to the east and north of the UST system was not possible due to the immediate proximity of property boundaries, and the constraints of the pre-approved workplan.

With the exception of B-5, above action level soils (>100 ppm-v) as defined by headspace measurements were not observed at depths less than 15 feet below ground surface. Laboratory analysis of soils from depths less than 15 feet (B-4 and B-5) did not indicate the presence of contamination. It is suspected that the headspace readings were due to vapors rather than adsorbed hydrocarbons.

No "highly contaminated" soils as defined by the USTRs were encountered. Soils with headspace readings in excess of 100 ppm-v were contained in barrels on-site. Eventual disposal of such soils is being handled under a separate contract between Allsups and another firm. Borings not otherwise completed as wells were backfilled with a five foot thick section of pure bentonite at their bottoms, topped by otherwise "clean" cuttings to within a few feet of surface, and capped with concrete.

5.0
Ground-Water Impact

With the depth to water of approximately 16 feet in the area, three monitoring wells are required by the USTRs to determine if ground water has been impacted. Two new wells (W-1 and W-2) were installed in borings B-2 and B-3, respectively. The existing well MW-9 installed in May of this year by Glorieta Geoscience was used as the third well. For purposes of this report, and any future action that the NMED may require of Allsups, this previously existing well is designated as W-3. Completion logs for the two BAI-installed wells are contained in Appendix E

The new wells were developed by bailing immediately after installation and all wells were checked for the presence of free-phase product at intervals of 24 hours and 7 days. Product was not observed in any well. Bailed water was also contained on-site for disposal by Allsups.

On October 15, 1993 the three wells were sampled for lab analysis. The sampling procedure (after determination of depth to water in each well) was to remove a minimum of three bore volumes of ground water from each well using a single-use disposable bailer. Water from the final bailer was then transferred from the bailer bottom into two clean 40 ml volatile organic analysis bottles provided by the lab. Prior to the sample transfer, each bottle was spiked with two drops of a 0.4 molar solution of mercuric chloride in distilled water as a preservative. The samples where then properly labeled and refrigerated until they could be delivered to the lab with proper chain of custody documents.

Samples were analyzed for benzene, toluene, ethylbenzene, total xylenes (BTEX), and methyl tertiary butyl ether (MTBE) using EPA Method 602 by Hall Environmental Analytical Laboratory (HEAL) in Albuquerque. Each of the samples was also analyzed by HEAL for the presence of 1,2-dichloroethane (EDC) by EPA Method 601 and ethylene dibromide (EDB) by EPA Method 504. A table of the latest organic water quality data can be found in Appendix F. Appendix G contains a photocopy of the actual laboratory water analysis report.

Ground water from well W-1 does not appear to be impacted by any of the analyzed constituents with the exception of MTBE at a concentration of 18.0 ppm. Nonetheless, the observed concentration of MTBE is more than five times less than the acceptable ground water standard of 100 ppb.

The sample from W-2 reveals impact by all constituents with the exception of EDB. The constituents which were measured at concentrations above the state standards were benzene, total xylenes, and MTBE.

Pre-existing well W-3 (MW-9) had the highest overall measured levels of dissolved-phase contamination. Above standard levels of benzene, ethylbenzene, total xylenes, and MTBE were detected.

The presence of MTBE in all three water samples becomes particularly relevant with respect to other sources of contamination in the immediate vicinity. The line leak discovered in 1991 was reported as being associated with a UST system dispensing

regular (leaded) grade gasoline. MTBE is not a normal component in leaded gasoline, but rather a oxygenating additive used in unleaded fuels.

Figures 3 through 9 present the horizontal dissolved-phase contaminant distribution for each of the analyzed constituents as observed for this sampling event overlain upon the site base map.

As a field screening of water quality, a determination of water headspace was also made for ground water from each well. The water headspace procedure is similar to that used for obtaining soil headspace data. The water headspace data is presented spatially in Figure 10 along with the total dissolved-phase BTEX measurements from the laboratory. It can be readily observed that the headspace information duplicates the general trend in dissolved-phase contamination as determined by quantitative laboratory methods.

6.0
Preliminary Aquifer Characteristics

In addition to sampling monitoring wells for laboratory and water headspace analysis, several additional parameters of the ground water were obtained. The top of casing elevation for each well was surveyed for use in generating an accurate basemap, as well as defining a potentiometric gradient when combined with depth-to-water data. Appendix H contains general well information including depth-to-water and calculated water table elevations.

Figure 11 provides a map of the inferred potentiometric surface from those data. Indications are ground water is moving in a easterly direction beneath the site (away from the Gallinas River and toward Pecos Arroyo) with an average gradient of 0.010 feet per foot. Ground-water velocity cannot be determined without specific information as to hydraulic conductivity which is outside the scope of the present investigation. A southeast trending gradient was indicated in May, 1993 based on the water table elevation data collected by Glorieta Geoscience from the set of wells associated with the Ross Texaco facility.

During the course of boring indications of saturation were not observed until depths of 20 feet or greater. The measured static levels in the wells (and open boring B-1) were eventually several feet less (approximately 16 feet). This would indicate that the shallow aquifer beneath the area is at least partially confined beneath the observed shale, or the horizontal hydraulic conductivity is very low. As the monitoring wells have screened intervals extending above the confining layer, the potential exists for rising ground water to "spill" out into the overlying clay and intermittent sands. The leakage rate would be controlled by the permeability of material along the bore wall in contact with the artificial sand pack. Not only could this interfere with accurate measurement of a true static water level, but there arises a possibility that the water samples may be compromised.

Soils containing hydrocarbon vapors and/or adsorbed amounts of liquid hydrocarbon were found to exist in the vadose zone at depths between 15 to 20 feet in the borings associated with wells W-2 and W-3. As there are three orders of magnitude difference in the detection levels for soils and water (parts per million versus parts per billion), an otherwise minimal or non-detectable amount of soil contamination could cause significant ground-water impact. A sequence of testing with monitoring wells using well defined screen intervals and annular bentonite seals is recommended as a part of any future investigations.

If the shallow aquifer is confined and ground water contamination truly exists, and is not due to "clean" water rising into "dirty" soils, then a question arises as to how vertically descending gasoline in the vadose zone from a release at this location would be able to breach an aquitard confining an aquifer.

Comparison with depth to water data taken in W-3/MW-9 by Glorieta Geoscience in May of 1993, indicate that the water table had risen 0.35 feet over the five month period.

Additionally, measurements of dissolved oxygen (DO) content were made on water samples from each of the three wells. The concentration of DO is a relative measure of contamination and of biodegradation potential as naturally occurring bacteria which can

consume hydrocarbon will rapidly deplete oxygen from the ground water as a part of their metabolic processes. Determination of DO is made by means of a colormetric titration test upon water from the first bailed volume. The initial volume of bailed ground water is used to minimize the effect of agitation (and thus oxygenation) during the bailing process.

A map showing the distribution of DO as recently measured is presented as Figure 12. The DO data in general reflect the water quality as determined by lab and headspace analysis. Wells W-2 and W-3 have low levels of DO and correspondingly high levels of contamination. W-1 has a concentration of DO at 2.0 mg/l (ppm) while remaining relatively free of hydrocarbon contamination. These DO data indicate that ground water has been impacted for some period of time.

7.0
Vapor Impacts to Utilities or Structures

Vapor surveys of the adjacent utility corridors and structures were conducted on two recent occasions; during August, and again in October, 1993. On both occasions the vapor survey was conducted using a photoionization detector (calibrated against a 100 ppm-v isobutylene-in-air standard) and an explosivity meter. The accessible utility corridors revealed no detectable hydrocarbon vapors or explosivity. Surveys of the convenience store also did not reveal any detectable vapors or explosivity. The store does not have a basement.

8.0
Surface Water Impacts

The nearest surface water course to the facility is the Pecos Arroyo, approximately 1/4 mile southeast of the site and is not a known supply of drinking water. This arroyo has a stone and concrete liner throughout most of its length, including the section nearest the site. Flowing water is intermittent in the arroyo. There were no indications in the immediate area of free-phase hydrocarbon product or contaminated soils in the

arroyo, or on its banks. The Gallinas River is another surface water course but lies more than 1/2 mile west of the facility. Storrie Lake is situated several miles to the north.

9.0
Released Product Recovery

USTR §1206B(3) specifically requests "a description of any actions taken and a brief description of plans for future actions to recover petroleum products released from the UST system;" At present no free-phase hydrocarbon product has been observed in any of the site wells. As such, no direct recovery is necessary or possible. Recent tightness testing performed on the UST system did not reveal the presence of any on-going release which would need mitigation.

The boring program did not discover any highly contaminated soils, or soils with even modest contamination beyond the presence of hydrocarbon vapors within the pore spaces of silts, clays, and consolidated sediments. The vapor volume (and contaminant weight) is consequently small, and could be removed in the future via simple soil vapor extraction. Any undiscovered soil contamination would likewise be remediated by a properly designed venting system as well as by natural biodegradation.

As a result of the relative insolubility of gasoline in water, only a very small mass of contamination can dissolve into the ground water (even if that ground water is highly contaminated in terms of pertinent state regulations). As the present pre-approved scope of work is to define the on-site extent of soil contamination and determination as to whether ground water has been impacted, no current effort is underway to reclaim or recover contaminated ground water. There does not appear to be an immediate hazard to public health and safety.

If after further investigation the NMED requires a ground water restoration program be implemented which involves BAI, it is likely BAI would implement a reclamation design based around the technology known as the SVVS® (US Patent 5,221,159). BAI has obtained a license from the patent's owners to apply this technology which

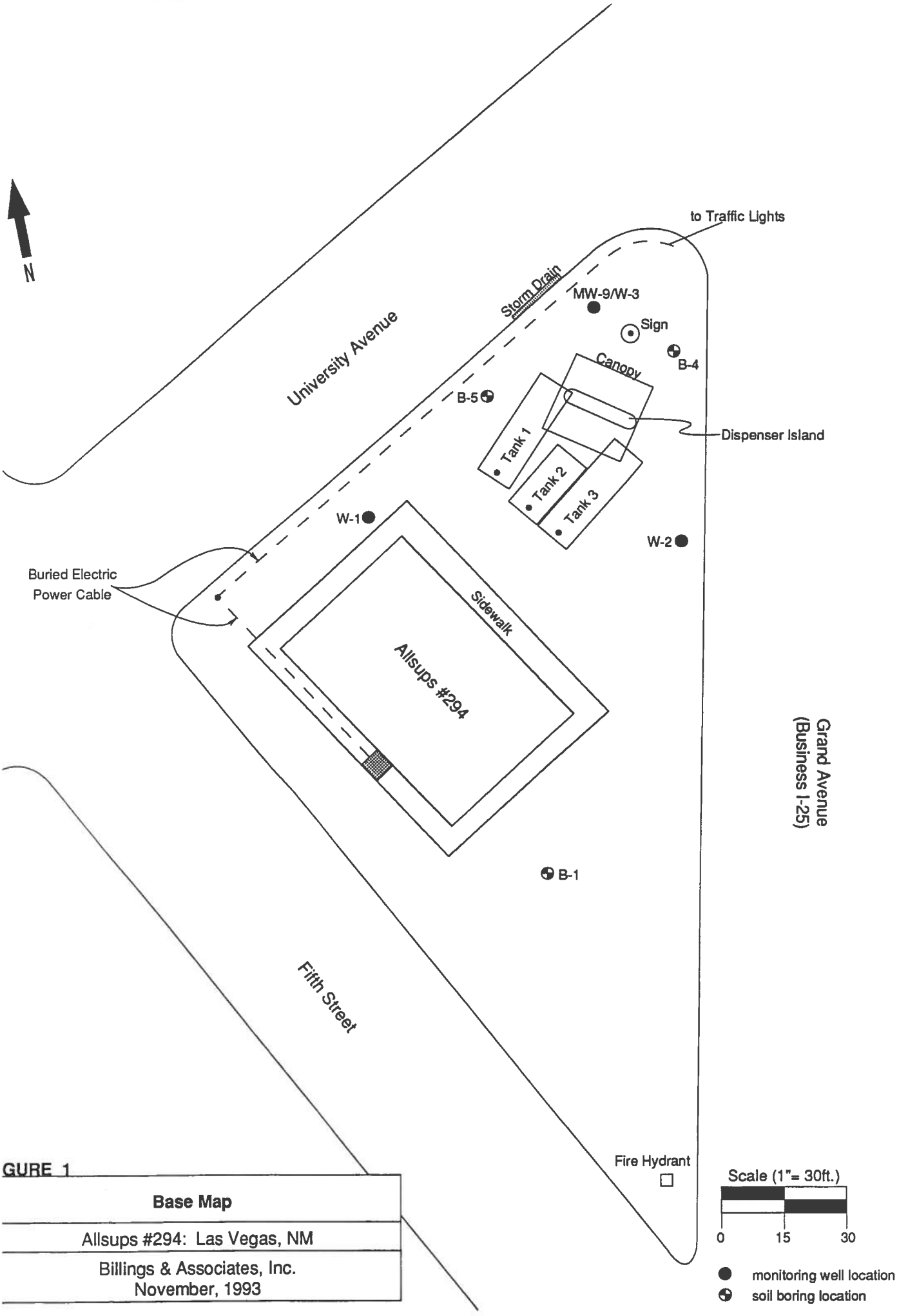
utilizes injection of fresh air below the water table to sparge volatile contaminants from the ground water, as well as promote rapid bioremediation by indigenous microorganisms.

10.0
Summary

- The subsurface lithology can be generally described as being composed of silts and clays with discontinuous thin sand lenses overlying a weathered shale of Cretaceous origin. Shallow ground water in the area seems to be at least partially confined beneath the shale at an average depth of 20 feet below ground surface.
- Most hydrocarbon contamination within the vadose zone appears to exist as vapors within the available pores rather than adsorbed to sediment grains. This contention is based on comparison of the field headspace readings with visual indications and lab soil analyses. Horizontal definition of the soil contamination has been reasonably defined in areas south and west of the UST system. Complete definition in areas north and east of the probable release area was not possible due to the proximity of property boundaries.
- Ground water beneath the facility appears impacted in the northeast portion of the site, but it is indeterminate as to what extent a release on the Allsups property may have been the cause. Ground water does not appear severely impacted in areas immediately west of the UST system.
- The use of normal interface-type monitoring wells at this site may not be recommended due to the possible confined nature of the aquifer. A confined situation with overlying contaminated soils could influence the organic water chemistry. Present indications are that ground-water flow in the area trends east, but this too may be questionable due to well construction.
- No free-phase hydrocarbon product has been observed in any of the on-site monitoring wells. No highly contaminated soils were encountered during the investigation.

- No significant vapor problems appear to be impacting subsurface utilities or on-site structures. Neither the source of public drinking water, nor the nearest surface water course appear to have been impacted. No obvious immediate impacts to public health and safety have been demonstrated.
- A formal written decision from the NMED is now required as to future investigation and/or reclamation activities in relation to this facility. If the property is to be included with Ross Texaco (and any other potential sources) as a "state-lead" site, such a decision needs to be made.

Figures

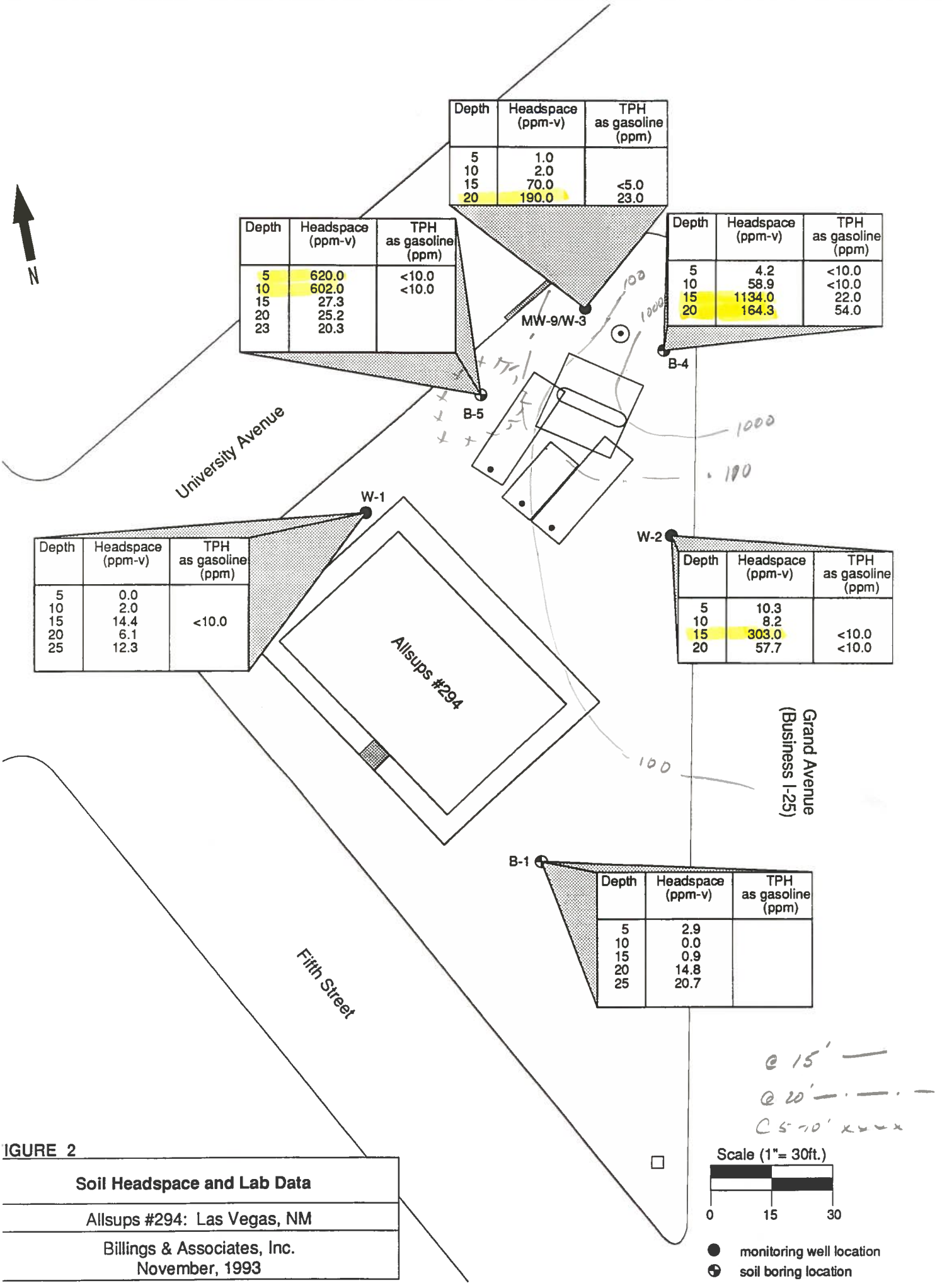


GURE 1

Base Map

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993



IGURE 2

Soil Headspace and Lab Data

Allsups #294: Las Vegas, NM

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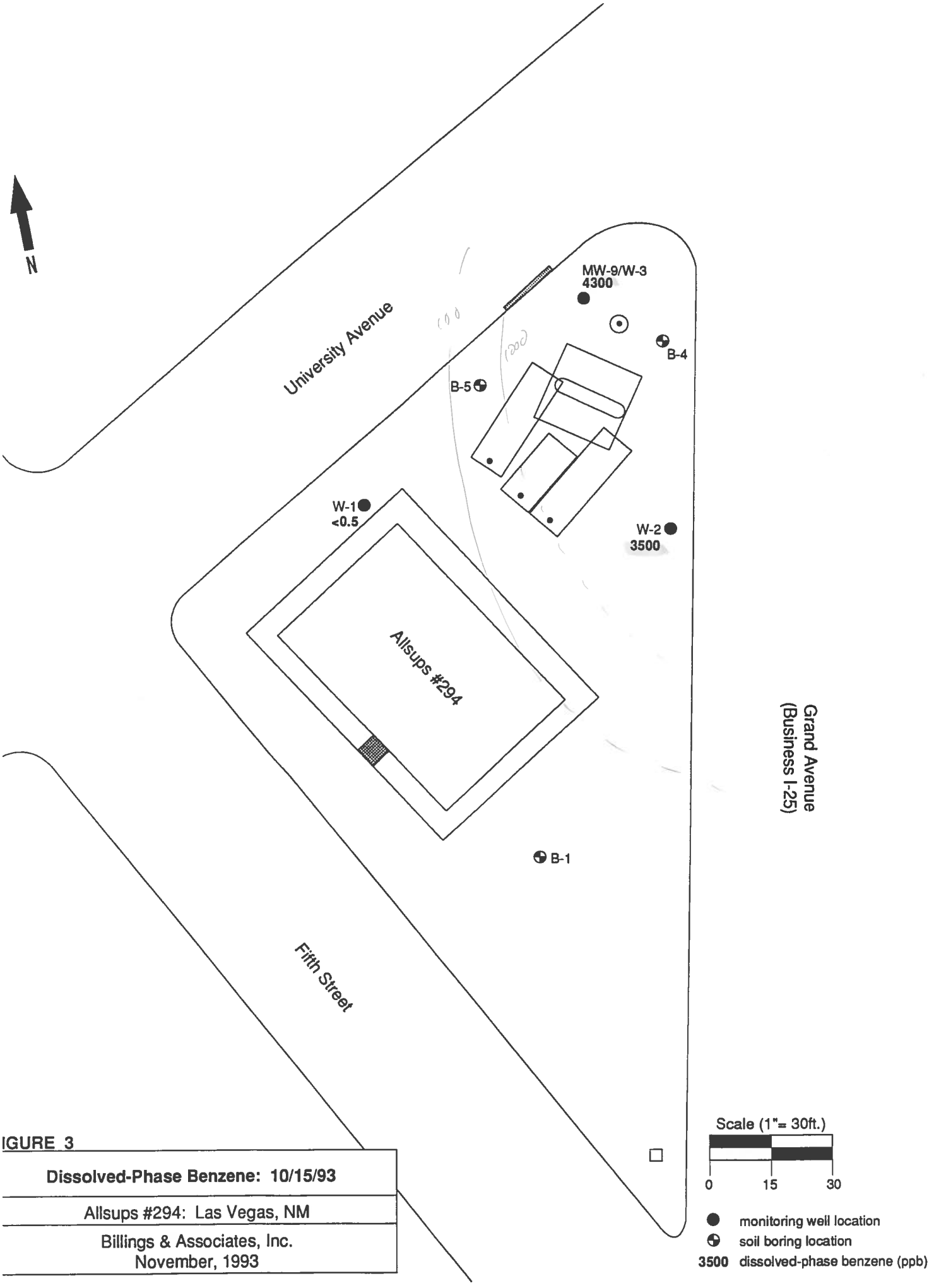
November, 1993



IGURE 3

Dissolved-Phase Benzene: 10/15/93

Allsups #294: Las Vegas, NM

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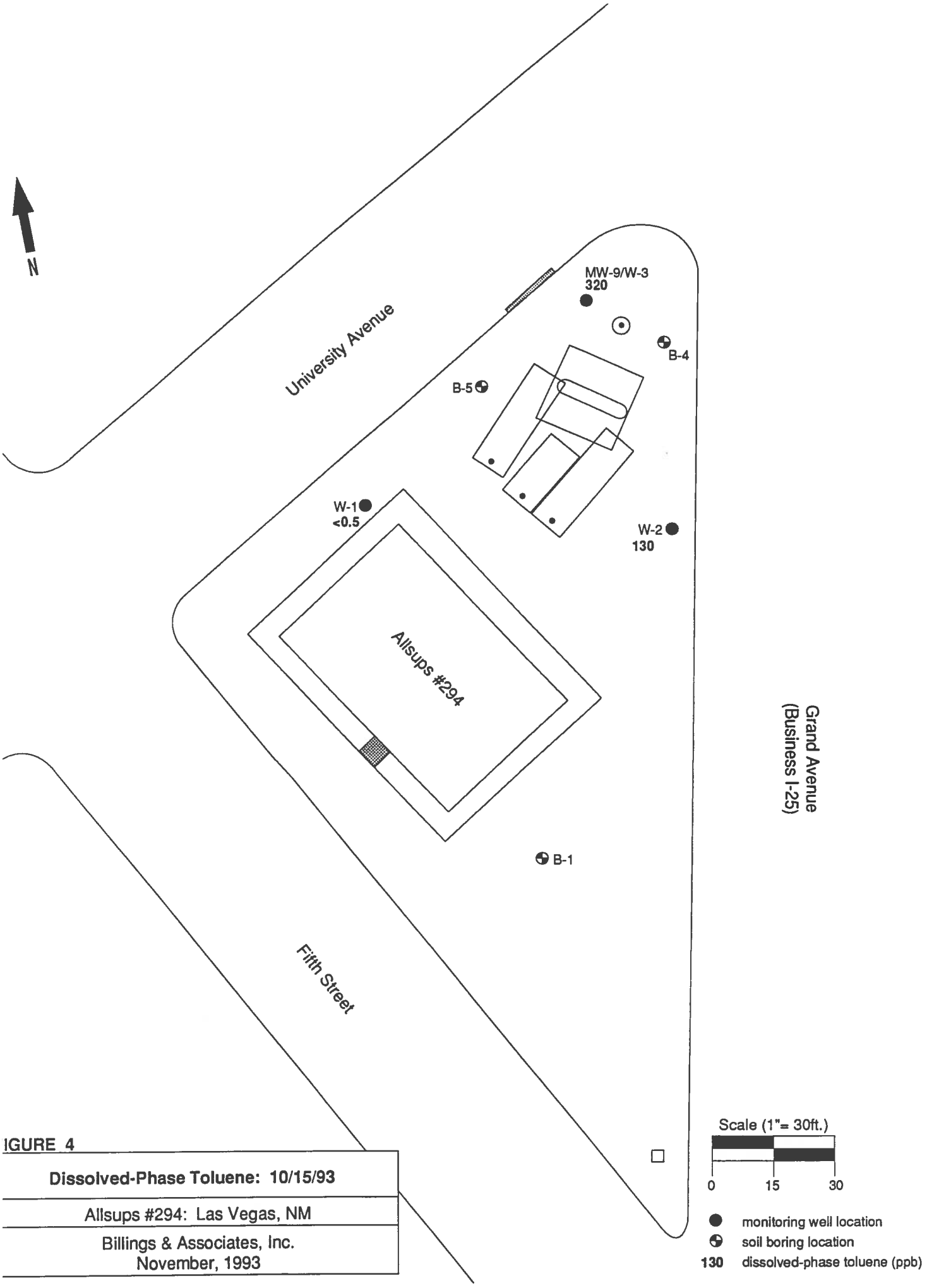
November, 1993



IGURE 4

Dissolved-Phase Toluene: 10/15/93

Allsups #294: Las Vegas, NM

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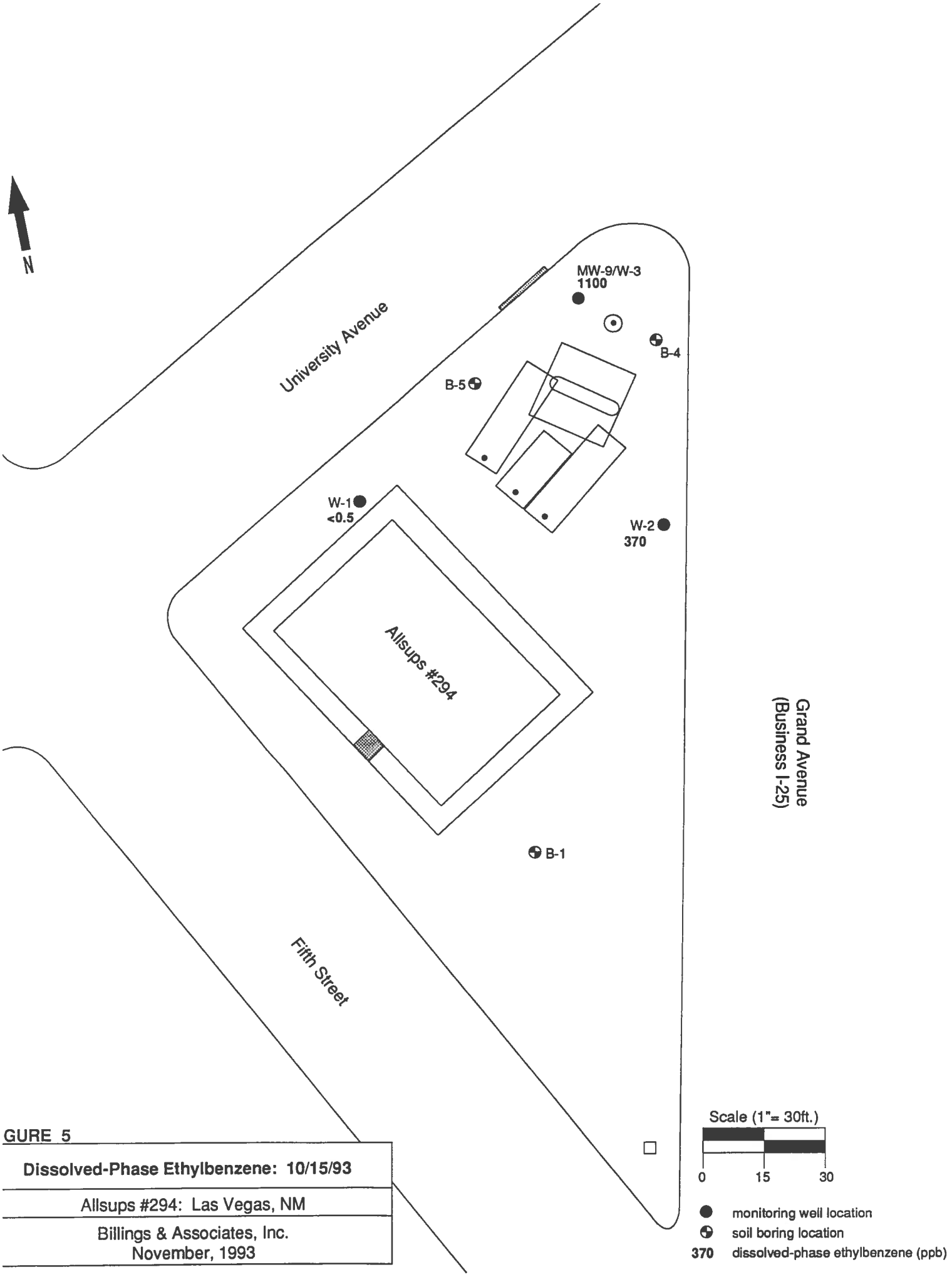
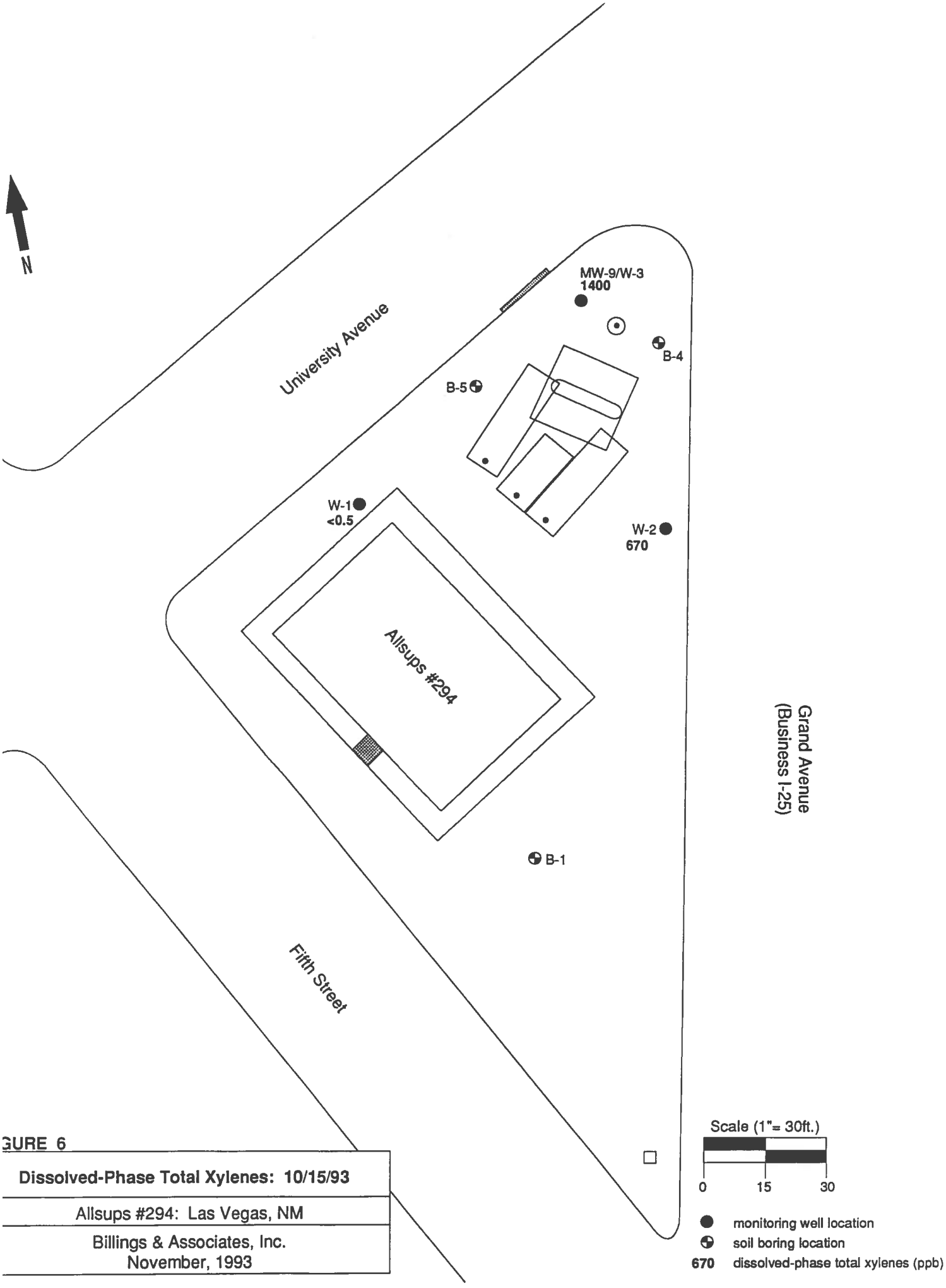


GURE 5

Dissolved-Phase Ethylbenzene: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993

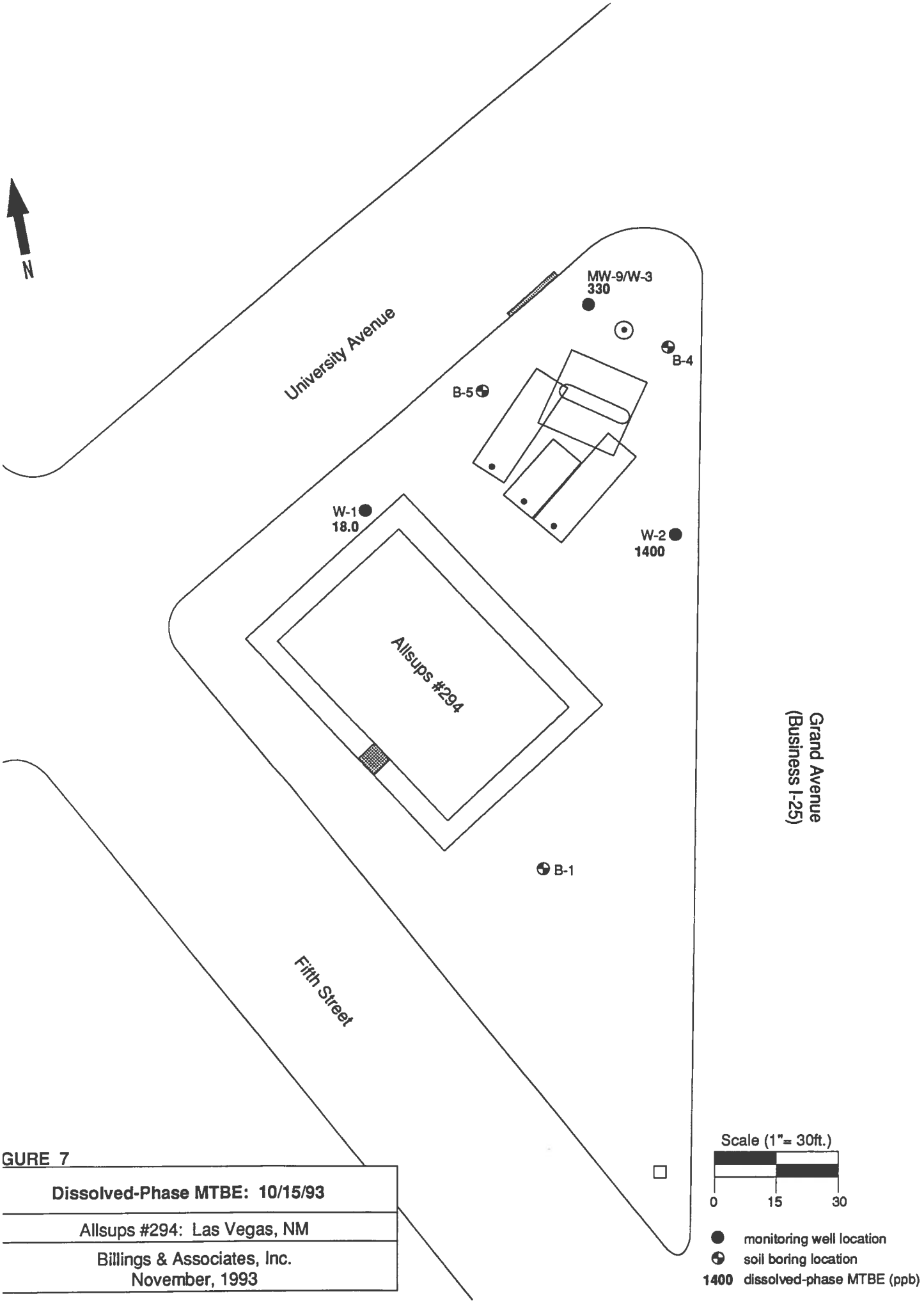


GURE 6

Dissolved-Phase Total Xylenes: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993

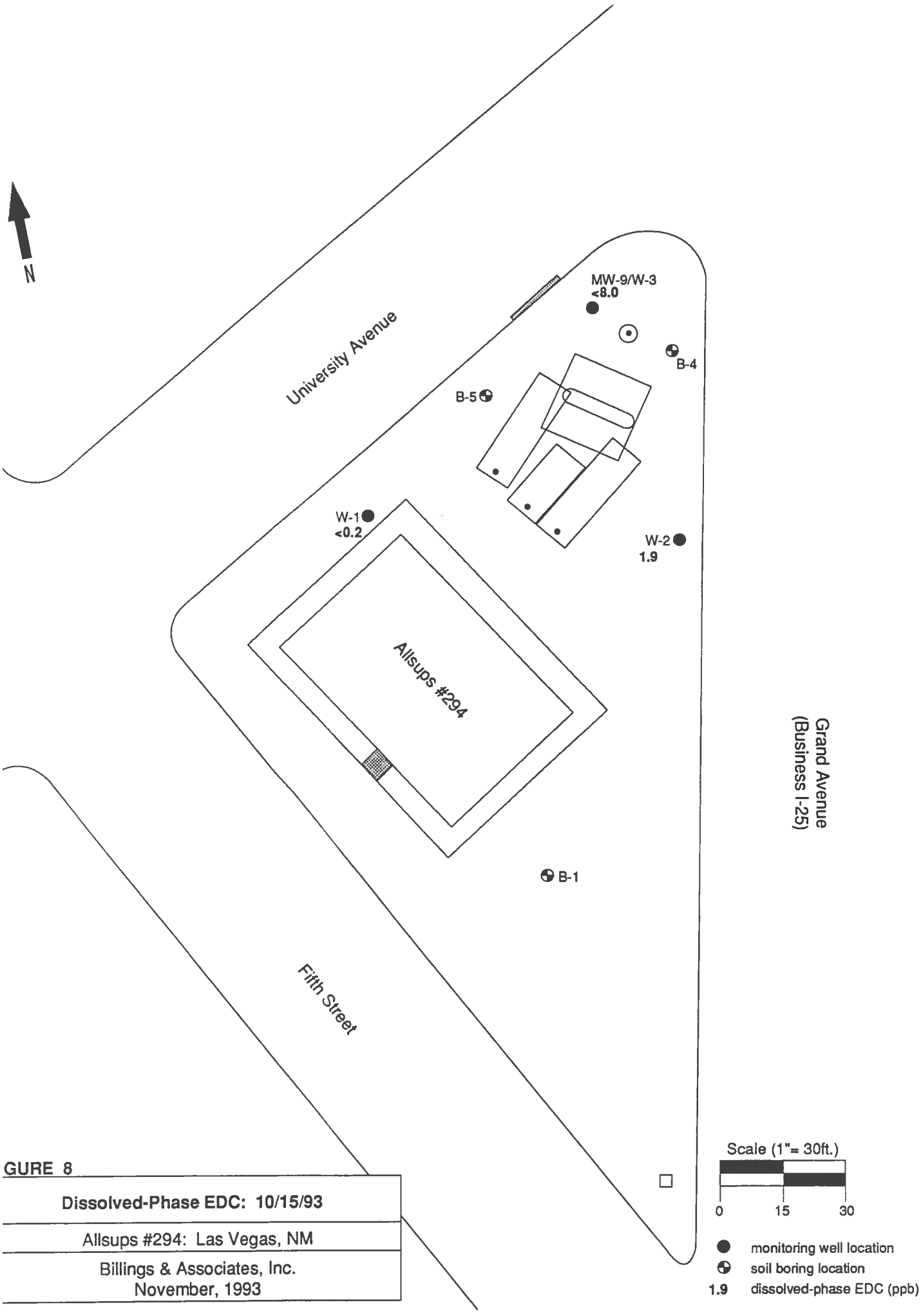


GURE 7

Dissolved-Phase MTBE: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993



GURE 8

Dissolved-Phase EDC: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993

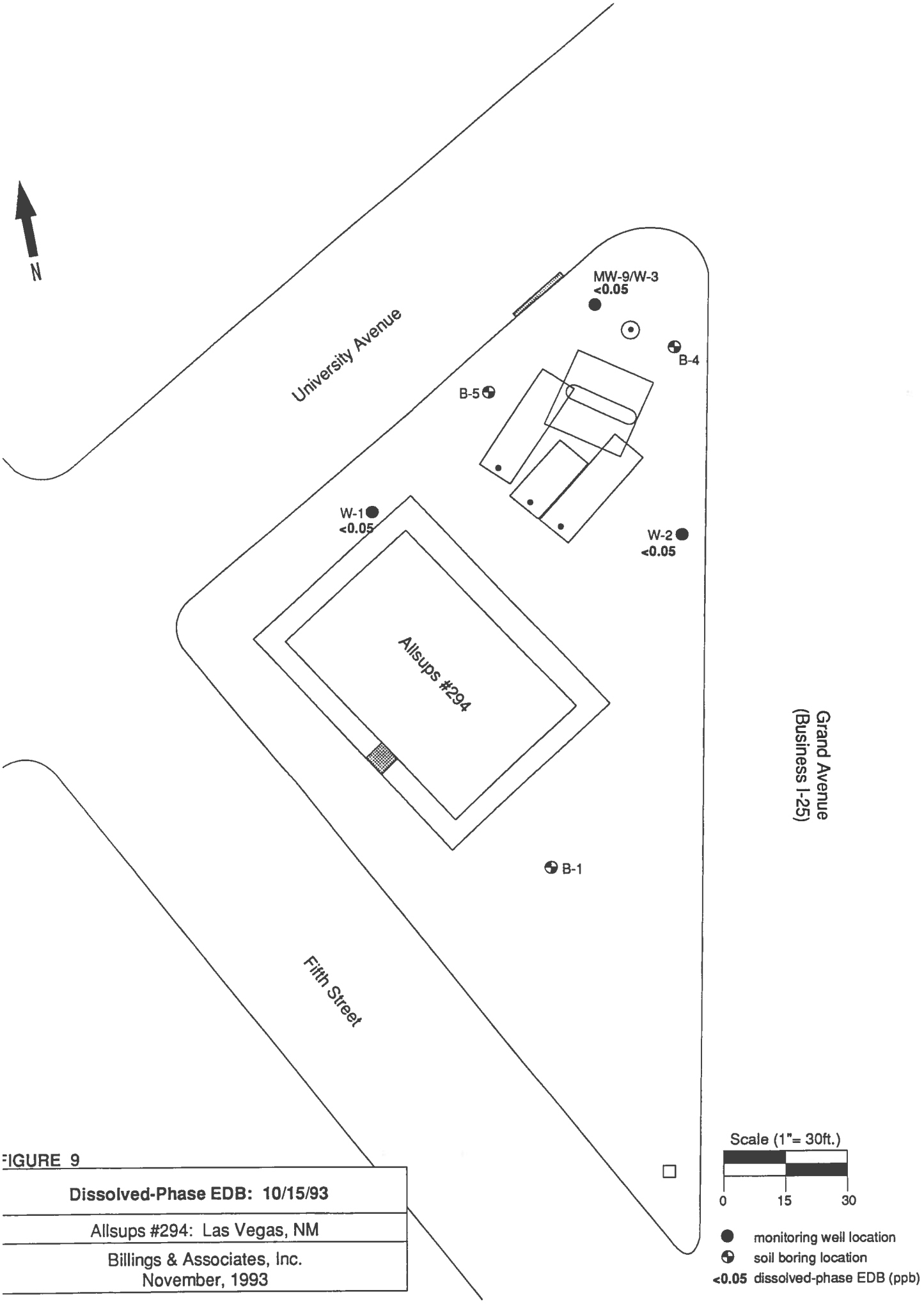


FIGURE 9

Dissolved-Phase EDB: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993

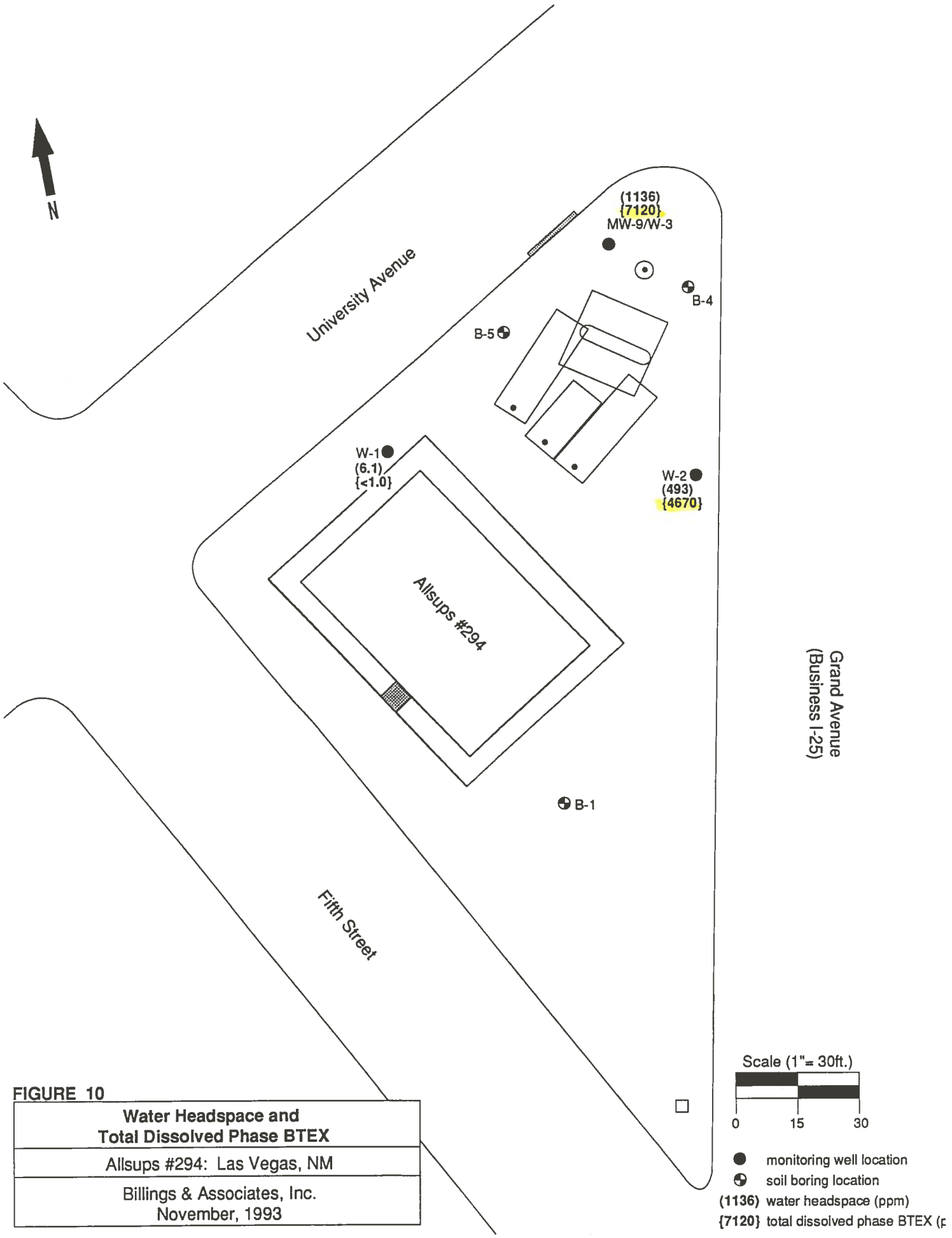
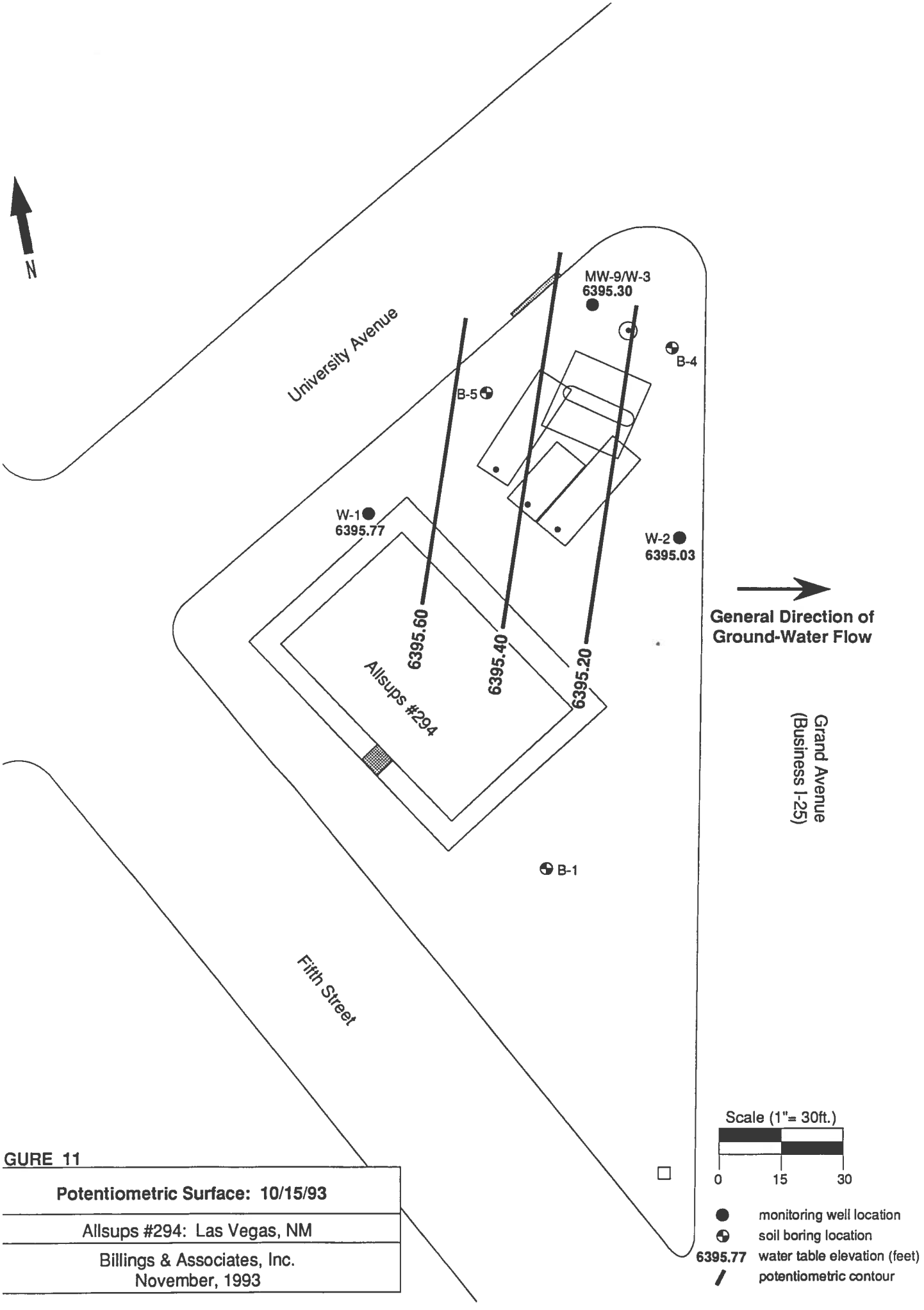


FIGURE 10

Water Headspace and Total Dissolved Phase BTEX
Allsups #294: Las Vegas, NM
Billings & Associates, Inc. November, 1993

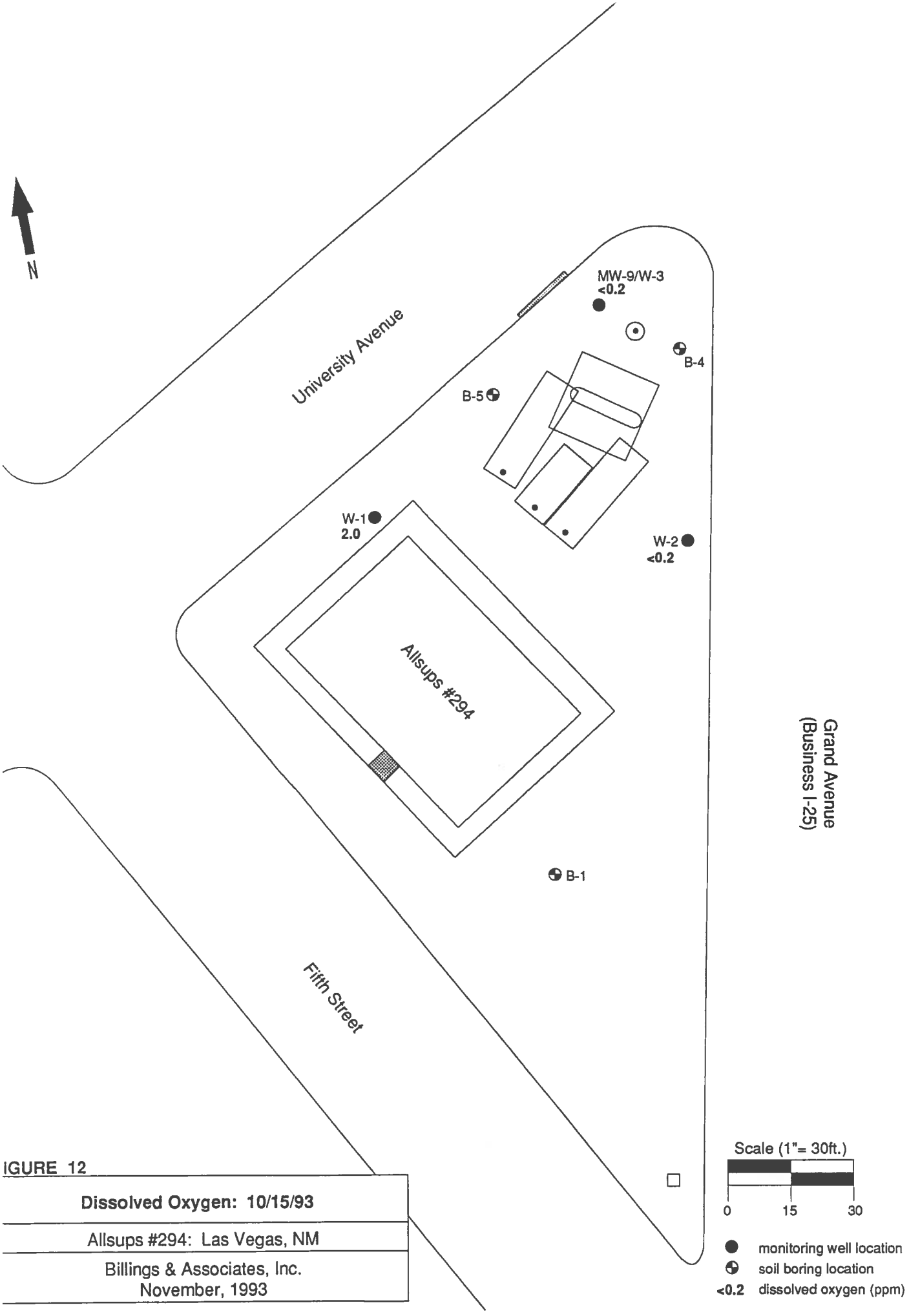


GURE 11

Potentiometric Surface: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993



IGURE 12

Dissolved Oxygen: 10/15/93

Allsups #294: Las Vegas, NM

Billings & Associates, Inc.
November, 1993

Appendices

Appendix A

Soil Analysis Data

Soil Analysis Data

Allsups #294
Las Vegas, New Mexico

Please refer to Figure 1 for boring locations

Boring	Depth (feet)	Headspace (ppm-v)	TPH as Gasoline (ppm)
B-1	5	2.9	
	10	0.0	
	15	0.9	
	20	14.8	
	25	20.7	
B-2/W-1	5	0.0	
	10	2.0	
	15	14.4	<10.0
	20	6.1	
	25	12.3	
B-3/W-2	5	10.3	
	10	8.2	
	15	303.0	<10.0
	20	57.7	<10.0
B-4	5	4.2	<10.0
	10	58.9	<10.0
	15	1134.0	22.0
	20	164.3	54.0
B-5	5	620.0	
	10	602.0	<10.0
	15	27.3	<10.0
	20	25.2	
	23	20.3	
MW-9/W-3	5	1.0	
	10	2.0	
	15	70.0	<5.0
	20	190.0	23.0

Appendix B

Recent Laboratory Soil Analysis Report

Entered & proofed MLS 10/20/93

Hall Environmental Analysis Laboratory

Hall Environmental Analysis Laboratory
2403 San Mateo N.E., Suite P-13
Albuquerque, N.M. 87110
(505) 880-1803

10/18/93

Billings and Associates, Inc.
3816 Academy Parkway N.E.
Albuquerque, N.M. 87109

Dear Mr. Jim Griswold:

Enclosed are the results for the analyses that were requested. These were done according to E.P.A. procedures or the equivalent.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely,

Scott Hallenbeck 10/18/93

Scott Hallenbeck
Laboratory Manager

Project: Allsups #294

Results for sample : B-2 / 15'

Date collected: 10/6/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-1
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 1

Results for sample : B-3 / 15'

Date collected: 10/6/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-2
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 86 %

Dilution Factor = 1

Results for sample : B-3 / 20'

Date collected: 10/6/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-3
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 88 %

Dilution Factor = 1

Results for sample : B-4 / 5'

Date collected: 10/7/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-4
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 1

Results for sample : B-4 / 10'

Date collected: 10/7/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-5
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 94 %

Dilution Factor = 1

Results for sample : B-4 / 15'

Date collected: 10/7/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-6
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	22	PPM (MG/KG)

BFB (Surrogate) Recovery = 102 %

Dilution Factor = 1

Results for sample : B-4 / 20'

Date collected: 10/7/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-7
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	54	PPM (MG/KG)

BFB (Surrogate) Recovery = 127 %

Dilution Factor = 1

Results for sample : B-5 / 10'

Date collected: 10/7/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-8
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

Results for sample : B-5 / 15'

Date collected: 10/7/93 Date received: 10/8/93
Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931017-9
Project Manager: Jim Griswold Sampled by: P. Goetze
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 89 %

Dilution Factor = 1

Results for QC : Reagent Blank

Date extracted: 10/11/93 Date injected: 10/15/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: RB 10/11
Project Manager: Jim Griswold
Matrix: Non-Aqueous

Method: EPA 8015 Modified

Compound	Amount	Units
Gasoline	<10	PPM (MG/KG)

BFB (Surrogate) Recovery = 102 %

Dilution Factor = 1

Results for QC: Matrix Spike/Matrix Spike Dup

Date extracted: 10/11/93 Date injected: 10/14/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931011-5 MS/MSD
Project Manager: Jim Griswold
Matrix: Non-Aqueous Units: MG/KG (PPM)

Method: EPA 8015 Modified

Compound	Sample Result	Amount Added	Matrix Spike	MS %	MS Dup	MSD %	RPD
Gasoline	<10	50	42	84	38	76	10

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
2403 San Mateo NE, Suite P-13
Albuquerque, New Mexico 87110
505.880.1803

Client: Billings & Associates

Project Name: Allsups #294

Address: 3816 Academy Pkwy NNE Albuquerque, NM 87109

Project #:

Project Manager: Jim Griswold

Phone #: 345-1116

Sampler: Phil Goetze

Fax #:

Samples Cold? ☒ Yes ☐ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative $HgCl_2$	Preservative HCl	Preservative Other	HEAL No.	BTEX (Method 602/8020)	BTEX + MTBE (602/8020)	TPH Method 8015 MOD (Gas/~~Diesel~~)	BTEX + TPH + MTBE (Gasoline Only)	BTEX + MTBE + TPH (Gas + Diesel)	TPH (Method 418.1)	601/602 Volatiles	EDB (Method 504.1)	EDC	610 (PNA or PAH)				Air Bubbles or Headspace (Y or N)
10/6/93	13:32	Solid	B-2 / 15'	4oz.	—	—	—	931017-1			X											Y
10/6/93	15:38	Solid	B-3 / 15'	4oz.	—	—	—	-2			X											Y
10/6/93	15:41	Solid	B-3 / 20'	4oz.	—	—		-3			X											Y
10/7/93	8:38	Solid	B-4 / 5'	4oz.	—	—	—	-4			X											Y
10/7/93	8:44	Solid	B-4 / 10'	4oz.	—	—	—	-5			X											Y
10/7/93	8:47	Solid	B-4 / 15'	4oz.	—	—		-6			X											Y
10/7/93	8:55	Solid	B-4 / 20'	4oz.	—	—		-7			X											Y
10/7/93	10:03	Solid	B-5 / 10'	4oz.	—	—		-8			X											Y
10/7/93	10:10	Solid	B-5 / 15'	4oz.	—	—		-9			X											Y

ANALYSIS REQUEST

Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)
10/8/93	10:59	[signature]	Vincent Speshock
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

Remarks:

Appendix C

Boring Logs

Billings & Associates, Inc.

BORING LOG

Project No.: Allsups #294
Boring No.: B-1
Location: South of store in parking lot

Installation Date: October 6, 1993
Completion Depth: Abandoned
By: P. Goetze & SHIB. Inc.

Depth (ft)	Profile Sketch	Odor (y/n)	PID Field Data (ppm)	Lab Data TPH (ppm)	Description
2					0.5 feet of reinforced concrete
4					CLAYEY SILT with 20% to 40% clay content, dark brown; clay content increases with depth; sharp lower contact. Moist
6		N	2.9		
8					
10		N	0.0		SAND with <10% silt content, brown, moderately sorted, subrounded to subangular, medium to fine grained quartz sand, sharp lower contact. Moist to dry
12					
14					SILTY CLAY with 20% silt content, light brown to gray to tan banding; abundant altered shale fragments. Moist
16		Y	14.4		
18					GRAVEL/WEATHERED SHALE, dark brown to black. Altered, friable shale and mudstone with banded clay; some carbonceous shales. Dry to saturated
20		N	6.1		
22					
24		N	12.3		
26	Auger TD: 25 '				
28					
30					
32					
34					
36					
38					
40					

* Field Monitoring Point

Water Table: 15.84 ft. bgs

Billings & Associates, Inc.

BORING LOG

Project No.: Allsups #294
Boring No.: B-2
Location: Along Grand Avenue in front of store

Installation Date: October 6, 1993
Completion Depth: 25 feet
By: P. Goetze & SHIB. Inc.

Depth (ft)	Profile Sketch	Odor (y/n)	PID Field Data (ppm)	Lab Data TPH (ppm)	Description
2					0.2 feet of reinforced concrete
4					CLAYEY SILT with 30% clay content, dark brown; clay content increasing with depth; sharp contact with lower unit. Moist
6		N	0.0		
8					
10		N	2.0		
12					
14					
16		N	14.4	<10	CLAY, light brown, tan, and gray banding. Numerous inclusions of altered and unaltered shale fragments. Moist
18					
20		N	6.1		GRAVEL/WEATHERED SHALE, dark brown to black; clay with altered shale fragments; fractures and secondary mineralization in shale. Moist to saturated
22					
24		N	12.3		
26	Auger TD: 25 '				
28					
30					
32					
34					
36					
38					
40					

* Field Monitoring Point

Water Table: 17.31 ft. bgs

Billings & Associates, Inc.

BORING LOG

Project No.: Allsups #294
Boring No.: B-3
Location: North corner of property adjacent to Grand Avenue

Installation Date: October 6, 1993
Completion Depth: 20 feet
By: P. Goetze & SHIB. Inc.

Depth (ft)	Profile Sketch	Odor (y/n)	PID Field Data (ppm)	Lab Data TPH (ppm)	Description
0					0.2 feet of reinforced concrete
2					CLAYEY SILT with 25% clay content, brown to dark brown. Moist to dry
4		N	10.3		
6					SAND with <10% silt content, medium grey; moderately sorted, subangular to subrounded, medium to fine-grained quartz. Moist
8					
10		N	2.0		CLAYEY SILT with 20% to 40% clay content, brown to dark brown, clay content increases with depth. Moist
12					
14		Y	303	<10	CLAY, brown, grey and tan banding. Moist
16					
18					SHALE, competent shale void of weathered surface interval
20		N	57.7	<10	
	Auger TD: 20 '				
22					
24					
26					
28					
30					
32					
34					
36					
38					
40					

* Field Monitoring Point

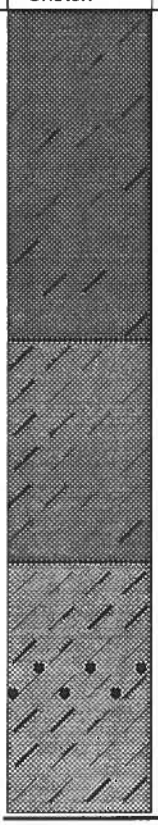
Water Table: 15.44 ft. bgs

Billings & Associates, Inc.

BORING LOG

Project No.: Allsups #294
Boring No.: B-4
Location: Along Grand Avenue, near Well MW-9/W-3

Installation Date: October 7, 1993
Completion Depth: Abandoned
By: P. Goetze & SHIB. Inc.

Depth (ft)	Profile Sketch	Odor (y/n)	PID Field Data (ppm)	Lab Data TPH (ppm)	Description
2					0.4 feet of reinforced concrete CLAYEY SILT with 20% to 30% clay content, dark brown. Moist
4		Y	4.2	<10	
6					
8					
10		N	58.9	<10	SILTY CLAY with 10% to 20% silt content, brown, silt content decreases with depth. Moist
12					
14		Y	1134	22.0	CLAY, brown to tan to gray bandings; abundant weathered shale gravels beginning at 18 feet. Moist to saturated
16					
18					
20		Y	164.3	54.0	
22					SHALE, consolidated shale; splitspoon sample shows no evidence of alteration/weathering. Dry below clay/shale contact
	Auger TD: 22 '				
24					
26					
28					
30					
32					
34					
36					
38					
40					

* Field Monitoring Point

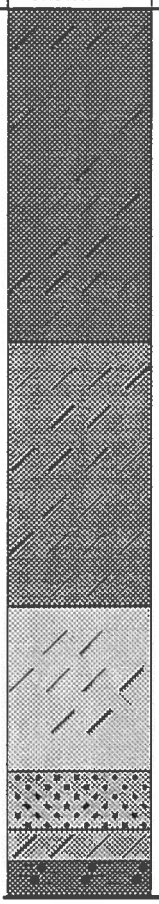
Water Table: 15.96 ft. bgs

Billings & Associates, Inc.

BORING LOG

Project No.: Allsups #294
Boring No.: B-5
Location: Along University Avenue
between Wells W-1 and MW-9/W-3

Installation Date: October 7, 1993
Completion Depth: Abandoned
By: P. Goetze & SHIB. Inc.

Depth (ft)	Profile Sketch	Odor (y/n)	PID Field Data (ppm)	Lab Data TPH (ppm)	Description
2		N	620		0.4 feet of reinforced concrete CLAYEY SILT with 20% to 30% clay content; brown to dark brown, clay content increasing with depth
4					
6					
8					
10		N	602	<10	SILTY CLAY with 20% silt content, brown with some color banding; banded clays dominant at lower contact; some shale gravels. Moist
12					
14		Y	27.3	<10	
16					CLAY, tan to gray to brown banding; abundant shale and altered shales; 0.2 foot very fine grained quartz sand stringer at 19 feet. Moist
18					
20		N	25.2		SAND with <10% silt content, brown; moderately sorted, subrounded, medium to fine grained quartz sand. Saturated
22		N	20.3		CLAY, same clay as 16 feet to 21 feet interval. Moist to saturated
24					GRAVELS/WEATHERED SHALE clay, with altered shale gravels and unweathered shale. Moist to dry
	Auger TD: 23.5 '				
26					
28					
30					
32					
34					
36					
38					
40					

* Field Monitoring Point

Water Table: 16.02 ft. bgs

Appendix D

Well Information for W-3/MW-9
from
Glorieta Geoscience

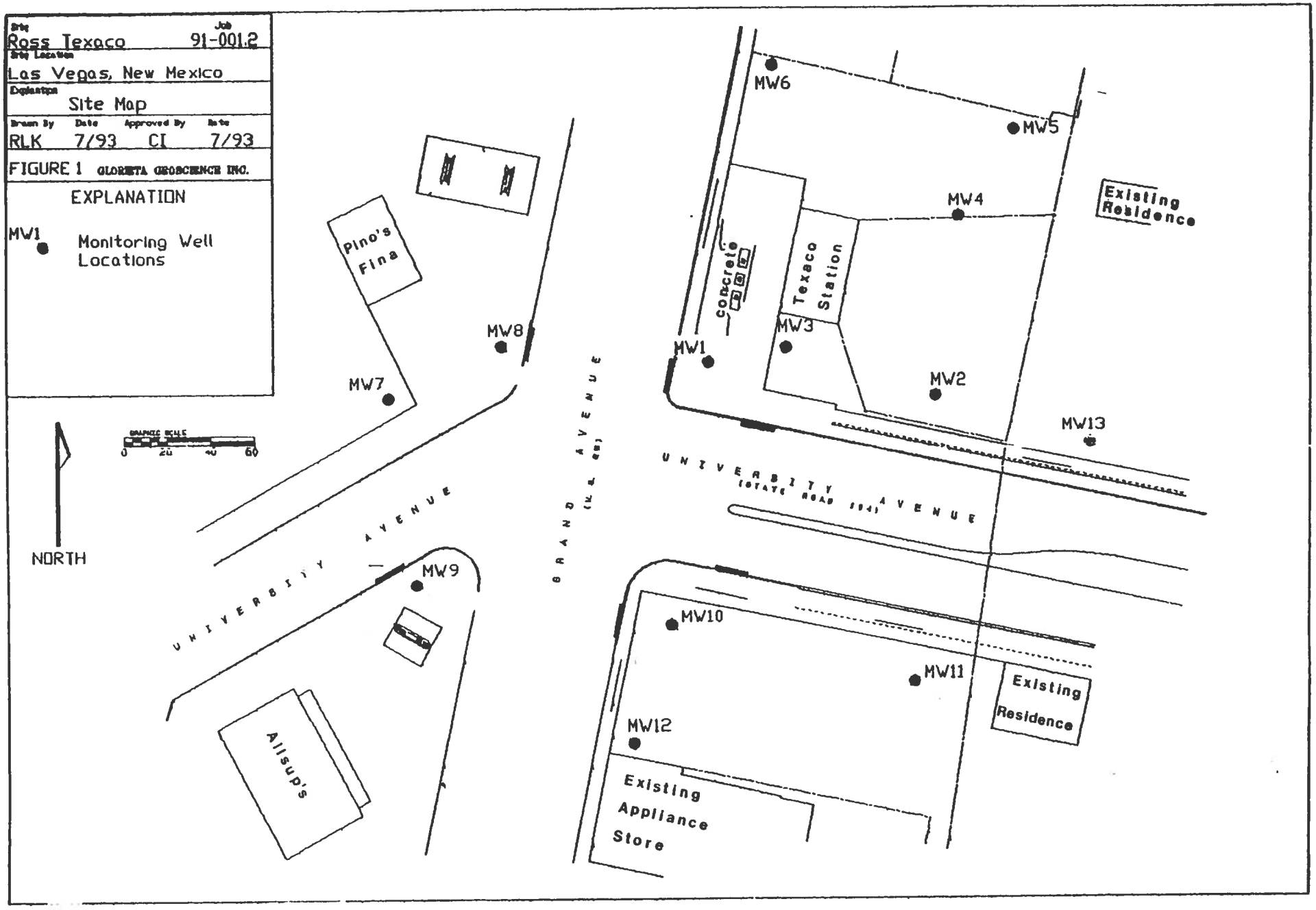
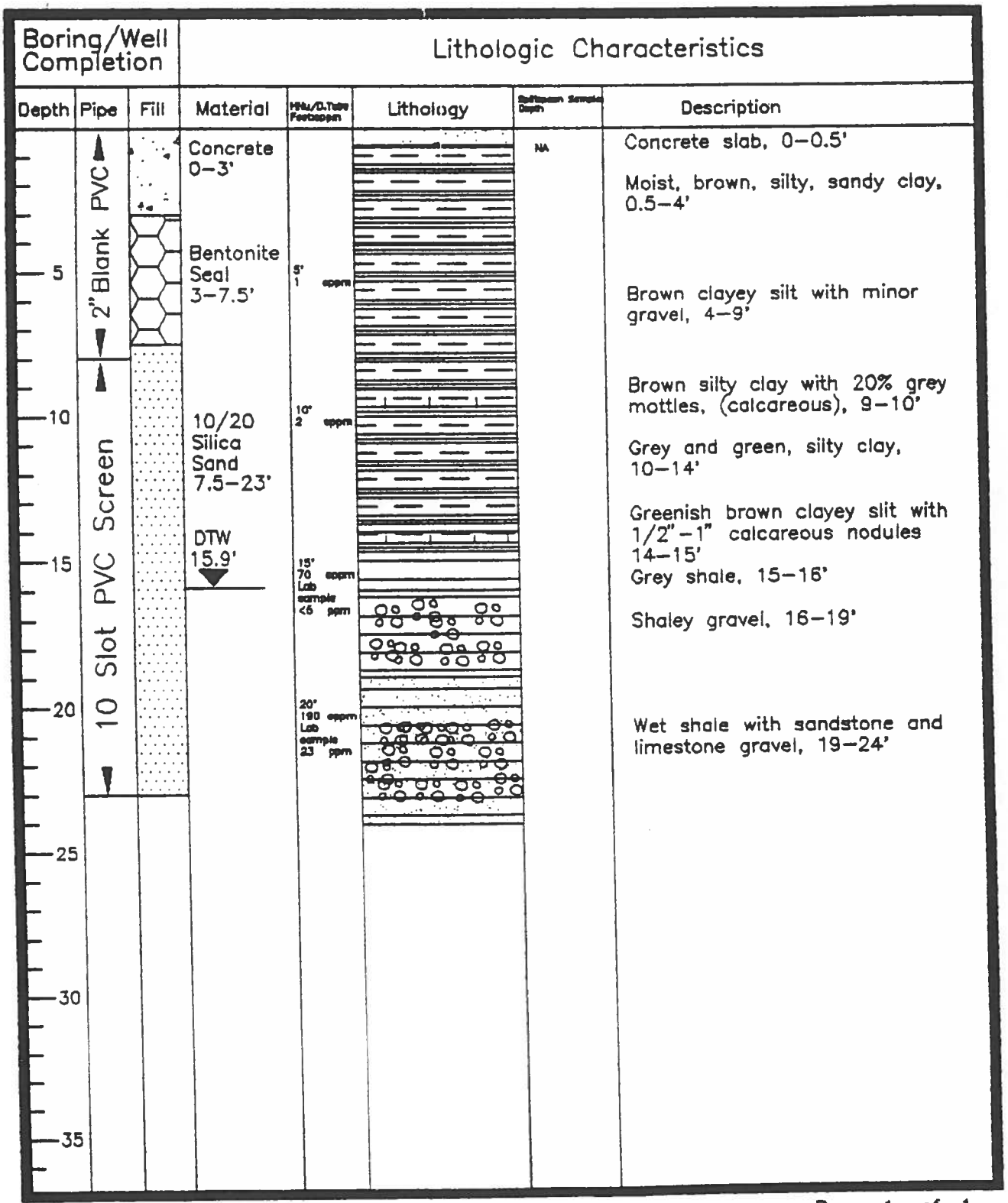


Figure 1: Site Location Map

Lithologic Log

Project:	Ross Texaco	Boring/Well No.:	MW9
Location:	Las Vegas, New Mexico	Date:	5/5/93
Client:	NMED/USTB	Total Depth:	23'
Job No.:	92-002.1	TOC Elevation:	6410.85'
Drilling Co.:	SHIB	Depth to Water:	15.9'
Drilling Method:	HSA, CME 55	Water Elevation:	6394.95'
Logged By:	C.L.	Product Thickness:	none



GLORIETA GEOSCIENCE, INC.

Glorieta Geoscience, Inc.	FIELD SCREENING RESULTS OF SOIL SAMPLES							ANALYTICAL RESULTS OF SOIL SAMPLES		
June 3, 1993	Ross Texaco and adjacent properties									
WELL#	DATE	LOCATION	TOTAL DEPTH *	DEPTH/EPPM **	DEPTH/EPPM **	DEPTH/EPPM **	DEPTH/EPPM **	DEPTH/PPM ****	DEPTH/PPM ****	DEPTH/PPM ****
MW1	6/92	RT-SW	24.00	5/5	10/90	15.5/>2000				
MW2	6/92	RT-SE	24.50	5/9	10/140	15/50				
MW3	6/92	RT-SC	25.00	NA	13/300	15/>2000				
MW4	6/92	RT-EC	25.00	5/1	10/5	15/200				
MW5	5/4/93	RT-NE	23.40	5/1.5	10/2.0	15/8	20/15.5			
MW6	5/4/93	RT-NW	23.75	5/1.5	10/2	NA		15/<20		
MW7	5/4/93	PF-SW	23.55	5/0.5	10/5.5	15/57		10/<20	15/<5 ***	
MW8	5/5/93	PF-SE	23.45	NA	10/10	15/320	20/200	10/<20		
MW9	5/5/93	AS-NE	22.20	5/1	10/2	15/70	20/190		15/<5 ***	20/23
MW10	5/6/93	NM-NW	19.00	5/0	10/146	15/200		10/<20	15/2000	*** (C6-C16)
MW11	5/6/93	NM-NE	20.00	5/3	10/1	15/240			15/29	
MW12	5/6/93	NM-SW	20.00	5/1.2	10/0.4	15/220			15/73	
MW13	5/6/93	LS-SW	19.50	5/.5	10/16	15/40			15/<20	

Notes:
NA: Indicates data not available
*: All depths in feet
**: Eppm (Benzene equivalents parts per million)
***: Analyzed by EPA Method 8015
****: Analyzed by EPA Method 418.1
Location Codes: RT: Ross Texaco, PF: Pino's Fina, AS: Allsup's, LS: Lasky property
NM: New Mexico State Highway and Transportation Department
NE: Northeast, NW: Northwest, NC: North central, etc.

TABLE 1: Field Screen and Analytical Results of Soil Samples

DEPTH TO WATER AND WATER TABLE ELEVATIONS Ross Texaco and adjacent properties								
WELL#	LOCATION	TOTAL DEPTH	DEPTH TO WATER 6/18/92	DEPTH TO WATER 7/6/92	DEPTH TO WATER 5/4/93	DEPTH TO WATER 5/6/93	TOP OF CASING ELEVATION	WATER TABLE ELEVATION
MW1	RT-SW	24.00	14.90	16.05	14.65	(14.67)	6409.53	6394.88
MW2	RT-SE	24.50	14.00	14.15	13.90	(13.87)	6408.15	6394.25
MW3	RT-SC	25.00	16.00	16.10	15.85	(16.87)#	6409.73	6393.88
MW4	RT-EC	25.00	15.50	15.45	15.10	NA	6409.03	6393.93
MW5	RT-NE	23.40				14.65	6409.34	6394.69
MW6	RT-NW	23.75				15.85	6411.02	6395.17
MW7	PF-SW	23.55				15.55	6411.62	6396.07
MW8	PF-SE	23.45				15.75	6410.76	6395.01
MW9	AS-NE	22.20				15.90	6410.85	6394.95
MW10	NM-NW	19.00				14.30	6409.02	6394.72
MW11	NM-NE	20.00				12.80	6407.31	6394.51
MW12	NM-SW	20.00				14.60	6409.21	6394.61
MW13	LS-SW	19.50				11.30	6406.22	6394.92

Notes:
NA: Indicates data not available
(DTW): Not used for water table elevation
#: Measured after bailing MW1
* All distances in feet
Location Codes: RT: Ross Texaco, PF: Pino's Fina
AS: Allsup's, NM: New Mexico State Highway and Transportation Department
LS: Lasky property
NE: Northeast, NW: Northwest, NC: North central, etc.

Table 4: Depth to Water

Appendix E

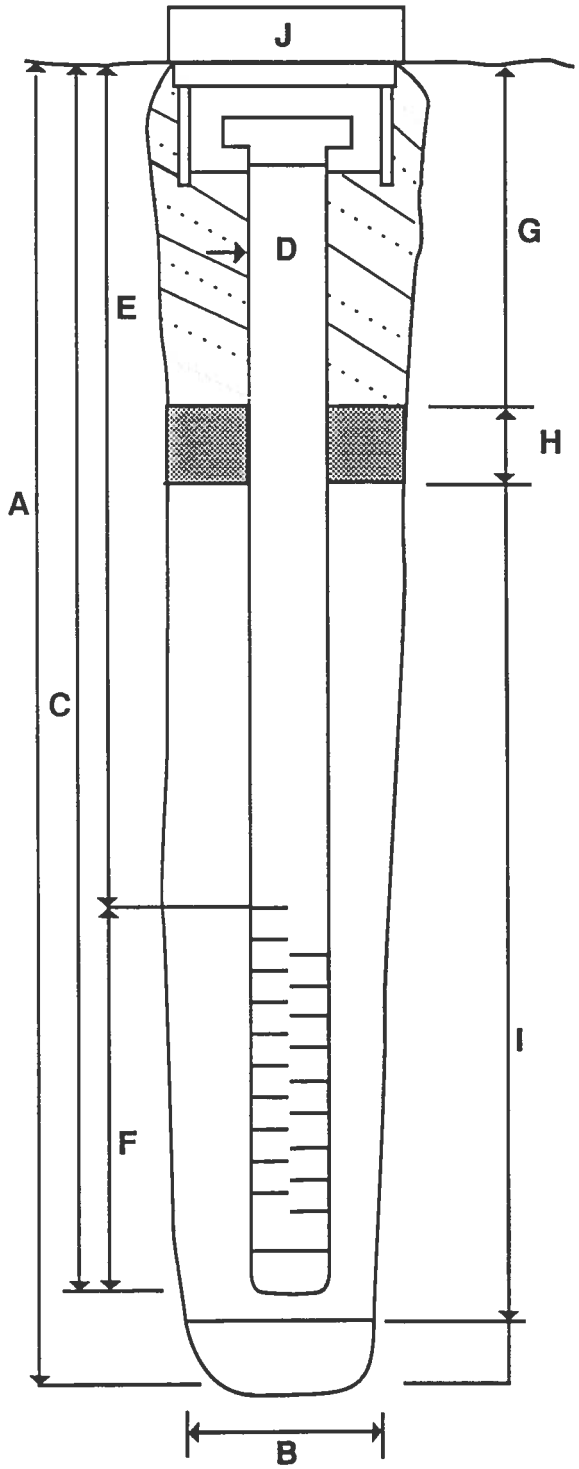
Well Completion Logs

Billings & Associates, Inc.

WELL DETAILS

PROJECT NAME: Allsups #294
PROJECT NUMBER:
WELL PERMIT NO:
BORING/WELL NO: B-2/W-1

CASING ELEVATION: 6412.90 FT. (based on MW-9 TOC)
SURFACE ELEVATION:
COMPLETION DATE: October 6, 1993
BY: P. Geotze and SHIB, Inc.



A. Total depth: 25 feet

B. Boring Diameter: 6 inches

Drilling method: Auger drill rig

C. Casing Length: 25 feet

Material: PVC - Sch 40

D. Casing Diameter: 2 inch

E. Depth to Perforations: 9.5 feet

F. Perforated Length: 15 feet

Perforated Interval: 24.5 feet to 9.5 feet

Perforation Type: Factory slot

Perforation Size: 0.010 inch

G. Surface Seal: 1.5 feet to surface

Seal Material: Cement

H. Pack Seal: 6 feet to 3 feet

Seal Material: Medium bentonite chips

I. Gravel Pack: 25 feet to 6 feet

Pack Material: Silica sand

Size: 10-20

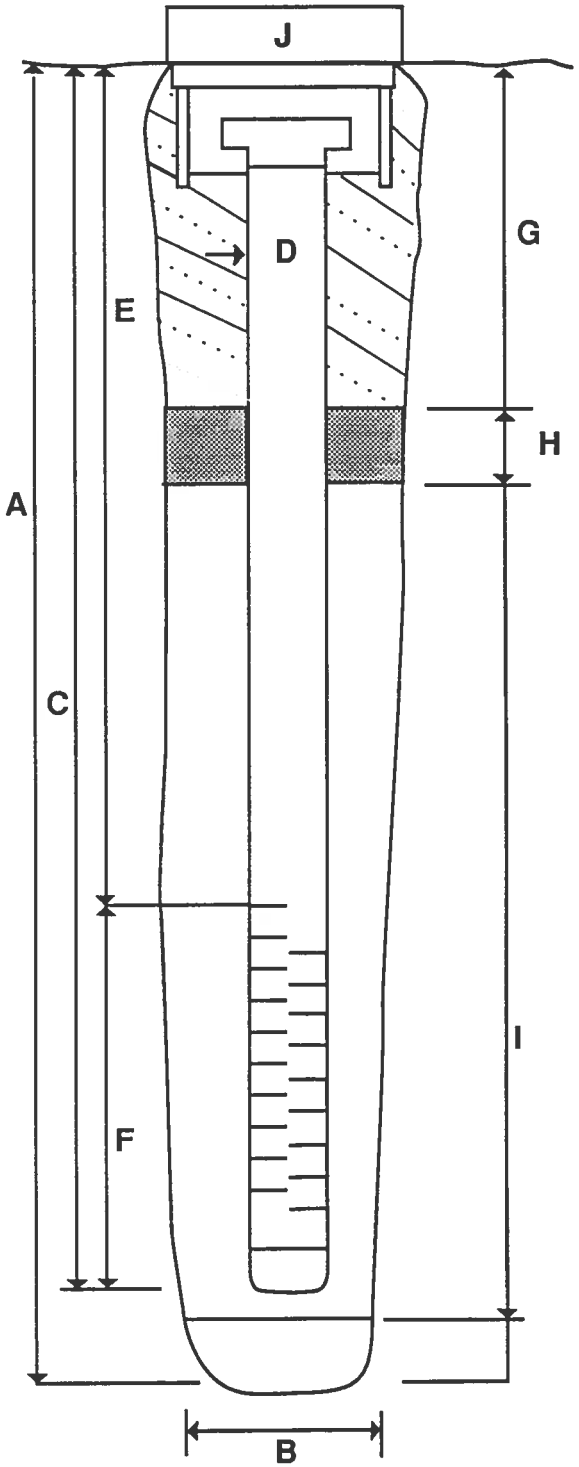
J. Surface Mount: PVC standing (locked) in 8-inch round manway

Billings & Associates, Inc.

WELL DETAILS

PROJECT NAME: Allsups #294
PROJECT NUMBER:
WELL PERMIT NO:
BORING/WELL NO: B-3/W-2

CASING ELEVATION: 6410.10 FT. (based on MW-9 TOC)
SURFACE ELEVATION:
COMPLETION DATE: October 6, 1993
BY: P. Goetze and SHIB, Inc.



A. Total depth: 20.1 feet

B. Boring Diameter: 6 inches

Drilling method: Auger drill rig

C. Casing Length: 20 feet

Material: PVC - Sch 40

D. Casing Diameter: 2 inch

E. Depth to Perforations: 9.6 feet

F. Perforated Length: 10 feet

Perforated Interval: 19.6 feet to 9.6 feet

Perforation Type: Factory slot

Perforation Size: 0.010 inch

G. Surface Seal: 2 feet to surface

Seal Material: Cement

H. Pack Seal: 8 feet to 6.3 feet

Seal Material: Medium bentonite chips

I. Gravel Pack: 20 feet to 8 feet

Pack Material: Silica sand

Size: 10-20

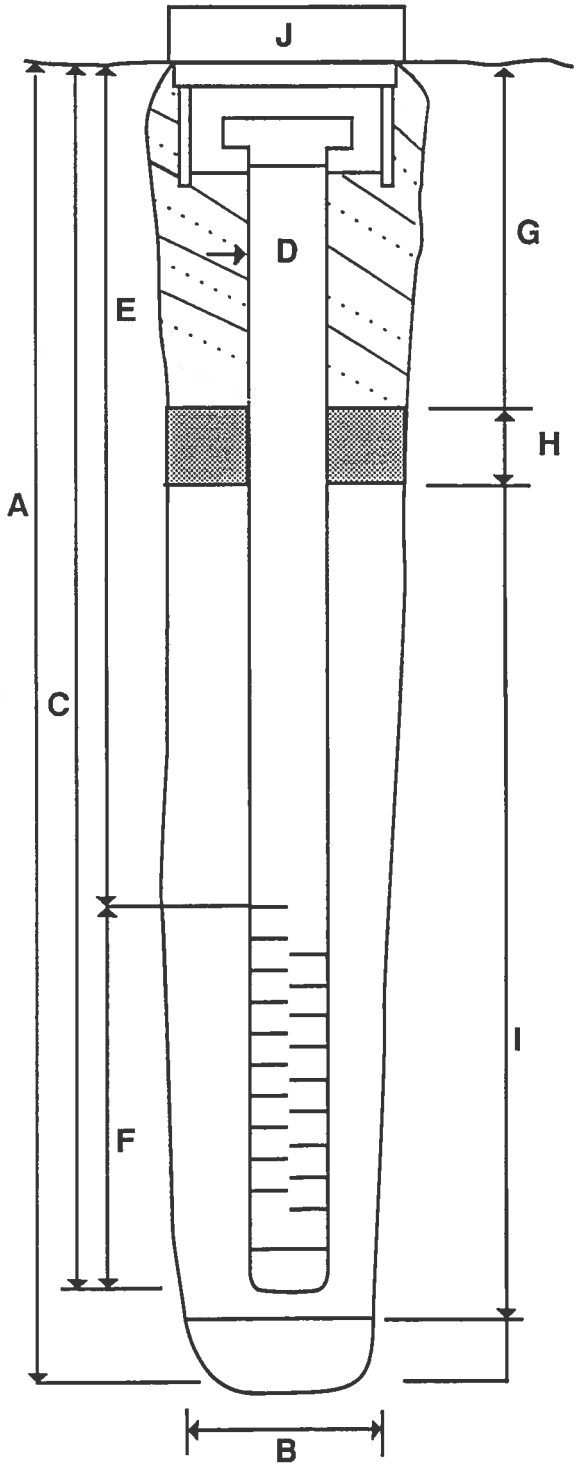
J. Surface Mount: PVC standing (locked) in 8-inch round manway

Billings & Associates, Inc.

WELL DETAILS

PROJECT NAME: Allsups #294
PROJECT NUMBER:
WELL PERMIT NO:
BORING/WELL NO: MW-9

CASING ELEVATION: 6410.85 FT.
SURFACE ELEVATION:
COMPLETION DATE: May 5, 1993
BY: Glorieta Geoscience



A. Total depth: 23 feet

B. Boring Diameter: 6 inches

Drilling method: Auger drill rig

C. Casing Length: 23 feet

Material: PVC - Sch 40

D. Casing Diameter: 2 inch

E. Depth to Perforations: 8 feet

F. Perforated Length: 15 feet

Perforated Interval: 23 feet to 8 feet

Perforation Type: Factory slot

Perforation Size: 0.010 inch

G. Surface Seal: 3 feet to surface

Seal Material: Cement

H. Pack Seal: 7.5 feet to 3 feet

Seal Material: Bentonite

I. Gravel Pack: 23 feet to 7.5 feet

Pack Material: Silica sand

Size: 10-20

J. Surface Mount: PVC standing (locked) in 8-inch round manway

Appendix F

Organic Water Quality Data

Organic Water Quality Data

Allsups 294
Las Vegas, New Mexico

All values are in parts per billion (ppb)

Well	Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	EDC	EDB
W-1	10/15/93	<0.5	<0.5	<0.5	<0.5	18.0	<0.2	<0.05
W-2	10/15/93	3500	130	370	670	1400	1.9	<0.05
W-3	10/15/93	4300	320	1100	1400	330	<8.0	<0.05
NMWQCC standards		10.0	750.0	750.0	620.0	100.0	10.0	0.10

Appendix G

Recent Laboratory Water Quality Report

Entered 11/1/93

Hall Environmental Analysis Laboratory

Hall Environmental Analysis Laboratory
2403 San Mateo N.E., Suite P-13
Albuquerque, N.M. 87110
(505) 880-1803

10/27/93

Billings and Associates, Inc.
3816 Academy Parkway North NE
Albuquerque, N.M. 87109

Dear Mr. Phil Goetze,

Enclosed are the results for the analyses that were requested. These were done according to E.P.A. procedures or the equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these levels (denoted by the < sign) has been made.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely.

Scott Hallenbeck 10/27/93

Scott Hallenbeck, Lab Manager

Project: Allsups #294

Results for sample : W-1

Date collected: 10/15/93 Date received: 10/18/93
Date extracted: 10/23/93 Date injected: 10/22,24/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931036-3
Project Manager: Phil Goetze Sampled by: Phil/John
Matrix: Aqueous

Test: EPA 602

Compound	Amount	Units
MTBE	18	PPB (UG/L)
Benzene	<0.5	PPB (UG/L)
Toluene	<0.5	PPB (UG/L)
Ethylbenzene	<0.5	PPB (UG/L)
Total Xylene	<0.5	PPB (UG/L)

BFB (Surrogate) Recovery = 90 %

Dilution Factor = 1

Test: EPA 601

Compound	Amount	Units
EDC	<0.2	PPB (UG/L)

BCM (Surrogate) Recovery = 92 %

Dilution Factor = 1

Test: EPA 504

Compound	Amount	Units
EDB	<0.05	PPB (UG/L)

Dilution Factor = 1

Results for sample : W-2

Date collected: 10/15/93 Date received: 10/18/93
Date extracted: 10/23/93 Date injected: 10/20,24/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931036-2
Project Manager: Phil Goetze Sampled by: Phil/John
Matrix: Aqueous

Test: EPA 602

Compound	Amount	Units
MTBE	1,400	PPB (UG/L)
Benzene	3,500	PPB (UG/L)
Toluene	130	PPB (UG/L)
Ethylbenzene	370	PPB (UG/L)
Total Xylene	670	PPB (UG/L)

BFB (Surrogate) Recovery = 101 %

Dilution Factor = 1

Test: EPA 601

Compound	Amount	Units
EDC	1.9	PPB (UG/L)

BCM (Surrogate) Recovery = 90 %

Dilution Factor = 1

Test: EPA 504

Compound	Amount	Units
EDB	0.05	PPB (UG/L)

Dilution Factor = 1

Results for sample : W-3

Date collected: 10/15/93 Date received: 10/18/93
Date extracted: 10/23/93 Date injected: 10/20,24/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931036-1
Project Manager: Phil Goetze Sampled by: Phil/John
Matrix: Aqueous

Test: EPA 602

Compound	Amount	Units
MTBE	330	PPB (UG/L)
Benzene	4,300	PPB (UG/L)
Toluene	320	PPB (UG/L)
Ethylbenzene	1,100	PPB (UG/L)
Total Xylene	1,400	PPB (UG/L)

BFB (Surrogate) Recovery = 87 %

Dilution Factor = 40

Test: EPA 601

Compound	Amount	Units
EDC	<8.0	PPB (UG/L)

BCM (Surrogate) Recovery = 85 %

Dilution Factor = 40

Test: EPA 504

Compound	Amount	Units
EDB	<0.05	PPB (UG/L)

Dilution Factor = 1

Results for QC : Reagent Blank

Date extracted: 10/23/93 Date injected: 10/20,24/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: RB 10/20,23
Project Manager: Jim Griswold
Matrix: Aqueous

Test: EPA 602

Compound	Amount	Units
MTBE	<2.5	PPB (UG/L)
Benzene	<0.5	PPB (UG/L)
Toluene	<0.5	PPB (UG/L)
Ethylbenzene	<0.5	PPB (UG/L)
Total Xylene	<0.5	PPB (UG/L)

BFB (Surrogate) Recovery = 98 %

Dilution Factor = 1

Test: EPA 601

Compound	Amount	Units
EDC	<0.2	PPB (UG/L)

BCM (Surrogate) Recovery = 101 %

Dilution Factor = 1

Test: EPA 504

Compound	Amount	Units
EDB	<0.03	PPB (UG/L)

Dilution Factor = 1

Results for QC: Matrix Spike/Matrix Spike Dup
Blank Spike/Blank Spike Dup

Date extracted: 10/23/93 Date injected: 10/20,24/93
Client: Billings and Associates, Inc.
Project Name: Allsups #294 HEAL #: 931031-4 MS/MSD
Project Manager: Jim Griswold BS/BSD 10/23
Matrix: Aqueous Units: PPB (UG/L)

Test: EPA 602

Compound	Sample Result	Amount Added	Matrix Spike	MS %	MS Dup	MSD %	RPD
MTBE	<2.5	40.0	42.7	107	43.6	109	2
Benzene	<0.5	20.0	21.8	109	21.8	109	0
Toluene	<0.5	20.0	21.0	105	21.3	107	1
Ethylbenzene	<0.5	20.0	20.2	101	20.5	103	1
Total Xylene	<0.5	60.0	62.2	104	62.3	104	0

Test: EPA 601

Compound	Sample Result	Amount Added	Matrix Spike	MS %	MS Dup	MSD %	RPD
EDC	<0.2	20.0	19.5	98	21.2	106	8

Test: EPA 504

Compound	Sample Result	Amount Added	Blank Spike	BS %	BS Dup	BSD %	RPD
EDB	<0.05	0.67	0.65	97	0.64	96	2

HALL ENVIRONMENTAL ANALYSIS LABORATORY
2403 SAN MATEO NE, SUITE P-13 • ALBUQUERQUE, NM 87110 • (550) 880-1803

CHAIN-OF-CUSTODY RECORD

ANALYSIS REQUEST

CLIENT: Billings & Assoc. Inc.	**PROJECT MANAGER:** Phil
ADDRESS: 3816 Academy Parkway North /NE.	**PHONE #:** 345-1116
	FAX #:
PROJECT NAME: Allsups 294	**SAMPLER:** Phil / John
	PROJECT #:

DATE	TIME	MATRIX	SAMPLE I.D. NO.	NUMBER/ VOLUME	PRESERVATIVE $HgCl_2$	PRESERVATIVE HgCl	PRESERVATIVE OTHER	BTEX (METHOD 602)	BTEX + MTBE (602)	TEH (METHOD 8015 MOD)	BTEX + TEH COMBINATION	TPH (METHOD 418.1)	601/602 VOLATILES	EDB (METHOD 504.1)	EDC	610 (PNA OR PAH)		AIR BUBBLES OR HEADSPACE (Y OR N)	HEAL#
10/15/93	12:25	H_2O	W-3	3	X				X					X	X			N	931036-1
10/15/93	11:20	H_2O	W-2	3	X				X					X	X			N	-2
10/15/93	13:10	H_2O	W-1	3	X				X					X	X			N	-3

SAMPLES COLD: (Y) or N

RELINQUISHED BY: (Signature)	DATE:	TIME:	RECEIVED BY:
Pat Cunningham	10/18/93	1045	Scott Hall
RELINQUISHED BY: (Signature)	DATE:	TIME:	RECEIVED BY:

REMARKS:

Appendix H

Well Data

Well Data

Allsups 294
Las Vegas, New Mexico

Well	Top of Casing Elevation (feet)	Date	Depth To Water (feet)	Water Table Elevation (feet)	Total Depth (feet)	Screen Interval (feet)
W-1	6412.90	10/15/93	17.13	6395.77	23.8	9.5 - 24.5
W-2	6410.10	10/15/93	15.07	6395.03	20.4	9.6 - 19.6
W-3	6410.85	5/5/93	15.90	6394.95	22.2	8.0 - 23.0
		10/15/93	15.55	6395.30	23.3	