ENVIRONMENTAL TESTING & MGMT.
111 N. MARKET ST., SUITE 600
SAN JOSE, CALIFORNIA 95113
408.938.0939 FAX: 408.938.3929

June 1, 1998

Scott O. Seery
Senior Hazardous Materials Specialist
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502-6577

Re: ADDENDUM TO PROPOSED WORK PLAN FOR CONTINUED SOIL AND WATER INVESTIGATION, AND EXPANDED GROUNDWATER MONITORING

SUBJECT SITE: GERMAN AUTOCRAFT
301 EAST 14TH STREET, SAN LEANDRO

Dear Mr. Seery:

Thank you for approving our proposed workplan dated February 3, 1998.

We have been considering utilizing a new technology in Geoprobe® small diameter monitoring wells. We would like to add the following information to our workplan Monitoring Well Installation Procedures:

Geoprobe® Small Diameter Groundwater Monitoring Well Installation Procedures: Where feasible, at each location selected for well placement, a permanent Geoprobe® prepacked screen monitoring well will be installed. The prepacked screens are constructed as follows; the inner component consists of 0.5" Schedule 80 PVC with 0.01" slots, and the outer component consists of 1.5" OD stainless steel wire mesh with a pore size of 0.011", with the annular space prepacked with 20/40 grade silica sand. The wells will be constructed with prepacked screens and Schedule 80 PVC riser. Once 2.125" probe rods are set at depth, the prepacked screens are lowered through the ID of the probe rods as additional PVC riser is added to the well assembly. The prepacked screens are attached to an expendable anchor point by a locking connector threaded to the bottom of the prepacked screens. Then the prepacked screens are locked into the anchor point, and the probe rods are retracted. Final well design will be modified to the site specific conditions encountered in the borehole during drilling. Once the aquifer strata has been defined, a slotted interval will be placed above the occurrence of groundwater to observe for floating product. As the rods are retracted above the screen, fine grade sand installed by gravity through the rod annulus is used to form a barrier two (2) feet above the prepacked screens. Granular bentonite is then installed in the annulus to form a one (1) foot well seal. A high pressure grout pump will pump neat cement grout to fill the well annulus from the bottom as the probe rods are retracted. A flush mounted traffic rated box will complete the well construction. All wells will be developed to remove the drilling muck, grade the sand pack, and provide a more complete hydraulic connection to the aquifer. The well volume will be calculated and a number of those volumes will be removed until the water becomes clear and the amount of sand pumped is minimal. The well will be allowed to recover for at least 72 hours prior to sampling. All wells will be surveyed to mean sea level using a known datum and added to the existing array.

In order to keep our paperwork in order for the UST Cleanup Fund Pre-Approval process, we ask that you issue a short note approving this addendum to our workplan.

Respectfully,

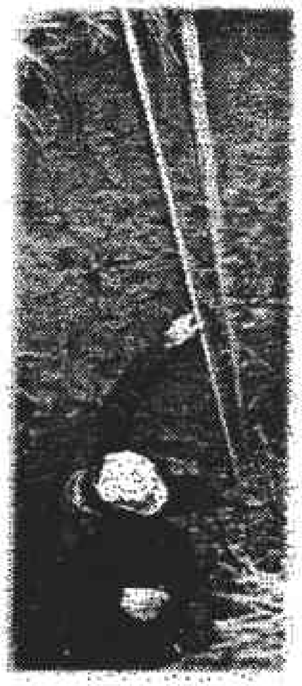
Tom Price, CHMM, REA
Project Manager

Christopher M. Palmer, CEG
Project Geologist

Attachments: Geoprobe® "Small Diameter Monitoring Wells"
Geoprobe® "Los Angeles Water Quality Board Approves Geoprobe's Prepacked Screen Monitoring Wells" article.
Advanced GeoEnvironmental, Inc. "Performance Comparison of 0.5-Inch Vs. 4-Inch Ground Water Monitoring Wells, Los Angeles, California"

REGISTERED GEOLOGIST
CHRISTOPHER M. PALMER
№ 1262
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

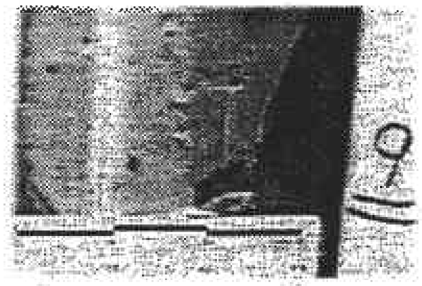
Small Diameter Monitoring Wells



Excavation of a Geoprobe® Monitoring Well shows the quality annular seal around the well casing to a depth of about 10 feet bgs.

There's a lot of excitement in the Environmental Industry about Geoprobe's new Prepacked Screens designed for setting Small Diameter Monitoring Wells. The procedure uses 2.125-inch (54 mm) outside diameter probe rods advanced to a predetermined depth with a Geoprobe® percussion probing machine. The well is assembled and installed through the 1.5-inch (38 mm) inside diameter of the probe rods and constructed with prepacked screens and 0.5-inch Schedule 80 PVC well riser.

Once the rods are set at depth, the prepacked screens are lowered through the 1.5-inch (38 mm) I.D. of the probe rods as additional PVC riser is added to the well assembly. The prepacked screens are attached to an expendable anchor point by a locking connector threaded to the bottom of the prepacked screens. When the prepacked screens are locked into the anchor point the probe rods are retracted. As the rods are retracted above the screens, either natural formation collapse or a fine-grade sand installed by gravity through the rod annulus, is used to form a barrier above the prepacked screens. This sand or natural formation barrier prevents bentonite grout from penetrating into the screened interval. Granular bentonite or bentonite slurry is then installed in the annulus to form a well seal. A high-pressure grout pump (Geoprobe® Model GS-1000) may be used to pump high-solids bentonite slurry or neat cement grout to fill the well annulus as the probe rods are retracted. The grout mixture must be pumped from the bottom up to accomplish a tight seal and to meet regulatory requirements.

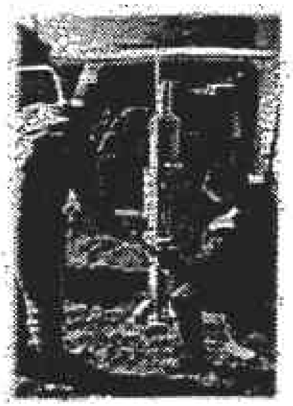


Close-up of the annular seal at 9 feet bgs. No voids in the grout and well casing remains centered in the annular space. (Blue scale in inches.)

Once the well is set, conventional flush-mount or aboveground well protection can be installed to prevent tampering or damage to the well head. These wells can be sampled by several available methods (peristaltic pump, mini-bailer, Geoprobe's tubing check valve, etc.) to obtain high integrity water quality samples. These wells also provide accurate water level measurements and can be used as observation wells during aquifer pump tests.

When installed properly, these small diameter wells generally meet regulatory requirements for a permanent monitoring well. Always check with your local regulator for local well installation requirements.

Geoprobe® Prepacked Screen Monitoring Well Advantages. . .



- Quick and simple installation.
- 1.5-inch outside diameter, 0.5-inch inside diameter.
- Prepacked Screen designed with 20/40 grade silica sand.
- No cuttings generated during installation.
- Meets all requirements of a RCRA well with exception of the smaller diameter.
- Permanent monitoring well installation with a Georpobe® Soil Probing Machine and 2.125-inch probe rods.
- Well seal and grouting meet EPA and ASTM D-5092 method requirements.
- No additional water required during installation which minimizes development purging time and wastewater disposal costs.
- Minimal disturbance of natural formation conditions.
- Can be developed, purged, and sampled using inexpensive tubing check valve system.
- 3-foot length screens can be assembled to desired length for installation.
- Minimal development and purge water generated for sampling reducing time requirements and disposal costs.
- Uses standard aboveground or flush-mount well protectors.

Geoprobe Systems

We have an SOP and paper about our Small Diameter Monitoring Wells that we'd be glad to send to you upon request. Just fill out the information request form or give us a call at **1-800-GEOPROBE** (U.S., Canada, or Puerto Rico) or 913-825-1842. We look forward to hearing from you!

|Geoprobe® Systems Home | Tools Menu |

Los Angeles Water Quality Control Board Approves Geoprobe's Prepacked Screen Monitoring Wells

Geoprobe's new 0.5-inch Prepacked Screen Monitoring Wells have been approved for use by the Los Angeles Water Quality Control Board. The approval follows on the heels of a joint project between Advanced GeoEnvironmental in Anaheim, California, and Geoprobe Systems. Advanced Geo-Environmental prepared a final report outlining the study and project for James Ross, Unit Chief of the LAWQCB, who encouraged and approved the use of the new system. The results were forwarded to the state level to receive statewide approval for this new technology.

The Spring 1996 issue of *The Probing Times* included a story describing the Los Angeles project which compared Geoprobe's new 0.5-inch monitoring well to a conventional four-inch well set with a drill rig in the northwestern LA region. The task was to investigate the potential impact of remaining contaminants on the groundwater under a parking lot where an underground storage tank used to be located.

Scott Traub (center) and Volker Wittig (seated) measure out the sand pack which is added above the screened area while setting a Geoprobe Prepacked Monitoring Well.

At the project site in April were Scott Traub, Operations Manager with EnviroProbe; Robert Loeffler, Project Geologist and onsite safety officer with Advanced GeoEnvironmental, both from Anaheim; and Hugh Marley, Associate Engineering Geologist with the California Regional Water Quality Control Board, Los Angeles Region. Providing Geoprobe equipment and expertise were Volker Wittig, R&D Engineering in the Salina office, and Kevin Pope with Geoprobe's Western Regional Office in Reedley, California.

Using a Geoprobe Model 5400 and two-inch probe rods, EnviroProbe's two-man team, with advice from Volker, Scott, and Kevin, set a new Geoprobe prepacked well screen (AGE-1) from 28 to 46 feet, complete with 0.5-inch riser pipe, bentonite seal, sand pack, and flush mount. Four days later, a conventional four-inch monitoring well (AGE-1A) was installed five-feet upgradient from AGE-1 with a three-man crew using a drill rig and 10-inch hollow-stem augers.

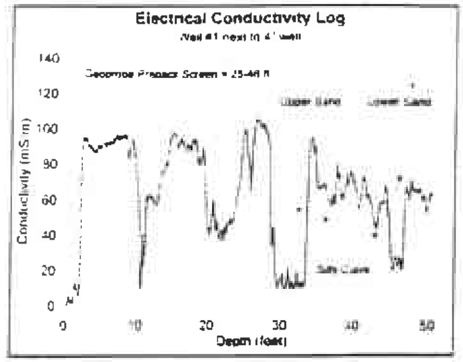
The wells were then developed and purged, pumping 110 gallons of water out of the four-inch well and only 16 gallon of water out of the Geoprobe well.

Both wells were sampled five times in a three-week period, generally purging three to four casing volumes prior to sampling, (0.5 gallons from the 0.5-inch Geoprobe well and 35 gallons from the four-inch well). The 0.375-inch polyethylene tubing with check ball valve worked fine for purging the Geoprobe well; a stainless steel mini-bailer was used for sampling. The samples were sent to a local lab and analyzed for BTEX using EPA Method 602 and for VOCs using EPA Method 8240. The accompanying tables show the results. Toluene was not detected.

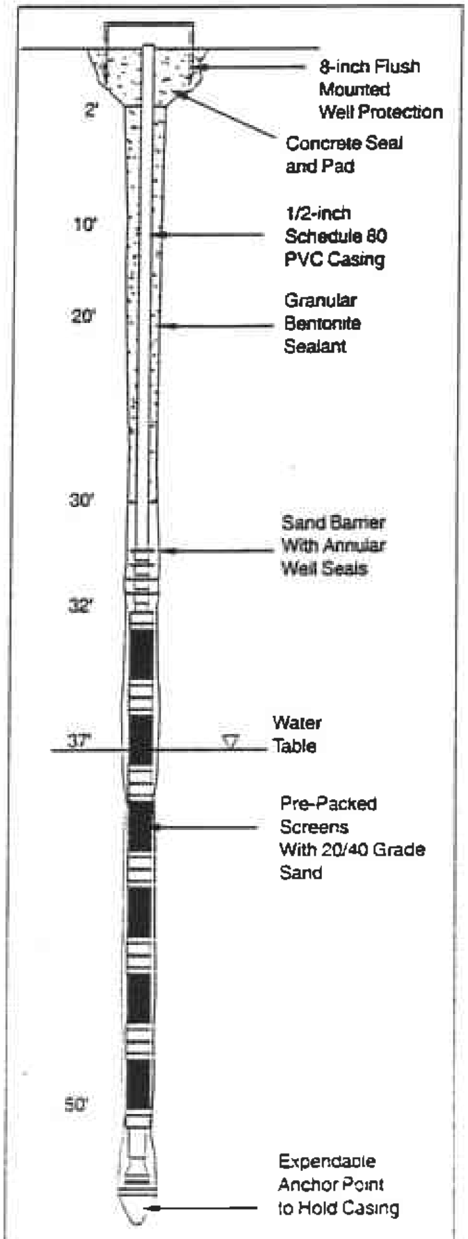
According to Volker, "information from the 0.5-inch Geoprobe well compares favorably with that from the four-inch well." (Tables 2 and 3). "The 0.5-inch well has slightly higher mean concentrations of benzene and ethylbenzene." (for EPA Method 602, shown in Table 1). The 0.5-inch well generally shows the least variation from the concentration means.

In summing up the results, Volker stated that in addition to producing comparable or better results, the 0.5-inch Geoprobe wells also decreased costs and time for well installation, greatly diminished volumes and costs for disposal of development and purge water.

(continued on next page)



A conductivity log taken of Well No. 1 at the California parking lot site. Groundwater was determined to be at 33 feet. The prepack screen well was set from 28–46 feet.



Larger Diameter Geoprobe Probe Rods Now Available

Special Late-Breaking Announcement: NEW larger diameter probe rods are now available at Geoprobe Systems!

Designed to withstand the rigors of percussion probing, two new sizes of Geoprobe rods are entering the direct push market. A 1.25-inch and 2.125-inch probe rod, are stronger, water tight, and will be faster to connect to the tool string. All of this adds up to reduced cost of operation for your company.

The new rods also have larger inside diameters than the standard Geoprobe rods, which will enable the probing technican to use a greater assortment of testing equipment and monitoring well components in the field. A larger diameter probe rod also means a more durable rod which is more rigid and less prone to bending and breakage.

The new rods come with a complement of pull caps, drive heads, and drive caps for use with your Geoprobe soil and groundwater samplers.

Call your Geoprobe Technical Service Rep for details.

Asad Al-Malazi (left) with Mayfair Petroleum in Warsaw, Poland, is Geoprobe's representative in Poland, the Czech Republic, and Hungary. Asad toured Geoprobe headquarters this spring and viewed some of the new tools and equipment R&D has been working on. Geoprobe's Volker Wittig makes a great tour guide!

Board Approves Wells cont.

did not produce any "expensive" drill cuttings, and provided reliable data to track and model groundwater conditions.

For more information about the Los Angeles project, you can contact Scott Traub, Robert Loeffler, or Nuel Henderson at Advanced GeoEnvironmental, 714-996-5151. For a complete copy of the 14-page report (prepared June, 1996) and accompanying data, call us at Geoprobe Systems at 1-800-GEOPROBE (1-800-436-7762). Volker can also be reached here at Geoprobe if you'd like to find out more information about the prepacked screens and California project.

Table 1
Comparison of 0.5-inch Geoprobe Prepacked Wells to Conventional 4-inch Monitoring Wells

WELL	Benzene		Ethylbenzene	
DIAMETER	EPA 602	EPA 8240	EPA 602	EPA 8240
Arithmetic Mean				
0.5-inch	1,210	1,160	975	910
4-inch	1,034	952	997.5	927.5
Standard Deviation				
0.5-inch	54.77	89.44	218.40	211.82
4-inch	282.45	165.14	410.7	158.5

Table 2
Laboratory Results for Water Samples – EPA Method 602
0.5-inch Well vs 4-inch Well
(results in micrograms per liter (ug/l))

	Well/Date	Benzene	Toluene	Ethylbenzene	Total Xylenes
0.5 Inch	AGE-1 [4-18-96]	1,200	ND	1,200	140
	AGE-1 [4-26-96]	1,200	ND	930	100
	AGE-1 [4-29-96]	1,300	ND	1,200	140
	AGE-1 [5-3-96]	1,200	ND	720	ND
	AGE-1 [5-6-96]	1,300	ND	950	ND
4 Inch	AGE-1A [4-18-96]	1,100	20	450	58
	AGE-1A [4-26-96]	1,300	ND	1,200	110
	AGE-1A [4-29-96]	570	ND	ND	ND
	AGE-1A [5-3-96]	1,000	ND	940	ND
	AGE-1A [5-6-96]	1,200	ND	140	ND

Table 3
Laboratory Results for Water Samples – EPA Method 8240
0.5-inch Well vs 4-inch Well
(results in micrograms per liter (ug/l))

	Well/Date	Benzene	Toluene	Ethylbenzene	Total Xylenes
0.5 Inch	AGE-1 [4-18-96]	1,200	ND	930	ND
	AGE-1 [4-26-96]	1,300	ND	1,000	ND
	AGE-1 [4-29-96]	1,100	ND	1,100	ND
	AGE-1 [5-3-96]	1,100	ND	610	ND
	AGE-1 [5-6-96]	1,100	ND	ND	ND
4 Inch	AGE-1A [4-18-96]	750	ND	ND	ND
	AGE-1A [4-26-96]	1,000	ND	860	ND
	AGE-1A [4-29-96]	910	ND	830	ND
	AGE-1A [5-3-96]	900	ND	820	ND
	AGE-1A [5-6-96]	1,200	ND	1,200	ND

Geoprobe® Systems

Publisher .... Geoprobe Systems
President .... Mel Kejr
Vice President .... Tom Christy
Editor .... Gayle Lacey

The Probing Times is the official newsletter of Geoprobe Systems. The publication is designed to acquaint the reader with the people and the products at Geoprobe Systems, to introduce new innovation, and to examine where and how people are using Geoprobe products. Suggestions for future newsletter articles or Geoprobe innovations are welcome. Call us at 1-800-436-7762.

Advanced GeoEnvironmental, Inc.

10 June 1996
AGE Project LA631J7.272

Subject: Performance Comparison of 0.5-Inch Vs. 4-Inch Ground Water Monitoring Wells Test Site in West Los Angeles, Los Angeles, California

Dear Mr.

Under your supervision, *Advanced* GeoEnvironmental, Inc. (AGE) in conjunction with EnviroProbe (EP) conducted a comparison test between a 0.5-inch monitoring well, installed using the direct push technology of a Geoprobe 5400, and a standard 4-inch ground water monitoring well installed approximately five feet upgradient from the 0.5-inch well by a hollow-stem auger drill rig. The purpose of this letter is to update you on the final analytical results obtained from paired ground water samples collected from the wells over a 19-day test period.

WELL INSTALLATION

The 0.5-inch diameter well (AGE-1) was set on 11 April 1996 using a Geoprobe 5400 and two man crew supplied by EnviroProbe. The well was set by preprobing a hole to 28 feet below surface grade (bsg), then continuously coring the soil using a 1.5-inch diameter Macro-Core® sampler from 28 feet bsg to 46 feet bsg. A flight of 2-inch rods with a self locking expendable tip was driven to 46.5 feet bsg. Six 1.5-inch O.D. by 3 foot long prepacked 0.010 slotted screens attached to 28 feet of 0.5-inch blank schedule 80 PVC were then lowered through the 2-inch rods. The well screen and casing was snap locked onto the expendable tip, to secure the well. The well was then completed by pouring #1/20 silica sand down the 2-inch rods to fill the annular space around the prepacked screen up to approximately 2 feet above the screened interval. Number 8 bentonite sand was then poured down the 2-inch rods as they were being pulled out of the ground, and was hydrated, to a depth of 2 feet bsg. The upper 2 feet of annular space were sealed with concrete. A piece of 4-inch PVC was set around the uppermost portion of the 0.5-inch PVC well, and fitted with a locking cap. Finally, an 8-inch flush mounted monitoring well cover was installed.

A 4-inch ground water monitoring well (AGE-1A) was installed approximately five feet away from AGE-1 on 15 April 1996. The well was installed utilizing a CME-75 drill rig and three man

3315 E. Miraloma Avenue, Suite 117, Anaheim, California 92806
Telephone (714) 996-5151 FAX (714) 996-5182

crew supplied by Cascade Drilling. The pilot boring was advanced with 10-inch hollow stem augers. The well construction of AGE-1A was carefully matched to that of AGE-1, with the same total depth, screen slot size, and screened interval.

The wells were developed by surging and purging. Approximately 110 gallons of water were purged from AGE-1A, and 16 gallons were purged from AGE-1.

PURGING AND SAMPLING PROCEDURES

Comparison sampling of the two wells commenced on 18 April 1996, and the two wells were subsequently purged and sampled on 26 April, 29 April, 03 May and 06 May, 1996. Both wells were purged of three to four casing volumes of water and allowed to achieve at least 90% recovery of their initial static water level prior to sampling. AGE-1 was purged and sampled prior to initiating the purge of AGE-1A to prevent the drawdown associated with purging AGE-1A from affecting the results from AGE-1. Generally, 0.5 gallon was purged from AGE-1, except on 29 April, when 8.0 gallons were purged to test the effectiveness of the 0.5-gallon purge volumes. Thirty-five gallons were purged from AGE-1A during each sampling event. The purge volume of AGE-1 was thought to be too small to affect the results from AGE-1A.

AGE-1 was purged by manually pumping a line of 3/8-inch polyethylene tubing equipped with a ball valve to lift the water to the surface. AGE-1A was purged with a 2-inch downhole pump for each sampling event. Temperature, pH, and electrical conductivity of the purged water was monitored to confirm stability of these parameters prior to sampling.

During the first three sampling events, ground water samples were collected from AGE-1 utilizing a new, clean 3/8-inch diameter poly line equipped with a ball valve at its base as a bailer to retrieve a water sample. Water samples were collected from AGE-1 during the last two sampling events utilizing a decontaminated stainless steel bailer. All water samples collected from AGE-1A were retrieved in new disposable polyethylene bailers equipped with a bottom sampling device. The samples were dispensed into EPA approved 40-ml glass VOA vials with Teflon-lined caps. The vials were completely filled to eliminate headspace. The samples were labeled with date, time, well designation and the sample collectors initials. The samples were immediately transported in chilled container under chain-of-custody to Core Laboratories (Core Lab) in Anaheim.

The samples were analyzed for benzene, toluene, ethylbenzene and total xylenes (BTE&X) using EPA Method 602. To aid in the project, Core Lab also ran the samples for volatile organics using EPA Method 8240. Core Lab analyzed both the sample and sample duplicate collected from AGE-1 during the final sampling event. The results for the sample and sample duplicate were averaged and treated as a single sample for the following discussions.

RESULTS

Samples obtained from AGE-1, the 0.5-inch diameter monitoring well, contained benzene at concentrations that ranged from 1,150 micrograms per liter (μg/l) to 1,300 μg/l as determined by EPA Method 602, and ranged from 1,100 to 1,300 μg/l as determined by EPA Method 8240. Ethylbenzene concentrations ranged from 720 μg/l to 1,200 μg/l by EPA Method 602, and ranged from less than the detection limit of 500 μg/l to 1,100 μg/l as measured by EPA Method 8240. Toluene was not detected by either EPA Method 602 or EPA Method 8240, and total xylenes were only detected by EPA Method 602, with concentrations ranging from less than the method detection limit (50 μg/l) to 140 μg/l.

The concentration of benzene in AGE-1A, the 4-inch diameter monitoring well, ranged from 570 μg/l to 1,300 μg/l as determined by EPA Method 602, and ranged from 750 μg/l to 1,200 μg/l as determined by EPA Method 8240. Ethylbenzene concentrations ranged from less than the method detection limit (50 μg/l) to 1,200 μg/l by EPA Method 602, and ranged from less than the detection limit of 500 μg/l to 1,200 μg/l as measured by EPA Method 8240. Toluene was detected only by EPA Method 602 at 20 μg/l, and total xylenes were only detected by EPA Method 602, with concentrations ranging from less than the method detection limit (50 μg/l) to 110 μg/l.

As determined by EPA Method 8240, benzene, ethylbenzene and total xylenes had slightly higher than average concentrations in AGE-1 on 29 April 1996, when 8 gallons (sixteen times the calculated required purge volume) were purged prior to sampling. EPA Method 602 detected slightly lower than average benzene concentrations and slightly higher ethylbenzene concentrations in AGE-1. These concentrations were not much different from the mean concentrations for each analyte determined by either analytical method, indicating that greater purge volumes for the 0.5-inch well were not necessary to achieve representative samples.

Tables 1 and 2 show the data for both wells using the two analytical methods. The data for benzene and ethylbenzene are compared for the two wells separately by analytical methods and analytes in Figures 1 through 4. Figures 5 and 6 are log-log cross plots of benzene and ethylbenzene concentrations for both wells as determined by EPA Methods 602 and 8240, respectively.

The four to five positive values for benzene and ethylbenzene for each well and analytical method are the minimum number of data points required to determine statistical means and standard deviations for data group comparison purposes. The following table shows these statistical parameters:

Well Diameter	Benzene		Ethylbenzene	
	EPA 602	EPA 8240	EPA 602	EPA 8240
	Arithmetic Mean			
0.5-Inch	1,210	1,160	975	910
4-Inch	1,034	952	997.5	927.5
	Standard Deviation			
0.5-Inch	54.77	89.44	218.40	211.82
4-Inch	282.45	165.14	410.7	182.46

DISCUSSION

The data in the table above and graphically presented in Figures 1 through 4 show that in general, the information obtained from the 0.5-inch well compares well with that from the 4-inch well. It can be seen in the table that the mean benzene concentrations were slightly higher and that the mean ethylbenzene concentrations were slightly lower in samples obtained from the 0.5-inch monitoring well, regardless of the method of analysis. In addition, the least variation from the concentration means occurs in the samples collected from the 0.5-inch well with the exception of ethylbenzene as analyzed by EPA Method 8240, where the standard deviation for data from the 0.5-inch well slightly exceeds that from the 4-inch well. These relationships are evident in Figures 1 through 4, wherein the concentration data from the 0.5-inch well is generally more linear, with less pronounced fluctuations than the data from the 4-inch well, demonstrating greater stability of the data obtained from the 0.5-inch well.

The differences between the mean concentrations of the analytes, as determined by the two analytical methods are also smaller for the 0.5-inch well compared to the 4-inch well, i.e., the difference between mean benzene concentrations as determined by EPA Method 602 compared to EPA Method 8240 for the 0.5-inch well is 50 μg/l, and is 82 μg/l for the 4-inch well.

Which well more accurately reflects ground water conditions in the surrounding saturated zone? While other interpretations of the data are possible, two come easily to mind:

1. The 4-inch well more accurately represents the surrounding ground water conditions and the 0.5-inch well is too slow to react to variation of the surrounding ground water, creating the apparently more stable results observed; or

2. The removal of 35 gallons of ground water from AGE-1A during purging may induce some turbulent flow of ground water into the well casing, causing stripping of some volatile organic compounds from the ground water, resulting in generally lower concentrations detected and greater variability of analytical results.

If interpretation number 1 is correct, and assuming that the water sample collected from the 4-inch well is more representative of actual ground water composition, excessive purging of AGE-1, such as occurred on 29 April 1996, would be expected to produce a ground water sample with analytical results more similar to the paired sample from AGE-1A, and showing some difference from previous results from AGE-1. The results were actually among the more divergent between wells as analyzed by EPA Method 602 (Figures 1 and 3) and were not notably closer between the wells as analyzed by EPA Method 8240 (Figures 2 and 4). Compared to previous and subsequent analytical results from AGE-1 samples, the sample collected after excessive purging showed no significant difference, indicating great stability of results from the 0.5-inch well, and that greater purge volumes from the 0.5-inch well (AGE-1) are not required to obtain representative ground water samples.

If interpretation number 2 is correct, one would expect samples from AGE-1 to have slightly higher concentrations of hydrocarbons due to reduced turbulent flow in the smaller diameter well casing, which is what was observed.

Intuitively, hydrocarbon concentrations in representative ground water samples would be expected to exhibit only slight variations over short periods of time due to the usually slow rate of movement of ground water. The stability of analytical results from the 0.5-inch well and the slightly higher mean concentrations of the detected analytes leads us to conclude that the water samples collected from the 0.5-inch well may be the more representative of actual ground water conditions.

A useful way of comparing data to determine whether one data set is similar to or substantially different from a second data set is to cross plot two variables. If the data sets are essentially similar to one another, they should plot in the same general region, conversely, if the data sets are substantially different from one another, they would plot in different regions. Benzene and ethylbenzene concentrations were cross plotted to compare the data sets. Figure 5 shows the cross plotted data as determined by EPA Method 602, while Figure 6 shows the data as determined by EPA Method 8240. Both plots lack one or two data points due to non-detect results, which cannot be plotted on a log-log cross plot. The remaining data on each cross plot show the results from the 0.5-inch well to fall within a broader region of data points from the 4-inch well, as in Figure 5, or the data from both wells plots together in a rather tight region, as in Figure 6. These two plots strongly suggest to us that the data acquired from the 0.5-inch well is as representative of the surrounding ground water conditions as the data from the 4-inch well.

We feel that regulatory approval of the use of 0.5-inch ground water monitoring wells will greatly help clients and consultants in the environmental field by significantly lowering well installation and monitoring costs without loss of data integrity. The benefits to all involved include:

1. Decreased cost for installation of 0.5-inch monitoring wells Vs. 4-inch monitoring wells (approximately $30/ft Vs. $40/ft); and
2. Greatly diminished volumes, and therefore costs for disposal, of auger returns, development water and purge water.
3. Reliable data to track and model ground water conditions.

AGE would like to continue testing and using the 0.5-inch wells on active projects. AGE would appreciate your comments and thoughts on this subject.

If we can be of further assistance to you in regard to this matter, please contact our office at (714) 996-5151.

Sincerely,

***Advanced* GeoEnvironmental, Inc.**

Nuel C. Henderson, Jr.
Senior Staff Geologist
Advanced GeoEnvironmental, Inc.
Registered Geologist No. 5837

Scott Traub
Director of Operations
EnviroProbe

TABLE 2
LABORATORY RESULTS FOR WATER SAMPLES
EPA METHOD 8240
0.5-Inch Well Vs. 4-Inch Well
Results in micrograms per liter (μg/l)

Well/Date	Benzene	Toluene	Ethylbenzene	Total Xylenes
AGE-1-4/18/96	1,200	ND	930	ND
AGE-1-4/26/96	1,300	ND	1,000	ND
AGE-1-4/29/96	1,100	ND	1,100	ND
AGE-1-5/3/96	1,100	ND	610	ND
AGE-1-5/6/96	1,100	ND	ND	ND
AGE-1A-4/18/96	750	ND	ND	ND
AGE-1A-4/26/96	1,000	ND	860	ND
AGE-1A-4/29/96	910	ND	830	ND
AGE-1A-5/3/96	900	ND	820	ND
AGE-1A-5/6/96	1,200	ND	1,200	ND

Note: Detection limit = 500 μg/l.

Figure 1: Benzene Concentrations, 0.5" Well Vs 4" Well, EPA 602

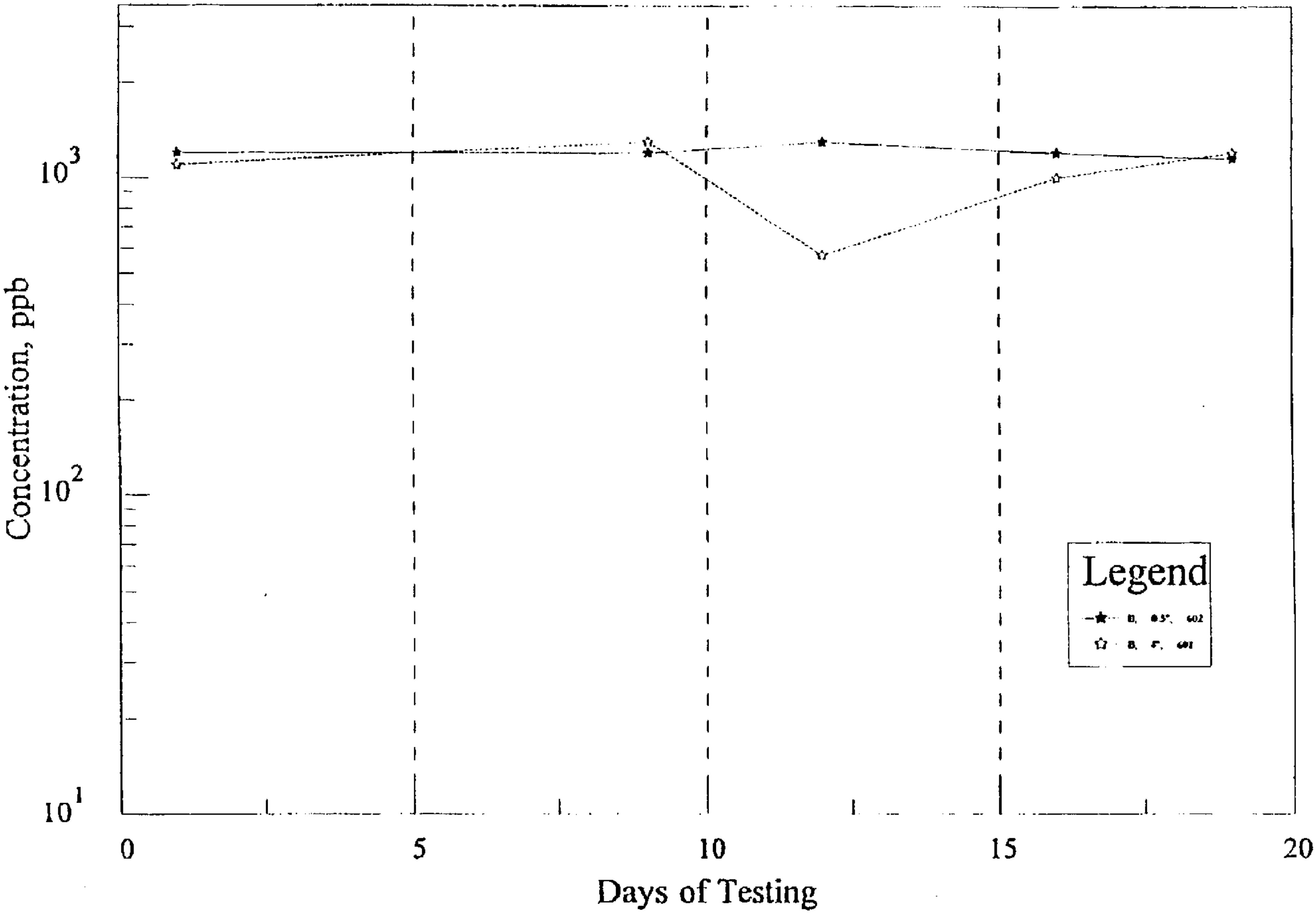


Figure 2: Benzene Concentrations, 0.5" Well Vs 4" Well, EPA 8240

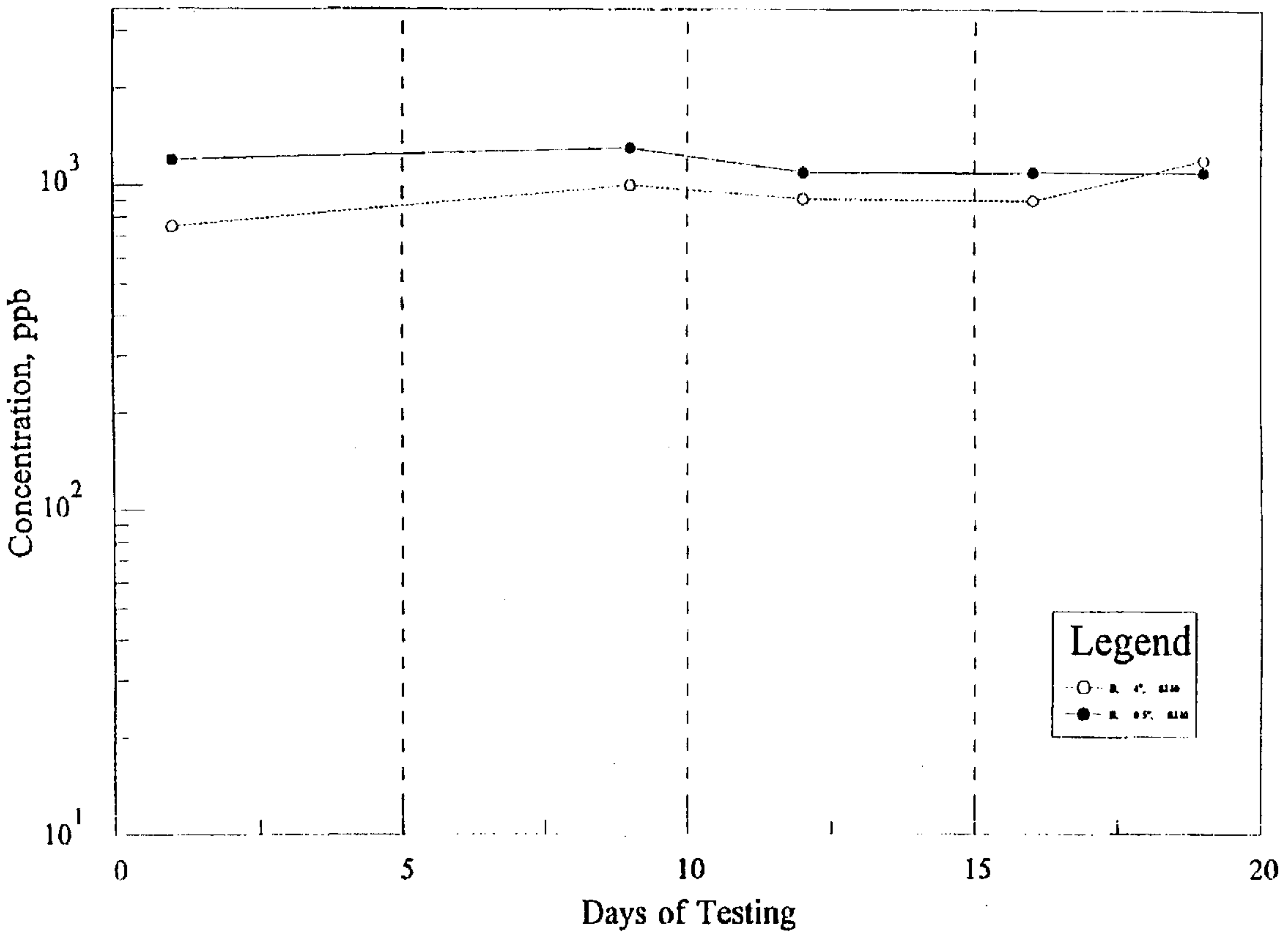


Figure 4: Ethylbenzene Concentrations, 0.5" Well Vs 4" Well, EPA 8240

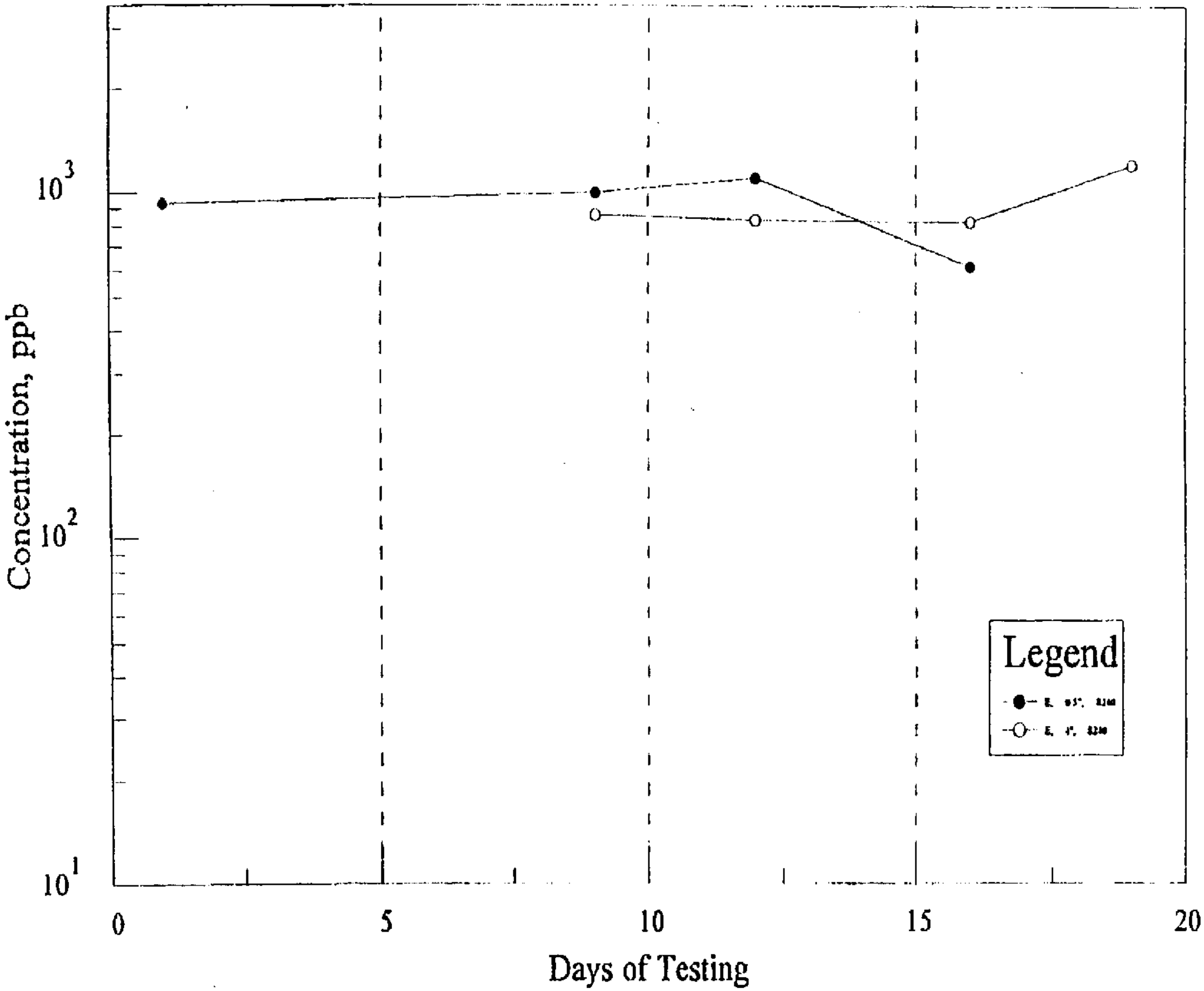


Figure 3: Ethylbenzene Concentrations, 0.5" Well Vs 4" Well, EPA 602

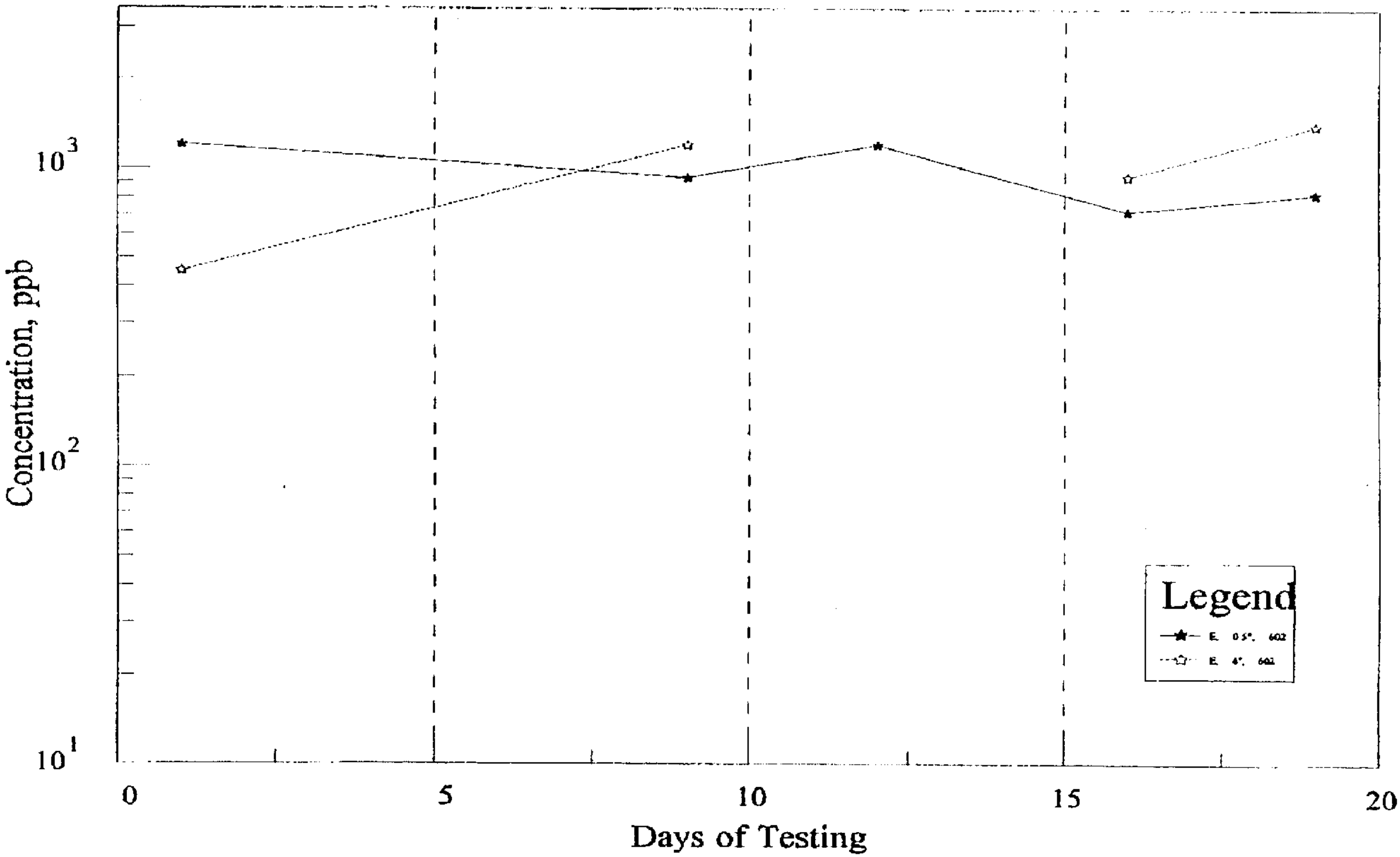


Figure 6: Benzene Vs Ethylbenzene Cross Plot, EPA 8240

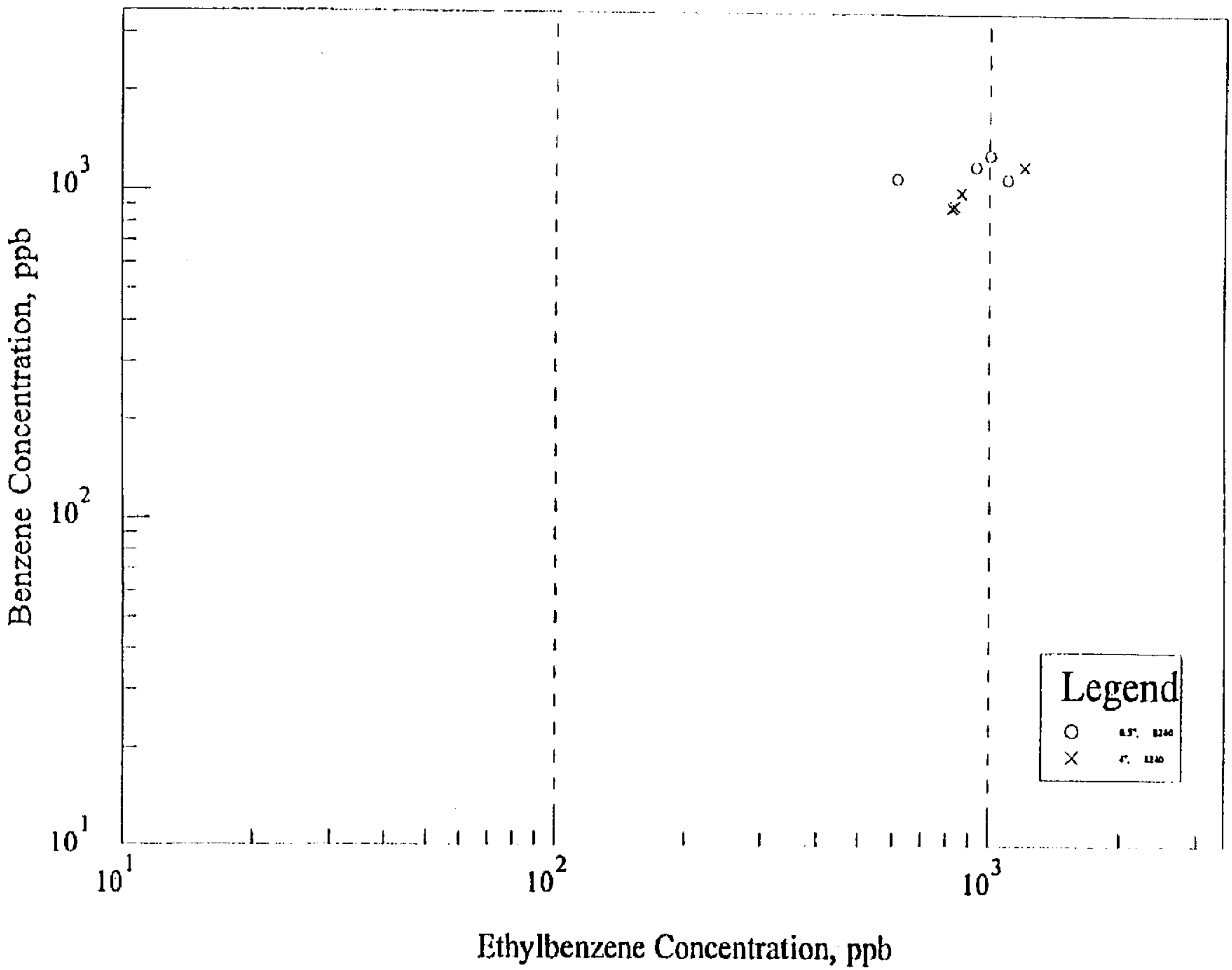


Figure 5: Benzene Vs Ethylbenzene Concentration, EPA Method 602