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Source Area Soil Remedy Evaluation

LEHIGH VALLEY RAILROAD DERAILMENT

BEDROCK VAPOR EXTRACTION RESULTS AND INTERPRETATIONS

February 5, 1999

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I. Introduction

II. Rock Core Sampling Event

In July 1998, DEC and IT Corp. staff collected rock samples for TCE analysis from the spill site and DC-5 area. While drilling for the upcoming Bedrock Vapor Extraction (BVE) pilot test, two wells were continuously cored for 100 feet and the rock cores were subsequently sampled for TCE. The cores were taken from the future EW-1 and EW-2 extraction wells, located near DC-1 and DC-5, respectively. During drilling at the EW-1 location, a mistake was made and only core from 26 feet to 100 feet bgs was sampled. The core for 0 to 25 feet had to be obtained from a different drilling location, five feet away, at one of the future observation wells.

Different segments of the core were selected for sampling, based on the number and size of visible fractures. The cores were then crushed with a hammer to 0.5 to 5.0 mm size gravel. Two different analytical procedures were used. In the first, approximately 50.0 g of the crushed core were then placed in a pre-weighed 8 oz wide-mouth jar containing approximately 50.0 g of methanol (also pre-weighed). These samples were sent to the NYSDEC lab in Saratoga. The other analytical method was the EPA standard (method 5035). For these samples, only 5.0 g of crushed rock were placed into a lab-supplied 40 mL bottle with 5.0 g of methanol pre-weighed. These samples were sent to a contract lab for analysis. The results are presented in Appendix A.

During sampling of the EW-1 cores, significant volatilization losses occurred during the crushing. Strong, pungent odors were detected in the top 25 feet of core once the particle size had been reduced to less than 5.0 mm. In one interval, at 6.5 feet bgs, two samples were collected with different particle sizes. The coarser sample, 5.0 to 10.0 mm, yielded results 50% higher than the normal particle size sample.

In general, the contract lab samples yielded lower concentrations than the NYSDEC lab samples. These differences can be attributed to several possible sources: First, the larger sample size would yield a more representative sample than the 5.0 g sample sent to the lab. Second, the contract lab samples tended to have a smaller particle size than the NYSDEC samples since any large pieces of core weighed too much for the 5.0 g sample. This difference in particle size would result in lower concentrations for the finer samples due to additional volatilization losses. Third, the NYSDEC samples were collected first from the crushed rock, within five minutes of actually crushing the rock. The contract lab samples were collected next and the crushed rock had been exposed to the air for a longer period of time, also increasing volatilization losses. Fourth, the labs may have held the samples for different extraction times before analysis. The NYSDEC samples were stored for over two weeks before the extracts were analyzed. This would allow greater extraction efficiency from the rock matrix than a sample that is allowed to extract for only a few days.[1]

The sample results obtained from the NYSDEC lab are more accurate than the contract lab samples, but they are biased low. Just how much volatilization and handling losses occurred is

[1] Research conducted by Beth Parker, Ph.D. at the University of Waterloo indicated that a minimum extraction time of two weeks is necessary to obtain reliable data from rock cores extracted with methanol. This information was conveyed to myself and Dave Foster by Beth during a site visit on July 20, 1998.

impossible to determine. However, I am confident that the data is at least internally consistent and useable.

Some interesting results were obtained regarding how the TCE is distributed in the bedrock. As expected, highly fractured areas, especially vertical fractures, contain large amounts of TCE. More surprisingly, the more competent and non-fractured sections of the core also revealed TCE contamination. This is probably due to the high porosity of the limestone and chemical diffusion of the TCE through the primary pore spaces. Samples of core containing chert revealed less TCE than the limestone. The chert is more crystalline in structure and does not seem to be absorbing TCE like the limestone does.

The high levels of contamination discovered in the top ten feet of rock at EW-1 are important. This section of rock will not be remediated by the BVE system, nor will it be addressed by the ex-situ soil SVE. In order to remediate this portion of the site, an alternative treatment method must be derived. One possibility is using in-situ thermal destruction technology similar to TerraTherm's.

III. Bedrock Vapor Extraction Test

Following the BVE drilling and sampling previously mentioned, the BVE pilot test was conducted from August 31, 1998 to XXXXXX. This test comprised of eight single extraction wells and three extraction well clusters. Each cluster had a central extraction well and two sets of three observation wells located radially from the extraction well (see figures in Appendix D). The single well tests were conducted by drawing vapor from the entire well interval, from the bottom of casing to the water table. The well clusters were tested at both the entire well interval and at packered-off sections. When packers were set in the well clusters, both the extraction well and the observation wells were isolated to a discrete horizon. The observation wells were monitored for vacuum influence from the extraction wells.

At each location, test parameters were slightly different. Vacuum levels and air flow rates were varied in order to determine the optimum operation parameters. During all testing, the wellhead air was periodically sampled with a PID specifically calibrated for TCE. Tabular field results are included in the appendix.

The test results revealed several characteristics of the bedrock. The site geology is somewhat heterogeneous, with two of the extraction wells producing no air and some of the wells producing over 70 scfm. The NAPL "plume" seems to follow a north-south trend along the railroad tracks extending from the DC-1 area to beyond the DC-15 area. As the distance from this axis is increased either east or west, the vapor concentrations seem to drop quickly from hundreds of ppm to tens of ppm. Also, as the distance south increases, the NAPL "plume" appears to be getting deeper. These results correlate closely with the core sampling data obtained during drilling.

During full-scale design, extreme care should be taken to interpret the BVE data and determine an

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appropriate "radius of influence," in as much as that term is accurate for fractured bedrock. Further, an easterly extension of the system should be tested along Gulf Road. There is strong anecdotal evidence that the wells east on Gulf Road were pumping NAPL shortly after the spill occurred. This area was not tested during the pilot test, but may represent a significant zone of TCE migration.

A PILOT STUDY OF TCE VAPOR EXTRACTION IN FRACTURED LIMESTONE

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ABSTRACT

The Lehigh Valley Railroad Spill site is the location of a 1970 railroad accident in which 30,000 gallons of TCE were spilled onto shallow soils overlying limestone and dolomite bedrock. The resulting uncontrolled migration has produced one of the largest ground water plumes in New York State. Following several years of remedial investigations, bedrock vapor extraction was chosen as a major component of the remedial plan.

Because vapor extraction technology is conventionally applied to unconsolidated overburden deposits, the application in bedrock is not thoroughly understood. For this reason a bedrock vapor extraction pilot test was performed at the subject site. This paper describes the design, implementation, and results of the pilot test.

INTRODUCTION

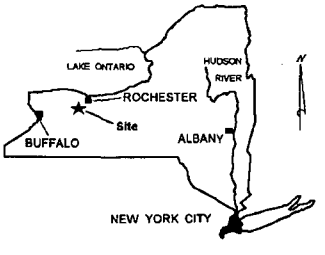
In December 1970, a train operated by the Lehigh Valley Railroad derailed at a grade crossing in the Town of LeRoy, NY. As a result of the derailment, two tank cars containing approximately 30,000 gallons to trichloroethene (TCE) ruptured and spilled their contents onto the ground. In addition, a car full of cyanide salts also ruptured, spilling its contents at the site. The immediate

response to the accident was to protect the public from the spilled cyanide. While the containment and cleanup of the cyanide continued, the TCE was allowed to infiltrate into the subsurface.

The derailment occurred in a rural area in the southern margin of the Ontario Lake Plain approximately 20 miles southwest of Rochester, NY (Figure 1). The spill site is 770 feet above mean sea level, and the surrounding area is a relatively level glaciated limestone and dolostone plateau. Within a half-mile radius surface elevation varies from 720 to 785 feet above msl. A deeply incised stream (Oatka Creek) flows in a 100 foot deep gorge 2/3 mile north of the site. Mud Creek, a tributary of Oatka Creek, flows immediately adjacent to the spill site and over a 30 foot waterfall ½ mile downstream of the site. Land use is rural residential, recreational and industrial. In the area of the site and its plume, there are over 100 residences, three sportsman's (hunting) clubs occupying abandoned farmland, and several large active and inactive limestone and dolostone quarrying operations.

The site is characterized by thin overburden soils ranging between one and four feet thick. The impacted bedrock beneath the site consists of sedimentary rocks. The vertical relation of the rock units is illustrated in Figures 2 and 3. The Camillus formation is a Silurian aged sequence of green shales, anhydrites and occasional dolostones. The Bertie formation is a Silurian sequence of argillaceous dolostones. The Akron formation is a discontinuous thin dolostone of Silurian age. The Bois Blanc formation is a thin and discontinuous cherty limestone of Devonian age. The Onondaga formation is a Devonian limestone comprised of four members, with varying contents of sand, chert, and fossil remains. Bedrock exposures in nearby quarries reveal well developed vertical joint sets and bedding plane partings.

In 1992 the New York State Department of Environmental Conservation (NYSDEC) initiated a Remedial Investigation and Feasibility Study (RI/FS) for the site. Completed in 1996, the RI/FS led to a Record of Decision (ROD) in March 1997. The RI/FS revealed extensive residual contamination of the site soils and bedrock. A ground water contamination plume associated with the source area stretches more than 3½ miles to the east of the site. It has contaminated at least 35 residential wells and is threatening many more. Based on dissolved concentrations of TCE exceeding 1% of its solubility, an approximately 10- acre "source area" of NAPL-contaminated bedrock is inferred to be present. However, no direct evidence of NAPL was encountered during the drilling or sampling activities of the RI. [1]



One conclusion of the remedial investigation is that dissolved TCE concentrations in groundwater samples change dramatically as the water table rises and falls seasonally. The water table fluctuates from 50 feet below ground surface (fbgs) in the summer and early fall to 30 fbgs in the late winter and early spring. When the water table is at its lowest level, the dissolved TCE concentrations at the spill site historically average below 10 mg/L (ppm). When the water table rises during the spring melt, dissolved TCE concentrations increase to approximately 60 mg/L (ppm). This observation led investigators to conclude that there is likely to be a large mass of TCE residing in the vadose zone of the bedrock and that this portion of the source area contamination comes into contact with ground water only as the water table rises.

The presence of a permanent 30-foot thick vadose zone above the high ground water elevation leads to the conclusion that any residual contamination in the upper thirty to fifty feet of bedrock is amenable to removal by vapor extraction technology. Based on a policy of attempting source removal whenever possible to restore groundwater quality, the NYSDEC selected bedrock vapor extraction (BVE) as its primary remedial approach for the bedrock contamination. Because of the inherent uncertainties of addressing DNAPL contamination in fractured bedrock, the ROD stipulates that a detailed pilot test be conducted to determine the operating parameters of the BVE system.

Review of EPA literature has turned up at least two other sites where BVE has been attempted. BVE was attempted at these sites only after hydraulic or pneumatic fracturing of the rock had been completed. [2] The EPA citizens' guide to SVE also suggests that vapor extraction may be an appropriate technology for use in fractured rock. [3]

BVE is a relatively novel use of an existing, well-understood technology. TCE is readily remediated from most soils using vapor extraction in a relatively short time frame. Applying this technology to fractured rock presents an array of complicating factors. Most regulatory agencies and PRPs are reluctant to risk significant sums of money and long periods of time on unproven remedies with

an uncertain chance of success. Further, the technical and operating parameters of a BVE system are difficult and costly to determine. Extraction wells need to be placed so as to intercept as many contaminant-bearing fractures as possible. Because the exact areal and vertical delineation of a NAPL problem can be difficult, the probability of installing too many or too few wells is high. Randomly drilling wells risks producing inconsistent and unreliable results. Even after the appropriate locations of extraction wells are determined, estimating appropriate flow rates and applied vacuum levels can be difficult to estimate.

The NYSDEC determined the Lehigh Valley site is an appropriate candidate for BVE technology because of the combination of the following conditions. There is a sufficiently thick vadose zone where the majority of contamination is located; the site is a government-funded project, eliminating the reluctance of PRPs to conduct source remediation in fractured rock; an exact location of the release is known; and a known quantity of material was released. The only uncertainties left to resolve are to "fine tune" the boundaries of the NAPL area and determine the pneumatic properties of the bedrock.

In reviewing the remedial alternatives, the ROD concluded that BVE offered the best combination of overall protection of human health and the environment, reduction in toxicity, volume and mobility, and long-term effectiveness and permanence [4,5]. For comparison, a containment strategy, if feasible, would never restore the site to pre-release conditions. While a containment strategy may or may not be feasible at this site, longstanding state policy is to attempt source treatment in preference to a containment strategy.

The Feasibility Study emphasized that the success of the BVE system would be highly dependent on completing a series of focused investigations and pilot tests at the site. In order to implement the remedy, a pilot test was necessary to determine or estimate the unknown parameters: precise area of contamination, depth of contamination, appropriate applied vacuum and corresponding flow rates, and an estimated mass removal rate. The study would also need to confirm the theory that a significant mass of TCE is present in the vadose zone and it is recoverable using vapor extraction technology.

NYSDEC staff conceptualized how to optimize data collection and developed the testing protocol to achieve it. Design of the pilot test was then assigned to a consultant who refined the details and hired a vapor extraction contractor. Planning and design of the pilot test required several months of close interaction between the NYSDEC and its consultant.

BVE PILOT STUDY

A total of 29 wells were drilled across the 10-acre suspected NAPL area. Twenty-seven of the wells were completed using an air rotary rig without any coring or subsurface sampling to a total depth of 60 feet bgs. These wells were an open-hole construction and spanned the Onondaga and upper Bertie Formations (Figure 2).

In order to estimate the vertical distribution of TCE in the fractured rock, the pilot test included chemical analysis of rock cores for TCE. Two wells were continuously cored and logged by a field geologist to a depth of 100 feet bgs. These wells spanned the Onondaga, Bertie and upper Camillus Formations. Field personnel selectively sampled both rock cores for residual TCE. Samples were selected based on visual identification of highly fractured portions of the rock. Several portions of the core from highly competent, non-fractured sections were also analyzed for comparison. Investigators used the comparison to determine if diffusion of TCE into the primary pore spaces of the rock matrix was occurring at the site.

The core sections selected for sampling were crushed using a hammer to 0.5- to 5.0-mm size gravel. The crushed stone for each sample was then transferred into a clean disposable paper cup. From the paper cup, an appropriate mass of rock was measured off and placed into a pre-weighed sampling vial containing methanol. Two different sampling methods were used. The first method was EPA method 5035. For these samples, only 5.0 g of crushed rock was placed into lab-supplied 40-mL bottles, pre-weighed and pre-filled with methanol.

A second sampling protocol was used for comparison. NYSDEC staff developed this protocol in conjunction with other researchers. [6] In this method, approximately 50.0 g of crushed rock were placed into pre-weighed 8-oz. wide-mouth jars containing approximately 50.0 g of methanol (also pre-weighed).

All measurements were conducted using a field scale sensitive to 0.1 g. The scale was recalibrated regularly during the sampling event. All samples were placed in coolers and kept at 4° C for transportation to the lab. An independent contract laboratory adhering to the EPA method analyzed the first set of samples. A NYSDEC laboratory analyzed the second set of samples. The NYSDEC samples were stored in a refrigerator for two weeks before analysis. The two-week waiting period before analysis was designed to allow complete extraction of the TCE from the rock matrix and micro-fractures.

Upon completion of all coring and sampling activities, the two cored wells

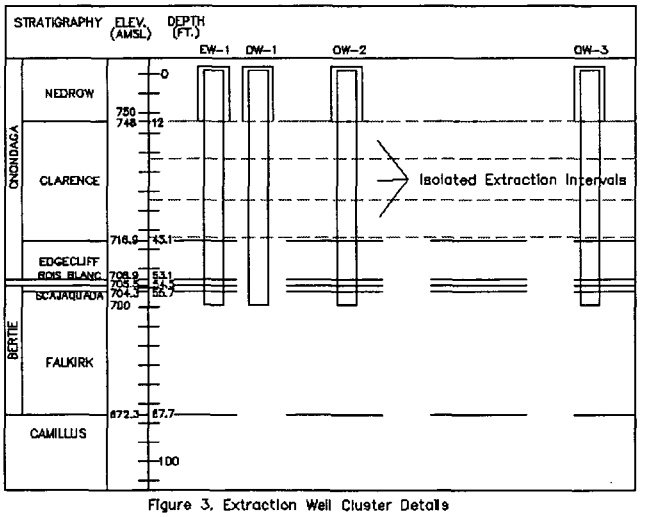


Figure 3. Extraction Well Cluster Details

were grouted back to 60 feet bgs and were completed identically to the other 27 wells.

One month after the coring and sampling were completed, the pilot study was begun. Two different types of extraction tests were performed at the site. For eight of the wells, a sanitary well cover was used to seal the well while vapors were extracted from the entire open rock interval of the well. At three other locations, observation wells were installed at 5, 15, and 50 feet from the extraction wells (Figure 3). The observation wells were monitored during extraction with vacuum transducers. These wells were designed to determine the extent of vacuum propagation in the fractured bedrock. In the three locations with observation wells, additional tests were conducted using well packers to isolate different portions of the stratigraphy. Each of the three locations was tested using an open hole and three different isolated intervals. The packer-isolated tests were designed to give detailed information on the variability of both TCE vapors and radius of influence over the depth of the well. A computerized data logger was used to continuously collect applied and induced vacuum data from the extraction and observation wells. Real-time vapor concentrations were measured using an organic vapor analyzer field-calibrated with 100-ppmv standard TCE gas. At three points in each test, a vapor sample was collected using Summa Canisters and sent to a certified laboratory for analysis.

OBSERVATIONS

On two occasions during drilling activities, a NAPL sheen was observed in the rock core obtained from the spill site. When a fragment of core was broken open along a fracture, the sheen was visible on both internal surfaces of the fracture.

During sampling, a strong solvent odor was detected during the crushing of the cores. This anecdotal evidence suggests that all analytical results should be biased low due to volatilization losses in the field. In addition to the volatilization losses during crushing, the act of coring these rock samples would also be expected to remove a significant portion of the residual TCE due to the heat of drilling and the introduction of pressurized coring water.

The samples analyzed by the NYSDEC lab revealed considerably higher concentrations of TCE than those analyzed by the independent lab using EPA Method 5035. The difference in results can probably be attributed to two different sources of variation. Since the NYSDEC samples were comprised of 50.0 g of material instead of 5.0 g, the samples were more likely to be representative of the actual conditions in the formation. In addition, The NYSDEC samples were stored for two weeks prior to analysis. This extra time would have allowed a greater amount of TCE to be extracted from micro-fractures or the primary porosity of the rock.

The results of the rock core sampling for BVE well number one are shown in Figure 4. The residual NAPL is primarily contained in the upper 35 to 40 feet of

the site, with little to no NAPL present below the Clarence member of the Onondaga formation. In addition, samples obtained from cherty zones in the limestone contained little TCE while those samples that were nearly all limestone or dolomite were the most heavily contaminated. Further, the data indicate that samples collected from the competent, non-fractured rock were much less contaminated than the fractured sections. The highly fractured areas had TCE concentrations between one and two orders of magnitude greater than competent areas located six inches from nearby fractures.

The data presented in figure 4 tend to confirm the findings of the RI, showing that much of the variation in dissolved TCE concentrations can be correlated with seasonal changes in the water table.

The vapor extraction test also yielded valuable data. On average, the rock formation was capable of producing between 60 and 70 scfm from each well with 150 to 200 inches of water applied vacuum. Two wells did not produce any air and those tests could not be completed. At each of the observation wells where an influence was detected, the response was almost immediate, with the vacuum propagating through the fractures within seconds.

Measurement of the induced vacuum at nearby observation wells was difficult to interpret and verify. Some wells showed an excellent response to the applied vacuum, with an extrapolated influence beyond 50 feet. Other observation wells, including wells located only 5 feet from the extraction well, showed little to no influence from the applied vacuum.

Most of the observation well pressure measurements were subject to barometric variability. For a given test, several of the observation wells underwent coincidental changes in the ambient pressure. These changes were usually large in comparison to the influence from the extraction well. Further evaluation of these data may help to identify which wells intersected vertical fractures and which wells were more influenced by bedding-plane fractures.

OVM readings during the vapor extraction tests did not correlate with the Summa Canister samples. Since the test was conducted over a period of several

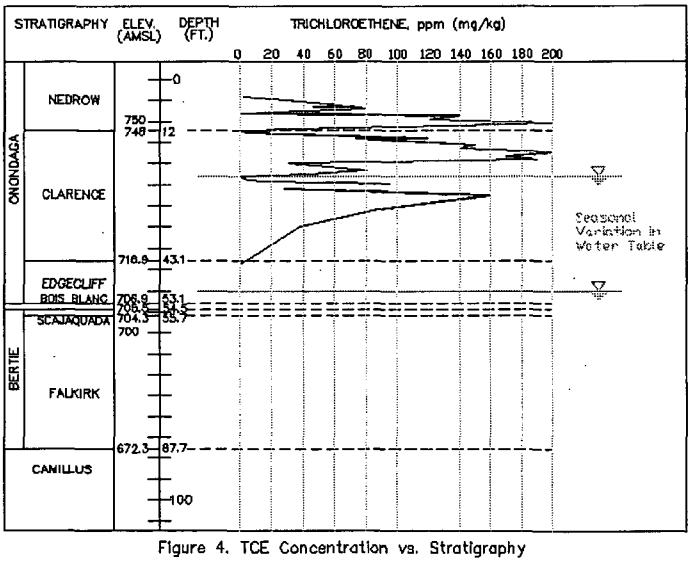


Figure 4. TCE Concentration vs. Stratigraphy

weeks, the variation in atmospheric conditions (barometric pressure, relative humidity, temperature, and suspended particulates) along with gradual deviation from the calibrated setting caused the OVM data to be less reliable. All vapor concentrations reported here refer to laboratory-certified results unless otherwise noted.

The packer-isolated interval tests revealed that the extractable vapors changed with depth across the site. At the location of the spill, the highest concentrations were observed in the upper 15 feet of the bedrock. Concentrations decreased with depth from there, reaching much lower levels at the 32-42 fbgs interval. Conversely, at the well cluster located approximately 600 feet south of the spill site, TCE concentrations were much lower at the shallow depths and increased at the middle and deeper intervals.

The tests also helped reveal the areal extent of contamination. Results of these tests show that the NAPL source is apparently concentrated in a near north-south axis through the site. The areal and vertical trends combined suggest that the DNAPL migrated along the bedding planes in a southerly direction and would "drop" into successively lower stratigraphic layers as it continued south.

CONCLUSIONS

The pilot study has helped delineate the areal extent of contaminated bedrock at the site. The NAPL-influenced area delineated in the RI was based on TCE concentrations in groundwater monitoring wells. The vapor extraction pilot test has refined the boundaries of the source area. In comparison, the contaminated groundwater plume suggests a larger source area than the vapor tests indicate.

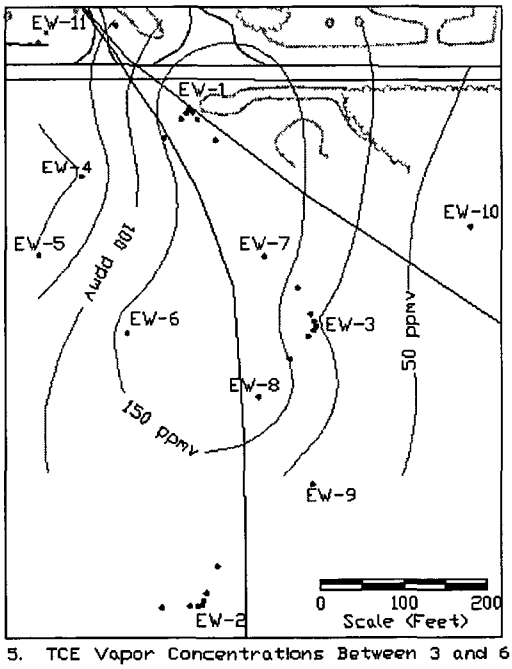


Figure 5. TCE Vapor Concentrations Between 3 and 6 Hours

Because hydrogeologic conditions at this site result in rapid groundwater flow rates, relying on aqueous TCE concentrations alone would tend to overstate the size of the source area. Keeping this in mind, it is further possible that the vapor tests have also overstated the size of the NAPL-influenced source area. In either case, the vapor extraction pilot test has helped to define the shape and relative strength of the NAPL source area.

The rock core sampling conducted almost 28 years after the spill event indicates that the residual TCE resides primarily within the vadose zone. A significant portion of this residual TCE appears to be adsorbed onto fracture (and presumably micro-fracture) surfaces. The data suggest that diffusion of TCE into the primary pore spaces of the rock is likely occurring as a secondary mechanism. The difference between competent rock samples and highly fractured rock samples show up to two orders of magnitude difference in TCE concentrations. Because the majority of TCE is readily available to vapor extraction technology, an active source clean up can be pursued at this site.

The ability of traditional vapor extraction technology to remove volatile organics from fractured bedrock media has been demonstrated. The test results show that appreciable quantities of TCE can be recovered using the vapor extraction method. However, once recovery rates decline sufficiently, then the mass-transfer of TCE from the micro-fractures into the vadose vapors will become an important issue. If mass transfer rates are determined to be very slow, then the residual threat to groundwater would also be considerably lower. In the meantime, the vapor extraction system will be able to recover a large portion of mass that is currently freely available and is seasonally contaminating the groundwater.

Several technical issues remain to be resolved during the design of the system. These include estimating the radius of influence in the fractured rock matrix and spacing the wells appropriately. In addition, the vertical distribution of recoverable vapors is variable. A decision must be made whether the vapor recovery will proceed with open holes or with vertically-targeted zones in each part of the site.

Extractable quantities of vapor were present at a considerable distance from the spill site. Whether the TCE has actually migrated over 500 feet to the south or strong connections to contaminated fractures are pervasive at the site allowing vapors to be carried long distances must be further evaluated.

The area of influence within the subsurface appears to be highly fracture-controlled. In many cases, nearby observation wells produced inconsistent results. At EW-3, the extraction well was producing 60 scfm of contaminated vapors, but none of the observation wells five or fifteen feet away had any measurable influence.

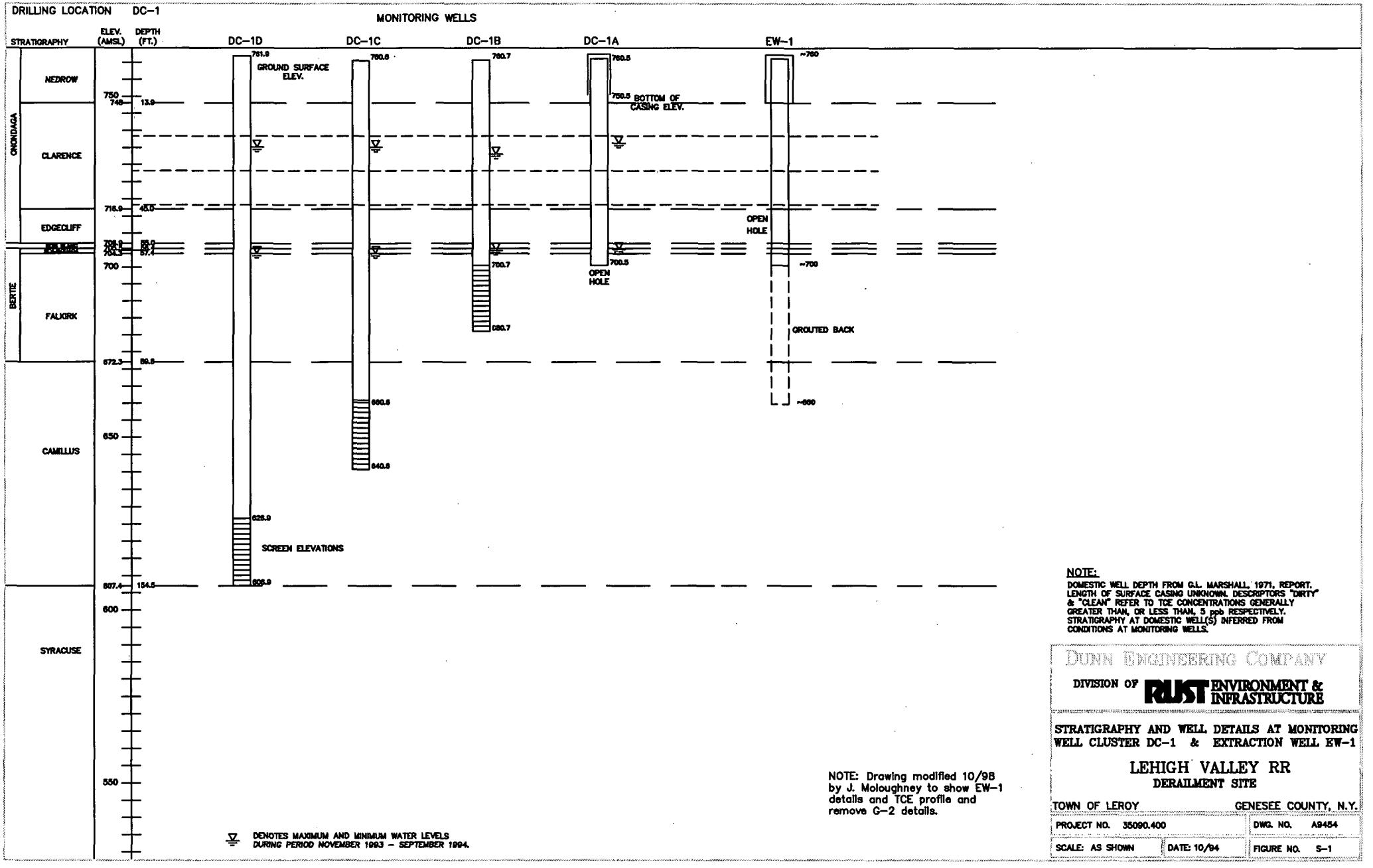
Additional work will need to be conducted to properly place the extraction wells during design. Improper placement may yield unproductive wells or highly productive clean wells. One promising tool is the use of a shallow 3-D seismic survey to identify major fractures in the subsurface. [6]

ACKNOWLEDGEMENTS

The authors would like to thank the Dr. Beth Parker for her assistance in developing the rock core sampling protocol. Additionally, Edward Rashak of IT Corporation was instrumental in helping to design the vapor extraction test protocols.

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NOTE:
DOMESTIC WELL DEPTH FROM G.L. MARSHALL, 1971, REPORT. LENGTH OF SURFACE CASING UNKNOWN. DESCRIPTORS "DIRTY" & "CLEAN" REFER TO TCE CONCENTRATIONS GENERALLY GREATER THAN, OR LESS THAN, 5 ppb RESPECTIVELY. STRATIGRAPHY AT DOMESTIC WELL(S) INFERRED FROM CONDITIONS AT MONITORING WELLS.

NOTE: Drawing modified 10/98 by J. Moloughney to show EW-1 details and TCE profile and remove G-2 details.

DUNN ENGINEERING COMPANY
DIVISION OF RUST ENVIRONMENT & INFRASTRUCTURE

STRATIGRAPHY AND WELL DETAILS AT MONITORING WELL CLUSTER DC-1 & EXTRACTION WELL EW-1

LEHIGH VALLEY RR
DERAILMENT SITE

TOWN OF LEROY GENESEE COUNTY, N.Y.

PROJECT NO. 35090.400		DWG. NO. A9454
SCALE: AS SHOWN	DATE: 10/94	FIGURE NO. S-1

DRILLING LOCATION DC–1

MONITORING WELLS

STRATIGRAPHY	ELEV (AMSL)	DEPTH (FT)
ONONDAGA / NEDROW	750	
	748	13 9
ONONDAGA / CLARENCE		
	716 9	45 0
ONONDAGA / EDGECLIFF		
BOIS BLANC	706 9	55 0
SCAJAQUADA	705 9	56 4
	704 3	57 4
BERTIE / FALKIRK	700	
	672 3	89 6
CAMILLUS	650	
	607 4	154 5
SYRACUSE	600	
	550	

DC–1D: 761 9 GROUND SURFACE ELEV; 626 9 SCREEN ELEVATIONS; 606 9

DC–1C: 760 6; 660 6; 640 6

DC–1B: 760 7; 700 7; 680 7

DC–1A: 760 5; 750 5 BOTTOM OF CASING ELEV; 700 5 OPEN HOLE

EW–1: ~760; OPEN HOLE; ~700; GROUTED BACK; ~660

▽ DENOTES MAXIMUM AND MINIMUM WATER LEVELS DURING PERIOD NOVEMBER 1993 – SEPTEMBER 1994

NOTE Drawing modified 10/98 by J Moloughney to show EW–1 details and TCE profile and remove G–2 details

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DOMESTIC WELL DEPTH FROM G L MARSHALL, 1971, REPORT LENGTH OF SURFACE CASING UNKNOWN DESCRIPTORS "DIRTY" & "CLEAN" REFER TO TCE CONCENTRATIONS GENERALLY GREATER THAN, OR LESS THAN, 5 ppb RESPECTIVELY STRATIGRAPHY AT DOMESTIC WELL(S) INFERRED FROM CONDITIONS AT MONITORING WELLS

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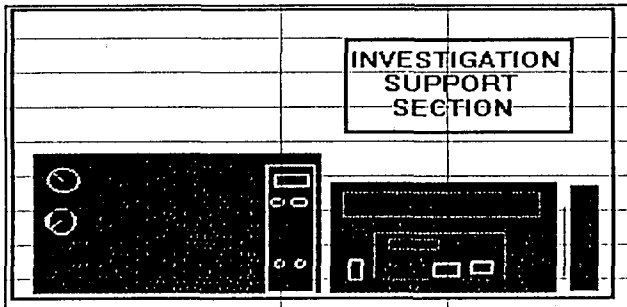
STRATIGRAPHY AND WELL DETAILS AT MONITORING WELL CLUSTER DC–1 & EXTRACTION WELL EW–1

LEHIGH VALLEY RR

DERAILMENT SITE

TOWN OF LEROY GENESEE COUNTY, N Y

PROJECT NO 35090 400		DWG NO A9454
SCALE AS SHOWN	DATE 10/94	FIGURE NO S–1



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION

LABORATORY ANALYTICAL REPORT

VOLATILE ORGANICS SPECIAL ANALYSIS DATA SHEET

Lab Sample ID	Field ID	Analysis Date	Volume MeOH analyzed(ml)		TCE (ng)	MD	TCE/MeOH analyzed (ng/ml)
898-208-01	EW-2-1	11-Aug-98	1		9.8		9.8
898-208-02	EW-2-2	6-Aug-98	0.1		66.98		669.8
898-208-03	EW-2-3	11-Aug-98	1		28.11		28.11
898-208-04	EW-2-4	11-Aug-98	1	<	5	<	5
898-208-05	EW-2-5	14-Aug-98	0.25	<	5	<	20
898-208-06	EW-2-6	14-Aug-98	0.25		12.16		48.64
898-208-07	EW-2-7	14-Aug-98	0.25	<	5	<	20
898-208-08	EW-2-8	14-Aug-98	0.25		5.05		20.2
898-208-09	EW-2-9	14-Aug-98	0.25	<	5	<	20
898-208-10	EW-2-10	14-Aug-98	0.25	<	5	<	20
898-212-01	EW-1-1	18-Aug-98	0.01		222.32		22232
898-212-02	EW-1-2	18-Aug-98	0.004		510.93		127732.5
898-212-03	EW-1-3	18-Aug-98	0.005		346.19		69238
898-212-04	EW-1-4	18-Aug-98	0.005		192.41		38482
898-212-05	EW-1-5	19-Aug-98	0.005		117.2		23440
898-212-06	EW-1-6	19-Aug-98	0.25		58.74		234.96
898-212-07	EW-1-7	19-Aug-98	0.25		22.01		88.04
898-212-08	EW-1-8	19-Aug-98	0.25		35.27		141.08
898-212-09	EW-1-9	19-Aug-98	0.25		31.15		124.6
898-212-10	EW-1-10	19-Aug-98	0.25		31.99		127.96
898-212-11	EW-1-11	19-Aug-98	0.25		53.07		212.28
898-212-12	EW-1-12	19-Aug-98	0.25		38.43		153.72
898-212-13	EW-1-13	20-Aug-98	0.25		22.66		90.64
898-212-14	EW-1-14	20-Aug-98	0.25		19.43		77.72
898-212-15	OW-1A-15	20-Aug-98	0.1		205.76		2057.6
898-212-16	OW-1A-16	20-Aug-98	0.005		236.88		47376
898-212-17	OW-1A-17	20-Aug-98	0.005		100.51		20102
898-212-18	OW-1A-18	21-Aug-98	0.005		163.36		32672
898-212-19	OW-1A-19	21-Aug-98	0.005		326.27		65254
898-212-20	OW-1A-20	21-Aug-98	0.1		65.84		658.4
898-212-21	OW-1A-21	21-Aug-98	0.005		487.36		97472
898-212-22	OW-1A-22	21-Aug-98	0.005		481.85		96370

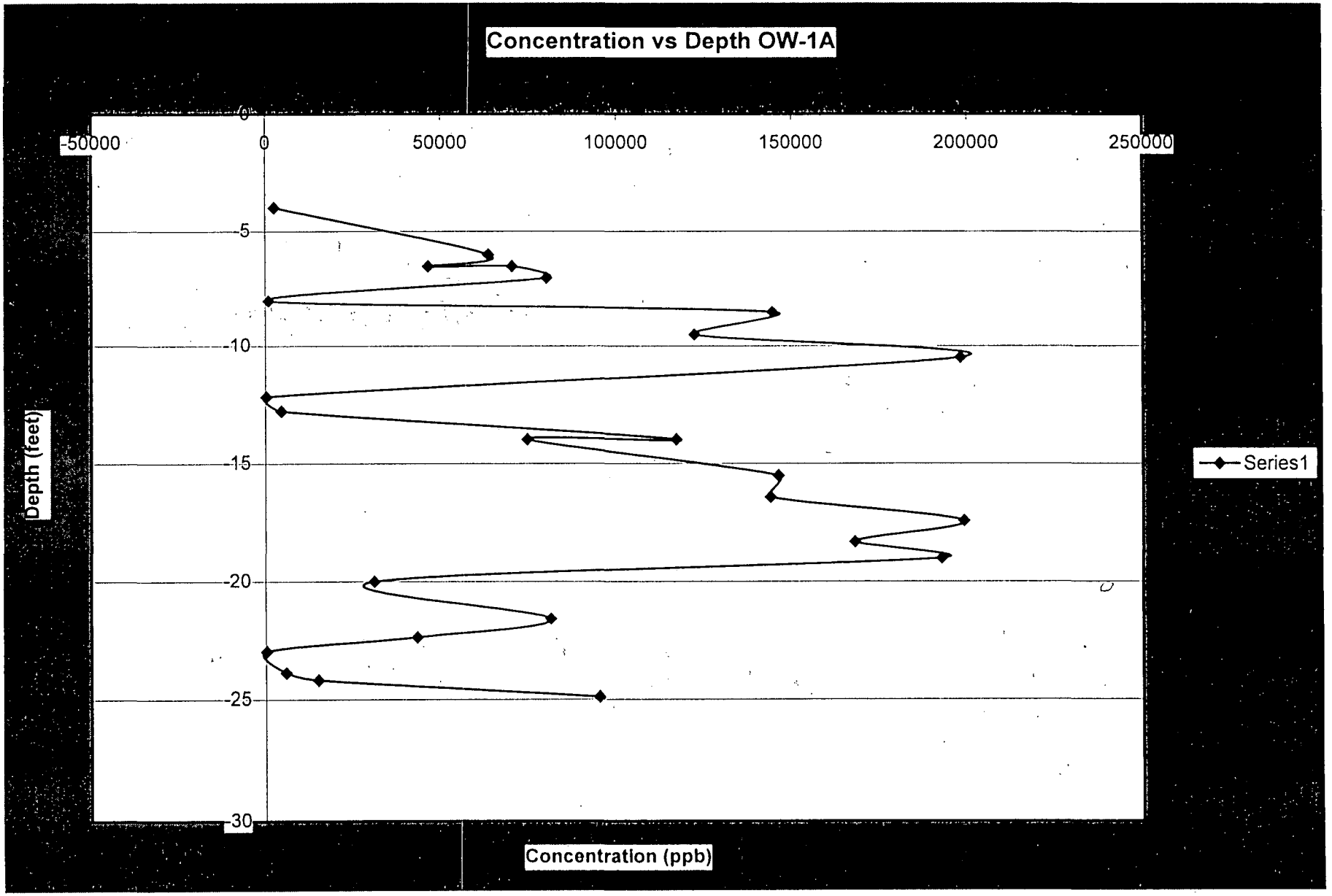
Lab Sample ID	Field ID	Analysis Date	Volume MeOH analyzed(ml)		TCE (ng)		TCE/MeOH analyzed (ng/ml)
898-212-23	OW-1A-23	21-Aug-98	0.005		805.42		161084
898-212-24	OW-1A-24	21-Aug-98	0.25		38.94		155.76
898-212-25	OW-1A-25	21-Aug-98	0.25		890.34		3561.36
898-212-26	OW-1A-26	21-Aug-98	0.005		531.67		106334
898-212-27	OW-1A-27	24-Aug-98	0.005		237.52		47504
898-212-28	OW-1A-28	24-Aug-98	0.005		559		111800
898-212-29	OW-1A-29	24-Aug-98	0.005		553.57		110714
898-212-30	OW-1A-30	24-Aug-98	0.005		793.68		158736
898-212-31	OW-1A-31	24-Aug-98	0.005		674.86		134972
898-212-32	OW-1A-32	24-Aug-98	0.005		725.92		145184
898-212-33	OW-1A-33	24-Aug-98	0.002		49.79		24895
898-212-34	OW-1A-34	24-Aug-98	0.002		125.62		62810
898-212-35	OW-1A-35	24-Aug-98	0.005		172.02		34404
898-212-36	OW-1A-36	25-Aug-98	0.25		45.03		180.12
898-212-37	OW-1A-37	25-Aug-98	0.05		228		4560
898-212-38	OW-1A-38	25-Aug-98	0.01		116.73		11673
898-212-39	OW-1A-39	25-Aug-98	0.005		378.15		75630
898-212-40	BLANK	25-Aug-98	0.25		8.7		34.8

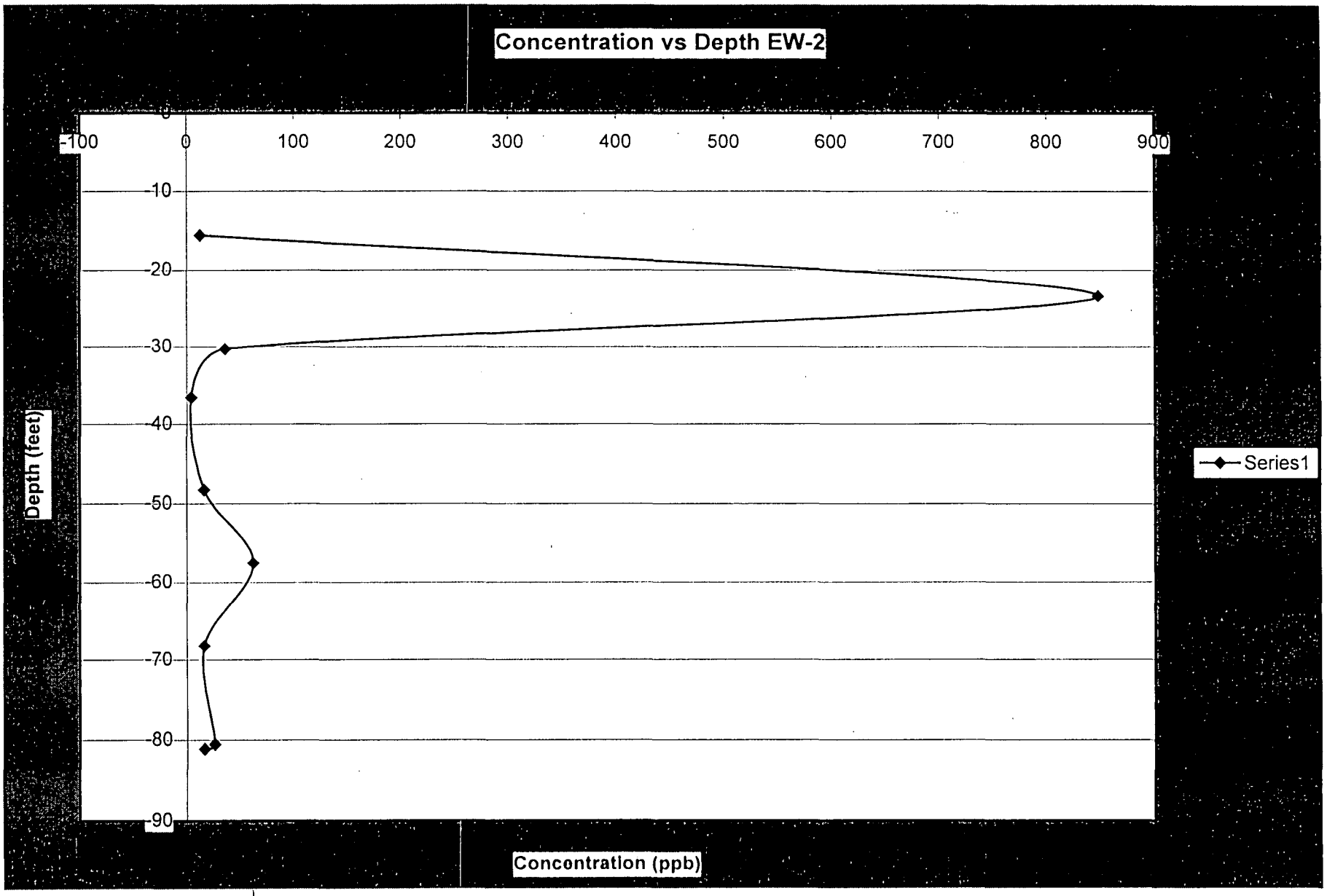
Lab Sample ID	Field ID	mass MeOH(g)	MeOH(ml)	mass Rock(g)	Vol MeOH/mass Rock(ml/g)	MDL	TCE/mass Rock(ng/g)	Depth(ft)
898-208-01	EW-2-1	50	63.29114	50	1.27		12.41	15.5
898-208-02	EW-2-2	50	63.29114	50	1.27		847.85	23.3
898-208-03	EW-2-3	50	63.29114	50	1.27		35.58	30.3
898-208-04	EW-2-4	50	63.29114	50	1.27	<	3.95	36.6
898-208-05	EW-2-5	50	63.29114	50	1.27	<	15.80	48.25
898-208-06	EW-2-6	50	63.29114	50	1.27		61.57	57.5
898-208-07	EW-2-7	50	63.29114	50	1.27	<	15.80	68.2
898-208-08	EW-2-8	50	63.29114	50	1.27		25.57	80.5
898-208-09	EW-2-9	50.1	63.41772	50	1.27	<	15.83	81.1
898-208-10	EW-2-10	50	63.29114	0		<	0.00	
898-212-01	EW-1-1	50.2	63.5443	50.1	1.27		28197.94	26
898-212-02	EW-1-2	50	63.29114	50	1.27		161686.71	27.5
898-212-03	EW-1-3	50.1	63.41772	50.1	1.27		87643.04	30.8
898-212-04	EW-1-4	50	63.29114	64.4	0.98		37819.40	34.8
898-212-05	EW-1-5	50.2	63.5443	28.5	2.23		52262.40	34.5
898-212-06	EW-1-6	50.3	63.67089	79.4	0.80		188.41	43.8
898-212-07	EW-1-7	50	63.29114	50.2	1.26		111.00	48.5
898-212-08	EW-1-8	50.7	64.17722	50.9	1.26		177.88	53.9
898-212-09	EW-1-9	48.6	61.51899	30	2.05		255.51	54.7
898-212-10	EW-1-10	50.1	63.41772	50.6	1.25		160.37	56.3
898-212-11	EW-1-11	50	63.29114	50.6	1.25		265.52	64.8
898-212-12	EW-1-12	50.3	63.67089	50.3	1.27		194.58	74
898-212-13	EW-1-13	49.7	62.91139	50.1	1.26		113.82	89.5
898-212-14	EW-1-14	48.3	61.13924	49.9	1.23		95.23	99
898-212-15	OW-1A-15	49.5	62.65823	50.2	1.25		2568.24	4
898-212-16	OW-1A-16	53	67.08861	50	1.34		63567.80	6
898-212-17	OW-1A-17	50.6	64.05063	27.7	2.31		46481.80	6.5
898-212-18	OW-1A-18	49.6	62.78481	29.2	2.15		70250.18	6.5
898-212-19	OW-1A-19	50	63.29114	51.6	1.23		80038.76	7
898-212-20	OW-1A-20	50.8	64.3038	46.8	1.37		904.65	8
898-212-21	OW-1A-21	50.1	63.41772	42.8	1.48		144426.45	8.5
898-212-22	OW-1A-22	50	63.29114	49.9	1.27		122231.81	9.5

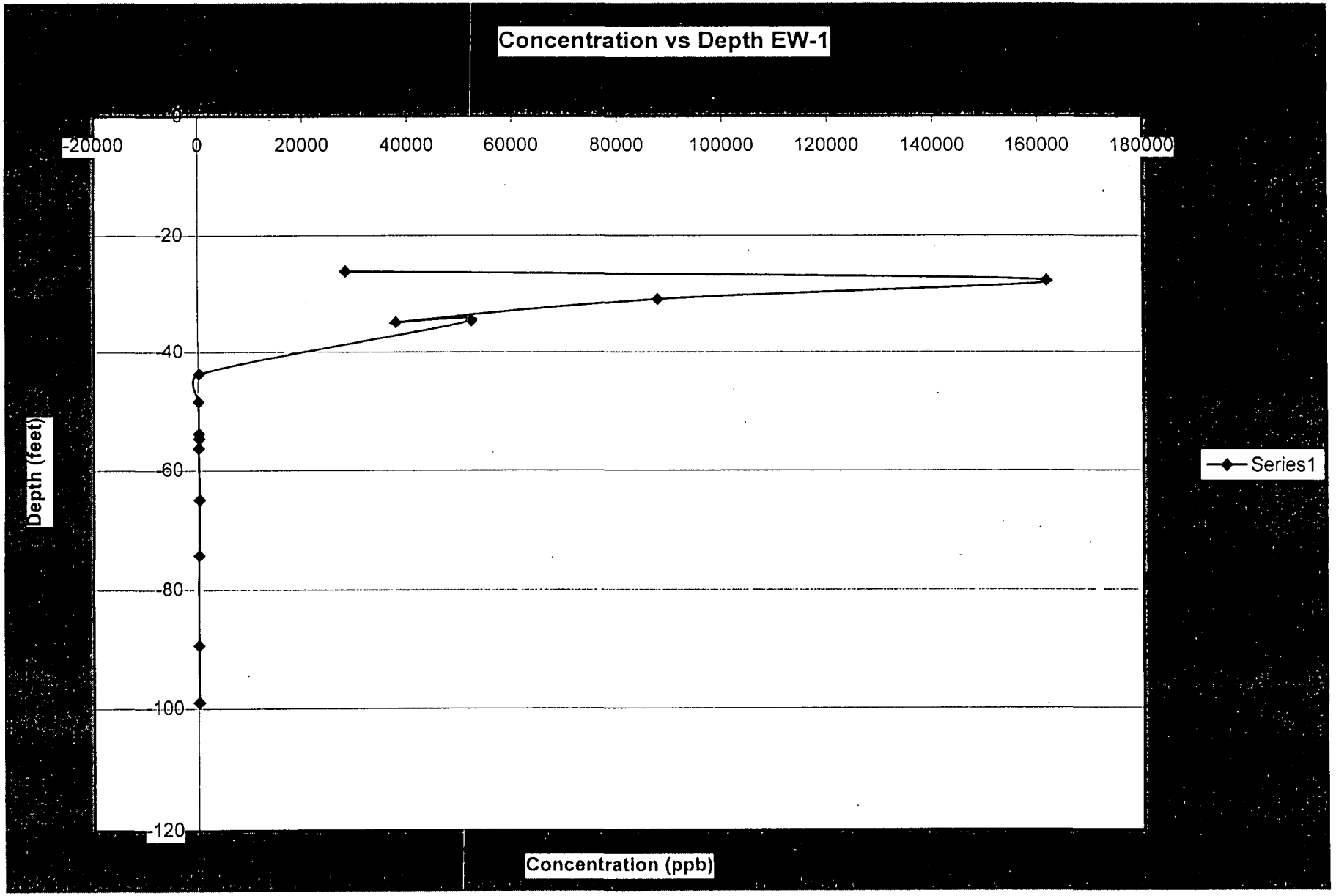
Lab Sample ID	Field ID	mass MeOH(g)	MeOH(ml)	mass Rock(g)	Vol MeOH/mass Rock(ml/g)		TCE/mass Rock(ng/g)	Depth(ft)
898-212-23	OW-1A-23	50.1	63.41772	51.6	1.23		197976.36	10.5
898-212-24	OW-1A-24	50.6	64.05063	51.2	1.25		194.85	12.2
898-212-25	OW-1A-25	50.1	63.41772	50.3	1.26		4490.13	12.8
898-212-26	OW-1A-26	50	63.29114	57.5	1.10		117043.48	14
898-212-27	OW-1A-27	49.8	63.03797	40.2	1.57		74491.44	14
898-212-28	OW-1A-28	51.5	65.18987	49.9	1.31		146056.67	15.5
898-212-29	OW-1A-29	51.5	65.18987	50.2	1.30		143773.54	16.4
898-212-30	OW-1A-30	50.2	63.5443	50.7	1.25		198950.07	17.4
898-212-31	OW-1A-31	49.9	63.16456	50.8	1.24		167823.75	18.3
898-212-32	OW-1A-32	50.2	63.5443	47.9	1.33		192601.59	19
898-212-33	OW-1A-33	49.8	63.03797	50.6	1.25		31014.43	20
898-212-34	OW-1A-34	50.8	64.3038	49.8	1.29		81102.84	21.6
898-212-35	OW-1A-35	49.8	63.03797	50.2	1.26		43202.36	22.4
898-212-36	OW-1A-36	50.8	64.3038	50.6	1.27		228.90	23
898-212-37	OW-1A-37	50.1	63.41772	50.3	1.26		5749.20	23.9
898-212-38	OW-1A-38	50	63.29114	49.5	1.28		14925.20	24.2
898-212-39	OW-1A-39	49.3	62.40506	49.7	1.26		94963.68	24.9
898-212-40	BLANK	50	63.29114	0				

Lab Sample ID	Field ID	TCE/mass Rock(2 significant digits) ng/g		
898-208-01	EW-2-1	12.00		horiz. fract.
898-208-02	EW-2-2	840.00		limestone, some chert, fracture
898-208-03	EW-2-3	36.00		fractured chert, some limestone
898-208-04	EW-2-4	<4.0		limestone
898-208-05	EW-2-5	<16	*	solid limestone 3-4" from fract.
898-208-06	EW-2-6	62		vert. fracture in competent limestone
898-208-07	EW-2-7	<16		carbonate (dolomite?)
898-208-08	EW-2-8	26		fractured dolomite/shale
898-208-09	EW-2-9	16	*	competent dolomite/shale
898-208-10	EW-2-10	<20 ng/ml		
898-212-01	EW-1-1	28000		
898-212-02	EW-1-2	160000		
898-212-03	EW-1-3	88000		
898-212-04	EW-1-4	38000		visible sheen
898-212-05	EW-1-5	52000		visible sheen
898-212-06	EW-1-6	190		fine horiz. fractures
898-212-07	EW-1-7	110	*	solid matrix, 6" below fracture
898-212-08	EW-1-8	180		highly fractured, fossilized limestone, some chert
898-212-09	EW-1-9	260		green colored chert
898-212-10	EW-1-10	160	*	fine grained very competent
898-212-11	EW-1-11	260	*	competent rock, few fractures
898-212-12	EW-1-12	190	*	competent rock, 1 foot from nearest bedding plane fracture
898-212-13	EW-1-13	110		shale? weathered bedding plane partings
898-212-14	EW-1-14	95		shale/dolomite?
898-212-15	OW-1A-15	2600		Top of rock
898-212-16	OW-1A-16	64000		
898-212-17	OW-1A-17	46000		same interval - normal crushing
898-212-18	OW-1A-18	70000		same interval - coarser sample
898-212-19	OW-1A-19	80000		vertical fracture
898-212-20	OW-1A-20	900	*	solid rock
898-212-21	OW-1A-21	140000		highly fractured
898-212-22	OW-1A-22	120000		highly fractured, some chert

Lab Sample ID	Field ID	TCE/mass Rock(2 significant digits) ng/g	
898-212-23	OW-1A-23	200000	Fractured rock, above vertical fracture
898-212-24	OW-1A-24	190	* competent rock - see photo
898-212-25	OW-1A-25	4500	very porous coral
898-212-26	OW-1A-26	120000	} same noticed a sheen
898-212-27	OW-1A-27	74000	} location
898-212-28	OW-1A-28	150000	
898-212-29	OW-1A-29	140000	
898-212-30	OW-1A-30	200000	
898-212-31	OW-1A-31	170000	
898-212-32	OW-1A-32	190000	
898-212-33	OW-1A-33	31000	
898-212-34	OW-1A-34	81000	
898-212-35	OW-1A-35	43000	
898-212-36	OW-1A-36	230	
898-212-37	OW-1A-37	5700	
898-212-38	OW-1A-38	15000	
898-212-39	OW-1A-39	95000	
898-212-40	FIELD BLANK	35 ng/ml	

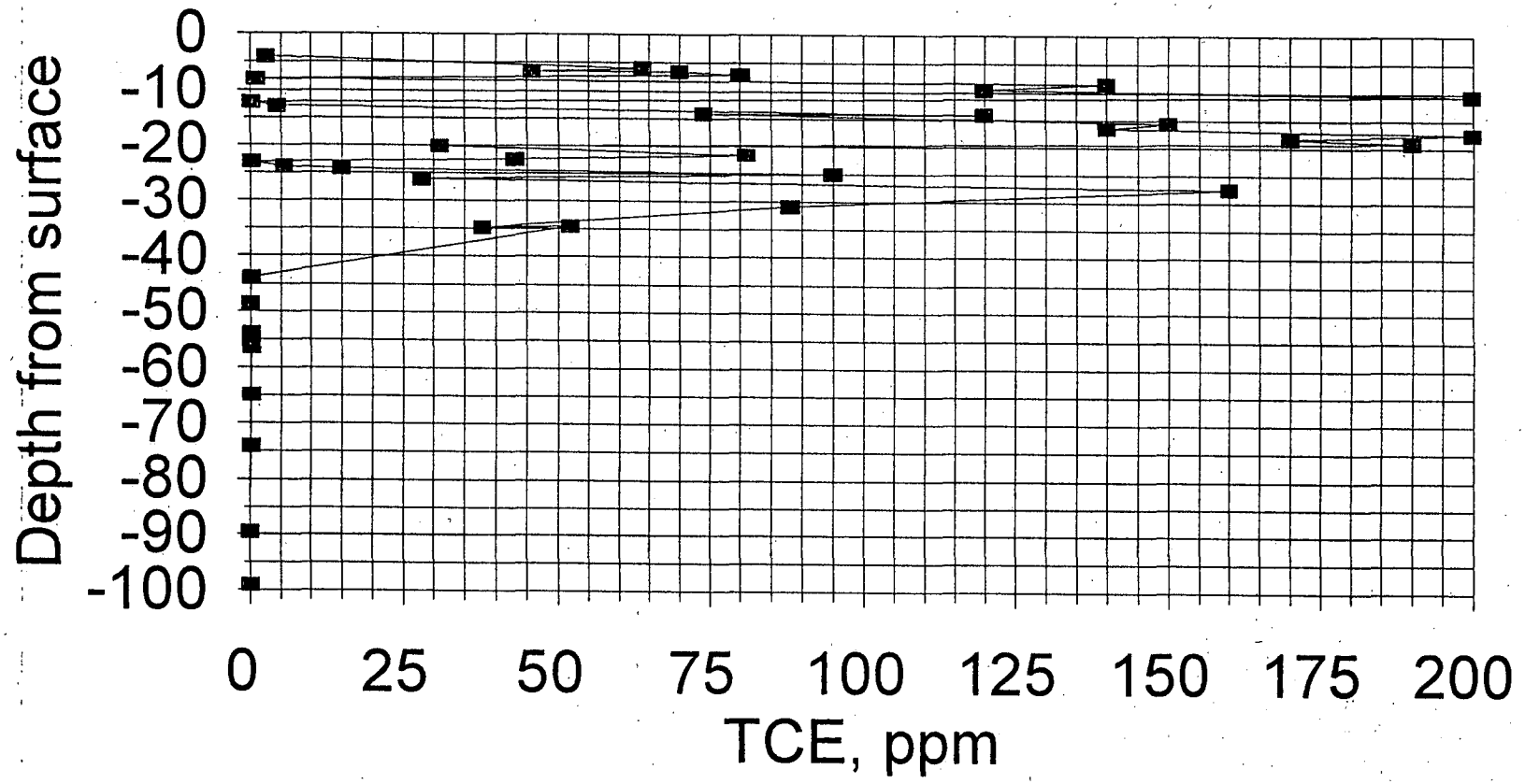

Concentration vs Depth OW-1A
-50000
0
50000
100000
150000
200000
250000
-5
-10
-15
-20
-25
-30
Depth (feet)
Concentration (ppb)
Series1


Concentration vs Depth EW-2
-100
0
100
200
300
400
500
600
700
800
900
-10
-20
-30
-40
-50
-60
-70
-80
-90
Depth (feet)
Concentration (ppb)
Series1


Concentration vs Depth EW-1
-20000
0
20000
40000
60000
80000
100000
120000
140000
160000
180000
-20
-40
-60
-80
-100
-120
Depth (feet)
Concentration (ppb)
Series1

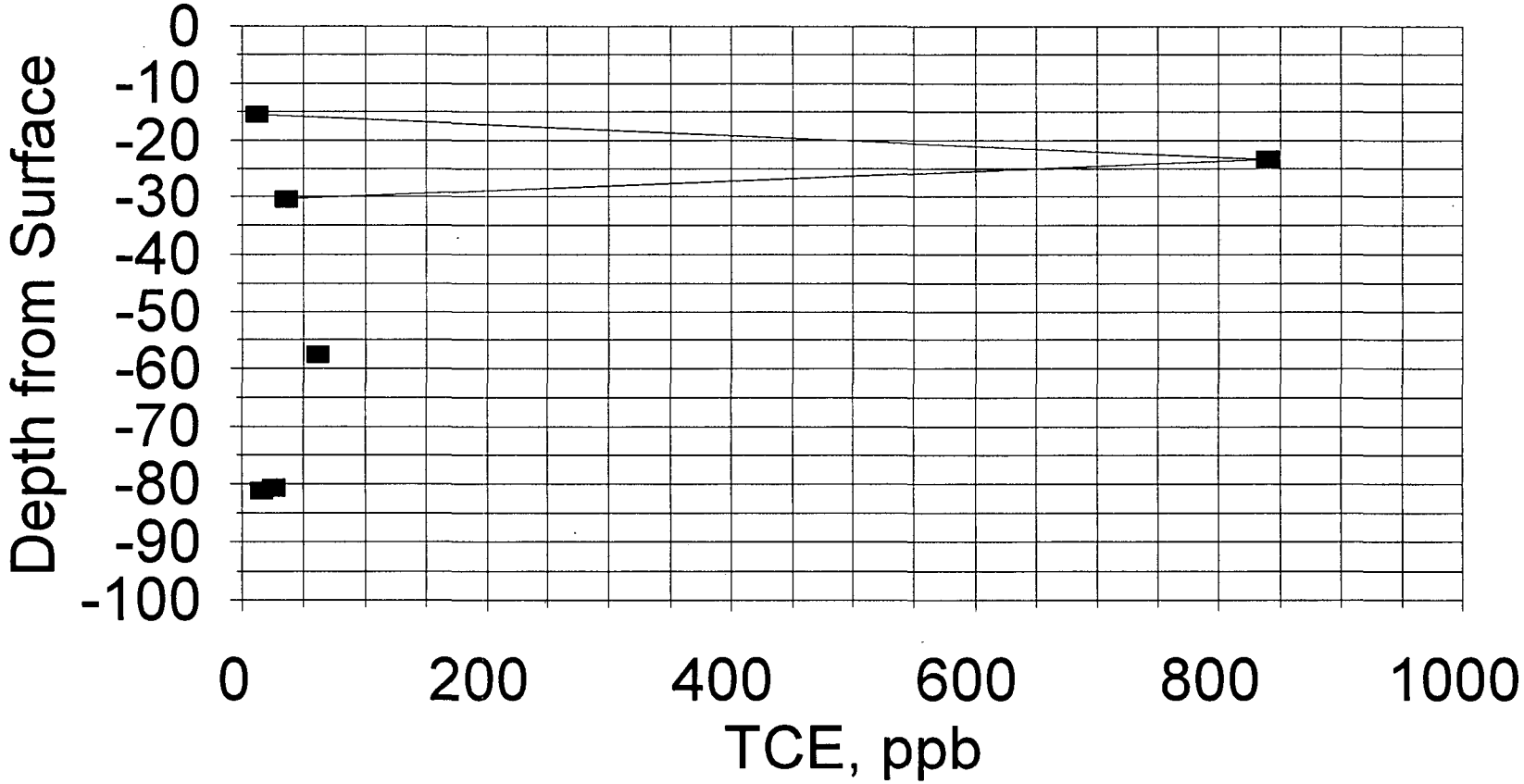
Lehigh Valley RR

EW-1 Profile



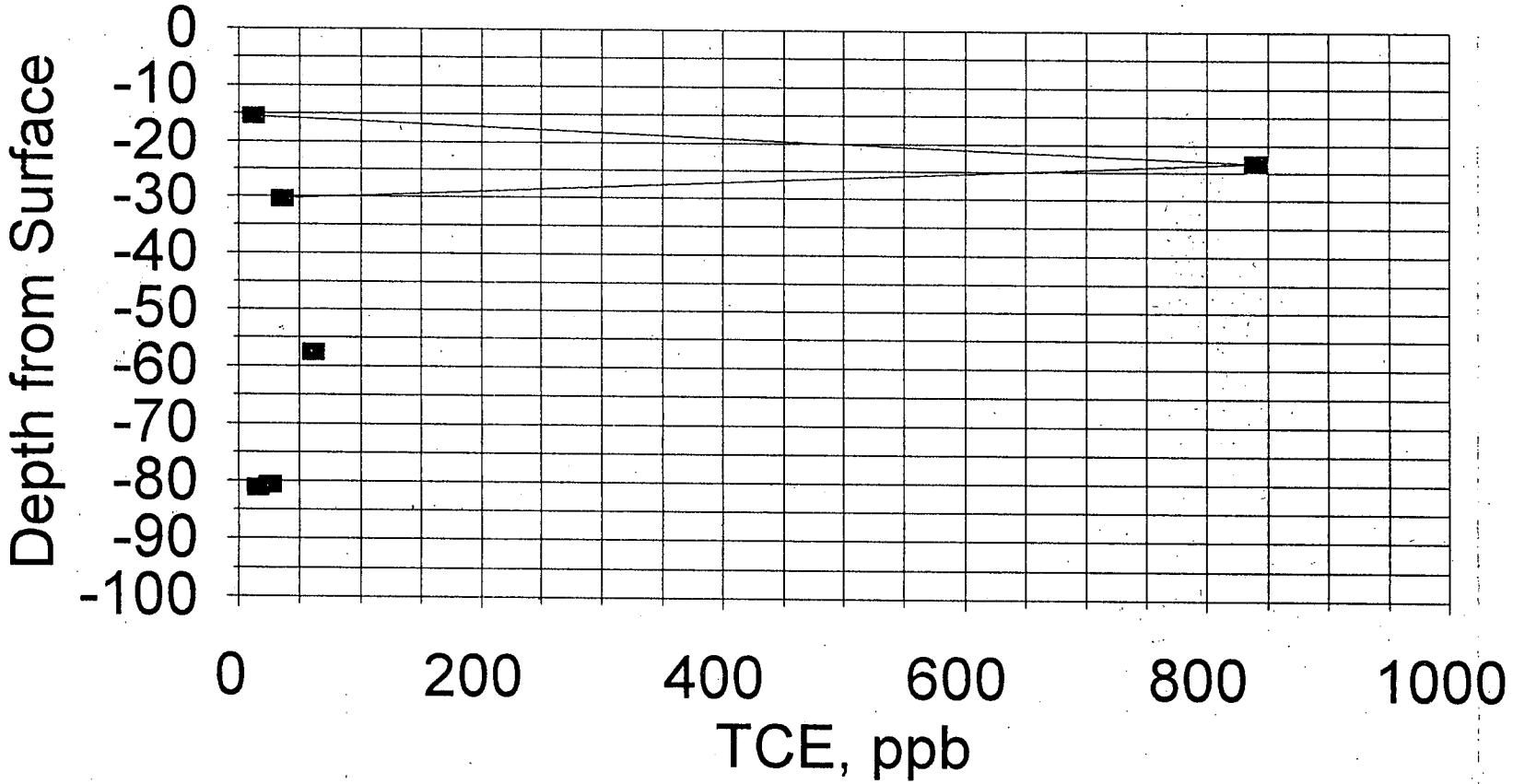
Lehigh Valley RR

EW-2 Profile



Lehigh Valley RR

EW-2 Profile



Pilot Study of TCE Vapor Extraction in Fractured Limestone

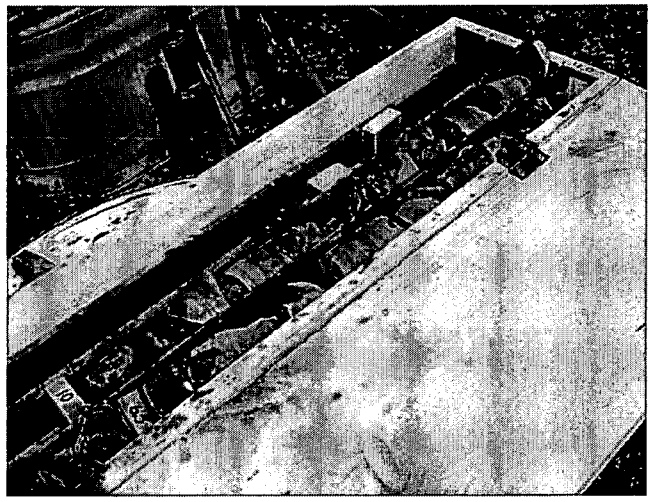
Joseph Moloughney, P.E.
G. David Foster
NYS Department of Environmental Conservation

Site History

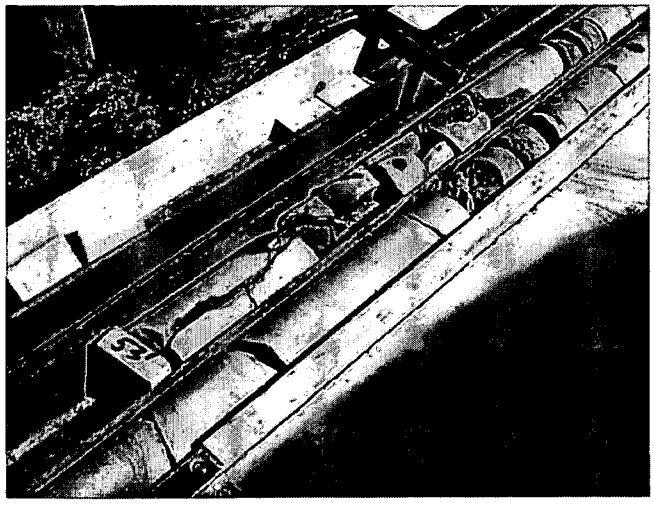
- Location of a December 1970 Railroad Derailment
- 30,000 Gallons TCE Spilled; None Recovered
- 1992 - Site Investigated by NYSDEC and DOH
- March 1997 ROD Signed
- August 1998 Pilot Test Conducted

RI Findings

- 3+ Mile Plume
- 38+ Contaminated Homes
- Shallow Limestone Bedrock
  - Highly Fractured
  - Voids, Solution Channels







RI Findings (Cont.)

- 1.5 Acre Soil Source Area
- 10 Acre Bedrock Source Area
  - Inferred From Groundwater Data
- Fluctuation of Aqueous Concentrations with Water Table

Record of Decision

Three Part Remedy

- Install Public Water Supply
- Ex-situ Surface Soil VE
- In-situ Bedrock VE

Pilot Test Objectives

- Quantify Bedrock Pneumatic Properties
  - Permeability
  - Radius of Influence
  - Flow Rates
- Delineate Areal and Vertical Extent of Recoverable Vapor
- Evaluate Strength of Vapors
- Estimate Mass Removal Rates
- Delineate Areal and Vertical Extent of DNAPL (If Possible)

Pilot Test Procedures

- Rock Coring
- Bedrock Sampling
- Extraction Well Installation
- Extraction Tests
  - Open Hole Tests
  - Isolated Interval Tests

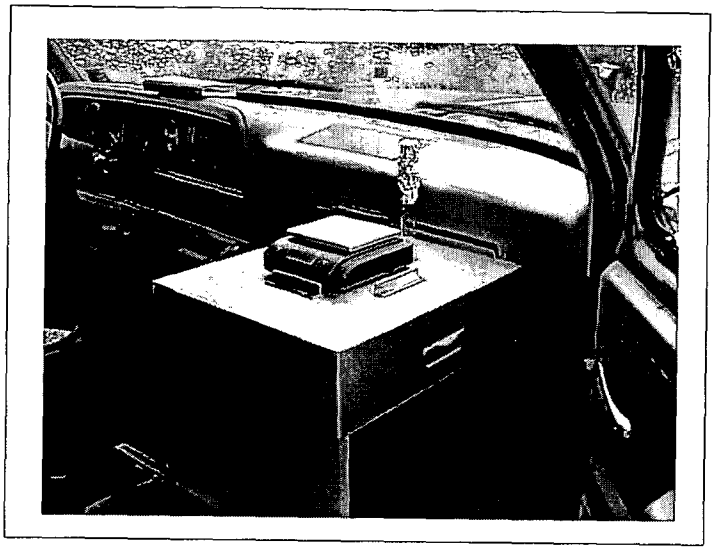
Bedrock Sampling

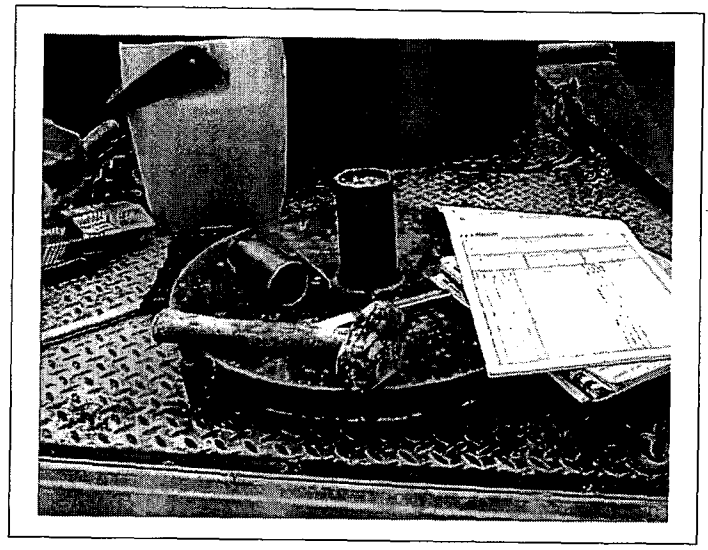
- Rock Cores Extracted From Well
- Odorous or Highly Fractured Areas Selected
- Cores Crushed with Hammer
- Crushed Cores Transferred to Sampling Bottles

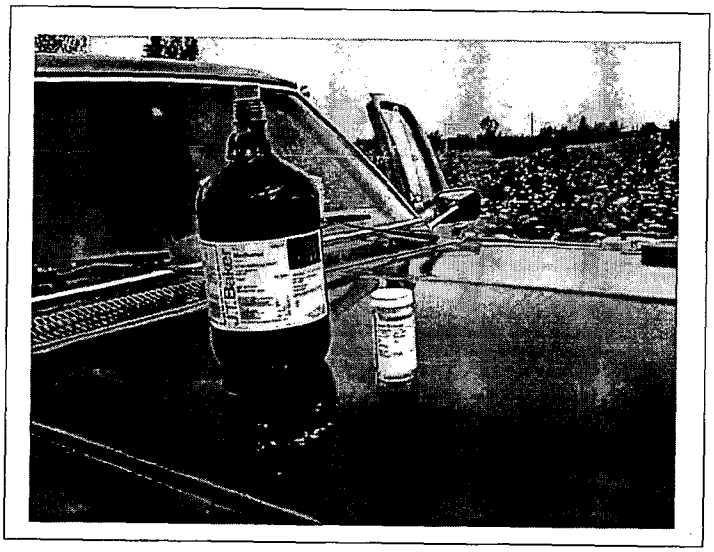
Core Ananlysis

Two Different Methods Used

- EPA Method 5035
  - 40 mL Vial
  - 5.0 g of Rock
  - 5.0 g Methanol (Pre-Weighed)
- NYSDEC Non-standard Method
  - Wide Mouth Jars
  - 50.0 g Rock
  - 50.0 g Methanol (Pre-Weighed)
  - Samples Analyzed After 2 Week Holding Time









Extraction Well Installation

- 29 Wells Drilled Across Site
  - 8 Single Wells
  - 3 Clusters of 7 Wells
- 6" Open Hole Construction
- Cased to 12 Feet Below Ground Surface

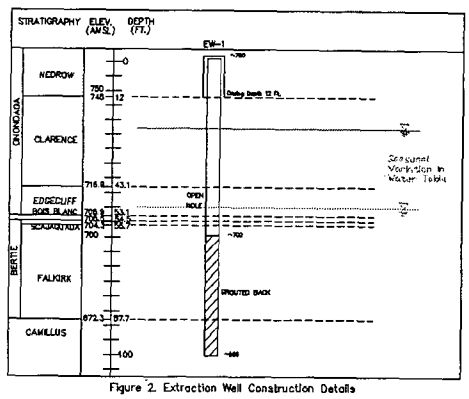


Figure 2. Extraction Well Construction Details

Extraction Tests

Three Types:

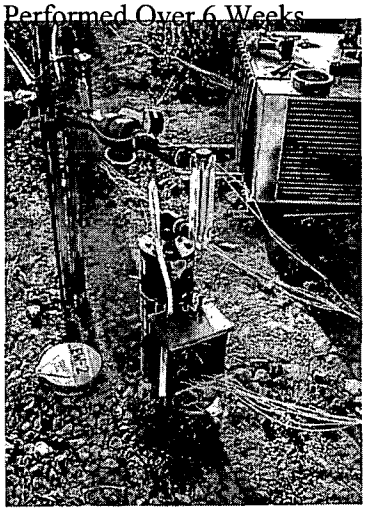
- Single Well, Open Intervals
- Multiple Well, Open Intervals
- Multiple Well, Isolated Intervals

Test Procedures

- Vacuum Transducers Placed in Each Well
- All Transducer Data Continuously Logged With PC
- Manual Recordings of Flow Rate, Applied Vacuum Every 15 Minutes
- Applied Vacuum Changed By Throttling Bypass Valve
- Three Vapor Samples Collected From Each Test With Summa Canisters
- Manual Recordings of OVM Every 15 Minutes During Tests
  - OVM Calibrated With TCE Gas
- 20 Tests Performed Over 6 Weeks

Single Well Tests

- 8 Tests Performed
- Extraction Blower Connected to Well Head
- Applied Vacuum, Flow Rate, and Wellhead Vacuum Recorded
- Tests Run Three to Six Hours



Multiple Well Tests

- 3 Tests Performed
- Single Extraction Well Surrounded by Six Observation Wells
- Observation Wells Arranged in Two Legs

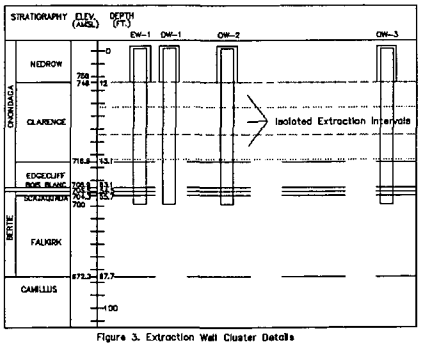
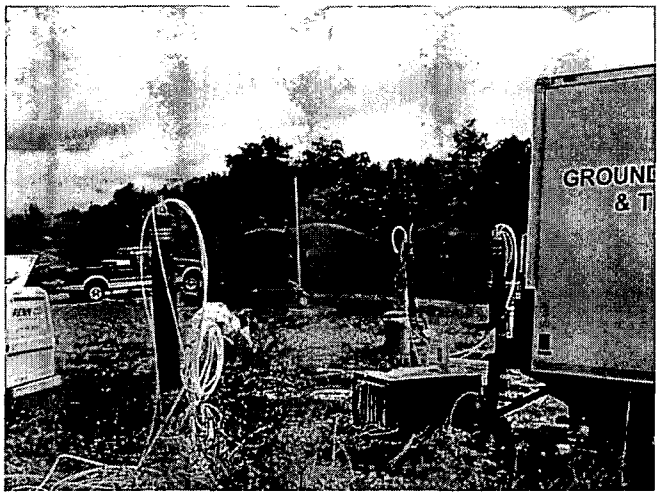
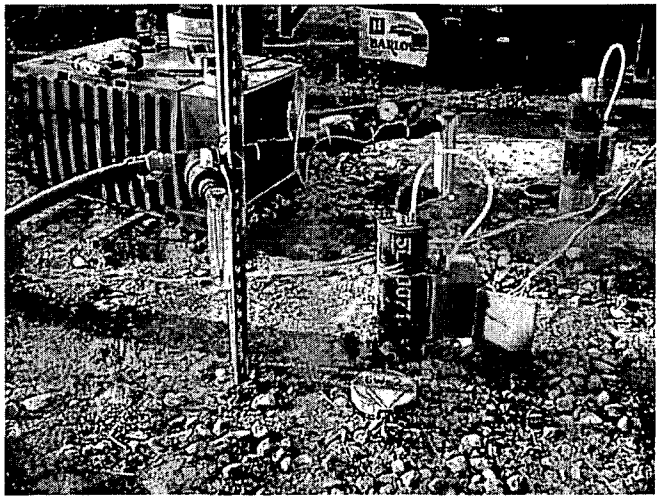


Figure 3. Extraction Well Cluster Details



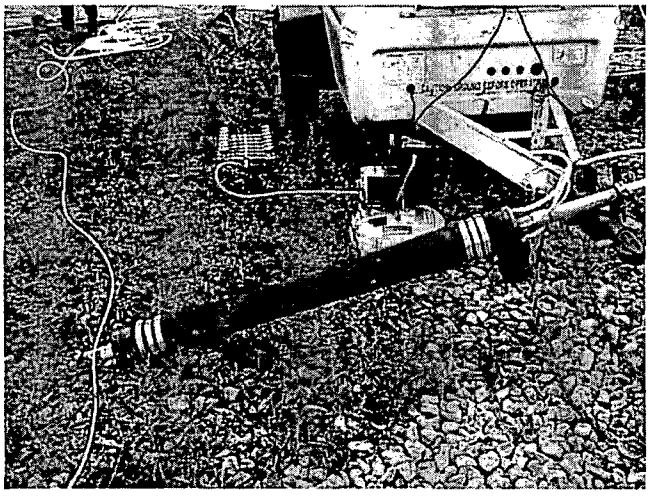
Multiple Well Tests (Cont.)

- Observation Wells Placed 5, 15, and 50 Feet From Extraction Well
- Applied Vacuum, Flow Rate, and Wellhead Vacuum Recorded
- Induced Vacuum Recorded in Observation Wells



Isolated Interval Tests

- Three Tests at Three Separate Locations
- Extraction Well and Observation Wells Isolated With Inflatable Packers
- 10 Foot Intervals Tested



Isolated Interval Tests

- Induced Vacuum Recorded Above, Below, and Within Isolated Intervals
- Applied Vacuum, Flow Rate, and Induced Interval Vacuum Recorded
- Once Completed, Packers Lowered to Next Interval

Observations

- NAPL Detected During Coring
- Noticeable Odor
- Core Analysis Results
- Vapor Extraction Results



Core Analysis Results

- EPA Method Revealed Low Levels of Contamination
- NYSDEC Revealed Higher Concentrations
- Vertical Profile of Residual TCE Developed
- Confirms RI Theory That Majority of NAPL is Located in Vadose Zone

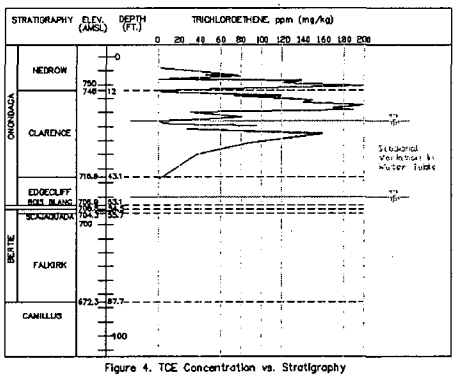


Figure 4. TCE Concentration vs. Stratigraphy

Vapor Extraction Results

- Areal Distribution of TCE Better Defined
- Long, Narrow Band of Residual TCE Vapors
- Vertical Distribution of TCE Changes Across Site
  - Shallow at Spill Site
  - Deeper to South
- Recoverable Vapor is Present

Vapor Extraction Results (Cont.)

- High Vapor Concentrations in Spill Area
  - Initially >800 ppmv
  - Xxx ppmv After x Hours
- Formation Yields 50 to 75 scfm
- Requires High Applied Vacuum
  - 100 to 200 inches Water
  - 3.5 to 7.0 psi

Vapor Extraction Results (Cont.)

- Variable Radius of Influence
  - Fracture Controlled Flow Patterns
  - Some Wells Produced Large Volumes of Air With No Induced Vacuum 5 Feet Away
  - Some Wells Produced Large Induced Vacuum 50 Feet Away

Next Steps

- Remedial Design To Begin Shortly
- 3-D Seismic Reflection Survey to Identify Fractures
- Targete Extraction Wells to Fracture Planes
- Reduce Applied Vacuum?
- Increase Density of Extraction Wells?
- Target Extraction Wells to Specific Intervals
- Phased Operation?

Cost

- Vapor Extraction Contractor
  - $110,000
- Consultant Fees
  - $30,000
- Drilling Costs
  - $30,000
- Analytical Costs
  - $25,000
- NYSDEC Oversight Costs

Source Area Soil Remedy Evaluation

Lehigh Valley Railroad Derailment Site

LeRoy, NY

December 27, 2000

DRAFT

1.0 Introduction 3

2.0 Pilot Test Results 3
2.1 Ex-situ Soil Vapor Extraction Test 3
2.2 Bedrock Vapor Extraction Test 4

3.0 Overburden Remedial Options 4
3.1 Ex-situ Treatment 4
3.2 In-situ Treatment 4
3.3 Consolidated In-situ Treatment 4

4.0 Evaluation of Options 4

5.0 Recommendation 4

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1.0 Introduction

On December 6, 1970, a portion of an eastbound 114-car freight train operated by the Lehigh Valley Railroad derailed at the crossing intersection of Gulf Road. Two tank cars containing TCE ruptured and spilled their contents onto the ground. An estimated 30,000 gallons of TCE were released during the spill; none of it was recovered.

The spill site, at the surface, is approximately 1.5 acres in area and is characterized by soil contaminated with trichloroethylene (TCE). Beneath the soil surface, in the bedrock, the spill site covers approximately 10 acres and is believed to contain pure, undissolved TCE in the bedrock. Groundwater contamination extending from the spill site is extensive. Thirty-eight (38) private wells, over an approximately three and a half square mile area, have been impacted by TCE from the site. Contamination has been observed as far away as Spring Street in the Village of Caledonia.

The RI/FS was completed in 1996. The Record of Decision (ROD) was signed in March 1997. The ROD calls for a large-scale public water supply to be constructed around the spill site. All private wells contaminated or threatened by the spill will be connected to the water supply. The ROD also calls for remediation of the spill site soils. Both soil and bedrock vapor extraction (SVE/BVE) systems are planned in the spill area to remove residual TCE from the surface soils and bedrock.

Pilot testing of the SVE and BVE systems was completed in 1998. A draft report entitled, "Ex-situ Soil Vapor Extraction and In-situ Bedrock Vapor Extraction Pilot Test Report," was prepared by IT Corp. for the NYSDEC in April 1999. The pilot test procedures, equipment, and data can be found in the IT Corp. report.

This document summarizes the results of the soil and bedrock vapor extraction tests at the Lehigh Valley Railroad Site and evaluates whether any changes in the originally proposed SVE and BVE system are appropriate.

2.0 Pilot Test Results

2.1 Ex-situ Soil Vapor Extraction Test

The ex-situ SVE pilot test was conducted on an approximately 50-cubic-yard volume of soil excavated from the spill area north of Gulf Road. The pilot test revealed poor pneumatic properties of the soil, including an especially small radius of influence (approximately 2 feet). The soil is highly permeable and the material handling of excavation, transportation, and pile construction significantly increased the permeability. Because of the high permeability, large volumes of air were able to be drawn through the system using a relatively low applied vacuum. If expanded to full-scale, an ex-situ pile would require very close monitoring during construction to ensure that the soils are not too permeable. Some form of compaction, impermeable cover system, or extraction vent

modification would be required to minimize the amount of air requiring treatment.

The soil pile reached an asymptotic removal rate relatively quickly. This is probably associated with cold temperatures during the test limiting desorption of the TCE and with short-circuiting of the air through the pile. Any predictions of TCE removal rates in a full-scale system would be premature.

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2.2 Bedrock Vapor Extraction Test

The bedrock vapor extraction pilot test consisted of two parts. First was the drilling and sampling of rock cores from two different well locations. The second part was operation of a vapor extraction system on numerous wells across the site.

On two occasions during drilling activities, a NAPL sheen was observed in the rock core obtained from the spill site. When a fragment of core was broken open along a fracture, the sheen was visible on both internal surfaces of the fracture.

During sampling, a strong solvent odor was detected during the crushing of the cores. This anecdotal evidence suggests that all analytical results should be biased low due to volatilization losses in the field. In addition to the volatilization losses during crushing, the act of coring these rock samples would also be expected to remove a significant portion of the residual TCE due to the heat of drilling and the introduction of pressurized coring water.

The results of the rock core sampling for BVE well number one are shown in Figure XX. The residual NAPL is primarily contained in the upper 35 to 40 feet of the site, with little to no NAPL present below the Clarence member of the Onondaga formation. Of the assumed NAPL residual in the upper 40 feet of the site, the upper 20 feet of the site is the most heavily contaminated.

The vapor extraction test also yielded valuable data. On average, the rock formation was capable of producing between 60 and 70 scfm from each well with 150 to 200 inches of water applied vacuum. Two wells did not produce any air and those tests could not be completed. At each of the observation wells where an influence was detected, the response was almost immediate, with the vacuum propagating through the fractures within seconds.

Measurement of the induced vacuum at nearby observation wells was difficult to interpret and verify. Some wells showed an excellent response to the applied vacuum, with an extrapolated influence beyond 50 feet. Other observation wells, including wells located only 5 feet from the extraction well, showed little to no influence from the applied vacuum.

Most of the observation well pressure measurements were subject to barometric variability. For a given test, several of the observation wells underwent coincidental changes in the ambient pressure. These changes were usually large in comparison to the

influence from the extraction well. Further evaluation of these data may help to identify which wells intersected vertical fractures and which wells were more influenced by bedding-plane fractures.

The packer-isolated interval tests revealed that the extractable vapors changed with depth across the site. At the location of the spill, the highest concentrations were observed in the upper 15 feet of the bedrock. Concentrations decreased with depth from there, reaching much lower levels at the 32-42 fbgs interval. Conversely, at the well cluster located approximately 600 feet south of the spill site, TCE concentrations were much lower at the shallow depths and increased at the middle and deeper intervals.

The tests also helped reveal the areal extent of contamination. Results of these tests show that the NAPL source is apparently concentrated in a nearly north-south axis through the site. The areal and vertical trends combined suggest that the DNAPL migrated along the bedding planes in a southerly direction and would "drop" into successively lower stratigraphic layers as it continued south.

3.0 Overburden Remedial Options

Two basic remedial approaches to the overburden soils are possible: in-situ and ex-situ. They are discussed below. A third option, consolidated in-situ treatment is also evaluated.

3.1 Ex-situ Treatment

Ex-situ treatment was originally selected in the ROD. The main reason for its selection was to prevent short-circuiting of an in-situ system to the atmosphere in the shallow soils. An engineered ex-situ pile would allow all of the contaminated soil to be excavated and treated under controlled conditions. In addition, some concern was raised in the ROD that soils located at the bedrock surface and in the top-of-rock fractures are heavily contaminated and could not be reliably treated in-situ.

However, an ex-situ pile also presents some challenges. The greatest of these is materials handling. The excavation, transportation, and pile construction activities all present some risk of fugitive emissions from the soil as it is being handled. While the immediate site area is relatively unpopulated, site workers would face an increased risk from fugitive emissions, construction vehicles, and open excavations. In addition, the cost to remove soils from the top-of-rock fractures and place them in the pile is projected to be quite expensive. Since most of this work is necessary at a small scale, manual labor would be the most likely means of accomplishing the soil removal from fractures. The additional labor and health and safety cost of "cleaning" the fractures is largely unpredictable and dependent on visual observations during construction.

The need to manually remediate the top-of rock fractures with the soil SVE system should be re-evaluated in light of the BVE pilot test results. Because the uppermost 20 feet of

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the site is the most heavily contaminated in the spill area, the shallow bedrock will require remediation. Any soils in the top-of-rock fractures should be successfully remediated along with the rock during the BVE treatment.

3.2 In-situ Treatment

Two in-situ approaches have been considered at the site. As stated above, in-situ SVE treatment was originally discarded because of fears of short-circuiting the SVE system in shallow soils. However, this problem can be addressed by placing am impermeable barrier over the soils in-situ. One approach to achieving this that is both durable and economical is to cover the shallow soil area with asphalt pavement. However, the very thin soils would still complicate any efforts to install vertical piping, requiring horizontal trenching though portions of the contaminated soils. One method of optimizing the benefits of in-situ treatment is to consolidate the thin soils with the deeper soils into one confined area. This could be accomplished by scraping or bulldozing the thin soils (less than 2 feet thick) and placing them on top of the deeper soils. The footprint of in-situ treatment would be greatly reduced, minimizing the need for horizontal wells in the thin soils. In addition the volume of material requiring handling would be minimized, reducing the risk of fugitive emissions, minimizing the change in soil permeability, and saving considerable costs compared with the ex-situ system.

In addition to in-situ SVE, in-situ thermal desorption techniques (i.e., TerraTherm's thermal blanket approach) can be applied to the thin soils. The very nature of the site (VOC contamination in very thin soils) suggests that this would be an excellent application of this technology. However, a significant volume of soil is present at depths below what the thermal blanket could remediate, requiring a number of vertical thermal wells to be installed as well. Niagra Mohawk has estimated that the cost to bring 1 to 2 MW of power to the site could approach $250,000 in capital costs. The high cost of bringing power to the site and the large amount of power that would be necessary to operate a thermal system make this option less desirable considering that SVE can achieve the same results with much less cost.

3.3 Consolidated In-situ Treatment

One final approach would be to combine the soil and bedrock remediation into one consolidated in-situ vapor extraction system. The soils would all be left in place to be treated concurrently with the BVE system. The same argument made above, that the top-of-rock fractures would be remediated anyway as part of the BVE system, begs the question, "why not treat all the soils along with the bedrock?"

The BVE pilot test was successful in demonstrating that the BVE concept would work, but also demonstrated that a shallow bedrock problem exists that would not be effectively treated by the wells as designed in the pilot test. The 10-foot well casings would effectively cut off half of the most heavily contaminated portions of the site from being remediated. Therefore, a viable well design must be considered that will successfully

remediate the upper ten feet of bedrock along with the soils without short-circuiting to the atmosphere. The primary obstacle for in-situ soil remediation has also become the primary obstacle for shallow bedrock remediation. Since the problem of short-circuiting must be overcome whether the soils are treated in-situ or not, why not just leave the soils in place and design a system that will remediate the shallow bedrock and thin soils together?

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4.0 Analysis and Recommendation

Because the shallow bedrock is heavily contaminated, it will require a vapor extraction system to be designed that prevents short-circuiting to the atmosphere. The problem of short-circuiting is also the major reason for selecting an ex-situ soil remedy. Since the short-circuiting problem must be overcome whether the overburden soils are treated in-situ or not, it makes sense to combine the units into one comprehensive vapor extraction system.

Appendix A

DRILLING LOCATION DC–1

MONITORING WELLS

STRATIGRAPHY		ELEV. (AMSL)	DEPTH (FT.)
ONONDAGA	NEDROW	750	
		748	13.9
	CLARENCE		
		716.9	45.0
	EDGECLIFF		
		706.9	55.0
		705.1	56.7
		704.3	57.4
BERTIE		700	
	FALKIRK		
		672.3	89.6
	CAMILLUS	650	
		607.4	154.5
	SYRACUSE	600	
		550	

DC–1D: 761.9 GROUND SURFACE ELEV.; SCREEN ELEVATIONS 628.9 – 608.9

DC–1C: 760.6; 660.6; 640.6

DC–1B: 760.7; 700.7; 680.7

DC–1A: 760.5; 760.5 BOTTOM OF CASING ELEV.; 700.5 OPEN HOLE

EW–1: ~760; OPEN HOLE; ~700; GROUTED BACK; ~660

▽ DENOTES MAXIMUM AND MINIMUM WATER LEVELS DURING PERIOD NOVEMBER 1993 – SEPTEMBER 1994.

NOTE:
DOMESTIC WELL DEPTH FROM G.L. MARSHALL, 1971, REPORT. LENGTH OF SURFACE CASING UNKNOWN. DESCRIPTORS "DIRTY" & "CLEAN" REFER TO TCE CONCENTRATIONS GENERALLY GREATER THAN, OR LESS THAN, 5 ppb RESPECTIVELY. STRATIGRAPHY AT DOMESTIC WELL(S) INFERRED FROM CONDITIONS AT MONITORING WELLS.

NOTE: Drawing modified 10/98 by J. Moloughney to show EW–1 details and TCE profile and remove G–2 details.

DUNN ENGINEERING COMPANY
DIVISION OF RUST ENVIRONMENT & INFRASTRUCTURE

STRATIGRAPHY AND WELL DETAILS AT MONITORING WELL CLUSTER DC–1 & EXTRACTION WELL EW–1

LEHIGH VALLEY RR
DERAILMENT SITE

TOWN OF LEROY GENESEE COUNTY, N.Y.

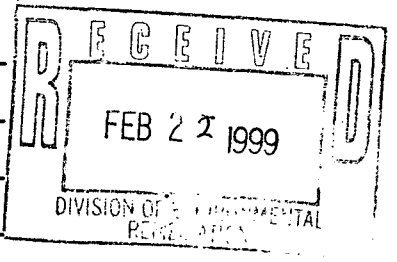
PROJECT NO. 35090.400		DWG. NO. A9454
SCALE: AS SHOWN	DATE: 10/94	FIGURE NO. S–1

FACSIMILE

INTERNATIONAL
TECHNOLOGY
CORPORATION

Date: 2-11-99
Page 1 of: 5

To: Joseph Moloughney
NYSDEC
Western Remedial



Fax No. ( ) Phone No. ( )
From: Dane Boyadjian
Project No. Project Name:

2200 Cottontail Lane ◆ Somerset, New Jersey ◆ 08873-1248
Phone *(732) 469-5599 ◆ Fax: (732) 469-7275

[*Please Note: Area Code has changed to 732 as of December 6, 1997 and Area Code 908 will no longer access IT Corp.]

Joe.
Message: Here is one log for EW-1
Ed has to clean up the other log
and he is in the field until at
least mid-week next week. As
soon as it is done he will get it
to you.
Dane
I will put hard copy in mail.

INTERNATIONAL TECHNOLOGY CORPORATION

By ED Date 7-27-98 Subject EW-1 Rock Core Fracture Notes Sheet No. 1 of 1

Chkd. By ___ Date ___ Proj. No. 773636

0.5cm. X 0.5cm.

FRACTURE NOTES

5.0 - 13.5'	Broken zone, both horizontal & vertical fractures
13.5 - 15.5'	Broken zone, horizontal fractures, white chert nodules
15.9 - 16.9'	Broken, horizontal fractures, high angle fractures
17.1 - 17.9'	High angle fractures, verticle fractures, white chert
17.9 - 20.5'	Abundant horizontal fractures
20.9 - 21.1'	vertical fracturing
21.8 - 25.3'	High angle fracturing (infrequent), both vert. & horiz.
25.5 - 30.6'	slight odor, horiz. fractures; HNU: 6 ppm max.
34.1 - 34.6'	horizontal fractures, sheen & odor on fractured surfaces, low & frac.
38.7 - 39.7'	high angle fractures.
42.3 - 45.0'	both vertical & horizontal fractures, HNU: 55 ppm max
56.7 - 57.6'	horizontal fractures, mottling, [redacted] (ED)
58.0 - 63.0'	horizontal & vertical fracturing, high & fractures
63 - 67.5'	HNU: 150 ppm max, high & fractures
68.0 - 70.0'	Heavy horizontal fracturing; HNU: 150 ppm w/ 300 ppm max
70.0 - 73.0'	Massive
83.0 - 93.2'	broken to massive, horizontal fractures
95.3 - 100'	SyC filled fractures, horizontal & few vertical fractures

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 773636 FIELD ENG./GEO. Eric Detweiler PAGE 1 OF 4

PROJECT NAME Lehigh Valley R.R. site BORING NO. EW-1

APPROX. ELEV. unknown CORE SIZE HQ DATE 7-27-98

DRILLING METHOD Air rotary/air hammer DATE STARTED 7-27-98

COORDINATES unknown DATE COMPLETED 7-28-98

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
6"	Set 12' bgs (bottom)	8/4/98	44.86 (toc)		

RUN NUMBER	DEPTH (ft)	RECOVERY (in.)	% RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	JOINT SPACING MINIMUM	JOINT SPACING AVERAGE	REMARKS
NA		NA	NA	NA	No sample; OVERBURDEN; fill	NA	NA	NA	
1	5 – 10	96	94	NA	5.0 – 13.1': LIMESTONE: medium light gray; fine grained; crystalline; chert; dark gray; less than 15% chert by volume; hard; slightly broken	5.5	3.4	4.5	
2	15	58	97	NA	13.1 – 43.5': CHERTY LIMESTONE; medium dark to medium gray; fine grained; crystalline; Chert 65 to 75%; dark gray; hard; slightly broken to massive	5.0	3.1	4.0	Driller changes coring bit
3	20	56	100	NA	13.5 – 26.3': WHITE CHERT ZONE; prevalent white chert layers w/ smaller clasts of grayish blue chert; very hard; broken to slightly broken	5.9	1.6	3.8	Driller changes coring bit
4	25	117	99	NA		10.3	3.1	6.7	Collected rock sample EW-1-26.0 Collected rock sample EW-1-27.5

BOULDER	COBBLE	PEBBLE	GRANULE	VERY COARSE SAND	COARSE SA	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	INDIVID PART
BOULDER CONGLOMERATE	COBBLE CONGLOMERATE	PEBBLE CONGLOMERATE	GRANULE CONGLOM-ERATE	VERY COARSE SANDSTONE	COARSE SANDSTONE	MEDIUM SANDSTONE	FINE SANDSTONE	VERY FINE SANDSTONE	SILTSTONE	CLAYSTONE AND SHALE	CONSOLIDATED ROCK

WENTWORTH SCALE FOR ROCK

TERMS USED TO DESCRIBE THE RELATIVE DEGREES OF ROCK CORE HARDNESS

DESCRIPTIVE TERMS	DEFINING CHARACTERISTICS
VERY SOFT	CRUSHES UNDER PRESSURE OF FINGERS AND/OR THUMB
SOFT	CRUSHES UNDER PRESSURE OF PRESSED HAMMER
MEDIUM HARD	BREAKS EASILY UNDER SINGLE HAMMER BLOW BUT WITH CRUMBLY EDGES
HARD	BREAKS UNDER ONE OR TWO STRONG HAMMER BLOWS BUT WITH RESISTANT SHARP EDGES
VERY HARD	BREAKS UNDER SEVERAL STRONG HAMMER BLOWS BUT WITH VERY RESISTANT SHARP EDGES AND MAY SPALL LEAVING CONCHOIDAL FRACTURES

THE SPACING OF THE DISCONTINUITIES IN THE ROCK MAY BE DESCRIBED BY ONE OF THE FOLLOWING TERMS

DESCRIPTIVE TERMS	SPACING
VERY BROKEN	LESS THAN 1 IN.
BROKEN	1 IN. TO 3 IN.
SLIGHTLY BROKEN	3 IN. TO 6 IN.
MASSIVE	6 IN. AND GREATER

TERMS USED TO DESCRIBE BEDDING THICKNESS

VERY THICKLY BEDDED	THICKER THAN 1 m
THICKLY BEDDED	30-100 cm
MEDIUM BEDDED	10-30 cm
THINLY BEDDED	3-10 cm
VERY THINLY BEDDED	1-3 cm
THICKLY LAMINATED	0 3-1 cm
THINLY LAMINATED	THINNER THAN 0 3 cm

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 773636 FIELD ENG./GEO. Eric Detweiler PAGE 2 OF 4
PROJECT NAME Lehigh Valley Railroad Spill Site BORING NO. EW-1
APPROX. ELEV. unknown CORE SIZE HQ DATE 7-27-98
DRILLING METHOD Air rotary/air hammer DATE STARTED 7-27-98
COORDINATES unknown DATE COMPLETED 7-28-98

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
6"	set 12' bgs				

RUN NUMBER	DEPTH (ft.)	RECOVERY (in.)	% RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	JOINT SPACING MINIMUM	JOINT SPACING AVERAGE	REMARKS
4		as above				as above			Collected rock sample EW-1-30.5 HNU reading down hole: 6 ppm max
5	35 40	96	100	NA		8.6	3.3	5.9	Collected rock sample EW-1-34.5, observed sheen on fractured rock surface, solvent type odor
6		24	100	NA		6.5	2.2	4.4	
7-28-98 ↗ 7	45 50	118	98	NA	43.5-54.5': LIMESTONE; medium gray; medium to coarse grained; crystalline; fossiliferous; medium bedded; medium hard; very broken to slightly broken	5.8	0.5	3.2	Collected rock sample EW-1-43.8
8	55	120	100	NA	54.5-56.7': CHERTY LIMESTONE; medium to light gray; fine grained; crystalline; chert; medium gray to dark gray; 60% +/- of core; hard 56.7-57.6: DOLOMITE; Yellowish gray, fine grained; thin bedded; slight mottling; sharp contact at upper Sholy zone	a.s	7.3	3.8	Collected rock sample EW-1-53.9 Collected rock sample for NYSDEC at 56.3-56.5

BOULDER	COBBLE	PEBBLE	GRANULE	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	INDURATED PARTICLES
BOULDER CONGLOMERATE	COBBLE CONGLOMERATE	PEBBLE CONGLOMERATE	GRANULE CONGLOMERATE	VERY COARSE SANDSTONE	COARSE SANDSTONE	MEDIUM SANDSTONE	FINE SANDSTONE	VERY FINE SANDSTONE	SILTSTONE	CLAYSTONE AND SHALE	CONSOLIDATED ROCK

WENTWORTH SCALE FOR ROCK

TERMS USED TO DESCRIBE THE RELATIVE DEGREES OF ROCK CORE HARDNESS

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SOFT	CRUSHES UNDER PRESSURE OF PRESSED HAMMER
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THICKLY BEDDED	30-100 cm
MEDIUM BEDDED	10-30 cm
THINLY BEDDED	3-10 cm
VERY THINLY BEDDED	1-3 cm
THICKLY LAMINATED	0 3-1 cm
THINLY LAMINATED	THINNER THAN 0 3 cm

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 773636 FIELD ENG./GEO. Eric Detweiler PAGE 3 OF 4
PROJECT NAME LeHigh Valley Railroad Spill Site BORING NO. EW-1
APPROX. ELEV. unknown CORE SIZE HQ DATE 7-28-98
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CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
6"	set 12' bgs				

RUN NUMBER	DEPTH (ft.)	RECOVERY (in.)	% RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	JOINT SPACING MINIMUM	JOINT SPACING AVERAGE	REMARKS
8		as	above		57.6-89.3': DOLOMITE 57.6-66.1: Yellowish gray; very fine grained to microcrystalline; laminar bedding; massive; very hard	as	above		
9	65	53	98	NA	66.1-70.9': medium light gray; fine grained; crystalline; argillaceous; thin bedded; very broken to broken; hard	5.8	0.3	3	Collected rock sample EW-1-64.8 Hnu reading down hole; 150 ppm max
10	70	66	100	NA	70.9-85.7': yellowish gray grading to olive gray; upper spacings are massive; thickly laminated; slight odor; very fine grained; crystalline; hard	9.3	0.6	9.6	rig breaks down; fix and resume drilling heavy drill chatter strong solvent odor
11	75 80	120	100	NA		13.2	0.4	6.8	Collected rock sample EW-1-74.0
12	85	118	98	NA	85.7-90.3'; yellowish gray; fine grained; crystalline; massive; very hard; argillaceous at contacts	11.8	0.8	6.3	Collected rock sample EW-1-89.5

BOULDER	COBBLE	PEBBLE	GRANULE	VERY COARSE SAND	COARSE SAND	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	INDIVIDUAL PARTICLES
BOULDER CONGLOMERATE	COBBLE CONGLOMERATE	PEBBLE CONGLOMERATE	GRANULE CONGLOMERATE	VERY COARSE SANDSTONE	COARSE SANDSTONE	MEDIUM SANDSTONE	FINE SANDSTONE	VERY FINE SANDSTONE	SILTSTONE	CLAYSTONE AND SHALE	CONSOLIDATED ROCK

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HARD	BREAKS UNDER ONE OR TWO STRONG HAMMER BLOWS BUT WITH RESISTANT SHARP EDGES
VERY HARD	BREAKS UNDER SEVERAL STRONG HAMMER BLOWS BUT WITH VERY RESISTANT SHARP EDGES AND MAY SPALL LEAVING CONCHOIDAL FRACTURES

THE SPACING OF THE DISCONTINUITIES IN THE ROCK MAY BE DESCRIBED BY ONE OF THE FOLLOWING TERMS

DESCRIPTIVE TERMS	SPACING
VERY BROKEN	LESS THAN 1 IN.
BROKEN	1 IN. TO 3 IN.
SLIGHTLY BROKEN	3 IN. TO 6 IN.
MASSIVE	6 IN. AND GREATER

TERMS USED TO DESCRIBE BEDDING THICKNESS

VERY THICKLY BEDDED	THICKER THAN 1 m
THICKLY BEDDED	30-100 cm
MEDIUM BEDDED	10-30 cm
THINLY BEDDED	3-10 cm
VERY THINLY BEDDED	1-3 cm
THICKLY LAMINATED	0 3-1 cm
THINLY LAMINATED	THINNER THAN 0 3 cm

INTERNATIONAL TECHNOLOGY CORPORATION

VISUAL CLASSIFICATION OF ROCK

PROJECT NUMBER 773636 FIELD ENG./GEO. Eric Detweiler PAGE 4 OF 4

PROJECT NAME Lehigh Valley Railroad Spill Site BORING NO. EW-1

APPROX. ELEV. unknown CORE SIZE HQ DATE 7-28-98

DRILLING METHOD Air rotary / air hammer DATE STARTED 7-27-98

COORDINATES unknown DATE COMPLETED 7-28-98

CASING INFORMATION		GROUNDWATER LEVEL DATA			
SIZE	DEPTH	ACTUAL TIME	DEPTH	ACTUAL TIME	DEPTH
6"	set 12' bgs				

RUN NUMBER	DEPTH (ft.)	RECOVERY (in.)	% RECOVERY	% RQD	DESCRIPTION	JOINT SPACING MAXIMUM	JOINT SPACING MINIMUM	JOINT SPACING AVERAGE	REMARKS
12		as above			90.3 - 100': Argillaceous DOLOMITE, medium gray; fine grained; crystalline; thickly laminated to medium bedded; argillaceous seams from 0.5' to 30 cm; hard	as above			
13	95	84	100	NA		11.8	0.3	6	collected rock sample EW-1-99.0
	100				T.D. = 100' @ 1535				

398-11-86

BOULDER	COBBLE	PEBBLE	GRANULE	VERY COARSE SAND	COARSE SA	MEDIUM SAND	FINE SAND	VERY FINE SAND	SILT	CLAY	INDIVIDUAL PARTICLES
BOULDER CONGLOMERATE	COBBLE CONGLOMERATE	PEBBLE CONGLOMERATE	GRANULE CONGLOMERATE	VERY COARSE SANDSTONE	COARSE SANDSTONE	MEDIUM SANDSTONE	FINE SANDSTONE	VERY FINE SANDSTONE	SILTSTONE	CLAYSTONE AND SHALE	CONSOLIDATED ROCK

WENTWORTH SCALE FOR ROCK

TERMS USED TO DESCRIBE THE RELATIVE DEGREES OF ROCK CORE HARDNESS

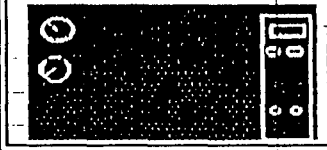
DESCRIPTIVE TERMS	DEFINING CHARACTERISTICS
VERY SOFT	CRUSHES UNDER PRESSURE OF FINGERS AND/OR THUMB
SOFT	CRUSHES UNDER PRESSURE OF PRESSED HAMMER
MEDIUM HARD	BREAKS EASILY UNDER SINGLE HAMMER BLOW BUT WITH CRUMBLY EDGES
HARD	BREAKS UNDER ONE OR TWO STRONG HAMMER BLOWS BUT WITH RESISTANT SHARP EDGES
VERY HARD	BREAKS UNDER SEVERAL STRONG HAMMER BLOWS BUT WITH VERY RESISTANT SHARP EDGES AND MAY SPALL LEAVING CONCHOIDAL FRACTURES

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VERY THICKLY BEDDED	THICKER THAN 1 m
THICKLY BEDDED	30-100 cm
MEDIUM BEDDED	10-30 cm
THINLY BEDDED	3-10 cm
VERY THINLY BEDDED	1-3 cm
THICKLY LAMINATED	0 3-1 cm
THINLY LAMINATED	THINNER THAN 0 3 cm



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION

LABORATORY ANALYTICAL REPORT

VOLATILE ORGANICS SPECIAL ANALYSIS DATA SHEET

Lab Sample ID	Field ID	Analysis Date	Volume MeOH analyzed(ml)		TCE (ng)	MD	TCE/MeOH analyzed (ng/ml)
898-208-01	EW-2-1	11-Aug-98	1		9.8		9.8
898-208-02	EW-2-2	6-Aug-98	0.1		66.98		669.8
898-208-03	EW-2-3	11-Aug-98	1		28.11		28.11
898-208-04	EW-2-4	11-Aug-98	1	<	5	<	5
898-208-05	EW-2-5	14-Aug-98	0.25	<	5	<	20
898-208-06	EW-2-6	14-Aug-98	0.25		12.16		48.64
898-208-07	EW-2-7	14-Aug-98	0.25	<	5	<	20
898-208-08	EW-2-8	14-Aug-98	0.25		5.05		20.2
898-208-09	EW-2-9	14-Aug-98	0.25	<	5	<	20
898-208-10	EW-2-10	14-Aug-98	0.25	<	5	<	20
898-212-01	EW-1-1	18-Aug-98	0.01		222.32		22232
898-212-02	EW-1-2	18-Aug-98	0.004		510.93		127732.5
898-212-03	EW-1-3	18-Aug-98	0.005		346.19		69238
898-212-04	EW-1-4	18-Aug-98	0.005		192.41		38482
898-212-05	EW-1-5	19-Aug-98	0.005		117.2		23440
898-212-06	EW-1-6	19-Aug-98	0.25		58.74		234.96
898-212-07	EW-1-7	19-Aug-98	0.25		22.01		88.04
898-212-08	EW-1-8	19-Aug-98	0.25		35.27		141.08
898-212-09	EW-1-9	19-Aug-98	0.25		31.15		124.6
898-212-10	EW-1-10	19-Aug-98	0.25		31.99		127.96
898-212-11	EW-1-11	19-Aug-98	0.25		53.07		212.28
898-212-12	EW-1-12	19-Aug-98	0.25		38.43		153.72
898-212-13	EW-1-13	20-Aug-98	0.25		22.66		90.64
898-212-14	EW-1-14	20-Aug-98	0.25		19.43		77.72
898-212-15	OW-1A-15	20-Aug-98	0.1		205.76		2057.6
898-212-16	OW-1A-16	20-Aug-98	0.005		236.88		47376
898-212-17	OW-1A-17	20-Aug-98	0.005		100.51		20102
898-212-18	OW-1A-18	21-Aug-98	0.005		163.36		32672
898-212-19	OW-1A-19	21-Aug-98	0.005		326.27		65254
898-212-20	OW-1A-20	21-Aug-98	0.1		65.84		658.4
898-212-21	OW-1A-21	21-Aug-98	0.005		487.36		97472
898-212-22	OW-1A-22	21-Aug-98	0.005		481.85		96370

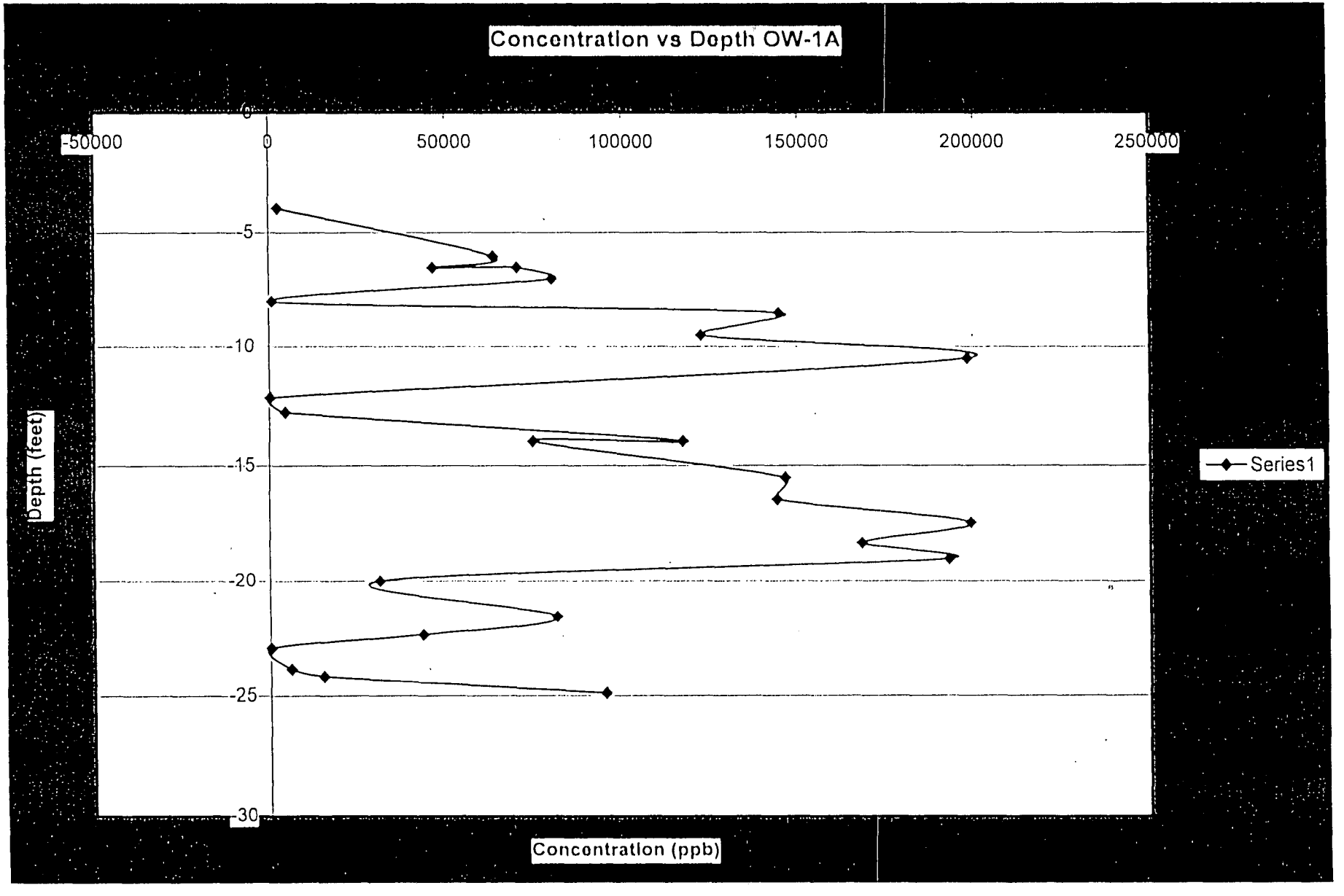
Lab Sample ID	Field ID	Analysis Date	Volume MeOH analyzed (ml)		TCE (ng)		TCE/MeOH analyzed (ng/ml)
898-212-23	OW-1A-23	21-Aug-98	0.005		805.42		161084
898-212-24	OW-1A-24	21-Aug-98	0.25		38.94		155.76
898-212-25	OW-1A-25	21-Aug-98	0.25		890.34		3561.36
898-212-26	OW-1A-26	21-Aug-98	0.005		531.67		106334
898-212-27	OW-1A-27	24-Aug-98	0.005		237.52		47504
898-212-28	OW-1A-28	24-Aug-98	0.005		559		111800
898-212-29	OW-1A-29	24-Aug-98	0.005		553.57		110714
898-212-30	OW-1A-30	24-Aug-98	0.005		793.68		158736
898-212-31	OW-1A-31	24-Aug-98	0.005		674.86		134972
898-212-32	OW-1A-32	24-Aug-98	0.005		725.92		145184
898-212-33	OW-1A-33	24-Aug-98	0.002		49.79		24895
898-212-34	OW-1A-34	24-Aug-98	0.002		125.62		62810
898-212-35	OW-1A-35	24-Aug-98	0.005		172.02		34404
898-212-36	OW-1A-36	25-Aug-98	0.25		45.03		180.12
898-212-37	OW-1A-37	25-Aug-98	0.05		228		4560
898-212-38	OW-1A-38	25-Aug-98	0.01		116.73		11673
898-212-39	OW-1A-39	25-Aug-98	0.005		378.15		75630
898-212-40	BLANK	25-Aug-98	0.25		8.7		34.8

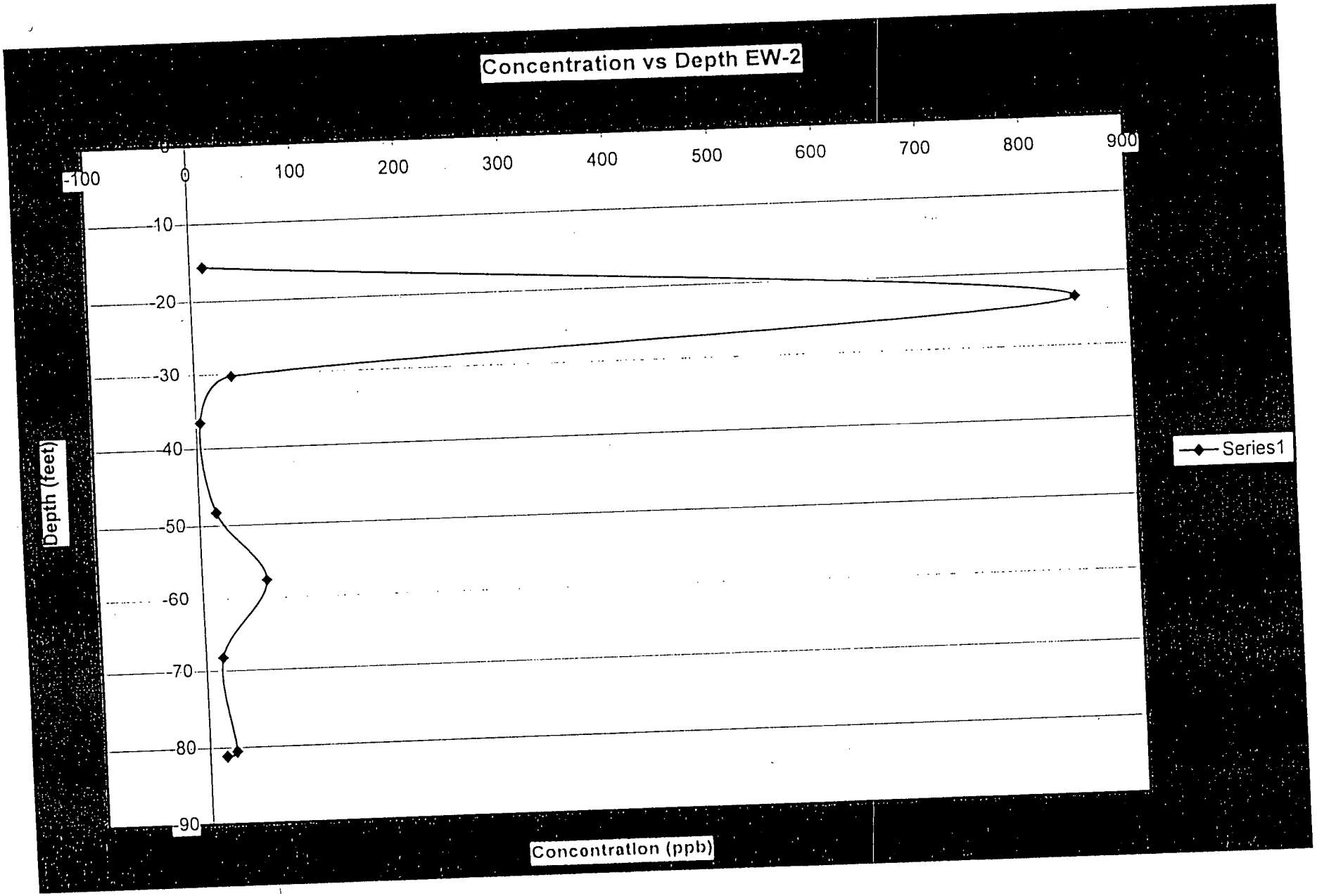
Lab Sample ID	Field ID	mass MeOH(g)	MeOH(ml)	mass Rock(g)	Vol MeOH/mass Rock(ml/g)	MDL	TCE/mass Rock(ng/g)	Depth(ft)
898-208-01	EW-2-1	50	63.29114	50	1.27		12.41	15.5
898-208-02	EW-2-2	50	63.29114	50	1.27		847.85	23.3
898-208-03	EW-2-3	50	63.29114	50	1.27		35.58	30.3
898-208-04	EW-2-4	50	63.29114	50	1.27	<	3.95	36.6
898-208-05	EW-2-5	50	63.29114	50	1.27	<	15.80	48.25
898-208-06	EW-2-6	50	63.29114	50	1.27		61.57	57.5
898-208-07	EW-2-7	50	63.29114	50	1.27	<	15.80	68.2
898-208-08	EW-2-8	50	63.29114	50	1.27		25.57	80.5
898-208-09	EW-2-9	50.1	63.41772	50	1.27	<	15.83	81.1
898-208-10	EW-2-10	50	63.29114	0		<	0.00	
898-212-01	EW-1-1	50.2	63.5443	50.1	1.27		28197.94	26
898-212-02	EW-1-2	50	63.29114	50	1.27		161686.71	27.5
898-212-03	EW-1-3	50.1	63.41772	50.1	1.27		87643.04	30.8
898-212-04	EW-1-4	50	63.29114	64.4	0.98		37819.40	34.8
898-212-05	EW-1-5	50.2	63.5443	28.5	2.23		52262.40	34.5
898-212-06	EW-1-6	50.3	63.67089	79.4	0.80		188.41	43.8
898-212-07	EW-1-7	50	63.29114	50.2	1.26		111.00	48.5
898-212-08	EW-1-8	50.7	64.17722	50.9	1.26		177.88	53.9
898-212-09	EW-1-9	48.6	61.51899	30	2.05		255.51	54.7
898-212-10	EW-1-10	50.1	63.41772	50.6	1.25		160.37	56.3
898-212-11	EW-1-11	50	63.29114	50.6	1.25		265.52	64.8
898-212-12	EW-1-12	50.3	63.67089	50.3	1.27		194.58	74
898-212-13	EW-1-13	49.7	62.91139	50.1	1.26		113.82	89.5
898-212-14	EW-1-14	48.3	61.13924	49.9	1.23		95.23	99
898-212-15	OW-1A-15	49.5	62.65823	50.2	1.25		2568.24	4
898-212-16	OW-1A-16	53	67.08861	50	1.34		63567.80	6
898-212-17	OW-1A-17	50.6	64.05063	27.7	2.31		46481.80	6.5
898-212-18	OW-1A-18	49.6	62.78481	29.2	2.15		70250.18	6.5
898-212-19	OW-1A-19	50	63.29114	51.6	1.23		80038.76	7
898-212-20	OW-1A-20	50.8	64.3038	46.8	1.37		904.65	8
898-212-21	OW-1A-21	50.1	63.41772	42.8	1.48		144426.45	8.5
898-212-22	OW-1A-22	50	63.29114	49.9	1.27		122231.81	9.5

Lab Sample ID	Field ID	mass MeOH(g)	MeOH(ml)	mass Rock(g)	MeOH/mass Rock(ml/g)		TCE/mass Rock(ng/g)	Depth(
898-212-23	OW-1A-23	50.1	63.41772	51.6	1.23		197976.36	10.5
898-212-24	OW-1A-24	50.6	64.05063	51.2	1.25		194.85	12.2
898-212-25	OW-1A-25	50.1	63.41772	50.3	1.26		4490.13	12.8
898-212-26	OW-1A-26	50	63.29114	57.5	1.10		117043.48	14
898-212-27	OW-1A-27	49.8	63.03797	40.2	1.57		74491.44	14
898-212-28	OW-1A-28	51.5	65.18987	49.9	1.31		146056.67	15.5
898-212-29	OW-1A-29	51.5	65.18987	50.2	1.30		143773.54	16.4
898-212-30	OW-1A-30	50.2	63.5443	50.7	1.25		198950.07	17.4
898-212-31	OW-1A-31	49.9	63.16456	50.8	1.24		167823.75	18.3
898-212-32	OW-1A-32	50.2	63.5443	47.9	1.33		192601.59	19
898-212-33	OW-1A-33	49.8	63.03797	50.6	1.25		31014.43	20
898-212-34	OW-1A-34	50.8	64.3038	49.8	1.29		81102.84	21.6
898-212-35	OW-1A-35	49.8	63.03797	50.2	1.26		43202.36	22.4
898-212-36	OW-1A-36	50.8	64.3038	50.6	1.27		228.90	23
898-212-37	OW-1A-37	50.1	63.41772	50.3	1.26		5749.20	23.9
898-212-38	OW-1A-38	50	63.29114	49.5	1.28		14925.20	24.2
898-212-39	OW-1A-39	49.3	62.40506	49.7	1.26		94963.68	24.9
898-212-40	BLANK	50	63.29114	0				

Lab Sample ID	Field ID	TCE/mass Rock(2 significant digits) ng/g		
898-208-01	EW-2-1	12.00		horiz. fract.
898-208-02	EW-2-2	840.00		limestone, some chert, fracture
898-208-03	EW-2-3	36.00		fractured chert, some limestone
898-208-04	EW-2-4	<4.0		limestone
898-208-05	EW-2-5	<16	*	solid limestone 3-4" from fract.
898-208-06	EW-2-6	62		vert. fracture in competent limestone
898-208-07	EW-2-7	<16		carbonate (dolomite?)
898-208-08	EW-2-8	26		fractured dolomite/shale
898-208-09	EW-2-9	16	*	competent dolomite/shale
898-208-10	EW-2-10	<20 ng/ml		
898-212-01	EW-1-1	28000		
898-212-02	EW-1-2	160000		
898-212-03	EW-1-3	88000		
898-212-04	EW-1-4	38000		visible sheen
898-212-05	EW-1-5	52000		visible sheen
898-212-06	EW-1-6	190		fine horiz. fractures
898-212-07	EW-1-7	110	*	solid matrix, 6" below fracture
898-212-08	EW-1-8	180		highly fractured, fossilized limestone, some chert
898-212-09	EW-1-9	260		green colored chert
898-212-10	EW-1-10	160	*	fine grained very competent
898-212-11	EW-1-11	260	*	competent rock, few fractures
898-212-12	EW-1-12	190	*	competent rock, 1 foot from nearest bedding plane fracture
898-212-13	EW-1-13	110		shale? weathered bedding plane partings
898-212-14	EW-1-14	95		shale/dolomite?
898-212-15	OW-1A-15	2600		Top of rock
898-212-16	OW-1A-16	64000		
898-212-17	OW-1A-17	46000		same – Normal crushing interval – coarser sample
898-212-18	OW-1A-18	70000		
898-212-19	OW-1A-19	80000		vertical fracture
898-212-20	OW-1A-20	900	*	solid rock
898-212-21	OW-1A-21	140000		highly fractured
898-212-22	OW-1A-22	120000		highly fractured, some chert

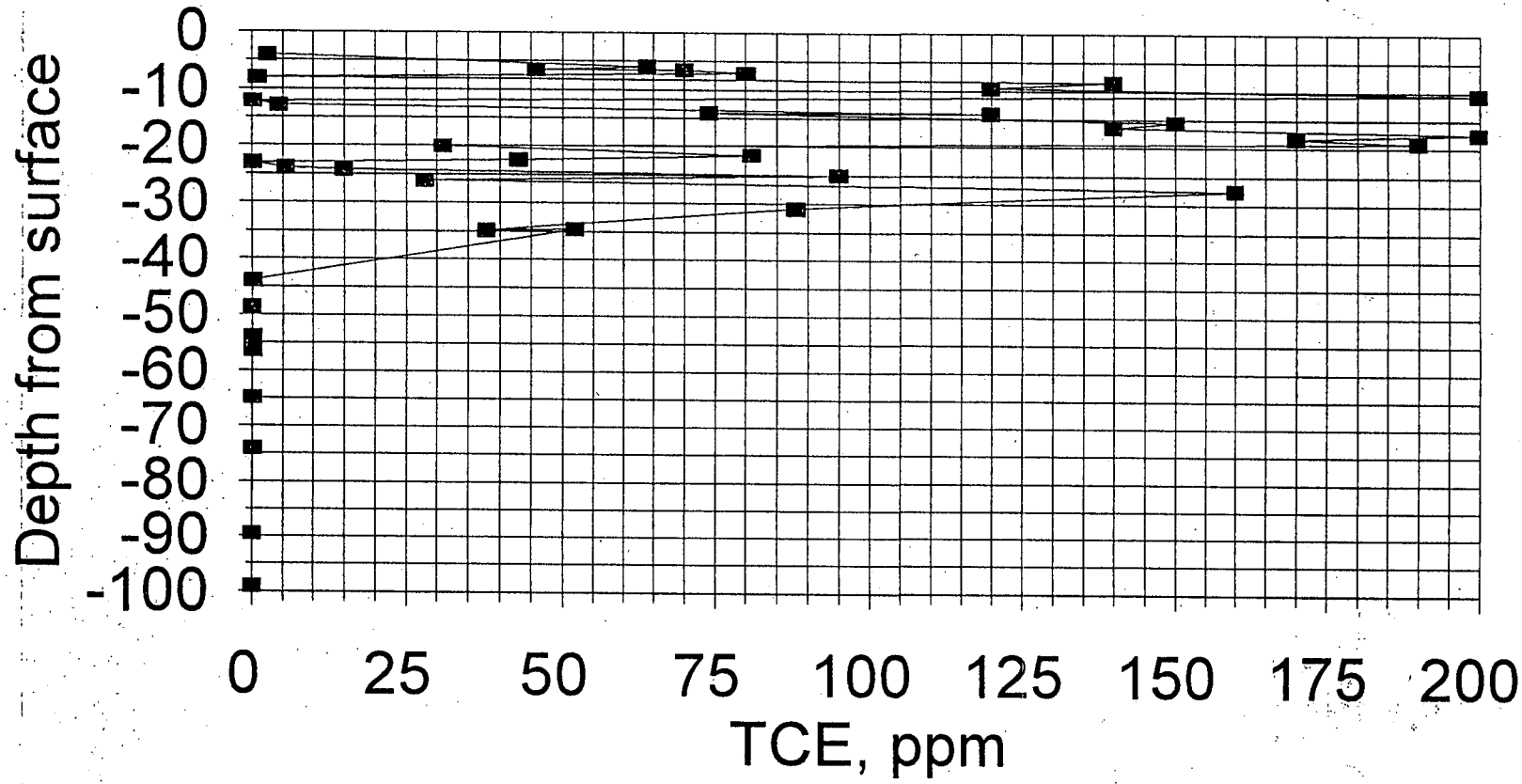
Lab Sample ID	Field ID	TCE/mass Rock(2 significant digits) ng/g	
898-212-23	OW-1A-23	200000	fractured rock, above vertical fracture
898-212-24	OW-1A-24	190	* competent rock - see photo
898-212-25	OW-1A-25	4500	very porous coral
898-212-26	OW-1A-26	120000	same location noticed a sheen
898-212-27	OW-1A-27	74000	
898-212-28	OW-1A-28	150000	
898-212-29	OW-1A-29	140000	
898-212-30	OW-1A-30	200000	
898-212-31	OW-1A-31	170000	
898-212-32	OW-1A-32	190000	
898-212-33	OW-1A-33	31000	
898-212-34	OW-1A-34	81000	
898-212-35	OW-1A-35	43000	
898-212-36	OW-1A-36	230	
898-212-37	OW-1A-37	5700	
898-212-38	OW-1A-38	15000	
898-212-39	OW-1A-39	95000	
898-212-40	FIELD BLANK	35 ng/ml	


Concentration vs Depth OW-1A
-50000
0
50000
100000
150000
200000
250000
0
-5
-10
-15
-20
-25
-30
Depth (feet)
Concentration (ppb)
Series1


Concentration vs Depth EW-2
-100
0
100
200
300
400
500
600
700
800
900
-10
-20
-30
-40
-50
-60
-70
-80
-90
Depth (feet)
Concentration (ppb)
Series1

Lehigh Valley RR

EW-1 Profile



46

LVRR 7/21

8:30 Arrive at s/c. Drillers are mobilizing. Ed Zaslet and Dave Foster are present. I picked up ice on way to site. Still need to pick up sample coolers from Avon. Yesterday Dave, Ed, and I staked out some well locations.

8:40 Ed & I go to Avon Regional office to pick up our sample bottles

9:30 Ed and I return to site. Drillers are auguring through gravel at DC-5 Area

9:45 Conclude site Health & Safety Briefing

10:35 Ed discovers a problem with the bottles sent by Recra Labs. He is calling them on cell phone.

10:45 Ed and I go to pay phone to call ~~from~~ Recra Labs.

11:09 Return to site. Drillers empying first core run. Top = 3.5 feet core run 3.5 - 7.0 feet.

Marty Kirsch 610 524 9466 47

12:15 Sample #1 taken from fracture to 1/2" deep. Depth - 15.5' weathered horizontal

12:30 ~~Sample~~ Sample taken from solid rock, 5' from nearest known fracture (drilling plane). Sample will be sent to contract lab w/ Meoh preservation.

12:45 Dave Foster and I go to lunch.

13:35 Return from Lunch

14:01 Sample #2 taken at 43.3'. Mostly limestone with some chert. During drilling, there registered 10 ppm in borehole at this interval.

16:05 Sample #3 taken 39.3' very cherty, some limestone highly fractured.

16:20 Drillers quit for the day. Will start at 8:00 tomorrow. Drillers 5's tonight now.

16:45 Leave site.

7/22

8:10 Arrive at site. Ed & Gregg Drillers arrive with refilled

water truck.

930 Dave and I finish laying out EW-1 wells.

953 Ed & I complete sampling. I took Sample #4 - mostly limestone, some chert. Depth = 36.6 Ed reported some slight flow hits at this interval during drilling. Ed also took a 5.0 g sample in both MeOH and H_2O preservation.

1010 I met Debbie Davis, Mayor of Caledonia at DC-1 area. We talked about site and waterline project. Nothing! I sent a truck to site to inform us that air rotary rig will not be drilling today. It failed a DOT inspection and needs some repairs.

1145 I Call office → Call John Byron. Need to

1205 Sample #5 - 48.25' taken from mostly carbonate rock 3-4" from nearest fracture, looking for matrix diffusion.

1215 Leave for Lunch

1230 Call John Byron. He mentioned there is a meeting in LeRoy tonight to discuss waterline issues. Mike will pick me up at hotel and we will go together. I called Meaghan to let her know a change in it.

1245 Lunch

100 I see drillers at restaurant in Caledonia. They get sandwiches to go.

105 I called office to speak w/ Christie McGrath or John Tkach. Bart Hulse took the call - he will call John at the lab and I will call back in 10-15 min.

125 I pass driller's helper on Spring St. He is filling water truck from hydrant in Caledonia.

135 I return to site. Drilling is in progress.

220 - At 5'-7.5 feet, encountered a vertical fracture through core. Will sample this section. Rock is mostly calcified limestone. May be Gallirus Edgecliff Bertie Sample #6.

440 Sample #7 taken from 68.2' Mostly dolomite.

445 I leave site.

620 John Byron picks me up at hotel and we go to Village of LeRay for meeting.

1030 I return to hotel after meeting.

7/23

754 I arrive at site, drillers are here and working. Ed is not here.

805 Drillers start coring.

825 Ed Rashak Arrives.

845 Vapors from hole are reading 15-20 ppm on HNu.

850 Core retrieved from 83'

901 I leave site to get new batteries for scale.

937 Core retrieved from 93'

945 Sample #8 retrieved from 80.5' in fractured area. Dolomite/shale

952 Sample #9 taken from 81.1' Solid matrix - nearest fracture is several inches away. Dolomite/shale

1006 Drillers retrieved core from 100 feet.

1115 Air Rotary Rig arrives

1130 Drillers break for lunch + leave site.

1205 I leave site for lunch

1345 Arrive at Museum for meeting.

435 I return to site w/ John Byron and Titus Falkenburg. Ed and the drillers are not here. I leave site for the day.

7/24

755 I arrive at site. Neal from Northeagle is here. Air Rotary rig is starting up. Air Rotary Rig finished two holes yesterday. Setting up at EW-3 now. Coring Rig is across road at old Knickerbocker Hotel. Thaning will be done soil borings until I return with batteries for next core run.

8¹⁰ Fuel truck arrives to refuel air rotary rig.

8³⁰ Health & safety meeting finishes. Ed is here. Neal leaves site to get supplies. Air rotary rig starts at EW-3.

9⁴⁵ Air rotary finishing up at EW-3. Ed and I have been waiting for Eric Detweiler from IT-Rochester.

10⁰⁰ Neal from Nothnagle returns to site with a trailer full of empty drums.

10¹⁰ I leave site.

7/27/98

10⁴⁰ I leave office to go to site. I have 48-4oz bottles from Fred Woodward. Last weeks bottles were given to Fred this morning. He will put them in coolers for me.

14³⁰ En route to the site, Eric Detweiler called me to discuss drilling. Apparently the drillers are coring EW-1 right now. I told Eric to halt operations until I get there. I know that I am here, the drillers are at about 30 feet into the hole.

We will have to re-core the top 25' of an adjacent area. I will discuss this problem w/Ed Rastak.

15³⁰ Core retrieved from 27-33'

15⁴⁰ Sample #1 @ 26'

16⁰⁰ Sample #2 @ 28'

16¹⁵ Sample #3 @ 30.5'

17⁰⁰ Core retrieved from 33-42? feet Sample #4 taken at 34.8' Visible sheen was seen when rock was broken open along fracture. While sampling, I took rock and put it directly into the bottle without weighing it. Once complete, I took a final weight and back-calculated the mass of rock in the bottle. The same procedure was used for sample #5 also taken at this depth. While filling sample #4 a small amount (less than 2 grams) of NAPL spilled from the bottle. Therefore, the accuracy of sample #4 may be affected.

17¹⁵ Drillers leave for day

17⁴⁰ Eric Detweiler leaves for day.

17⁴⁵ I leave for the day.

7/28

800 Tamie at site. Both drill rigs are operating. Eric Detweiler called and said he is on his way.

805 Core is retrieved from 41-43'

835 Eric Detweiler arrives. He takes an Hnu reading in the hole of about 50 ppm. Work space air is ok.

910 Sample #6 - Carbonate rock with many fine horizontal fractures. Depth 43.8 feet

927 Sample #7 - Carbonate rock, solid matrix, six inches below void. Depth 48.5'

1010 After finishing another core run and dropping the core barrel back into the hole, Neal notices a solvent odor. Depth is 63'. Hnu in borehole reads 170 ppm. Workspace is <10 ppm. Will stop work for a few minutes to let hole clear out. Water truck leaves to refill.

A 945 A drum supplier arrives and drops off some 55-gal drums for drillers.

1015 53.9' Mostly carbonate, some chert, highly fractured and fossilized. Sample #8 taken.

1020 Neal restarts drill while I monitor vapors. Workspace 45 ppm. Downhole <10 ppm.

1030 Collect Sample #9 @ 54.7' Green coloring in rock. Rock is very coarse gravel in a well fractured section of core. Upon breaking apart, it appears that green coloring is a chert nodule - possibly a mineral causing the discoloration. Surrounding rock is not green and has no chemical odor.

1050 Sample #10 @ 56.3'. Transition from grey, fractured rock to fine grained very competent thin bedding planes.

1100 Air rotary crew breaks for lunch.

1105 I leaves site for lunch.

1110 After a few minutes of drill equipment problems, Air rotary crew, Eric, and I all separately leave for lunch. Neal needs a new bit and has to go to shop soon.

1215 I return to site. Drillers still working on core barrel. Air rotary rig is running.

1230 core retrieved from 63 to 67.5'

1233 Neal leaves site to go to shop again.

1255 Sample #11 @ 64.8' thin bedded dolomite w/shale? fractured section of rock, sample itself was competent, with very few fractures. Neal returns to site. Resume drilling.

1345 HNu reads 150-300ppm in borehole. Workspace ok.

1425 Sample # 12 at 74.0' V.v. competent rock. Carbonate based. No fractures nearby - 1' from nearest bedding plane fracture

1510 Sample #13 @ 89.5' - Shale? Weathered bedding plane partings

1555 Finish Drilling. Sample #14 Shale/Dolomite? @ 99'

1600 Drillers Leave Site.

1620 I leave site. Eric is leaving soon also.

7/29

820 I arrive at site. Drillers are here, starting at next hole to core top 20ft. Air rotary crew and Eric Dedecker are here as well.

925 Sample 15 - Top of Rock Depth = 40'

930 Sample 16 - Strong odor (wet, pulverized) Depth 60'

940 Samples 17 & 18 collected #17 was crushed to assess consistency. #18 was much coarser, almost gravel Depth = 65'

Upon breaking these rocks, significant chemical odors are released.

950 Air retrieved from hole.

1000 Sample 19 @ 70' Vertical Fracture

1007 Sample #20 @ 8.0'
Solid rock matrix several inches from nearest fracture.

1013 Sample 21 @ 8.5'
Highly fractured

1020 Sample 22 @ 9.5'
Highly fractured, some chert when breaking apart, no odor from chert, but very strong odor from limestone

1040 Sample 23 @ 10.5' fractured rock above a vertical fracture. 11.8.

1045 Sample 24 @ ~~12.2~~ -8"
Section of competent rock broken and sampled in middle see picture - no odor when crushed - matrix diffusion?

1103 Sample 25 @ 12.8' a piece of coral - very porous, strong odor when crushed.

1112 Two samples taken #26 and #27 both from 14' vertical fracture with some evidence of a sheen or discoloration in the fracture.

1120 I transfer scale and bottles to Eric. I am going to drive to pick up more bottles and make some calls.

1230 Return to site no one is here.

1245 Eric Detweiler returns from lunch.

1300 Drillers return & I leave site to go to Diaz. Eric has all sample bottles

1630 Leave Diaz - while in Valley, I stopped and spoke with some residents on Tucker St who border on the site. They expressed a number of complaints about the plant. They would like to have a Geo Barber survey in their backyards as soon as possible.

7/30

745 I arrive at site - air rotary crew just arrived.

750 Neal arrives

900 Eric arrives.

855 Neal starts soil borings Eric has given me all my samples

900 I leave site to return to Albany

Chem Sales

8/17/98

1320 I arrive on site. Mike Gotman of URS is here with Geologic Soil Gas crew. Sky is overcast with thunder heard near by. Soil Gas grid has already been laid out and work is ready to begin. A faint odor is noticeable around the site. Can't tell if it's a chemical odor or just some garbage odor from fall-offs on Atkins property.

1420 Ready to start work. I inspected inside buildings and found only about half of the drums that were previously inside. I checked out the fall-offs on Atkins property and there were no odors. A light rain is starting to fall. Start at 160 N, 0 E in soil gas grid.

50 drums x½

CLOSED-SYSTEM PURGE-AND-TRAP AND EXTRACTION FOR VOLATILE ORGANICS IN SOIL AND WASTE SAMPLES

1.0 SCOPE AND APPLICATION

1.1 This method describes a closed-system purge-and-trap process for the analysis of volatile organic compounds (VOCs) in solid materials (e.g., soils, sediments, and solid waste). While the method is designed for use on samples containing low levels of VOCs, procedures are also provided for collecting and preparing solid samples containing high concentrations of VOCs and for oily wastes. For these high concentration and oily materials, sample collection and preparation are performed using the procedures described here, and sample introduction is performed using the aqueous purge-and-trap procedure in Method 5030. These procedures may be used in conjunction with any appropriate determinative gas chromatographic procedure, including, but not limited to, Methods 8015, 8021, and 8260.

1.2 The low soil method utilizes a hermetically-sealed sample vial, the seal of which is never broken from the time of sampling to the time of analysis. Since the sample is never exposed to the atmosphere after sampling, the losses of VOCs during sample transport, handling, and analysis are negligible. The applicable concentration range of the low soil method is dependent on the determinative method, matrix, and compound. However, it will generally fall in the 0.5 to 200 µg/kg range.

1.3 Procedures are included for preparing high concentration samples for purging by Method 5030. High concentration samples are those containing VOC levels of >200 µg/kg.

1.4 Procedures are also included for addressing oily wastes that are soluble in a water-miscible solvent. These samples are also purged using Method 5030..

1.5 Method 5035 can be used for most volatile organic compounds that have boiling points below 200°C and that are insoluble or slightly soluble in water. Volatile, water-soluble compounds can be included in this analytical technique. However, quantitation limits (by GC or GC/MS) are approximately ten times higher because of poor purging efficiency.

1.6 Method 5035, in conjunction with Method 8015 (GC/FID), may be used for the analysis of the aliphatic hydrocarbon fraction in the light ends of total petroleum hydrocarbons, e.g., gasoline. For the aromatic fraction (BTEX), use Method 5035 and Method 8021 (GC/PID). A total determinative analysis of gasoline fractions may be obtained using Method 8021 in series with Method 8015.

1.7 As with any preparative method for volatiles, samples should be screened to avoid contamination of the purge-and-trap system by samples that contain very high concentrations of purgeable material above the calibration range of the low concentration method. In addition, because the sealed sample container cannot be opened to remove a sample aliquot without compromising the integrity of the sample, multiple sample aliquots should be collected to allow for screening and reanalysis.

1.8 The closed-system purge-and-trap equipment employed for low concentration samples is not appropriate for soil samples preserved in the field with methanol. Such samples should be analyzed using Method 5030 (see the note in Sec. 6.2.2).

1.9 This method is restricted to use by or under the supervision of trained analysts. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 Low concentration soil method - generally applicable to and soils and other solid samples with VOC concentrations in the range of 0.5 to 200 µg/kg.

Volatile organic compounds (VOCs) are determined by collecting an approximately 5-g sample, weighed in the field at the time of collection, and placing it in a pre-weighed vial with a septum-sealed screw-cap (see Sec. 4) that already contains a stirring bar and a sodium bisulfate preservative solution. The vial is sealed and shipped to a laboratory or appropriate analysis site. The entire vial is then placed, unopened, into the instrument carousel. Immediately before analysis, organic-free reagent water, surrogates, and internal standards (if applicable) are automatically added without opening the sample vial. The vial containing the sample is heated to 40°C and the volatiles purged into an appropriate trap using an inert gas combined with agitation of the sample. Purged components travel via a transfer line to a trap. When purging is complete, the trap is heated and backflushed with helium to desorb the trapped sample components into a gas chromatograph for analysis by an appropriate determinative method.

2.2 High concentration soil method - generally applicable to soils and other solid samples with VOC concentrations greater than 200 µg/kg.

The sample introduction technique in Sec. 2.1 is not applicable to all samples, particularly those containing high concentrations (generally greater than 200 µg/kg) of VOCs which may overload either the volatile trapping material or exceed the working range of the determinative instrument system (e.g., GC/MS, GC/FID, GC/EC, etc.). In such instances, this method describes two sample collection options and the corresponding sample purging procedures.

2.2.1 The first option is to collect a bulk sample in a vial or other suitable container without the use of the preservative solution described in Sec. 2.1. A portion of that sample is removed from the container in the laboratory and is dispersed in a water-miscible solvent to dissolve the volatile organic constituents. An aliquot of the solution is added to 5 mL of reagent water in a purge tube. Surrogates and internal standards (if applicable) are added to the solution, then purged using Method 5030, and analyzed by an appropriate determinative method. Because the procedure involves opening the vial and removing a portion of the soil, some volatile constituents may be lost during handling.

2.2.2 The second option is to collect an approximately 5-g sample in a pre-weighed vial with a septum-sealed screw-cap (see Sec 4) that contains 5 mL of a water-miscible organic solvent (e.g., methanol). At the time of analysis, surrogates are added to the vial, then an aliquot of the solvent is removed from the vial, purged using Method 5030 and analyzed by an appropriate determinative method.

2.3 High concentration oily waste method - generally applicable to oily samples with VOC concentrations greater than 200 µg/kg that can be diluted in a water-miscible solvent.

Samples that are comprised of oils or samples that contain significant amounts of oil present additional analytical challenges. This procedure is generally appropriate for such samples when they are soluble in a water-miscible solvent.

2.3.1 After demonstrating that a test aliquot of the sample is soluble in methanol or polyethylene glycol (PEG), a separate aliquot of the sample is spiked with surrogates and diluted in the appropriate solvent. An aliquot of the solution is added to 5 mL of reagent water in a purge tube, taking care to ensure that a floating layer of oil is not present in the purge tube. Internal standards (if applicable) are added to the solution which is then purged using Method 5030 and analyzed by an appropriate determinative method.

2.3.2 Samples that contain oily materials that are not soluble in water-miscible solvents must be prepared according to Method 3585.

3.0 INTERFERENCES

3.1 Impurities in the purge gas and from organic compounds out-gassing from the plumbing ahead of the trap account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running method blanks. The use of non-polytetrafluoroethylene (non-PTFE) plastic coating, non-PTFE thread sealants, or flow controllers with rubber components in the purging device must be avoided, since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. These compounds will result in interferences or false positives in the determinative step.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride and fluorocarbons) through the septum seal of the sample vial during shipment and storage. A trip blank prepared from organic-free reagent water and carried through sampling and handling protocols serves as a check on such contamination.

3.3 Contamination by carryover can occur whenever high-concentration and low-concentration samples are analyzed in sequence. Where practical, samples with unusually high concentrations of analytes should be followed by an analysis of organic-free reagent water to check for cross-contamination. If the target compounds present in an unusually concentrated sample are also found to be present in the subsequent samples, the analyst must demonstrate that the compounds are not due to carryover. Conversely, if those target compounds are <u>not</u> present in the subsequent sample, then the analysis of organic-free reagent water is not necessary.

3.4 The laboratory where volatile analysis is performed should be completely free of solvents. Special precautions must be taken to determine methylene chloride. The analytical and sample storage area should be isolated from all atmospheric sources of methylene chloride, otherwise random background levels will result. Since methylene chloride will permeate through PTFE tubing, all GC carrier gas lines and purge gas plumbing should be constructed of stainless steel or copper tubing. Laboratory workers' clothing previously exposed to methylene chloride fumes during common liquid/liquid extraction procedures can contribute to sample contamination. The presence of other organic solvents in the laboratory where volatile organics are analyzed will also lead to random background levels and the same precautions must be taken.

4.0 APPARATUS AND MATERIALS

4.1 Sample Containers

The specific sample containers required will depend on the purge-and-trap system to be employed (see Sec. 4.2). Several systems are commercially available. Some systems employ 40-mL clear vials with a special frit and equipped with two PTFE-faced silicone septa. Other

systems permit the use of any good quality glass vial that is large enough to contain at least 5 g of soil or solid material and at least 10 mL of water and that can be sealed with a screw-cap containing a PTFE-faced silicone septum. Consult the purge-and-trap system manufacturer's instructions regarding the suitable specific vials, septa, caps, and mechanical agitation devices.

4.2 Purge-and-Trap System

The purge-and-trap system consists of a unit that automatically adds water, surrogates, and internal standards (if applicable) to a vial containing the sample, purges the VOCs using an inert gas stream while agitating the contents of the vial, and also traps the released VOCs for subsequent desorption into the gas chromatograph. Such systems are commercially available from several sources and shall meet the following specifications.

4.2.1 The purging device should be capable of accepting a vial sufficiently large to contain a 5-g soil sample plus a magnetic stirring bar and 10 mL of water. The device must be capable of heating a soil vial to 40°C and holding it at that temperature while the inert purge gas is allowed to pass through the sample. The device should also be capable of introducing at least 5 mL of organic-free reagent water into the sample vial while trapping the displaced headspace vapors. It must also be capable of agitating the sealed sample during purging, (e.g., using a magnetic stirring bar added to the vial prior to sample collection, sonication, or other means). The analytes being purged must be quantitatively transferred to an absorber trap. The trap must be capable of transferring the absorbed VOCs to the gas chromatograph (see 4.2.2).

NOTE: The equipment used to develop this method was a Dynatech PTA-30 W/S Autosampler. This device was subsequently sold to Varian, and is now available as the Archon Purge and Trap Autosampler. See the Disclaimer at the front of this manual for guidance on the use of alternative equipment.

4.2.2 A variety of traps and trapping materials may be employed with this method. The choice of trapping material may depend on the analytes of interest. Whichever trap is employed, it must demonstrate sufficient adsorption and desorption characteristics to meet the quantitation limits of all the target analytes for a given project and the QC requirements in Method 8000 and the determinative method. The most difficult analytes are generally the gases, especially dichlorodifluoromethane. The trap must be capable of desorbing the late eluting target analytes.

NOTE: Check the responses of the brominated compounds when using alternative charcoal traps (especially Vocarb 4000), as some degradation has been noted when higher desorption temperatures (especially above 240 - 250°C) are employed. 2-Chloroethyl vinyl ether is degraded on Vocarb 4000 but performs adequately when Vocarb 3000 is used. The primary criterion, as stated above, is that all target analytes meet the sensitivity requirements for a given project.

4.2.2.1 The trap used to develop this method was 25 cm long, with an inside diameter of 0.105 inches, and was packed with Carbopack/Carbosieve (Supelco, Inc.).

4.2.2.2 The standard trap used in other EPA purge-and-trap methods is also acceptable. That trap is 25 cm long and has an inside diameter of at least 0.105 in. Starting from the inlet, the trap contains the equal amounts of the adsorbents listed below. It is recommended that 1.0 cm of methyl silicone-coated packing (35/60 mesh, Davison, grade 15 or equivalent) be inserted at the inlet to extend the life of the trap. If

the analysis of dichlorodifluoromethane or other fluorocarbons of similar volatility is not required, then the charcoal can be eliminated and the polymer increased to fill 2/3 of the trap. If only compounds boiling above 35°C are to be analyzed, both the silica gel and charcoal can be eliminated and the polymer increased to fill the entire trap.

4.2.2.2.1 2,6-Diphenylene oxide polymer - 60/80 mesh, chromatographic grade (Tenax GC or equivalent).

4.2.2.2.2 Methyl silicone packing - OV-1 (3%) on Chromosorb-W, 60/80 mesh or equivalent.

4.2.2.2.3 Coconut charcoal - Prepare from Barnebey Cheney, CA-580-26, or equivalent, by crushing through 26 mesh screen.

4.2.2.3 Trapping materials other than those listed above also may be employed, provided that they meet the specifications in Sec. 4.2.3, below.

4.2.3 The desorber for the trap must be capable of rapidly heating the trap to the temperature recommended by the trap material manufacturer, prior to the beginning of the flow of desorption gas. Several commercial desorbers (purge-and-trap units) are available.

4.3 Syringe and Syringe Valves

4.3.1 25-mL glass hypodermic syringes with Luer-Lok (or equivalent) tip (other sizes are acceptable depending on sample volume used).

4.3.2 2-way syringe valves with Luer ends.

4.3.3 25-µL micro syringe with a 2 inch x 0.006 inch ID, 22° bevel needle (Hamilton #702N or equivalent).

4.3.4 Micro syringes - 10-, 100-µL.

4.3.5 Syringes - 0.5-, 1.0-, and 5-mL, gas-tight with shut-off valve.

4.4 Miscellaneous

4.4.1 Glass vials

4.4.1.1 60-mL, septum-sealed, to collect samples for screening, dry weight determination.

4.4.1.2 40-mL, screw-cap, PTFE lined, septum-sealed. Examine each vial prior to use to ensure that the vial has a flat, uniform sealing surface.

4.4.2 Top-loading balance - Capable of accurately weighing to 0.01 g.

4.4.3 Glass scintillation vials - 20-mL, with screw-caps and PTFE liners, or glass culture tubes with screw-caps and PTFE liners, for dilution of oily waste samples.

4.4.4 Volumetric flasks - Class A, 10-mL and 100-mL, with ground-glass stoppers.

4.4.5 2-mL glass vials, for GC autosampler - Used for oily waste samples extracted with methanol or PEG.

4.4.6 Spatula, stainless steel - narrow enough to fit into a sample vial.

4.4.7 Disposable Pasteur pipettes.

4.4.8 Magnetic stirring bars - PTFE- or glass-coated, of the appropriate size to fit the sample vials. Consult manufacturer's recommendation for specific stirring bars. Stirring bars may be reused, provided that they are thoroughly cleaned between uses. Consult the manufacturers of the purging device and the stirring bars for suggested cleaning procedures.

4.5 Field Sampling Equipment

4.5.1 Purge-and-Trap Soil Sampler - Model 3780PT (Associated Design and Manufacturing Company, 814 North Henry Street, Alexandria, VA 22314), or equivalent.

4.5.2 EnCore™ sampler - (En Chem, Inc., 1795 Industrial Drive, Green Bay, WI 54302), or equivalent.

4.5.3 Alternatively, disposable plastic syringes with a barrel smaller than the neck of the soil vial may be used to collect the sample. The syringe end of the barrel is cut off prior to sampling. One syringe is needed for each sample aliquot to be collected.

4.5.4 Portable balance - For field use, capable of weighing to 0.01 g.

4.5.5 Balance weights - Balances employed in the field should be checked against an appropriate reference weight at least once daily, prior to weighing any samples, or as described in the sampling plan. The specific weights used will depend on the total weight of the sample container, sample, stirring bar, reagent water added, cap, and septum.

5.0 REAGENTS

5.1 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.2 Methanol, CH_3OH - purge-and-trap quality or equivalent. Store away from other solvents.

5.3 Polyethylene glycol (PEG), $H(OCH_2CH_2)_nOH$ - free of interferences at the detection limit of the target analytes.

5.4 Low concentration sample preservative

5.4.1 Sodium bisulfate, $NaHSO_4$ - ACS reagent grade or equivalent.

5.4.2 The preservative should be added to the vial prior to shipment to the field, and must be present in the vial prior to adding the sample.

5.5 See the determinative method and Method 5000 for guidance on internal standards and surrogates to be employed in this procedure.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

Refer to the introductory material in this chapter, Organic Analytes, Sec. 4.1, for general sample collection information. The low concentration portion of this method employs sample vials that are filled and weighed in the field and never opened during the analytical process. As a result, sampling personnel should be equipped with a portable balance capable of weighing to 0.01 g.

6.1 Preparation of sample vials

The specific preparation procedures for sample vials depend on the expected concentration range of the sample, with separate preparation procedures for low concentration soil samples and high concentration soil and solid waste samples. Sample vials should be prepared in a fixed laboratory or other controlled environment, sealed, and shipped to the field location. Gloves should be worn during the preparation steps.

6.1.1 Low concentration soil samples

The following steps apply to the preparation of vials used in the collection of low concentration soil samples to be analyzed by the closed-system purge-and-trap equipment described in Method 5035.

6.1.1.1 Add a clean magnetic stirring bar to each clean vial. If the purge-and-trap device (Sec. 4.2) employs a means of stirring the sample other than a magnetic stirrer (e.g., sonication or other mechanical means), then the stir bar is omitted.

6.1.1.2 Add preservative to each vial. The preservative is added to each vial prior to shipping the vial to the field. Add approximately 1 g of sodium bisulfate to each vial. If samples markedly smaller or larger than 5 g are to be collected, adjust the amount of preservative added to correspond to approximately 0.2 g of preservative for each 1 g of sample. Enough sodium bisulfate should be present to ensure a sample pH of ≤ 2.

6.1.1.3 Add 5 mL of organic-free reagent water to each vial. The water and the preservative will form an acid solution that will reduce or eliminate the majority of the biological activity in the sample, thereby preventing biodegradation of the volatile target analytes.

6.1.1.4 Seal the vial with the screw-cap and septum seal. If the double-ended, fritted, vials are used, seal both ends as recommended by the manufacturer.

6.1.1.5 Affix a label to each vial. This eliminates the need to label the vials in the field and assures that the tare weight of the vial includes the label. (The weight of any markings added to the label in the field is negligible).

6.1.1.6 Weigh the prepared vial to the nearest 0.01 g, record the tare weight, and write it on the label.

6.1.1.7 Because volatile organics will partition into the headspace of the vial from the aqueous solution and will be lost when the vial is opened, surrogates, matrix spikes, and internal standards (if applicable) should only be added to the vials after the sample has been added to the vial. These standards should be introduced back in the

laboratory, either manually by puncturing the septum with a small-gauge needle or automatically by the sample introduction system, just prior to analysis.

6.1.2 High concentration soil samples collected without a preservative

When high concentration samples are collected without a preservative, a variety of sample containers may be employed, including 60-mL glass vials with septum seals (see Sec. 4.4).

6.1.3 High concentration soil samples collected and preserved in the field

The following steps apply to the preparation of vials used in the collection of high concentration soil samples to be preserved in the field with methanol and analyzed by the aqueous purge-and-trap equipment described in Method 5030.

6.1.3.1 Add 10 mL of methanol to each vial.

6.1.3.2 Seal the vial with the screw-cap and septum seal.

6.1.3.3 Affix a label to each vial. This eliminates the need to label the vials in the field and assures that the tare weight of the vial includes the label. (The weight of any markings added to the label in the field is negligible).

6.1.3.4 Weigh the prepared vial to the nearest 0.01 g, record the tare weight, and write it on the label.

NOTE: Vials containing methanol should be weighed a second time on the day that they are to be used. Vials found to have lost methanol (reduction in weight of >0.01 g) should not be used for sample collection.

6.1.3.5 Surrogates, internal standards and matrix spikes (if applicable) should be added to the sample after it is returned to the laboratory and prior to analysis.

6.1.4 Oily waste samples

When oily waste samples are known to be soluble in methanol or PEG, sample vials may be prepared as described in Sec. 6.1.3, using the appropriate solvent. However, when the solubility of the waste is unknown, the sample should be collected without the use of a preservative, in a vial such as that described in Sec. 6.1.2.

6.2 Sample collection

Collect the sample according to the procedures outlined in the sampling plan. As with any sampling procedure for volatiles, care must be taken to minimize the disturbance of the sample in order to minimize the loss of the volatile components. Several techniques may be used to transfer a sample to the relatively narrow opening of the low concentration soil vial. These include devices such as the EnCore™ sampler, the Purge-and-Trap Soil Sampler ™, and a cut plastic syringe. Always wear gloves whenever handling the tared sample vials.

6.2.1 Low concentration soil samples

6.2.1.1 Using an appropriate sample collection device, collect approximately 5 g of sample as soon as possible after the surface of the soil or other solid material has been exposed to the atmosphere: generally within a few minutes at most. Carefully wipe the exterior of the sample collection device with a clean cloth or towel.

6.2.1.2 Using the sample collection device, add about 5 g (2 - 3 cm) of soil to the sample vial containing the preservative solution. Quickly brush any soil off the vial threads and immediately seal the vial with the septum and screw-cap. Store samples on ice at 4°C.

NOTE: Soil samples that contain carbonate minerals (either from natural sources or applied as an amendment) may effervesce upon contact with the acidic preservative solution in the low concentration sample vial. If the amount of gas generated is very small (i.e., several mL), any loss of volatiles as a result of such effervescence may be minimal if the vial is sealed quickly. However, if larger amounts of gas are generated, not only may the sample lose a significant amount of analyte, but the gas pressure may shatter the vial if the sample vial is sealed. Therefore, when samples are known or suspected to contain high levels of carbonates, a test sample should be collected, added to a vial, and checked for effervescence. If a rapid or vigorous reaction occurs, discard the sample and collect low concentration samples in vials that do not contain the preservative solution.

6.2.1.3 When practical, use a portable balance to weigh the sealed vial containing the sample to ensure that 5.0 ± 0.5 g of sample were added. The balance should be calibrated in the field using an appropriate weight for the sample containers employed (Sec. 4.5.5). Record the weight of the sealed vial containing the sample to the nearest 0.01 g.

6.2.1.4 Alternatively, collect several trial samples with plastic syringes. Weigh each trial sample and note the length of the soil column in the syringe. Use these data to determine the length of soil in the syringe that corresponds to 5.0 ± 0.5 g. Discard each trial sample.

6.2.1.5 As with the collection of aqueous samples for volatiles, collect at least two replicate samples. This will allow the laboratory an additional sample for reanalysis. The second sample should be taken from the same soil stratum or the same section of the solid waste being sampled, and within close proximity to the location from which the original sample was collected.

6.2.1.6 In addition, since the soil vial cannot be opened without compromising the integrity of the sample, at least one additional aliquot of sample must be collected for screening, dry weight determination, and high concentration analysis (if necessary). This third aliquot may be collected in a 60-mL glass vial or a third 40-mL soil sample vial. However, this third vial must *not* contain the sample preservative solution, as an aliquot will be used to determine dry weight. If high concentration samples are collected in vials containing methanol, then two additional aliquots should be collected, one for high concentration analysis collected in a vial containing methanol, and another for the dry weight determination in a vial without either methanol or the low concentration aqueous preservative solution.

6.2.1.7 If samples are known or expected to contain target analytes over a wide range of concentrations, thereby requiring the analyses of multiple sample aliquots; it may be advisable and practical to take an additional sample aliquot in a low concentration soil vial containing the preservative, but collecting only 1-2 g instead of the 5 g collected in Sec. 6.2.1.1. This aliquot may be used for those analytes that exceed the instrument calibration range in the 5-g analysis.

6.2.1.8 The EnCore™ sampler has not been thoroughly evaluated by EPA as a sample storage device. While preliminary results indicate that storage in the EnCore™ device may be appropriate for up to 48 hours, samples collected in this device should be transferred to the soil sample vials as soon as possible, or analyzed within 48 hours.

6.2.1.9 The collection of low concentration soil samples in vials that contain methanol is not appropriate for samples analyzed with the closed-system purge-and-trap equipment described in this method (see Sec. 6.2.2).

6.2.2 High concentration soil samples preserved in the field

The collection of soil samples in vials that contain methanol has been suggested by some as a combined preservation and extraction procedure. However, this procedure is not appropriate for use with the low concentration soil procedure described in this method.

NOTE: The use of methanol preservation has not been formally evaluated by EPA and analysts must be aware of two potential problems. First, the use of methanol as a preservative and extraction solvent introduces a significant dilution factor that will raise the method quantitation limit beyond the operating range of the low concentration direct purge-and-trap procedure (0.5-200 µg/kg). The exact dilution factor will depend on the masses of solvent and sample, but generally exceeds 1000, and may make it difficult to demonstrate compliance with regulatory limits or action levels for some analytes. Because the analytes of interest are volatile, the methanol extract cannot be concentrated to overcome the dilution problem. Thus, for samples of unknown composition, it may still be necessary to collect an aliquot for analysis by this closed-system procedure and another aliquot preserved in methanol and analyzed by other procedures. The second problem is that the addition of methanol to the sample is likely to cause the sample to fail the ignitability characteristic, thereby making the unused sample volume a hazardous waste.

6.2.2.1 When samples are known to contain volatiles at concentrations high enough that the dilution factor will not preclude obtaining results within the calibration range of the appropriate determinative method, a sample may be collected and immediately placed in a sample vial containing purge-and-trap grade methanol.

6.2.2.2 Using an appropriate sample collection device, collect approximately 5 g of sample as soon as possible after the surface of the soil or other solid material has been exposed to the atmosphere: generally within a few minutes at most. Carefully wipe the exterior of the sample collection device with a clean cloth or towel.

6.2.2.3 Using the sample collection device, add about 5 g (2 - 3 cm) of soil to the vial containing 10 mL of methanol. Quickly brush any soil off the vial threads and immediately seal the vial with the septum and screw-cap. Store samples on ice at 4°C.

6.2.2.4 When practical, use a portable balance to weigh the sealed vial containing the sample to ensure that 5.0 ± 0.5 g of sample were added. The balance should be calibrated in the field using an appropriate weight for the sample containers employed (Sec. 4.5.5). Record the weight of the sealed vial containing the sample to the nearest 0.01 g.

6.2.2.5 Alternatively, collect several trial samples with plastic syringes. Weigh each trial sample and note the length of the soil column in the syringe. Use these data to determine the length of soil in the syringe that corresponds to 5.0 ± 0.5 g. Discard each trial sample.

6.2.2.6 Other sample weights and volumes of methanol may be employed, provided that the analyst can demonstrate that the sensitivity of the overall analytical procedure is appropriate for the intended application.

6.2.2.7 The collection of at least one additional sample aliquot is required for the determination of the dry weight, as described in Sec. 6.2.1.6. Samples collected in methanol should be shipped as described in Sec. 6.3, and must be clearly labeled as containing methanol, so that the samples are not analyzed using the closed-system purge-and-trap equipment described in this procedure.

6.2.3 High concentration soil sample not preserved in the field

The collection of high concentration soil samples that are not preserved in the field generally follows similar procedures as for the other types of samples described in Secs. 6.2.1 and 6.2.2, with the obvious exception that the sample vials contain neither the aqueous preservative solution nor methanol. However, when field preservation is not employed, it is better to collect a larger volume sample, filling the sample container as full as practical in order to minimize the headspace. Such collection procedures generally do not require the collection of a separate aliquot for dry weight determination, but it may be advisable to collect a second sample aliquot for screening purposes, in order to minimize the loss of volatiles in either aliquot.

6.2.4 Oily waste samples

The collection procedures for oily samples depend on knowledge of the waste and its solubility in methanol or other solvents.

6.2.4.1 When an oily waste is known to be soluble in methanol or PEG, the sample may be collected in a vial containing such a solvent (see Sec. 6.1.4), using procedures similar to those described in Sec. 6.2.2.

6.2.4.2 When the solubility of the oily waste is not known, the sample should either be collected in a vial without a preservative, as described in Sec. 6.2.3, or the solubility of a trial sample should be tested in the field, using a vial containing solvent. If the trial sample is soluble in the solvent, then collect the oily waste sample as described in Sec. 6.2.2. Otherwise, collect an unpreserved sample as described in Sec. 6.2.3.

6.3 Sample handling and shipment

All samples for volatiles analysis should be cooled to approximately 4°C, packed in appropriate containers, and shipped to the laboratory on ice, as described in the sampling plan.

6.4 Sample storage

6.4.1 Once in the laboratory, store samples at 4°C until analysis. The sample storage area should be free of organic solvent vapors.

6.4.2 All samples should be analyzed as soon as practical, and within the designated holding time from collection. Samples not analyzed within the designated holding time must be noted and the data are considered minimum values.

6.4.3 When the low concentration samples are strongly alkaline or highly calcareous in nature, the sodium bisulfate preservative solution may not be strong enough to reduce the pH of the soil/water solution to below 2. Therefore, when low concentration soils to be sampled are known or suspected to be strongly alkaline or highly calcareous, additional steps may be required to preserve the samples. Such steps include: addition of larger amounts of the sodium bisulfate preservative to non-calcareous samples, storage of low concentration samples at -10°C (taking care not to fill the vials so full that the expansion of the water in the vial breaks the vial), or significantly reducing the maximum holding time for low concentration soil samples. Whichever steps are employed, they should be clearly described in the sampling and QA project plans and distributed to both the field and laboratory personnel. See Sec. 6.2.1.2 for additional information.

7.0 PROCEDURE

This section describes procedures for sample screening, the low concentration soil method, the high concentration soil method, and the procedure for oily waste samples. High concentration samples are to be introduced into the GC system using Method 5030. Oily waste samples are to be introduced into the GC system using Method 5030 if they are soluble in a water-miscible solvent, or using Method 3585 if they are not.

7.1 Sample screening

7.1.1 It is highly recommended that all samples be screened prior to the purge-and-trap GC or GC/MS analysis. Samples may contain higher than expected quantities of purgeable organics that will contaminate the purge-and-trap system, thereby requiring extensive cleanup and instrument maintenance. The screening data are used to determine which is the appropriate sample preparation procedure for the particular sample, the low concentration closed-system direct purge-and-trap method (Sec. 7.2), the high concentration (methanol extraction) method (Sec. 7.3), or the nonaqueous liquid (oily waste) methanol or PEG dilution procedure (Sec. 7.4).

7.1.2 The analyst may employ any appropriate screening technique. Two suggested screening techniques employing SW-846 methods are:

7.1.2.1 Automated headspace (Method 5021) using a gas chromatograph (GC) equipped with a photoionization detector (PID) and an electrolytic conductivity detector (HECD) in series, or,

7.1.2.2 Extraction of the sample with hexadecane (Method 3820) and analysis of the extract on a GC equipped with a FID and/or an ECD.

7.1.3 The analyst may inject a calibration standard containing the analytes of interest at a concentration equivalent to the upper limit of the calibration range of the low concentration soil method. The results from this standard may be used to determine when the screening results approach the upper limit of the low concentration soil method. There are no linearity or other performance criteria associated with the injection of such a standard, and other approaches may be employed to estimate sample concentrations.

7.1.4 Use the low concentration closed-system purge-and-trap method (Sec. 7.2) if the estimated concentration from the screening procedure falls within the calibration range of the selected determinative method. If the concentration exceeds the calibration range of the low concentration soil method, then use either the high concentration soil method (Sec. 7.3), or the oily waste method (Sec. 7.4).

7.2 Low concentration soil method (Approximate concentration range of 0.5 to 200 µg/kg - the concentration range is dependent upon the determinative method and the sensitivity of each analyte.)

7.2.1 Initial calibration

Prior to using this introduction technique for any GC or GC/MS method, the system must be calibrated. General calibration procedures are discussed in Method 8000, while the determinative methods and Method 5000 provide specific information on calibration and preparation of standards. Normally, external standard calibration is preferred for the GC methods (non-MS detection) because of possible interference problems with internal standards. If interferences are not a problem, or when a GC/MS method is used, internal standard calibration may be employed.

7.2.1.1 Assemble a purge-and-trap device that meets the specification in Sec. 4.2 and that is connected to a gas chromatograph or a gas chromatograph/mass spectrometer system.

7.2.1.2 Before initial use, a Carbopack/Carbosieve trap should be conditioned overnight at 245°C by backflushing with an inert gas flow of at least 20 mL/minute. If other trapping materials are substituted for the Carbopack/Carbosieve, follow the manufacturers recommendations for conditioning. Vent the trap effluent to the hood, not to the analytical column. Prior to daily use, the trap should be conditioned for 10 minutes at 245°C with backflushing. The trap may be vented to the analytical column during daily conditioning; however, the column must be run through the temperature program prior to analysis of samples.

7.2.1.3 If the standard trap in Sec. 4.2.2.2 is employed, prior to initial use, the trap should be conditioned overnight at 180°C by backflushing with an inert gas flow of at least 20 mL/min, or according to the manufacturer's recommendations. Vent the trap effluent to the hood, not to the analytical column. Prior to daily use, the trap should be conditioned for 10 min at 180°C with backflushing. The trap may be vented to the analytical column during daily conditioning; however, the column must be run through the temperature program prior to analysis of samples.

7.2.1.4 Establish the purge-and-trap instrument operating conditions. Adjust the instrument to inject 5 mL of water, to heat the sample to 40°C, and to hold the sample at 40°C for 1.5 minutes before commencing the purge process, or as recommended by the instrument manufacturer.

7.2.1.5 Prepare a minimum of five initial calibration standards containing all the analytes of interest and surrogates, as described in Method 8000, and following the instrument manufacturer's instructions. The calibration standards are prepared in organic-free reagent water. The volume of organic-free reagent water used for calibration must be the same volume used for sample analysis (normally 5 mL added to the vial before shipping it to the field plus the organic-free reagent water added by the instrument). The calibration standards should also contain approximately the same amount of the sodium bisulfate preservative as the sample (e.g., ~1 g), as the presence of the preservative will affect the purging efficiencies of the analytes. The internal standard solution must be added automatically, by the instrument, in the same fashion as used for the samples. Place the soil vial containing the solution in the instrument carousel. In order to calibrate the surrogates using standards at five concentrations, it may be necessary to disable the automatic addition of surrogates to each vial containing a calibration standard (consult the manufacturer's instructions). Prior to purging, heat the sample vial to 40°C for 1.5 minutes, or as recommended by the manufacturer.

7.2.1.6 Carry out the purge-and-trap procedure as outlined in Secs. 7.2.3. to 7.2.5.

7.2.1.7 Calculate calibration factors (CF) or response factors (RF) for each analyte of interest using the procedures described in Method 8000. Calculate the average CF (external standards) or RF (internal standards) for each compound, as described in Method 8000. Evaluate the linearity of the calibration data, or choose another calibration model, as described in Method 8000 and the specific determinative method.

7.2.1.8 For GC/MS analysis, a system performance check must be made before this calibration curve is used (see Method 8260). If the purge-and-trap procedure is used with Method 8021, evaluate the response for the following four compounds: chloromethane; 1,1-dichloroethane; bromoform; and 1,1,2,2-tetrachloroethane. They are used to check for proper purge flow and to check for degradation caused by contaminated lines or active sites in the system.

7.2.1.8.1 Chloromethane is the most likely compound to be lost if the purge flow is too fast.

7.2.1.8.2 Bromoform is one of the compounds most likely to be purged very poorly if the purge flow is too slow. Cold spots and/or active sites in the transfer lines may adversely affect response.

7.2.1.8.3 Tetrachloroethane and 1,1-dichloroethane are degraded by contaminated transfer lines in purge-and-trap systems and/or active sites in trapping materials.

7.2.1.9 When analyzing for very late eluting compounds with Method 8021 (i.e., hexachlorobutadiene, 1,2,3-trichlorobenzene, etc.), cross-contamination and memory effects from a high concentration sample or even the standard are a common problem.

Extra rinsing of the purge chamber after analysis normally corrects this. The newer purge-and-trap systems often overcome this problem with better bakeout of the system following the purge-and-trap process. Also, the charcoal traps retain less moisture and decrease the problem.

7.2.2 Calibration verification

Refer to Method 8000 for details on calibration verification. A single standard near the mid-point of calibration range is used for verification. This standard should also contain approximately 1 g of sodium bisulfate.

7.2.3 Sample purge-and-trap

This method is designed for a 5-g sample size, but smaller sample sizes may be used. Consult the instrument manufacturer's instructions regarding larger sample sizes, in order to avoid clogging of the purging apparatus. The soil vial is hermetically sealed at the sampling site, and MUST remain so in order to guarantee the integrity of the sample. Gloves must be worn when handling the sample vial since the vial has been tared. If any soil is noted on the exterior of the vial or cap, it must be carefully removed prior to weighing. Weigh the vial and contents to the nearest 0.01 g, even if the sample weight was determined in the field, and record this weight. This second weighing provides a check on the field sampling procedures and provides additional assurance that the reported sample weight is accurate. Data users should be advised on significant discrepancies between the field and laboratory weights.

7.2.3.1 Remove the sample vial from storage and allow it to warm to room temperature. Shake the vial gently, to ensure that the contents move freely and that stirring will be effective. Place the sample vial in the instrument carousel according to the manufacturer's instructions.

7.2.3.2 Without disturbing the hermetic seal on the sample vial, add 5 mL of organic-free reagent water, the internal standards, and the surrogate compounds. This is carried out using the automated sampler. Other volumes of organic-free reagent water may be used, however, it is imperative that all samples, blanks, and calibration standards have exactly the same final volume of organic-free reagent water. Prior to purging, heat the sample vial to 40°C for 1.5 minutes, or as described by the manufacturer.

7.2.3.3 For the sample selected for matrix spiking, add the matrix spiking solution described in Sec. 5.0 of Method 5000, either manually, or automatically, following the manufacturer's instructions. The concentration of the spiking solution and the amount added should be established as described in Sec. 8.0 of Method 8000.

7.2.3.4 Purge the sample with helium or another inert gas at a flow rate of up to 40 mL/minute (the flow rate may vary from 20 to 40 mL/min, depending on the target analyte group) for 11 minutes while the sample is being agitated with the magnetic stirring bar or other mechanical means. The purged analytes are allowed to flow out of the vial through a glass-lined transfer line to a trap packed with suitable sorbent materials.

7.2.4 Sample Desorption

7.2.4.1 Non-cryogenic interface - After the 11 minute purge, place the purge-and-trap system in the desorb mode and preheat the trap to 245°C without a flow

of desorption gas. Start the flow of desorption gas at 10 mL/minute for about four minutes (1.5 min is normally adequate for analytes in Method 8015). Begin the temperature program of the gas chromatograph and start data acquisition.

7.2.4.2 Cryogenic interface - After the 11 minute purge, place the purge-and-trap system in the desorb mode, make sure that the cryogenic interface is at -150°C or lower, and rapidly heat the trap to 245°C while backflushing with an inert gas at 4 mL/minute for about 5 minutes (1.5 min is normally adequate for analytes in Methods 8015). At the end of the 5-minute desorption cycle, rapidly heat the cryogenic trap to 250°C. Begin the temperature program of the gas chromatograph and start the data acquisition.

7.2.5 Trap Reconditioning

After desorbing the sample for 4 minutes, recondition the trap by returning the purge-and-trap system to the purge mode. Maintain the trap temperature at 245°C (or other temperature recommended by the manufacturer of the trap packing materials). After approximately 10 minutes, turn off the trap heater and halt the purge flow through the trap. When the trap is cool, the next sample can be analyzed.

7.2.6 Data Interpretation

Perform qualitative and quantitative analysis following the guidance given in the determinative method and Method 8000. If the concentration of any target analyte exceeds the calibration range of the instrument, it will be necessary to reanalyze the sample by the high concentration method. Such reanalyses need only address those analytes for which the concentration exceeded the calibration range of the low concentration method. Alternatively, if a sample aliquot of 1-2 g was also collected (see Sec. 6.2.1.7), it may be practical to analyze that aliquot for the analytes that exceeded the instrument calibration range in the 5-g analysis. If results are to be reported on a dry weight basis, proceed to Sec. 7.5

7.3 High concentration method for soil samples with concentrations generally greater than 200 µg/kg.

The high concentration method for soil is based on a solvent extraction. A solid sample is either extracted or diluted, depending on sample solubility in a water-miscible solvent. An aliquot of the extract is added to organic-free reagent water containing surrogates and, if applicable, internal and matrix spiking standards, purged according to Method 5030, and analyzed by an appropriate determinative method. Wastes that are insoluble in methanol (i.e., petroleum and coke wastes) are diluted with hexadecane (see Sec. 7.3.8).

The specific sample preparation steps depend on whether or not the sample was preserved in the field. Samples that were <u>not</u> preserved in the field are prepared using the steps below, beginning at Sec. 7.3.1. If solvent preservation was employed in the field, then the preparation begins with Sec. 7.3.4.

7.3.1 When the high concentration sample is <u>not</u> preserved in the field, the sample consists of the entire contents of the sample container. Do not discard any supernatant liquids. Whenever practical, mix the contents of the sample container by shaking or other mechanical means without opening the vial. When shaking is not practical, quickly mix the contents of the vial with a narrow metal spatula and immediately reseal the vial.

7.3.2 If the sample is from an unknown source, perform a solubility test before proceeding. Remove several grams of material from the sample container. Quickly reseal the container to minimize the loss of volatiles. Weigh 1-g aliquots of the sample into several test tubes or other suitable containers. Add 10 mL of methanol to the first tube, 10 mL of PEG to the second, and 10 mL of hexadecane to the third. Swirl the sample and determine if it is soluble in the solvent. Once the solubility has been evaluated, discard these test solutions. If the sample is soluble in either methanol or PEG, proceed with Sec. 7.3.3. If the sample is only soluble in hexadecane, proceed with Sec. 7.3.8.

7.3.3 For soil and solid waste samples that are soluble in methanol, add 9.0 mL of methanol and 1.0 mL of the surrogate spiking solution to a tared 20-mL vial. Using a top-loading balance, weigh 5 g (wet weight) of sample into the vial. Quickly cap the vial and reweigh the vial. Record the weight to 0.1 g. Shake the vial for 2 min. If the sample was not soluble in methanol, but was soluble in PEG, employ the same procedure described above, but use 9.0 mL of PEG in place of the methanol. Proceed with Sec. 7.3.5.

NOTE: The steps in Secs. 7.3.1, 7.3.2, and 7.3.3 must be performed rapidly and without interruption to avoid loss of volatile organics. These steps must be performed in a laboratory free from solvent fumes.

7.3.4 For soil and solid waste samples that were collected in methanol or PEG (see Sec. 6.2.2), weigh the vial to 0.1 g as a check on the weight recorded in the field, add the surrogate spiking solution to the vial by injecting it through the septum, shake for 2 min, as described above, and proceed with Sec. 7.3.5.

7.3.5 Pipet approximately 1 mL of the extract from either Sec. 7.3.3 or 7.3.4 into a GC vial for storage, using a disposable pipet, and seal the vial. The remainder of the extract may be discarded. Add approximately 1 mL of methanol or PEG to a separate GC vial for use as the method blank for each set of samples extracted with the same solvent.

7.3.6 The extracts must be stored at 4°C in the dark, prior to analysis. Add an appropriate aliquot of the extract (see Table 2) to 5.0 mL of organic-free reagent water and analyze by Method 5030 in conjunction with the appropriate determinative method. Proceed to Sec. 7.0 in Method 5030 and follow the procedure for purging high concentration samples.

7.3.7 If results are to be reported on a dry weight basis, determine the dry weight of a separate aliquot of the sample, using the procedure in Sec. 7.5, after the sample extract has been transferred to a GC vial and the vial sealed.

7.3.8 For solids that are not soluble in methanol or PEG (including those samples consisting primarily of petroleum or coking waste) dilute or extract the sample with hexadecane using the procedures in Sec. 7.0 of Method 3585.

7.4 High concentration method for oily waste samples

This procedure for the analysis of oily waste samples involves the dilution of the sample in methanol or PEG. However, care must be taken to avoid introducing any of the floating oil layer into the instrument. A portion of the diluted sample is then added to 5.0 mL of organic-free reagent water, purged according to Method 5030, and analyzed using an appropriate determinative method.

For oily samples that are not soluble in methanol or PEG (including those samples consisting primarily of petroleum or coking waste), dilute or extract with hexadecane using the procedures in Sec. 7.0 of Method 3585.

The specific sample preparation steps depend on whether or not the sample was preserved in the field. Samples that were not preserved in the field are prepared using the steps below, beginning at Sec. 7.4.1. If methanol preservation was employed in the field, then the preparation begins with Sec. 7.4.3.

7.4.1 If the waste was not preserved in the field and it is soluble in methanol or PEG, weigh 1 g (wet weight) of the sample into a tared 10-mL volumetric flask, a tared scintillation vial, or a tared culture tube. If a vial or tube is used instead of a volumetric flask, it must be calibrated prior to use. This operation must be performed prior to opening the sample vial and weighing out the aliquot for analysis.

7.4.1.1 To calibrate the vessel, pipet 10.0 mL of methanol or PEG into the vial or tube and mark the bottom of the meniscus.

7.4.1.2 Discard this solvent, and proceed with weighing out the 1-g sample aliquot.

7.4.2 Quickly add 1.0 mL of surrogate spiking solution to the flask, vial, or tube, and dilute to 10.0 mL with the appropriate solvent (methanol or PEG). Swirl the vial to mix the contents and then shake vigorously for 2 minutes.

7.4.3 If the sample was collected in the field in a vial containing methanol or PEG, weigh the vial to 0.1 g as a check on the weight recorded in the field, add the surrogate spiking solution to the vial by injecting it through the septum. Swirl the vial to mix the contents and then shake vigorously for 2 minutes and proceed with Sec. 7.4.4.

7.4.4 Regardless of how the sample was collected, the target analytes are extracted into the solvent along with the majority of the oily waste (i.e., some of the oil may still be floating on the surface). If oil is floating on the surface, transfer 1 to 2 mL of the extract to a clean GC vial using a Pasteur pipet. Ensure that no oil is transferred to the vial.

7.4.5 Add 10 - 50 µL of the methanol extract to 5 mL of organic-free reagent water for purge-and-trap analysis, using Method 5030.

7.4.6 Prepare a matrix spike sample by adding 10 - 50 µL of the matrix spike standard dissolved in methanol to a 1-g aliquot of the oily waste. Shake the vial to disperse the matrix spike solution throughout the oil. Then add 10 mL of extraction solvent and proceed with the extraction and analysis, as described in Secs. 7.4.2 - 7.4.5. Calculate the recovery of the spiked analytes as described in Method 8000. If the recovery is not within the acceptance limits for the application, use the hexadecane dilution technique in Sec. 7.0 of Method 3585.

7.5 Determination of % Dry Weight

If results are to be reported on a dry weight basis, it is necessary to determine the dry weight of the sample.

NOTE: It is highly recommended that the dry weight determination only be made after the analyst has determined that no sample aliquots will be taken from the 60-mL vial for high

concentration analysis. This is to minimize loss of volatiles and to avoid sample contamination from the laboratory atmosphere. There is no holding time associated with the dry weight determination. Thus, this determination can be made any time prior to reporting the sample results, as long as the vial containing the additional sample has remained sealed and properly stored.

7.5.1 Weigh 5-10 g of the sample from the 60-mL VOA vial into a tared crucible.

7.5.2 Dry this aliquot overnight at 105°C. Allow to cool in a desiccator before weighing. Calculate the % dry weight as follows:

$$\% \text{ dry weight} = \frac{\text{g of dry sample}}{\text{g of sample}} \times 100$$

WARNING: The drying oven should be contained in a hood or vented. Significant laboratory contamination may result from a heavily contaminated hazardous waste sample.

8.0 QUALITY CONTROL

8.1 Refer to Chapter One for specific quality control procedures and Method 5000 for sample preparation QC procedures.

8.2 Before processing any samples, the analyst should demonstrate through the analysis of an organic-free reagent water method blank that all glassware and reagents are interference free. Each time a set of samples is extracted, or there is a change in reagents, a method blank should be processed as a safeguard against chronic laboratory contamination. The blank samples should be carried through all stages of the sample preparation and measurement.

8.3 Initial Demonstration of Proficiency - Each laboratory must demonstrate initial proficiency with each sample preparation and determinative method combination it utilizes, by generating data of acceptable accuracy and precision for target analytes in a clean matrix. The laboratory must also repeat this demonstration whenever new staff are trained or significant changes in instrumentation are made. See Sec. 8.0 of Methods 5000 and 8000 for information on how to accomplish this demonstration.

8.4 Sample Quality Control for Preparation and Analysis - See Sec. 8.0 in Method 5000 and Method 8000 for procedures to follow to demonstrate acceptable continuing performance on each set of samples to be analyzed. These include the method blank, either a matrix spike/matrix spike duplicate or a matrix spike and duplicate sample analysis, a laboratory control sample (LCS), and the addition of surrogates to each sample and QC sample.

8.5 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9.0 METHOD PERFORMANCE

9.1 Single laboratory accuracy and precision data were obtained for the method analytes in three soil matrices, sand, a soil collected 10 feet below the surface of a hazardous landfill, called the

C-Horizon, and a surface garden soil. Each sample was fortified with the analytes at a concentration of 20 ng/5 g, which is equivalent to 4 µg/kg. These data are listed in tables found in Method 8260.

9.2 Single laboratory accuracy and precision data were obtained for certain method analytes when extracting oily liquid using methanol as the extraction solvent. The data are presented in a table in Method 8260. The compounds were spiked into three portions of an oily liquid (taken from a waste site) following the procedure for matrix spiking described in Sec. 7.4. This represents a worst case set of data based on recovery data from many sources of oily liquid.

10.0 REFERENCES

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TABLE 1

QUANTITY OF METHANOL EXTRACT REQUIRED FOR ANALYSIS OF HIGH CONCENTRATION SOILS/SEDIMENTS

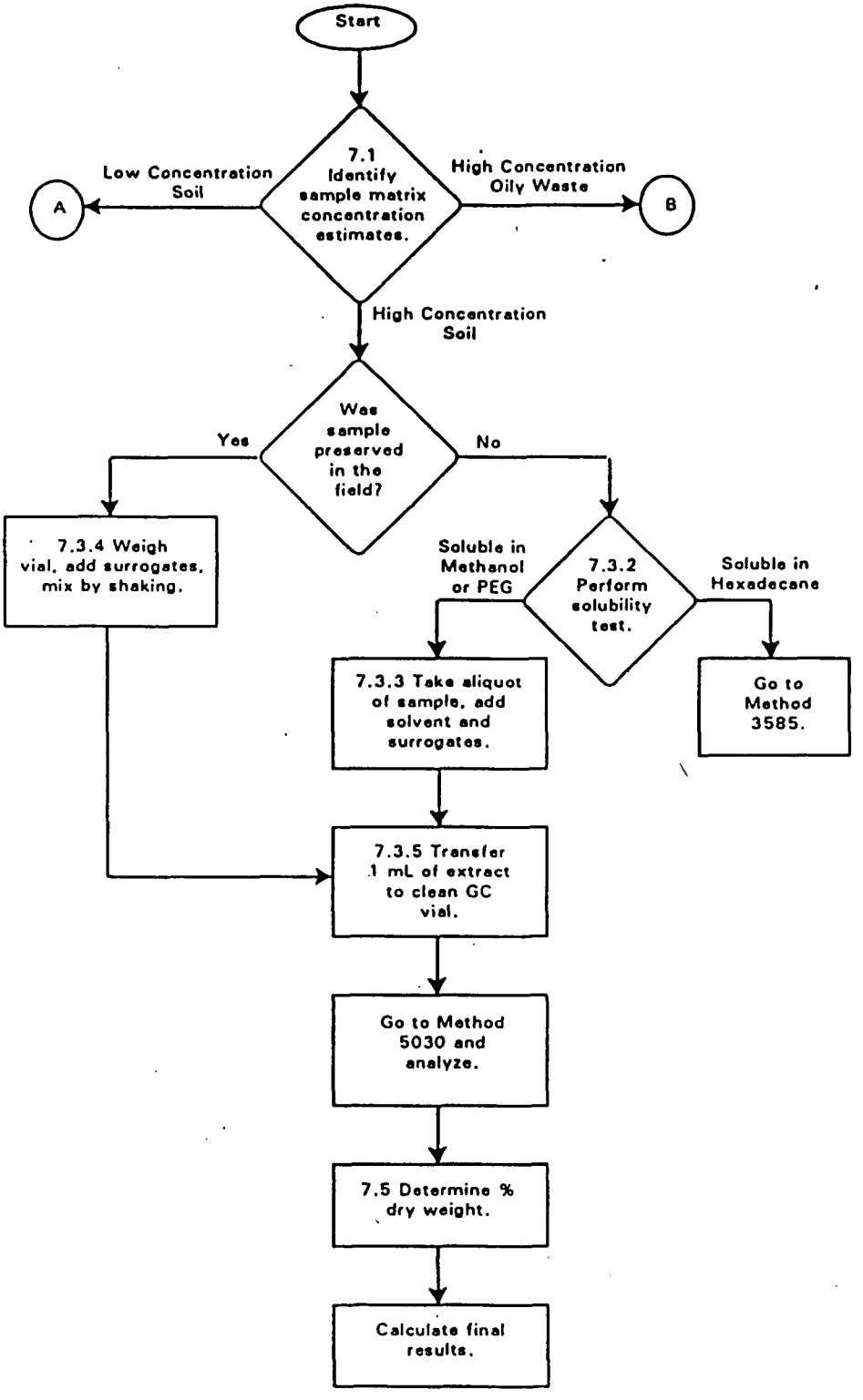
Approximate Concentration Range	Volume of Methanol Extract[a]
500 - 10,000 µg/kg	100 µL
1,000 - 20,000 µg/kg	50 µL
5,000 - 100,000 µg/kg	10 µL
25,000 - 500,000 µg/kg	100 µL of 1/50 dilution[b]

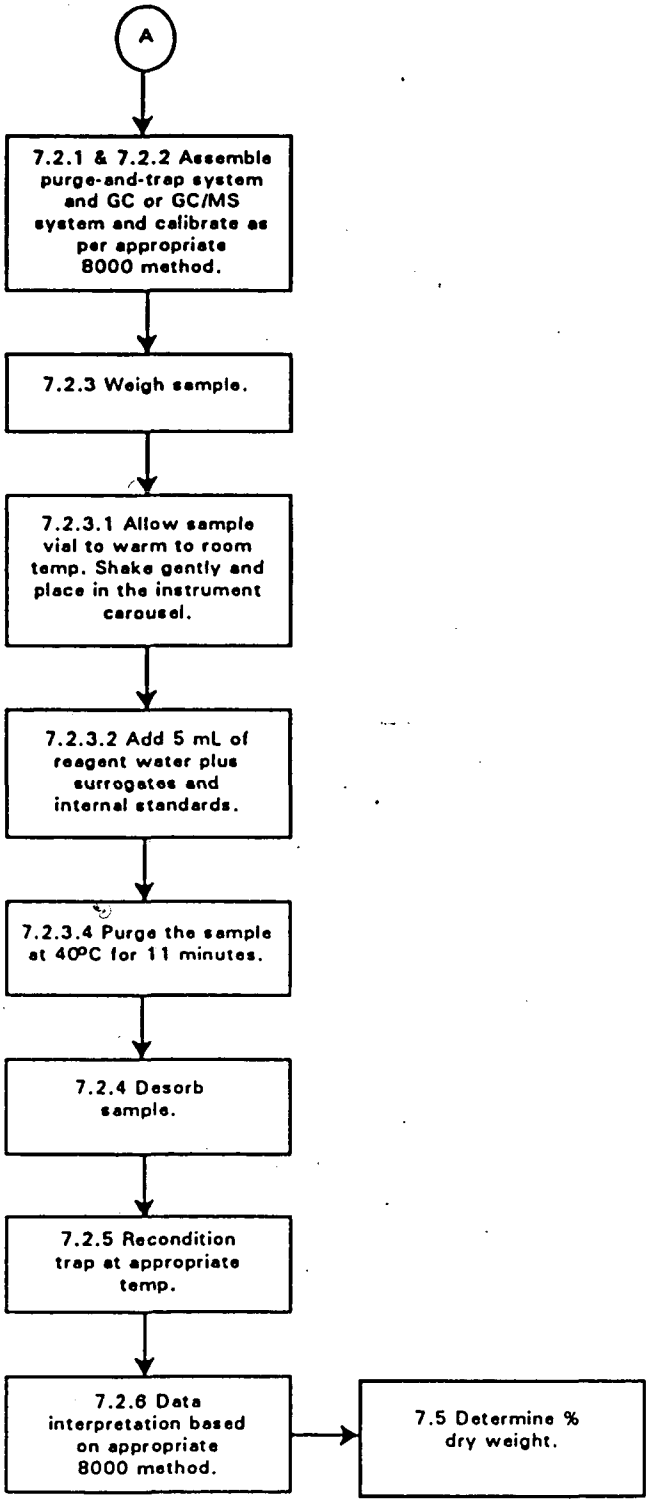
Calculate appropriate dilution factor for concentrations exceeding those in this table.

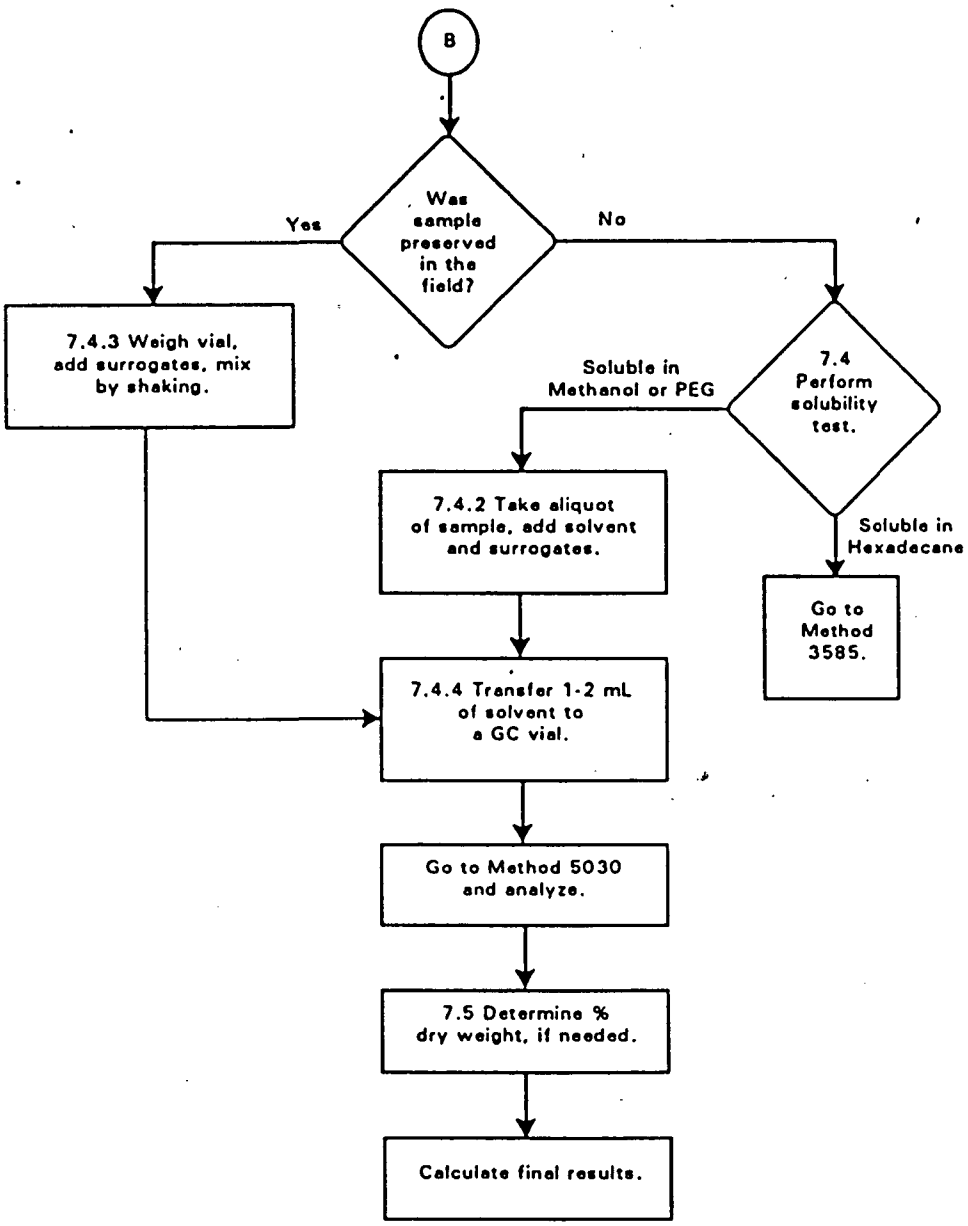
[a] The volume of methanol added to 5 mL of water being purged should be kept constant. Therefore, add to the 5-mL syringe whatever volume of methanol is necessary to maintain a total volume of 100 µL of methanol.

[b] Dilute an aliquot of the methanol extract and then take 100 µL for analysis.

METHOD 5035
CLOSED-SYSTEM PURGE-AND-TRAP AND EXTRACTION FOR VOLATILE ORGANICS IN SOIL AND WASTE SAMPLES




A
7.2.1 & 7.2.2 Assemble purge-and-trap system and GC or GC/MS system and calibrate as per appropriate 8000 method.
7.2.3 Weigh sample.
7.2.3.1 Allow sample vial to warm to room temp. Shake gently and place in the instrument carousel.
7.2.3.2 Add 5 mL of reagent water plus surrogates and internal standards.
7.2.3.4 Purge the sample at 40°C for 11 minutes.
7.2.4 Desorb sample.
7.2.5 Recondition trap at appropriate temp.
7.2.6 Data interpretation based on appropriate 8000 method.
7.5 Determine % dry weight.


B
Was sample preserved in the field?
Yes
No
7.4.3 Weigh vial, add surrogates, mix by shaking.
7.4 Perform solubility test.
Soluble in Methanol or PEG
Soluble in Hexadecane
7.4.2 Take aliquot of sample, add solvent and surrogates.
Go to Method 3585.
7.4.4 Transfer 1-2 mL of solvent to a GC vial.
Go to Method 5030 and analyze.
7.5 Determine % dry weight, if needed.
Calculate final results.

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000026

Client No.

EW-1A-6.0'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310101

Sample wt/vol: 5.20 (g/mL) G Lab File ID: H8271.RR

Level: (low/med) MED Date Samp/Recv: 07/29/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/04/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	22000	E
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000028

Client No.

EW-1A-6.0'DL

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310101DL

Sample wt/vol: 5.20 (g/mL) G Lab File ID: H8287.RR

Level: (low/med) MED Date Samp/Recv: 07/29/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 4.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	1900	U
74-83-9	Bromomethane	1900	U
75-01-4	Vinyl chloride	1900	U
75-00-3	Chloroethane	1900	U
75-09-2	Methylene chloride	1900	U
67-64-1	Acetone	1900	U
75-15-0	Carbon Disulfide	1900	U
75-35-4	1,1-Dichloroethene	1900	U
75-34-3	1,1-Dichloroethane	1900	U
540-59-0	1,2-Dichloroethene (Total)	1900	U
67-66-3	Chloroform	1900	U
107-06-2	1,2-Dichloroethane	1900	U
78-93-3	2-Butanone	1900	U
71-55-6	1,1,1-Trichloroethane	1900	U
56-23-5	Carbon Tetrachloride	1900	U
75-27-4	Bromodichloromethane	1900	U
78-87-5	1,2-Dichloropropane	1900	U
10061-01-5	cis-1,3-Dichloropropene	1900	U
79-01-6	Trichloroethene	19000	D
124-48-1	Dibromochloromethane	1900	U
79-00-5	1,1,2-Trichloroethane	1900	U
71-43-2	Benzene	1900	U
10061-02-6	trans-1,3-Dichloropropene	1900	U
75-25-2	Bromoform	1900	U
108-10-1	4-Methyl-2-pentanone	1900	U
591-78-6	2-Hexanone	1900	U
127-18-4	Tetrachloroethene	1900	U
108-88-3	Toluene	1900	U
79-34-5	1,1,2,2-Tetrachloroethane	1900	U
108-90-7	Chlorobenzene	1900	U
100-41-4	Ethylbenzene	1900	U
100-42-5	Styrene	1900	U
1330-20-7	Total Xylenes	1900	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000030

Client No.

EW-1A-12.'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310102

Sample wt/vol: 5.80 (g/mL) G Lab File ID: H8272.RR

Level: (low/med) MED Date Samp/Recv: 07/29/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/04/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	430	U
74-83-9	Bromomethane	430	U
75-01-4	Vinyl chloride	430	U
75-00-3	Chloroethane	430	U
75-09-2	Methylene chloride	430	U
67-64-1	Acetone	430	U
75-15-0	Carbon Disulfide	430	U
75-35-4	1,1-Dichloroethene	430	U
75-34-3	1,1-Dichloroethane	430	U
540-59-0	1,2-Dichloroethene (Total)	430	U
67-66-3	Chloroform	430	U
107-06-2	1,2-Dichloroethane	430	U
78-93-3	2-Butanone	430	U
71-55-6	1,1,1-Trichloroethane	430	U
56-23-5	Carbon Tetrachloride	430	U
75-27-4	Bromodichloromethane	430	U
78-87-5	1,2-Dichloropropane	430	U
10061-01-5	cis-1,3-Dichloropropene	430	U
79-01-6	Trichloroethene	190	J
124-48-1	Dibromochloromethane	430	U
79-00-5	1,1,2-Trichloroethane	430	U
71-43-2	Benzene	430	U
10061-02-6	trans-1,3-Dichloropropene	430	U
75-25-2	Bromoform	430	U
108-10-1	4-Methyl-2-pentanone	430	U
591-78-6	2-Hexanone	430	U
127-18-4	Tetrachloroethene	430	U
108-88-3	Toluene	430	U
79-34-5	1,1,2,2-Tetrachloroethane	430	U
108-90-7	Chlorobenzene	430	U
100-41-4	Ethylbenzene	430	U
100-42-5	Styrene	430	U
1330-20-7	Total Xylenes	430	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000032

Client No.

EW-1A-18.3'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310133

Sample wt/vol: 5.17 (g/mL) G Lab File ID: H8273.RR

Level: (low/med) MED Date Samp/Recv: 07/29/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/04/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.30

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	59000	E
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000034

Client No.

EW-1A-18.3'DL

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310103DL

Sample wt/vol: 5.17 (g/mL) G Lab File ID: H8288.RR

Level: (low/med) MED Date Samp/Recv: 07/29/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 10.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	4800	U
74-83-9	Bromomethane	4800	U
75-01-4	Vinyl chloride	4800	U
75-00-3	Chloroethane	4800	U
75-09-2	Methylene chloride	4800	U
67-64-1	Acetone	4800	U
75-15-0	Carbon Disulfide	4800	U
75-35-4	1,1-Dichloroethene	4800	U
75-34-3	1,1-Dichloroethane	4800	U
540-59-0	1,2-Dichloroethene (Total)	4800	U
67-66-3	Chloroform	4800	U
107-06-2	1,2-Dichloroethane	4800	U
78-93-3	2-Butanone	4800	U
71-55-6	1,1,1-Trichloroethane	4800	U
56-23-5	Carbon Tetrachloride	4800	U
75-27-4	Bromodichloromethane	4800	U
78-87-5	1,2-Dichloropropane	4800	U
10061-01-5	cis-1,3-Dichloropropene	4800	U
79-01-6	Trichloroethene	38000	D
124-48-1	Dibromochloromethane	4800	U
79-00-5	1,1,2-Trichloroethane	4800	U
71-43-2	Benzene	4800	U
10061-02-6	trans-1,3-Dichloropropene	4800	U
75-25-2	Bromoform	4800	U
108-10-1	4-Methyl-2-pentanone	4800	U
591-78-6	2-Hexanone	4800	U
127-18-4	Tetrachloroethene	4800	U
108-88-3	Toluene	4800	U
79-34-5	1,1,2,2-Tetrachloroethane	4800	U
108-90-7	Chlorobenzene	4800	U
100-41-4	Ethylbenzene	4800	U
100-42-5	Styrene	4800	U
1330-20-7	Total Xylenes	4800	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000010
Client No.

EW-1-26.0'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310104

Sample wt/vol: 5.32 (g/mL) G Lab File ID: H8289.RR

Level: (low/med) MED Date Samp/Recv: 07/27/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	470	U
74-83-9	Bromomethane	470	U
75-01-4	Vinyl chloride	470	U
75-00-3	Chloroethane	470	U
75-09-2	Methylene chloride	470	U
67-64-1	Acetone	470	U
75-15-0	Carbon Disulfide	470	U
75-35-4	1,1-Dichloroethene	470	U
75-34-3	1,1-Dichloroethane	470	U
540-59-0	1,2-Dichloroethene (Total)	470	U
67-66-3	Chloroform	470	U
107-06-2	1,2-Dichloroethane	470	U
78-93-3	2-Butanone	470	U
71-55-6	1,1,1-Trichloroethane	470	U
56-23-5	Carbon Tetrachloride	470	U
75-27-4	Bromodichloromethane	470	U
78-87-5	1,2-Dichloropropane	470	U
10061-01-5	cis-1,3-Dichloropropene	470	U
79-01-6	Trichloroethene	4600	
124-48-1	Dibromochloromethane	470	U
79-00-5	1,1,2-Trichloroethane	470	U
71-43-2	Benzene	470	U
10061-02-6	trans-1,3-Dichloropropene	470	U
75-25-2	Bromoform	470	U
108-10-1	4-Methyl-2-pentanone	470	U
591-78-6	2-Hexanone	470	U
127-18-4	Tetrachloroethene	470	U
108-88-3	Toluene	470	U
79-34-5	1,1,2,2-Tetrachloroethane	470	U
108-90-7	Chlorobenzene	470	U
100-41-4	Ethylbenzene	470	U
100-42-5	Styrene	470	U
1330-20-7	Total Xylenes	470	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000012

Client No.

EW-1-34.5'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310135

Sample wt/vol: 5.16 (g/mL) G Lab File ID: H8275.RR

Level: (low/med) MED Date Samp/Recv: 07/27/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/04/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	22000	E
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000014

Client No.

EW-1-34.5'DL

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310105DL

Sample wt/vol: 5.16 (g/mL) G Lab File ID: H8290.RR

Level: (low/med) MED Date Samp/Recv: 07/27/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 4.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	1900	U
74-83-9	Bromomethane	1900	U
75-01-4	Vinyl chloride	1900	U
75-00-3	Chloroethane	1900	U
75-09-2	Methylene chloride	1900	U
67-64-1	Acetone	1900	U
75-15-0	Carbon Disulfide	1900	U
75-35-4	1,1-Dichloroethene	1900	U
75-34-3	1,1-Dichloroethane	1900	U
540-59-0	1,2-Dichloroethene (Total)	1900	U
67-66-3	Chloroform	1900	U
107-06-2	1,2-Dichloroethane	1900	U
78-93-3	2-Butanone	1900	U
71-55-6	1,1,1-Trichloroethane	1900	U
56-23-5	Carbon Tetrachloride	1900	U
75-27-4	Bromodichloromethane	1900	U
78-87-5	1,2-Dichloropropane	1900	U
10061-01-5	cis-1,3-Dichloropropene	1900	U
79-01-6	Trichloroethene	20000	D
124-48-1	Dibromochloromethane	1900	U
79-00-5	1,1,2-Trichloroethane	1900	U
71-43-2	Benzene	1900	U
10061-02-6	trans-1,3-Dichloropropene	1900	U
75-25-2	Bromoform	1900	U
108-10-1	4-Methyl-2-pentanone	1900	U
591-78-6	2-Hexanone	1900	U
127-18-4	Tetrachloroethene	1900	U
108-88-3	Toluene	1900	U
79-34-5	1,1,2,2-Tetrachloroethane	1900	U
108-90-7	Chlorobenzene	1900	U
100-41-4	Ethylbenzene	1900	U
100-42-5	Styrene	1900	U
1330-20-7	Total Xylenes	1900	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000016

Client No.

EW-1-43.8'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310106

Sample wt/vol: 5.11 (g/mL) G Lab File ID: H8276.RR

Level: (low/med) MED Date Samp/Recv: 07/28/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/04/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	490	U
74-83-9	Bromomethane	490	U
75-01-4	Vinyl chloride	490	U
75-00-3	Chloroethane	490	U
75-09-2	Methylene chloride	490	U
67-64-1	Acetone	490	U
75-15-0	Carbon Disulfide	490	U
75-35-4	1,1-Dichloroethene	490	U
75-34-3	1,1-Dichloroethane	490	U
540-59-0	1,2-Dichloroethene (Total)	490	U
67-66-3	Chloroform	490	U
107-06-2	1,2-Dichloroethane	490	U
78-93-3	2-Butanone	490	U
71-55-6	1,1,1-Trichloroethane	490	U
56-23-5	Carbon Tetrachloride	490	U
75-27-4	Bromodichloromethane	490	U
78-87-5	1,2-Dichloropropane	490	U
10061-01-5	cis-1,3-Dichloropropene	490	U
79-01-6	Trichloroethene	270	J
124-48-1	Dibromochloromethane	490	U
79-00-5	1,1,2-Trichloroethane	490	U
71-43-2	Benzene	490	U
10061-02-6	trans-1,3-Dichloropropene	490	U
75-25-2	Bromoform	490	U
108-10-1	4-Methyl-2-pentanone	490	U
591-78-6	2-Hexanone	490	U
127-18-4	Tetrachloroethene	490	U
108-88-3	Toluene	490	U
79-34-5	1,1,2,2-Tetrachloroethane	490	U
108-90-7	Chlorobenzene	490	U
100-41-4	Ethylbenzene	490	U
100-42-5	Styrene	490	U
1330-20-7	Total Xylenes	490	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000018

Client No.

EW-1-53.9'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310107

Sample wt/vol: 5.18 (g/mL) G Lab File ID: H8291.RR

Level: (low/med) MED Date Samp/Recv: 07/28/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	480	U
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000020

Client No.

EW-1-64.8'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310108

Sample wt/vol: 5.76 (g/mL) G Lab File ID: H8292.RR

Level: (low/med) MED Date Samp/Recv: 07/28/98 07/30/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	430	U
74-83-9	Bromomethane	430	U
75-01-4	Vinyl chloride	430	U
75-00-3	Chloroethane	430	U
75-09-2	Methylene chloride	430	U
67-64-1	Acetone	430	U
75-15-0	Carbon Disulfide	430	U
75-35-4	1,1-Dichloroethene	430	U
75-34-3	1,1-Dichloroethane	430	U
540-59-0	1,2-Dichloroethene (Total)	430	U
67-66-3	Chloroform	430	U
107-06-2	1,2-Dichloroethane	430	U
78-93-3	2-Butanone	430	U
71-55-6	1,1,1-Trichloroethane	430	U
56-23-5	Carbon Tetrachloride	430	U
75-27-4	Bromodichloromethane	430	U
78-87-5	1,2-Dichloropropane	430	U
10061-01-5	cis-1,3-Dichloropropene	430	U
79-01-6	Trichloroethene	82	J
124-48-1	Dibromochloromethane	430	U
79-00-5	1,1,2-Trichloroethane	430	U
71-43-2	Benzene	430	U
10061-02-6	trans-1,3-Dichloropropene	430	U
75-25-2	Bromoform	430	U
108-10-1	4-Methyl-2-pentanone	430	U
591-78-6	2-Hexanone	430	U
127-18-4	Tetrachloroethene	430	U
108-88-3	Toluene	430	U
79-34-5	1,1,2,2-Tetrachloroethane	430	U
108-90-7	Chlorobenzene	430	U
100-41-4	Ethylbenzene	430	U
100-42-5	Styrene	430	U
1330-20-7	Total Xylenes	430	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

C00022

Client No.

EW-1-89.5'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310109

Sample wt/vol: 5.07 (g/mL) G Lab File ID: H8293.RR

Level: (low/med) MED Date Samp/Recv: 07/28/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	490	U
74-83-9	Bromomethane	490	U
75-01-4	Vinyl chloride	490	U
75-00-3	Chloroethane	490	U
75-09-2	Methylene chloride	490	U
67-64-1	Acetone	490	U
75-15-0	Carbon Disulfide	490	U
75-35-4	1,1-Dichloroethene	490	U
75-34-3	1,1-Dichloroethane	490	U
540-59-0	1,2-Dichloroethene (Total)	490	U
67-66-3	Chloroform	490	U
107-06-2	1,2-Dichloroethane	490	U
78-93-3	2-Butanone	490	U
71-55-6	1,1,1-Trichloroethane	490	U
56-23-5	Carbon Tetrachloride	490	U
75-27-4	Bromodichloromethane	490	U
78-87-5	1,2-Dichloropropane	490	U
10061-01-5	cis-1,3-Dichloropropene	490	U
79-01-6	Trichloroethene	490	U
124-48-1	Dibromochloromethane	490	U
79-00-5	1,1,2-Trichloroethane	490	U
71-43-2	Benzene	490	U
10061-02-6	trans-1,3-Dichloropropene	490	U
75-25-2	Bromoform	490	U
108-10-1	4-Methyl-2-pentanone	490	U
591-78-6	2-Hexanone	490	U
127-18-4	Tetrachloroethene	490	U
108-88-3	Toluene	490	U
79-34-5	1,1,2,2-Tetrachloroethane	490	U
108-90-7	Chlorobenzene	490	U
100-41-4	Ethylbenzene	490	U
100-42-5	Styrene	490	U
1330-20-7	Total Xylenes	98	J

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000024

Client No.

EW-1-99.0'

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8310110

Sample wt/vol: 4.86 (g/mL) G Lab File ID: H8294.RR

Level: (low/med) MED Date Samp/Recv: 07/28/98 08/03/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/05/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	510	U
74-83-9	Bromomethane	510	U
75-01-4	Vinyl chloride	510	U
75-00-3	Chloroethane	510	U
75-09-2	Methylene chloride	510	U
67-64-1	Acetone	510	U
75-15-0	Carbon Disulfide	510	U
75-35-4	1,1-Dichloroethene	510	U
75-34-3	1,1-Dichloroethane	510	U
540-59-0	1,2-Dichloroethene (Total)	510	U
67-66-3	Chloroform	510	U
107-06-2	1,2-Dichloroethane	510	U
78-93-3	2-Butanone	510	U
71-55-6	1,1,1-Trichloroethane	510	U
56-23-5	Carbon Tetrachloride	510	U
75-27-4	Bromodichloromethane	510	U
78-87-5	1,2-Dichloropropane	510	U
10061-01-5	cis-1,3-Dichloropropene	510	U
79-01-6	Trichloroethene	510	U
124-48-1	Dibromochloromethane	510	U
79-00-5	1,1,2-Trichloroethane	510	U
71-43-2	Benzene	510	U
10061-02-6	trans-1,3-Dichloropropene	510	U
75-25-2	Bromoform	510	U
108-10-1	4-Methyl-2-pentanone	510	U
591-78-6	2-Hexanone	510	U
127-18-4	Tetrachloroethene	510	U
108-88-3	Toluene	510	U
79-34-5	1,1,2,2-Tetrachloroethane	510	U
108-90-7	Chlorobenzene	510	U
100-41-4	Ethylbenzene	510	U
100-42-5	Styrene	510	U
1330-20-7	Total Xylenes	510	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000008
Client No.

EW-2 (12.5)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294101

Sample wt/vol: 5.09 (g/mL) G Lab File ID: H8205.RR

Level: (low/med) MED Date Samp/Recv: 07/21/98 07/25/98

% Moisture: not dec. 0.1 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	490	U
74-83-9	Bromomethane	490	U
75-01-4	Vinyl chloride	490	U
75-00-3	Chloroethane	490	U
75-09-2	Methylene chloride	490	U
67-64-1	Acetone	490	U
75-15-0	Carbon Disulfide	490	U
75-35-4	1,1-Dichloroethene	490	U
75-34-3	1,1-Dichloroethane	490	U
540-59-0	1,2-Dichloroethene (Total)	490	U
67-66-3	Chloroform	490	U
107-06-2	1,2-Dichloroethane	490	U
78-93-3	2-Butanone	490	U
71-55-6	1,1,1-Trichloroethane	490	U
56-23-5	Carbon Tetrachloride	490	U
75-27-4	Bromodichloromethane	490	U
78-87-5	1,2-Dichloropropane	490	U
10061-01-5	cis-1,3-Dichloropropene	490	U
79-01-6	Trichloroethene	490	U
124-48-1	Dibromochloromethane	490	U
79-00-5	1,1,2-Trichloroethane	490	U
71-43-2	Benzene	490	U
10061-02-6	trans-1,3-Dichloropropene	490	U
75-25-2	Bromoform	490	U
108-10-1	4-Methyl-2-pentanone	490	U
591-78-6	2-Hexanone	490	U
127-18-4	Tetrachloroethene	490	U
108-88-3	Toluene	490	U
79-34-5	1,1,2,2-Tetrachloroethane	490	U
108-90-7	Chlorobenzene	490	U
100-41-4	Ethylbenzene	490	U
100-42-5	Styrene	490	U
1330-20-7	Total Xylenes	490	U

000010

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

Client No.

EW-2 (23.3)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294102

Sample wt/vol: 5.19 (g/mL) G Lab File ID: H8206.RR

Level: (low/med) MED Date Samp/Recv: 07/21/98 07/25/98

% Moisture: not dec. 0.6 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	310	J
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000012

Client No.

EW-2 (30.2)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294103

Sample wt/vol: 5.18 (g/mL) G Lab File ID: H8207.RR

Level: (low/med) MED Date Samp/Recv: 07/21/98 07/25/98

% Moisture: not dec. 0.7 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	490	U
74-83-9	Bromomethane	490	U
75-01-4	Vinyl chloride	490	U
75-00-3	Chloroethane	490	U
75-09-2	Methylene chloride	490	U
67-64-1	Acetone	490	U
75-15-0	Carbon Disulfide	490	U
75-35-4	1,1-Dichloroethene	490	U
75-34-3	1,1-Dichloroethane	490	U
540-59-0	1,2-Dichloroethene (Total)	490	U
67-66-3	Chloroform	490	U
107-06-2	1,2-Dichloroethane	490	U
78-93-3	2-Butanone	490	U
71-55-6	1,1,1-Trichloroethane	490	U
56-23-5	Carbon Tetrachloride	490	U
75-27-4	Bromodichloromethane	490	U
78-87-5	1,2-Dichloropropane	490	U
10061-01-5	cis-1,3-Dichloropropene	490	U
79-01-6	Trichloroethene	490	U
124-48-1	Dibromochloromethane	490	U
79-00-5	1,1,2-Trichloroethane	490	U
71-43-2	Benzene	490	U
10061-02-6	trans-1,3-Dichloropropene	490	U
75-25-2	Bromoform	490	U
108-10-1	4-Methyl-2-pentanone	490	U
591-78-6	2-Hexanone	490	U
127-18-4	Tetrachloroethene	490	U
108-88-3	Toluene	490	U
79-34-5	1,1,2,2-Tetrachloroethane	490	U
108-90-7	Chlorobenzene	490	U
100-41-4	Ethylbenzene	490	U
100-42-5	Styrene	490	U
1330-20-7	Total Xylenes	490	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000014
Client No.

EW-2 (36.6)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294104

Sample wt/vol: 5.19 (g/mL) G Lab File ID: H8208.RR

Level: (low/med) MED Date Samp/Recv: 07/22/98 07/25/98

% Moisture: not dec. 0.0 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	480	U
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000016

Client No.

EW-2 (48.25)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294105

Sample wt/vol: 4.91 (g/mL) G Lab File ID: H8209.RR

Level: (low/med) MED Date Samp/Recv: 07/22/98 07/25/98

% Moisture: not dec. 0.2 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	510	U
74-83-9	Bromomethane	510	U
75-01-4	Vinyl chloride	510	U
75-00-3	Chloroethane	510	U
75-09-2	Methylene chloride	510	U
67-64-1	Acetone	510	U
75-15-0	Carbon Disulfide	510	U
75-35-4	1,1-Dichloroethene	510	U
75-34-3	1,1-Dichloroethane	510	U
540-59-0	1,2-Dichloroethene (Total)	510	U
67-66-3	Chloroform	510	U
107-06-2	1,2-Dichloroethane	510	U
78-93-3	2-Butanone	510	U
71-55-6	1,1,1-Trichloroethane	510	U
56-23-5	Carbon Tetrachloride	510	U
75-27-4	Bromodichloromethane	510	U
78-87-5	1,2-Dichloropropane	510	U
10061-01-5	cis-1,3-Dichloropropene	510	U
79-01-6	Trichloroethene	510	U
124-48-1	Dibromochloromethane	510	U
79-00-5	1,1,2-Trichloroethane	510	U
71-43-2	Benzene	510	U
10061-02-6	trans-1,3-Dichloropropene	510	U
75-25-2	Bromoform	510	U
108-10-1	4-Methyl-2-pentanone	510	U
591-78-6	2-Hexanone	510	U
127-18-4	Tetrachloroethene	510	U
108-88-3	Toluene	510	U
79-34-5	1,1,2,2-Tetrachloroethane	510	U
108-90-7	Chlorobenzene	510	U
100-41-4	Ethylbenzene	510	U
100-42-5	Styrene	510	U
1330-20-7	Total Xylenes	510	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000018

Client No.

EW-2 (57.5)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294106

Sample wt/vol: 5.23 (g/mL) G Lab File ID: H8210.RR

Level: (low/med) MED Date Samp/Recv: 07/22/98 07/25/98

% Moisture: not dec. 0.2 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	480	U
74-83-9	Bromomethane	480	U
75-01-4	Vinyl chloride	480	U
75-00-3	Chloroethane	480	U
75-09-2	Methylene chloride	480	U
67-64-1	Acetone	480	U
75-15-0	Carbon Disulfide	480	U
75-35-4	1,1-Dichloroethene	480	U
75-34-3	1,1-Dichloroethane	480	U
540-59-0	1,2-Dichloroethene (Total)	480	U
67-66-3	Chloroform	480	U
107-06-2	1,2-Dichloroethane	480	U
78-93-3	2-Butanone	480	U
71-55-6	1,1,1-Trichloroethane	480	U
56-23-5	Carbon Tetrachloride	480	U
75-27-4	Bromodichloromethane	480	U
78-87-5	1,2-Dichloropropane	480	U
10061-01-5	cis-1,3-Dichloropropene	480	U
79-01-6	Trichloroethene	480	U
124-48-1	Dibromochloromethane	480	U
79-00-5	1,1,2-Trichloroethane	480	U
71-43-2	Benzene	480	U
10061-02-6	trans-1,3-Dichloropropene	480	U
75-25-2	Bromoform	480	U
108-10-1	4-Methyl-2-pentanone	480	U
591-78-6	2-Hexanone	480	U
127-18-4	Tetrachloroethene	480	U
108-88-3	Toluene	480	U
79-34-5	1,1,2,2-Tetrachloroethane	480	U
108-90-7	Chlorobenzene	480	U
100-41-4	Ethylbenzene	480	U
100-42-5	Styrene	480	U
1330-20-7	Total Xylenes	480	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000020
Client No.

EW-2 (60.2)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294107

Sample wt/vol: 5.01 (g/mL) G Lab File ID: H8211.RR

Level: (low/med) MED Date Samp/Recv: 07/22/98 07/25/98

% Moisture: not dec. 1.2 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene chloride	500	U
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	500	U
75-35-4	1,1-Dichloroethene	500	U
75-34-3	1,1-Dichloroethane	500	U
540-59-0	1,2-Dichloroethene (Total)	500	U
67-66-3	Chloroform	500	U
107-06-2	1,2-Dichloroethane	500	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	500	U
56-23-5	Carbon Tetrachloride	500	U
75-27-4	Bromodichloromethane	500	U
78-87-5	1,2-Dichloropropane	500	U
10061-01-5	cis-1,3-Dichloropropene	500	U
79-01-6	Trichloroethene	500	U
124-48-1	Dibromochloromethane	500	U
79-00-5	1,1,2-Trichloroethane	500	U
71-43-2	Benzene	500	U
10061-02-6	trans-1,3-Dichloropropene	500	U
75-25-2	Bromoform	500	U
108-10-1	4-Methyl-2-pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	500	U
108-88-3	Toluene	500	U
79-34-5	1,1,2,2-Tetrachloroethane	500	U
108-90-7	Chlorobenzene	500	U
100-41-4	Ethylbenzene	500	U
100-42-5	Styrene	500	U
1330-20-7	Total Xylenes	500	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000022

Client No.

EW-2 (80.5)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294108

Sample wt/vol: 4.85 (g/mL) G Lab File ID: H8212.RR

Level: (low/med) MED Date Samp/Recv: 07/23/98 07/25/98

% Moisture: not dec. 3.5 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	530	U
74-83-9	Bromomethane	530	U
75-01-4	Vinyl chloride	530	U
75-00-3	Chloroethane	530	U
75-09-2	Methylene chloride	530	U
67-64-1	Acetone	530	U
75-15-0	Carbon Disulfide	530	U
75-35-4	1,1-Dichloroethene	530	U
75-34-3	1,1-Dichloroethane	530	U
540-59-0	1,2-Dichloroethene (Total)	530	U
67-66-3	Chloroform	530	U
107-06-2	1,2-Dichloroethane	530	U
78-93-3	2-Butanone	530	U
71-55-6	1,1,1-Trichloroethane	530	U
56-23-5	Carbon Tetrachloride	530	U
75-27-4	Bromodichloromethane	530	U
78-87-5	1,2-Dichloropropane	530	U
10061-01-5	cis-1,3-Dichloropropene	530	U
79-01-6	Trichloroethene	530	U
124-48-1	Dibromochloromethane	530	U
79-00-5	1,1,2-Trichloroethane	530	U
71-43-2	Benzene	530	U
10061-02-6	trans-1,3-Dichloropropene	530	U
75-25-2	Bromoform	530	U
108-10-1	4-Methyl-2-pentanone	530	U
591-78-6	2-Hexanone	530	U
127-18-4	Tetrachloroethene	530	U
108-88-3	Toluene	530	U
79-34-5	1,1,2,2-Tetrachloroethane	530	U
108-90-7	Chlorobenzene	530	U
100-41-4	Ethylbenzene	530	U
100-42-5	Styrene	530	U
1330-20-7	Total Xylenes	530	U

NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

CCCC34

Client No.

EW-2 (83.0)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294109

Sample wt/vol: 5.13 (g/mL) G Lab File ID: H8213.RR

Level: (low/med) MED Date Samp/Recv: 07/23/98 07/25/98

% Moisture: not dec. 6.5 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	520	U
74-83-9	Bromomethane	520	U
75-01-4	Vinyl chloride	520	U
75-00-3	Chloroethane	520	U
75-09-2	Methylene chloride	520	U
67-64-1	Acetone	520	U
75-15-0	Carbon Disulfide	520	U
75-35-4	1,1-Dichloroethene	520	U
75-34-3	1,1-Dichloroethane	520	U
540-59-0	1,2-Dichloroethene (Total)	520	U
67-66-3	Chloroform	520	U
107-06-2	1,2-Dichloroethane	520	U
78-93-3	2-Butanone	520	U
71-55-6	1,1,1-Trichloroethane	520	U
56-23-5	Carbon Tetrachloride	520	U
75-27-4	Bromodichloromethane	520	U
78-87-5	1,2-Dichloropropane	520	U
10061-01-5	cis-1,3-Dichloropropene	520	U
79-01-6	Trichloroethene	520	U
124-48-1	Dibromochloromethane	520	U
79-00-5	1,1,2-Trichloroethane	520	U
71-43-2	Benzene	520	U
10061-02-6	trans-1,3-Dichloropropene	520	U
75-25-2	Bromoform	520	U
108-10-1	4-Methyl-2-pentanone	520	U
591-78-6	2-Hexanone	520	U
127-18-4	Tetrachloroethene	520	U
108-88-3	Toluene	520	U
79-34-5	1,1,2,2-Tetrachloroethane	520	U
108-90-7	Chlorobenzene	520	U
100-41-4	Ethylbenzene	520	U
100-42-5	Styrene	520	U
1330-20-7	Total Xylenes	520	U

IT CORPORATION
NYSDEC STANDBY CONTRACT
ASP 95 - VOLATILES
ANALYSIS DATA SHEET

000026

Client No.

EW-2 (99.5)

Lab Name: Recra LabNet Contract: _____

Lab Code: RECNY Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: A8294110

Sample wt/vol: 5.11 (g/mL) G Lab File ID: H8214.RR

Level: (low/med) MED Date Samp/Recv: 07/23/98 07/25/98

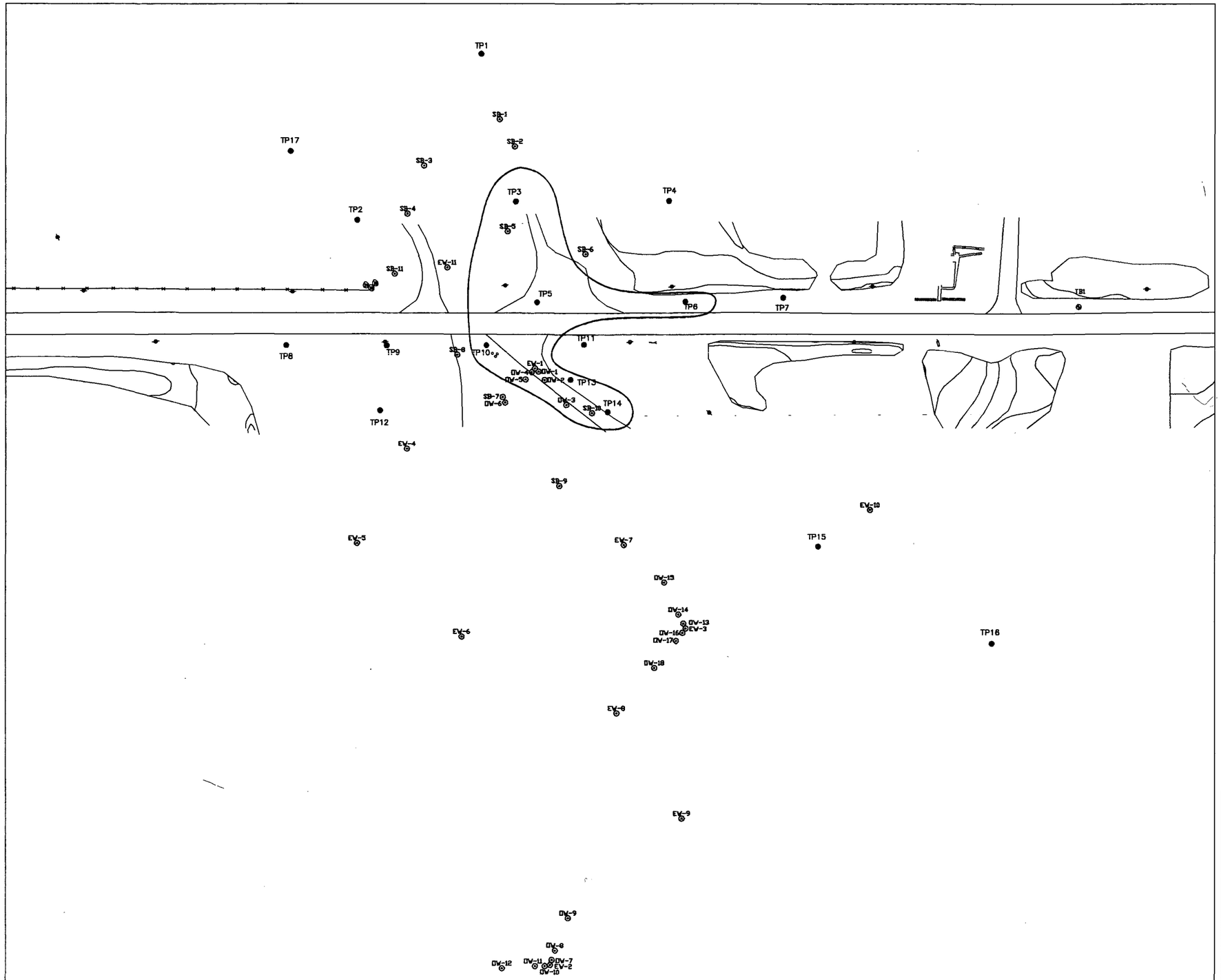
% Moisture: not dec. 7.8 Heated Purge: N Date Analyzed: 08/01/98

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.00

Soil Extract Volume: 5000 (uL) Soil Aliquot Volume: 100.00 (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	530	U
74-83-9	Bromomethane	530	U
75-01-4	Vinyl chloride	530	U
75-00-3	Chloroethane	530	U
75-09-2	Methylene chloride	530	U
67-64-1	Acetone	530	U
75-15-0	Carbon Disulfide	530	U
75-35-4	1,1-Dichloroethene	530	U
75-34-3	1,1-Dichloroethane	530	U
540-59-0	1,2-Dichloroethene (Total)	530	U
67-66-3	Chloroform	530	U
107-06-2	1,2-Dichloroethane	530	U
78-93-3	2-Butanone	530	U
71-55-6	1,1,1-Trichloroethane	530	U
56-23-5	Carbon Tetrachloride	530	U
75-27-4	Bromodichloromethane	530	U
78-87-5	1,2-Dichloropropane	530	U
10061-01-5	cis-1,3-Dichloropropene	530	U
79-01-6	Trichloroethene	530	U
124-48-1	Dibromochloromethane	530	U
79-00-5	1,1,2-Trichloroethane	530	U
71-43-2	Benzene	530	U
10061-02-6	trans-1,3-Dichloropropene	530	U
75-25-2	Bromoform	530	U
108-10-1	4-Methyl-2-pentanone	530	U
591-78-6	2-Hexanone	530	U
127-18-4	Tetrachloroethene	530	U
108-88-3	Toluene	530	U
79-34-5	1,1,2,2-Tetrachloroethane	530	U
108-90-7	Chlorobenzene	530	U
100-41-4	Ethylbenzene	530	U
100-42-5	Styrene	530	U
1330-20-7	Total Xylenes	530	U

Appendix B



50 0 50 100

SCALE OF FEET

REV. NO.	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY

PROJECT MANAGER: D.B. | DRAWN BY: A.D.R. | DATE: 12/28/98

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 1
SOIL SAMPLE LOCATIONS AND BVE TEST LOCATIONS

Prepared For:

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION
LEHIGH VALLEY RR DERAILMENT SITE
DECEMBER 1998

PROJECT NO.	FILE NO.	CHK'D:	DRAWING NUMBER	REV. NO.
773636	B1	ENG. / APPVD.	773636-B01	

773636-B01.dg 12/30/98 5:06pm A.D.R.

Appendix C

INTERNATIONAL TECHNOLOGY CORPORATION

140 Allens Creek Road
Rochester, New York 14618
Phone: (716) 271-6430
Fax: (716) 271-0251

TO: Dana B. 10:55 DATE: 10/15

COMPANY:

FROM: Web S. PROJECT NO.:

NO. OF PAGES (including cover sheet) 25

URGENT: ☐ FOR APPROVAL: ☐ FOR REVIEW: ☐

ORIGINAL TO BE MAILED: ☐

COMMENTS: Part I

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INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 3 98 | NO. | SHEET 1 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 Depart for Site

0745 Arrive on-site; meet w/ Nothnagle drillers who will be reaming out observation & extraction wells as necessary; meet w/ NYSDEC rep. Joe Mologhoney, review site activities

0830 Nothnagle begins reaming 1st well (OW-9)

0850 Drillers, Ground/water Treatment reps prepare to lower packer down hole (OW-9) to confirm that reaming was successful

0900 ~~packers~~ Experiencing difficulty lowering packers downhole in OW-9; tolerances are just to small to allow packers down hole smoothly

0930 Drillers pack up and leave under direction of NYSDEC until issues are resolved regarding sending out smaller packers and/or [redacted] if additional reaming is required; look down hole w/mirror and OW-9 open rock hole is very straight, simply too little clearance around packer to [redacted] & lower [redacted] and raise them without them hanging up;

0930 Ground/water Treatment sets up @ EW-5 to run vapor test on open rock hole

1050 BVE is completely set up on EW-5; begin testing transducers within system prior to [redacted] running BVE system; all routed through computer system

1100 BVE system up & running @ EW-5; collected 1st SUMA canister air sample @ EW-5 (EW-5-AS1)

1110 Took OVM reading out of sample port; max reading indicated was 1.8 ppm; recorded air flow rates

1125 took OVM reading of outlet port on carbon filter: 0.0 ppm

1135 take 2nd round of air monitoring/system readings; carbon filter still 0.0 ppm

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 3 98 | NO. | SHEET 2 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1210 continue air/system monitoring; OVM monitoring
1295 LUNCH (sample EW-5-AS2 collected during this time (mid-way point))
1330 return from lunch; take OVM readings, monitor extraction system
1410 pull water level data logger out of pre-existing well and set it up to monitor water level change in EW-4 when next BVE is set up; take next round of measurements; H2O datalogger will be set @ 55'
1415 collected 3rd & final SUMA canister air sample @ EW-5 (EW-5-AS3)
1420 system shut down after final round of monitoring; begin breaking down equipment; all readings at outlet of carbon drum filter were 0.0 ppm
1435 while equipment is set up/transferred to extraction well EW-4, head to Avon NYSDEC office to pick up more SUMA canisters
1545 Arrive back on-site; NYSDEC, Ground/Water & Technology had just begun VE on MW-4; rock is too competent and they are unable to draw enough/any air out of bore hole; no samples taken, NO readings; under direction of NYSDEC operations are shut down and hole is abandoned for now; [redacted] begin packing up equipment and prepare to move to MW-6
1615 Drop equipment off @ MW-6 and leave site for the day
1700 Arrive Roch. office

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

3278-7-87

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	4	98
	NO.			
	SHEET	1	OF	

249 4021

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 leave Roch.
0745 Arrive on site; Ground/Water Technologies is finishing setup @ MW-6
0800 Begin BVE test on EW-6; conduct air monitoring of system get initial hits on OVM up to 107 ppm in sampling port.
0805 Collect 1st air sample in canister; continue air monitoring of system; OVM reading in outlet of carbon filter drum: 0.0 ppm
0830 Completed 3rd round of air monitoring of BVE system; max reading @ sampling port was 153 ppm, still 0.0 ppm at carbon filter outlet
0915 Continue air monitoring of BVE system; still no reading (0.0 ppm) at outlet of carbon filter canister (drum)
0935 after determining peak flowstream concentration, prepare to take 2nd air vapor sample; EO will increase [redacted] rate prior to sampling (up to 125 in H_2O)
0940 Collect Air vapor sample EW-6-AS2 after system was increased to 125 in H_2O; took OVM reading immediately following sample collection: 272 ppm
1045 took air monitoring readings w/ dilution running @ 27 scfm (186 ppm); shut dilution valve off well head rdg = 70 scfm, 200 in H_2O and OVM reading rose to 254 ppm (no ambient air dilution)
1105 took OVM reading at sampling port until reading stabilized @ 177 ppm; shut down well head valve and opened ambient air dilution valve all the way so system was drawing clean air only; then measured [redacted] the amount of time it took to evacuate the air hose/pump system until OVM readings dropped to 0; duration was approx. 30 seconds System continues running @ EW-6 (running 2nd test)

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 4 98 | NO. | SHEET 2 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1200 Continue air monitoring data collection of BVE system

1220 LUNCH, conference call w/ Dana, Ed Roshak, Dan Chen regarding construction of packers; they requested that I attempt to locate a caliper inorder to measure the packers and ensure that they were constructed to specs. (no larger than 5.4"); attempted to find calipers @ Town Garage, hardware store, autoparts store - no luck, return to site.

1329 Back on site, continued collecting air measurements/data;

1400 Ed w/ Ground/water bumps up BVE system

1415 Collected final SUMA canister vapor sample w/out dilution; waited 30 seconds for air line to evacuate prior to sampling, collected sample and took final reading w/ dilution valve back on at a flow rate of 20 scfm: 1467 ppm was max reading and still 0.0 at carbon filter outlet.

1420 BVE is shut down after completion of 2nd 3 hour test; pack up supplies, stage generator by next pilot test well location; Ground/water crew takes all supplies (packers, truck, generator) into fenced staging area for weekend.

1445 leave site

1530 Arrive Rochester office; send malfunctioning instrument out via fedex; order micrometer from Grainger to measure packers with, will be in on Tues.

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 9 98 | NO. | SHEET 1 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0700 Depart ~~Re~~ from Roch. for site
0745 Arrive on site; no one on site, wait for Ground/water technologies to arrive
085 Ground/Water Technologies crew arrives, pulls equipment out of fenced staging area
0830 Begin SVE system setup at EW-7; pull cap off of well & take OVM reading: 0.0 ppm;
0900 System is set up @ EW-7; begin calibrating transducers
0935 System is up and begins running
0940 System shut down due to a vacuum problem; hose is refitted downhole
0945 System up & running again; begin test w/ a vacuum rate of 80 in H_2O
0955 Collected 1st vapor sample EW-7-AS1 after shutting dilution valve completely off and letting hose evacuate diluted air for ± 30 seconds; Continued taking readings at sampling port
1015 took 4" PVC pipe to OW-9 as a simulated packer; glued end caps onto pvc that were 5.40" in diameter, attached 2" galvanized pipe to 20' section (10' sections of galvanized) and began lowering simulated packer downhole by adding 10' sections of 2" pipe. PVC lowered down hole without any problems; didn't get caught at casing/bedrock interface or anywhere else downhole; lower simulated packer all the way down to 60' without a problem; this is the only well that has been reamed.
1100 took OVM ~~SVE~~ system readings w/dilution valve on; turned dilution valve completely off, evacuated diluted air in hose for approx. 30 seconds and took OVM reading: w/dilution valve on: 119.4 ppm / w/dilution valve off: 234 ppm

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	8	98
	NO.			
	SHEET	2	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1105 Ed bumped up system vacuum to 125 in H_2O; continued air monitoring activities

1120 Continue simulated packer test... this time at OW-8; simulated packer lowers to 60' with some difficulty, hangs up in a few locations on the way downhole; also gets caught up on the way out of hole (almost not able to withdraw it from hole w/ 5.40" end cap)

1200 Prepare to take 2nd air/vapor sample; close off dilution valve, allow hose to evacuate for ≈ 30 seconds, take OVM reading: 233.2 ppm, then collect sample; return system to prior setting of 125 in H_2O vacuum, Ed; Bruce lower simulated packer down OW-7; experience some difficulty in lowering unit; this hole was reamed to 20'; PVC packer was difficult to pull out of hole as the end caps caught/rubbed on rock walls; move to EW-2 and perform same test, simulated packers lower and pull out, but again with tight tolerances and some rubbing on corehole walls.

1245 Take final OVM readings at EW-7, no breakthrough at activated carbon filter outlet; attempt to call Dana Boyadjian @ Somerset office for input on next BVE pilot test; unable to get through after several tries and no one answers at Rochester office; make decision to run another 3 hour test @ EW-7 with 200 in H_2O vacuum to see if TCE readings will drop

1300 Lunch

1400 Continue OVM readings of BVE system

1555 Collect final (3rd) vapor sample EW-7-AS3; OVM reading immediately prior to sample collection was 180.3 ppm

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	8	98
	NO.			
	SHEET	3	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1600 2nd 3 hour test is complete @ EW-7, pack up equipment and move to EW-8 in preparation for BVE test tomorrow.

1630 setup @ EW-8, leave site

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

FIELD ACTIVITY DAILY LOG

DAILY LOG | DATE 4 9 98 | NO. | SHEET 1 OF

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0715 leave Roch. for Grainger store to pick up micrometer.
0745 leave Grainger for LHVRR site
0825 Arrive on site, BVE system @ EW-8 has just been started, immediately take OVM reading (163.5 ppm) and collect 1st air-vapor sample EW-8-AS1 Take OVM reading just prior to air sample after dilution valve was shut down and air hose was evacuated: 255.4 ppm peak, collect sample and return system to 90 in H_2O vacuum, 50 scfm dilution, 45 scfm air flow rate @ well head. Still no breakthrough at carbon filter outlet
0835 continue monitoring vapor concentrations
0900 Began measuring packer diameters w/ new micrometer, 1st two packers measured had a minimum diameter of 5.55" and a max. diameter of 5.75"; IT specs were 5.4" max. diameter; measured PVC simulated packer used yesterday in EW-2 cluster to determine whether it would fit the larges PVC end cap measured 5.4" and made it in, 4 out of 5 of the 7 wells (only 5 were fit tested); Ground/water Technologies begins grinding welds off of packers; continue measurements
0930 Continue air system (BVE) OVM readings; measuring packer diameters; G/W Technologies begins changing bands that hold rubber inflaters onto packers because some measured 5.75" across
0945 metal packer end caps measure 5.55" dia., rubber measures 5.45" dia., bands measure 5.55-5.65" diam.
1000 Called Dana Boyadjian & left message about packer diameter situation
1005 Bump BVE system @ EW-8 up to 150 in H_2O vacuum, take initial reading: 156.5 ppm

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	9	98
	NO.			
	SHEET 2 OF			

FIELD ACTIVITY DAILY LOG

PROJECT NAME: PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1040 Continue taking OVM readings @ EW-8

1050 Take OVM reading w/ system running @ 150 in H_2O vacuum; just prior to collecting 2nd vapor canister sample; shut dilution valve off and allow hose to evacuate for 30 seconds while checking gauges; take OVM reading: 164.3 ppm, then collect sample EW-8-AS2; return system to 150 in H_2O vacuum and take another OVM reading (143.6 ppm)

1100 Continue OVM readings (137.1 ppm peak)

1120 Prepare to take 3rd vapor sample @ EW-8; take OVM readings prior to sample w/ system running @ 150 in H_2O; turn dilution valve off, collect reading (162.9 ppm); collect sample EW-8-AS3 @ 1121 after allowing air line to evacuate; take post-sample reading and then return system to 150 in H_2O vacuum (from 200 w/ dilution valve off)

1125 BVE Test #1 is complete @ EW-8 (3 hour duration); decide to run system for 1 additional hour @ 200 in H_2O; initial reading was 160.3 ppm @ 1135

1140 LUNCH

1230 Return from lunch, take final few readings

1240 BVE system is shut down @ EW-8; prepare to setup at EW-9; go to phone & discuss site activities w/ Ed Rushak, Dan Chen

1340 BVE system is set up @ EW-9; start test @ vacuum level 123 in H_2O

1345 Prepare to collect 1st vapor sample; take OVM reading

1347 Collect sample EW-9-AS1 w/ dilution valve shut off completely; ★ system will not run at less than 125 in H_2O vacuum (dilution valve is fully open)

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 9 98 | NO. | SHEET 2 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1415 Continue OVM readings @ EW-9; Ground/Water Treatment finishes handgrinding edges & welds off of packers to be used in test tomorrow, they will be lowered down hole in some of the EW-2 well cluster wells; replaces bands that hold inflatable rubbers on; they now measure 5.55-5.6" versus the old bands that were up to 5.75-5.80"

1645 test complete @ EW-9 (1st 3 hours test); GWTT packs up equipment for evening; lock fenced staging area

1700 leave site for day

1715

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	10	98
	NO.			
	SHEET	1	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0730 leave Roch. for site

0800 Arrive on-site; GWTT prepares to start BVE system up again @ EW-9 and run it @ 200 in H_2O vacuum.

0820 System is up and running, take OVM [redacted] readings immediately following start up (51.3 ppm); collect sample EW-9-AS2 w/ dilution valve shut off and [redacted] vacuum gauge pegged above 200 in H_2O. ~~take~~ sample was collected after air line was evacuated for ≈ 30 seconds; take OVM readings

0845 GWTT prepares to run packers downhole @ EW-2 to see if they will fit now that welds have been grinded off and the bands that secure the rubbers on the packers have been changed; again... end caps are minimum of 5.55" diameter

0930 Packers are lowered to ≈ 37' bgs and hang up in EW-2. this hole has not been reamed; decision is made to finish grinding a second set of packers to be lowered down reamed hole OW-9 to determine whether or not that will be enough to allow packers down to bottom zone (just above water table)

1030 GWTT decides that a flexible fitting (hydraulic hose) between packers and above packers would ease the lowering and retrieval of packer units down hole since the wells are not drilled perfectly straight; head to Nothnagle Drilling to see if they have such a [redacted] hose; they ordered hose from Batavia, GWTT will pick up later

1050 Continue [redacted] OVM readings @ EW-9.

1115 Prepare to collect final vapor sample @ EW-9; take OVM reading, shut off dilution valve, allow air line to evacuate and collect sample EW-9-AS3

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 10 98 | NO. | SHEET 2 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1125 GWTT begins packing up equipment and prepares to move to EW-10 (across Gulf Rd.)

1140 GWTT moves all equipment to EW-10; begins set up there

1145 Take water level measurement @ EW-9 from top of steel casing: 47.38' BTOC

1210 Setup @ EW-10, turn system on (BVE system) and rock hole will not allow vapor/air to be drawn out of hole; abandon setup

1215 LUNCH

1300 Begin BVE system setup @ EW-11; intial OVM reading was 7.3 ppm max and steadily increased; w/ dilution valve fully open, the lowest achievable vacuum value is 85 in H_2O; will run at that value for 1 hour. collected vapor sample EW-11-AS1 w/ dilution valve shut completely and air line evacuated; readings rose to 49.0 ppm, turned system back down to 88 in H_2O vacuum.

1425 Bump BVE system up to 125 in H_2O and continue OVM monitoring; update Joe Mcloughney again regarding site activities

1546 Bump BVE system up again to 200 in H_2O vacuum; GWTT is still in Batavia picking up flexible hose for packers (custom hydraulic line); initial OVM value was 40.1 when vacuum was increased; collected sample EW-11-AS2 immediately following vacuum increase after evacuating air line (dilution value is already shut off completely); continue OVM monitoring

1640 Collect final air/vapor canister sample at EW-11 (EW-11-AS3) take final OVM readings; shut BVE system down and pack up all equip

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	10	98
	NO.			
	SHEET	3	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1700 Move all BVE system equipment back to EW-7 to perform overnight TCE concentration test, took H_2O level measurement @ EW-11 : 50.55' from top of casing

1715 Begin BUE system setup @ EW-7; took H_2O level measurement prior to setup : 55.15' from top of casing

1730 BUE system up & running @ EW-7 w/out computer system; system is running @ 200 in H_2O vacuum; obtain OVM readings; help GWTT run 2nd packer test; initial OVM reading @ EW-7 is 144.2 ppm

1830 Successfully lower packers w/ new flex hose above the top packer to ∝ 51' below top of casing; fit is still tight but it lowered w/out much problem; leave in EW-2 overnight; continue taking OVM readings @ EW-7

1900 leave site for the day

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 11 98 | NO. | SHEET 1 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0815 leave Roch for site

0800 Arrive on site; take OVM readings @ EW-7; TCE concentration has halved overnight; continue monitoring system (½ TCE concen. in 15 hours)

0820 GWTT begins hooking up transducers to EW-7 in preparation for incremental vacuum test (start @ 75 in H_2O & bump system up by increments of 25 in H_2O every 30 min)

0900 Begin BVE computer set up @ EW-7 for incremental test; with dilution valve fully open, lowest achievable vacuum is 76 in H_2O ← test starts there for ½ hour; initial OVM reading is 30.9 ppm @ 75 in H_2O

0930 BVE system @ EW-7 is bumped up to 100 in H_2O, continue TCE concentration monitoring; GWTT continues grinding down welds on packers as well as changing bands

1000 Spoke w/ Joe Moulaghney regarding site activities, stepped system up to 125 in H_2O, continue monitoring

1030 Step system up to 150 in H_2O; TCE concent. rose to 50.3 ppm, continue monitoring

1200 Shutdown BVE system @ EW-7 after interval test (vacuum) ↳ final interval run was @ 192 in H_2O w/ dilution valve fully closed;

GWTT continues hand grinding welds off of packers and changes bands that secure rubbers onto end caps in an attempt to make them all 5.55" diameter (max); also grinding end cap edges to "round" them so they don't get caught on rock walls when lowered down hole

1245 Measure off fenced berm area dimensions: FENCED AREA MEASURES: 135' x 90'; BERMED AREA IS 95' x 80'; DRUMS CURRENTLY OCCUPY 30' x 20'

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG				
	DATE	9	11	98
	NO.			
	SHEET	2	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1330 All equipment being packed up for weekend and staged inside fenced staging area ~~SEED~~

1400 leave site for weekend, fenced staging area locked, drive to Caledonia to call Dana Boyadjian regarding site activities, fenced staging area dimensions

1430 leave caledonia

1515 Arrive Roch. office

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 14 98 | NO. | SHEET 1 OF 1

FIELD ACTIVITY DAILY LOG

PROJECT NAME Lehigh Valley | PROJECT NO. 776363

FIELD ACTIVITY SUBJECT: OVM/Air Monitoring - BVE Pilot Test

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0800 Arrive on site, meet with Groundwater Technology + Treatment (GT+T) and Eric Detweiler (IT)
Review monitoring procedure with Eric D.
GT+T setting up on holes @ EW-1, OW-1, OW-2, OW-3, OW-4 OW-5, OW-6

0930 Eric D leaves site for office, Natalie R leaves site for home to call office

1015 Natalie R arrives on site, GT+T ready to start test

1026 Start Test - Test will run 6 hours, pressure will be increased every hour, readings will be collected every 15 min.

1215 Continue testing; GT+T start modifying packers

1340 Joe Maloney (NYSDEC) arrives on site - he requests to look at past test results (provided)

1355 Joe agrees with plan of increasing vacuum 25" inH2O every hour

1615 Break through on carbon filter. Decided to replace drum after test

1630 End test

1635 Leave Site - Joe requests to keep data so he can begin to plot it

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
Joe Maloney (NYSDEC) Ed (GT-T) Bruce (GT+T)	
WEATHER CONDITIONS: Sunny, Clear 80-85°	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE: Eric Detweiler, Natalie Reigle

SIGNATURE Natalie Reigle DATE: 9/14/98

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	15	98
	NO.			
	SHEET	1	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME: LEHIGH VALLEY R.R. PROJECT NO. 776363

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0730 Leave Roch. office for site after going over notes from 9-14-98 w/ Natalie Reigle and picking up OVM

0815 Arrive on-site. GWTT is setting up open rock BVE system at EW-3 cluster. BVE system is hooked up on EW-3 as well as on all 6 observation wells;

0940 BVE system is setup and ready to run @ EW-3 cluster, start system; under direction of NYSDEC, system will be run for an 8 hour period at a vacuum level of 175 in H_2O; start system, begin OVM monitoring; initial reading was 40.6 ppm; collect 1st vapor sample EW-3-AS1 @0949; prior to sampling dilution valve is completely shut off (closed) and air line is allowed to evacuate for 30 seconds; continue OVM monitoring

1100 GWTT's computer screen displays the air flow/vacuum rates for EW-2 as well as the vacuum readings for the 6 observation wells; all 6 observation well values are at 0.0 with system running @ 175 in H_2O vacuum, indicating no influence in the extraction of vapor out of EW-3 on the surrounding 6 wells; continue OVM monitoring

1200 Lunch

1255 Return from lunch, continue TCE concentration monitoring w/ OVM; GWTT is finishing grinding remaining packers down to minimal diameter

1500 GWTT gets metal bands (picks up) needed to complete downsizing of packers, begins replacing old bands

1630 all packers are finished; begin lowering them down hole @ OW-9 (reamed rock hole)

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	15	98
	NO.			
	SHEET 2 OF			

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1645 Discuss upcoming site activities w/ NYSDEC and decide on packer-test work plan; copy plan, continue OVM monitoring Take H_2O level @ 54' btoc; packer was able to be lowered into OW-9 To a total depth of ≈15'

1700 GWTT begins lowering another packer system, now into OW-8; will finish packer set up tomorrow morning

1740 Shut dilution valve completely off in preparation of collecting sample EW-3-AS2 just prior to BUE system test shutdown; allow air line to evacuate, take OVM reading and then collect sample; return system back to 175 in H_2O for remaining few minutes and continue OVM readings

1750 System shuts down, GWTT packs up equipment for the day

1815 leave site

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	16	98
	NO.			
	SHEET	1	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME: LEHIGH VALLEY R.R.	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

~~Arri~~ Leave Roch. for site

0800 Arrive on-site; GWTT ^ finishing preparing to lowering packers into 3 remaining observation wells (OW-10 thru OW-12) @ EW-2 cluster, one packer gets stuck because of rock wedging between packer and rock hole wall (broke away from rock-hole); successfully retrieved. only able to lower packers in OW-7 down to 10' below ground surface (bottom of top packer) which is where 1st interval was to be set anyway; had to put 22" flexible hydraulic hose in between the 2 packers to help allow it past lip in core hole that is there due to reaming hole to 20' belowground surface; thus this packer is ≈ 21' in [redacted]. total length (2×5' galv. pipe, 22" hydraulic hose; 2×4.5' packers); all air hoses have to be lined up

- use box truck w/ hoist to pull packer system out of OW-7 when it got stuck; then to lower it again once it was modified w/ flex hose
- used line level to align all 6 observation wells w/ extraction well EW-2

1830 leave site for the day

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 17 98 | NO. | SHEET 1 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0800 Arrive on-site. GWTT is finishing hooking up air lines on all packers to valve body; inflate all packers to make sure they don't leak. 4 leak, 2 of which are able to be fixed externally (torn hose, slip on coupling was bad) for the other 2 → 1 had a torn rubber (from rock in core hole) from pulling it in & out and/or inflating it and the 2nd packer had a bad weld. now begin replacing those 2 packers w/ 2 spares; GWTT needs misc. parts and heads to Grainger in Rock. for parts

- hooked up all transducers to all observation wells, packers being replaced are out of EW-2

1030 - GWTT returns w/ parts needed to properly set up the 2 spare packers

1710 - lower new packers down OW-10 and set in place @ proper depth interval; now begin working on packer system for EW-2

1740 new packers are now in place @ EW-2; begin inflating all 14 packers to make sure there are no more leaks

1900 leave site

1945 Arrive Rochester

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS: Sunny, 80	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	18	98
	NO.			
	SHEET	1	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0730 Leave Roch. for site

0815 Arrive on-site, GWTT is attempting to repair leak in final packer; successfully fix packer and continue cluster EW-2 BVE system setup

0900 GWTT begins calibrating transducers @ all observation well locations

1000 GWTT lowers last set of repaired packers down hole @ OW-9; prepares to start up BVE system

1020 GWTT Begins inflating the packers

1030 BVE system ready to run w/ packers in place and inflated @ EW-2 cluster

1035 BVE system is started, take initial OVM reading: 1.0 ppm; all packers are set @ at 10-20' interval bgs (bottom of top packer is set @ 10' BGS (except for OW-7 which has additional 2' flex hydraulic hose between packers): 10-22 from bottom of top packer to top of bottom packer)

1037 System shut down due to problem w/ air compressor - air compressor is tripping the circuit breaker in the power strip used to run all computer equip, power supply, etc.; GWTT gets out more powerful air compressor

1055 New air compressor hooked up & start BVE system up again

1100 Collected 1st sample EW-2-AS1 (with packers set @ 10-20' BGS interval) w/ dilution valve fully closed; OVM readings were only as high as 3.1 ppm; continue BVE system monitoring / OVM readings; BVE system @ EW-2 is beginning to show an influence on OW-8, OW-11; air pressure in packers is constantly monitored, all packers are inflated to 50 psi.; TEST 1 will run for 2 hours as per NYSDEC request

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 18 98 | NO. | SHEET 2 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1200 Collected 2nd sample @ 10-20' packer interval @ EW-2 cluster; shut dilution valve off completely, allowed air line to evacuate and took OVM reading prior to sampling; collected sample EW-2-AS2 and then returned system back to 175 in H_2O vacuum; continue OVM monitoring; now only seeing an influence @ OW-11

1253 Shut dilution valve completely off in preparation for collecting final vapor sample; allowed air lines to evacuate prior to sampling; took OVM reading prior to sample collection. Collected sample EW-2-AS3 from sampling port, returned system back to 175 in H_2O for final few minutes

1300 BVE system is shut down as TEST 1 is concluded (2 hr. test)

1315 LUNCH

1400 Talk w/ Steve DiLella, Joe Moloughney about working this weekend; not possible on such short notice... nobody is available; GWTT packs up equipment for weekend; secures site

1445 leave site for weekend

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 22 98 | NO. | SHEET 1 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0730 Leave Roch. for job-site

0815 Arrive on-site; GWTT briefs me on last evenings activities; OVM lamp broke towards end of 9 hour test due to cold temperatures; GWTT continues lowering packers @ EW-2 cluster for 3rd and final packer test at an interval of 30-40'. Call Pine Environmental regarding calibrating the back-up Hnu PID; Pine could not tell me how to calibrate it

1000 Drive to town, call Response Rentals for calibration info.

1030 Back on-site, attempt to calibrate Hnu while speaking w/ Response Rental technician... Hnu is already calibrated to TCE 99 ppm; use Hnu instead of OVM

1107 Start up BVE System test #3 (30-40' interval); initial OVM readings on Hnu are ≈50 ppm; shut dilution valve off completely and collect 1st sample of the test (EW-2-AS7); open dilution back up to a vacuum rate of 175 in H_2O; still seeing no meaningful influence at any of the observation wells (OW-7 still set @ 10-20'); continue OVM monitoring; will run test for 2 hour duration initial

1245 Continue PID readings of system; system will run out it's 2 hour test and GWTT will then take a lunch break; test will be started and run for 2 additional hours due to Hnu readings being fairly significant (≈80 ppm @ 175 in H_2O vacuum); still negligible influence in all observation wells (< 0.5)

1310 Shut off dilution valve, take PID reading (300 ppm) and collect vapor sample EW-2-AS8 mid way through test; BVE system is shut down as computer had initially

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG				
	DATE	9	22	98
	NO.	0	0	2
	SHEET	2	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME: LEHIGH VALLEY R.R. BVE PILOT STUDY | PROJECT NO. 773636

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

been setup for a 2 hour test; GWTT takes lunch break before starting up BVE system for the 2nd half (2 hours) of the test.

1414 Eric O. leaves for office, N. Riegle continues field preparations

1425 started test

1612 Collected sample EW-2-AS9

1623 Turned off system

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

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TO: Nana B. 11:22 DATE: 10/15

COMPANY:

FROM: Deb S. PROJECT NO.:

NO. OF PAGES (including cover sheet) ~~30~~ ~~35~~ 19

URGENT: ☐ FOR APPROVAL: ☐ FOR REVIEW: ☐

ORIGINAL TO BE MAILED: ☐

COMMENTS: Part II

Sorry - Part I was 26 pages.

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INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	23	98
	NO.			
	SHEET	1	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

715 Leave Roch. for site

0800 Arrive on site; GWTT begins tearing down remainder of BVE system, pulling packers out and moving all equipment to EW-3 cluster because test durations will be shorter and GWTT can not work this weekend (also away from road)

1000 OW-10 packers are stuck downhole, will not come out using GWTT's box truck mounted crane/winch; OW-11 and OW-12 are stuck down hole also

1500 Nothnagle Drilling company is called to bring out rig to pull packers out with (need more power)

1710 packers are inflated as a test for leaks (on the ground); inflated to 50 psi (normal operating pressure)
1 packer blows up so spare packer is brought out, a few fittings on 3 or 4 of the packers are leaking so GWTT attempts to repair w/ liquid epoxy/steel

1815 leave site for Roch.

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 24 98 | NO. | SHEET / OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0715 Leave Roch. for site

0800 Arrive on-site, GWTT is still setting packers up, getting BVE system ready

1000 All packers are now set in place for 1st interval test (12-22') and leveled w/ a line level; continue setup activities

1230 Back to office to drop off logs, talk to Dana

1500 Back on site, system ready to go

1520 BVE System is started @ EW-3; packers are all set @ 12-22' and were leveled; initial HNU hits were high (≈130 ppm) and quickly dropped down to ≈ 50 ppm. Test #1 will be run for 3 hours; shut dilution valve off and collected sample EW-3-AS1 as initial sample from 12-22' packer interval; HNU readings rose to approx 90 ppm with dilution shut off, returned system to vacuum of 175 in H_2O where test will run for entire duration;

1550 No influence is seen in any of the 6 observation wells initially.

1610 Very slight influence seen @ wells OW-15, OW-16 but values are negligible (<0.5)

1650 Shut dilution valve off, take HNU reading (60 ppm) and collect mid-test sample EW-3-AS2, take 2nd reading following sample collection and return BVE system to 175 in H_2O vacuum
- still no significant influence seen in any of the 6 observation wells, continue PID readings

1820 After collecting 3rd (final) sample @ 12-22' interval (w/ dilution valve off) BVE System is shut down, SAMPLE was EW-3-AS3

VISITORS ON SITE:
1830 leave site

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:
overcast, 65°

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

0800 set up

1040 To Avon DEC to get sample canisters

1130 inflate packers, prepare to run TEST #2 @ EW-3 cluster (22-32' INTERVAL)

1137 Start BVE TEST #2 @ EW-3 cluster for a 3 hour run period. (22-32' interval) Took initial HNU readings (150 ppm), closed dilution valve off, evacuated hose, took pre sample reading (280 ppm) and then collected sample EW-3-AS4. Top packer in well OW-17 blows up, continue HNU monitoring, test; BVE system is drawing a fair amount of H_2O vapor out of hole and into system @ a vacuum of ≈175 in H_2O... doesn't appear to be a problem so continue running test (no H_2O discharging out of system into carbon unit)

1255 2nd top packer looses air pressure (@ OW-13) call PM and briefly discuss problems — will call @ ≈1500

1310 Shut dilution valve off completely, allow air line to evacuate, take HNU reading ( ) and collect mid-test sample EW-3-AS5. return system to ≈175 in H_2O Col. vacuum. system is still drawing out H_2O vapor. HAVE NOT SEEN ANY APPRECIABLE INFLUENCE AT ANY OF THE OBSERVATION WELLS DURING THIS 2nd TEST AT EW-3 CLUSTER.

(1440) Take last sample before end of test #2 (EW-3-AS6), call (1440) PM to discuss upcoming activities; under NYSDEC & IT PM direction, it is determined that we will run the 3rd (last) test at EW-3 cluster (32-42' interval) and that all packers will be fixed for EW-1 cluster tests

1530 Back on site, inform GWTT of plans/directions; GWTT begins to prepare to lower packers to 32-42' interval for 3rd test

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 9 29 98 | NO. | SHEET / OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0745 Leave Roch. for Caledonia
0830 Call Dana (PM) and discuss site activities along w/ NYSDEC Rep. Determine game plan
0940 Arrive onsite; GWTT was able to lower packers in EW-3 to desired interval (32-42') which changes [redacted] plans
1000 Preparing to run 3rd and final test @ EW-3 cluster; Packers are set @ 32-42' interval @ EW-3, OW-14, OW-15, OW-16, OW-18; OW-13 and OW-17 have only one functional packer which is set @ 32' (bottom of packer) and will cover down to the H_2O table (around ≈57')
BVE system will be run @ 175 inH_2O Col. vacuum for 1 hour initially ~~and~~ and possibly extend for 2 additional hours (max. 3); * air compressor dies, GWTT has to switch a vacuum pump over to a different voltage rating (208 V from 460 V)
1050 Test vacuum pump w/ new voltage configuration, won't work
1100 Vacuum pump revived & functional now; prepare to inflate packers w/ small back up compressor
1130 Continue set up (computer, BVE system); begin inflating packers for test. [redacted]
1200 BVE System is set up, ready; start pump and begin 1 hour test (to see TCE concentrations, influence in observation wells)
1230 No influence seen @ any of the six observation wells; collected 1st sample (EW-3-AS7) @ 1203; OVM readings are considerably higher than HNU readings (after attempting to calibrate OVM); continue to use HNU

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

IT INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	29	98
	NO.			
	SHEET 2 OF			

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1255 Still no influence seen @ any of the observation wells
1300 LUNCH
1345 Reinflating packers, will be running test for 2 additional hours
1415 Start up BVE System again, continue TEST #3 For 2 more hours, continue PID monitoring
1447 Collect MID - TEST sample EW-3-AS8 w/ dilution valve completely shut off; return system to ≈ 175 in w.c. and continue monitoring;
1530 Top packer in OW-16 looses all air pressure (blows up?); continue test for remainder of the 2 hour time period; still negligible influence seen in any of the observation wells; still drawing some H_2O vapor out of EW-3; most influence seen is in OW-16 and measures 0.7 in H_2O column max; collect final test sample EW-3-AS9 w/dilution valve completely shut off.
1610

1700 leave site
1745 arrive @ Roch. office

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	9	30	98
	NO.			
	SHEET	1	OF	1

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0815 Leave Rochester for site

0800 Arrive on-site. Nothnagle drill rig has just arrived on-site to help pull out packers (GWTT's hoist in their box-truck has a maximum load rating of 1600 lbs without the crane arm extended) Steve from Nothnagle begins pulling packers out of each hole.

0930 All packers have been pulled out of all 7 wells without any problems; inspect top packers that came out of OW-13, OW-14, EW-17 and all 3 had blown rubbers; one had split (blown) along the seam of the 2-ply rubber (hard to find any cut or rub marks), one was blown in the middle of the rubber section and had gray rock-flour/rock fragment scrape marks at and around the point of tearing, the final packer was split near one of the bands where the rubber had been temporarily repaired w/ tape (tape taped over a slight gash in rubber); Steve from Nothnagle leaves site w/ rig

0945 Begin moving all packers and piping to EW-1 cluster for final test prep;

1915 leave site

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

436-0184

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	10	1	98
	NO.			
	SHEET	1	OF	

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0800 Arrive on-site, GWTT sets up for TEST #1 @ EW-1

1135 Start test #1 BVE system (to run for 9 hr. duration) at a depth interval of 12-22' with all packers; collect a vapor sample EW-1-AS1 with dilution valve fully closed; OVM readings appear to be > 10,000 ppm and are out of the range of the instrument; start test for 10 min @ 200 in H_2O column; significant influence is observed @ OW-1, OW-2, OW-4 (OW-1: 3.1 / 2.8 | OW-2: 2.3 / 2.8 | OW-4: 1.4 / 1.2

1150 Drop system down to 190 in H_2O column, continue OVM readings; now have break-through @ the carbon filter canister (1.6 ppm) GWTT swaps filters w/ a new carbon unit; Strong odor present when taking OVM readings, no readings in breathing zone/workspace

1200 Drop BVE system down to 180 in H_2O column, continue OVM readings

INFLUENCE OF SYSTEM: OW-1: 3.2 / 2.8 | OW-2: 2.4 / 2.3 | OW-3: 0.3 / 0.3 | OW-4: 1.3 / 1.2

OW-5-1: 0.2 | OW-6-1: 0.1
OW-5-2: 0.1 | OW-6-2: 0.0

1212 Drop BVE System down to 170 in H_2O column

INFLUENCE: OW-1-1: 3.1 | OW-2-1: 2.3 | OW-3-1: 0.3 | OW-4-1: 1.3 | OW-5-1: 0.2 | OW-6-1: 0.1
OW-1-2: 2.7 | OW-2-2: 2.2 | OW-3-2: 0.2 | OW-4-2: 1.2 | OW-5-2: 0.1 | OW-6-2: 0.0

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

IT INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG	DATE	10	1	98
	NO.			
	SHEET 2	OF		

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1230 Drop BVE system to ≈160 in H_2O column vacuum, continue OVM/ow influence monitoring

INFLUENCE

ow-1-1: 3.0	ow-2-1: 2.2	ow-3-1: -0.3	ow-4-1: 1.2	ow-5-1: 0.1	ow-6-1: 0.2
ow-1-2: 2.6	ow-2-2: 2.2	ow-3-2: 0.3	ow-4-2: 1.1	ow-5-2: 0.0	ow-6-2: -0.1

1243 Drop system to ≈150 in H_2O column vacuum; continue OVM monitoring

ow-1-1: 3.0	ow-2-1: 2.3	ow-3-1: -0.1	ow-4-1: 1.3	ow-5-1: 0.2	ow-6-1: 0.2
ow-2-1: 2.6	ow-2-2: 2.2	ow-3-2: 0.3	ow-4-2: 1.1	ow-5-2: 0.0	ow-6-2: -0.1

1255 Drop system to ≈140 in H_2O column; continue OVM monitoring

ow-1-1: 3.0	ow-2-1: 2.2	ow-3-1: -0.1	ow-4-1: 1.1	ow-5-1: -0.1	ow-6-1: 0.1
ow-1-2: 2.5	ow-2-2: 2.1	ow-3-2: 0.6	ow-4-2: 1.0	ow-5-2: -0.2	ow-6-2: -0.1

1305 Drop system to ≈130 in H_2O column; continue OVM monitoring

ow-1-1: 2.7	ow-2-1: 2.0	ow-3-1: -0.2	ow-4-1: 1.0	ow-5-1: -0.2	ow-6-1: 0.2
ow-1-2: 2.2	ow-2-2: 1.8	ow-3-2: 0.4	ow-4-2: 0.9	ow-5-2: -0.3	ow-6-2: -0.2

1315 Drop system to ≈120 in H_2O column; continue OVM monitoring

ow-1-1: 2.6	ow-2-1: 1.9	ow-3-1: 0.0	ow-4-1: 1.1	ow-5-1: 0.0	ow-6-1: 0.2
ow-1-2: 2.1	ow-2-2: 1.8	ow-3-2: 0.3	ow-4-2: 0.9	ow-5-2: 0.0	ow-6-2: 0.0

1330 Drop system to ≈110 in H_2O column

ow-1-1: 2.6	ow-2-1: 1.8	ow-3-1: 0.0	ow-4-1: 1.0	ow-5-1: 0.0	ow-6-1: 0.1
ow-1-2: 2.0	ow-2-2: 1.7	ow-3-2: 0.4	ow-4-2: 0.9	ow-5-2: 0.0	ow-6-2: 0.0

1342 Drop system to ≈100 in H_2O column

INFLUENCE:

ow-1-1: 2.4	ow-2-1: 1.6	ow-3-1: 0.0	ow-4-1: 0.9	ow-5-1: 0.0	ow-6-1: 0.1
ow-1-2: 1.8	ow-2-2: 1.5	ow-3-2: 0.2	ow-4-2: 0.8	ow-5-2: 0.0	ow-6-2: 0.0

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

IT INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 10 | 1 | 98 | NO. | | | | SHEET 3 OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1400 Drop system to ≈90 in H_2O column, dilution valve is now completely open, run for 10 min, monitor TCE w/ OVM

INFLUENCE:

OW-1-1: 2.4	OW-2-1: 1.6	OW-3-1: 0.1	OW-4-1: 0.9	OW-5-1: 0.0	OW-6-1: 0.2
OW-1-2: 1.8	OW-2-2: 1.5	OW-3-2: 0.5	OW-4-2: 0.8	OW-5-2: 0.0	OW-6-2: 0.0

1430 Set BVE system back up to ≈175 in H_2O column vacuum for remainder of 9 hr. test; continue OVM/OW influence monitoring

1440 INFLUENCE:

OW-1-1: 3.1	OW-2-1: 2.0	OW-3-1: 0.0	OW-4-1: 1.4	OW-5-1: 0.0	OW-6-1: 0.0
OW-1-2: 2.5	OW-2-2: 2.1	OW-3-2: 0.0	OW-4-2: 1.3	OW-5-2: 0.0	OW-6-2: 0.0

1510 INFLUENCE @ Observ. Wells:

OW-1-1: 3.3	OW-2-1: 2.3	OW-3-1: 0.0	OW-4-1: 1.7	OW-5-1: 0.3	OW-6-1: 0.3
OW-1-2: 2.7	OW-2-2: 2.3	OW-3-2: 0.3	OW-4-2: 1.5	OW-5-2: 0.1	OW-6-2: 0.0

1610 INFLUENCE @ Observation Wells:

OW-1-1: 3.2	OW-2-1: 2.0	OW-3-1: 0.0	OW-4-1: 1.7	OW-5-1: 0.3	OW-6-1: 0.3
OW-1-2: 2.4	OW-2-2: 2.2	OW-3-2: 0.1	OW-4-2: 1.6	OW-5-2: 0.2	OW-6-2: 0.0

Shut dilution valve off completely; recorded OVM reading w/ valve off. Collected sample EW-1-AS2 after allowing airline to evacuate completely.

1620 BVE Pilot system is set back @ ≈175 in H_2O column vacuum where it will run for remaining ≈4.5 hrs. Continue OVM monitoring

1710 INFLUENCE @ OBSERVATION WELLS:

OW-1-1: 3.5	OW-2-1: 2.4	OW-3-1: 0.3	OW-4-1: 2.1	OW-5-1: 0.6	OW-6-1: 0.5
OW-1-2: 2.9	OW-2-2: 2.4	OW-3-2: 1.1	OW-4-2: 1.8	OW-5-2: 0.4	OW-6-2: 0.1

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE 10 / 1 / 98 | NO. | SHEET 4 OF 4

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT:

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

1715 2 spares packers are brought back from welding shop; both have new rubbers installed and one packer is completely fixed (re-welded). 2nd spare packer → rubber was cut 1.5" shorter and wasn't re-welded yet; can be easily finished if needed

1810 INFLUENCE IN OBSERVATION WELLS (@ 175 in H_2O column)

OW-1-1: 3.9	OW-2-1: 2.9	OW-3-1: 0.6	OW-4-1: 2.2	OW-5-1: 1.1	OW-6-1: 0.7
OW-1-2: 3.5	OW-2-2: 2.6	OW-3-2: 1.1	OW-4-2: 1.9	OW-5-2: 0.7	OW-6-2: 0.3

1910 INFLUENCE IN OBSERVATION WELLS: (@ ≈175 in H_2O column)

OW-1-1: 4.4	OW-2-1: 3.4	OW-3-1: 1.0	OW-4-1: 2.4	OW-5-1: 1.5	OW-6-1: 1.1
OW-1-2: 4.1	OW-2-2: 3.0	OW-3-2: 2.0	OW-4-2: 2.1	OW-5-2: 0.9	OW-6-2: 0.7

2010 INFLUENCE in OW's (@ 175 in H_2O column)

OW-1-1: 4.6	OW-2-1: 3.6	OW-3-1: 1.1	OW-4-1: 2.5	OW-5-1: 1.6	OW-6-1: 1.1
OW-1-2: 4.4	OW-2-2: 3.1	OW-3-2: 2.1	OW-4-2: 2.1	OW-5-2: 1.0	OW-6-2: 0.8

2035 INFLUENCE

OW-1-1: 4.6	OW-2-1: 3.6	OW-3-1: 1.0	OW-4-1: 2.5	OW-5-1: 1.6	OW-6-1: 1.1
OW-1-2: 4.4	OW-2-2: 3.1	OW-3-2: 2.1	OW-4-2: 2.2	OW-5-2: 1.0	OW-6-2: 0.7

2045 leave site

2130 Arrive Roch.

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG				
	DATE	10	2	98
	NO.			
	SHEET	1	OF	1

FIELD ACTIVITY DAILY LOG

PROJECT NAME:	PROJECT NO.
FIELD ACTIVITY SUBJECT:	

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

0715 leave Rock for site
0800 Arrive on-site; GWTT has begun lowering packer strings to the 2nd TEST interval of 22-32' bgs @ EW-1 cluster.
0900 EW-1 packer string is getting hung up in core hole

VISITORS ON SITE:	CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.
WEATHER CONDITIONS:	IMPORTANT TELEPHONE CALLS:
IT PERSONNEL ON SITE:	
SIGNATURE:	DATE:

INTERNATIONAL TECHNOLOGY CORPORATION

By ED Date 9-3-98 Subject OVM/AIR READINGS Sheet No. 1 of

Chkd. By Date Proj. No.

LOCATION	TIME	(MAL READING) OVM READING @ SAMPLE PORT	(VACUUM GAUGE) AIR FLOW RATE OUT OF WELL (in H_2O)	0.5cm. X 0.5cm. (DILUTION) AMBIENT AIR FLOW (BLEEDER)	(WELL HEAD) AIR FLOW R ON TOP OF WELL (SCFM
EW-5	1110	1.8 ppm	115 in H_2O	44 scfm	45 scfm
EW-5	1135	0.5 ppm	110 in H_2O	44 scfm	45 scfm
"	1155	0.4 ppm	110 in H_2O	45 scfm	45 scfm
"	1210	0.3 ppm	112 in H_2O	45 scfm	45 scfm
"	1230	0.0 ppm	110 in H_2O	43 scfm	44 scfm
"	12:45	0.2 ppm	125 in H_2O	30 scfm	50 scfm
"	13:10	0.3 ppm	135 in H_2O	30 scfm	50 scfm
"	13:40	0.3 ppm	130 in H_2O	30 scfm	50 scfm
"	1410	0.1 ppm	130 in H_2O	30 scfm	50 scfm
"	1420	0.0 ppm	130 in H_2O	30 scfm	50 scfm
EW-6	0800	107.2 ppm	100 in H_2O	44 scfm	50 scfm
EW-6	0815	130.1 ppm	95 in H_2O	45 scfm	48 scfm
EW-6	0830	153.3 ppm	93 in H_2O	45 scfm	48 scfm
"	0845	161.2 ppm	94 in H_2O	44 scfm	49 scfm
"	0900	165.3 ppm	93 in H_2O	44 scfm	48 scfm
"	0915	166.0 ppm	94 in H_2O	44 scfm	48 scfm
"	0930	163.7 ppm	93 in H_2O	45 scfm	48 scfm

49

INTERNATIONAL TECHNOLOGY CORPORATION

By ED Date 9-4-98 Subject OVM AIR MONITORING Sheet No. 2 of ____

Chkd. By ____ Date ____ Proj. No. ____

0.5cm. X 0.5cm.

LOCATION	TIME	(@ sample port) OVM READING (max ppm)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELL HEAD (scfm)	activated CARBON FILTER - OVM READING (ppm)
EW-6	0945	272.2	125	27	56	0.0
EW-6	1000	193.8	125	27	56	0.0
EW-6	1015	191.3	125	26	55	0.0
EW-6	1030	191.6	125	27	56	0.0
EW-6	1045	186.5	125	27	56	0.0
EW-6	1046	254.3	200	0	70	0.0
2. EW-6	1105	177	0	50	0	0.0
EW-6	1120	183.6	115	28	55	0.0
EW-6	1145	180.3	118	28	55	0.0
EW-6	1200	171.7	120	28	55	0.0
EW-6	1215	165.3	120	28	55	0.0
EW-6	1330	158.1	119	28	55	0.0
EW-6	1345	166.6	120	28	55	0.0
EW-6	1346	216.0	195	0	70	0.0
EW-6	1400	157.3	130	20	58	0.0
2. EW-6	1415	146.7	120	20	55	0.0
9-98 EW-7	0935	221.3	88	SYSTEM	SHUT	DOWN
EW-7	0945	185.3	80	54	45	0.0
CHANGE 2 PSI AVEN EW-7	0955	150.3	80	54	45	0.0
EW-7	1000	148.9	80	54	45	0.0
EW-7	1015	146.8	80	52	45	0.0
EW-7	1030	133.4	80	54	45	0.0
EW-7	1100	119.4	80	54	45	0.0
DILUTION VALVE CLOSED EW-7	1105	234	200	0	70	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

By ED Date 9-8-98 Subject OVM Readings of BVE Pilot Test System Sheet No. #3 of ____

Chkd. By ____ Date ____ Proj. No. 776363

LOCATION	TIME	OVM Reading (max ppm @ sample port)	Vacuum Gauge (in H2O)	Ambient Air flow @ dilution valve (scfm)	Air flow Rate @ well head (scfm)	0.5cm. X 0.5cm. Activated Carbon filter - OVM reading (ppm)
EW-7	1115	186.4	125	26	56	0.0
EW-7	1130	166.8	125	26	56	0.0
EW-7	1145	160.3	125	26	56	0.0
EW-7	1200	156.7	125	26	56	0.0
EW-7	1205	233.2	200	0	70	0.0
EW-7	1210	154.0	125	27	56	0.0
EW-7	1230	146.7	125	27	56	0.0
EW-7	1245	139.0	125	27	56	0.0
EW-7	1300	197.3	200	0	70	0.0
EW-7	1400	197.7	200	0	70	0.0
EW-7	1415	193.1	200	0	70	0.0
EW-7	1430	195.4	200	0	70	0.0
EW-7	1445	195.1	200	0	70	0.0
EW-7	1500	192.8	195	0	70	0.0
EW-7	1515	189.8	195	0	70	0.0
EW-7	1530	181.7	195	0	70	0.0
EW-7	1545	180.7	195	0	70	0.0
EW-7	1600	179.4	195	0	70	0.0
EW-8	0825	163.5	85	55	45	0.0
EW-8	0828	255.4	200	0	70	0.0
EW-8	0830	151.7	90	50	45	0.0
EW-8	0845	140.7	90	50	45	0.0
EW-8	0900	123.1	86	49	46	0.0
EW-8	0915	115.6	87	50	45	0.0
EW-8	0930	110.2	87	50	45	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

By ED Date 9-9-98 Subject OVM Readings of BWE System Sheet No. 4 of ____

Chkd. By ____ Date ____ Proj. No. ____

0.5cm. X 0.5cm.

LOCATION	TIME	OVM READING (max ppm @ sample port)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELL HEAD (scfm)	Activated Carbon filter - OVM Reading (ppm)
EW-8	0940	110.4	85	49	44	0.0
EW-8	0950	122.9	86	49	45	0.0
EW-8	1000	112.5	86	50	45	0.0
EW-8	1005	156.5	150	18	62	0.0
EW-8	1015	143.3	150	18	62	0.0
EW-8	1025	132.5	150	18	63	0.0
EW-8	1040	122.4	150	18	62	0.0
EW-8	1050	122.3	150	18	63	0.0
collect vapor sample EW-8-AS2 → EW-8	1052	164.3	200	0	70	0.0
EW-8	1054	143.6	151	18	64	0.0
EW-8	1100	137.1	150	18	64	0.0
EW-8	1105	136.3	151	18	64	0.0
cut sample out plug out of bottom top drop EW-8	1106	109.5	151	18	64	0.0
EW-8	1110	132.6	151	18	64	0.0
EW-8	1115	129.4	151	18	63	0.0
cut sample but plug out at bottom top EW-8	1116	113.6	151	18	64	0.0
EW-8	1120	134.7	151	18	64	0.0
collected sample EW-8-AS3 before prior to sample EW-8	1121	162.9	200	0	70	0.0
after sample EW-8	1122	165.8	200	0	70	0.0
EW-8	1124	131.8	150	19	61	0.0
EW-8	1135	160.3	200	0	71	0.0
EW-8	1150	159.6	200	0	71	0.0
EW-8	1220	151.3	200	0	71	0.0
EW-8	1235	146.6	200	0	71	0.0
EW-8	1240	144.3	200	0	71	0.0
EW-9	1340	15.3	125	60	29	0.0
EW-9	1345	22.1	125	60	29	0.0
sample EW-9-AS1 collected EW-9	1346	72.6	200	0	70	0.0
EW-9	1348	75.0	175	60	28	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date 9-9-98 Subject OVM Readings of BUE system Sheet No. 5 of _____

Chkd. By _____ Date _____ Proj. No. _____

LOCATION	TIME	OVM READING (max ppm @ sampleport)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELL HEAD (scfm)	0.5cm. X 0.5cm. ACTIVATED CARBON FILTER - OVM RDG. (ppm)
EW-9	1355	25.2	125	60	31	0.0
EW-9	1415	25.6	125	60	30	0.0
EW-9	1425	25.9	125	60	31	0.0
EW-9	1435	26.0	125	60	31	0.0
EW-9	1450	26.1	125	59	32	0.0
EW-9	1500	25.9	125	60	31	0.0
EW-9	1515	25.7	125	59	31	0.0
EW-9	1530	26.0	123	59	31	0.0
EW-9	1545	25.0	125	58	32	0.0
EW-9	1600	25.2	120	58	31	0.0
EW-9	1615	25.3	112	59	32	0.0
EW-9	1630	24.3	113	59	32	0.0
EW-9	1640	23.4	113	58	32	0.0
EW-9	1645	23.0	112	58	32	0.0
EW-9	0820	51.3	200	22	48	0.0
EW-9	0830	48.0	200	23	49	0.0
EW-9	0845	48.2	200	22	49	0.0
EW-9	0855	46.6	200	23	48	0.0
EW-9	0910	44.3	198	22	49	0.0
EW-9	0925	41.7	195	22	49	0.0
EW-9	0938	40.9	195	23	49	0.0
EW-9	0950	40.1	195	22	48	0.0
EW-9	1005	38.7	195	23	48	0.0
EW-9	1025	38.5	195	23	48	0.0
EW-9	1050	38.7	195	23	49	0.0
EW-9	1105	38.3	195	23	49	0.0
EW-9	1115	38.4	195	23	48	0.0
EW-9	1116	66.3	200+	0	70	0.0
EW-11	1345	7.3	85	50	47	0.0
EW-11	1348	18.1	85	50	47	0.0
EW-11	1350	20.9	85	50	46	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date 9-10-98 Subject OVM Readings of BVE System Sheet No. 6 of _____

Chkd. By _____ Date _____ Proj. No. _____

0.5cm. X 0.5cm.

LOCATION	TIME	OVM READING (max ppm value @ sample port)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW @ DILUTION VALVE (scfm)	AIRFLOW RATE @ WELL HEAD (scfm)	ACTIVATED CARBON FILTER - OVM RDG. (ppm)
EW-11	1358	24.0	89	50	47	0.0
EW-11	1405	23.4	88	50	47	0.0
EW-11	1420	23.4	89	50	47	0.0
EW-11	1435	20.9	88	50	47	0.0
EW-11	1445	25.5	130	~~47~~37	59	0.0
EW-11	1450	26.4	125	~~4~~29	57	0.0
EW-11	1500	26.2	125	29	57	0.0
EW-11	1515	25.9	125	29	56	0.0
EW-11	~~1530~~ 1530	25.5	125	30	56	0.0
EW-11	1545	25.3	125	30	56	0.0
EW-11	1546	40.3	200	0	72	0.0
EW-11	1550	40.1	200	0	72	0.0
EW-11	1555	41.2	200	0	72	0.0
EW-11	1615	39.6	200	0	71	0.0
EW-11	1630	38.2	200	0	71	0.0
EW-11	1645	37.0	200	0	72	0.0
EW-7	1730	144.2	198	0	71	0.0
EW-7	1735	143.2	198	0	71	0.0
EW-7	1755	132.5	197	0	71	0.0
EW-7	1810	126.2	197	0	71	0.0
EW-7	18:34	122.4	197	0	71	0.0
EW-7	19:00	120.5	197	0	71	0.0
EW-7	0800	78.1	200	0	71	0.0
EW-7	0810	76.2	200	0	71	0.0
EW-7	0820	74.1	200	0	71	0.0
EW-7	0830	73.3 (73.3)	200	0	71	0.0
EW-7	0845	71.2	200	0	71	0.0
EW-7	0905	30.9	75	49	46	0.0
EW-7	0910	28.9	75	49	46	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

By ED Date 9-11-98 Subject OVM Readings of BUE Pilot System Sheet No. 7 of ____

Chkd. By____ Date____ Proj. No. ____

0.5cm. X 0.5cm.

LOCATION	TIME	OVM READING (max ppm value)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELLHEAD (scfm)	ACTIVATED CARBON FILTER-OVM VALUE (ppm)
EW-7	0920	28.4	75	48	46	0.0
EW-7	0925	28.7	75	48	46	0.0
EW-7	0930	28.3	75	49	46	0.0
EW-7	0930	36.0	100	35	52	0.0
EW-7	0935	36.2	100	35	52	0.0
EW-7	0940	36.6	100	35	52	0.0
EW-7	0945	37.0	100	35	52	0.0
EW-7	0950	36.9	100	35	52	0.0
EW-7	0955	38.2	100	36	52	0.0
EW-7	1000	43.2	125	25	59	0.0
EW-7	1005	43.3	125	25	59	0.0
EW-7	1010	43.3	125	26	59	0.0
EW-7	1015	42.2	125	26	59	0.0
EW-7	1020	42.1	125	26	58	0.0
EW-7	1030	42.5	125	26	58	0.0
EW-7	1035	50.3	150	15	65	0.0
EW-7	1037	50.0	150	15	65	0.0
EW-7	1040	50.7	150	15	65	0.0
EW-7	1045	50.5	150	15	65	0.0
EW-7	1050	49.8	150	15	65	0.0
EW-7	1055	49.3	150	15	65	0.0
EW-7	1100	49.0	150	15	65	0.0
EW-7	1101	59.6	175	ED 5	70	0.0
EW-7	1105	60.1	175	ED 5	70	0.0
EW-7	1110	60.1	175	ED 5	70	0.0
EW-7	1115	60.5	175	ED 5	70	0.0
EW-7	1120	60.5	175	ED 5	70	0.0
EW-7	1130	60.3	175	ED 5	70	0.0
EW-7	1135	67.6	192	0	72	0.0
EW-7	1140	68.0	192	0	72	0.0
EW-7	1145	67.2	192	0	72	0.0
EW-7	1150	67.2	191	0	72	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

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INTERNATIONAL TECHNOLOGY CORPORATION

By N. Rejfe Date 9/14/98 Subject OVM/Air Readings Sheet No. 1 of 1

Chkd. By ____ Date ____ BVE Pilot Test System Proj. No. 226363

Location	Time	(Max Reading) ovm reading @ Sample port (ppm)	(Vacuum Guage) Air flow rate out of well (in H_2O)	(Dilution) Ambient Air Flow (Scfm)	(Well Head) Air flow rate on top of well (Scfm)	Activated Carb filter ovm reading (ppm)
EW-1	1026	Start System				
	1027	233.0				
	1028	Collect Sample	EW-1-AS1			
	1031	152.8	90	50	44	
	1046	131.8	90	50	44	0.0
	1101	112.7	90	50	43	0.0
	1116	107.1	90	50	43	0.0
	1126	99.9	90	50	43	0.0
	1130	110.1	100	40	45	0.0
	1145	105.3	100	40	45	0.0
	200	100.8	100	40	46	0.0
	1215	98.5	100	40	46	0.0
	1228	91.9	100	40	46	0.0
	1230	108.0	125	28	54	0.0
	1245	106.6	125	28	54	0.0
	1300	101.3	125	28	54	0.0
	1315	98.6	125	28	54	0.0
	1329	91.6	125	28	54	0.0
	1345	86.4	125	28	54	
	1356	99.8	150	18	60	
	1415	96.8	150	17	60	0.0
	1430	94.6	150	17	60	0.0
	1431	109.9	175	~~65~~ <45	65	0.0
	1445	107.5	175	<45	65	0.0
	1500	105.5	175	<45	65	0.0
	1515	99.9	175	<45	65	0.0
	1530	94.9	175	<45	65	0.0
	1531	108.6	200	0	67	
	1532	Collected Sample	EW-1-AS2			
	1545	106.8	200	0	68	0.0
	1600	105.7	200	0	68	0.0
	1615	102.9	200	0	68	1.2
	1621	Collected Sample	EW-1-AS3			
	1624	102.5	200	0	68	

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date 9-15-98 Subject OVM Readings of BVE System Sheet No. 1 of _____

Chkd. By _____ Date _____ Proj. No. _____

LOCATION	TIME	OVM READING (max ppm value)	VACUUM GAUGE (in H2O)	AMBIENT AIR FLOW @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELL HEAD (scfm)	0.5cm. X 0.5cm. CARBON FILTER READING (ppm)
EW-3	0943	40.6	175	11	69	0.0
EW-3	0948	34.9	175	11	69	0.0
EW-3	0949	41.7	200	0	71	0.0
	0951	34.0	175	10	69	0.0
	1000	30.4	↓	↓	↓	↓
	1015	30.4			70	
	1030	29.9	↓			
	1045	29.0	173			
	1100	28.1	173			
	1115	27.1	173	↓		
	1130	27.4	175	< 5		
	1145	27.4	175	< 5		
	1200	27.2	175	< 5		
	1230	22.7	175	< 5		
	1255	22.4	175	< 5		0.0
	1315	22.3	175	< 5		
	1345	21.6	175	< 5		
	1400	22.2	175	< 5		
	1415	22.1	175	< 5		
	1430	22.1	175	< 5		
	1445	21.8	175	< 5		
	1500	21.1	175	< 5		
	1515	20.9	175	< 5		
	1530	20.1	175	< 5		
	1550	19.6	175	< 5		
	1600	19.5	175	< 5		
	1615	19.2	175	< 5		
	1630	19.0	175	< 5		
	1700	18.1	175	< 5		
	1715	17.8	175	< 5		
	1730	17.7	175	< 5		
	1740	17.7	175	< 5	↓	
collected N-3-AS2 →	1741	21.3	192	0	72	
	1743	17.4	175	< 5	69	
↓	1745	17.2	175	< 5	69	↓

INTERNATIONAL TECHNOLOGY CORPORATION

By _____ Date 9/18/98 Subject OVM monitoring of BVE system Sheet No. 1 of _____

Chkd. By _____ Date _____ (with packers) Proj. No. _____

0.5cm. X 0.5cm.

LOCATION	TIME	OVM READINGS (ppm @ sample port)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW RATE @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELL HEAD (scfm)	CARBON FILTER CANISTER — OVM Rdg. (ppm)
EW-2	1035	1.0	175	≈ 5 (<10)	70	0.0
* PACKERS AT 10-20' interval BGS						
	1055	1.2	180	6	70	0.0
collected sample EW-2-AS1 →	1100	2.8	200	0	70	0.0
	1102	3.1	200	0	70	0.0
	1105	5.3	180	13	65	0.0
	1110	11.4	175	18	58	0.0
TEST #1	1120	12.9	170	18	59	0.0
	1130	14.2	175	17	59	0.0
	1145	14.8	175	17	59	0.0
	1200	14.8	175	17	59	0.0
collected sample EW-2-AS2 →	1202	22.1	>200	0*	65	0.0
	1205	14.3	175	18	58	0.0
	1215	14.2	175	18	57	0.0
	1230	14.9	180	18	55	0.0
	1240	10.4	175	23	51	0.0
	1250	9.7	176	22	50	0.0
collected sample EW-2-AS3 →	1253	17.2	> 200	0	64	0.0
	1255	8.9	174	24	50	0.0
	1300	8.4	175	24	50	0.0

9-21-98

TIS #2

LOCATION	TIME	OVM READING (max ppm)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW RATE @ DILUTION VALVE (scfm)	AIR FLOW RATE @ ORIFICE HEAD (scfm)	CARBON FILTER OUTLET (ppm)
EW-2	1340	12.8	>220	0	60	0.0
EW-2	1345	20.7	>200	0	60	0.0
EW-2	1347	19.2	200	13	55	0.0
EW-2	1353	22.3	200	12	55	0.0
EW-2	1356	24.1	201	13	55	0.0
EW-2	1400	26.5	201	13	55	0.0
EW-2	1401	23.4	191	20	45	0.0
EW-2	1405	22.4	190	22	45	0.0
EW-2	1410	21.3	190	22	45	0.0
EW-2	1411	19.6	180	27	40	0.0
EW-2	1415	19.4	180	27	40	0.0
EW-2	1420	19.5	180	27	40	0.0
EW-2	1421	17.1	170	30	38	0.0
EW-2	1425	17.3	170	31	39	0.0
EW-2	1430	17.9	170	31	39	0.0
EW-2	1431	16.4	160	35	35	0.0
EW-2	1435	16.6	160	35	35	0.0
EW-2	1440	15.8	160	34	35	0.0
EW-2	1441	14.4	150	40	33	0.0
EW-2	1445	14.9	150	40	33	0.0
EW-2	1450	14.9	150	40	35	0.0
EW-2	1451	13.4	140	45	30	0.0
EW-2	1455	13.0	140	45	30	0.0
EW-2	1500	12.9	140	45	30	0.0
EW-2	1510	12.8	140	45	30	0.0
EW-2	1511	11.2	130	50	27	0.0
EW-2	1515	10.9	130	50	27	0.0
EW-2	1520	10.7	130	50	27	0.0
EW-2	1521	9.4	120	58	25	0.0
EW-2	1525	10.1	120	58	25	0.0

EW-2 — Step Drawdown Pilot Test #2 (EW-30 in Recirc.)

LOCATION	TIME	OVM READING (max ppm)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW RATE @ DILUTION VALVE (scfm)	AIR FLOW RATE @ WELL HEAD (scfm)	CARBON FILTER OUTLET (ppm)
EW-2	1530	9.5	122	60	25	0.0
EW-2	1535	8.6	120	60	24	0.0
EW-2	1545	9.1	120	60	24	0.0
EW-2	1600	8.1	123	61	24	0.0
EW-2	1630	8.3	125	61	24	0.0
EW-2	1645	8.5	125	61	24	0.0
EW-2	1647	13.9	175	40	28	0.0
EW-2	1655	12.8	175	40	28	0.0
EW-2	1700	12.9	175	40	26	0.0
EW-2	1715	13.6	175	39	26	0.0
EW-2	1730	14.0	175	40	26	0.0
EW-2	1745	12.8	175	40	27	0.0
EW-2	1800	12.3	175	40	27	0.0
EW-2	1802	38.3	>200	0	70	0.0
EW-2	1805	14.8	175	41	26	0.0
EW-2	1815	14.9	175	41	25	0.0
EW-2	1830	13.0	195	41	25	0.0
EW-2	1845	9.9	176	41	26	0.0
EW-2	19:00	9.2	178	41	25	0.0
EW-2	19:15	8.6	180	41	24	0.0
EW-2	19:30	8.6	202	35	27	0.0
EW-2	19:45	9.1	206	34	27	0.0
EW-2	20:00	8.1	206	34	27	0.0
EW-2	20:15	8.2	208	34	26	
EW-2	20:30	11.9	220	39	29	0.0
EW-2	20:45	11.2	222	29	27	0.0
EW-2	21:00	10.8	223	29	27	0.0
EW-2	21:15	10.9	225	29	26	0.0
EW-2	21:30	12.4	175	52	18	0.0
EW-2	21:45	11.4	172	51	20	0.0
EW-2	22:00		172	51	20	
EW-2	22:15		175	52	20	
EW-2	22:30		174	52	20	
EW-2	22:45		179	51	19	

* TRY TO SET SYSTEM @ 110 in H2O with 90 below 120 vacuum value with throttle fully open

FAX (716) 472-1211

9-22-98

LOCATION	TIME	HNU Reading (max ppm)	VACUUM GAUGE (in H_2O)	AMBIENT AIR FLOW RATE @ DILUTION VALVE (scfm)	Air Flow Rate @ well Head (scfm)	Carbon filter outlet (ppm)
EW-2	1107	50	175	41	31	0.0
EW-2	1110	54	175	41	31	0.0
collect sample EW-2-AS7 EW-2	1111	170	299	0	70	0.0
EW-2	1115	79	175	44	28	0.0
EW-2	1125	80	175	44	29	0.0
EW-2	1130	80	175	44	26	0.0
EW-2	1145	79	175	44	25	0.0
EW-2	1200	80	175	44	25	0.0
EW-2	1205	80	180	44	25	0.0
EW-2	1215	80	180	44	25	0.0
EW-2	1230	82	182	44	25	0.0
EW-2	1240	78	175	49	22	0.0
EW-2	1245	82	175	49	22	0.0
EW-2	1300	84	176	50	22	0.0
collect sample EW-2-AS8 EW-2	1307	88	176	50	22	0.0
EW-2	1309	300	321	0	70	0.0
EW-2	1310	90	175	49	23	0.0
EW-2	1427	58	174	55	17	0.0
EW-2	1445	50	175.8	55	17	0.0
EW-2	1500	50	176.8	55	17	0.0
EW-2	1515	55	175.9	55	17	0.0
EW-2	1530	48	177.8	55	17	0.0
EW-2	1546	48	174.5	55	17	
EW-2	1600	56	178.0	55	17	
611 turn 30 Dilution EW-2	0612	300 collect sample	337.4	0	39	
	1615	return pressure to		175		
EW-2	1616	80	179.7	53	18	
	1618	80	181.1	53	18	
	1621	84	180.2	53	8	0.0

1623 system turn 80

INTERNATIONAL TECHNOLOGY CORPORATION

DAILY LOG | DATE | NO. | SHEET OF

FIELD ACTIVITY DAILY LOG

PROJECT NAME: | PROJECT NO.

FIELD ACTIVITY SUBJECT: TEST #1 @ EW-3 cluster (10-20' packer interval) @ BGS

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

LOCATION	TIME	~~HNU~~ Reading (ppm)	Vacuum Gauge (in H_2O)	Ambient Air flow rate @ Dilution Valve (scfm)	Air Flow Rate @ Well Head (scfm)	Carbon filter outlet (ppm)
EW-3	1520	130 ppm	176	15	60	0.0
EW-3	1522	80	178	14	61	0.0
EW-3	1523	90	> 200	0	70	0.0
EW-3	1525	55	172	15	60	0.0
EW-3	1535	52	171	16	60	0.0
EW-3	1545	40	174	16	60	0.0
EW-3	1600	34	171	16	60	0.0
EW-3	1615	34	172	16	60	0.0
EW-3	1630	32	171	15	60	0.0
EW-3	1645	33	172	15	60	0.0
EW-3	1650	60	224	0	70	0.0
EW-3	1653	54	223	0	70	0.0
EW-3	1700	40	175	15	60	0.0
EW-3	1715	36	174	15	60	0.0
EW-3	1730	35	173	15	60	0.0
EW-3	1745	34	174	15	60	0.0
EW-3	1800	32	173	15	60	0.0
EW-3	1812	32	171	15	60	0.0
EW-3	1814	50	221	0	70	0.0
EW-3	1815	48	222	0	70	0.0
EW-3	1817	30	174	15	60	0.0
EW-3	1819	30	172	15	60	0.0
			TEST #1	OVER		

allocated sample EW-3-MS1

allocated sample EW-3-MS2

allocated sample EW-3-MS3

VISITORS ON SITE:

CHANGES FROM PLANS AND SPECIFICATIONS, AND OTHER SPECIAL ORDERS AND IMPORTANT DECISIONS.

WEATHER CONDITIONS:

IMPORTANT TELEPHONE CALLS:

IT PERSONNEL ON SITE:

SIGNATURE: DATE:

(22-32' interval packer test)

Top packer blew up in OW-1?

LOCATION	TIME	VACUUM GAUGE (in H_2O)	Air Flow Rate @ Dilution valve (scfm)	Airflow Rate @ well head (scfm)	HNU Reading (max ppm)	Carbon Tube (ppm)
EW-3	1137	175	25	49	150 ppm	0.0
EW-3	1139	174	25	48	142	0.0
EW-3	1140	320	0	> 100	280	0.0
EW-3	1145	173	34	≈ 40 (sporadic w/draining H_2O vapor)	144	0.0
EW-3	1150	≈ 170	35	≈ 40	146	0.0
EW-3	1200	≈ 175	35	≈ 40	90	0.0
EW-3	1205	≈ 175	34	≈ 40	80	0.0
EW-3	1215	≈ 164	≈ 35	≈ 40	84	0.0
EW-3	1230	≈ 163	≈ 35	≈ 40	82	0.0
EW-3	1250	178	30	≈ 40	88	0.0
EW-3	1300	161	28	≈ 42	82	0.0
EW-3	1310	173	28	≈ 50	112	0.0
EW-3	1312	265	0	> 100	220	0.0
EW-3	1315	180	28	≈ 45	108	0.0
EW-3	1330	181	28	≈ 45	104	0.0
EW-3	1345	168	29	≈ 45	106	0.0
EW-3	1400	174	28	≈ 40	88	0.0
EW-3	1415	164	28	≈ 40	89	0.0
EW-3	1430	174	28	≈ 40	80	0.0
EW-3	1435	267	0	> 100	200	0.0
EW-3	1438	181	29	≈ 45	108	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

By 9-29-98 Date _____ Subject TEST #3 @ EW-3 cluster Sheet No. ___ of ___

Chkd. By ___ Date _____ 32-42' interval Proj. No. _____

0.5cm. X 0.5cm.

LOCATION	TIME	OVM Reading (max ppm)	Hnu Reading (max ppm)	VACUUM GAUGE (in W.C.)	Air flow Rate @ Dilution Valve (scfm)	Air Flow Rate @ well Head (scfm)	Carbon Filter outlet (ppm)
collected EW-3-AS7 EW-3	1200	287	142	175	22	55	0.0
EW-3	1202		220	243	0	65	0.0
EW-3	1205		120	174	21	50	0.0
EW-3	1215		90	168	28	50	0.0
EW-3	1230		80	162	28	50	0.0
EW-3	1245		72	154	28	50	0.0
EW-3	1250		80	171	20	55	0.0
EW-3	1255		80	172	20	55	0.0
EW-3	1300		82	173	20	55	0.0
BREAK	IN	TEST	AFTER	1(1) HR.			
EW-3	1415		88	173	20	50	0.0
EW-3	1420		84	176	20	50	0.0
EW-3	1430		80	158	20	50	0.0
EW-3	1433		86	172	15	65	0.0
EW-3	1445		98	170	15	65	0.0
collected EW-3-AS8 EW-3	1447		134	219	0	80	0.0
EW-3	1450		100	171	14	67	0.0
EW-3	1500		100	176	12	70	0.0
EW-3	1515		99	176	12	70	0.0
EW-3	1530		98	175	12	70	0.0
EW-3	1545		98	175	12	70	0.0
EW-3	1600		100	174	12	70	0.0
collected EW-3-AS9 EW-3	1610		90	176	12	70	0.0
EW-3	1612		132	215	0	78	0.0
EW-3	1615		98	169	14	70	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

EW-1 Cluster (Packer Test)

By 10-1-98 Date _____ Subject TEST #1 (12-22' interval) Sheet No. 1 of _____

Chkd. By _____ Date _____ Proj. No. _____

LOCATION	TIME	OVM (ppm)	Vacuum gauge (in H.g.)	Air flow Rate Dilution Valve (scfm)	Air flow rate Well Head	0.5cm. X 0.5cm Carbon Filter
EW-1	1135	out of OVM range > 8500 ppm	200	<10	65	0.0
EW-1	1138	out of range	≈228	0	67	0.0
EW-1	1140	>10,000ppm out of range	200	<10	64	0.0
EW-1	1150 (1150)	>10,000 out of range	190	12	61	0.0
EW-1	1155	>10,000 out of range	189	12	61	1.6
EW-1	1200	8959 out of range	180	15	60	0.0
EW-1	1205	≈8300 out of range	179	15	60	0.0
EW-1	1211	≈7400 out of range	170	18	59	0.0
EW-1	1220	≈7300 out of range	169	18	59	0.0
EW-1	1225	≈7000 out of range	167	18	58	0.0
EW-1	1231	≈6250 out of range	159	22	55	0.0
EW-1	1236	≈6000 out of range	158	21	55	0.0
EW-1	1241	≈6000 out of range	159	21	55	0.0
EW-1	1243	≈5250 out of range	150	25	55	0.0
EW-1	1248	≈5250 out of range	149	25	53	0.0
EW-1	1253	≈5000 out of range	148	25	54	0.0
EW-1	1255	≈4600	141	28	51	0.0
EW-1	1300	≈4475	141	28		
EW-1	1305	≈4450	140	28	50	0.0
EW-1	1307	≈3800	130	32	48	0.0
EW-1	1312	≈3750	130	33	49	0.0
EW-1	1317	≈3600	129	33	49	0.0
EW-1	1319	≈3100	120	37	45	0.0
EW-1	1324	≈3000	121	38	45	0.0
EW-1	1330	≈2700	111	43	43	0.0
EW-1	1335	≈2560	110	43	43	0.0
EW-1	1340	≈2600	109	43	43	0.0
EW-1	1343	≈2300	100	49	40	0.0
EW-1	1348	≈2800 (2200)	101	49	40	0.0
EW-1	1400	≈2000↓	100	49	40	0.0
EW-1	1405	≈1800 alarm	91	55	38	0.0
EW-1	1410	≈1775 Alarm	92	55	38	0.0
EW-1	1430	≈1650	92	55	38	0.0

INTERNATIONAL TECHNOLOGY CORPORATION

EW-1 CLUSTER

By _____ Date 10-1-98 Subject PACKER TEST #1 (12-22' INTERVAL BGS) Sheet No. 2 of _____

Chkd. By _____ Date _____ Proj. No. _____

LOCATION	TIME	OVM Reading (max ppm)	Vacuum gauge (in H_2O col.)	Air flow rate @dilution valve (scfm)	Air Flow Rate @ Well Head (scfm)	0.5cm. X 0.5cm. Carbon filter outlet (ppm)
EW-1	1432	≈4100 over-range	175	16	59	0.0
EW-1	1445	≈4000 over range	177	16	59	0.0
EW-1	1500	≈3750 over range	177	16	59	0.0
EW-1	1520	≈ 3600 over range	175	16	58	0.0
EW-1	1540	≈ 3350 over range	176	16	59	0.0
EW-1	1600	≈ 3100 over range	174	16	58	0.0
collected mid-test sample at EW-1-AS2						
EW-1	1610	≈ 4800 over range	≈ 226	0	65	0.0
EW-1	1620	≈ 2900 over range	176	16	58	0.0
EW-1	1640	≈ 2775 over range	177	16	58	0.0
EW-1	1700	≈2550 over range	178	16	58	0.0
EW-1	1720	≈2400 over range	177	16	59	0.0
EW-1	1740	≈2300 over range	178	16	59	0.0
EW-1	1800	≈2250 over range	174	18 (18)	58 (56)	0.0
EW-1	1820	≈2250 over range	174	18	56	0.0
EW-1	1840	≈2150 over range	176	18	57	0.0
EW-1	1900	≈2125 over range	175	18	57	0.0
EW-1	1920	≈ 2000 over range	175	18	57	0.0
EW-1	1940	2012 over range	174	18	57	0.0
EW-1	2000	1991 over range alarm	175	18	57	0.0
EW-1	2020	1939	175	18	57	0.0
collected at EW-1-AS3						
EW-1	2025	3255 over range	≈229	0	65	0.0
EW-1	2030	1883 alarm	174	18	58	0.0
EW-1	2035	1876	175	18	58	0.0

SUMMARY OF AIR SAMPLE ANALYSIS RESULTS
LeHigh Valley R.R. Spill Site, BVE Pilot Test

		DETECTED ANALYTES 1,2									
Sample Designatio	Sample Dat	Benzene	Methylene chlorid	Trichloroethen	1,1-Dichloroetha	p&m-Xylen	o-Xylene	Toluene	1,2,4-Trimethylbenze	Ethylbenzen	1,3,5-Trimethylbenze
EW-5-AS1	09/03/98	--	34	830	--	--	--	--	--	--	--
EW-5-AS2	09/03/98	--	29	730	--	--	--	--	--	--	--
EW-5-AS3	09/03/98	--	37	1,190	20	--	--	--	--	--	--
EW-6-AS1	09/04/98	--	--	123,000	--	--	--	--	--	--	--
EW-6-AS2	09/04/98	--	6,457	141,000	--	--	--	--	--	--	--
EW-6-AS3	09/04/98	--	6,660	164,000	--	--	--	--	--	--	--
EW-7-AS1	09/08/98	--	6,580	256,000	--	--	--	--	--	--	--
EW-7-AS2	09/08/98	--	9,720	246,000	--	--	--	--	--	--	--
EW-7-AS3	09/08/98	--	7,650	183,000	--	--	--	--	--	--	--
EW-8-AS1	09/09/98	--	13,600	246,000	--	--	--	--	--	--	--
EW-8-AS2	09/09/98	--	5,380	211,000	--	--	--	--	--	--	--
EW-8-AS3	09/09/98	--	8,050	198,000	--	--	--	--	--	--	--
EW-9-AS1	09/09/98	--	--	64,100	--	--	--	--	--	--	--
EW-9-AS2	09/10/98	--	--	67,800	--	--	--	--	--	--	--
EW-9-AS3	09/10/98	--	--	82,000	--	--	--	--	--	--	--
EW-11-AS1	09/10/98	--	--	58,400	--	--	--	--	--	--	--
EW-11-AS2	09/10/98	54,700	--	--	--	--	--	--	--	--	--
EW-11-AS3	09/10/98	50,700	--	--	--	--	--	--	--	--	--
EW-1-AS1	09/14/98	572,000	--	--	--	--	--	--	--	--	--
EW-1-AS2	09/14/98	218,000	--	--	--	--	--	--	--	--	--
EW-1-AS3	09/14/98	--	--	206,000	--	--	--	--	--	--	--
EW-3-AS1	09/15/98	--	--	122,000	--	--	--	--	--	--	--
EW-3-AS2	09/15/98	--	--	93,400	--	--	--	--	--	--	--
EW-2-AS1	09/18/98	--	357	11,900	--	344	388	--	--	--	--
EW-2-AS2	09/18/98	--	--	71,300	--	--	--	--	--	--	--
EW-2-AS3	09/18/98	--	--	92,400	--	--	--	--	--	--	--
EW-2-AS4	09/21/98	--	--	141,000	--	--	--	--	--	--	--
EW-2-AS5	09/21/98	--	--	213,000	--	--	--	--	--	--	--
EW-2-AS6	09/21/98	--	--	197,000	--	--	--	--	--	--	--
EW-2-AS7	09/22/98	--	--	127,000	--	--	--	--	--	--	--
EW-2-AS8	09/22/98	--	--	155,000	--	--	--	--	--	--	--
EW-2-AS9	09/22/98	--	--	191,000	--	--	--	--	--	--	--
EW-3-AS1A	09/24/98	--	--	58,100	--	--	--	--	--	--	--
EW-3-AS2A	09/24/98	--	670	28,500	--	--	--	--	--	--	--
EW-3-AS3A	09/24/98	--	840	24,900	--	--	--	--	--	--	--
EW-3-AS4A	09/28/98	--	6,540	172,000	--	--	--	--	--	--	--
EW-3-AS5A	09/28/98	--	--	112,000	--	--	--	--	--	--	--
EW-3-AS6A	09/28/98	1,980	--	109,000	--	23,000	21,700	20,400	11,400	4,420	10,100
EW-3-AS7A	09/29/98	--	--	132,000	--	--	--	--	--	--	--
EW-3-AS8A	09/29/98	--	--	92,100	--	--	--	--	--	--	--
EW-3-AS9A	09/29/98	--	--	92,900	--	--	--	--	--	--	--
EW-1-AS1A	10/01/98	--	--	807,000	--	--	--	--	--	--	--
EW-1-AS2A	10/01/98	--	--	310,000	--	--	--	--	--	--	--
EW-1-AS3A	10/01/98	--	--	247,000	--	--	--	--	--	--	--
EW-1-AS4A	10/05/98	--	--	459,000	--	--	--	--	--	--	--
EW-1-AS5A	10/05/98	--	4,180	227,000	--	--	--	--	--	--	--
EW-1-AS6A	10/05/98	--	--	181,000	--	--	--	--	--	--	--
EW-1-AS7A	10/06/98	--	--	382,000	--	--	--	--	--	--	--
EW-1-AS8A	10/06/98	--	--	248,000	--	--	--	--	--	--	--
EW-1-AS9A	10/06/98	--	--	4,780	--	10,100	9,980	6,600	7,580	--	--

Notes:

1. " -- " denotes that the analyte was under detection limit, i.e., it is a non-detect.
2. Results in Parts Per Billion by Volume (PPBV)

GROUND/WATER TREATMENT
& TECHNOLOGY, INC.

P.O. BOX 1174 DENVILLE, NEW JERSEY 07834
Phone (973) 983-0901 • Fax (973) 983-0903

December 22, 1998

International Technology Corporation
2200 Cottontail Lane
Somerset, New Jersey 08873-1248

ATTN: **Mr. Dana Boyadjian**

RE: **Lehigh Valley R.R. Derailment Site, LeRoy, New York**
Vapor Extraction Pilot Testing Methodology

Dear Mr. Boyadjian:

Pursuant to our recent conversation regarding the above referenced project, provided below is a narrative description of the methodology of the pilot testing performed. This includes a description of the equipment used during the pilot testing process and an explanation of the calibration procedures used to acquire the data submitted to International Technology Corporation (IT Corp.) on December 7, 1998. A schematic diagram depicting the configuration of the system has been included.

Equipment Description

All monitoring equipment used during the vapor extraction pilot testing procedure was within the specifications outlined in the Statement of Work (SOW) provided for the project and received by Ground/Water Treatment and Technology, Inc. (GWTT), via facsimile, on February 2, 1998. Equipment manufacturer's "cut sheets" and engineering specifications for all major equipment used during the procedure have been included for your review.

1. Vacuum Pump – The Siemens 2BL series vacuum pump is capable of generating 28.5 in. Hg and has a capacity to deliver 20 to 150 cfm. The negative pressure applied the system was controlled by adjusting the amount of ambient air pulled into the system. The vacuum pump also included a filter to prevent solids, moisture, etc. from entering the pump and/or the carbon units.

2. Pressure Transmitter(s) – The Druck PTX 1240 industrial pressure transmitter has a ±0.25% F.S. BSL and provides a 4-20 mA, two-wire output. For the vapor extraction testing procedure, GWTT supplied twenty (20) 0-5 psig (0-138.9 in. H_2O) transmitters for observation and four (4) 0-15 (0-400.2 in. H_2O) psig transmitters for vacuum extraction.

3. Data Logger – The Iotech, Inc. DaqBook/216 utilizes a universal current/voltage signal conditioner to output a voltage range in bipolar mode at ±5V/channel. The signal is then converted into a compatible number that can be easily read by a computer software program. Thirty (32) inputs channels were supplied for the project to enable individual recording of each transmitter output.

System Calibration

Each 0-5 psig (0-138.9 in. H_2O) and 0-15 psig (0-400.2 in. H_2O) transmitter was calibrated in the following manner in accordance with the data logger manufacturer's instructions:

1. The universal input card within the DaqBook reads incoming signals within a ± 5V range. Using Ohm's Law ($V=IR$) and a 250Ω resister a 4-20mA signal is converted.

@ 4mA V=0.004(250) V=1	@ 20mA V=0.020(250) V=5

2. In order to maintain an appropriate scale for reading the transmitter, the point slope formula ($y=mx+b$) was introduced to convert raw readings. After preliminary testing, the scale set for the 0-5 psig (0-138.9 in. H_2O) transmitters at the observation wells was 0-30 in. H_2O.

x = voltage (V) at specific mA reading **Solve for x at 0 in. H_2O** x @ 0 in. H_2O = 0.004(250) = 1 V **Solve for x at 30 in. H_2O** (30/138.9) in. H_2O = 0.22 and 0.22*16 mA = 3.5 mA, therefore 30in. H_2O = (4+3.5) mA = 7.5 mA x @ 30 in. H_2O = 0.0075 (250) = 1.875 V	y = in. H_2O over scale set for transmitters y = 0 and 30 in. H_2O
Solve for b y = mx+b @ y = 0 in. H_2O 0 = m(1) + b b = -m	**Solve for m** y = mx+b @ y = 30 in. H_2O 30 = m(1.875) – m m = 34.29 and b = -34.29

3. The values for *m* and *b* were entered into the DaqBook data logger program and each transmitter was test calibrated. An assembly that included a vacuum induction device and a negative pressure gage was attached to each transmitter. A vacuum of 30 in. H_2O was applied to the transmitter and the response by the DaqBook observed to ensure correct calibration. Once all transmitters were calibrated, the test was performed. Please note, all transmitters were calibrated or checked prior to each extraction test.

Summary of Test Results

In our letter to IT Corp. on December 7, 1998, regarding the vapor extraction pilot testing data, it was stated that any data point less than 0.5 in. H_2O should be considered at zero value (i.e., 0 in. H_2O). The explanation of this statement is as follows:

1. The industrial pressure transmitter has a combined non-linearity, hysteresis and repeatability accuracy of ±0.25% F.S. BSL maximum. Based upon the full scale span of the 0-5 psig (0-138.39 in. H_2O) transmitter, this equates to approximately 0.35 in. H_2O.

2. In addition to this percentage of accuracy, all transmitters are affected by temperature. The temperature effect for this specific transmitter is ±2% F.S. thermal error band over the compensated temperature range (-4° to +180°F). This equates to 0.01%/°F of the temperature range. The maximum temperature change over a period of one (1) extraction pilot test was approximately 10°F. The accuracy factor for temperature compensation is 0.10%. Based upon the full-scale span of the 0-5 psig (0-138.39 in. H_2O) transmitter, this equates to approximately 0.14 in. H_2O.

3. The total error based upon the combined non-linearity, hysteresis and repeatability as well as temperature compensation is 0.50 in. H_2O.

Based upon the above, any values less than 0.5 in. H_2O should be considered a zero value.

We trust the above is fully responsive to your request. If you have any questions or require additional clarification regarding the testing or calibration procedures, please call.

Very Truly Yours,
Ground/Water Treatment and Technology, Inc.

Edward R. Christine
Project Engineer

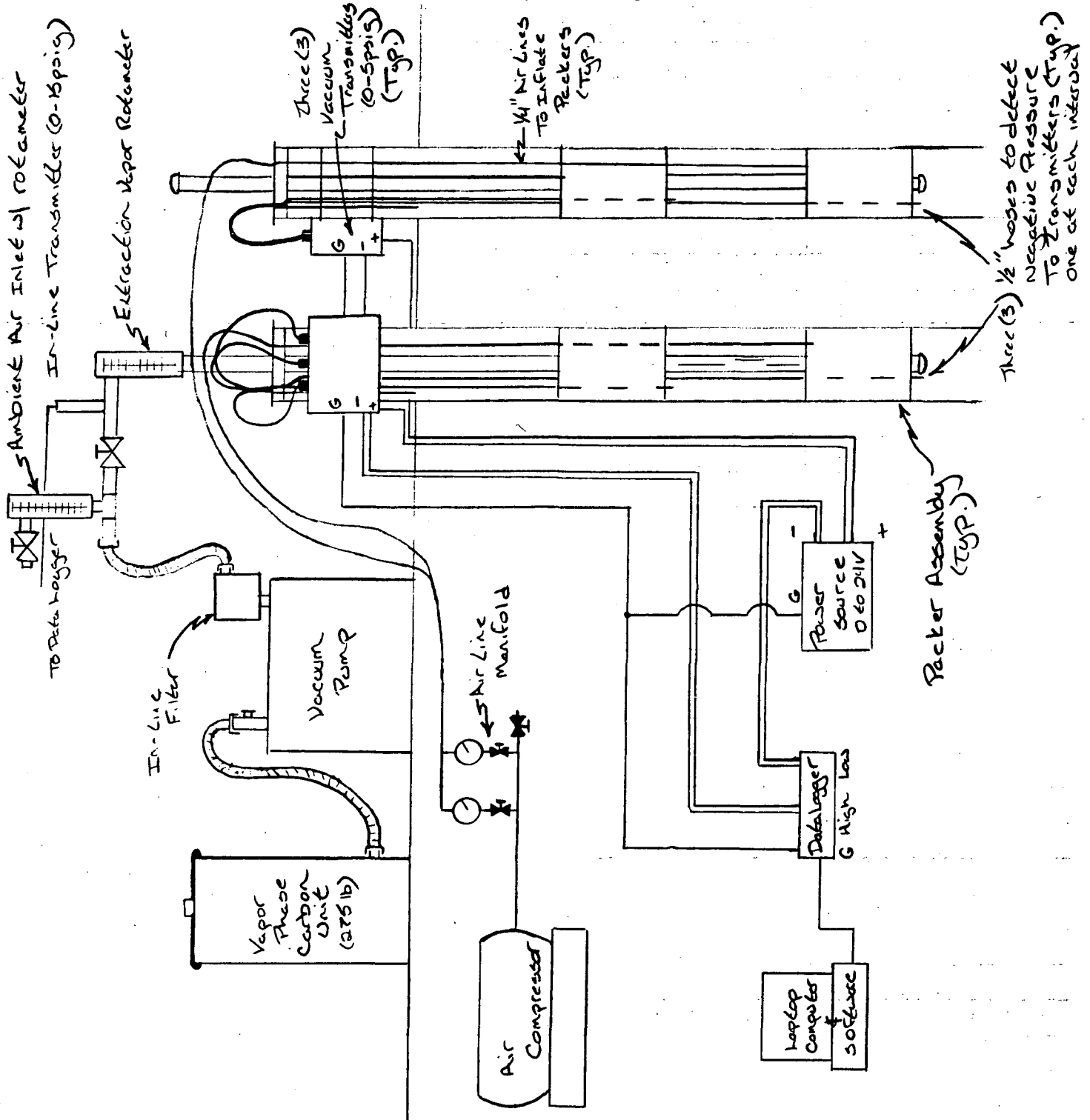
cc: Robert Kunzel (GWTT)

Contractor Ground/Water Treatment & Technology, Inc. — M_A Contract No. 97024

Project Lehigh Valley RR - Derailment Site — Page _____ of _____

Location Leroy, New York — By ERC Date 12/21/98

Subject Vapor Extraction Test - Equipment Layout — Ck _____ Date _____



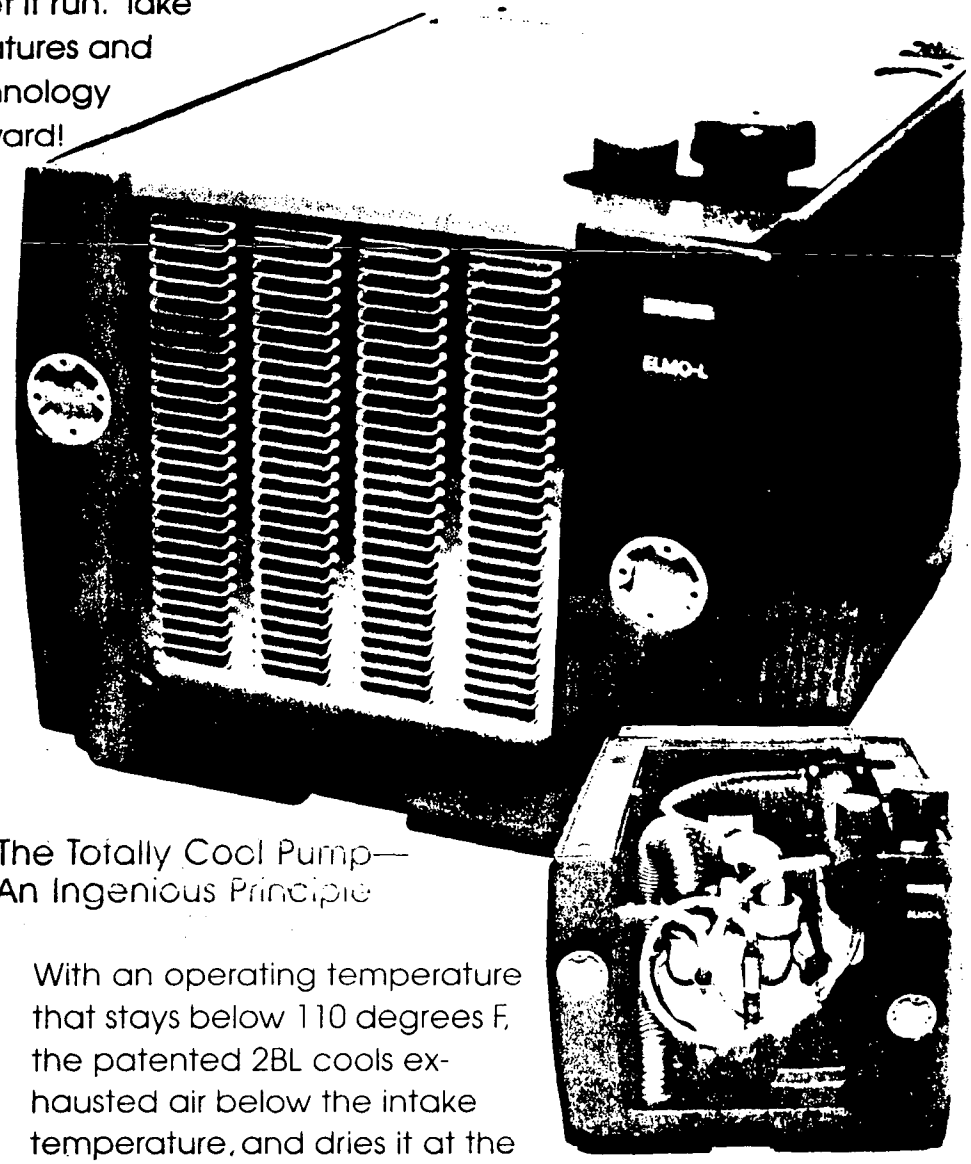
SIEMENS

Siemens *new* 2BL series vacuum pump is an ideal alternative to standard rotary vane vacuum pumps.

2BL Series Vacuum Pump

NEW Patented Technology

This revolutionary product ***requires no external water supply or oil,*** and it's remarkably easy-to-use—just plug it in and let it run. Take a close look at the 2BL's features and you'll agree—vacuum technology has taken a giant leap forward!



Series Vacuum Pump

- Oil free
- Maintenance free
- Self-contained internal water circuit
- Insensitive to dust and water vapor
- Discharges totally clean air
- Compact, quiet and cool running
- No thermal protection needed
- Capacity of 20 to 150 cfm; generates 28.5 inches of HgV
- Easy to install; simply plug it in to a power source and it's ready to run

Typical Applications

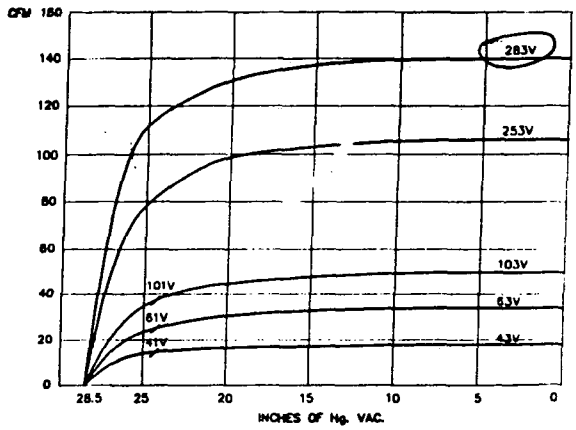
- Medical/Lab Vacuum
- Vacuum Holding (routing machines)
- Pneumatic Conveying
- Food Processing
- Packaging Machines (blister packaging, vacuum forming)

The Totally Cool Pump—An Ingenious Principle

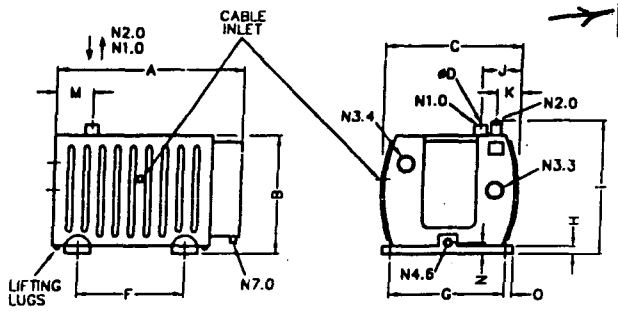
With an operating temperature that stays below 110 degrees F, the patented 2BL cools exhausted air below the intake temperature, and dries it at the same time. Cool, clean air is the only thing discharged on the delivery side. Condensed water returns to the internal water system, so there's no need for an external water supply.

Technical Information and Sales Offices on reverse side

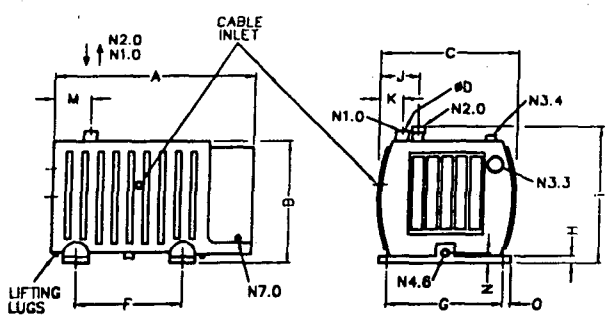
Performance Data — Vacuum (60 Hz)



Perf. Curve#	Item Curve#	Rated (HP)	Voltage (V)	Rated Amps	Sound dB(A)	Weight (lbs.)
41V	2BL10410NK012P	1.70	208-230/415-460	4.8/2.4	66	95
43V	2BL10412NK012P	1.70	208-230/415-460	4.8/2.4	66	95
61V	2BL10610NK032P	3.40	208-230/415-460	9.3/4.65	67	130
63V	2BL10612NK032P	3.40	208-230/415-460	9.3/4.65	67	130
101V	2BL11010QK052P	5.90	208-230/415-460	16.6/8.3	72	191
103V	2BL11012QK052P	5.90	208-230/415-460	16.6/8.3	72	191
253V	2BL12512KK012P	8.30	208-230/415-460	22.0/11.0	71	396
283V	2BL12812KK012P	11.00	208-230/415-460	27.8/13.9	73	408



2BL1 041/061



2BL1 101/25. 28.

Nozzle	Description
N1.0	INLET
N2.0	DISCHARGE
N3.3	CONNECTION LEVEL CONTROLLERS
N3.4	FILLING
N4.6	TOTAL DRAIN/FLUSH
N7.0	HEAT EXCHANGER-DRAIN, TUBE SIDE

*Dimensions in inches

Type	A	B	C	F	G	H	I	J	K	L	M	N	O	N1.0(ØD)	N3.3	N3.4	N4.6	N7.0
2BL1 041	23.6	15.3	16.5	13.6	14.6	.98	17.3	4.5	2.6	3.2	4.6	1.4	.98	1.3	S56 X 4	S56 X 4	G 3/4"	G 1/8"
2BL1 061	29.1	16.9	20.5	17.7	18.1	.98	19.1	5.9	3.2	3.4	4.7	1.4	1.2	2.0	S56 X 4	S56 X 4	G 3/4"	G 1/8"
2BL1 101	36.2	18.5	24.4	23.3	21.1	.98	20.7	5.6	2.8	3.5	8.9	1.4	1.7	2.0	S56 X 4	S56 X 4	G 1"	G 1/8"
2BL1 25./28.	43.3	24.8	33.3	29.7	28.5	1.2	27.4	9.5	4.7	3.5	12.2	1.4	2.4	2.5	S56 X 4	Ra30 X 1/4	G 1"	G 1/8"

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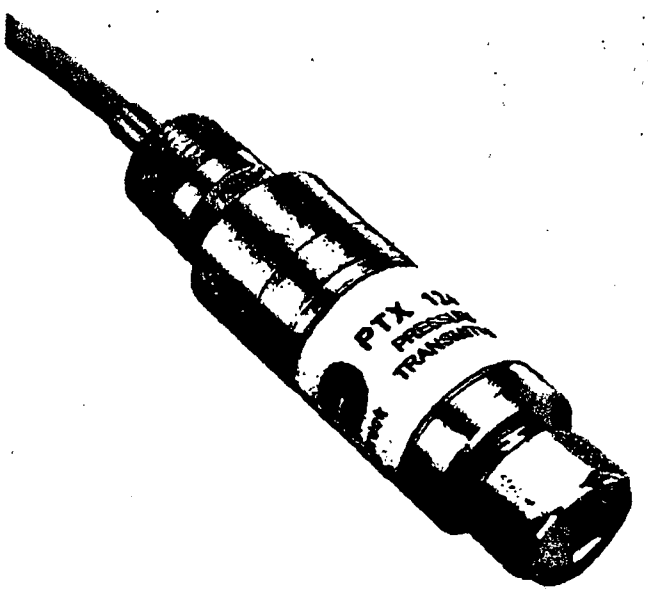
SIEMENS

Druck

PTX 1240

Industrial Pressure Transmitter

- ±0.25% accuracy
- NACE compatible
- Low cost
- Class I, Div I Intrinsic Safe Certified
- Class I, Div I Explosion Proof Pending
- CE Marked



The PTX 1240 industrial pressure transmitter has been designed for use with aggressive pressure media found in many industrial and process applications.

The fully-welded 316L stainless steel pressure module ensures excellent media compatibility without compromising performance of Druck's micromachined silicon pressure sensing element.

The PTX 1240 incorporates developments from aerospace applications and high volume manufacturing advances to achieve excellent performance at competitive pricing. Industry demands for rapid delivery are met by holding fully compensated semi-finished stock of the most common ranges.

The integral 2-wire, 4-20mA electronics provide power supply regulation, reverse polarity, overvoltage and EMC protection.

The PTX 1240 is intrinsic safe qualified, and has explosion proof pending, thus making it suitable for use in the oil and gas industry.

This transmitter features a compact, rugged design with field-proven electronics to ensure long term reliable measurement and low cost-of-ownership.

STANDARD SPECIFICATION

Operating Pressure Ranges
0 to 5, 15, 30, 50, 60, 100, 200, 300, 500, and 600 psig or psia.
0 to 1000, 1500, 2000, 3000, 5000, 10,000 psi sg or psia.
-15 to 30 psig
11.5 to 17.4 psia (Barometric)
Please refer to manufacturer for additional ranges.
Venting is provided by a flame-arresting filter designed to allow the transmitter to breathe while preventing the ingress of fluids.

Overpressure
The rated pressure can be exceeded by the following without degrading performance:
4x for ranges to 600 psig
2x for ranges 1000 to 10,000 psig

Pressure Containment
6X Full Scale for vented gauge
2,500 psi for all absolute and sealed gauge ranges 2000 psi and below
20,000 psi for all absolute and sealed gauge ranges above 2000 psi

Pressure Media
Fluids compatible with 316L Stainless Steel and Hastelloy C276 (NACE compatible)

Supply Voltage
9 to 30 Vdc
The minimum supply voltage (V_{min}) that must appear across the transmitter terminals is 9 Vdc and is calculated by:

$$V_{min} = V_s - (0.02 \times R_L)$$

Where V_s is supply voltage in volts
R_L is total loop resistance in ohms

Output Current
4–20mA (two-wire configuration)
Consult factory for availability of low-power 1-5 Vdc PMP 1240

Zero and Span Offset
±0.5%F.S.

Long term Stability
±0.2% F.S. / annum

Combined Non-linearity, Hysteresis and Repeatability
±0.25% F.S. BSL maximum

Temperature Limits

Process:	- 40°	to +250°F
Ambient:	- 40°	to +185°F
Storage:	- 50°	to +185°F
Compensated:	- 4°	to +180°F

Operating Temperature Range
-40° to +185°F

Temperature Effects
±2% F.S. Thermal Error Band Maximum over Compensated Temperature Range

Weight
10 oz. Nominal

Pressure Connection
1/4" NPT female

Electrical Connection
1/2" NPT Male Conduit Fitting with 3 feet cable (18 awg conductors)
additional cable available upon request

Ingress Protection
Nema 4X when properly installed with conduit fitting

Voltage Spike Protection
Units will withstand 600V spike test to ENV 50142 without damage applied between excitations lines and case

Safety Classifications
CE marked
UL Intrinsically Safe for Class I, Div I, Groups A, B, C and D
cUL Intrinsically Safe for Class I, Div I, Groups A, B, C and D

Factory Mutual Approvals Pending
Intrinsically Safe for Class I, Division 1, Groups A, B, C, D, for hazardous locations.

Explosion-Proof pending for Class I, Div. 1, Groups A, B, C, D; Class II, Groups E, F, G; and Class III Hazardous locations; indoor and outdoor Nema 4 Enclosure

Canadian Standards Association (CSA) Approvals Pending
Intrinsically Safe in Hazardous Locations as designed by Class I, Div. 1, Groups A, B, C, & D and Class II, Groups E, F, & G; Temperature code T3C

Explosion-Proof pending in Hazardous Locations as designed by Class I, Div. 1, Groups A, B, C, D; Class II, Groups E, F, G; and Class III.
The enclosure meets CSA requirements for Enclosure 4.

OPTIONS

Pressure port:
1/2" NPT female via adapter
1/4" NPT male via adapter
1/2" NPT male, welded adapter
Conduit Fitting:
1/2" NPT female, via adapter
CSA/FM/UL Approval
(state which logo on transducer)
Extra Cable Length
(state length in feet or meters)
NIST Room Temperature 9-pt Calibration Certificate
Alternate Engineering Units
(equivalent to standard psi ranges)

ORDERING INFORMATION

Please state the following:
(1) Type number PTX 1240
(2) Operating pressure range (gauge or absolute)
(3) Options (if required)

Continuing development sometimes necessitates specification changes without notice.

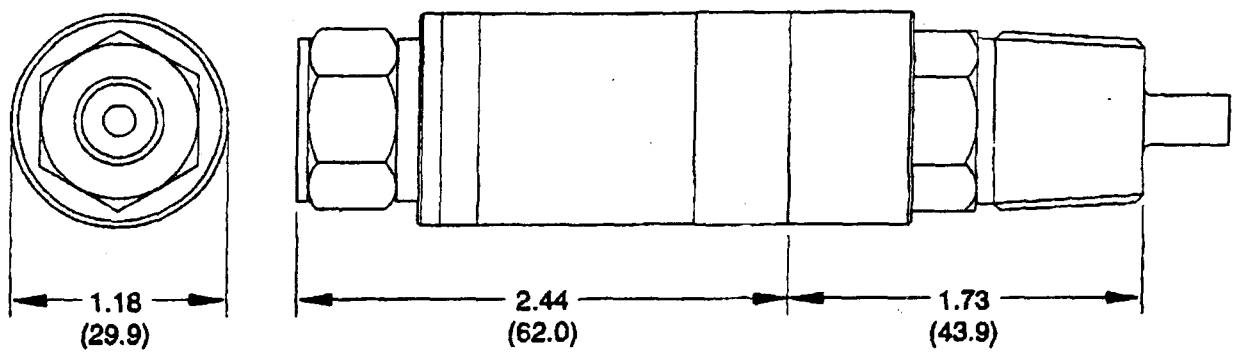
RELATED PRODUCTS

PMP 1240 – low power
PTX 1230 Submersible
DPI 610 Portable Calibrators
DPI 280 Series Indicators

Please refer to the manufacturer for further information and data sheets.

Druck Inc. is an ISO 9000 registered company.

INSTALLATION DRAWINGS: Dimensions in inches/(mm)



PTX 1240

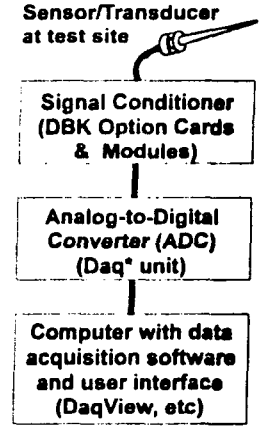
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Representative

Overview

Data Acquisition Systems

A data acquisition system monitors a process or series of tests by collecting readings of various physical measurements. These readings are processed and stored so the resulting data can be presented in a useful format. The figure shows the 4 parts of data acquisition:



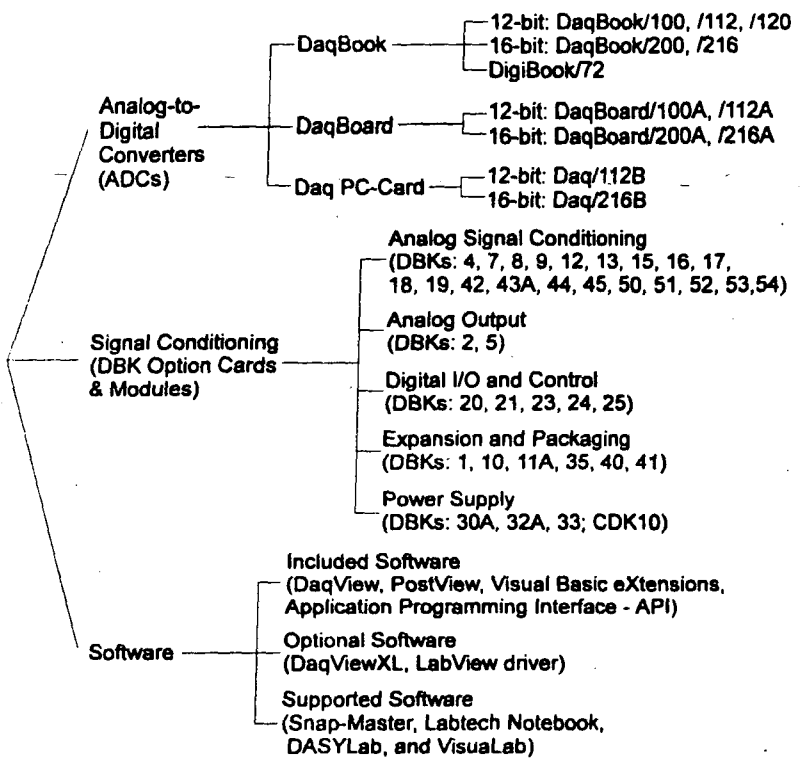
Block Diagram of Data Acquisition System

- A **sensor/transducer** reacts to a physical quantity (such as stress, strain, frequency, temperature, acceleration, or light intensity) and encodes that quantity in an electrical signal. A wide variety of transducers produce signals that vary in type and strength—some generate a voltage; some alter a voltage, current, or resistance according to the physical quantity. The signal can vary with the measured value directly or inversely and in a linear or non-linear way. To be useful, these raw signals must first be conditioned.
- The **signal conditioner** changes the raw transducer signal into a standardized voltage output to send to the ADC. Depending on signal quality, several steps and processes may be involved (e.g., linearization, isolation of high voltages, amplification of weak signals, attenuation of strong signals, filtering of noise and irrelevant frequencies, differential voltage measurement, simultaneous sample and hold, and pulse/current-to-voltage conversions). The many DBK option modules are each designed for a particular type of transducer input signal. The signal conditioner's output voltage is "normalized" to correspond to a user-selected range for the measured quantity. The output voltage range is 0 to 10 V in unipolar mode and ±5 V in bipolar mode.
- The **analog to digital converter (ADC)** changes a conditioned analog signal into a corresponding digital number. A 12-bit converter uses 4096 numbers (2^{12}); a 16-bit converter uses 65,536 numbers (2^{16}). Such numbers are easily used by a computer with compatible software. To meet your particular needs, the ADC function can be performed by various Daq* models (DaqBook, DaqBoard, Daq PC-Card) with varying capabilities (12/16-bit, digital I/O, etc).
- The **computer** (typically a laptop or desktop PC) can apply further processing to the digital data and then graph or store the result in various ways. Several software options are available. DaqView (or DaqViewXL as an Excel add-on) and other programs (LabVIEW, etc) process the data and provide a control interface (often a virtual instrument panel to fit the application). The Application Programming Interface (API) and a standard data format allow users to develop custom software for their application.

The Daq* Family

The equipment and software described in this manual form a modular and interrelated family of data acquisition products. As a group, they provide the tools to handle most any data acquisition task for use with PCs and various transducers. Thus, users wishing to expand their system with compatible equipment have many options to choose from. The figure below shows the relation among these products divided into 3 main branches:

- Analog-to-Digital Conversion (ADC) is at the heart of the system. The data source of transducers and signal conditioners are on one side of the ADC; and the PC data processor is on the other side. The ADCs include several models of the DaqBook, DaqBoard, and Daq PC-Card—collectively referred to as Daq*.
- Signal Conditioning. Over 30 DBK cards and modules (the number is constantly growing) provide various types of signal conditioning and system expansion.
- Software. DaqView comes with the ADC and provides a ready-to-use basic data acquisition program. The ADC also comes with several drivers to interface all the equipment and software options including custom programming in several languages.



Daq Family Tree*

Analog to Digital Conversion—DaqBook, DaqBoard, and Daq PC-Card

Daq*s connect to one or more DBKs on their signal input side and a computer on their output side. Each Daq type connects to the computer in a different way:

- The **DaqBook** is an external module that connects to a computer's parallel port or an EPP PC-Card.
- The **DaqBoard** is an internal card that plugs into an ISA-bus slot within the computer.
- The **Daq PC-Card** is inserted in the PCMCIA slot of a laptop/notebook computer.

Features common to the Daq*s include:

- 100-kHz channel-to-channel scan *and* gain switching (10 µs).
- 512-location sequence memory that can be loaded with any combination of channels and gains.
- Ability to access up to 256 different channels of DBK signals while maintaining the 100-kHz channel-to-channel scan rate. The DBK expansion options can accommodate mixed-signal inputs from thermocouples and RTDs to isolated high-voltage inputs and strain gages.
- Ability to handle 8 differential or 16 single-ended signal inputs without DBK expansion units.
- Ability to handle fixed digital I/O up to 4 TTL lines in and 4 TTL lines out (accessible only if no analog expansion cards are in use).

Each type of Daq has several models to meet various needs. The table lists these models and their features.

Daq* Models and Features

Model	A/D Resolution	Analog Output Channels @ 12 bit	Unipolar/ Bipolar Selection	Single-ended/ Differential Selection	Programmable Digital I/O Lines	Programmable Counter/ Timers	Size (inches)	Current Use
DaqBook Models								
DaqBook/100	12 bit	2	Jumper	Jumper	16 high speed 24 gen purpose	5 ch 7 MHz	8.5×11 ×1.375	510 mA
DaqBook/112	12 bit	2	Jumper	Jumper	N/A	N/A	8.5×11 ×1.375	360 mA
DaqBook/120	12 bit	2	Jumper	Jumper	16 high speed 24 gen purpose	5 ch 7 MHz	8.5×11 ×1.375	510 mA
DaqBook/200	16 bit	2	Software	Software	16 high speed 24 gen purpose	5 ch 7 MHz	8.5×11 ×1.375	620 mA
DaqBook/216	16 bit	2	Software	Software	N/A	N/A	8.5×11 ×1.375	600 mA
DaqBoard Models								
DaqBoard/100A	12 bit	2	Sequencer	Software	16 high speed 24 gen purpose	5 ch 7 MHz	4.5×13.125	1330 mA
DaqBoard/112A	12 bit	2	Sequencer	Software	N/A	N/A	4.5×13.125	970 mA
DaqBoard/200A	16 bit	2	Sequencer	Software	16 high speed 24 gen purpose	5 ch 7 MHz	4.5×13.125	1700 mA
DaqBoard/216A	16 bit	2	Sequencer	Software	N/A	N/A	4.5×13.125	1340 mA
Daq PC-Card Models								
Daq112B	12 bit	N/A	Bipolar Only	Software	N/A	N/A	3.375×0.2	510 mA
Daq216B	16 bit	N/A	Bipolar Only	Software	N/A	N/A	3.375×0.2	510 mA

Signal Conditioning—the DBK Cards and Modules

A transducer connects to one of a variety of DBK Option Cards and Modules. These DBK signal-conditioning units are designed for use with the Daq*s. However, the DBKs can also be used with ISA bus-based data acquisition boards from vendors such as Omega, Keithley/MetraByte, Computer Boards, and Avantech. The DBKs perform best when used with an ADC (such as the Daq*) that can dynamically select both channel and gain/range. Dynamic channel and gain/range selection allows high channel-to-channel scan rates with a wide variety of transducers.

No matter what the transducer input, the DBKs output signals suitable for use by an ADC. The output signals can be bipolar (-5 to +5 V) or unipolar (0 to 10 V). The user can select a range of relevant values to correspond to the lowest (-5 or 0 V) and highest (5 or 10 V) signal—this range selection guarantees the highest resolution in 12- or 16-bit conversion by the ADC.

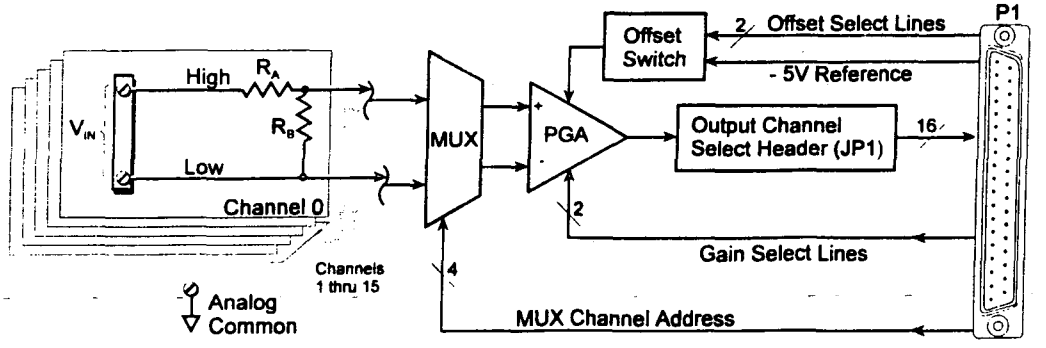
For complex signal-conditioning, high-capacity modules have more circuitry than can fit on a compact card. The modules attach to the same Daq* P1 bus as the cards. Modules share the same footprint as the DaqBook and a typical notebook PC for easy stacking. Most modules have their own power supply that can run on an AC or DC power source.

DBK15 Universal Current/Voltage Input Card

Overview

The DBK15 features a 16-channel multiplexer and a programmable gain input amplifier. Component sockets accept resistors that configure each channel for current-to-voltage conversion or for voltage attenuation. The differential signal input from the transducer must use 3 leads: high, low, and common.

When configured by appropriate resistors, the DBK15 can measure voltages up to 30 VDC or currents up to 1 A. Each of the 16 input channels has a resistor "A" location and a resistor "B" location. Installing various resistors in these locations yields channel-to-channel flexibility. The DBK15's input amplifier is software programmable for ×1 or ×2 gain per channel, providing unipolar 0 to +10 V or bipolar -5 to +5 V ranges per channel.



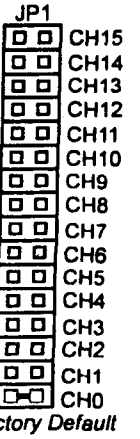
$$V_{OUT} = V_{IN}\left(\frac{R_B}{R_A + R_B}\right)(GAIN) + OFFSET$$

DBK15 Block Diagram

Hardware Setup

Card Configuration

1. Determine the Daq*'s Analog Input Channel for each DBK15 in your system. As few as one or as many as 16 DBK15's may be connected to your Daq*. Since this is a daisy-chain type interface, each card must appear unique to the Daq*. This is accomplished by assigning each card to a different Analog Input on the Daq*.
2. Locate the 16×2 pin header labeled JP1 near the front of the board. Note the 16 jumper locations on this header labeled CH0 through CH15 corresponding to the Daq*'s Analog Input Channels.
3. Set JP1 jumper on the pins for your intended output channel (CH0-CH15, see figure). Only one jumper is used on a single card. No two cards in the same system can have the same jumper setting.
4. Determine the values for R_A and R_B for each input signal channel. Standard RN55D (¼ watt, 1%, metal film) resistors or 22 ga bare wire (short) plug into the pin sockets (see table).

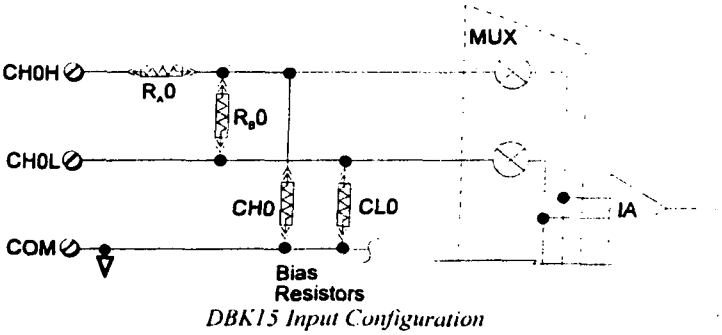


Factory Default
JP1 Channel Configuration

Input Range	R_A	R_B	Gain	Polarity
±5 VDC	Short	Open	×1	Bipolar
±10 VDC	2K	2K	×1	Bipolar
±30 VDC	10K	2K	×1	Bipolar
±20 mA	Short	249	×1	Bipolar
±20 mA	Short	124	×2	Bipolar
±2 mA	Short	1240	×2	Bipolar

Note: You can configure 8 channels identically with 16-pin, 8-resistor DIP-8 resistor networks. With no resistors, the DBK15 provides 16 differential voltage inputs for +5 V full-scale inputs.

5. Install resistors in R_A and R_B sockets for each channel as desired. See figure.



DBK15 Input Configuration

Note: A multiplexed input in sampled data systems must have low impedance to allow for accurate measurements. For 12-bit accuracy at 100 kHz, equivalent attenuator impedance's should be less than 1000 ohms and signal sources must have impedance's less than 1/4000 of the attennuator input impedance. For example, a 2:1 attenuator using 2K resistors will have 1K of equivalent impedance, but the source impedance must be less than 1/2 ohm (1/4000 of 2000) for 12-bit measurement accuracy to be attained.

Card Connection

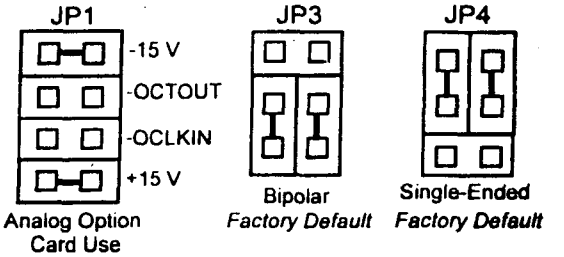
1. Connect the signal input wires to the appropriate screw terminals. The DBK15 is equipped with screw terminal connectors for easy access to inputs and ground access points. Connectors are provided for 16 differential inputs. There are also areas on the board to install bias resistors. These resistor areas connect to the analog input terminals and analog common. They are labeled by channel number and H and L for high and low analog inputs.
   Note: The DBK15 card only supports differential inputs (not single-ended). Connect the high end of the signal to the High input and the low end to the Low input of the desired channel. Ground referencing to Analog Common is important for optimum accuracy. If necessary, use bias resistors. Two differential measurement configurations can be used: floating or referenced differential (refer to the chapter *Signal Management and Troubleshooting Tips* for more information.)
2. It is suggested that you strain relieve the wires with nylon tie wraps (not included) to the pre-drilled holes at the rear edge of the board. Verify that all wires are secured in a way that will not allow mechanical stress to affect signal connection.

DaqBook/DaqBoard Configuration

Use of the DBK15 expansion card requires three specific setup steps in the DaqBook/DaqBoard.

1. If not using auxiliary power, place the JP1 jumper in the expanded analog mode.
   Note: this default position is necessary to power the interface circuitry of the DBK15 via the internal ±15 VDC power supply. If using auxiliary power (DBK32A/33), you must remove both JP1 jumpers (refer to *Power Management* at the beginning of this chapter and the DBK32A/33 sections).
2. *Place the JP3 jumper in Bipolar mode.
3. *Place the JP4 jumper in single-ended mode. **Note**: Analog expansion cards convert all input signals to single-ended voltages referenced to analog common.

*Applies to DaqBook/100, /112, and /120.



Jumper Settings for DBK15

Software Setup in DaqView

To use the DBK15 within DaqView, you must configure several DaqView parameters.

1. From the DaqView main window, select the Device pull-down menu and then Configure Hardware Settings. The Configure System Hardware parameters help interpret the incoming data and provide the controls to access the hardware. As expansion cards are added, make sure Hardware Setup reflects the present configuration. On the left side of this window, the Analog Input Option Cards selection allows the user to assign DBKs to the 16 analog inputs of the base unit. Selecting a DBK will add channels in the main window's analog input spreadsheet.
2. Select the DBK15 Multiplexer Card option. The main window now has 16 channels for this one board.
3. Set the parameters for each channel. You can define the channel gains by using the "Type" column of the analog input spreadsheet. Each channel can be configured for unipolar or bipolar mode using the "Pole" column. The engineering units column (including the use of $mx+b$) is used to convert raw readings to a volts or amps as configured at the DBK15.

Programming a DBK15

Note: Users of DaqView or other turnkey packages can skip this section.

The following example is a program segment that demonstrates how to get a sample from the DBK15 expansion card.

```
expCard = 2;      /*DBK15 JP1 position*/
expChan = 15;     /*DBK15 screw terminal connection*/
daqAdcExpToChan(expCard, expChan, &softChan);
daqAdcRd(soft Chan, &sample, Dbk15UniX2);
```

If the DBK15 was configured with R_A shorted and a 124 Ω resistor in R_B, the sample read by the DaqBook/DaqBoard can be converted to an actual 20 mA full-scale reading with the equation:

$$\text{milliamps} = \text{sample} * 20 / 65536$$

Note: Similar equations can be used with other hardware configurations. Refer to the separate *Programmer's Manual*.

DBK15 - Specifications

Name/Function: Universal Current/Voltage Input Card
Input Connectors: Screw terminals for signal connections
Output Connector: DB37 male, mates with P1 on the DaqBook, using CA-37-x cable
Attenuation/Shunt Resistor Connector: Machine sockets accommodate standard ¼-watt resistors
Gain Ranges: ×1, ×2
Inputs: 16 differential
Voltage Input Ranges: ±5 VDC max
Current Input Range: ±20 mA max
Attenuator Resistors:
- Accuracy: +1%
- Temperature Coefficient: 100 ppm/°C

Gain Accuracy: ±0.05% typ, ±0.25% max
Maximum Input Voltage: ±35 VDC
Slew Rate: 10 V/µs
Settling Time: 2µs to 0.01%
CMRR: 80 dB min
Non-Linearity: 0.002% typ, 0.015% max
Unattenuated Bias Current: 150 pA typ, 0.2 µA max @ 25°C
Offset Voltage:
- ±(0.5 + 5/G) mV @ 25°C typ
- ±(2.0 + 24/G) mV @ 25°C max

Offset Drift:
- ±(3 + 50/G) µV/°C typ
- ±(12 + 240/G) µV/°C max

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& TECHNOLOGY, INC.

P.O. BOX 1174 DENVILLE, NEW JERSEY 07834
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December 7, 1998

International Technology Corporation
2200 Cottontail Lane
Somerset, New Jersey 08873-1248

Attn: Mr. Dana Boyadjian

RE: Lehigh Valley R.R. Derailment Site, Leroy, New York
Vapor Extraction Pilot Testing Data

Dear Mr. Boyadjian:

Enclosed please find the data acquired during the Vapor Extraction Pilot Testing/Packer Testing at the above referenced site. The information provided on the attached diskette(s) includes the following individual testing parameters:

Date	Well No.	Description
September 2, 1998	EW-2	One (1) hour test of well cluster EW-2 including monitoring of OW-7, OW-8, OW-9, OW-10, OW-11 and OW-12. No packers installed.
September 3, 1998	EW-5	Three (3) hour test of well EW-5. No additional wells monitored during testing. No Packers installed.
September 4, 1998	EW-6	Three (3) hour test of well EW-6. No additional wells monitored during testing. No Packers installed.
September 4, 1998	EW-6a	Additional three (3) hour test of well EW-6. No additional wells monitored during testing. No Packers installed.
September 8, 1998	EW-7	Three (3) hour test of well EW-7. No additional wells monitored during testing. No Packers installed.
September 8, 1998	EW-7a	Additional three (3) hour test of well EW-7. No additional wells monitored during testing. No Packers installed.
September 9, 1998	EW-8	Three (3) hour test of well EW-8. No additional wells monitored during testing. No Packers installed.
September 9, 1998	EW-8a	Additional one (1) hour test of well EW-8. No additional wells monitored during testing. No Packers installed.
September 9, 1998	EW-9	Three (3) hour test of well EW-9. No additional wells monitored during testing. No Packers installed.
September 10, 1998	EW-9a	Additional three (3) hour test of well EW-9. No additional wells monitored during testing. No Packers installed.
September 10, 1998	EW-11	Three (3) hour test of well EW-11. No additional wells monitored during testing. No Packers installed.
September 11, 1998	EW-7b	Three (3) hour test of well EW-7. No additional wells monitored during testing. No Packers installed. Stepped vacuum test.
September 14, 1998	EW-1	Six (6) hour test of well cluster EW-1 including monitoring of OW-1, OW-2, OW-3, OW-4, OW-5 and OW-6. No packers installed.
September 15, 1998	EW-3	Eight (8) hour test of well cluster EW-3 including monitoring of OW-13, OW-14, OW-15, OW-16, OW-17 and OW-18. No packers installed.

Date	Well No.	Description
September 18, 1998	EW-2a	Two (2) hour test of well cluster EW-2 including monitoring of OW-7, OW-8, OW-9, OW-10, OW-11 and OW-12. Packers installed at interval depth 10-20 feet below ground surface (BGS).
September 21, 1998	EW-2b	Nine (9) hour test of well cluster EW-2 including monitoring of OW-7, OW-8, OW-9, OW-10, OW-11 and OW-12. Packers installed at interval depth 20-30 feet BGS.
September 22, 1998	EW-2c	Two (2) hour test of well cluster EW-2 including monitoring of OW-7, OW-8, OW-9, OW-10, OW-11 and OW-12. Packers installed at interval depth 30-40 feet BGS.
September 22, 1998	EW-2d	Additional two (2) hour test of well cluster EW-2 including monitoring of OW-7, OW-8, OW-9, OW-10, OW-11 and OW-12. Packers installed at interval depth 30-40 feet BGS.
September 24, 1998	EW-3a	Three (3) hour test of well cluster EW-3 including monitoring of OW-13, OW-14, OW-15, OW-16, OW-17 and OW-18. Packers installed at interval depth 12-22 feet BGS.
September 28, 1998	EW-3b	Three (3) hour test of well cluster EW-3 including monitoring of OW-13, OW-14, OW-15, OW-16, OW-17 and OW-18. Packers installed at interval depth 22-32 feet BGS.
September 29, 1998	EW-3c	One (1) hour test of well cluster EW-3 including monitoring of OW-13, OW-14, OW-15, OW-16, OW-17 and OW-18. Packers installed at interval depth 32-42 feet BGS.
September 29, 1998	EW-3d	Additional two (2) hour test of well cluster EW-3 including monitoring of OW-13, OW-14, OW-15, OW-16, OW-17 and OW-18. Packers installed at interval depth 32-42 feet BGS.
October 1, 1998	EW-1a	Nine (9) hour test of well cluster EW-1 including monitoring of OW-1, OW-2, OW-3, OW-4, OW-5 and OW-6. Packers installed at interval depth 12-22 feet BGS.
October 5, 1998	EW-1b	Nine (9) hour test of well cluster EW-1 including monitoring of OW-1, OW-2, OW-3, OW-4, OW-5 and OW-6. Packers installed at interval depth 22-32 feet BGS.
October 6, 1998	EW-1c	Nine (9) hour test of well cluster EW-1 including monitoring of OW-1, OW-2, OW-3, OW-4, OW-5 and OW-6. Packers installed at interval depth 32-42 feet BGS.

Please note the following information regarding acquired data and testing procedures:

1) All data values are read in inches of water column (in. H_2O).
2) Any data point less than 0.5 in. H_2O should be considered at zero value (i.e., 0 in. H_2O). These deviating values were obtained due to the 0.5% F.S. of the industrial pressure transmitter zero and span offset.
3) During testing of individual wells EW-4 and EW-10 a no flow condition was detected during the vapor extraction process. Therefore, no data was acquired for these wells.
4) During vapor extraction testing with packer installation, three (3) pressure transducers were installed to monitor each well. The suffix one (i.e., OW1-1) indicates the transducer below bottom packer, the suffix two (i.e., OW2-1) indicates the transducer between the packers, and the suffix three (i.e., OW2-3) indicates the transducer above the top packer.
5) During vapor extraction testing with packer installation, the testing at interval depths 10-20 feet and 12-22 feet are not monitored with a transducer above the packers (i.e.,

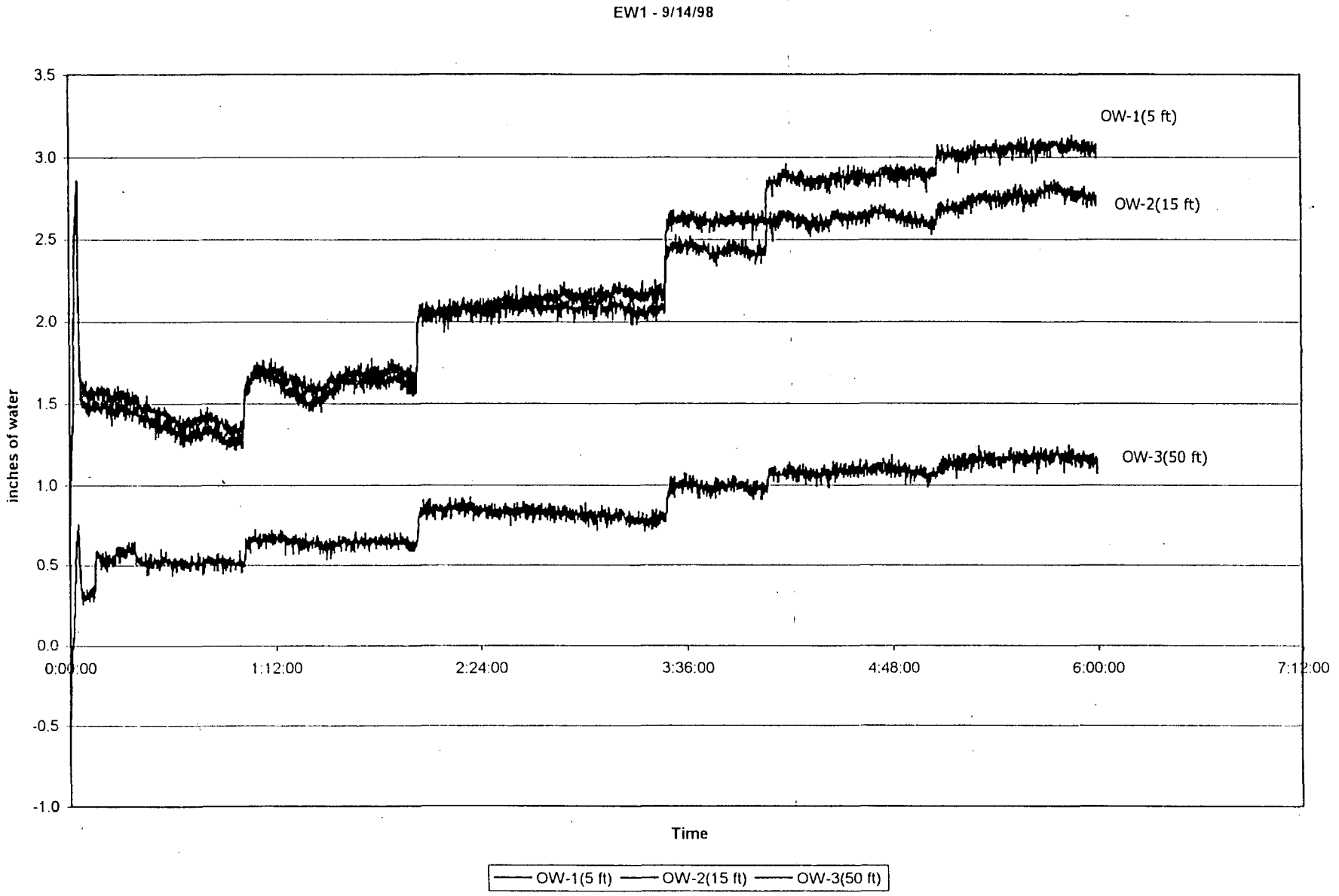
OW1-3). This was performed because the space above the packers during this testing was within the well casing and no influence could be monitored.

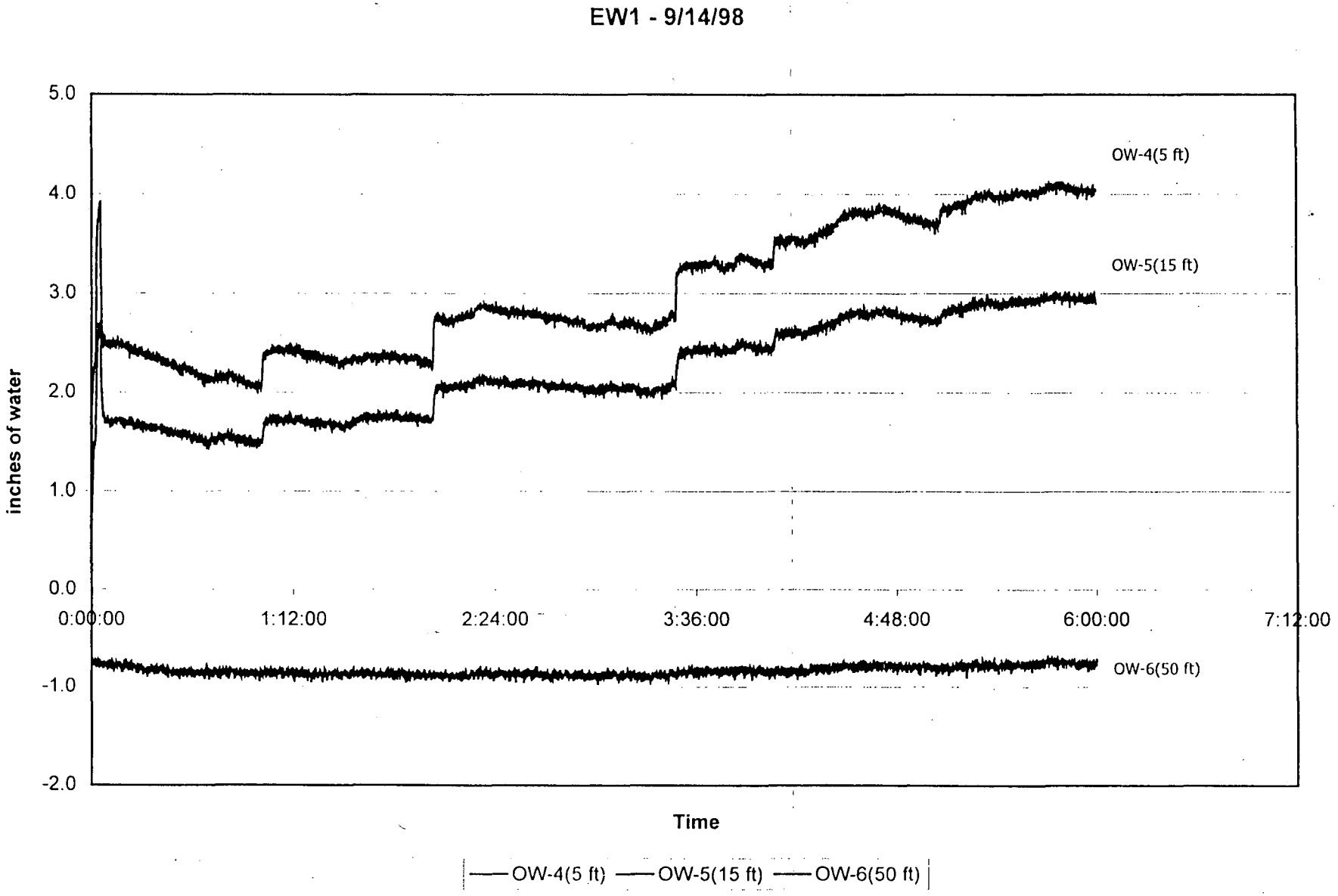
Ground/Water Treatment and Technology, Inc. sincerely appreciates the opportunity to be of service to you and IT Corporation. The cooperation and efforts of everyone involved allowed us to complete the work efficiently and effectively.

If there are any questions regarding the data or if there is any other way that we may assist you, please do not hesitate to call.

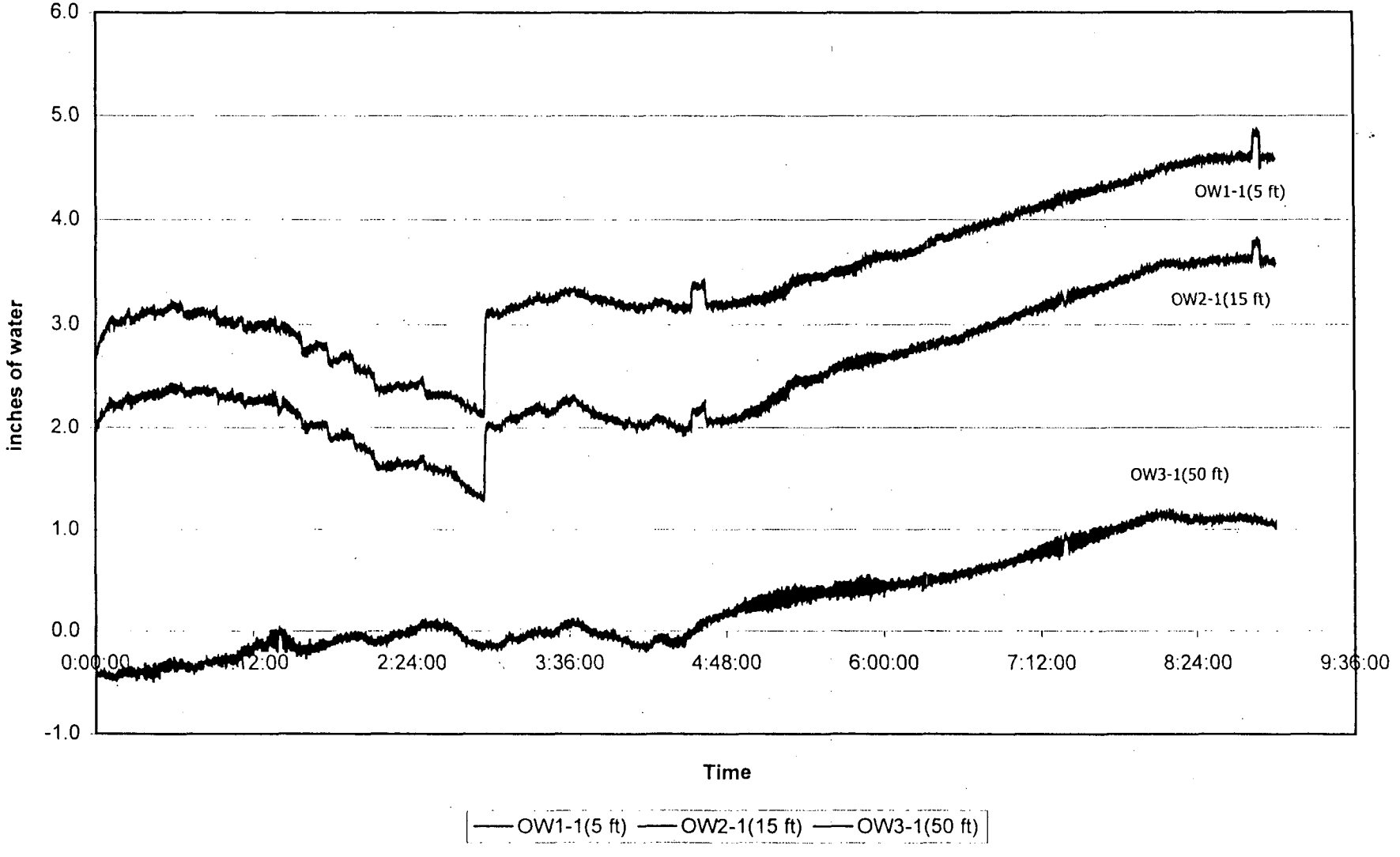
Sincerely,

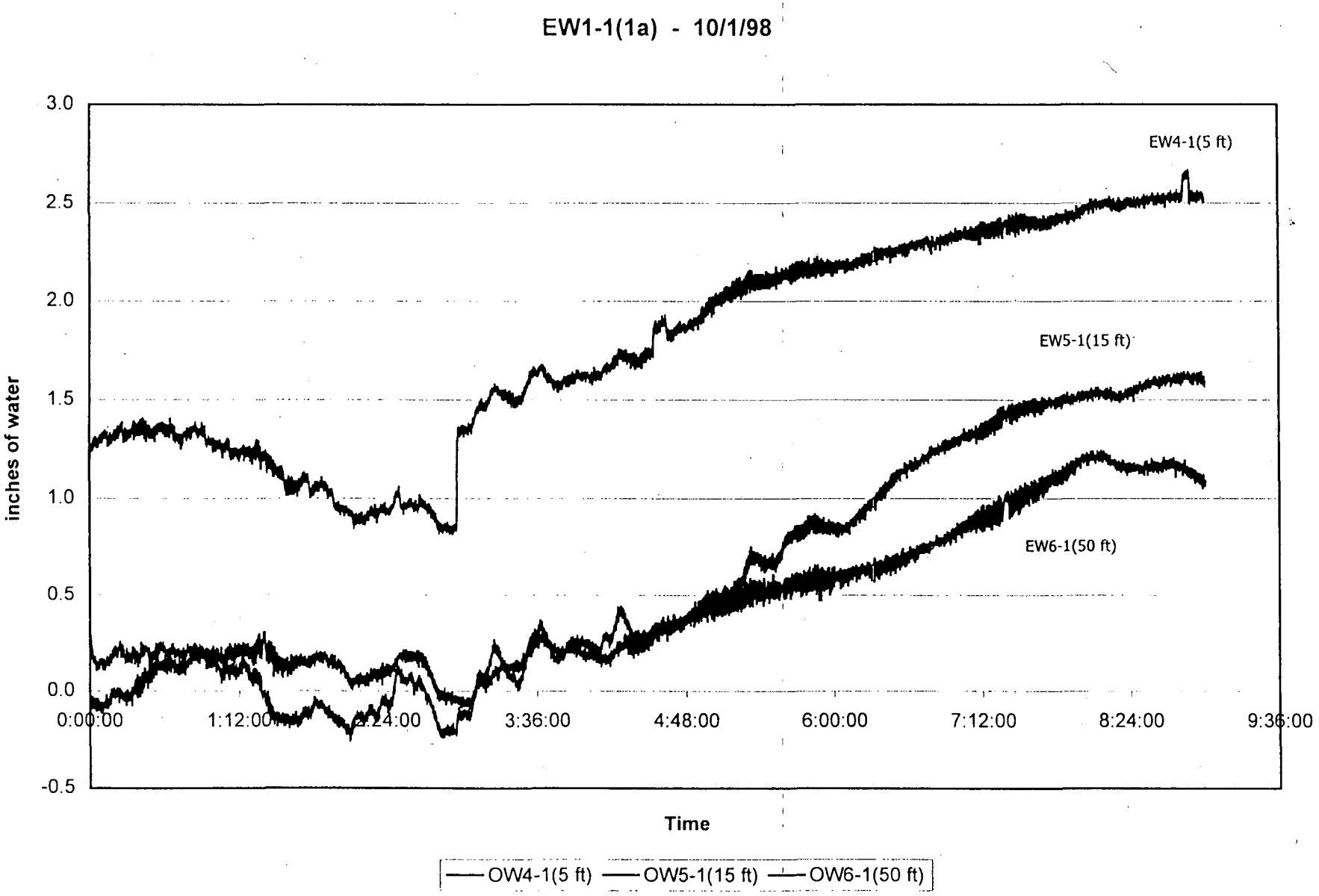
Edward R. Christine
Project Engineer


EW1 - 9/14/98
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
inches of water
OW-1(5 ft)
OW-2(15 ft)
OW-3(50 ft)
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
Time
OW-1(5 ft)
OW-2(15 ft)
OW-3(50 ft)

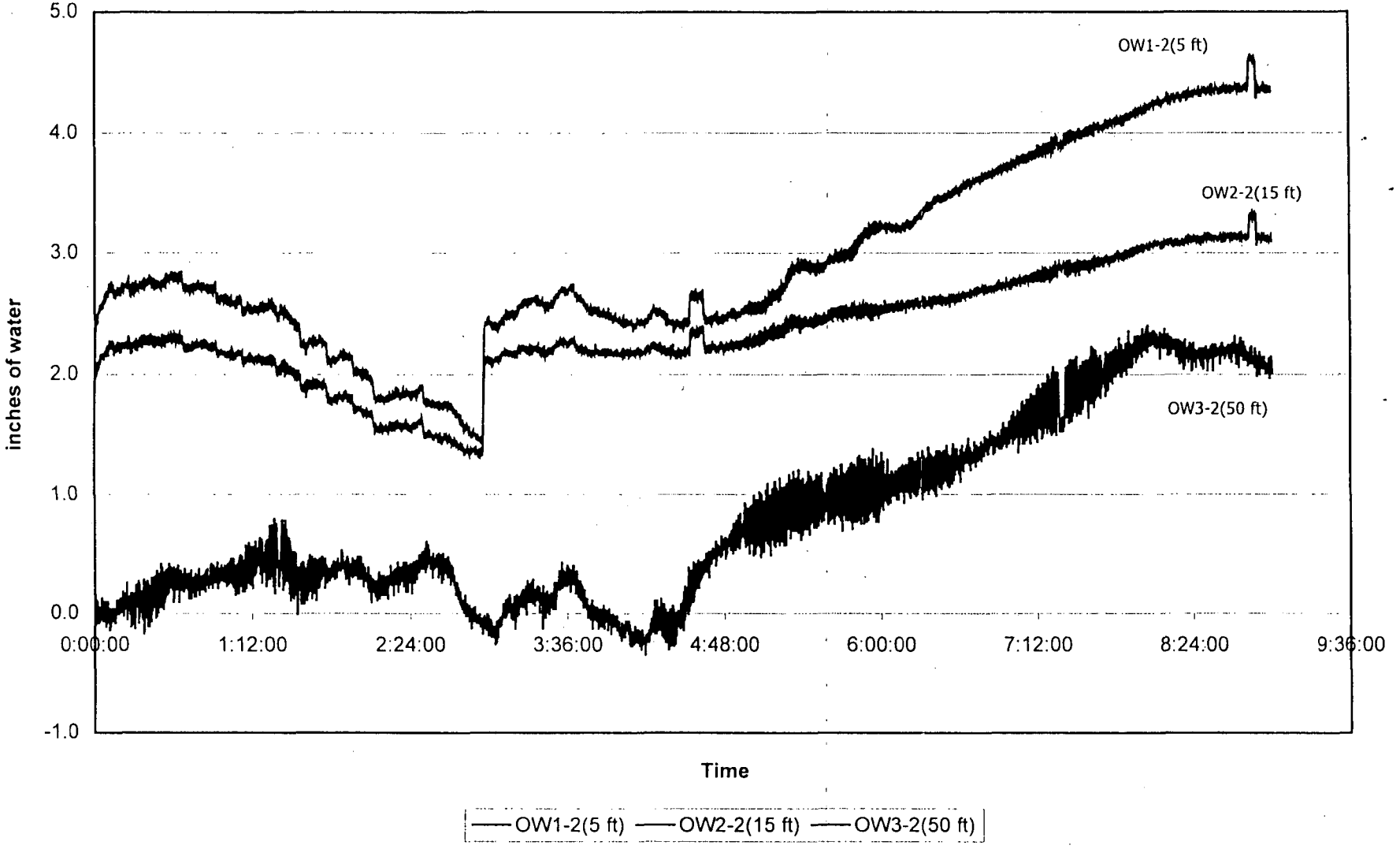

EW1 - 9/14/98
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
inches of water
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
Time
OW-4(5 ft)
OW-5(15 ft)
OW-6(50 ft)
OW-4(5 ft) OW-5(15 ft) OW-6(50 ft)

EW1-1(1a) - 10/1/98

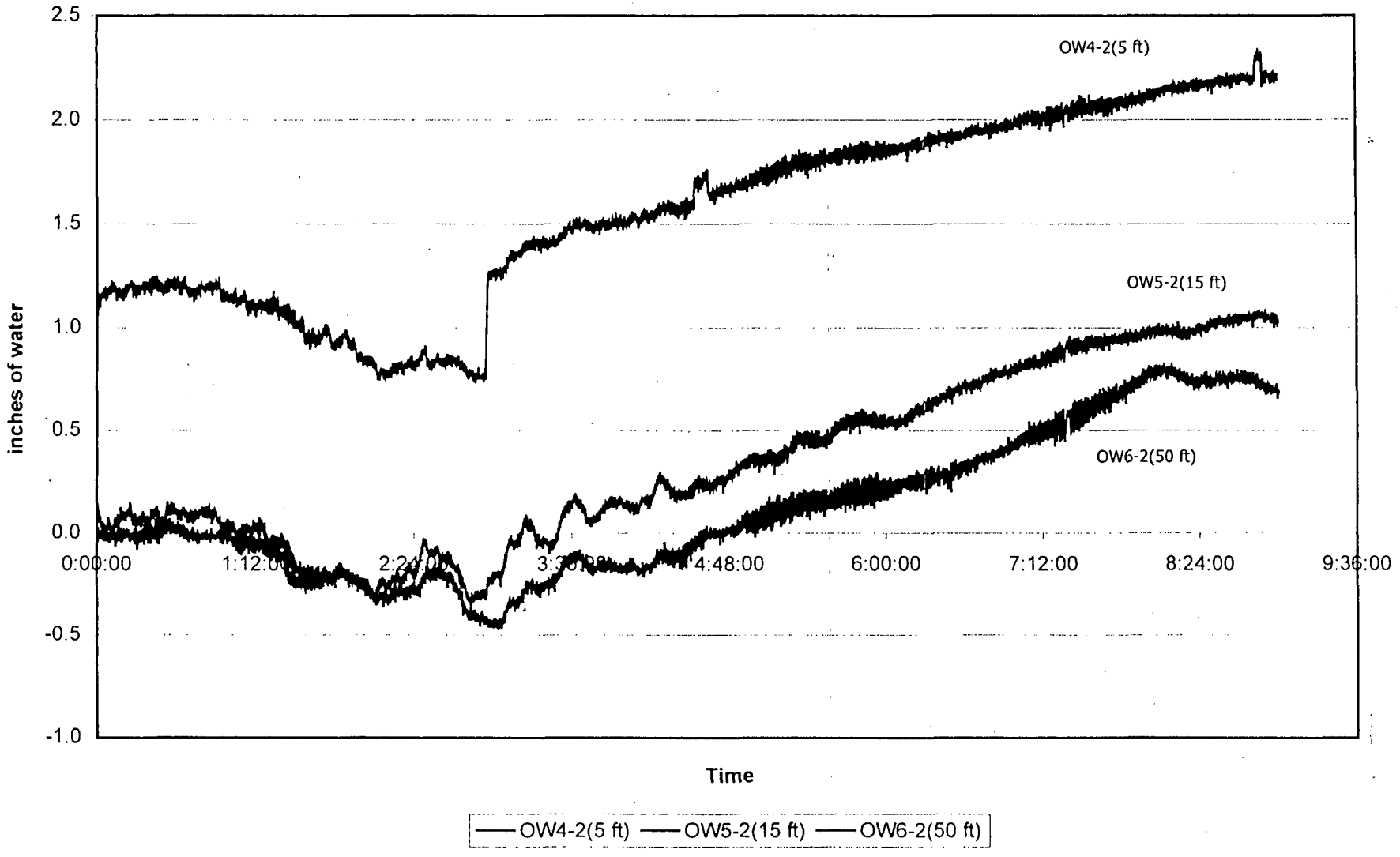



EW1-1(1a) - 10/1/98
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
inches of water
EW4-1(5 ft)
EW5-1(15 ft)
EW6-1(50 ft)
0:00:00
1:12:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
9:36:00
Time
OW4-1(5 ft)
OW5-1(15 ft)
OW6-1(50 ft)

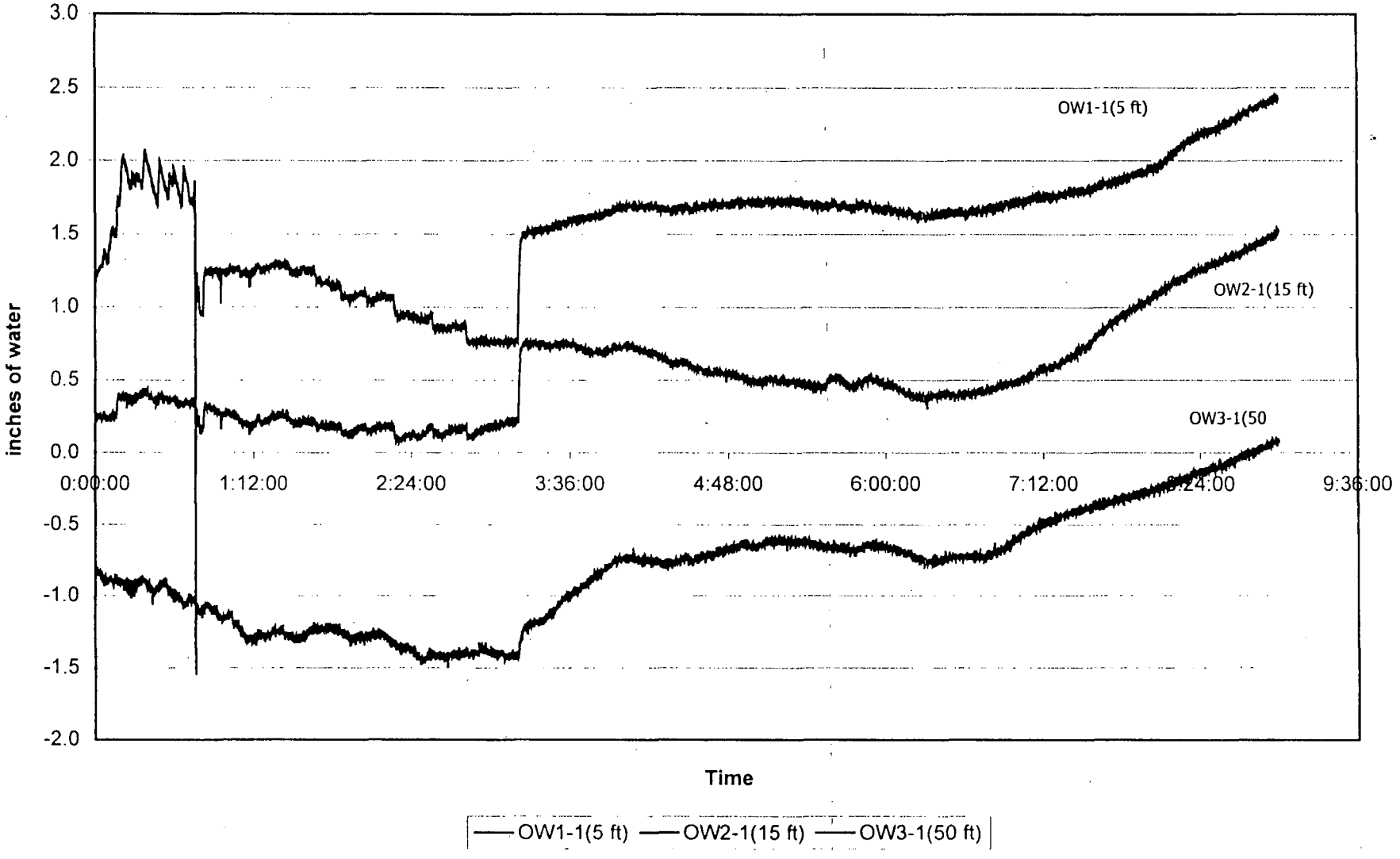
EW1-1(1a) - 10/1/98



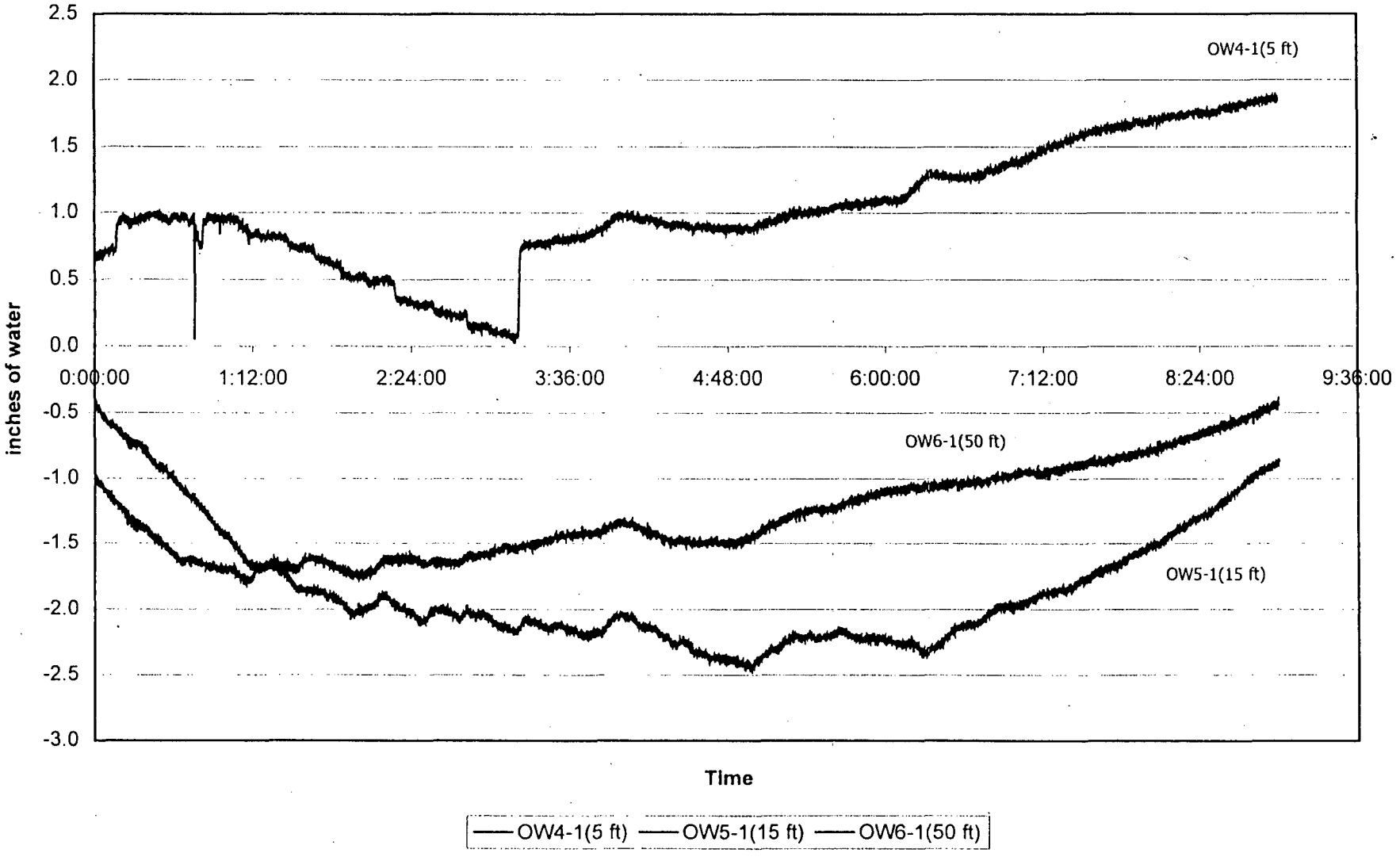
EW1-1(1a) - 10/1/98



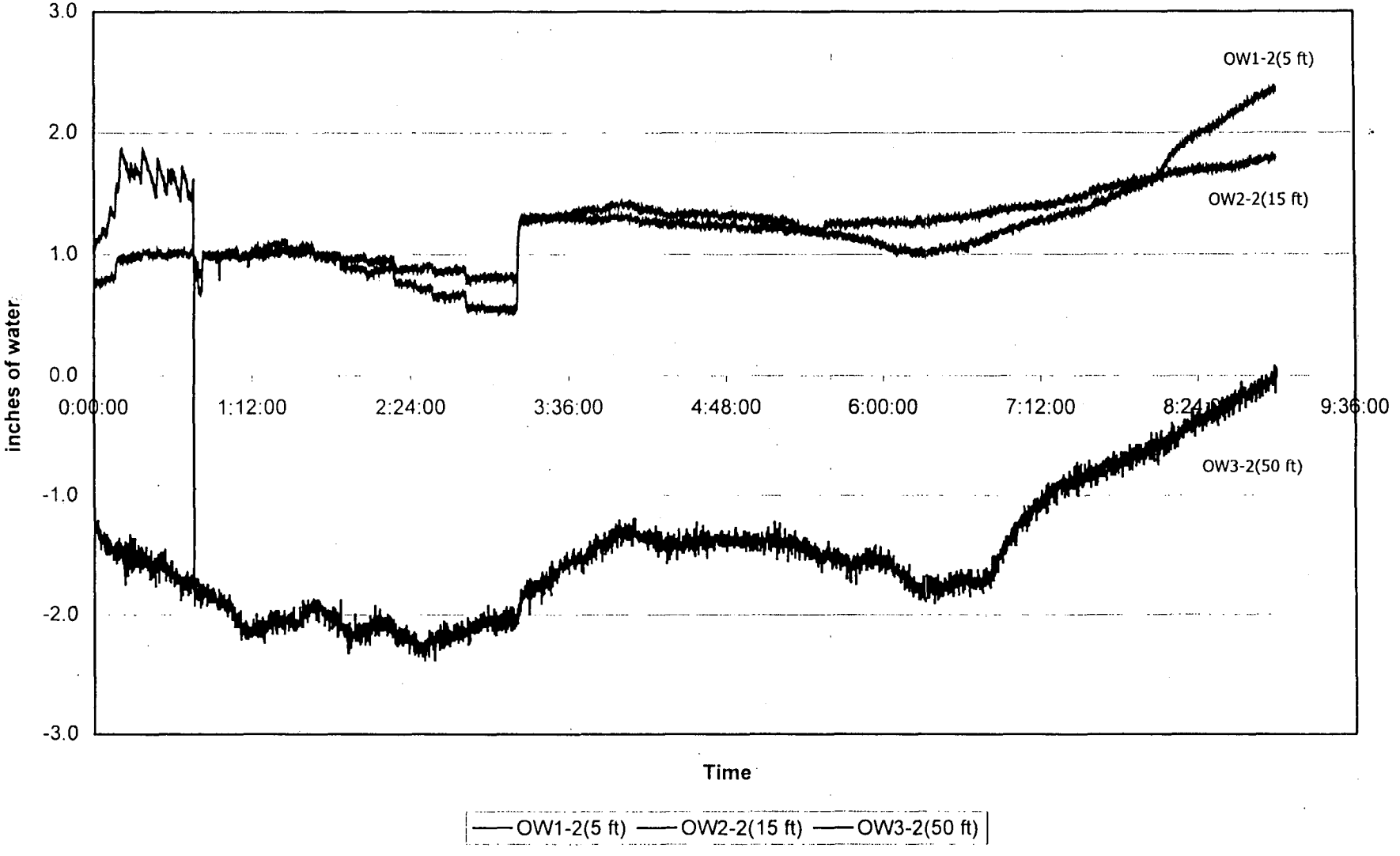
EW1-2(1b) - 10/5/98



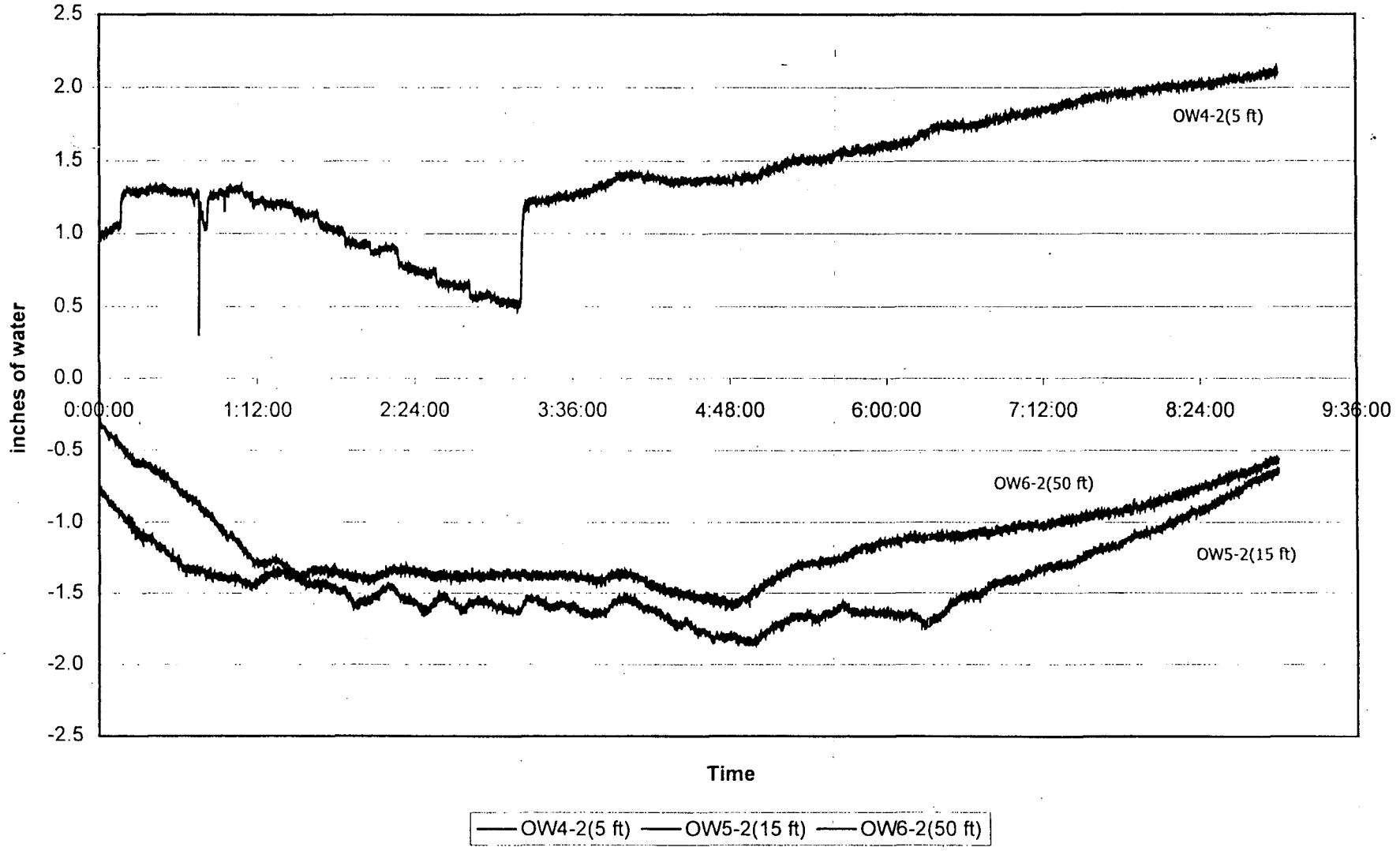
EW1-2(1b) - 10/5/98



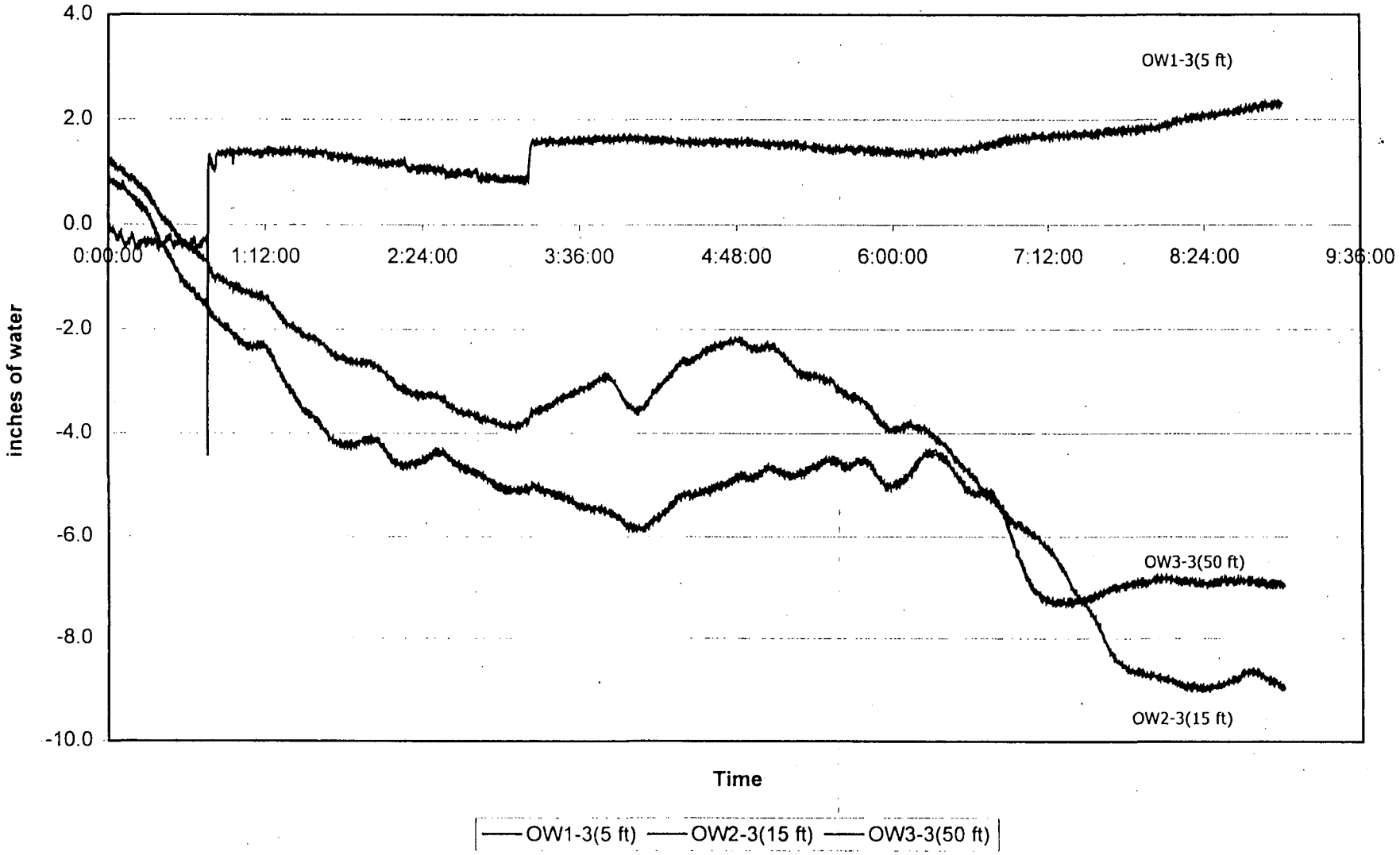
EW1-2(1b) - 10/5/98



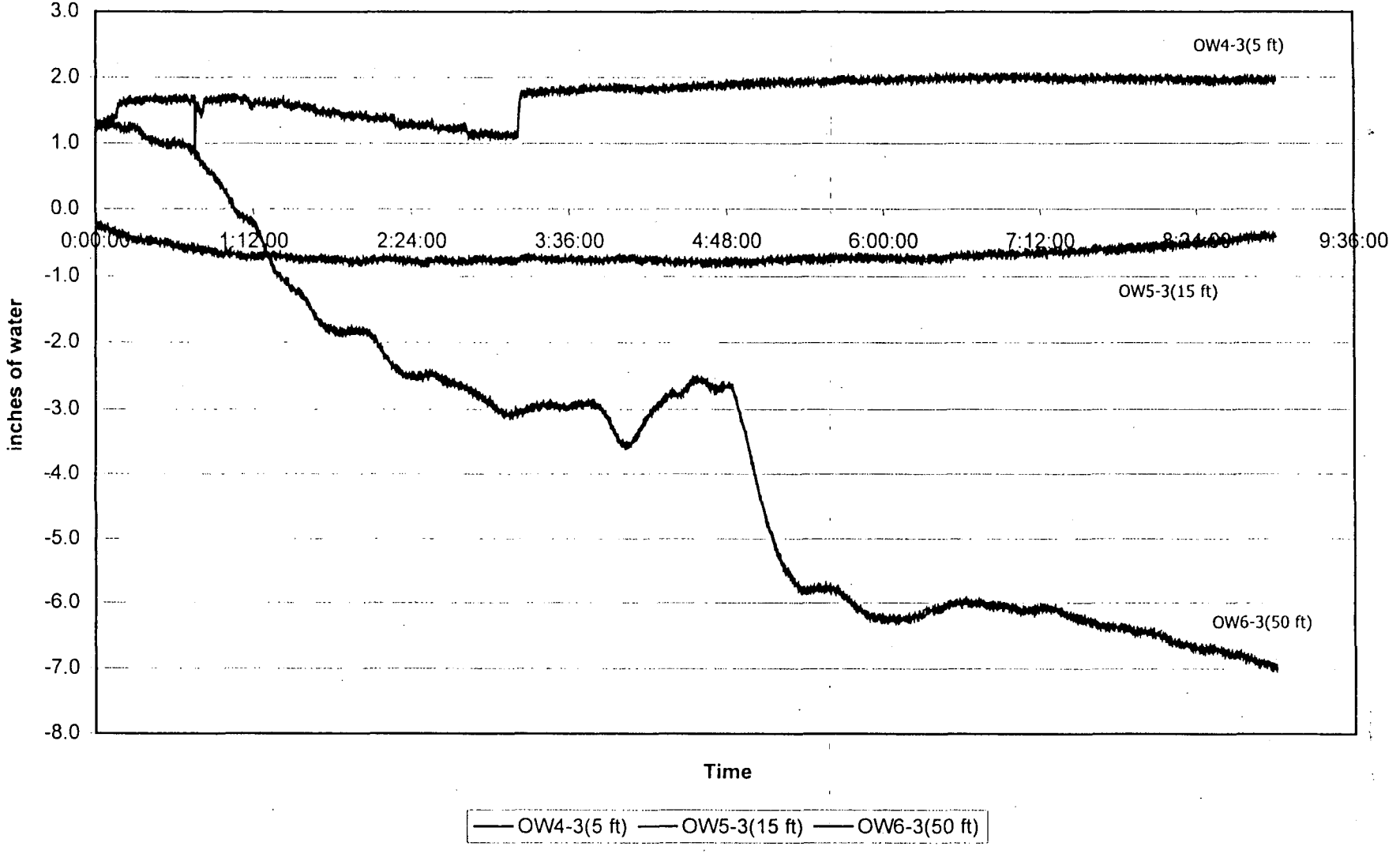
EW1-2(1b) - 10/5/98



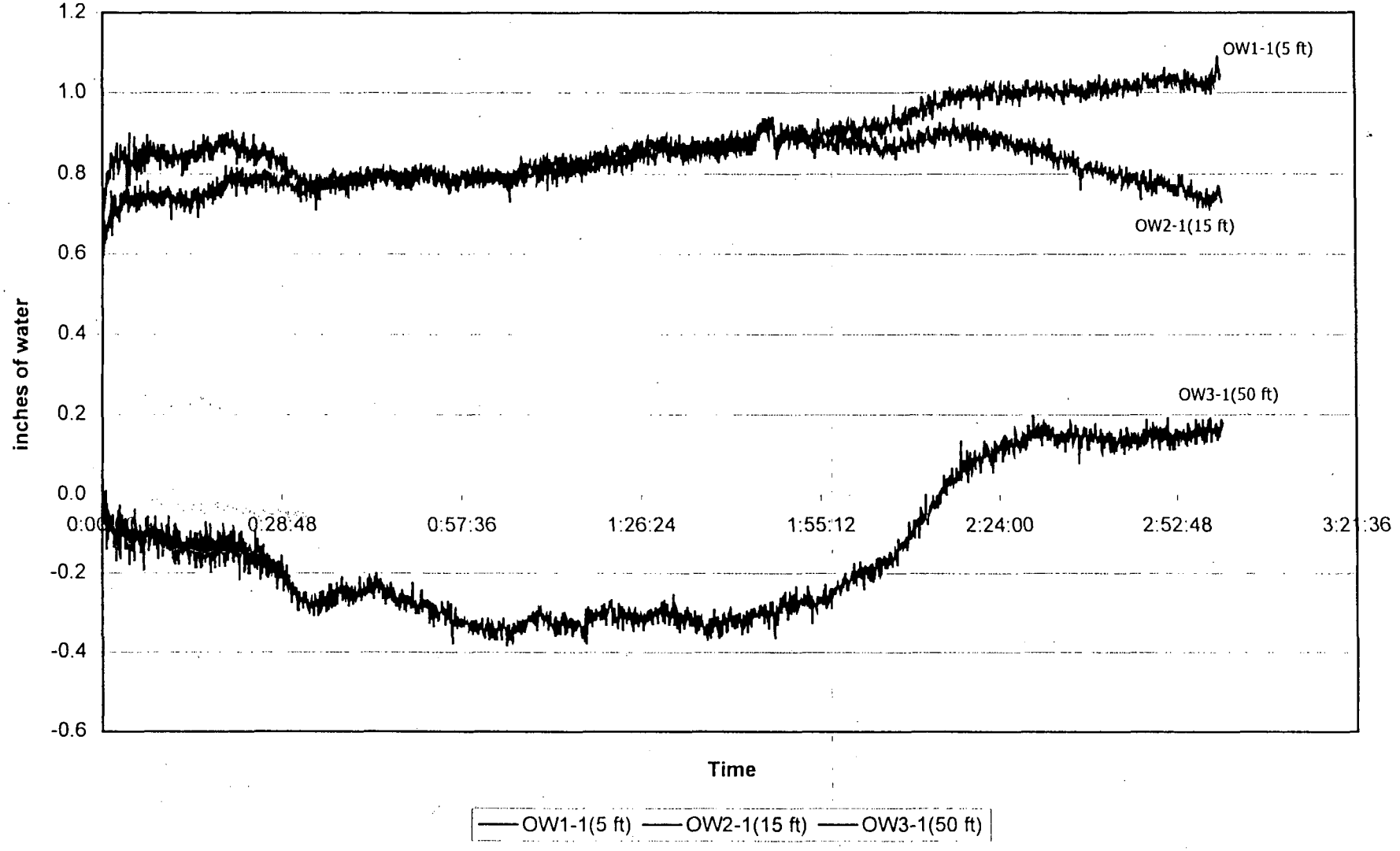
EW1-2(1b) - 10/5/98



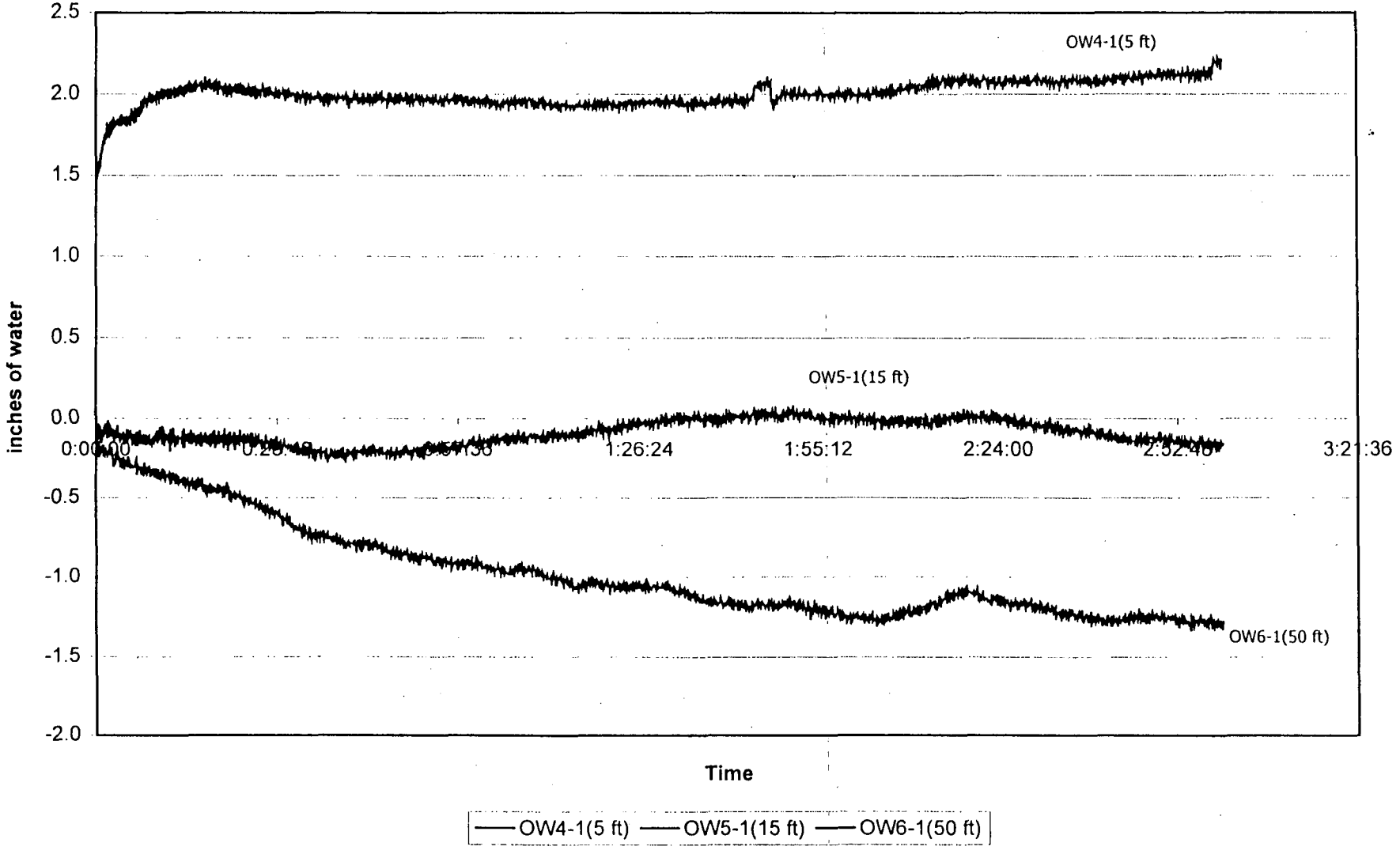
EW1-2(1b) - 10/5/98



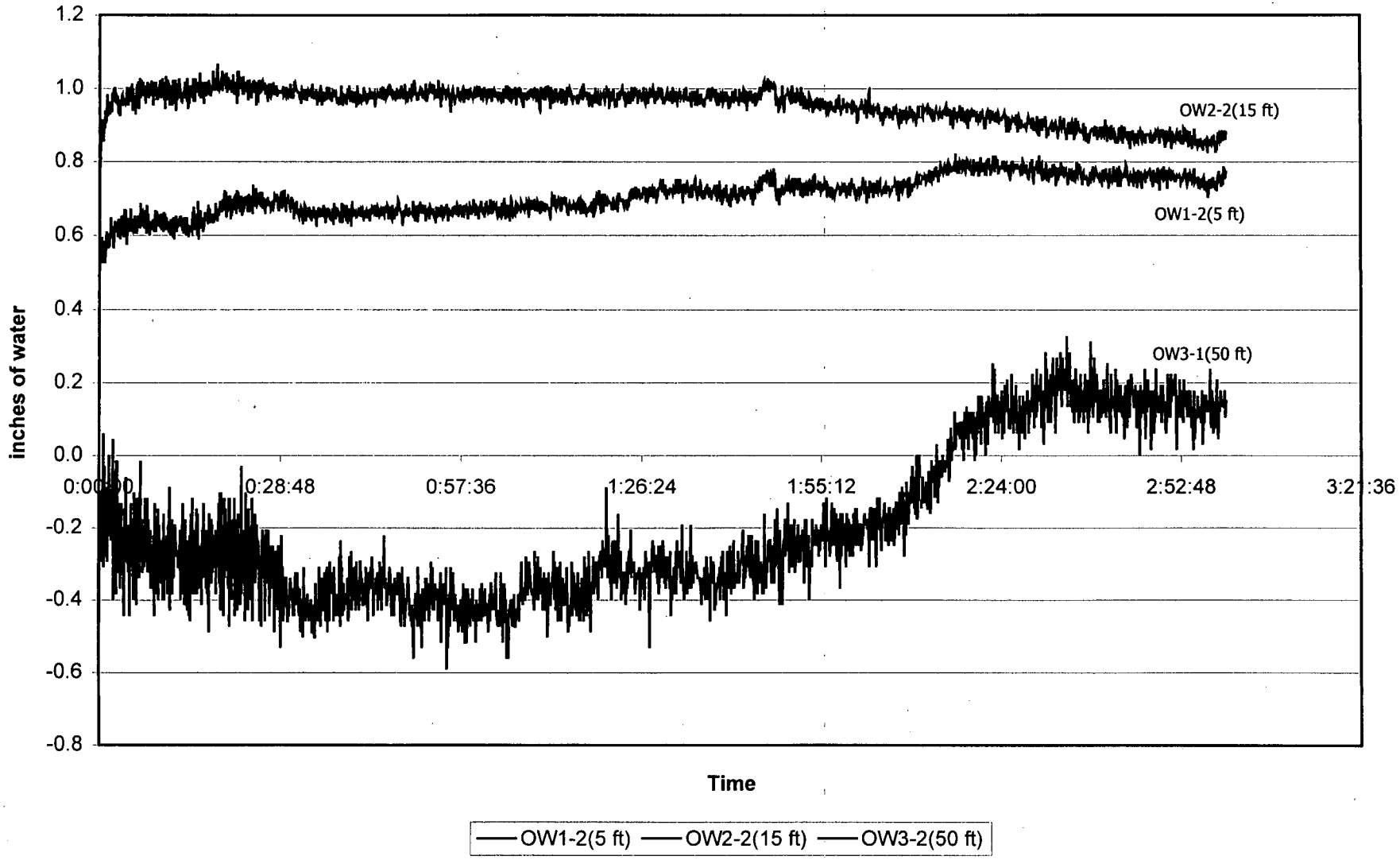
EW1-3(1c)(32-42) - 10/6/98



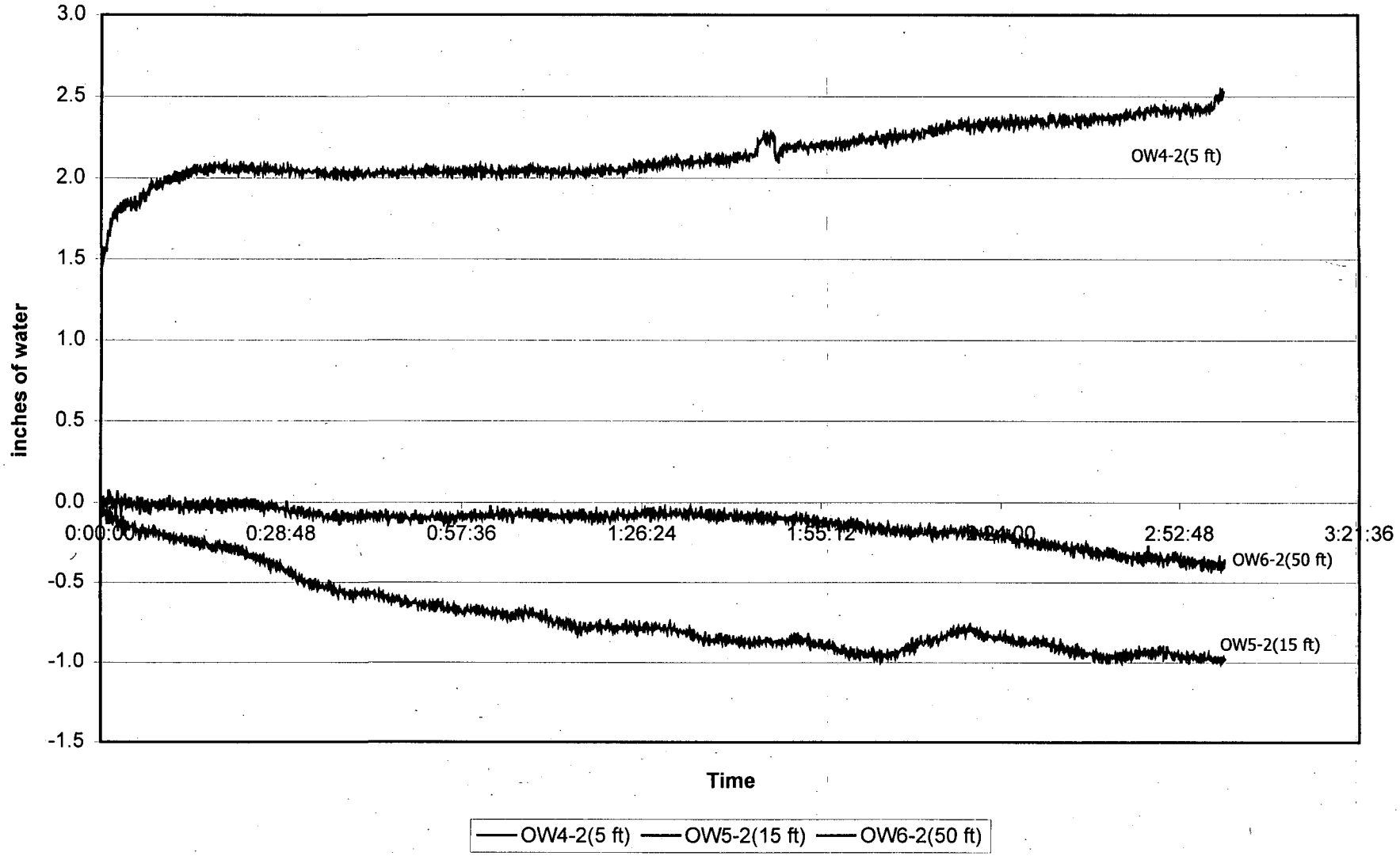
EW1-3(1c)(32-42) - 10/6/98



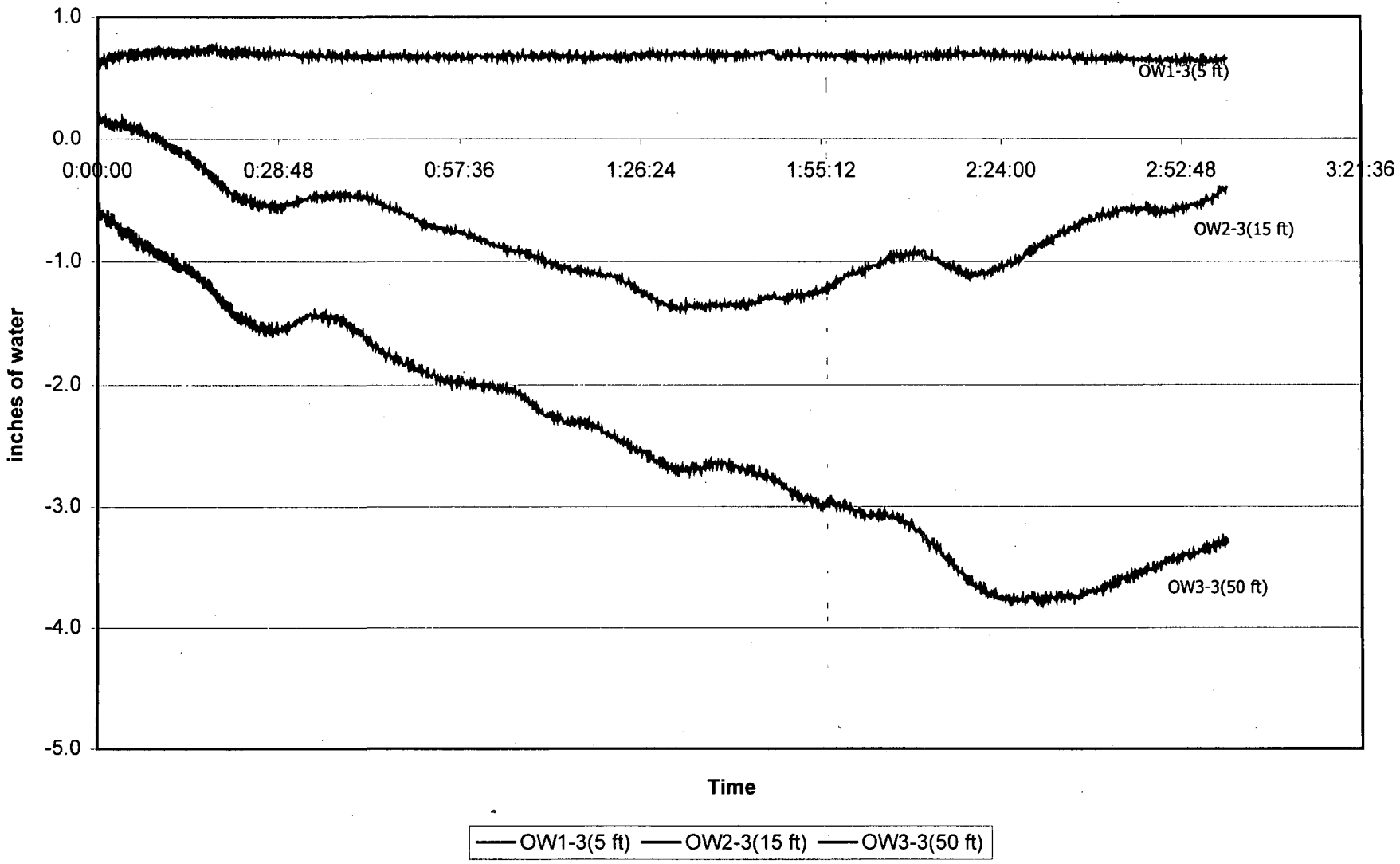
EW1-3(1c)(32-42) - 10/6/98



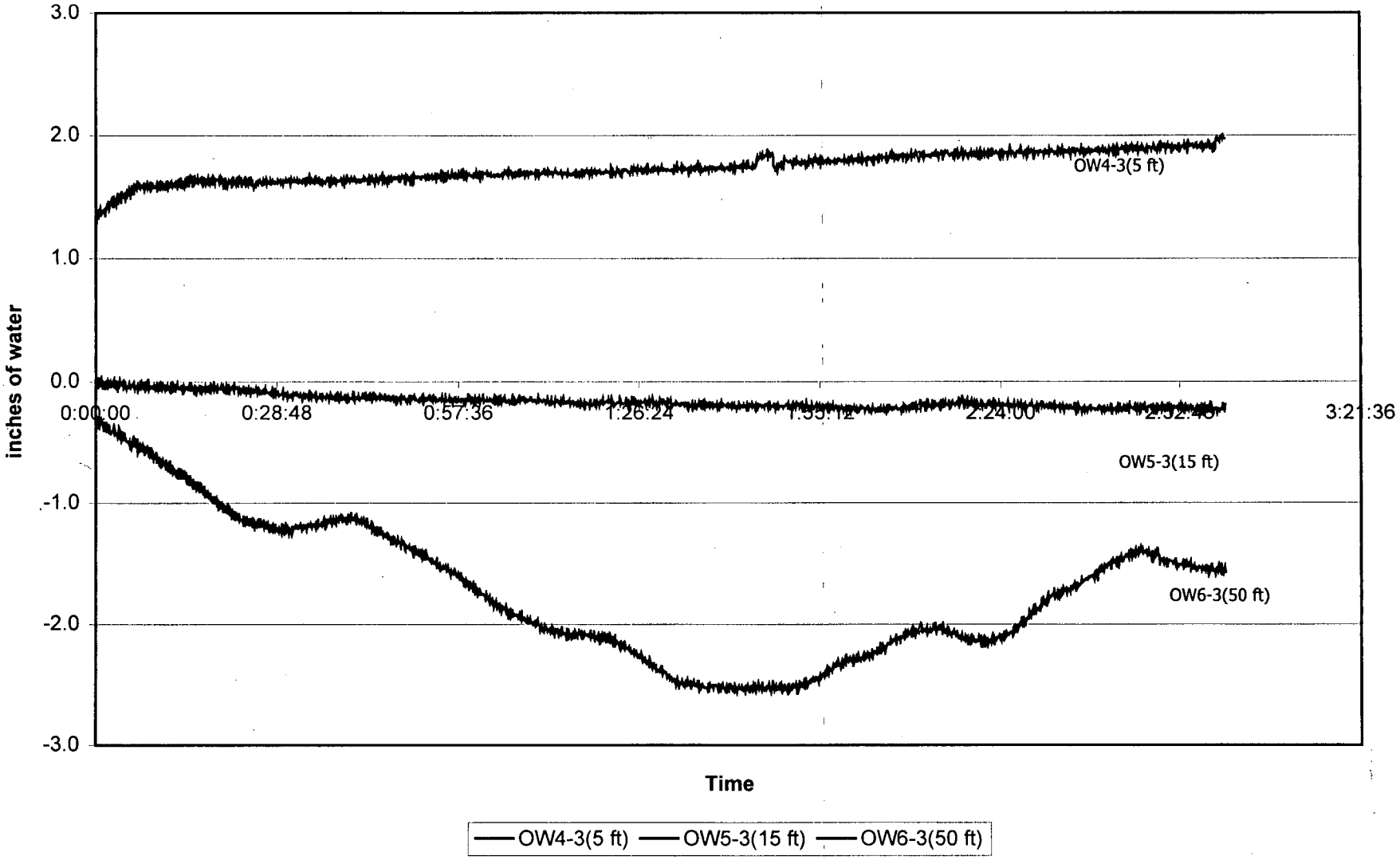
EW1-3(1c)(32-42) - 10/6/98



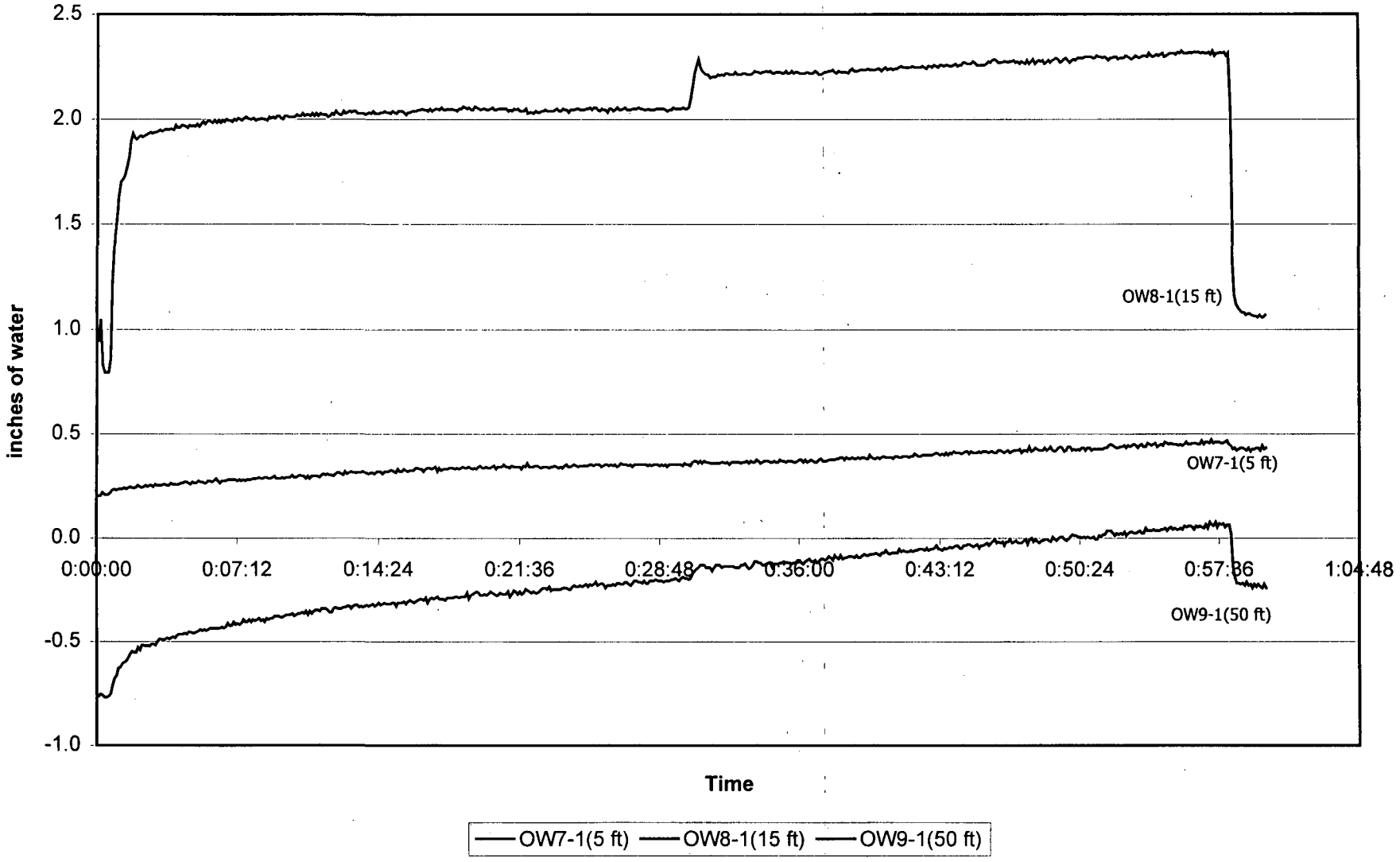
EW1-3(1c)(32-42) - 10/6/98



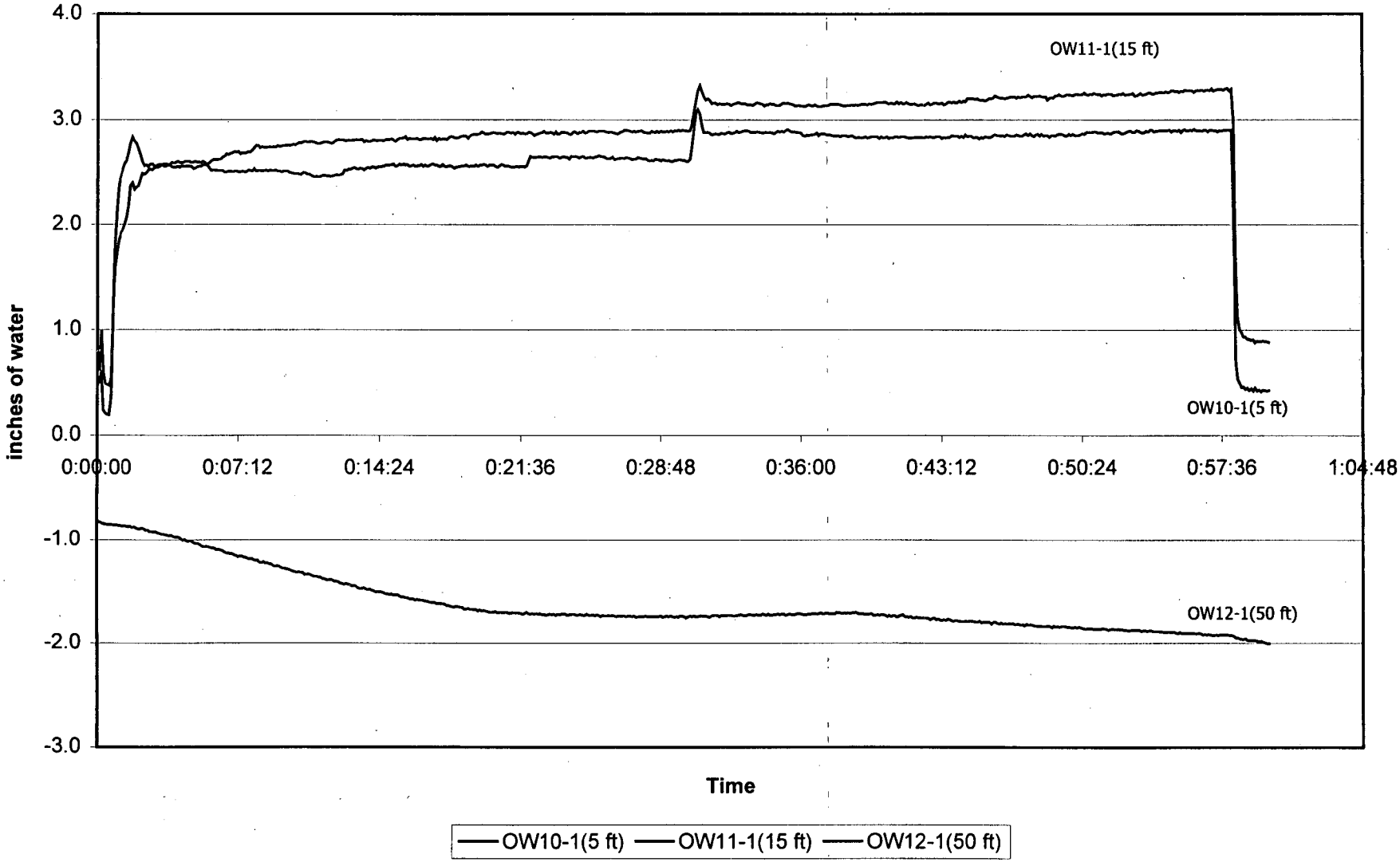
EW1-3(1c)(32-42) - 10/6/98



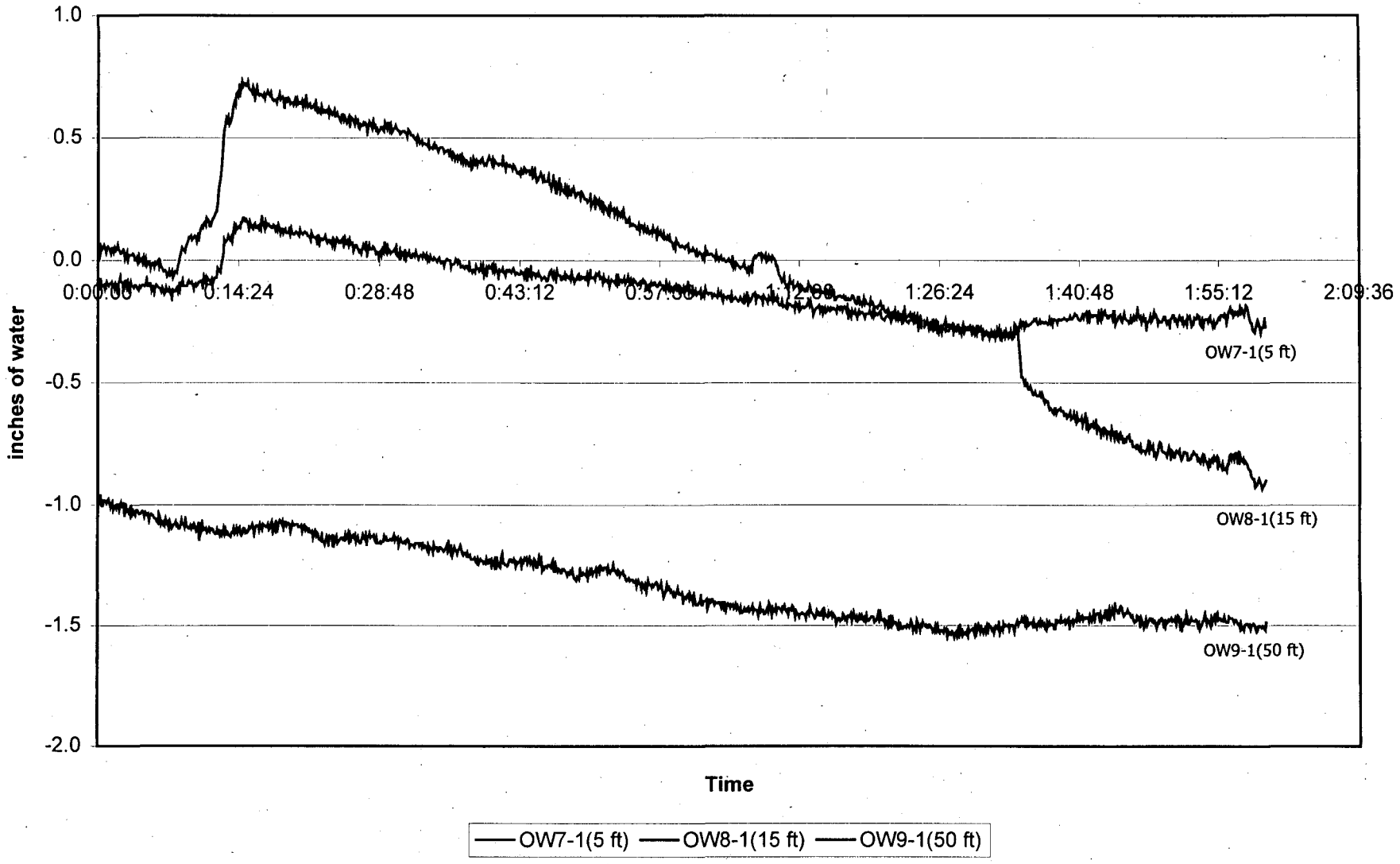
EW2 - 9/2/98


2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
inches of water
0:00:00
0:07:12
0:14:24
0:21:36
0:28:48
0:36:00
0:43:12
0:50:24
0:57:36
1:04:48
Time
OW8-1(15 ft)
OW7-1(5 ft)
OW9-1(50 ft)
OW7-1(5 ft)
OW8-1(15 ft)
OW9-1(50 ft)

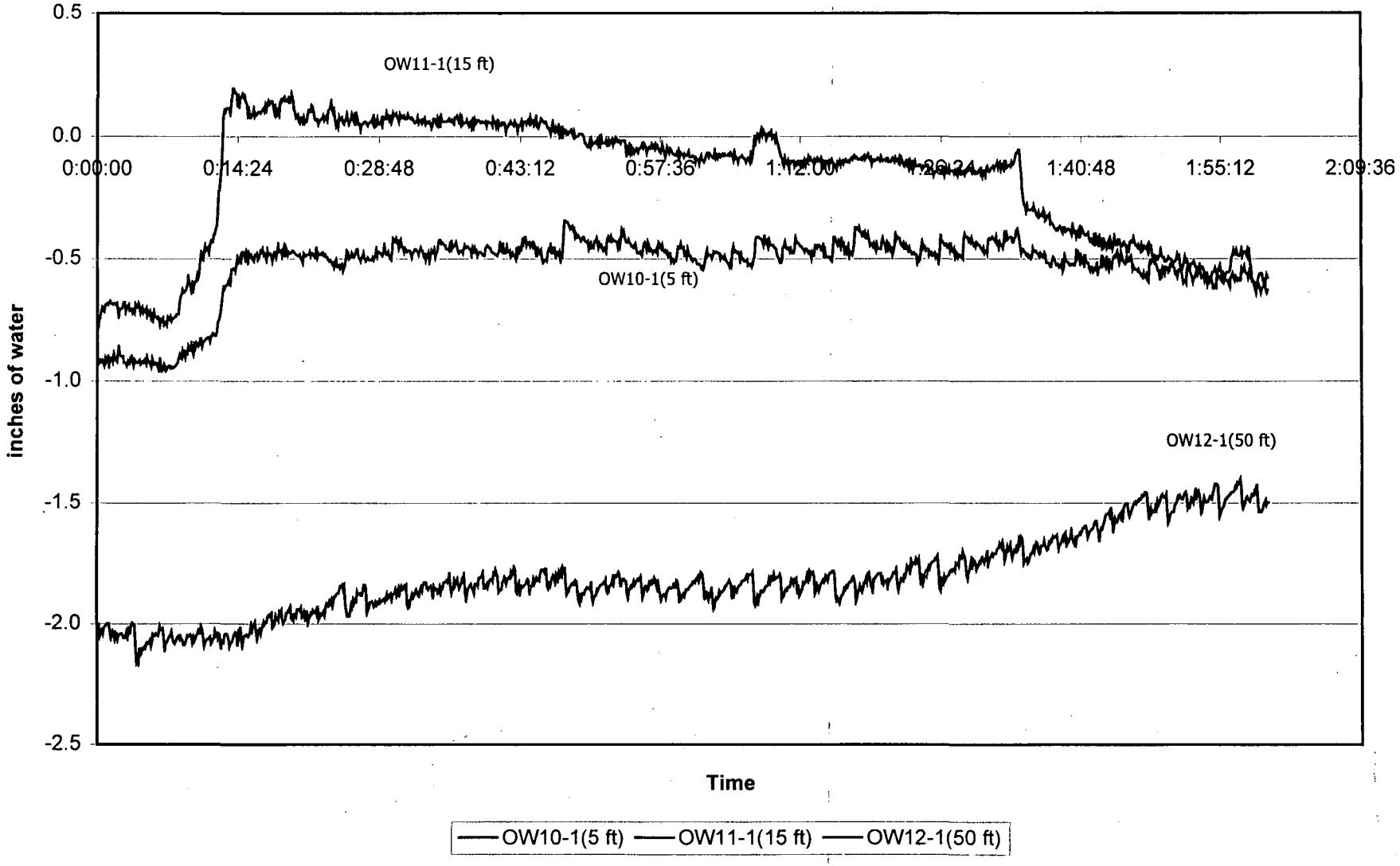
EW2 - 9/2/98


4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
inches of water
OW11-1(15 ft)
OW10-1(5 ft)
OW12-1(50 ft)
0:00:00
0:07:12
0:14:24
0:21:36
0:28:48
0:36:00
0:43:12
0:50:24
0:57:36
1:04:48
Time
OW10-1(5 ft)
OW11-1(15 ft)
OW12-1(50 ft)

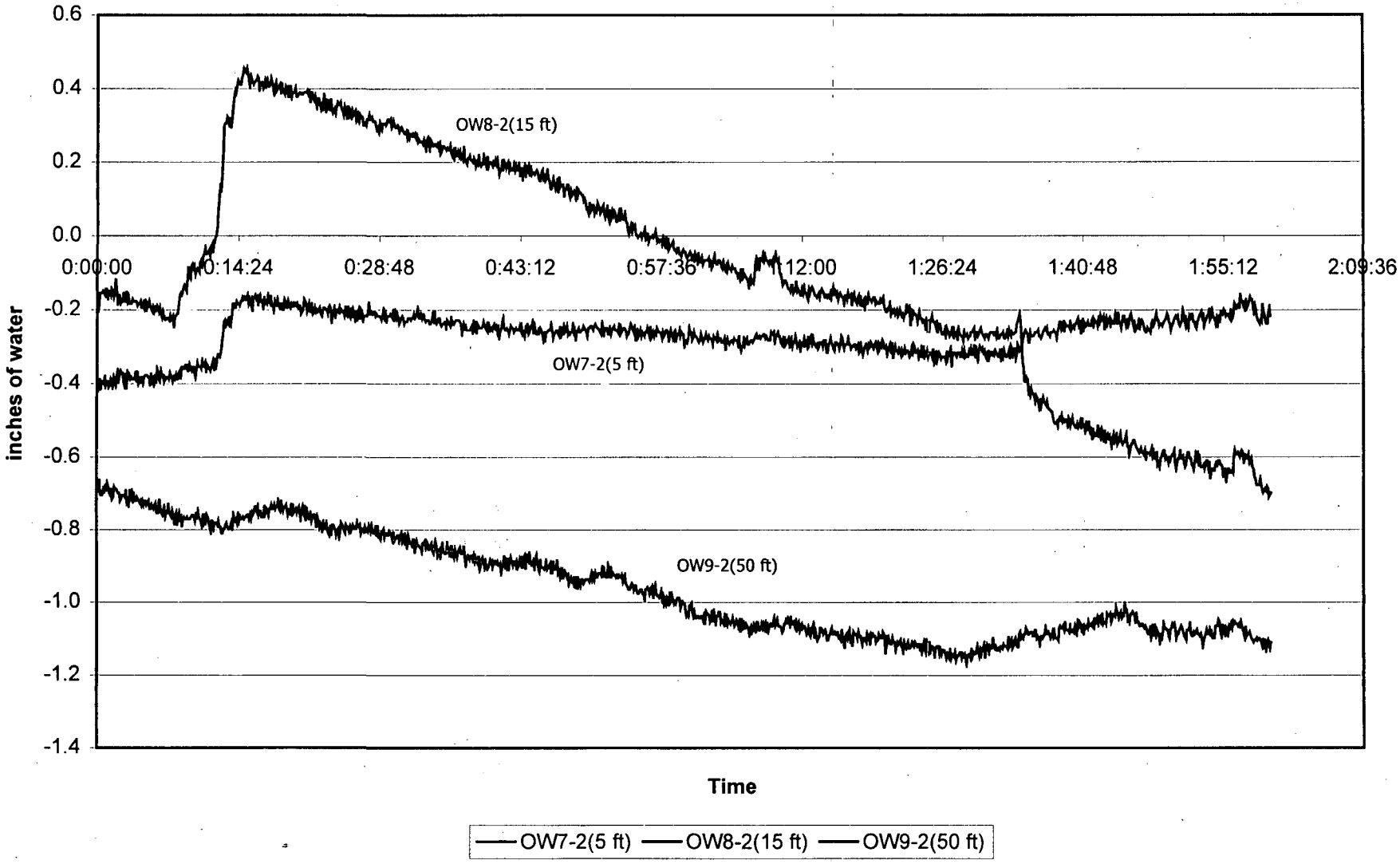
Ew2-1(2a) - 9/18/98



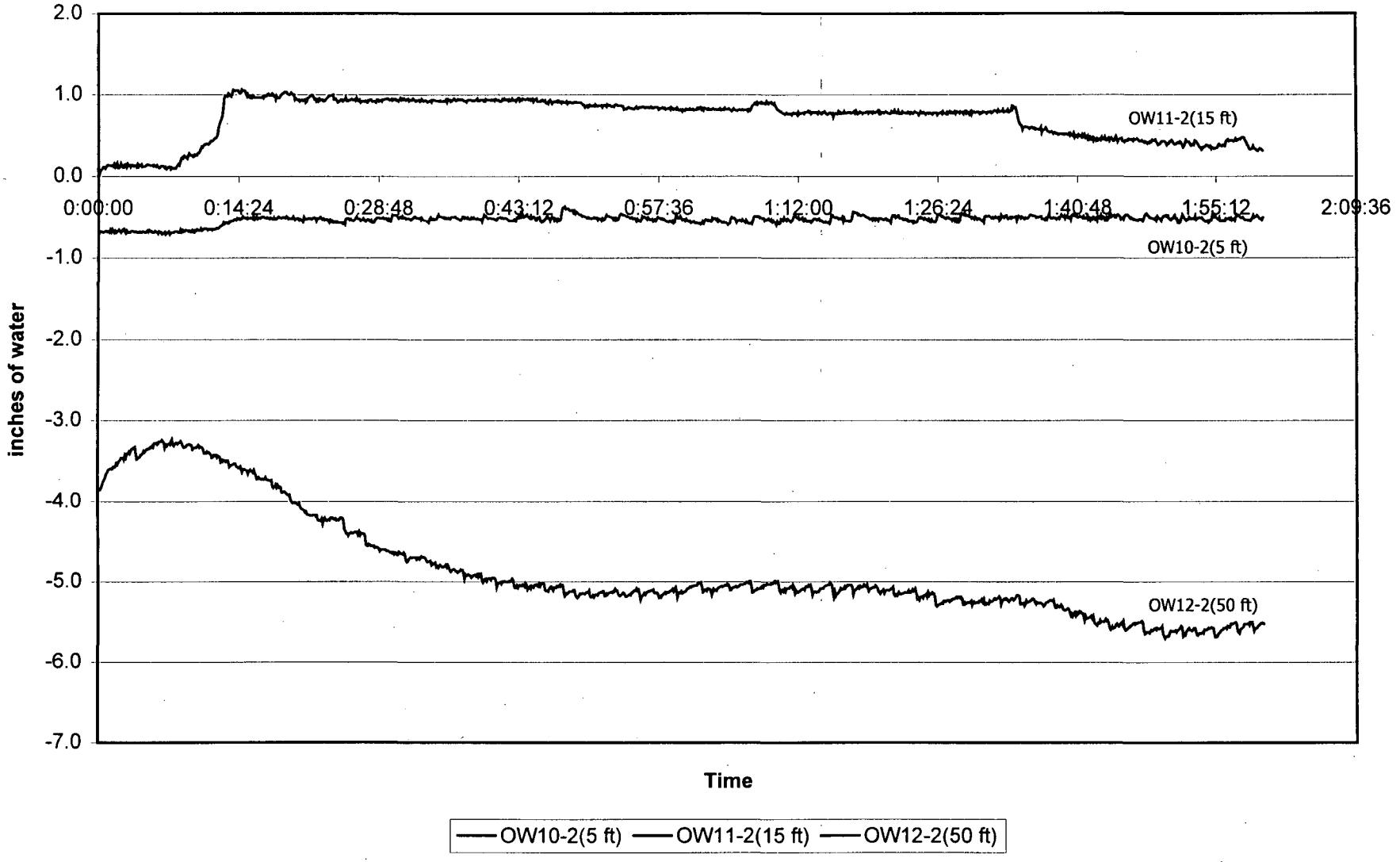
Ew2-1(2a) - 9/18/98



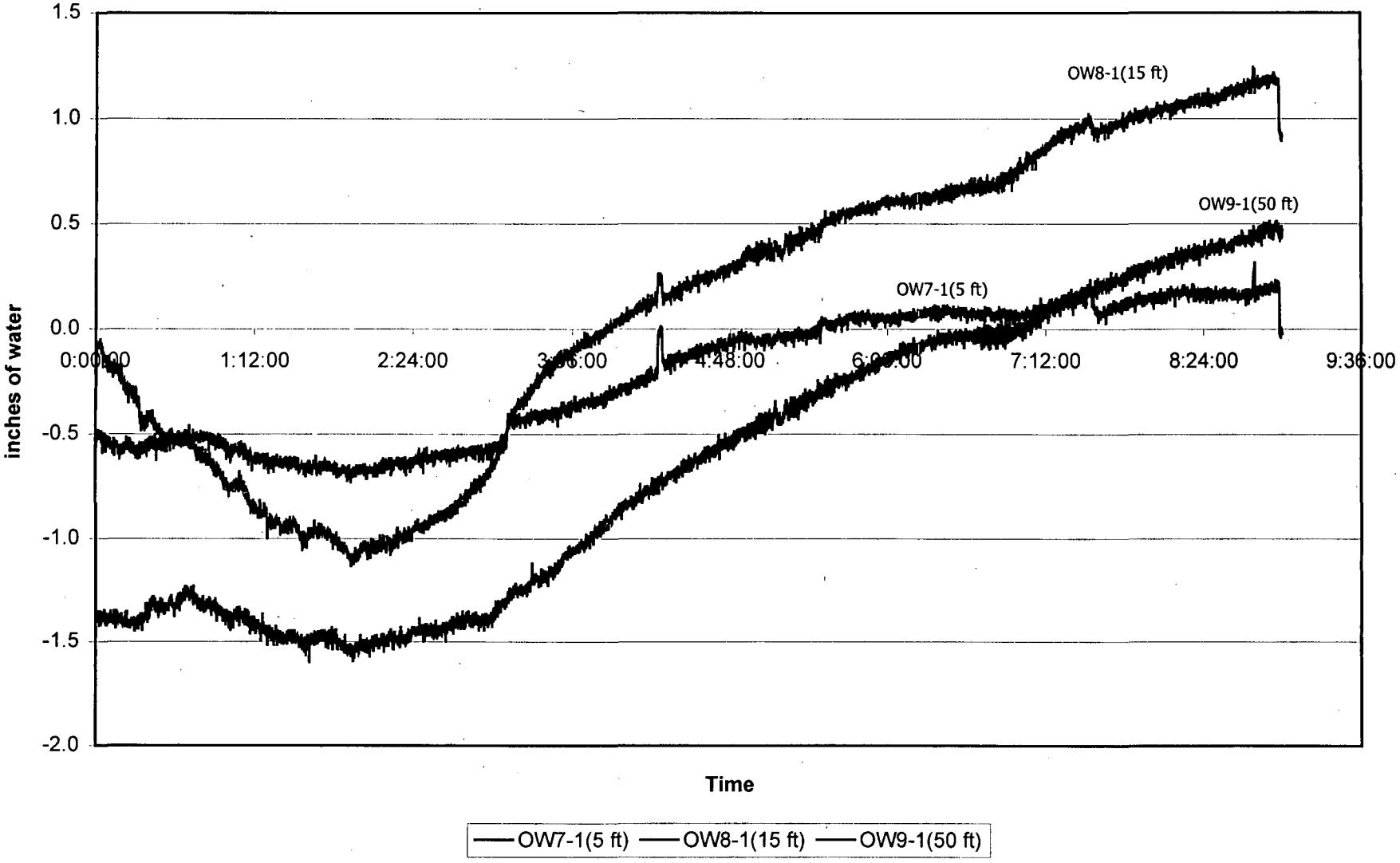
Ew2-1(2a) - 9/18/98



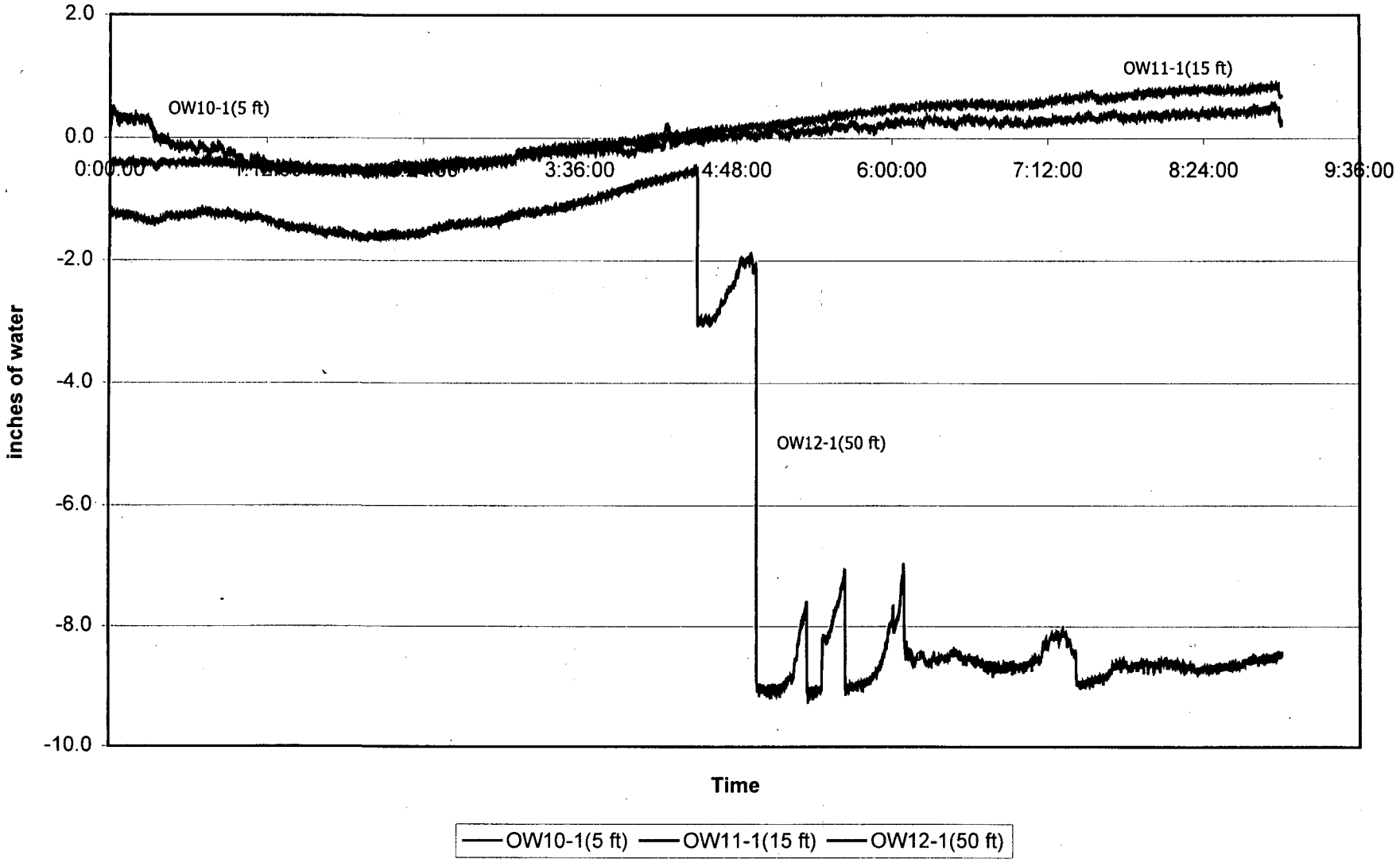
Ew2-1(2a) - 9/18/98



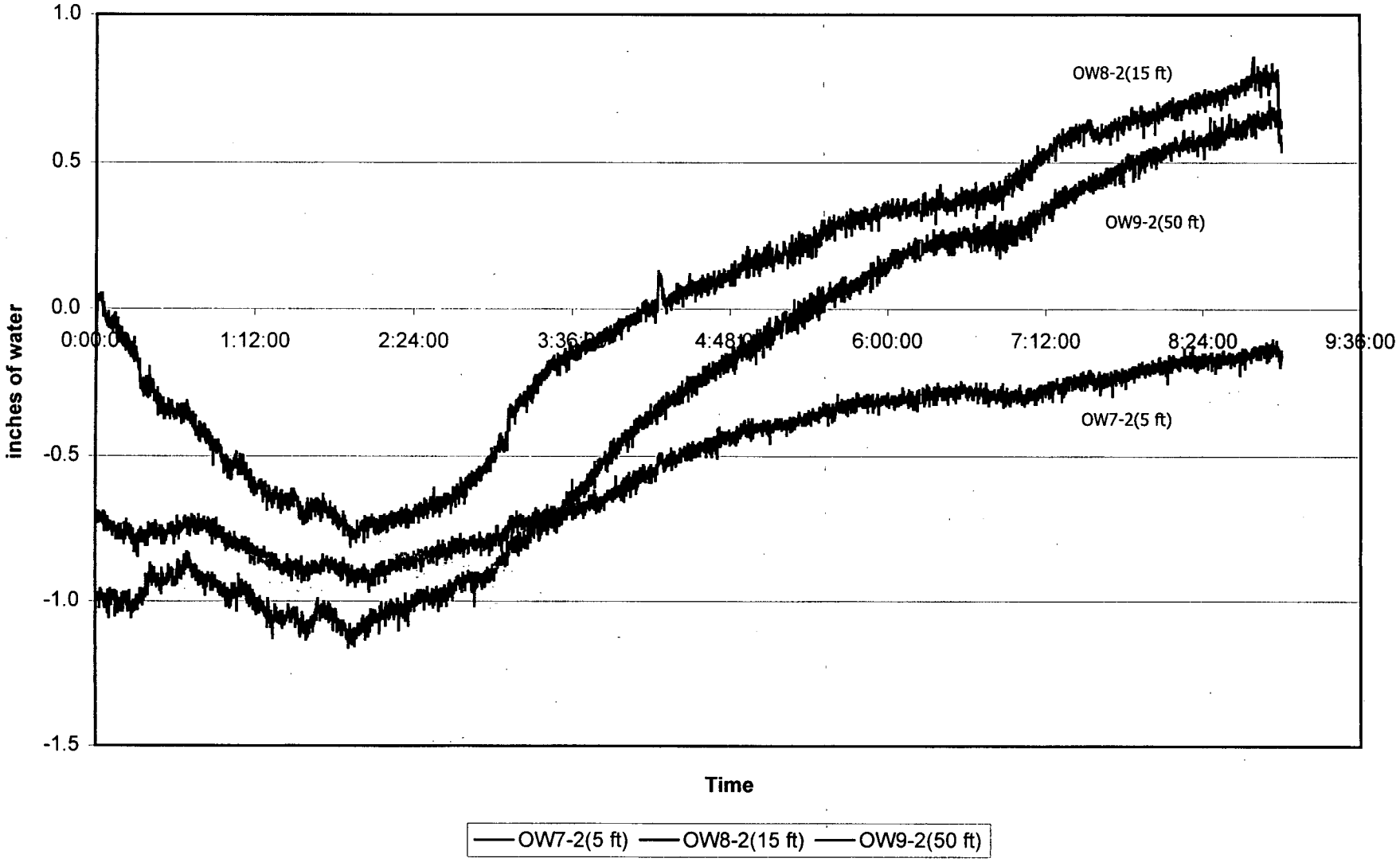
EW2-2(2b) - 9/21/98



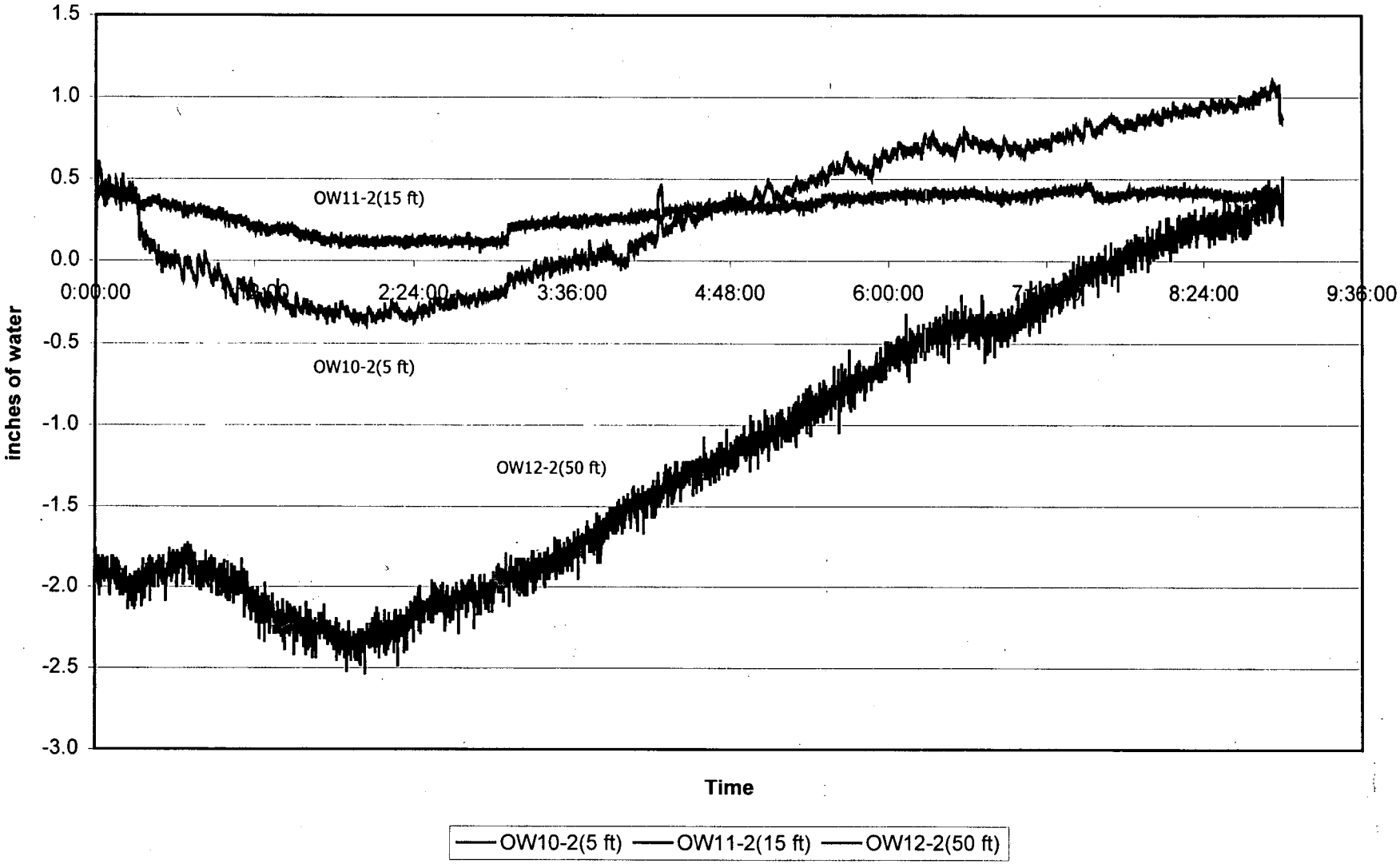
EW2-2(2b) - 9/21/98



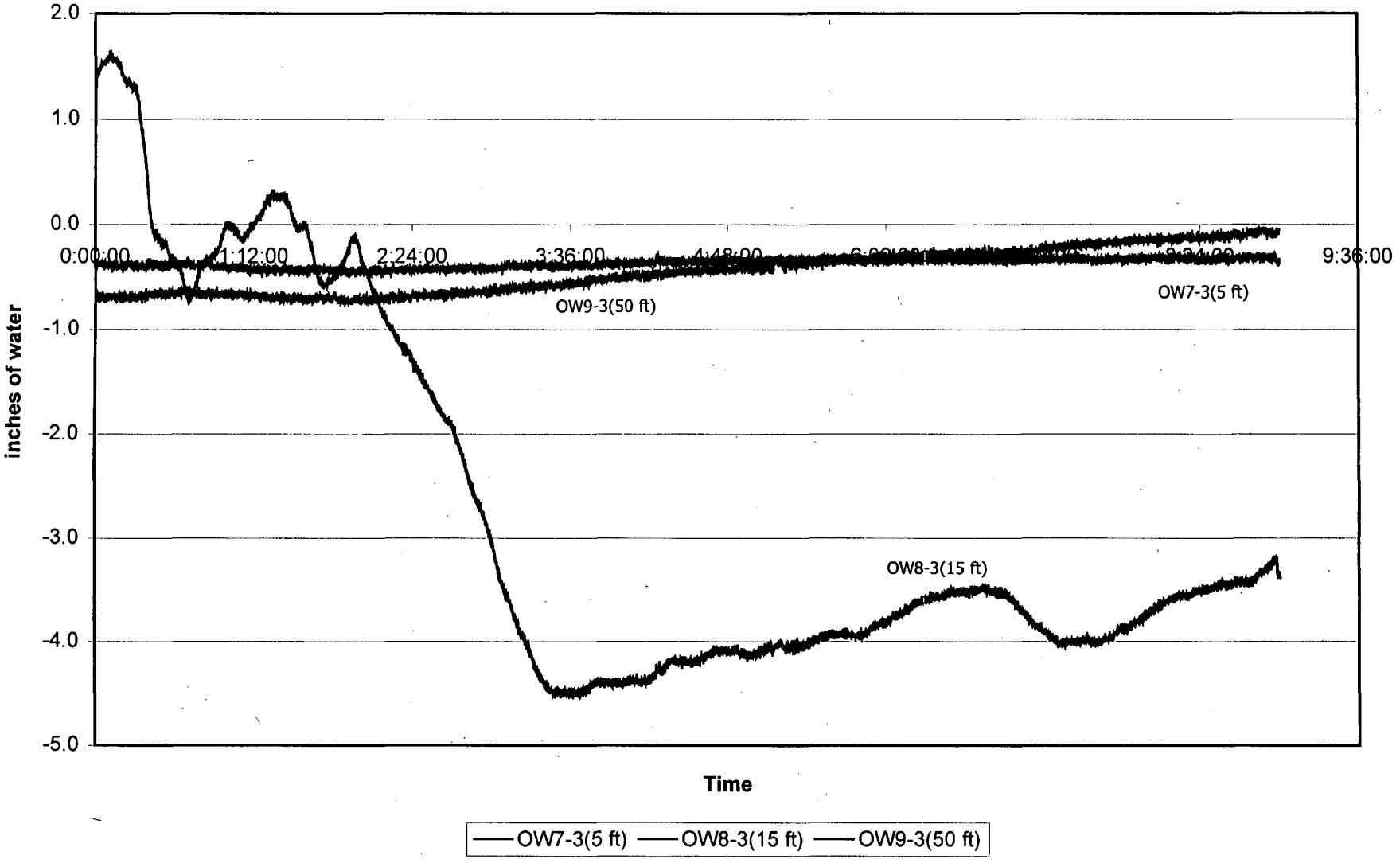
EW2-2(2b) - 9/21/98



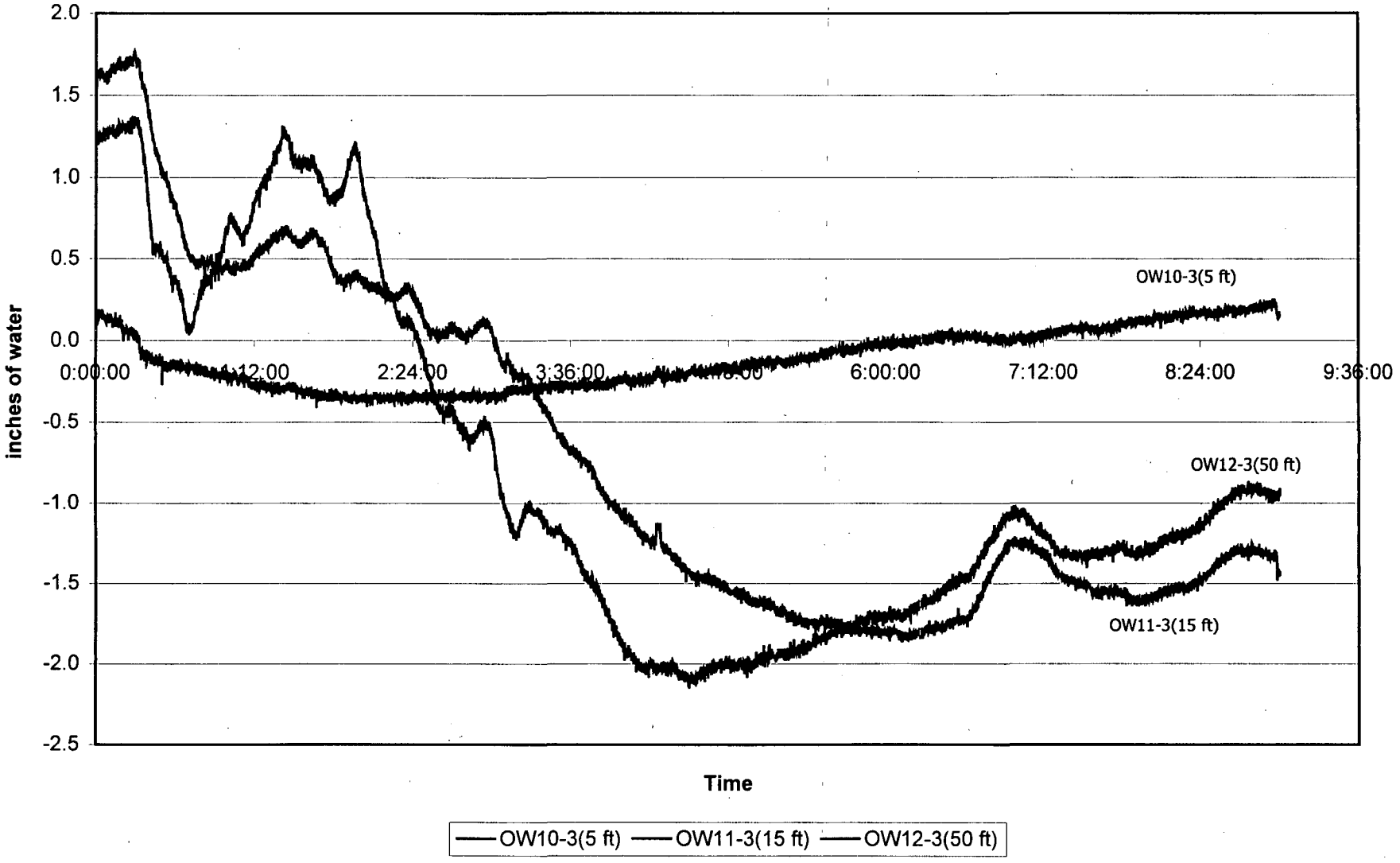
EW2-2(2b) - 9/21/98



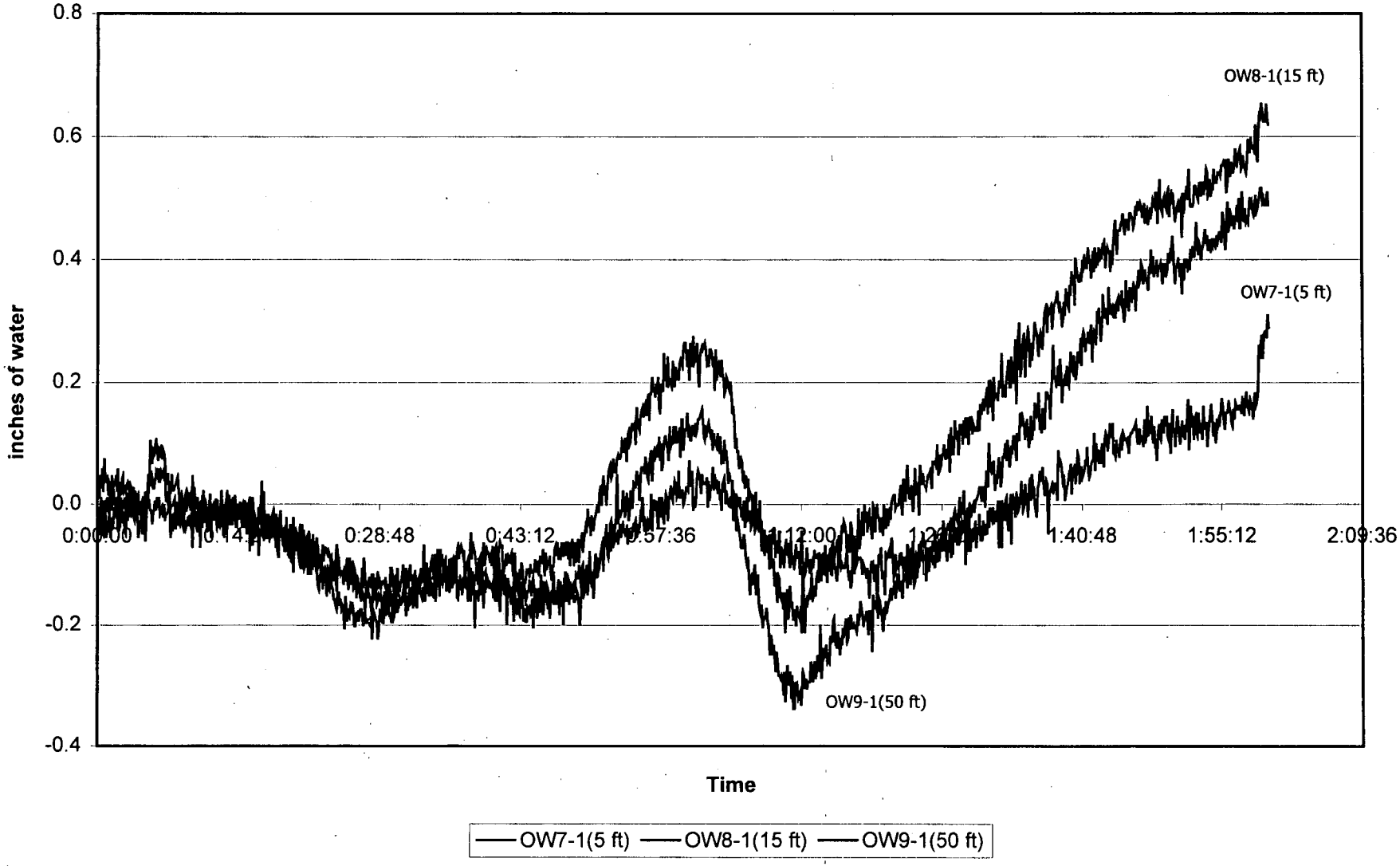
Ew2-2(2b) - 9/21/98



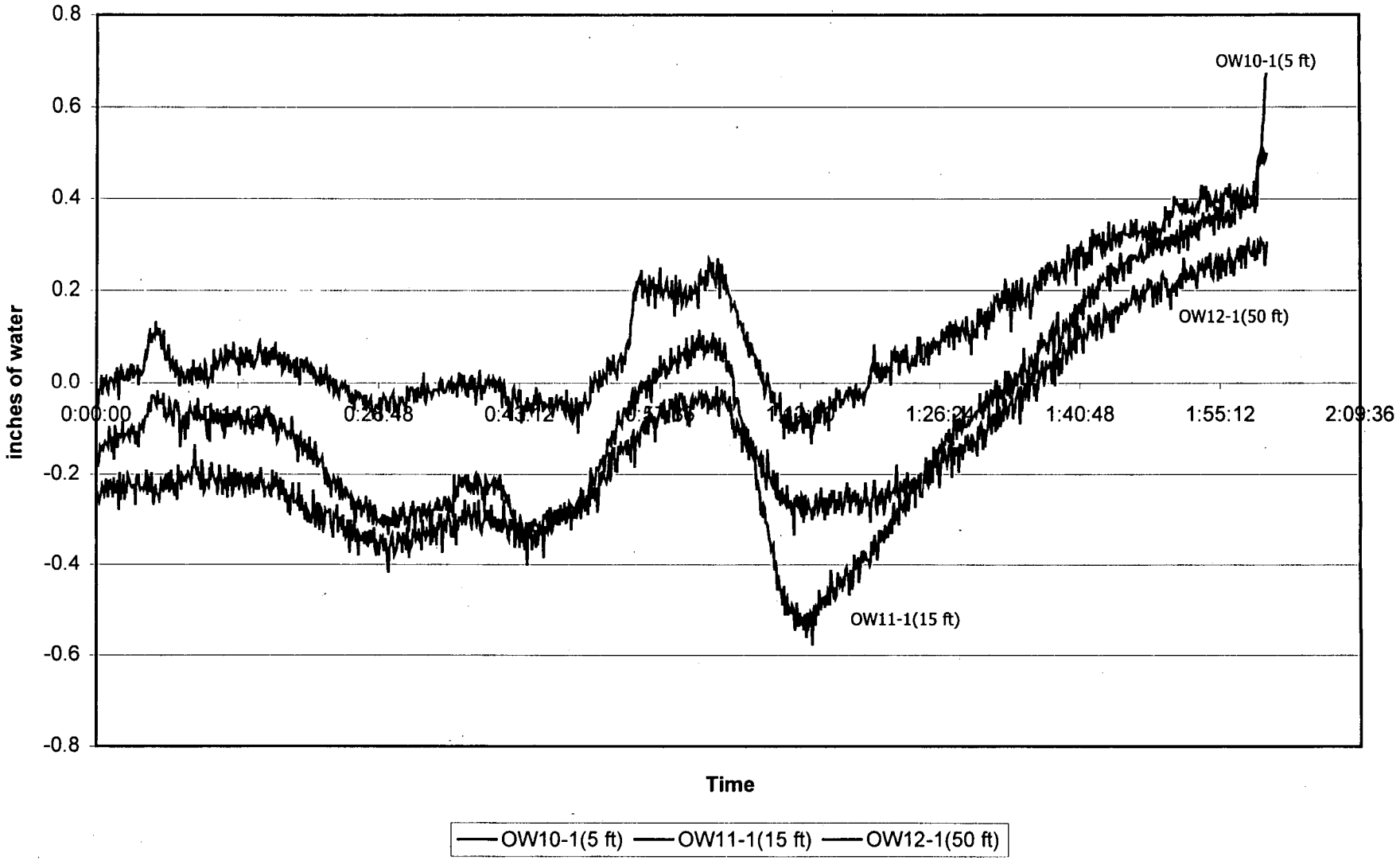
Ew2-2(2b) - 9/21/98



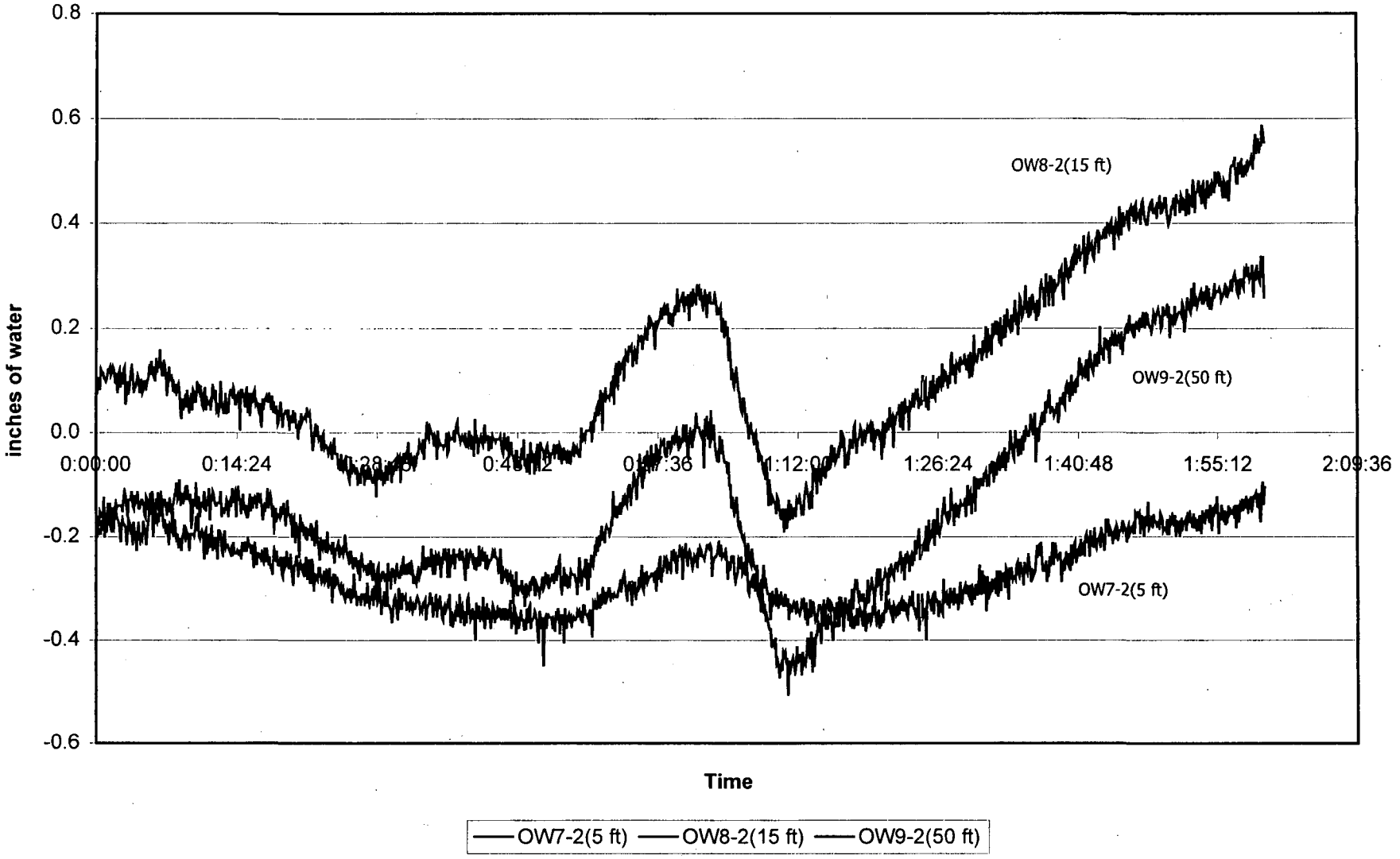
EW2-3(2c) - 9/22/98



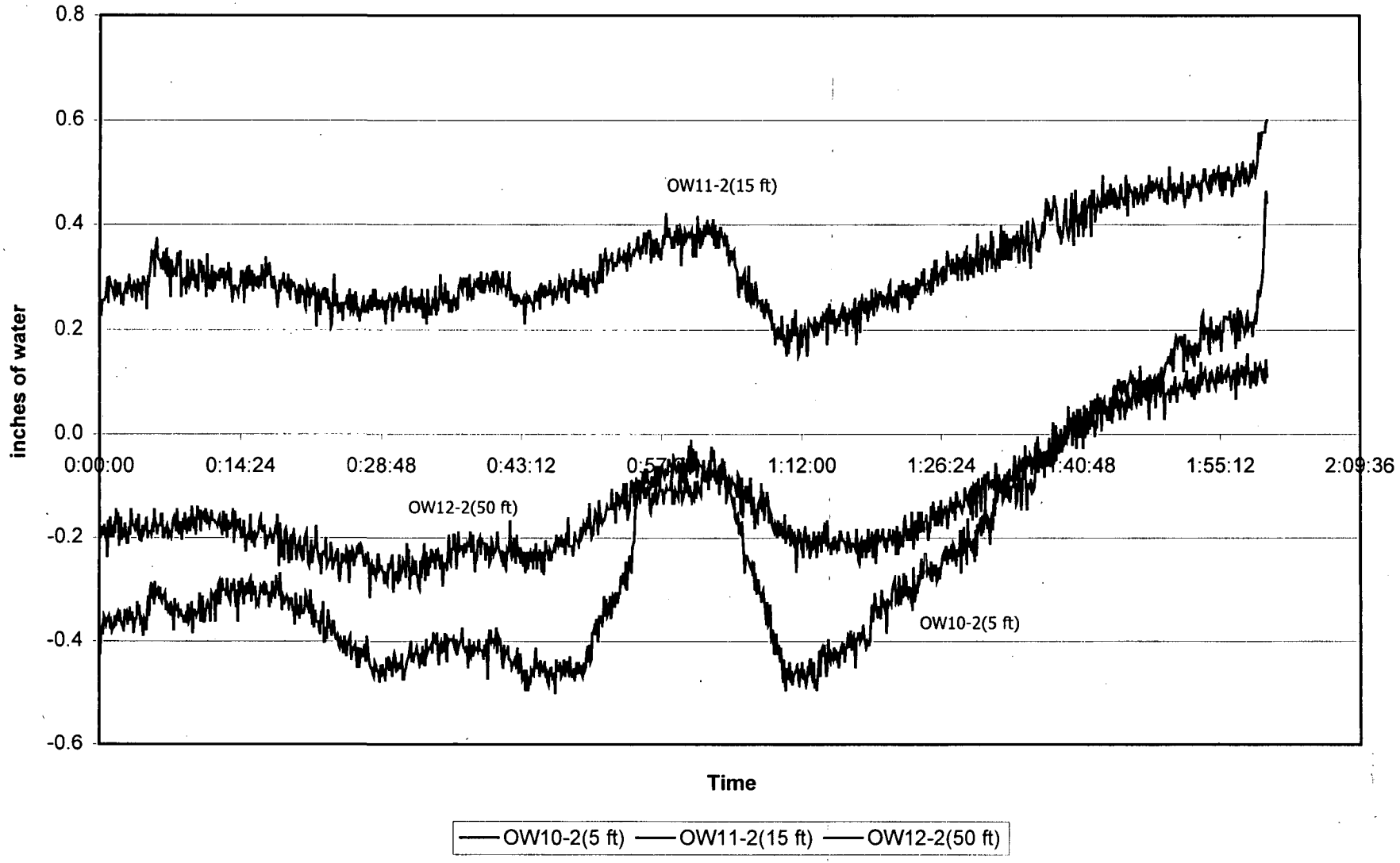
EW2-3(2c) - 9/22/98



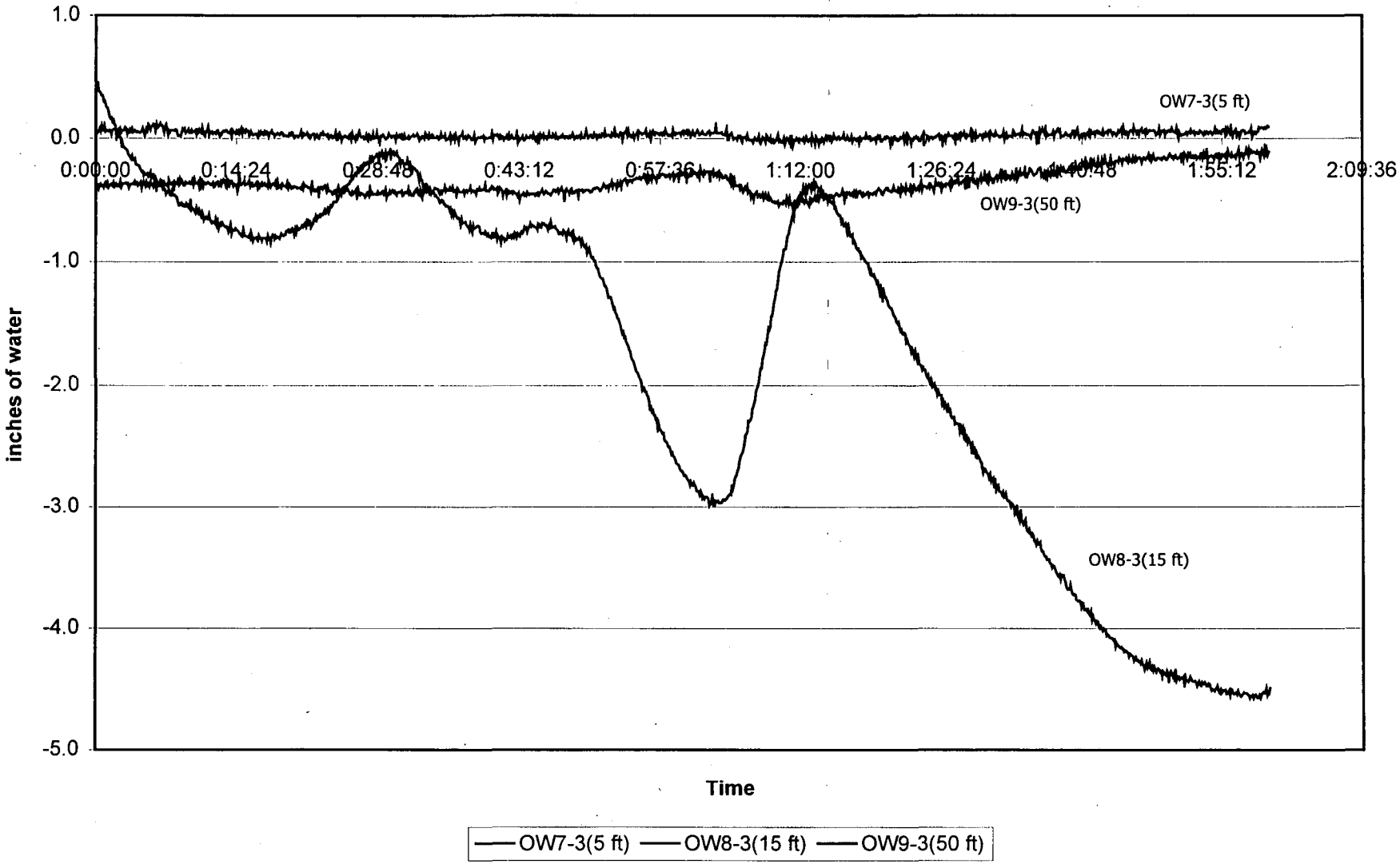
EW2-3(2c) - 9/22/98



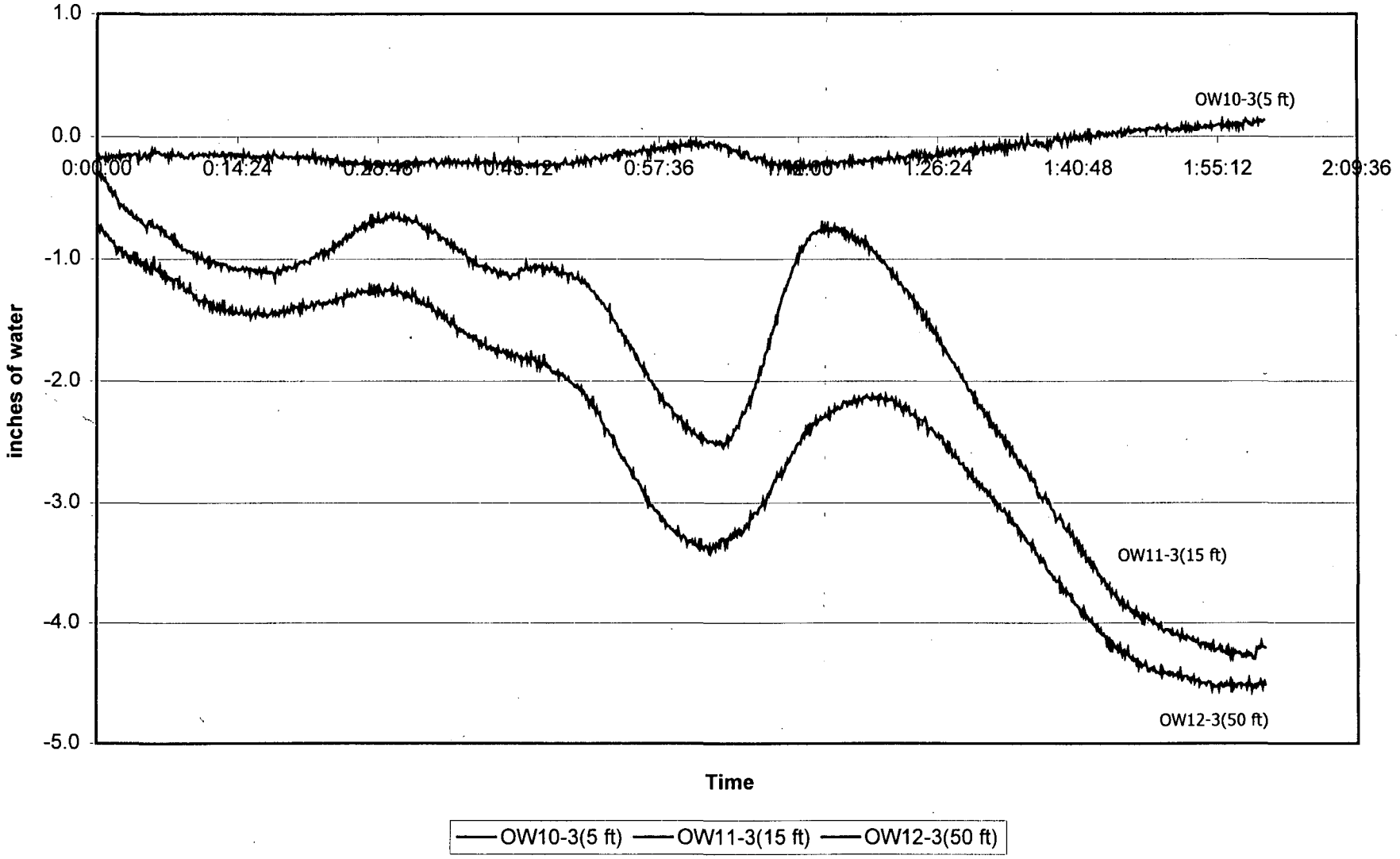
Ew2-3(2c) - 9/22/98



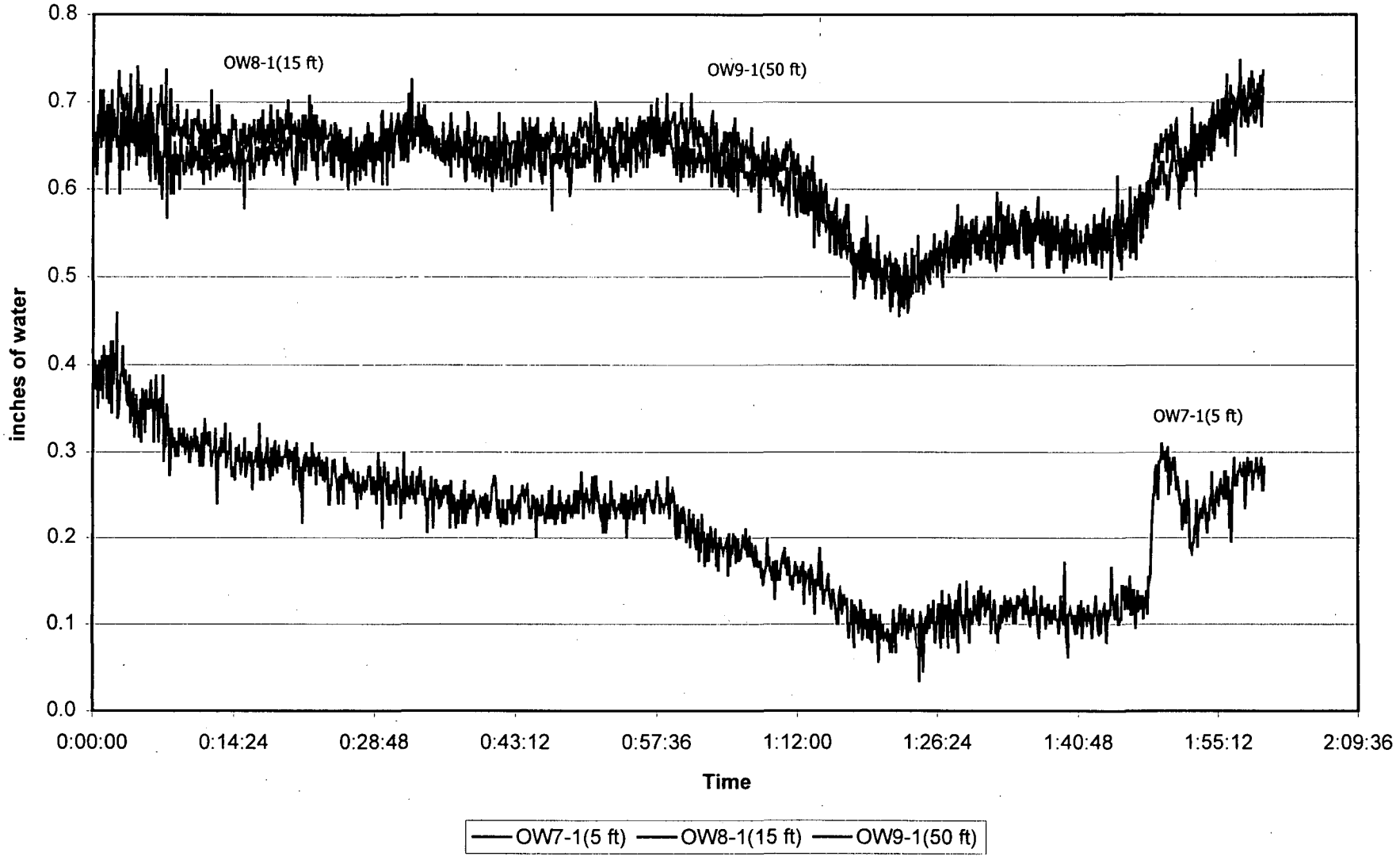
Ew2-3(2c) - 9/22/98



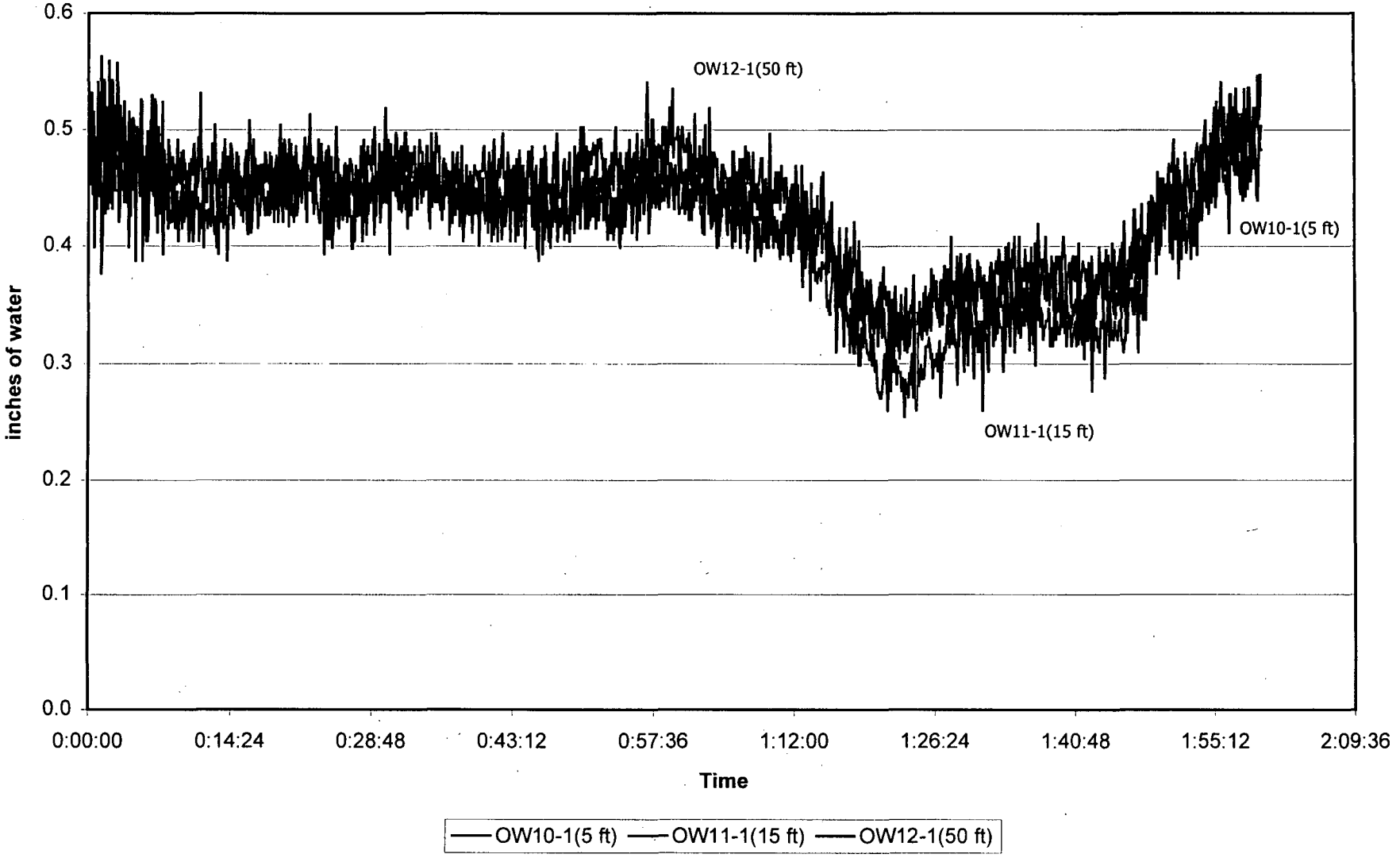
EW2-3(2c) - 9/22/98



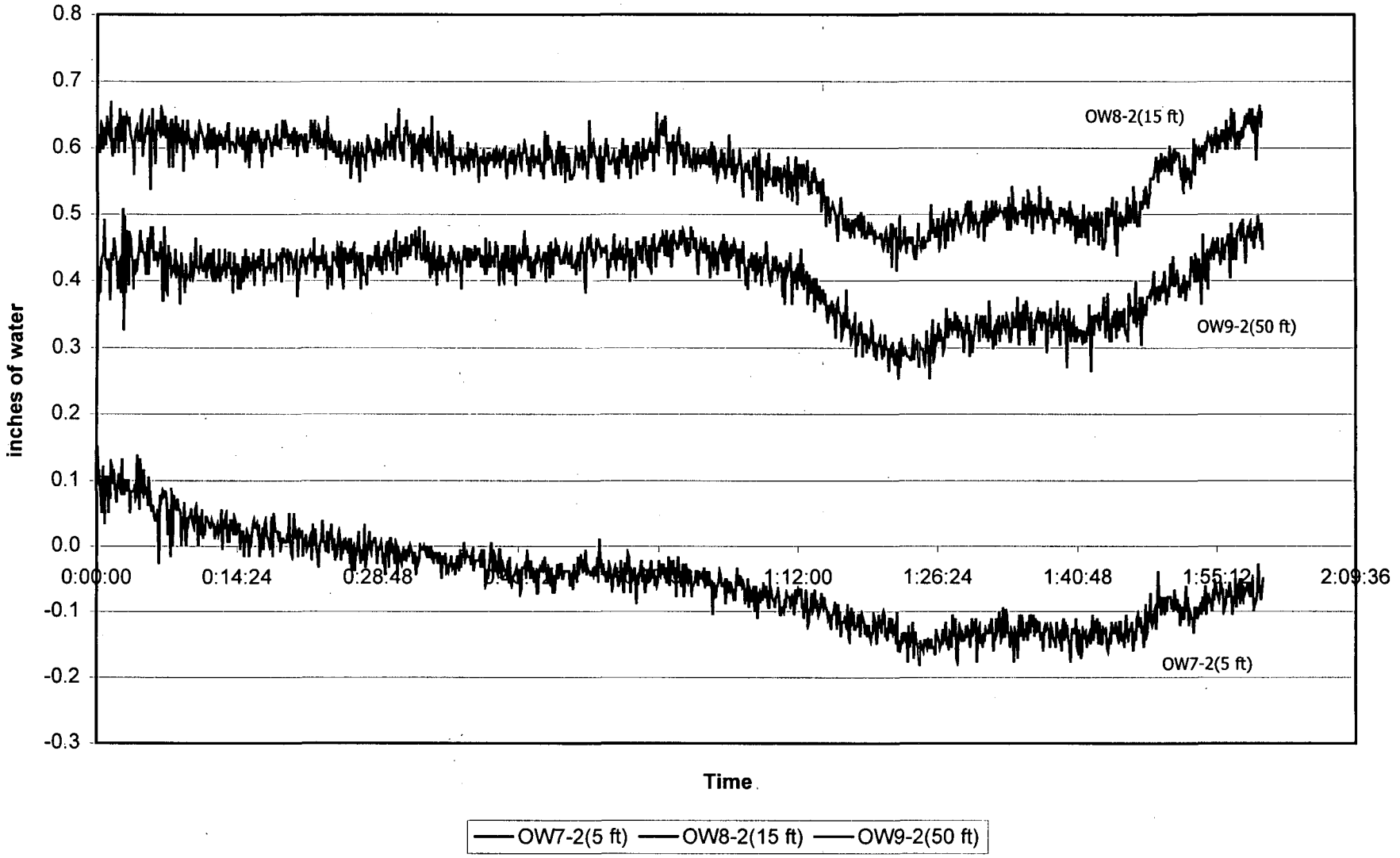
EW2-4(2d) - 9/22/98



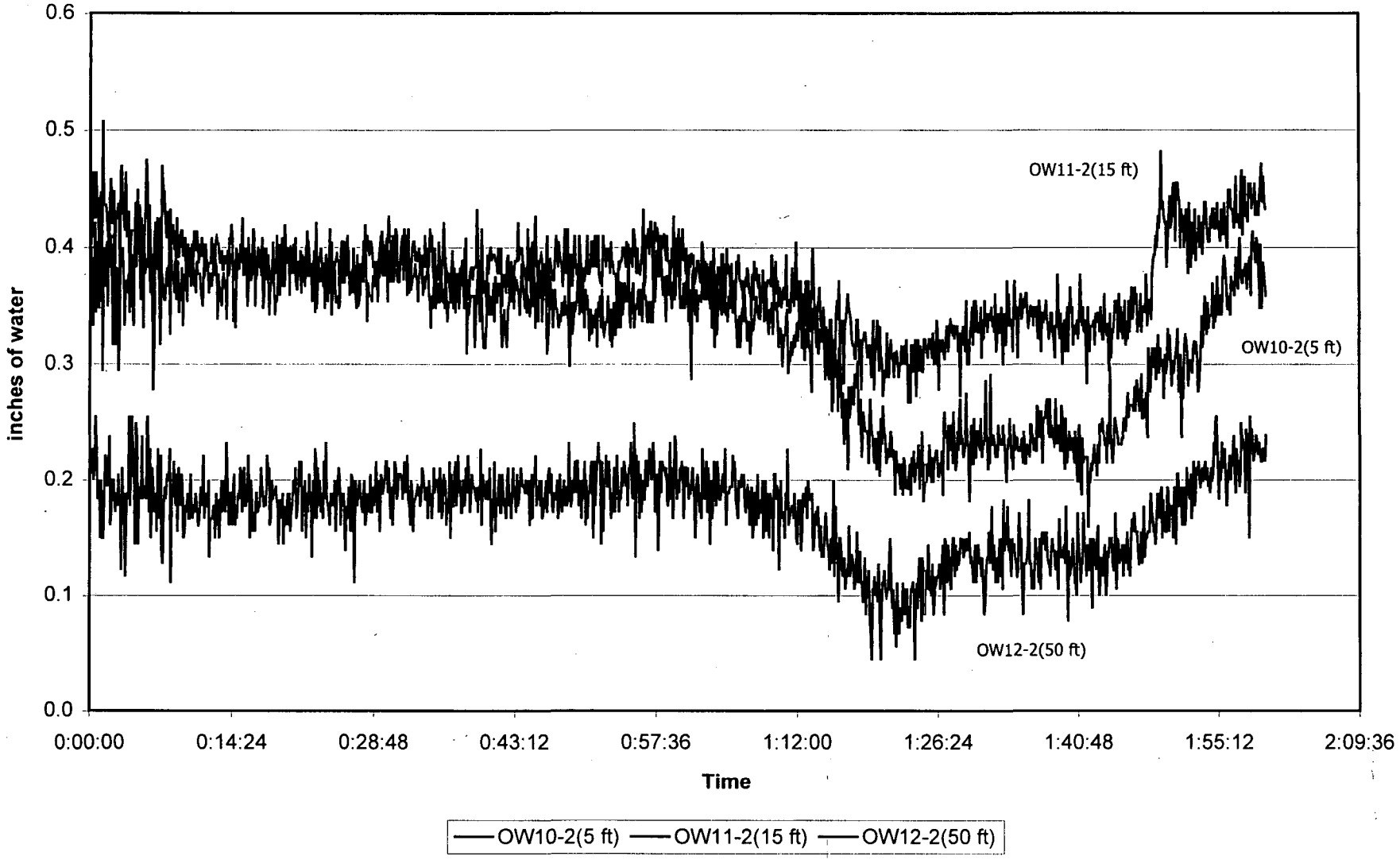
EW2-4(2d) - 9/22/98



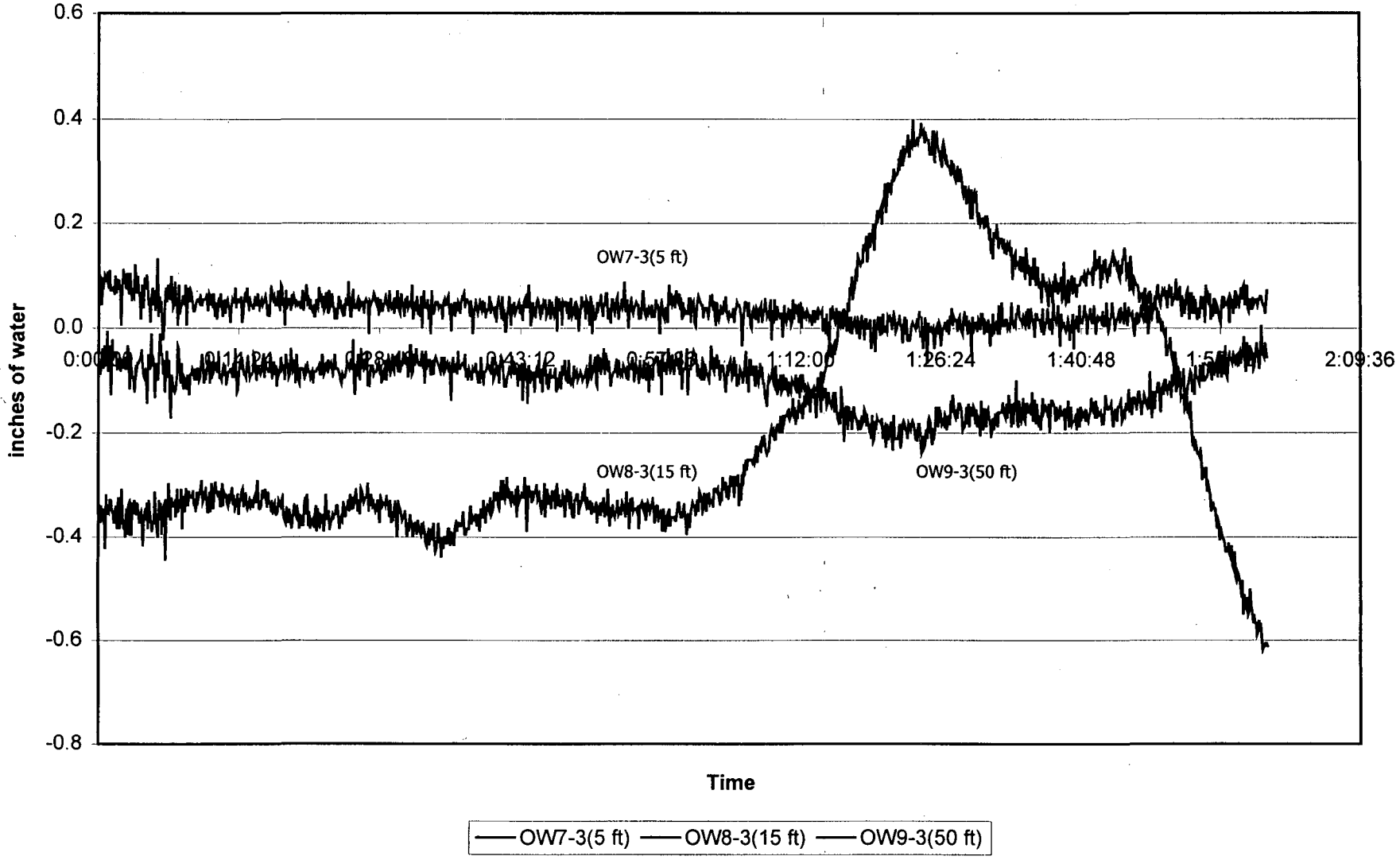
Ew2-4(2d) - 9/22/98



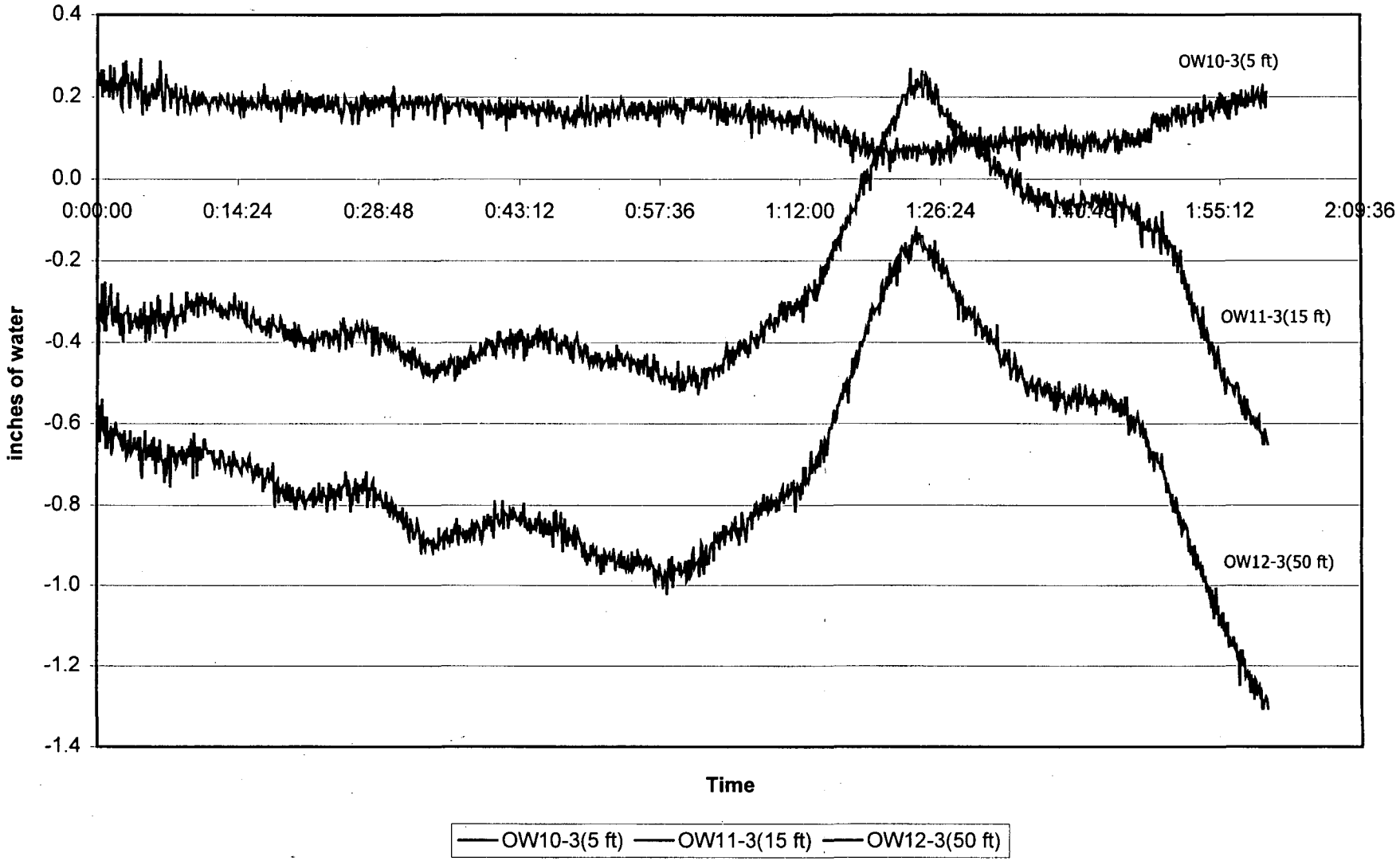
EW2-4(2d) - 9/22/98



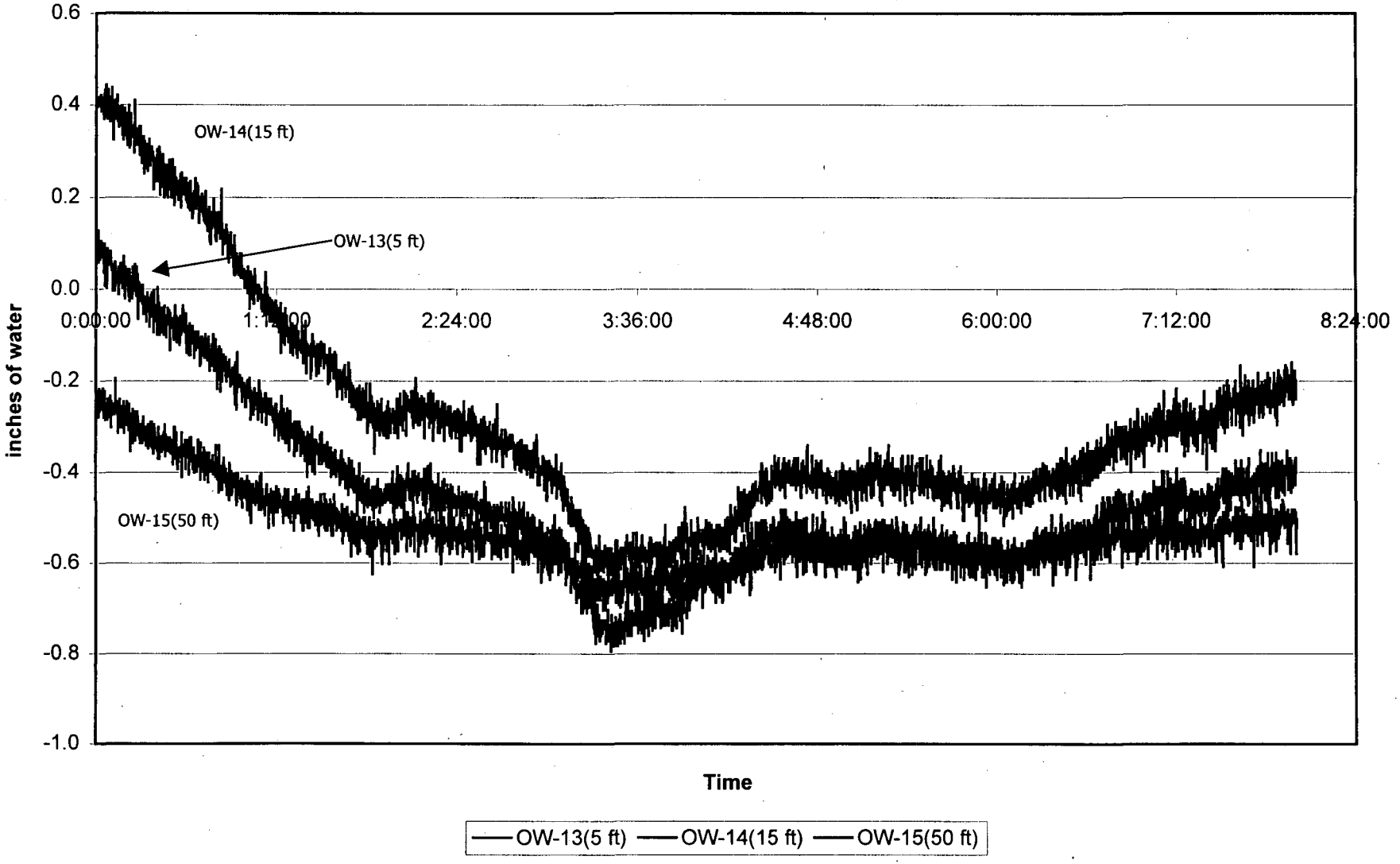
EW2-4(2d) - 9/22/98



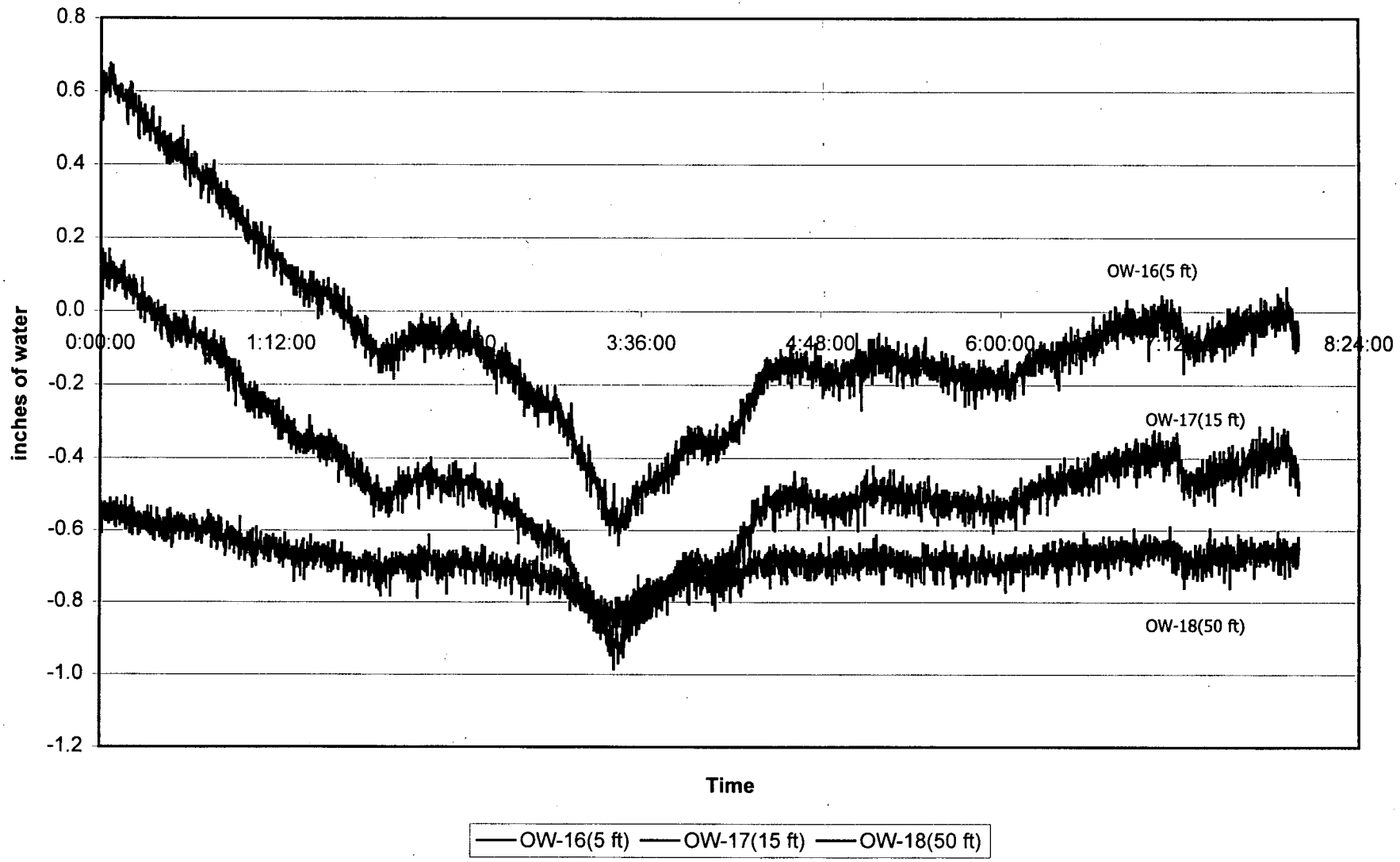
EW2-4(2d) - 9/22/98



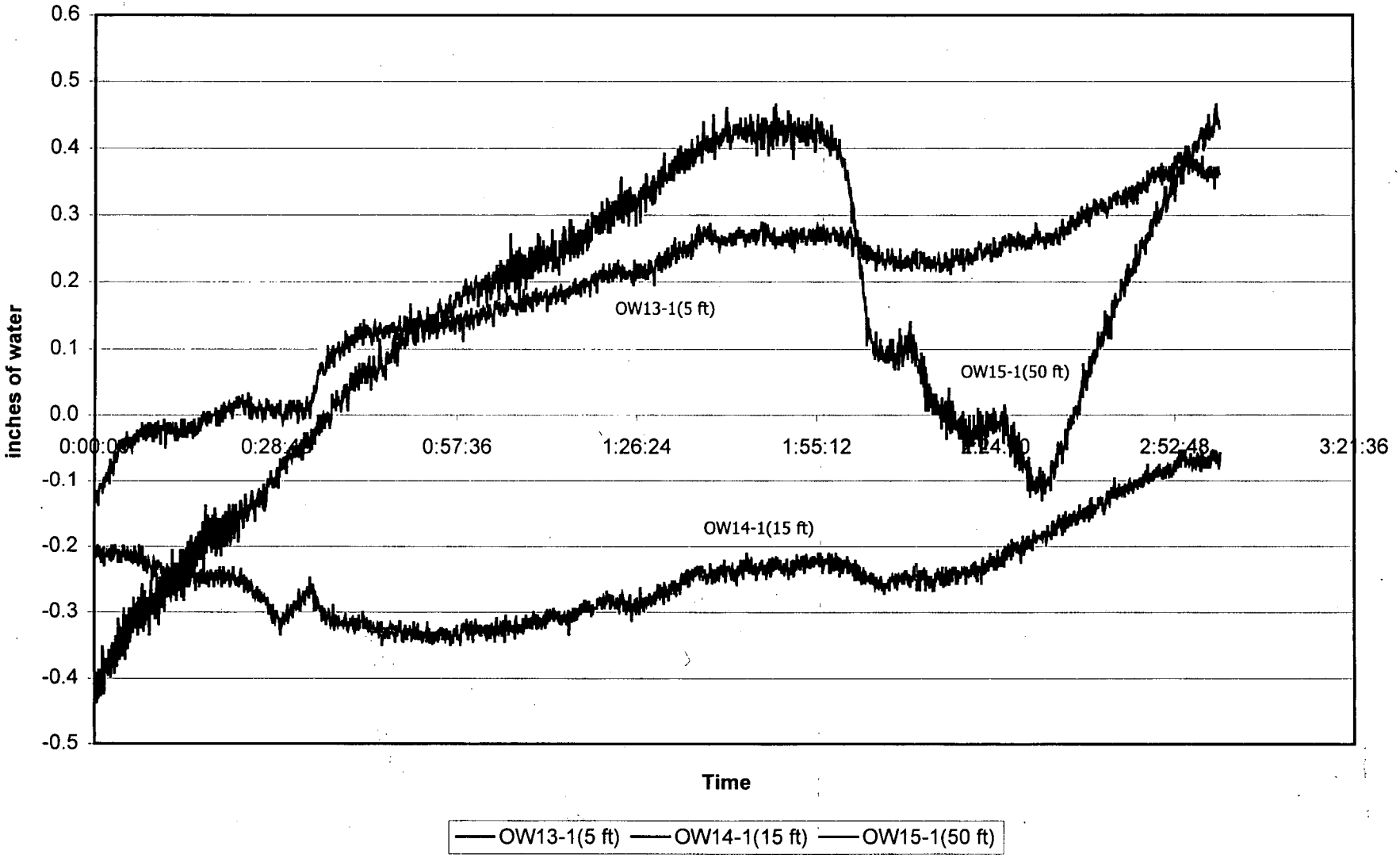
EW3 - 9/15/98


0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
inches of water
OW-14(15 ft)
OW-13(5 ft)
OW-15(50 ft)
0:00:00
2:24:00
3:36:00
4:48:00
6:00:00
7:12:00
8:24:00
Time
OW-13(5 ft)
OW-14(15 ft)
OW-15(50 ft)

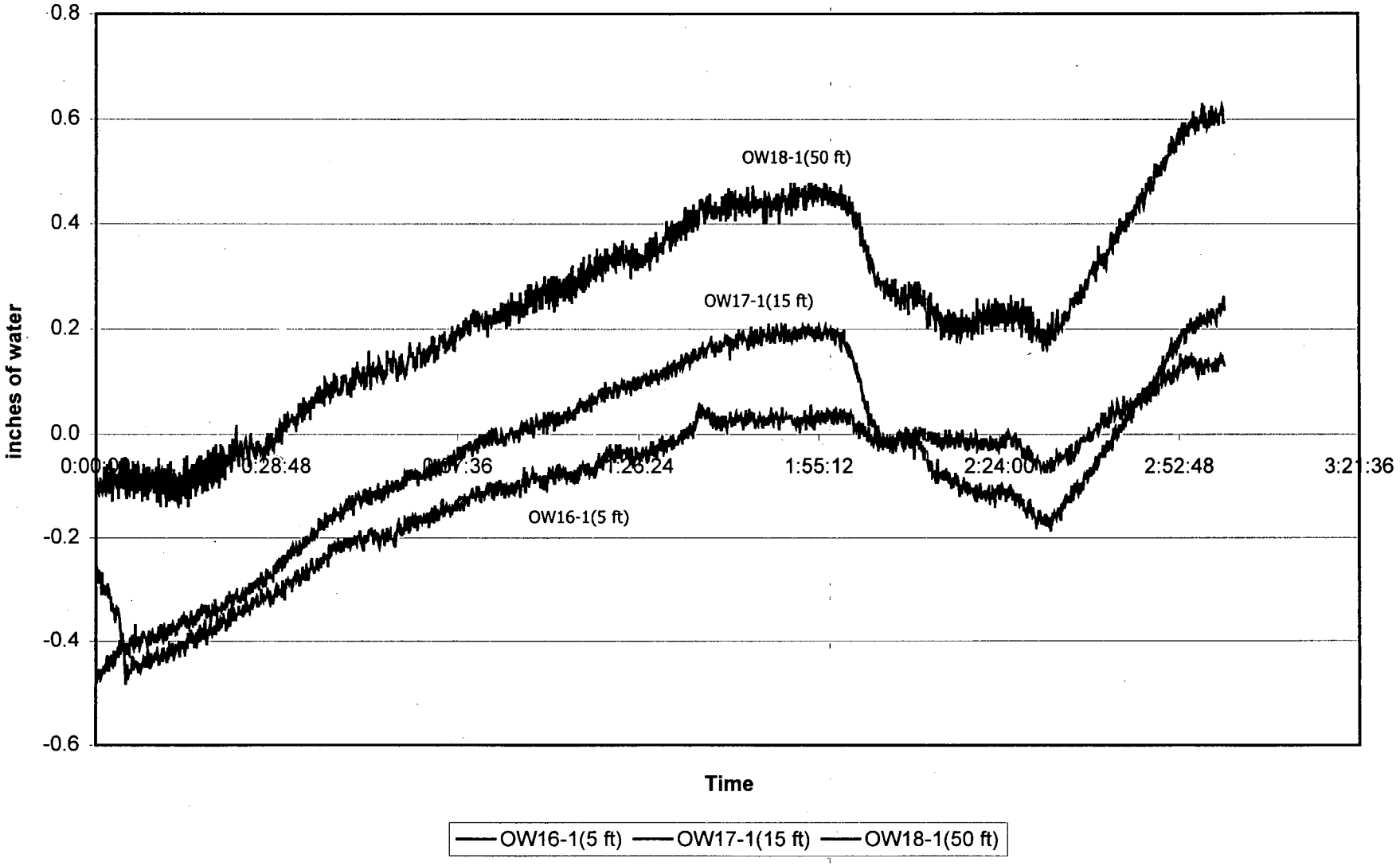
EW3 - 9/15/98


0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8
-1.0
-1.2
inches of water
0:00:00
1:12:00
3:36:00
4:48:00
6:00:00
8:24:00
OW-16(5 ft)
OW-17(15 ft)
OW-18(50 ft)
Time
OW-16(5 ft)
OW-17(15 ft)
OW-18(50 ft)

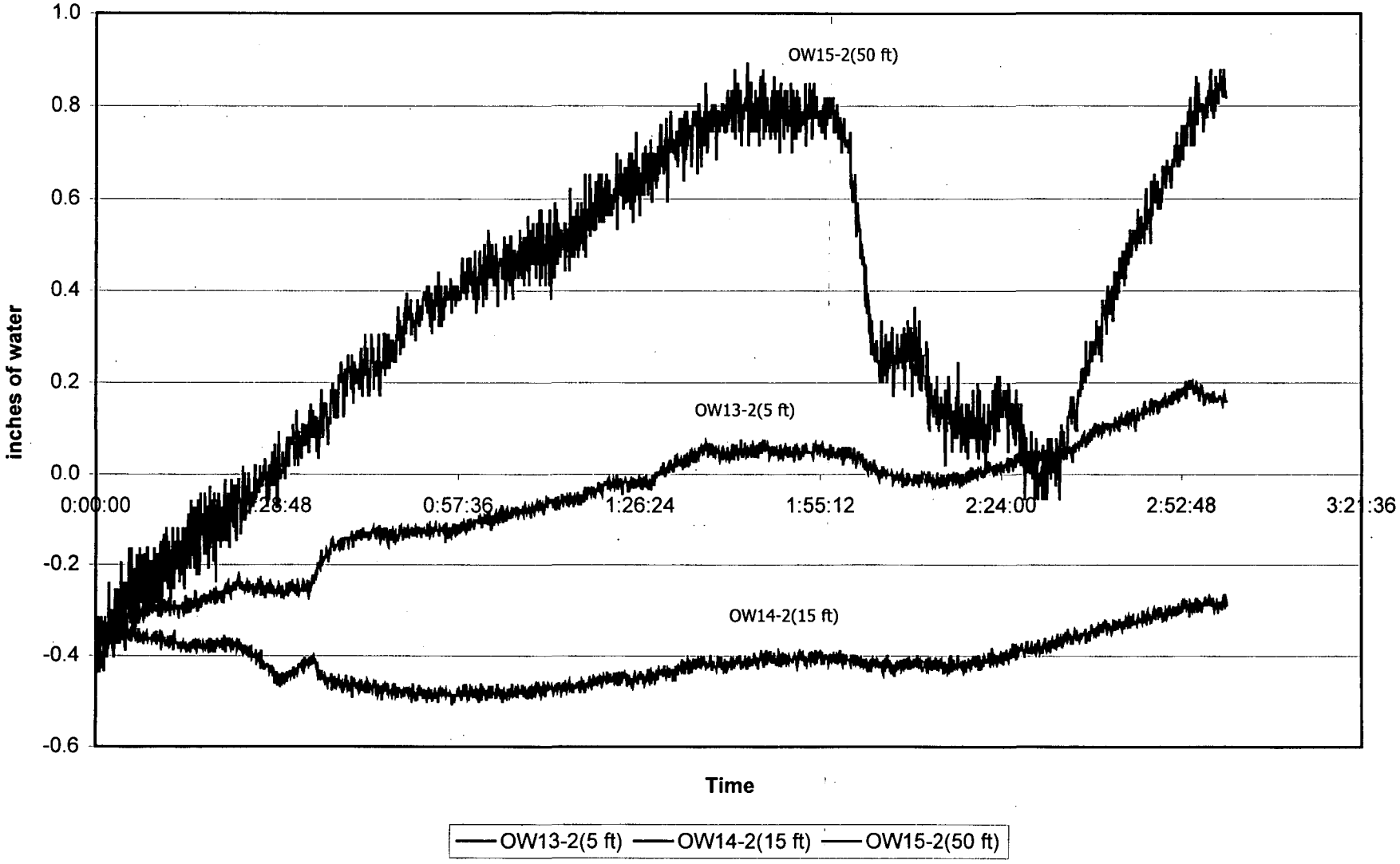
EW3-1(3a) - 9/24/98



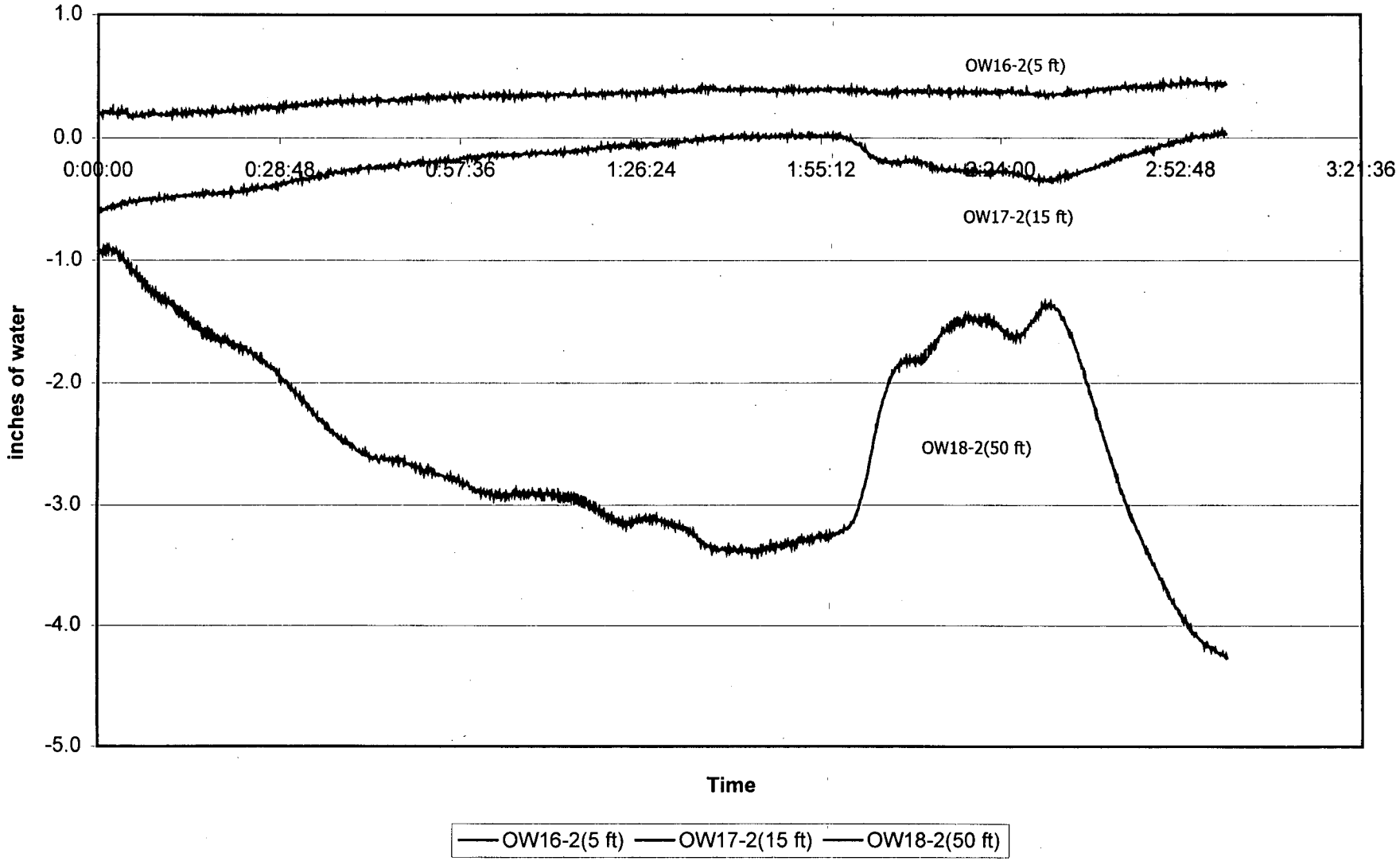
EW3-1(3a) - 9/24/98



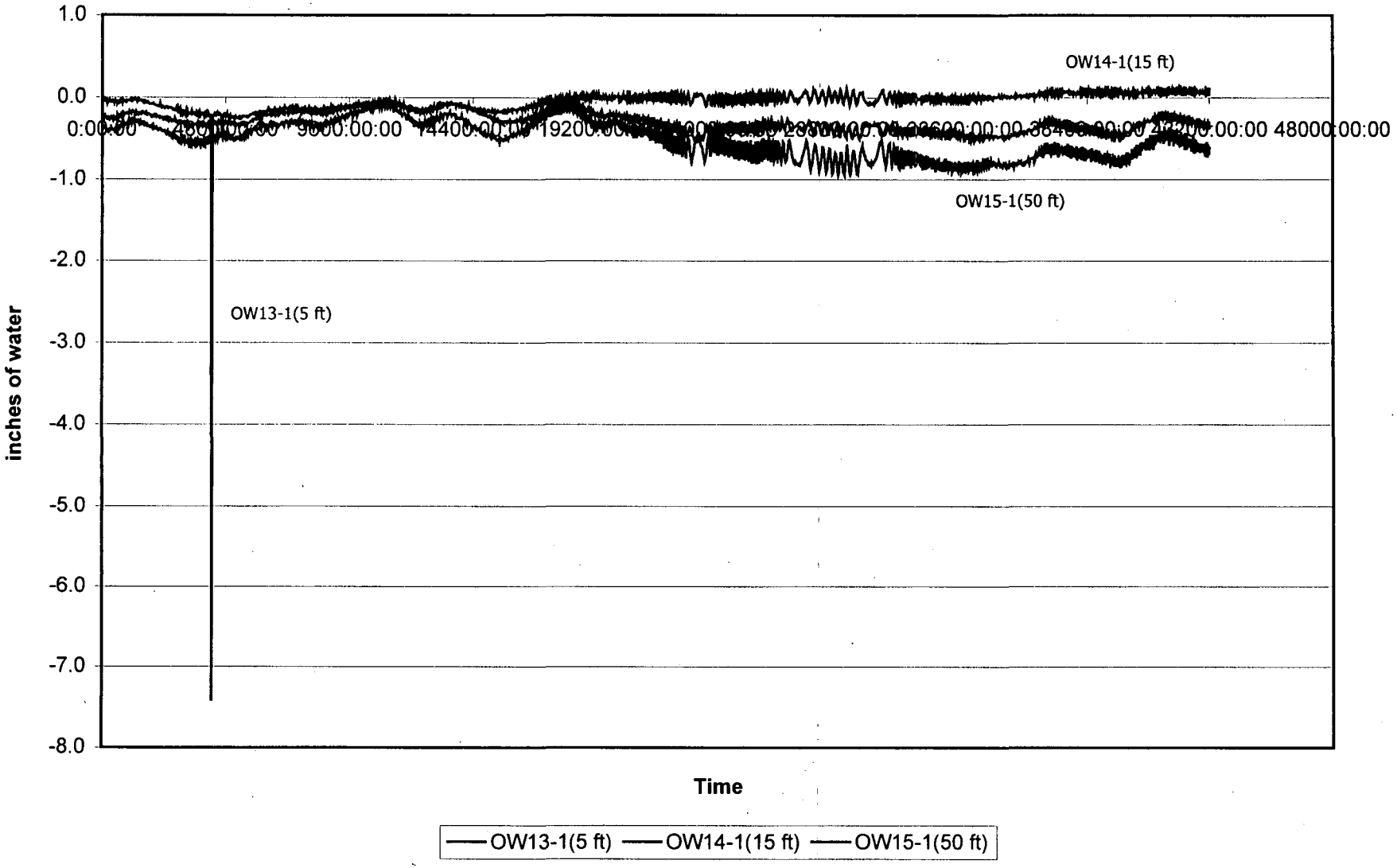
EW3-1(3a) - 9/24/98



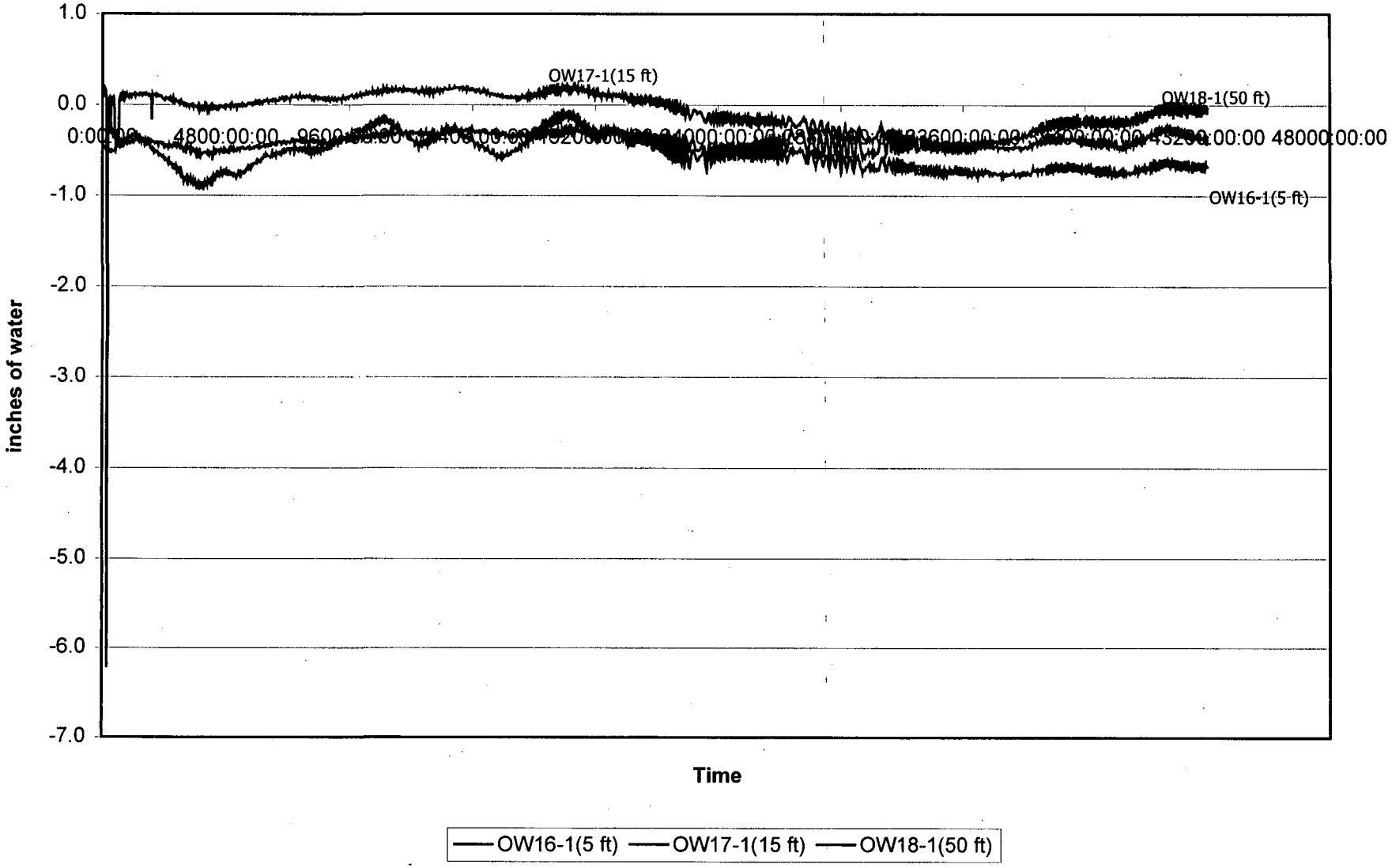
EW3-1(3a) - 9/24/98



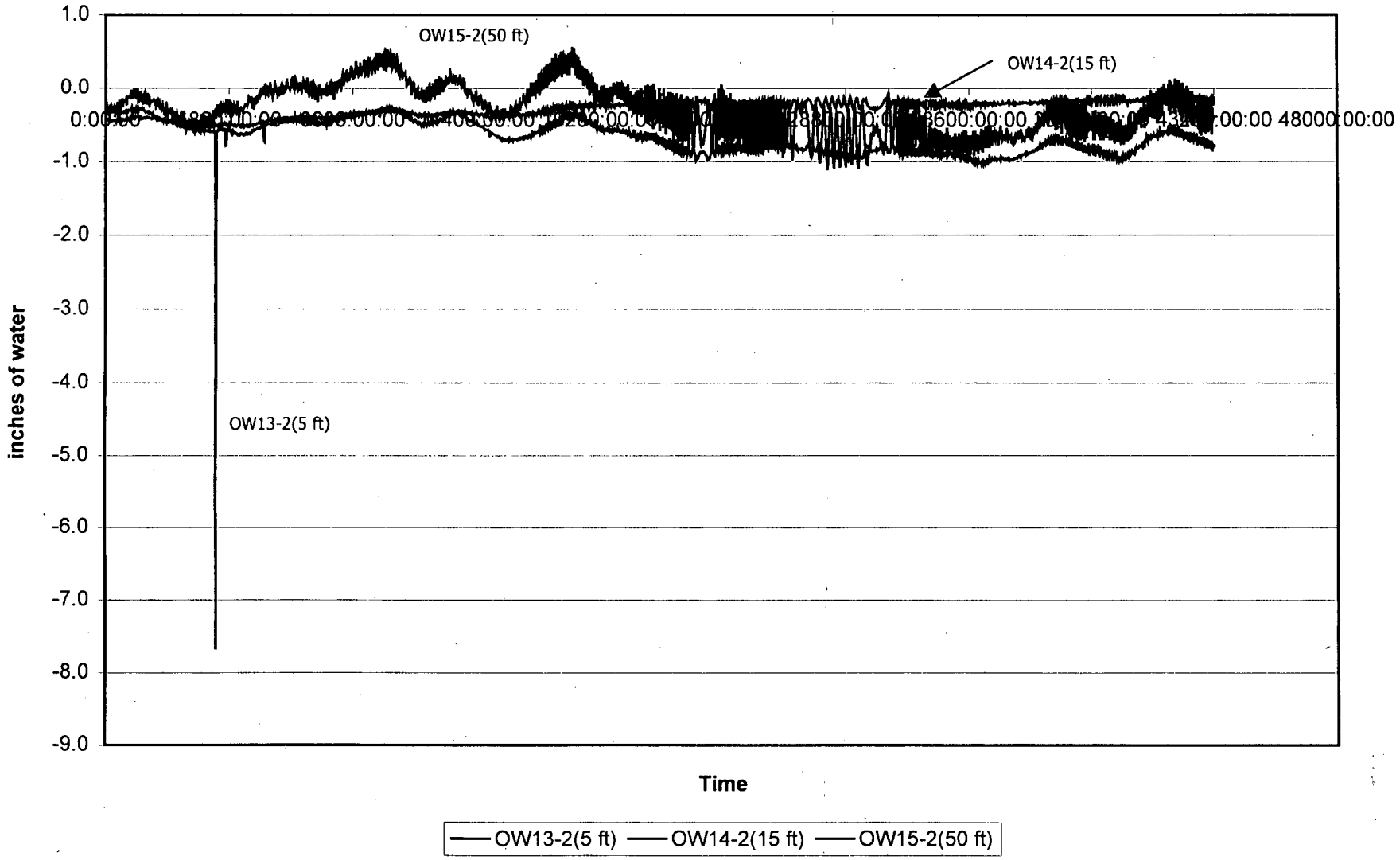
EW3-2(3b) - 9/28/98



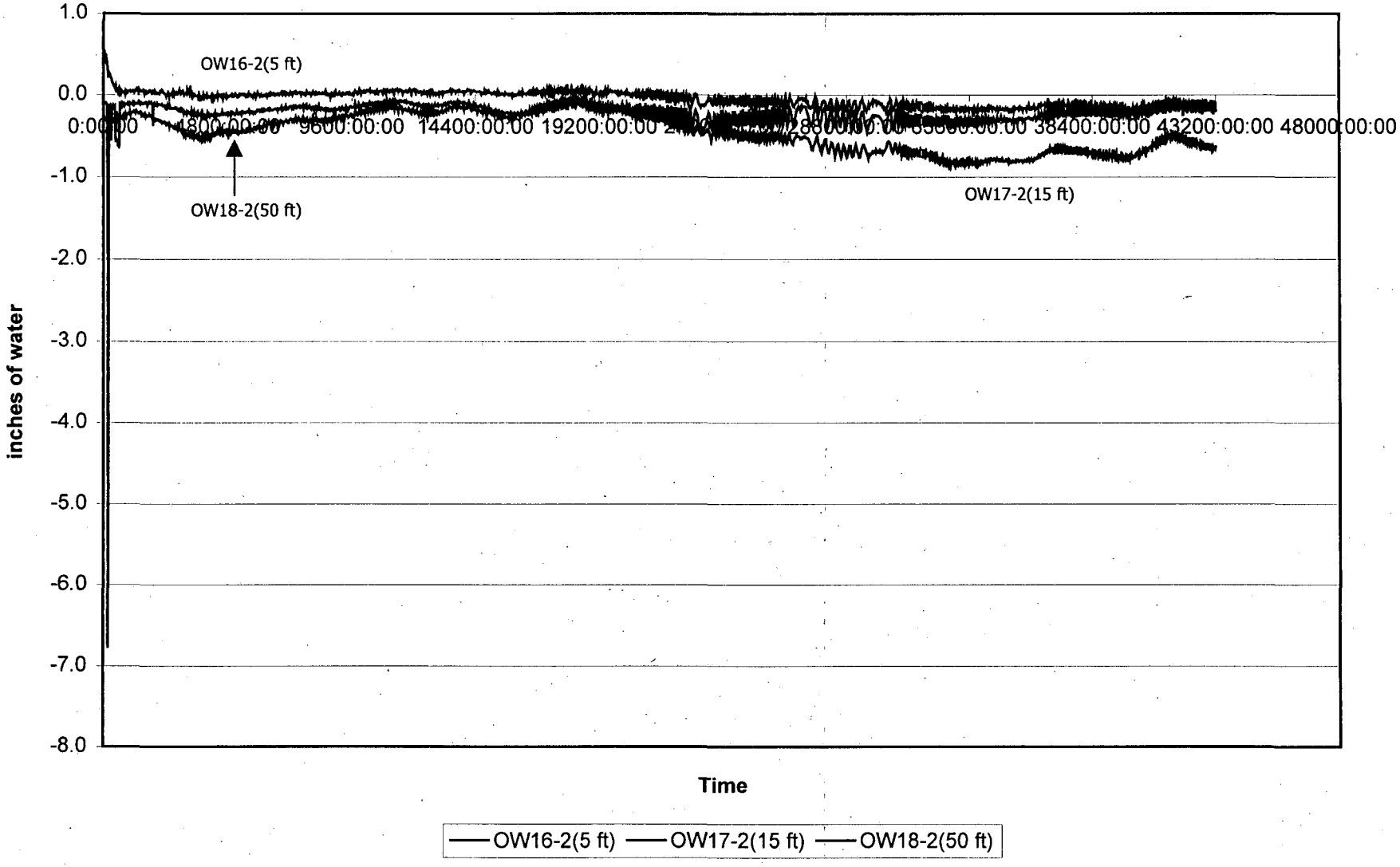
EW3-2(3b) - 9/28/98



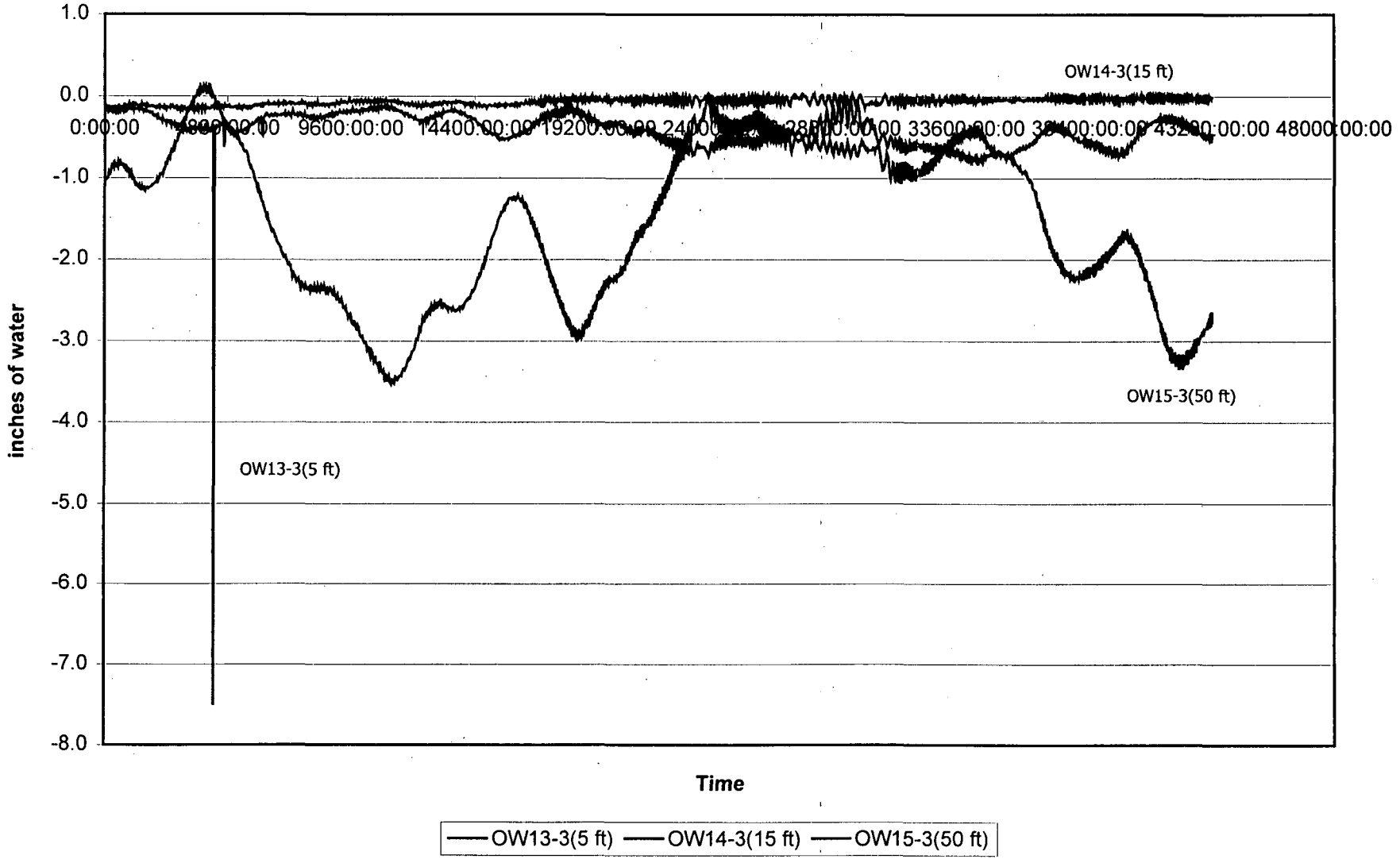
EW3-2(3b) - 9/28/98



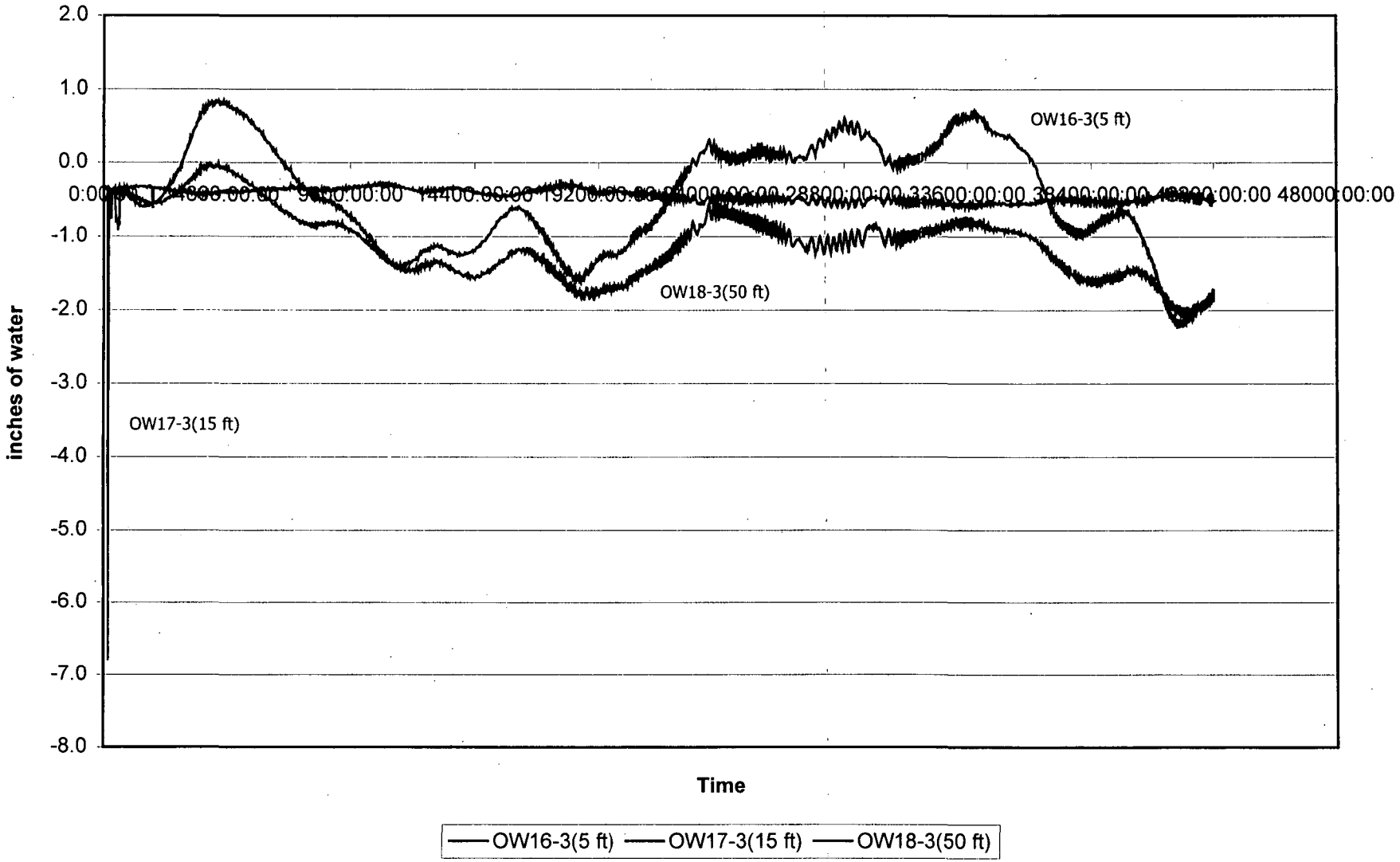
EW3-2(3b) - 9/28/98



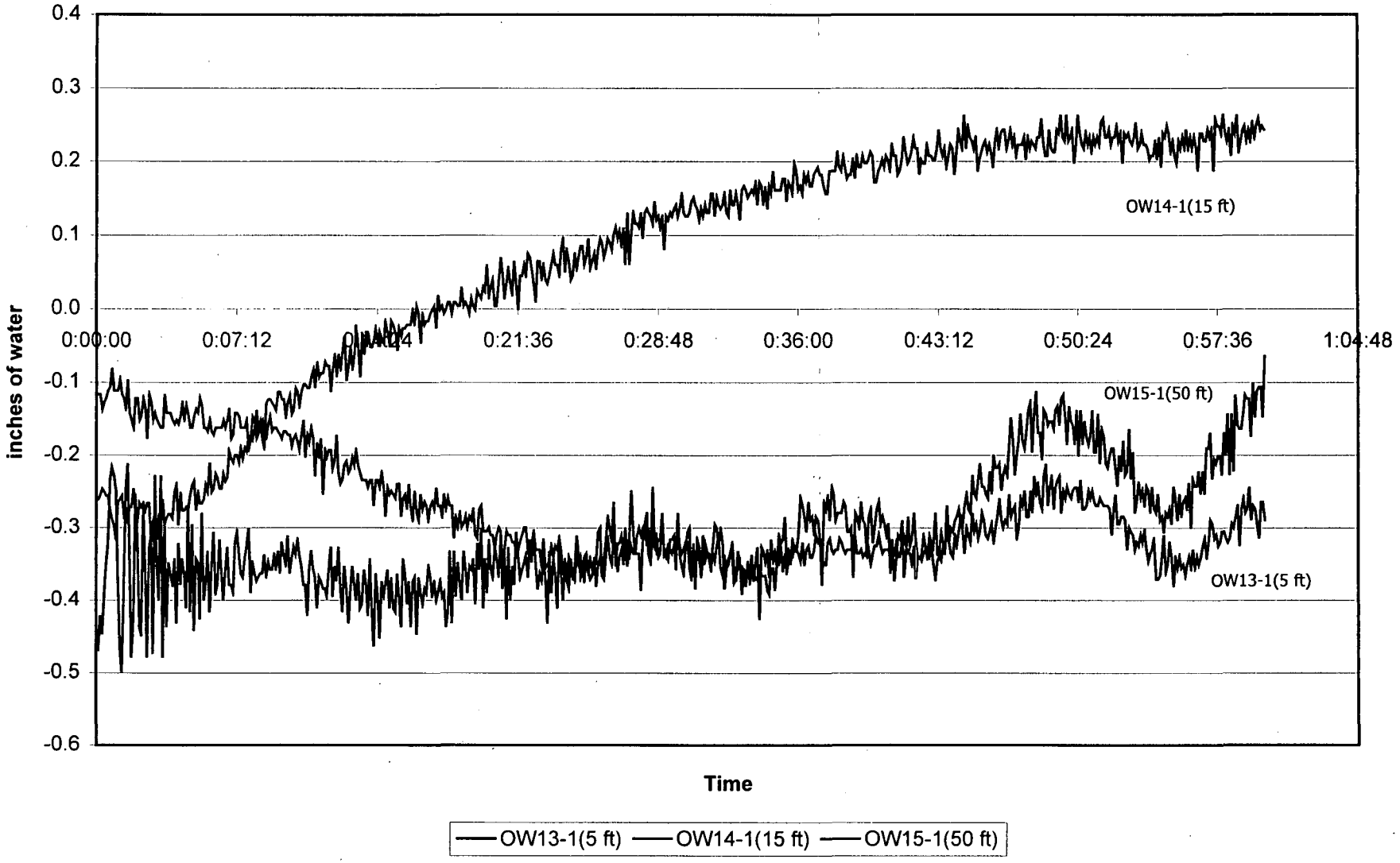
EW3-2(3b) - 9/28/98



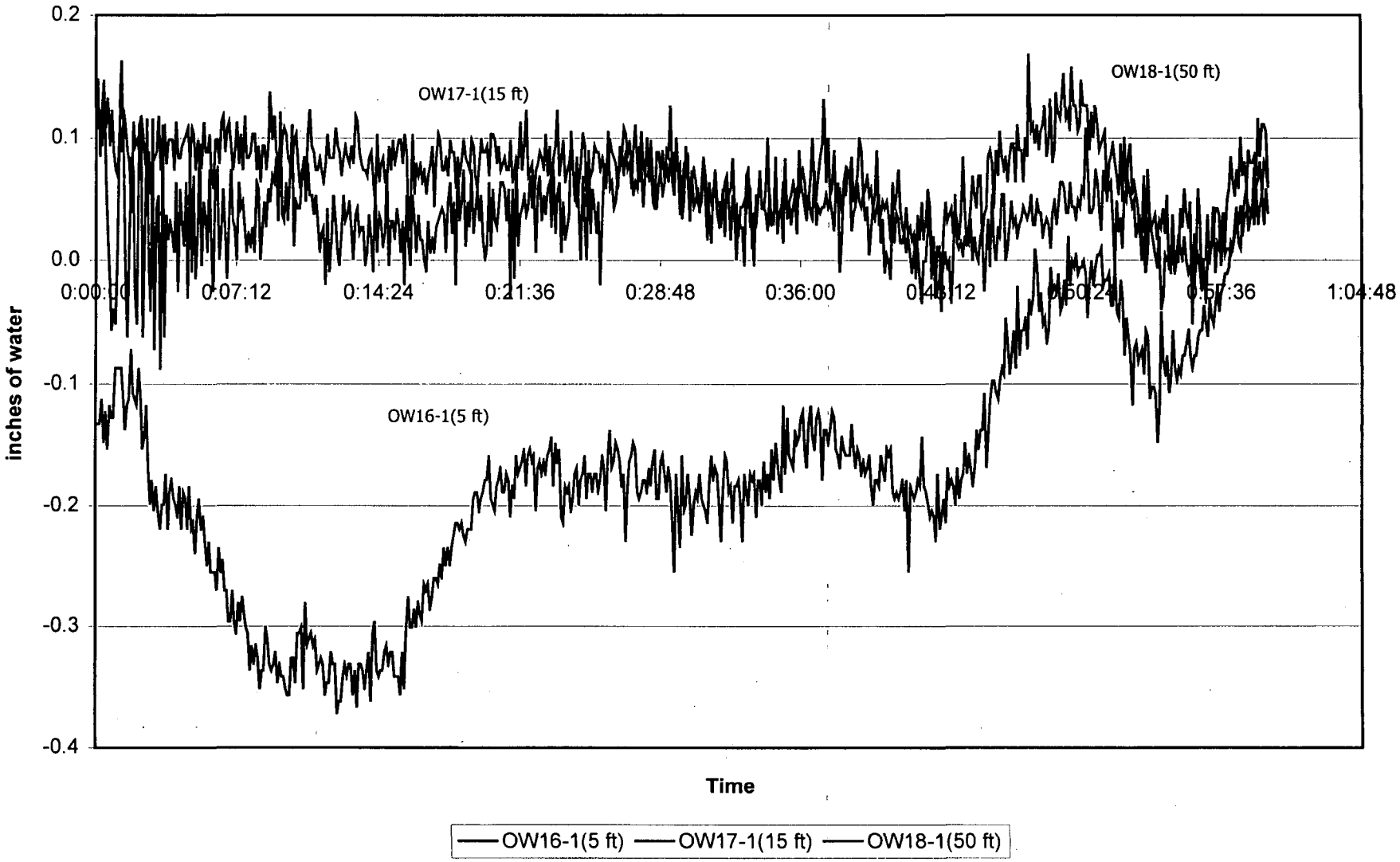
EW3-2(3b) - 9/28/98



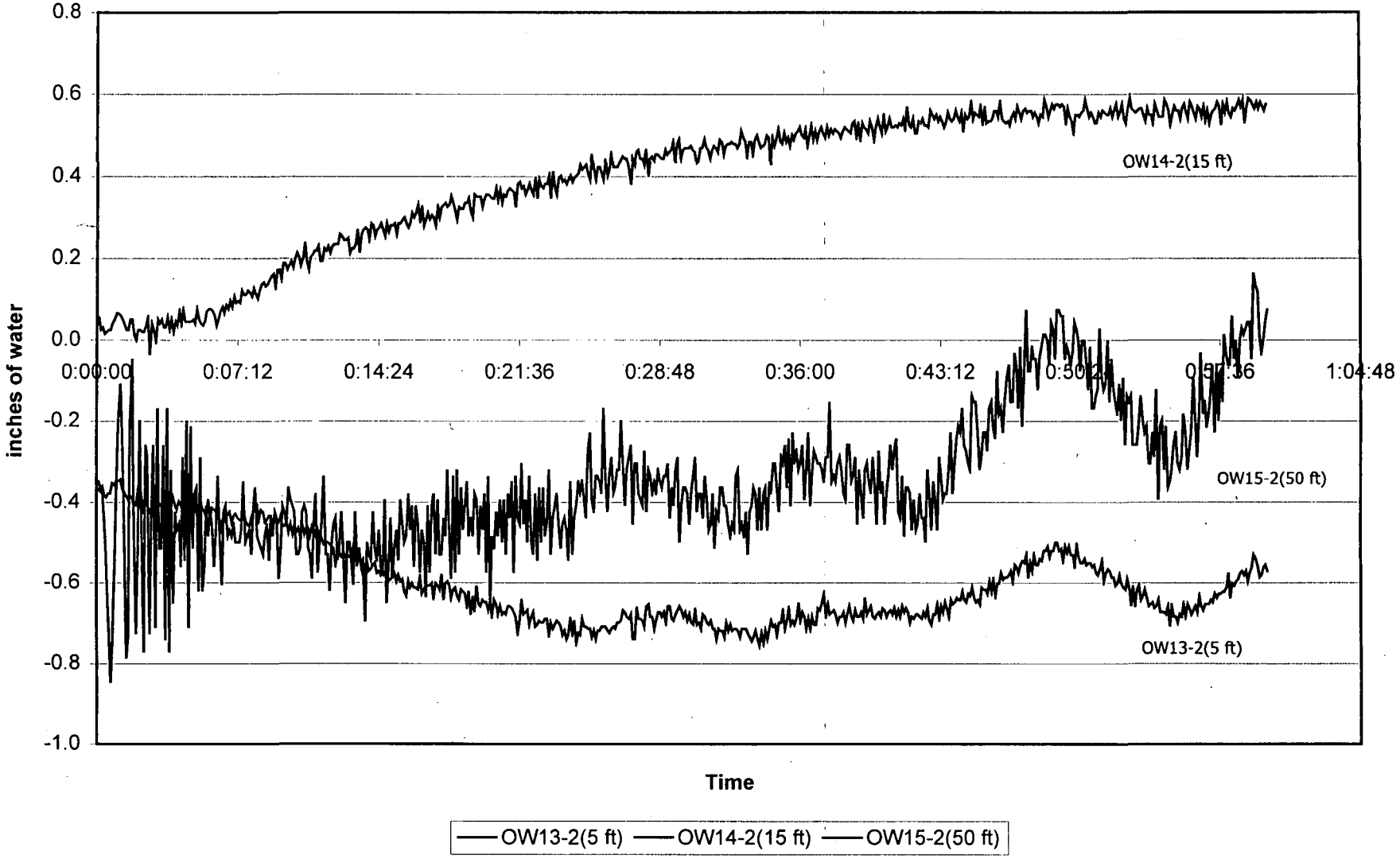
EW3-3(3c) - 9/29/98



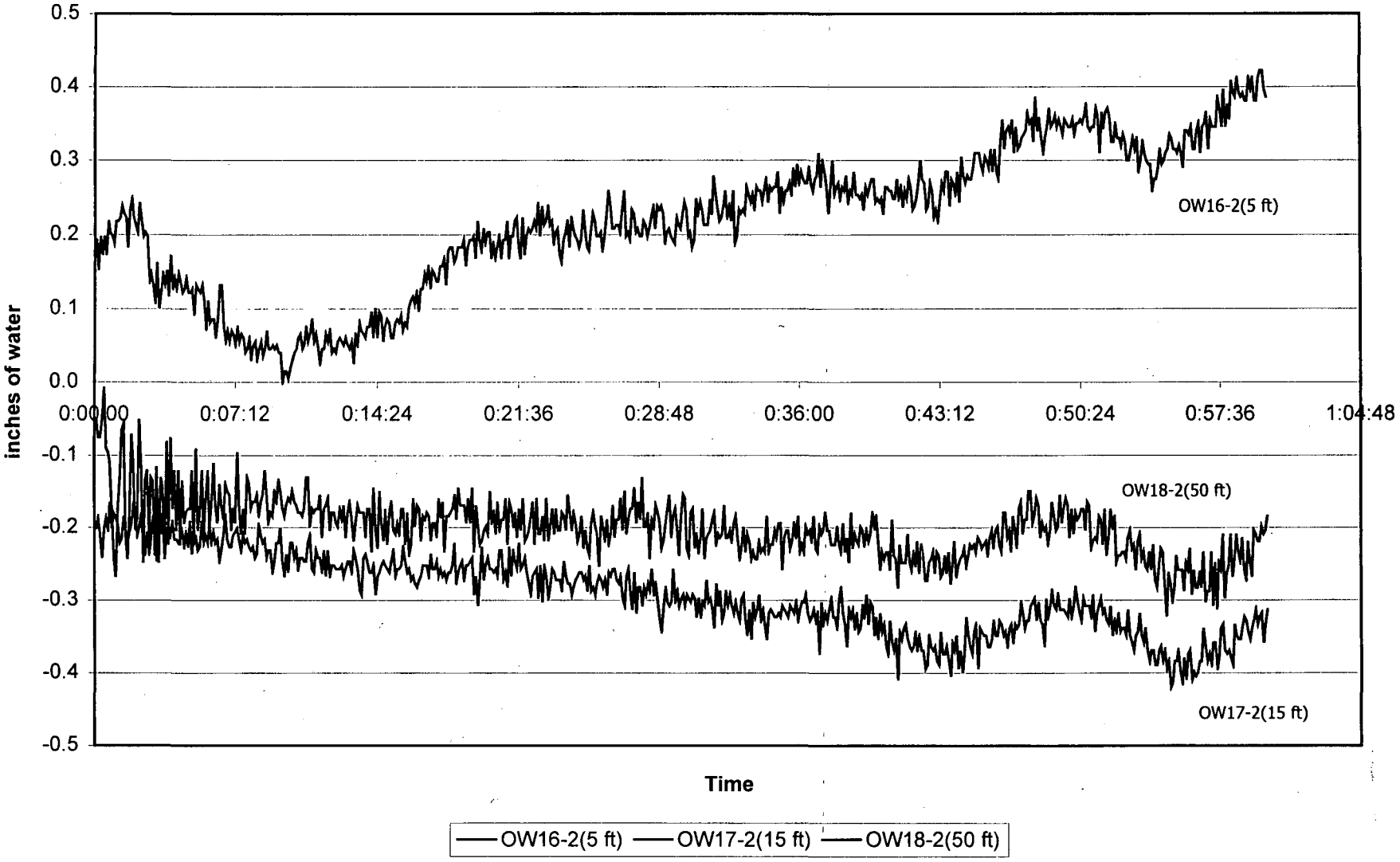
EW3-3(3c) - 9/29/98



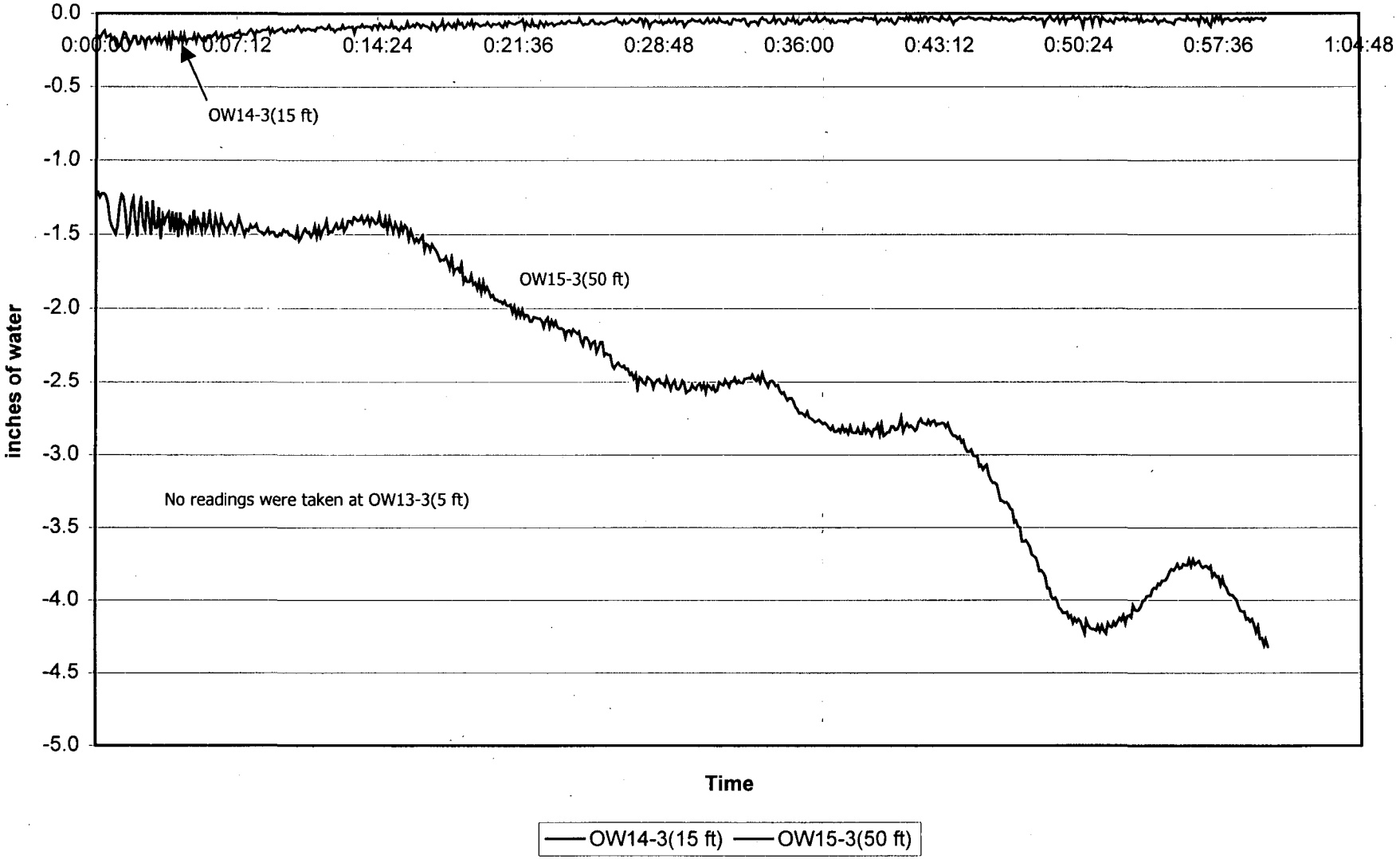
EW3-3(3c) - 9/29/98

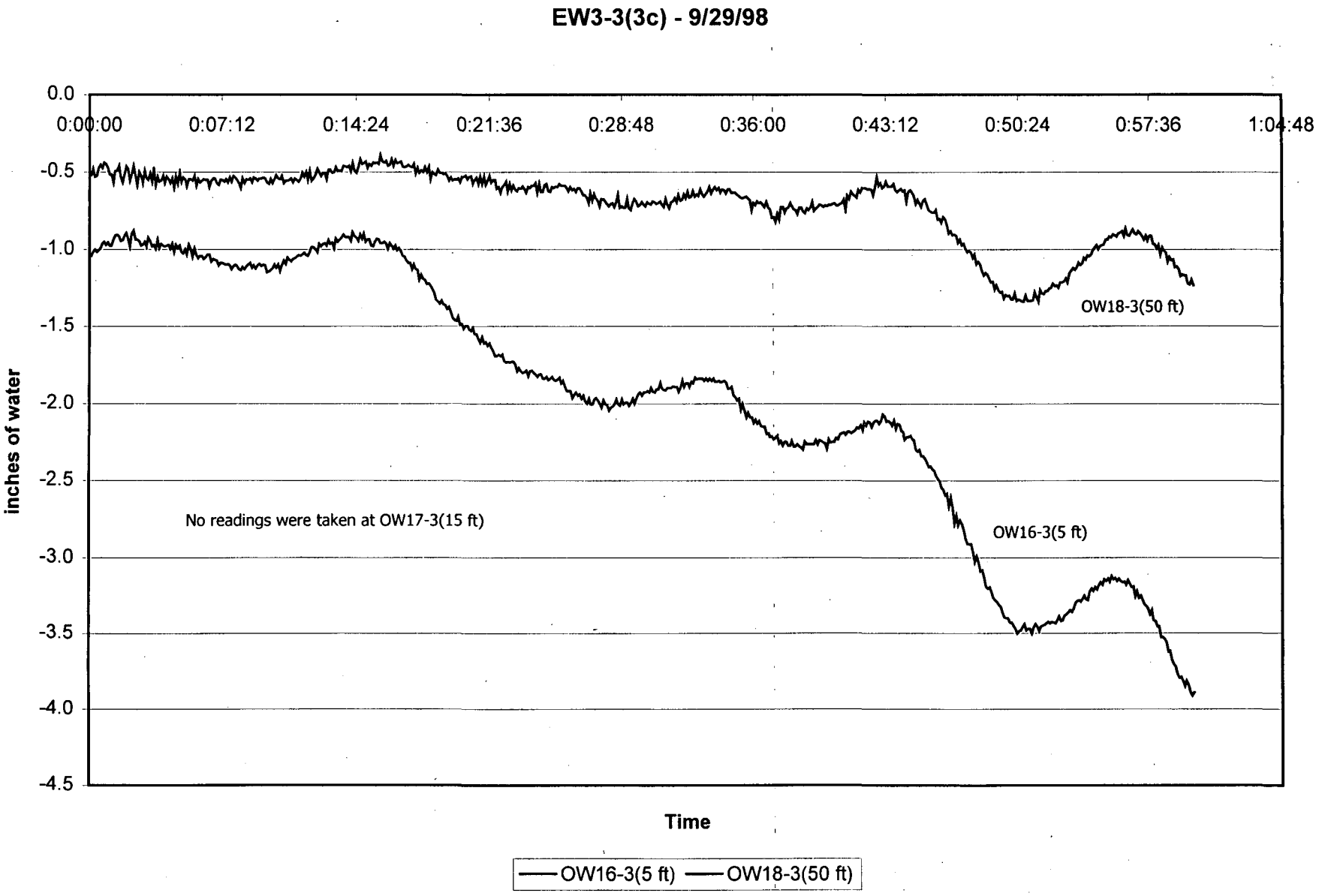


EW3-3(3c) - 9/29/98

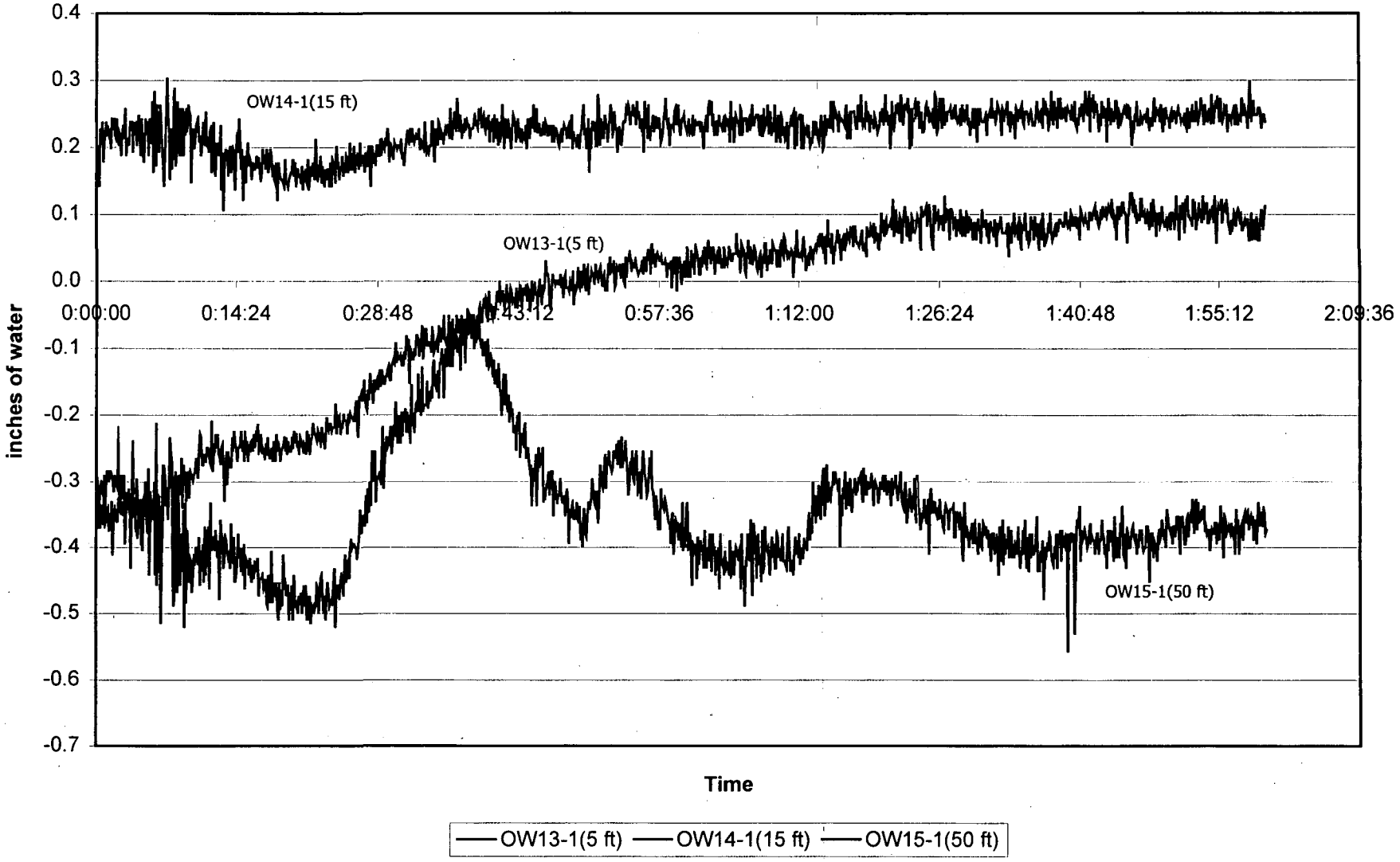


EW3-3(3c) - 9/29/98

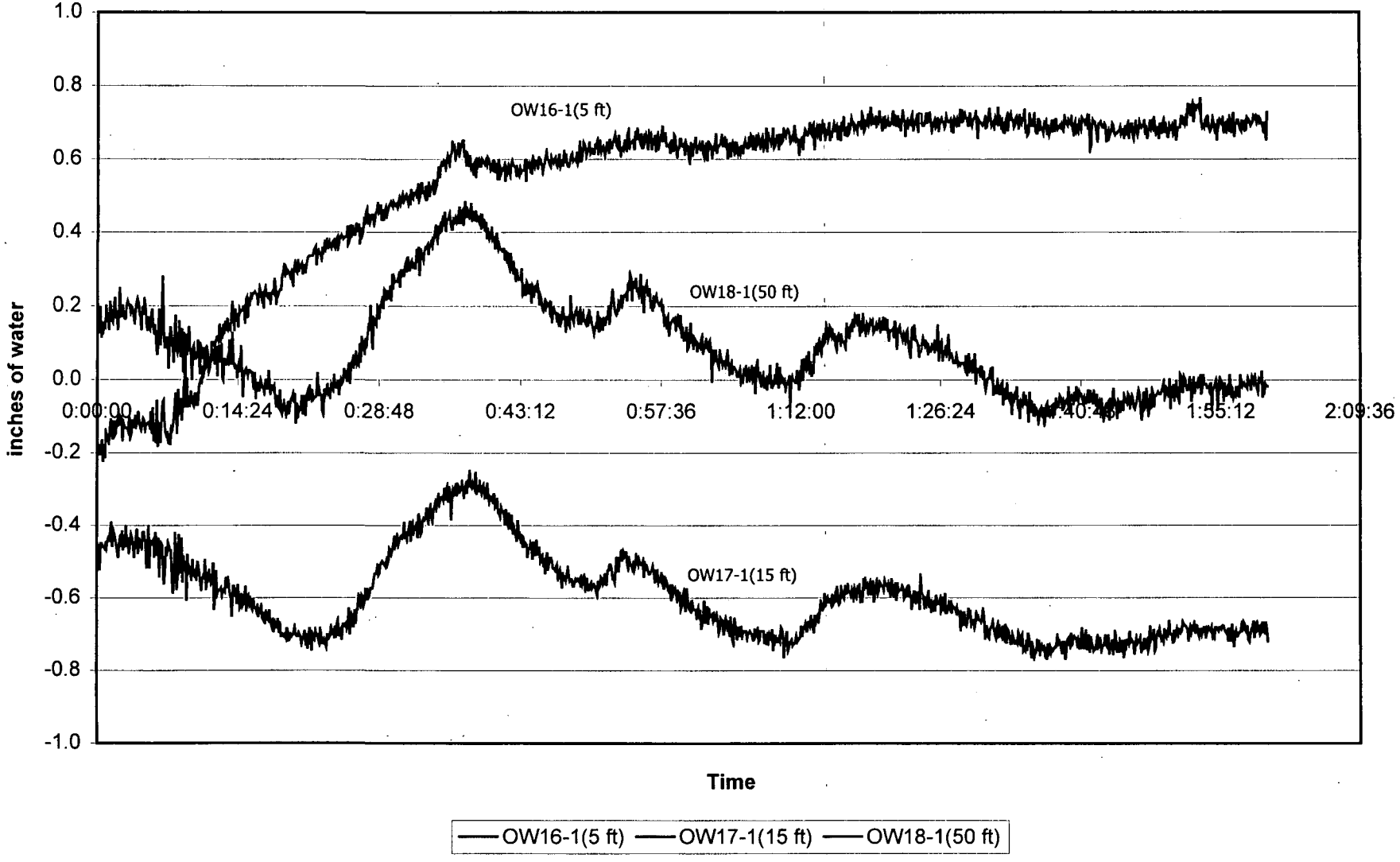



EW3-3(3c) - 9/29/98
0.0
0:00:00
0:07:12
0:14:24
0:21:36
0:28:48
0:36:00
0:43:12
0:50:24
0:57:36
1:04:48
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
inches of water
OW18-3(50 ft)
No readings were taken at OW17-3(15 ft)
OW16-3(5 ft)
Time
OW16-3(5 ft)
OW18-3(50 ft)

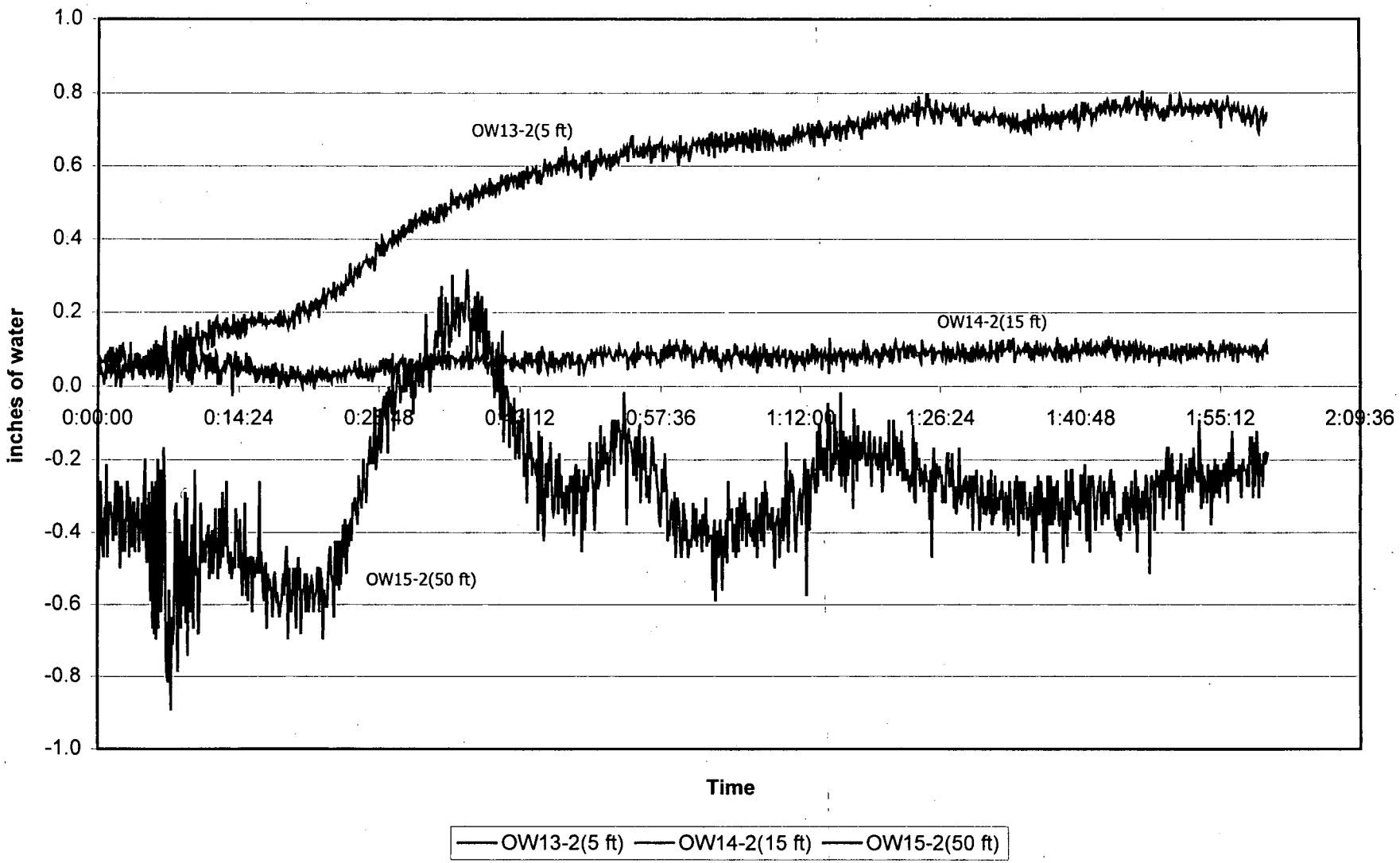
EW3-4(3d) - 9/29/98



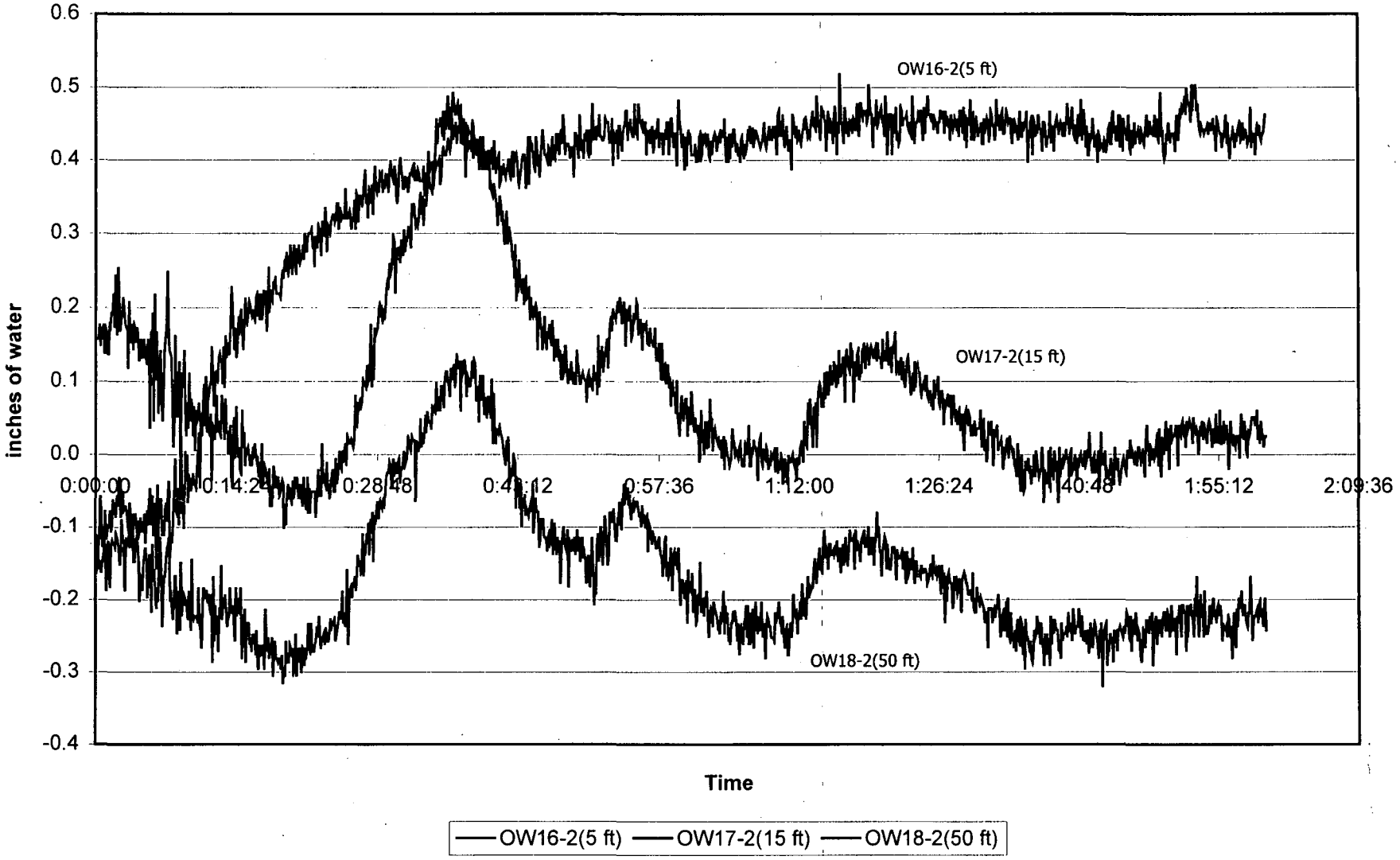
EW3-4(3d) - 9/29/98



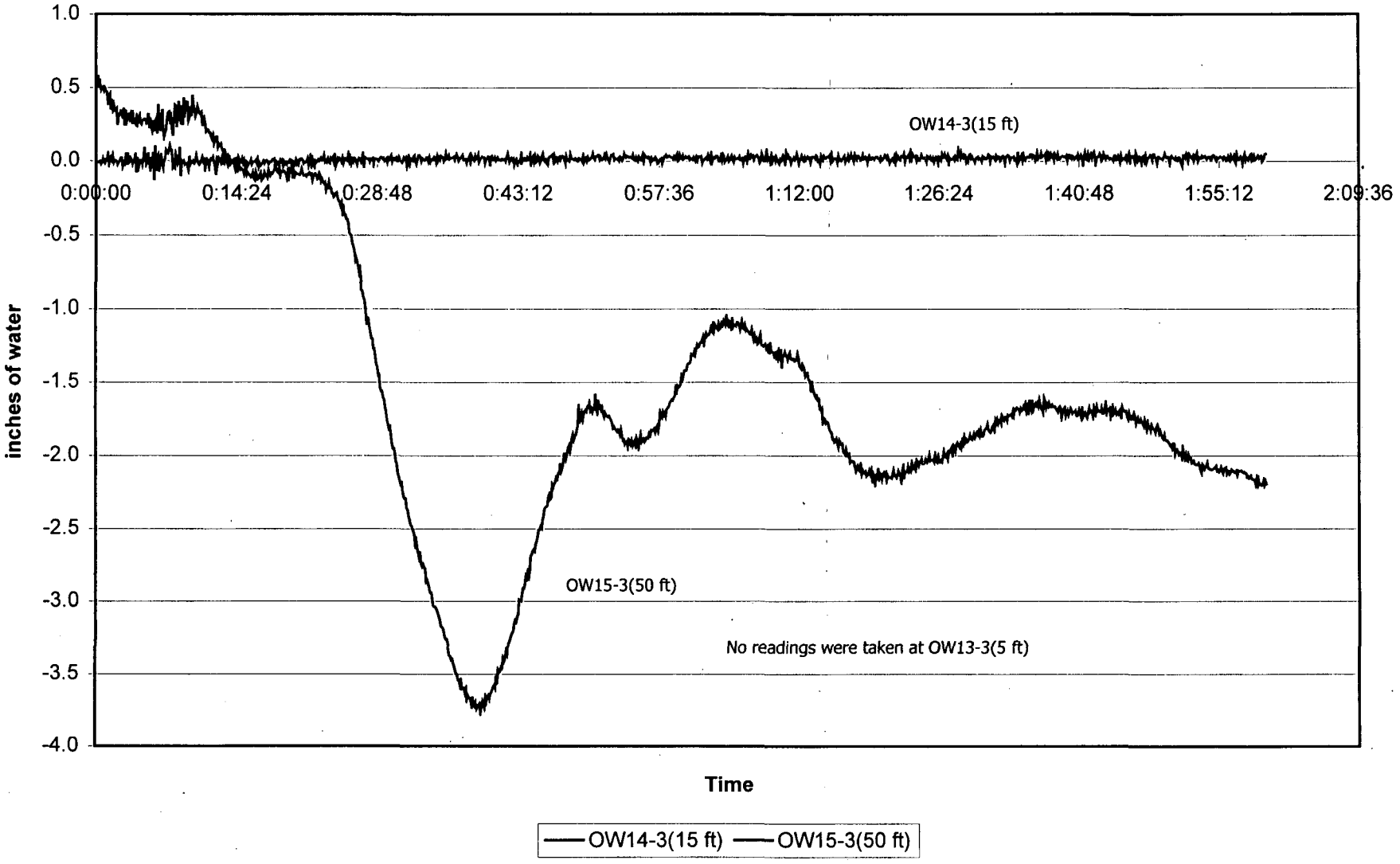
EW3-4(3d) - 9/29/98



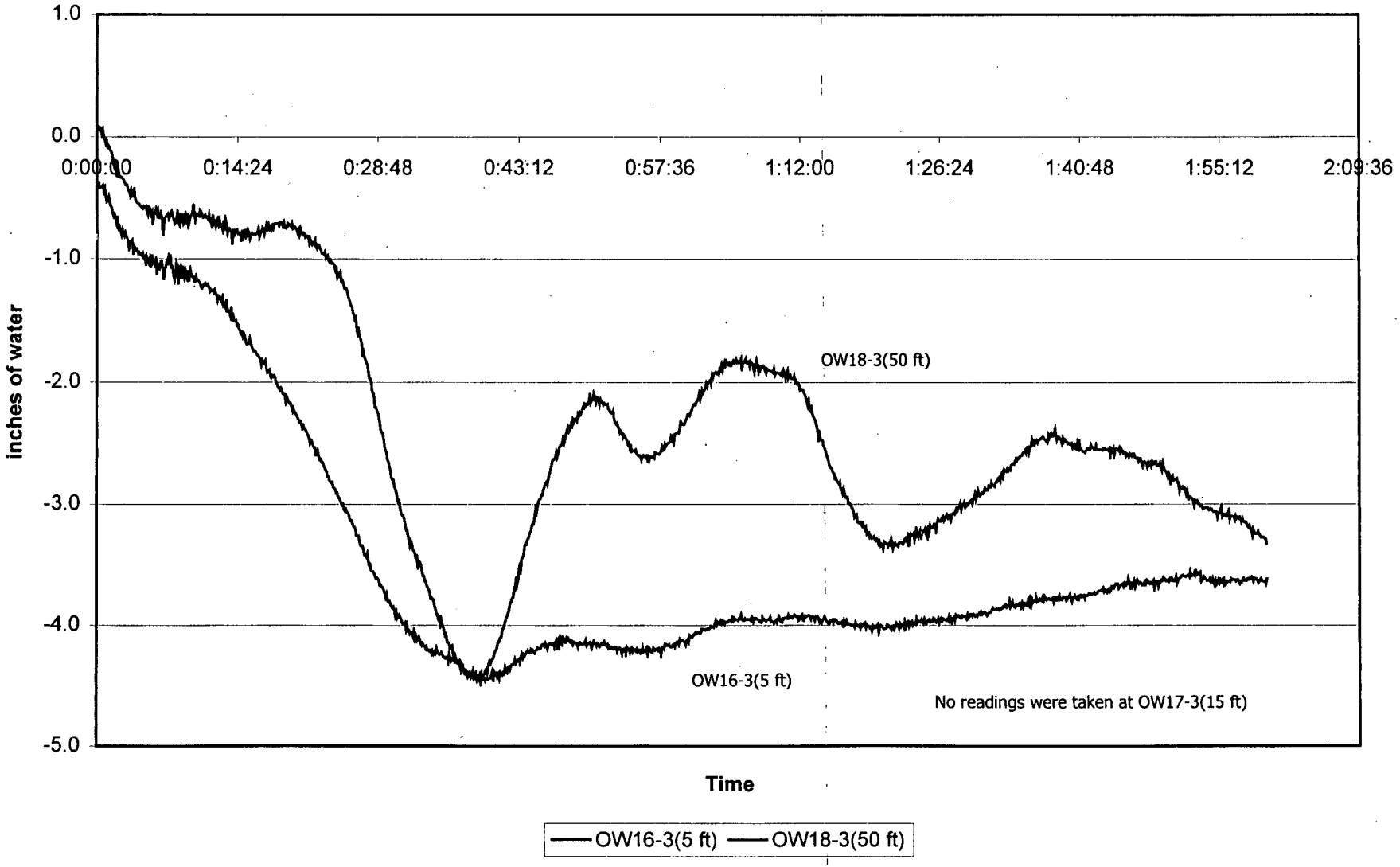
EW3-4(3d) - 9/29/98



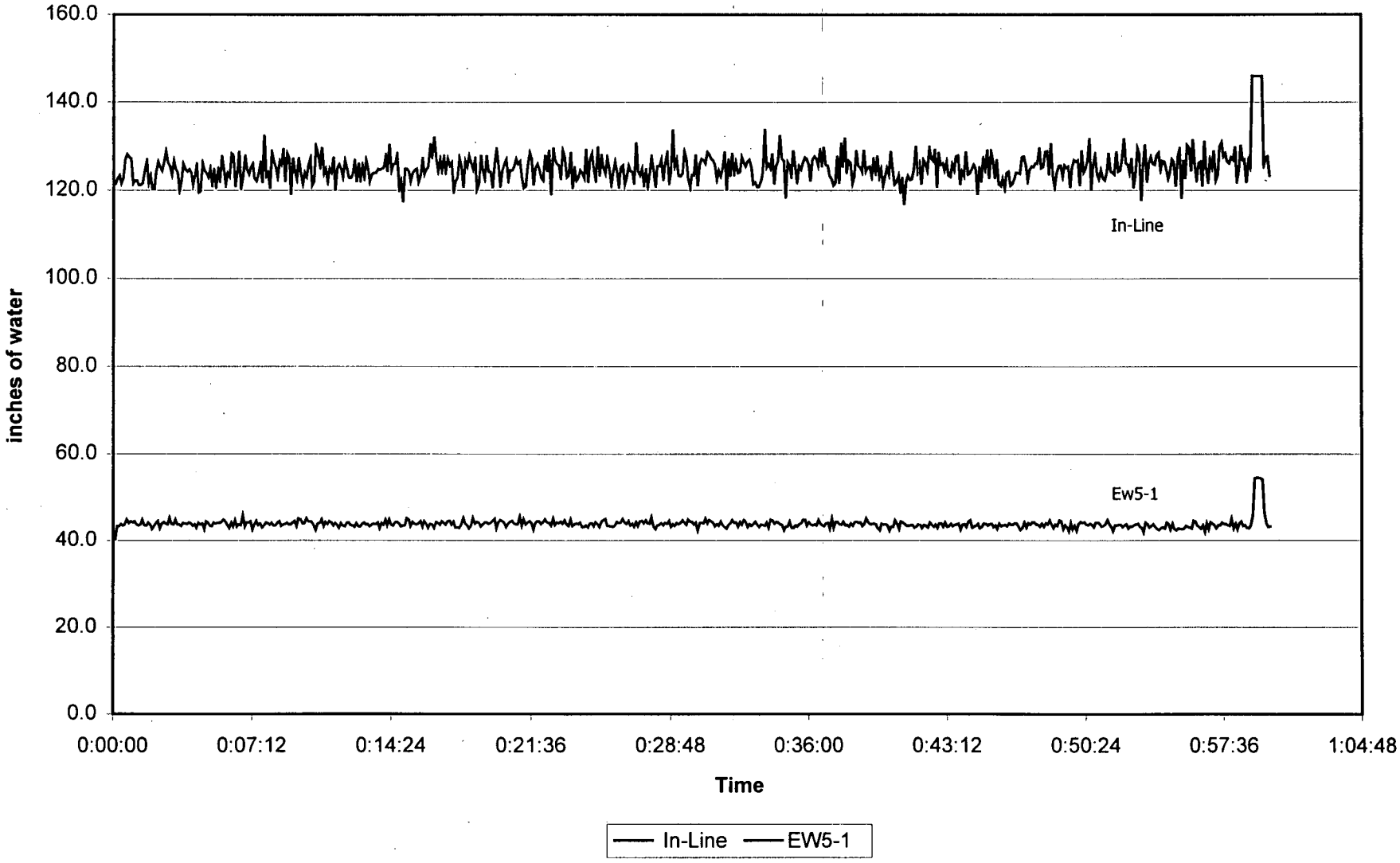
EW3-4(3d) - 9/29/98

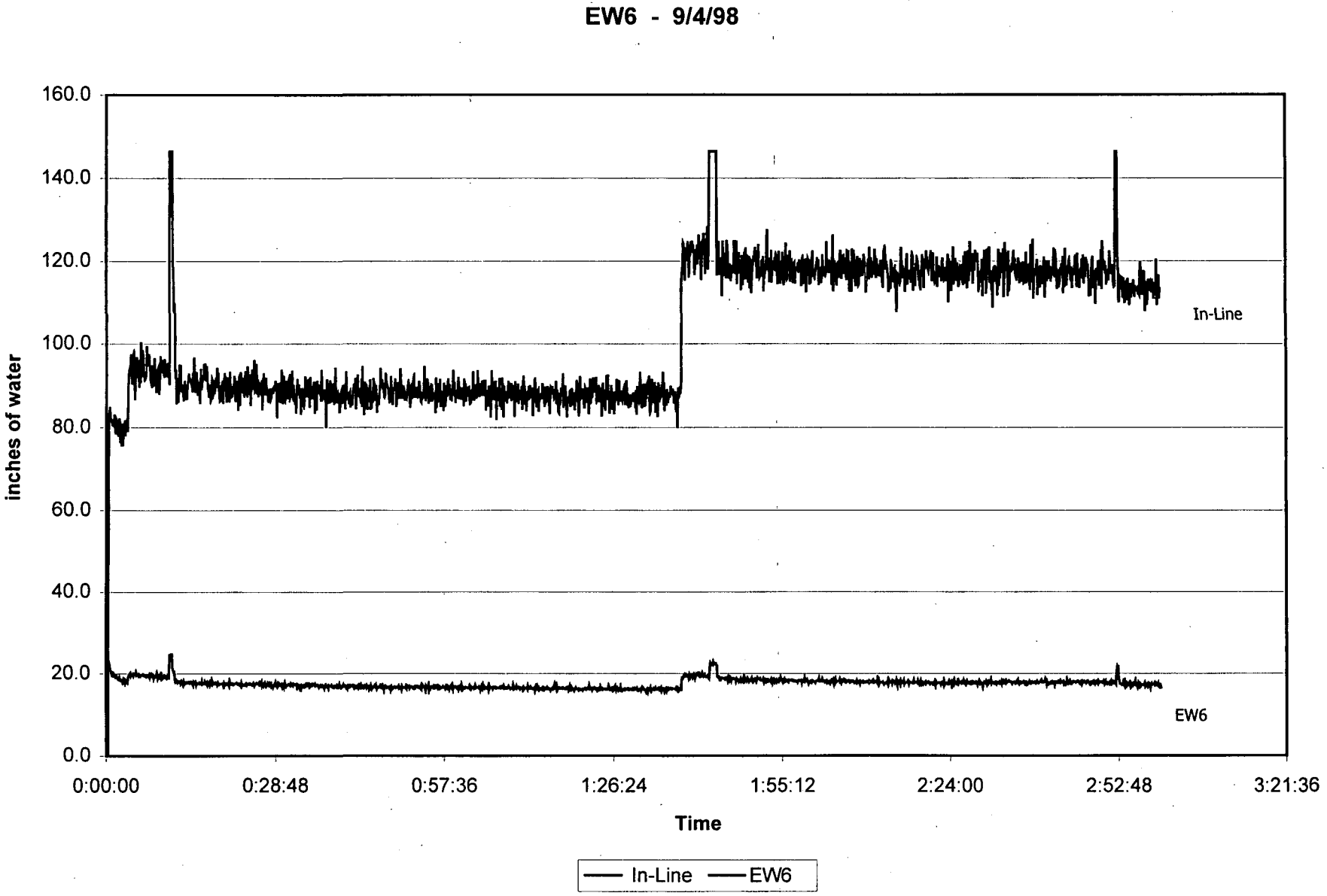


EW3-4(3d) - 9/29/98

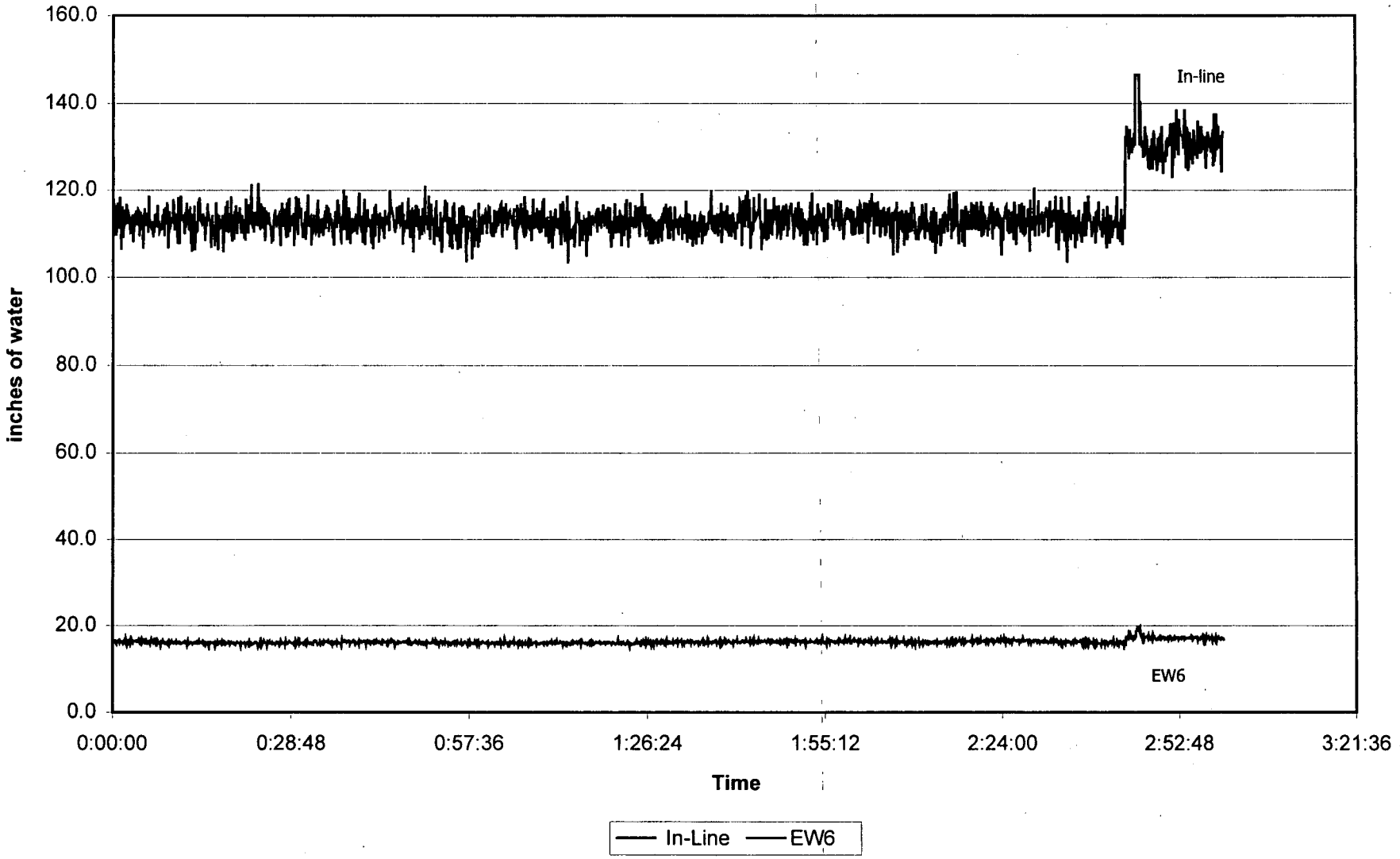


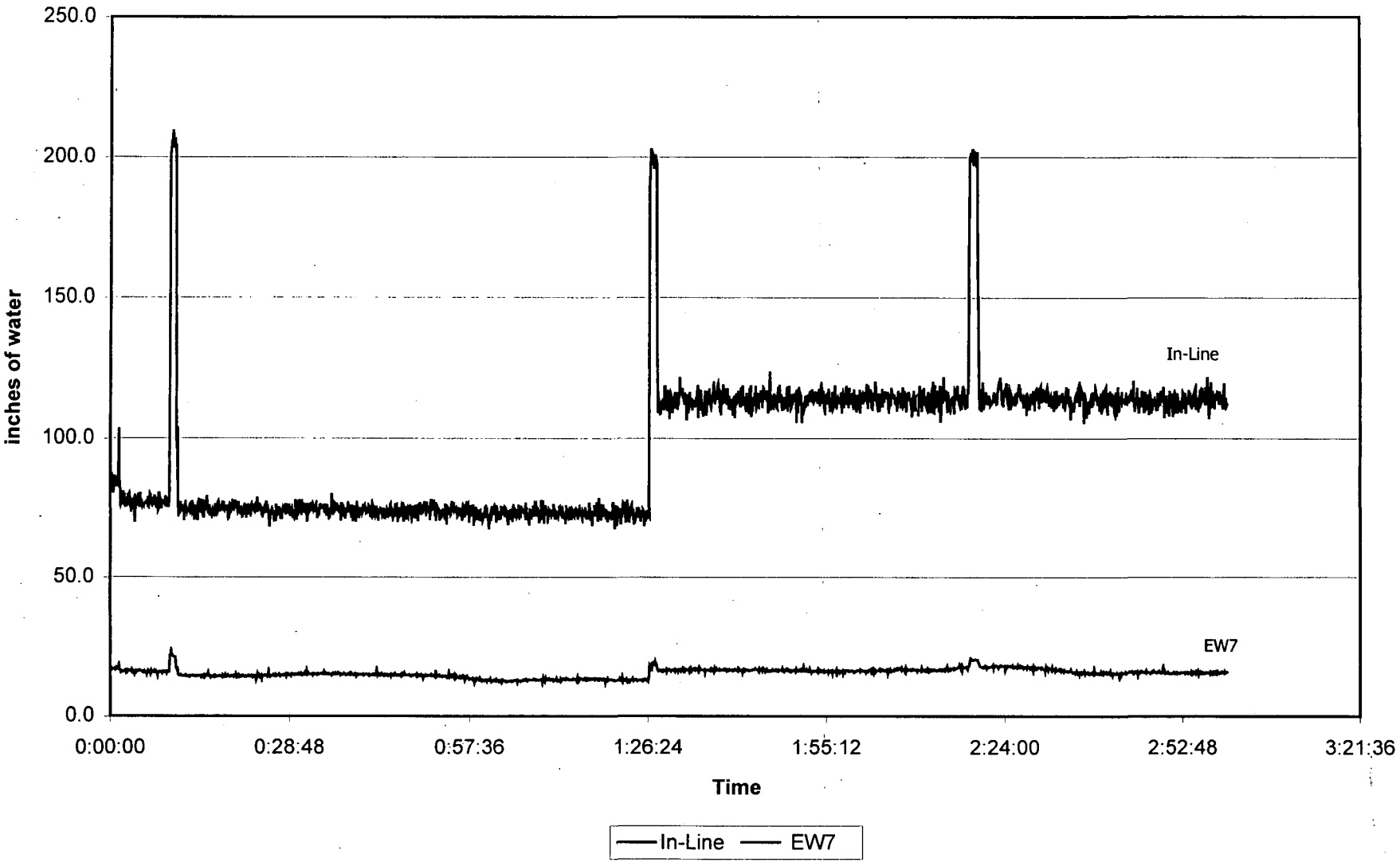
EW5-1 - 9/3/98

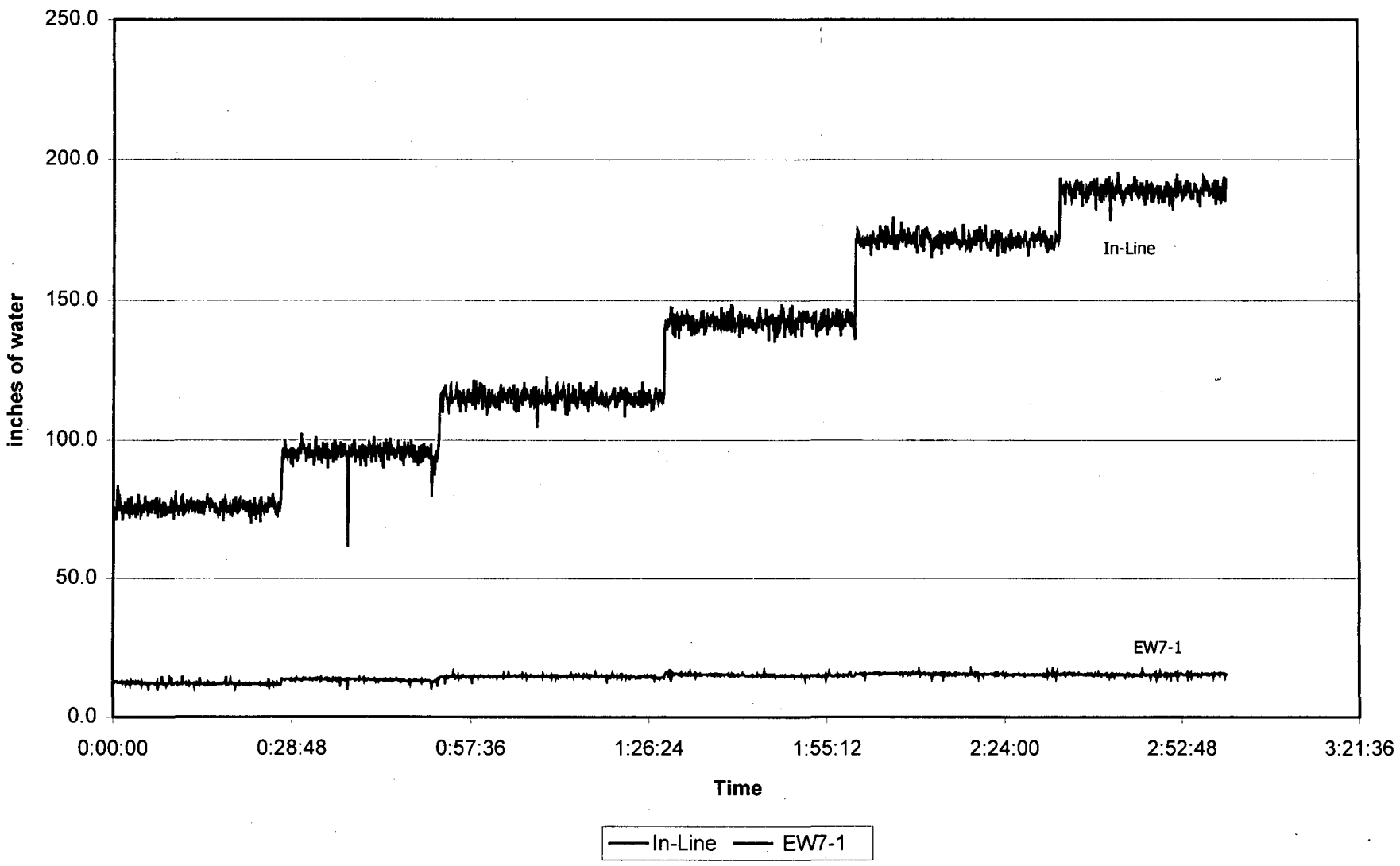

160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
inches of water
In-Line
Ew5-1
0:00:00
0:07:12
0:14:24
0:21:36
0:28:48
0:36:00
0:43:12
0:50:24
0:57:36
1:04:48
Time
In-Line
EW5-1


EW6 - 9/4/98
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
inches of water
In-Line
EW6
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW6

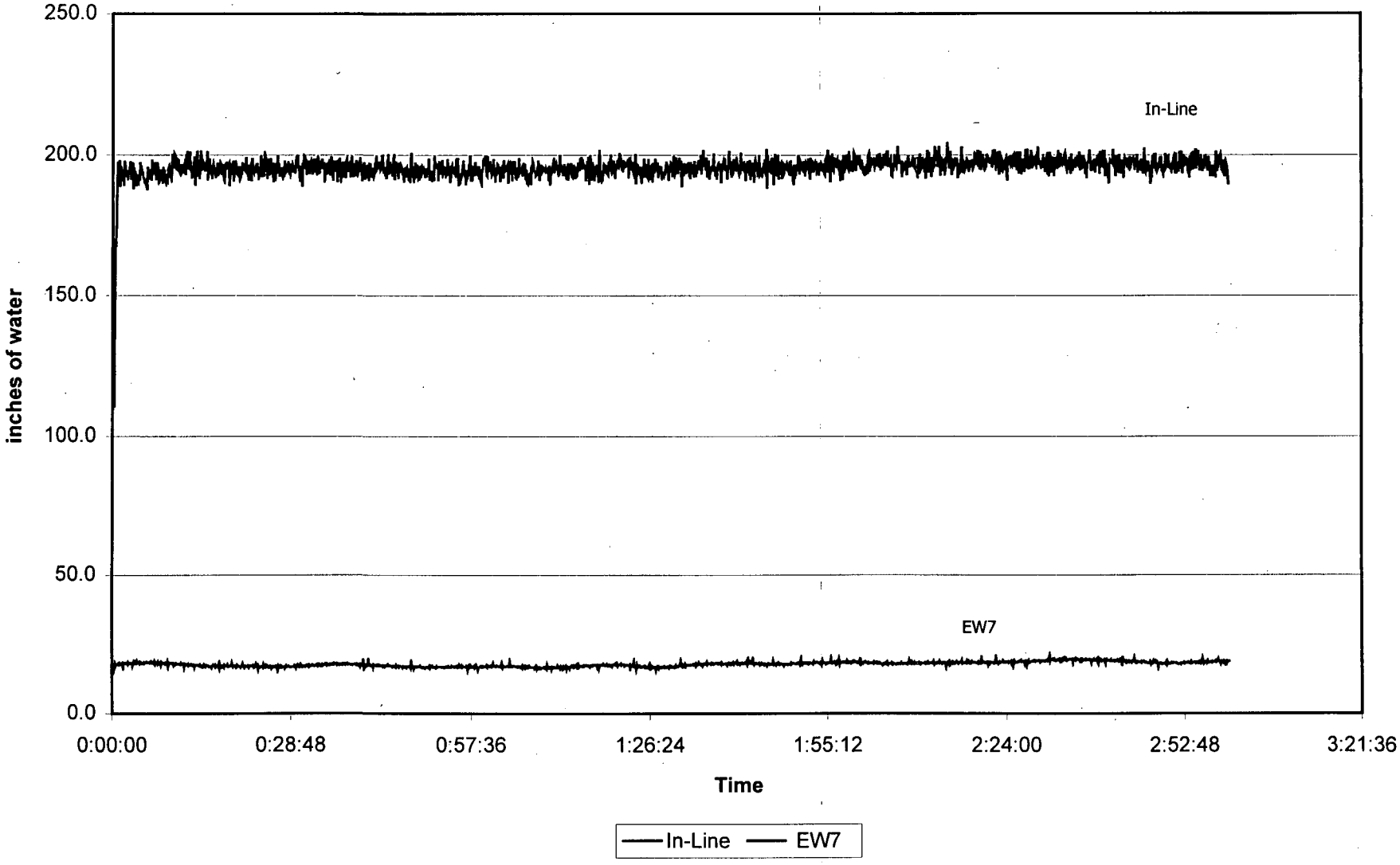
EW6-1(6a) - 9/4/98

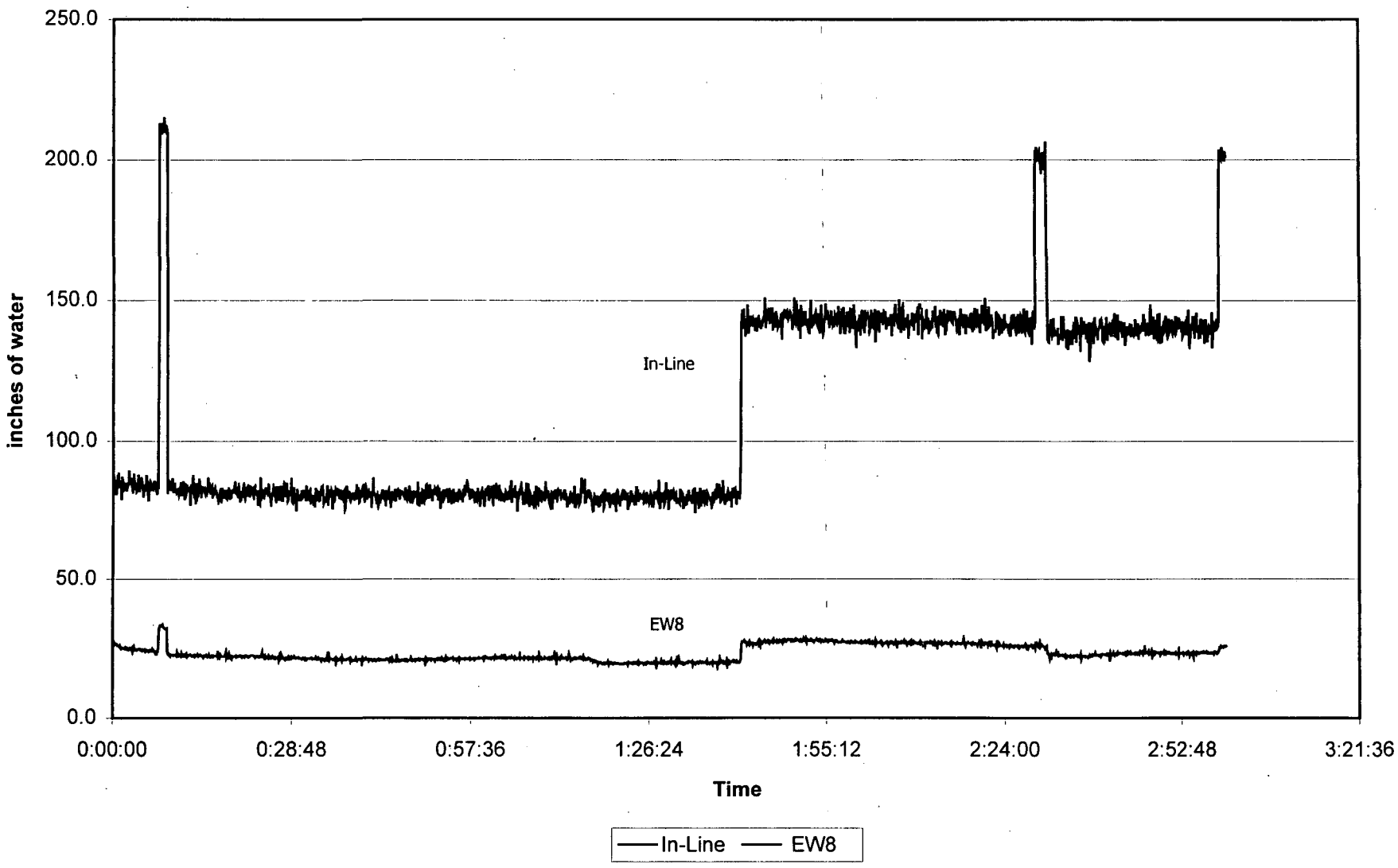

160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
inches of water
In-line
EW6
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW6

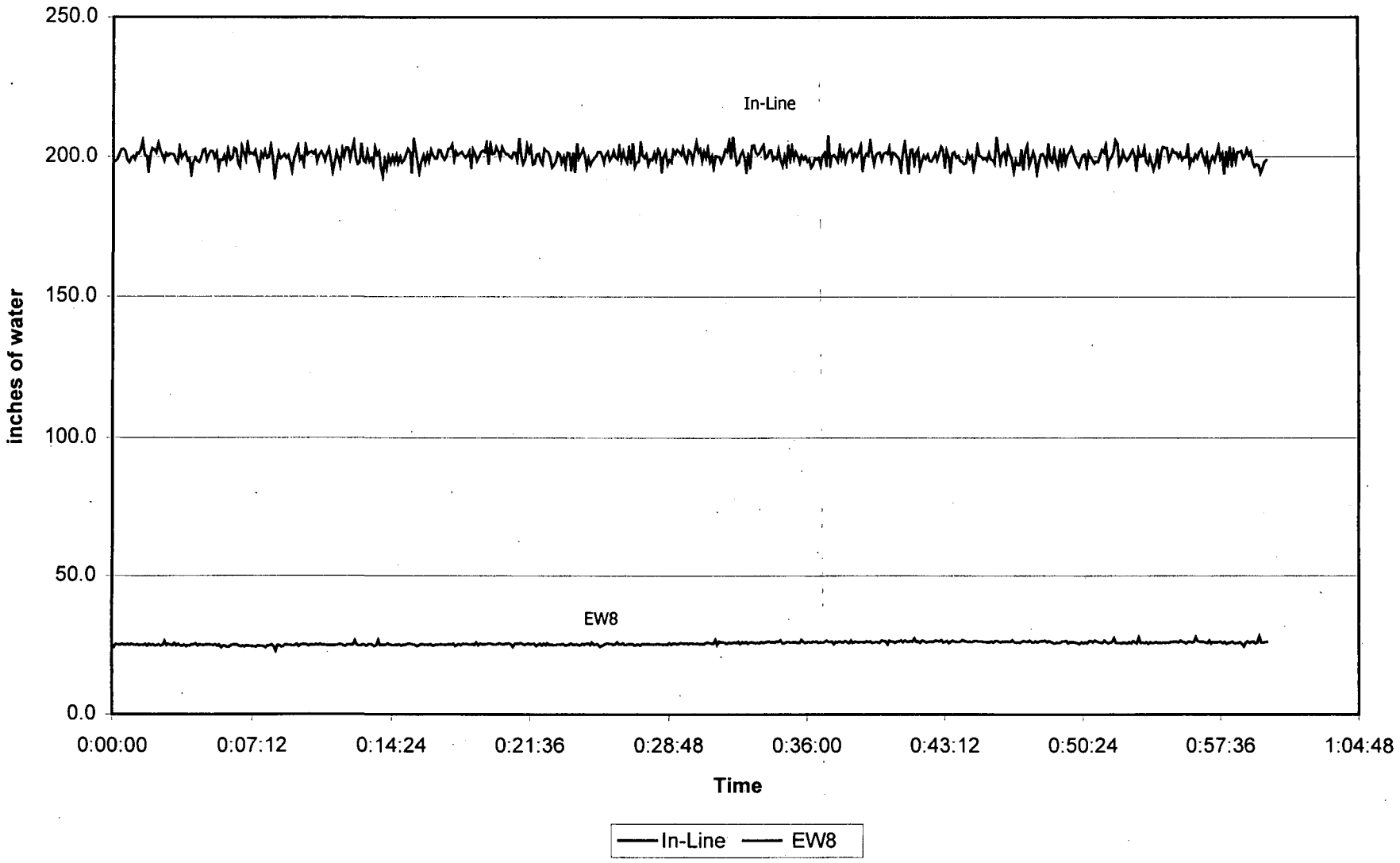

EW7-1 - 9/8/98
250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW7
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW7

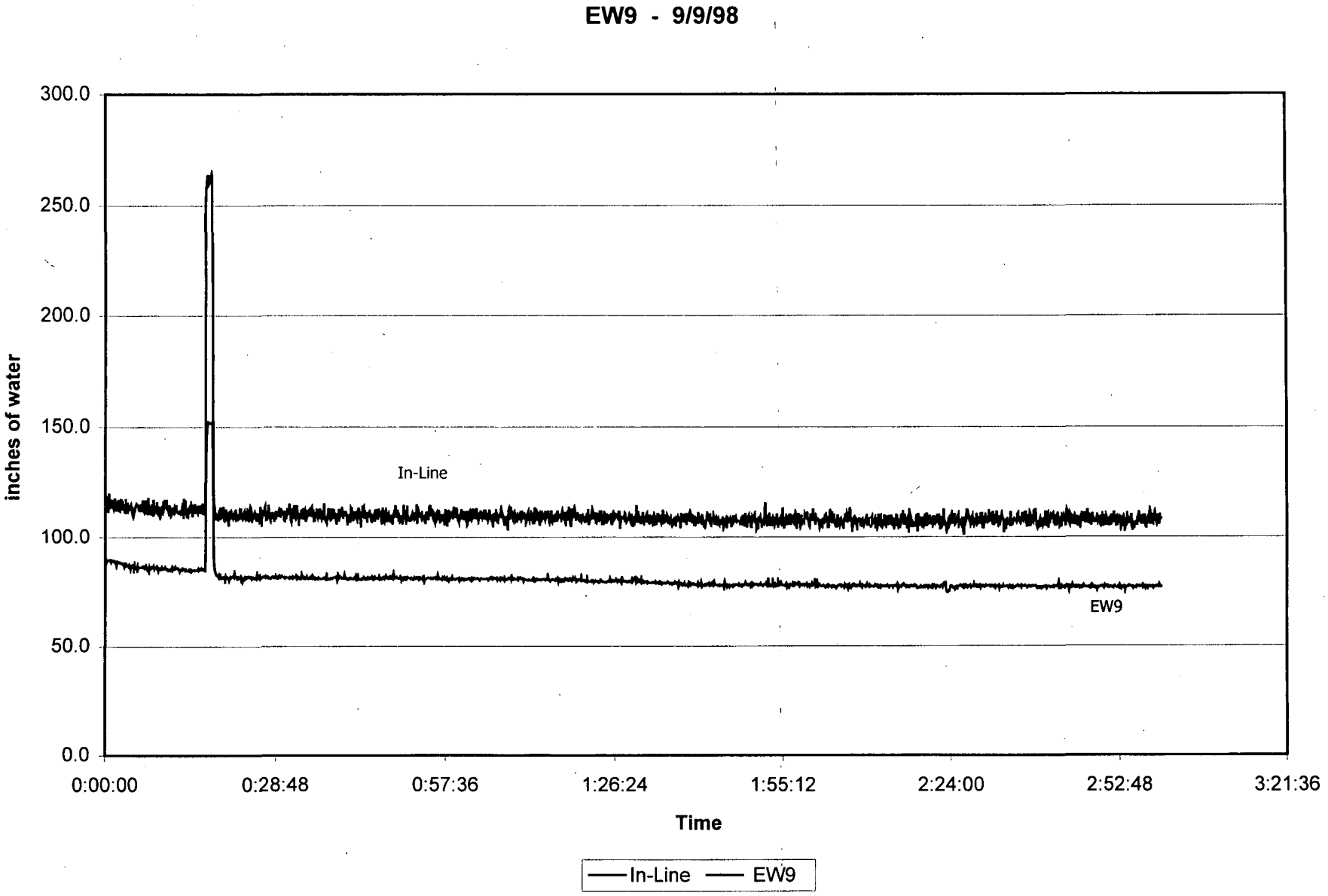

Ew7-3 - 9/11/98
250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW7-1
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW7-1

EW7-2(7a) - 9/8/98

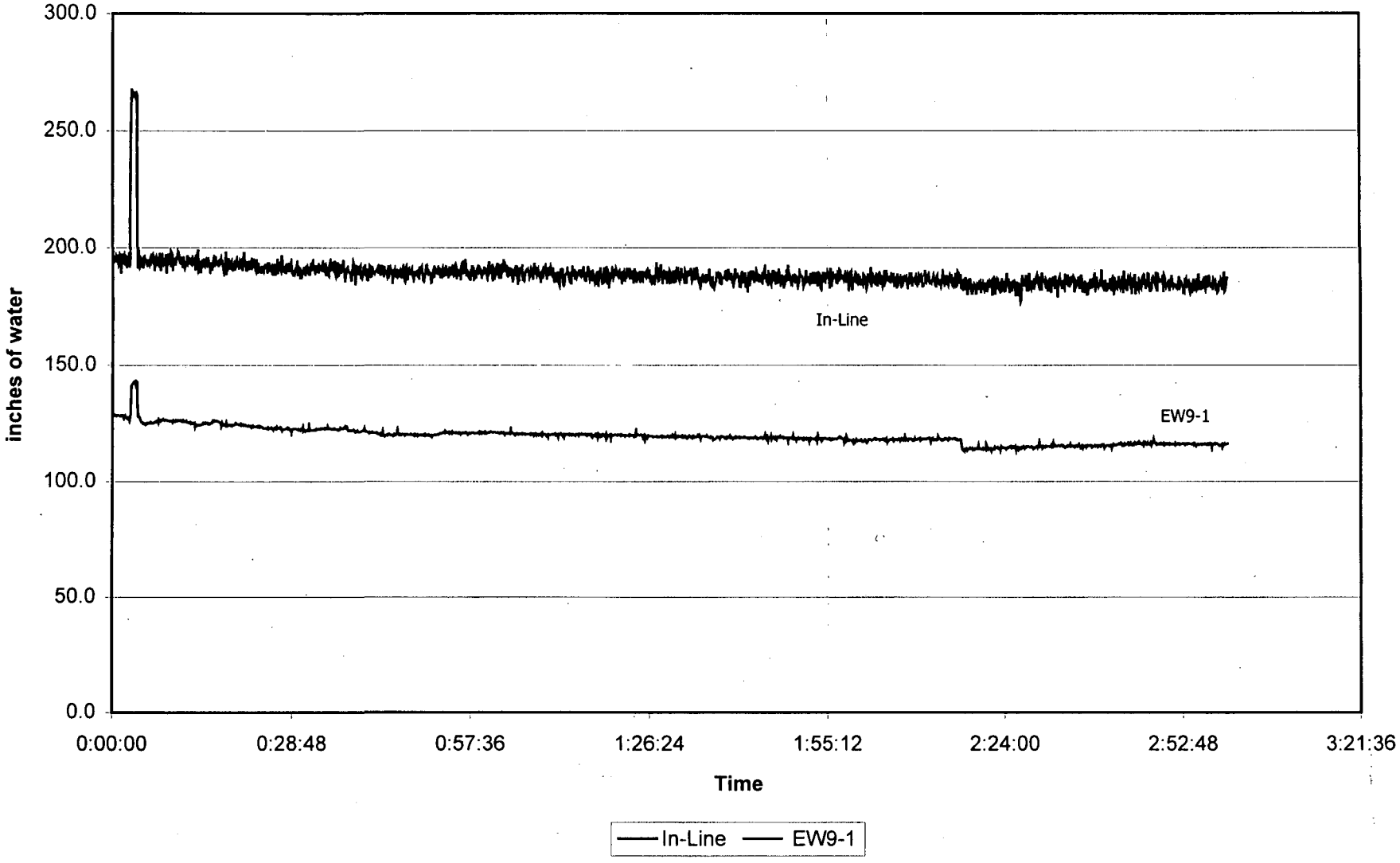

250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW7
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW7

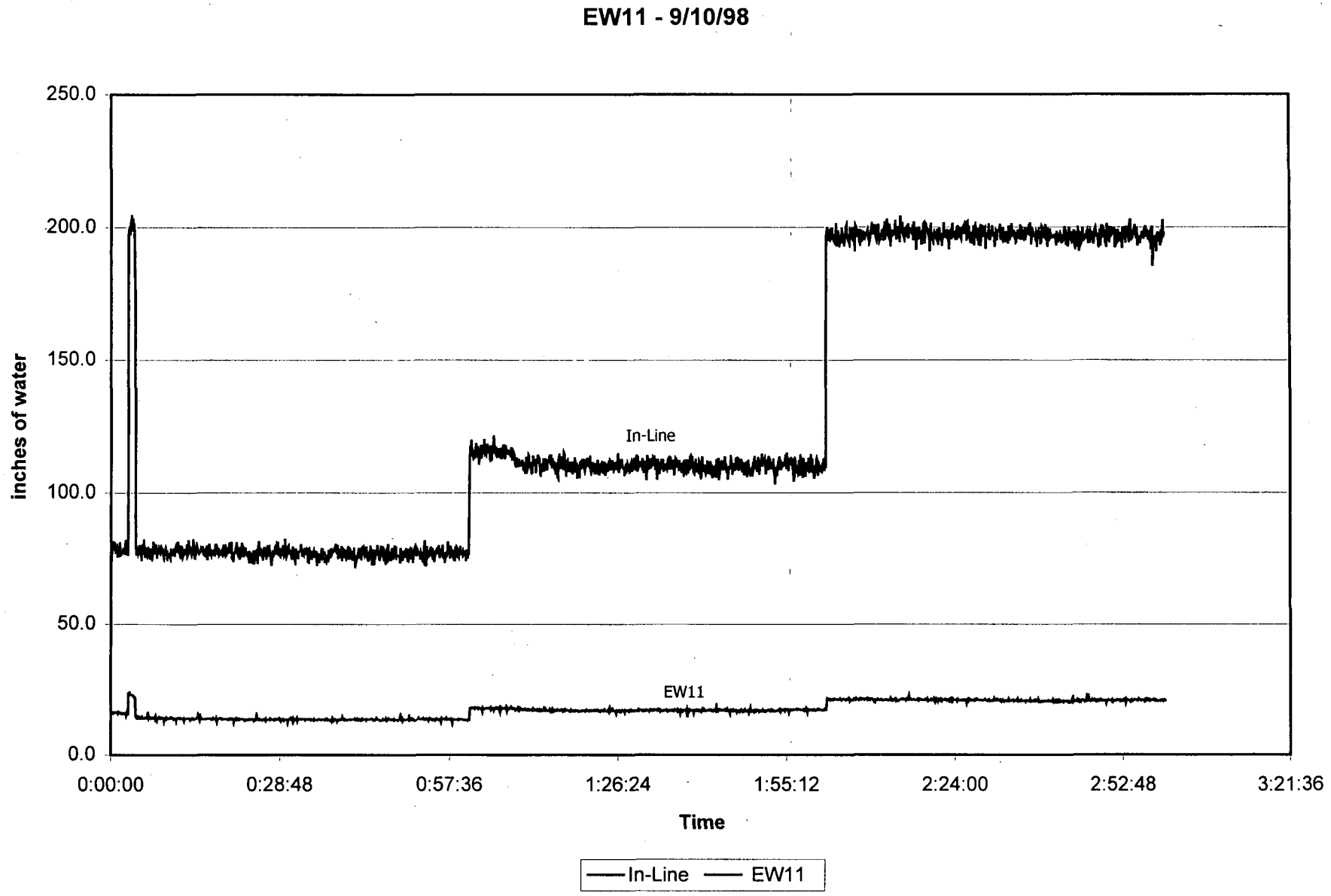

EW8 - 9/9/98
250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW8
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW8


EW8-1(8a) - 9/9/98
250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW8
0:00:00
0:07:12
0:14:24
0:21:36
0:28:48
0:36:00
0:43:12
0:50:24
0:57:36
1:04:48
Time
In-Line
EW8


EW9 - 9/9/98
300.0
250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW9
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW9

EW9-1(9a) - 9/10/98




EW11 - 9/10/98
250.0
200.0
150.0
100.0
50.0
0.0
inches of water
In-Line
EW11
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
3:21:36
Time
In-Line
EW11

Regional Office

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LEHIGH VALLEY BEDROCK VAPOR EXTRACTION TEST

GENERAL CONCLUSIONS

1. Rock formation yielded approximately 70 cfm at 200 inches of vacuum at 9 of 11extraction wells (73%).

2. PID and air sampling indicated that all extraction wells contained contaminated vapors. EW-1 had the highest vapor concentrations. EW-2, the furthest downgradient extraction well had a maximum influent of 213 ppm (600 feet from spill site).

3. Influent concentrations in EW-1 dropped dramatically during the test (i.e. 800 ppm to 247 ppm). However most EW wells had stable influent concentrations of 100-200 ppm (EW6, EW7, EW8, EW2, EW3) for the duration of the tests.

4. Radius of influence was highest at EW-1 with measurable influences up to 50 feet away. EW-2 had influences of approximately 15-20 feet. EW-3 had no measurable influence in any of the OW wells.

5. ROI was determined based on vacuum readings at observation well, trends in the vacuum readings, and vacuum changes at the observation wells due to the step tests at the extractions wells.

6. Barometric pressure changes influenced vacuum readings within the rock at a number of pressure transducers, indicating that some areas of the rock are more isolated than other from the surface.

7. Generally, packers were successful in separating the three zones from each other based on internal vacuum readings from the three zones in the extraction wells.

8. Generally, ROI did not vary within the three zones. However, in EW-1 where ROI was calculated, ROI was higher in the deeper zone (32-42 ft bls). ROI was the same at all three zones within well EW-2.

9. The low ROI in EW-3 could be due to the lack of inner-connecting fractures between the extraction well and the OW wells. Although no influence was recorded, contaminated vapors were extracted at the same rate as EW-1.

10. Due to no air recovery at two of the extraction wells and no influence at EW-3, the placement of extraction wells within the bedrock will be difficult in order to insure uniform remediation of the bedrock. Bedrock mapping of fractures and/or enhancement of the fractures will be necessary to successfully design a BVE system.

Summary of BVE Test
Lehigh Valley

Extraction Well	Date	Duration of Test	Notes
EW-2	9/2/98	1	Open Borehole with monitoring
EW-5	9/3/98	3	No monitoring
EW-4	9/3/98	0.2	No Air, stoped test
EW-6	9/4/98	6	No monitoring
EW-7	9/8/98	6	No monitoring
EW-8	9/9/98	4	No monitoring
EW-9	9/9/98	3	No monitoring
EW-9	9/10/98	3	No monitoring
EW-10	9/10/98	0.2	No Air, stoped test
EW-11	9/10/98	3	No monitoring
EW-7	9/11/98	18.5	Overnight Test
EW-1	9/14/98	6	Open Borehole with monitoring
EW-3	9/15/98	8	Open Borehole with monitoring
EW-2a	9/18/98	2	10'-20' bgs with packers with monitoring
EW-2b	9/21/98	9	20'-30' bgs with packers with monitoring
EW-2c	9/22/98	4	30'-40' bgs with packers with monitoring
EW-3a	9/24/98	3	12'-22' bgs with packers with monitoring
EW-3b	9/28/98	3	22'-32' bgs with packers with monitoring
EW-3c	9/29/98	3	32'-42' bgs with packers with monitoring
EW-1a	10/1/98	9	12'-22' bgs with packers with monitoring
EW-1b	10/2/98	9	22'-32' bgs with packers with monitoring
EW-1c	10/3/98	9	32'-42' bgs with packers with monitoring

Y= ≥.5 in H_2O

Summary of BVE Test Results - Vacuum Influences
Lehigh Valley

Extraction Well	Extraction Depth (ft)	Oberservation Depth (ft)	OW-1(5 ft)	OW-2(15 ft)	OW-3(50 ft)	OW-4(5 ft)	OW-5(15 ft)	OW-6(50 ft)	Estimated ROI (ft)	Notes
EW-1	ALL	ALL	Y	Y	Y	Y	Y	N	20	
	12-22	32-42	Y	Y	Y	Y	Y	Y	50	Need High vacuum, >200 inches
		22-32	Y	Y	Y	Y	Y	Y	28	
	22-32	32-42	Y	Y	Y	Y	N	N	5-15	OW4, OW5, OW6 LIMITS ROI
		22-32	Y	Y	N	Y	N	N	5-15	
		12-22	Y	N	N	Y	N	N	5-15	
	32-42	32-42	Y	Y	N	Y	N	N	5-15	
		22-32	Y	Y	N	Y	N	N	5-15	OW2 had higer vacuum than OW1
		12-22	Y	N	N	Y	N	N	5-15	

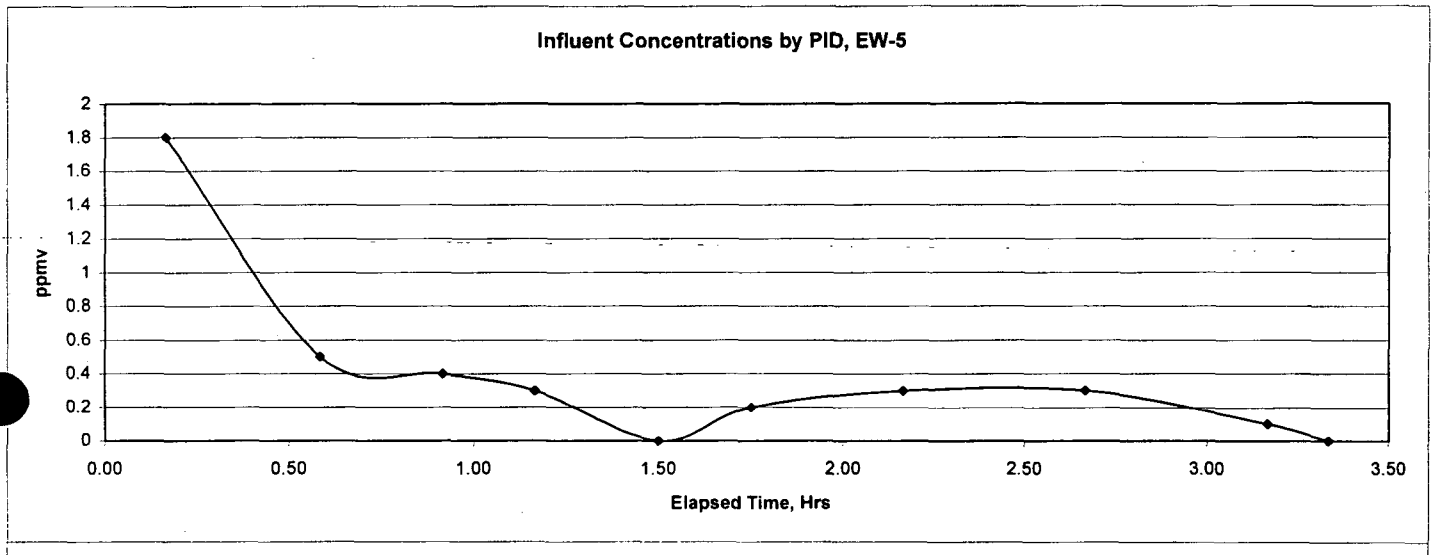
Extraction Well	Extraction Depth (ft)	Oberservation Depth (ft)	OW7-1(5 ft)	OW8-1(15 ft)	OW9-1(50 ft)	OW10-1(5 ft)	OW11-1(15 ft)	OW12-1(50 ft)	Estimated ROI (ft)	Notes
EW-2	ALL	ALL	Y	Y	Y	Y	Y	N	25	
	10-20	32-42	Y	Y	N	Y	Y	N	15-20	
		22-32	Y	Y	N	N	Y	N	15-20	
	20-30	32-42	Y	Y	N	Y	Y	N	5-15	
		22-32	N	Y	N	Y	Y	N	15-20	
		12-22	Y	N	N	Y	N	N	5-15	
	30-40	32-42	Y	Y	N	Y	Y	N	5-15	
		22-32	N	Y	N	Y	Y	N	15-20	
		12-22	Y	N	N	Y	N	N	5-15	

Extraction Well	Extraction Depth (ft)	Oberservation Depth (ft)	OW-13(5 ft)	OW-14(15 ft)	OW-15(50 ft)	OW-16(5 ft)	OW-17(15 ft)	OW-18(50 ft)	Estimated ROI (ft)	Notes
EW-3	ALL	ALL	N	N	N	N	N	N	<5	
	10-20	32-42	N	N	N	Y	N	N	<5	
		22-32	N	N	N	N	N	N	<5	
	20-30	32-42	N	N	N	N	N	N	<5	
		22-32	N	N	N	N	N	N	<5	
		12-22	N	N	N	N	N	N	<5	
	30-40	32-42	N	N	N	N	N	N	<5	
		22-32	N	N	N	N	N	N	<5	
		12-22	N	N	N	N	N	N	<5	

Table 1
Extraction Well EW-5 Field Data

VE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well (ppmv)	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
9/3/98	11:00	0.00			0	0			
9/3/98	11:10	0.17	1.8	0.0	115	45	44	830	Collected Air Sample - EW-5-AS1
9/3/98	11:35	0.58	0.5	0.0	110	45	44		
9/3/98	11:55	0.92	0.4	0.0	110	45	45		
9/3/98	12:10	1.17	0.3	0.0	112	45	45		
9/3/98	12:30	1.50	0.0	0.0	110	45	43		
9/3/98	12:45	1.75	0.2	0.0	125	50	30	730	Collected Air Sample EW-5-AS2, increased vacuum
9/3/98	13:10	2.17	0.3	0.0	135	50	30		
9/3/98	13:40	2.67	0.3	0.0	130	50	30		
9/3/98	14:10	3.17	0.1	0.0	130	50	30		
9/3/98	14:20	3.33	0.0	0.0	130	50	30	1190	Collected Air Sample - EW-5-AS3



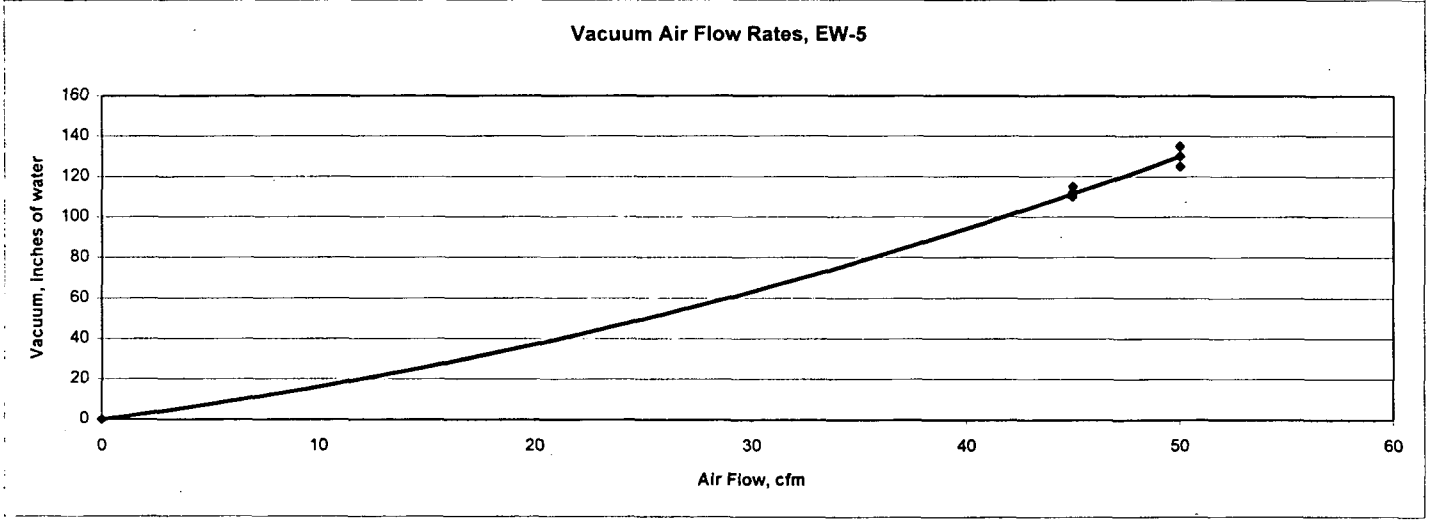
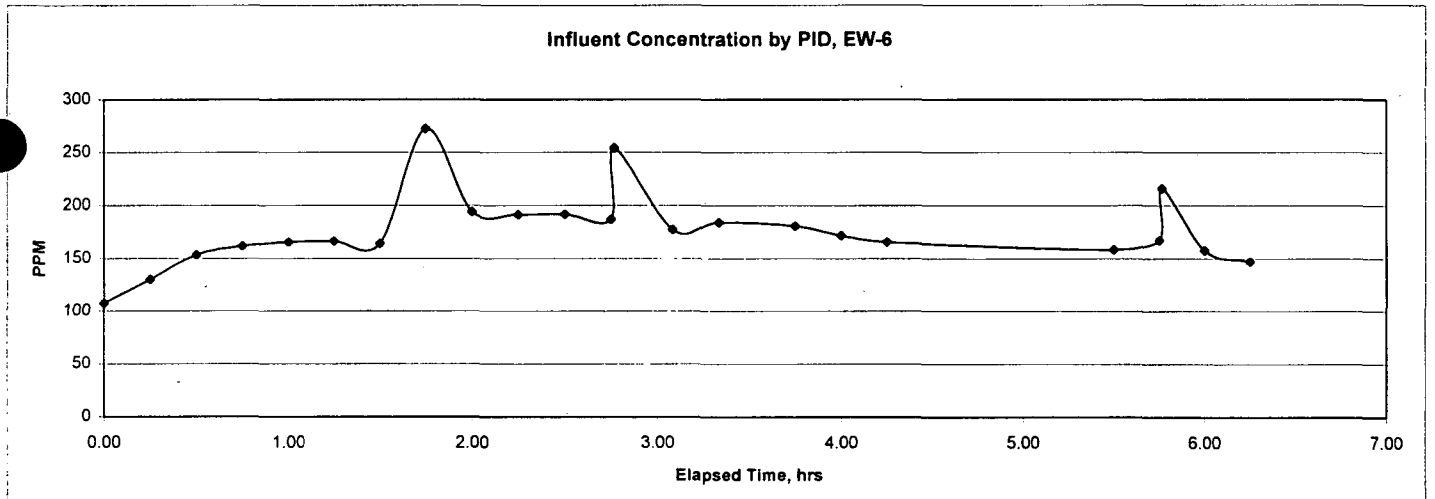


Table 2
Extraction Well EW-6 Field Data

VE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/4/98	8:00	0.00	107.2	0.0	100	50	44	123,000	Collected Air Sample - EW-6-AS1
9/4/98	8:15	0.25	130.1	0.0	95	48	45		
9/4/98	8:30	0.50	153.3	0.0	93	48	45		
9/4/98	8:45	0.75	161.2	0.0	94	49	44		
9/4/98	9:00	1.00	165.3	0.0	93	48	44		
9/4/98	9:15	1.25	166.0	0.0	94	48	44		
9/4/98	9:30	1.50	163.7	0.0	93	48	45		
9/4/98	9:45	1.75	272.2	0.0	125	56	27	141,000	Collected Air Sample EW-6-AS2, increase vacuum
9/4/98	10:00	2.00	193.8	0.0	125	56	27		
9/4/98	10:15	2.25	191.3	0.0	125	55	26		
9/4/98	10:30	2.50	191.6	0.0	125	56	27		
9/4/98	10:45	2.75	186.5	0.0	125	56	27		
9/4/98	10:46	2.77	254.3	0.0	200	70	0		close dilution valve
9/4/98	11:05	3.08	177	0.0	115	55	28		
9/4/98	11:20	3.33	183.6	0.0	115	55	28		
9/4/98	11:45	3.75	180.3	0.0	118	55	28		
9/4/98	12:00	4.00	171.7	0.0	120	55	28		
9/4/98	12:15	4.25	165.3	0.0	120	55	28		
9/4/98	13:30	5.50	158.1	0.0	119	55	28		
9/4/98	13:45	5.75	166.6	0.0	120	55	28		
9/4/98	13:46	5.77	216	0.0	195	70	0		close dilution valve
9/4/98	14:00	6.00	157.3	0.0	130	58	20		
9/4/98	14:15	6.25	146.7	0.0	120	55	20	164,000	Collected Air Sample - EW-6-AS3



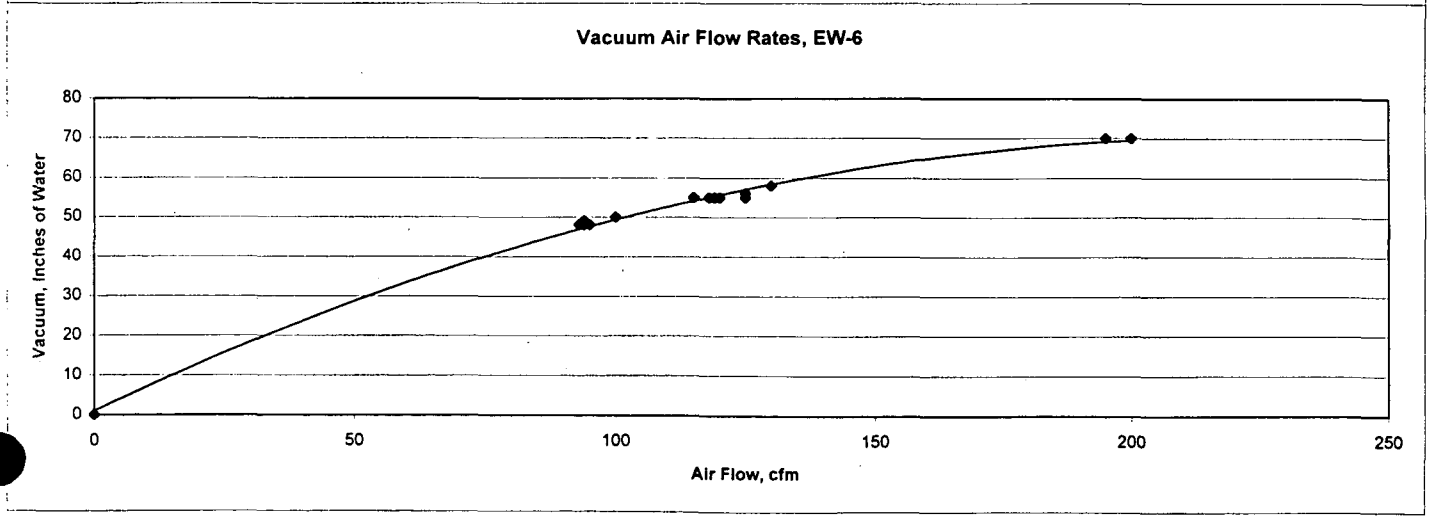
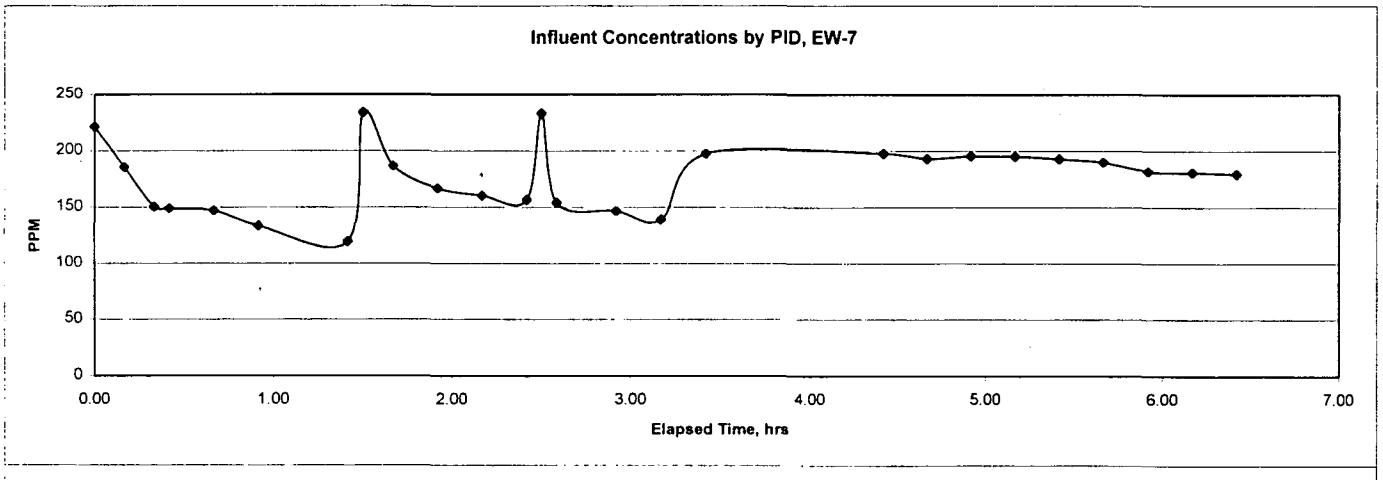


Table 3
Extraction Well EW-7 Field Data

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/8/98	9:35	0.00	221.3	0.0	88	45	54		
9/8/98	9:45	0.17	185.3	0.0	80	45	54		System shut down and restarted
9/8/98	9:55	0.33	150.3	0.0	80	45	54	256,000	Collected air sample EW-7-AS1
9/8/98	10:00	0.42	148.9	0.0	80	45	54		
9/8/98	10:15	0.67	146.8	0.0	80	45	52		
9/8/98	10:30	0.92	133.4	0.0	80	45	54		
9/8/98	11:00	1.42	119.4	0.0	80	45	54		
9/8/98	11:05	1.50	234.0	0.0	200	70	0		close dilution valve
9/8/98	11:15	1.67	186.4	0.0	125	56	26		increase vacuum
9/8/98	11:30	1.92	166.8	0.0	125	56	26		
9/8/98	11:45	2.17	160.3	0.0	125	56	26		
9/8/98	12:00	2.42	156.7	0.0	125	56	26		
9/8/98	12:05	2.50	233.2	0.0	200	70	0	246,000	Collected air sample EW-7-AS2, close dil valve
9/8/98	12:10	2.58	154	0.0	125	56	27		
9/8/98	12:30	2.92	146.7	0.0	125	56	27		
9/8/98	12:45	3.17	139	0.0	125	56	27		
9/8/98	13:00	3.42	197.3	0.0	200	70	0		increase vacuum
9/8/98	14:00	4.42	197.7	0.0	200	70	0		
9/8/98	14:15	4.67	193.1	0.0	200	70	0		
9/8/98	14:30	4.92	195.4	0.0	200	70	0		
9/8/98	14:45	5.17	195.1	0.0	200	70	0		
9/8/98	15:00	5.42	192.8	0.0	195	70	0		
9/8/98	15:15	5.67	189.8	0.0	195	70	0		
9/8/98	15:30	5.92	181.7	0.0	195	70	0		
9/8/98	15:45	6.17	180.7	0.0	195	70	0	183,000	Collected air sample EW-7-AS3
9/8/98	16:00	6.42	179.4	0.0	195	70	0		



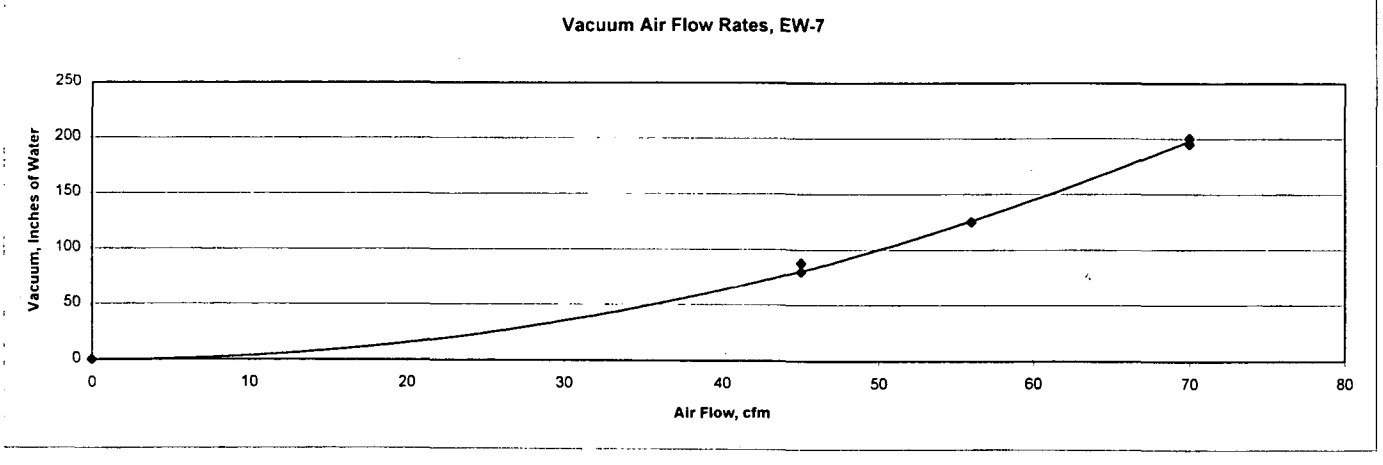
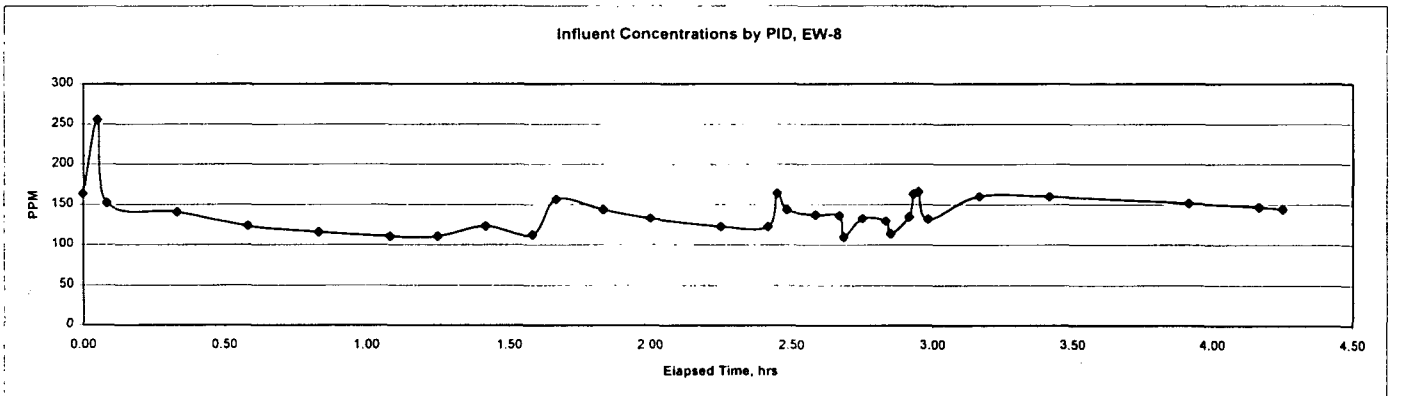


Table 4
Extraction Well EW-8 Field Data

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/9/98	8:25	0.00	163.5	0.0	85	45	55		
9/9/98	8:28	0.05	255.4	0.0	200	70	0	246,000	Collect air sample EW-8-AS1, close dil. Valve
9/9/98	8:30	0.08	151.7	0.0	90	45	50		
9/9/98	8:45	0.33	140.7	0.0	90	45	50		
9/9/98	9:00	0.58	123.1	0.0	86	46	49		
9/9/98	9:15	0.83	115.6	0.0	87	45	50		
9/9/98	9:30	1.08	110.2	0.0	87	45	50		
9/9/98	9:40	1.25	110.4	0.0	85	44	49		
9/9/98	9:50	1.42	122.9	0.0	86	45	49		
9/9/98	10:00	1.58	112.5	0.0	86	45	50		
9/9/98	10:05	1.67	156.5	0.0	150	62	18		increase vacuum
9/9/98	10:15	1.83	143.3	0.0	150	62	18		
9/9/98	10:25	2.00	132.5	0.0	150	63	18		
9/9/98	10:40	2.25	122.4	0.0	150	62	18		
9/9/98	10:50	2.42	122.3	0.0	150	63	18		
9/9/98	10:52	2.45	164.3	0.0	200	70	0	211,000	Collect air sample EW-8-AS2, close dil. Valve
9/9/98	10:54	2.48	143.6	0.0	151	64	18		
9/9/98	11:00	2.58	137.1	0.0	150	64	18		
9/9/98	11:05	2.67	136.3	0.0	151	64	18		
9/9/98	11:06	2.68	109.5	0.0	151	64	18		
9/9/98	11:10	2.75	132.6	0.0	151	64	18		
9/9/98	11:15	2.83	129.4	0.0	151	63	18		
9/9/98	11:16	2.85	113.6	0.0	151	64	18		
9/9/98	11:20	2.92	134.7	0.0	151	64	18		
9/9/98	11:21	2.93	162.9	0.0	200	70	0	198,000	Collect air sample EW-8-AS3, increase vacuum
9/9/98	11:22	2.95	165.8	0.0	200	70	0		
9/9/98	11:24	2.98	131.8	0.0	150	61	19		
9/9/98	11:35	3.17	160.3	0.0	200	71	0		
9/9/98	11:50	3.42	159.6	0.0	200	71	0		
9/9/98	12:20	3.92	151.3	0.0	200	71	0		
9/9/98	12:35	4.17	146.6	0.0	200	71	0		
9/9/98	12:40	4.25	144.3	0.0	200	71	0		



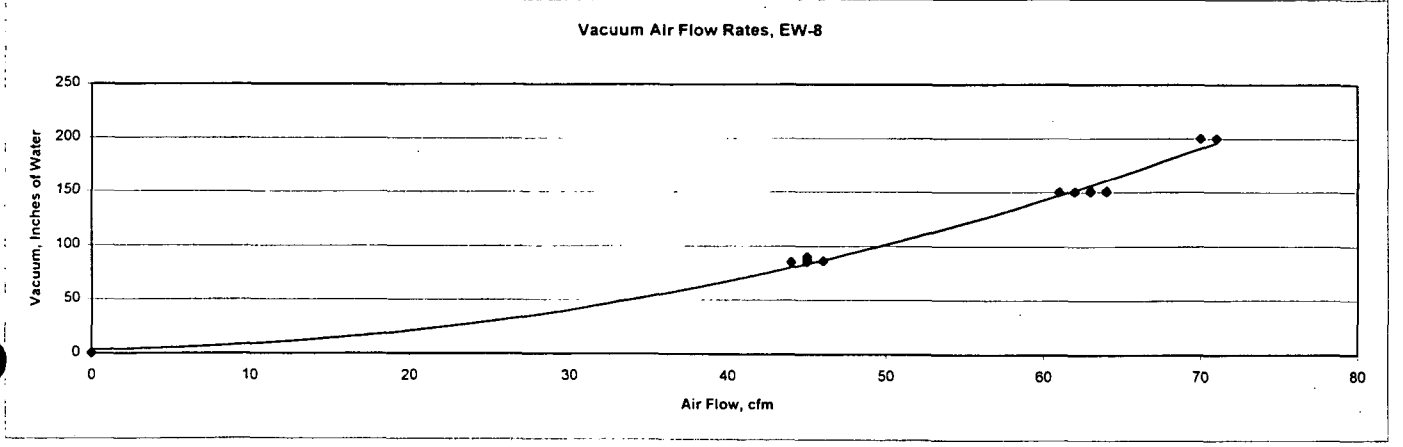
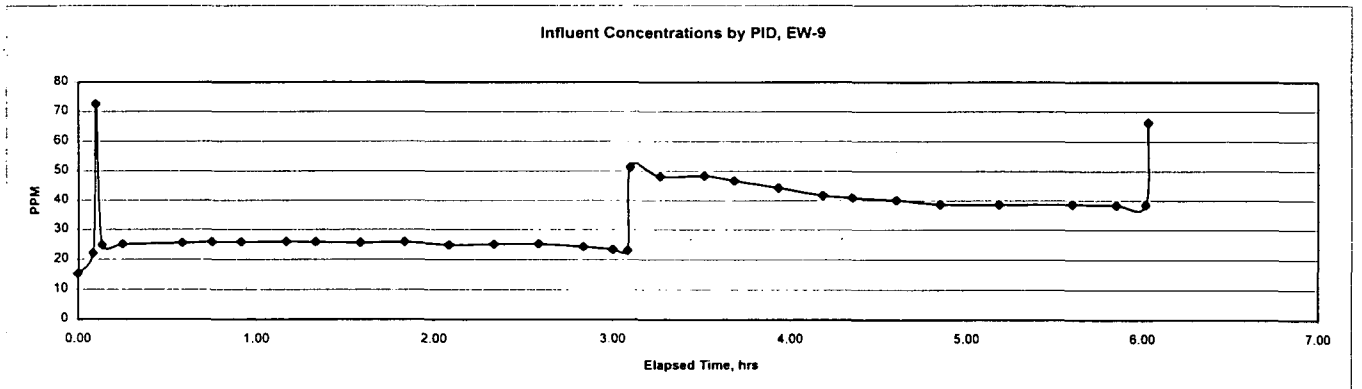


Table 5
Extraction Well EW-9 Field Data

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/9/98	13:40	0.00	15.3	0.0	125	29	60		
9/9/98	13:45	0.08	22.1	0.0	125	29	60		
9/9/98	13:46	0.10	72.6	0.0	200	70	0	64,100	Collect Air Sample EW-9-AS1, close dil valve
9/9/98	13:48	0.13	25.0	0.0	125	28	60		
9/9/98	13:55	0.25	25.2	0.0	125	31	60		
9/9/98	14:15	0.58	25.6	0.0	125	30	60		
9/9/98	14:25	0.75	25.9	0.0	125	31	60		
9/9/98	14:35	0.92	26.0	0.0	125	31	60		
9/9/98	14:50	1.17	26.1	0.0	125	32	59		
9/9/98	15:00	1.33	25.9	0.0	125	31	60		
9/9/98	15:15	1.58	25.7	0.0	125	31	59		
9/9/98	15:30	1.83	26	0.0	123	31	59		
9/9/98	15:45	2.08	25	0.0	125	32	58		
9/9/98	16:00	2.33	25.2	0.0	120	31	58		
9/9/98	16:15	2.58	25.3	0.0	112	32	59		reduce vacuum
9/9/98	16:30	2.83	24.3	0.0	113	32	59		
9/9/98	16:40	3.00	23.4	0.0	113	32	58		
9/9/98	16:45	3.08	23	0.0	112	32	58		System shut down
9/10/98	8:20	3.10	51.3	0.0	200	48	22	67,800	System restarted, Collect air sample EW-9-AS2
9/10/98	8:30	3.27	48	0.0	200	49	23		
9/10/98	8:45	3.52	48.2	0.0	200	49	22		
9/10/98	8:55	3.68	46.6	0.0	200	48	23		
9/10/98	9:10	3.93	44.3	0.0	198	49	22		
9/10/98	9:25	4.18	41.7	0.0	195	49	22		
9/10/98	9:35	4.35	40.9	0.0	195	49	23		
9/10/98	9:50	4.60	40.1	0.0	195	48	22		
9/10/98	10:05	4.85	38.7	0.0	195	48	23		
9/10/98	10:25	5.18	38.5	0.0	195	48	23		
9/10/98	10:50	5.60	38.7	0.0	195	49	23		
9/10/98	11:05	5.85	38.3	0.0	195	49	23		
9/10/98	11:15	6.02	38.4	0.0	195	48	23		
9/10/98	11:16	6.03	66.3	0.0	200	70	0	82,000	Collect Air Sample EW-9-AS3



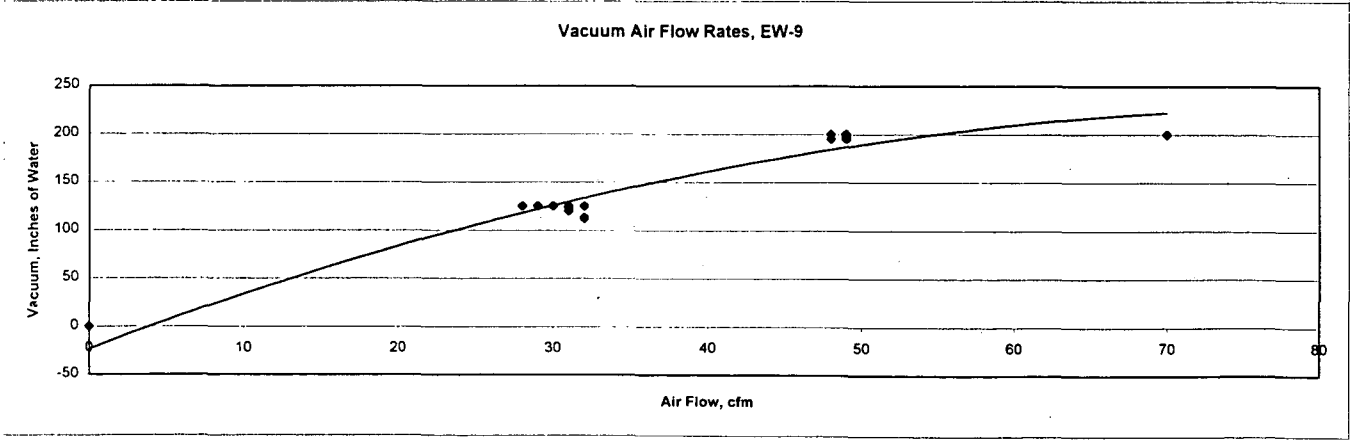
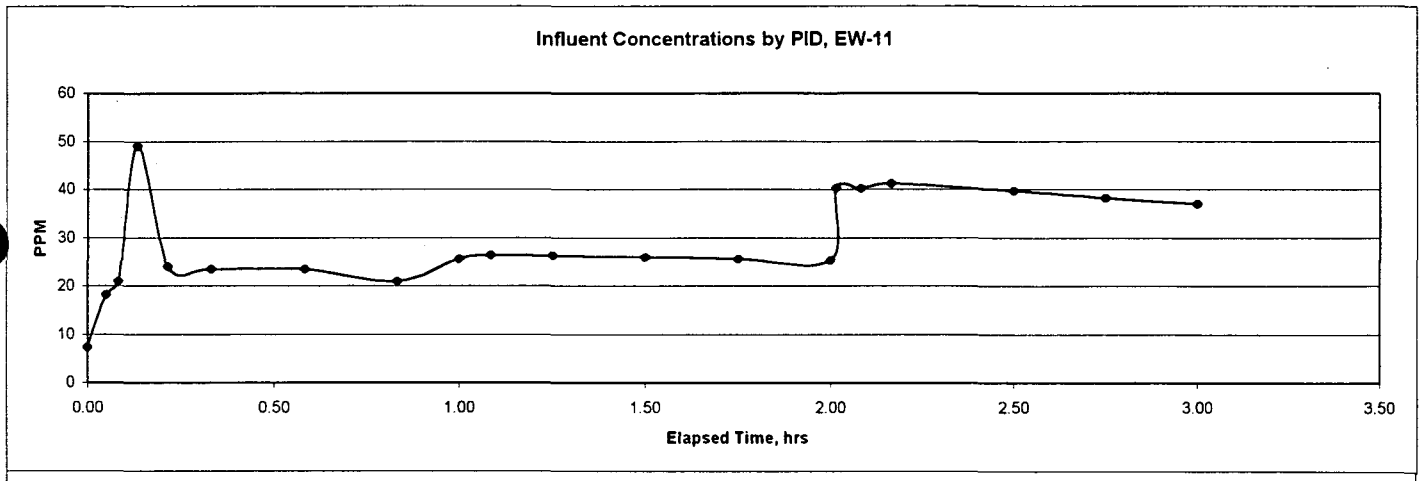


Table 6
Extraction Well EW-11 Field Data

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/10/98	13:45	0.00	7.3	0.0	85	47	50		
9/10/98	13:48	0.05	18.1	0.0	85	47	50		
9/10/98	13:50	0.08	20.9	0.0	85	47	50		
9/10/98	13:53	0.13	49.0	0.0	200	71	0	58,400	Collect Air Sample EW-11-AS1
9/10/98	13:58	0.22	24.0	0.0	89	47	50		
9/10/98	14:05	0.33	23.4	0.0	88	47	50		
9/10/98	14:20	0.58	23.4	0.0	89	47	50		
9/10/98	14:35	0.83	20.9	0.0	88	47	50		
9/10/98	14:45	1.00	25.5	0.0	130	59	37		increase vacuum
9/10/98	14:50	1.08	26.4	0.0	125	57	29		
9/10/98	15:00	1.25	26.2	0.0	125	57	29		
9/10/98	15:15	1.50	25.9	0.0	125	56	29		
9/10/98	15:30	1.75	25.5	0.0	125	56	30		
9/10/98	15:45	2.00	25.3	0.0	125	56	30		
9/10/98	15:46	2.02	40.3	0.0	200	72	0	54,700	increase vacuum, collect air sample EW-11-AS2
9/10/98	15:50	2.08	40.1	0.0	200	72	0		
9/10/98	15:55	2.17	41.2	0.0	200	72	0		
9/10/98	16:15	2.50	39.6	0.0	200	71	0		
9/10/98	16:30	2.75	38.2	0.0	200	71	0		
9/10/98	16:45	3.00	37	0.0	200	72	0	50,700	Collect Air Sample EW-11-AS3



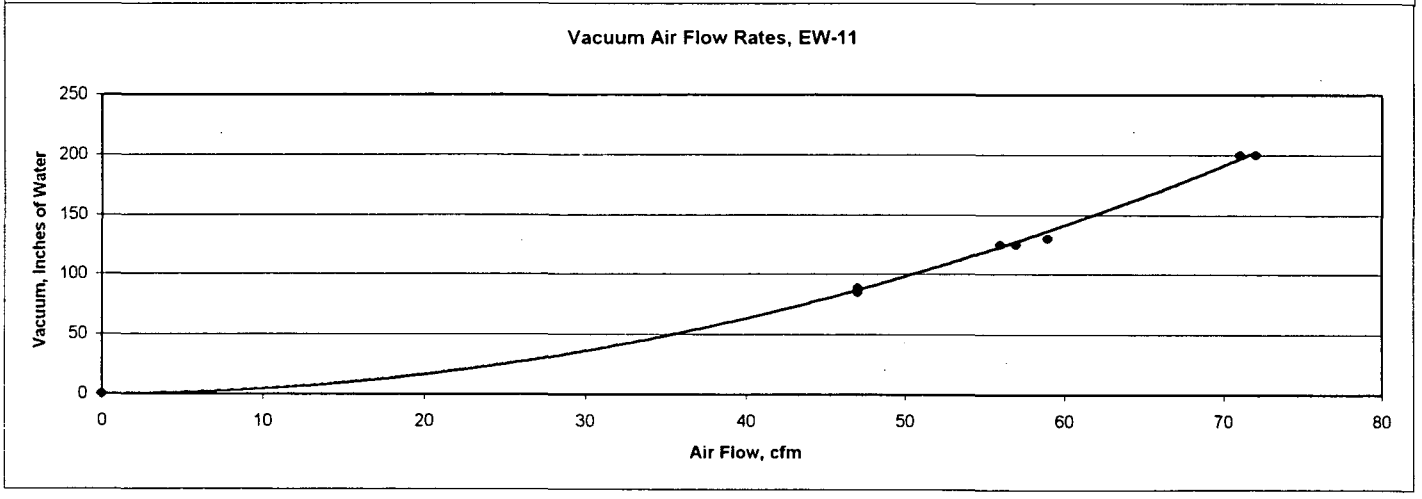
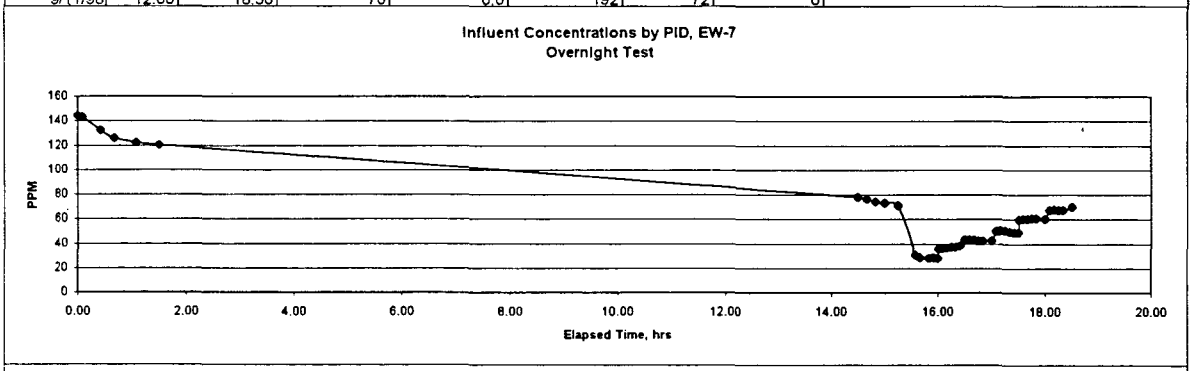


Table 7
Extraction Well EW-7 Field Data - Over night test

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Notes
					0	0		
9/10/98	17:30	0.00	144.2	0.0	198	71	0	dilution valve closed
9/10/98	17:35	0.08	143.2	0.0	198	71	0	
9/10/98	17:55	0.42	132.5	0.0	197	71	0	
9/10/98	18:10	0.67	126.2	0.0	197	71	0	
9/10/98	18:34	1.07	122.4	0.0	197	71	0	
9/10/98	19:00	1.50	120.5	0.0	197	71	0	left system on overnight
9/11/98	8:00	14.50	78.1	0.0	200	71	0	
9/11/98	8:10	14.67	76.2	0.0	200	71	0	
9/11/98	8:20	14.83	74.1	0.0	200	71	0	
9/11/98	8:30	15.00	73.3	0.0	200	71	0	
9/11/98	8:45	15.25	71.2	0.0	200	71	0	
9/11/98	9:05	15.58	30.9	0.0	75	46	49	begin step test
9/11/98	9:10	15.67	28.9	0.0	75	46	49	
9/11/98	9:20	15.83	28.4	0.0	75	46	48	
9/11/98	9:25	15.92	28.7	0.0	75	46	48	
9/11/98	9:30	16.00	28.3	0.0	75	46	49	
9/11/98	9:31	16.02	36	0.0	100	52	35	increase vacuum
9/11/98	9:35	16.08	36.2	0.0	100	52	35	
9/11/98	9:40	16.17	36.6	0.0	100	52	35	
9/11/98	9:45	16.25	37	0.0	100	52	35	
9/11/98	9:50	16.33	36.9	0.0	100	52	35	
9/11/98	9:55	16.42	38.2	0.0	100	52	35	
9/11/98	10:00	16.50	43.2	0.0	125	59	25	increase vacuum
9/11/98	10:05	16.58	43.3	0.0	125	59	25	
9/11/98	10:10	16.67	43.3	0.0	125	59	26	
9/11/98	10:15	16.75	42.2	0.0	125	59	26	
9/11/98	10:20	16.83	42.1	0.0	125	58	26	
9/11/98	10:30	17.00	42.5	0.0	125	58	26	
9/11/98	10:35	17.08	50.3	0.0	150	65	15	increase vacuum
9/11/98	10:37	17.12	50	0.0	150	65	15	
9/11/98	10:40	17.17	50.7	0.0	150	65	15	
9/11/98	10:45	17.25	50.5	0.0	150	65	15	
9/11/98	10:50	17.33	49.8	0.0	150	65	15	
9/11/98	10:55	17.42	49.3	0.0	150	65	15	
9/11/98	11:00	17.50	49	0.0	150	65	15	
9/11/98	11:01	17.52	59.6	0.0	175	70	5	increase vacuum
9/11/98	11:05	17.58	60.1	0.0	175	70	5	
9/11/98	11:10	17.67	60.1	0.0	175	70	5	
9/11/98	11:15	17.75	60.5	0.0	175	70	5	
9/11/98	11:20	17.83	60.5	0.0	175	70	5	
9/11/98	11:30	18.00	60.3	0.0	175	70	5	
9/11/98	11:35	18.08	67.6	0.0	192	72	0	increase vacuum, dilution valve closed
9/11/98	11:40	18.17	68	0.0	192	72	0	
9/11/98	11:45	18.25	67.2	0.0	192	72	0	
9/11/98	11:50	18.33	67.2	0.0	191	72	0	
9/11/98	12:00	18.50	70	0.0	192	72	0	



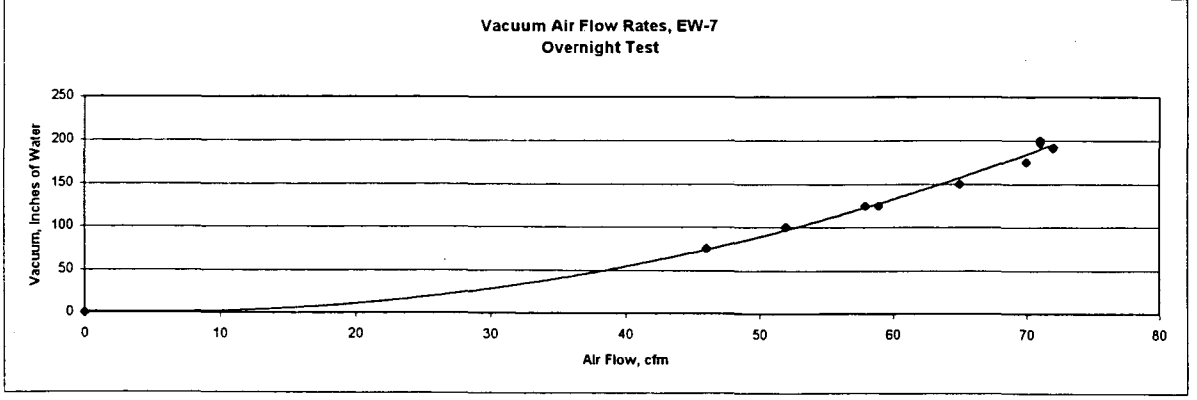
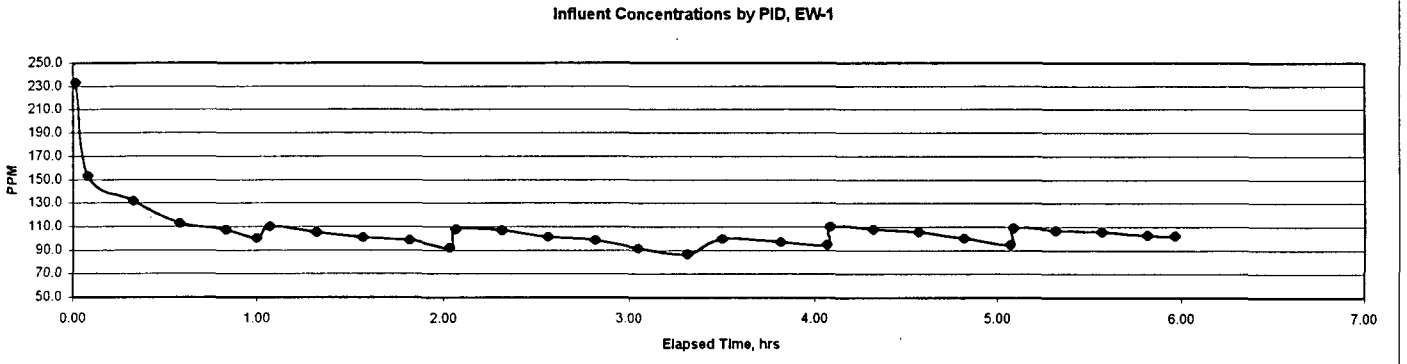


Table 8
Extraction Well EW-1 Field Data

VE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
9/14/98	10:26	0.00			0	0			Start-up
9/14/98	10:27	0.02	233.0	0.0	200	68	0	572,000	Collected air sample EW-1-AS1
9/14/98	10:31	0.08	152.8	0.0	90	44	50		
9/14/98	10:46	0.33	131.8	0.0	90	44	50		
9/14/98	11:01	0.58	112.7	0.0	90	43	50		
9/14/98	11:16	0.83	107.1	0.0	90	43	50		
9/14/98	11:26	1.00	99.9	0.0	90	43	50		
9/14/98	11:30	1.07	110.1	0.0	100	45	40		increased vacuum
9/14/98	11:45	1.32	105.3	0.0	100	45	40		
9/14/98	12:00	1.57	100.8	0.0	100	46	40		
9/14/98	12:15	1.82	98.5	0.0	100	46	40		
9/14/98	12:28	2.03	91.9	0.0	100	46	40		
9/14/98	12:30	2.07	108.0	0.0	125	54	28		increased vacuum
9/14/98	12:45	2.32	106.6	0.0	125	54	28		
9/14/98	13:00	2.57	101.3	0.0	125	54	28		
9/14/98	13:15	2.82	98.6	0.0	125	54	28		
9/14/98	13:29	3.05	91.6	0.0	125	54	28		
9/14/98	13:45	3.32	86.4	0.0	125	54	28		
9/14/98	13:56	3.50	99.8	0.0	150	60	18		increased vacuum
9/14/98	14:15	3.82	96.8	0.0	150	60	17		
9/14/98	14:30	4.07	94.6	0.0	150	60	17		
9/14/98	14:31	4.08	109.9	0.0	175	65	5		increased vacuum
9/14/98	14:45	4.32	107.5	0.0	175	65	5		
9/14/98	15:00	4.57	105.5	0.0	175	65	5		
9/14/98	15:15	4.82	99.9	0.0	175	65	5		
9/14/98	15:30	5.07	94.9	0.0	175	65	5		
9/14/98	15:31	5.08	108.6	0.0	200	67	0	218,000	Collected air sample EW-1-AS2, increase vacuum
9/14/98	15:45	5.32	106.8	0.0	200	68	0		
9/14/98	16:00	5.57	105.7	0.0	200	68	0		
9/14/98	16:15	5.82	102.9	1.2	200	68	0		
9/14/98	16:24	5.97	102.5	1.2	200	68	0	206,000	Collected air sample EW-1-AS3



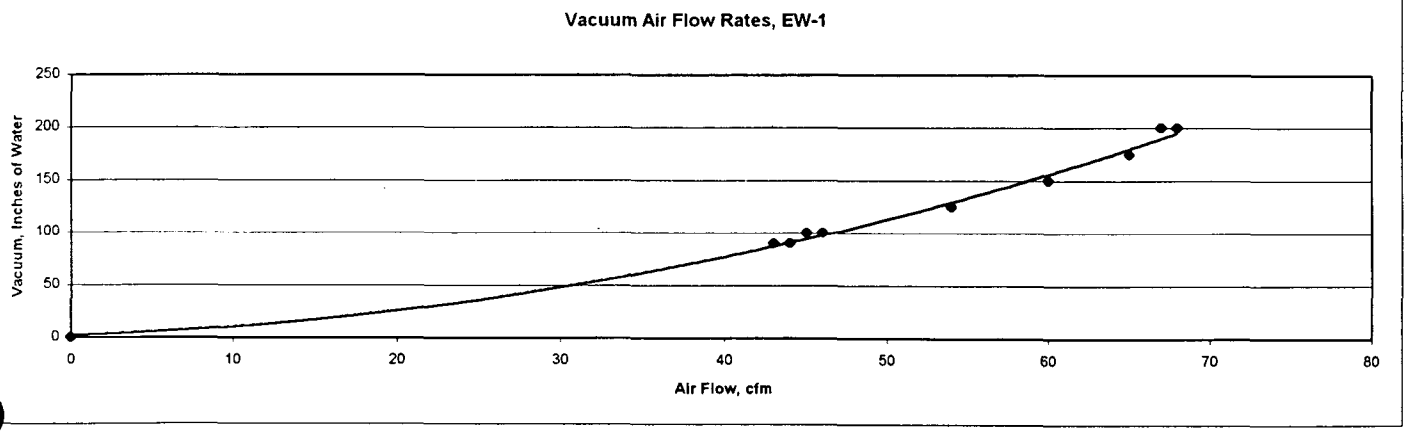
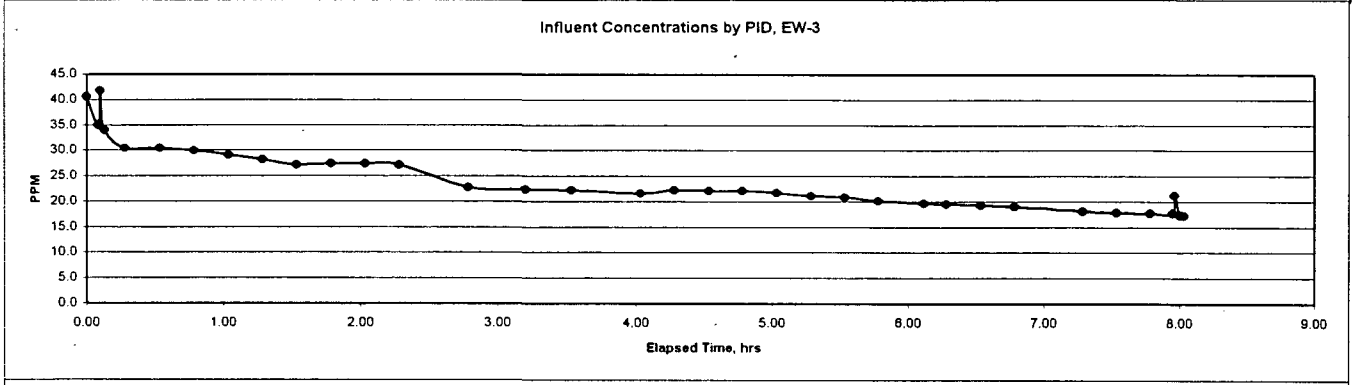


Table 9
Extraction Well EW-3 Field Data

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/15/98	9:43	0.00	40.6	0.0	175	69	11		Start-up
9/15/98	9:48	0.08	34.9	0.0	175	69	11		
9/15/98	9:49	0.10	41.7	0.0	200	71	0	122,000	Collected air sample EW-3-AS1
9/15/98	9:51	0.13	34.0	0.0	175	69	10		
9/15/98	10:00	0.28	30.4	0.0	175	69	10		
9/15/98	10:15	0.53	30.4	0.0	175	70	10		
9/15/98	10:30	0.78	29.9	0.0	175	70	10		
9/15/98	10:45	1.03	29.0	0.0	173	70	10		
9/15/98	11:00	1.28	28.1	0.0	173	70	10		
9/15/98	11:15	1.53	27.1	0.0	173	70	10		
9/15/98	11:30	1.78	27.4	0.0	175	70	5		
9/15/98	11:45	2.03	27.4	0.0	175	70	5		
9/15/98	12:00	2.28	27.2	0.0	175	70	5		
9/15/98	12:30	2.78	22.7	0.0	175	70	5		
9/15/98	12:55	3.20	22.4	0.0	175	70	5		
9/15/98	13:15	3.53	22.3	0.0	175	70	5		
9/15/98	13:45	4.03	21.6	0.0	175	70	5		
9/15/98	14:00	4.28	22.2	0.0	175	70	5		
9/15/98	14:15	4.53	22.1	0.0	175	70	5		
9/15/98	14:30	4.78	22.1	0.0	175	70	5		
9/15/98	14:45	5.03	21.8	0.0	175	70	5		
9/15/98	15:00	5.28	21.1	0.0	175	70	5		
9/15/98	15:15	5.53	20.9	0.0	175	70	5		
9/15/98	15:30	5.78	20.1	0.0	175	70	5		
9/15/98	15:50	6.12	19.6	0.0	175	70	5		
9/15/98	16:00	6.28	19.5	0.0	175	70	5		
9/15/98	16:15	6.53	19.2	0.0	175	70	5		
9/15/98	16:30	6.78	19.0	0.0	175	70	5		
9/15/98	17:00	7.28	18.1	0.0	175	70	5		
9/15/98	17:15	7.53	17.8	0.0	175	70	5		
9/15/98	17:30	7.78	17.7	0.0	175	70	5		
9/15/98	17:40	7.95	17.7	0.0	175	70	5		
9/15/98	17:41	7.97	21.3	0.0	192	72	0	93,400	Collected air sample EW-3-AS2
9/15/98	17:43	8.00	17.4	0.0	175	69	5		
9/15/98	17:45	8.03	17.2	0.0	175	69	5		



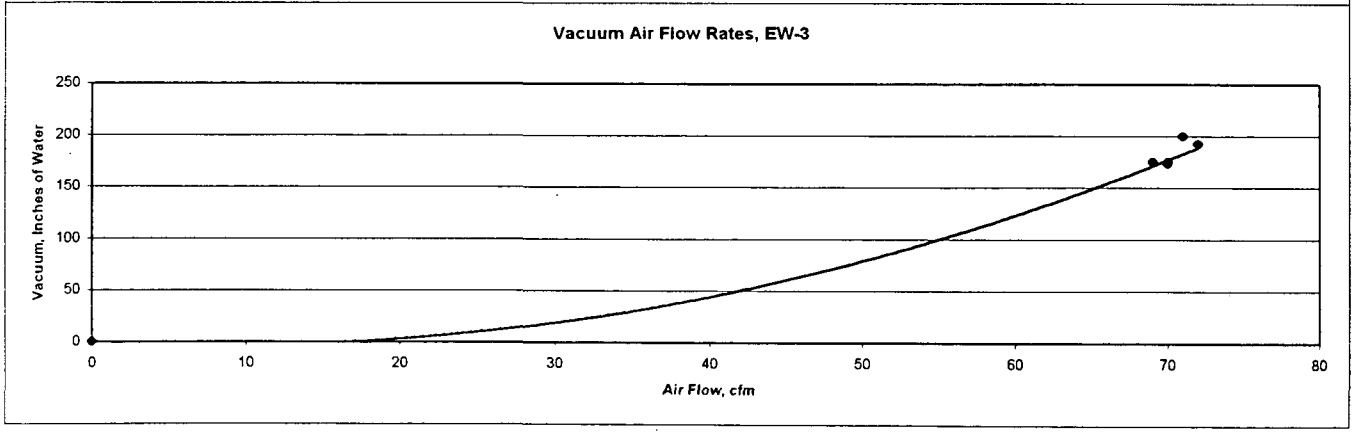
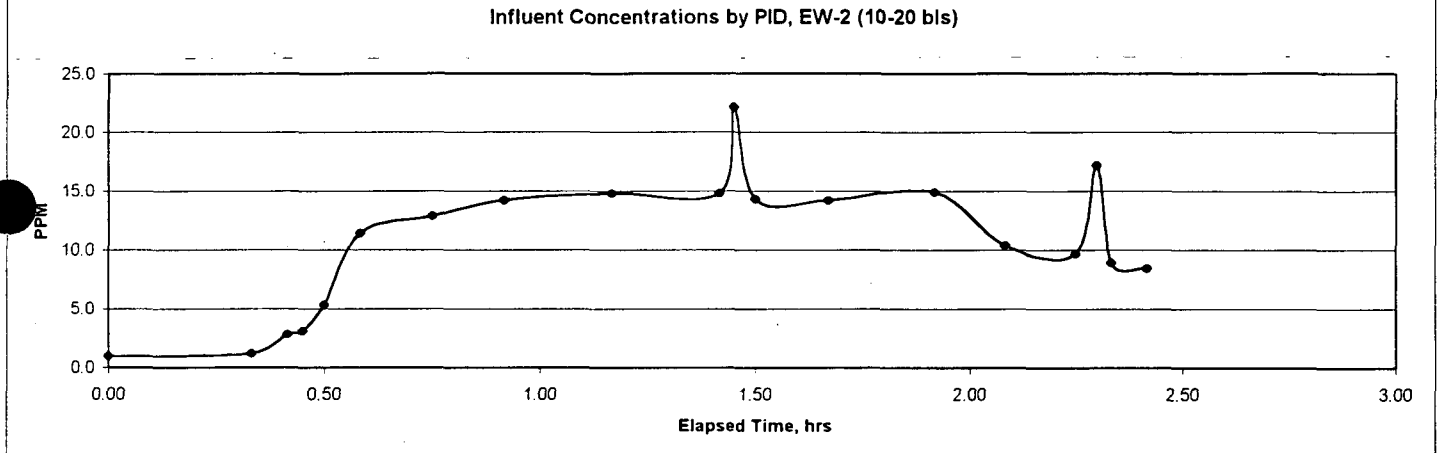


Table 10
Extraction Well EW-2 Field Data
Packer Internval 10'-20'

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
9/18/98	10:35	0.00	1.0	0.0	175	70	5		
9/18/98	10:55	0.33	1.2	0.0	180	70	6	11,900	Collected air sample EW-2-AS1
9/18/98	11:00	0.42	2.8	0.0	200	70	0		
9/18/98	11:02	0.45	3.1	0.0	200	70	0		
9/18/98	11:05	0.50	5.3	0.0	180	65	13		
9/18/98	11:10	0.58	11.4	0.0	175	58	18		
9/18/98	11:20	0.75	12.9	0.0	170	59	18		
9/18/98	11:30	0.92	14.2	0.0	175	59	17		
9/18/98	11:45	1.17	14.8	0.0	175	59	17		
9/18/98	12:00	1.42	14.8	0.0	175	59	17		
9/18/98	12:02	1.45	22.1	0.0	200	65	0	71,300	Collected air sample EW-2-AS2
9/18/98	12:05	1.50	14.3	0.0	175	58	18		
9/18/98	12:15	1.67	14.2	0.0	175	57	18		
9/18/98	12:30	1.92	14.9	0.0	180	55	18		
9/18/98	12:40	2.08	10.4	0.0	175	51	23		
9/18/98	12:50	2.25	9.7	0.0	176	50	22		
9/18/98	12:53	2.30	17.2	0.0	200	64	0	92,400	Collected air sample EW-2-AS3
9/18/98	12:55	2.33	8.9	0.0	174	50	24		
9/18/98	13:00	2.42	8.4	0.0	175	50	24		



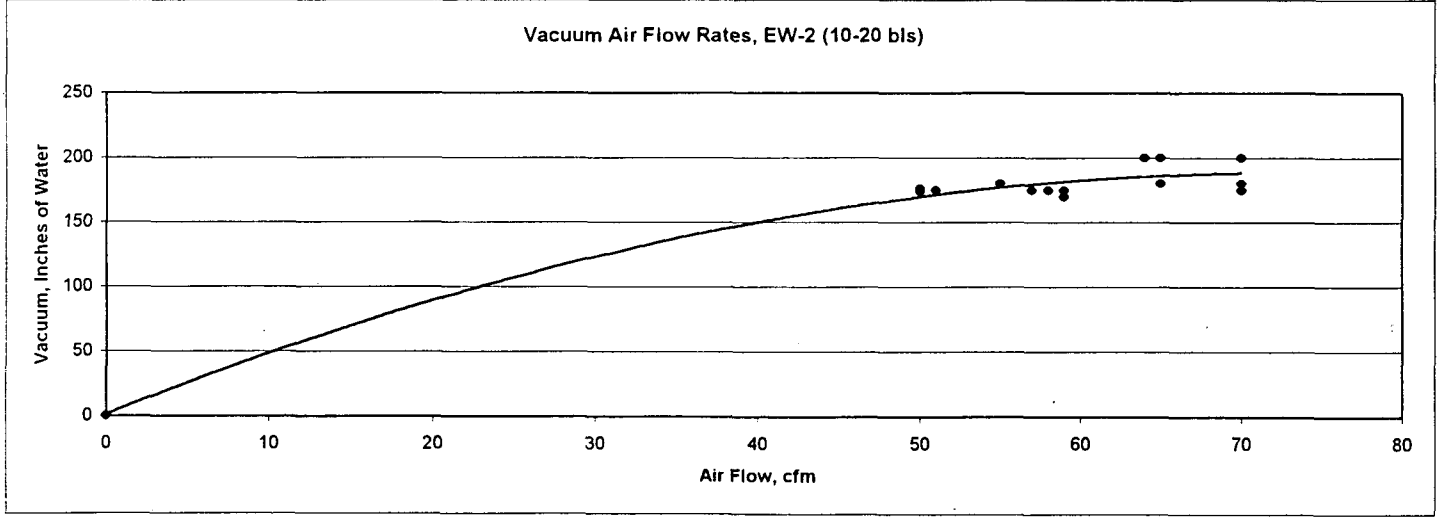


Table 10
Extraction Well EW-2 Field Data
Packer Internval 20'-30'

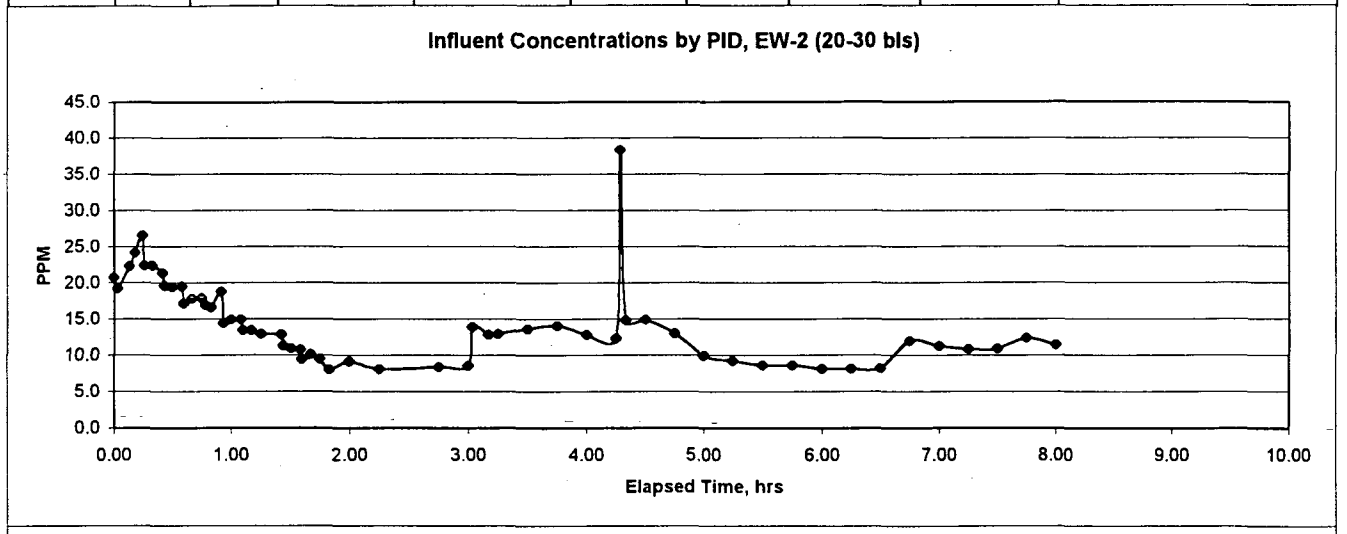
BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
9/21/98	13:43	0.00	12.8	0.0	212	68	0		
9/21/98	13:45	0.00	20.7	0.0	212	68	0	141,000	Collected air sample EW-2-AS4
9/21/98	13:47	0.03	19.2	0.0	200	55	13		
9/21/98	13:53	0.13	22.3	0.0	200	55	12		
9/21/98	13:56	0.18	24.1	0.0	201	55	13		
9/21/98	14:00	0.25	26.5	0.0	201	55	13		
9/21/98	14:01	0.27	22.4	0.0	191	45	20		
9/21/98	14:05	0.33	22.4	0.0	190	45	22		
9/21/98	14:10	0.42	21.3	0.0	190	45	22		
9/21/98	14:11	0.43	19.6	0.0	180	40	27		
9/21/98	14:15	0.50	19.4	0.0	180	40	27		
9/21/98	14:20	0.58	19.5	0.0	180	40	27		
9/21/98	14:21	0.60	17.1	0.0	170	38	30		
9/21/98	14:25	0.67	17.8	0.0	170	39	31		
9/21/98	14:30	0.75	17.9	0.0	170	42	31		
9/21/98	14:32	0.78	16.9	0.0	160	35	35		
9/21/98	14:35	0.83	16.6	0.0	160	35	35		
9/21/98	14:40	0.92	18.8	0.0	160	35	34		
9/21/98	14:41	0.93	14.4	0.0	150	33	40		
9/21/98	14:45	1.00	14.9	0.0	150	33	40		
9/21/98	14:50	1.08	14.9	0.0	150	33	40		
9/21/98	14:51	1.10	13.4	0.0	140	30	45		
9/21/98	14:55	1.17	13.4	0.0	140	30	45		
9/21/98	15:00	1.25	12.9	0.0	140	30	45		
9/21/98	15:10	1.42	12.8	0.0	140	30	45		
9/21/98	15:11	1.43	11.2	0.0	130	27	50		
9/21/98	15:15	1.50	10.9	0.0	130	27	50		
9/21/98	15:20	1.58	10.7	0.0	130	27	50		
9/21/98	15:21	1.60	9.4	0.0	120	25	58		
9/21/98	15:25	1.67	10.1	0.0	122	25	58		
9/21/98	15:30	1.75	9.5	0.0	120	25	60		
9/21/98	15:35	1.83	8.0	0.0	120	24	60		
9/21/98	15:45	2.00	9.1	0.0	120	24	60		
9/21/98	16:00	2.25	8.1	0.0	123	24	61		
9/21/98	16:30	2.75	8.3	0.0	125	24	61		
9/21/98	16:45	3.00	8.5	0.0	125	24	61		
9/21/98	16:47	3.03	13.9	0.0	175	42	40		
9/21/98	16:55	3.17	12.8	0.0	175	43	40		
9/21/98	17:00	3.25	12.9	0.0	175	43	40		
9/21/98	17:15	3.50	13.6	0.0	175	44	39		
9/21/98	17:30	3.75	14.0	0.0	175	44	40		
9/21/98	17:45	4.00	12.8	0.0	175	43	40		
9/21/98	18:00	4.25	12.3	0.0	175	42	40		
9/21/98	18:02	4.28	38.3	0.0	215	70	0	213,000	Collected air sample EW-2-AS5
9/21/98	18:05	4.33	14.8	0.0	175	42	41		
9/21/98	18:15	4.50	14.9	0.0	175	42	41		
9/21/98	18:30	4.75	13.0	0.0	175	43	41		
9/21/98	18:45	5.00	9.9	0.0	176	45	41		
9/21/98	19:00	5.25	9.2	0.0	178	46	41		
9/21/98	19:15	5.50	8.6	0.0	178	47	41		
9/21/98	19:30	5.75	8.6	0.0	178	47	35		
9/21/98	19:45	6.00	8.1	0.0	178	47	34		
9/21/98	20:00	6.25	8.1	0.0	175	43	34		
9/21/98	20:15	6.50	8.2	0.0	180	40	34		
9/21/98	20:30	6.75	11.9	0.0	175	42	38		
9/21/98	20:45	7.00	11.2	0.0	175	43	29		
9/21/98	21:00	7.25	10.8	0.0	178	47	29		
9/21/98	21:15	7.50	10.9	0.0	178	47	29		
9/21/98	21:30	7.75	12.4	0.0	130	27	52		
9/21/98	21:45	8.00	11.4	0.0	130	27	51		
9/21/98	22:00	8.25			135	20	51		PID Malfunctioning

Table 10
Extraction Well EW-2 Field Data
Packer Internval 20'-30'

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
9/21/98	22:15	8.50			130	27	52		
9/21/98	22:30	8.75			130	26	52		
9/21/98	22:45	9.00			130	26	51	197,000	Collected air sample EW-2-AS6
					0	0	0		



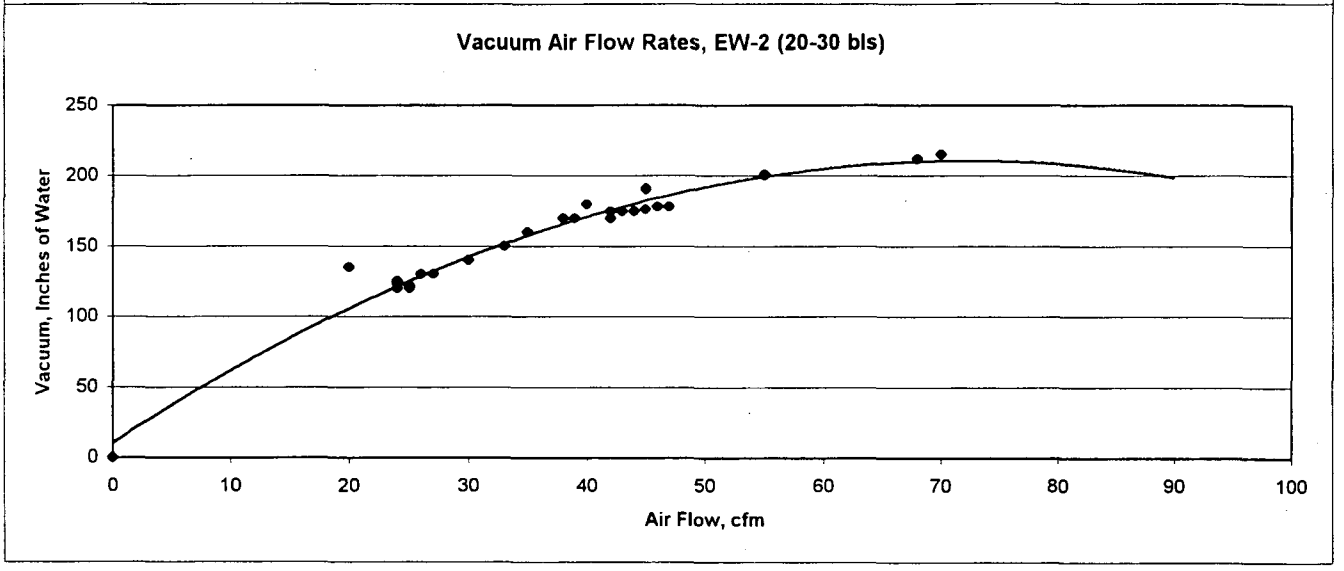
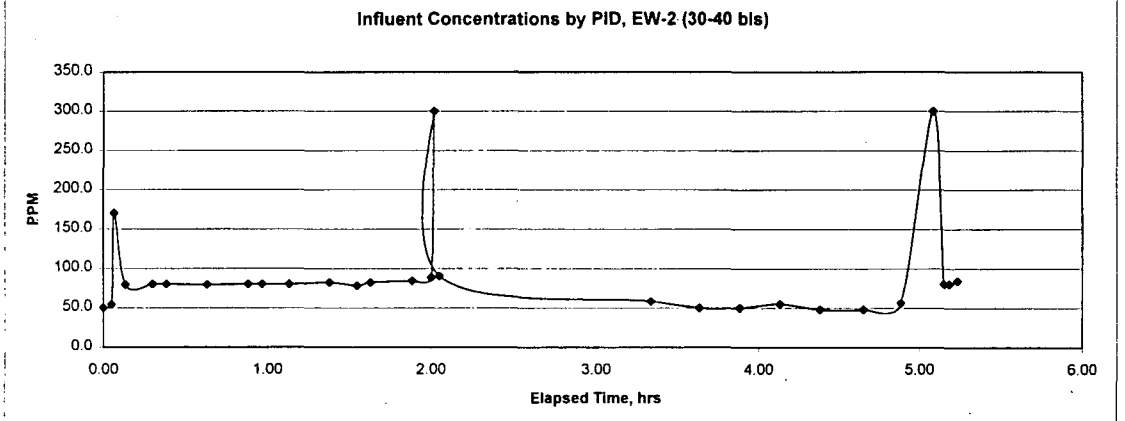


Table 11
Extraction Well EW-2 Field Data
Packer Internval 30'-40'

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
9/22/98					0	0			
9/22/98	11:07	0.00	50.0	0.0	175	31	41		
9/22/98	11:10	0.05	54.0	0.0	175	31	41		
9/22/98	11:11	0.07	170.0	0.0	299	70	0	127,000	Collected air sample EW-2-AS7
9/22/98	11:15	0.13	79.0	0.0	175	28	44		
9/22/98	11:25	0.30	80.0	0.0	175	29	44		
9/22/98	11:30	0.38	80.0	0.0	175	26	44		
9/22/98	11:45	0.63	79.0	0.0	175	25	44		
9/22/98	12:00	0.88	80.0	0.0	175	25	44		
9/22/98	12:05	0.97	80.0	0.0	180	25	44		
9/22/98	12:15	1.13	80.0	0.0	180	25	44		
9/22/98	12:30	1.38	82.0	0.0	182	25	44		
9/22/98	12:40	1.55	78.0	0.0	175	22	49		
9/22/98	12:45	1.63	82.0	0.0	175	22	49		
9/22/98	13:00	1.88	84.0	0.0	176	22	50		
9/22/98	13:07	2.00	88.0	0.0	176	22	50		
9/22/98	13:08	2.02	300.0	0.0	321	23	0	155,000	Collected air sample EW-2-AS8
9/22/98	13:10	2.05	90.0	0.0	175	17	49		
9/22/98	14:27	3.33	58.0	0.0	177	17	55		
9/22/98	14:45	3.63	50.0	0.0	175	17	55		
9/22/98	15:00	3.88	50.0	0.0	176	17	55		
9/22/98	15:15	4.13	55.0	0.0	175	17	55		
9/22/98	15:30	4.38	48.0	0.0	177	17	55		
9/22/98	15:46	4.65	48.0	0.0	174	17	55		
9/22/98	16:00	4.88	56.0	0.0	178	17	55		
9/22/98	16:12	5.08	300.0	0.0	337	39	0	191,000	Collected air sample EW-2-AS9
9/22/98	16:16	5.15	80.0	0.0	179	18	53		
9/22/98	16:18	5.18	80.0	0.0	181	18	53		
9/22/98	16:21	5.23	84.0	0.0	180	8	53		



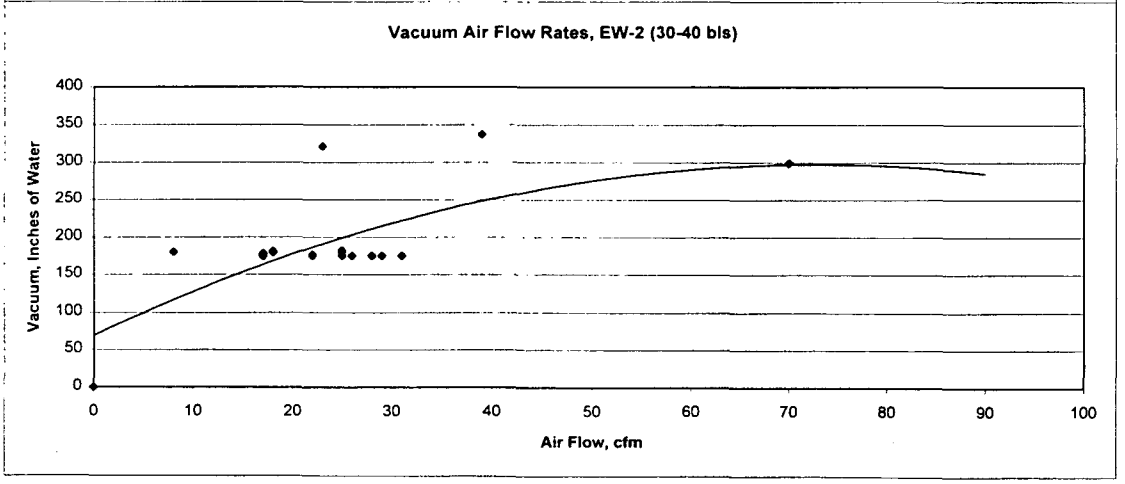


Table 13
Extraction Well EW-1 Field Data
Packer Internval 20'-30'

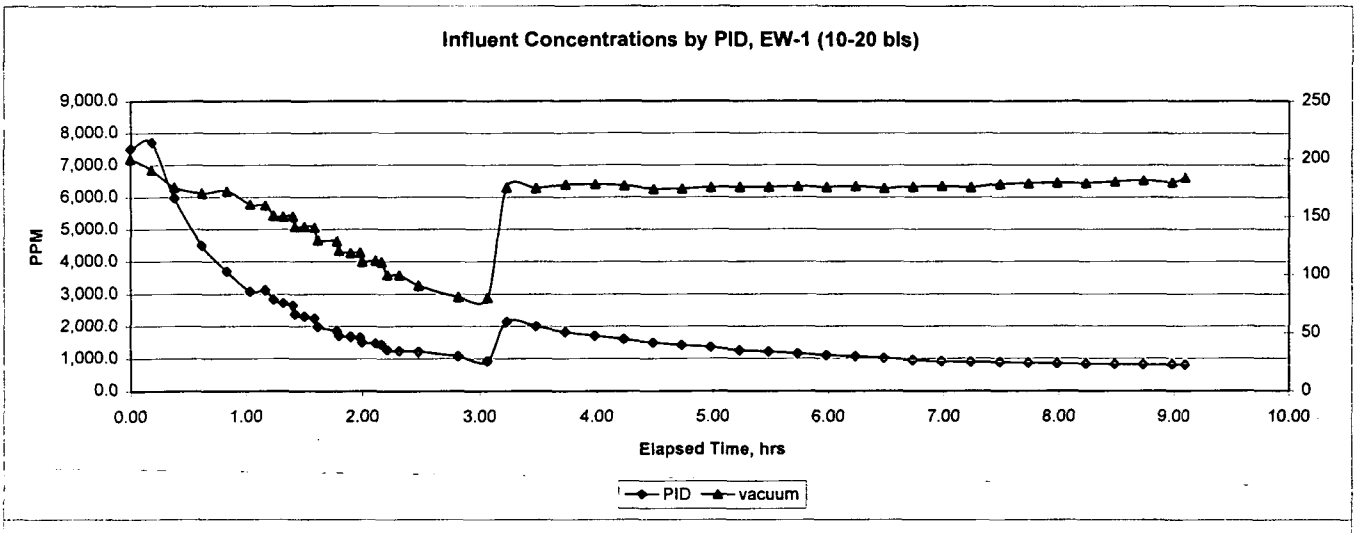
BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Contaminant Extraction Rate (lbs/hr)	Notes
					0	0				
10/5/98	9:16	0.00	7,500.0	0.0	199.8	70	10	459,000	0.668	Collected air sample EW-1-AS4A
10/5/98	9:27	0.18	7,700.0	0.0	190.5	68	10			
10/5/98	9:39	0.38	5,975.0	0.0	175.4	67	12			
10/5/98	9:53	0.62	4,500.0	0.0	170	64	13			
10/5/98	10:06	0.83	3,700.0	0.0	171.9	64	13			
10/5/98	10:18	1.03	3,075.0	0.0	160.5	65	15			
10/5/98	10:26	1.17	3,111.0	0.0	159.5	64	15			
10/5/98	10:30	1.23	2,832.0	0.0	150.7	61	18			
10/5/98	10:35	1.32	2,719.0	0.0	149.9	61	18			
10/5/98	10:40	1.40	2,648.0	0.0	150.1	61	18			
10/5/98	10:41	1.42	2,386.0	0.0	141	60	20			
10/5/98	10:46	1.50	2,311.0	0.0	141.5	60	20			
10/5/98	10:51	1.58	2,248.0	0.0	140.5	60	20			
10/5/98	10:53	1.62	1,981.0	0.0	129.5	57	25			
10/5/98	11:03	1.78	1,856.0	0.0	128.7	57	25			
10/5/98	11:04	1.80	1,720.0	0.0	120.4	55	30			
10/5/98	11:10	1.90	1,689.0	0.0	118.6	55	30			
10/5/98	11:15	1.98	1,659.0	0.0	119.1	55	30			
10/5/98	11:16	2.00	1,505.0	0.0	111.2	52	33			
10/5/98	11:23	2.12	1,475.0	0.0	111.8	52	33			
10/5/98	11:26	2.17	1,445.0	0.0	110.7	52	33			
10/5/98	11:29	2.22	1,267.0	0.0	99.7	49	40			
10/5/98	11:35	2.32	1,236.0	0.0	99.6	49	40			
10/5/98	11:45	2.48	1,225.0	0.0	90.6	45	43			
10/5/98	12:05	2.82	1,069.0	0.0	80.8	42	52			
10/5/98	12:20	3.07	922.0	0.0	80.1	42	50			
10/5/98	12:30	3.23	2,140.0	0.0	175	65	10			
10/5/98	12:45	3.48	2,001.0	0.0	174.6	65	10	227,000	0.331	Collected air sample EW-1-AS5A
10/5/98	13:00	3.73	1,822.0	0.0	177.6	65	10			
10/5/98	13:15	3.98	1,709.0	0.0	177.7	65	10			
10/5/98	13:30	4.23	1,606.0	0.0	176.3	65	10			
10/5/98	13:45	4.48	1,500.0	0.0	173.7	65	10			
10/5/98	14:00	4.73	1,421.0	0.0	174	65	10			
10/5/98	14:15	4.98	1,360.0	0.0	175.1	65	10			
10/5/98	14:30	5.23	1,250.0	0.0	175.3	65	10			
10/5/98	14:45	5.48	1,212.0	0.0	175.2	65	10			
10/5/98	15:00	5.73	1,156.0	0.0	175.9	65	10			
10/5/98	15:15	5.98	1,105.0	0.0	175.4	65	10			
10/5/98	15:30	6.23	1,061.0	0.0	176.2	65	10			
10/5/98	15:45	6.48	1,008.0	0.0	174.6	65	10			
10/5/98	16:00	6.73	950.0	0.0	175.7	65	10			
10/5/98	16:15	6.98	912.0	0.0	176	65	10			
10/5/98	16:30	7.23	892.0	0.0	175	65	10			
10/5/98	16:45	7.48	882.0	0.0	177.9	65	10			
10/5/98	17:00	7.73	860.0	0.0	178.5	65	10			
10/5/98	17:15	7.98	846.0	0.0	179.1	65	10			
10/5/98	17:30	8.23	838.0	0.0	178.8	65	10			
10/5/98	17:45	8.48	822.0	0.0	180.1	65	10			
10/5/98	18:00	8.73	812.0	0.0	181	65	10			
10/5/98	18:15	8.98	810.0	0.0	179.4	65	10	181,000	0.264	Collected air sample EW-1-AS6A
10/5/98	18:22	9.10	807.0	0.0	183.5	65	10			

Table 13
Extraction Well EW-1 Field Data
Packer Internval 20'-30'

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Contaminant Extraction Rate (lbs/hr)	Notes



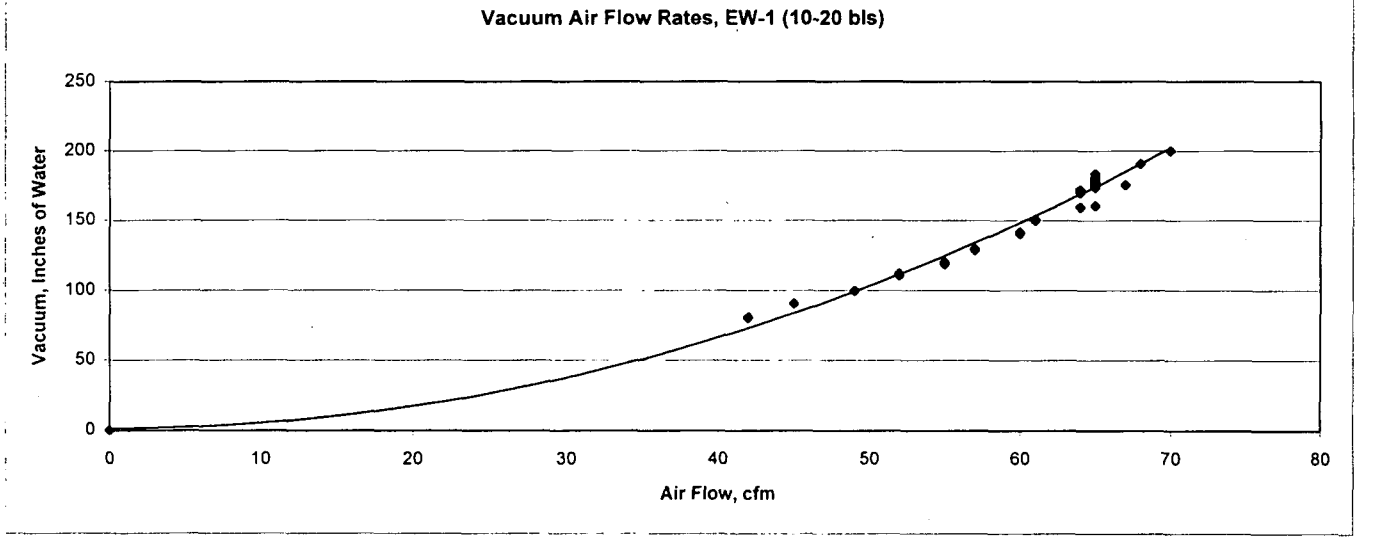
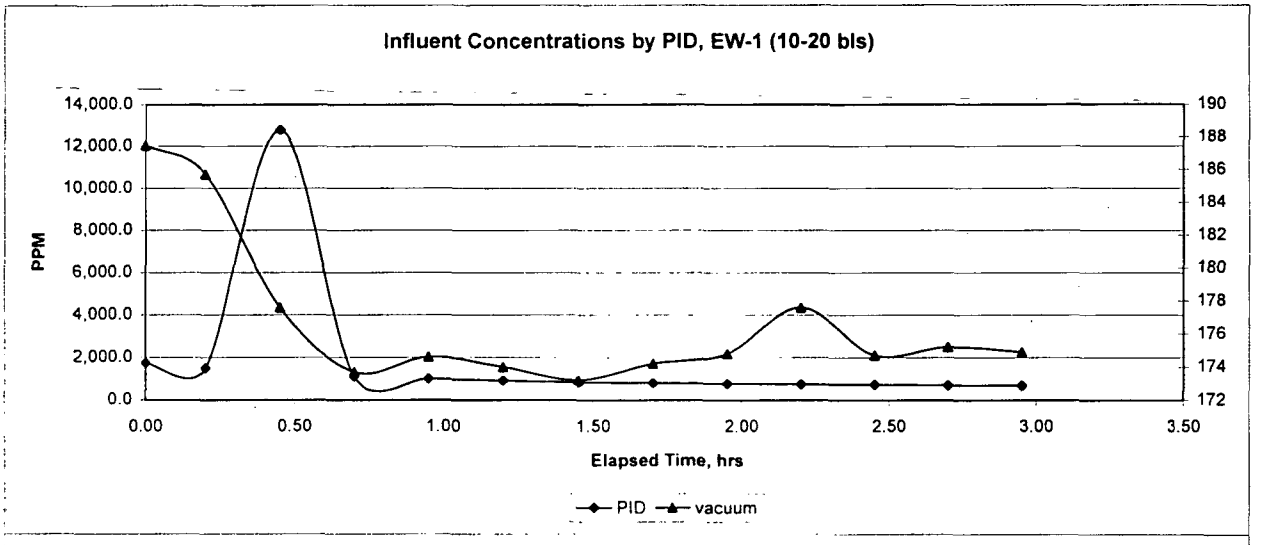


Table 14
Extraction Well EW-1 Field Data
Packer Internval 32'-42'

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
10/6/98	10:48	0.00	1,740.0	0.0	187.5	65	12	382,000	Collected air sample EW-1-AS7A
10/6/98	11:00	0.20	1,500.0	0.0	185.7	65	12		
10/6/98	11:15	0.45	12,770.0	0.0	177.6	63	13		
10/6/98	11:30	0.70	1,100.0	0.0	173.7	63	13		
10/6/98	11:45	0.95	998.0	0.0	174.6	63	13		
10/6/98	12:00	1.20	900.0	0.0	174	63	13		
10/6/98	12:15	1.45	830.0	0.0	173.2	63	13		
10/6/98	12:30	1.70	795.0	0.0	174.2	63	13	248,000	Collected air sample EW-1-AS8A
10/6/98	12:45	1.95	770.0	0.0	174.8	63	13		
10/6/98	13:00	2.20	740.0	0.0	177.6	65	12.5		
10/6/98	13:15	2.45	730.0	0.0	174.7	64	12		
10/6/98	13:30	2.70	700.0	0.0	175.2	64	12	4,780	Collected air sample EW-1-AS9A
10/6/98	13:45	2.95	680.0	0.0	174.9	64	12		



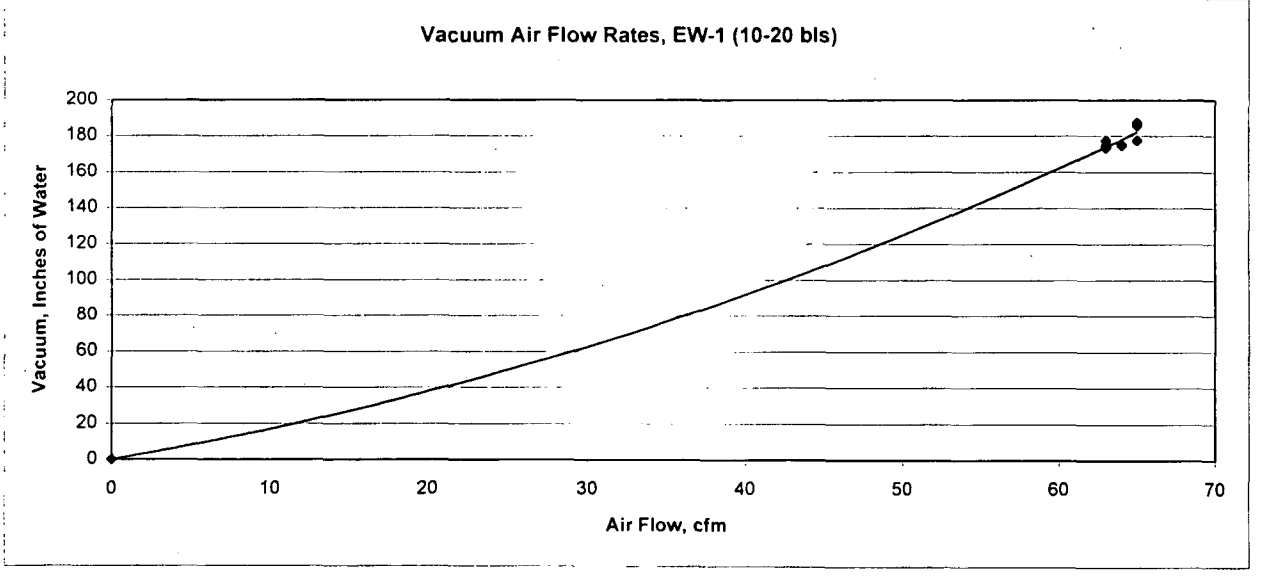


Table 12
Extraction Well EW-1 Field Data
Packer Internval 12'-22'

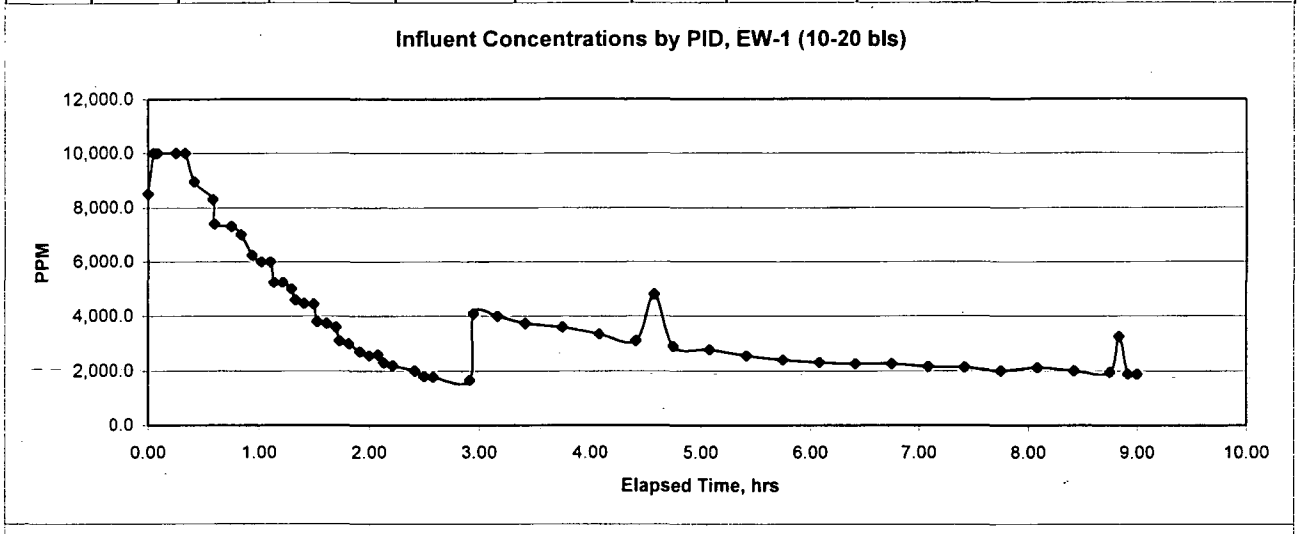
BVE Pilot Test
Lehigh Valley

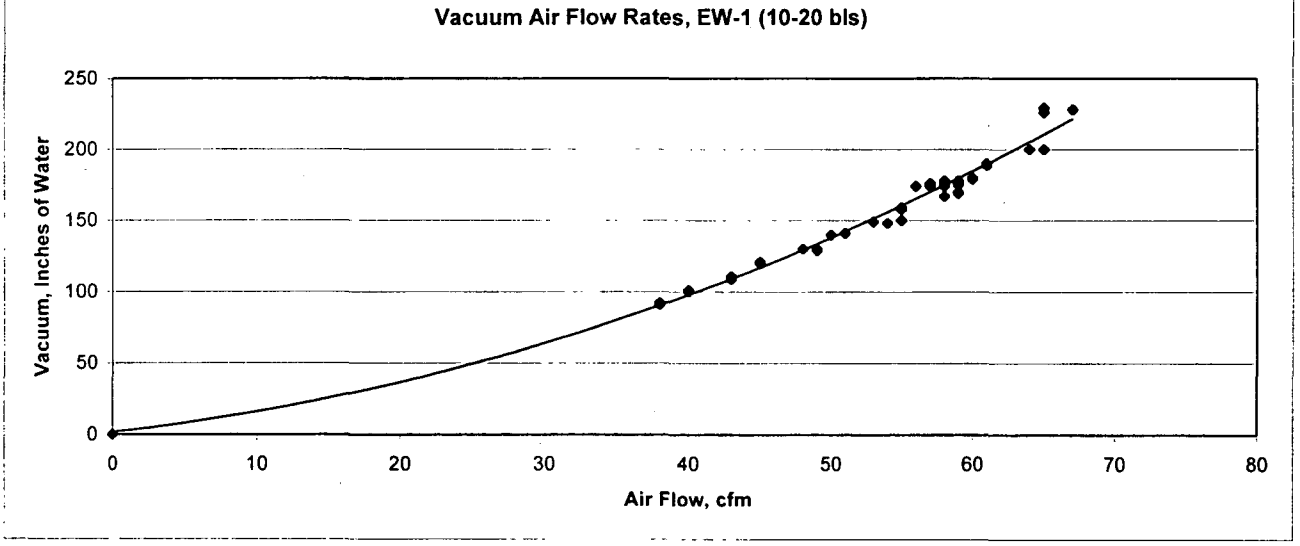
Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
					0	0			
10/1/98	11:35	0.00	8,500.0	0.0	200	65	10		
10/1/98	11:38	0.05	10,000.0	0.0	228	67	0	807,000	Collected air sample EW-1-AS1A
10/1/98	11:40	0.08	10,000.0	0.0	200	64	10		
10/1/98	11:50	0.25	10,000.0	0.0	190	61	12		
10/1/98	11:55	0.33	10,000.0	0.0	189	61	12		
10/1/98	12:00	0.42	8,959.0	0.0	180	60	15		
10/1/98	12:10	0.58	8,300.0	0.0	179	60	15		
10/1/98	12:11	0.60	7,400.0	0.0	170	59	18		
10/1/98	12:20	0.75	7,300.0	0.0	169	59	18		
10/1/98	12:25	0.83	7,000.0	0.0	167	58	18		
10/1/98	12:31	0.93	6,250.0	0.0	159	55	22		
10/1/98	12:36	1.02	6,000.0	0.0	158	55	21		
10/1/98	12:41	1.10	6,000.0	0.0	159	55	21		
10/1/98	12:43	1.13	5,250.0	0.0	150	55	25		
10/1/98	12:48	1.22	5,250.0	0.0	149	53	25		
10/1/98	12:53	1.30	5,000.0	0.0	148	54	25		
10/1/98	12:55	1.33	4,600.0	0.0	141	51	28		
10/1/98	13:00	1.42	4,475.0	0.0	141	51	28		
10/1/98	13:05	1.50	4,450.0	0.0	140	50	28		
10/1/98	13:07	1.53	3,800.0	0.0	130	48	32		
10/1/98	13:12	1.62	3,750.0	0.0	130	49	33		
10/1/98	13:17	1.70	3,600.0	0.0	129	49	33		
10/1/98	13:19	1.73	3,100.0	0.0	120	45	37		
10/1/98	13:24	1.82	3,000.0	0.0	121	45	38		
10/1/98	13:30	1.92	2,700.0	0.0	111	43	43		
10/1/98	13:35	2.00	2,560.0	0.0	110	43	43		
10/1/98	13:40	2.08	2,600.0	0.0	109	43	43		
10/1/98	13:43	2.13	2,300.0	0.0	100	40	49		
10/1/98	13:48	2.22	2,200.0	0.0	101	40	49		
10/1/98	14:00	2.42	2,000.0	0.0	100	40	49		
10/1/98	14:05	2.50	1,800.0	0.0	91	38	55		
10/1/98	14:10	2.58	1,775.0	0.0	92	38	55		
10/1/98	14:30	2.92	1,650.0	0.0	92	38	55		
10/1/98	14:32	2.95	4,100.0	0.0	175	59	16		
10/1/98	14:45	3.17	4,000.0	0.0	177	59	16		
10/1/98	15:00	3.42	3,750.0	0.0	177	59	16		
10/1/98	15:20	3.75	3,600.0	0.0	175	58	16		
10/1/98	15:40	4.08	3,350.0	0.0	176	59	16		
10/1/98	16:00	4.42	3,100.0	0.0	174	58	16		
10/1/98	16:10	4.58	4,800.0	0.0	226	65	0	310,000	Collected air sample EW-1-AS2A
10/1/98	16:20	4.75	2,900.0	0.0	176	58	16		
10/1/98	16:40	5.08	2,775.0	0.0	177	58	16		
10/1/98	17:00	5.42	2,550.0	0.0	178	58	16		
10/1/98	17:20	5.75	2,400.0	0.0	177	59	16		
10/1/98	17:40	6.08	2,300.0	0.0	178	59	16		
10/1/98	18:00	6.42	2,250.0	0.0	174	56	18		
10/1/98	18:20	6.75	2,250.0	0.0	174	56	18		
10/1/98	18:40	7.08	2,150.0	0.0	176	57	18		
10/1/98	19:00	7.42	2,125.0	0.0	175	57	18		
10/1/98	19:20	7.75	2,000.0	0.0	175	57	18		
10/1/98	19:40	8.08	2,112.0	0.0	174	57	18		
10/1/98	20:00	8.42	1,991.0	0.0	175	57	18		

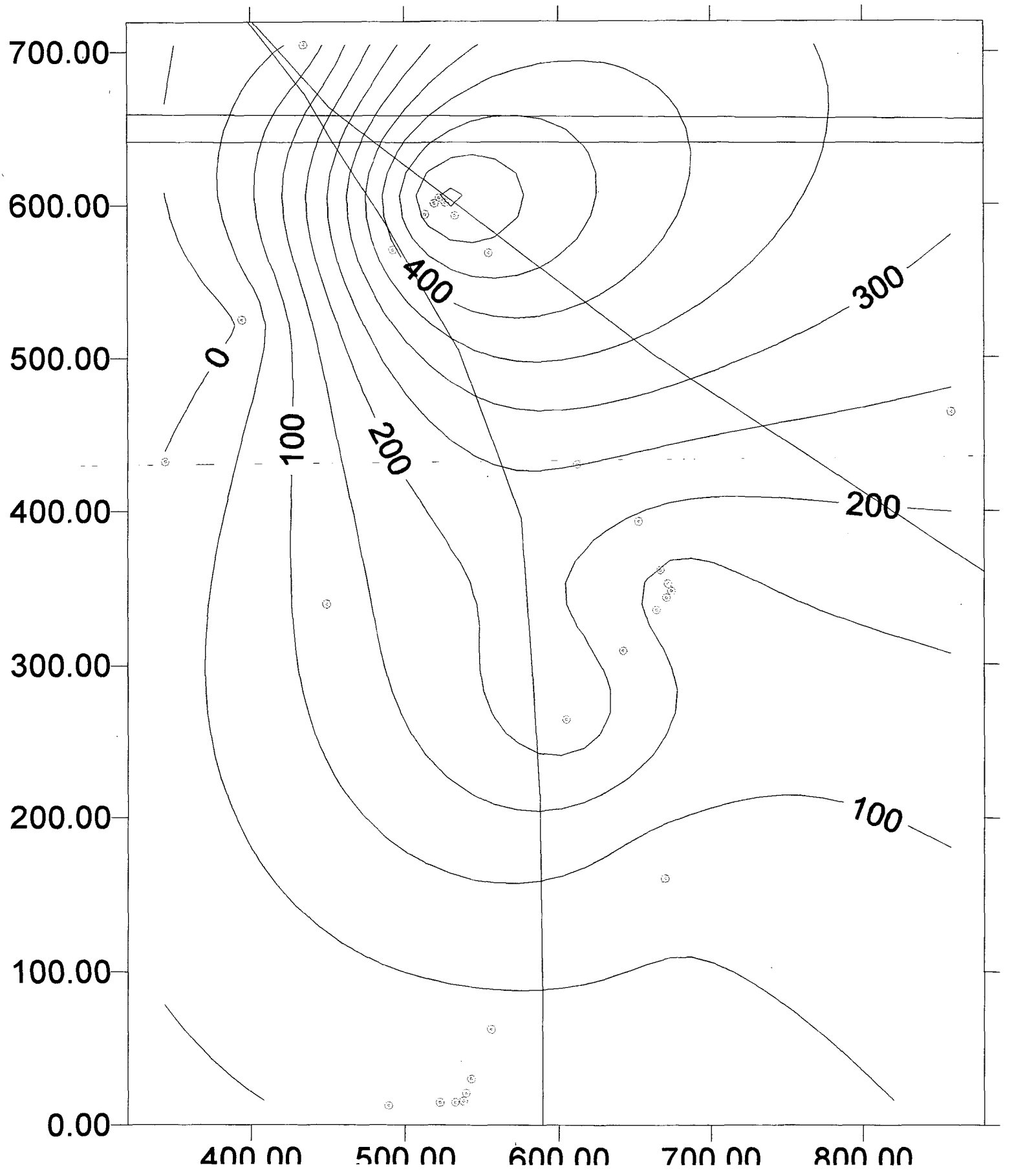
Table 12
Extraction Well EW-1 Field Data
Packer Internval 12'-22'

BVE Pilot Test
Lehigh Valley

Date	Time	Elapsed Time, hrs	PID Reading at Well, ppmv	PID Reading after Carbon, ppmv	Vacuum at Well, inches of water	Air flow at Well, cfm	Air Flow @ Dilution Valve, cfm	Air Sample Analytical Result (ppbv)	Notes
10/1/98	20:20	8.75	1,939.0	0.0	175	57	18		
10/1/98	20:25	8.83	3,255.0	0.0	229	65	0	247,000	Collected air sample EW-1-AS3A
10/1/98	20:30	8.92	1,883.0	0.0	174	58	18		
10/1/98	20:35	9.00	1,876.0	0.0	175	58	18		






Initial TCE Vapor Concentrations (ppmv)
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
400.00
500.00
600.00
700.00
800.00
0
100
200
400
300
200
100

SUMMARY OF AIR SAMPLE ANALYSIS RESULTS
LeHigh Valley R.R. Spill Site, BVE Pilot Test

		DETECTED ANALYTES [1,2]									
Sample Designation	Sample Date	Benzene	Methylene chloride	Trichloroethene	1,1-Dichloroethane	p&m-Xylene	o-Xylene	Toluene	1,2,4-Trimethylbenzene	Ethylbenzene	1,3,5-Trimethylbenzene
EW-5-AS1	9/3/98	--	34	830	--	--	--	--	--	--	--
EW-5-AS2	9/3/98	--	29	730	--	--	--	--	--	--	--
EW-5-AS3	9/3/98	--	37	1,190	20	--	--	--	--	--	--
EW-6-AS1	9/4/98	--	--	123,000	--	--	--	--	--	--	--
EW-6-AS2	9/4/98	--	6,457	141,000	--	--	--	--	--	--	--
EW-6-AS3	9/4/98	--	6,660	164,000	--	--	--	--	--	--	--
EW-7-AS1	9/8/98	--	6,580	256,000	--	--	--	--	--	--	--
EW-7-AS2	9/8/98	--	9,720	246,000	--	--	--	--	--	--	--
EW-7-AS3	9/8/98	--	7,650	183,000	--	--	--	--	--	--	--
EW-8-AS1	9/9/98	--	13,600	246,000	--	--	--	--	--	--	--
EW-8-AS2	9/9/98	--	5,380	211,000	--	--	--	--	--	--	--
EW-8-AS3	9/9/98	--	8,050	198,000	--	--	--	--	--	--	--
EW-9-AS1	9/9/98	--	--	64,100	--	--	--	--	--	--	--
EW-9-AS2	9/10/98	--	--	67,800	--	--	--	--	--	--	--
EW-9-AS3	9/10/98	--	--	82,000	--	--	--	--	--	--	--
EW-11-AS1	9/10/98	--	--	58,400	--	--	--	--	--	--	--
EW-11-AS2	9/10/98	--	--	54,700	--	--	--	--	--	--	--
EW-11-AS3	9/10/98	--	--	50,700	--	--	--	--	--	--	--
EW-1-AS1	9/14/98	--	--	572,000	--	--	--	--	--	--	--
EW-1-AS2	9/14/98	--	--	218,000	--	--	--	--	--	--	--
EW-1-AS3	9/14/98	--	--	206,000	--	--	--	--	--	--	--
EW-3-AS1	9/15/98	--	--	122,000	--	--	--	--	--	--	--
EW-3-AS2	9/15/98	--	--	93,400	--	--	--	--	--	--	--
EW-2-AS1	9/18/98	--	357	11,900	--	344	388	--	--	--	--
EW-2-AS2	9/18/98	--	--	71,300	--	--	--	--	--	--	--
EW-2-AS3	9/18/98	--	--	92,400	--	--	--	--	--	--	--
EW-2-AS4	9/21/98	--	--	141,000	--	--	--	--	--	--	--
EW-2-AS5	9/21/98	--	--	213,000	--	--	--	--	--	--	--
EW-2-AS6	9/21/98	--	--	197,000	--	--	--	--	--	--	--
EW-2-AS7	9/22/98	--	--	127,000	--	--	--	--	--	--	--
EW-2-AS8	9/22/98	--	--	155,000	--	--	--	--	--	--	--
EW-2-AS9	9/22/98	--	--	191,000	--	--	--	--	--	--	--
EW-3-AS1A	9/24/98	--	--	58,100	--	--	--	--	--	--	--
EW-3-AS2A	9/24/98	--	670	28,500	--	--	--	--	--	--	--
EW-3-AS3A	9/24/98	--	840	24,900	--	--	--	--	--	--	--
EW-3-AS4A	9/28/98	--	6,540	172,000	--	--	--	--	--	--	--
EW-3-AS5A	9/28/98	--	--	112,000	--	--	--	--	--	--	--
EW-3-AS6A	9/28/98	1,980	--	109,000	--	23,000	21,700	20,400	11,400	4,420	10,100
EW-3-AS7A	9/29/98	--	--	132,000	--	--	--	--	--	--	--
EW-3-AS8A	9/29/98	--	--	92,100	--	--	--	--	--	--	--
EW-3-AS9A	9/29/98	--	--	92,900	--	--	--	--	--	--	--
EW-1-AS1A	10/1/98	--	--	807,000	--	--	--	--	--	--	--
EW-1-AS2A	10/1/98	--	--	310,000	--	--	--	--	--	--	--
EW-1-AS3A	10/1/98	--	--	247,000	--	--	--	--	--	--	--
EW-1-AS4A	10/5/98	--	--	459,000	--	--	--	--	--	--	--
EW-1-AS5A	10/5/98	--	4,180	227,000	--	--	--	--	--	--	--
EW-1-AS6A	10/5/98	--	--	181,000	--	--	--	--	--	--	--
EW-1-AS7A	10/6/98	--	--	382,000	--	--	--	--	--	--	--
EW-1-AS8A	10/6/98	--	--	248,000	--	--	--	--	--	--	--
EW-1-AS9A	10/6/98	--	--	4,780	--	10,100	9,980	6,600	7,580	--	--

Notes:

1. " -- " denotes that the analyte was under detection limit, i.e., it is a non-detect.
2. Results in Parts Per Billion by Volume (PPBV)

Soil Vapor Extraction [redacted]
Vapor Emission Calculation

Site: Lehigh Valley - EW-1 (20-30)

SVE Influent Concentrations

Compound	*Elapsed Time*	*Conc. ppmv*	*Conc. g/m3*
TCE	0	459	2.33
	3.48	227	1.15
	8.98	181	0.92

Air Flow Properties

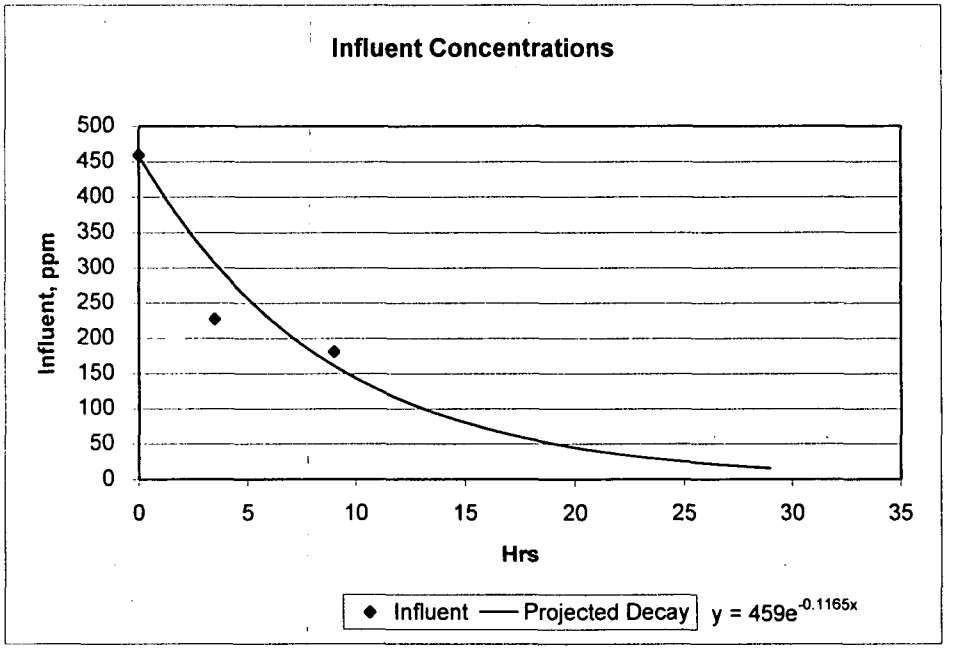
Air Flow	ft/sec	13
Pipe Diameter	Inches	4
Air Flow Rate	cfm	70

Contaminant Information

Compound	*M. Weight*
TCE	131.40

Extraction Rate Results

Compound		
TCE	*Elapsed Time*	*lbs/hr*
	0	0.668
	3.48	0.331
	8.98	0.264



Hydrocarbon Decay Rate

Hydrocarbon Decay Half Life = 5.948

Time (hrs)	Influent	Extraction Rate lbs/day	Carbon Usage lbs/day
0	459	0.668	6.68
1	409	0.595	5.95
2	364	0.529	5.29
3	324	0.471	4.71
4	288	0.419	4.19
5	256	0.373	3.73
6	228	0.332	3.32
7	203	0.296	2.96
8	181	0.263	2.63
9	161	0.234	2.34
10	143	0.208	2.08
11	127	0.186	1.86
12	113	0.165	1.65
13	101	0.147	1.47
14	90	0.131	1.31
15	80	0.116	1.16
16	71	0.104	1.04
17	63	0.092	0.92
18	56	0.082	0.82
19	50	0.073	0.73
20	45	0.065	0.65
21	40	0.058	0.58
22	35	0.052	0.52
23	31	0.046	0.46
24	28	0.041	0.41

Soil Vapor Extraction [redacted]n
Vapor Emission Calculation

Site: Lehigh Valley - EW-1 (10-20)

SVE Influent Concentrations

Compound	*Elapsed Time*	*Conc. ppmv*	*Conc. g/m3*
TCE	0	807	4.09
	4.58	310	1.57
	8.83	247	1.25

Air Flow Properties

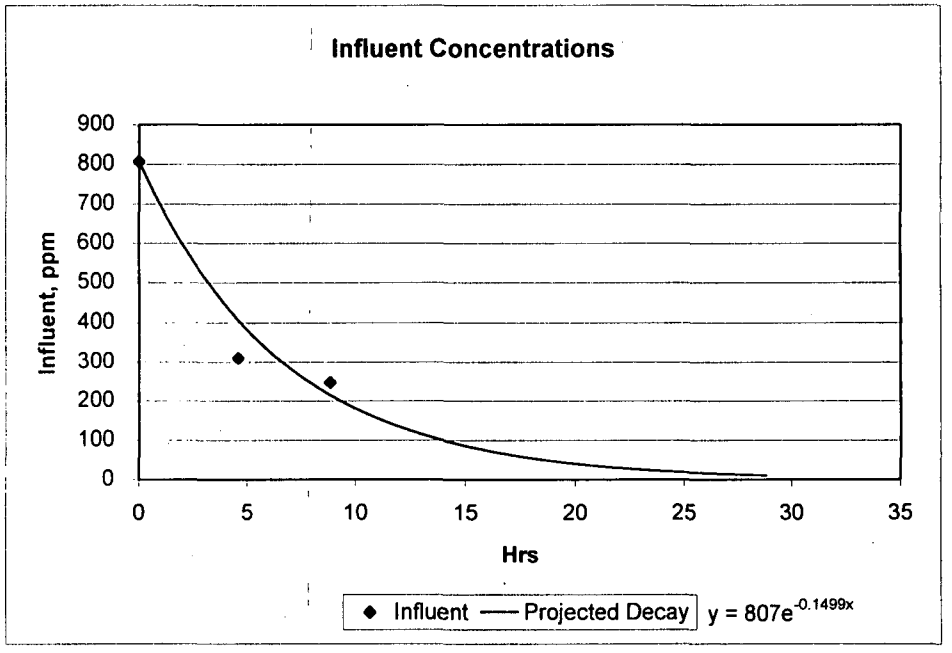
Air Flow	ft/sec	11
Pipe Diameter	Inches	4
Air Flow Rate	cfm	60

Contaminant Information

Compound	*M. Weight*
TCE	131.40

Extraction Rate Results

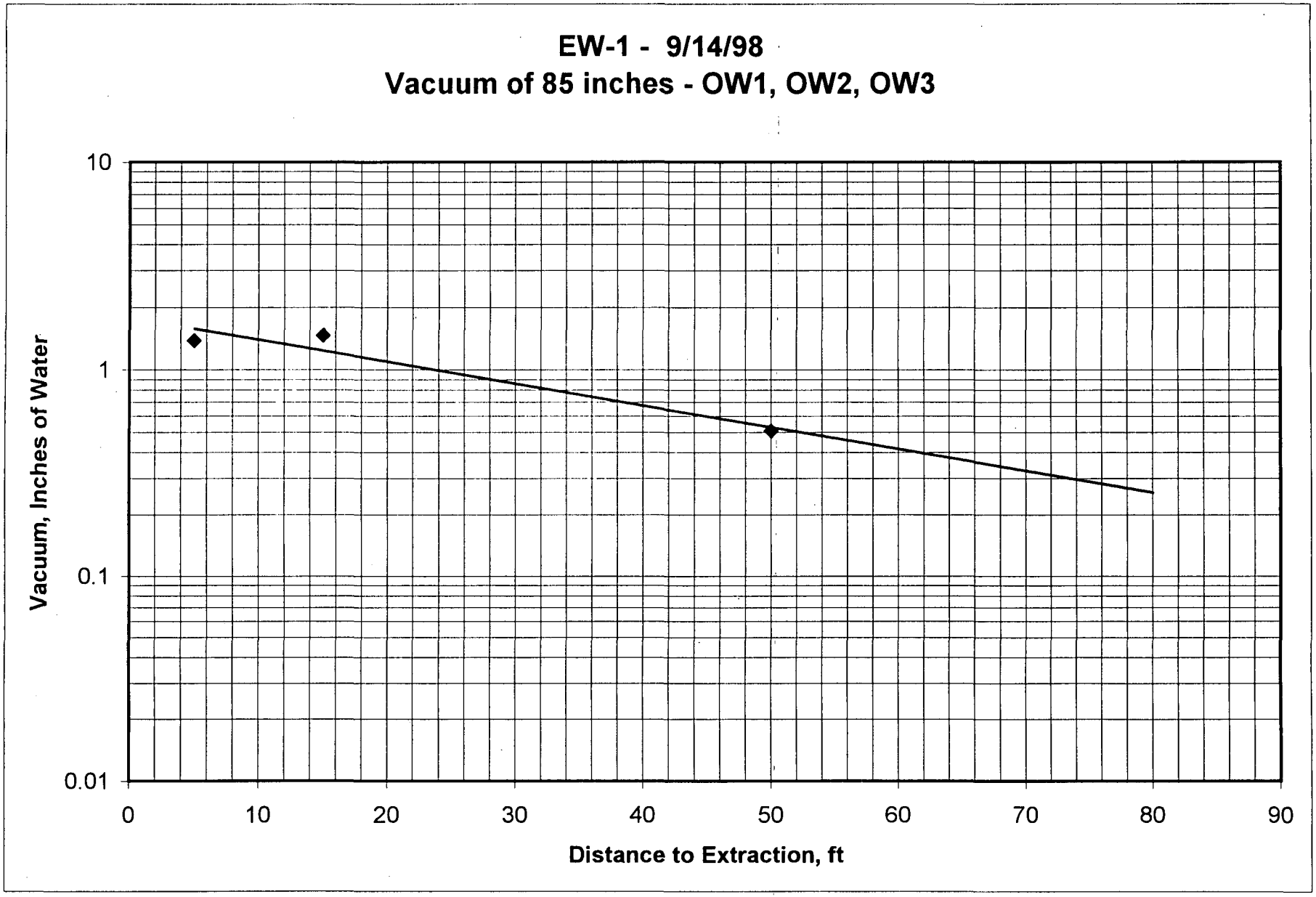
Compound		
TCE	*Elapsed Time*	*lbs/hr*
	0	1.007
	4.58	0.387
	8.83	0.308

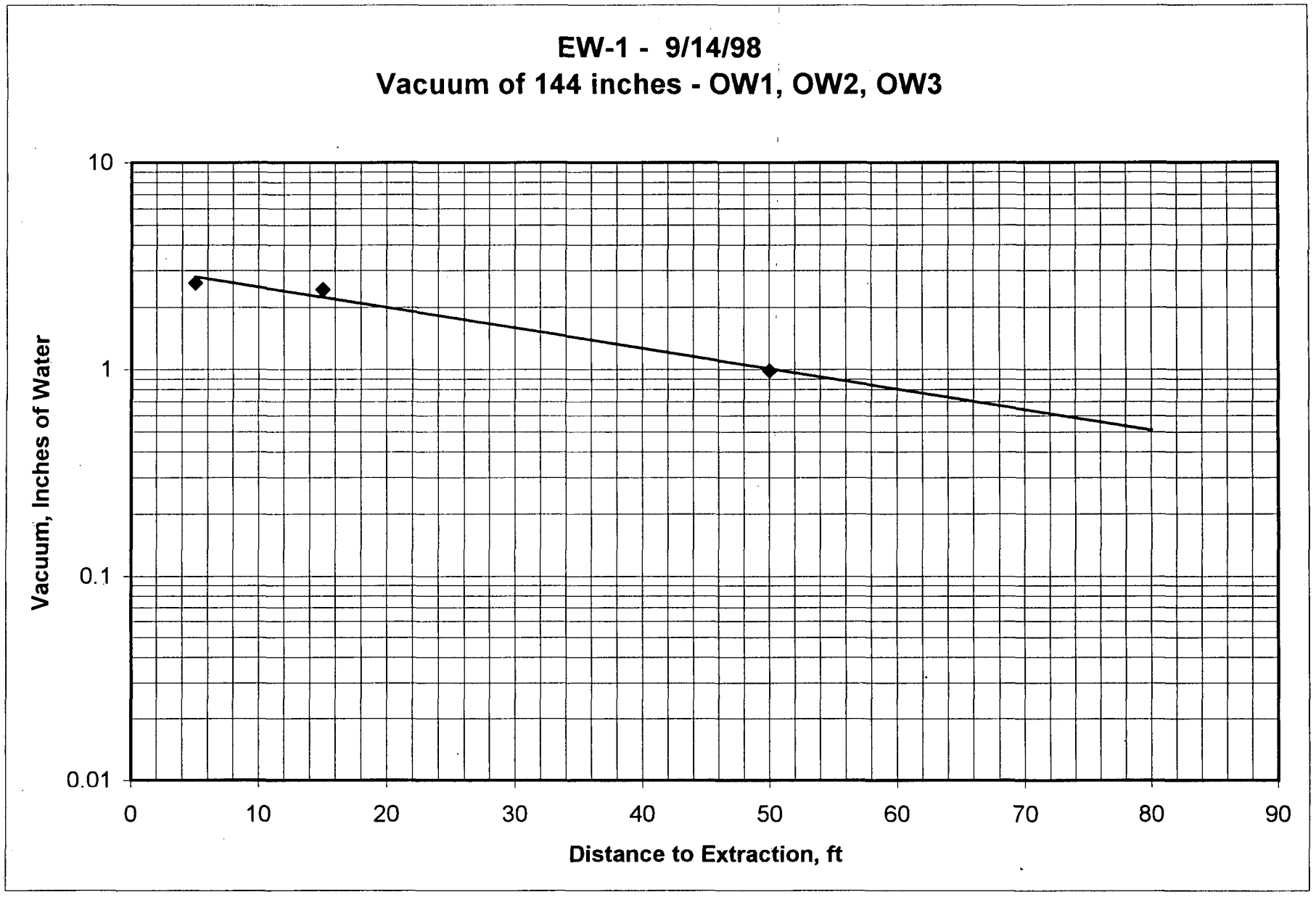


Hydrocarbon Decay Rate

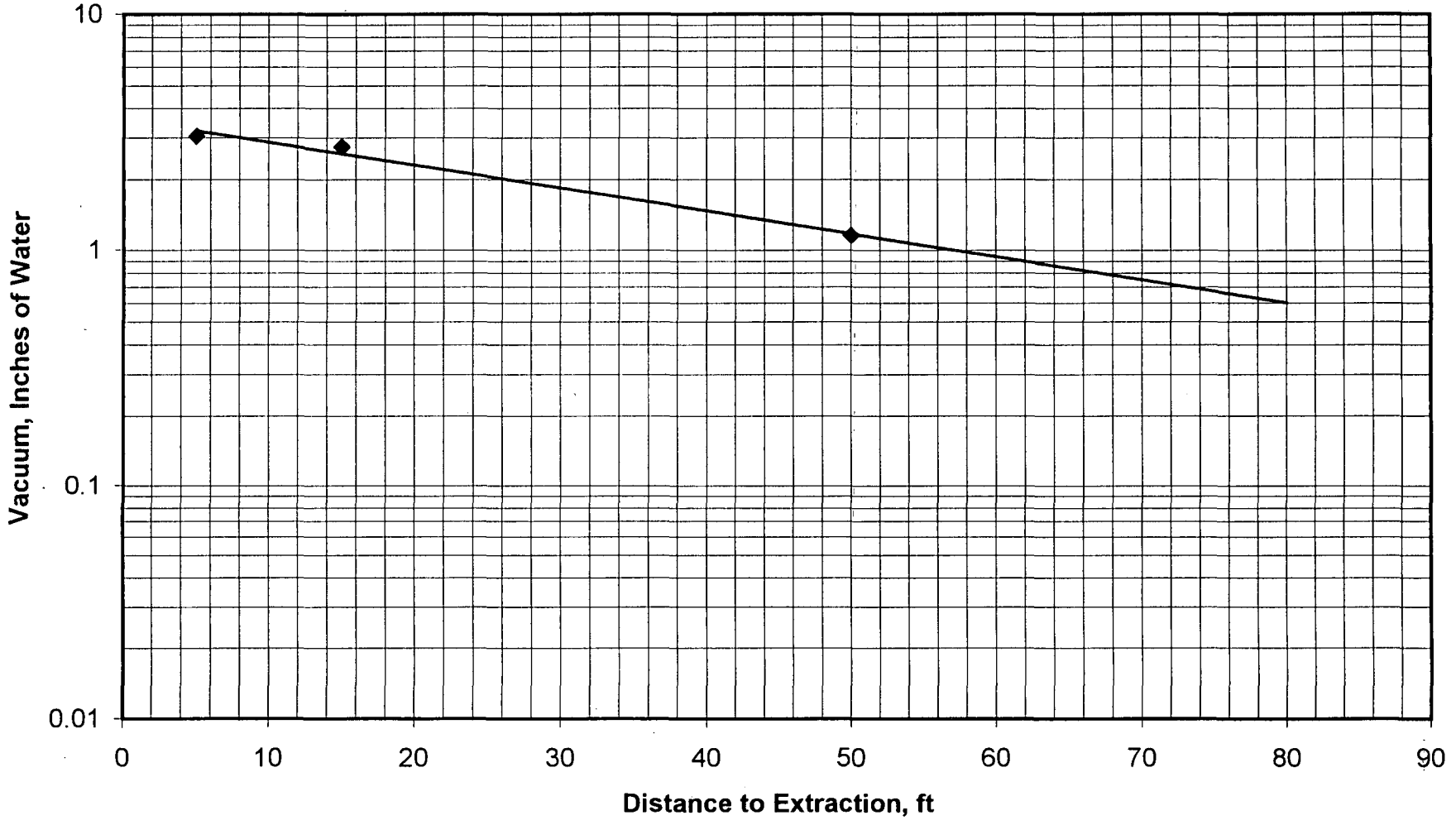
Hydrocarbon Decay Half Life = 4.623082055

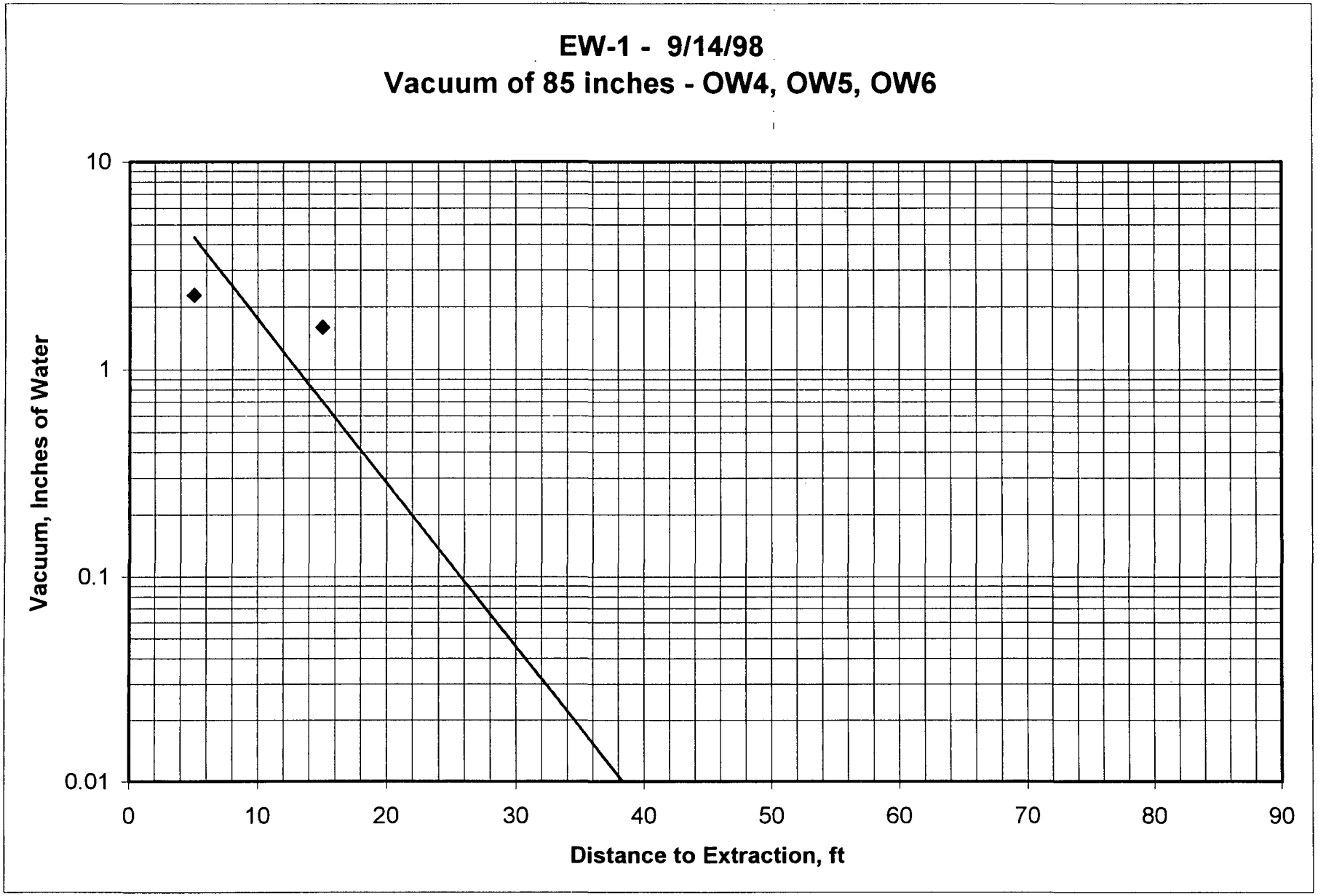
Time (hrs)	Influent	Extraction Rate lbs/day	Carbon Usage lbs/day
0	807	1.007	10.07
1	695	0.867	8.67
2	598	0.746	7.46
3	515	0.642	6.42
4	443	0.553	5.53
5	381	0.476	4.76
6	328	0.410	4.10
7	283	0.353	3.53
8	243	0.304	3.04
9	209	0.261	2.61
10	180	0.225	2.25
11	155	0.194	1.94
12	134	0.167	1.67
13	115	0.143	1.43
14	99	0.124	1.24
15	85	0.106	1.06
16	73	0.092	0.92
17	63	0.079	0.79
18	54	0.068	0.68
19	47	0.058	0.58
20	40	0.050	0.50
21	35	0.043	0.43
22	30	0.037	0.37
23	26	0.032	0.32
24	22	0.028	0.28

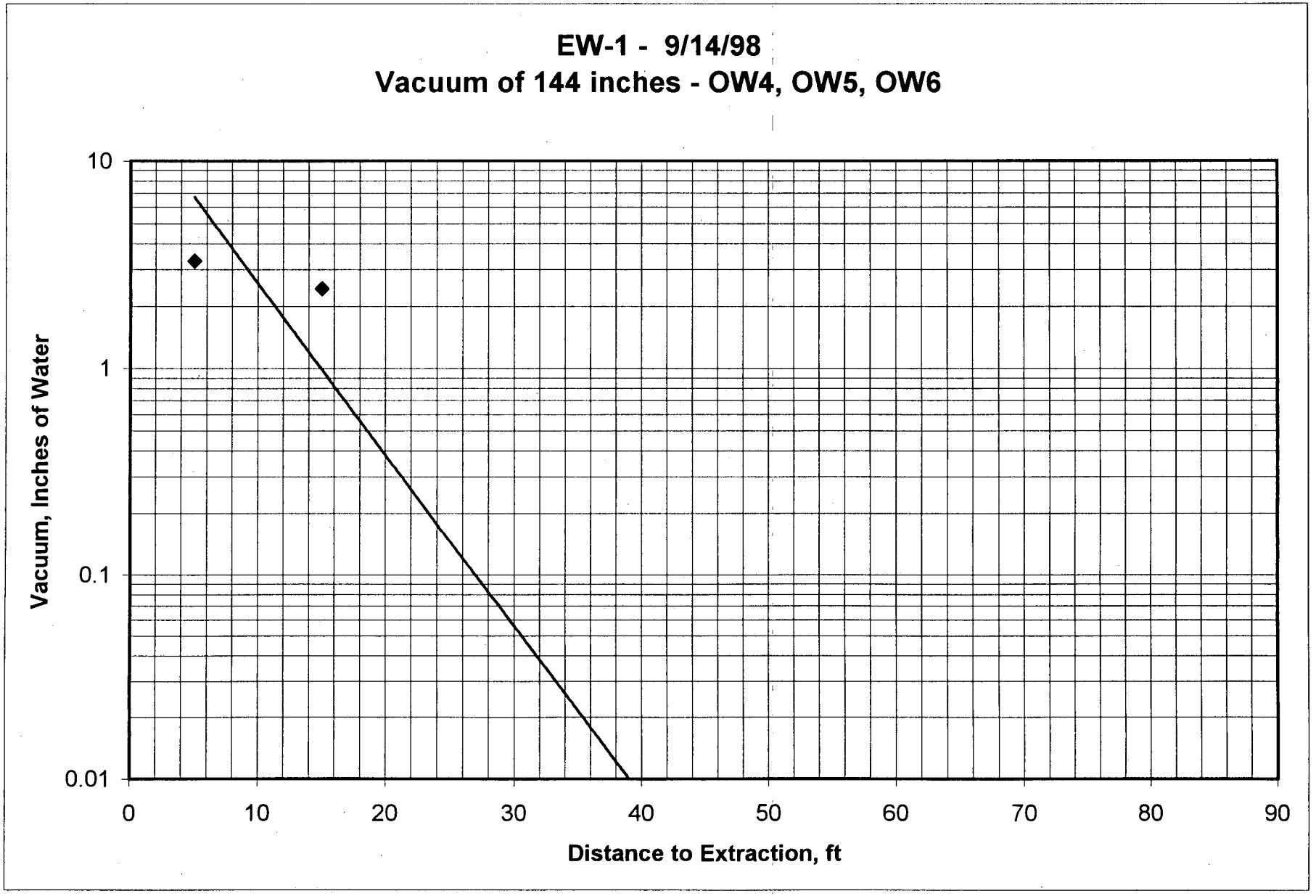

EW-1 - 9/14/98
Vacuum of 85 inches - OW1, OW2, OW3
Vacuum, Inches of Water
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
Distance to Extraction, ft

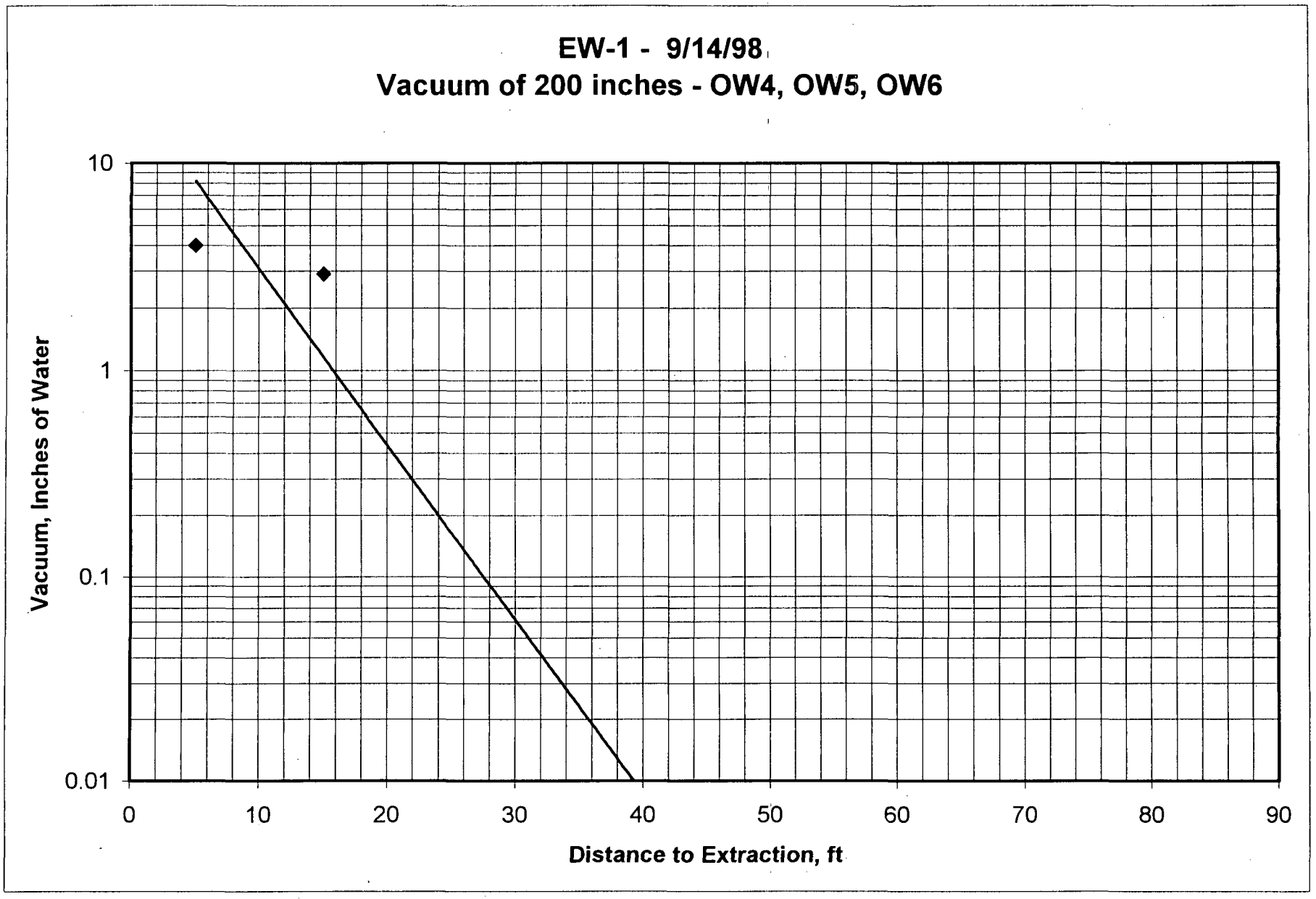

EW-1 - 9/14/98
Vacuum of 144 inches - OW1, OW2, OW3
Vacuum, Inches of Water
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
Distance to Extraction, ft

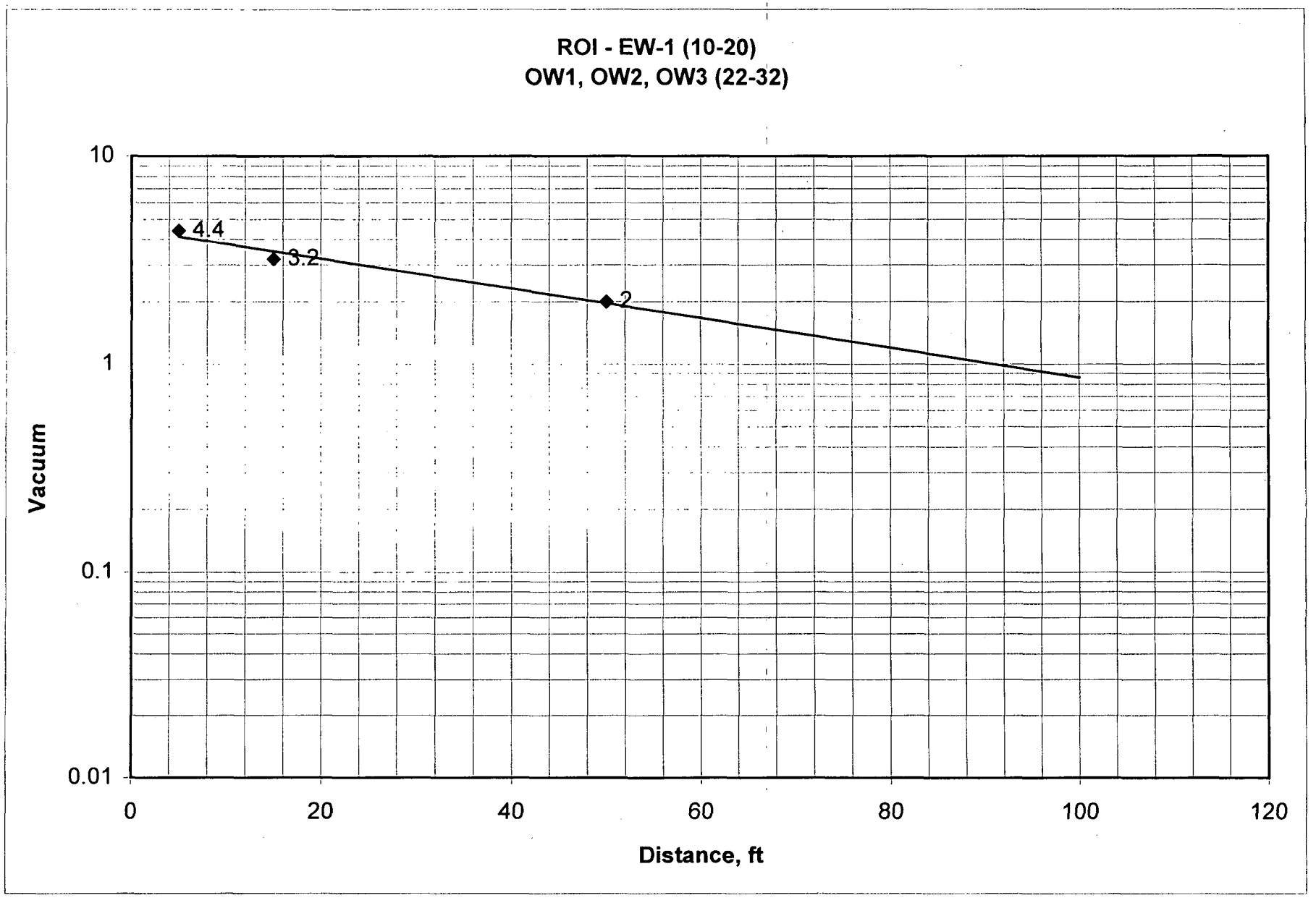
EW-1 - 9/14/98
Vacuum of 200 inches - OW1, OW2, OW3

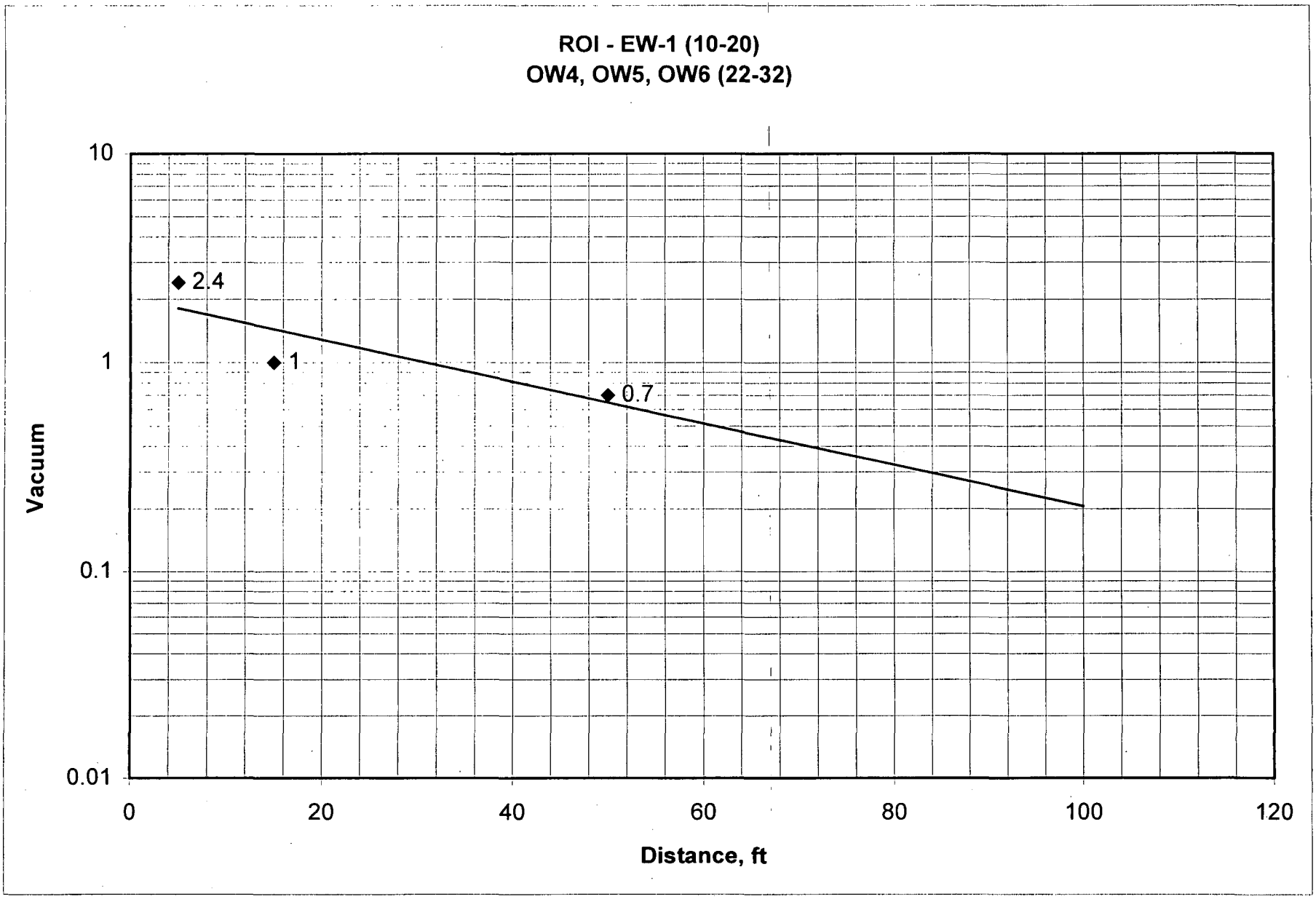


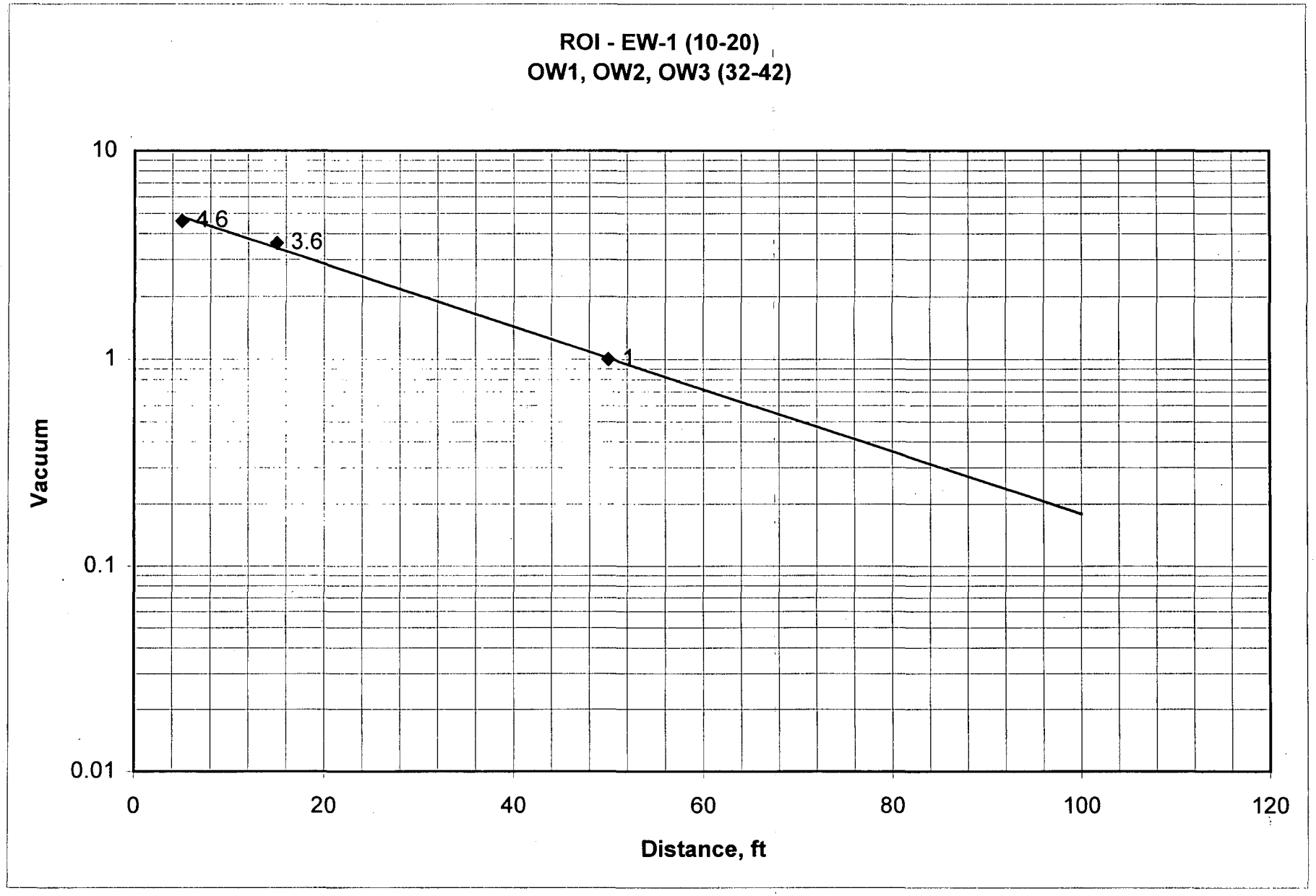

EW-1 - 9/14/98
Vacuum of 85 inches - OW4, OW5, OW6
Vacuum, Inches of Water
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
Distance to Extraction, ft

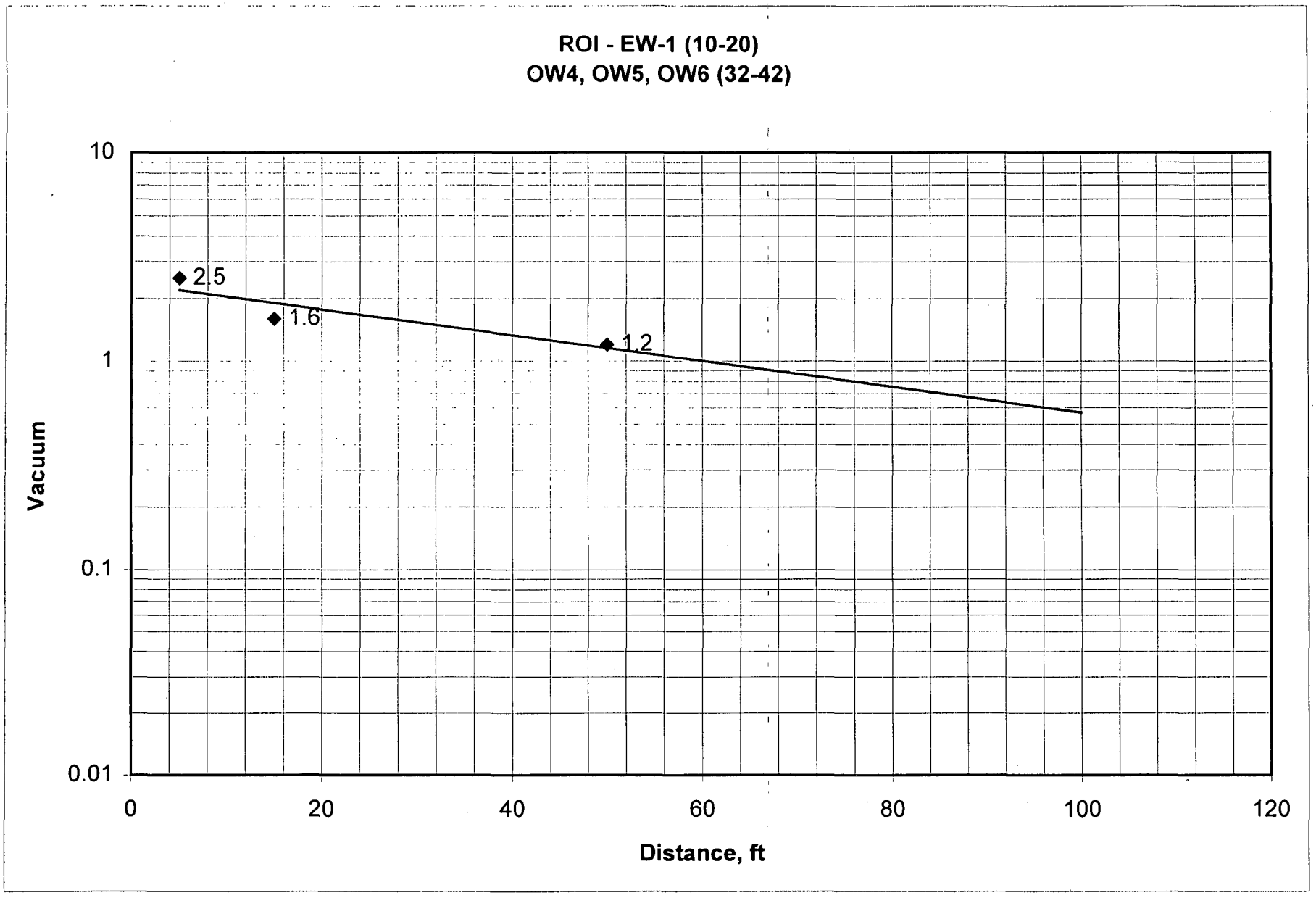

EW-1 - 9/14/98
Vacuum of 144 inches - OW4, OW5, OW6
Vacuum, Inches of Water
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
Distance to Extraction, ft


EW-1 - 9/14/98
Vacuum of 200 inches - OW4, OW5, OW6
Vacuum, Inches of Water
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
Distance to Extraction, ft


ROI - EW-1 (10-20)
OW1, OW2, OW3 (22-32)
10
1
0.1
0.01
Vacuum
4.4
3.2
2
0
20
40
60
80
100
120
Distance, ft

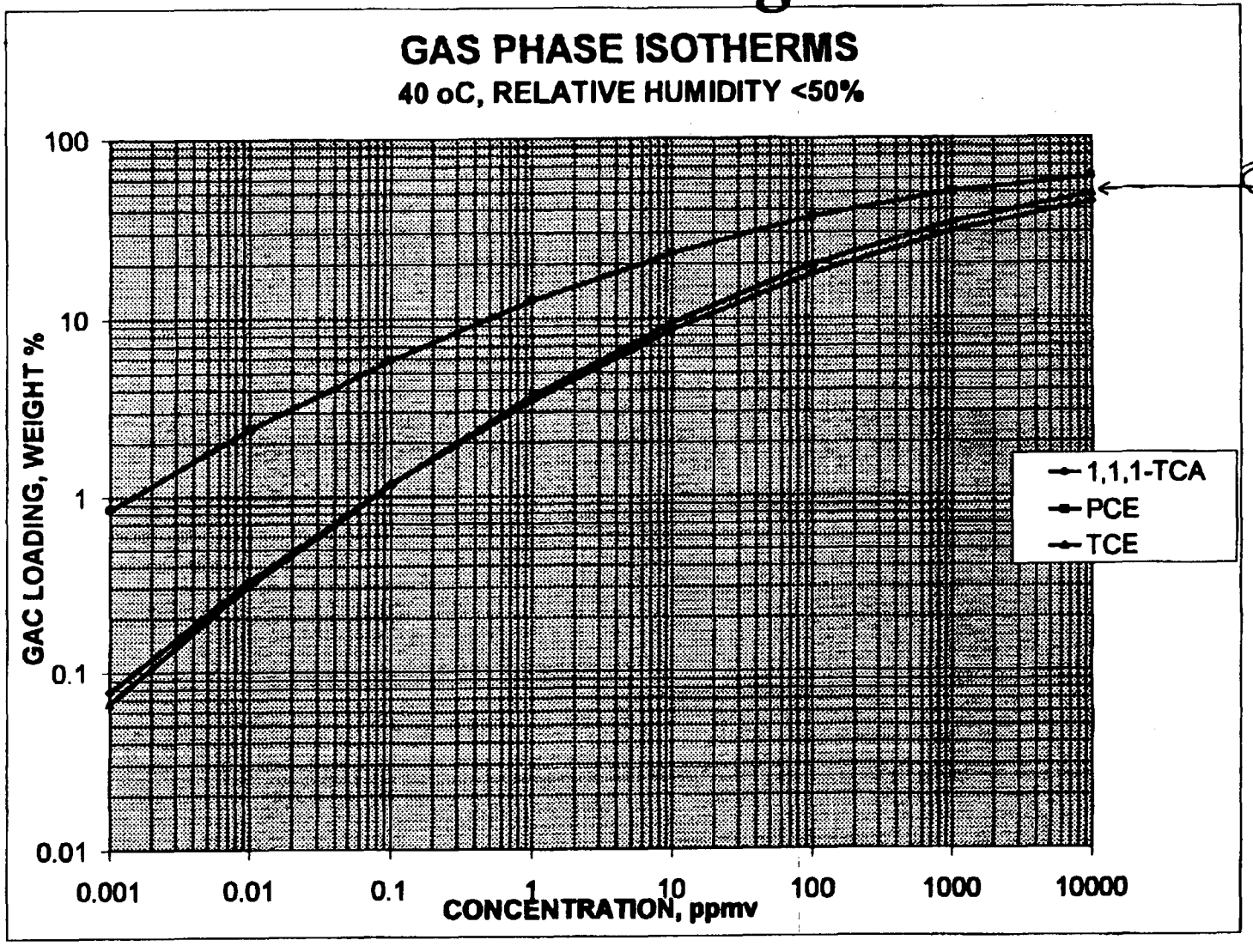

ROI - EW-1 (10-20)
OW4, OW5, OW6 (22-32)
10
1
0.1
0.01
Vacuum
2.4
1
0.7
0
20
40
60
80
100
120
Distance, ft


ROI - EW-1 (10-20)
OW1, OW2, OW3 (32-42)
Vacuum
10
1
0.1
0.01
4.6
3.6
1
0
20
40
60
80
100
120
Distance, ft


ROI - EW-1 (10-20)
OW4, OW5, OW6 (32-42)
10
1
0.1
0.01
Vacuum
2.5
1.6
1.2
0
20
40
60
80
100
120
Distance, ft

U.S.FILTER
WESTATES

Use of Isotherms to Determine GAC Usage



Jan-12-99 03:33P U.S. Filter/Westates (NJ) 9086680610 P.03