GROUNDWATER APPROPRIATION PERMIT APPLICATION

HYDROGEOLOGIC REPORT

Prepared for

BLACK & DECKER (U.S.), INC.
Hampstead, Maryland

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SECTION 1

INTRODUCTION

1.0 PURPOSE AND OBJECTIVES

The purpose of this report is to provide the information necessary to obtain a Groundwater Appropriation Permit for the Black & Decker (U.S.), Inc. (B&D) facility located in Hampstead, Maryland. The proposed groundwater withdrawal is a part of a groundwater remedial plan which involves the development of a pump and treat system designed to restrict potential off-site contaminant migration and to recover and treat contaminated groundwater from the B&D property. The design of the pump and treat system is the result of an extensive site investigation conducted by Roy F. Weston, Inc. (WESTON®).

1.1 SITE DESCRIPTION

The B&D facility is located in Hampstead, Maryland, in northeastern Carroll County, approximately 35 miles north of Baltimore (Figure 1-1). The plant is situated on 185 acres of property in a predominantly rural setting. Two separate parcels of farmland are situated on 138 and 173 acres of property to the north and west of the site, respectively. The population center of Hampstead is approximately 0.8 mile north of the plant along Hanover Road, State Route 30.

Currently, water supply for the plant is obtained from five water supply wells which line the northwest boundary of the site. Well yields of the existing supply wells range from 20 to 45 gpm. After the Groundwater Appropriation Permit is granted to B&D, the existing supply wells will be abandoned and treated water from the recovery wells will be used to supply the plant's water.

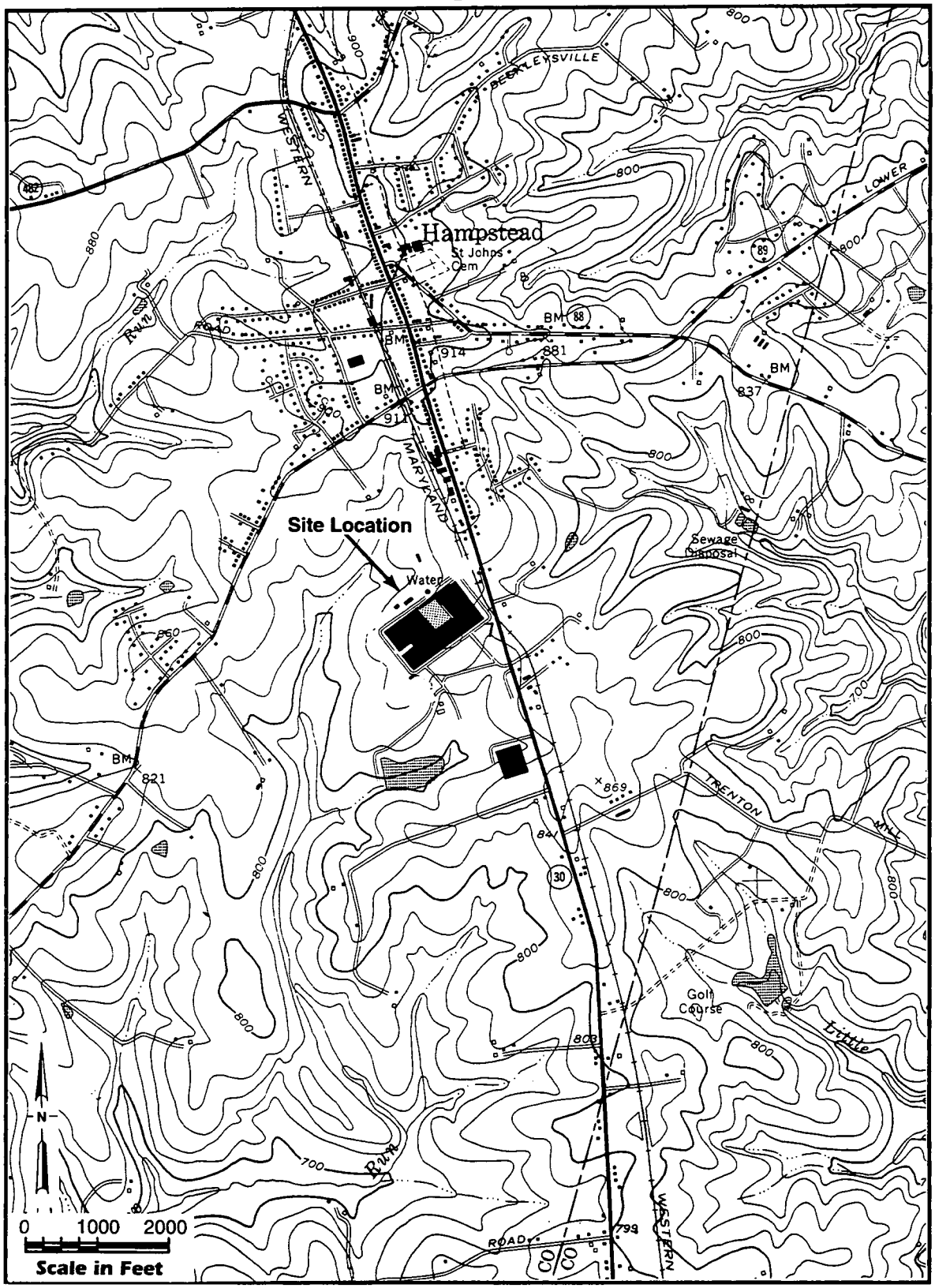


FIGURE 1-1 SITE LOCATION MAP, BLACK & DECKER, HAMPSTEAD, MD

1.2 SITE HISTORY

An environmental site investigation was initiated in 1987 at the request of B&D for its Hampstead facility. The investigation was completed by WESTON in several phases which culminated in the submission of an Environmental Investigation Report (April 1989) to the Maryland Department of the Environment (MDE) Groundwater Investigation Division. The site investigation included an examination of the groundwater quality, hydrogeology, and potential source areas and indicated the following:

- A PCE plume is present primarily on the western half of the facility, while TCE is present in groundwater primarily in the northeastern part of the facility.
- Groundwater is migrating predominantly along the hydraulic gradient both in the saprolite and bedrock to the south-southwest.
- A minor component of groundwater flow on the northeastern corner of the facility may be directed east toward State Route 30.
- Soils located in the area of a former underground storage tank farm contain PCE, TCE and petroleum hydrocarbons.
- Other potential source areas investigated were found not to be contributing significant contaminants to the environment.

Based on these conclusions, remediation strategies to recover and treat the contaminated groundwater were proposed in the 1989 Environmental Investigation Report. A work plan for soil and groundwater remediation was developed and submitted to MDE in December, 1989 (WESTON 1989). Results of the field activities completed as part of the work plan are discussed in this report. A description of the field activities is presented in Section 2. Results of the field activities and a description of the site geology and hydrogeology are presented in Section 3. Conclusions of the investigation are presented in Section 4.

SECTION 2

REMEDIAL FIELD INVESTIGATION

The field investigation for the remedial design of the groundwater recovery and treatment system at the B&D facility involved geophysics, well installation, aquifer testing and groundwater sampling. Each of these activities is described in the following sections.

2.1 WELL INSTALLATION

Seven new recovery wells, capable of yielding significant quantities of water (>20 gpm), were installed to create a cone of depression on the east and west sides of the B&D facility to control the groundwater plume. Prior to installation of the new wells, a geophysical investigation was conducted to locate areas which had the greatest potential for intercepting water-bearing fractures. Two different instruments (Geonics EM-31 and ABE Wadi VLF System) were used to measure the electromagnetic conductance of the subsurface. The areas which have higher electrical conductance properties typically indicate fracture locations.

A series of pilot holes were drilled at locations which were chosen based on the results of the geophysical investigation. While fractures were intercepted at most of the pilot holes, many were filled with clay and did not produce significant water. Additional pilot holes were drilled as a result of a field reconnaissance of the site and were positioned in locations where recovery wells were suspected to be needed.

At each potential recovery well location, an 8-inch "pilot hole" was drilled a minimum of 25 feet into competent bedrock using the air rotary drilling method (previous drilling has indicated that no significant water-bearing zones are encountered further than 25 feet into competent bedrock). All cuttings generated during drilling were containerized on site pending proper disposal. Once the total depth was reached, the borehole was developed

and the yield was estimated. If the total yield was less than 40 gpm, and the pilot hole was in a location that could be used as an observation point, a 2-inch diameter well was installed to aid in the characterization of aquifer properties during pumping tests. In areas where there was an adequate number of observation wells, boreholes were abandoned by tremie piping a cement/bentonite grout from the bottom of the borehole to ground surface.

In cases where the total yield of the borehole exceeded 40 gpm, the 8-inch borehole was widened to a diameter of 12 inches and completed to a depth of approximately five feet below the deepest observed water producing zone. The borehole was developed until the discharge water cleared. Once all drilling rods were removed, a 6-inch diameter PVC well was constructed. A sand filter pack was emplaced in the annular space between the screen and the borehole to a minimum of five feet above the top of the screen. An approximate five foot bentonite seal was placed on top of the sand and the remaining annular space was pressure-grouted (using tremie methods) to ground surface with a cement/bentonite grout.

Each of the newly installed recovery wells and piezometers are shown on Figure 2-1. Existing wells which will be converted to recovery wells are also shown in Figure 2-1. A new well identification number (EW-#) has been assigned to each of the wells which will be converted to an extraction well. These new identification numbers are provided for future reference. Lithologic descriptions of each new recovery well and piezometer are included in Appendix A. Well and piezometer completion forms are included in Appendix B.

2.2 AQUIFER TESTING

A series of well performance and aquifer tests were conducted as part of the field work to collect data required for the design of the groundwater recovery system. An 8 hour step-drawdown test was conducted at each potential recovery well to evaluate well performance and to estimate the maximum sustainable well yield. Three long-term

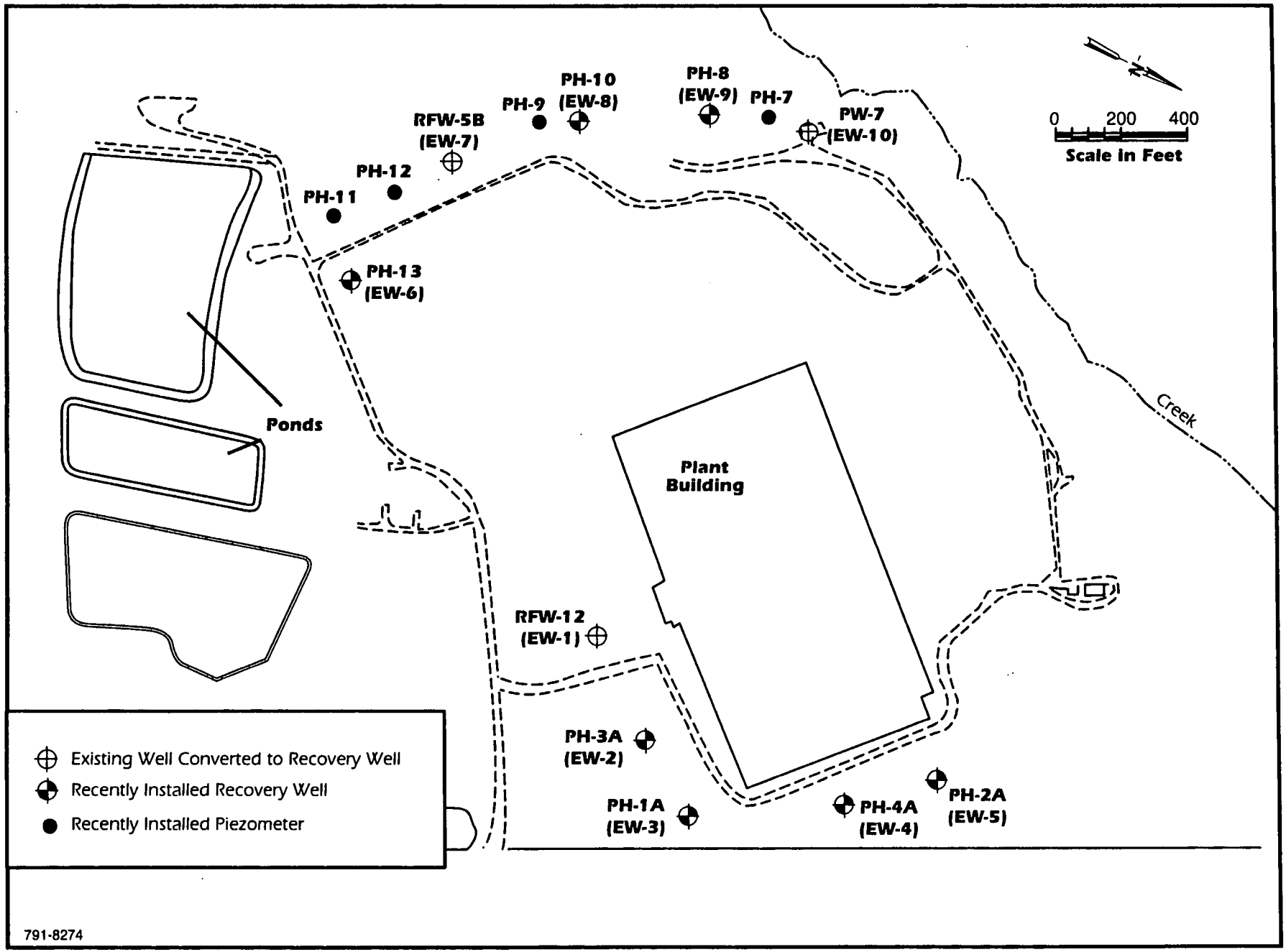


FIGURE 2-1 LOCATION OF RECOVERY WELLS

(duration of 24 hours or longer) aquifer tests were conducted to characterize aquifer properties at the site. Table 2-1 summarizes the specifications of each of the aquifer tests conducted at the site. The results of the pumping tests were used to develop an analytical flow model to determine the number and spacing of wells needed to create a hydraulic barrier (see Section 3).

A decontaminated submersible pump was used to discharge the groundwater during the pumping test at each well. The discharge water was routed through a 2-inch line to the air stripper on the B&D property. The discharge rate was regulated with a flow valve and monitored with an in-line flowmeter. An outlet port, located at the wellhead, was used for collecting samples from the discharge line. Water levels and elapsed time data were collected using a data logger (In-Situ Model SE2000) and transducers and Stevens recorders. Transducers were used in the pumping well and those wells located closest to the pumping well. In addition, water level measurements were collected manually at wells more distant to the pumping that, based on knowledge of the site and site area, could potentially have been affected during the pumping tests.

2.3 GROUNDWATER SAMPLING

Time series groundwater samples were collected from selected recovery wells during five of the seven pumping tests. The time series samples were collected periodically during each pumping test to characterize potential trends in VOC concentrations as pumping continued. The results of the time series sampling were used to evaluate the efficiency of the wells in recovering contaminated groundwater and as input to the design of the treatment system.

In addition, groundwater samples were collected during the week of 17 February 1992 as part of the quarterly groundwater sampling program initiated at the B&D facility based on agreement with the MDE Groundwater Investigation Division. Groundwater samples were collected at seven of the ten recovery wells and were analyzed for VOCs. Additional

TABLE 2-1

PUMPING TEST SPECIFICATIONS
BLACK & DECKER
HAMPSTEAD, MARYLAND

Pumping Well	Duration of Test (hrs)	Purpose of Test
PH-8	4	Well Performance
PH-8	70	Aquifer Characterization
PH-1A	4	Well Performance
PH-1A	30	Aquifer Characterization
RFW-12	8	Well Performance
PH-2A	24	Well Performance/ Aquifer Characterization
PH-13	8	Well Performance
PH-10	8	Well Performance
RFW-5B	8	Well Performance

inorganic parameters (alkalinity, chloride, hardness, sulfate, total dissolved solids, and total suspended solids) were analyzed at six of the eight wells included in the quarterly sampling program. The purpose of collecting the groundwater samples was not only to characterize general groundwater quality, but also to quantify the levels of contamination present to aid in the design of the groundwater treatment system. The additional parameters were analyzed to evaluate whether pretreatment would be required prior to air-stripping to prevent scaling, bio-fouling, etc. During both sampling events, standard QA/QC procedures were followed as detailed in the September 1987 work plan (WESTON, 1987). A summary of the analytical program for the pumping test samples and the quarterly sampling program is presented in Table 2-2.

TABLE 2-2

Summary of Groundwater Analytical Program

Black and Decker, Inc., Hampstead, MD

Analysis for Quarterly Sampling Program	Location						
	PH-1A	PH-2A	PH-8	PH-10	PH-13	RFW-5B	RFW-12
VOC	X	X	X	X	X	X	X
Iron	X	X	X			X	X
Manganese	X	X	X			X	X
Sodium	X	X	X			X	X
Alkalinity	X	X	X			X	X
Chloride	X	X	X			X	X
Hardness	X	X	X			X	X
pH	X	X	X			X	X
Sulfate	X	X	X			X	X
Specific Conductance	X	X	X			X	X
Total Suspended Solids	X	X	X			X	X
Total Dissolved Solids	X	X	X			X	X
Number of Samples Collected During Pumping Test*	**2**	**3**	**4**	**0**	**2**	**0**	**3**

* - Each sample collected during the pumping test was analyzed for VOCs.

SECTION 3

RESULTS OF INVESTIGATION

3.1 GEOLOGY

As in most of eastern Carroll County, an indeterminate thickness of the albite-chlorite schist facies of the Wissahickon Formation underlies the B&D property. This facies consists principally of tightly folded albite schist or phyllite interbedded with layers of chlorite and or muscovite schist. Cream to yellow, vitreous, micaceous quartzite veins are locally present along the planes of foliation.

Thin quartz veins (< 5 feet thick) are interbedded with the phyllite near the base of the formation. As is common in the Piedmont, the Wissahickon Formation underlying the site has been highly deformed and fractured. Zones of intense fracturing may have surface expression as valleys or draws, or as other linear topographic features. Meyer (1958) reports that the strike of schistosity in the plant area ranges from N36°E to N46°E.

Chemical weathering has produced a 25- to 80-foot thickness of weathered schist, referenced to as saprolite, overlying the crystalline bedrock on-site. The saprolite grades from a micaceous, clayey reddish-brown silt at shallow depths to a medium soft, grayish-brown, slightly weathered schist/phyllite near the interface with competent bedrock. Residual quartz veins are encountered throughout the overburden.

3.2 HYDROGEOLOGY

In the Hampstead area, groundwater occurs predominately in fractures, joints and shear zones within the Wissahickon Formation, and in the pore spaces of the overlying saprolite. Recharge to the bedrock is principally from the downward percolation of water

stored in the saprolite (Meyer, 1958). In the site area, these two lithologic units are hydrologically strongly inter-connected and act essentially as a single aquifer system.

The yields of wells drilled in the area range from less than one gpm to a reported 300 gpm, and average about 16 gpm (Meyer, 1958). These variable yields are considered a result of the relatively limited storage capacity of the bedrock, and as a result of the highly transmissive capabilities of the fracture zones within the bedrock, as compared to the competent bedrock itself. With increasing depth, fracture spacing and intensity is consistently strongly reduced due principally to pressure from overlying rocks. In the Piedmont, fractures which will yield water are generally extremely rare below 300 feet; thus, most water supply wells are less than 200 feet deep (Richardson, 1980).

3.2.1 Site Hydrogeology

Information pertaining to site hydrogeology has been gathered during the extensive drilling program conducted by WESTON and by the series of well performance and aquifer tests completed at the site. The site hydrogeology is consistent with that described above, with the exception that the largest quantities of water appear to be associated with those wells that intersect fractures filled with quartz veins. This was evident during the installation of the pilot holes, particularly at PH-1A, where the highest yield was obtained after a large quartz vein was intersected.

During the recent drilling program, no quartz veins or significant quantities of water were encountered more than 25 feet into competent rock at any location. Below this zone, drilling indicated that very few fractures existed, and for those fractures which did exist, little or no water was associated with them.

All wells onsite were surveyed to establish an exact location and elevation. Depth to water measurements were taken at each well and are listed in Table 3-1. Using this data, a groundwater contour map was constructed (see Figure 3-1). At the time the data was

Table 3-1
Groundwater Elevation Measurement
Black & Decker
Hampstead, Maryland

Well	Top of Casing Elevation	Depth to Water (ft) 9 Dec 91	Groundwater Elevation 9 Dec 91
RFW-1A	864.37	38.65	825.72
RFW-1B	864.23	38.64	825.59
RFW-2A	857.41	19.35	838.06
RFW-2B	857.73	19.91	837.82
RFW-3B	839.21	31.40	807.81
RFW-4A	830.37	37.38	792.99
RFW-4B	830.37	37.41	792.96
RFW-5A	817.50	22.01	795.49
RFW-5B	818.14	22.85	795.29
RFW-6	785.04	2.10	782.94
RFW-7	805.14	7.73	797.41
RFW-8	860.07	37.02	823.05
RFW-9	858.21	30.01	828.20
RFW-10	852.06	30.62	821.44
RFW-11A	849.32	32.23	817.09
RFW-11B	849.62	32.83	816.79
RFW-12A	844.58	26.75	817.83
RFW-12B	844.87	27.38	817.49
RFW-13	849.11	56.24	792.87
RFW-14	812.39	25.60	786.79
RFW-16	856.14	29.90	826.24
PH-7	805.94	18.06	787.88
PH-8	810.97	16.76	794.21
PH-9	814.94	18.94	796.00
PH-10	810.89	9.30	801.59
PH-11	820.68	35.52	785.16
PH-12	828.35	38.10	790.25
PH-13	832.13	46.35	785.78
P-8	812.07	10.39	801.68
S-1	813.71	11.92	801.79
W-1	813.72	11.77	801.95
S-3	822.12	16.88	805.24
B-1	815.55	20.19	795.36
B-2	807.68	5.01	802.67
B-3	803.02	10.62	792.40
PH-1A	846.64	29.31	817.33
PH-2A	863.36	41.50	821.86

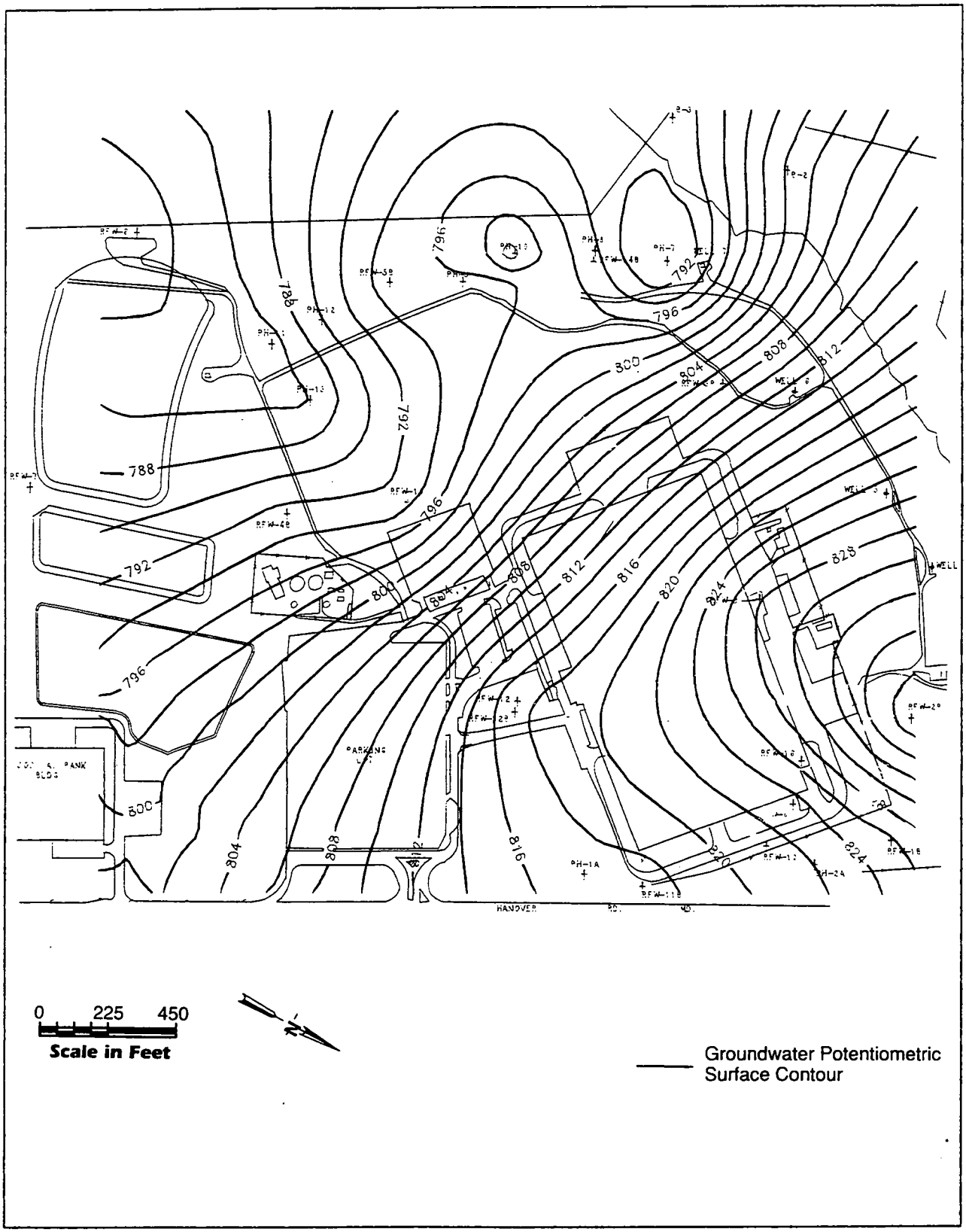


FIGURE 3-1 GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP, DECEMBER 1992

collected, water supply well No. 7 had been pumping at a rate of approximately 40 gpm. As evidenced by the groundwater potentiometric surface contour map, groundwater flow at the site is principally to the southwest, but also to the south and east. A small depression, due to pumping well No. 7, is evident from the potentiometric surface map.

3.2.2 Pumping Test Results

The results from the pumping tests conducted on site are summarized in Table 3-2. Semi-log graphs of time versus drawdown were constructed for each piezometer where drawdown was observed and are presented in Appendix C. Aquifer properties were characterized using both drawdown and recovery data. Analysis of the data was completed using Jacob's method and the Theis recovery method (Driscoll, 1986). A literature search revealed that a pumping test was conducted at the B&D facility in 1958 and the results presented in Meyer and Beall (1958). The results of this aquifer test are also summarized in Table 3-2.

The individual pumping tests indicated that the maximum sustainable yield varied from 35 gpm (RFW-12) to 84 gpm (PH-1A and PH-2A). The maximum sustainable yields were calculated using data collected during step-drawdown tests conducted at each well and reflect the maximum pumping rate which could be consistently relied upon given the following assumptions: 1) annual precipitation is normal; and 2) no other pumping wells exist nearby which would interfere with the ability of the well to produce water. Given the number of recovery wells which will be located at the B&D facility (see Subsection 3.2.3), it is unlikely that a well will be able to produce the maximum sustainable yield. Actual maximum sustainable yields will likely be much lower when each of the recovery wells is operational.

Calculated values for transmissivity ranged from 160 gallons per day per foot (gpd/ft) to 100,000 gpd/ft. The majority of the values were between 4,000 and 8,000 gpd/ft. This range of values is common for fractured bedrock aquifers. Table 3-2 also lists values for

Table 3–2
Pumping Test Summary
Black & Decker

Pumping Well	Observation Well	Duration of Pumping Test (hours)	Distance to Observation Well (ft)	Maximum Observed Drawdown (ft)	Transmissivity (gpd/ft)	Specific Yield	Method of Analysis	Estimated Maximum Sustainable Yield of Pumping Well (gpm)
PH–8	B–1	70	73.5	27	160	0.04	Boulton	33
	PH–10	70	280	0.5	14,300	0.03	Jacob	
					*	*	Theis Recovery	
PH–2A	RFW–10	24	145	3.2	4,950	0.01	Jacob	75
	RFW–8	24	220	1.4	8,080	0.01	Jacob	
	RFW–1B	24	272	0.1	***	***	***	
					930	––	Theis Recovery	
Well #3	(Meyer & Beall 1958)**	107	––	––	5,000	0.02	Jacob	
PH–1A	RFW–11B	30	224	5.8	5,100	0.001	Jacob	90
					6,720	––	Theis Recovery	
RFW–5B	PH–9	8	315	0.4	***	***	***	70
	RFW–5A	8	8	1.75	11,800	0.25	Jacob	
					4,750	––	Theis Recovery	
PH–13	PH–11	8	228	1.6	7,600	0.002	Jacob	45
					1,570	––	Theis Recovery	
RFW–12	––	8	––	––	3,000	––	Theis Recovery	35
PH–10	PH–9	8	97	0.15	*	*	Jacob	80
	PH–8	8	280	0.2	*	*	Jacob	
					*	*	Theis Recovery	

* Unable to accurately estimate due to heavy precipitation.

** Meyer, G., & Beall, R.M., 1958, The Water Resources of Carrol and Frederick Counties, Maryland Board of Natural Resources, Dept. of Geology, Mines and Water Resources, Bulletin 22, 355p.

*** Insufficient drawdown to reliably estimate aquifer properties.

specific yield. Once again, the variability of these values is common to fractured bedrock aquifers. A value of 0.02 is considered the best estimate for specific yield, and is characteristic of unconfined aquifers (Fetter, 1988). During the pumping tests at wells PH-1A and PH-2A water levels in off-site Well #22 (owned by the Village of Hampstead) were monitored. No drawdown was observed in Well #22 during either pumping test.

Potential anisotropy in the bedrock was evaluated using the aquifer test data reported by Meyer and Beall (1958). This aquifer test was conducted on B&D supply well No. 3 for a duration of 107 hours. Nine piezometers were installed and were used to monitor aquifer response throughout the aquifer test. The data from Meyer and Beall's test was evaluated for anisotropy by WESTON using two methods. The first evaluation of anisotropy utilized the Hantush method (Kruseman and DeRidder, 1990) which estimates the directions of the major and minor axes of anisotropy and also calculates the anisotropy ratio. The second method involved plotting the observed drawdown from each piezometer after 1,000 minutes of pumping on a map. A line connecting points of equal drawdown was drawn, and the resulting shape of the cone of depression was used to characterize aquifer anisotropy. The results of the Hantush method indicate the major anisotropy axis is oriented N84°E and the anisotropy ratio is 1.9. The anisotropy ratio indicates that the hydraulic conductivity in the direction of the major axis is nearly two times greater as compared to the direction of the minor axis, which is located 90° from the major axis. The results of the graphical method indicate the major anisotropy axis is orientated N22°E and the anisotropy ratio is 1.2. The significance of these findings is that, in the bedrock, the anisotropy ratio can be expected to vary from 1.0 (isotropic conditions) to 2.0 and is dependent upon the degree of inter-connectivity of the local fracture network and fracture spacing. The direction of the major anisotropy axis likely varies with local fracture orientation, but can be assumed to be coincident with regional lineaments which are oriented approximately N25°E (WESTON, 1989).

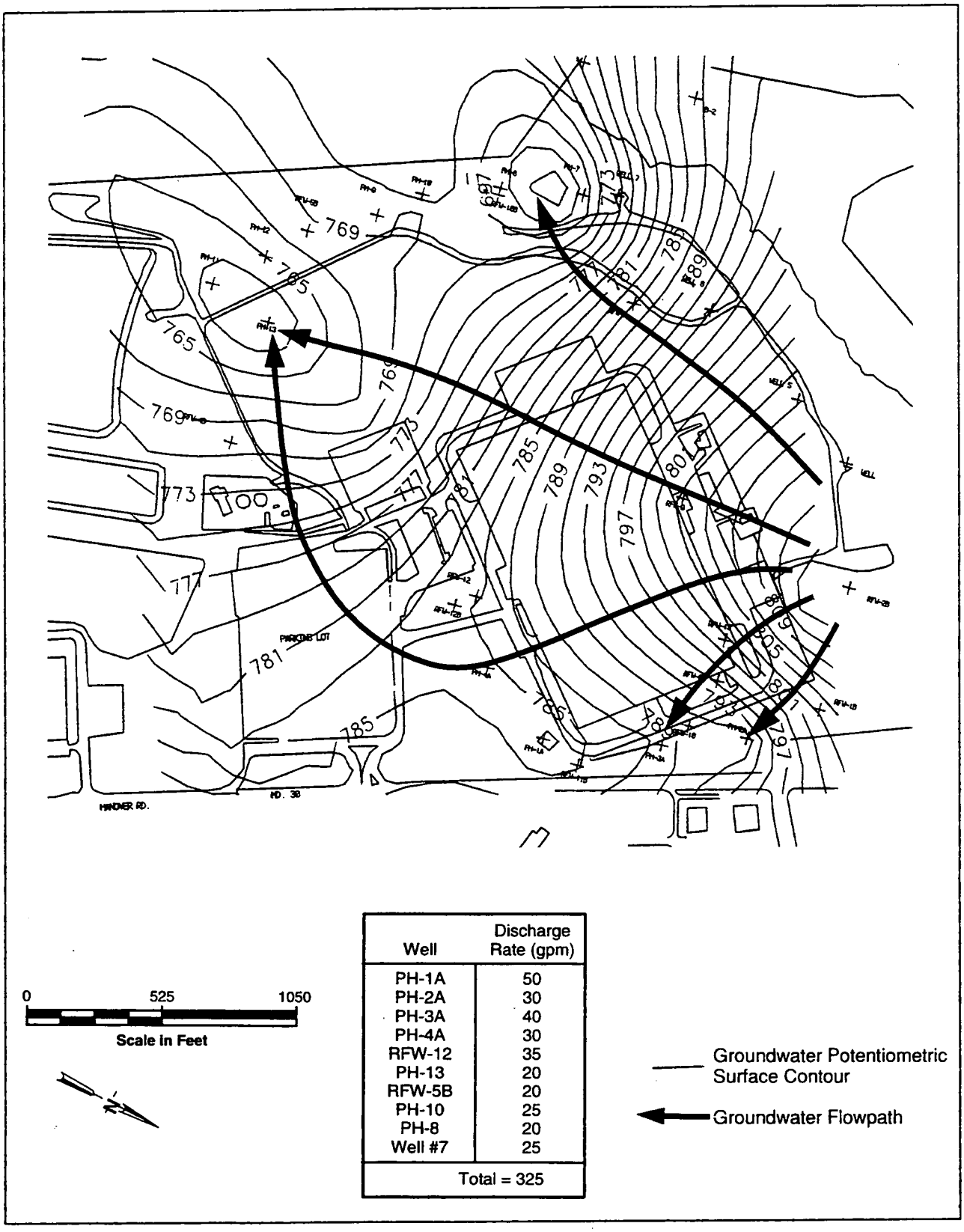
3.2.3 Groundwater Recovery System Design

Groundwater recovery and treatment was selected as the most direct approach which would achieve the remediation objective; the objective of designing the groundwater recovery system was to prevent groundwater from moving off-site. Removing groundwater via a series of wells located along the perimeter of the site would create a cone of depression in the water table and would effectively alter groundwater flow such that the potential for off-site migration of contaminants would be eliminated.

An analytical groundwater model, WELFLO (Walton, 1989), was used to establish the number, spacing and discharge rate of the recovery wells necessary to establish a hydraulic barrier which would meet the remediation objective. The WELFLO model incorporated site specific data and was used to predict the combined drawdown effects created from pumping multiple recovery wells.

Some simplifying assumptions concerning the hydrogeology of the site were made prior to running WELFLO. These assumptions included the following: the aquifer is isotropic and homogeneous, no vertical component of groundwater flow is present, recovery wells fully penetrate the aquifer, the aquifer is of infinite areal extent, and the aquifer thickness is constant across the site.

WELFLO provides a drawdown value at the intersection of each grid line. Results from the model were contoured using SURFER, a graphics package which grids and contours raw data. SURFER was then used to subtract the predicted drawdown surface from the water table potentiometric surface (December, 1991) which was also contoured using SURFER. The resulting surface (Figure 3-2) represents an approximation of the water table potentiometric surface under pumping conditions. Well yields and design pumping rates, input to the WELFLO model (based on pumping test results), are listed in Table 3-3. The design pumping rate is the rate which each recovery well will be initially



Well	Discharge Rate (gpm)
PH-1A	50
PH-2A	30
PH-3A	40
PH-4A	30
RFW-12	35
PH-13	20
RFW-5B	20
PH-10	25
PH-8	20
Well #7	25
Total = 325	

Groundwater Potentiometric Surface Contour

Groundwater Flowpath

FIGURE 3-2 WELFLO SIMULATION OF POTENTIOMETRIC SURFACE UNDER PUMPING CONDITIONS

TABLE 3-3

DESIGN FLOW RATES AND AREA
OF INFLUENCE FOR EACH RECOVERY WELL

Well ID	Maximum Sustainable Yield[1] (gpm)	Design Pumping Rate (gpm)	Areas of Influence[2] (ft)
PH-1A (EW-3)	90	50	1680
PH-2A (EW-5)	75	30	1300
PH-3A (EW-2)	55	40	1500
PH-4A (EW-4)	30	30	1300
PH-8 (EW-9)	33	20	1060
PH-10 (EW-8)	80	25	1185
PH-13 (EW-6)	45	20	1060
RFW-5B (EW-7)	70	20	1060
RFW-12 (EW-1)	35	35	1400
PW-7 (EW-10)	40	25	1185
Total	553	295	-

[1]Groundwater withdrawal rate for permit application based on maximum sustainable yield.

[2]Todd, 1964. Based on discharge rate equal to design pumping rate.

set to create the hydraulic barrier predicted with WELFLO. Therefore, the total discharge from the groundwater recovery system is predicted to be 295 gpm, not 553 gpm which is the sum of the maximum sustainable yields. The area of influence of each well is also provided in this table.

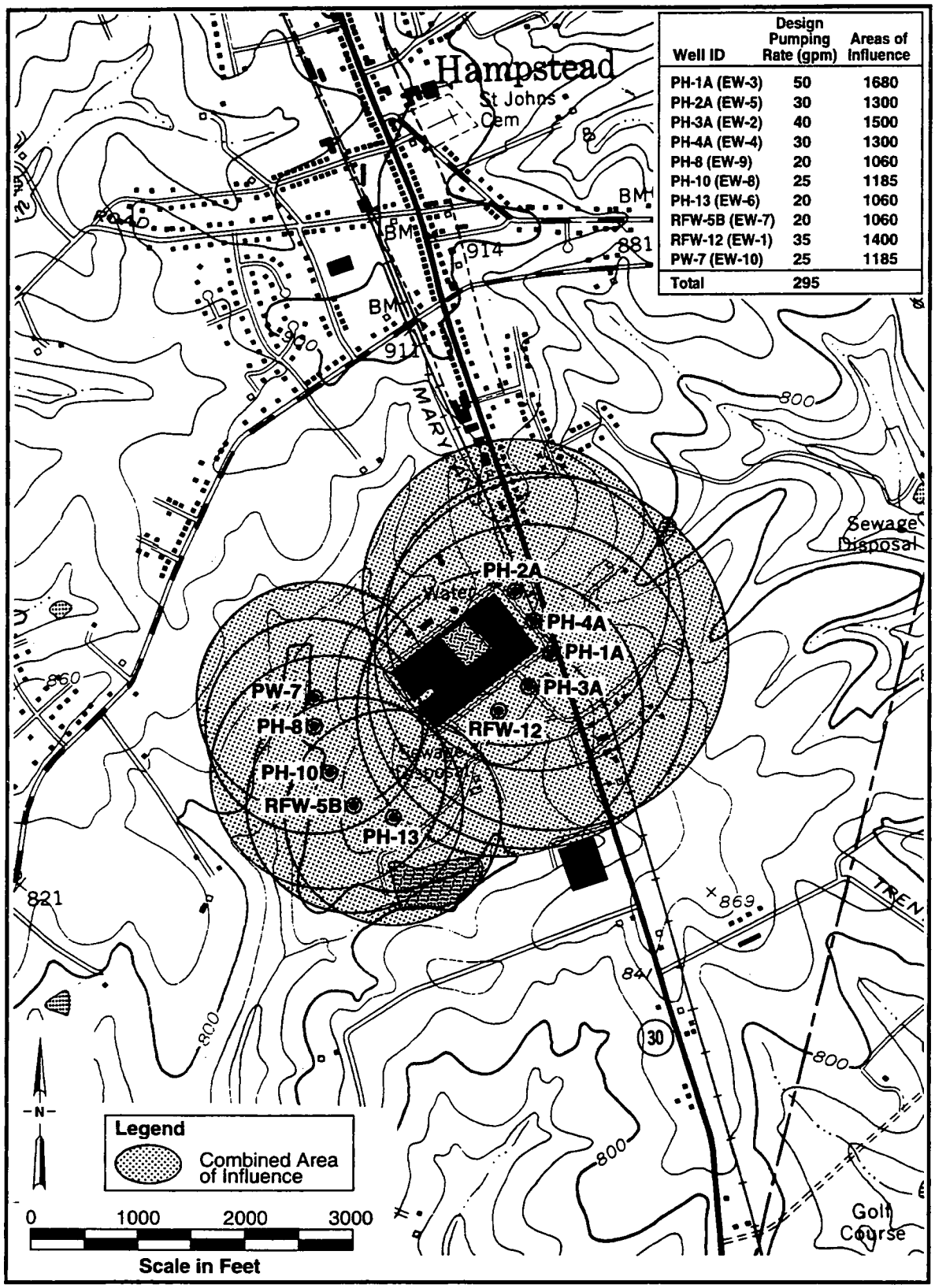
The area of influence was calculated using a method developed by Todd (1964) and was calculated for the design pumping rate for each recovery well. For steady-state conditions, the radius of influence of a pumping well describes an area over which the recharge rate is equal to the pumping rate. This relationship is described by the following equation:

$$Q_w = r_o^2 W$$

Where: Q_w = Pumping rate (gpm)
r_o = Radius of influence (ft)
W = Groundwater recharge rate (gpm/ft^2)

It was assumed that thirty-three percent of the annual precipitation (44 inches, Duigon, 1981) is distributed as groundwater recharge. The results, presented in Table 3-3, indicate the maximum area of influence is 1,680 feet for recovery well PH-1A at a pumping rate of 50 gpm. The area of influence for each recovery well was plotted using the design pumping rate and is presented in Figure 3-3.

The total groundwater discharge rate will be approximately 295 gpm during the start-up of the recovery system. Following start-up of the recovery system, the performance of the system will be monitored to evaluate whether the predicted aquifer response matches the actual response. Once the evaluation is completed, discharge rates at each recovery well may be modified. If data indicates the objectives of the groundwater recovery system would not be met by modifying the discharge rates, an additional well (or wells)



Well ID	Design Pumping Rate (gpm)	Areas of Influence
PH-1A (EW-3)	50	1680
PH-2A (EW-5)	30	1300
PH-3A (EW-2)	40	1500
PH-4A (EW-4)	30	1300
PH-8 (EW-9)	20	1060
PH-10 (EW-8)	25	1185
PH-13 (EW-6)	20	1060
RFW-5B (EW-7)	20	1060
RFW-12 (EW-1)	35	1400
PW-7 (EW-10)	25	1185
Total	295	

FIGURE 3-3 RECOVERY WELLS AREA OF INFLUENCE BASED ON DESIGN PUMPING RATE

may be installed to remedy the situation. Total discharge from the groundwater recovery system will not exceed 550 gpm without a modification to the Groundwater Appropriation permit.

3.3 WATER QUALITY

As detailed in Section 2.3, groundwater samples were collected from the recovery wells on site on two separate occasions. The results of the quarterly sampling event are summarized in Table 3-4. The results of the samples collected during the pumping tests are presented in Table 3-5.

The volatile organic compounds (VOCs) detected in the highest concentrations were trichloroethene (TCE) and tetrachlorethene (PCE). Those compounds detected at lower concentrations are 1,2-dichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, and 1,1,2-trichloroethane. The remainder of VOCs present were detected at levels well below the Federal Maximum Concentration Levels (MCL).

As found in earlier sampling events at the B&D facility, the highest concentrations of TCE are found on the eastern half of the B&D facility. The highest concentrations of PCE were found in the vicinity of production well 7 and recovery well PH-8. Figures 3-4 and 3-5 show the distribution of TCE and PCE in groundwater, respectively, based on historical analytical data.

Table 3–4
Quarterly Groundwater Sampling Results
February 1992
Black and Decker, Inc.
Hampstead, MD.

	DETECTION LIMIT	PH–1A	PH–2A	PH–8	PH–8 (duplicate)	PH–10	PH–13	RFW–5B	RFW–12	FIELD BLANK #1	TRIP BLANK
Date Sampled											
Acetone	10 ug/L	ND	ND	ND	ND	10 B	ND	ND	ND	9 JB	12 B
Methylene Chloride	5 ug/L	ND	ND	ND	ND	3 JB	ND	ND	2 JB	6 B	4 JB
1,1–Dichloroethene	5 ug/L	ND	ND	1 J	ND	ND	ND	ND	4 J	ND	ND
1,2–Dichloroethene (total)	5 ug/L	ND	ND	5	6	12	1 J	3 J	5	ND	ND
Chloroform	5 ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1–Trichloroethane	5 ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5 ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5 ug/L	830	310	29	28	7	12	ND	7300	ND	ND
1,1,2–Trichloroethane	5 ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4–Methyl–2–pentanone	10 ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5 ug/L	17	ND	1100	1100	170	61	ND	170	ND	ND
Toluene	5 ug/L	ND	ND	ND	ND	ND	ND	2 J	ND	ND	2 J
Xylene (total)	5 ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron, total	100 ug/L	ND	ND	1440	1580	NA	NA	11300	1050	NA	NA
Manganese, total	15.0 ug/L	50.6	44.3	55.5	55.3	NA	NA	182	60.4	NA	NA
Sodium, total	5000 ug/L	54900	9980	7240	7690	NA	NA	25500	22700	NA	NA
Alkalinity	2.0 mg/L	38.0	2.5	38.0	38.0	NA	NA	52.0	20.0	NA	NA
Chloride	0.25 mg/L	118	17.0	9.2	9.2	NA	NA	62.6	47.6	NA	NA
Hardness	1.0 mg/L	105	14.0	63.0	63.0	NA	NA	61.0	45.0	NA	NA
Hardness	1.0 mg/L	34.5	5.1	50.0	50.0	NA	NA	29.0	20.5	NA	NA
pH	0.010 mg/L	5.4	6.0	5.8	5.8	NA	NA	5.4	5.5	NA	NA
Sulfate	2.5 mg/l	ND	ND	3.0	11.8	NA	NA	ND	3.5	NA	NA
Specific Conductance	1.0 umhos/cm	47.1	78.8	113	113	NA	NA	265	201	NA	NA
Total Dissolved Solids	5.0 mg/L	310	62.0	107	110	NA	NA	255	147	NA	NA
Total Suspended Solids	5.0 mg/L	ND	ND	334	194	NA	NA	31.0	29.0	NA	NA

ND – Not Detected
NA – Not Analyzed.
J – Analyte present below detection limit.
B – Analyte present in blank.

TABLE 3-5

PUMPING TEST ANALYTICAL DATA
BLACK & DECKER
HAMPSTEAD, MARYLAND

Pumping Well ID	Sample ID	Duration of Pumping Test at Time of Sample Collection (hrs)	Concentrations (µg/l)	
			TCE	PCE
PH1A	PH1A-1-1	1	720	13
	PH1A-2-1	24	820	14
PH2A	PH2A-1	1	270	1.4
	PH2A-2	6	310	ND
	PH2A-3	24	2600	47
PH13	PH13-1-1	1	2.3	61
	PH13-2-1	8	12	87
PH8	PH8-1-1	1	18	930
	PH8-2-1	24	19	1100
	PH8-3-1	48	29	840
	PH8-4-1	71	17	630
RFW12	RFW12-1-1	1	4900	130
	RFW12-2-1	4	6400	87
	RFW12-3-1	8	6100	89

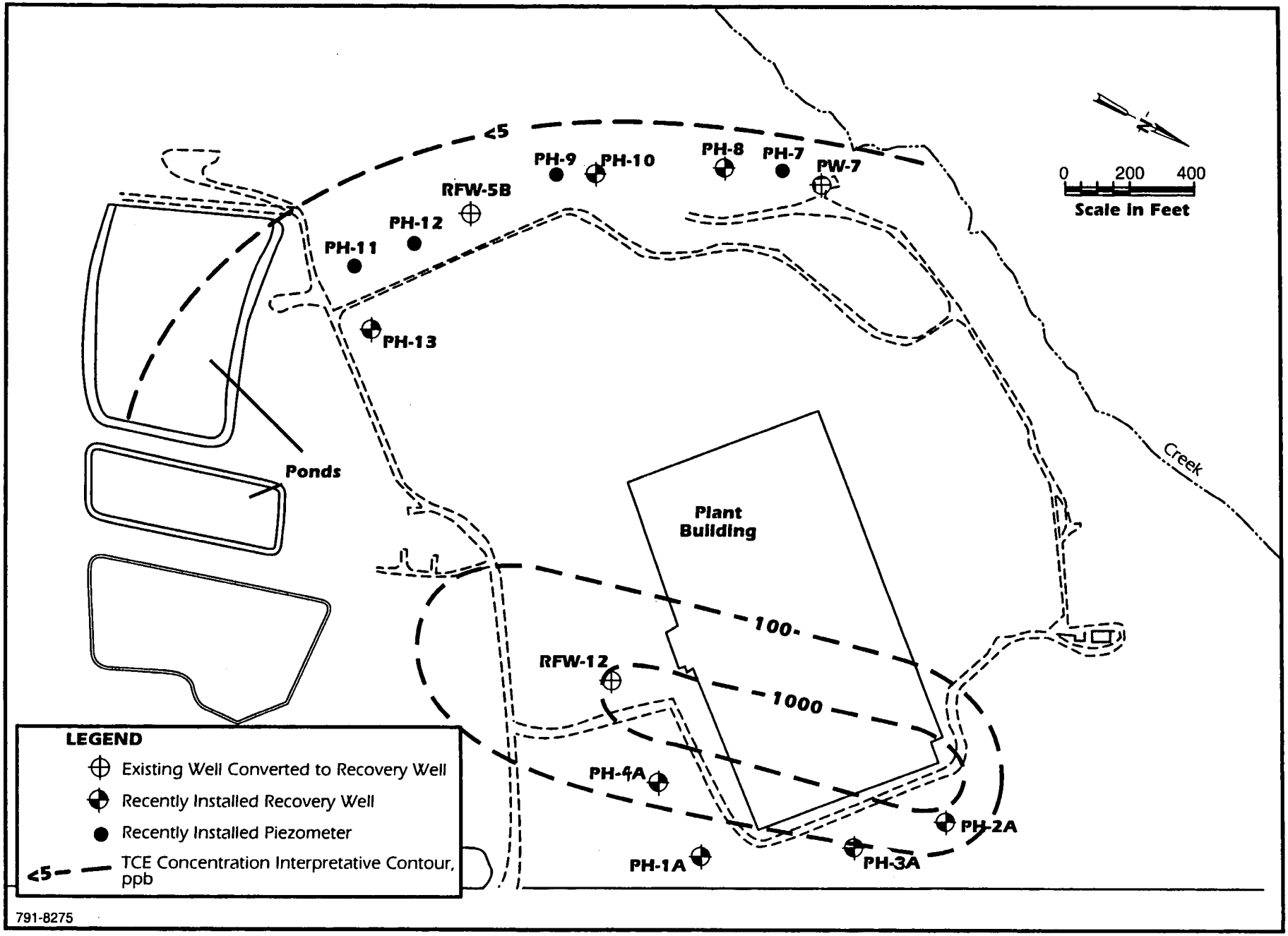


FIGURE 3-4 TCE CONCENTRATION IN GROUNDWATER 7/88 AND 12/88, BLACK & DECKER, HAMPSTEAD, MD

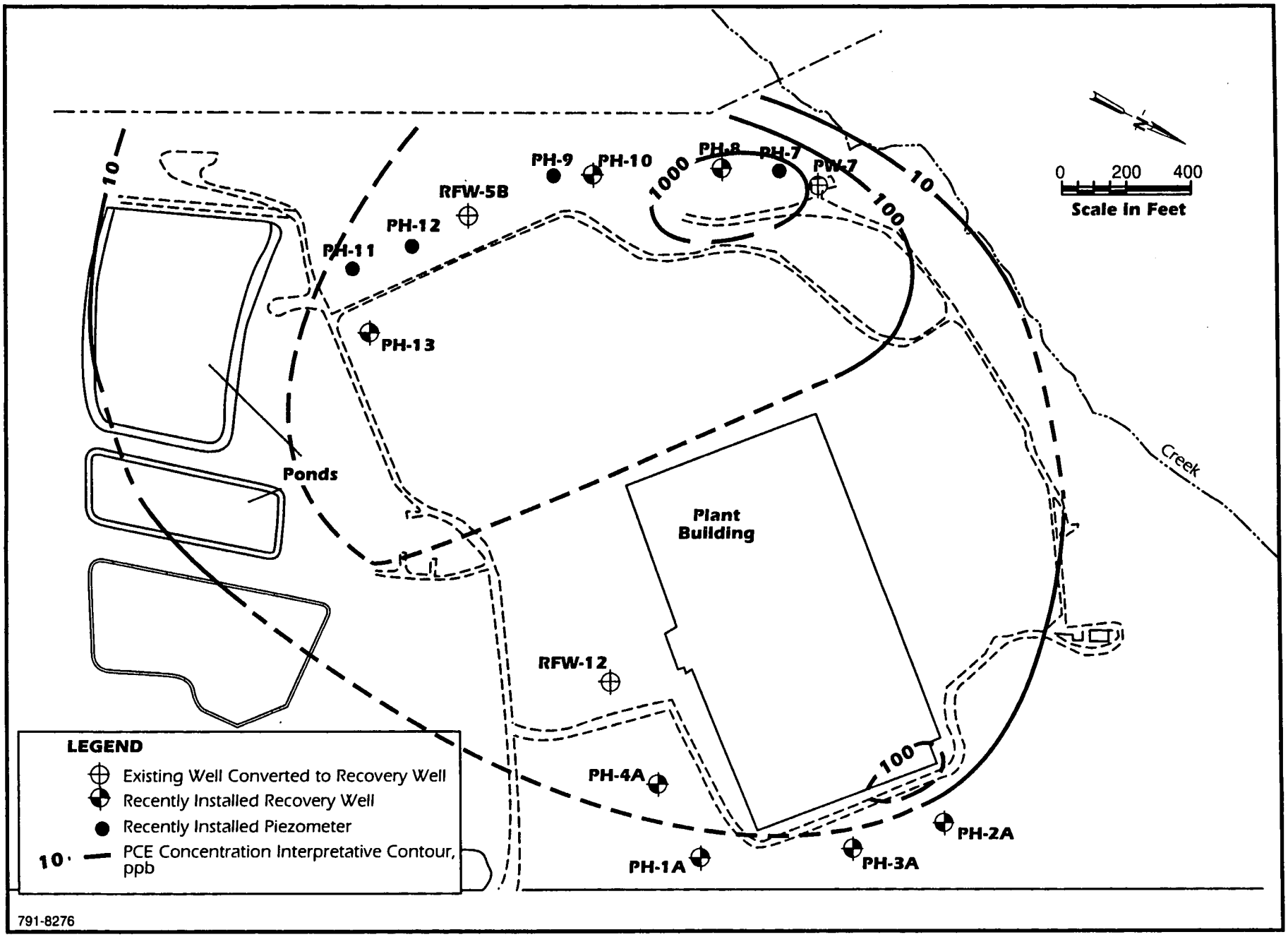


FIGURE 3-5 PCE CONCENTRATION IN GROUNDWATER 7/88 AND 12/88, BLACK & DECKER, HAMPSTEAD, MD

SECTION 4

CONCLUSIONS

The following conclusions are made for the B&D facility, located in Hampstead, Maryland, based on previous investigations and the recent field work which included geophysics, well installation, aquifer and well performance testing and groundwater sampling.

- The two lithologies at the site, saprolite and bedrock, are hydraulically inter-connected and act essentially as a single aquifer system.

- Groundwater occurs predominantly in fractures, joints and shear zones within the Wissahickon formation, and in the pore spaces of the overlying saprolite.

- Results of the aquifer testing indicate aquifer transmissivity averages between 4,000 and 8,000 gpd/ft and aquifer specific yield is approximately 0.02.

- Well performance tests indicate the maximum sustainable yields of the ten recovery wells range from 30 to 90 gpm and total 553 gpm. These yields are based on individual well pumping tests, and are not considered obtainable or necessary under a multiple well pumping scenario.

- Design pumping rates for the groundwater recovery system were calculated using WELFLO, an analytical groundwater model. The design pumping rates range from 20 to 50 gpm and total 295 gpm. These pumping rates are obtainable when multiple recovery wells are operating.

- The ten recovery wells operating at design pumping rates will create a hydraulic boundary preventing off-site migration of the groundwater.

- The removal of groundwater from the ten recovery wells at the design pumping rate will not affect the ability of off-site domestic and public utility wells to obtain water for water supply purposes.

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APPENDIX A

DRILLING LOGS

Project	Black and Decker	Well Number	PH–1A
Location	Hampstead, MD.	Date Started	09–Oct–91
Geologist	Dave Cairns	Date Completed	09–Oct–91
Drilling Contractor	Walton Corporation	Drilling Method	Air Rotary
Driller	Paul Foley	Total Depth	127 ft.

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–5'		dry	reddish–brown clayey SILT, little weathered schist fragments, trace quartz
5–8'		moist	brown clayey SILT, some weathered schist fragments, trace quartz
8–38'		moist	lt. orange–brown clayey SILT, little weathered schist and quartz fragments * water @ 33 ft. * water producing zone @ 38 ft.
38–45'		wet	gray highly weathered SCHIST, trace quartz, soft
45–67'	fractured zone from 60–95 ft.	wet	brown clayey SILT and weathered SCHIST, little quartz fragments, abundant weathering (iron) on cuttings (* total yield 10 gpm. @ 67 ft.)
67–90'		wet	greenish–gray weathered SCHIST, friable, iron and pyrite weathering on cuttings (* total yield 35–40 gpm. @ 87 ft.)
90–105'		wet	green–gray SCHIST, some to little quartz, micaceous, iron and pyrite weathering on cuttings
105–108'	fractured zone from 105–110 ft.	wet	QUARTZ vein, fractured (* total yield 65–70 gpm. @ 107 ft.)
108–110'		wet	greenish–gray SCHIST, abundant weathering on cuttings, some quartz
110–127'		wet	dark green–gray–black SCHIST, trace to little quartz, hard–no evidence of fractures throughout interval (* total yield 80 gpm @ 127 ft.)

Project	Black and Decker	**Well Number**	PH–2A
Location	Hampstead, MD.	**Date Started**	10–Oct–91
Geologist	Dave Cairns	**Date Completed**	10–Oct–91
Drilling Contractor	Walton Corporation	**Drilling Method**	Air Rotary
Driller	Paul Foley	**Total Depth**	127 ft.

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–22'		dry	reddish–brown clayey SILT, some quartz and weathered schist fragments, micaceous
22–74'		moist	brown to reddish–brown to gray–brown clayey SILT, little quartz and weathered schist * water @ 45 ft.
74–94'	fractured between 82–90 ft. fracture @ 91 ft. fracture @ 93 ft.	wet	gray–brown–green weathered SCHIST, friable–soft to 82 ft. becoming harder below 82 ft. (* total yield 10 gpm. @ 87 ft.)
94–127'			dark gray–green SCHIST, foliated, hard, micaceous–chlorite, no evidence of fractures below 94 ft. (* total yield 45 gpm. @ 107 ft.) (* total yield 45 gpm. @ 127 ft.)

Project	**Black and Decker**	**Pilot Hole Number**	**PH-3A**
Location	**Hampstead, MD.**	**Date Started**	**17-Feb-92**
Geologist	**Dave Cairns**	**Date Completed**	**19-Feb-92**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**117 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0-11'		moist	lt. orange-brown clayey SILT, some pieces of schist
11-20'		slightly moist	brown clayey SILT, some schist fragments
20-33'		--	lt. brown clayey SILT, little to some weathered schist, micaceous, variegated light brown to brown to gray-brown
33-52'		slightly moist to moist	green-brown clayey SILT (weathered schist), some schist fragments, trace quartz, schist is chloritic. * water @ 48 ft. (*total yield 3 gpm. @ approx. 45 ft.)
52-80'	fractured zone from 85-87' competent rock @ 90'	wet	gray-green weathered SCHIST, harder but not competent, chloritic, silver shiny luster, some quartz veins in matrix, friable, abundant weathering on rock surfaces, mainly iron, little pyrite weathering, harder @ 73' and @ 78' (*total yield 25-30 gpm. @ 67 ft.)
80-117'	fractured zone from 100-101' fracture @ 105 fractured zone from 107.5-108	wet	dk gray-green SCHIST, trace quartz in matrix, chlorite and amphibole, little quartz (vein) @ 90', quartz vein @ 93-94' - more water, iron on cuttings @ 105', rock very hard @ 99' though still contains some fractures, very hard rock 108-117' without any breaks (*total yield 60 gpm. @ 87 ft.) (*total yield 55-60 gpm. @ 107 ft.)

Project	**Black and Decker**	**Pilot Hole Number**	**PH-4A**
Location	**Hampstead, MD.**	**Date Started**	**19-Feb-92**
Geologist	**Dave Cairns**	**Date Completed**	**20-Feb-92**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**107 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0-1'		--	TOPSOIL
1-4'		--	brown clayey SILT, trace schist and quartz fragments
4-6'		--	QUARTZ vein
6-33'		--	gray-brown micaceous SILT, little weathered rock fragments
33-39'		moist	variegated predominantly gray-green to brown clayey SILT, micaceous, little to some schist fragments, trace quartz fragments
39-45'		moist	gray-green weathered SCHIST, micaceous, little quartz fragments
52-80'			* wet @ 45 ft. (*total yield 2 gpm. @ 47 ft.)
45-63'		wet	gray-green SCHIST, foliated, micaceous, trace quartz (vein)
63-65'	fracture @ 64'	wet	QUARTZ vein
65-85'		wet	dk gray SCHIST, foliated, trace quartz in matrix, silver luster, hard (*total yield 15 gpm. @ 67 ft.)
85-86.5'		--	QUARTZ vein
86.5-107'	small fracture @ 95'	wet	same as 65-85' but not as dark in color, green-gray, slightly more quartz in matrix, not much water @ 95' small fracture zone (*total yield 35-40 gpm. @ 107 ft.)

Project	Black and Decker	**Well Number**	PH–7
Location	Hampstead, MD.	**Date Started**	15–Oct–91
Geologist	Dave Cairns	**Date Completed**	15–Oct–91
Drilling Contractor	Walton Corporation	**Drilling Method**	Air Rotary
Driller	Paul Foley	**Total Depth**	127 ft.

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–21'		moist	lt. orange brown clayey SILT, little quartz fragments, trace weathered schist and sand (mica)
21–70'		moist wet @ 33 ft.	brown clayey SILT, little quartz and weathered schist, little sand (mica), abundant weathering on cuttings–pyrite and iron (* total yield 2 gpm @ 67 ft.)
70–82'		wet	brown weathered SCHIST, abundant pyrite staining on cuttings
82–92'	fracture @ 85 ft.	wet	gray to black to white SCHIST/PHYLLITE, approx. 50–60 % quartz (* total yield 30 gpm @ 87 ft.)
92–94'	fracture @ 92–94 ft.	wet	QUARTZ vein
94–99'		wet	gray–white SCHIST/PHYLLITE, little quartz, hard/soft in parts, some weathering–iron and pyrite
99–105'	fracture @ 105 ft.	wet	gray–black SCHIST/AMPHIBOLITE, trace to little quartz in matrix, hard (* total yield 40 gpm @ 107 ft.)
105–127'		––	gray–black SCHIST/AMPHIBOLITE, little quartz, hard–no evidence of weathering (* total yield 45–50 gpm @ 127 ft.)

Project	**Black and Decker**	**Well Number**	**PH–8**
Location	**Hampstead, MD.**	**Date Started**	**16–Oct–91**
Geologist	**Dave Cairns**	**Date Completed**	**16–Oct–91**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**156 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–8'		moist	orange–brown clayey SILT, little quartz fragments and weathered schist, trace sand (mica)
	void @ 8.5 ft.		
8–30'		moist	brown clayey SILT, as above
30–45'		moist	reddish brown clayey SILT, as above but with a higher % of schist fragments
45–65'		moist–wet	brown clayey SILT, abundant pyrite staining on cuttings * water producing zone @ 52 ft.
65–75'		wet	gray–green–brown weathered SCHIST, micaceous–chlorite, some quartz * water producing zone @ 75 ft.
75–80'		wet	SCHIST, as above but more competent
80–81'		wet	QUARTZ vein
81–85'	fracture @ 84 ft.	wet	SCHIST, same as 75–80 ft. interval
85–86'		wet	QUARTZ vein
86–91'	fractured from 87–91 ft.	wet	SCHIST, same as 75–80 ft. interval (* total yield 10–12 gpm. @ 87 ft.)
91–117'	fracture @ 94 ft. fractured from 96–97 ft.	wet	green–gray SCHIST, trace quartz, chlorite and amphibole, little weathering on cuttings (* total yield 20 gpm @ 107 ft.)
117–140'	fracture @ 113–115 ft. fracture @ 132–134 ft. fracture @ 138–139 ft.	wet	gray–black–white SCHIST, little quartz, chlorite, amphibole, biotite, hard–no evidence of fractures (* total yield 70 gpm @ 126 ft.)
140–156'		--	green–gray SCHIST, little quartz, chloritic, hard (* total yield 70 gpm. @ 146 ft.)

Project	**Black and Decker**	**Well Number**	**PH–9**
Location	**Hampstead, MD.**	**Date Started**	**24–Oct–91**
Geologist	**Dave Cairns**	**Date Completed**	**24–Oct–91**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**126 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–24'		moist	orange–brown clayey SILT (weathered schist), little quartz, little sand (mica)
24–48'		moist wet @ 43'	alternating beds of reddish–brown and lt. brown clayey SILT, little quartz, micaceous (* total yield 7 gpm @ 46 ft.)
48–60'	fracture @ 57–59'		gray–brown weathered SCHIST, friable, abundant iron staining on cuttings
60–64'		wet	gray–brown SCHIST, little quartz,slightly harder than previous interval, abundant pyrite and iron staining
64–70'	fracture @ 69–70 ft.	wet	gray–brown to red–brown SCHIST, trace quartz, competent rock (* total yield 20 gpm. @ 66 ft.)
70–85'	fracture @ 83 ft.	wet	dark gray–green SCHIST, competent but not real hard (* total yield 30–35 gpm @ 86 ft.)
85–96'	fracture @ 96–97 ft.	––	dark gray–green SCHIST, composed mainly of amphibole/biotite and chlorite, no quartz, slow drilling–hard rock
97–119'		––	dark greenish–gray to black SCHIST/AMPHIBOLITE, trace quartz in matrix, no evidence of fractures (* total yield 45–50 gpm @ 106 ft.)
119–126'		––	dark green–gray SCHIST, trace quartz, vitreous, competent. (*total yield 45 gpm @ 126 ft.) No significant water producing zone past 97 feet.

Project	**Black and Decker**	**Well Number**	**PH–10**
Location	**Hampstead, MD.**	**Date Started**	**24–Oct–91**
Geologist	**Dave Cairns**	**Date Completed**	**24–Oct–91**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**126 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–16'		moist	lt. orange–brown clayey SILT, little quartz and schist fragments
16–50'		wet @ 20'	lt. tannish–brown clayey SILT, little weathered schist fragments and quartz pebbles * water @ 20 ft. * water producing zone @ 40 ft. (* total yield 10 gpm @ 46 ft.)
50–76'	fracture @ 57 ft. fractured from 60–66 ft.	wet	gray–brown weathered SCHIST, friable–soft, abundant pyrite and iron staining (* total yield 20 gpm. @ 66 ft.)
76–94'	fracture @ 80–82 ft.	wet	green–gray SCHIST, little quartz, soft/hard (* total yield 30–35 gpm @ 86 ft.)
94–114'	fractured from 86–94 ft.	wet	dark gray–green SCHIST, trace to little quartz, chloritic, vitreous (* total yield 65 gpm @ 106 ft.)
114–116'		––	green–gray to black to white SCHIST/AMPHIBOLITE, little quartz, no weathering or evidence of fractures
116–126'		––	same as 94–114' (* total yield 65–75 gpm @ 126 ft.) No significant water producing zones below 94 ft.

Project	**Black and Decker**	**Well Number**	**PH–11**
Location	**Hampstead, MD.**	**Date Started**	**28–Oct–91**
Geologist	**Dave Cairns**	**Date Completed**	**28–Oct–91**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**106 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–17'		moist	lt. brown clayey SILT, little weathered schist and quartz fragments
17–38'		moist	lt. tannish–brown to reddish–brown clayey SILT, little rock fragments
38–53'		wet	gray clayey SILT (highly weathered schist), little quartz and rock fragments, abundant weathering present * water producing zone @ 39 ft.
53–54'	fracture @ 53 ft.	wet	QUARTZ vein
54–64'		wet	gray weathered SCHIST, little quartz, friable, fractured throughout interval (* total yield 15–20 gpm @ 66 ft.)
64–74'	fractured from 73–84 ft.	wet	greenish–gray SCHIST, competent but heavily fractured
74–85'		wet	greenish–gray SCHIST, as above, but competent–non friable, chloritic, pyrite staining on relict bedding surfaces (* total yield 30–35 gpm @ 86 ft.)
85–90'		wet	dark gray–black AMPHIBOLITE/SCHIST, occassional quartz vein, hard–no drill breaks
90–106'			dark gray to black to white AMPHIBOLITE/SCHIST, some quartz in matrix, very hard (* total yield 35–40 gpm @ 106 ft.)

Project	Black and Decker	**Well Number**	PH–12
Location	Hampstead, MD.	**Date Started**	28–Oct–91
Geologist	Dave Cairns	**Date Completed**	28–Oct–91
Drilling Contractor	Walton Corporation	**Drilling Method**	Air Rotary
Driller	Paul Foley	**Total Depth**	106 ft.

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–16'		dry	lt. brown to lt. reddish brown clayey SILT, little rock fragments–weathered schist (gray to red–brown) and quartz
16–30'		moist	lt. tannish–brown clayey SILT, trace to little rock fragments (weathered schist and quartz)
30–45'		moist	same as above but greenish–gray, rock fragments have pyrite staining on surfaces * water producing zone @ 45 ft.
45–75'		wet	greenish–gray weathered SCHIST, some quartz, hard/soft (* total yield 10 gpm. @ 66 ft.)
75–85'	fracture @ 85 ft.	wet	dark gray to black to white SCHIST/AMPHIBOLITE, some quartz in matrix, foliated, hard (* total yield 15–20 gpm, @ 85 ft.)
86–106'		wet	greenish–gray SCHIST, foliated, chloritic–hard (* total yield 15–20 gpm. @ 106 ft.)

Project	**Black and Decker**	**Well Number**	**PH–13**
Location	**Hampstead, MD.**	**Date Started**	**30–Oct–91**
Geologist	**Dave Cairns**	**Date Completed**	**30–Oct–91**
Drilling Contractor	**Walton Corporation**	**Drilling Method**	**Air Rotary**
Driller	**Paul Foley**	**Total Depth**	**137 ft.**

INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–18'		dry	reddish–brown to brown clayey SILT, little schist fragments and trace quartz
18–28'		moist	brown clayey SILT, as above
28–47'		moist	gray–brown clayey SILT, as above, abundant weathering on cuttings
47–64'		moist	as above but variegated–gray–brown to brown to reddish–brown * water producing zone @ 62 ft.
64–80'		wet	gray–brown weathered SCHIST, trace to little quartz, friable, hard/soft–fractured, iron and pyrite staining (*total yield 15–20 gpm @ 67 ft.)
80–83'		wet	greenish–gray SCHIST, little quartz (veins), weathered–predominantly iron some pyrite
83–84'		wet	QUARTZ vein
84–90'		wet	same as 80–83 ft. (*total yield 15–20 gpm @ 87 ft.)
90–91'		wet	QUARTZ vein
91–106'		wet	same as 80–83 ft.
106–137'	fracture @ 110 ft.	wet	SCHIST, as above but darker–higher % of biotite/amphibole (* total yield 25 gpm @ 107 ft.) (* total yield 50 gpm @ 127 ft.)

Project	Black and Decker	Well Number	RFW–12B
Location	Hampstead, MD.	Date Started	09–Oct–91
Geologist	Dave Cairns	Date Completed	11–Oct–91
Drilling Contractor	Walton Corporation	Drilling Method	Air Rotary
Driller	Paul Foley	Total Depth	264 ft.

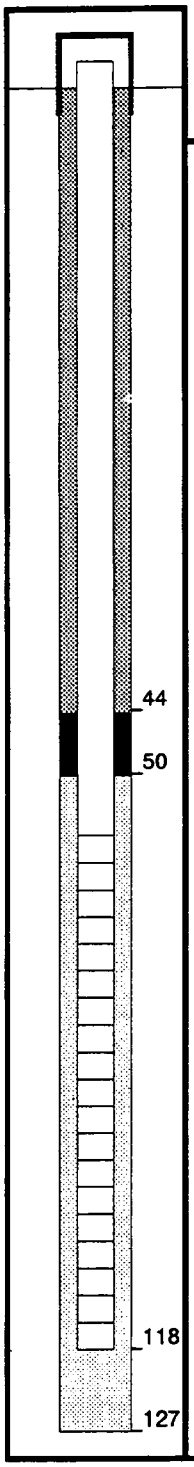
INTERVAL	FRACTURES/ DRILL BREAK	MOISTURE CONTENT	LITHOLOGIC DESCRIPTION
0–22'		moist	lt. gray–brown clayey SILT, some weathered schist, trace quartz
22–34'		moist	lt. brown clayey SILT, some weathered schist, little quartz * water producing zones @ 36 ft.
34–68'			gray clayey SILT, some weathered schist, little quartz, micaceous (*total yield 1 gpm @ 46 ft.) (*total yield 2 gpm @ 67 ft.)
68–70'		wet	gray weathered SCHIST, little quartz
70–90'	competent rock @ 70 ft. fracture @ 85 ft.	wet	gray SCHIST, micaceous, little quartz, foliated, hard (*total yield 7 gpm @ 87 ft.)
90–97'			gray–green SCHIST, some quartz, foliated
97–99'			QUARTZ vein
99–107'	fracture @ 103 ft.		gray–green SCHIST, litte quartz, foliated, hard, trace weathering on cuttings (*total yield 8–9 gpm @ 107 ft.)
107–125'		dry	gray–green SCHIST, hard, foliated, no evidence of weathering/fractures
125–264'		dry to moist	dk gray–green–black SCHIST/AMPHIBOLITE, litte quartz in matrix, hard, micaceous
			* moist @ 168'
			* trickle of water @ 181'
	fracture @ 207 ft.		* fracture @ 207 ft. – but no water
			Well producing <0.5 gpm @ 264 ft.

APPENDIX B

WELL COMPLETION FORMS

Well I.D. PH-1A

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 165.96 (N)
2413.35 (E)
Elevation: Ground Level 844.40
Top of Casing 846.64

Drilling Summary:

Total Depth: 127 feet
Borehole Diameter: 8-inch pilot hole; 12-inch ream
Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 8-inch hammer; 12-inch ream bit
Drilling Fluid: Potable water
Surface Casing: 8-inch steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___
Casing String(s): C=Casing S=Screen

+2	- 58	C1
58	- 118	S1
___	- ___	___
___	- ___	___

Casing: C1 6-inch schedule 40 PVC
C2
Screen: S1 6-inch 10 slot schedule 40 PVC
S2
Centralizers: At 40 and 100-feet below ground surface
Filter Material: No. 2 Morie Sand (50-121 ft)
Cement: Portland/Bentonite grout (0-44 ft.)
Other: Bentonite (holeplug) Seal (44-50 ft.)

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8-inch	10/09	10:40	10/09	12:05
12-inch	10/22	13:50	10/22	15:55
Geophys. Logging	--	--	--	--
Casing:				
6-inch PVC	10/22	16:05	10/22	16:30
Filter Placement:	10/22	16:05	10/22	16:30
Cementing:	10/23	14:00	10/23	15:00
Development:	10/9	12:05	10/9	12:45
Other:				
Bentonite	10/22	17:20	10/22	17:30

Well Development:

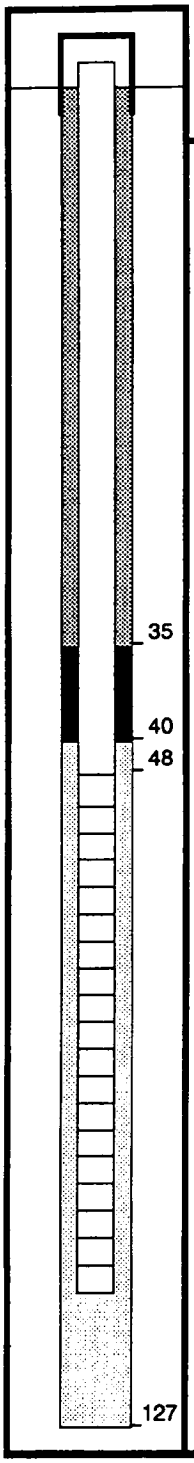
Hole air developed for 40 minutes. Well was pumped for approximately 28-hours during pump test.

Comments:

Permit No. CL-88-2059

Well I.D. PH-2A

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 200.74 (N)
3205.10 (E)
Elevation: Ground Level 861.66
Top of Casing 863.36

Drilling Summary:

Total Depth: 127 feet
Borehole Diameter: 8-inch pilot hole; 12-inch reaming bit
Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 8-inch hammer; 12-inch reaming bit
Drilling Fluid: NONE
Surface Casing: 8-inch steel

Well Design:

Basis: Geologic Log: X
Geophysical Log:
Casing String(s): C=Casing S=Screen

+2	– 48	C1
48	– 98	S1
	–	
	–	

Casing: C1 6-inch schedule 40 PVC
C2
Screen: S1 6-inch 10 slot schedule 40 PVC
S2
Centralizers: At 42 and 85 feet below ground surface
Filter Material: No. 2 Morie Sand (40-104 ft).
Cement: Portland/Bentonite grout (0-35 ft).
Other: Bentonite (holeplug) Seal (35-40 ft).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8-inch	10/10	14:40	10/10	15:40
12-inch	10/23	08:35	10/23	10:30
Geophys. Logging	--	--	--	--
Casing:				
6-inch	10/23	10:45	10/23	11:10
Filter Placement:	10/23	11:10	10/23	11:55
Cementing:	10/24	09:00	10/24	10:00
Development:	10/10	15:40	10/10	16:00
Other:				
Bentonite Seal	10/23	12:00	10/23	12:10

Well Development:

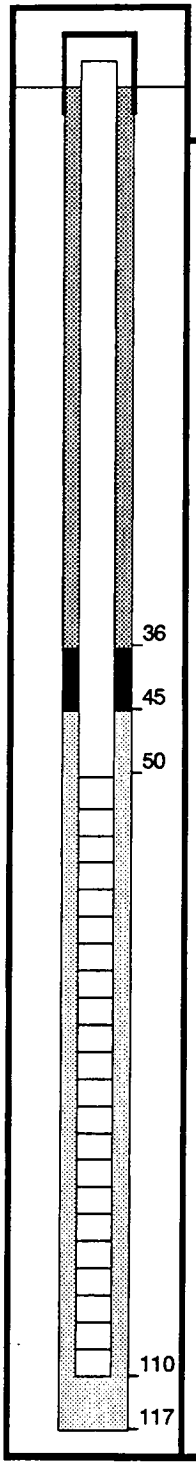
Borehole was air developed for 20-minutes – produced 45-50 gpm. Well was pumped for 24-hours at 75 gpm on 25 and 26 November 1991.

Comments:

Permit No. CL-88-1939

Well I.D. PH-3A

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: (N)
(E)
Elevation: Ground Level
Top of Casing

Drilling Summary:

Total Depth: 117 feet
Borehole Diameter: 10-inches

Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 10-inch hammer
Drilling Fluid: Potable water
Surface Casing: 8-inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log:
Casing String(s): C=Casing S=Screen

+2	– 50	C1
50	– 110	S1
	–	
	–	

Casing: C1 6-inch schedule 40 PVC
C2
Screen: S1 6-inch 10 slot schedule 40 PVC
S2
Centralizers: At 47 feet below ground surface

Filter Material: No. 2 Morie sand (44.5-117 ft.)

Cement: Portland/bentonite grout (0-35.9 ft.)

Other: Bentonite seal (35.9-44.5 ft.)

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling: 10-inch	17-Feb-92	15:30	18-Feb-92	11:30
Geophys. Logging	--	--	--	--
Casing: 6-inch PVC	18-Feb-92	13:30	18-Feb-92	14:00
Filter Placement:	18-Feb-92	14:00	18-Feb-92	14:45
Cementing:	19-Feb-92	09:15	19-Feb-92	10:00
Development:	18-Feb-92	11:30	18-Feb-92	12:00
Other: Bentonite seal	18-Feb-92	14:45	18-Feb-92	15:00

Well Development:

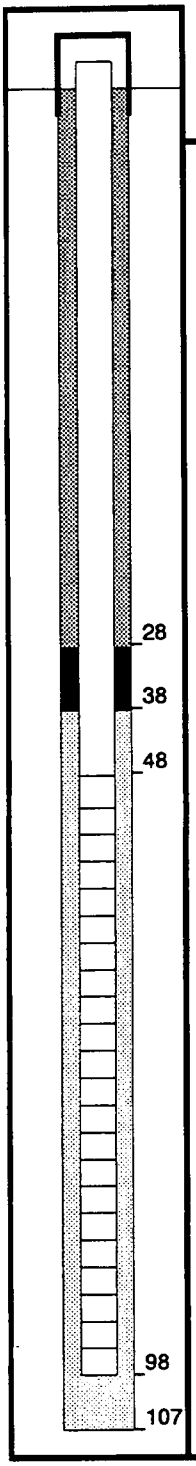
Borehole was air developed for 30 minutes. Water was clear and free of particulates.

Comments:

Permit No. CL-88-2241

Well I.D. PH-4A

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: (N) (E)

Elevation: Ground Level
Top of Casing

Drilling Summary:

Total Depth: 107 feet
Borehole Diameter: 10-inches

Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 10-inch hammer
Drilling Fluid: Potable water
Surface Casing: 8-inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___

Casing String(s): C=Casing S=Screen

+2	- 48	C1
48	- 98	S1
___	- ___	___
___	- ___	___

Casing: C1 6-inch schedule 40 PVC
C2

Screen: S1 6-inch 10 slot schedule 40 PVC
S2

Centralizers: None

Filter Material: No. 2 Morie sand (37-107 ft.)

Cement: Portland/bentonite grout (0-28 ft.)

Other: Bentonite seal (28-37 ft.)

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling: 10-inch	19-Feb-92	14:30	19-Feb-92	17:20
Geophys. Logging	--	--	--	--
Casing: 6-inch PVC	20-Feb-92	09:45	20-Feb-92	10:00
Filter Placement:	20-Feb-92	10:00	20-Feb-92	10:55
Cementing:	20-Feb-92	11:40	20-Feb-92	12:30
Development:	20-Feb-92	08:20	20-Feb-92	09:20
Other:				
Bentonite seal	20-Feb-92	10:55	20-Feb-92	11:00

Well Development:

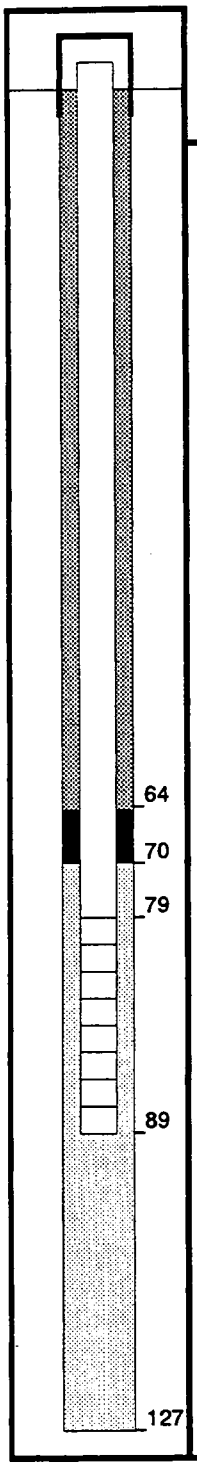
Borehole was air developed for one hour. Water was clear and free of particulates.

Comments:

Permit No. CL-88-2242

Well I.D. PH-7

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 803.82 (N)
805.94 (E)

Elevation: Ground Level 803.82
Top of Casing 805.94

Drilling Summary:

Total Depth: 127 feet
Borehole Diameter: 8-inches

Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 8-inch hammer
Drilling Fluid: Potable water
Surface Casing: 8-inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___

Casing String(s): C=Casing S=Screen

+2	- 79	C1
79	- 89	S1
___	- ___	___
___	- ___	___

Casing: C1 2-inch schedule 40 PVC
C2 ___
Screen: S1 2-inch 10 slot schedule 40 PVC
S2 ___
Centralizers: NONE

Filter Material: No. 2 Morie Sand (70-127 ft.)

Cement: Portland/Bentonite grout (0-64 feet).

Other: Bentonite (holeplug) Seal (64-70 ft).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling: 8-inch	10/15	7:56	10/15	9:23
Geophys. Logging	--	--	--	--
Casing: 2-inch PVC	10/18	08:20	10/23	08:30
Filter Placement:	10/18	08:30	10/18	08:45
Cementing:	10/18	08:55	10/18	09:40
Development:				
Other: Bentonite Seal	10/18	08:45	10/18	08:50

Well Development:

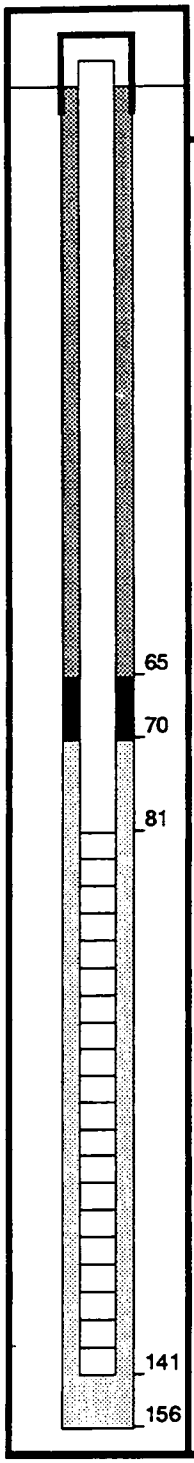
Installed as an observation well for pump tests conducted in area.

Comments:

Permit No. CL-88-2060

Well I.D. PH–8

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 2287.46 (N)
2410.40 (E)
Elevation: Ground Level 808.91
Top of Casing 810.97

Drilling Summary:

Total Depth: 156 feet
Borehole Diameter: 8–inch; 12–inch

Driller: Paul Foley

Rig: Ingersoll Rand T–3
Bit(s): 8–inch hammer; 12–inch reaming bit
Drilling Fluid: Potable water
Surface Casing: 8–inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___
Casing String(s): C=Casing S=Screen

+2	– 81	C1
81	– 141	S1
___	– ___	___
___	– ___	___

Casing: C1 6–inch schedule 40 PVC
C2
Screen: S1 6–inch 10 slot schedule 40 PVC
S2
Centralizers: At 40–feet and 100–feet below ground surface
Filter Material: No. 2 Morie Sand (70–141 ft.)
Cement: Portland/Bentonite grout (0–65 feet).
Other: Bentonite (holeplug) Seal (64–70 ft).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8–inch	10/16	14:34	10/16	16:15
12–inch	10/21	14:40	10/22	08:30
Geophys. Logging	--	--	--	--
Casing:				
6–inch PVC	10/22	08:30	10/22	09:20
Filter Placement:	10/22	09:30	10/22	11:00
Cementing:	10/22	12:50	10/22	14:00
Development:				
Other:				
Bentonite Seal	10/22	11:00	10/22	11:15

Well Development:

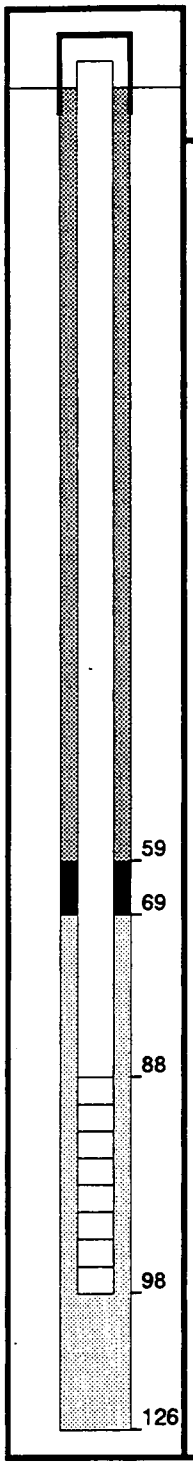
Borehole was air developed for 10 minutes once the total depth was reached. Well was pumped at 40 gpm during a 72 hour pump test (11/12–11/15).

Comments:

Permit No. CL–88–1937

Well I.D. PH–9

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 2235.22 (N)
2049.68 (E)
Elevation: Ground Level 808.58
Top of Casing 814.94

Drilling Summary:

Total Depth: 126 feet
Borehole Diameter: 8–inch

Driller: Paul Foley

Rig: Ingersoll Rand T–3
Bit(s): 8–inch hammer
Drilling Fluid: Potable water
Surface Casing: 6–inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___
Casing String(s): C=Casing S=Screen

+2	– 88	C1
88	– 98	S1
___	– ___	___
___	– ___	___

Casing: C1 2–inch 10 slot schedule 40 PVC
C2
Screen: S1 2–inch 10 slot schedule 40 PVC
S2
Centralizers: NONE

Filter Material: No. 2 Morie Sand (69–101 ft.)

Cement: Portland/Bentonite grout (0–59 feet).
Other: Bentonite (holeplug) Seal (59–69 ft).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8–inch	10/24	08:50	10/24	10:30
Geophys. Logging	--	--	--	--
Casing:				
2–inch PVC	10/28	10:30	10/28	10:45
Filter Placement:	10/28	10:45	10/28	11:00
Cementing:	10/31	10:00	10/31	10:50
Development:	10/24	10:30	10/24	10:40
Other:				
Bentonite Seal	10/28	11:00	10/28	11:05

Well Development:

Borehole air developed for 10 minutes – produced 40 gpm.

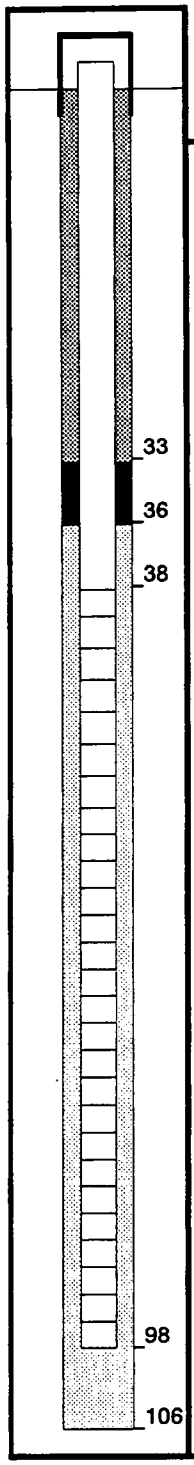
Comments:

Installed as an observation well for pump tests conducted in area.

Permit No. CL–88–2061

Well I.D. PH–10

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 2280.82 (N)
2135.92 (E)
Elevation: Ground Level 810.89
Top of Casing 813.05

Drilling Summary:

Total Depth: 126 Feet
Borehole Diameter: 8–inch pilot hole
12–inch ream.
Driller: Paul Foley

Rig: Ingersoll Rand T–3
Bit(s): 8–inch hammer; 12–inch ream bit
Drilling Fluid: Potable water
Surface Casing: 8–inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___
Casing String(s): C=Casing S=Screen

+2	– 38	C1
38	– 98	S1
___	– ___	___
___	– ___	___

Casing: C1 6–inch schedule 40 PVC
C2 ___
Screen: S1 6–inch 10 slot schedule 40 PVC
S2 ___
Centralizers: NONE

Filter Material: No. 2 Morie Sand (36–106 ft)
Cement: Portland/Bentonite grout (0–33 ft.)
Other: Bentonite (holeplug) Seal (33–36 ft).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8–inch	10/24	15:10	10/24	16:25
12–inch	10/25	07:55	10/25	08:50
Geophys. Logging	--	--	--	--
Casing:				
6–inch PVC	10/25	09:10	10/25	09:20
Filter Placement:	10/25	09:20	10/25	10:20
Cementing:	10/25	10:50	10/25	11:20
Development:	10/24	16:25	10/24	16:40
Other:				
Bentonite Seal	10/25	10:20	10/25	10:25

Well Development:

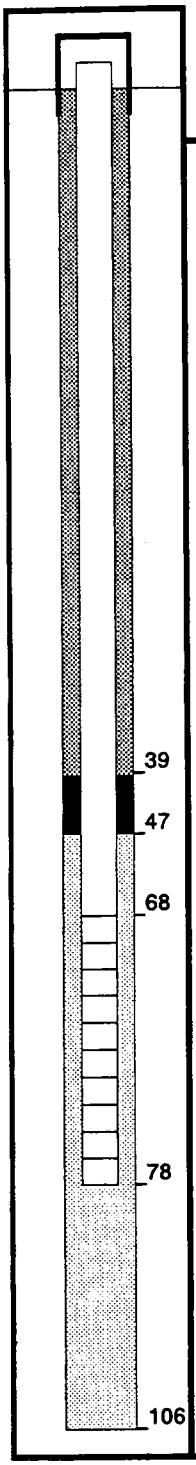
Borehole was air developed for 15–minutes – produced 70–75 gpm. Well was pumped for 8–hours at 75 gpm on 12/2.

Comments:

Permit No. CL–88–2062

Well I.D. PH-11

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 1934.38 (N)
1287.49 (E)

Elevation: Ground Level 818.64
Top of Casing 820.68

Drilling Summary:

Total Depth: 106 feet
Borehole Diameter: 8-inch

Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 8-inch hammer
Drilling Fluid: Potable water
Surface Casing: 6-inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___

Casing String(s): C=Casing S=Screen

+2	- 68	C1
68	- 78	S1
___	- ___	___
___	- ___	___

Casing: C1 2-inch schedule 40 PVC
C2 ___
Screen: S1 2-inch 10 slot schedule 40 PVC
S2 ___
Centralizers: NONE

Filter Material: No. 2 Morie Sand (47-78 feet)

Cement: Portland/Bentonite grout (0-39 feet).

Other: Bentonite (holeplug) Seal (39-47 feet).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8-inch	10/28	11:55	10/28	13:10
Geophys. Logging	--	--	--	--
Casing:				
2-inch PVC	10/28	13:30	10/28	13:40
Filter Placement:	10/28	13:40	10/28	14:10
Cementing:	10/30	10:10	10/30	10:30
Development:	10/28	13:10	10/28	13:25
Other:				
Bentonite Seal	10/28	16:35	10/28	16:40

Well Development:

Borehole air developed for 15 minutes - produced 35-40 gpm.

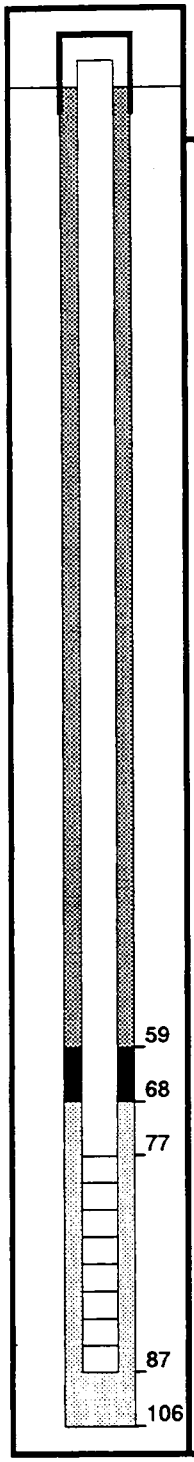
Comments:

Installed as an observation well for pump tests conducted in area.

Permit No. CL-88-2063

Well I.D. PH-12

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 2072.51 (N)
1505.76 (E)
Elevation: Ground Level 825.41
Top of Casing 828.35

Drilling Summary:

Total Depth: 106 feet
Borehole Diameter: 8-inch

Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 8-inch hammer
Drilling Fluid: Potable water
Surface Casing: 6-inch protective steel

Well Design:

Basis: Geologic Log: X
Geophysical Log:
Casing String(s): C=Casing S=Screen

+2	77	C1
77	87	S1

Casing: C1 2-inch 10 slot schedule 40 PVC
C2
Screen: S1 2-inch 10 slot schedule 40 PVC
S2
Centralizers: NONE

Filter Material: No. 2 Morie Sand (68-105 feet)

Cement: Portland/Bentonite grout (0-59 feet).
Other: Bentonite (holeplug) Seal (59-68 feet).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling: 8-inch	10/28	15:10	10/28	16:20
Geophys. Logging	--	--	--	--
Casing: 2-inch PVC	10/29	08:00	10/29	08:30
Filter Placement:	10/29	08:30	10/29	09:00
Cementing:	10/30	11:00	10/30	11:30
Development:	10/28	16:20	10/28	16:35
Other: Bentonite Seal	10/29	09:00	10/29	09:10

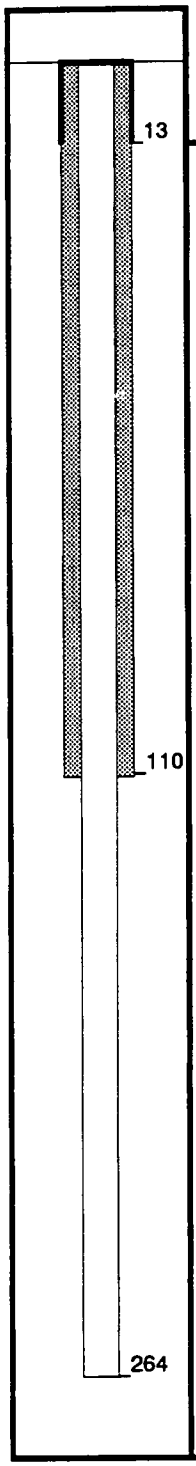
Well Development:
Borehole air developed for 15 minutes - produced 15-20 gpm.

Comments:
Installed as an observation well for pump tests conducted in area.

Permit No. CL-88-2064

Well I.D. RFW-12B

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 625.47 (N)
2171.43 (E)
Elevation: Ground Level 845.12
Top of Casing 844.87

Drilling Summary:

Total Depth: 264-feet
Borehole Diameter: 8-inch to 110-feet
5-inch to 264-feet
Driller: Paul Foley

Rig: Ingersoll Rand T-3
Bit(s): 8-inch hammer; 5.75-inch hammer
Drilling Fluid: Potable water
Surface Casing: NONE-flush mount

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___
Casing String(s): C=Casing S=Screen

0	13	C1
0	110	C2

Casing: C1 8-inch steel
C2 6-inch steel
Screen: S1
S2
Centralizers: NONE

Filter Material: NONE

Cement: Portland/Bentonite grout (0-110 feet).
Other:

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8-inch	10/10	08:00	10/10	08:50
5-inch	10/11	07:50	10/11	10:20
Geophys. Logging	--	--	--	--
Casing:				
6-inch	10/10	9:10	10/10	10:10
Filter Placement:				
Cementing:	10/10	10:10	10/10	11:00
Development:	10/14	10:45	10/14	11:15
Other:				

Well Development:

Air deveoled well until water became clear - produced 0.5 gpm.

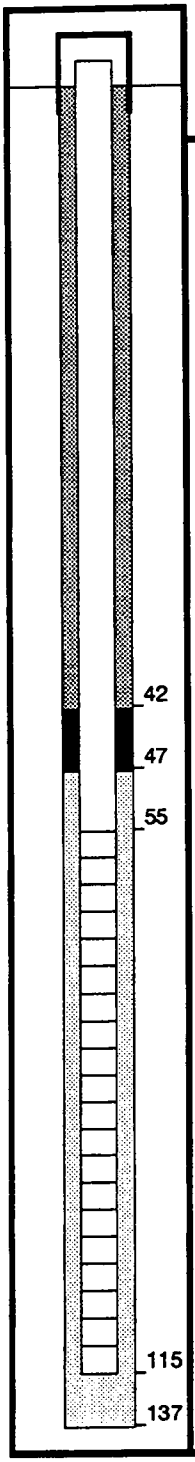
Comments:

Completed as an open borehole.

Permit No. CL-88-1935

Well I.D. PH–13

Well Construction Summary



Project: BLACK AND DECKER
Location: Hampstead, MD.
Personnel: Dave Cairns

Location or Coordinates: 1795.72 (N)
1465.69 (E)

Elevation: Ground Level 829.34
Top of Casing 832.13

Drilling Summary:

Total Depth: 137–feet
Borehole Diameter: 8–inch pilot hole:
12–inch ream.
Driller: Paul Foley

Rig: Ingersoll Rand T–3
Bit(s): 8–inch hammer; 12–inch reaming bit
Drilling Fluid: NONE
Surface Casing: 12–inch steel

Well Design:

Basis: Geologic Log: X
Geophysical Log: ___

Casing String(s): C=Casing S=Screen

+2	– 15	C1
+2	– 55	C1
55	– 115	S1
___	– ___	___

Casing: C1 12–inch steel casing
C2 6–inch schedule 40 PVC.
Screen: S1 6–inch 10 slot schedule 40 PVC
S2 ___
Centralizers: NONE

Filter Material: No. 2 Morie Sand (47–120 feet).
Cement: Portland/Bentonite grout (0–42 feet).
Other: Bentonite (holeplug) Seal (42–47 feet).

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:				
8–inch	10/30	13:40	10/30	15;30
12–inch	10/31	06:30	10/31	08:00
Geophys. Logging	––	––	––	––
Casing:				
6–inch PVC	10/31	09:30	10/31	10:00
Filter Placement:	10/31	10:00	10/31	10:40
Cementing:	10/31	12:30	10/31	13:20
Development:	10/30	15:30	10/30	15:40
Other:				
Bentonite Seal	10/31	10:40	10/31	10:55

Well Development:

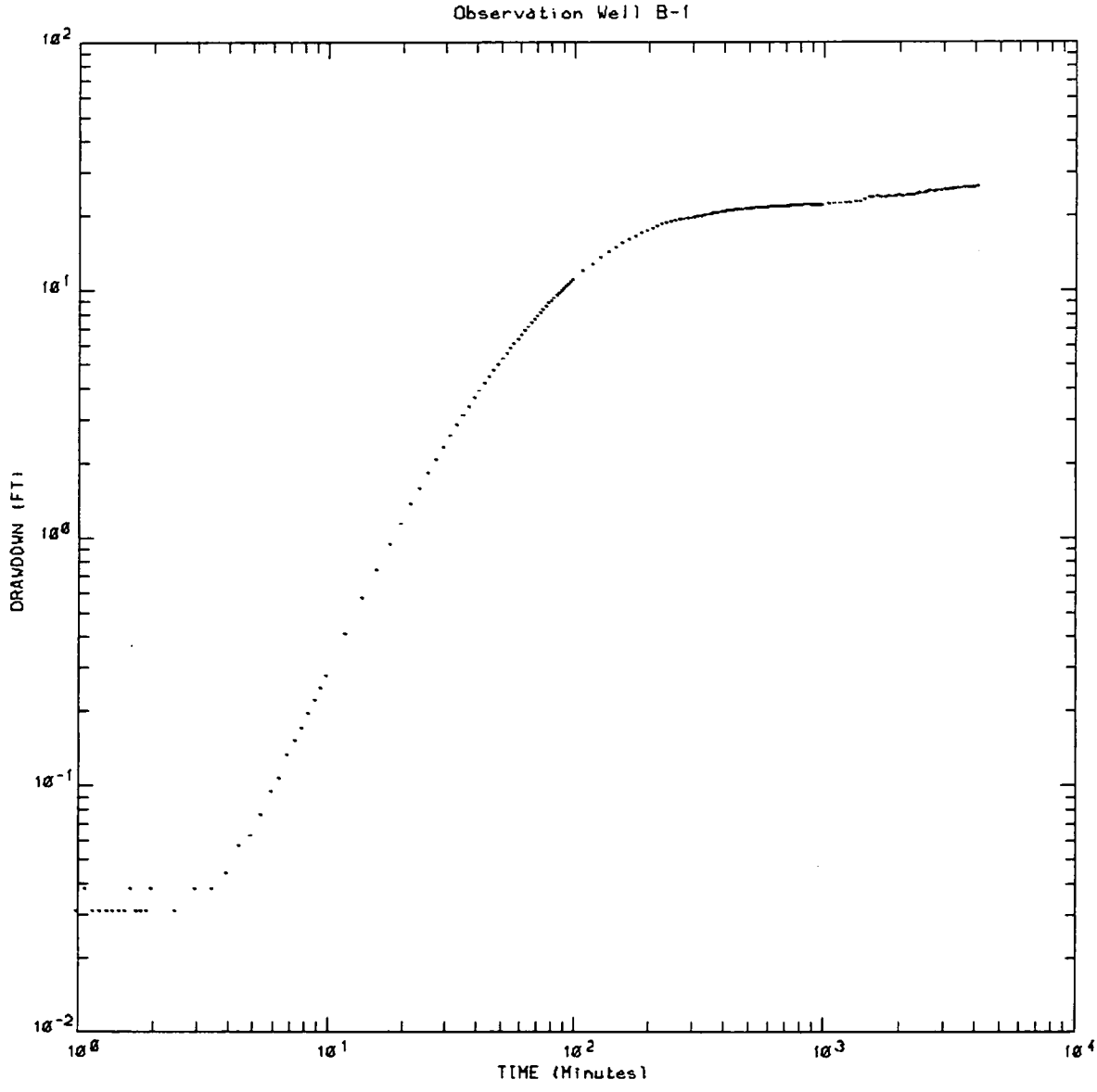
Borehole was air developed for 10 minutes – produced 50 gpm. Well was pumped for 8–hours at 50 gpm on 12/04.

Comments:

Permit No. CL–88–2065

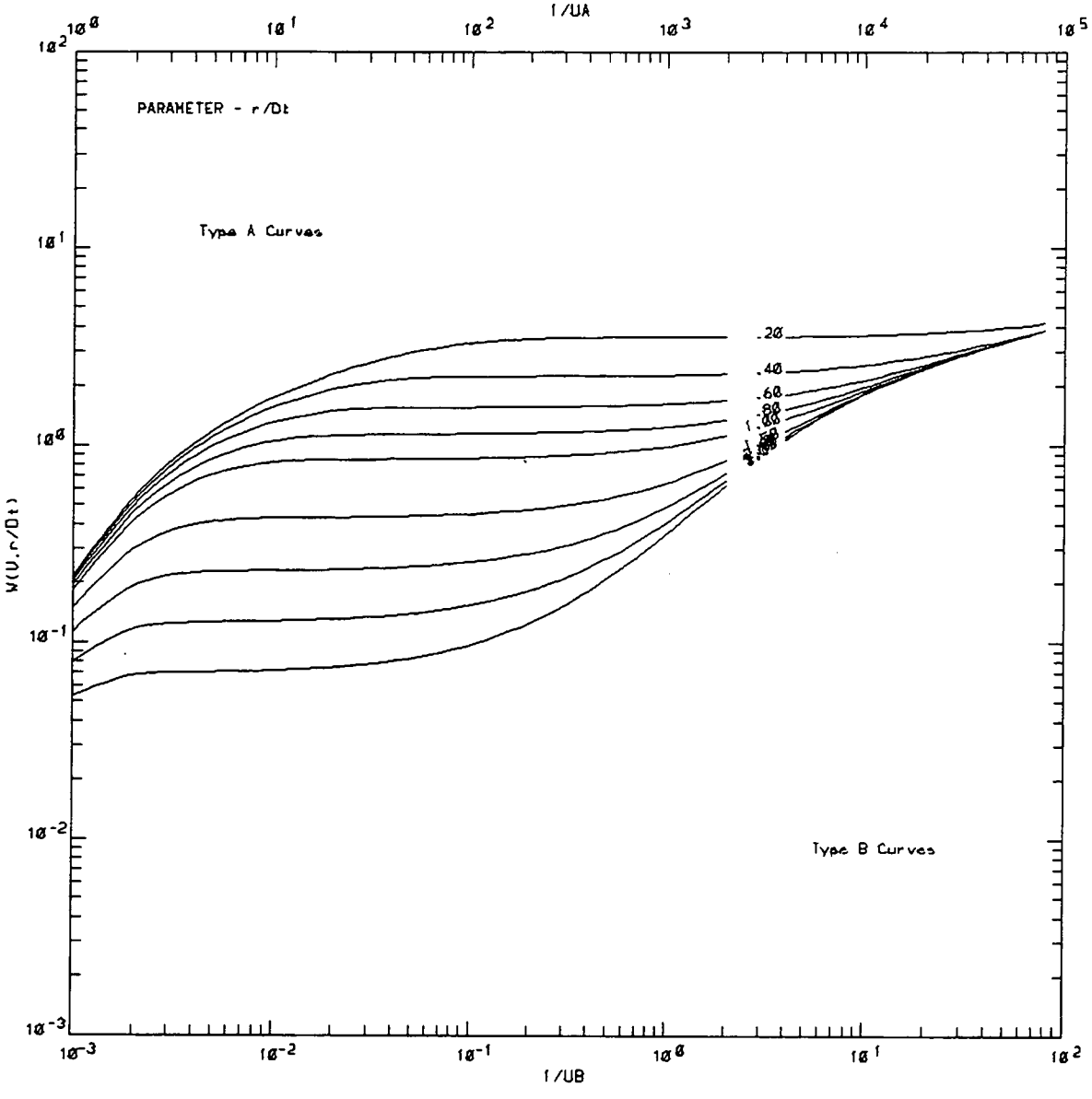
APPENDIX C

PUMPING TEST RESULTS

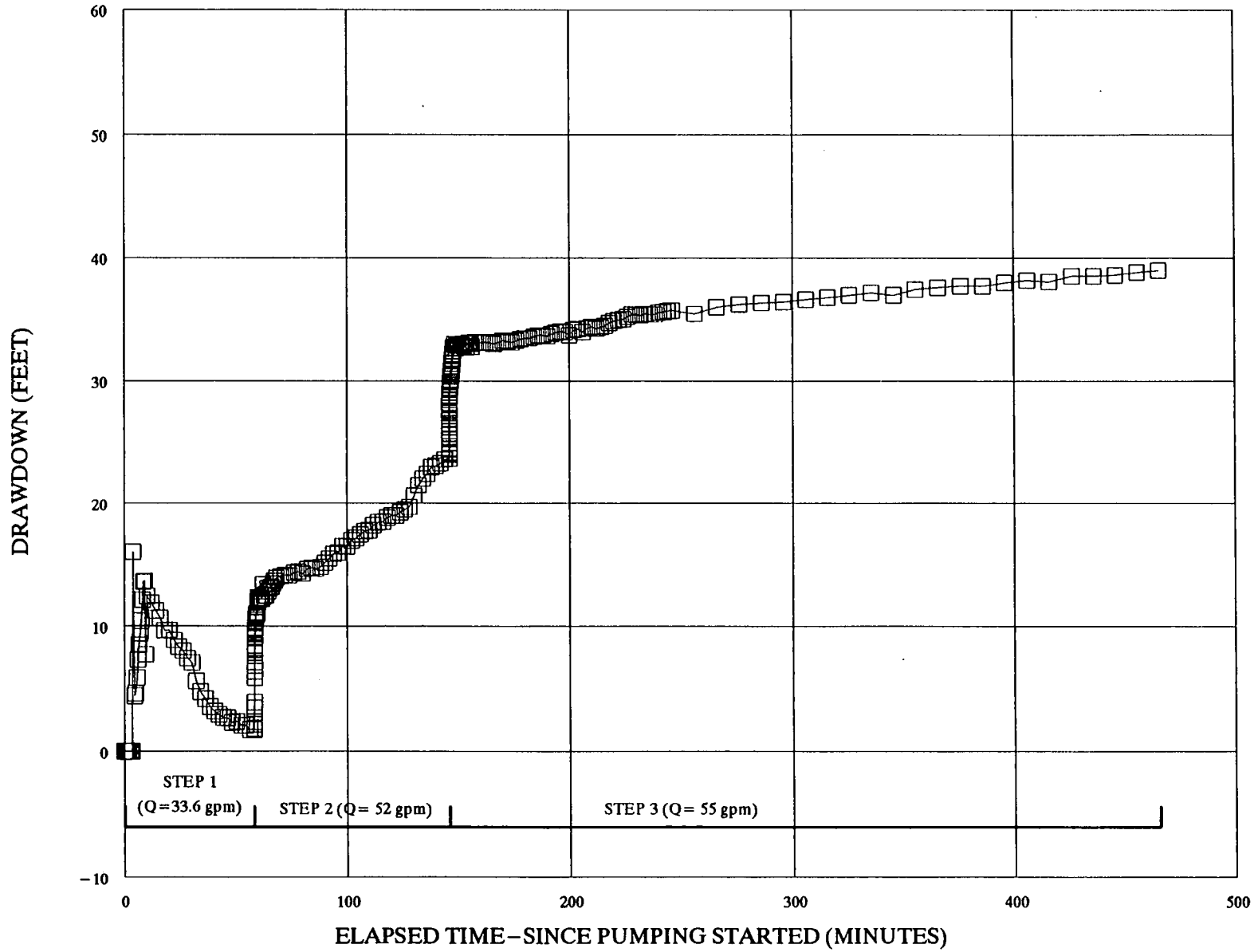

Observation Well B-1
DRAWDOWN (FT)
TIME (Minutes)
1Ø^2
1Ø^1
1Ø^Ø
1Ø^-1
1Ø^-2
1Ø^Ø
1Ø^1
1Ø^2
1Ø^3
1Ø^4

BOULTON (1963) TYPE CURVE

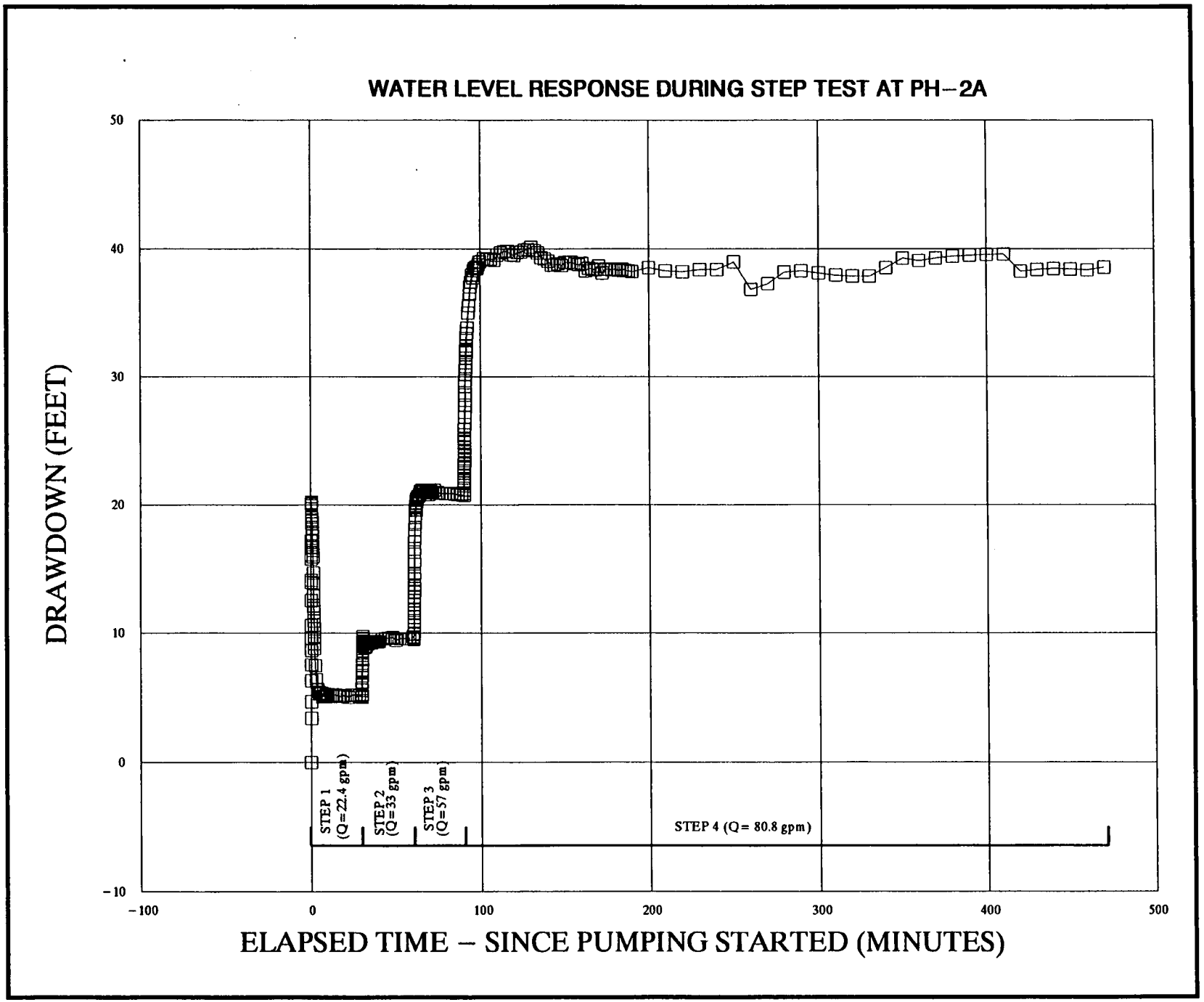
Fully Penetrated Unconfined Aquifer



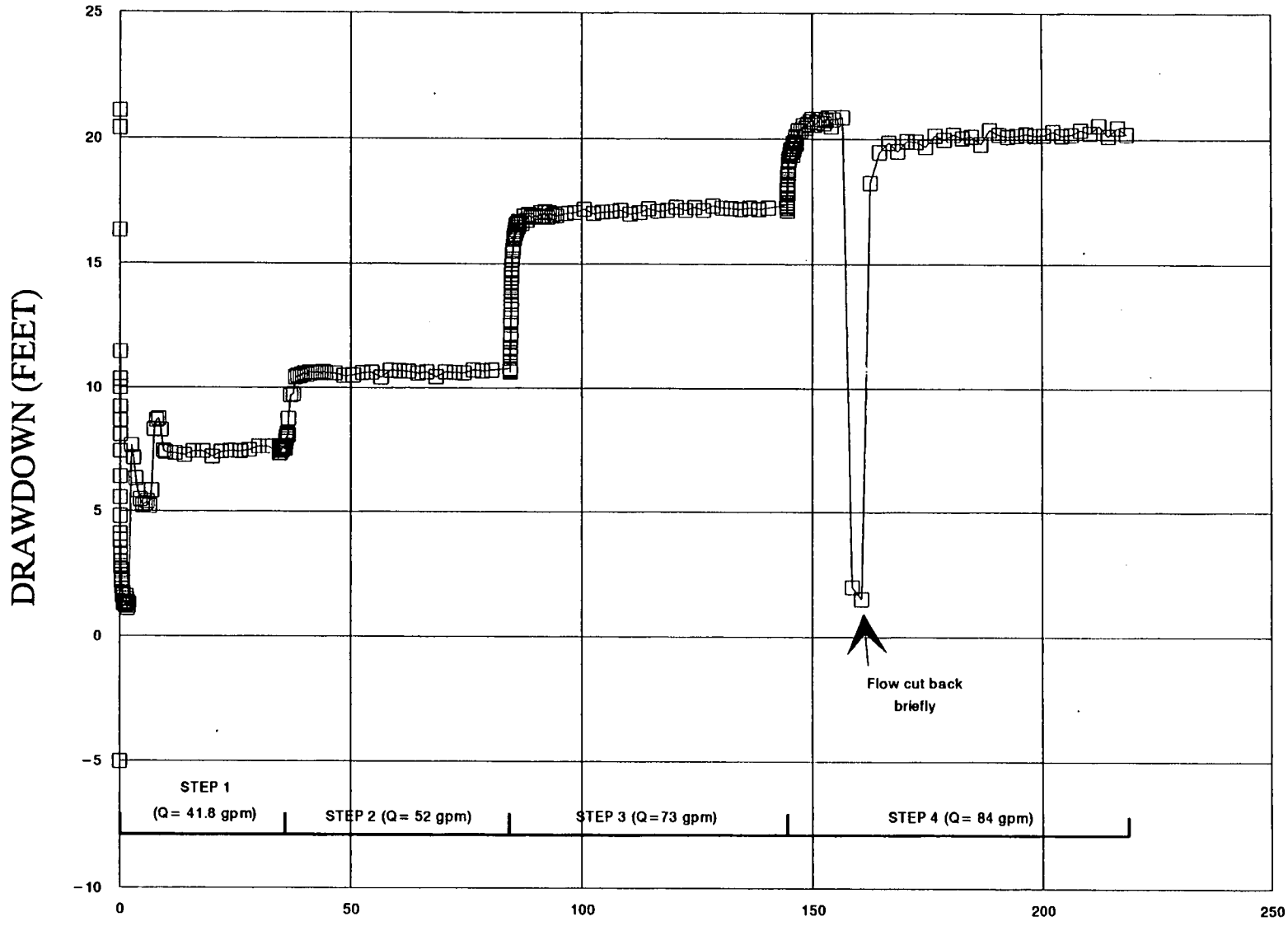
WATER LEVEL RESPONSE DURING STEP TEST AT PH–13



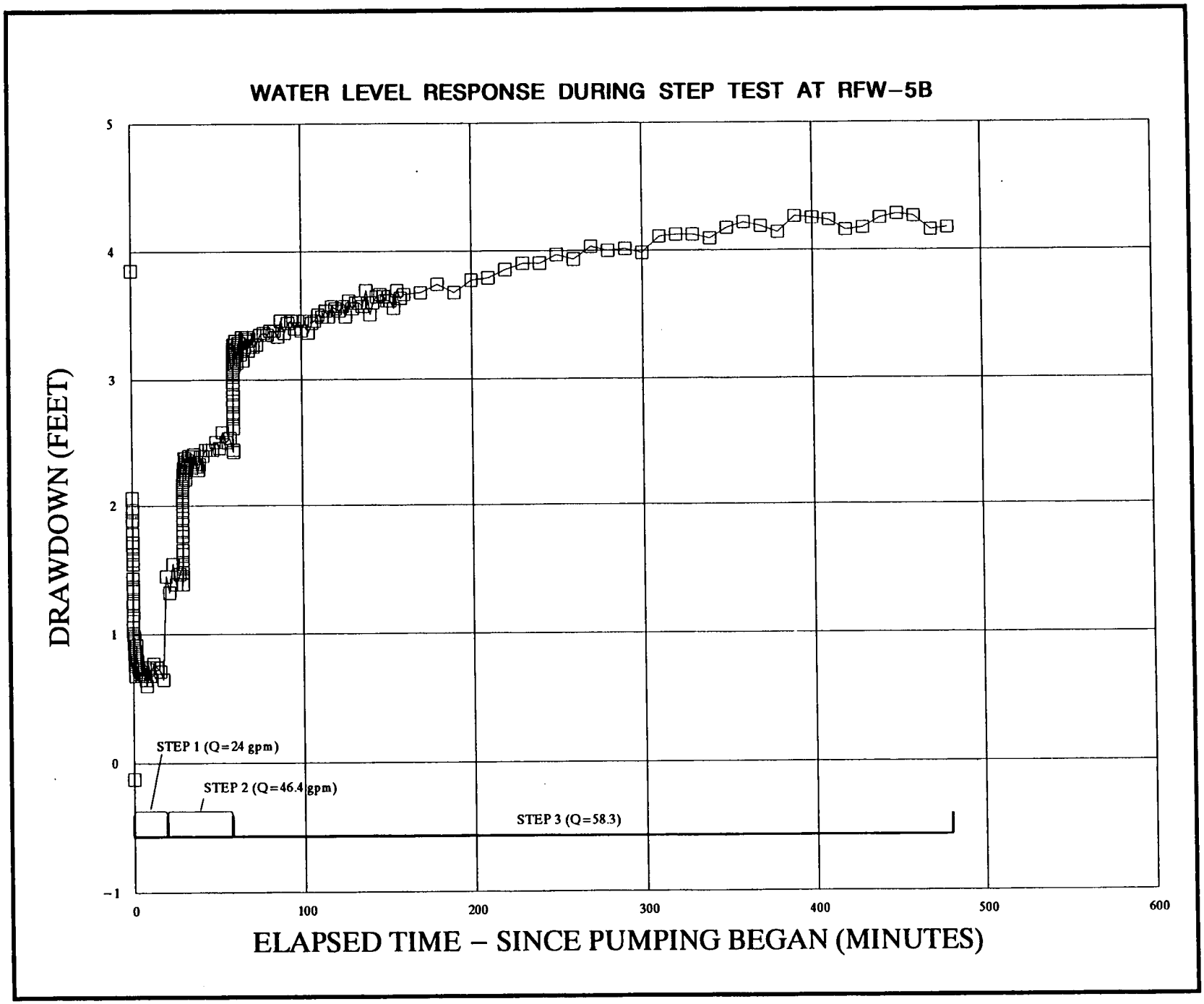
WESTON MANAGERS DESIGNERS CONSULTANTS


WATER LEVEL RESPONSE DURING STEP TEST AT PH–2A
DRAWDOWN (FEET)
50
40
30
20
10
0
-10
-100
0
100
200
300
400
500
ELAPSED TIME – SINCE PUMPING STARTED (MINUTES)
STEP 1 (Q=22.4 gpm)
STEP 2 (Q=33 gpm)
STEP 3 (Q=57 gpm)
STEP 4 (Q= 80.8 gpm)

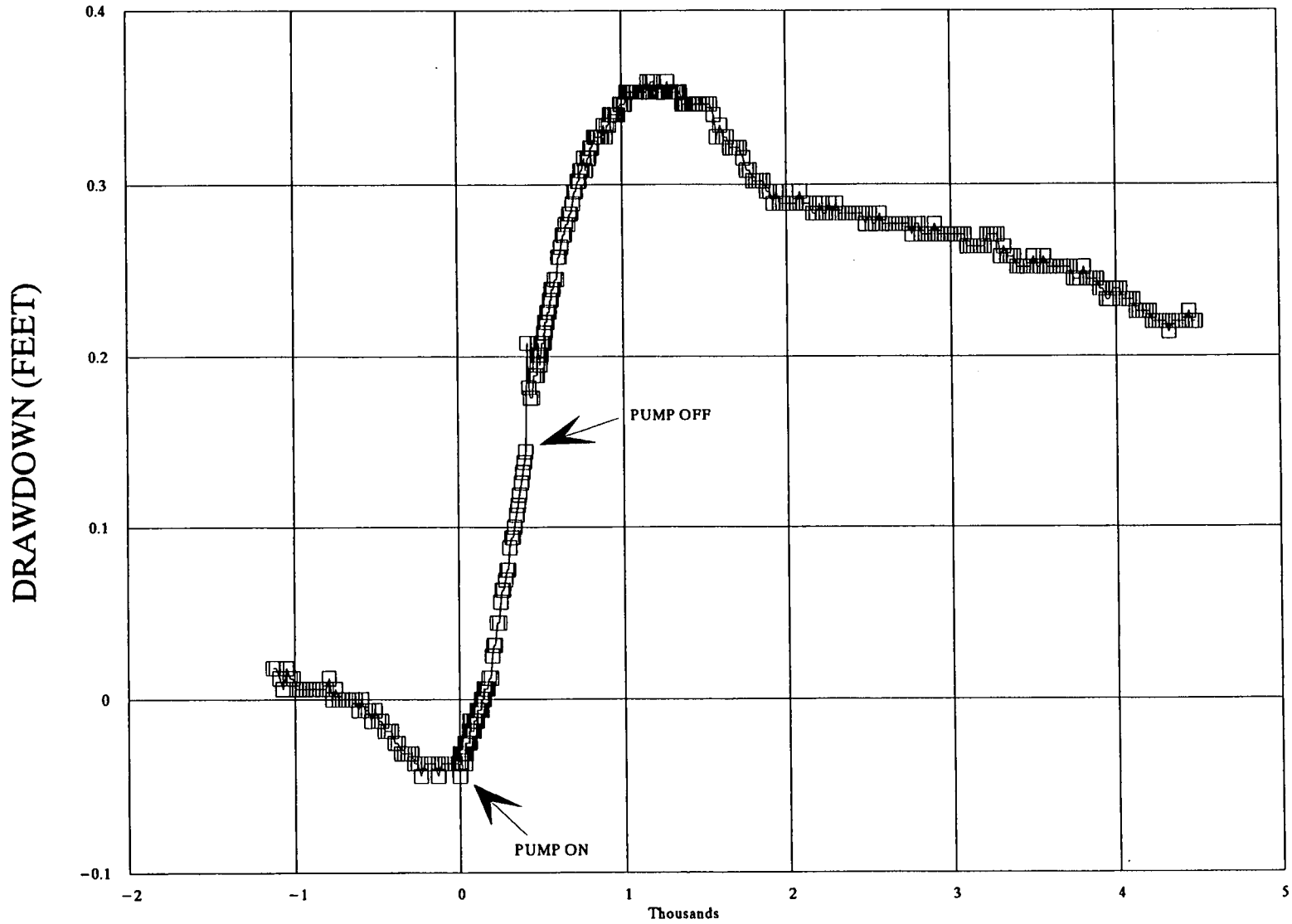
WATER LEVEL RESPONSE DURING STEP TEST AT PH–1A



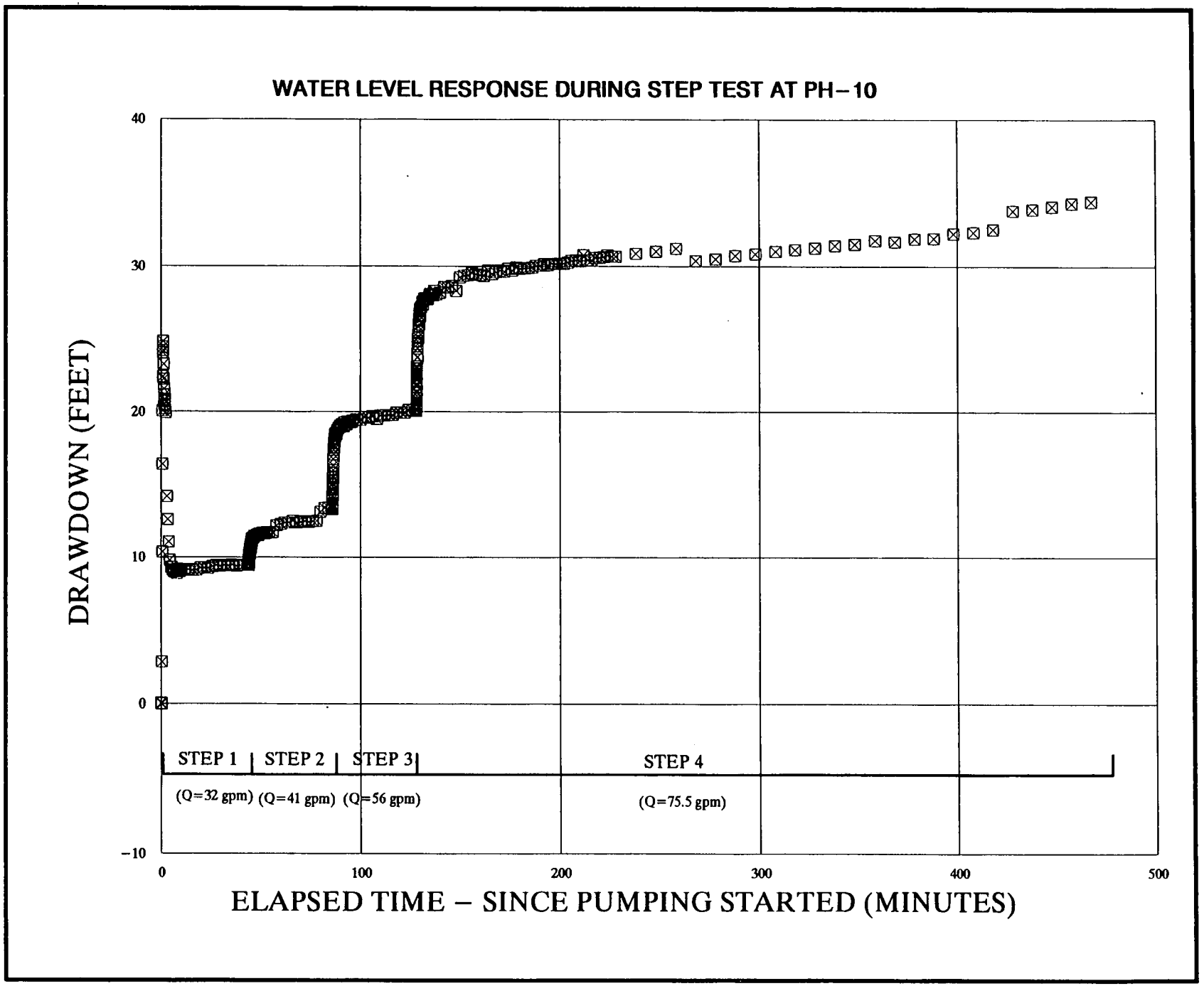
WESTON MANAGERS DESIGNERS CONSULTANTS

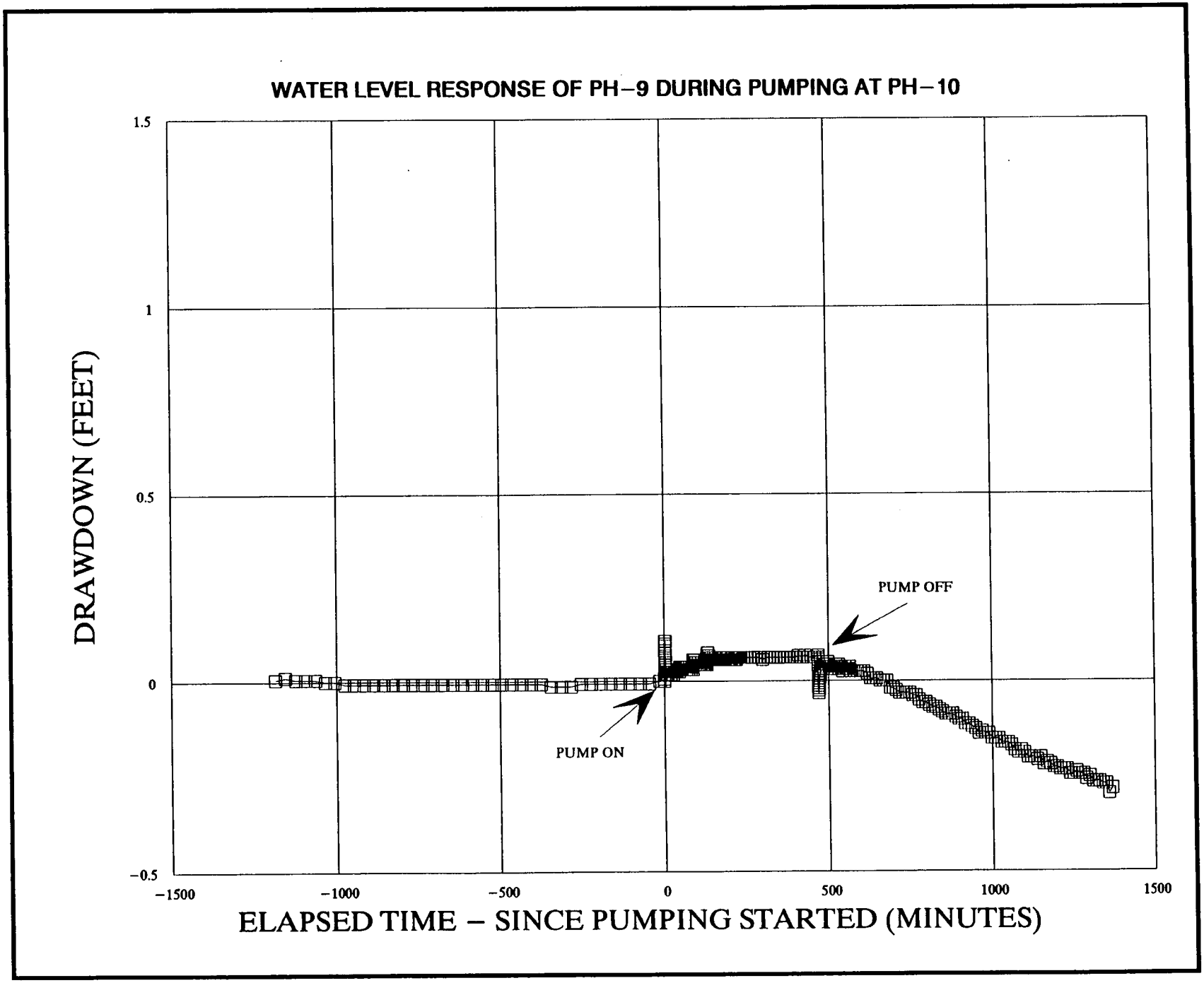

WATER LEVEL RESPONSE DURING STEP TEST AT RFW-5B
DRAWDOWN (FEET)
5
4
3
2
1
0
-1
0
100
200
300
400
500
600
STEP 1 (Q=24 gpm)
STEP 2 (Q=46.4 gpm)
STEP 3 (Q=58.3)
ELAPSED TIME – SINCE PUMPING BEGAN (MINUTES)

WATER LEVEL RESPONSE AT PH–9 DURING PUMPING AT RFW–5B

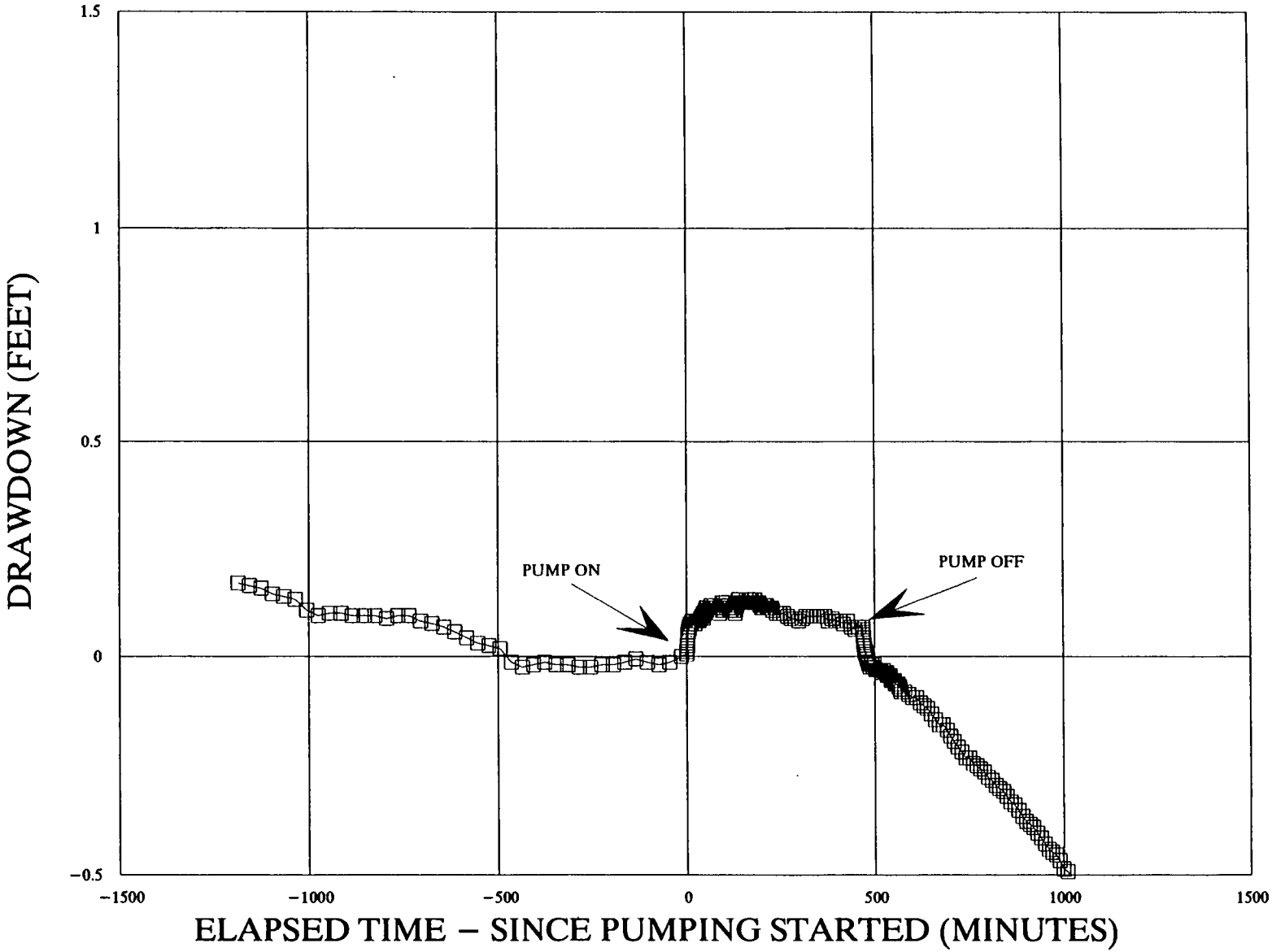


WESTON MANAGERS ENGINEERS CONSULTANTS

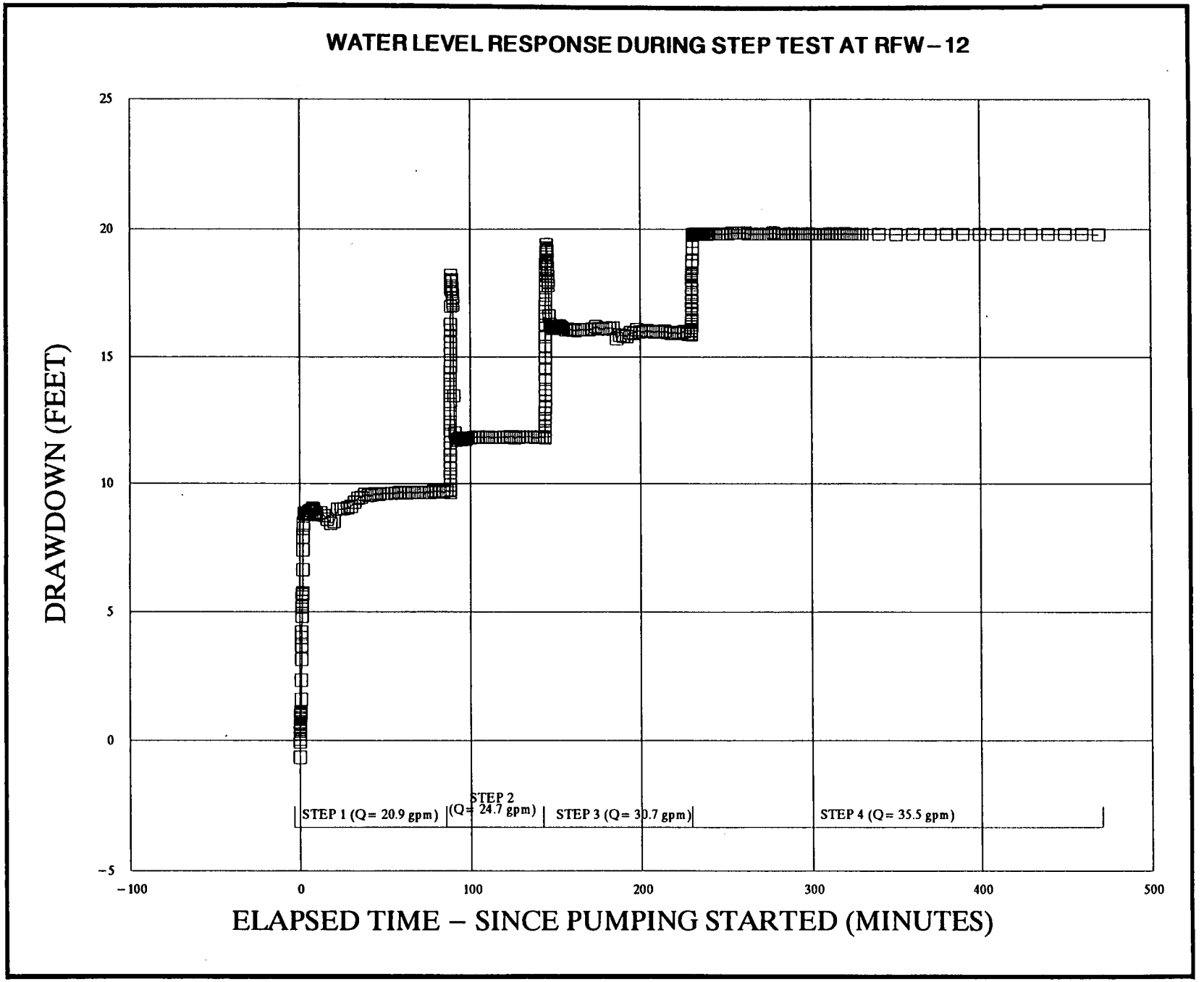

WATER LEVEL RESPONSE DURING STEP TEST AT PH-10
DRAWDOWN (FEET)
40
30
20
10
0
-10
0
100
200
300
400
500
ELAPSED TIME – SINCE PUMPING STARTED (MINUTES)
STEP 1
STEP 2
STEP 3
STEP 4
(Q=32 gpm)
(Q=41 gpm)
(Q=56 gpm)
(Q=75.5 gpm)


WATER LEVEL RESPONSE OF PH–9 DURING PUMPING AT PH–10
DRAWDOWN (FEET)
1.5
1
0.5
0
–0.5
–1500
–1000
–500
0
500
1000
1500
PUMP OFF
PUMP ON
ELAPSED TIME – SINCE PUMPING STARTED (MINUTES)

WATER LEVEL RESPONSE OF PH-8 DURING PUMPING AT PH-10

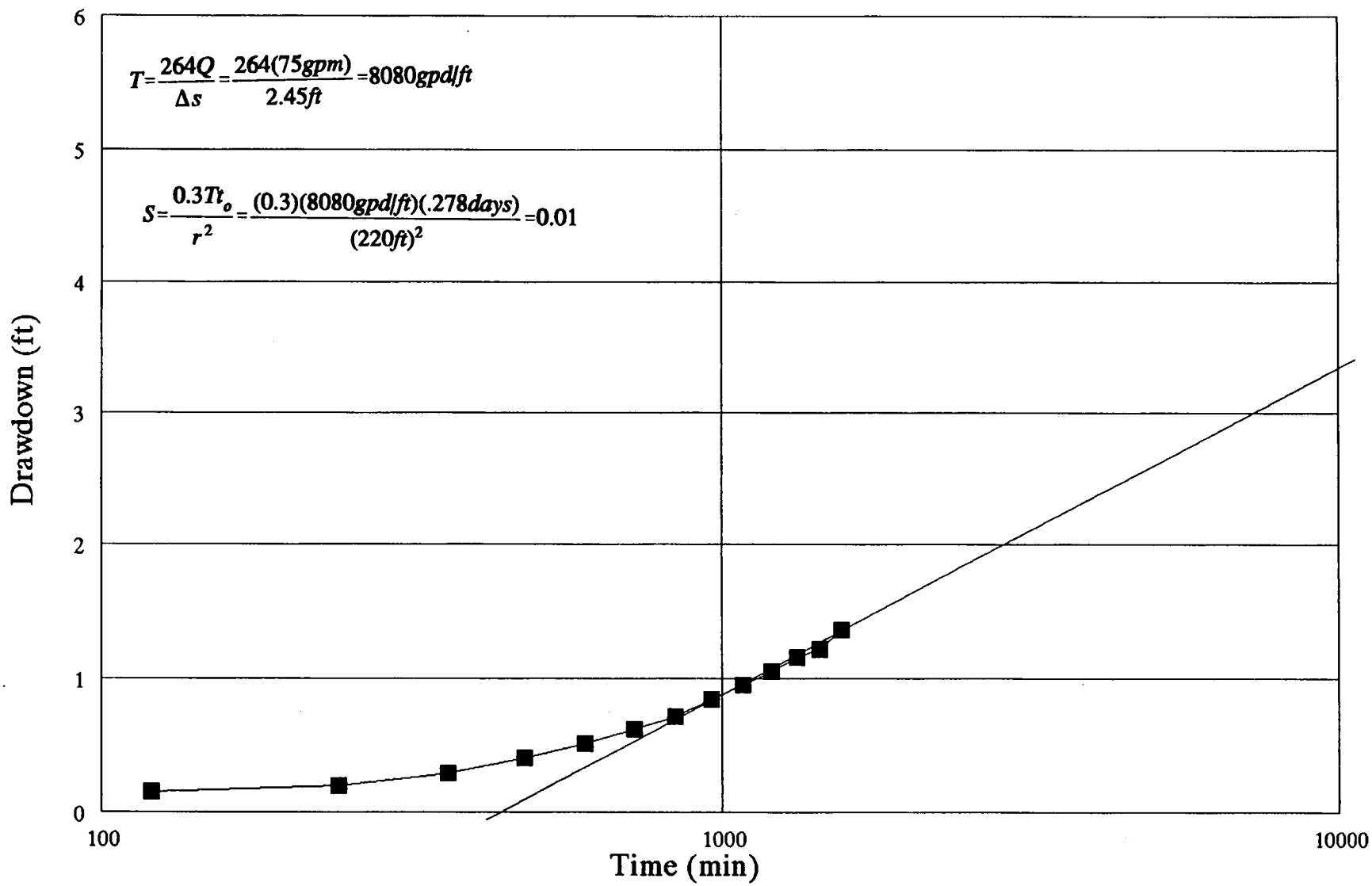


WESTON


WATER LEVEL RESPONSE DURING STEP TEST AT RFW-12
DRAWDOWN (FEET)
25
20
15
10
5
0
-5
-100
0
100
200
300
400
500
STEP 1 (Q= 20.9 gpm)
STEP 2 (Q= 24.7 gpm)
STEP 3 (Q= 30.7 gpm)
STEP 4 (Q= 35.5 gpm)
ELAPSED TIME - SINCE PUMPING STARTED (MINUTES)

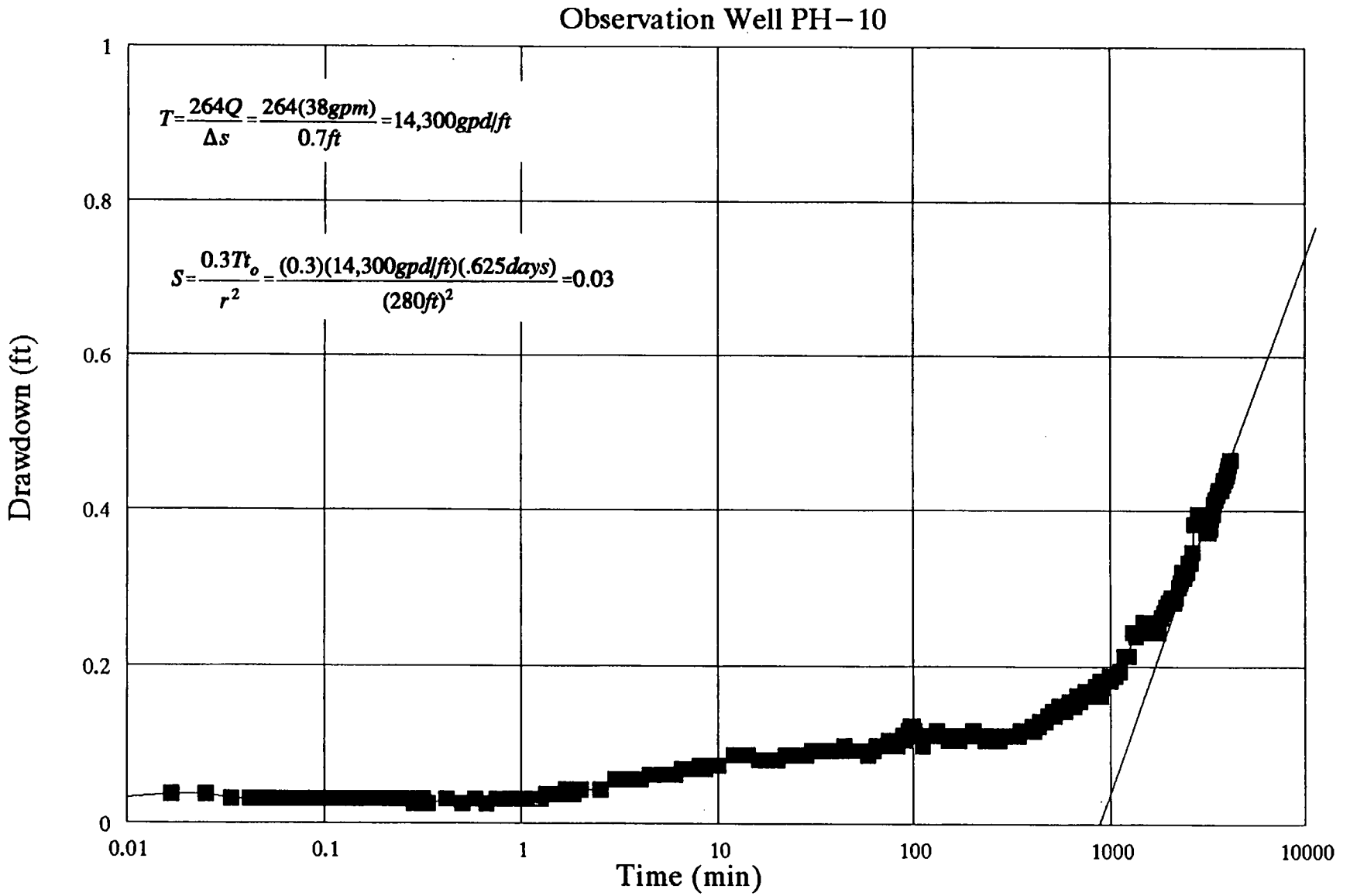
BLACK AND DECKER PUMP TESTS

During Pumping of PH–2A



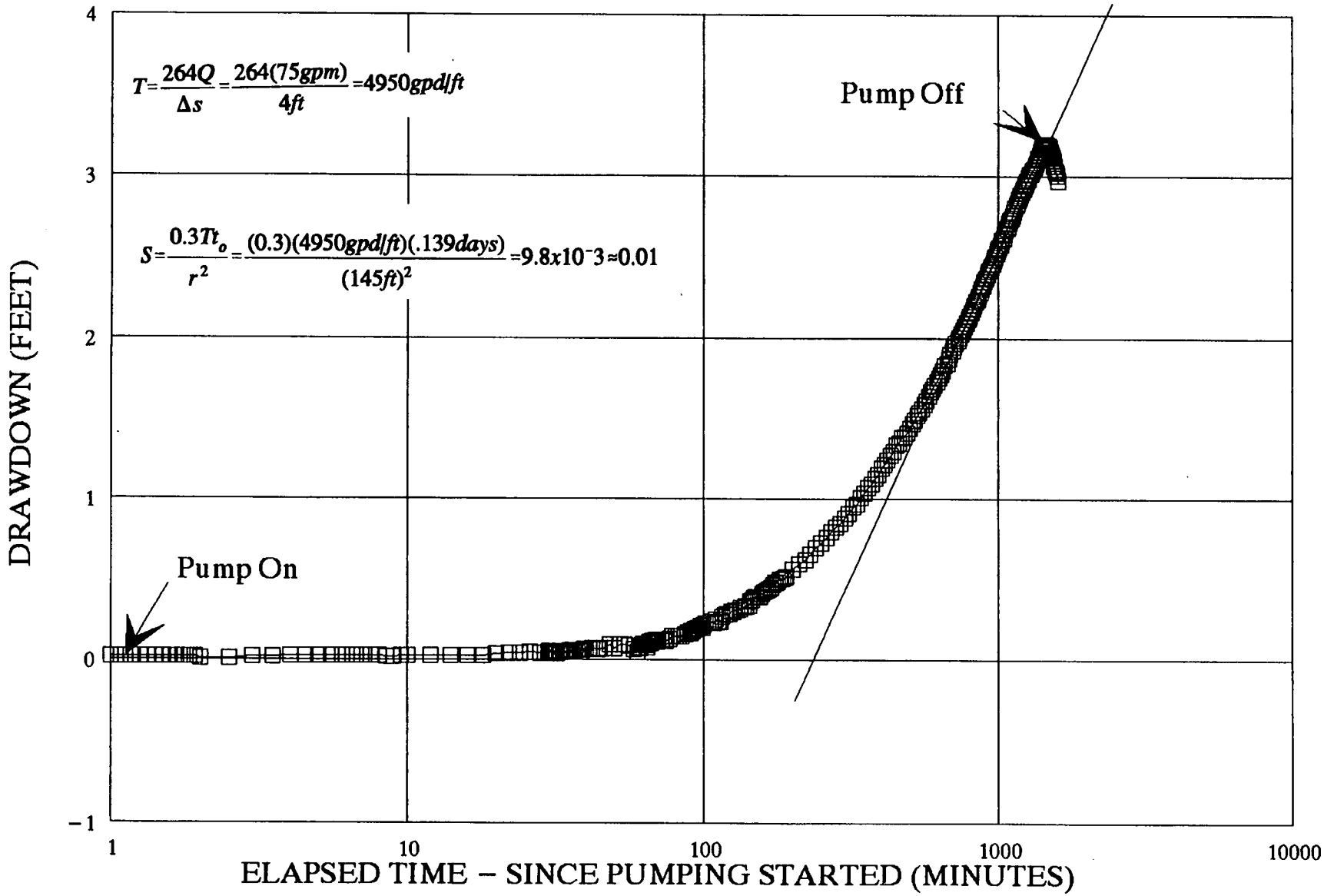
BLACK AND DECKER PUMP TESTS

During Pumping of PH–8



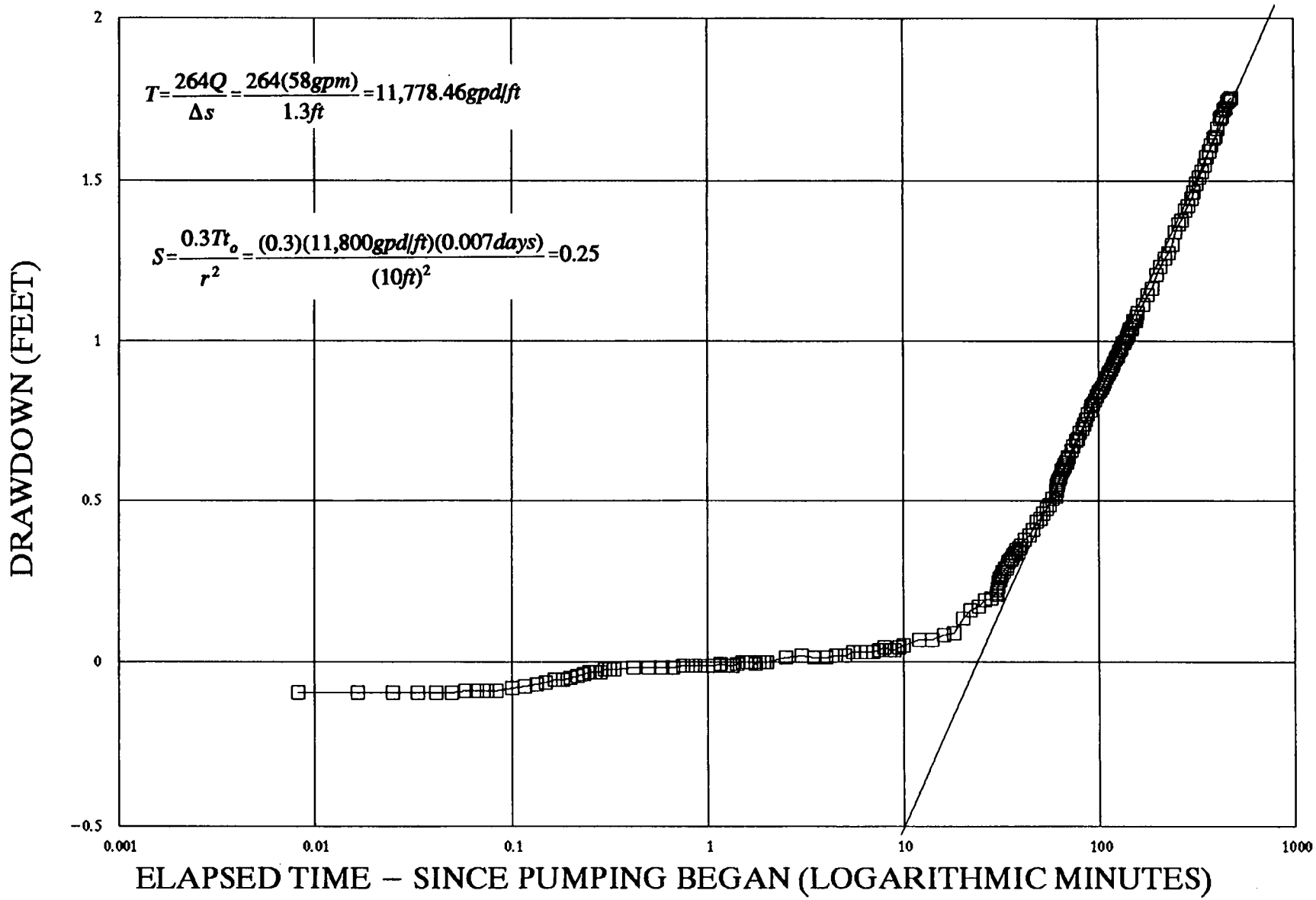
BLACK AND DECKER PUMP TESTS

GRAPH OF RFW-10 WHILE PUMPING PH-2A



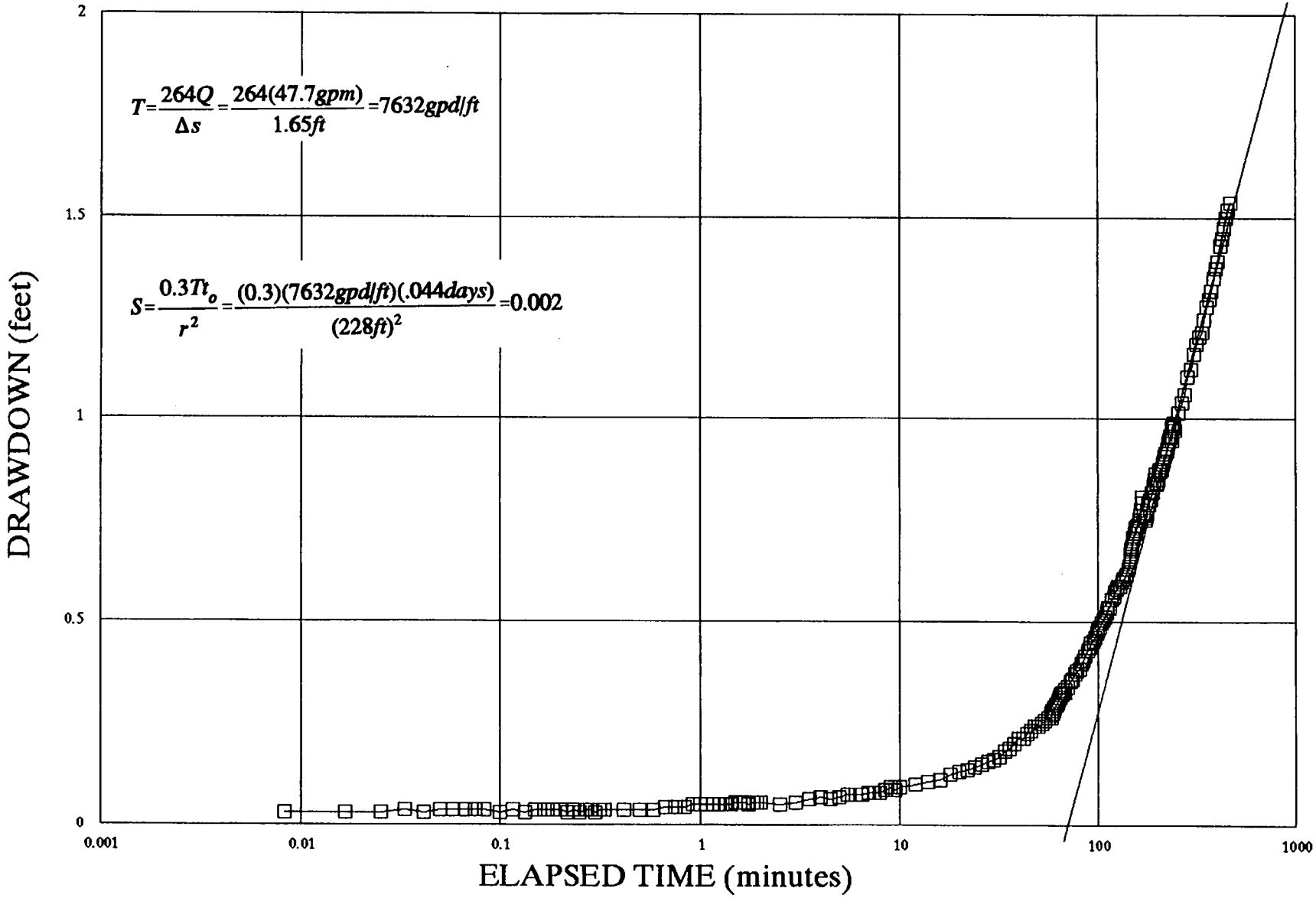
BLACK AND DECKER PUMP TESTS

SEMI-LOG GRAPH OF RFW-5A WHILE PUMPING RFW-5B



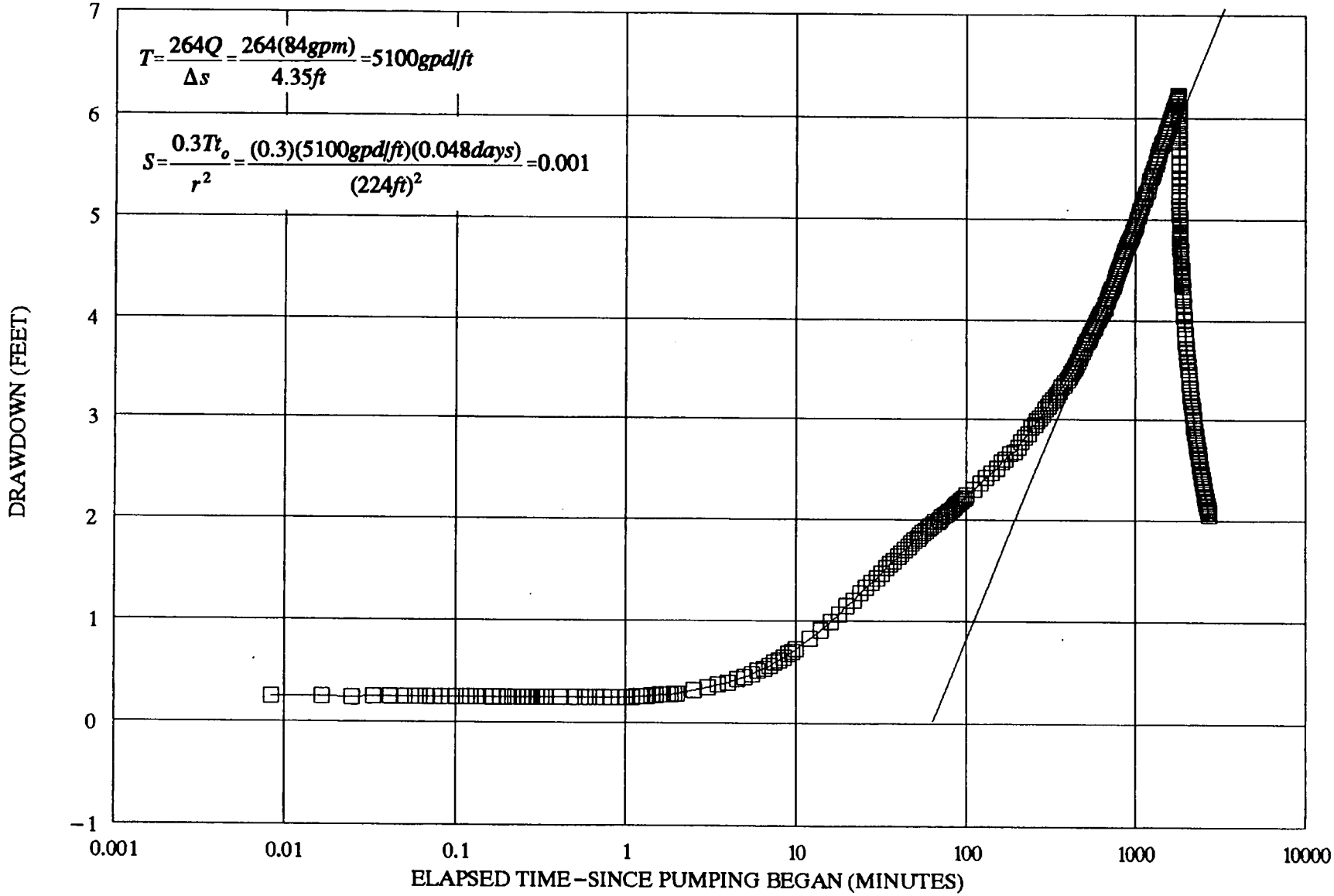
BLACK AND DECKER PUMP TESTS

SEMI-LOG GRAPH OF PH-11 WHILE PUMPING PH-13



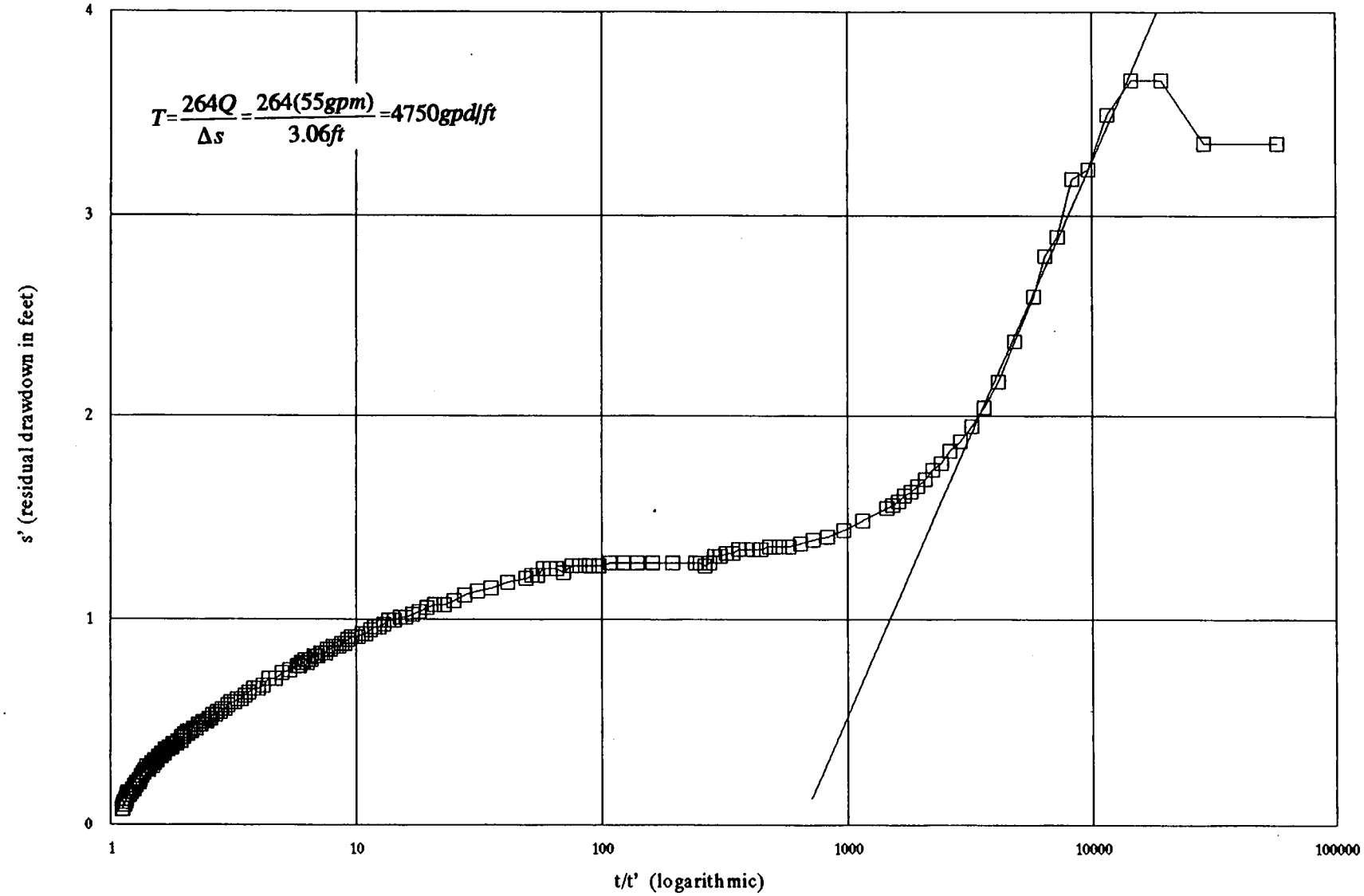
BLACK AND DECKER PUMP TESTS

GRAPH OF RFW-11B WHILE PUMPING PH-1A



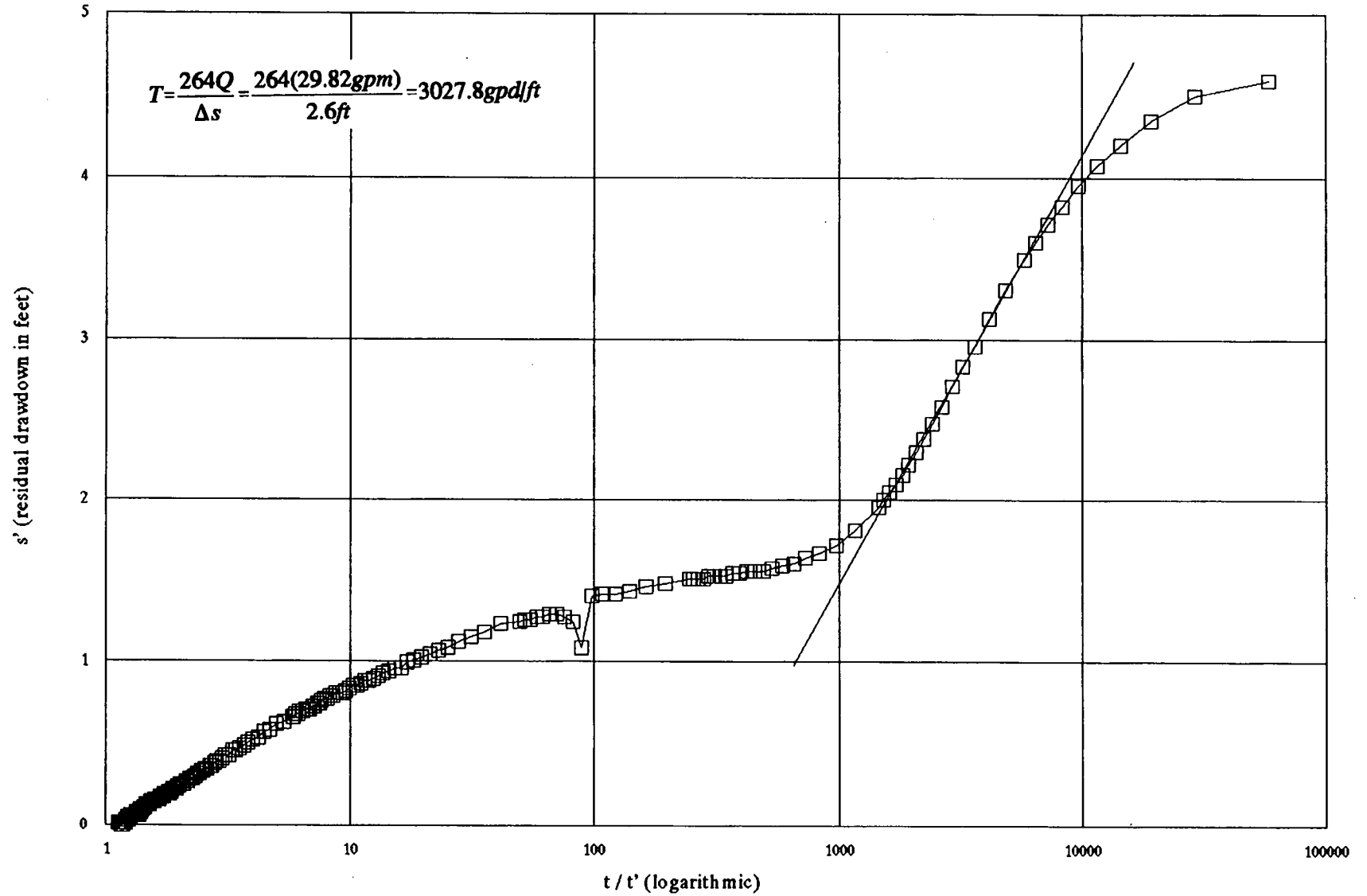
BLACK AND DECKER PUMP TESTS

RECOVERY DATA FOR RFW-5B



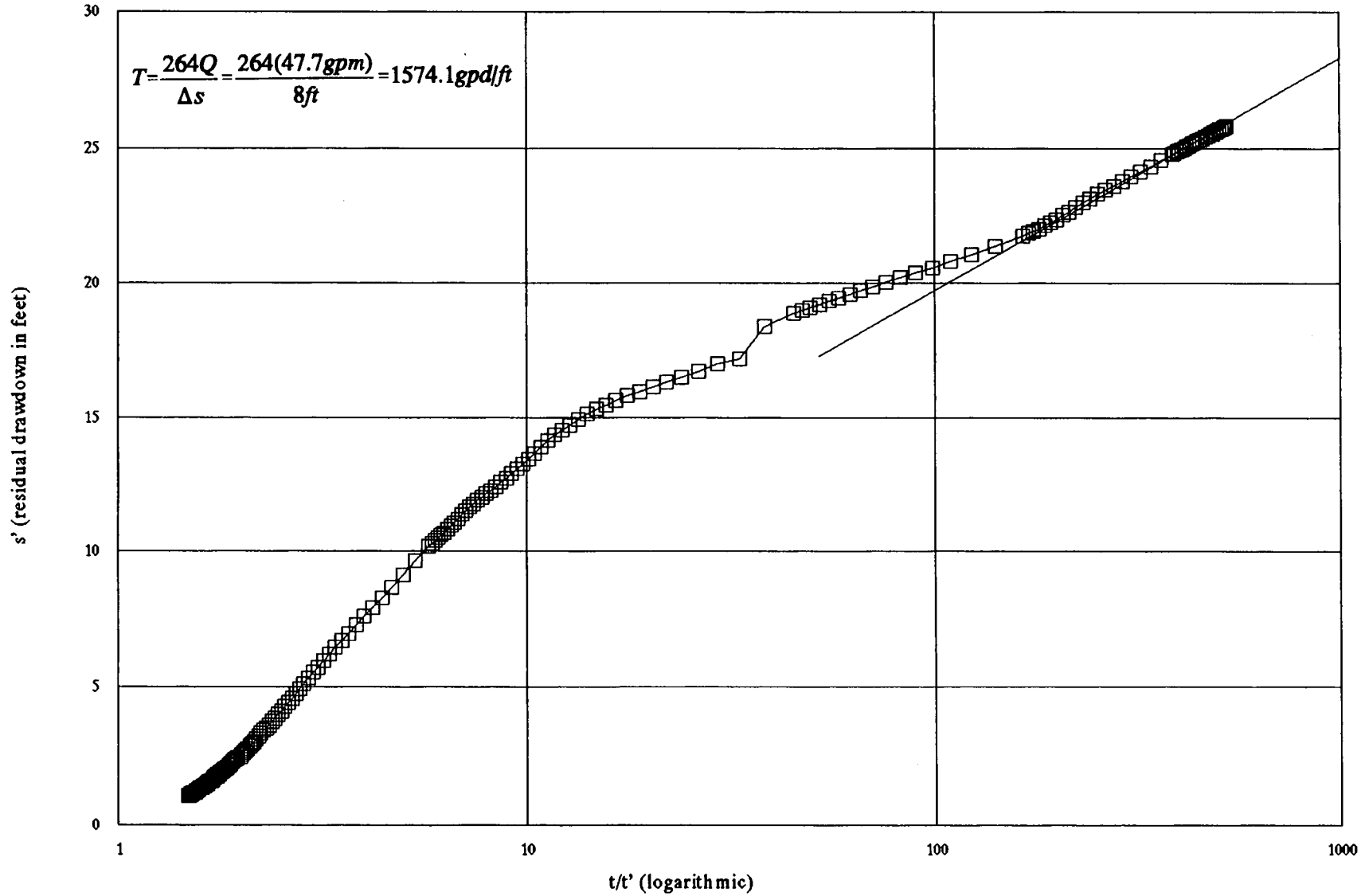
BLACK AND DECKER PUMP TESTS

RECOVERY DATA FOR RFW-12



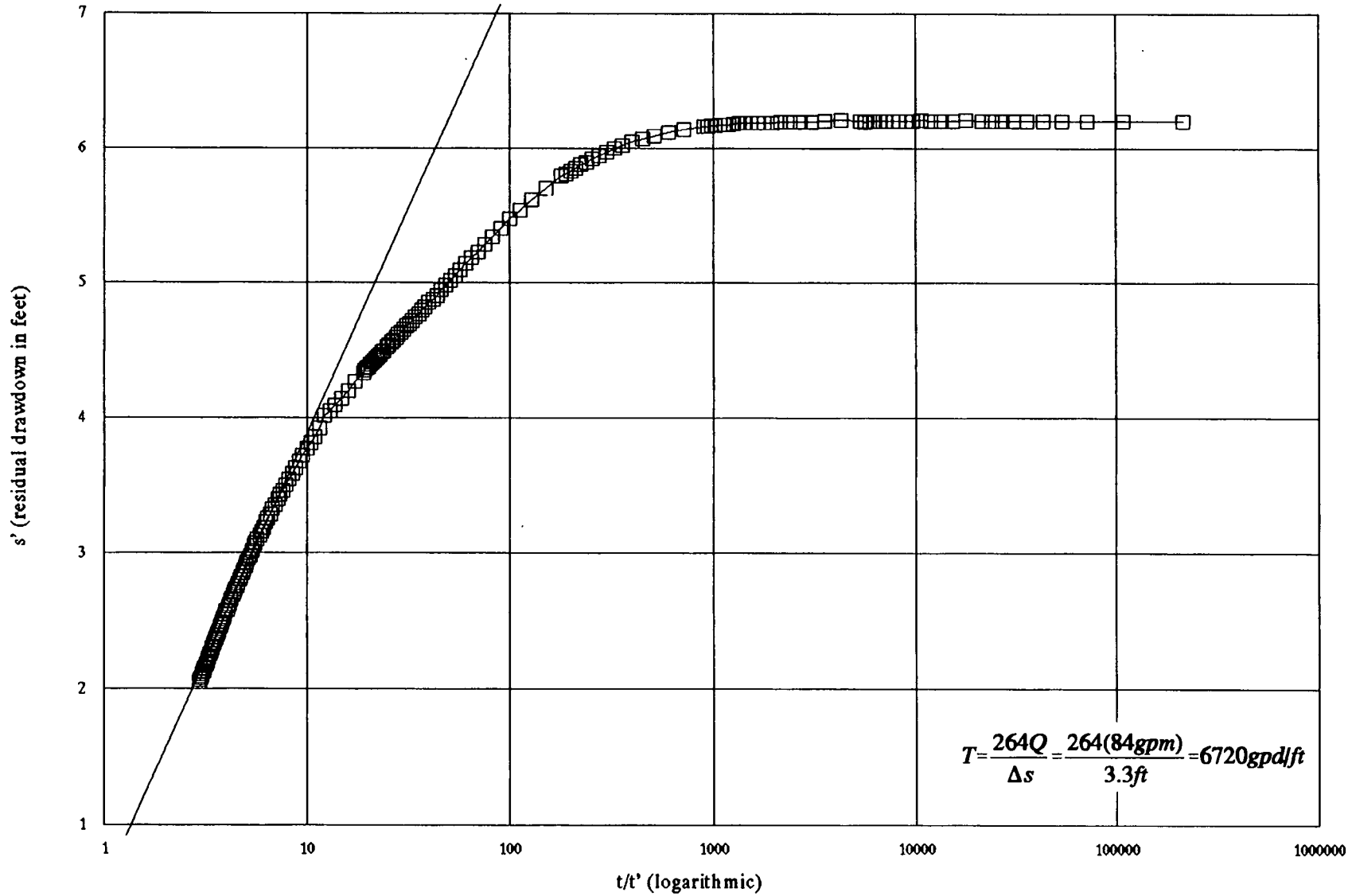
BLACK AND DECKER PUMP TESTS

RECOVERY DATA FOR PH-13



BLACK AND DECKER PUMP TESTS

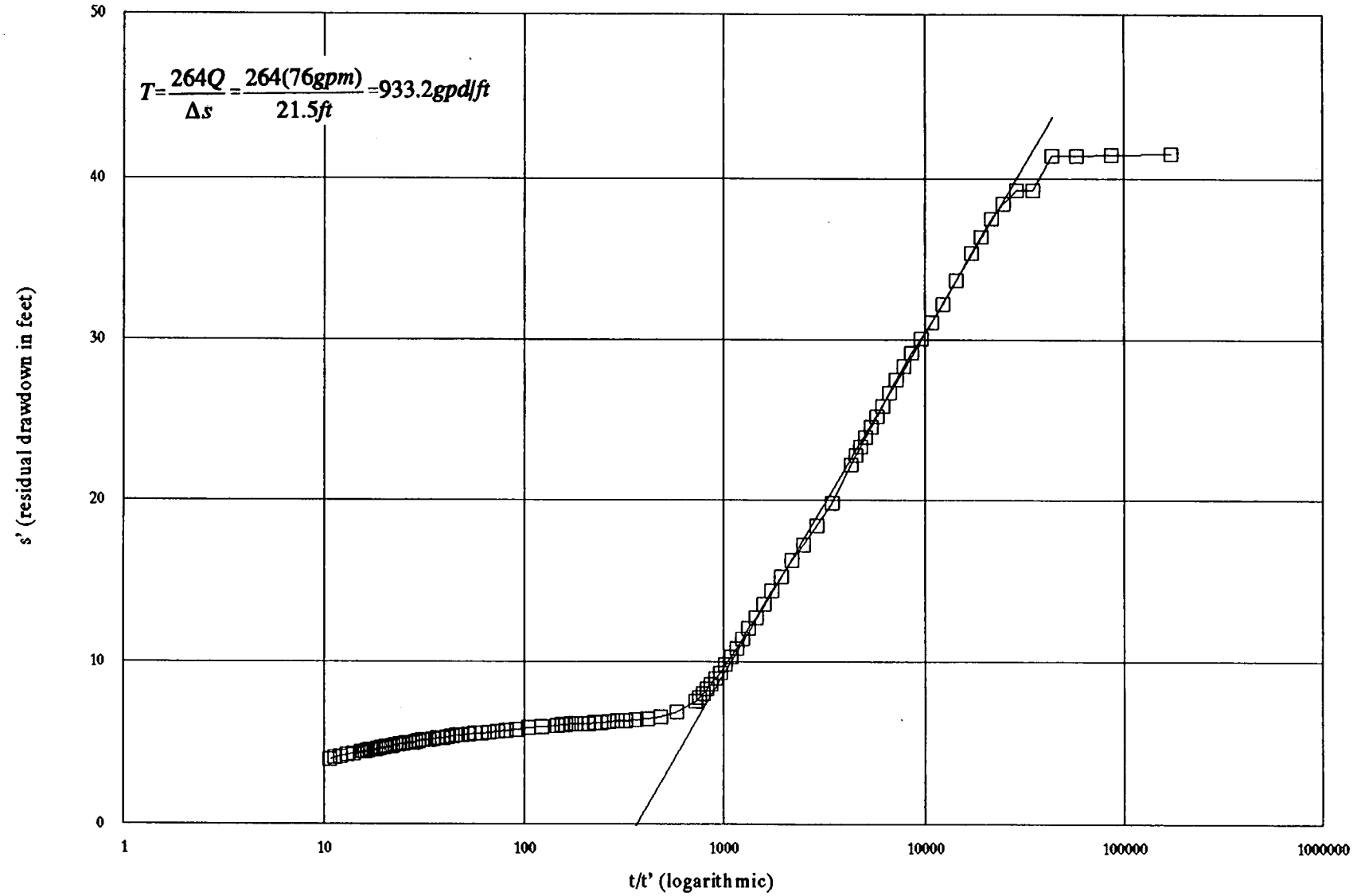
RECOVERY DATA FOR PH-1A



BLACK AND DECKER PUMP TESTS

RECOVERY DATA FOR PH-2A

$$T=\frac{264Q}{\Delta s}=\frac{264(76gpm)}{21.5ft}=933.2gpd/ft$$



APPENDIX D

GROUNDWATER ANALYTICAL DATA

Round 1 Early Sampling

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L431 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/17/92 17:04 Page: 1a

	Cust ID:	RFW-5B	RFW-5B	RFW-5B	RFW-12	RFW-12	PH-1A
Sample Information	RFW#:	001	001 MS	001 MSD	002	002 DL	003
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	80.0	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	100 %	98 %	98 %	98 %	100 %	100 %
	Bromofluorobenzene	104 %	96 %	98 %	105 %	101 %	101 %
	1,2-Dichloroethane-d4	114 %	103 %	106 %	109 %	109 %	111 %
Chloromethane		10 U	10 U	10 U	10 U	NA	10 U
Bromomethane		10 U	10 U	10 U	10 U	NA	10 U
Vinyl Chloride		10 U	10 U	10 U	10 U	NA	10 U
Chloroethane		10 U	10 U	10 U	10 U	NA	10 U
Methylene Chloride		5 U	1 JB	1 JB	2 JB	NA	5 U
Acetone		10 U	11 B	10 U	10 U	NA	10 U
Carbon Disulfide		5 U	5 U	5 U	5 U	NA	5 U
1,1-Dichloroethene		5 U	94 %	99 %	4 J	NA	5 U
1,1-Dichloroethane		5 U	5 U	5 U	5 U	NA	5 U
1,2-Dichloroethene (total)		3 J	4 J	3 J	5	NA	5 U
Chloroform		5 U	5 U	5 U	5 U	NA	5 U
1,2-Dichloroethane		5 U	5 U	5 U	5 U	NA	5 U
2-Butanone		10 U	10 U	10 U	10 U	NA	10 U
1,1,1-Trichloroethane		5 U	5 U	5 U	5 U	NA	5 U
Carbon Tetrachloride		5 U	5 U	5 U	5 U	NA	5 U
Vinyl Acetate		10 U	10 U	10 U	10 U	NA	10 U
Bromodichloromethane		5 U	5 U	5 U	5 U	NA	5 U
1,2-Dichloropropane		5 U	5 U	5 U	5 U	NA	5 U
cis-1,3-Dichloropropene		5 U	5 U	5 U	5 U	NA	5 U
Trichloroethene		5 U	109 %	109 %	E	7300	E
Dibromochloromethane		5 U	5 U	5 U	5 U	NA	5 U
1,1,2-Trichloroethane		5 U	5 U	5 U	5 U	NA	5 U
Benzene		5 U	102 %	104 %	5 U	NA	5 U
Trans-1,3-Dichloropropene		5 U	5 U	5 U	5 U	NA	5 U
Bromoform		5 U	5 U	5 U	5 U	NA	5 U
4-Methyl-2-pentanone		10 U	10 U	10 U	10 U	NA	10 U
2-Hexanone		10 U	10 U	10 U	10 U	NA	10 U
Tetrachloroethene		5 U	5 U	5 U	170	NA	17
1,1,2,2-Tetrachloroethane		5 U	5 U	5 U	5 U	NA	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L431 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Page: 1b

Cust ID:	RFW-5B	RFW-5B	RFW-5B	RFW-12	RFW-12	PH-1A
RFW#:	001	001 MS	001 MSD	002	002 DL	003
Toluene	2 J	103 %	104 %	5 U	NA	5 U
Chlorobenzene	5 U	102 %	102 %	5 U	NA	5 U
Ethylbenzene	5 U	5 U	5 U	5 U	NA	5 U
Styrene	5 U	5 U	5 U	5 U	NA	5 U
Xylene (total)	5 U	5 U	5 U	5 U	NA	5 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L431 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/17/92 17:04 Page: 2a

	Cust ID:	PH-1A	PH-2A	PH-2A	PH-8	PH-8	PH-8D
Sample Information	RFW#:	003 DL	004	004 DL	005	005 DL	006
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	8.00	1.00	2.00	1.00	12.5	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	104 %	100 %	102 %	101 %	100 %	101 %
	Bromofluorobenzene	98 %	103 %	102 %	102 %	99 %	103 %
	1,2-Dichloroethane-d4	96 %	112 %	110 %	109 %	106 %	108 %
Chloromethane		NA	10 U	NA	10 U	NA	10 U
Bromomethane		NA	10 U	NA	10 U	NA	10 U
Vinyl Chloride		NA	10 U	NA	10 U	NA	10 U
Chloroethane		NA	10 U	NA	10 U	NA	10 U
Methylene Chloride		NA	5 U	NA	5 U	NA	5 U
Acetone		NA	10 U	NA	10 U	NA	10 U
Carbon Disulfide		NA	5 U	NA	5 U	NA	5 U
1,1-Dichloroethene		NA	5 U	NA	1 J	NA	5 U
1,1-Dichloroethane		NA	5 U	NA	5 U	NA	5 U
1,2-Dichloroethene (total)		NA	5 U	NA	5	NA	6
Chloroform		NA	5 U	NA	5 U	NA	5 U
1,2-Dichloroethane		NA	5 U	NA	5 U	NA	5 U
2-Butanone		NA	10 U	NA	10 U	NA	10 U
1,1,1-Trichloroethane		NA	5 U	NA	5 U	NA	5 U
Carbon Tetrachloride		NA	5 U	NA	5 U	NA	5 U
Vinyl Acetate		NA	10 U	NA	10 U	NA	10 U
Bromodichloromethane		NA	5 U	NA	5 U	NA	5 U
1,2-Dichloropropane		NA	5 U	NA	5 U	NA	5 U
cis-1,3-Dichloropropene		NA	5 U	NA	5 U	NA	5 U
Trichloroethene		830	E	310	29	NA	28
Dibromochloromethane		NA	5 U	NA	5 U	NA	5 U
1,1,2-Trichloroethane		NA	5 U	NA	5 U	NA	5 U
Benzene		NA	5 U	NA	5 U	NA	5 U
Trans-1,3-Dichloropropene		NA	5 U	NA	5 U	NA	5 U
Bromoform		NA	5 U	NA	5 U	NA	5 U
4-Methyl-2-pentanone		NA	10 U	NA	10 U	NA	10 U
2-Hexanone		NA	10 U	NA	10 U	NA	10 U
Tetrachloroethene		NA	5 U	NA	E	1100	E
1,1,2,2-Tetrachloroethane		NA	5 U	NA	5 U	NA	5 U

*= Outside of EPA CLP QC limits.

Cust ID:	PH-1A	PH-2A	PH-2A	PH-8	PH-8	PH-8D
RFW#:	003 DL	004	004 DL	005	005 DL	006
Toluene	NA	5 U	NA	5 U	NA	5 U
Chlorobenzene	NA	5 U	NA	5 U	NA	5 U
Ethylbenzene	NA	5 U	NA	5 U	NA	5 U
Styrene	NA	5 U	NA	5 U	NA	5 U
Xylene (total)	NA	5 U	NA	5 U	NA	5 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L431 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/17/92 17:04 Page: 3a

	Cust ID:	PH-8D	BDFB-2	VBLK	VBLK	VBLK
Sample Information	RFW#:	006 DL	007	92LVK033-MB1	92LVK034-MB1	92LVW035-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER
	D.F.:	12.5	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	100 %	99 %	102 %	100 %	104 %
	Bromofluorobenzene	99 %	101 %	104 %	97 %	104 %
	1,2-Dichloroethane-d4	108 %	106 %	98 %	98 %	97 %
Chloromethane		NA	10 U	10 U	10 U	10 U
Bromomethane		NA	10 U	10 U	10 U	10 U
Vinyl Chloride		NA	10 U	10 U	10 U	10 U
Chloroethane		NA	10 U	10 U	10 U	10 U
Methylene Chloride		NA	6 B	2 J	5	3 J
Acetone		NA	10 U	10 U	17	10 U
Carbon Disulfide		NA	5 U	5 U	5 U	5 U
1,1-Dichloroethene		NA	5 U	5 U	5 U	5 U
1,1-Dichloroethane		NA	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)		NA	5 U	5 U	5 U	5 U
Chloroform		NA	5 U	5 U	5 U	5 U
1,2-Dichloroethane		NA	5 U	5 U	5 U	5 U
2-Butanone		NA	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane		NA	5 U	5 U	5 U	5 U
Carbon Tetrachloride		NA	5 U	5 U	5 U	5 U
Vinyl Acetate		NA	10 U	10 U	10 U	10 U
Bromodichloromethane		NA	5 U	5 U	5 U	5 U
1,2-Dichloropropane		NA	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene		NA	5 U	5 U	5 U	5 U
Trichloroethene		NA	5 U	5 U	5 U	5 U
Dibromochloromethane		NA	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane		NA	5 U	5 U	5 U	5 U
Benzene		NA	5 U	5 U	5 U	5 U
Trans-1,3-Dichloropropene		NA	5 U	5 U	5 U	5 U
Bromoform		NA	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone		NA	10 U	10 U	10 U	10 U
2-Hexanone		NA	10 U	10 U	10 U	10 U
Tetrachloroethene		1100	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane		NA	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L431 Client: BLACK & DECKER Work Order: 2501-04-01-0010

Cust ID:	PH-8D	BDFB-2	VBLK	VBLK	VBLK
RFW#:	006 DL	007	92LVK033-MB1	92LVK034-MB1	92LVW035-MB1
Toluene	NA	5 U	5 U	5 U	5 U
Chlorobenzene	NA	5 U	5 U	5 U	5 U
Ethylbenzene	NA	5 U	5 U	5 U	5 U
Styrene	NA	5 U	5 U	5 U	5 U
Xylene (total)	NA	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/18/92 09:37 Page: 1a

	Cust ID:	RFW-4A		RFW-4A		RFW-4B		RFW-4B		RFW-9		RFW-10	
Sample Information	RFW#:	001		001 DL		002		002 DL		003		004	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		5.00		1.00		5.00		1.00		1.00	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	102	%	104	%	99	%	101	%	103	%	107	%
	Bromofluorobenzene	94	%	95	%	94	%	93	%	94	%	97	%
	1,2-Dichloroethane-d4	100	%	104	%	103	%	102	%	109	%	105	%
Chloromethane		10	U	NA		10	U	NA		10	U	10	U
Bromomethane		10	U	NA		10	U	NA		10	U	10	U
Vinyl Chloride		10	U	NA		10	U	NA		10	U	10	U
Chloroethane		10	U	NA		10	U	NA		10	U	10	U
Methylene Chloride		6	B	NA		6	B	NA		9	B	8	B
Acetone		10	U	NA		10	U	NA		10	U	10	U
Carbon Disulfide		5	U	NA		5	U	NA		5	U	5	U
1,1-Dichloroethene		5	U	NA		5	U	NA		5	U	5	U
1,1-Dichloroethane		5	U	NA		5	U	NA		5	U	5	U
1,2-Dichloroethene (total)		11		NA		9		NA		6		5	U
Chloroform		5	U	NA		2	J	NA		5	U	5	U
1,2-Dichloroethane		5	U	NA		5	U	NA		5	U	5	U
2-Butanone		10	U	NA		10	U	NA		10	U	10	U
1,1,1-Trichloroethane		5	U	NA		5	U	NA		6		5	U
Carbon Tetrachloride		5	U	NA		5	U	NA		5	U	5	U
Vinyl Acetate		10	U	NA		10	U	NA		10	U	10	U
Bromodichloromethane		5	U	NA		5	U	NA		5	U	5	U
1,2-Dichloropropane		5	U	NA		5	U	NA		5	U	5	U
cis-1,3-Dichloropropene		5	U	NA		5	U	NA		5	U	5	U
Trichloroethene		150		NA		120		NA		16			E
Dibromochloromethane		5	U	NA		5	U	NA		5	U	5	U
1,1,2-Trichloroethane		5	U	NA		5	U	NA		5	U	5	U
Benzene		5	U	NA		5	U	NA		5	U	5	U
Trans-1,3-Dichloropropene		5	U	NA		5	U	NA		5	U	5	U
Bromoform		5	U	NA		5	U	NA		5	U	5	U
4-Methyl-2-pentanone		10	U	NA		10	U	NA		10	U	10	U
2-Hexanone		10	U	NA		10	U	NA		10	U	10	U
Tetrachloroethene			E	460			E	430		21		7	
1,1,2,2-Tetrachloroethane		5	U	NA		5	U	NA		5	U	5	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Page: 1b

Cust ID:	RFW-4A	RFW-4A	RFW-4B	RFW-4B	RFW-9	RFW-10
RFW#:	001	001 DL	002	002 DL	003	004
Toluene	1 J	NA	1 J	NA	1 J	1 J
Chlorobenzene	5 U	NA	5 U	NA	5 U	5 U
Ethylbenzene	5 U	NA	5 U	NA	5 U	5 U
Styrene	5 U	NA	5 U	NA	5 U	5 U
Xylene (total)	5 U	NA	5 U	NA	5 U	5 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/18/92 09:37 Page: 2a

	Cust ID:	RFW-10	RFW-11A	RFW-11B	RFW-11B	RFW-13	RFW-16
Sample Information	RFW#:	004 DL	005	006	006 DL	007	008
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	5.00	1.00	1.00	2.50	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	107 %	101 %	105 %	98 %	103 %	84 * %
	Bromofluorobenzene	97 %	92 %	94 %	92 %	94 %	184 * %
	1,2-Dichloroethane-d4	105 %	104 %	105 %	81 %	104 %	108 %
Chloromethane		NA	10 U	10 U	NA	10 U	10 U
Bromomethane		NA	10 U	10 U	NA	10 U	10 U
Vinyl Chloride		NA	10 U	10 U	NA	10 U	10 U
Chloroethane		NA	10 U	10 U	NA	10 U	10 U
Methylene Chloride		NA	8 B	10 B	NA	10 B	9 B
Acetone		NA	10 U	E	320 B	10 U	11 B
Carbon Disulfide		NA	5 U	5 U	NA	5 U	5 U
1,1-Dichloroethene		NA	5 U	5 U	NA	5 U	5 U
1,1-Dichloroethane		NA	5 U	5 U	NA	5 U	5 U
1,2-Dichloroethene (total)		NA	5 U	5 U	NA	5 U	2 J
Chloroform		NA	5 U	5 U	NA	5 U	5 U
1,2-Dichloroethane		NA	5 U	5 U	NA	5 U	5 U
2-Butanone		NA	10 U	10 U	NA	10 U	10 U
1,1,1-Trichloroethane		NA	5 U	5 U	NA	5 U	5 U
Carbon Tetrachloride		NA	5 U	5 U	NA	5 U	4 J
Vinyl Acetate		NA	10 U	10 U	NA	10 U	10 U
Bromodichloromethane		NA	5 U	5 U	NA	5 U	5 U
1,2-Dichloropropane		NA	5 U	5 U	NA	5 U	5 U
cis-1,3-Dichloropropene		NA	5 U	5 U	NA	5 U	5 U
Trichloroethene		440	170	69	NA	5	E
Dibromochloromethane		NA	5 U	5 U	NA	5 U	5 U
1,1,2-Trichloroethane		NA	5 U	5 U	NA	5 U	28
Benzene		NA	5 U	5 U	NA	5 U	5 U
Trans-1,3-Dichloropropene		NA	5 U	5 U	NA	5 U	5 U
Bromoform		NA	5 U	5 U	NA	5 U	5 U
4-Methyl-2-pentanone		NA	10 U	11	NA	10 U	10 U
2-Hexanone		NA	10 U	10 U	NA	10 U	10 U
Tetrachloroethene		NA	5	5 U	NA	77	12
1,1,2,2-Tetrachloroethane		NA	5 U	5 U	NA	5 U	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010

Cust ID:	RFW-10	RFW-11A	RFW-11B	RFW-11B	RFW-13	RFW-16
RFW#:	004 DL	005	006	006 DL	007	008
Toluene	NA	1 J	2 J	NA	3 J	3 J
Chlorobenzene	NA	5 U	5 U	NA	5 U	5 U
Ethylbenzene	NA	5 U	5 U	NA	5 U	5 U
Styrene	NA	5 U	5 U	NA	5 U	5 U
Xylene (total)	NA	5 U	5 U	NA	3 J	5 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/18/92 09:37 Page: 3a

	Cust ID:	RFW-16	PH-10	PH-13	RFW-1A	RFW-1A	RFW-1A
Sample Information	RFW#:	008 DL	009	010	011	011 MS	011 MSD
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	500	1.00	1.00	1.00	1.00	1.00
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	103 %	105 %	101 %	98 %	99 %	97 %
	Bromofluorobenzene	96 %	94 %	88 %	90 %	90 %	89 %
	1,2-Dichloroethane-d4	84 %	97 %	88 %	96 %	78 %	90 %
Chloromethane		NA	10 U	10 U	10 U	10 U	10 U
Bromomethane		NA	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride		NA	10 U	10 U	10 U	10 U	10 U
Chloroethane		NA	10 U	10 U	10 U	10 U	10 U
Methylene Chloride		NA	3 JB	5 U	1 JB	9 B	8 B
Acetone		NA	10 B	10 U	10 U	10 B	4 JB
Carbon Disulfide		NA	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene		NA	5 U	5 U	5 U	81 %	80 %
1,1-Dichloroethane		NA	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)		NA	12	1 J	5 U	5 U	5 U
Chloroform		NA	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane		NA	5 U	5 U	5 U	5 U	5 U
2-Butanone		NA	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane		NA	5 U	5 U	6	4 J	4 J
Carbon Tetrachloride		NA	5 U	5 U	5 U	5 U	5 U
Vinyl Acetate		NA	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane		NA	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane		NA	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene		NA	5 U	5 U	5 U	5 U	5 U
Trichloroethene		80000	7	12	5 U	99 %	101 %
Dibromochloromethane		NA	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane		NA	5 U	5 U	5 U	5 U	5 U
Benzene		NA	5 U	5 U	5 U	92 %	93 %
Trans-1,3-Dichloropropene		NA	5 U	5 U	5 U	5 U	5 U
Bromoform		NA	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-pentanone		NA	10 U	10 U	10 U	10 U	10 U
2-Hexanone		NA	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene		NA	170	61	1 J	5 U	5 U
1,1,2,2-Tetrachloroethane		NA	5 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Page: 3b

Cust ID:	RFW-16	PH-10	PH-13	RFW-1A	RFW-1A	RFW-1A
RFW#:	008 DL	009	010	011	011 MS	011 MSD
Toluene	NA	5 U	5 U	5 U	97 %	94 %
Chlorobenzene	NA	5 U	5 U	5 U	103 %	101 %
Ethylbenzene	NA	5 U	5 U	5 U	5 U	5 U
Styrene	NA	5 U	5 U	5 U	5 U	5 U
Xylene (total)	NA	5 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/18/92 09:37 Page: 4a

	Cust ID:	RFW-7	RFW-5A	RFW-6	BDFB-1	RFW-6D	RFW-14B
Sample Information	RFW#:	012	013	014	015	016	017
	Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00	2.50
	Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery	Toluene-d8	100 %	107 %	99 %	102 %	104 %	101 %
	Bromofluorobenzene	88 %	99 %	91 %	95 %	93 %	96 %
	1,2-Dichloroethane-d4	94 %	103 %	104 %	107 %	105 %	93 %
Chloromethane		10 U	10 U	10 U	10 U	10 U	25 U
Bromomethane		10 U	10 U	10 U	10 U	10 U	25 U
Vinyl Chloride		10 U	10 U	10 U	10 U	10 U	25 U
Chloroethane		10 U	10 U	10 U	10 U	10 U	25 U
Methylene Chloride		2 JB	2 JB	9 B	6 B	5 B	12 B
Acetone		10 U	10 U	18 B	9 JB	10 U	43 B
Carbon Disulfide		5 U	5 U	5 U	5 U	5 U	12 U
1,1-Dichloroethene		5 U	5 U	5 U	5 U	5 U	12 U
1,1-Dichloroethane		5 U	5 U	5 U	5 U	5 U	12 U
1,2-Dichloroethene (total)		5	7	10	5 U	12	12 U
Chloroform		5 U	5 U	5 U	5 U	5 U	12 U
1,2-Dichloroethane		5 U	5 U	5 U	5 U	5 U	12 U
2-Butanone		10 U	10 U	10 U	10 U	10 U	25 U
1,1,1-Trichloroethane		5 U	5 U	5 U	5 U	5 U	12 U
Carbon Tetrachloride		5 U	5 U	5 U	5 U	5 U	12 U
Vinyl Acetate		10 U	10 U	10 U	10 U	10 U	25 U
Bromodichloromethane		5 U	5 U	5 U	5 U	5 U	12 U
1,2-Dichloropropane		5 U	5 U	5 U	5 U	5 U	12 U
cis-1,3-Dichloropropene		5 U	5 U	5 U	5 U	5 U	12 U
Trichloroethene		9	14	48	5 U	50	12
Dibromochloromethane		5 U	5 U	5 U	5 U	5 U	12 U
1,1,2-Trichloroethane		5 U	5 U	5 U	5 U	5 U	12 U
Benzene		5 U	5 U	5 U	5 U	5 U	12 U
Trans-1,3-Dichloropropene		5 U	5 U	5 U	5 U	5 U	12 U
Bromoform		5 U	5 U	5 U	5 U	5 U	12 U
4-Methyl-2-pentanone		10 U	10 U	10 U	10 U	10 U	25 U
2-Hexanone		10 U	10 U	10 U	10 U	10 U	25 U
Tetrachloroethene		5 U	22	69	5 U	82	220
1,1,2,2-Tetrachloroethane		5 U	5 U	5 U	5 U	5 U	12 U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010

Cust ID:	RFW-7	RFW-5A	RFW-6	BDFB-1	RFW-6D	RFW-14B
RFW#:	012	013	014	015	016	017
Toluene	5 U	5 U	1 J	5 U	5 U	12 U
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	12 U
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	12 U
Styrene	5 U	5 U	5 U	5 U	5 U	12 U
Xylene (total)	5 U	5 U	5 U	5 U	5 U	12 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS, HSL List

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Report Date: 03/18/92 09:37 Page: 5a

	Cust ID:	RFW-12B		RFW-8		BD TRIP BLANK		VBLK		VBLK		VBLK	
Sample Information	RFW#:	018		019		020		92LVB031-MB1		92LVB032-MB1		92LVW039-MB1	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	20.0		10.0		1.00		1.00		1.00		1.00	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	Toluene-d8	100	%	99	%	94	%	101	%	100	%	97	%
	Bromofluorobenzene	97	%	96	%	86	%	96	%	93	%	97	%
	1,2-Dichloroethane-d4	96	%	95	%	100	%	100	%	101	%	89	%
Chloromethane		200	U	100	U	10	U	10	U	10	U	10	U
Bromomethane		200	U	100	U	10	U	10	U	10	U	10	U
Vinyl Chloride		200	U	100	U	10	U	10	U	10	U	10	U
Chloroethane		200	U	100	U	10	U	10	U	10	U	10	U
Methylene Chloride		160	B	77	B	4	JB	5		10		2	J
Acetone		360	B	170	B	12	B	9	J	14		9	J
Carbon Disulfide		100	U	50	U	5	U	5	U	5	U	5	U
1,1-Dichloroethene		100	U	50	U	5	U	5	U	5	U	5	U
1,1-Dichloroethane		100	U	50	U	5	U	5	U	5	U	5	U
1,2-Dichloroethene (total)		100	U	24	J	5	U	5	U	5	U	5	U
Chloroform		100	U	50	U	5	U	5	U	5	U	5	U
1,2-Dichloroethane		100	U	50	U	5	U	5	U	5	U	5	U
2-Butanone		200	U	100	U	10	U	10	U	10	U	10	U
1,1,1-Trichloroethane		100	U	50	U	5	U	5	U	5	U	5	U
Carbon Tetrachloride		100	U	50	U	5	U	5	U	5	U	5	U
Vinyl Acetate		200	U	100	U	10	U	10	U	10	U	10	U
Bromodichloromethane		100	U	50	U	5	U	5	U	5	U	5	U
1,2-Dichloropropane		100	U	50	U	5	U	5	U	5	U	5	U
cis-1,3-Dichloropropene		100	U	50	U	5	U	5	U	5	U	5	U
Trichloroethene		3600		1500		5	U	5	U	5	U	5	U
Dibromochloromethane		100	U	50	U	5	U	5	U	5	U	5	U
1,1,2-Trichloroethane		100	U	50	U	5	U	5	U	5	U	5	U
Benzene		100	U	50	U	5	U	5	U	5	U	5	U
Trans-1,3-Dichloropropene		100	U	50	U	5	U	5	U	5	U	5	U
Bromoform		100	U	50	U	5	U	5	U	5	U	5	U
4-Methyl-2-pentanone		200	U	100	U	10	U	10	U	10	U	10	U
2-Hexanone		200	U	100	U	10	U	10	U	10	U	10	U
Tetrachloroethene		44	J	32	J	5	U	5	U	5	U	5	U
1,1,2,2-Tetrachloroethane		100	U	50	U	5	U	5	U	5	U	5	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9202L430 Client: BLACK & DECKER Work Order: 2501-04-01-0010 Page: 5b

Cust ID:	RFW-12B	RFW-8	BD TRIP BLANK	VBLK	VBLK	VBLK
RFW#:	018	019	020	92LVB031-MB1	92LVB032-MB1	92LVW039-MB1
Toluene	100 U	50 U	2 J	5 U	5 U	5 U
Chlorobenzene	100 U	50 U	5 U	5 U	5 U	5 U
Ethylbenzene	100 U	50 U	5 U	5 U	5 U	5 U
Styrene	100 U	50 U	5 U	5 U	5 U	5 U
Xylene (total)	100 U	50 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
-007	BDFB-2	Iron, Total	100	u	UG/L	100
		Manganese, Total	15.0	u	UG/L	15.0
		Sodium, Total	5000	u	UG/L	5000

ROY F. WESTON INC.

INORGANIC METHOD BLANK DATA SUMMARY PAGE 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
BLANK1	92L0675-MB1	Iron, Total	100	u	UG/L	100
		Manganese, Total	15.0	u	UG/L	15.0
		Sodium, Total	5000	u	UG/L	5000

ROY F. WESTON INC.

INORGANIC DUPLICATE SPIKE REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%RPD
LCS2	92L0675-LC2	Iron, LCS	98.6	101	2.8
		Manganese, LCS	98.2	101	2.6
		Sodium, LCS	102	104	2.0

ROY F. WESTON INC.

INORGANIC LABORATORY CONTROL STANDARDS REPORT 03/17/92

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	92L0675-LC1	Iron, LCS	4930	5000	UG/L	98.6
		Manganese, LCS	736	750	UG/L	98.2
		Sodium, LCS	25400	25000	UG/L	102
LCS2	92L0675-LC2	Iron, LCS	5070	5000	UG/L	101
		Manganese, LCS	756	750	UG/L	101
		Sodium, LCS	25900	25000	UG/L	104

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
-001	RFW-5B	Iron, Total	11300	UG/L	100
		Manganese, Total	182	UG/L	15.0
		Sodium, Total	25500	UG/L	5000

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
-002	RFW-12	Iron, Total	1050	UG/L	100
		Manganese, Total	60.4	UG/L	15.0
		Sodium, Total	22700	UG/L	5000

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
-003	PH-1A	Iron, Total	100	u	UG/L	100
		Manganese, Total	50.6		UG/L	15.0
		Sodium, Total	54900		UG/L	5000

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
-004	PH-2A	Iron, Total	100	u	UG/L	100
		Manganese, Total	44.3		UG/L	15.0
		Sodium, Total	9980		UG/L	5000

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
-005	PH-8	Iron, Total	1440	UG/L	100
		Manganese, Total	55.5	UG/L	15.0
		Sodium, Total	7240	UG/L	5000

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/17/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
-006	PH-8D	Iron, Total	1580	UG/L	100
		Manganese, Total	55.3	UG/L	15.0
		Sodium, Total	7690	UG/L	5000

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/20/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
-001	RFW-5B	Alkalinity	52.0		MG/L	2.0
		Chloride	62.6		MG/L	5.0
		Hardness	61.0		MG/L	1.0
		Hardness	29.0		MG/L	1.0
		pH	5.4		PH UNITS	0.010
		Sulfate	2.5	u	MG/L	2.5
		Specific Conductance	265		UMHOS/CM	1.0
		Total Dissolved Solids	255		MG/L	5.0
		Total Suspended Solids	31.0		MG/L	5.0
-002	RFW-12	Alkalinity	20.0		MG/L	2.0
		Chloride	47.6		MG/L	2.5
		Hardness	45.0		MG/L	1.0
		Hardness	20.5		MG/L	1.0
		pH	5.5		PH UNITS	0.010
		Sulfate	3.5		MG/L	2.5
		Specific Conductance	201		UMHOS/CM	1.0
		Total Dissolved Solids	147		MG/L	5.0
		Total Suspended Solids	29.0		MG/L	5.0
-003	PH-1A	Alkalinity	38.0		MG/L	2.0
		Chloride	118		MG/L	6.2
		Hardness	105		MG/L	1.0
		Hardness	34.5		MG/L	1.0
		pH	5.4		PH UNITS	0.010
		Sulfate	2.5	u	MG/L	2.5
		Specific Conductance	471		UMHOS/CM	1.0
		Total Dissolved Solids	310		MG/L	5.0
		Total Suspended Solids	5.0	u	MG/L	5.0
-004	PH-2A	Alkalinity	2.5		MG/L	0.50
		Chloride	17.0		MG/L	1.2
		Hardness	14.0		MG/L	1.0
		Hardness	5.1		MG/L	1.0
		pH	6.0		PH UNITS	0.010
		Sulfate	2.5	u	MG/L	2.5
		Specific Conductance	78.8		UMHOS/CM	1.0
		Total Dissolved Solids	62.0		MG/L	5.0
		Total Suspended Solids	5.0	u	MG/L	5.0

ROY F. WESTON INC.

INORGANIC DATA SUMMARY REPORT 03/20/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
-005	PH-8	Alkalinity	38.0	MG/L	2.0
		Chloride	9.2	MG/L	0.25
		Hardness	63.0	MG/L	1.0
		Hardness	50.0	MG/L	1.0
		pH	5.8	PH UNITS	0.010
		Sulfate	3.0	MG/L	2.5
		Specific Conductance	113	UMHOS/CM	1.0
		Total Dissolved Solids	107	MG/L	5.0
		Total Suspended Solids	334	MG/L	10.0
-006	PH-8D	Alkalinity	38.0	MG/L	2.0
		Chloride	9.2	MG/L	0.25
		Hardness	63.0	MG/L	1.0
		Hardness	50.0	MG/L	1.0
		pH	5.8	PH UNITS	0.010
		Sulfate	11.8	MG/L	2.5
		Specific Conductance	113	UMHOS/CM	1.0
		Total Dissolved Solids	110	MG/L	5.0
		Total Suspended Solids	194	MG/L	5.0
-007	BDFB-2	Alkalinity	0.50 u	MG/L	0.50
		Chloride	0.50	MG/L	0.25
		Hardness	1.0 u	MG/L	1.0
		Hardness	1.0 u	MG/L	1.0
		pH	6.4	PH UNITS	0.010
		Sulfate	2.5 u	MG/L	2.5
		Specific Conductance	1.0 u	UMHOS/CM	1.0
		Total Dissolved Solids	17.0	MG/L	5.0
		Total Suspended Solids	50.0	MG/L	5.0

ROY F. WESTON INC.

INORGANIC METHOD BLANK DATA SUMMARY PAGE 03/19/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT
BLANK10	92LAL008-MB1	Alkalinity	0.50 u	MG/L	0.50
BLANK20	92LAL008-MB2	Alkalinity	0.50 u	MG/L	0.50
BLANK10	92LCL013-MB1	Chloride	0.25 u	MG/L	0.25
BLANK20	92LCL013-MB2	Chloride	0.25 u	MG/L	0.25
BLANK30	92LCL013-MB3	Chloride	0.25 u	MG/L	0.25
BLANK10	92LHD008-MB1	Hardness	1.0 u	MG/L	1.0
BLANK20	92LHD008-MB2	Hardness	1.0 u	MG/L	1.0
BLANK30	92LHD008-MB3	Hardness	1.0 u	MG/L	1.0
BLANK10	92LHD009-MB1	Hardness	1.0 u	MG/L	1.0
BLANK20	92LHD009-MB2	Hardness	1.0 u	MG/L	1.0

ROY F. WESTON INC.

INORGANIC METHOD BLANK DATA SUMMARY PAGE 03/19/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	RESULT		UNITS	REPORTING LIMIT
BLANK10	92LS4012-MB1	Sulfate	2.5	u	MG/L	2.5
BLANK20	92LS4012-MB2	Sulfate	2.5	u	MG/L	2.5
BLANK30	92LS4012-MB3	Sulfate	2.5	u	MG/L	2.5
BLANK10	92LSP023-MB1	Specific Conductance	1.0	u	UMHOS/CM	1.0
BLANK20	92LSP023-MB2	Specific Conductance	1.0	u	UMHOS/CM	1.0
BLANK30	92LSP023-MB3	Specific Conductance	1.0	u	UMHOS/CM	1.0
BLANK10	92LSS035-MB1	Total Dissolved Solids	5.0	u	MG/L	5.0
		Total Suspended Solids	5.0	u	MG/L	5.0
BLANK20	92LSS035-MB2	Total Dissolved Solids	5.0	u	MG/L	5.0

ROY F. WESTON INC.

INORGANIC ACCURACY REPORT 03/19/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV
-006	PH-8D	Hardness	150	50.0	100	99.8
BLANK10	92LAL008-MB1	Alkalinity	101	0.50u	100	101
		Alkalinity MSD	100	0.50u	100	100
BLANK20	92LAL008-MB2	Alkalinity	100	0.50u	100	100
BLANK10	92LCL013-MB1	Chloride	5.4	0.25u	5.0	107
		Chloride MSD	5.4	0.25u	5.0	108
BLANK20	92LCL013-MB2	Chloride	5.0	0.25u	5.0	101
BLANK30	92LCL013-MB3	Chloride	5.4	0.25u	5.0	107
BLANK10	92LHD008-MB1	Hardness	99.7	1.0 u	100	99.7
		Hardness MSD	330	1.0 u	330	100
BLANK20	92LHD008-MB2	Hardness	99.8	1.0 u	100	99.8
BLANK30	92LHD008-MB3	Hardness	99.5	1.0 u	100	99.5
BLANK10	92LHD009-MB1	Hardness	100	1.0 u	100	100
		Hardness MSD	253	1.0 u	250	101

ROY F. WESTON INC.

INORGANIC ACCURACY REPORT 03/19/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE		SPIKED SAMPLE	INITIAL RESULT		SPIKED AMOUNT	%RECOV
BLANK20	92LHD009-MB2	Hardness		101	1.0	u	100	101
BLANK10	92LS4012-MB1	Sulfate		19.7	2.5	u	20.0	98.5
		Sulfate		20.1	2.5	u	20.0	100
BLANK20	92LS4012-MB2	Sulfate		19.8	2.5	u	20.0	98.8
BLANK30	92LS4012-MB3	Sulfate		19.6	2.5	u	20.0	98.0
BLANK10	92LSP023-MB1	Specific Conductance		148	1.0	u	147	101
		Specific Conductance	M	149	1.0	u	147	101
BLANK20	92LSP023-MB2	Specific Conductance		722	1.0	u	718	101
BLANK30	92LSP023-MB3	Specific Conductance		1410	1.0	u	1410	99.6

ROY F. WESTON INC.

INORGANIC DUPLICATE SPIKE REPORT 03/19/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%RPD
BLANK10	92LAL008-MB1	Alkalinity	101	100	1.0
BLANK10	92LCL013-MB1	Chloride	107	108	0.40
BLANK10	92LHD008-MB1	Hardness	99.7	100	0.30
BLANK10	92LHD009-MB1	Hardness	100	101	0.80
BLANK10	92LS4012-MB1	Sulfate	98.5	100	2.2
BLANK10	92LSP023-MB1	Specific Conductance	101	101	0.70

ROY F. WESTON INC.

INORGANIC PRECISION REPORT 03/19/92

CLIENT: BLACK & DECKER
WORK ORDER: 2501-04-01-0010

WESTON BATCH #: 9202L431

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	%RPD
-001REP	RFW-5B	Alkalinity	52.0	50.0	3.9
		pH	5.4	5.4	0.18
		Specific Conductance	265	267	0.75
-004REP	PH-2A	Hardness	5.1	5.4	5.7