

APR 11 2001

C.E. Bradley Laboratories

Status Report

January 1, 2000 Through December 31, 2000

DEC Site # 77-0037

April 2001

Brattleboro, Vermont

Prepared for

C.E. BRADLEY LABORATORIES

P.O. Box 8238

North Brattleboro, Vermont 05304

Prepared by

THE JOHNSON COMPANY, INC.

100 State Street, Suite 600

TABLE OF CONTENTS

1.0 SUMMARY AND CONTEXT	1
2.0 RESULTS OF GROUNDWATER MEASUREMENT AND SAMPLING	4
2.1 SUMMARY OF GROUNDWATER SAMPLING PROCEDURES AND RESULTS	4
2.1.1 <u>Monitoring Well MW-5D</u>	4
2.1.2 <u>Monitoring Well MW-6</u>	5
2.1.3 <u>Monitoring Well MW-8</u>	7
2.2 GROUNDWATER LEVEL ELEVATIONS AND FREE PRODUCT MEASUREMENTS	13
3.0 CONCLUSIONS AND RECOMMENDATIONS	19

LIST OF FIGURES

Figure 1	Site Location Map	2
Figure 2	Site Plan and Remedial System Configuration	3
Figure 3	Graph: Reported Groundwater Data vs. Time, Monitoring Well MW-5D	6
Figure 4	Graph: Reported Groundwater Data vs. Time, Monitoring Well MW-6	8
Figure 5	Graph: Reported Groundwater Data vs. Time, Monitoring Well MW-8	10
Figure 6	Graph: Reported Groundwater Data vs. Time, Monitoring Well MW-12D	12
Figure 7	Graph: Water Level Elevations vs. Time, Upgradient Well MW-2	14
Figure 8	Graph: Water Level Elevations vs. Time, Laterally-Extended Well	15
Figure 9	Graph: Water Level Elevations vs. Time, Former Tank Farm-East	16
Figure 10	Graph: Water Level Elevations vs. Time, Former Tank Farm-West	17
Figure 11	Graph: Water Level Elevations vs. Time, Downgradient wells	18

LIST OF TABLES

Table 2-1	Laboratory-Reported Contaminant Concentrations in Monitoring Well MW-5D	5
Table 2-2	Laboratory-Reported Contaminant Concentrations in Monitoring Well MW-6	7
Table 2-3	Laboratory-Reported Contaminant Concentrations in Monitoring Well MW-8	9
Table 2-4	Laboratory-Reported Contaminant Concentrations in Monitoring Well MW-12D	11

LIST OF ATTACHMENTS

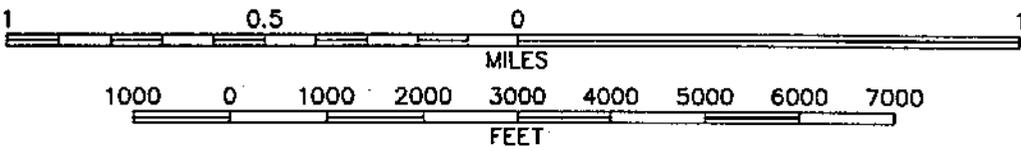
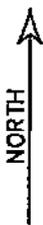
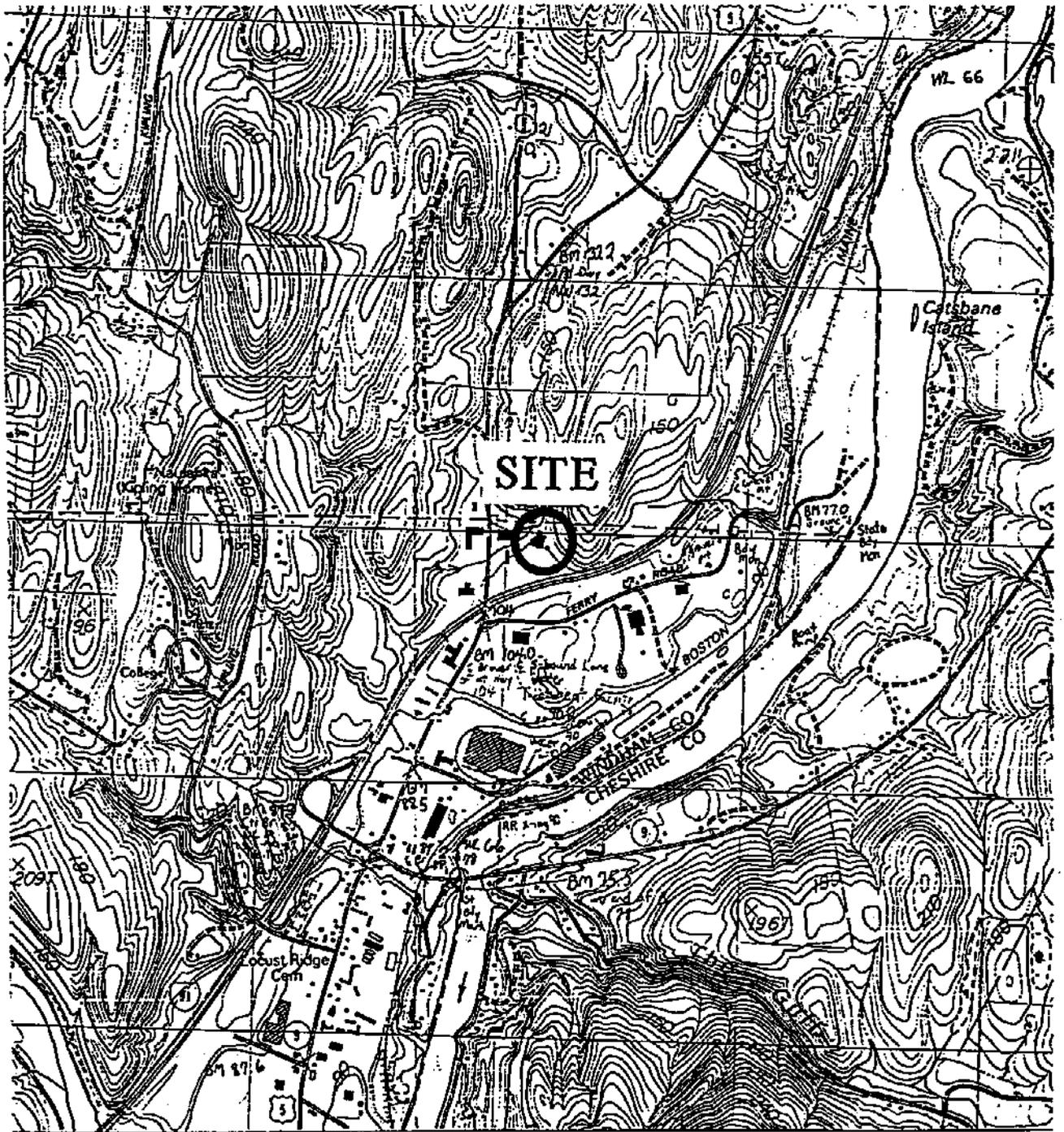
Attachment 1	DEC Letter March 31, 2000 re: 1999 Annual Status Report Review
Attachment 2	Laboratory Analytical Results for Groundwater Samples
Attachment 3	Monthly Water Level Data and Product Measurements

1.0 SUMMARY AND CONTEXT

C.E. Bradley Laboratories, of Brattleboro, Vermont is a manufacturer of industrial finishing products (Figure 1). Soils and groundwater beneath the former tank farm portion of the C.E. Bradley site ("the Site") are contaminated with volatile organic compounds (VOCs) including ethylbenzene, xylenes, toluene, butyl acetate and others (See Section 2). Remedial actions have been underway since 1986 to address this contamination. This is the annual status report for C.E. Bradley Laboratories, for the period from January 1, 2000 through December 31, 2000 (reporting period).

Annual remedial systems status reports have been submitted to the Vermont Department of Environmental Conservation Waste Management Division (WMD) since 1995. These reports describe systems operations during the previous reporting periods and contain estimates of VOC recovery. The last annual status report was submitted to the WMD in March 2000. That report contained recommendations regarding the remedial systems remaining off-line and groundwater monitoring and a discussion on achieving site closure status. The WMD concurred with the recommendations in a letter dated March 31, 2000 (Attachment 1).

A soil vapor extraction and treatment system (SVE system) and a groundwater withdrawal and treatment system (water system) are installed in the vicinity of the former tank farm location (Figure 2). Following WMD approval provided in a memorandum dated December 14, 1998, the water system operation was terminated after operating seasonally in various configurations since 1986. The SVE system has operated seasonally since September 1994 until September 1999.



CONTOUR INTERVAL 6 METERS



BASE MAP: USGS 7.5 Minute Topographic Quadrangle NEWFANE, VERMONT-NEW HAMPSHIRE PROVISIONAL EDITION 1984

MAP LOCATION

FIGURE 1: SITE LOCATION MAP
 C.E. BRADLEY LABORATORIES, INC.
 BRATTLEBORO, VERMONT

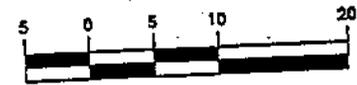
THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
 100 STATE STREET
 MONTPELIER, VT 05602

REVISED 12/3/86 TJK

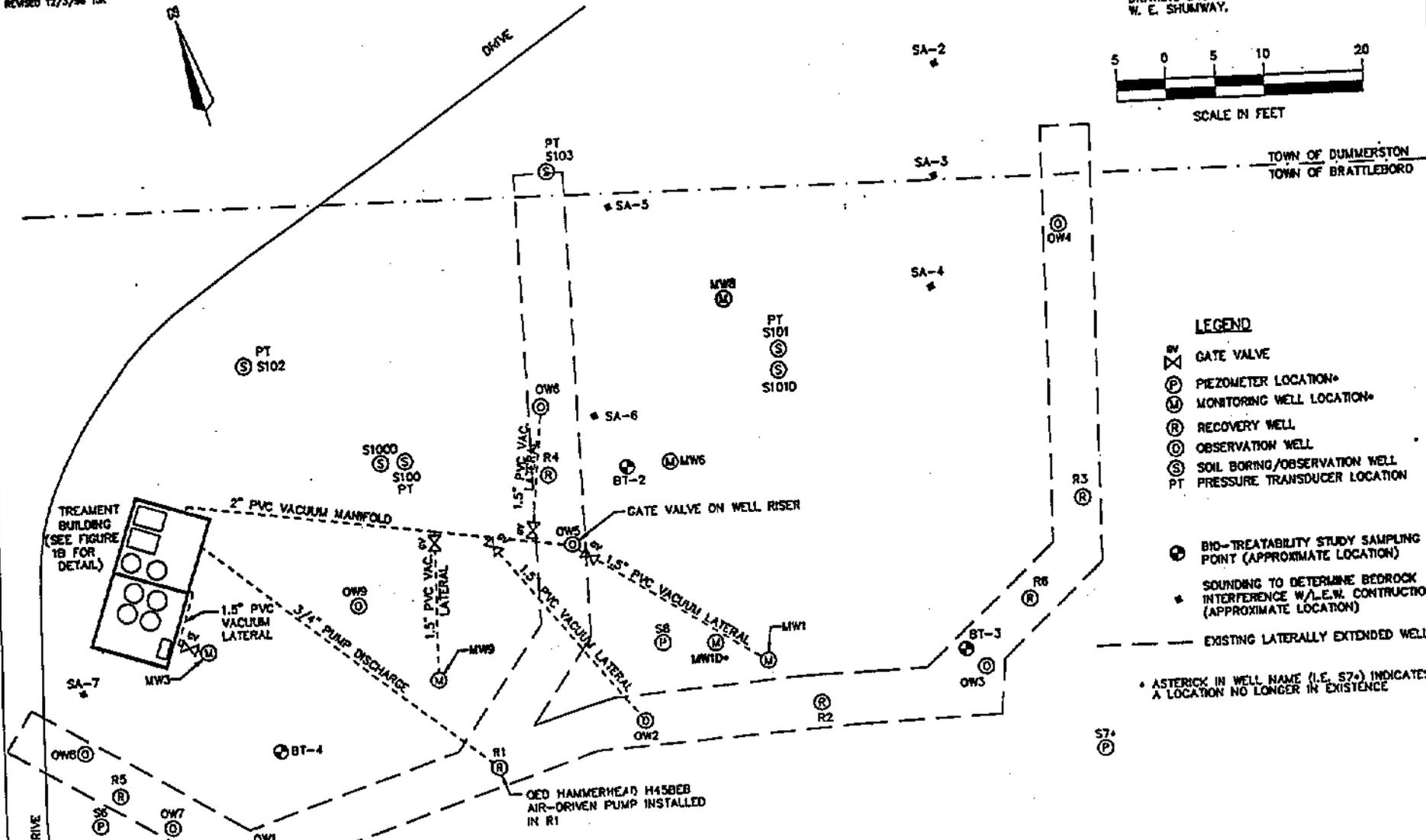


⑤ S104
PT

NOTE: INFORMATION FOR THIS DRAWING TAKEN FROM
DRAWING DTD 08-03-84 BY W. E. SHUMWAY
DRAWING DTD 07-27-87 REV'D 10-03-87 BY
W. E. SHUMWAY.



SCALE IN FEET



LEGEND

- ⊗ GATE VALVE
- ⊕ PIEZOMETER LOCATION
- ⊙ MONITORING WELL LOCATION
- ⊚ RECOVERY WELL
- ⊛ OBSERVATION WELL
- ⊜ SOIL BORING/OBSERVATION WELL
- PT PRESSURE TRANSDUCER LOCATION
- ⊕ BIO-TREATABILITY STUDY SAMPLING POINT (APPROXIMATE LOCATION)
- ⋄ SOUNDING TO DETERMINE BEDROCK INTERFERENCE W/ A.E.W. CONSTRUCTION (APPROXIMATE LOCATION)
- - - EXISTING LATERALLY EXTENDED WELL
- * ASTERISK IN WELL NAME (I.E. S7*) INDICATES A LOCATION NO LONGER IN EXISTENCE

FIGURE 2

SITE PLAN & REMEDIAL SYSTEMS LAYOUT
C.E. BRADLEY LABORATORIES, INC.
BRATTLEBORO, VERMONT

THE JOHNSON COMPANY, INC.
Environmental Sciences and Engineering
100 STATE STREET
MONTPELIER, VT 05602

2.0 RESULTS OF GROUNDWATER MEASUREMENT AND SAMPLING

In accordance with the requirements of the Vermont DEC, C.E. Bradley personnel conduct monthly water level measurements and collect groundwater samples at either quarterly or annual intervals from specified monitoring wells within the former tank farm area and its surroundings. Following is a description of the results of this work during the reporting period.

2.1 SUMMARY OF GROUNDWATER SAMPLING PROCEDURES AND RESULTS

Groundwater quality samples were collected on four dates during the reporting period: January 27; April 26; July 25; and October 24, 2000. On each sampling date, groundwater samples were collected by C.E. Bradley personnel using sampling procedures described by The Johnson Company on page 17 of the State-approved work plan. Groundwater samples were shipped via courier using chain-of-custody procedures to STL laboratories in Westfield, Massachusetts for laboratory analysis using a modified EPA Method 624 procedure. Laboratory analytical data for these sampling dates are included in Attachment 2.

A synopsis of the groundwater monitoring well network at C.E. Bradley Laboratories is included in a previous The Johnson Company report, "Laboratory Analytical Data and Quality Assurance/Quality Control Data for Groundwater Samples, September 1990-October 1993, C.E. Bradley Laboratories, Brattleboro, Vermont, February, 1994."

Following is a description of the results of groundwater sampling by location for the reporting period, including tabular and graphical data presentation where appropriate.

2.1.1 Monitoring Well MW-5D

As approved by WMD, the frequency of monitoring at MW-5D is once annually during April. One sample was collected from MW-5D during the reporting period, on April 26, 2000. None of the compounds which are included in the modified Method 624 testing were reported at concentrations above the PQL during analysis of the sample collected in April nor was methanol. Table 2-1 summarizes the compounds reported above PQLs during the past three reporting period:

TABLE 2-1 C.E. BRADLEY LABORATORIES LABORATORY REPORTED VOLATILE ORGANIC COMPOUNDS MONITORING WELL MW-5D (micrograms per liter (µg/l))				
Parameter	April 1998	April 1999	April 2000	State Groundwater Enforcement Standard
Acetone	<100	< 10	<10	700
Ethylbenzene	53	55	< 5	700
Total Xylenes	84	150	< 5	10,000

Figure 3 is a graphical presentation of the reported concentrations of ethylbenzene, toluene and total xylenes and groundwater level in MW-5D since 1986. Groundwater quality has improved at this location; the concentrations of all reported analytes have declined since 1986. Note that many of the recent graphical values are PQLs, not actual analytical results. The decline is most likely the result of removal of the three former tanks, plumbing and the shallow soil contamination at this location, along with remedial systems operations and natural attenuation.

2.1.2 Monitoring Well MW-6

Groundwater monitoring well MW-6 was sampled three times during the reporting period: January 27; April 28, and July 25, 2000. The monitor well was dry on October 24, 2000, therefore a sample could not be collected. The last previous sampling for this well was in October 1999. Table 2-2 summarizes the reported concentrations of organic compounds reported above PQLs during the reporting period. The reported concentrations of ethylbenzene and total xylenes were above PQLs and above the enforcement standard (ES) concentrations on the three sampling dates. None of the other compounds which are included in the modified Method 624 testing were reported at concentrations above PQLs, with the exception of toluene in January and April 2000. Shading and starred values indicate reported concentrations in excess of an ES.

Figure 3 C.E. Bradley Laboratories Contaminant Concentrations in MW-5D

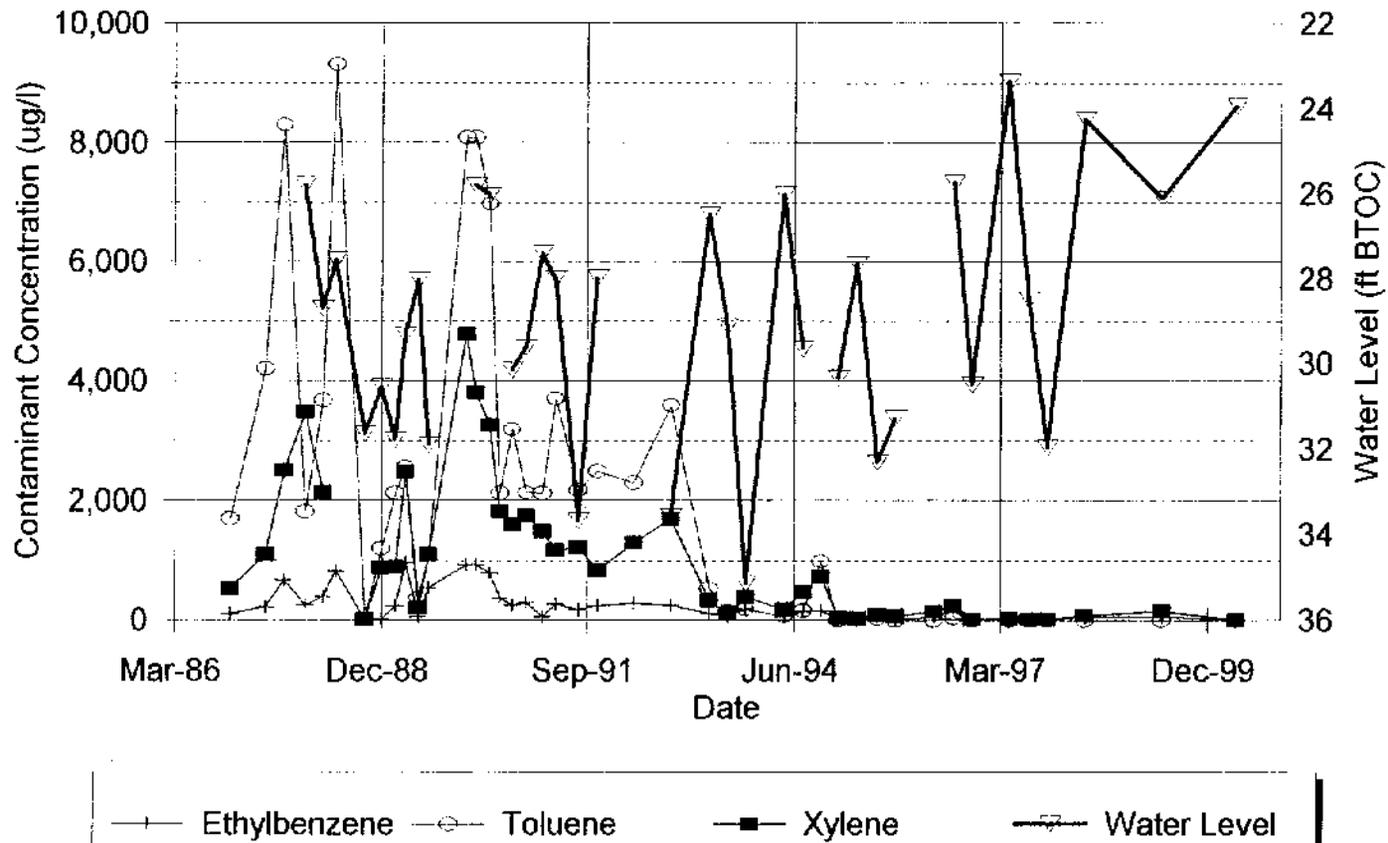


TABLE 2-2 C.E. BRADLEY LABORATORIES LABORATORY REPORTED VOLATILE ORGANIC COMPOUNDS MONITORING WELL MW-6 (µg/l)					
Parameter	January 2000	April 2000	July 2000	October 2000	State Groundwater Enforcement Standard
ethylbenzene	3,100*	8,300*	6,000*	dry	700
toluene	250	690 (j)	< 2,500	dry	1,000
total xylenes	11,000*	28,000*	29,000*	dry	10,000
(j) indicates an estimated value					

Figure 4 is a graphical presentation of contaminant concentrations and water levels versus time in monitoring well MW-6 since 1986. Reported concentrations of VOCs in groundwater at this location continue to demonstrate an overall downward trend. An increase in concentrations in the April and July samples may be related to the low groundwater conditions in late 1999 and the extended period of high groundwater experienced at the beginning during the first half of the reporting period.

2.1.3 Monitoring Well MW-8

Groundwater monitoring well MW-8 was sampled three times during the reporting period: January 27; April 28, and July 25, 2000. The monitor well was dry on October 24, 2000, therefore a sample could not be collected. The last previous sampling of this well took place during October 1999. The analytical results indicate that ethylbenzene and xylenes were reported above the PQL and above ES concentrations during the three sampling events. Toluene was reported above the PQL and the ES concentration in the January sample. The results of analytical testing performed on groundwater samples collected on those dates are summarized in Table 2-3, below. Shading and starred values indicate reported concentrations in excess of an ES.

Figure 4 C.E. Bradley Laboratories

Contaminant Concentrations in MW-6

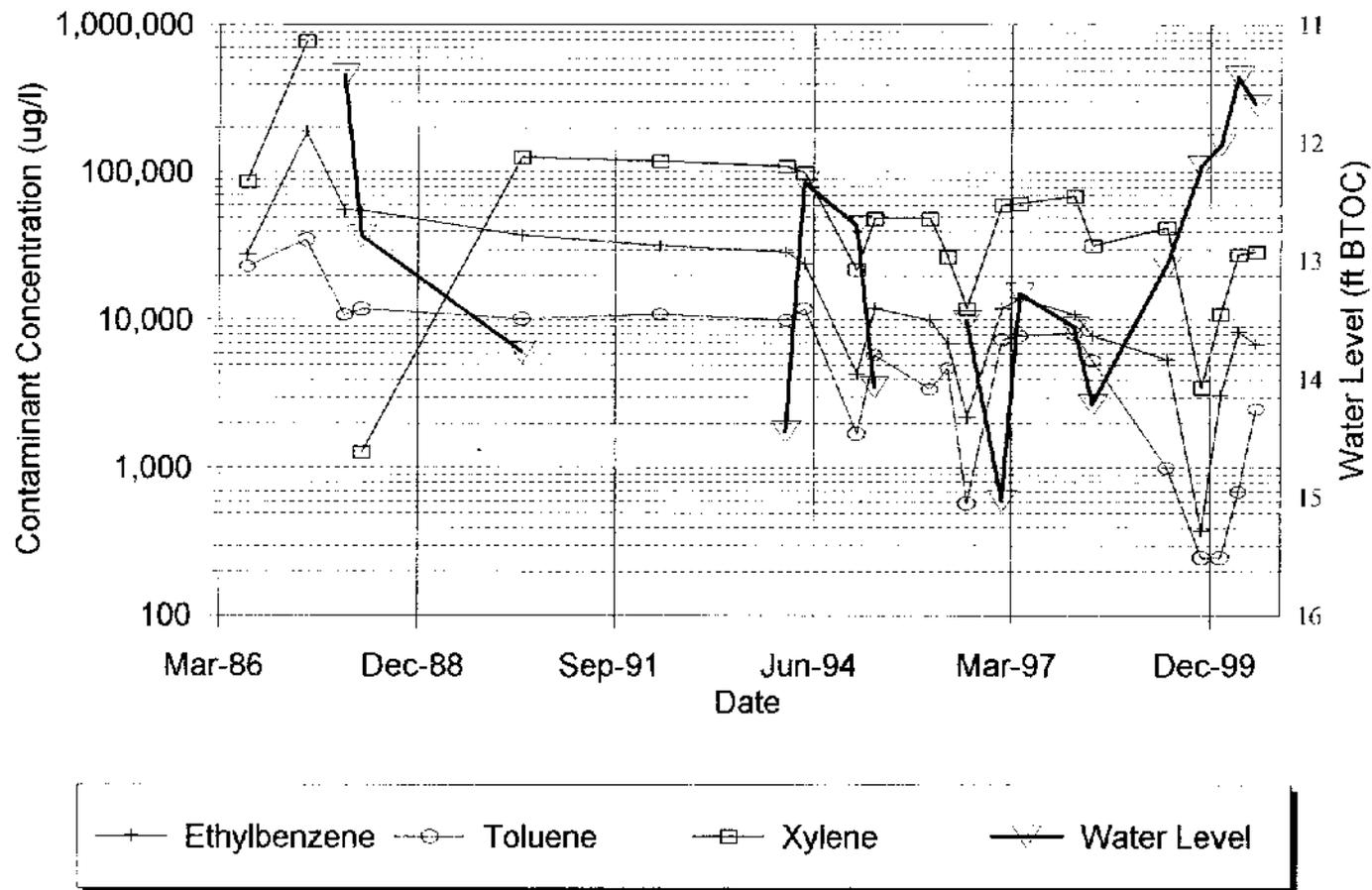


TABLE 2-3 C.E. BRADLEY LABORATORIES LABORATORY REPORTED VOLATILE ORGANIC COMPOUNDS MONITORING WELL MW-8 (µg/l)					
Parameter	January 2000	April 2000	July 2000	October 2000	State Groundwater Enforcement Standard
ethylbenzene	24,000*	6,600*	20,000*	dry	700
toluene	1,200*(j)	<2,500	<5,000	dry	1000
total xylenes	128,000*	41,000*	91,000*	dry	10,000
(j) indicates an estimated value					

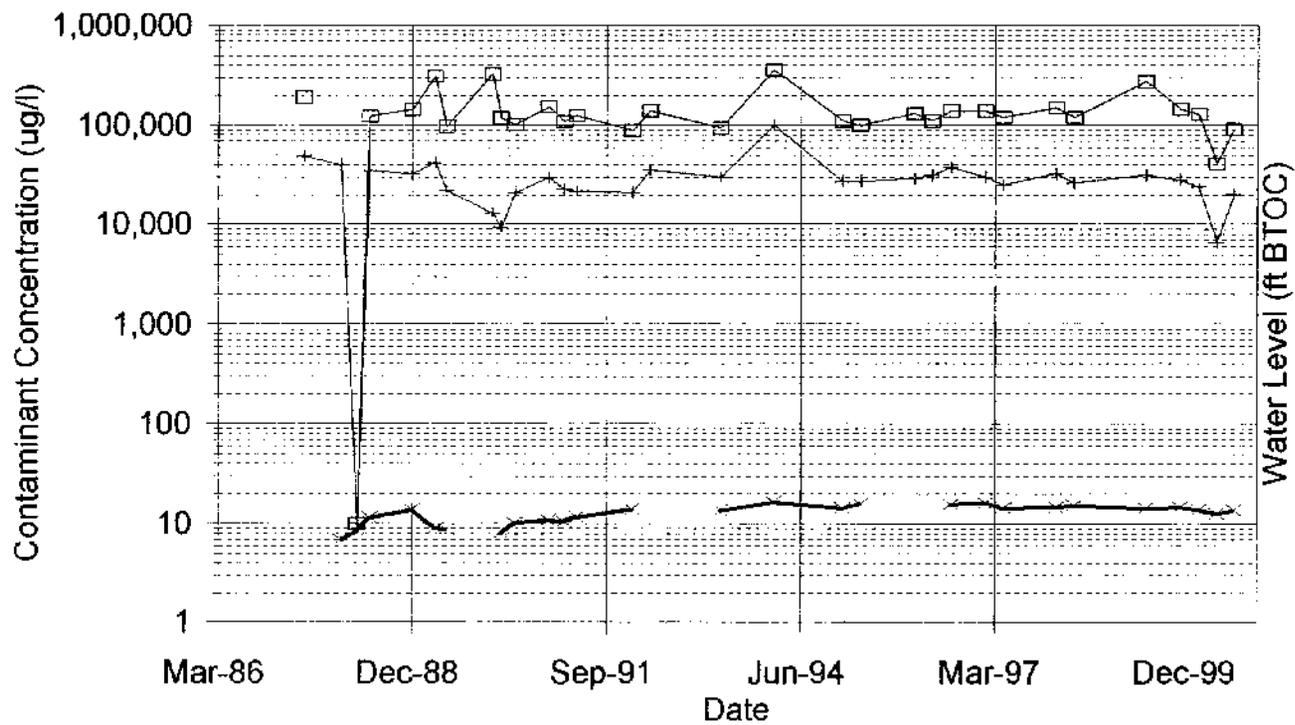
None of the other compounds which are included in the modified Method 624 testing were reported at concentrations above PQLs during the reporting period.

Figure 5 is a graphical presentation of the accumulated water quality data in MW-8 since 1987 for ethylbenzene and total xylenes. These compounds were selected because of their persistence in groundwater samples from this well. Figure 5 indicates that the reported concentrations of ethylbenzene and total xylenes have been relatively stable for the past eleven years.

2.1.4 Monitoring Well MW-12D

Groundwater samples were collected from monitoring well MW-12D on January 27; April 28, July 25, 2000 and October 24, 2000. Duplicate samples were collected on these sampling dates. The reported testing results indicate that total xylenes and ethylbenzene were reported above PQLs and the ES concentration on all three sampling dates during the reporting period, and toluene was reported above PQLs and the ES concentration in the April 2000 sample. None of the other compounds which are included in the modified Method 624 testing were reported at concentrations above the PQL during the reporting period nor was methanol. Table 6-4 summarizes the groundwater quality data during the reporting period.

Figure 5 C.E. Bradley Laboratories Contaminant Concentrations in MW-8



Ethylbenzene
 Xylene
 Water Level

A graphical presentation of reported groundwater concentrations over time in MW-12D is included as Figure 6. The reported contaminant concentrations in MW-12D have fluctuated during the reporting period and appear to have "spiked" during July 2000 when the concentrations of all tested analytes were higher than normal.

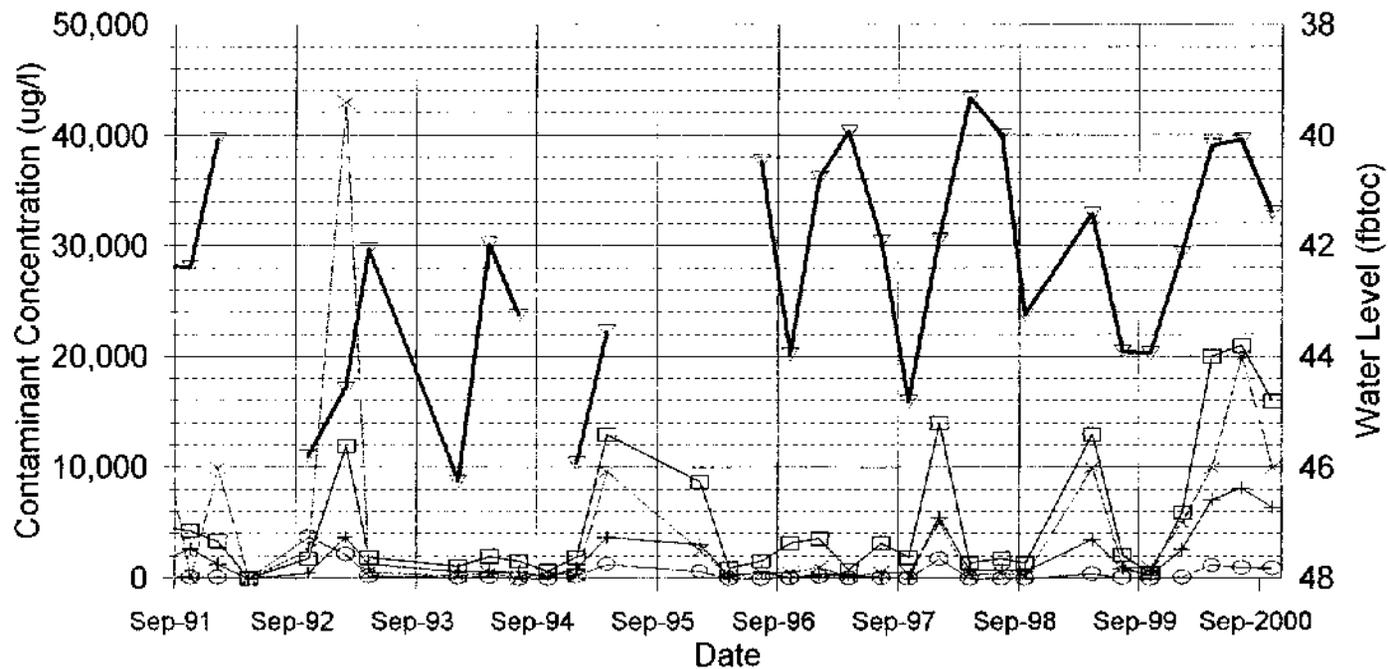
**TABLE 2-4
C.E. BRADLEY LABORATORIES
LABORATORY REPORTED VOLATILE ORGANIC COMPOUNDS
MONITORING WELL MW-12D (µg/l)**

Parameter	July 1999	October 1999	January 2000	April 2000	July 2000	October 2000	State Groundwater Enforcement Standard
ethylbenzene	870* / 910*	290 / 300	2,600* / 3,100*	7,100* / 8,000*	8,100* / 7,500*	6,400*	700
toluene	< 100 / < 100	< 50 / < 50	150 / 180	1,200* / 1,300*	< 1,000 / < 1,000	950 / 890	1,000
total xylenes	2,100 / 2,200	440 / 520	5,900 / 7000	20,000* / 22,000*	21,000* / 20,000*	10,000*	10,000

JAD
B
12-00
20,000

There have been other reported "spikes" in contaminant concentrations in this well, notably during February 1993, April 1995, January 1998 and April 1999. In all of these cases, very low water level measurements in monitoring well MW-12D preceded the increase in reported contamination. Prior to the most recent "spike" the groundwater level was low for an extended period and the "spike" coincided with an extended period of high groundwater levels.

Figure 6 C.E. Bradley Laboratories
Contaminant Concentrations in MW-12D



—+— Ethylbenzene —○— Toluene —□— Xylene —*— Ethylacetate —▽— Water Level

2.2 GROUNDWATER LEVEL ELEVATIONS AND FREE PRODUCT MEASUREMENTS

At the end of the previous reporting period the groundwater levels were relatively low. During the first half of the reporting period the groundwater levels were consistently higher than similar periods in past years. Hydrographs of the monitored wells at C.E. Bradley laboratories for the period January 2000-December 2000 are included as Figures 7-11.

Review of monthly groundwater measurement data (Attachment 4) collected by C.E. Bradley personnel during the reporting period indicates:

- A. Most of the monitored locations were hydrated from January through September 2000 and in November and December 2000. Upgradient water levels were abnormally during the summer of 2000 and did not drop until October 2000 (Figure 7). Water levels in the laterally extended well were near or at the ground surface for six months during 2000, April through August and November (Figure 8). This extended high groundwater period was also evident in the former tank farm (Figures 9 and 10). This trend was also noted in the downgradient wells (Figure 11), however, it was less pronounced in the deeper wells MW-5D and MW-12.
- B. Several monitoring stations were dry in October 2000.

With respect to free product measurements (LNAPL), the following observations were noted.

- A. Product was detected in one monitoring station during the reporting period, OW-4.
- B. In OW-4, product was detected on nine occasions during the reporting period (January 2000 through August 2000, and November 2000). All of these were reported as films (i.e. less than 0.01' thick) in contrast to measurable thicknesses observed prior to 1998.

Although during the 1998 reporting period there appeared to be no good correlation between groundwater level and the appearance of free product films in OW-4, free product films appeared during periods of highest relative groundwater levels in the 2000 reporting period, similar to that noted in 1999.

Figure 7 C.E. Bradley Laboratories

Water Level Elevations Upgradient

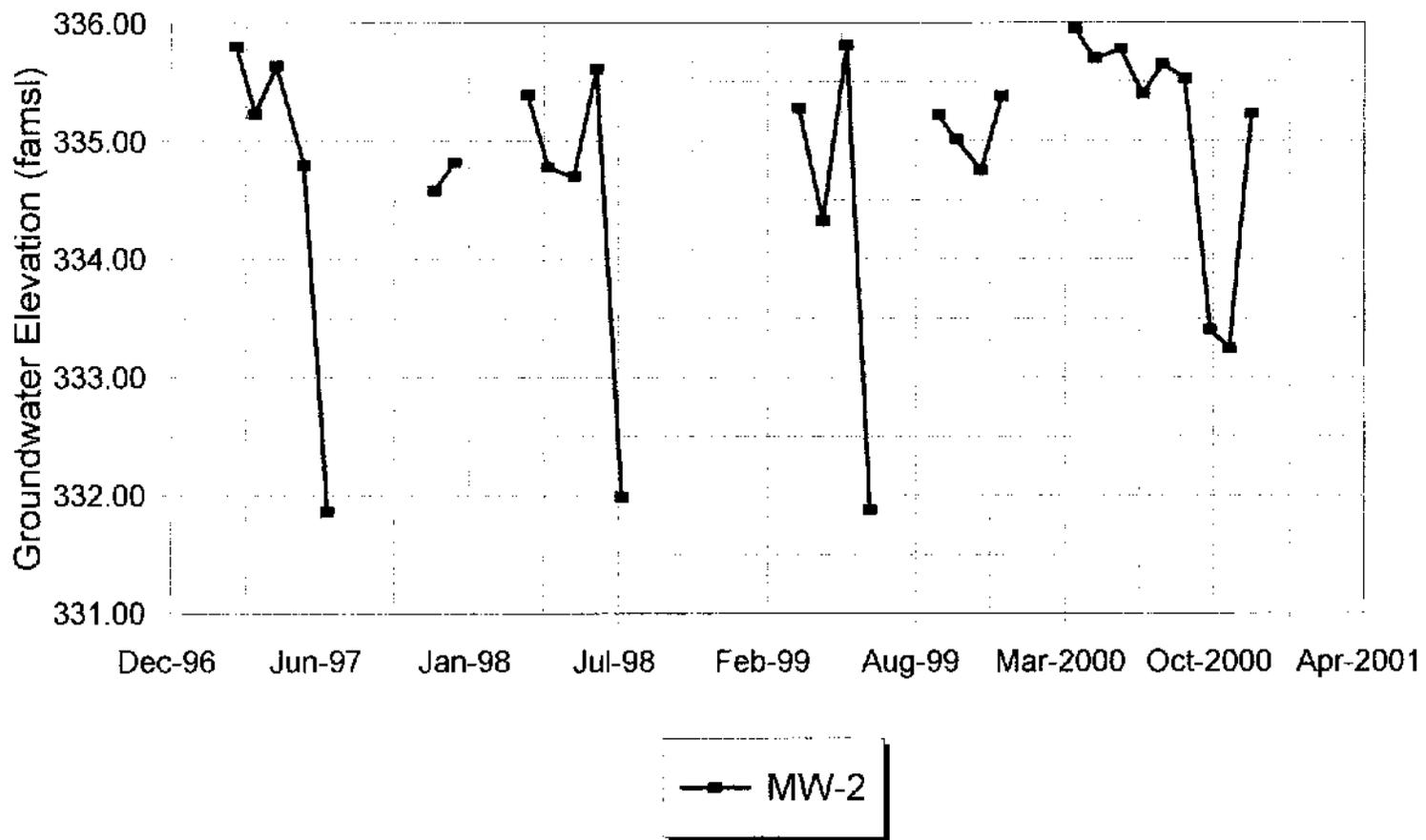
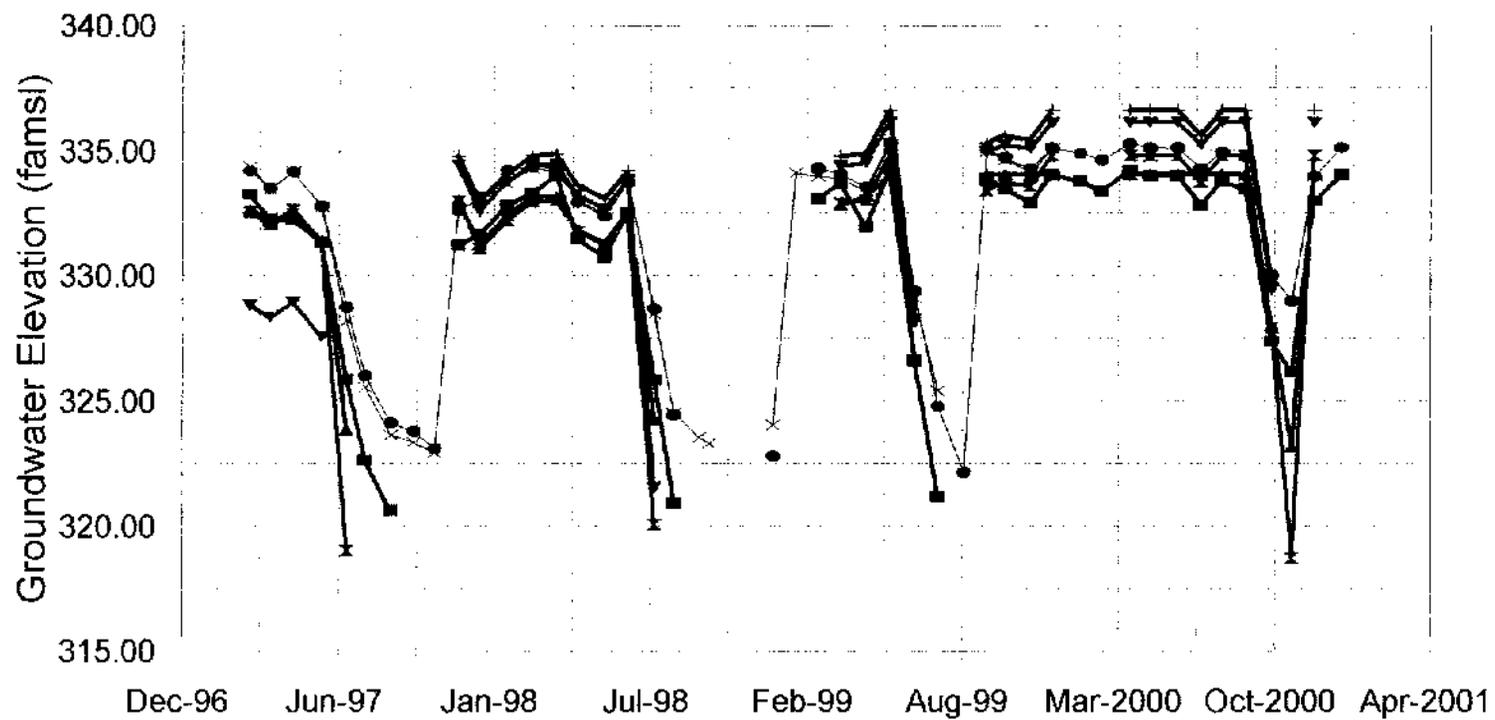


Figure 8 C.E. Bradley Laboratories
Water Level Elevations in LEW



R-3
 RW-6
 OW-8
 R-5
 OW-7
 R-1
 OW-4

Figure 9 C.E. Bradley Laboratories

Water Level Elevations OTF East

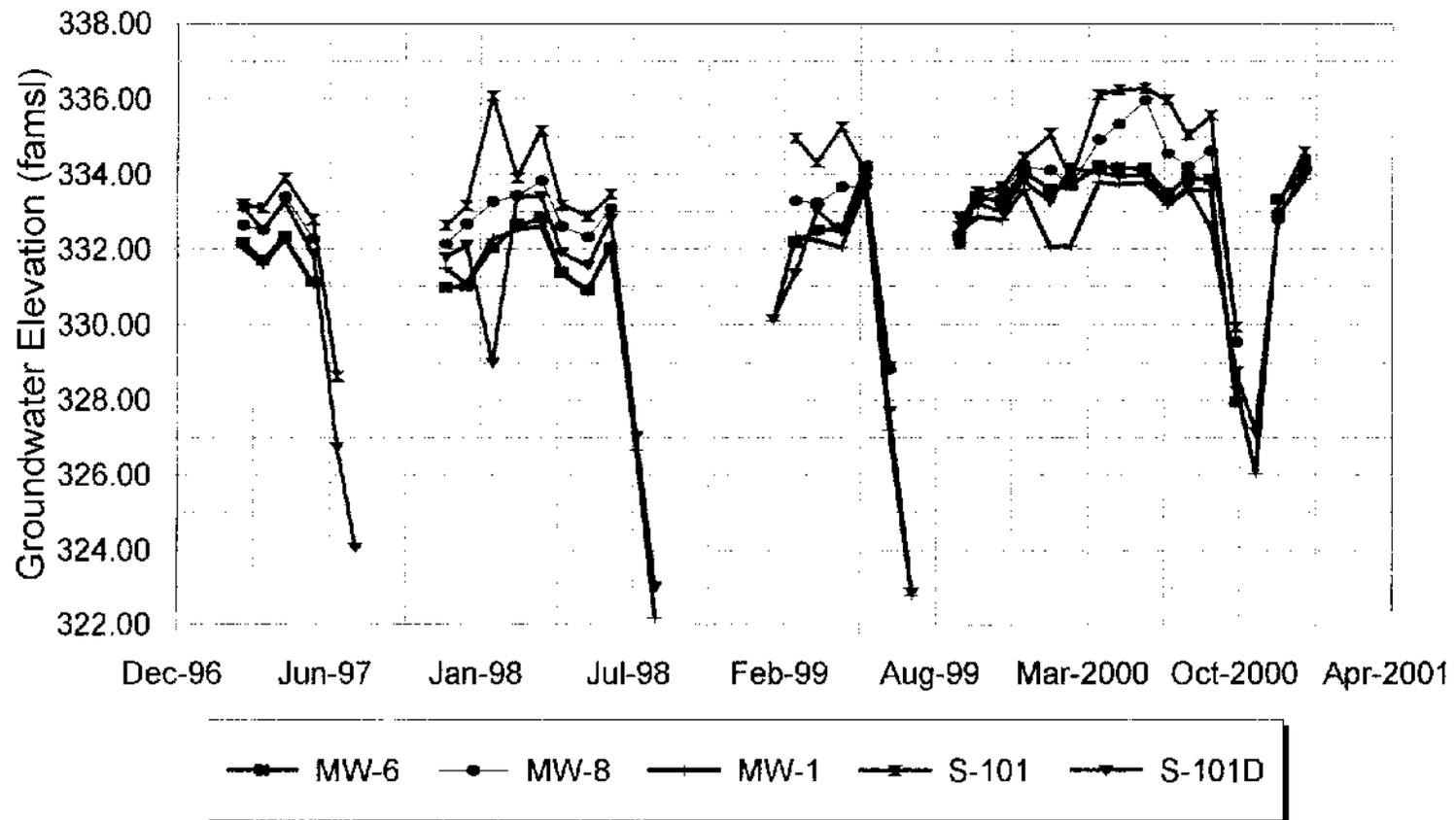
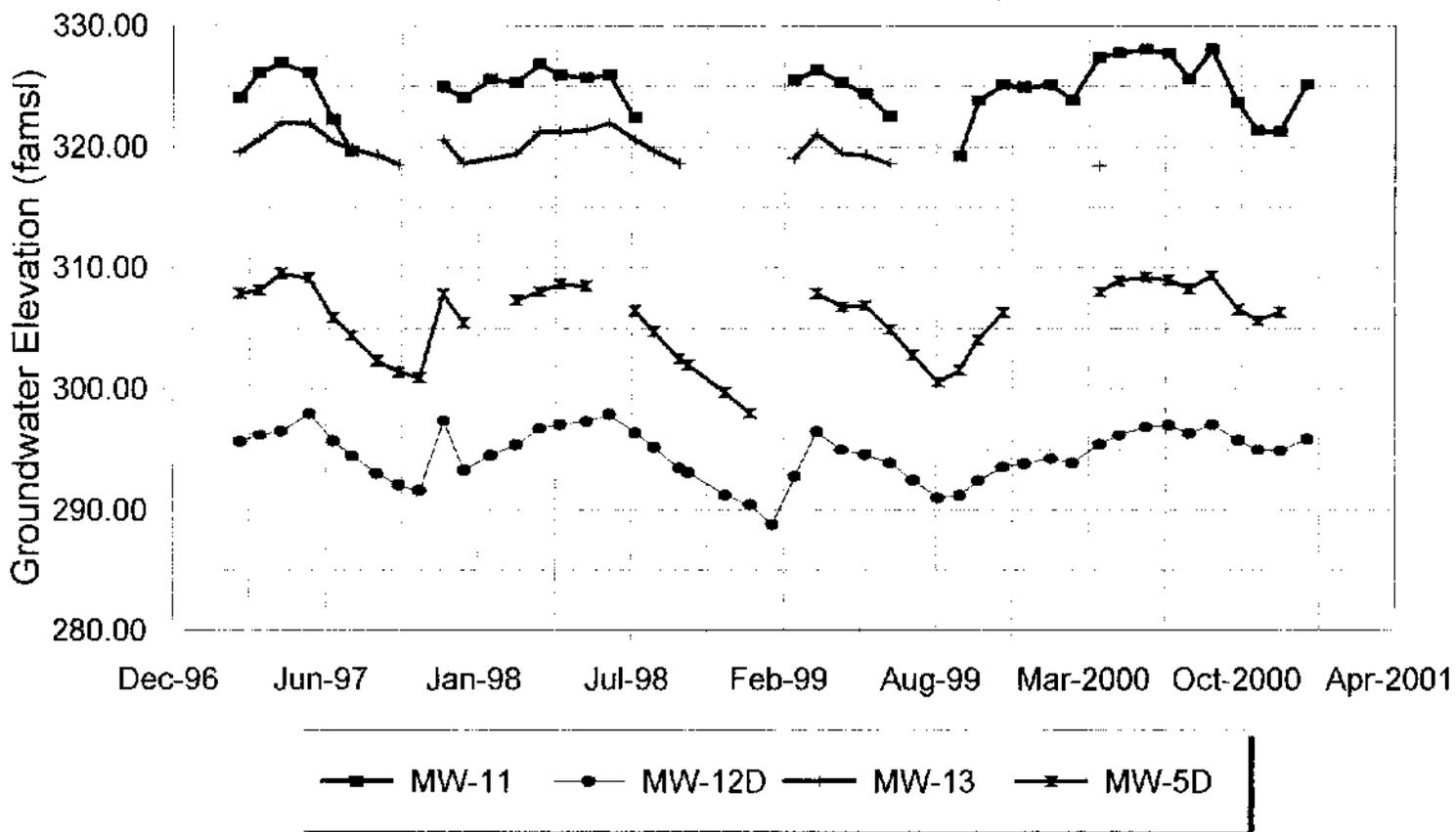


Figure 11 C.E. Bradley Laboratories

Water Level Elevations Downgradient



3.0 CONCLUSIONS AND RECOMMENDATIONS

The remedial systems have recovered a significant amount of VOCs from the ground at this site. We estimate that the SVE system has recovered approximately 90 gallons since its commencement of operations in September 1994. The SVE system recovery rate has declined markedly during the 5 years of operation. The SVE system was left "off-line" intentionally during the reporting period. The duration of time that the conditions necessary to operate the SVE system (i.e., low groundwater elevations) was limited (generally the month of October) during the reporting period.

The most recent groundwater test results indicate that contaminant concentrations are generally declining even at locations in the former tank farm. A spike in contaminant concentration was noted at MW-12D during April and July 2000, indicating some contaminant source remains. The groundwater quality at this location is very cyclic with higher concentrations coinciding with high groundwater elevations. The magnitude and duration of the most recent concentration "spike" appears to correlate with the extended high groundwater conditions experienced during the reporting period. Free product, which had been measurable in inches or feet in years past, was absent from the site during the reporting period except for films on the groundwater surface at OW-4 on seven of twelve measurement dates.

The available data indicates that the contaminant levels in the groundwater are stable or declining. Recent increases in contaminant levels noted in groundwater at MW-12D may be a result of greater than normal aquifer recharge conditions experienced during the reporting period following a relatively dry summer and fall of 1999.

We make the following specific recommendations in regard to the upcoming year.

- A. We recommend that the SVE system remain "off-line" during the upcoming year. The DEC recommended in a November 24, 1999 letter (Attachment 7) that a minimum 1 year post remedial groundwater quality monitoring commence from when the SVE system was shut down in the Fall of 1999 to determine if the concentrations of contaminants rebound after the remedial system is shut off. Additional data is needed to assess whether increases in contaminant concentrations at MW-12D are a result of "rebound" or due the cyclic nature of groundwater quality at the location and recent climatic conditions
- B. We recommended that the groundwater monitoring at the selected locations (MW-5D, MW-6, MW-8 and MW-12D) be continued at the current quarterly frequency.

- C. With respect to removal of this site from the active hazardous sites list, we understand that the site closure criteria will include at least: no groundwater enforcement standards exceedences at property line locations; stable or declining contaminant concentrations in groundwater within the property boundaries; existing remedial efforts having achieved negligible recovery rates; and an absence of measurable free product at all monitoring locations on the property.

The considerable progress that C.E. Bradley has made in site remediation during the past several years has advanced the sites' standing with respect to these criteria. There remain one outstanding criteria to be met: no enforcement standards exceedences at the property line (i.e. MW-12D).

When the groundwater quality at the downgradient property line meets the groundwater enforcement standards for a year or more, C.E. Bradley plans on submitting a petition to remove this site from the Vermont Active Hazardous Sites list.