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2001 Annual Report
Monitoring Events 18 and 19
Site 9: Neptune Drive Disposal Site
Naval Air Station, Brunswick, Maine

Contract No. N62472-92-D-1296
Contract Task Order No. 0047

U.S. NAVAL AIR STATION
BRUNSWICK, MAINE

Prepared for

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

EA Engineering, Science, and Technology
Southborough Technology Park
333 Turnpike Road, Route 9
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January 2003
FINAL
296.0047

2001 Annual Report
Monitoring Events 18 and 19
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23 January 2003

Alexander C. Easterday, P.G.
CTO Manager

Date

23 January 2003

Kenneth W. Kilmer
Program Manager

Date

January 2003
FINAL
296.0047

EA Engineering, Science, and Technology

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5 February 2003

Ms. Christine Williams
U.S. Environmental Protection Agency
Region 1
1 Congress Street, Suite 1100 (HBT)
Boston, Massachusetts 02114

Ms. Claudia Sait
Maine Department of Environmental Protection
State House, Station 17
Augusta, Maine 04333-0017

RE: Final 2001 Annual Report, Monitoring Events 18 and 19,
Site 9: Neptune Drive Disposal Site, Naval Air Station, Brunswick, Maine
Contract No. N62472-92-D-1296; Contract Task Order No. 0047
EA Project No. 29600.47

Dear Ms. Williams/Ms. Sait:

On behalf of the Department of the Navy, EA Engineering, Science, and Technology is pleased to submit the Final 2001 Annual Report for monitoring and sampling conducted at Site 9 (Neptune Drive Disposal Site). Response to regulator comments for the Monitoring Event 18 and 19 reports and the 2000 Annual Report are included as an appendix to this document.

If additional information is required, please contact me at (508) 485-2982, Extension 209, or Mr. Lonnie J. Monaco (610) 595-0567, Extension 164.

Sincerely,

Alexander Easterday

Alexander C. Easterday, P.G.
CTO Manager

ACE/caw
Enclosures

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QUALITY REVIEW STATEMENT

Contract No. N62472-92-D-1296 EA Project No.: 29600.47
Contract Task Order No. 0047
Activity: Naval Air Station, Brunswick, Maine

Description of Report/Deliverable:

Final 2001 Annual Report – Monitoring Events 18 and 19, Site 9: Neptune Drive Disposal Site, Naval Air Station, Brunswick, Maine

EA CTO Manager: Alexander C. Easterday, P.G.

In compliance with EA's Quality Procedures for review of deliverables outlined in the Quality Management Plan, this final deliverable has been reviewed for quality by the undersigned Senior Technical Reviewer(s). The information presented in this report/deliverable has been prepared in accordance with the approved Implementation Plan for the Contract Task Order (CTO) and reflects a proper presentation of the data and/or the conclusions drawn and/or the analyses or design completed during the conduct of the work. This statement is based upon the standards identified in the CTO and/or the standard of care existing at the time of preparation.

Senior Technical Reviewer

23 January 2003

Kevin Scully, LSP, P.G. (Date)
Hydrogeologist

QUALITY REVIEW STATEMENT

Contract No. N62472-92-D-1296 EA Project No.: 296.0047
Contract Task Order No. 47
Activity: Naval Air Station, Brunswick, Maine

Description of Report/Deliverable:

Final 2001 Annual Report – Monitoring Events 18 and 19, Site 9: Neptune Drive Disposal Site, Naval Air Station, Brunswick, Maine

EA CTO Manager: Alexander C. Easterday, P.G.

As per State of Maine Department of Professional and Financial Regulations, Title 32 Chapter 73, Law, the sections of this document related to geology and geologic data interpretation have been reviewed for its technical content by the undersigned State of Maine Certified Geologist.

Specifically, Chapters 2 and 3 and Figures 2-1 and 2-2 of this document have been reviewed by the undersigned for their geological interpretive content. This statement is based upon the review of the undersigned conducted during the preparation of this report, as dated below.

STATE OF MAINE
GINA M. CALDERONE
No. GE442
CERTIFIED GEOLOGIST

Certified Geologist Reviewer

Gina M. Calderone

23 January 2003
(Date)

Gina M. Calderone, CPG, CG
State of Maine Certified Geologist (No. GE442)

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1. INTRODUCTION

1.1 BACKGROUND

Under Contract No. N62472-92-D-1296, Contract Task Order No. 0047, Engineering Facility Activity Northeast, Naval Facilities Engineering Command contracted with EA Engineering, Science, and Technology to perform long-term monitoring at the Neptune Drive Disposal Site (Site 9), Naval Air Station (NAS), Brunswick, Maine. NAS Brunswick is located between the Androscoggin River and Middle Bay/Harpswell Cove approximately 1 mi southwest of Cooks Corner (Figure 1-1). The layout of Site 9 is shown on Figure 1-2.

NAS Brunswick is an active base owned and operated by the Federal government through the Department of the Navy. In 1987, NAS Brunswick was placed on the National Priorities List by the U.S. Environmental Protection Agency (EPA) and is currently part of the Navy's Installation Restoration Program. At Site 9, the Navy is performing long-term monitoring and maintenance as part of the long-term remedial actions required by the Final Record of Decision dated September 1999 (EA 1999a). In August 1999, the final Long-Term Monitoring Plan (LTMP) (EA 1999b) was established pursuant to the Final Record of Decision (EA 1999a). The LTMP serves as the basis for conducting long-term monitoring activities. The selected site remedy is natural attenuation with long-term monitoring and institutional controls. The major components of the selected remedy are described within the Final Record of Decision (EA 1999a).

1.2 LONG-TERM MONITORING PROGRAM

The LTMP establishes the requirement for monitoring, sampling, and analysis of ground water, surface water, and sediment, along with the implementation of institutional controls to prevent human contact with ground water in the Site 9 area.

The objective of the Long-Term Monitoring Program is to obtain data necessary to evaluate the long-term effectiveness of the remedial action (i.e., natural attenuation with long-term monitoring and institutional controls) conducted at Site 9. Monitoring and sampling data collected during the performance of long-term monitoring are being used to:

- Assess variations in the concentration of volatile organic compounds (VOCs) in ground water, surface water, and sediment to assess the effectiveness of natural attenuation. Vinyl chloride in ground water is the primary contaminant of concern at Site 9.

- Assess whether ground water downgradient of the Site 9 landfill is impacted by inorganics from the site.

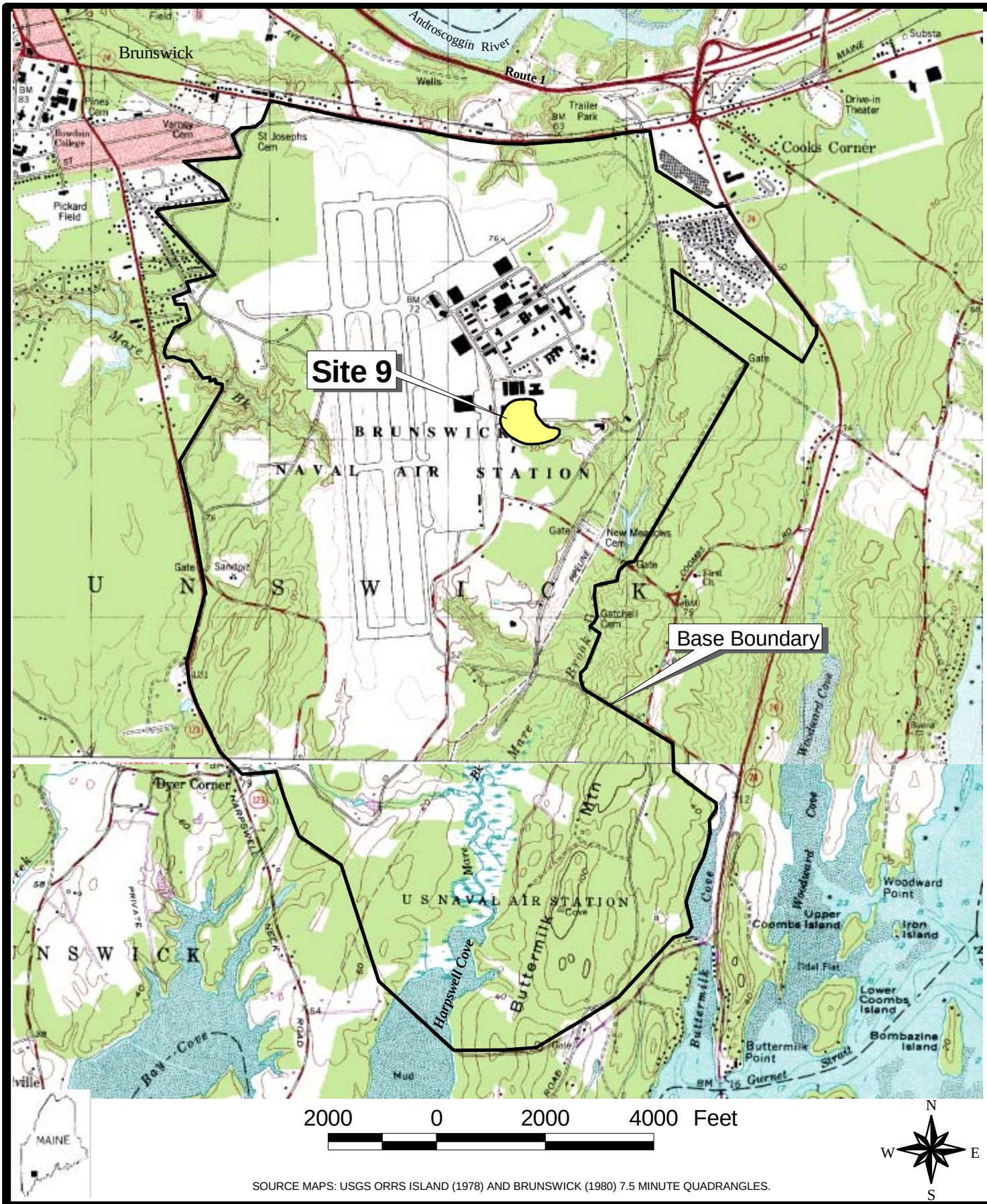
- Assess variations in the ground-water flow patterns.
- Monitor the structural integrity of the ground-water monitoring wells.

A summary of the sampling and gauging conducted during 2001 is provided in Table 1-1. Although not required by the LTMP, 9 monitoring wells at the Navy Exchange Service Station (NEX) site, where an active air sparging system is operating to address petroleum-impacted soil and ground water, were gauged as part of Monitoring Events 18 and 19 to assess ground-water flow patterns upgradient of Site 9. Ground-water elevation data were gathered to assess whether ground water from the NEX air sparging may be flowing toward Site 9. Results of ground-water gauging are presented in Section 2.1. Additional information on site gauging and sampling activities completed during 2001 can be found in the reports for Monitoring Events 18 and 19 for Site 9 (EA 2001, 2002). A complete description of site geologic conditions is not presented in this Annual Report, but can be found in the 1999 Annual Report for Site 9 (EA 2000). A geologic cross-section of the site is shown on Figure 1-3 to illustrate general site geology.

1.3 ANNUAL REPORT ORGANIZATION

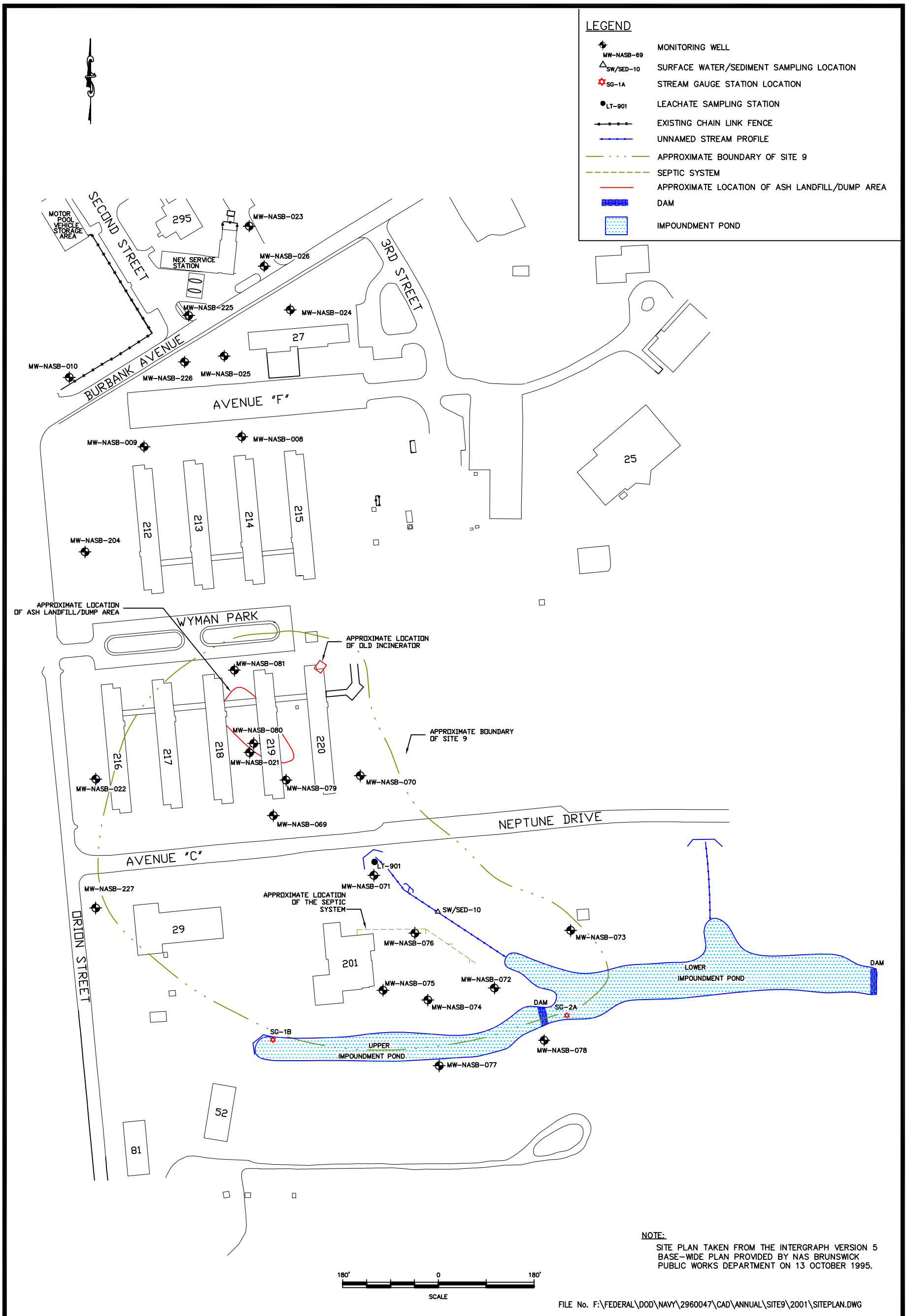
This 2001 Annual Report details project activities conducted as part of the Long-Term Monitoring Program at Site 9 during the two monitoring and sampling events of 2001. Monitoring Event 18 was completed during April 2001. Monitoring Event 19 was completed during October 2001. The data summary tables, ground-water contour maps, and VOC contour maps are only presented in the monitoring event reports. When these items are cited in the annual report text, a reference is made to the appropriate monitoring event report. The site geology and background sections have not changed since 1999 and, therefore, are not presented within annual reports. If new geologic information is generated that would allow for refinement of the conceptual model as presented in the Final Record of Decision for Site 9 (EA 1999a), this information would then be included in the future annual report covering the year in which the work was completed.

The format of the annual report is as follows. Chapter 1 provides an introduction and overview of the Long-Term Monitoring Program activities conducted at the site. Chapter 2 presents the results of the two monitoring events conducted during 2001. Chapter 3 presents conclusions and recommendations based on site data. Appendix A provides completed response to comments from the Maine Department of Environmental Protection and U.S. Environmental Protection Agency on the draft report. Graphs showing trends of data collected during the Long-Term Monitoring Program are presented in Appendix B. Appendix C provides responses to regulator comments received regarding the 2000 Annual Report and Monitoring Events 18 and 19.



SOURCE MAPS: USGS ORRS ISLAND (1978) AND BRUNSWICK (1980) 7.5 MINUTE QUADRANGLES.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY	NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE 1-1 SITE LOCATION MAP, SITE 9 (NEPTUNE DRIVE DISPOSAL SITE)					
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
PLN	BT	BT	PLN	AS SHOWN	1 AUGUST 2002	29600.47	I:\NASB_GIS \NAVY.APR



NOTE:
SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.

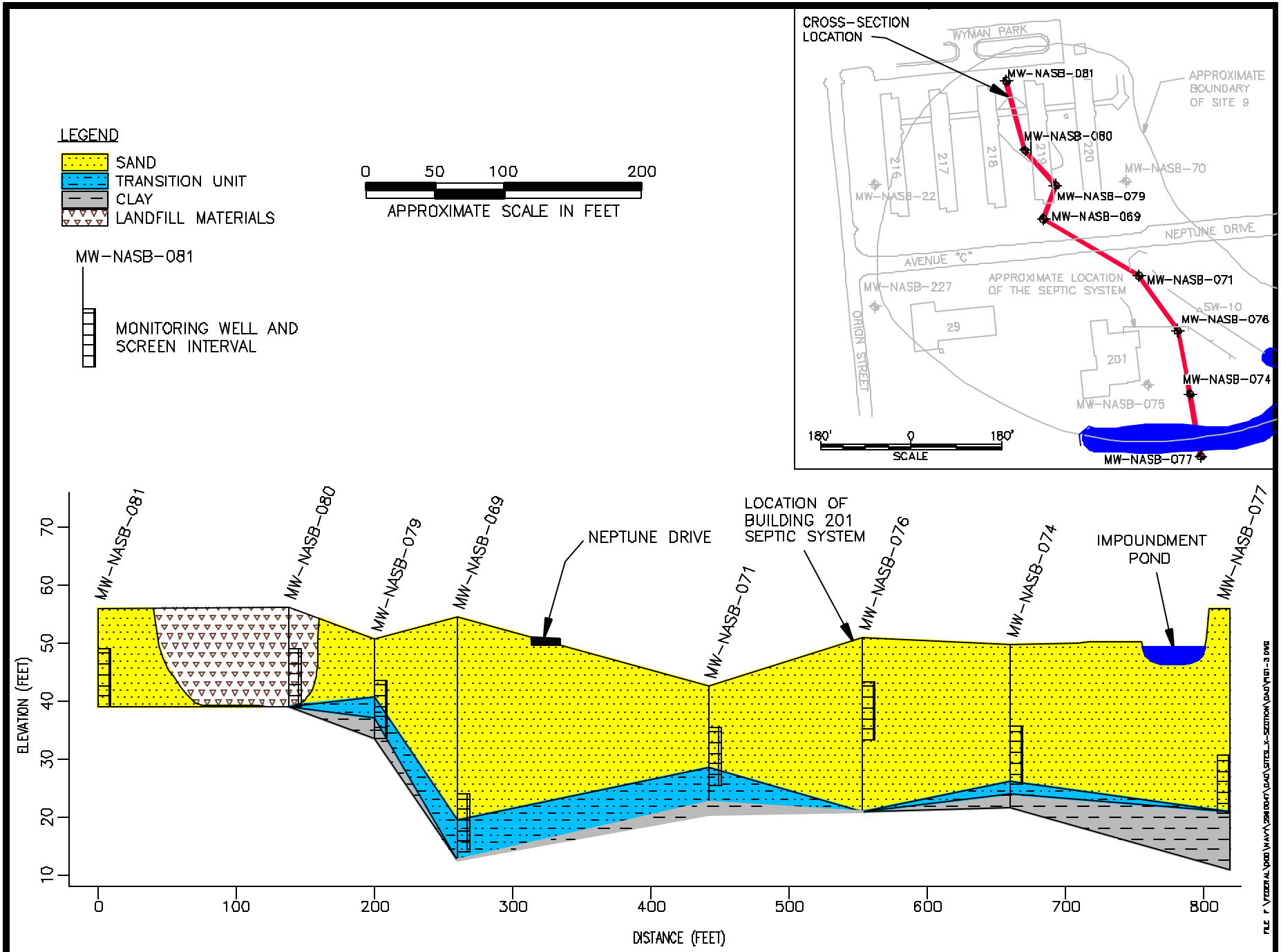
FILE No. F:\FEDERAL\DOD\NAVY\2960047\CAD\ANNUAL\SITE9\2001\SITEPLAN.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 9
(NEPTUNE DRIVE DISPOSAL SITE)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1-2
SITE PLAN

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
AE	SAP	SAP	GMC	1"=180'	8 APRIL 2002	29600.47	SITEPLAN



NOTE: VERTICAL EXAGGERATION = 5 TIMES

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 9
(NEPTUNE DRIVE DISPOSAL SITE)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1-3
GEOLOGIC CROSS-SECTION OF SITE 9

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
PLN	BT	BT	PLN	AS SHOWN	11 MAY 2000	29600.47	FIG1-3

TABLE 1-1 SUMMARY OF 2001 LONG-TERM MONITORING PROGRAM AT SITE 9, NAVAL AIR STATION, BRUNSWICK, MAINE

Well Designation	Previous Well Designation	2001 Sampling Dates	Sample Parameters		
			TCL VOC	TAL Elements/SVOC	Water Level Gauging[a]
Monitoring Wells					
MW-NASB-069	MW-901	April, October	X	X[b]	X
MW-NASB-070	MW-902	April, October	---	X[b]	X
MW-NASB-071	MW-903	April, October	X	---	X
MW-NASB-072	MW-904	April, October	X	---	X
MW-NASB-073	MW-905	Not sampled	---	---	X
MW-NASB-074	MW-906	April, October	X	---	X
MW-NASB-075	MW-907	April, October	X	---	X
MW-NASB-076	MW-908	April, October	X	---	X
MW-NASB-077	MW-909	Not sampled	---	---	X
MW-NASB-078	MW-910	Not sampled	---	---	X
MW-NASB-079	MW-914	October	---	X[b]	X
MW-NASB-080	MW-915	April, October	X	---	X
MW-NASB-081	MW-916	Not sampled	---	---	X
MW-NASB-021	None	April, October	X	---	X
MW-NASB-022	None	April, October	X	---	X
MW-NASB-204	None	Not sampled	---	---	X
MW-NASB-227	None	April, October	X	---	X

Sample Location	2001 Sampling Dates	Sample Parameters		
		TCL VOC	TAL Elements	Water Level Gauging
Seep Station				
LT-901 (SEEP)	April, October	X	NR	---
Surface Water				
SW-010	April, October	X	NR	---
Sediment				
SED-010	April, October	X	NR	---
Surface Water Impoundment				
SG-01B	Not sampled	---	---	X
SG-02A	Not sampled	---	---	X

(a) Water level gauging was conducted during March and October 2001.
(b) Sample was analyzed for semivolatile organic compounds by the U.S. Environmental Protection Agency (EPA) Method 8270C.

NOTE: TCL = Target Compound List.
VOC = Volatile organic compounds by EPA Method 8260.
TAL = Target Analyte List by EPA Method 6010/7000.
SVOC = Semivolatile organic compounds.
Nine Naval Exchange Service Station monitoring wells were gauged during April and October 2001, although they are not part of Site 9.
Dashes (---) indicate sample parameter was not collected.
Sample locations, frequency, and collection methods for 2001 were implemented in accordance with the Final Long-Term Monitoring Plan (EA 1999b). Analytical methods and detection limits were established in the Final Record of Decision (EA 1999a).

2. LONG-TERM MONITORING PROGRAM RESULTS—2001

2.1 WATER LEVEL GAUGING PROGRAM

During the two monitoring events that occurred in 2001 (Monitoring Events 18 and 19), 17 ground-water monitoring wells at Site 9 were gauged to obtain depth to water. Well gauging was conducted as part of bi-annual sampling events completed on 25 April and 26 October 2001. Eight additional monitoring wells associated with the NEX were gauged as part of Monitoring Events 18 and 19 to assess ground-water flow patterns upgradient of Site 9. A summary of 2001 gauging data is presented in the reports for Monitoring Events 18 and 19 (EA 2001, 2002).

The interpreted water table contour maps for Monitoring Events 18 and 19 are included as Figures 2-1 and 2-2.

2.2 GROUND-WATER MONITORING AND SAMPLING PROGRAM

Ground-water samples were collected during Monitoring Events 18 and 19 from monitoring wells at Site 9. A summary of the wells included in the Long-Term Monitoring Program at Site 9 is provided in Table 1-1.

Summaries of compounds/analytes detected in ground-water samples collected during the two sampling events, and those listed as contaminants of concern for Site 9, are provided in Appendix A of the reports for Monitoring Events 18 and 19. The analytical results of ground-water samples were compared against the State of Maine's Maximum Exposure Guidelines (MEGs) and Federal Maximum Contaminant Levels (MCLs) to assess whether analytes detected in site ground-water samples exceeded applicable regulatory criteria.

2.2.1 Volatile Organic Compounds

Vinyl chloride was reported at concentrations above the corresponding Federal MCL and/or State MEG in samples from 3 monitoring wells sampled during 2001 (MW-NASB-069, MW-NASB-076, and MW-NASB-080). During the April 2001 sampling event, vinyl chloride was detected at concentrations of 53 µg/L in MW-NASB-069, 57 µg/L in the duplicate sample from MW-NASB-069, and 2J µg/L in MW-NASB-076. In October 2001, vinyl chloride was detected at a concentration of 55 µg/L in monitoring well MW-NASB-069 and 63 µg/L in the duplicate sample collected at MW-NASB-069 (the highest reported vinyl chloride concentration detected in 2001). Vinyl chloride was detected at concentrations of 2 µg/L and 9 µg/L in MW-NASB-076 and MW-NASB-080, respectively, in October 2001.

No other VOCs were reported above the MEG or MCL in the samples collected during 2001 sampling activities. Graphs showing VOC trends for Monitoring Events 1 through 19 are presented in Appendix A. Note that contaminants detected in the associated method blank have not been used when calculating the total VOC values. VOC results are summarized in Appendix A of the reports for Monitoring Events 18 and 19.

VOC indicators of natural attenuation assessed during 2001 and throughout the LTMP include vinyl chloride trends over the Long-Term Monitoring Program and the ratio of vinyl chloride to 1,2-dichloroethene (DCE) over time.

2.2.2 Vinyl Chloride Trend Data

Figure 2-3 illustrates total VOC and vinyl chloride trends for long-term monitoring data collected between 1995 and 2001 for the 7 monitoring wells in which vinyl chloride concentrations were detected in samples collected for analysis. Regression analyses of vinyl chloride data are presented for the 1995-2001 time period, and separately for 1999-2001 data, to illustrate changing trends with time. The table below summarizes the trends as indicated by the least-mean square regression analyses shown on Figure 2-3:

Vinyl Chloride Trends			
Well	1995–2001	1999–2001	2001
MW-NASB-069	Increasing	Increasing	Increasing
MW-NASB-071	Steady at non-detection	Steady at non-detection	Steady at non-detection
MW-NASB-072	Decreasing	Steady at non-detection	Steady at non-detection
MW-NASB-074	Decreasing	Steady at non-detection	Steady at non-detection
MW-NASB-075	Decreasing	Steady at non-detection	Steady at non-detection
MW-NASB-076	Increasing	Increasing	Increasing
MW-NASB-080	Steady	Increasing	Increasing

2.2.3 Vinyl Chloride/Total Dichloroethene Ratio

The assessment of the vinyl chloride/DCE ratio provides a measure of the rate of dechlorination in ground water as noted by changing concentrations of the parent-daughter compounds. A decreasing concentration of total DCE (parent compound) and an increasing concentration of vinyl chloride (daughter product) indicated the rate of the dechlorination process is increasing. Figure 2-4 shows trend data for the ratio of vinyl chloride to total DCE for Monitoring Events 1 through 19 for wells where both compounds were detected in samples. Figure 2-5 illustrates the sum of vinyl chloride and 1,2-DCE concentrations from Site 9 monitoring wells for the long-term monitoring and sampling program from 1995 through 2001. The table below summarizes the trends in the vinyl chloride to total DCE ratios as shown on Figure 2-4:

Vinyl Chloride to DCE Ratio	
Well	1995-2001 Trend
MW-NASB-069	Increasing
MW-NASB-072	Increasing
MW-NASB-074	Decreasing
MW-NASB-075	Decreasing
MW-NASB-076	Increasing
MW-NASB-080	Increasing

Figure 2-5 shows the sum of vinyl chloride concentrations (daughter compound) and total 1,2-DCE concentrations (parent compound) between 1995 and 2001. The concentrations of both compounds have been increasing on an annual basis. The analysis of the October 2001 data showed a slight decrease in total 1, 2-DCE concentrations, however, vinyl chloride has shown a sustained rate of increase based on data from the previous four monitoring events (i.e., April 1999 through October 2001). Note that the majority of the increases in vinyl chloride concentrations illustrated on Figure 2-5 are the result of increases at one monitoring point (MW-NASB-069).

NEX is located upgradient of Site 9 and is believed to have an impact on Site 9 ground-water geochemical conditions. Although no chlorinated VOC source has been identified at or near the NEX, the influx of oxygen-reduced ground water into Site 9 due to the presence of petroleum products in soil and ground water may create favorable conditions for dechlorination at Site 9. These petroleum releases were being further investigated in 2002 and the data collected in those efforts will be reviewed to assess whether these releases may be a contributing factor in the vinyl chloride peaks that have been observed at MW-NASB-069 beginning in 1997.

2.2.4 Semivolatile Organic Compounds

No semivolatile organic compounds were detected in the ground-water samples collected during Monitoring Events 18 and 19.

2.2.5 Inorganic Analytes

Inorganic analytes were reported in each of the samples collected from 3 wells (MW-NASB-069, MW-NASB-070, and MW-NASB-079) analyzed for metals during the 2001 monitoring events. The concentration of three inorganic analytes (iron, manganese, and aluminum) was detected above the corresponding State MEG and/or Federal MCL during both sampling events in 2001. Iron was detected in excess of the Federal MCL in samples collected from monitoring wells MW-NASB-069, MW-NASB-069 (duplicate), and MW-NASB-079 at concentrations of 407 µg/L, 337 µg/L, and 13,900 µg/L, respectively, during the April 2001 sampling event. Iron was detected in excess of the Federal MCL in samples collected from monitoring wells MW-NASB-069, MW-NASB-069 (duplicate), and MW-NASB-079 at concentrations of 4,510 µg/L, 542 µg/L, and 29,600 µg/L, respectively, during the October 2001 sampling event. Manganese was detected at concentrations of 488 µg/L and 521 µg/L in monitoring well MW-NASB-069 in April

and October 2001, respectively. The duplicate samples collected at MW-NASB-069 had similar detected concentrations of manganese at 516 µg/L and 434 µg/L in April and October 2001, respectively. Manganese was detected above the Federal MCL in monitoring wells MW-NASB-070 and MW-NASB-079 (203 µg/L and 77.4 µg/L, respectively) during the April 2001 sampling event. Manganese was detected above the Federal MCL in monitoring wells MW-NASB-070 and MW-NASB-079 (1,460 µg/L and 144 µg/L, respectively) during the October 2001 sampling event. Aluminum was detected above the State MEG and Federal MCL in well MW-NASB-069 during the October 2001 sampling event. The inorganic results are summarized in Appendix A of the reports for Monitoring Events 18 and 19.

2.3 SURFACE WATER, SEDIMENT, AND SEEP SAMPLING

Surface water and sediment samples were collected from one location (SW-10/SED-010) during the 2001 monitoring events along the northern unnamed stream. A seep sample was collected from one location (LT-901) during each of the 2001 monitoring events. Table 1-1 summarizes the surface water, sediment, and seep sampling and analytical program completed at Site 9 in 2001.

2.3.1 Surface Water Sample

Vinyl chloride was not detected in surface water sample SW-010 during Monitoring Events 18 and 19. One VOC (1,2-DCE) was detected in surface water sample SW-010 at a concentration of 0.7J µg/L during Monitoring Event 19. No other VOCs were detected in the surface water samples collected during Monitoring Events 18 and 19. A summary of analytical results for surface water samples collected during 2001 is provided in Appendix A in the reports for Monitoring Events 18 and 19.

2.3.2 Sediment Sample

Vinyl chloride was detected at 3 µg/L in the sediment sample collected during Monitoring Event 18. Four VOCs (acetone, methylene chloride, total 1,2-DCE, and carbon disulfide) were detected in sediment sample SED-10 collected during Monitoring Event 18. Seven VOCs (total 1,2-DCE, acetone, carbon disulfide, chloroform, dibromochloromethane, methylene chloride, and trichloroethene) were detected in sediment sample SED-10 collected during Monitoring Event 19. It should be noted that bromoform was detected in the sediment sample during the October 2001 sampling event, however, the laboratory stated in their narrative that this is due to preservative contamination.

A summary of analytical results for sediment samples collected during 2001 is provided in Appendix A in the reports for Monitoring Events 18 and 19.

2.3.3 Seep Sample

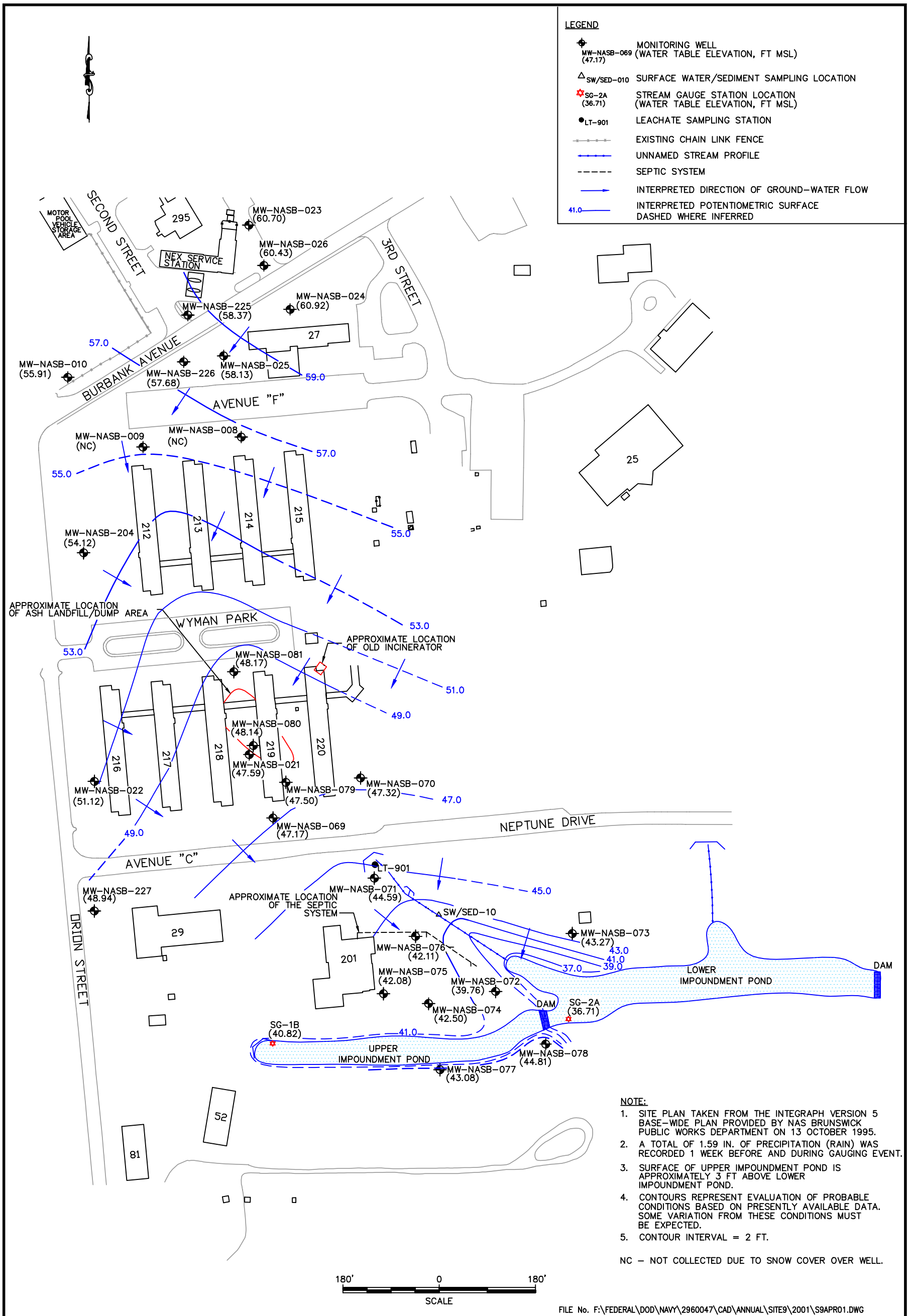
There were no reported concentrations of vinyl chloride in the seep samples collected during 2000. One VOC analyte (methylene chloride) was detected in the samples collected during Monitoring Event 19. A summary of analytical results for seep samples collected at sample station LT-901 is provided in Appendix A in the reports for Monitoring Events 18 and 19.

2.4 VISUAL INSPECTION

Site inspection activities were completed during the 2001 monitoring events by an engineer in accordance with the procedures established by the LTMP (EA 1999b). Site inspection activities included the following:

- Inspection of the ground surface for evidence of stressed vegetation
- Inspection of the onsite ground-water monitoring wells
- Inspection of the stream channel for evidence of additional seeps.

On 24 April and 25 October 2001, a site inspection was completed by an engineer in accordance with the LTMP (EA 1999b). Copies of the site inspection reports are provided in the reports for Monitoring Events 18 and 19.



NOTE:

1. SITE PLAN TAKEN FROM THE INTEGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. A TOTAL OF 1.59 IN. OF PRECIPITATION (RAIN) WAS RECORDED 1 WEEK BEFORE AND DURING GAUGING EVENT.
3. SURFACE OF UPPER IMPOUNDMENT POND IS APPROXIMATELY 3 FT ABOVE LOWER IMPOUNDMENT POND.
4. CONTOURS REPRESENT EVALUATION OF PROBABLE CONDITIONS BASED ON PRESENTLY AVAILABLE DATA. SOME VARIATION FROM THESE CONDITIONS MUST BE EXPECTED.
5. CONTOUR INTERVAL = 2 FT.

NC – NOT COLLECTED DUE TO SNOW COVER OVER WELL.

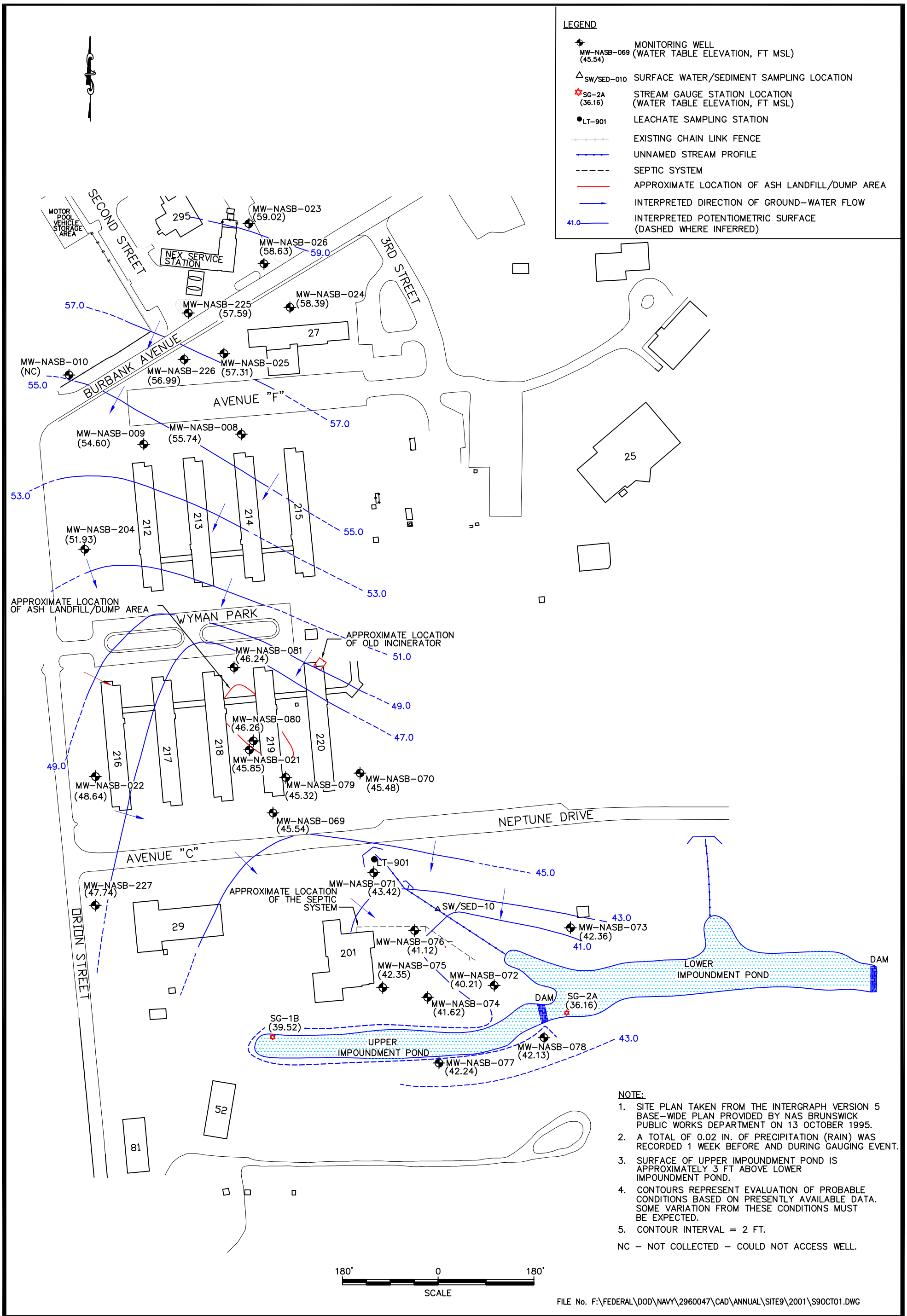
FILE No. F:\FEDERAL\DOD\NAVY\2960047\CAD\ANNUAL\SITE9\2001\S9APR01.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 9
(NEPTUNE DRIVE DISPOSAL SITE)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2-1
INTERPRETED POTENTIOMETRIC SURFACE ELEVATIONS, 2 APRIL 2001 WELL GAUGING DATA

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
AE	SAP	SAP	SYC	AS SHOWN	8 APRIL 2002	29600.47	S9APR01



NOTE:

1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. A TOTAL OF 0.02 IN. OF PRECIPITATION (RAIN) WAS RECORDED 1 WEEK BEFORE AND DURING GAUGING EVENT.
3. SURFACE OF UPPER IMPOUNDMENT POND IS APPROXIMATELY 3 FT ABOVE LOWER IMPOUNDMENT POND.
4. CONTOURS REPRESENT EVALUATION OF PROBABLE CONDITIONS BASED ON PRESENTLY AVAILABLE DATA. SOME VARIATION FROM THESE CONDITIONS MUST BE EXPECTED.
5. CONTOUR INTERVAL = 2 FT.

NC – NOT COLLECTED – COULD NOT ACCESS WELL.

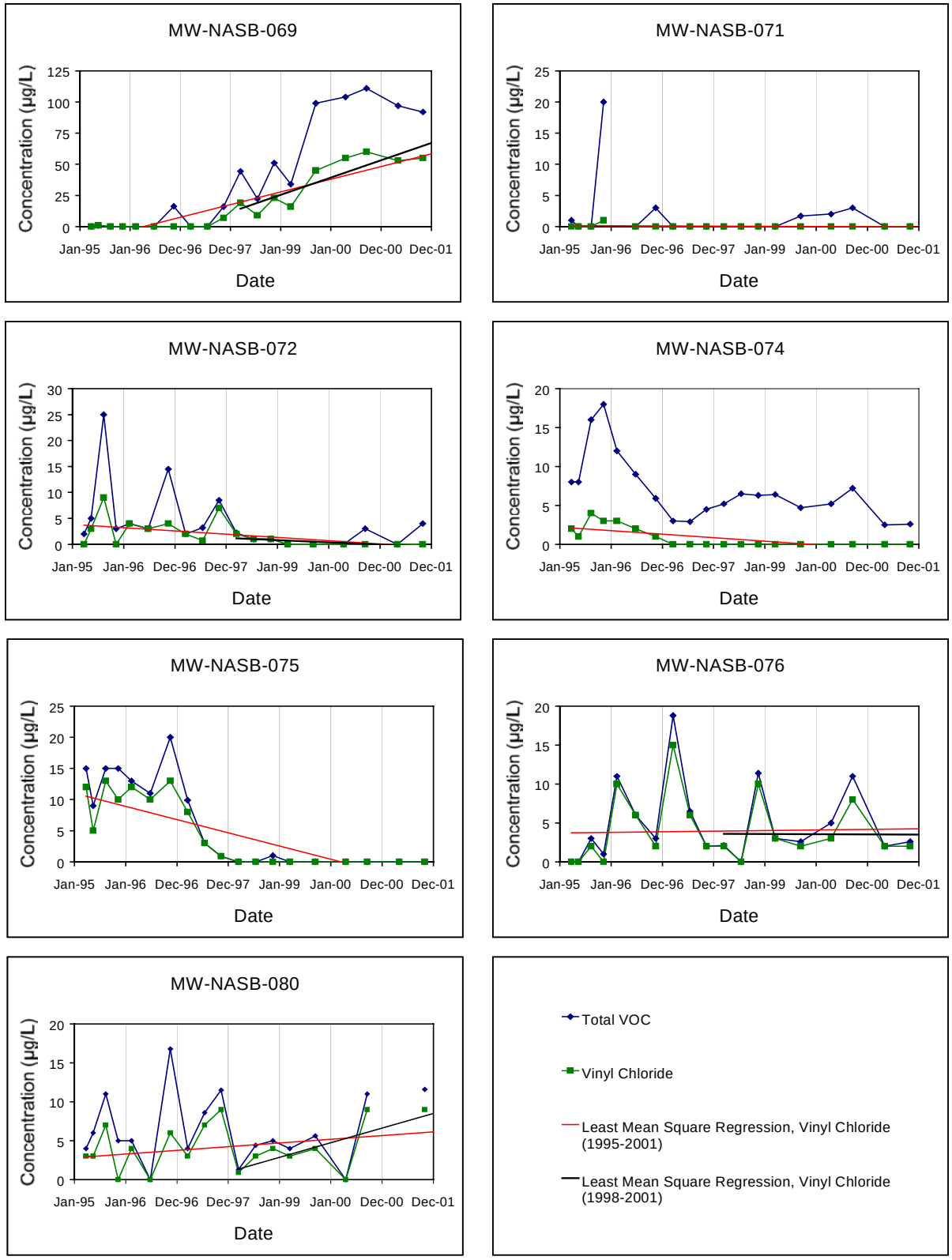
FILE No. F:\FEDERAL\DOD\NAVY\2960047\CAD\ANNUAL\SITE9\2001\S9OCT01.DWG

EA ENGINEERING, SCIENCE, AND TECHNOLOGY

SITE 9
(NEPTUNE DRIVE DISPOSAL SITE)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 2-2
INTERPRETED POTENTIOMETRIC SURFACE ELEVATIONS, 30 OCTOBER 2001 WELL GAUGING DATA

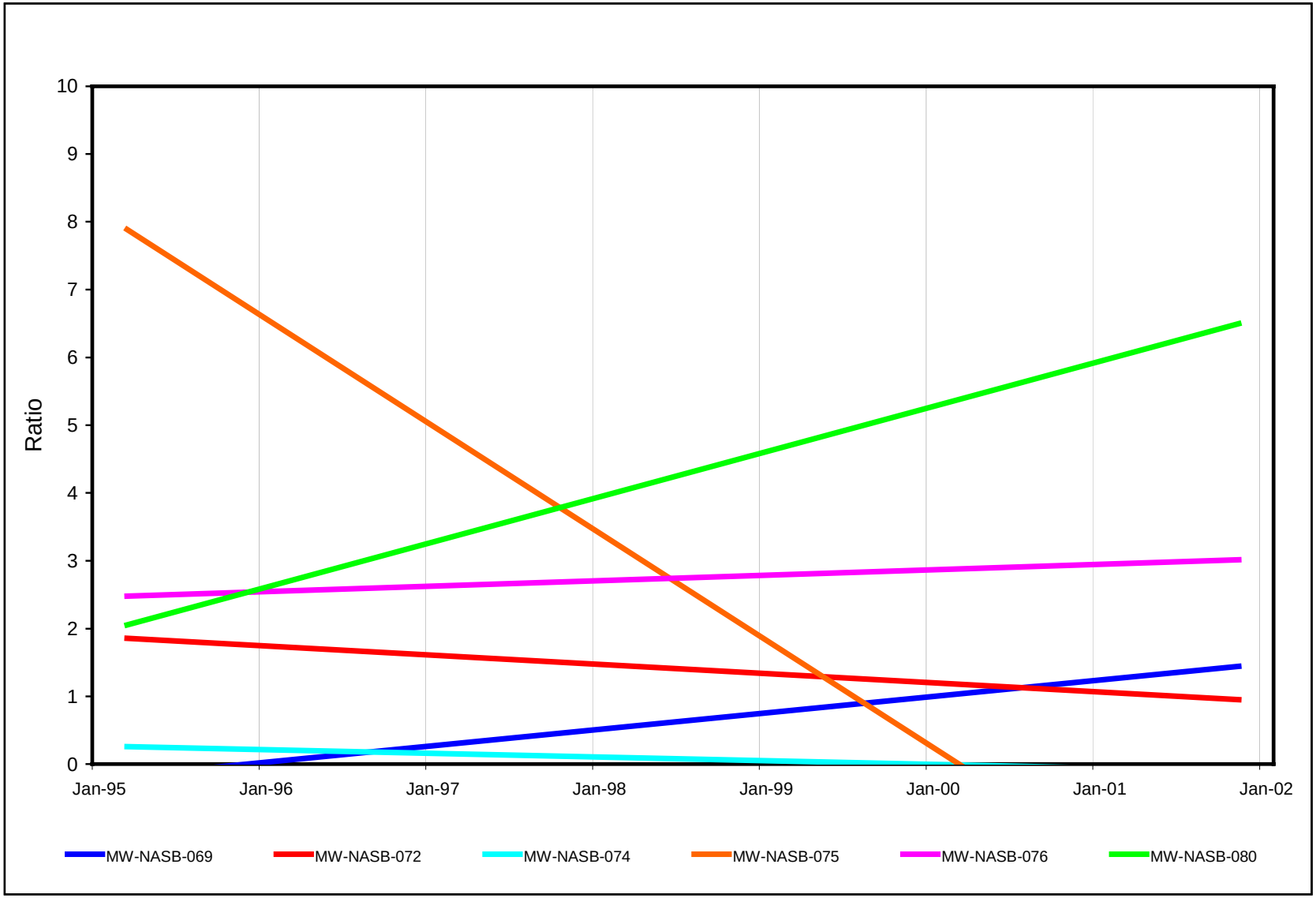
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
AE	SAP	SAP	AE/GMC	AS SHOWN	8 APRIL 2002	29600.47	S9OCT01



F:\Federal\DoD\Navy\2960047\ANNUAL\2001\Site 9\Charts\FIG2-3.DOC

NOTE: Vinyl chloride concentrations less than the detection limit (2 µg/L) are plotted as a zero concentration on these charts. MW-NASB-080 graph scale enlarged to show vinyl chloride trends. Acetone concentration detected in February 1996 is considered laboratory contaminant and is shown off graph scale.

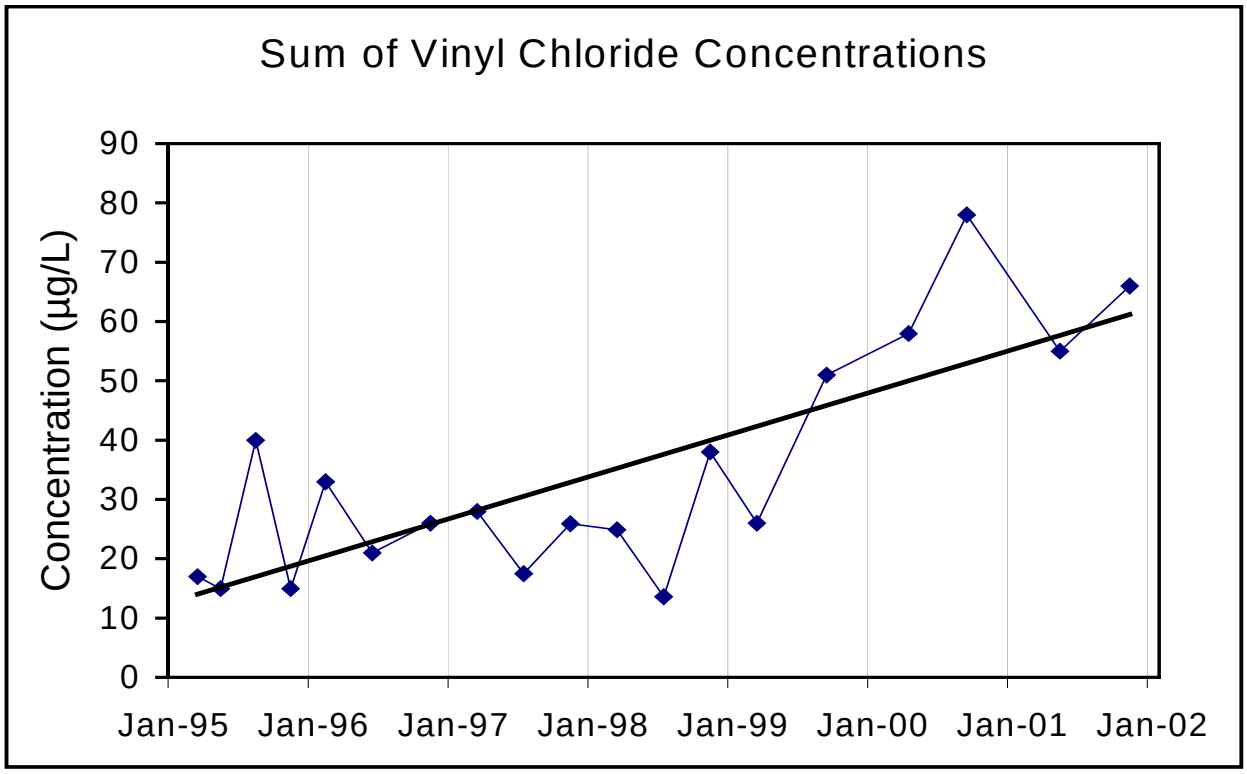
Figure 2-3. Total volatile organic compounds and vinyl chloride trends, 1995-2001.

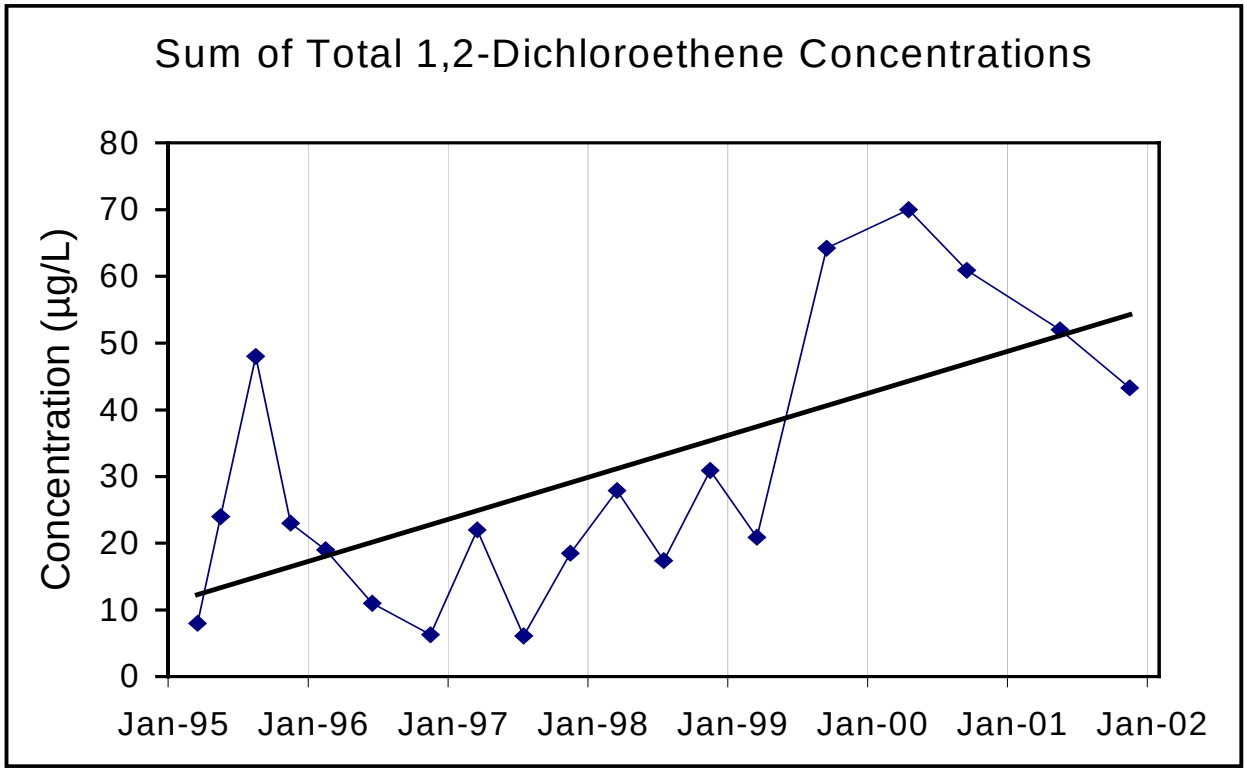


F:\Federal\DoD\Navy\2960047\ANNUAL\2001\Site 9\Charts\Fig2-4.doc

NOTE: Higher vinyl chloride/total 1,2 -dichloroethene ratio indicates increasing dechlorination.
Lines show least mean square regression based on ratios of vinyl chloride to total 1,2-dichloroethene.

Figure 2-4. Vinyl chloride/total 1,2-dichloroethene ratio trends, Monitoring Events 1 through 19.





F:\Federal\DoD\Navy\2960047\ANNUAL\2001/Site 9/Charts\Fig2-5.doc

Analyte concentrations less than the sample detection limit (2µg/L) were summed as zero concentrations in these graphs.

Figure 2-5. Sum of vinyl chloride and 1,2-dichloroethene, total concentration, 1995-2001.

3. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

3.1 SUMMARY AND CONCLUSIONS

3.1.1 Water Level Gauging Program

Results of the water level gauging program conducted during 2001 indicate that ground-water flow is generally to the south at Site 9, toward the unnamed stream located south of Neptune Drive. Based on seven rounds of gauging data collected from monitoring wells at the NEX, the interpreted flow pattern within the NEX site, which is upgradient of Site 9, is to the southwest; however, the ground-water flow curves to the southeast over a distance of 500 ft and enters into the northern area of Site 9. The interpreted hydraulic gradient shows an increasing gradient to the south. The steepest hydraulic gradients are observed in the vicinity of the northern and southern branches of the unnamed stream and in the vicinity of the impoundment ponds. This is consistent with previous gauging results.

Based on data collected during 2001, the following observations are noted:

- Shallow ground water north of Neptune Drive is likely to flow toward the northern branch of the unnamed streams and associated branch of the lower impoundment pond. Ground-water flow from the portion of Site 9 that is west and immediately south of Building 201 is likely to flow toward the upper impoundment pond. Ground-water flow to the north toward the upper impoundment pond is consistently observed south of the pond based on ground-water elevations collected at MW-NASB-077 and MW-NASB-078 south of Site 9. It is suspected that the quality of shallow ground water south of the pond is not linked to the quality of shallow ground water north of the pond.

3.1.2 Ground-Water Monitoring and Sampling Program

Water Quality Parameters

Water quality parameters, including pH, conductivity, temperature, dissolved oxygen, and turbidity, were measured during well purging. Although not required, oxidation-reduction potential (Eh) was recorded for informational purposes. Based on data collected during 2001, the following observations are noted:

- In a comparison of 2001 to 2000 dissolved oxygen data, 1 of 11 wells (MW-NASB-227) noted increased dissolved oxygen concentrations for Monitoring Events 16 through 19. The dissolved oxygen concentrations measured in the remaining wells decreased or remained at a constant level between the Monitoring Event 16 and Monitoring Event 19 sampling events. The measured concentrations of dissolved oxygen in the NEX wells and in the areas north of Building 201 were similar.

- A comparison of Eh trend values for 2000 and 2001 shows a mix of increasing and decreasing values. The Site 9 trend of Eh was increasing, with 7 wells exhibiting increased levels of Eh and 4 wells exhibiting decreasing Eh values as a year over year comparison.

Volatile Organic Compound Concentrations

The results of the ground-water sampling and analysis program conducted at Site 9 during 2001 indicate the following:

- The most notable trend indicated by the sampling of the onsite monitoring wells was the continued increase in vinyl chloride concentrations at 3 monitoring wells at Site 9 (MW-NASB-069, MW-NASB-076, and MW-NASB-080). These wells are located within the central portion of Site 9, and have shown increases in vinyl chloride concentrations throughout the duration of the Long-Term Monitoring Program (1995-1999), with elevated concentrations in 1999 and 2000. Monitoring wells outside this central portion of Site 9 generally show steady non-detections of vinyl chloride, or decreasing vinyl chloride concentrations.

- The breakdown of 1,2-DCE to vinyl chloride in the central portion of Site 9 is suspected to be the reason for increasing concentrations of vinyl chloride at these monitoring wells. However, this breakdown process is currently being evaluated by the Navy in order to determine whether the dissolved phase petroleum hydrocarbon plume from the NEX is enhancing reductive dechlorination at Site 9. This relationship will also be further discussed in a forthcoming separate NEX site evaluation report.

- It is possible that favorable geochemical conditions exist in the vicinity of MW-NASB-069, which promotes reductive dechlorination, thereby causing elevated concentrations of vinyl chloride at this sampling location. The decrease in vinyl chloride concentrations at MW-NASB-076 (located downgradient of MW-NASB-069) may be the result of volatilization and natural attenuation of vinyl chloride as ground water moves through the unconsolidated aquifer. Although the specific reason for the increase in vinyl chloride concentrations cannot be identified conclusively, non-detections for vinyl chloride are noted at monitoring wells near the impoundment ponds (MW-NASB-072, MW-NASB-074, and MW-NASB-075), indicating that vinyl chloride is being naturally attenuated to nominal concentrations.

- Data results suggest dechlorination of 1,2-DCE into vinyl chloride has accelerated during 2001 at Site 9, as illustrated by the following observations:

  — The ratio of vinyl chloride to 1,2-DCE is increasing at the majority of locations where these compounds were detected (Figure 2-2). However, these data should be considered general trend indicators for dechlorination because calculation of the vinyl

chloride to 1,2-DCE ratio is sensitive to a number of factors, including the low concentrations of vinyl chloride and 1,2-DCE that have been reported at Site 9, the variability that may be present due to laboratory methods, and the significant amount of variability of the site data. Despite these sensitive factors, the overall continued increasing ratios in the wells with the highest detected concentrations at Site 9 indicate dechlorination is occurring at Site 9.

- The net sum of the concentrations of vinyl chloride and 1,2-DCE in all study area wells is increasing at a similar rate as shown on Figure 2-5. Regression lines through these data points are similar for total 1,2-DCE and vinyl chloride. The increasing trend for parent and daughter compounds based on data collected between 1995 and 2001 strongly suggest that the increase in vinyl chloride is related to the increase in 1,2-DCE concentrations. Dechlorination of 1,2-DCE and the subsequent formation of vinyl chloride appears to be occurring at a similar rate. The source of the 1,2-DCE at Site 9 is not apparent, but may be related to changing geochemical conditions at the NEX, which have affected ground-water chemistry at Site 9. The presence of petroleum at the NEX site (upgradient of Site 9) may be enhancing co-metabolism of chlorinated compounds, thereby increasing dechlorination of parent compounds into 1,2-DCE and vinyl chloride. Based on long-term monitoring data, the increase in 1,2-DCE concentrations appears to be limited to the ground water present in the central portion of Site 9, and no wider scale impacted area appears to be present.

- Ground water moving onto Site 9 from the west (i.e., from the area near MW-NASB-227) does not appear to be contributing approximately 2-3 μg/L of 1,2-DCE to Site 9. Ground water that originates from the area to the west of Site 9 does not appear to be moving toward wells with the highest concentrations of vinyl chloride (MW-NASB-069). Based on these observations, a significant source of 1,2-DCE at the western boundary of Site 9 does not appear to be likely. This topic is planned for further discussion at an upcoming technical meeting.

- Elevated levels of VOCs and vinyl chloride concentrations followed by decreasing concentrations have been observed in samples from site wells throughout the Long-Term Monitoring Program (Appendix A). Similar patterns are expected to continue. These elevated levels may be related to petroleum releases at the NEX, which then affects Site 9 ground-water chemistry at a later date.

- Based on ground-water data collected during 2001, the vinyl chloride plume at Site 9 is limited to the central portion of the site. Monitoring wells in the long-term monitoring network appear to be well positioned to assess changes in vinyl chloride concentrations north of the impoundment ponds. Therefore, if elevated concentrations of vinyl chloride were to occur in areas downgradient of MW-NASB-069, the existing monitoring well network is likely to effectively track changes in ground-water concentrations of VOCs.

Inorganic Concentrations

The results of the ground-water sampling and analysis program conducted at Site 9 during 2001 indicate the following:

- Results of samples from the portion of Site 9 downgradient of the landfill reported elevated concentrations of iron above the Federal MCL in MW-NASB-069, MW-NASB-069 duplicate, and MW-NASB-079 in April and October 2001; manganese above the corresponding MEG and/or Federal MCL at wells MW-NASB-069, MW-NASB-069 duplicate, MW-NASB-070, and MW-NASB-079 in April and October 2001; and aluminum above the corresponding MEG and MCL at well MW-NASB-069 in October 2001. No other inorganic elements were detected in excess of MEGs and/or MCLs.

3.1.3 Surface Water Sampling Program

Results of the surface water sampling and analysis program conducted during 2001 indicate the following:

- 1,2-DCE was detected in surface water sample SW-010 collected from the northern branch of the unnamed stream in October 2001; 1,2-DCE was reported at an estimated concentration because it was identified below the detection limit. This result is likely the result of ground water from Site 9 discharging to the unnamed stream, as indicated in site ground-water flow patterns (Figures 2-1 and 2-2). Concentrations of VOCs at this sampling location are approximately two orders of magnitude below ground-water concentrations measured upgradient (MW-NASB-069), and lower than concentrations measured at the closest monitoring well (MW-NASB-076). The decrease in VOCs at the surface water sampling location is likely due to volatilization and dilution of VOCs in the unnamed stream.

3.1.4 Sediment Sampling Program

Results of the sediment sampling and analysis program conducted during 2001 indicate the following:

- Vinyl chloride was detected at a concentration of 3 μg/Kg in the sediment sample collected during Monitoring Event 18; 1,2-DCE was detected at concentrations of 6 μg/Kg and 4 μg/Kg during Monitoring Event 18 and at concentrations of 2 μg/Kg and 1 μg/Kg during Monitoring Event 19.

3.1.5 Seep Sampling Program

Results of the seep sampling and analysis program conducted during 2001 indicate the following:

- There were no detected concentrations of vinyl chloride in the seep sample. Only methylene chloride was reported in the seep samples collected at Site 9 in 2001.

3.1.6 Visual Inspection

Site inspections indicated no visual evidence of stressed vegetation in the vicinity of the site during the two inspection events. No well repairs were conducted at site wells, and no significant well integrity issues were observed. No evidence of stressed vegetation or physical evidence of tampering with site monitoring wells was observed. All monitoring wells at the site were found to be capped, labeled, locked, and in good condition. In April 2001, a minor sheen was observed at the entrance to the retention pond and a propylene glycol odor was noted.

3.2 RECOMMENDATIONS

Based on an analysis of the data collected at Site 9 as part of the Long-Term Monitoring Program, the following recommendations are made:

- Continue long-term monitoring and sampling during 2002 to assess the effectiveness of natural attenuation with long-term monitoring, the selected remedy for the site.

- Continue gauging of wells located at Site 9, upgradient wells, and monitoring wells at the NEX during 2002 to collect data on ground-water flow patterns.

- Continue to obtain data to evaluate the effect of the NEX on the ground-water geochemistry at Site 9. Ongoing investigations at the NEX will provide additional data during 2002 that can be evaluated and included in future annual reports.

- Reduce the number of parameters for laboratory analysis to reflect the fact that there were no reported concentrations of any semivolatile organic compound analytes in any samples collected and analyzed during any of the monitoring events conducted in 1999, 2000, and 2001.

- Complete a re-assessment of the long-term monitoring network at Site 9 with site stakeholders. The focus of ground-water monitoring should be re-assessed to track vinyl chloride concentrations on the downgradient portion of the plume, and to ensure the interior portion of the plume is adequately monitored. It is anticipated that this optimization would be completed as part of a technical evaluation group meeting in 2002 prior to the September 2002 sampling event.

REFERENCES

ABB Environmental Services (ABB-ES). 1994. Final Long-Term Monitoring Plan, Building 95, Sites 1 and 3, and Eastern Plume. August.

EA Engineering, Science, and Technology. 1999a. Final Record of Decision. Site 9, Naval Air Station, Brunswick, Maine. September.

EA. 1999b. Final Long-Term Monitoring Plan. Site 9, Naval Air Station, Brunswick, Maine. August.

EA. 2000. 1999 Annual Report, Monitoring Events 14 and 15, Site 9: Neptune Drive Disposal Site, Naval Air Station, Brunswick, Maine. June.

EA. 2001. Monitoring Event 18 – April/May 2001. Site 9, Naval Air Station, Brunswick, Maine. December.

EA. 2002. Monitoring Event 19 – October/November 2001. Site 9, Naval Air Station, Brunswick, Maine. May.

Appendix A

Completed Response to Comments from the Maine Department of Environmental Protection and U.S. Environmental Protection Agency on the Draft Report

"Sait, Claudia B"
Claudia.B.Sait@maine.gov

01/27/2003 02:52 PM

To: Easterday, Al aeasterd@eaest.com
Cc:
Subject: FW: final edits to the 17 October RTC for Site 9 2001 annual letter

From: Sait, Claudia B

Sent: Friday, January 24, 2003 1:28 PM

To: gmcalder@eaest.com

Subject: RE: final edits to the 17 October RTC for Site 9 2001 annual letter

Looks good. CBS

RESPONSE TO COMMENTS FROM THE
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
ON THE 2001 ANNUAL REPORT FOR SITE 9
MONITORING EVENTS 18 AND 19
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 17 October 2002**

The Maine Department of Environmental Protection (MEDEP) has reviewed the draft report entitled *2001 Annual Report, Monitoring Events 18 and 19, Site 9 Neptune Drive Disposal Area*, dated August 2002, prepared by EA Engineering, Science, and Technology. Based on that review, MEDEP has the following comments and issues.

GENERAL COMMENTS

1. Vinyl chloride and total 1,2-dichloroethene trends have continued upward throughout 2001, continuing a trend began in early 1999. (When plotting trends, MEDEP uses the maximum concentration measured from all diffusion samplers in MW-NASB-069). MEDEP's concern is unchanged from that expressed in our Monitoring Event 19 comment letter of July 25, 2002 (Comment 1). MEDEP is looking forward to presenting our concerns at the next technical meeting (October 22, 2002). (NR)

   Response—Comment noted. This topic was discussed at the 22 October 2002 Technical Meeting, and the Navy is proceeding with determining what type of investigation is most appropriate to investigate this concern (e.g., a direct-push investigation with ground-water sampling, etc.). It should be noted that considerable previous work at Site 9 has failed to clearly identify any source of the vinyl chloride plume, or locate a source of ground-water VOCs. Therefore, while the Navy's additional investigation effort will provide valuable additional information, it is possible that the investigation results at Site 9 may not conclusively answer the overall questions related to the source of site-wide ground-water impacts.

   NOTE: Site 9 was discussed during the 12 December 2002 NAS Brunswick Technical Meeting in Portland, Maine, and the Navy is proceeding with tasking their consultant with a direct-push effort to investigate this area and the ash landfill around Barracks Building Nos. 218 and 219.

2. The specific method that the Navy has used in selecting concentration values to plot in the VOC graphs (Appendix A) should be standardized and explained in the text. For wells where several data sets are collected per event, (i.e., primary set of multiple diffusion samples at different depths, duplicate set of diffusion samples - not necessarily all depths, and one or two low-flow samples) the selection criteria should be agreed upon by the stakeholders. It looks like the plotted values in the 2001 report are some kind of derived average. MEDEP proposes that the highest value at each well be used, unless it is obviously an outlier. Our rational is that volatilization in the field and lab may reduce solvent concentrations, but field and lab procedures (except cross-contamination) are unlikely to add solvent concentration to a sample. (ED/MTG)

Response—Comment noted. A text page has been added to the trend graph appendix that explains how the trend graphs are developed. The trend graphs present the low-flow sample data from the wells since this is the approved sample collection technique as per the LTMP for Site 9. In addition, all aqueous diffusion sample data have been included on the same trend graph since this continues to be a pilot study and the method has not been adopted as a formal part of the LTMP for Site 9. Therefore, all data that are collected from the well are presented on one trend graph.

SPECIFIC COMMENTS

3. ***Section 2.2.3, Vinyl Chloride/Total Dichloroethene Ratio, p. 2-2, 2nd sentence***—A decreasing concentration of total DCE (parent compound) and an increasing concentration of vinyl chloride (daughter product) indicated the rate of the dechlorination processes increasing.

   Table in text characterizes the vinyl chloride to DCE ratio for MW-NASB-069 as "increasing" (p. 2-3).

   The accuracy of these statements depends on what laboratory concentrations were selected for plotting (See comment 2 above). While the Navy's graph for MW-NASB-069 in Appendix A could support this statement, a graph of the highest concentrations for each event shows nearly the same increases in both parent and daughter compounds in the last two years. Such a 1:1 relationship implies to MEDEP that the parent dechlorination process has not yet peaked, and that the source of DCE has not decreased appreciably. This interpretation is based on the graph titled "A Decay Profile of Trichloroethyene" in the EPA's Ground Water monitoring Series CERI-87-8, page 60.

   MEDEP recommends that the Navy develop a mutually agreeable approach to comparing this data. (MTG)

   Response—Since Monitoring Event 15, the maximum VOC concentration was used for plotting on these graphs and on the individual well trend graphs. The figures and trend graphs have been revised to plot the data from the approved LTMP sample collection method/low-flow sample method as presented in the Long-Term Monitoring Plan for Site 9. In addition, the aqueous diffusion sample data, still in a pilot program, will be plotted on a separate trend graph for each well used in the pilot study program.

4. ***Section 2.2.3, Vinyl Chloride/Total Dichloroethene Ratio, p. 2-3, 2nd paragraph***—The last sentence reads "…may be a contributing factor in vinyl chloride spikes that have been observed a MW-NASB-069 beginning in 1997." The term "spike" indicates a long thin sharp pointed reading caused by abrupt changes in concentration therefore the word "spikes" do not appear to apply and should be replaced with "continual buildup." (ED)

   Response—Editorial comment noted; however, the following revised text has been added:

   > *...may be a contributing factor in the vinyl chloride <u>peaks</u> ~~spikes~~ that have been observed at MW-NASB-069 beginning in 199….*

5. ***Section 2.4, Visual Inspection, p. 2-5, last sentence***—Copies of the site inspection reports are provided in the reports for Monitoring Events 18 and 19. The Navy should consider developing a field form to be filled out during the inspections and included in the Appendices. The condition of the pond gauges should be part of this inspection and included in each monitoring events. (RR)

   Response—The Navy will develop a site inspection field form for Site 9 that will be included in subsequent Site 9 reports.

6. ***Figure 2-2, Interpreted Potentiometric Surface Elevations, 30 October 2001***—The 41.0-foot contour runs very close to the north side of the lower pond, which had a gauged elevation of 36.16 feet. As pointed out in MEDEP's comments on Monitoring Event 19, this contour should be shown back away from the edge of the pond. There are no data to support such a large implied groundwater gradient. This report should not be finalized until consensus is reached on this matter. (ED & MTG)

   Response—The 41.0-ft contour line in the north area of the lower impoundment pond is supported by a number of data points (MW-NASB-072, MW-NASB-073, MW-NASB-074, MW-NASB-076, and SG-2A). The contour line is contained within this data set and is a valid professional interpretation of this data set. This comment was discussed with the MEDEP Project Geologist during the 12 December 2002 Technical Meeting, and the Navy will revise the 41.0-ft contour in this area of Site 9 for the final version of the report.

7. ***Figure 2-5, Sum of vinyl chloride and 1,2-dichloroethene, total concentration, 1995-2001***—It would be helpful in the comparison of the trend lines to make the vertical (Y-axes) scales identical. (ED)

   Response—The individual graphs of vinyl chloride and 1,2-dichloroethene have been combined into one graph.

8. ***Section 3.1.1, Water Level Gauging Program, p. 3-1, 1st paragraph***—Based on seven rounds of gauging data collected from monitoring wells at the Navy Exchange Service Station (NEX), the interpreted flow pattern upgradient of Site 9 is to the southwest.

   MEDEP appreciates that the Navy is including the upgradient groundwater conditions at the NEX with respect to Site 9 conditions, due to the potential linkage between sites. However the above report statement does not serve this purpose as it should, because if groundwater flowed straight southwest from the NEX it would not encounter Site 9. However, in actuality, the flow lines curve to the southeast over a distance of approximately 500 feet, and enter Site 9. Please rephrase. (ED)

   Response—The text has been revised as follows:

   > *Based on seven rounds of gauging data collected from monitoring wells at the NEX, the interpreted flow pattern within the NEX site, which is upgradient of Site 9, is to the southwest; <u>however, the ground-water flow curves to the southeast over a distance of 500 ft and enters into the northern area of Site 9.</u>*

9. Section 3.1.2, Volatile Organic Compound Concentrations, p. 3-2, 3rd bullet—Although the specific reason for the increase in vinyl chloride concentrations cannot be identified conclusively, non-detections for vinyl chloride are noted at monitoring wells near the impoundment ponds (MW-NASB-072, MW-NASB-074, and MW-NASB-075).…
A strong likelihood exists that vinyl chloride contamination is passing under the well screen of MW-NASB-076 (or in its neighborhood), and has not migrated into the MW-NASB-075/MW-NASB-074/MW-NASB-072 area since the detention ponds altered groundwater flow regime so that discharge is directed away from the upper pond in favor of the lower pond. Thirteen feet of sandy material occurs below the bottom of the screen in MW-NASB-076. In that the vinyl chloride is found at considerable depth just above the clay in MW-NASB-069, a potential escape route to surface water is present here. MEDEP is looking forward to discussing this concern at our October technical meeting. (RR/MTG)

   Response—While the theory being proposed by MEDEP (the core of the vinyl chloride plume may be escaping into the lower pond undetected, due to a subtle change in ground-water flow caused by creation of the impoundment ponds) is possible, the Navy believes this statement is accurate as written. A number of monitoring wells are located north of the impoundment ponds and, therefore, limited opportunity exists for the core of the plume to escape undetected. The statement put forth in the report is fully supported by existing data. We expect that the additional investigation to be completed at Site 9 will indicate which of these two theories is correct.

   Note that as of the December 2002 Technical Meeting, the Navy has decided to conduct additional subsurface efforts at Site 9 consisting of direct-push soil borings and installation of 2 pairs of nested (shallow and deep screened) piezometers. The planned work will be presented in a letter work plan to the MEDEP and EPA to comment on, and the Navy anticipates working with representatives of MEDEP and EPA to optimally place the locations of the piezometers and direct-push borings prior to installing them.

10. ***Section 3.1.2, Volatile Organic Compound Concentrations, p. 3-3, 2nd Bullet***—Another possible explanation for explaining the predominant occurrence of 1,2-DCE in the "central portion of Site 9" (and little elsewhere) is that the parent compound (TCE, PCE) may be entering this area from the west along a narrow depression in the clay surface, which may connect with the MW-NASB-069 clay depression. MEDEP will discuss this concept in detail at the October technical meeting. (MTG)

    Response—Comment noted.

11. ***Section 3.1.2, Volatile Organic Compound Concentrations, p. 3-3, 3rd Bullet***—With the exception of wells MW-NASB-076 and MW-NASB-080, the use of "spikes" to characterize variation in graphed long-term concentrations is not warranted. Although a precise definition of a "spike" is difficult to establish, most well graphs do not show large abrupt changes in contaminant concentrations. MEDEP suggests substituting the term *"elevated levels"* for "spikes." (ED)

    Response—See response to Comment No. 4.

12. ***Section 3.1.2, Volatile Organic Compound Concentrations, p. 3-3, last bullet***—Monitoring wells in the long-term monitoring network appear to be well positioned to assess changes in vinyl chloride concentrations north of the impoundment ponds. Therefore, if elevated concentrations of vinyl chloride were to occur in areas downgradient of MW-NASB-069, the existing monitoring well network is likely to effectively track changes in ground-water concentration of VOCs. The Department does not agree with these statements. (See Comment 9 above.) (RR/MTG)

    Response—See response to Comment No. 9.

13. ***Section 3.1.3, Surface Water Sampling Program, p. 3-4, Bullet***—The decrease in VOCs at the surface water sampling location is likely due to volatilization and dilution of VOCs in the unnamed stream.

    Another likely explanation is that a narrow plume of migrating VOCs that used to 'squarely' intersect the location of SW-010 now has shifted farther north along the unnamed stream. A gradual adjustment in discharge location could be the result of the filling of the detention ponds, and an apparent shift in the groundwater flow lines, as interpreted from recent year contour maps. As the Navy knows, the MEDEP is uncomfortable with having only one surface water monitoring station. MEDEP looks forward to discussing this the October technical meeting. (RR/MTG)

    Response—The explanation proposed by MEDEP (the narrow plume of VOCs that used to 'squarely' intersect the location of SW-010 now has shifted further north along the unnamed stream) is possible. However, there are a number of monitoring wells located in the area of the impoundment ponds and, therefore, limited opportunity exists for the core of the plume to escape undetected. The statement put forth in the report is fully supported by existing data. We expect that the additional investigation to be completed at Site 9 will indicate which of these two theories is correct. See response to Comment No. 9 regarding the additional investigation effort that the Navy is planning to undertake with the goal of optimizing the Long-Term Monitoring Program at Site 9.

14. ***Section 3.2, Recommendations, p. 3-5, 4th Bullet***—The Navy is proposing that the number of parameters for laboratory analysis be reduced for Site 9, apparently by totally dropping semi volatile organic compound analytes. These analytes were determined after much discussion between the agencies and the BASCE representative and should be reevaluated based on that original reasoning and subsequent data. (MTG)

    Response—This topic was discussed at the 22 October 2002 Technical Meeting regarding the elimination of SVOCs from the Site 9 Long-Term Monitoring Program. As a result of the discussion at the meeting, the analysis of SVOCs will remain as part of the Site 9 Long-Term Monitoring Program.

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY ON THE
DRAFT 2001 ANNUAL REPORT FOR SITE 9
NAVAL AIR STATION BRUNSWICK, MAINE

COMMENTOR: Michael S. Barry **DATED: 12 November 2002**

Thank you for the opportunity to review the above report which was submitted by EA Engineering, Science, and Technology on behalf of the Navy on 23 August 2002.

In general, the EPA concurs with the draft reports summaries, conclusions, and findings; our specific comments and/or any issues are attached. The EPA strongly supports the optimization of the Long-Term Monitoring Program (LTMP) at Site 9. We look forward to upcoming discussions on this topic as generally discussed at the 22 October 2002 technical meeting and following that, submission of a formal draft revision 2 to the LTMP by the Navy.

Comment codes:		
	NR	No specific response required, comment for record or observation
	ED	Editorial comment
	RR	Response requested
	MTG	Recommend comment be discussed at meeting prior to formal response

SUMMARY AND CONCLUSIONS, SECTION 3.1

1. ***(NR) Section 3.1.2, Page 3-3, Bullet 1***—We concur that it's likely that the primary source of the 1,2-Dichloroethylene (and subsequent vinyl chloride) is upgradient, in the area of the NEX. We speculate that "source area" rather than a source in the traditional sense exists(ed) due to the apparent relative low level of VOCs. We speculate the cause of the "source area" may have been occasional, undocumented, historical small volume dumping.

   Response—Comment noted.

2. ***(NR) Section 3.1.2, Page 3-3, Bullet 2***—Regarding the source of VOCs in MW-227 we concur that it is likely a non-significant source from historical operations along the flight line to the west. In EPA's experience it's very common for flight lines to contain several small VOCs sources from episodic releases associated with maintenance activities dating from before hanger floor drains were connected to the sewer, or before waste VOCs were captured in systems for recycling, reuse or disposal elsewhere. Due to the historical nature and small size of these releases (relative to a fire training area or a drum burial pit) a discrete source for many of these type of sites is not discernable at the present time.

   Response—Comment noted.

3. ***(NR) Section 3.1.3, Page 3-4***—Noted and concur with explanation regarding low level 1,2-DCE detected in surface water at SW-010.

   Response—Comment noted.

RECOMMENDATIONS, SECTION 3.2, PAGE 3.5

4. ***(NR)***—Concur with recommendation bullets 1-3 without comment.

   Response—Comment noted.

5. ***(RR/MTG) Bullet 4 regarding SVOCs***—Concur with eliminating SVOCs from MW-69, 70 and 79 except for once every five years and upon concurrence of the project team. Despite the long history of non-detections of SVOCs, a sample is required for the five year review to assess remedy protectiveness regarding the waste that remains in place in the ash landfill. EPA envisions that this change would be implemented by the Navy submitting a LTMP revision to section 1.4.5 and table 3.1 of the Final LTMP (August 1999). (LTMP draft revision 1 was submitted in July 2001, but has never been finalized.)

   Response—Comment noted. Section 1.4.5 and Table 3-1 of the July 2001 Long-Term Monitoring Plan will be revised to include semivolatile organic compound sampling from MW-69, MW-70, and MW-79.

6. ***(NR/MTG) Bullet 5 regarding LTMP optimization***—EPA looks forward to participating this effort. In our view, many of the wells are no longer producing useful information, especially given their semi-annual sampling periodicity and overall low concentrations detected. On the other hand, the network is apparently only "hitting" the plume at one well, MW-69, and new, better placed well would aid in monitoring plume trends. Another approach to LTMP optimization would be to deploy vapor diffuser samplers in the retention ponds to identify plume discharge zones, then monitor with a few water diffuser samplers in lieu of more/some of the monitoring wells. This would have the benefit of directly monitoring the affected ecological receptor but would require a large number of vapor samplers to locate the water sampler locations. The EPA lab could be scheduled per availability to analyze the vapor samplers to reduce implementation costs to the Navy. This is not a formal proposal at this time, but is a possible approach for project team discussion regarding LTMP optimization.

   Response—Comment noted. This topic should be discussed at the TEG team meeting in Spring 2003.

Appendix B

Analytical Trend Graphs
March 1995 – October 2001

These trend graphs were prepared from the Naval Air Station Brunswick Long-Term Monitoring Program database using the reporting module of Microsoft Access®. The analytical results from each sampling location, matrix, sampling technique, and analysis are presented on separate graph panes for clarity. Results from field duplicate samples are not shown.

The analytes plotted are the contaminants of concern for the site. All non-detect results are plotted as having a value of zero. The total volatile organic compound value is the sum of the detected volatile analyte values, excluding acetone and methylene chloride which are common laboratory contaminants.

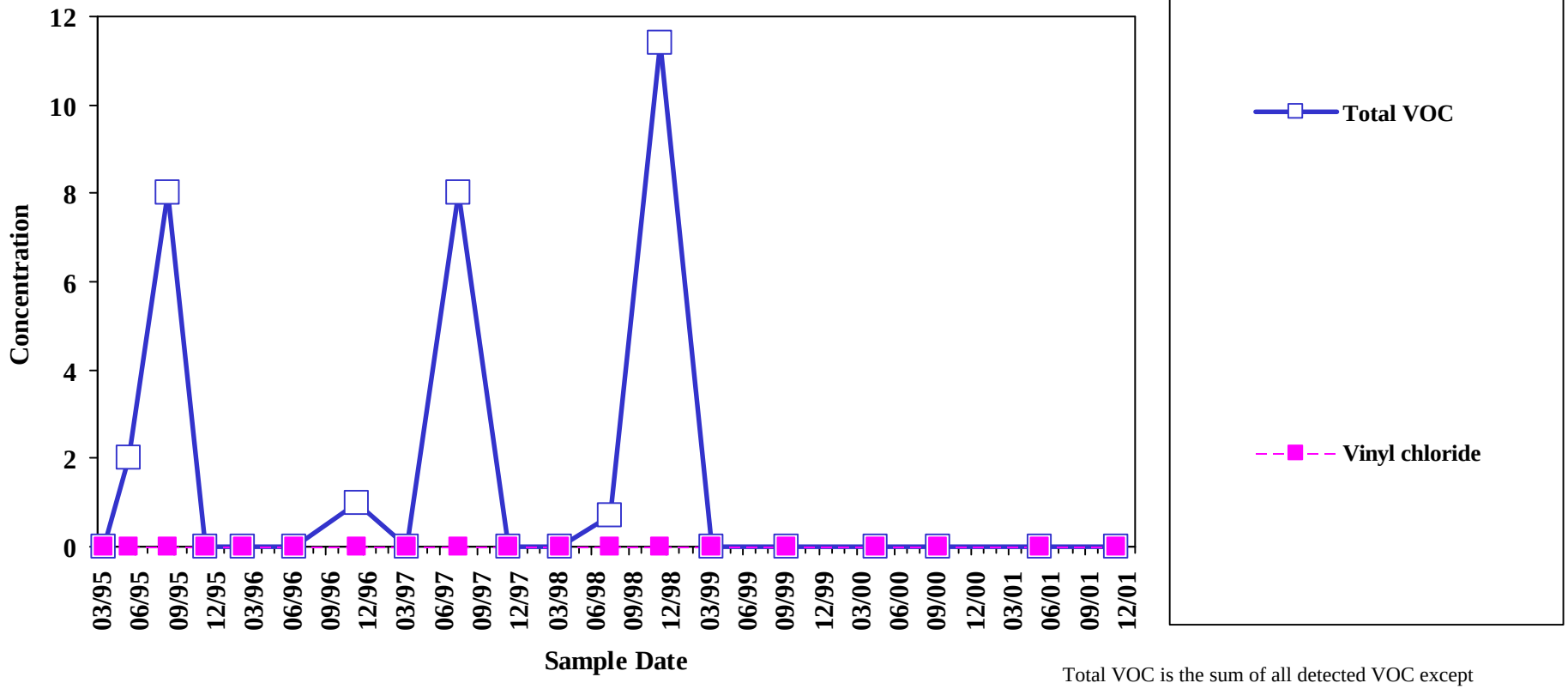
Sample Location:

LT-901

Site 9

Leachate

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

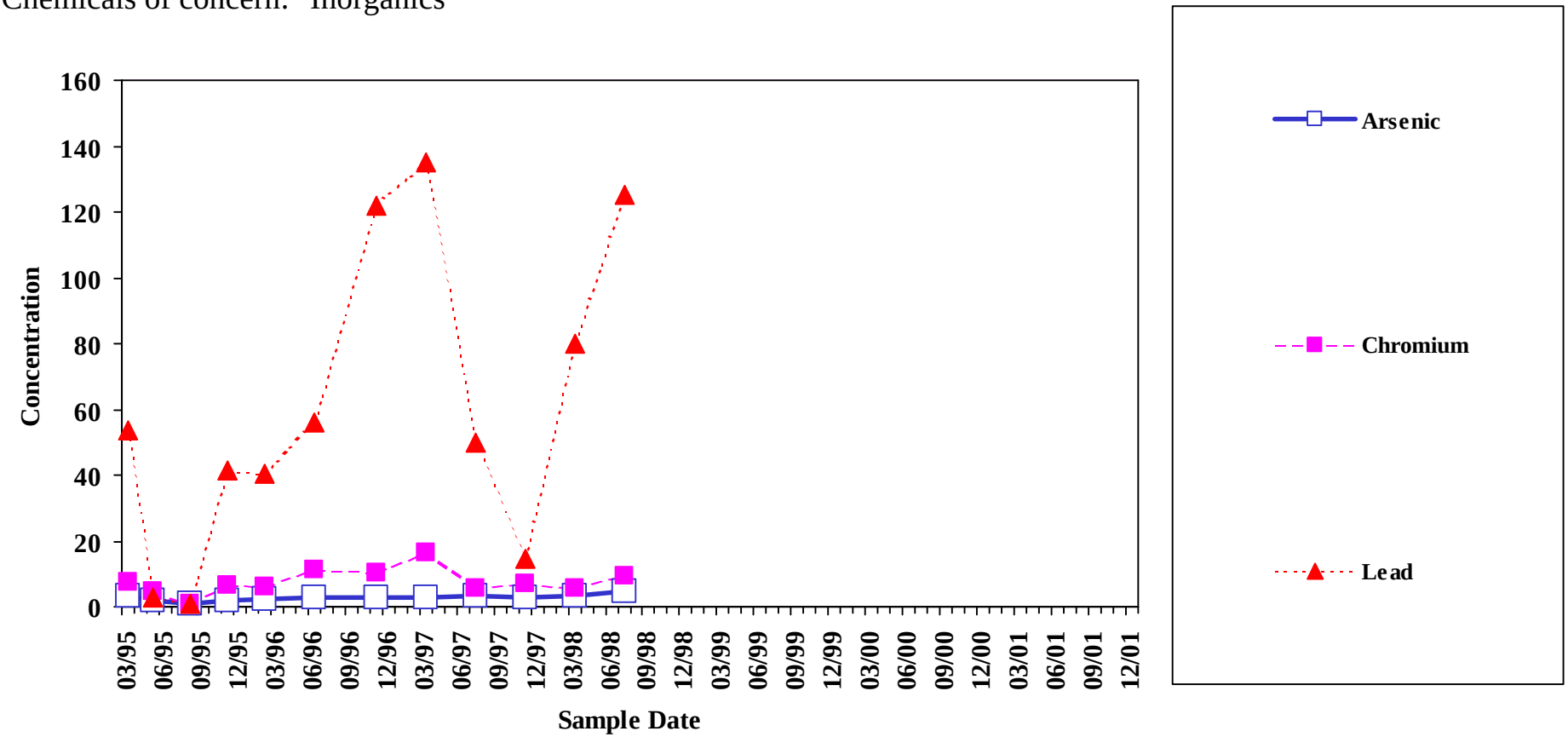
Sample Location:

LT-901

Site 9

Sediment

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: mg/Kg

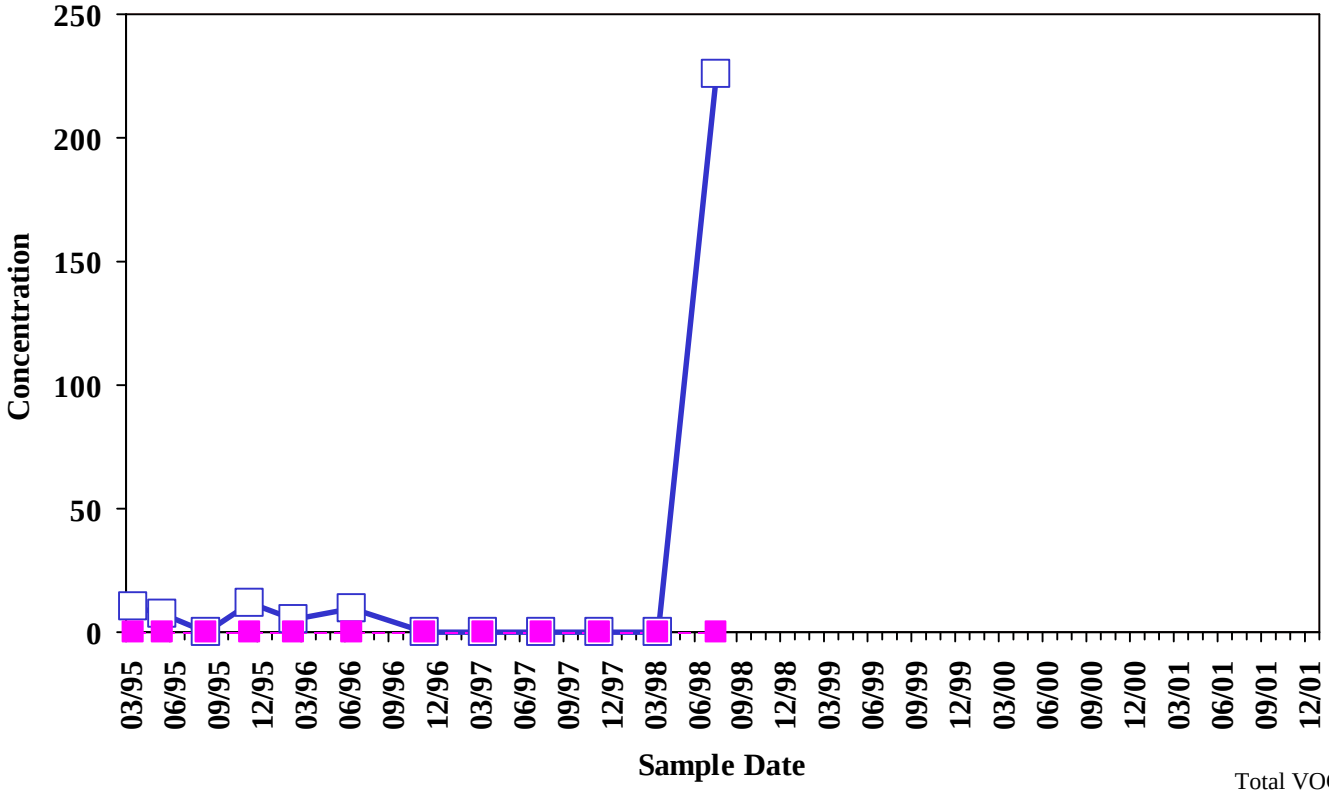
Sample Location:

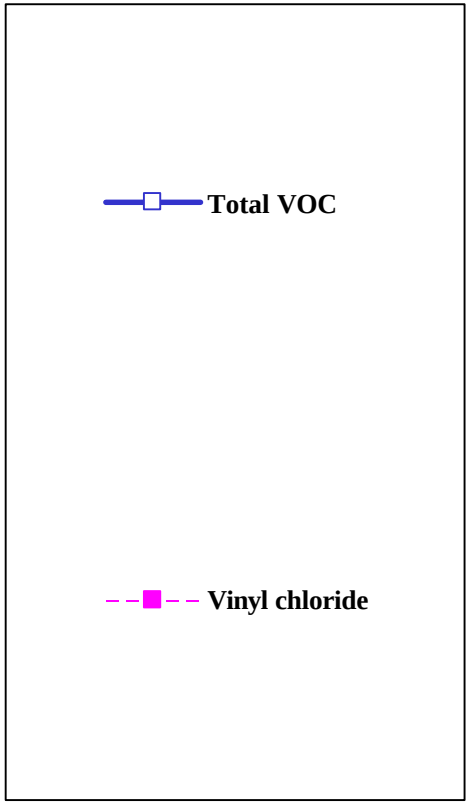
LT-901

Site 9

Sediment

Chemicals of concern: Volatiles





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

Sample Location:

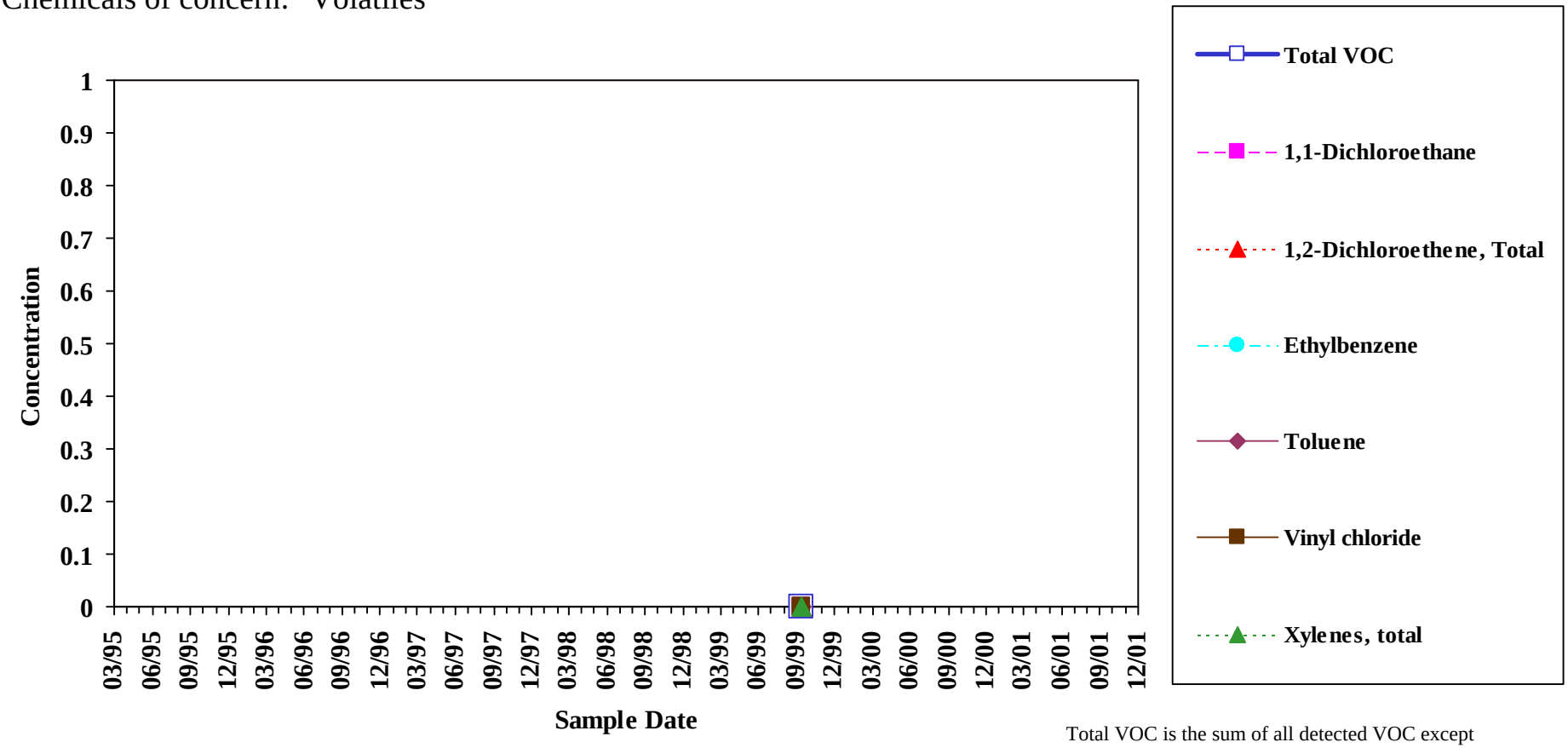
MW-NASB-008

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

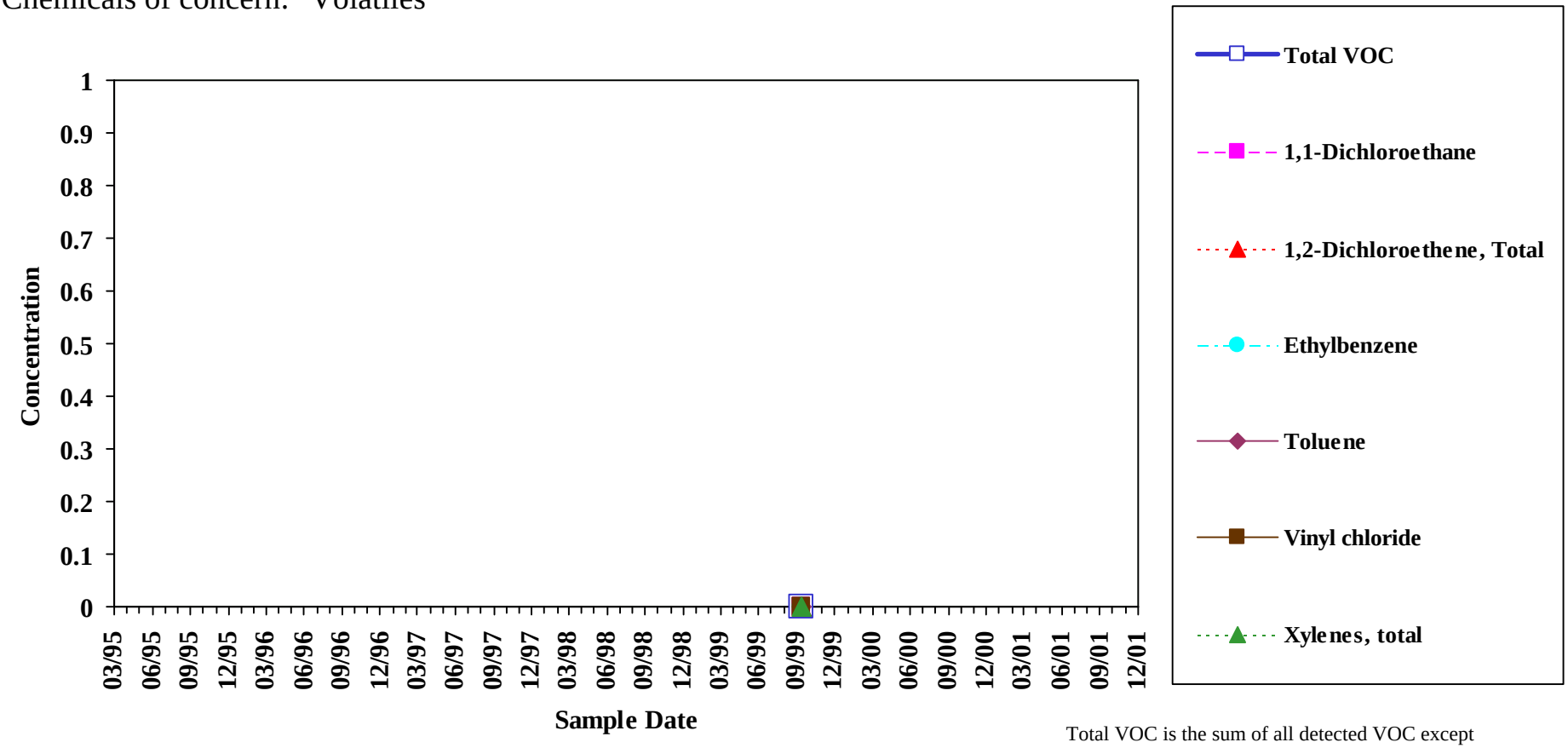
MW-NASB-009

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

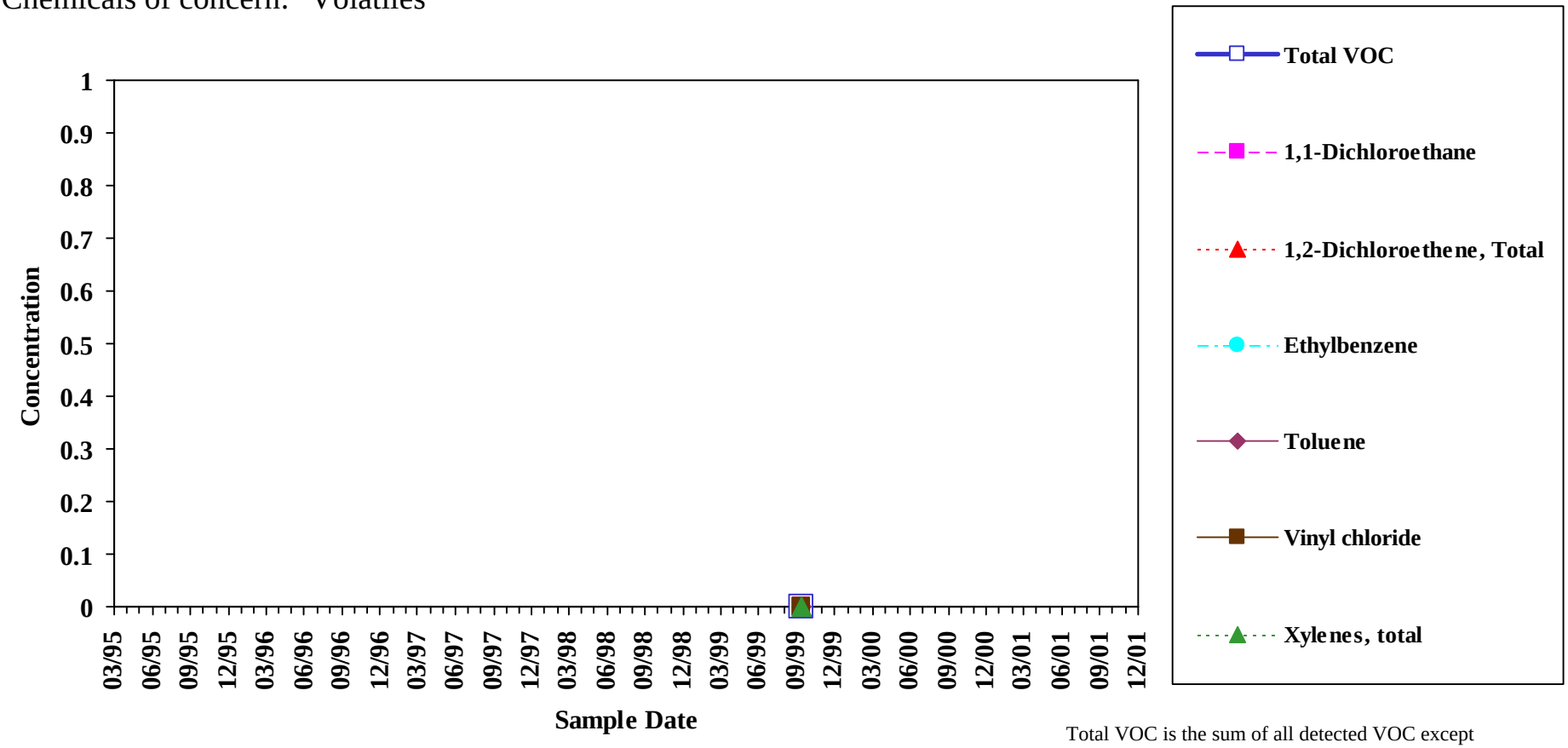
MW-NASB-010

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

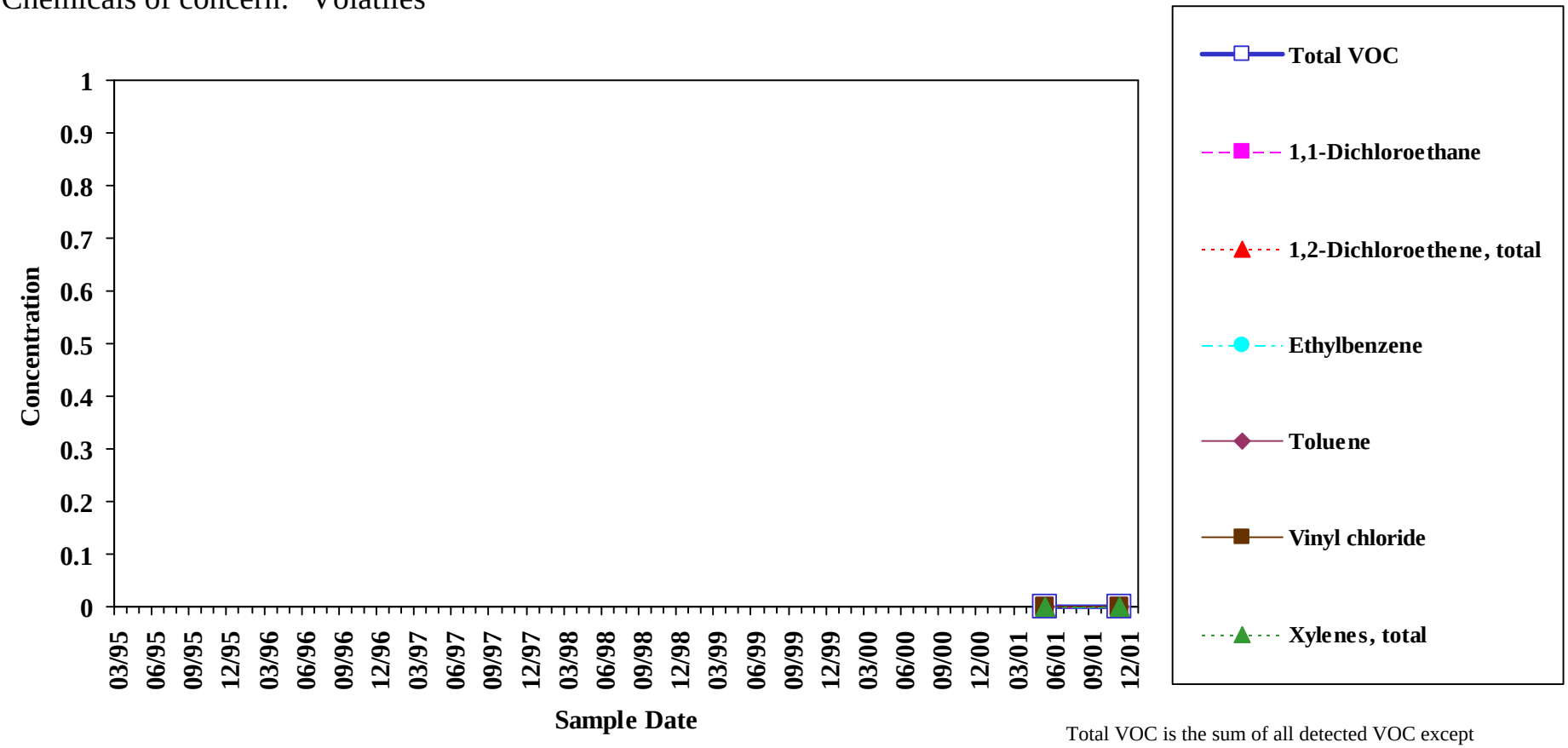
MW-NASB-021

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

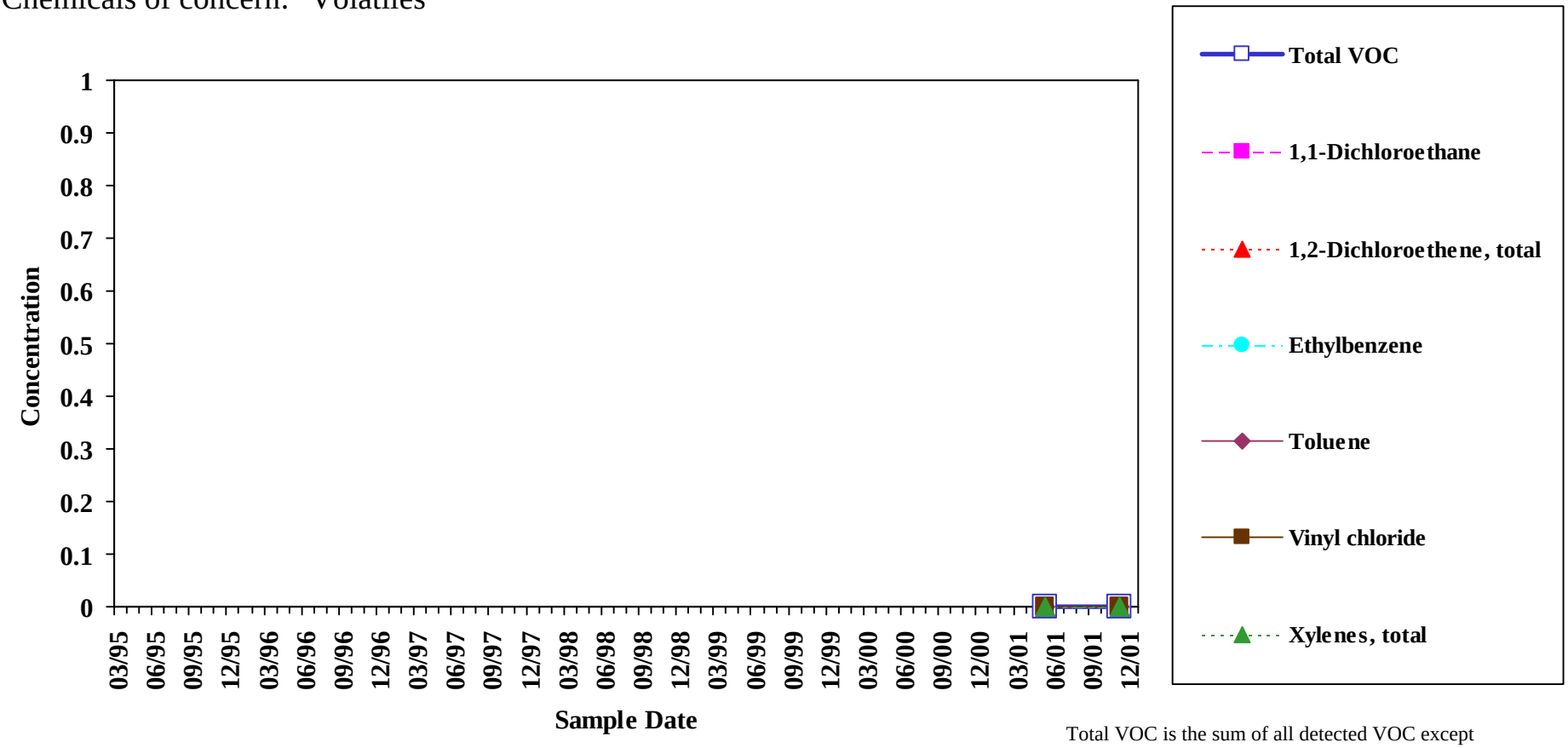
MW-NASB-021

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

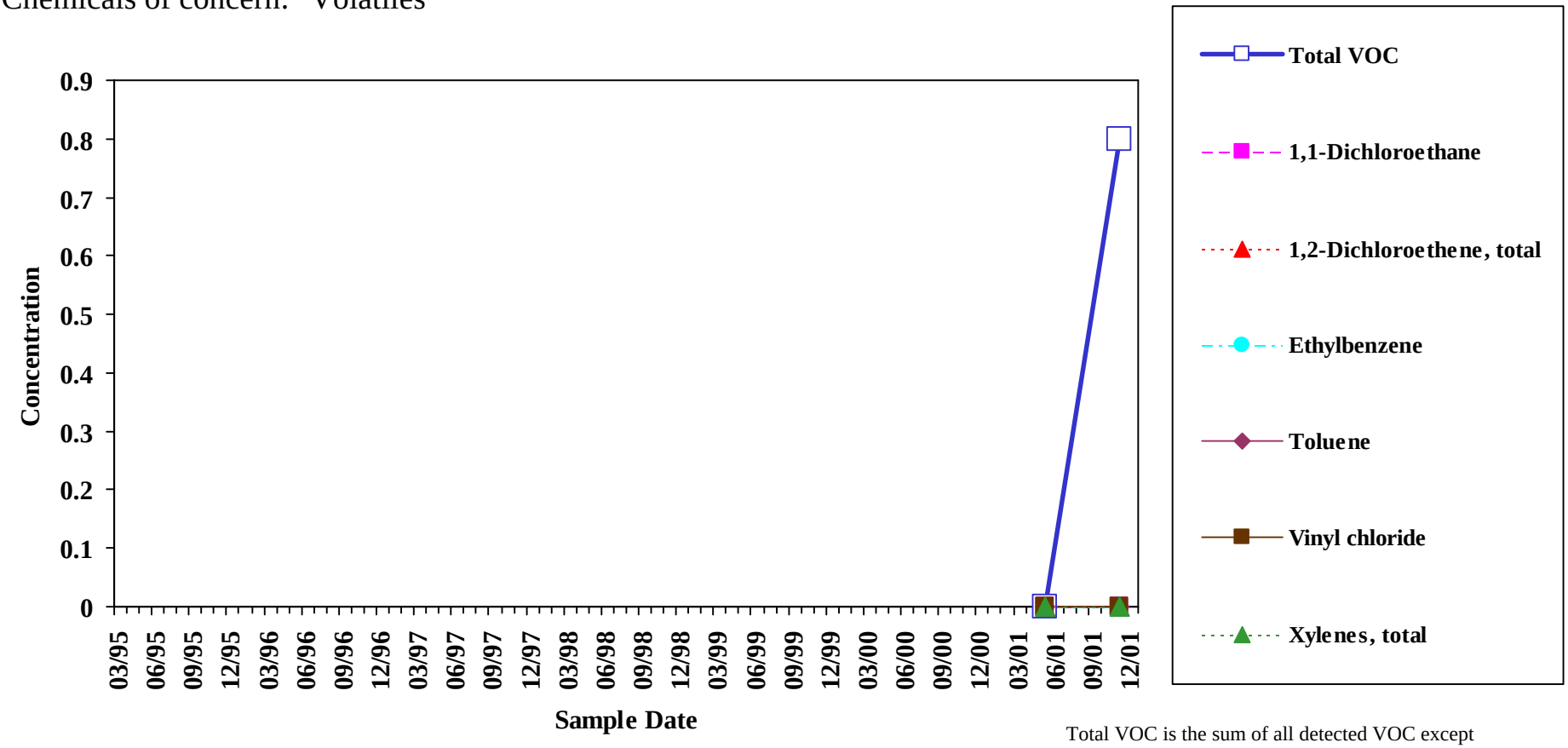
MW-NASB-021

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

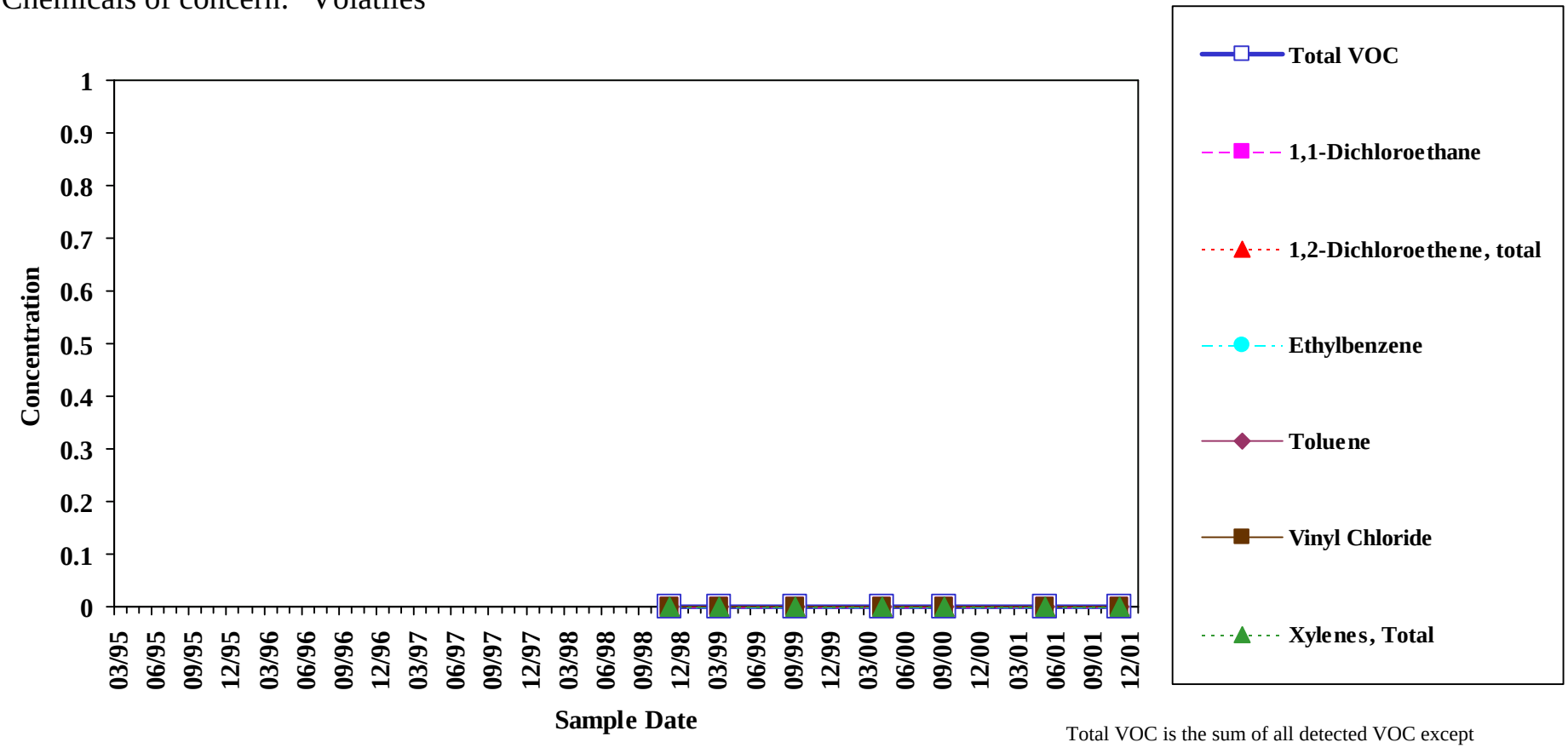
MW-NASB-022

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

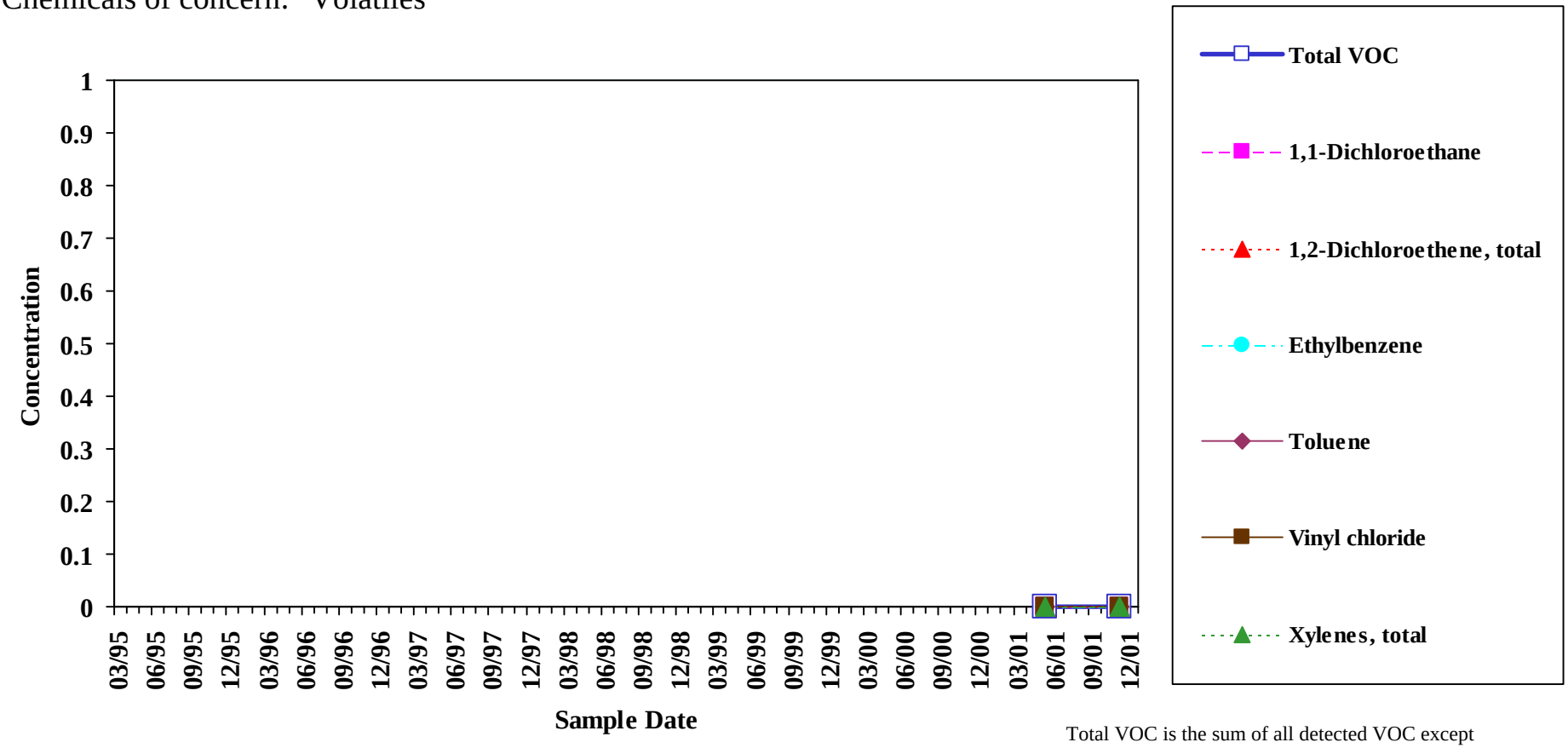
MW-NASB-022

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

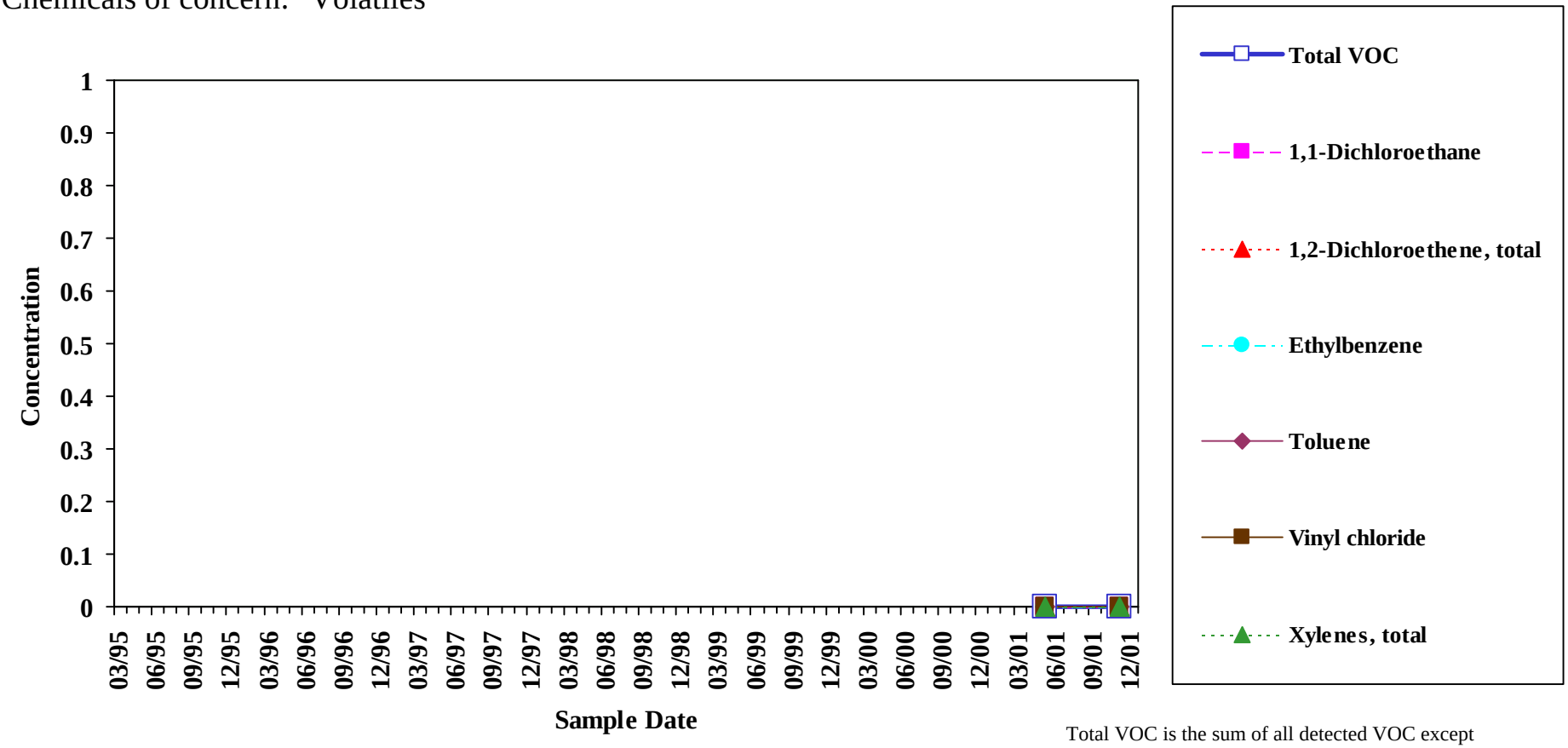
MW-NASB-022

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

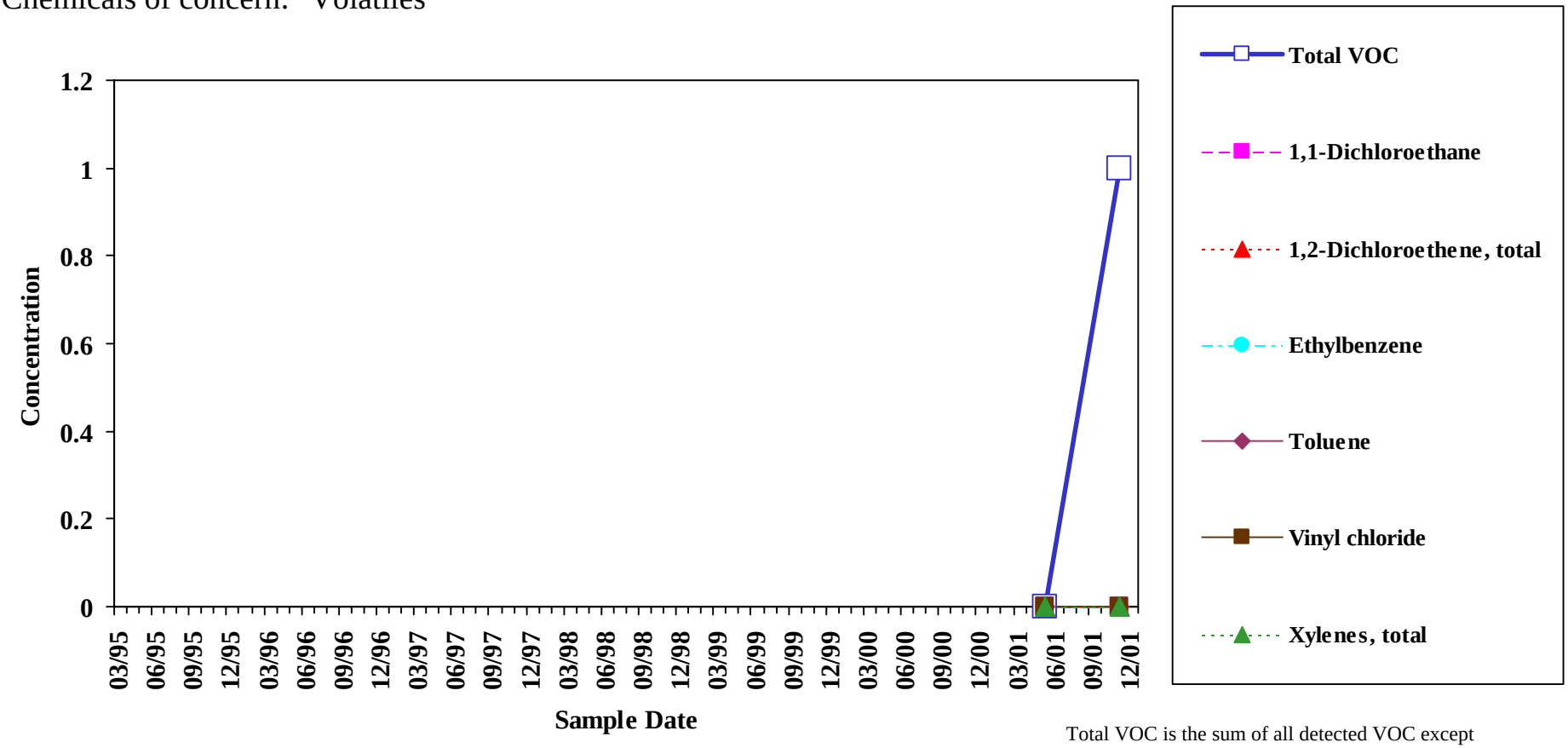
MW-NASB-022

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

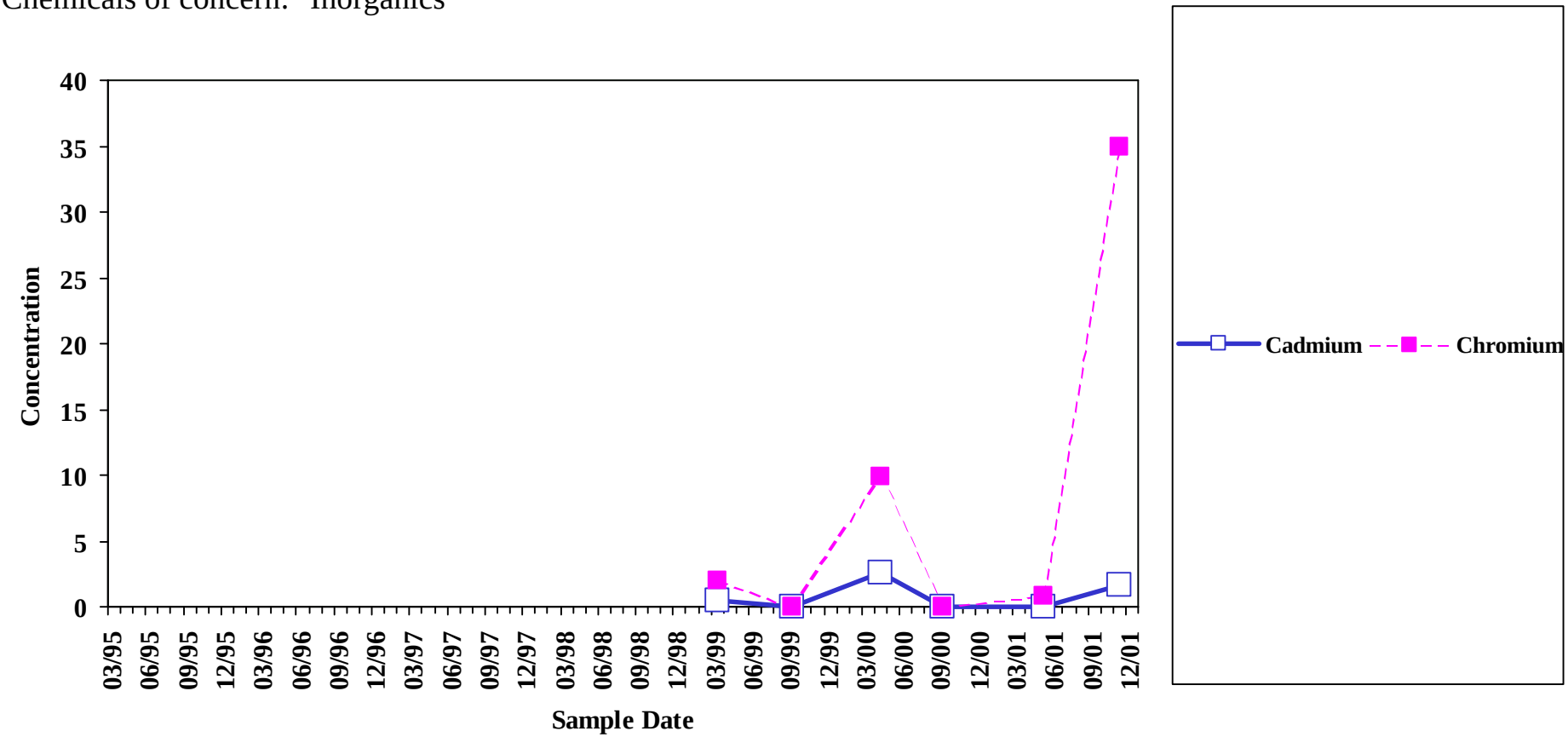
MW-NASB-069

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

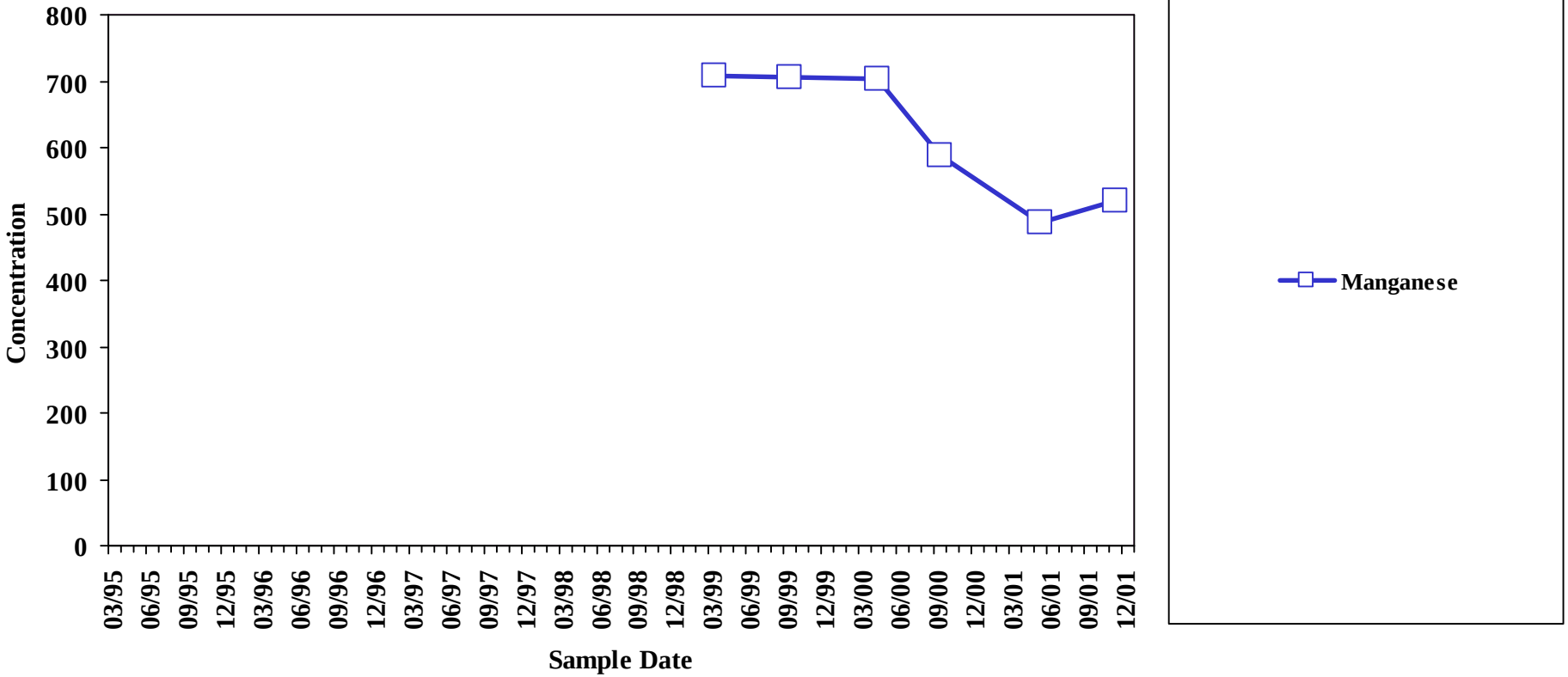
MW-NASB-069

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

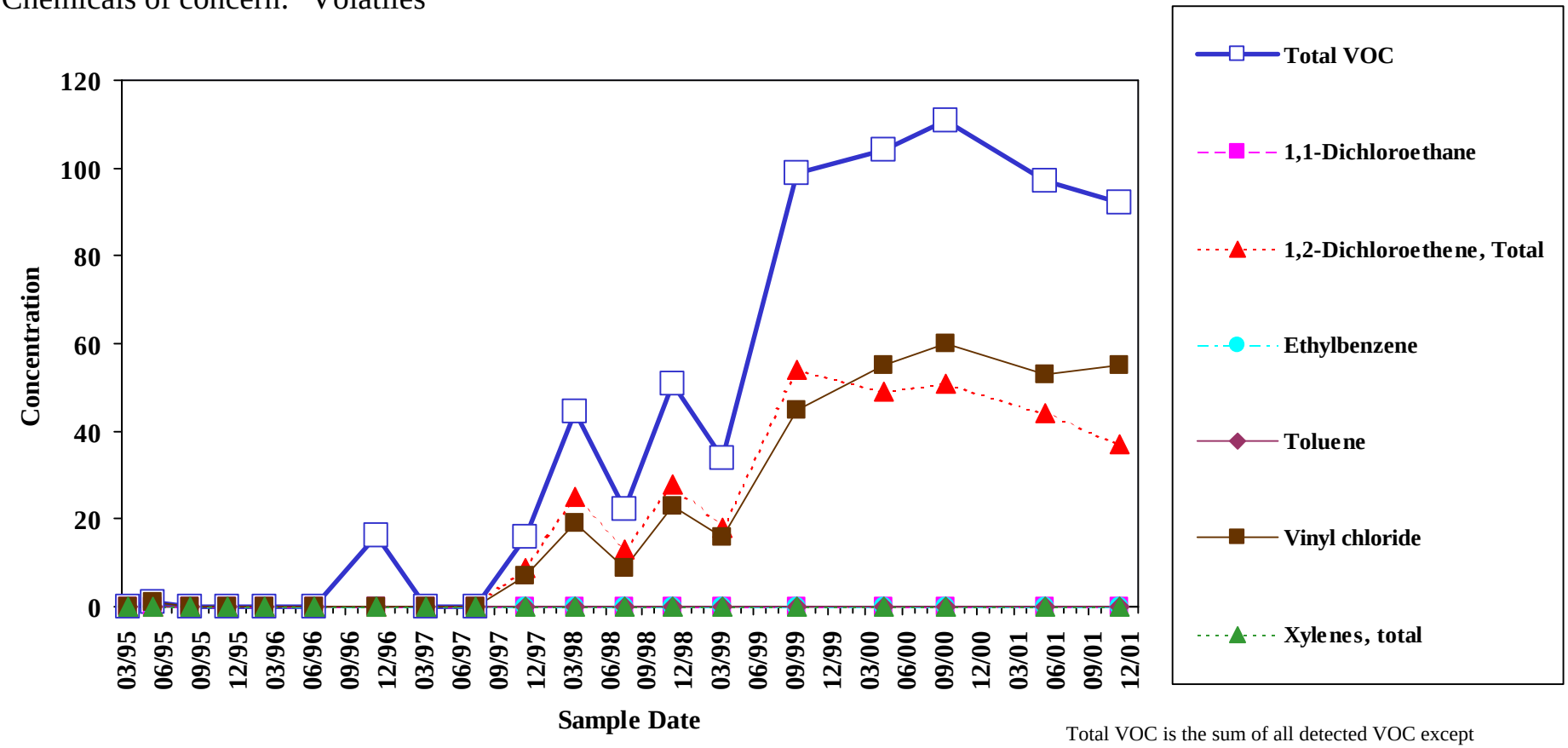
MW-NASB-069

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

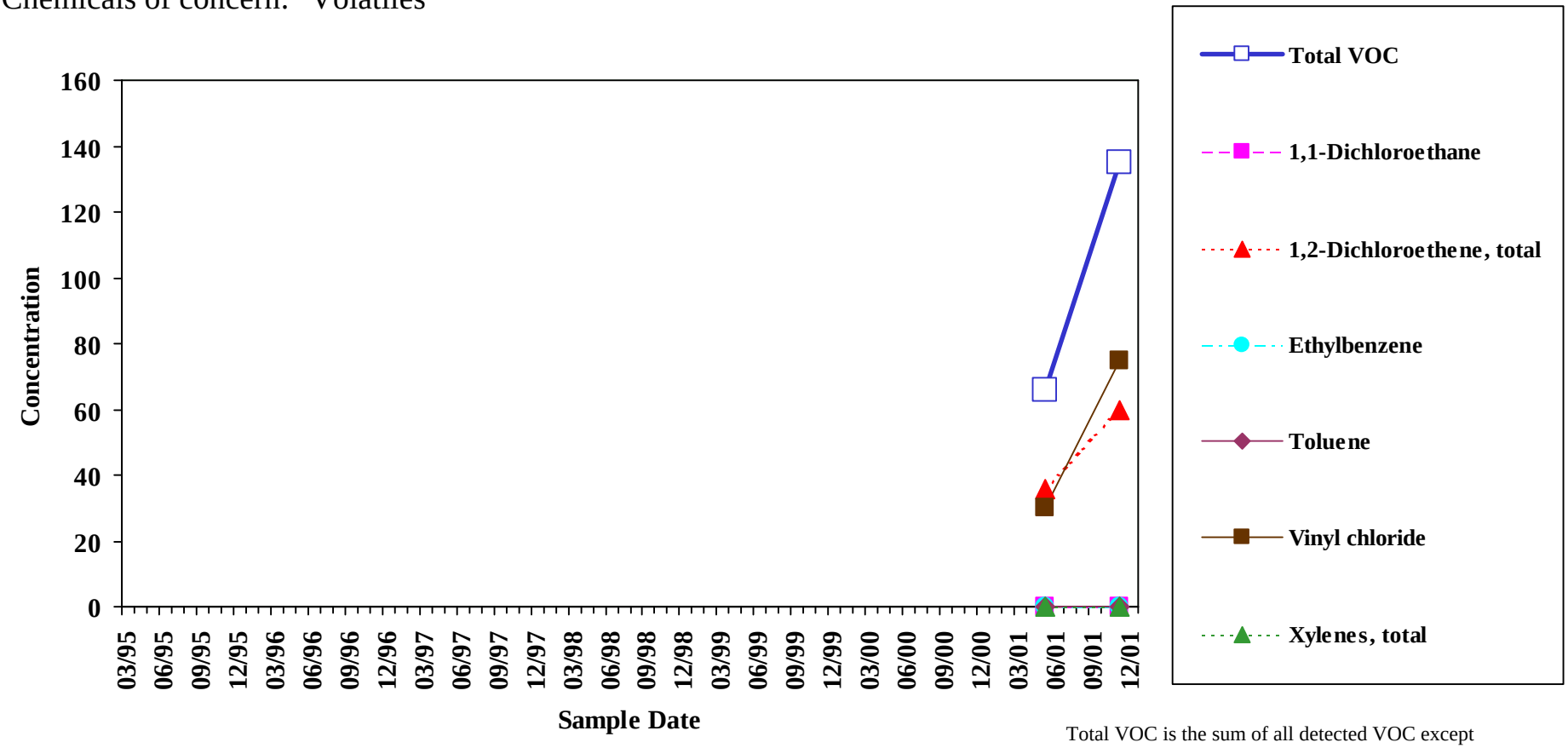
MW-NASB-069

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

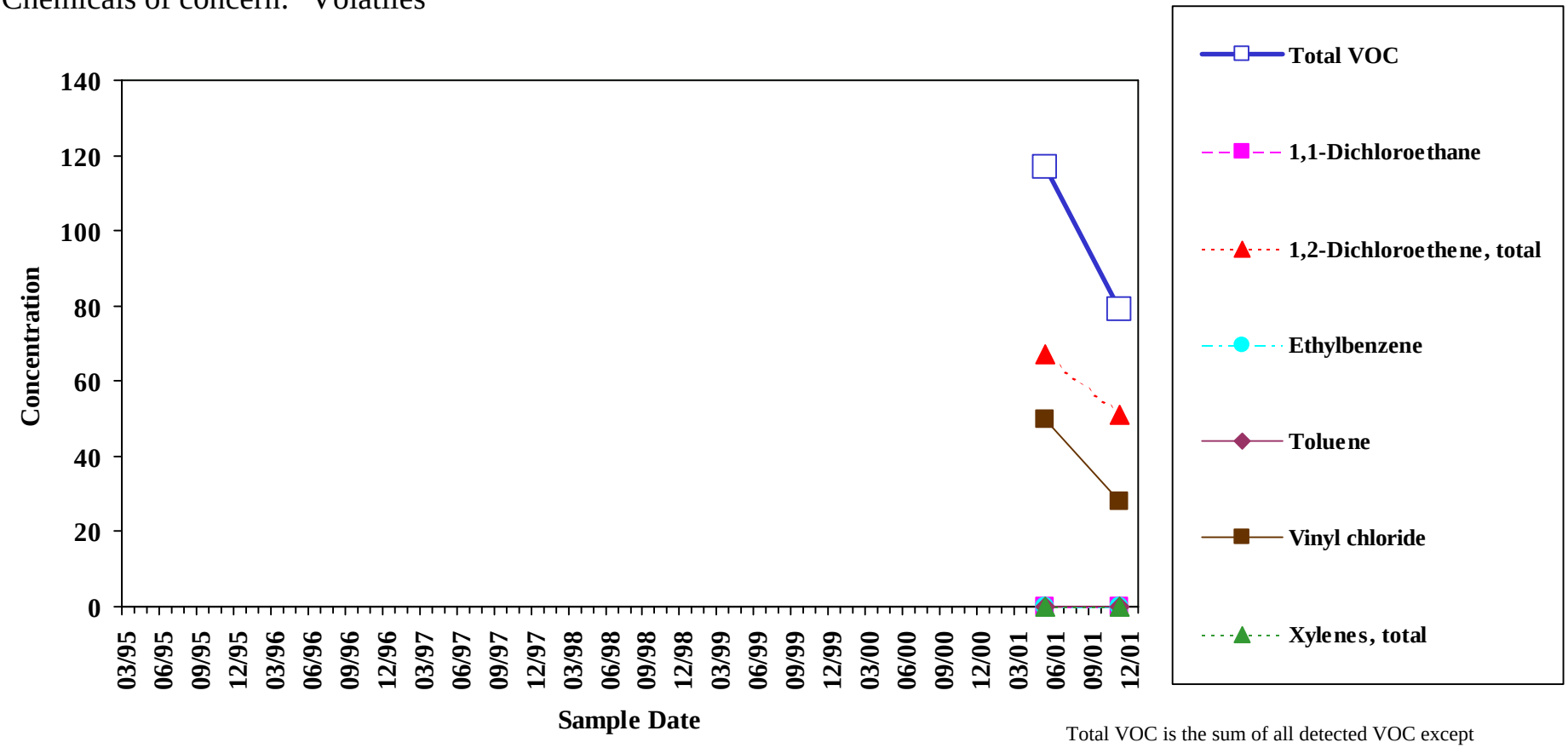
MW-NASB-069

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

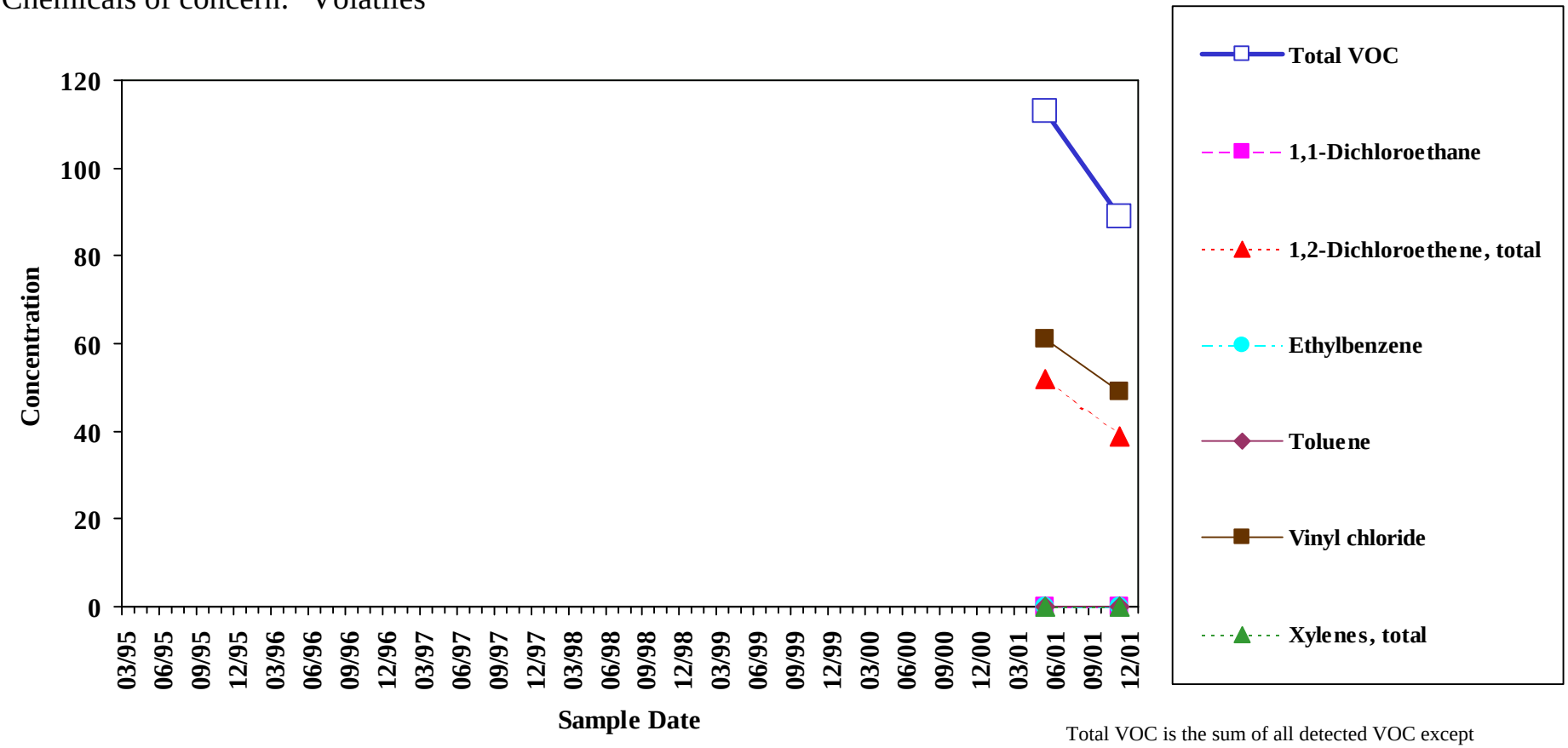
MW-NASB-069

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

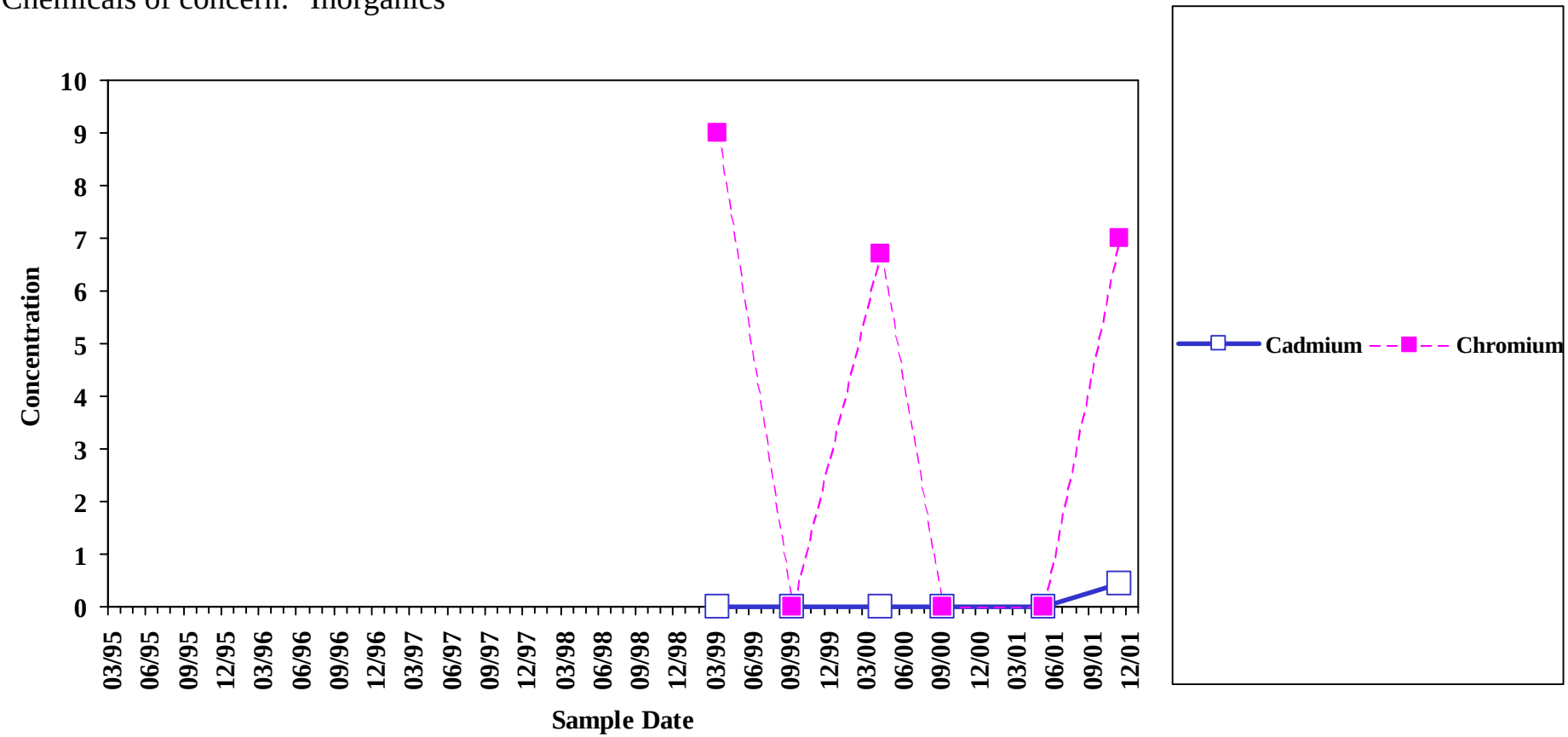
MW-NASB-070

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

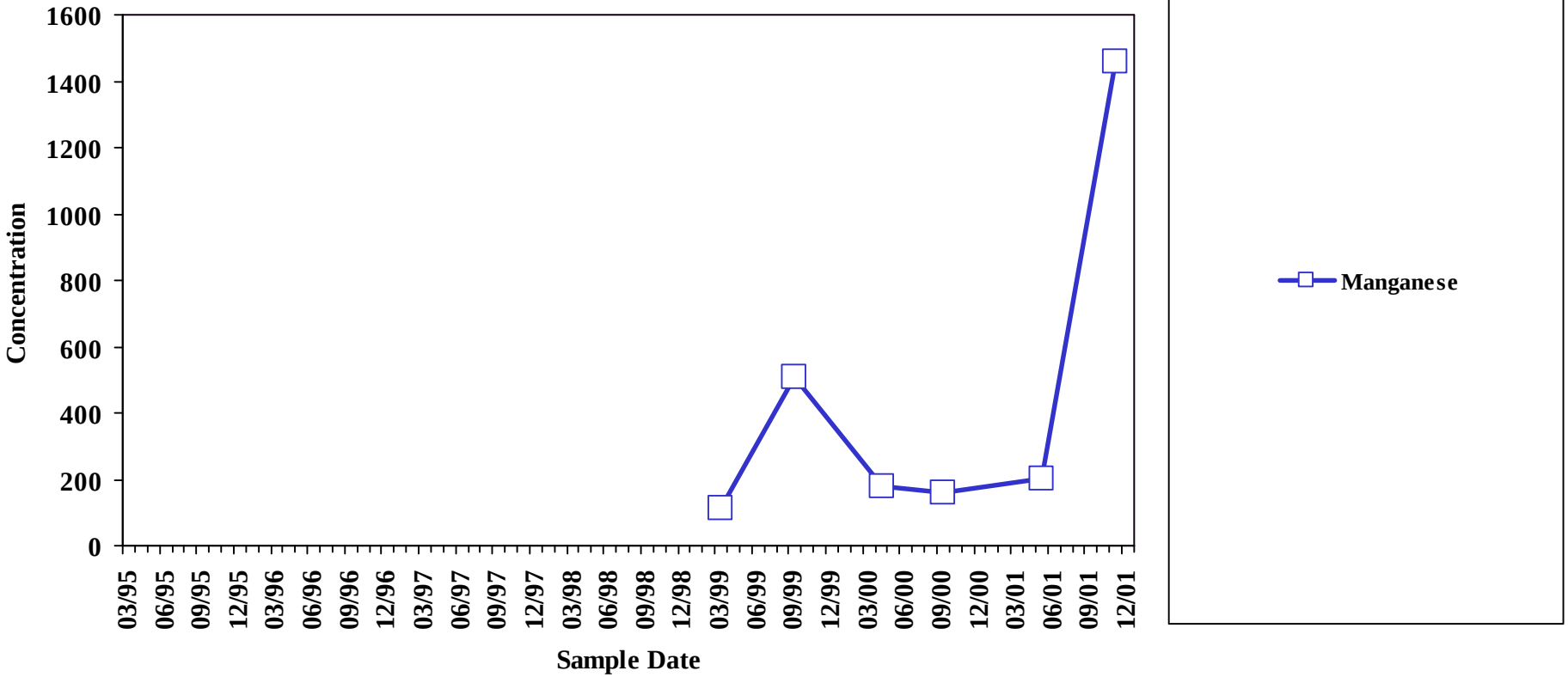
MW-NASB-070

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

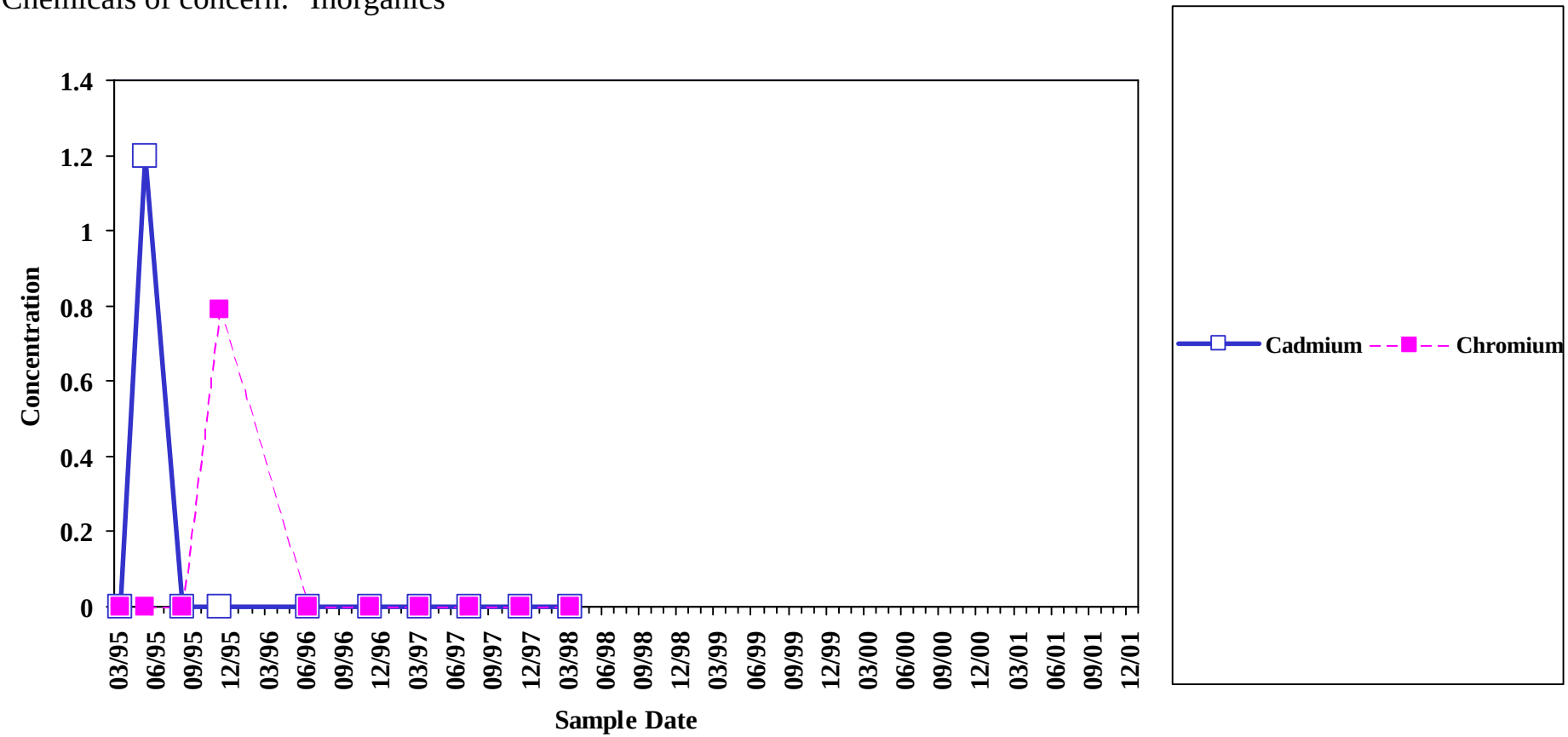
MW-NASB-071

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

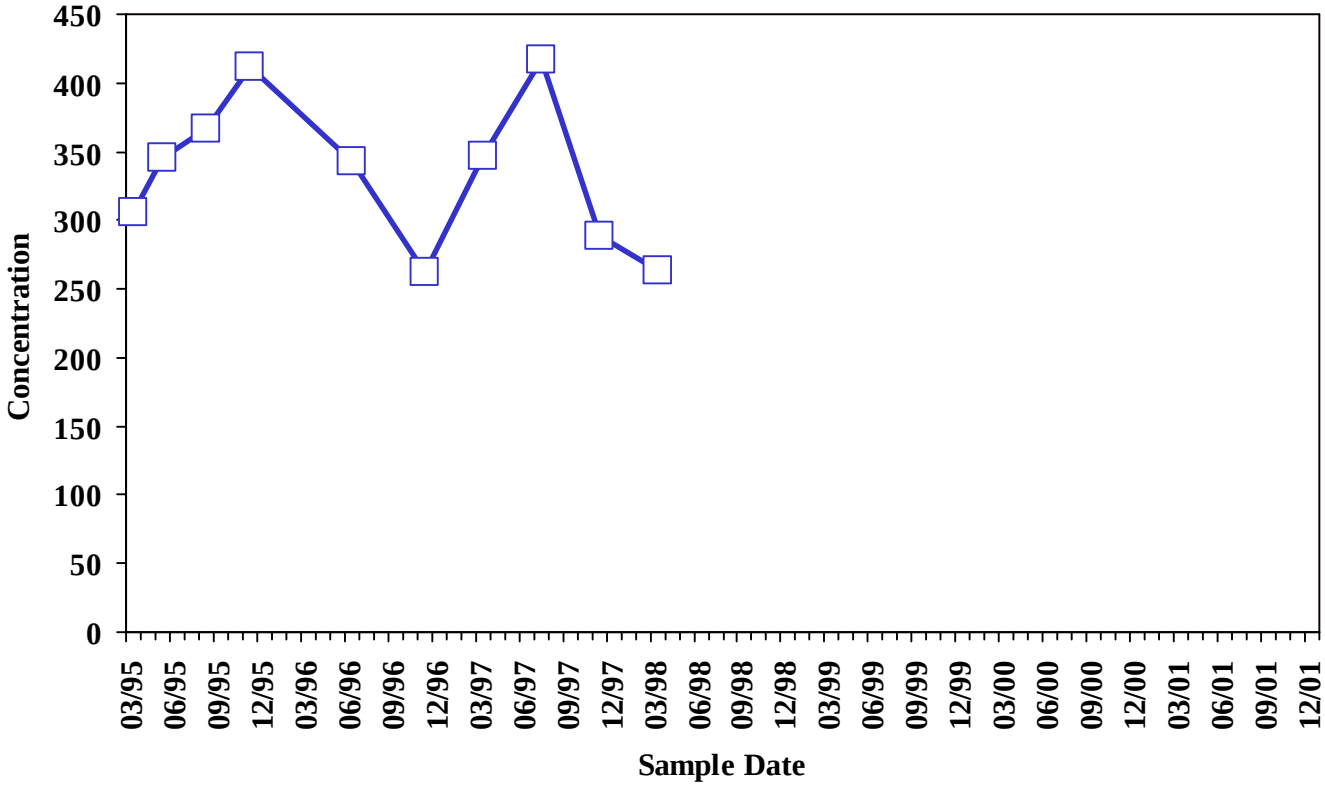
MW-NASB-071

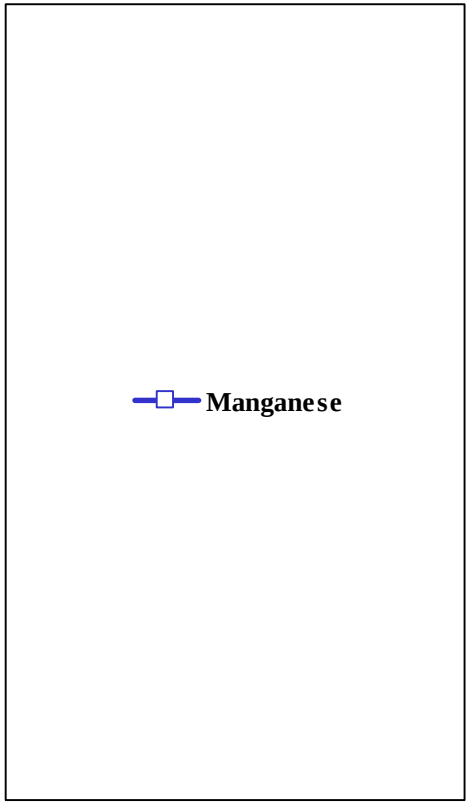
Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

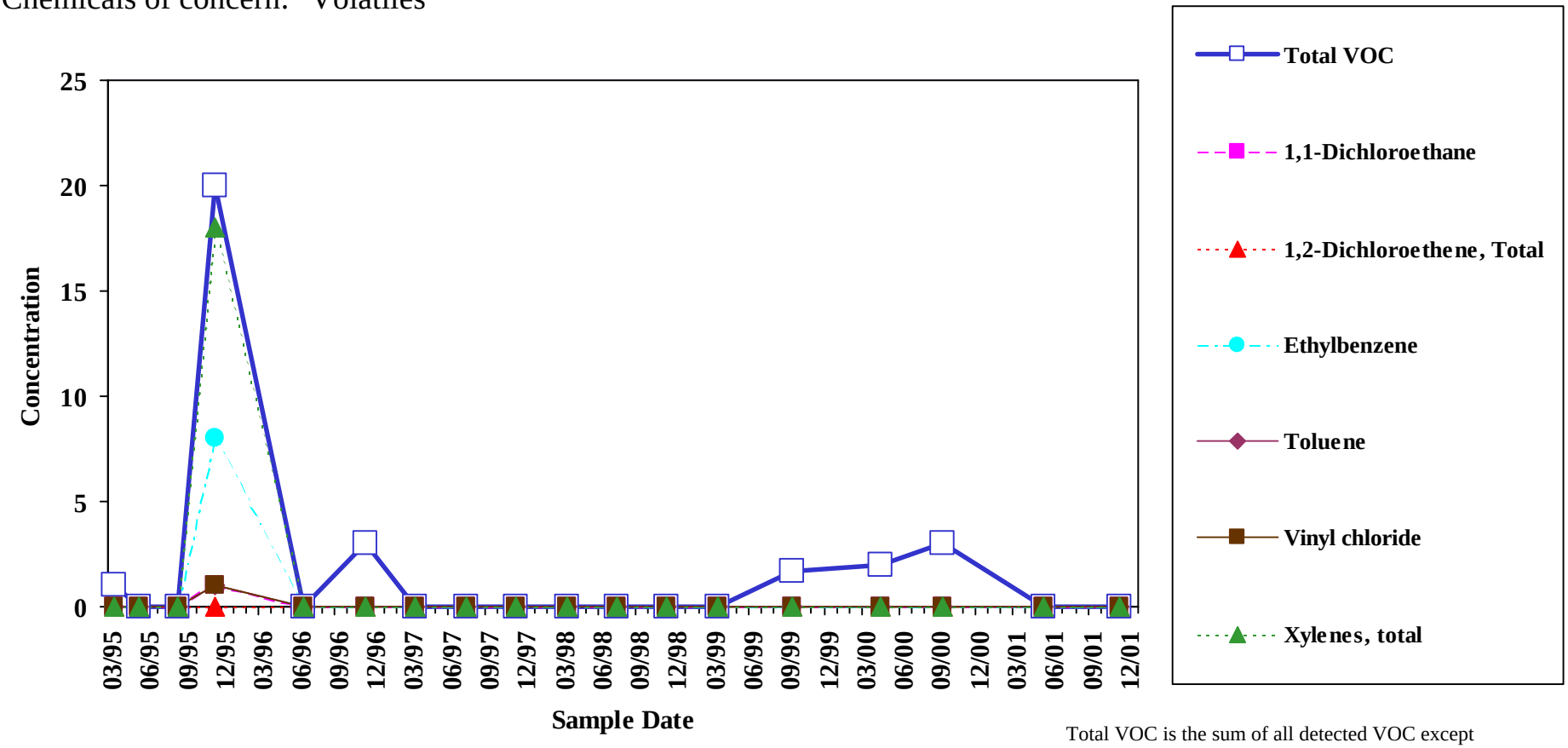
MW-NASB-071

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

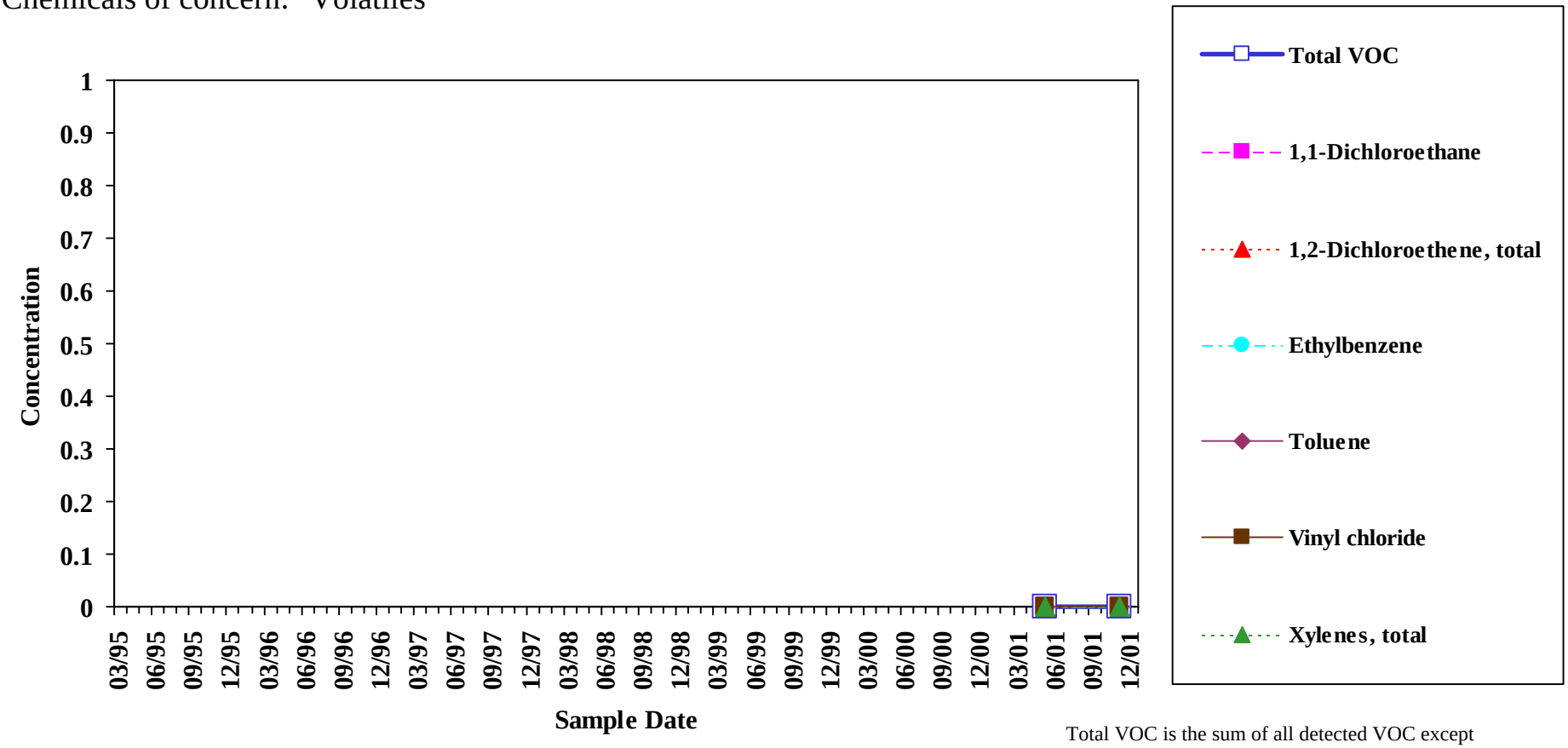
MW-NASB-071

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

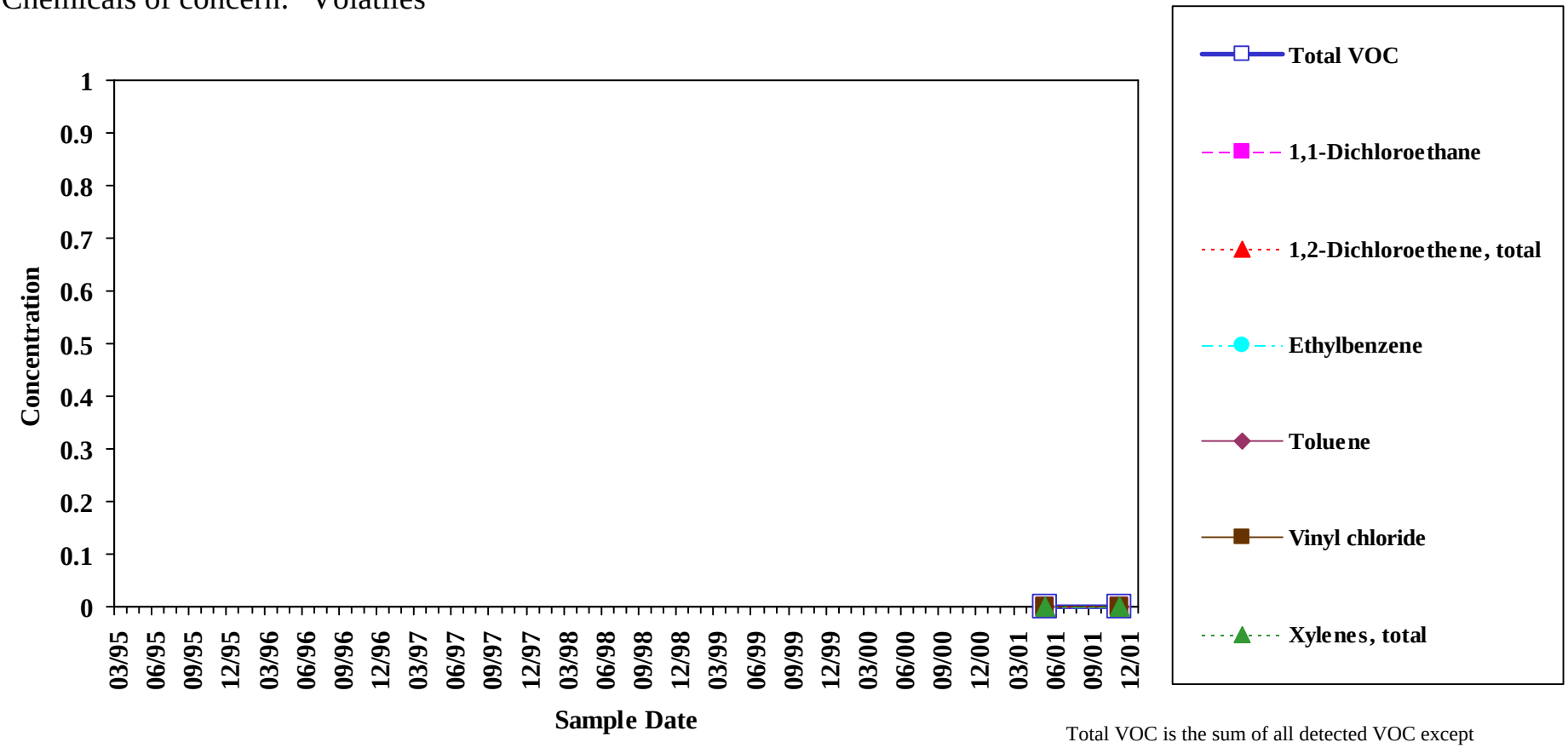
MW-NASB-071

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

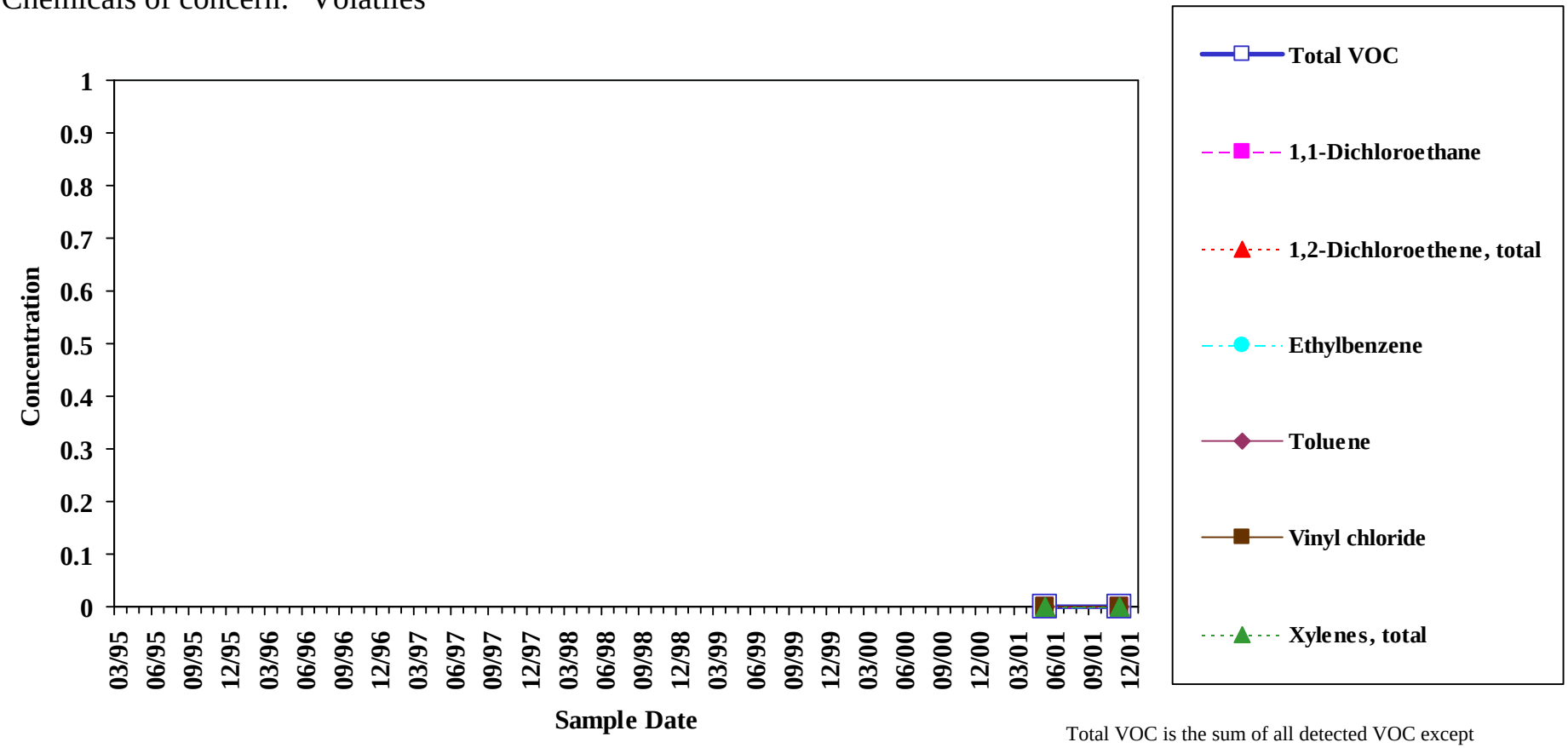
MW-NASB-071

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

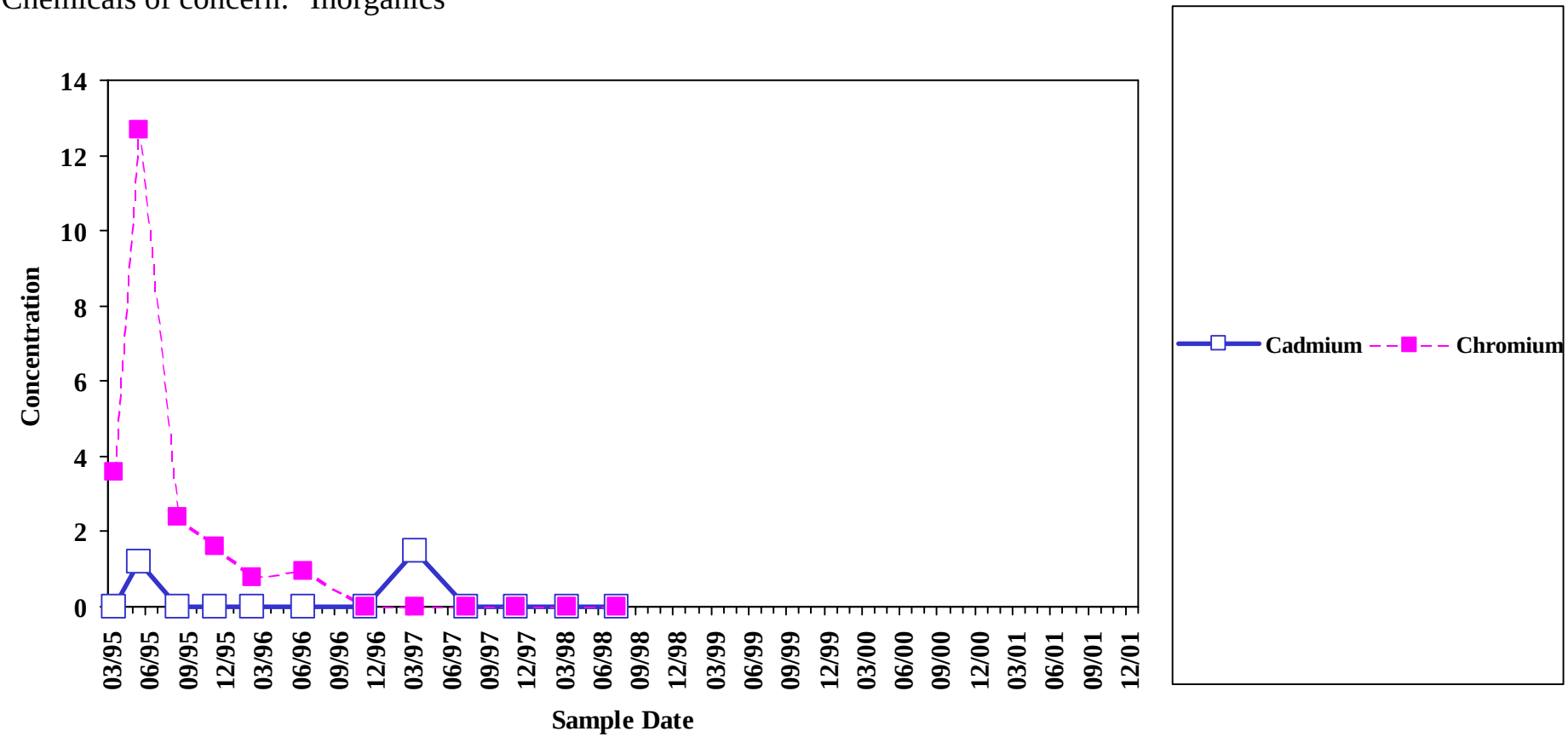
MW-NASB-072

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

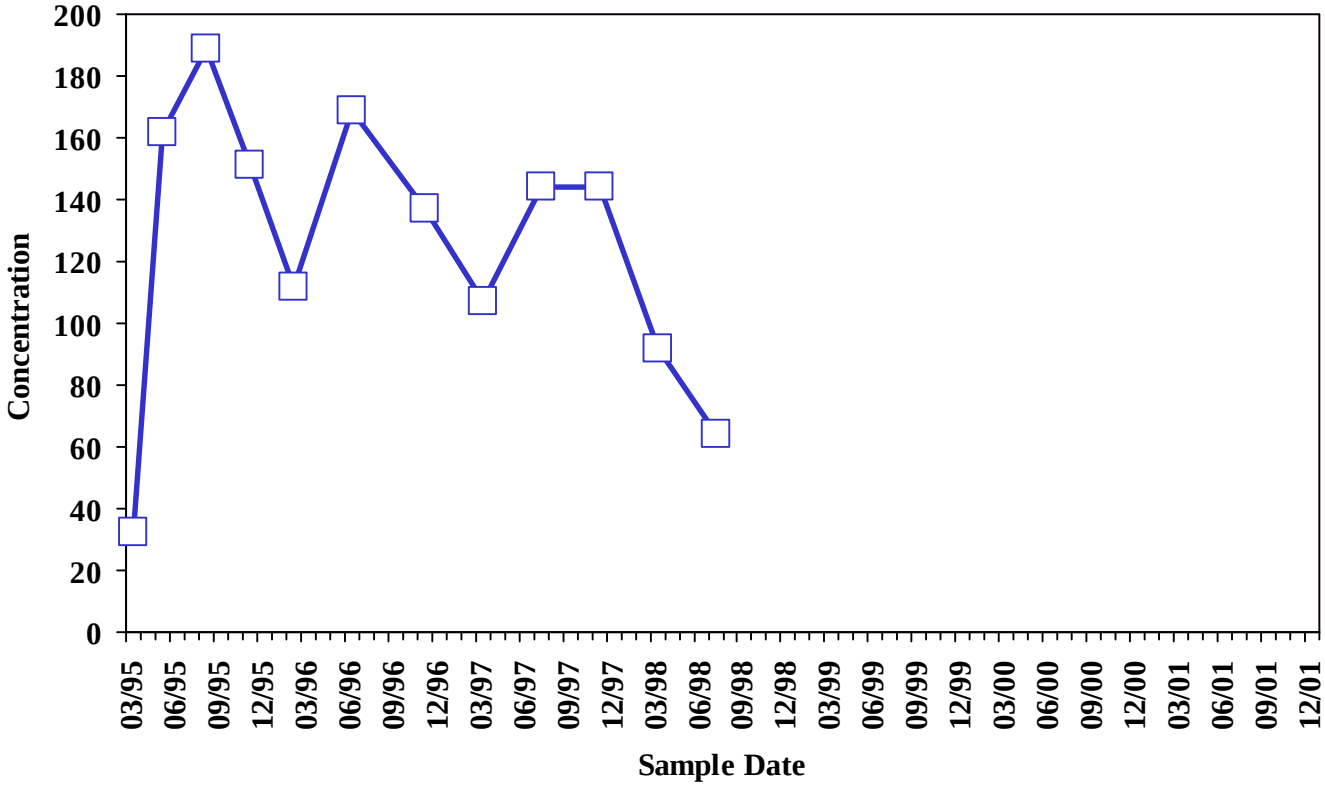
MW-NASB-072

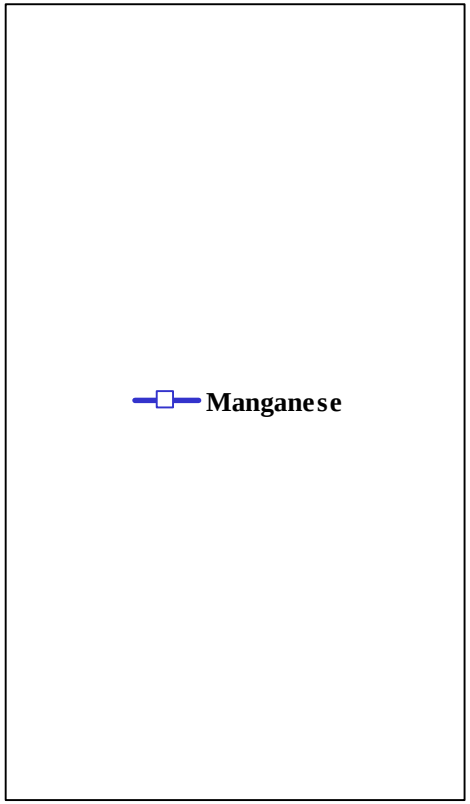
Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

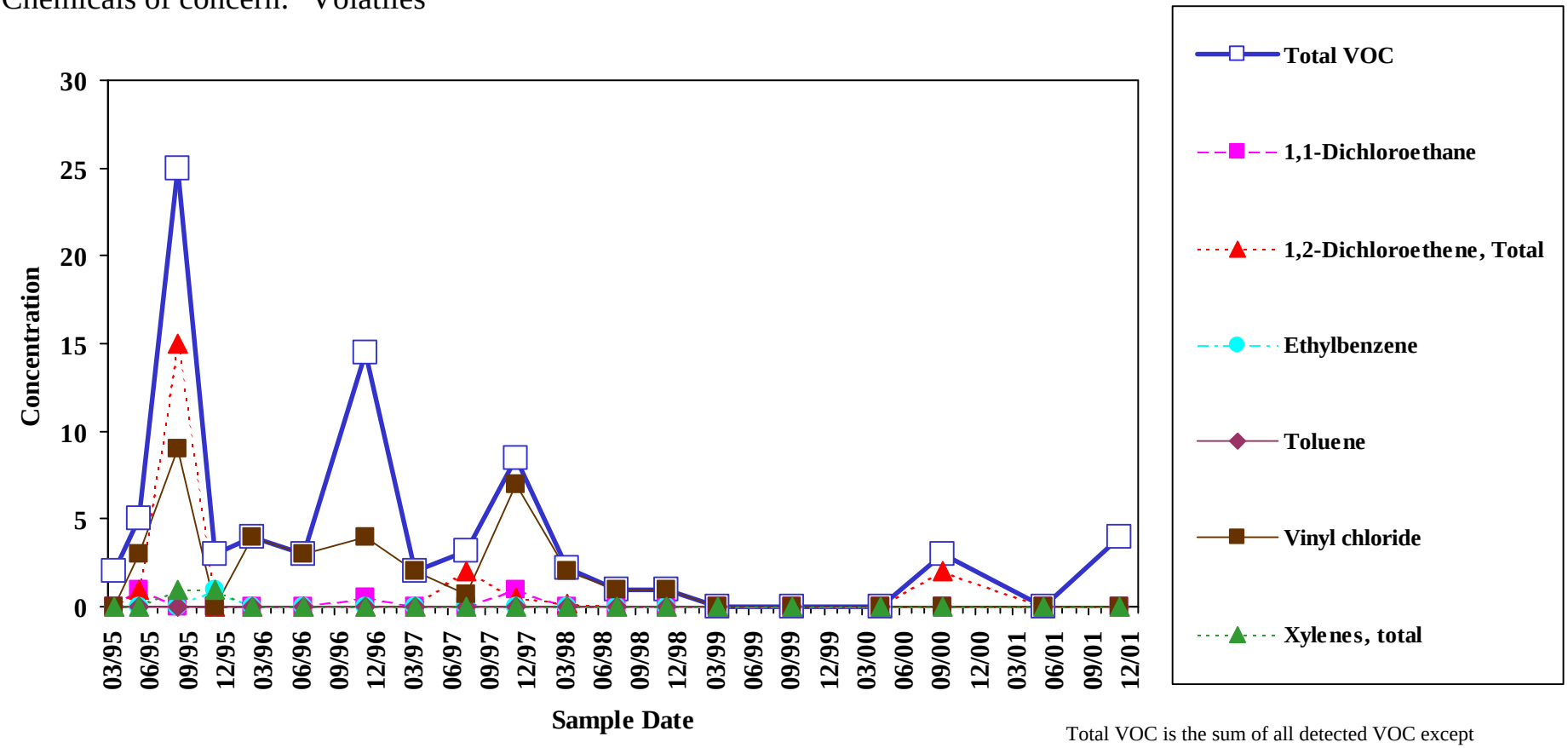
MW-NASB-072

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

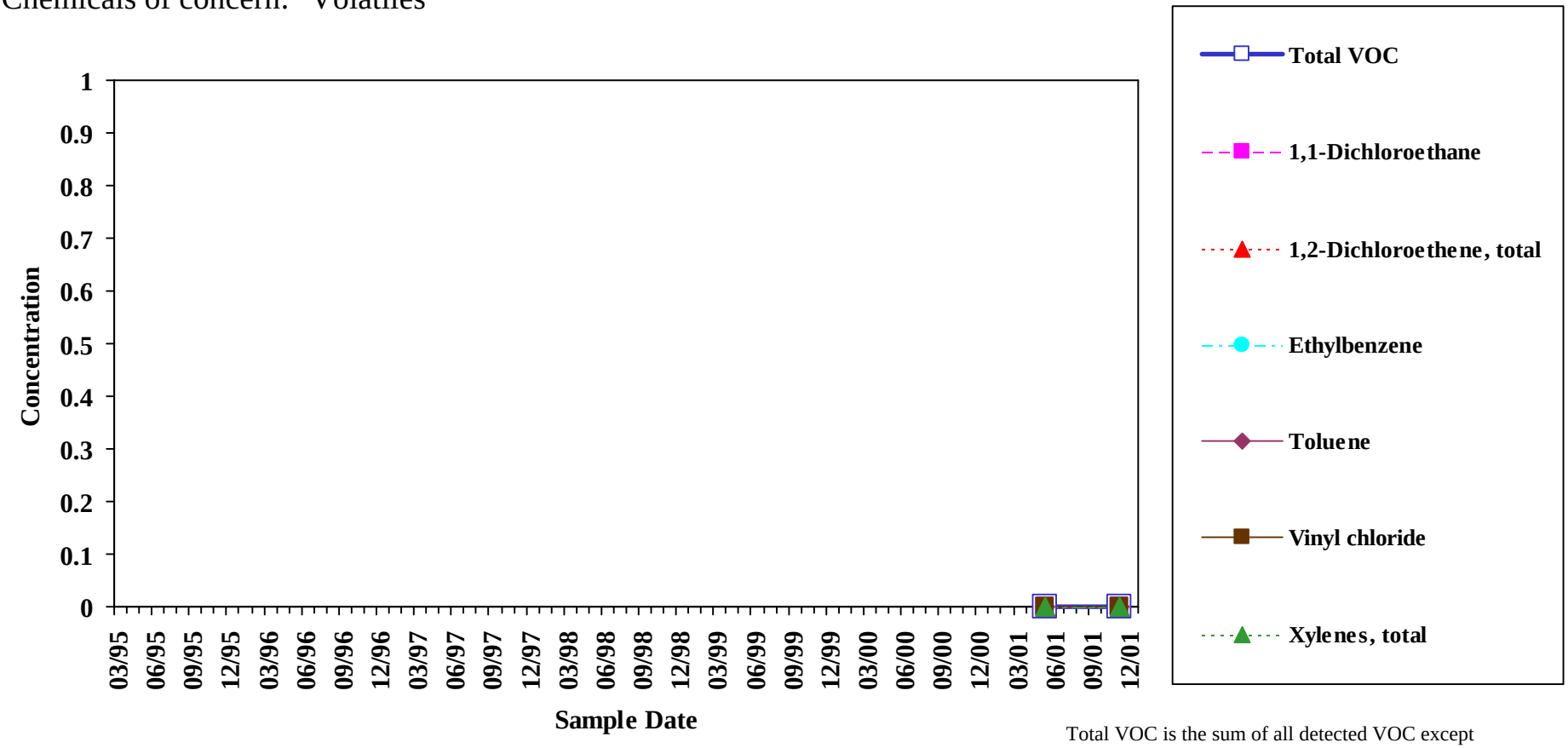
MW-NASB-072

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

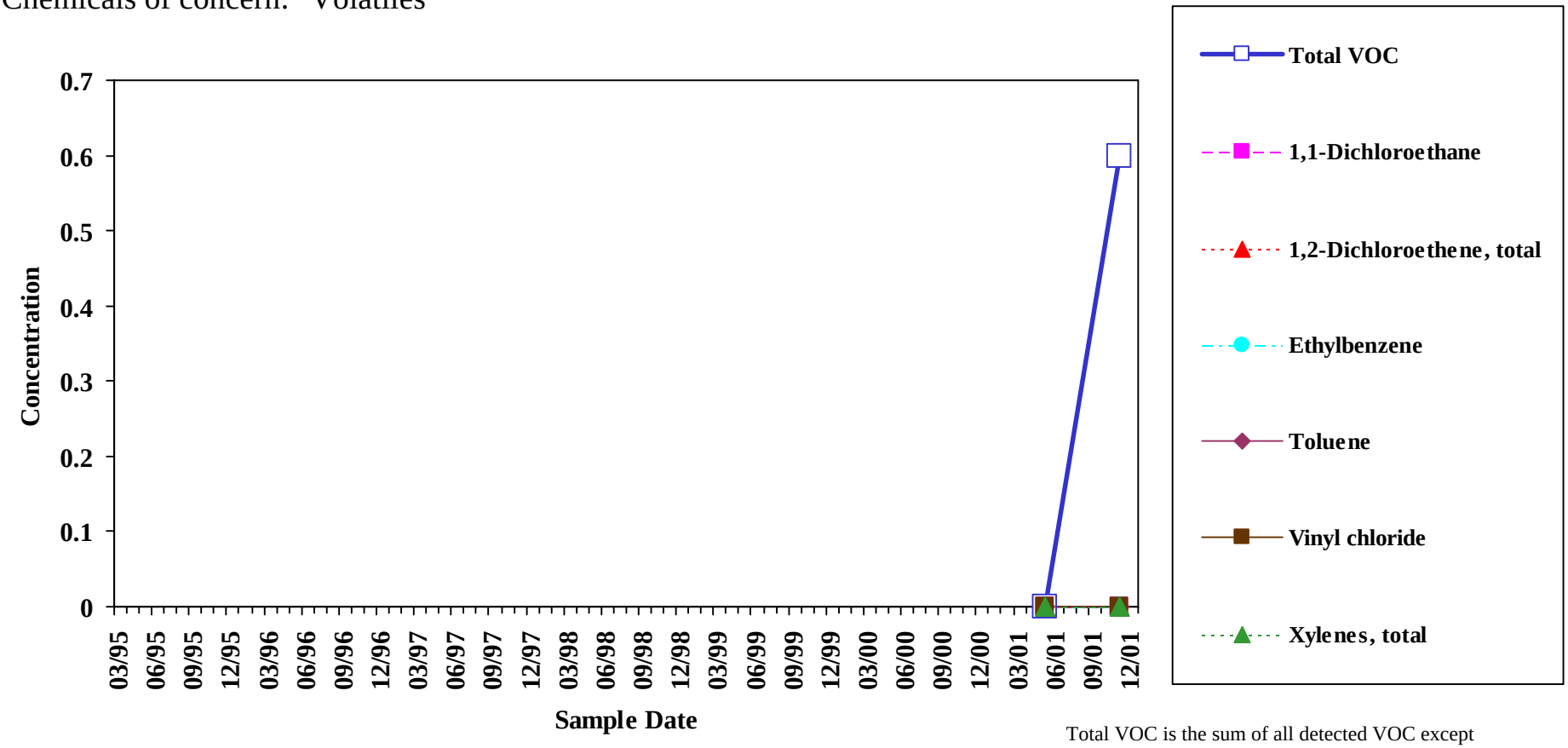
MW-NASB-072

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

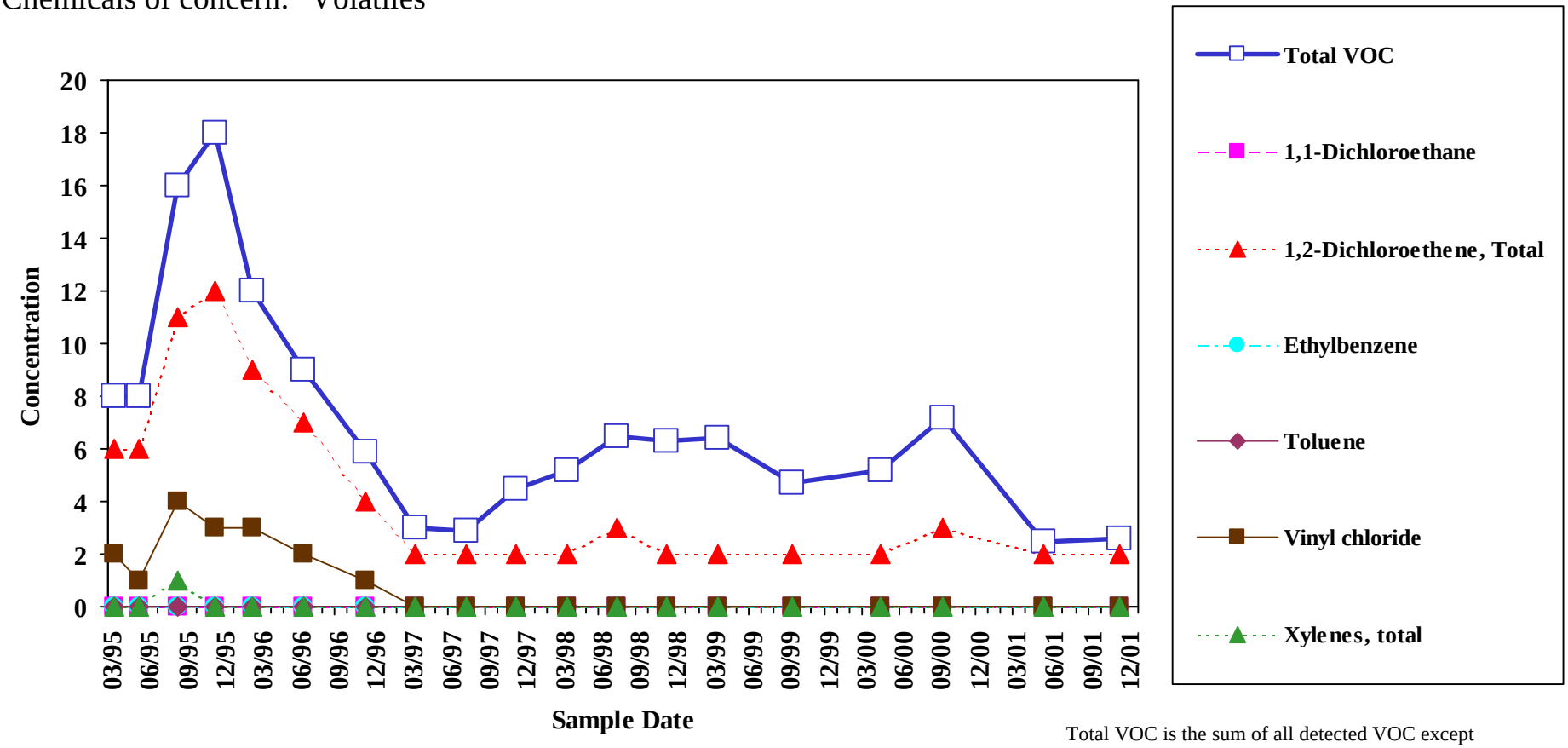
MW-NASB-074

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

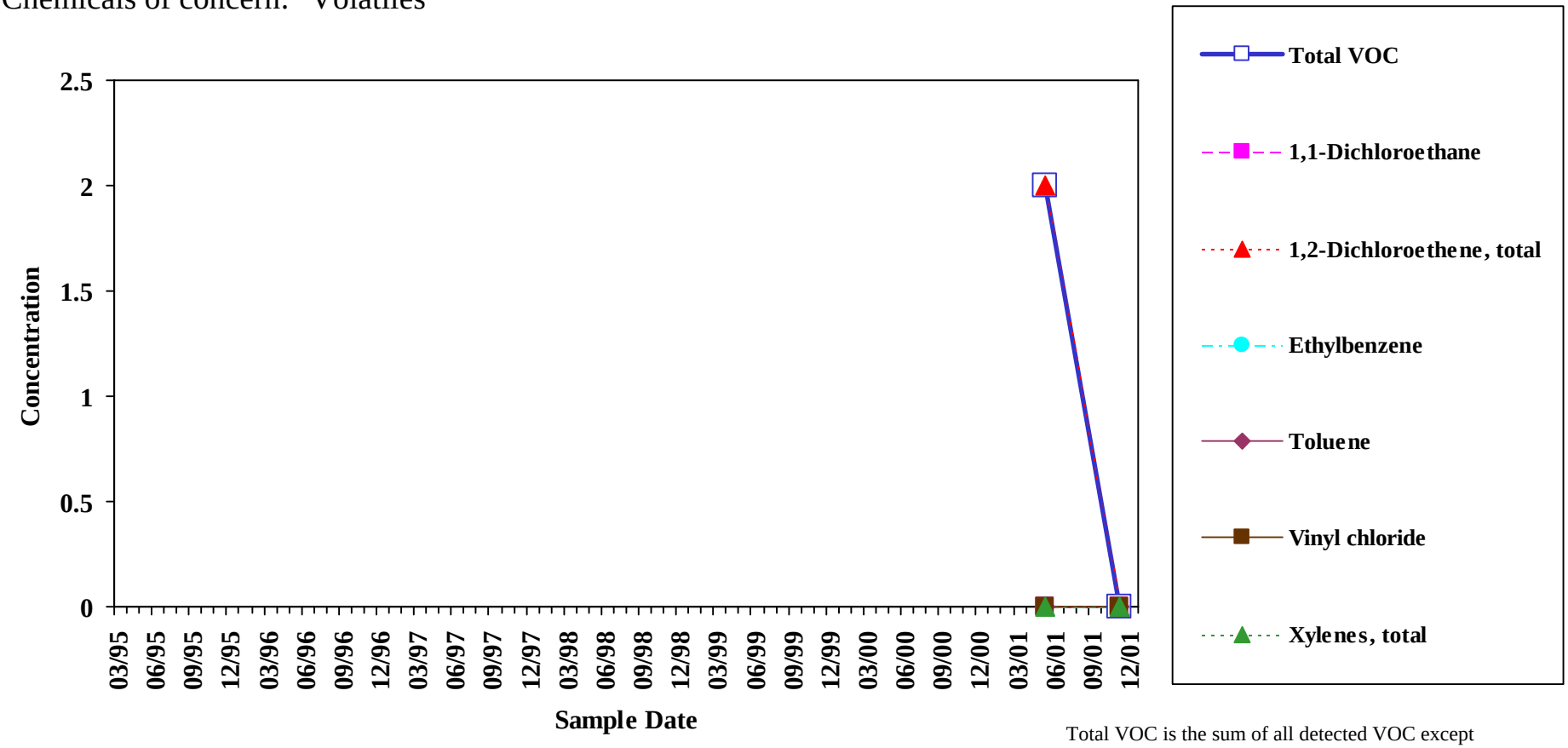
MW-NASB-074

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

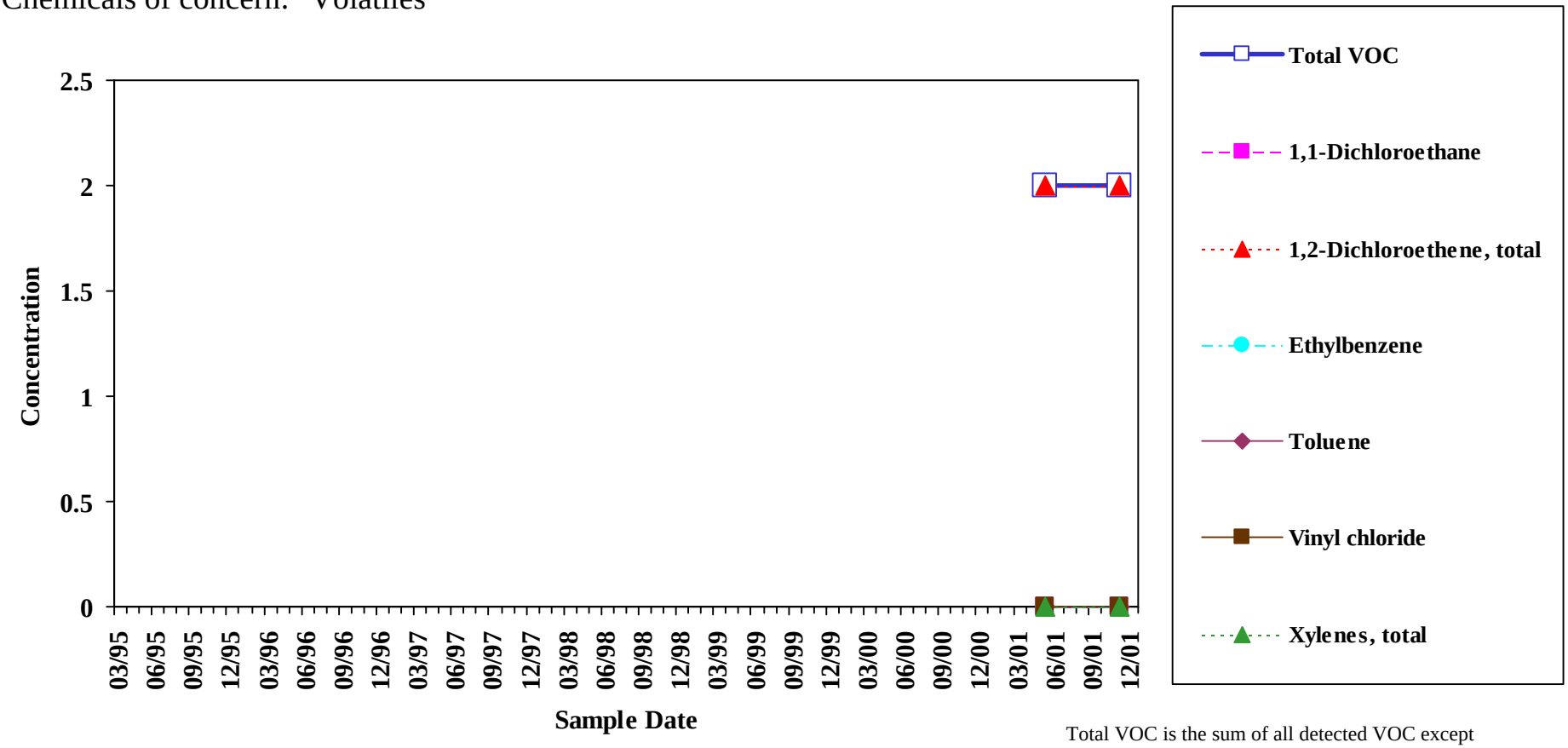
MW-NASB-074

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

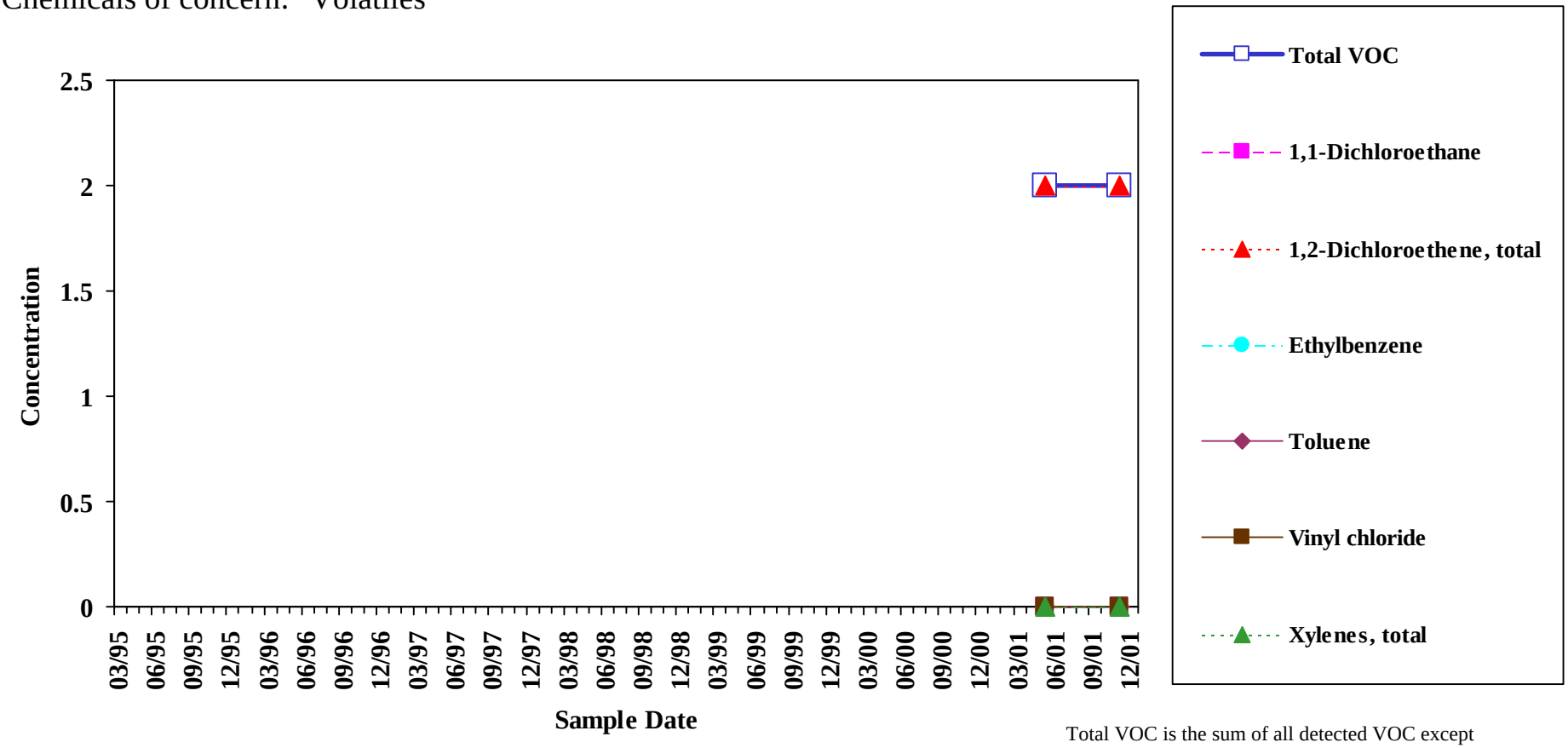
MW-NASB-074

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



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Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

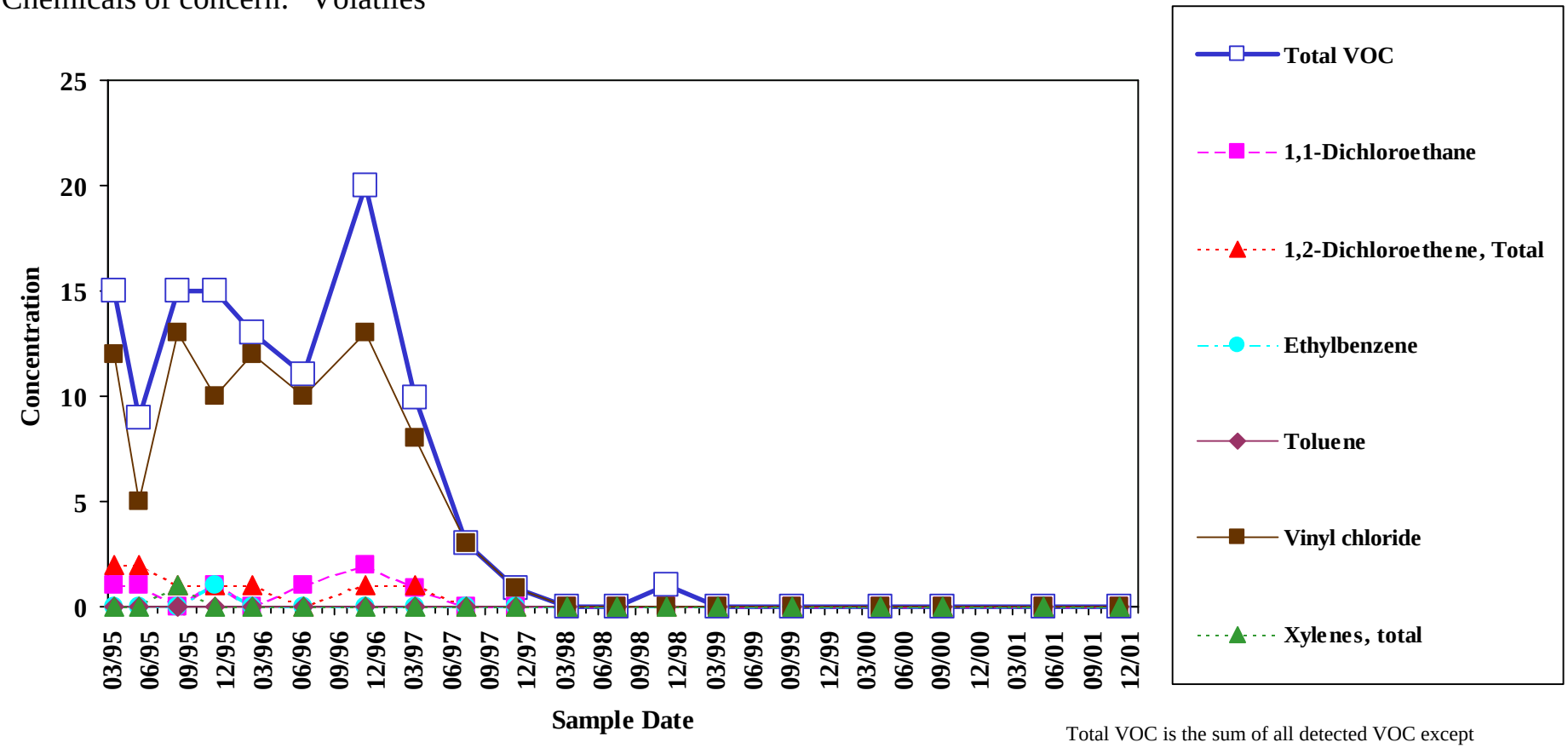
MW-NASB-075

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

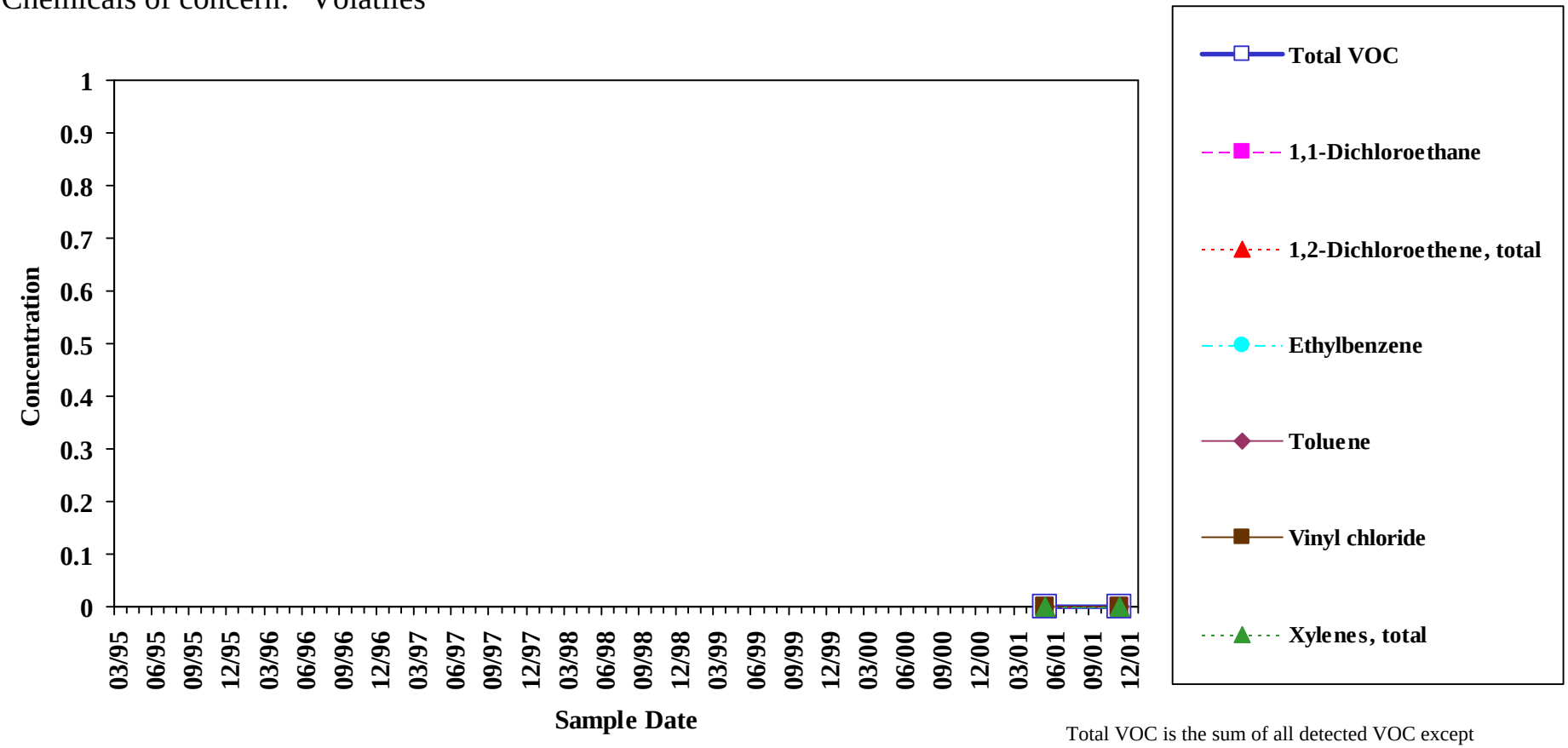
MW-NASB-075

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



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Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

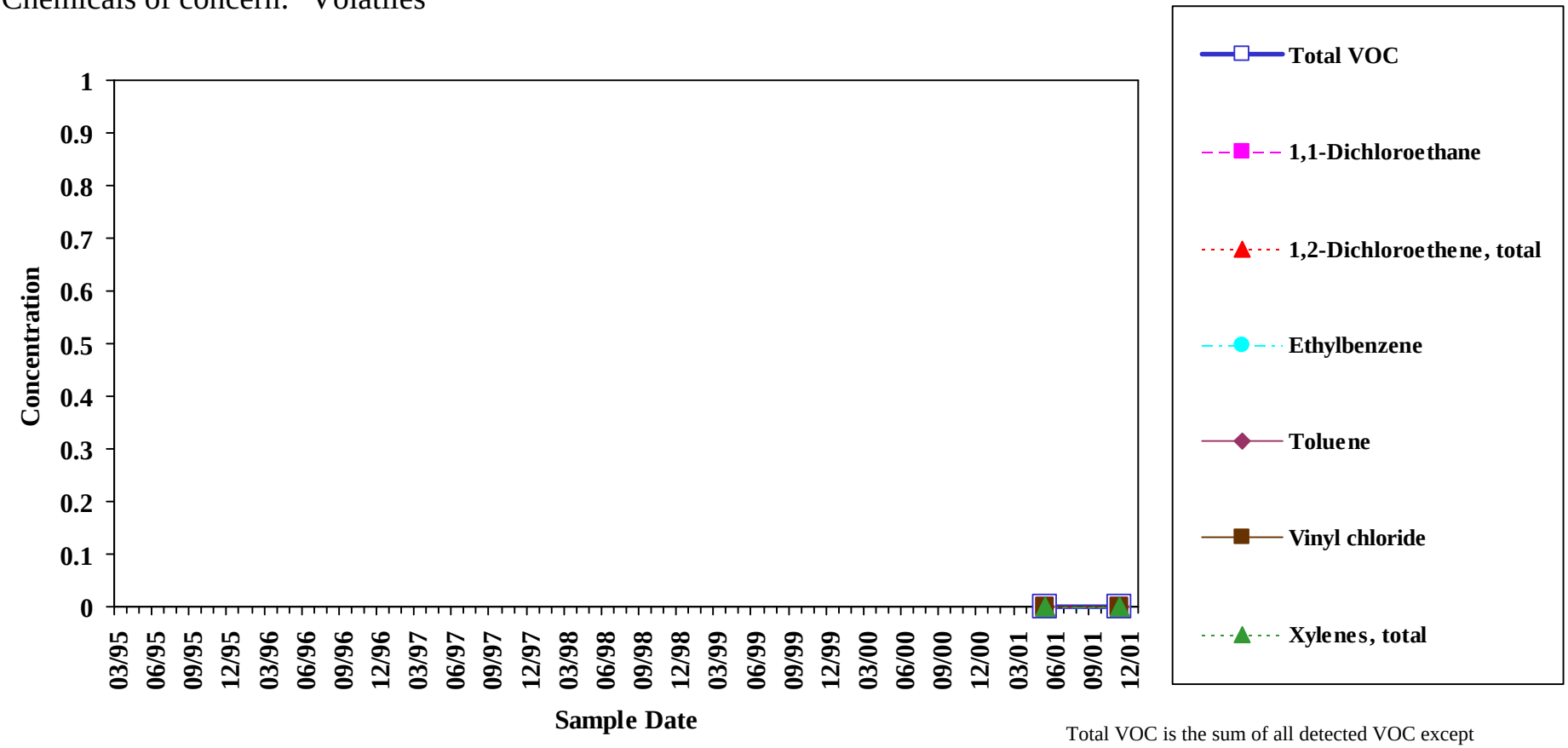
MW-NASB-075

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



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Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

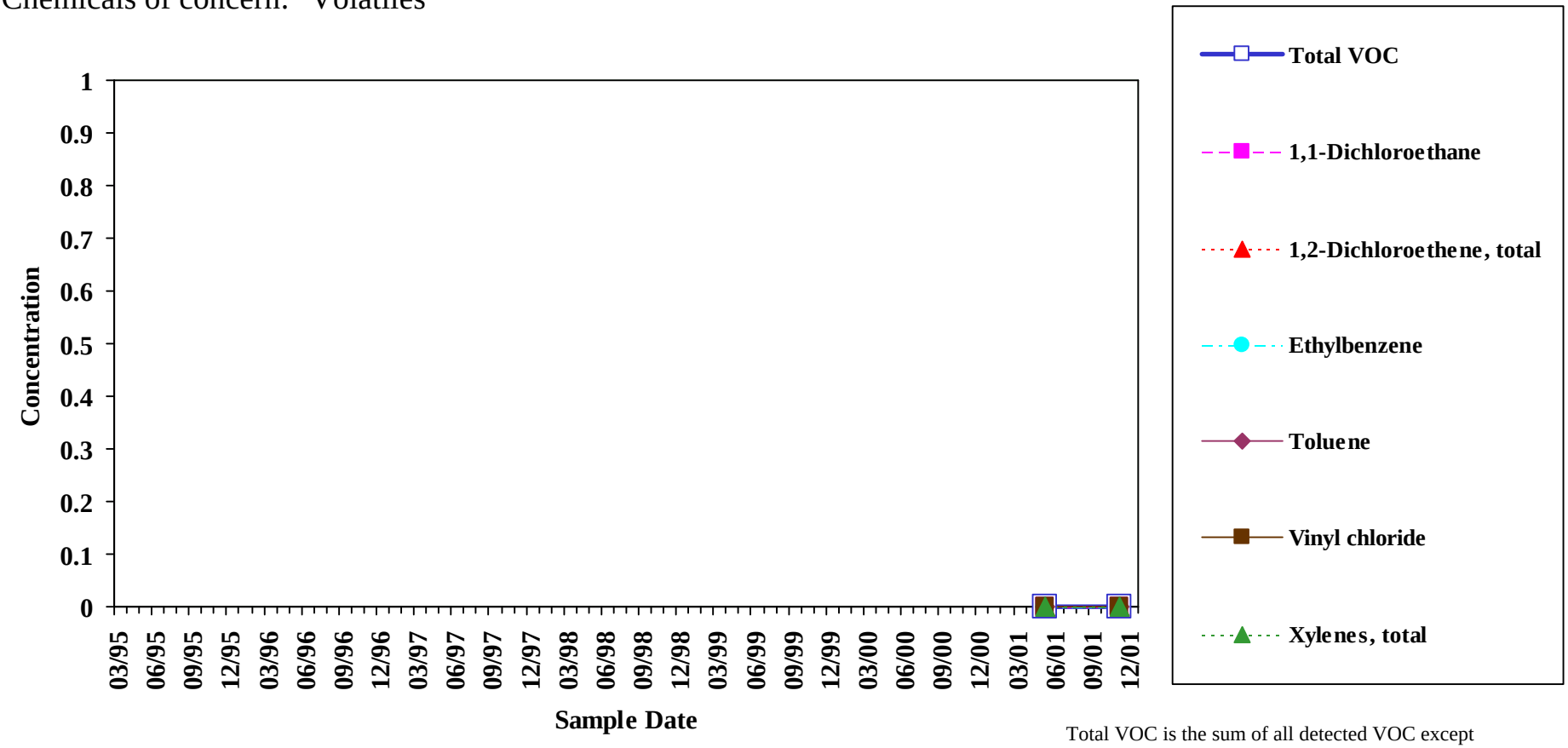
MW-NASB-075

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

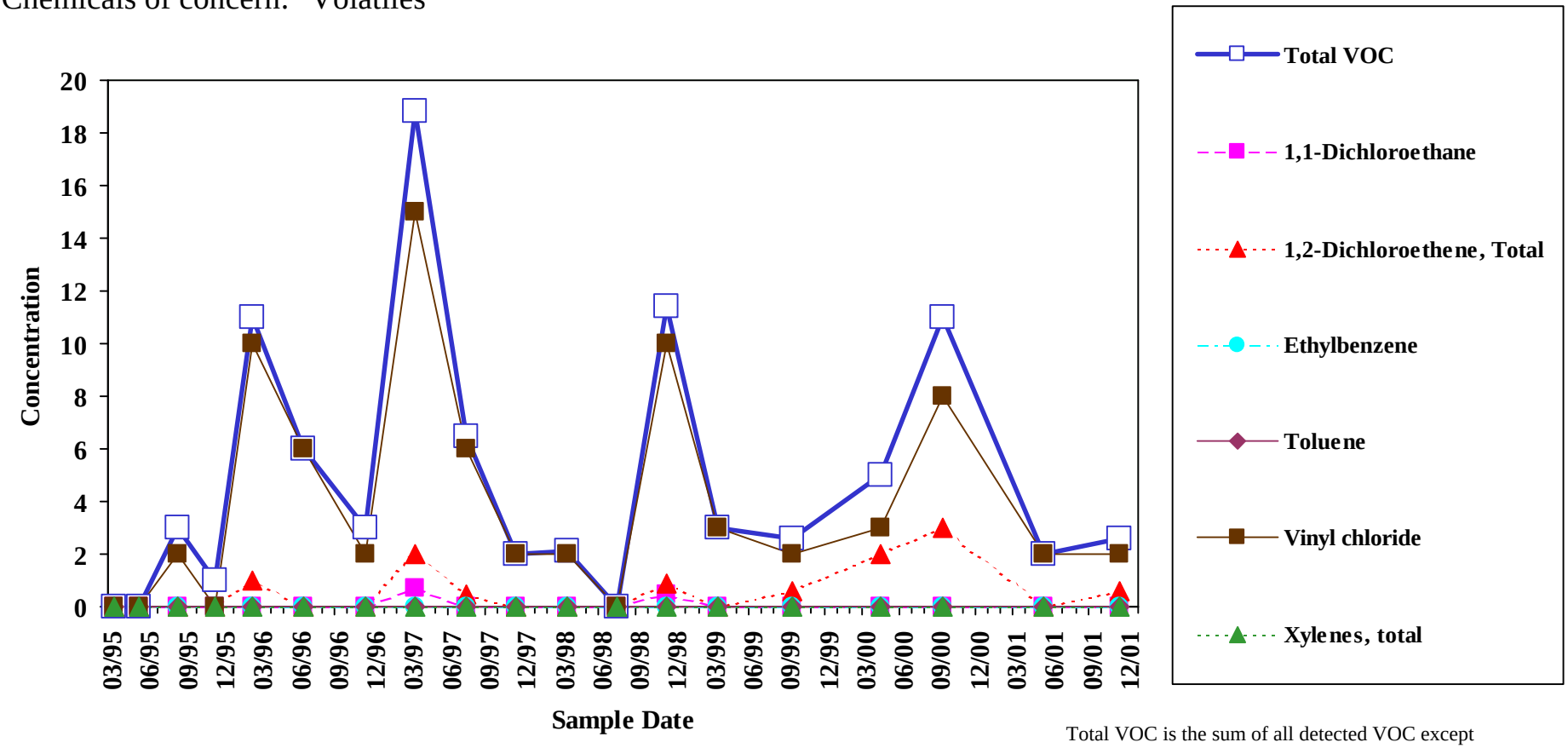
MW-NASB-076

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

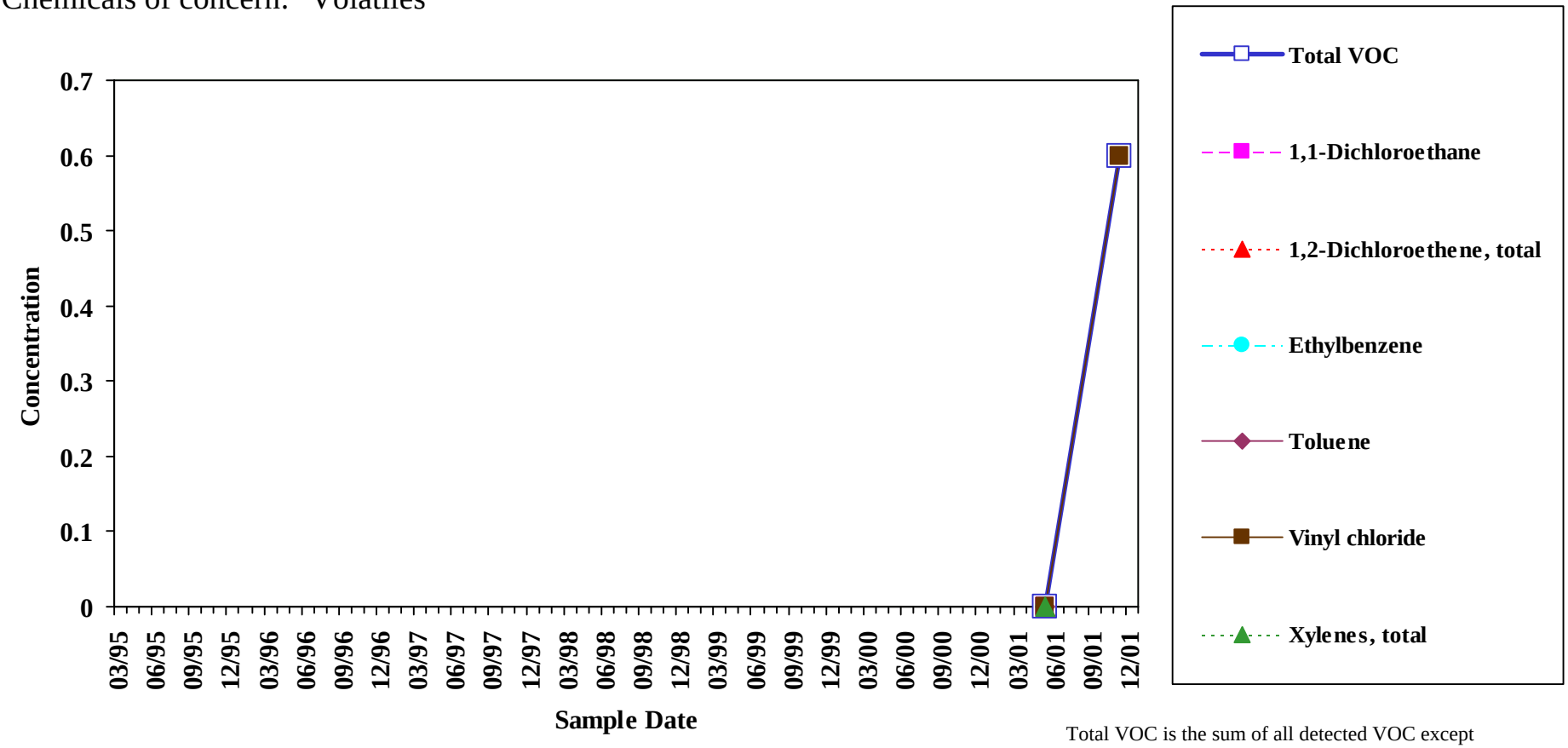
MW-NASB-076

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

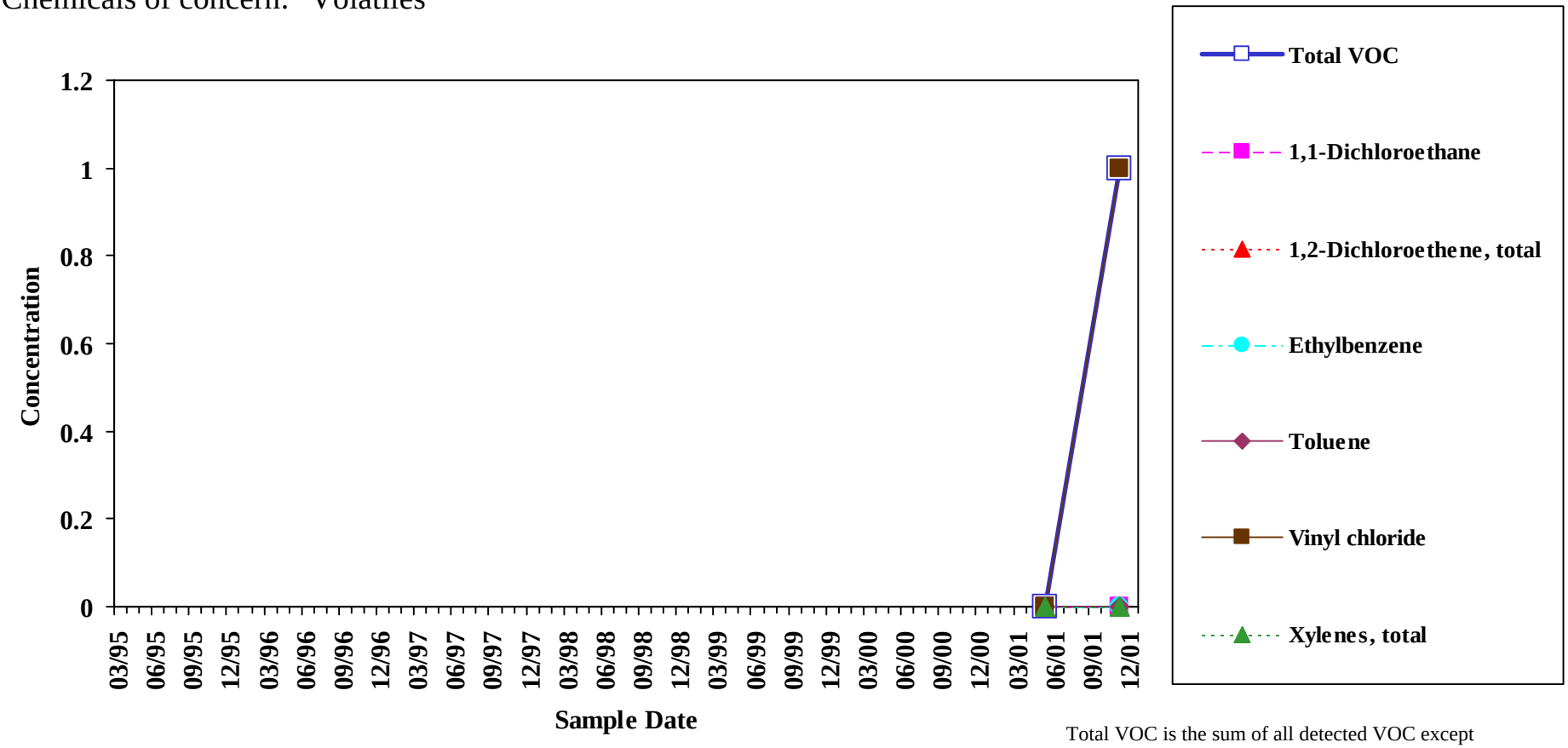
MW-NASB-076

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

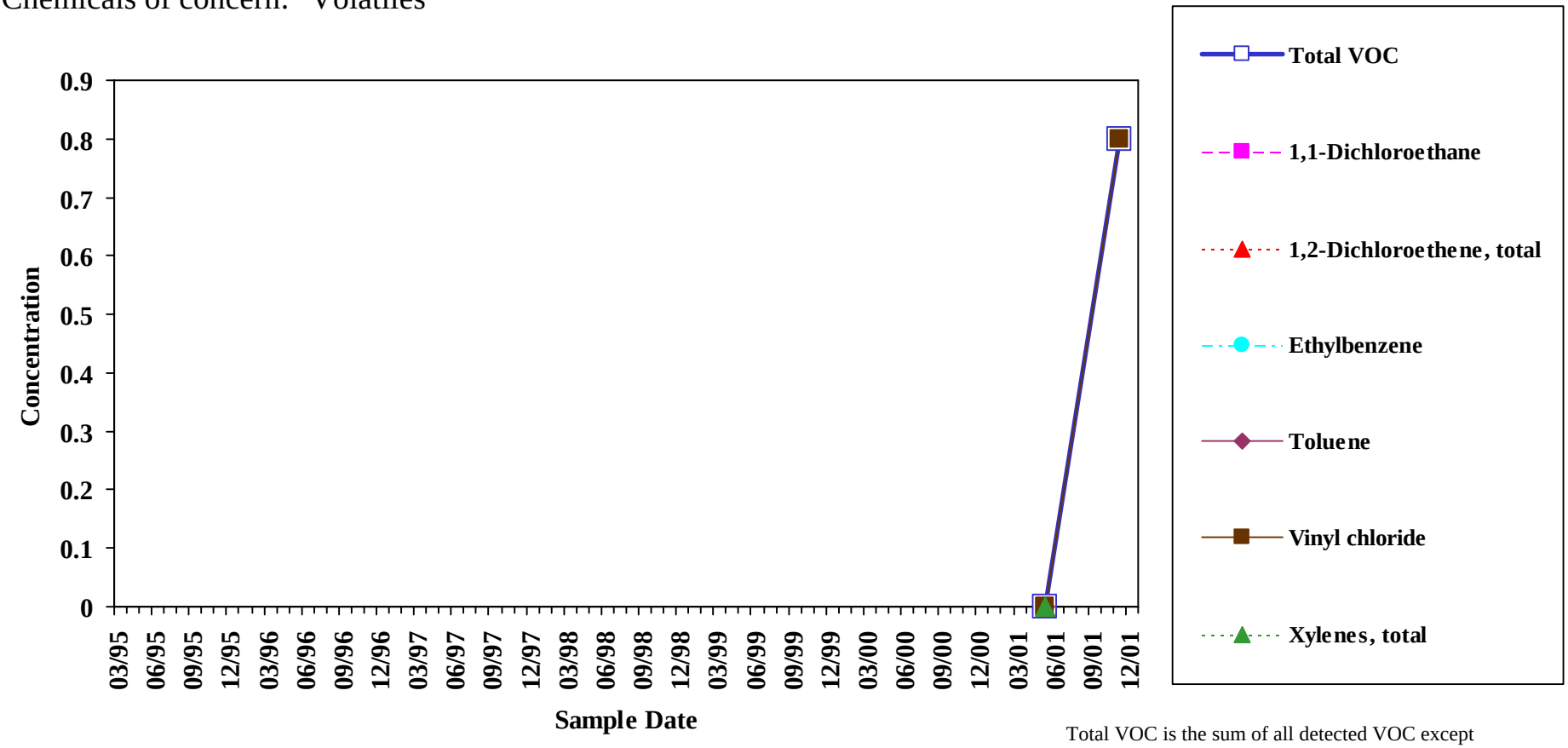
MW-NASB-076

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



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Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

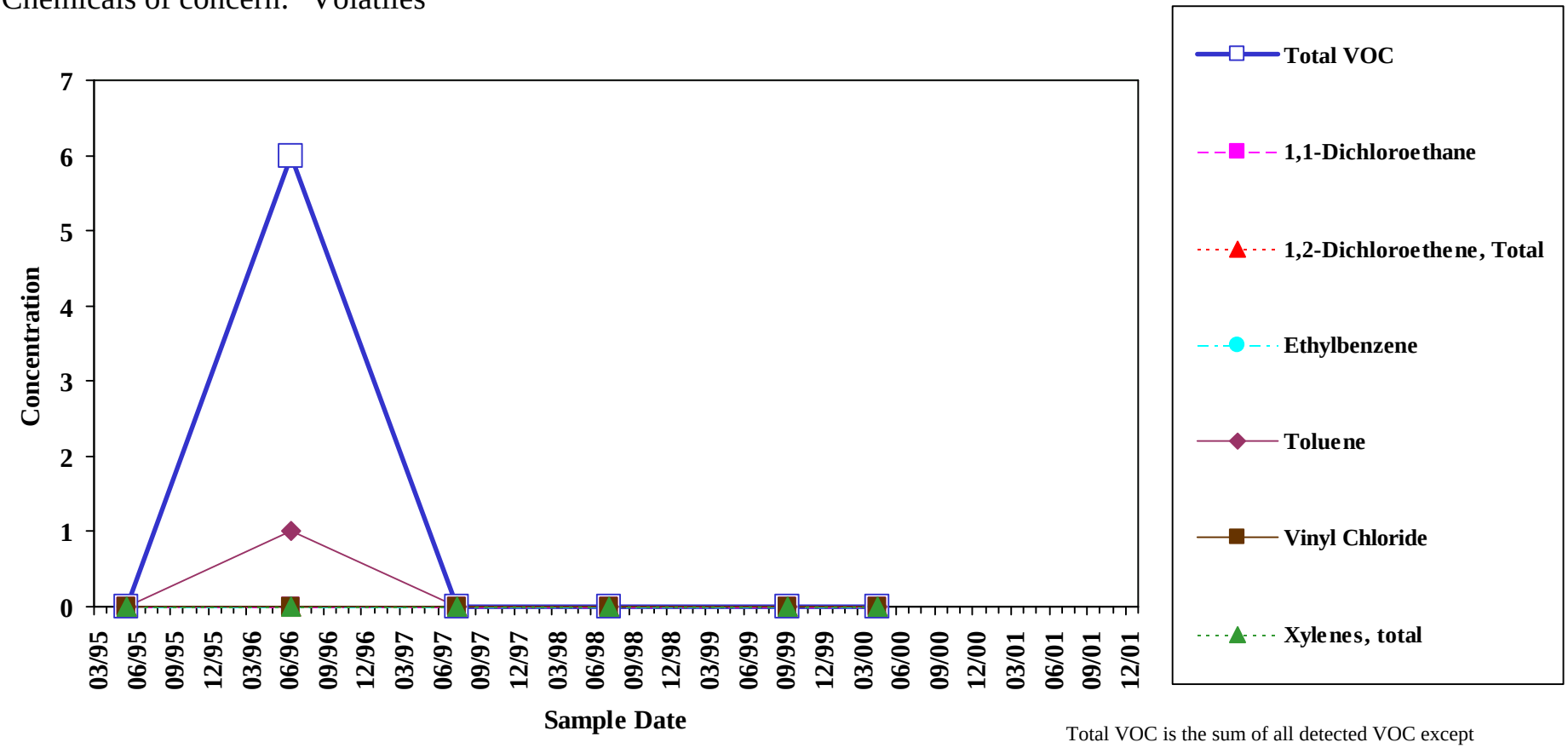
MW-NASB-077

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

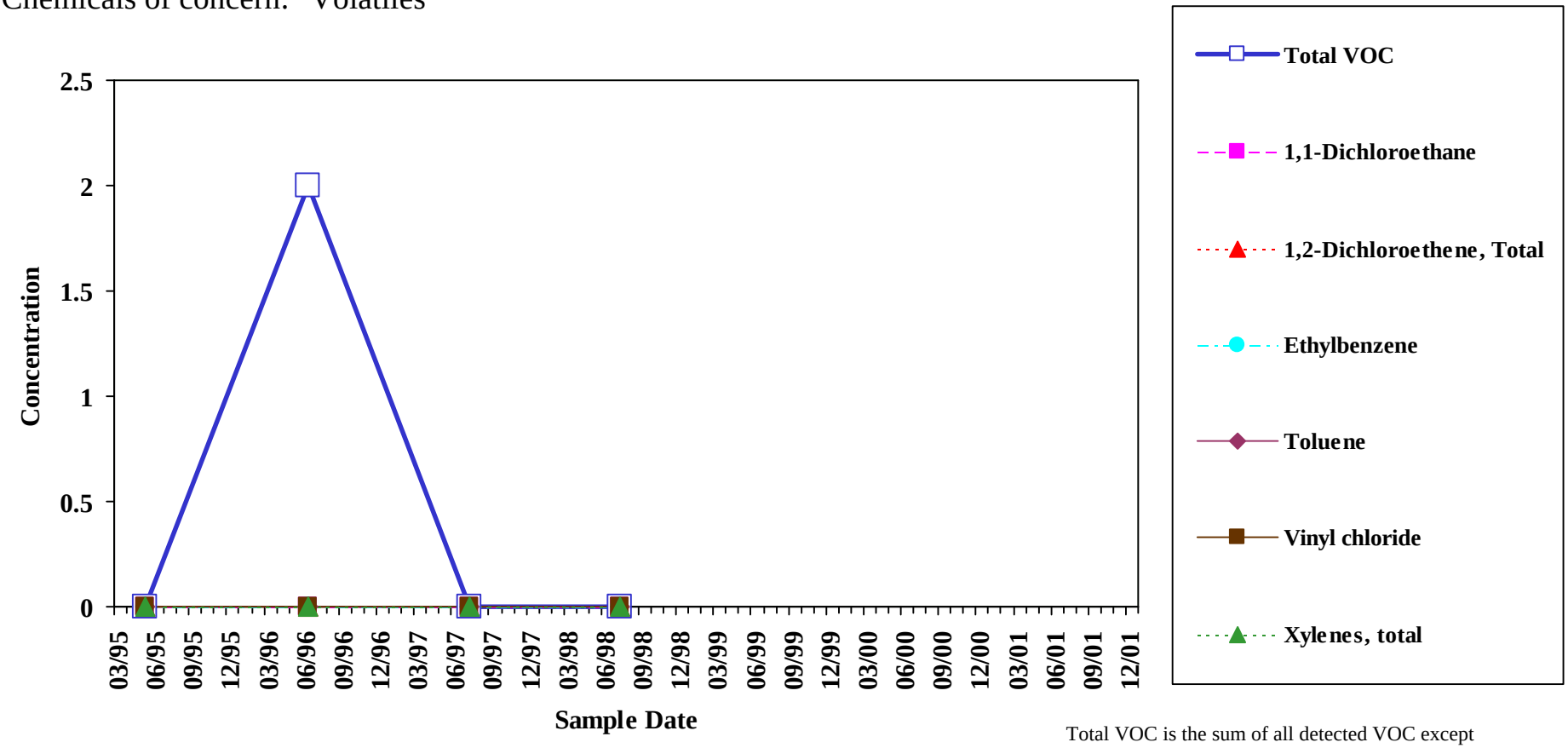
MW-NASB-078

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



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Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

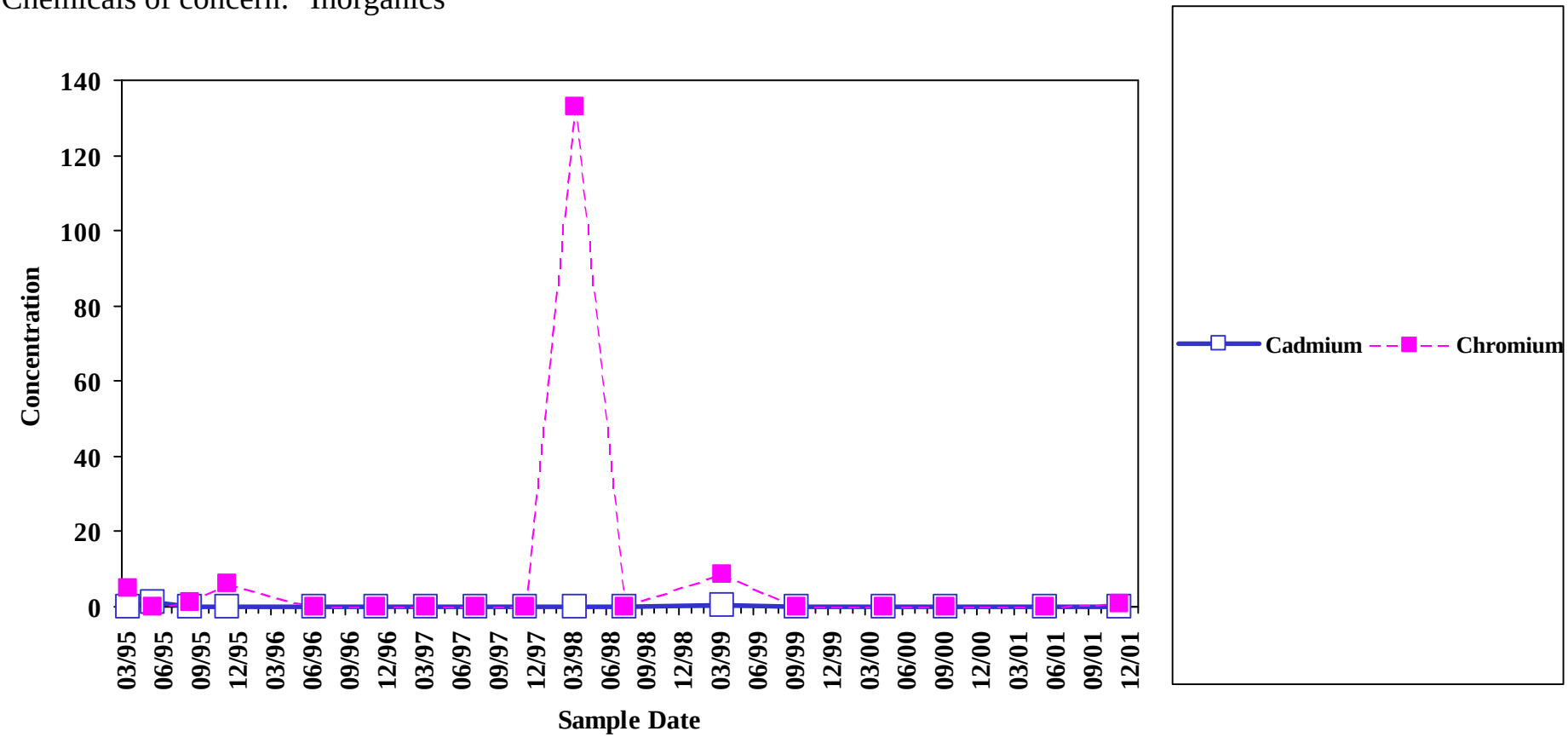
MW-NASB-079

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

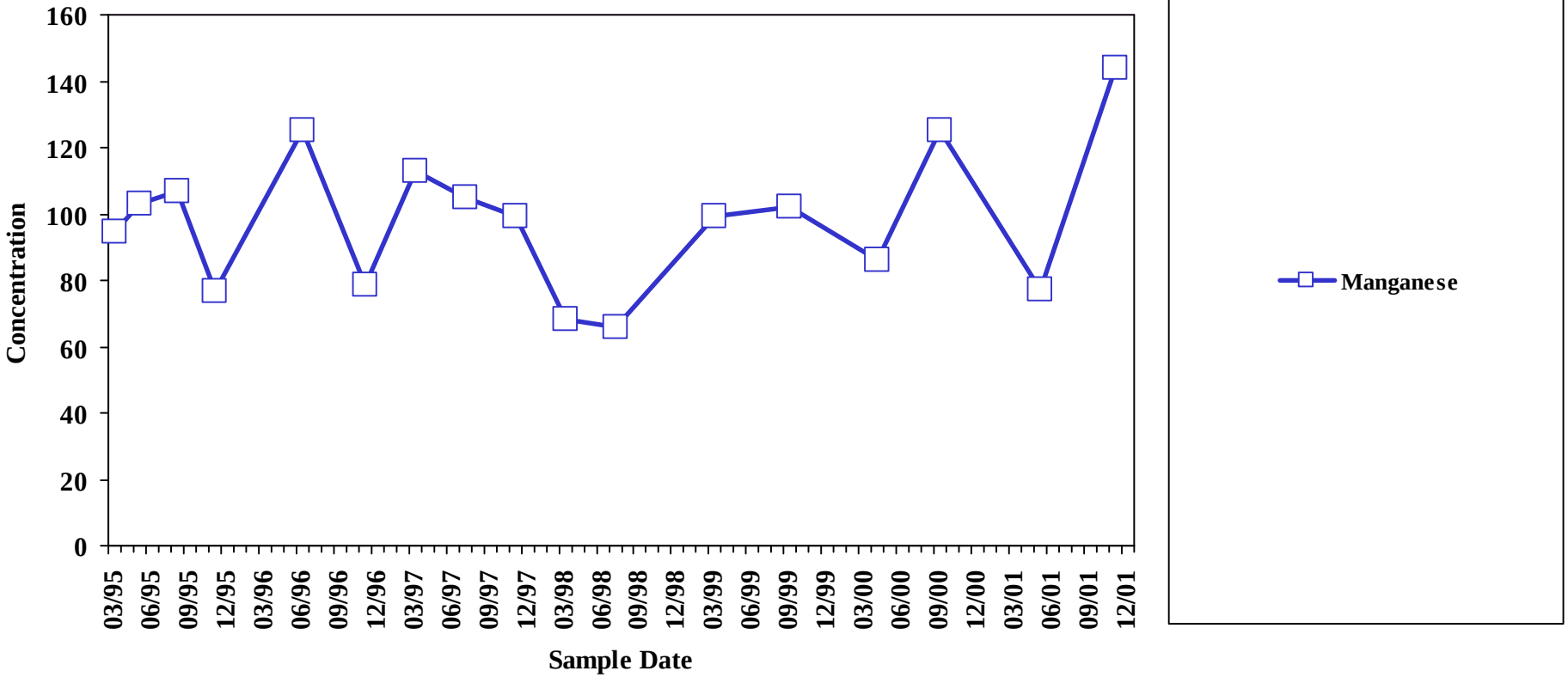
MW-NASB-079

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

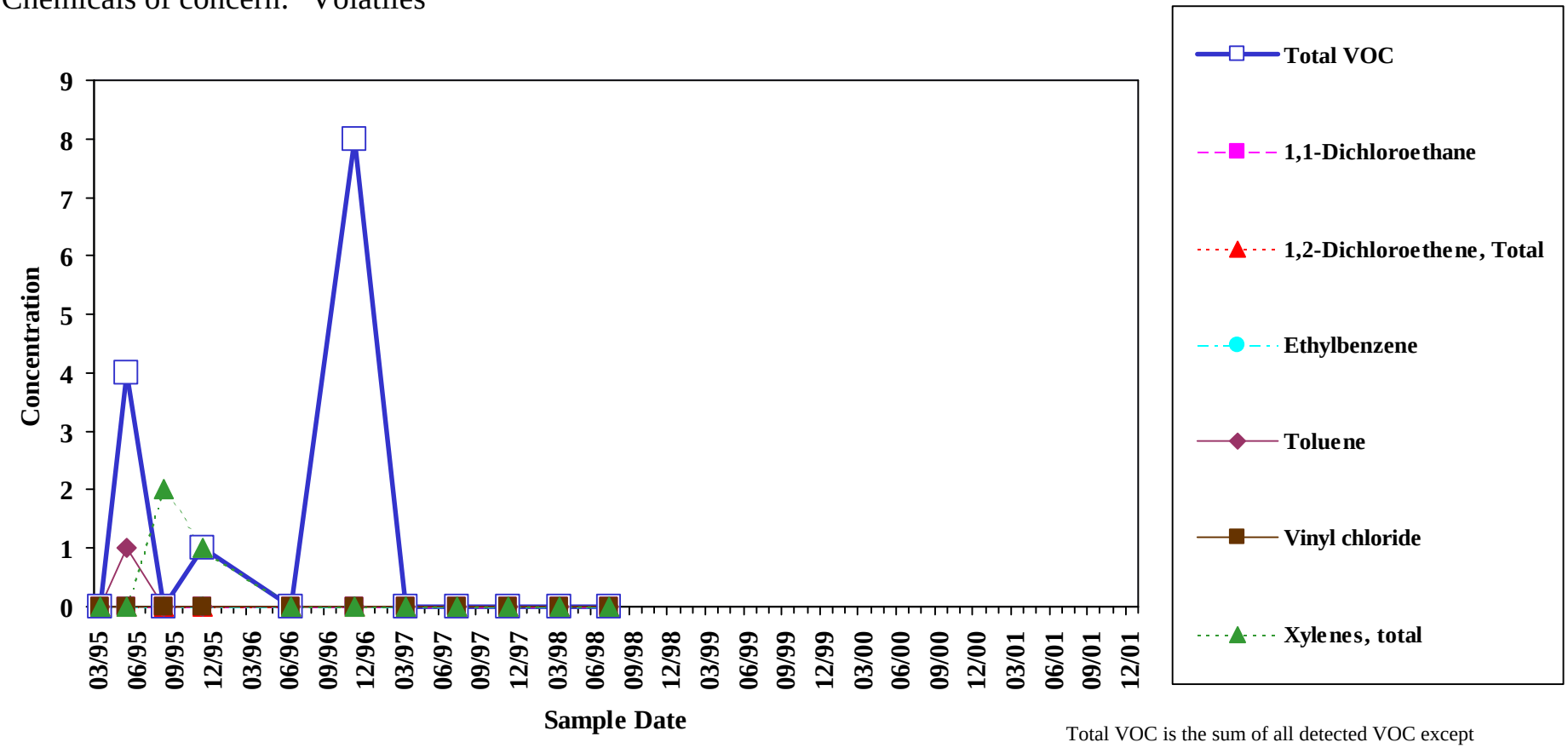
MW-NASB-079

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

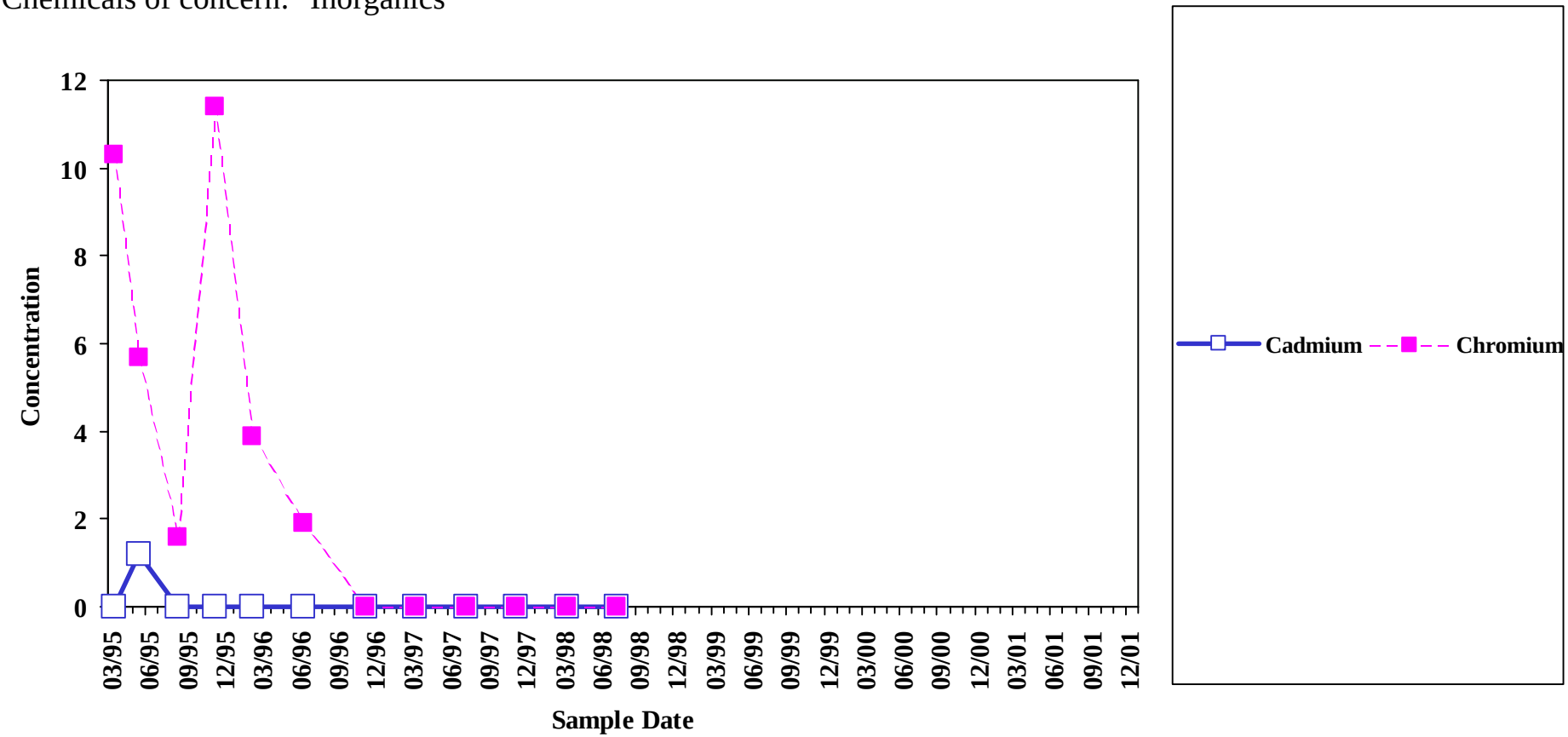
MW-NASB-080

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

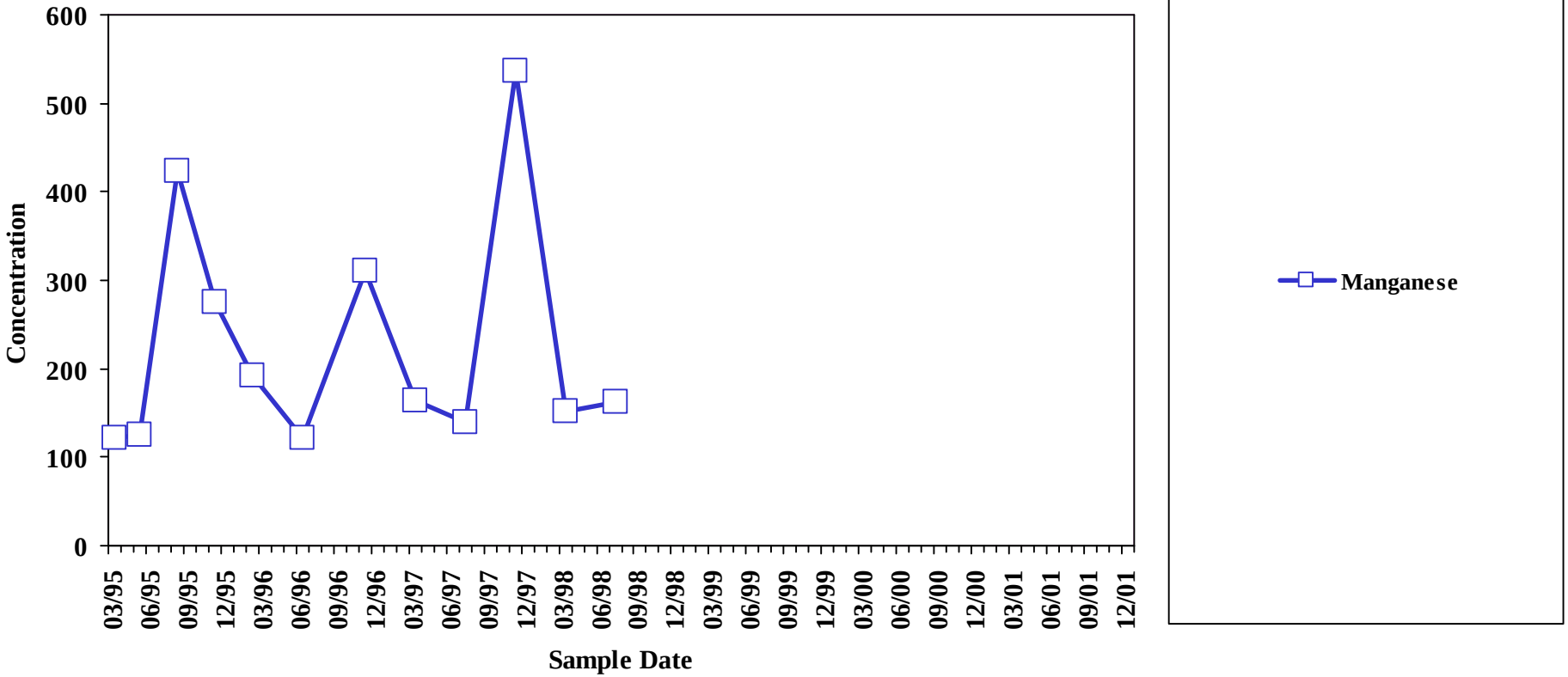
MW-NASB-080

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

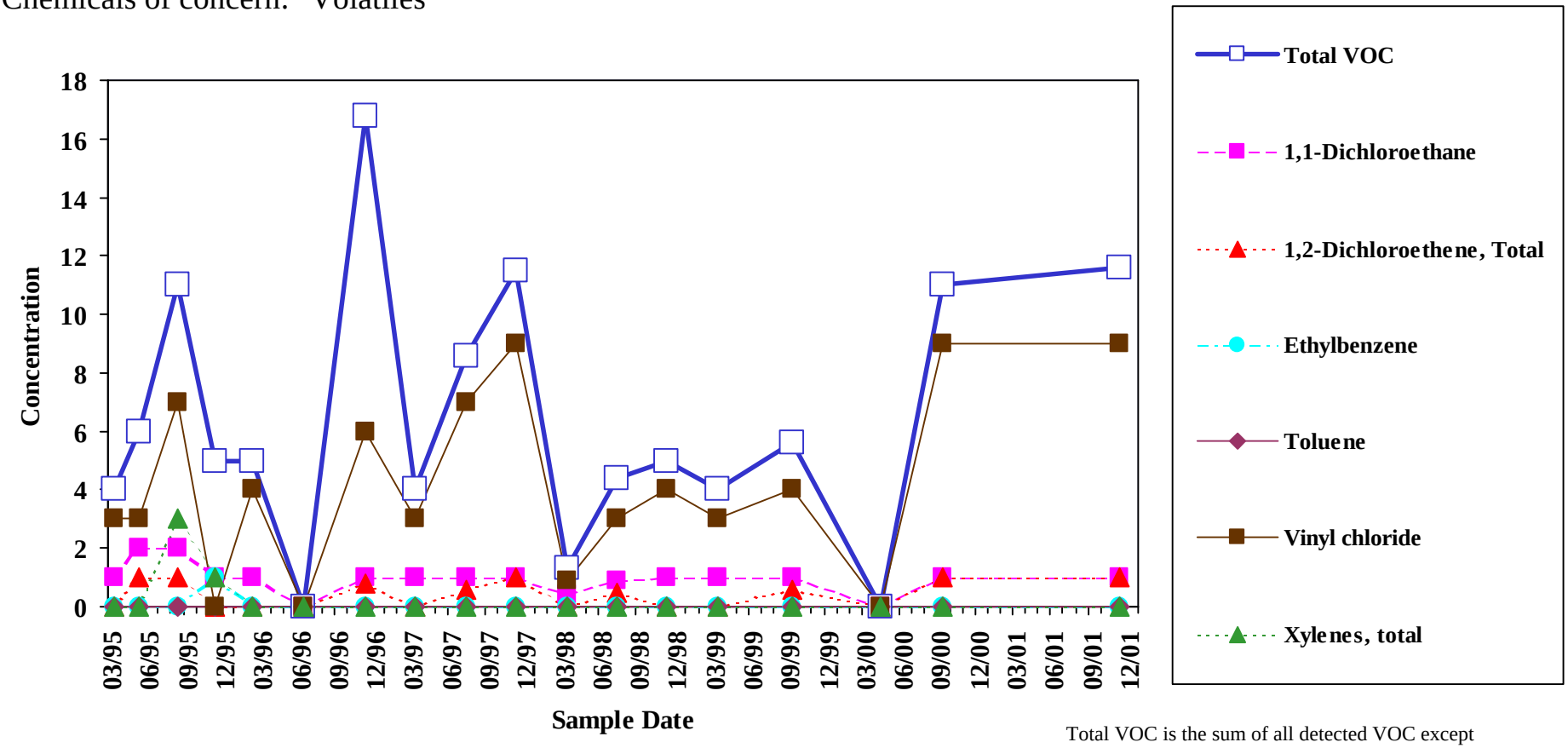
MW-NASB-080

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

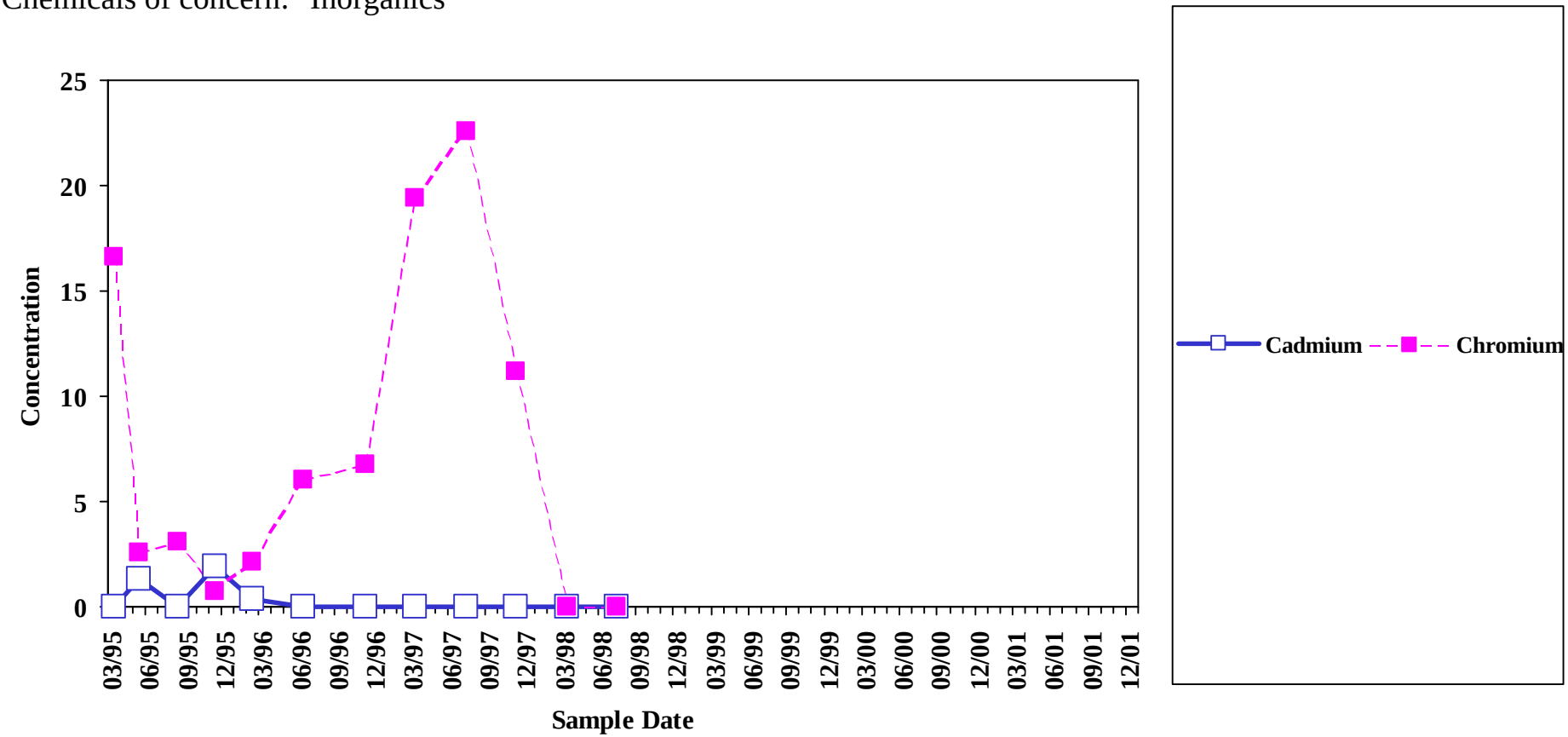
MW-NASB-081

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location:

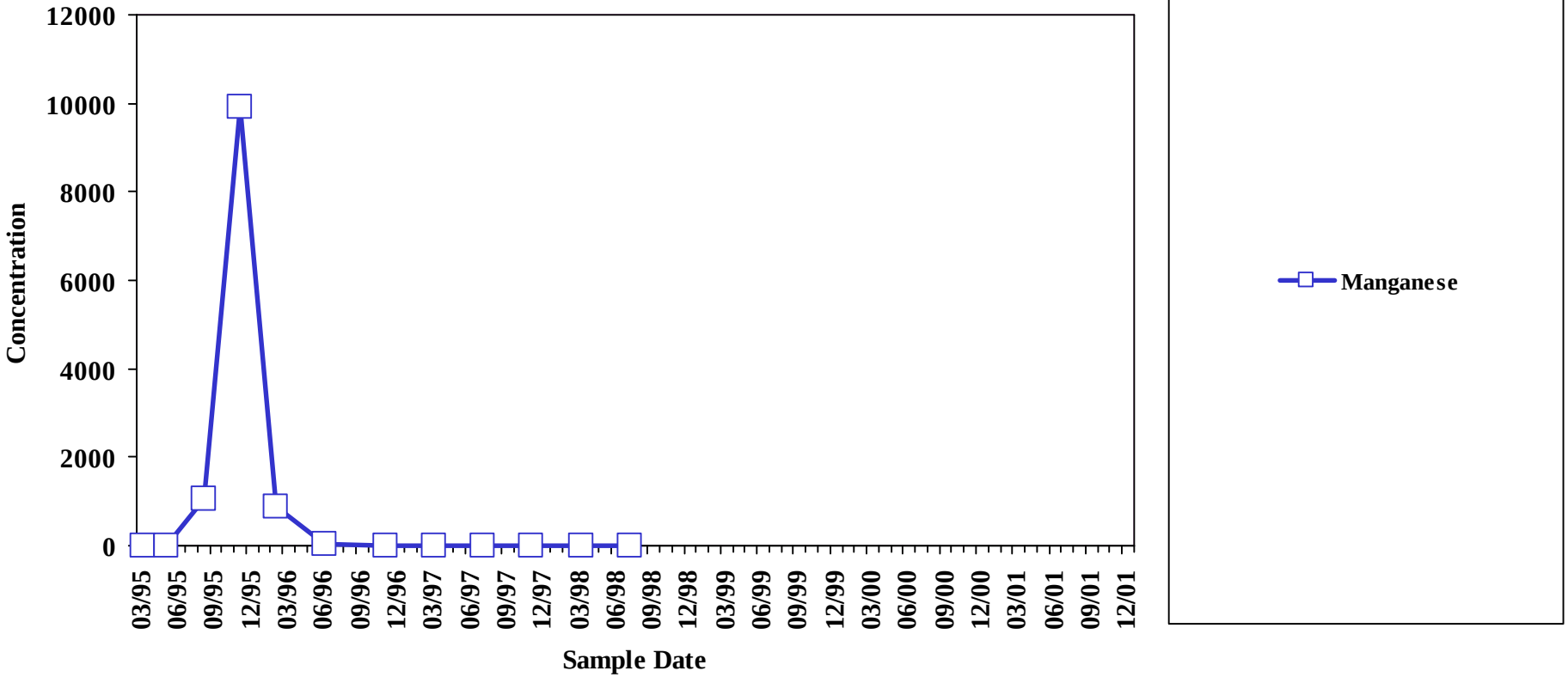
MW-NASB-081

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Manganese	
MEG:	200
MCL:	50

Sample Location:

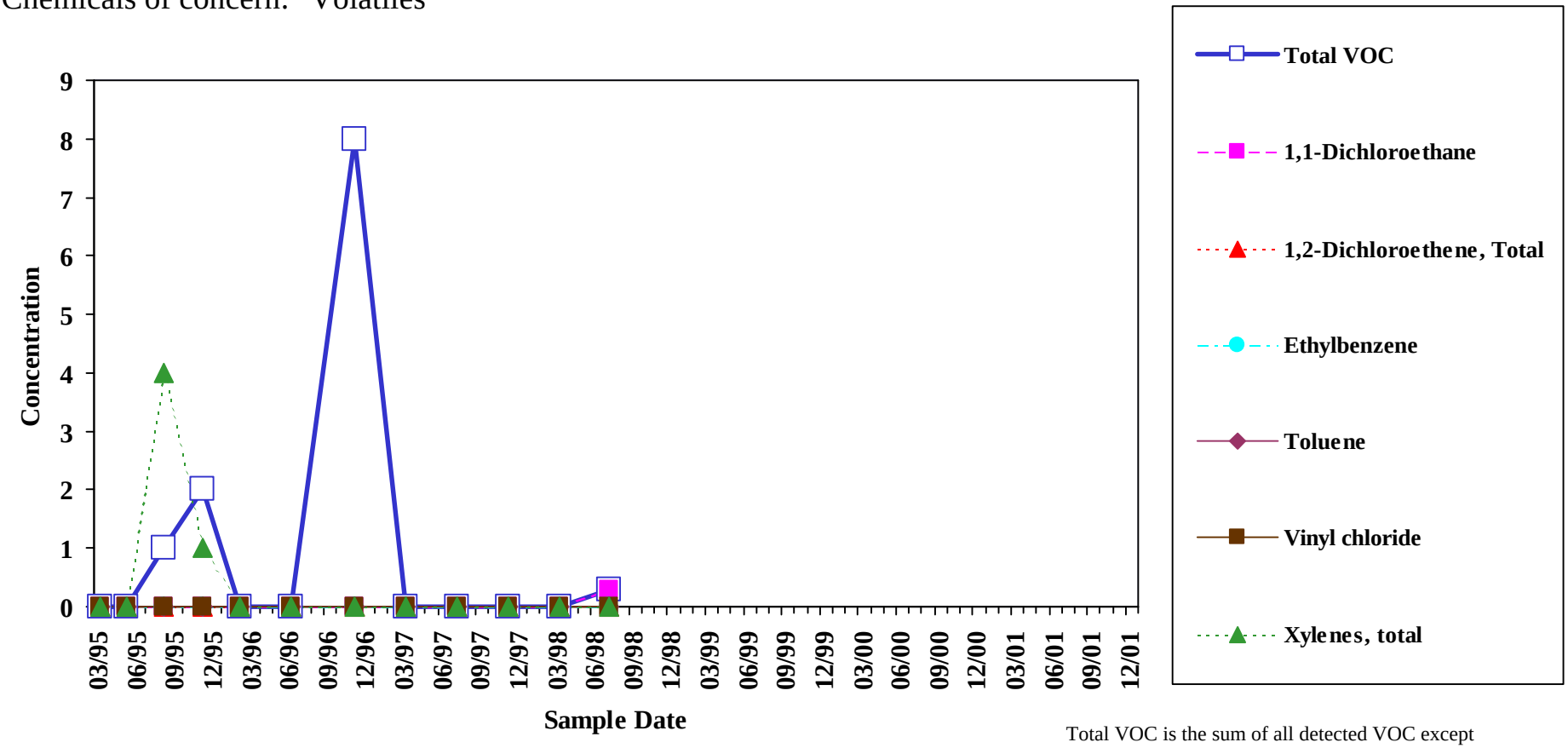
MW-NASB-081

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

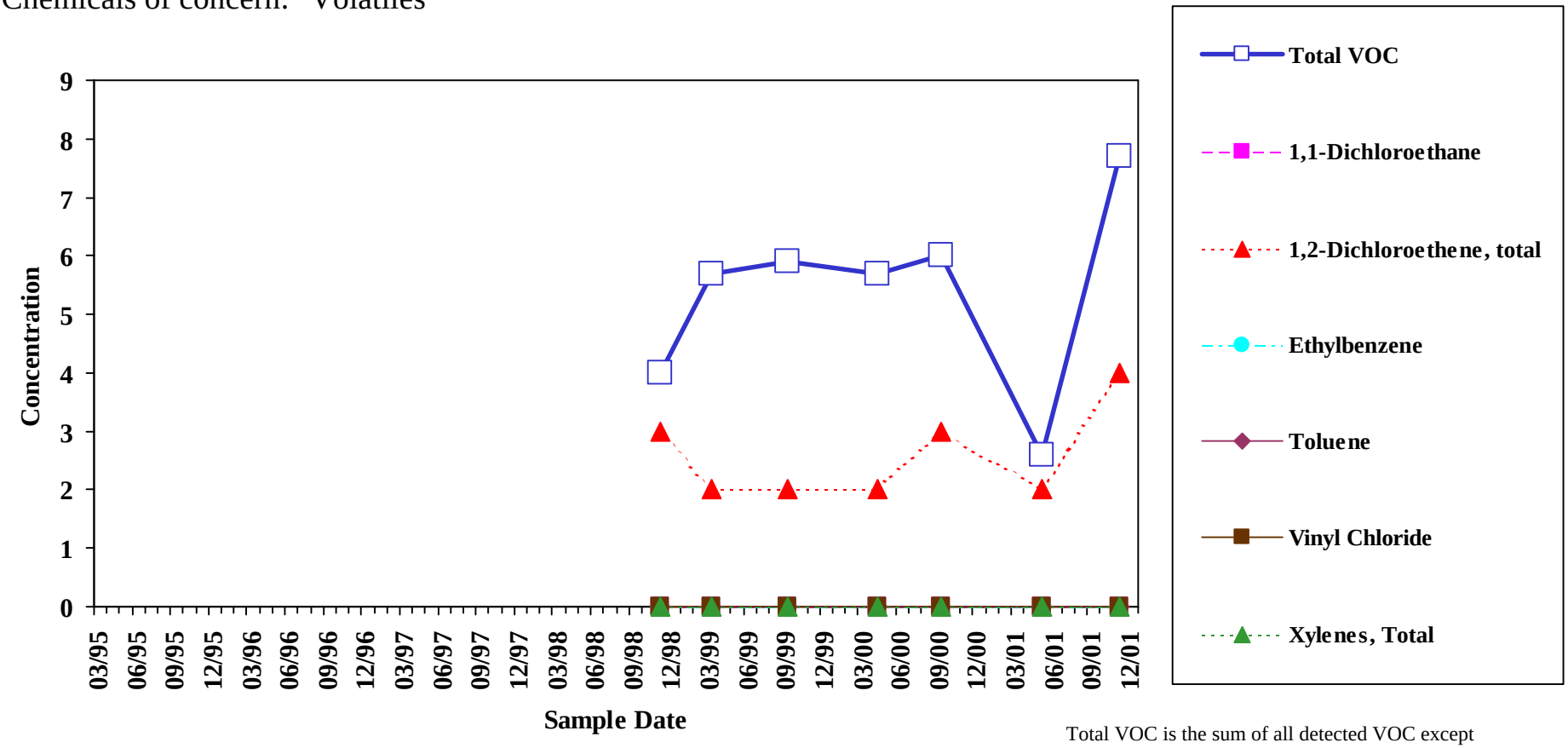
MW-NASB-227

Low-flow Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

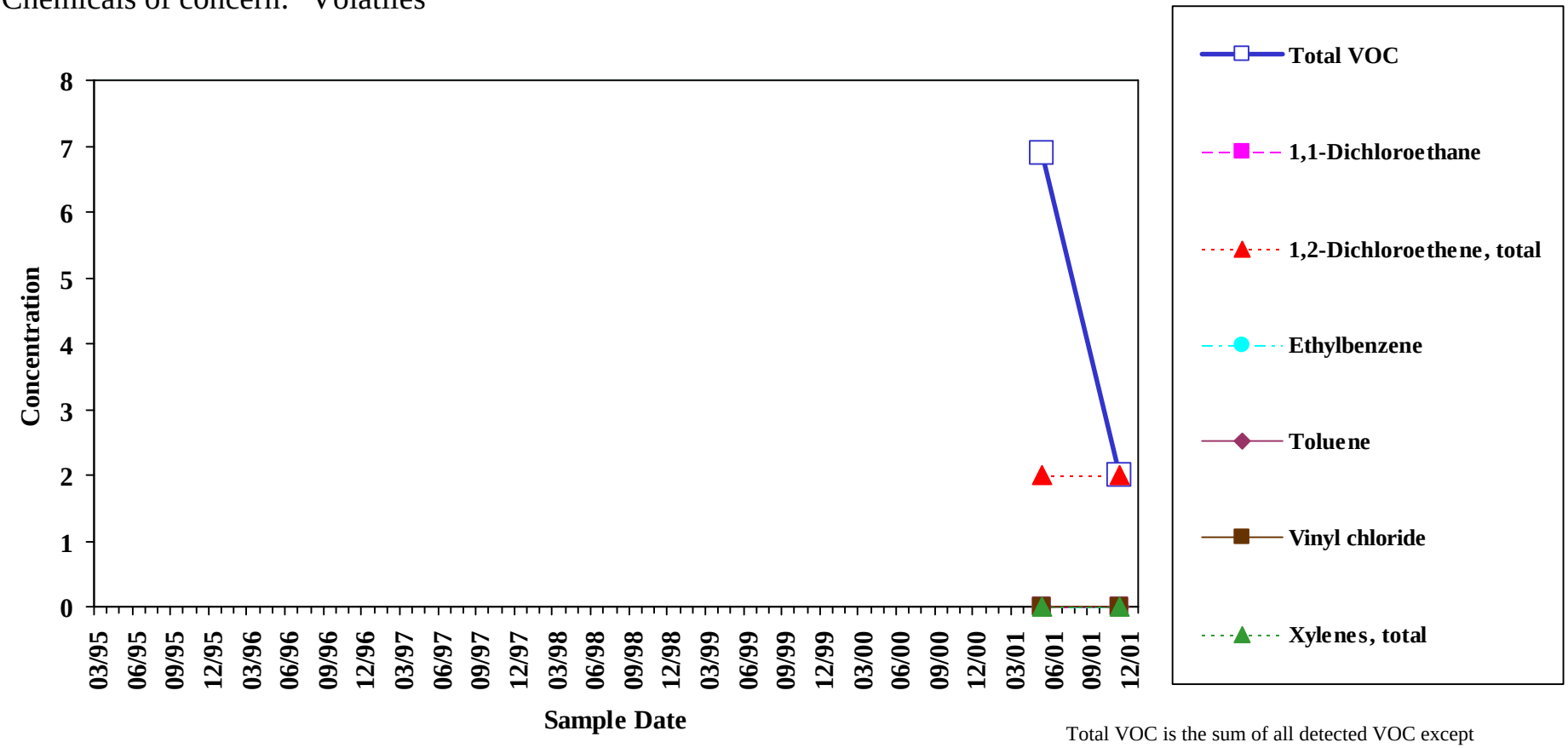
MW-NASB-227

Shallow Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

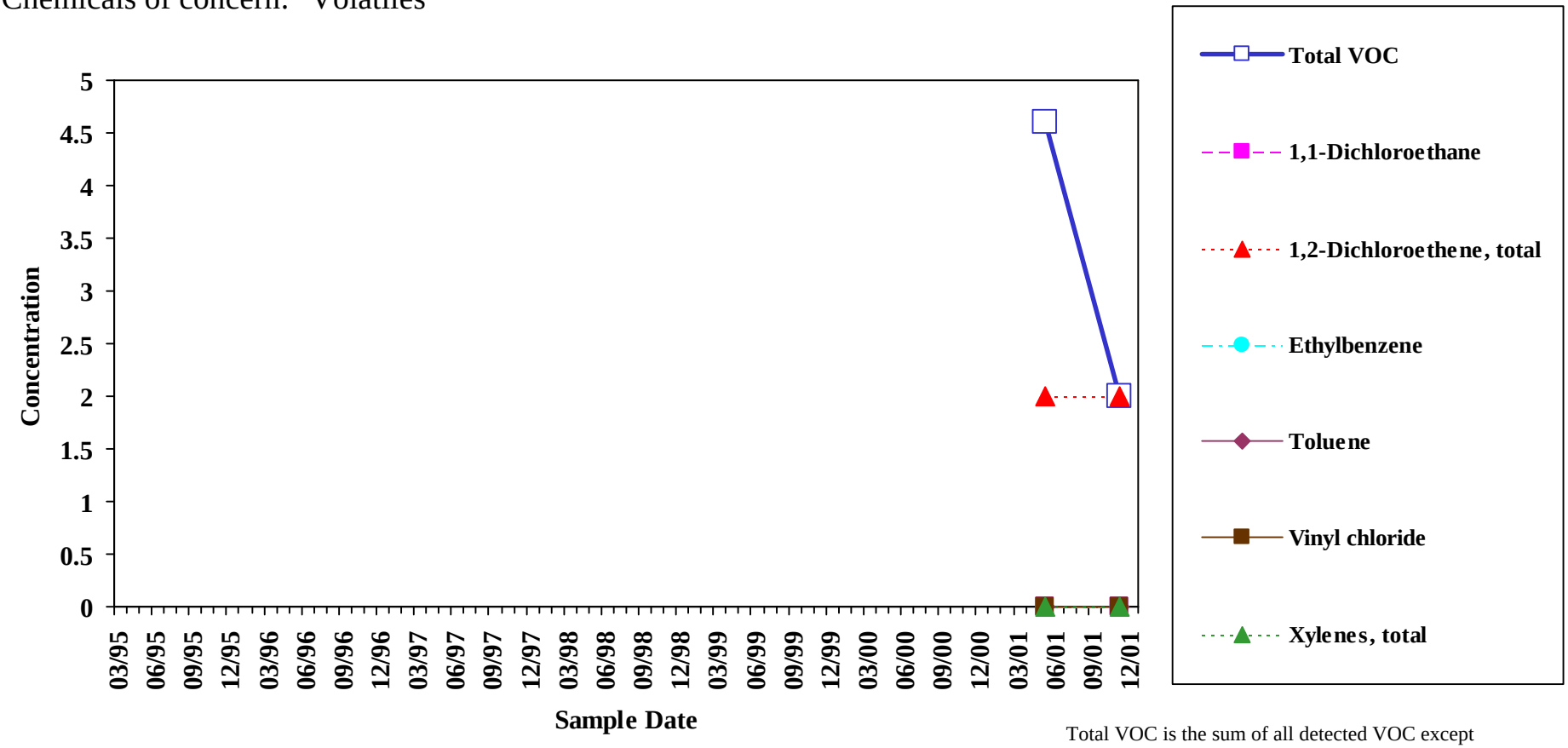
MW-NASB-227

Mid-depth Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location:

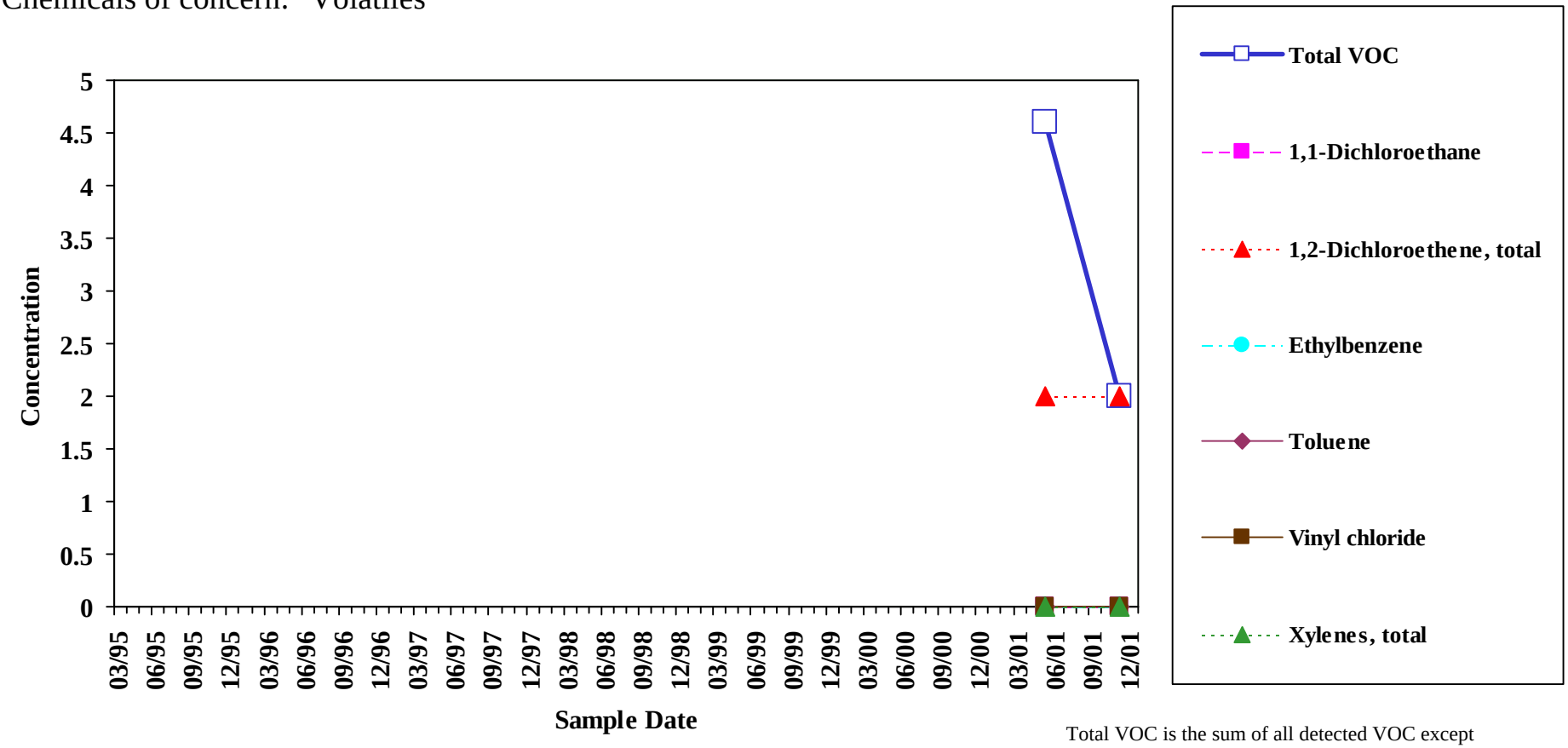
MW-NASB-227

Deep Diffusion Sample

Site 9

Ground Water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

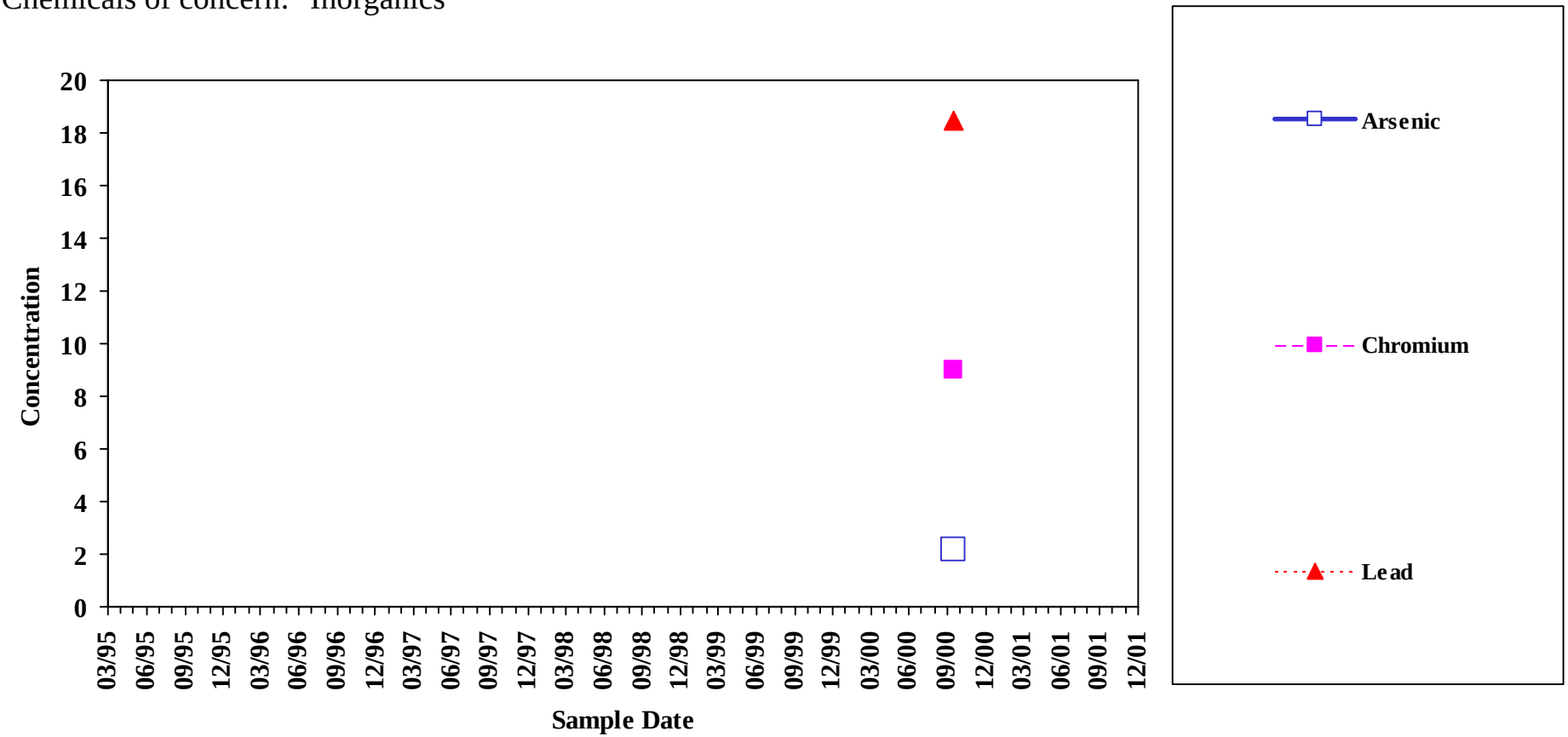
Sample Location:

SED-10

Site 9

Sediment

Chemicals of concern: Inorganics



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: mg/Kg

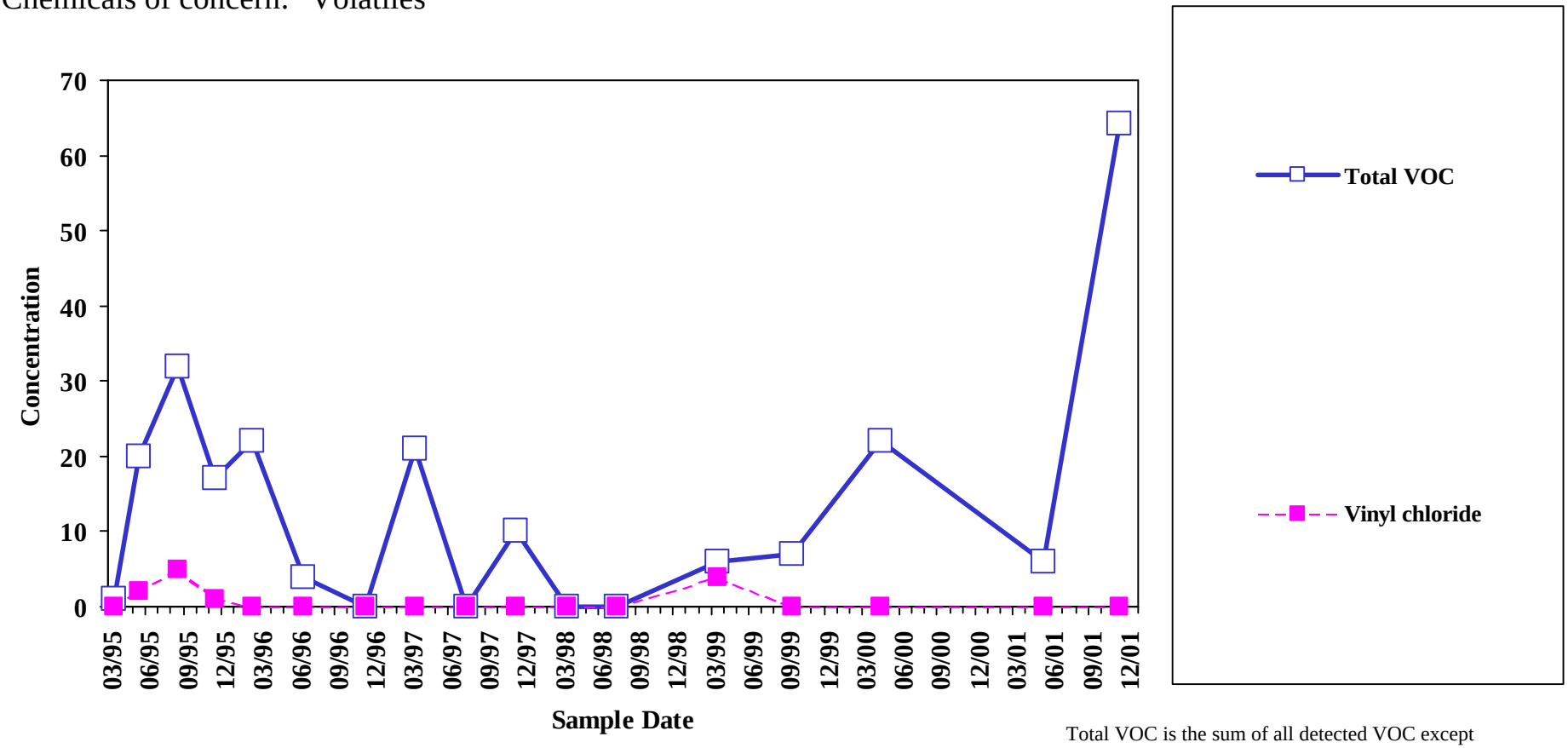
Sample Location:

SED-10

Site 9

Sediment

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

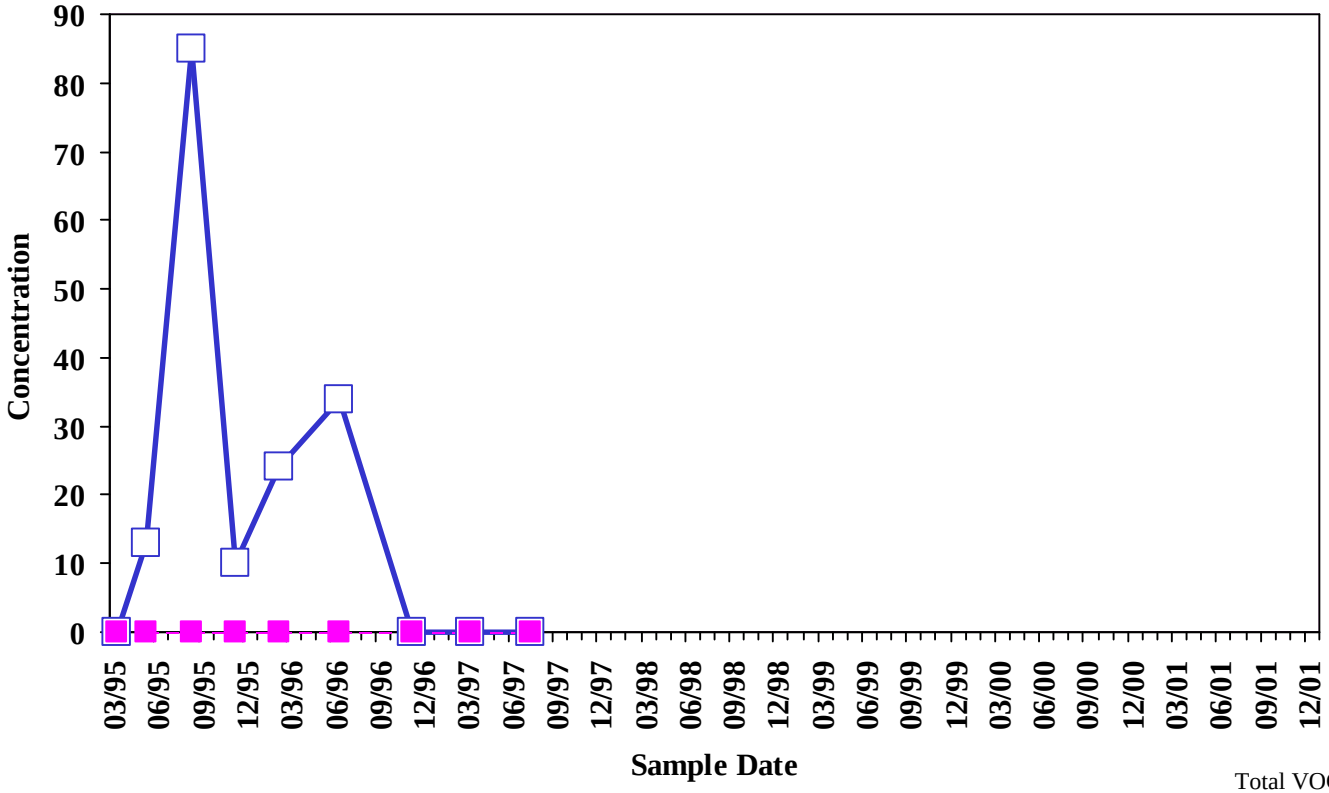
Sample Location:

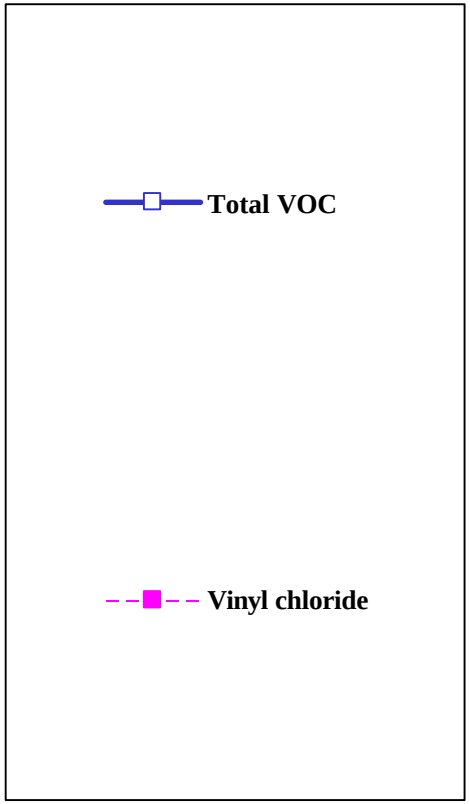
SED-11

Site 9

Sediment

Chemicals of concern: Volatiles





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

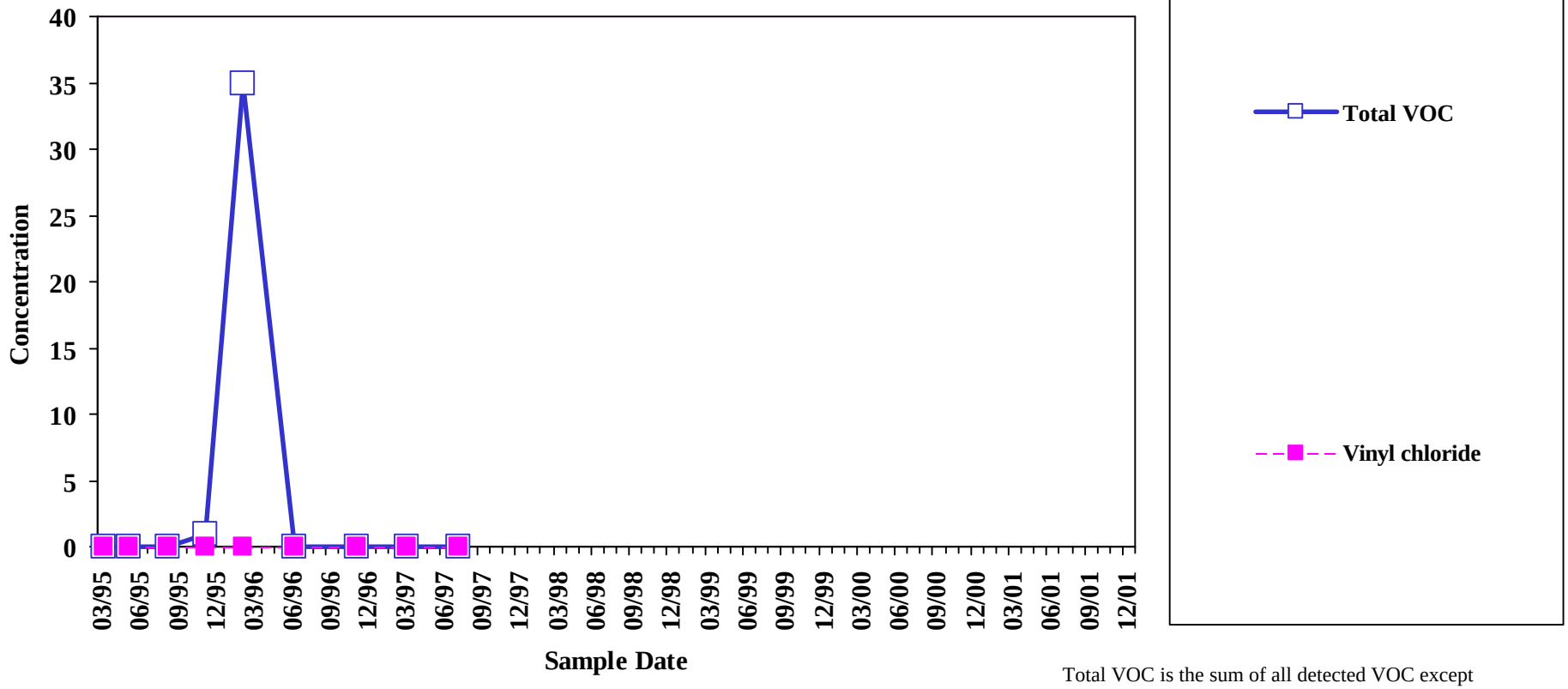
Sample Location:

SED-12

Site 9

Sediment

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

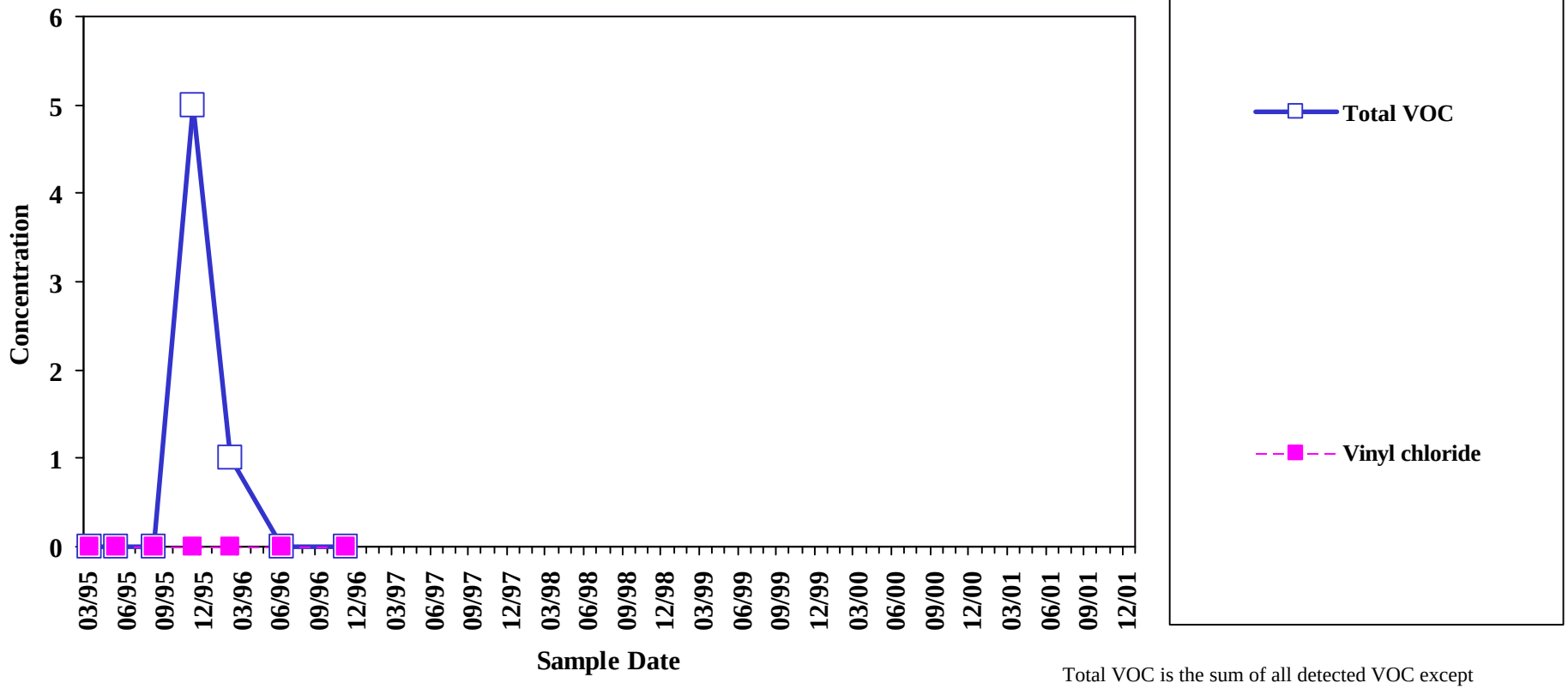
Sample Location:

SED-915

Site 9

Sediment

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

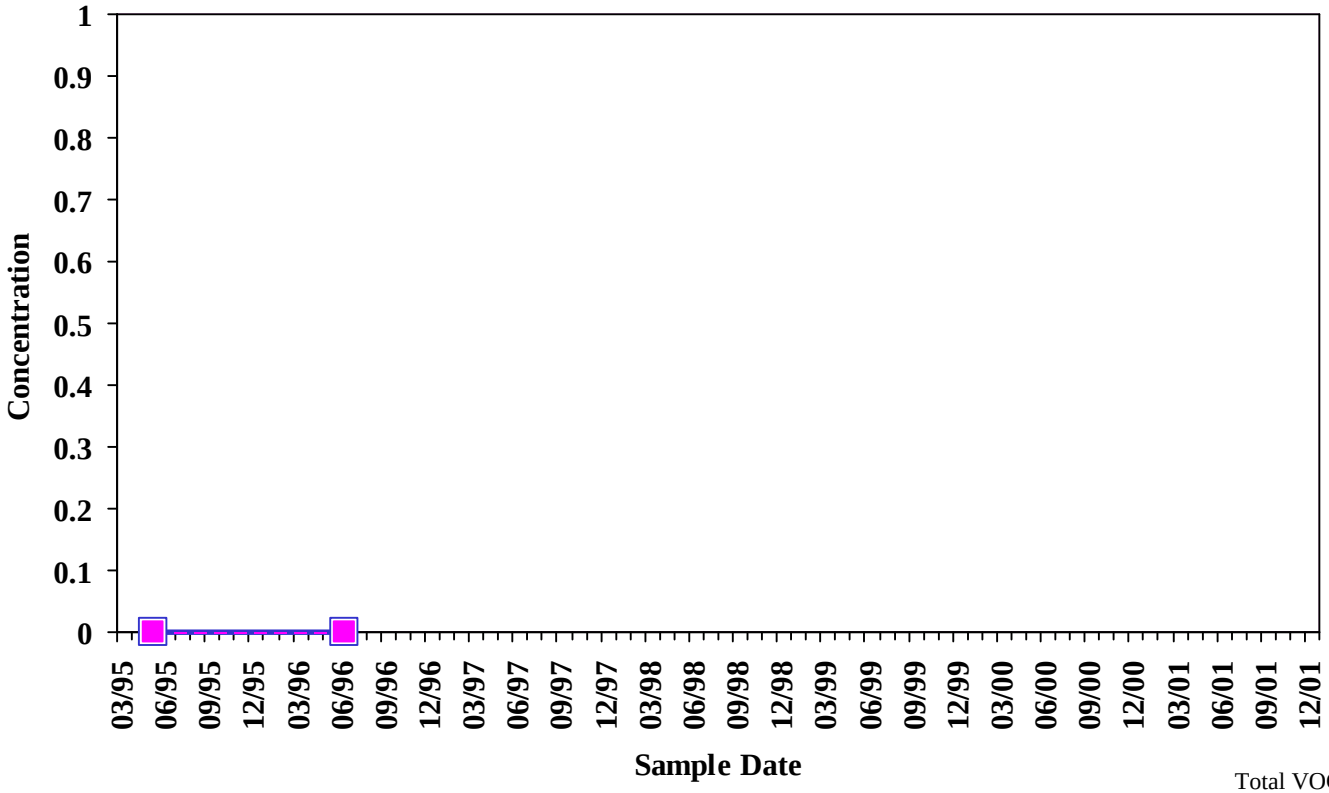
Sample Location:

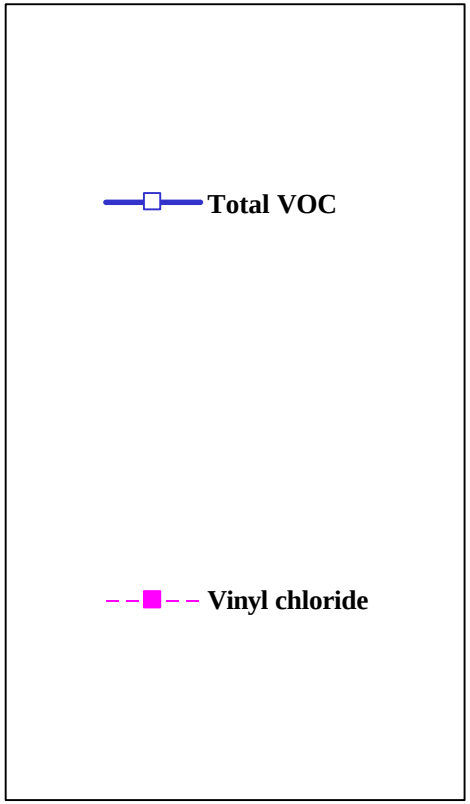
SED-916

Site 9

Sediment

Chemicals of concern: Volatiles





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

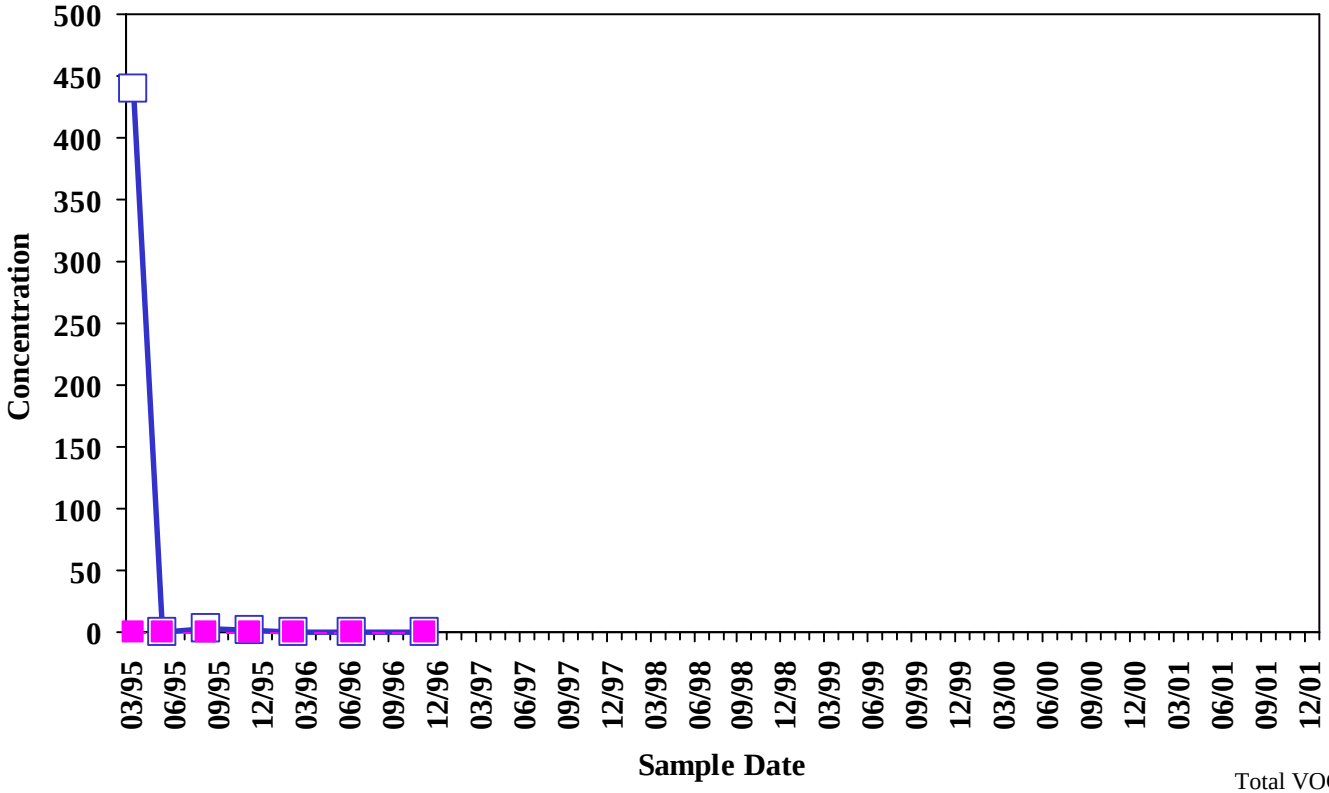
Sample Location:

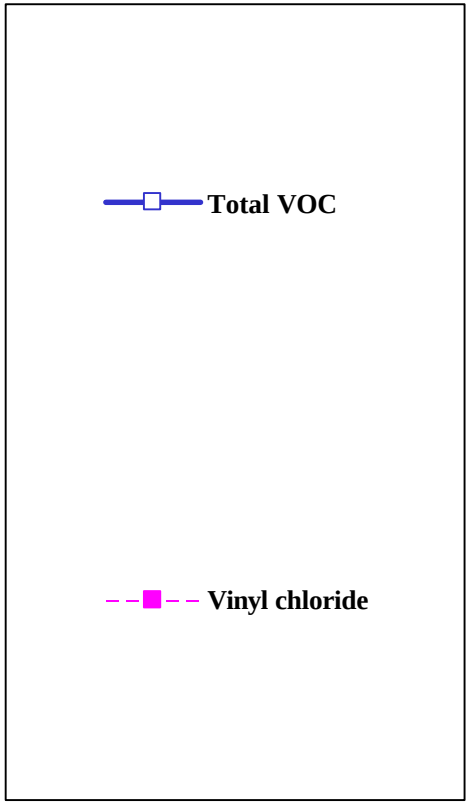
SED-919

Site 9

Sediment

Chemicals of concern: Volatiles





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

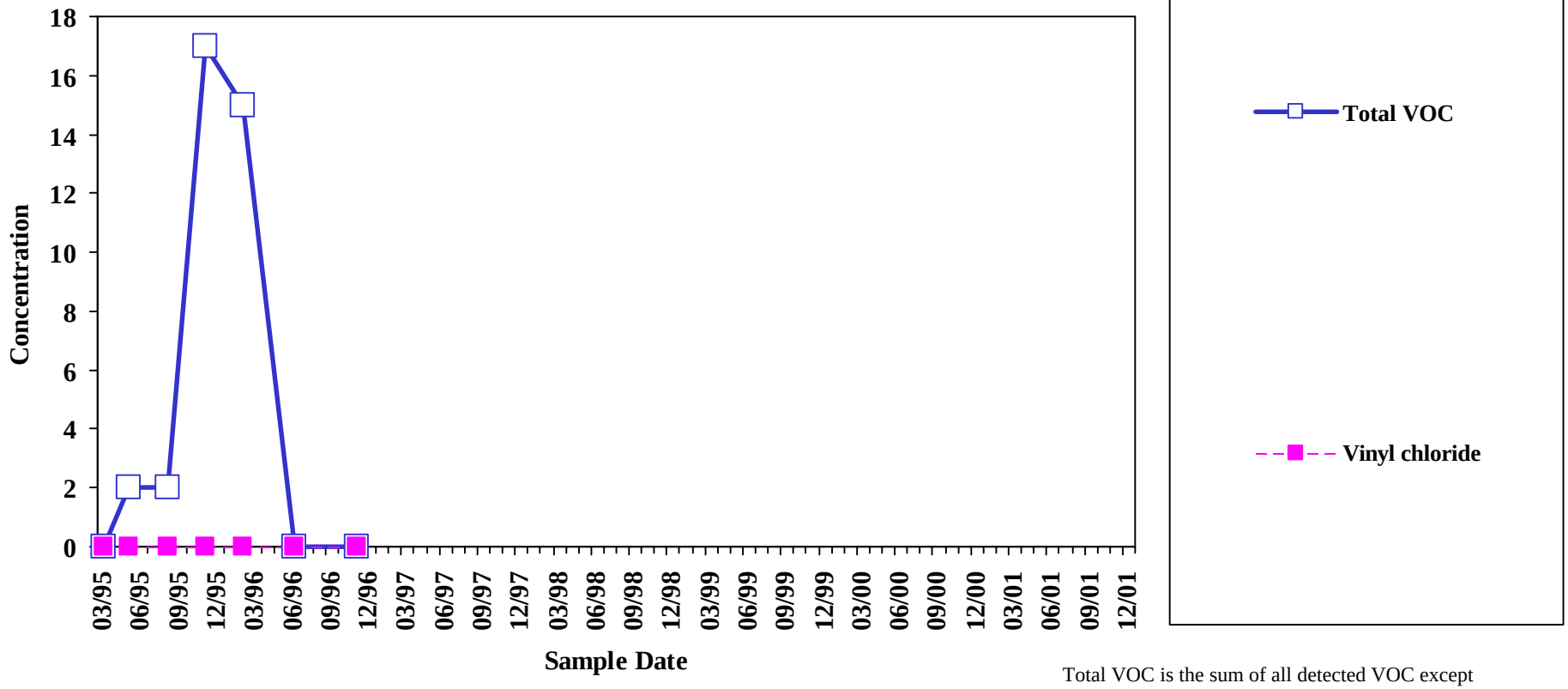
Sample Location:

SED-922

Site 9

Sediment

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/Kg

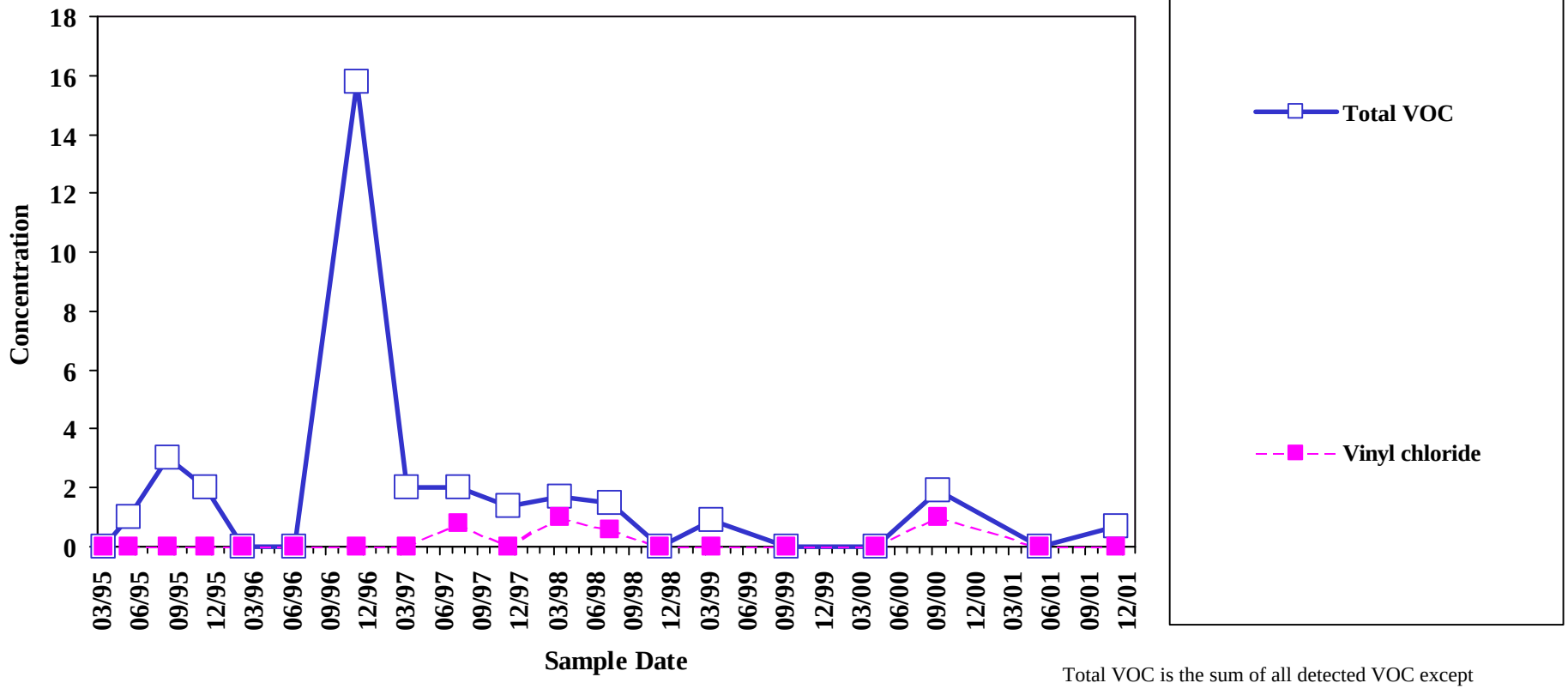
Sample Location:

SW-010

Site 9

Surface water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

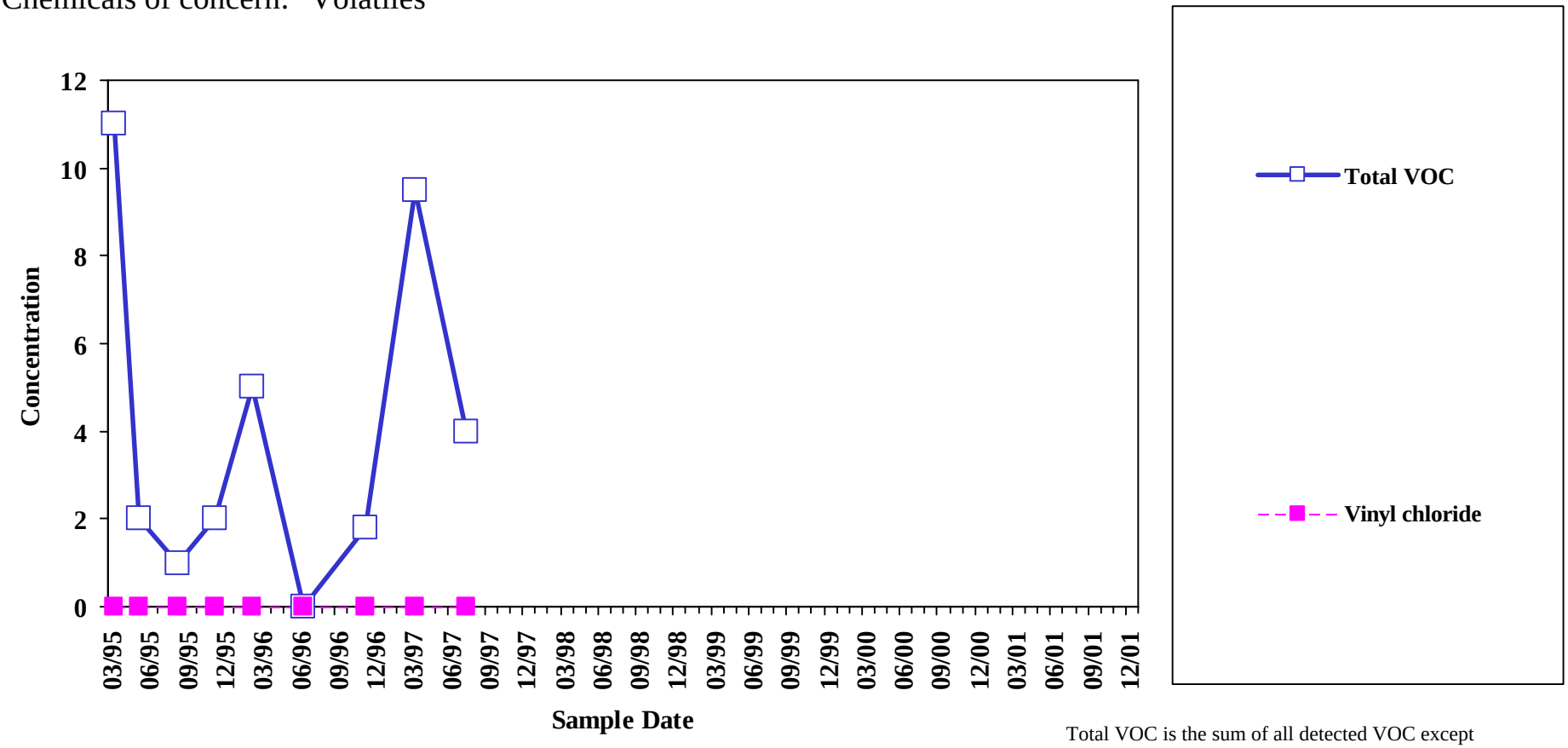
Sample Location:

SW-011

Site 9

Surface water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

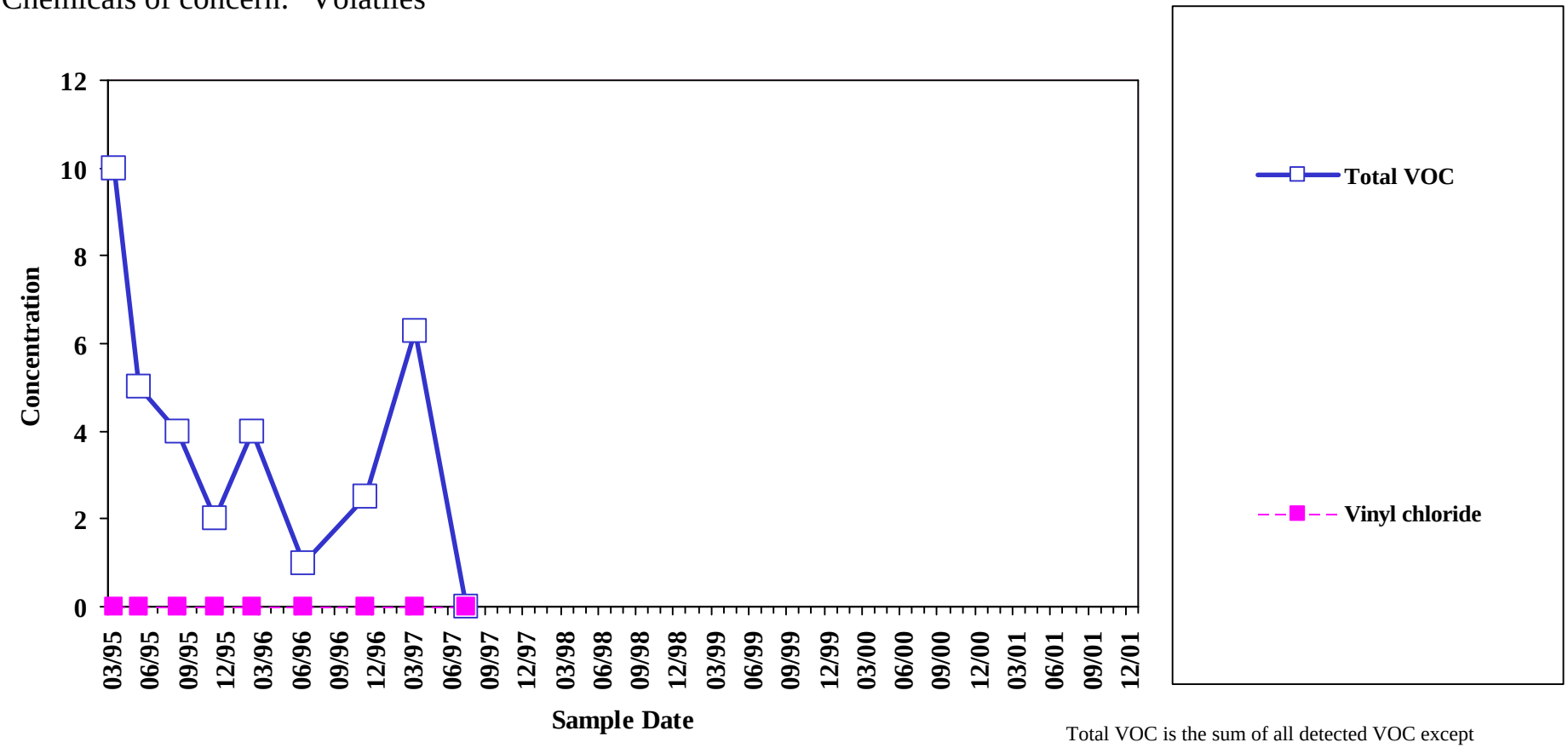
Sample Location:

SW-012

Site 9

Surface water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

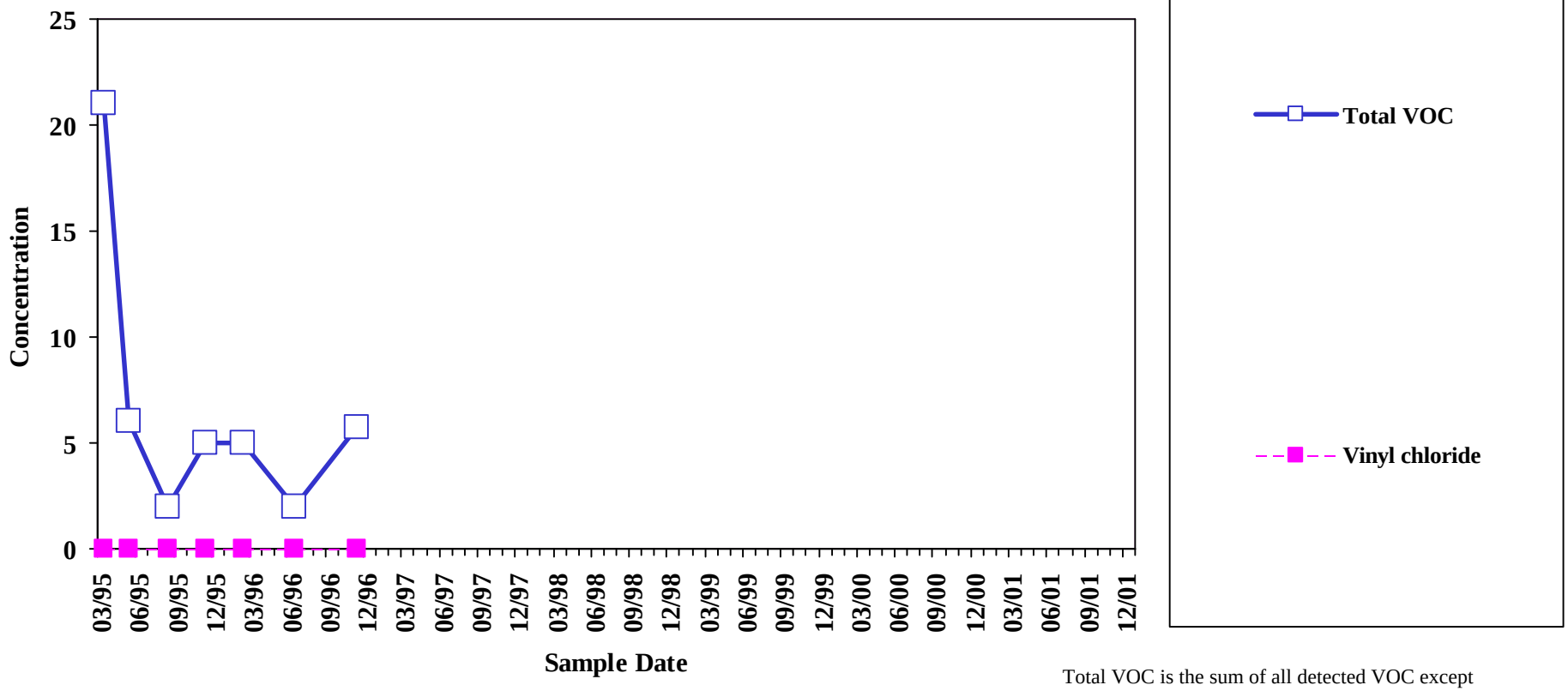
Sample Location:

SW-915

Site 9

Surface water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

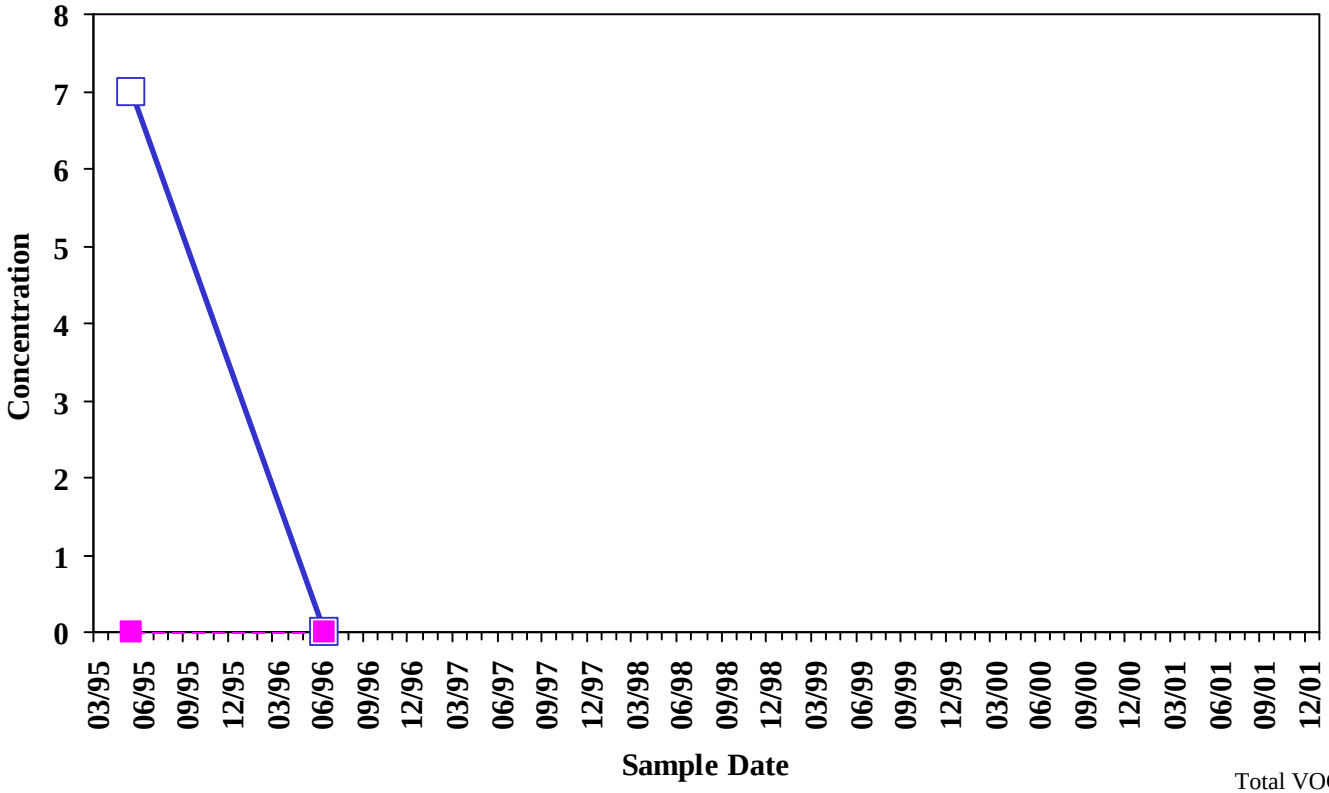
Sample Location:

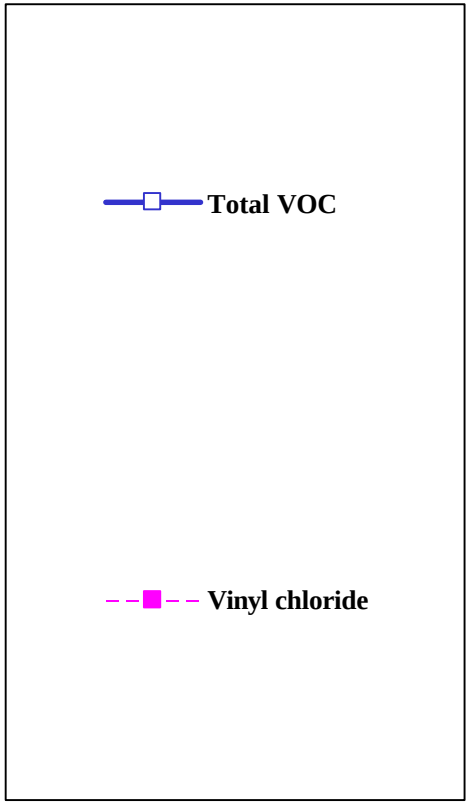
SW-916

Site 9

Surface water

Chemicals of concern: Volatiles





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

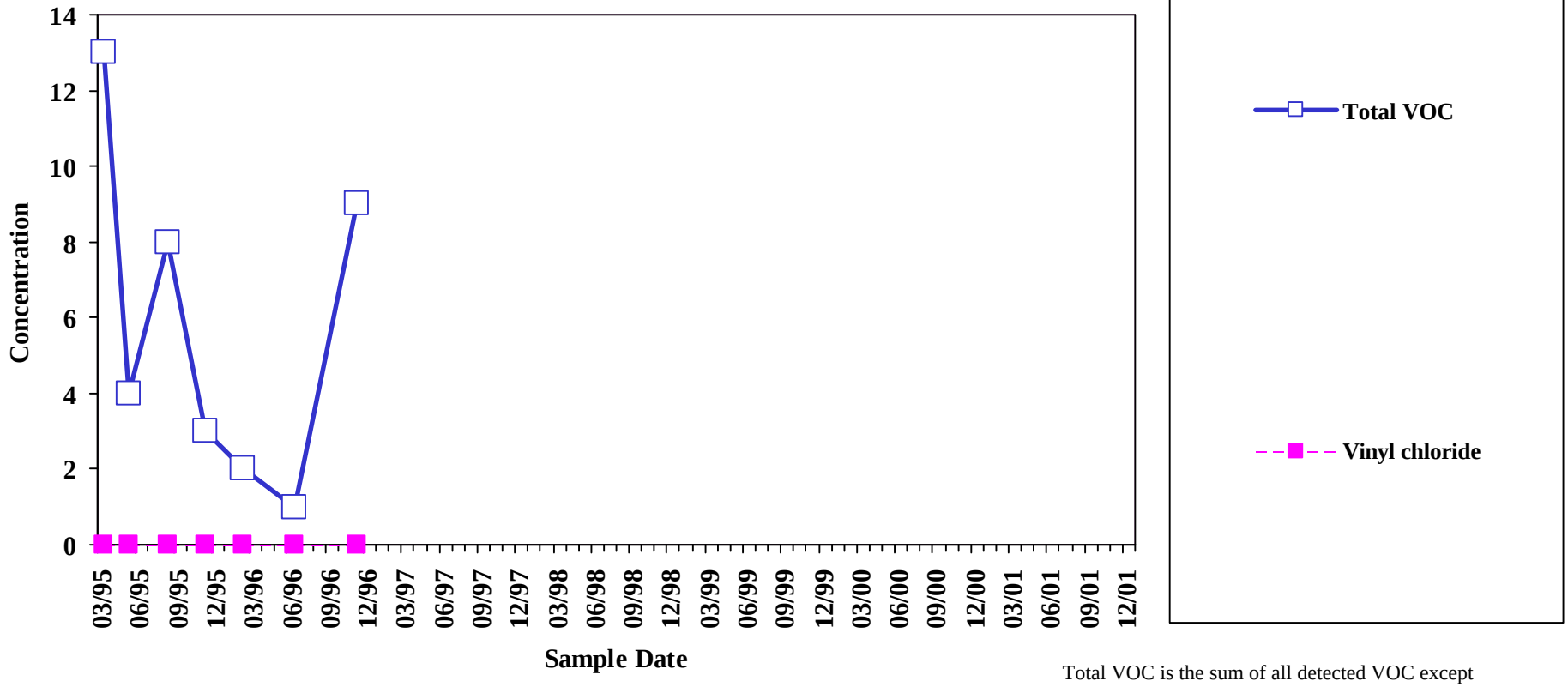
Sample Location:

SW-919

Site 9

Surface water

Chemicals of concern: Volatiles



Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

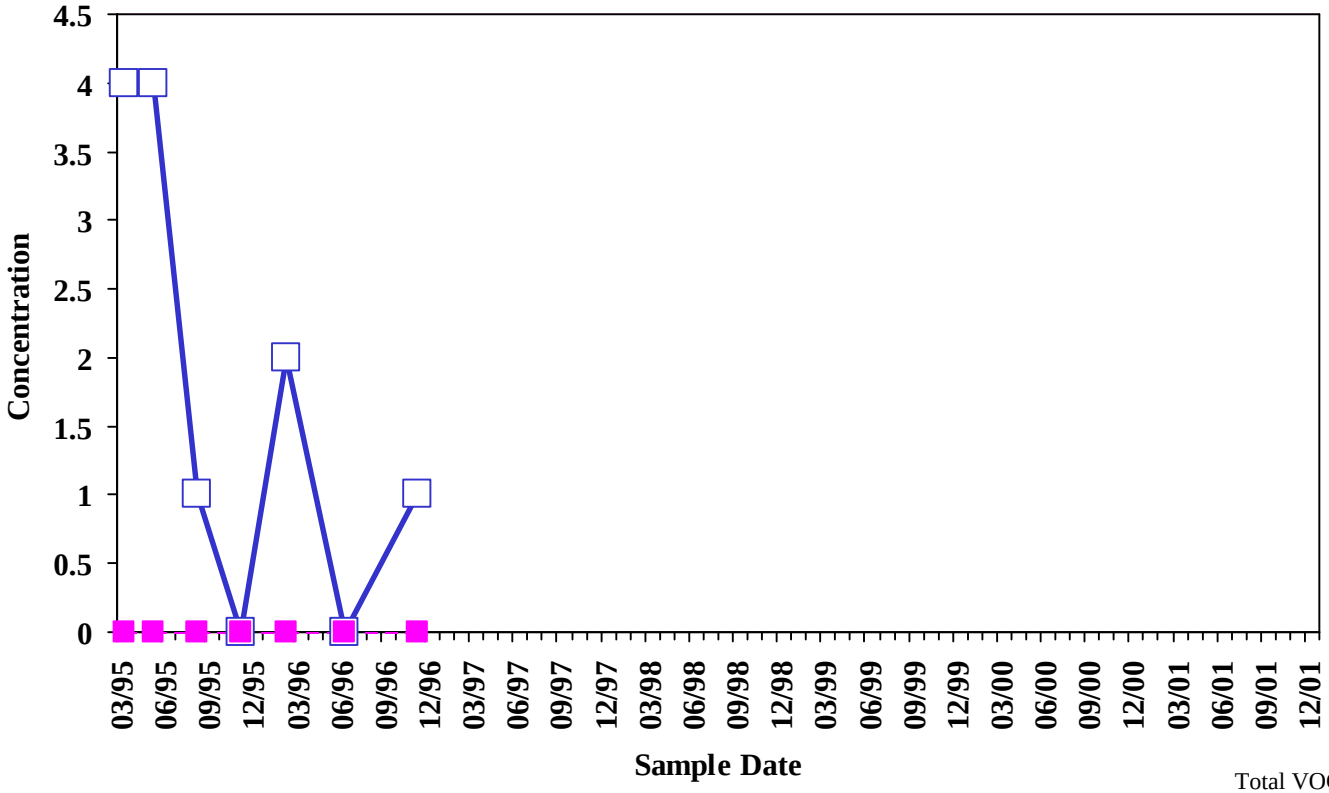
Sample Location:

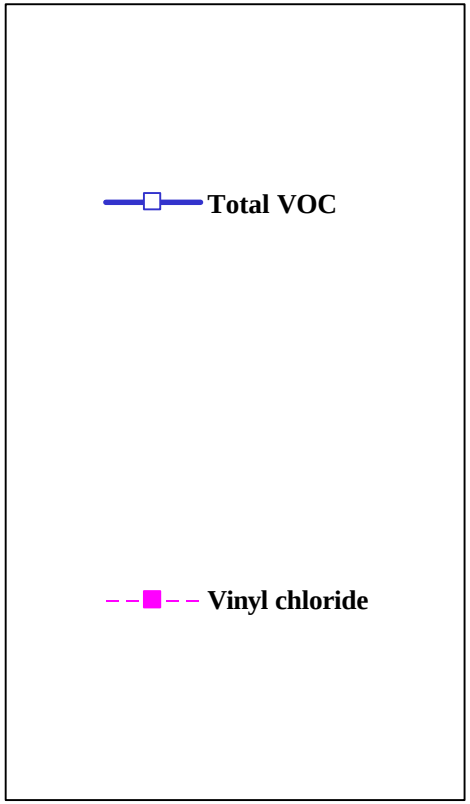
SW-922

Site 9

Surface water

Chemicals of concern: Volatiles





Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

Appendix C

Response to Comments for the Monitoring Events 18 and 19 Reports and 2000 Annual Report

Appendix C-1

Response to
Maine Department of Environmental Protection and U.S. Environmental Protection Agency Comments on Monitoring Event 18 Report

RESPONSE TO COMMENTS FROM THE
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
FOR THE APRIL/MAY 2001
MONITORING EVENT 18, SITE 9, DATED DECEMBER 2001
AT THE NAVAL AIR STATION, BRUNSWICK MAINE

COMMENTOR: Claudia Sait **DATED: 5 February 2002**

GENERAL COMMENTS

1. MEDEP's review of this document, in context with past Site 9 reports, again raises our concern that the monitoring network may be inadequate. To ensure that the full picture of contamination and natural attenuation is being tracked through long-term monitoring and that the remedy remains protective, additional monitoring wells and another surface water/sediment station may be necessary. MEDEP proposes to discuss its concerns at a future technical meeting. (MTG)

   ***Response*—**Comment noted. This topic will be discussed at the next TEG meeting.

2. The data from MW-NASB-80 except for gauging appears to be missing. Please provide an explanation for the omission or provide supplemental data for this monitoring event. (RR)

   ***Response*—**The data from MW-NASB-80 were provided (hand delivered) to the State during the April 2002 Technical Meeting and are included on the Naval Air Station Brunswick 2002 GIS updated CD.

3. The TCE level at MW-NASB-227 (4 ppb) is approaching its Maximum Exposure Guideline threshold of 5 ppb, therefore, the institutional control boundary may not be protective. This is another concern that should be discussed at a future technical meeting. (MTG)

   ***Response*—**The continued monitoring of the Site 9 monitoring wells will also provide data to demonstrate the effectiveness of the remedy in place at this site. The TCE concentration reported in the ground-water sample collected from MW-NASB-227, although below the Maximum Exposure Guideline, and the effectiveness of the institutional control boundary at the site, will be discussed at a future TEG meeting.

SPECIFIC COMMENTS

1. ***Section 1.3.1 Sampling Activities, Page 2, Bottom Paragraph***—MEDEP notes that MW-NASB-071 was purged for sampling at 1.5 liters per minute, which is not considered a low-flow sampling rate. The well did not incur much drawdown during the purging, and because the diffusion sampling method gave non-detects for all compounds tested, the non-detect results reported from the pumped sample appear to be valid. When true low-rates are not achieved, the data needs to be qualified in tables and the pumping rate given. In the case of MW-NASB-071, Table 4 and Appendix A.1 should have a footnote added. (ED)

   ***Response*—**A footnote will be added to Table 4 and Appendix A.1 to indicate any changes in low-flow pumping rates in future monitoring event reports.

2. ***Section 1.6, Visual Inspection, Page 4***—A minor sheen was present at the entrance of the retention pond. A propylene odor was noted in the area of the retention ponds by the inspector.

   Please identify if the pond with the sheen is the Upper Impoundment Pond. The report should provide a statement of the amount of rainfall received the week before sampling at Site 9, as does the Eastern Plume report. (MEDEP assumes that the Base Environmental Office was notified.) (ED)

   Response—In the event that the sheen is reported in the future in the retention pond, the monitoring event report will provide a statement regarding the amount of rainfall received the week prior to sampling at Site 9.

3. ***Section 1.8, Analytical Data Quality Review, Page 5***—Please explain what the Navy means by the phrase…"should be considered estimated with a low bias based on precision criteria". Does this imply that the laboratory-reported values for vinyl chloride are lower than values that might have been obtained with no precision standards problem? Appendix C-3 (Precision) does not provide clarity either. Since vinyl chloride is the primary contaminant of concern at Site 9, this quality control problem must not be allowed to impact graphed contamination trends and should be plainly footnoted if the impact is discernable. (RR/ED)

   Response—The phrase "should be considered estimated with a low bias based on precision criteria" indicates that sample results may be biased low based on matrix spike/matrix spike duplicate (MS/MSD) relative percent difference (RPD) results due to the RPD percent being outside method quality control acceptance criteria (MS/MSD RPD criteria are 20 percent; MW/MSD RPD result was 76 percent). This means that vinyl chloride concentrations reported for Monitoring Event 18 ground-water samples were likely to be biased low (as noted in the data quality review). However, we have reviewed the MS/MSD RPD percentages for Monitoring Events 17 through 20, and this problem was only significant in Monitoring Event 18. Therefore, we do not feel that trends reported for vinyl chloride at Site 9 wells have been significantly affected. For clarity, we do not feel footnotes on the trend graphs are required (for either biased high or biased low results) as these issues do not occur often and, therefore, trend lines over time can be used with confidence to assess changes in vinyl chloride concentrations.

4. ***Section 1.8, Analytical Data Quality Review, Page 6, Last Bullet***—The results for total 1,2-dichloroethene should be considered an estimation of its true concentration in Sample MW-NASB-069 (shallow) based on field precision criteria.

   Why is this statement necessary? Please clarify what makes this particular sample unlike any of the others. (RR)

   Response—This statement "The results for total 1,2-dichloroethene should be considered an estimation of its true concentration in Sample MW-NASB-069 (shallow) based on field precision criteria" was necessary because this was the sample chosen for field duplication and there was an issue with the RPD for total 1,2-dichloroethene. The RPD for total 1,2-dichloroethene was outside the quality control acceptance criteria (RPD field duplicate criteria is 30 percent; RPD result for total 1,2-dichloroethene was 40 percent) and, therefore,

the results for total 1,2-dichloroethene are considered estimated due to the increased variability between the results.

5. ***Table 5, Summary of Water Quality Indicator Parameters Measured in Surface water and Leachate Seep Samples*****—**Surface water and leachate seep temperatures are reported as 18.7 and 17.72°C, respectively. These values are high for this time of year (May 2), unless the sampled locations were strongly affected by direct sunshine. Please explain the circumstances at the time of sample collection. (RR)

   Response**—**The surface water and leachate seep temperatures reported in the Monitoring Event 18 report (2 May 2002) are high in comparison to the measured temperatures (i.e., 9.81 and 9.39°C, respectively) in Monitoring Event 16 (11 April 2000) for these same sample locations. The reason for the reported increase in surface water temperature during the May 2002 sampling event is suspected to be due to the warming effects of direct sunlight during the time of the sampling in addition to the non-flowing conditions at the sample locations. However, in future monitoring event reports, a notation will be added to Table 5 in order to explain field conditions that may cause noticeable changes in the measured surface water temperatures.

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
FOR MONITORING EVENT 18 – APRIL/MAY 2001
SITE 9, NAVAL AIR STATION, BRUNSWICK MAINE

COMMENTOR: Michael Barry **DATED: 26 December 2001**

***General Comment*—**I couldn't find the VOC results for MW-NASB-80 nor any explanation of a deleted well or lost VOC results. It looks like the recent rise in VOCs has leveled off, but that's a matter for the 2001 annual report.

***Response*—**Comment noted.

Appendix C-2

Response to
Maine Department of Environmental Protection
and U.S. Environmental Protection Agency
Comments on Monitoring Event 19 Report

RESPONSE TO COMMENTS FROM THE
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
FOR MONITORING EVENT 19 – OCTOBER/NOVEMBER 2001
SITE 9, NAVAL AIR STATION, BRUNSWICK MAINE, DATED MAY 2002

COMMENTOR: Claudia Sait **DATED: 25 July 2002**

The Maine Department of Environmental Protection (MEDEP or Department) has reviewed the report entitled Monitoring Event 19 – October/November 2001, Site 9, dated May 2002, prepared by EA Engineering, Science, and Technology. Based on that review, the Department has the following comments and issues.

GENERAL COMMENTS

1. MEDEP notes that the concentrations of vinyl chloride and total 1,2-DCE continue to rise to new site highs. Vinyl chloride was detected at only one other well (MW-NASB-076 at 2 µg/L). The State continues to be uneasy about the downgradient fate of vinyl chloride that exceeds the MEG by over two orders of magnitude when only one downgradient well is showing any vinyl chloride. It is our understanding that the Navy is contemplating installing additional monitoring wells in the near future. (RR)

   Response—The Navy would like to discuss this issue in-depth at our next technical meeting or conference call. We believe that the presence of eight monitoring wells downgradient from MW-NASB-069 is sufficient to provide a high level of confidence that the vinyl chloride plume is not exiting Site 9. The ground-water flow patterns in the vicinity of MW-NASB-069 and downgradient are well established. The long-term monitoring data and contaminant trends at site wells that are downgradient from MW-NASB-069 suggest that vinyl chloride is being attenuated by some means before ground water reaches the downgradient monitoring wells. Due to the nature of vinyl chloride (which is highly volatile), and the relatively low concentrations being detected (which are greater than the guidance values, but less than 80 µg/L), it is possible that the physical process, including diffusion, dispersion, and degradation, are in fact reducing concentrations to below non-detection in downgradient wells. If additional wells were to be installed at this site, it is likely that other existing monitoring wells would not be required, and could be removed from the Long-Term Monitoring Program.

SPECIFIC COMMENTS

2. ***Section 1.1, Introduction, Page 1, 2nd Paragraph***—The first sentence should also say that the remedial action being implemented at Site 9 is "natural attenuation with monitoring" (not "monitored natural attenuation" as stated in Section 1.7 on Page 6.) (ED)

   Response—Agreed. The second paragraph will be edited to read:

   At Site 9, the Navy is providing monitoring and maintenance as part of the long-term remedial actions required by the Final Record of Decision for Site 9. Specifically, the remedial action being implemented at Site 9 is natural attenuation with monitoring.

3. ***Section 1.3.1, Sampling Activities, Page 3, First Paragraph***—"Wells were purged at the lowest flow rate obtainable with the submersible pump (0.1 L/minute)."

   The field monitoring and sampling forms in Appendix B documents that rates this low were achieved, as had been done occasionally during past sampling events. Why was it decided to lower the purging rate from the more common historical rate of 0.2 L/minute? Were not drawdowns already very small? MEDEP recommends that consistency in rate at each well be maintained through time. The technical review committee should discuss this at the next technical meeting. (MTG)

   Response—During sampling, wells are consistently purged at the highest rate obtainable which maintains the water elevation with minimal drawdown. The difference at this well noted in the comment (0.1 L/min compared to 0.2 L/min) is extremely small, and could be related to equipment or other uncontrollable factors, which could include ambient temperature, water height in the well, or voltage rates on the generator. The Navy does not feel that consistent purge rates should be used between events, as the minimal drawdown method which is currently followed at NAS Brunswick allows the sampling team to determine the proper purge rate depending on well conditions at the time of sampling. In fact, use of that sort of pre-defined purge rate would supersede the established procedure for well sampling. The Navy would be willing to discuss this issue at a technical meeting, as requested.

4. ***Section 1.3.1, Sampling Activities, p. 3:***

   (a) In Section 1.4.1, bullets are presented that provide "notable observations of water quality indicator parameter measurements for surface water and the leachate seep sample." Notable observations are not provided for groundwater laboratory analytical parameters; however, the first paragraph on Page 3 does describe a few field parameter comparisons. The bulleted format has been quite useful in past reports, and the Navy is encouraged to return to the bullet format for all notable results presented. (ED)

   Response—Agreed. The Navy will use a bullet format for presenting notable results where applicable.

(b) ***Bottom of Page 3***—Conductivity results were similar between the diffusion sampler data and the low-flow data.

MEDEP does not agree. For 5 of 9 wells sampled, conductivities differed by over 100 µmhos/cm (refer to Table 4). In one case (MW-NASB-071), the diffusion value was 380 µmhos/cm greater than the low-flow sample, or +282%. At the other extreme (MW-NASB-069) the diffusion value was 138 µmhos/cm less than the low-flow value, or -59%. The low-flow values are more tightly grouped, and seem more reasonable. The poor replication between the two methods of collection is discouraging. The Navy needs to propose improvements to obtain better agreement in the future. The above report statement should be retracted. (RR)

Also, it would be advantageous for the technical review committee to discuss whether is this a significant obstacle to switching to diffusion samplers at this site. (MTG)

Response—The goal for using diffusion samplers at Site 9, and other sites at NAS Brunswick, is to obtain representative ground-water samples of VOCs. Analytical data have shown that diffusion samplers are useful for this purpose. The primary reason for collecting ground-water parameters before and during sampling (pH, temperature, conductivity, dissolved oxygen, turbidity, and Eh) is to provide data on whether the well has "stabilized" as part of low-flow sampling, and to establish whether sampling can be conducted. Also, these data are used for assessment of other aquifer conditions. The comparison for conductivity noted in this comment does not mention that a very good correlation was noted for pH, temperature, and, to a lesser degree, turbidity and Eh. Variations between diffusion samplers (which are a sealed plastic bag) and low-flow samples for conductivity, turbidity, and Eh should be expected as the sampling techniques are completely different. A review of the VOC data for Site 9, and other sites at NAS Brunswick (in addition to substantial literature and EPA guidance documents), clearly shows that diffusion samplers are acceptable for collecting VOC samples. The Navy would be interested in discussing this at a technical meeting, possibly in conjunction with other issues raised by MEDEP regarding Site 9.

5. ***Section 1.8, Analytical Data Quality Review, 6th Bullet***—Total-1,2-dichloroethene and trichloroethene concentrations in sample SED-010 should be considered as estimated values due to the exceedances of field precision criteria.

Appendix C.7 (duplicate field samples, Page C-17) contains a similar statement, and nothing more is said. The reader is left wondering if the values given in Table A-6 are lower or higher than true values. Because SED-010 is the only active sediment station, and has had hits of contaminants in the past, it is very important to collect and analyze concentrations without encumbering the data with nebulous qualifiers. Please provide more clarity to the above statement. (RR)

Response—The primary sample and a duplicate sample noted in this comment are SED-010 and SED-010 DUP. During the data quality review for these two samples, it was determined that the concentrations for total 1,2-dichloroethene and trichloroethene should be considered as estimated, as was reported. The Navy believes that the report is accurate as written, and

that these data cannot be further qualified (i.e., whether results were biased high or biased low) based on the data available.

The results for total 1,2-dichloroethene and trichloroethene are considered estimated due to the results of the relative percent difference (RPD) between field duplicates. RPD is a way to calculate the variability of a group of measurements compared to their average value. The RPD of a data pair is calculated using the following equation:

$$RPD = \frac{\backslash A-B \backslash}{\left(\frac{\backslash A+B \backslash}{2}\right)} * 100$$

where A and B are the reported concentrations for sample duplicate analyses.

The calculated RPD values for the primary sample and duplicate sample in question for total 1,2-dichloroethene and trichloroethene are 67 and 96 percent, respectively. These values exceeded the field RPD criteria (i.e., RPD <50 percent). The results for 1,2-dichloroethene and trichloroethene are considered estimated as per EPA Region 1 Organic Data Validation Functional Guidelines (dated December 1996). Note that total 1,2-dichloroethene and trichloroethene did not have other quality control anomalies. Other data that were evaluated included method blanks, matrix spike/matrix spike duplicate recoveries, matrix spike/matrix spike duplicate, RPDs, laboratory control sample recoveries, surrogate recoveries, field blanks, and holding times. These other criteria were acceptable for these two compounds, therefore, biases could not be determined solely by field duplicate RPD.

If the matrix spike/matrix spike duplicate recoveries or laboratory control sample recoveries were outside acceptance criteria for these compounds, then a bias could be determined. For example, when recovery acceptance criteria is 75-125 percent, the compound recovery is 65 percent, then you can determine that the compound result in question is estimated bias low. With precision, there are no upper or lower limits to determine bias, there is only a value that the RPD cannot exceed (in this case, less than 50 percent for the non-aqueous samples). Therefore, the only determination that can be made regarding the concentrations of the compounds is that they are estimated. The source of this RPD difference could be due to several factors, including variations in sample material due to sample collection procedures, analytical procedures, data processing procedures, sample handling, or storage procedures.

6. ***Figure 3, Interpreted Potentiometric Surface Elevations***—The contouring satisfactorily represents the general movement of groundwater from the upgradient NEX area to within 100 ft or so of the impoundment ponds. The 41- and 43-ft contours close to the water bodies do not appear realistic. One problem is that these contours surely bend parallel to the shorelines of the upper pond, rather than approach the pond perpendicularly. Secondly, the north side of the 41-ft contour is too close to the shoreline. It is highly unlikely that the water table drops 5 ft to the pond over a 10-ft horizontal span. While Figure Note 4 is probably justified, a better portrayal of the elevation data can be shown. The contour map in the Monitoring Event 18 report looks much more realistic near the ponds. More attention needs

to be paid to groundwater-surface-water relationships when drawing these contours in the future. Please correct this for the Annual Report. (ED)

Response—The Navy agrees that contour lines should not approach the ponds as a perpendicular angle, and that contours in this area were better represented in the Monitoring Event 18 Report. This figure will be revised for the Annual Report.

7. ***Table A-1, Summary of Ground-Water Sample VOC Results***—Under MW-NASB-076, the total VOC concentrations are shown, and are the same concentration as vinyl chloride concentrations. Total VOC concentrations should not be shown for this well, as only vinyl chloride was run in the laboratory. (ED)

   Response—For consistency, total VOC data were provided. The Navy believes the table in question accurately documents the total VOCs detected in that sample, even if only vinyl chloride was the only analyte. The table is clear in showing only results for vinyl chloride. If total VOCs were not noted on the table, and was omitted in the corresponding analytical database, report users could conclude that our methods for calculating total VOC were not accurate or applied consistently.

8. ***Table A-3, Summary of Ground-Water Sample TAL Elements Results***

   (a) The duplicate sample for MW-NASB-069 produced much lower concentrations for aluminum, chromium, and iron than did the primary sample. Table 4 reports a turbidity of 7 NTUs for this well, and thus, turbidity cannot be the cause of the discrepancies. An explanation is needed. (RR)

   Response—Sample variations must be expected between samples, and occasionally a sample and its duplicate do not have as similar values as would be preferred. It is true that reported concentrations for aluminum, chromium, and iron showed differences between the sample and the duplicate. An additional review indicates that readily soluble cations including sodium, magnesium, and potassium show very close correlation. This suggests that the dissolved concentrations are similar in both these samples, while some suspended material may have been present in the primary sample at MW-NASB-069. Field practices at NAS Brunswick are completed to minimize differences between primary and duplicate samples although differences were recorded here. The field team will be alerted to this result in an attempt to minimize discrepancies like this in the future.

   (b) Per the data tables given in Appendix A, the following noteworthy findings should be reported in the Annual report:

   - At MW-NASB-069 the primary diffusion samples indicate contaminate stratification, with the highest concentrations of both vinyl chloride and total 1,2-dichloroethene found at the top of the screen interval - opposite to the Event 18 relationship. Interestingly, the low-flow sample concentrations, taken mid-screen, agree more closely with the deep diffusion sample.

- For the fifth sequential sampling event, the concentration of vinyl chloride in MW-NASB-069 reached an all-time high (78 µg/L) at Site 9. A new record high was also set this event for total 1,2-dichloroethene (60 µg/L) in MW-NASB-069.

- At MW-NASB-227, trace to low levels of PCE and TCE in the low-flow sample were not replicated by diffusion samples at any depth. (ED)

Response—The Navy appreciates the suggestions regarding the content of the Annual Report, and will take these under advisement.

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
ON SITE 9 MONITORING EVENT 19, OCTOBER/NOVEMBER 2001
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Michael Barry **DATED: 21 June 2002**

Thank you for the opportunity to review the above report, which was prepared for the Navy by EA Engineering, Science, and Technology. We have no comment to the report at this time. Regarding the results presented in the report, we will reserve comment until the draft 2001 annual report is presented.

EPA's primary concerns with the Eastern Plume are concurrently being worked through by the additional investigations proposed by the Navy and EPA. Also, for Site 9, the Technical Evaluation Group is working on a well optimization proposal.

Response—Comment noted.

Appendix C-3

Response to
Maine Department of Environmental Protection
and U.S. Environmental Protection Agency
Comments on 2000 Annual Report

RESPONSE TO COMMENTS FROM THE
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION ON THE
DRAFT 2000 ANNUAL REPORT, MONITORING EVENTS 16 AND 17,
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 4 January 2002**

The Maine Department of Environmental Protection (MEDEP or Department) has reviewed the draft report entitled *2000 Annual Report, Monitoring Events 16 and 17, Site 9: Neptune Drive Disposal Site*, dated October 2001, prepared by EA Engineering, Science, and Technology. Based on that review, the Department has the following comments and issues.

GENERAL RESPONSE TO COMMENTS

A review and optimization of the Long-Term Monitoring Program at Site 9 has been scheduled during 2002. As part of this review, it is anticipated that site stakeholders, including the Navy, EPA, MEDEP, and others will discuss specific sampling requirements and appropriate locations for each sampling point at Site 9. Project reporting issues will also be discussed such as the content of monitoring event reports and annual reports for the site. The findings and outcome of the program optimization will be summarized in a letter to be added to the Administrative Record for the site. It is anticipated that many of the issues raised in this comment letter will be addressed during this program optimization.

GENERAL COMMENTS

1. Based on the following comments, there appear to be enough technical issues regarding Site 9 to warrant a 4-hour discussion on trends and modification to the monitoring network at the next technical meeting. (MTG)

   Response—We agree with this comment and look forward to resolving these technical issues during the Site 9 optimization meeting. Please see the General Response to Comments.

2a. MEDEP notes that the concentration of vinyl chloride has continued its gradual rise to a high of 60 µg/L in September 2000, whereas 1,2-dichloroethene (DCE) has remained nearly steady around 50 µg/L for the last three monitoring events. While it is encouraging to see the natural chemical degradation process working at Site 9 (as the selected remedy anticipated), MEDEP is anxious to see vinyl chloride levels in ground water begin to decrease. A permanent decrease would signify that the mass of parent compound is appreciably shrinking.

   Response—Due to the complexity of any ground-water plume, it is very difficult to accurately predict or explain the low concentration changes over time, as have been observed at this site. We believe that a rise in vinyl chloride concentrations, which has been observed within the main portion of the plume, most likely reflects natural variations in ground-water chemistry. While concentration decreases would be most favorable, increases in VOC

concentrations should be expected as well. We believe the existing monitoring wells located downgradient of the plume are showing that the plume is not expanding, and that vinyl chloride concentrations have decreased considerably in the vicinity of the impoundment ponds. The Navy believes that the remedy in place is protective of human health and the environment, and that natural attenuation is occurring that will slowly degrade contaminants over time. We anticipate further discussions on this topic during the upcoming Site 9 Long-Term Monitoring Program optimization meeting.

2b. The higher the vinyl concentrations become at the deep-screened monitoring well near the center of the site, the more concern MEDEP has that the downgradient wells may not be intercepting the core of the plume and may not be truly representing concentrations that are entering the northern surface water impoundment. Only downgradient monitoring well MW-NASB-072 is screened just above the clay, and only one surface water station is now being sampled. If one or both of these monitoring sites is not located within the plume migration path, chemical impacts at the discharge area will not be correctly measured. This multi-year issue has not gone away, and MEDEP requests that it be discussed at the next technical meeting. (MTG)

Response—We agree that this topic should be discussed during a technical meeting. Please see the General Response to Comments above.

SPECIFIC COMMENTS

3. ***Long-Term Monitoring Program, Section 1.2, Pages 1 and 2, Bullets***—The five goals of the Long-Term Monitoring Program are outlined on Page 1-2 of the Long-Term Monitoring Plan (August 1999); this section should be revised to incorporate those goals verbatim. (ED)

   Response—The bullets in this section have been revised to correspond with the goals listed in the Long-Term Monitoring Plan (August 1999).

4. ***Long-Term Monitoring Program, Section 1.2, Page 1, 1st Paragraph***—The ROD, not the LTMP, established the requirement for monitoring, sampling, and institutional controls. Please restate. (ED)

   Response—To clarify the section noted in the comment, the word "establishes" will be changed to "lists." This change will eliminate the connotation that the Long-Term Monitoring Plan is the document that establishes requirements for monitoring at the site.

5. ***Long-Term Monitoring Program, Section 1.2, Page 2, 1st Paragraph after Bullets***—"Ground-water elevation data were gathered to assess whether ground water from the Navy Exchange Service Station air sparging may be flowing toward Site 9."

   As written, the intent and meaning of this statement is confusing. MEDEP believes that it has been evident for several years that ground water flows from the NEX area into Site 9, and that the assessment is now one of delineating how this flowpath responds to changes in remedial activities at the NEX, and to wet versus dry periods. Our recommended revision of the above statement is: "*Ground-water elevation data were gathered to assess changes in*

the pathway of ground-water flow from the Navy Exchange Service Station air sparging remedial area into Site 9." (ED)

Response—The text of this sentence has been changed as recommended in the comment.

6. ***Long-Term Monitoring Program, Section 1.2, Page 2, 1st Paragraph after Bullets***—"A complete description of site geologic conditions is not presented in this Annual Report, but can be found in previous Annual Reports for Site 9."

   The Navy needs to reference a specific annual report, preferably the latest that applies. (ED)

   Response—A reference has been added to the 1999 Annual Report for Site 9.

7. ***Figure 1-3, Geologic Cross-Section of Site 9***—The Department is pleased to see a geologic section added to the Annual Report. MEDEP recommends the following to enhance the readers understanding.

   First, the section follows nearly parallel with the interpreted movement of ground water on Figures 2-1 and 2-2 except for wells MW-NASB-074 and MW-NASB-077. The section line may be improved by dropping these two wells, and adding MW-NASB-072 (and possibly MW-NASB-078 to cross the lower end of the Upper Pond) follow the plume center to its surface water discharge. MEDEP believes that very little plume water discharges to the Upper Pond, as suggested by the potentiometric contour maps. (ED)

   Response—We appreciate this suggestion, but feel the existing cross-section accurately depicts subsurface conditions at Site 9. MEDEP is invited to discuss the issue of changes in cross-section lines during the upcoming Site 9 optimization meeting scheduled for June 2002.

8. Secondly, another geologic cross-section is recommended to portray the subsurface perpendicular to ground-water flow. It is recommended to run this line through the "hot spot" (MW-NASB-069), and include wells MW-NASB-227, MW-NASB-079, and MW-NASB-70 for this Annual Report. (ED)

   Response—Please see the response to Comment No. 7 above.

9. ***Volatile Organic Compounds, Section 2.2.1, Page 2-1, 3rd Sentence***—"…(the highest reported vinyl chloride concentration detected in 2000)."

   Please delete "reported" as the connotation is that other non-reported data exist. (ED)

   Response—The word "reported" has been removed as suggested.

10. ***Vinyl Chloride Trend Data, Section 2.2.2, Page 2-2***

(a) The referenced Figure 2-1 should be Figure 2-3, in both cases. Please correct. (ED)

Response—Figure 2-1 has been changed to Figure 2-3 in both cases.

(b) Also, in the trend table summary, please review the characterizations of "steady" for 1995-2000 and of "increasing" for 1999-2000 for MW-NASB-080. These seem to be reversed. (ED)

Response—After reviewing the data on Figure 2-3, we believe the summary of trends presented on Page 2-2 is correct. Vinyl chloride concentrations from 1995 to 2000 (the red regression line on Figure 2-3) is steady, while data from 1999 can be characterized as increasing.

11. ***Vinyl Chloride/Total Dichloroethene Ratio, Section 2.2.3, Pages 2-2 and 2-3***

(a) Please review all of the figure reference numbers in this section. Does the Navy intend to reference Figures 2-4 and 2-5? Please correct as necessary. (ED)

Response—The text has been changed to reference Figures 2-4 and 2-5.

(b) "A decreasing concentration of total DCE (parent compound) and an increasing concentration of vinyl chloride (daughter product) indicated the rate of dechlorination process is increasing."

The sloped straight lines on Figure 2-4 do not represent increasing rates of dechlorination; straight lines on arithmetic graphs imply that the rate for any specific line (or well) is constant over time. MEDEP suggests that this statement be removed or revised as written in the note on Figure 2-4.

A higher vinyl chloride/total 1,2-DCE ratio indicates increasing dechlorination.

Response—The text has been revised as requested.

(c) DCE may not be the true parent compound, as it also is a daughter product of TCE. TCE has been detected historically between the MEG/MCL (5 µg/L) and 1 µg/L at MW-NASB-227 and MW-NASB-074, and at trace levels at MW-NASB-072, MW-NASB-075, and MW-NASB-076. Therefore, any reference to DCE as a parent compound needs to include the fact that DCE likely is a daughter product of TCE.

Response—We believe the text is accurate as written, as DCE is the direct parent material of vinyl chloride. While DCE may be the daughter product of TCE, the presence of DCE may be the result of dechlorination, or could be as the result of a release. In either case, the vinyl chloride at Site 9 is believed to originate from DCE via the dechlorination process.

12. ***Figure 2-3, Total Volatile Organic Compounds and Vinyl Chloride Trends, 1995-2000***— In the graph for MW-NASB-080, the black trend line for 1998–2000 does not appear correctly drawn. Also, refer to Specific Comment No. 9. Please review and make the appropriate change. (ED)

    Response—The slope and positioning of the trend line was inadvertently based on 1996-2000 data. This trend has been revised to show the data from 1998 to 2000 for this well.

13. ***Figure 2-5, Sum of Vinyl Chloride and 1,2-Dichloroethene, Total Concentration, 1995–2000***

    (a) Because vinyl chloride is very likely derived from the degradation of total 1,2-dichloroethene, it would be better to show the DCE graph physically above the VC graph. (ED)

    Response—We believe the graphs, as presented, are accurate. No changes were made to the 2000 Annual Report based on this comment.

    (b) Please add a clarifying footnote that says that the sum represents all monitoring wells sampled at Site 9 for each monitoring event. (ED)

    Response—The title of this figure has been changed to the following to address this comment:

    Figure 2-5. Sum of the total concentrations of vinyl chloride and 1,2-dichloroethene for all site monitoring wells for monitoring events from 1995 to 2000.

14. ***Ground-Water Monitoring and Sampling Program, Section 3.1.2, Page 3-3, 1st Bullet***— "The source of the 1,2-DCE at Site 9 is not apparent, but may be related to changing geochemical conditions at the Navy Exchange Service Station, which have affected ground-water chemistry at Site 9."

    Please rewrite to indicate the following:

    The source of contamination at Site 9 has not been determined. The changing geochemical conditions related to the Navy Exchange Service Station do appear important and likely have aided degradation of 1,2-DCE at Site 9. (ED)

    Response—The text of this section has been revised as suggested.

15. ***Ground-Water Monitoring and Sampling Program, Section 3.1.2, Page 3-3, 2nd Bullet***— "Ground water moving onto Site 9 from the west (i.e., the area near MW-NASB-227) does not appear to be contributing significant concentrations of VOCs to Site 9."

    MEDEP suggests that after the surface water drainage was dammed in early 1998 and after the air sparging began at the NEX, the ground-water flow pattern changed subtly but significantly. It seems likely that the flow into Site 9 had a stronger west to east component

prior to 1998. If the 42-in. drain pipe was actually removed as the Navy contends, this could have also lessened the draw of ground water from west of Site 9. Although potential solvent sources once existed in the current upgradient direction (e.g., the vehicle maintenance building and the waste oil storage tank at the NEX), past migration from the Flight Line to Site 9 is another possibility, as EPA has suggested. (NR)

Response—This comment is best addressed during the upcoming meeting to discuss the optimization of the Site 9 monitoring program. At that time, a complete review of ground-water flow patterns at the site is expected, and revisions to the monitoring program to account for the current understanding of the site is expected. No changes were made to the 2000 Annual Report based on this comment.

16. ***Ground-Water Monitoring and Sampling Program, Section 3.1.2, Page 3-3, 4th Bullet***— "Therefore, if elevated concentrations of vinyl chloride were to occur in areas downgradient of MW-NASB-069, the existing monitoring well network is likely to effectively track changes in ground-water concentrations of VOCs."

    It is very possible that the existing monitoring network is not adequate. Only MW-NASB-072 has a well screen placed just above the clay and is also located between MW-NASB-069 and surface water. The mass of the vinyl chloride appears to be moving along the top of the clay. The graph of VOC concentrations at MW-NASB-072 (Appendix A, Figure 18) shows a gradual decline from a range of 5 to 10 µg/L in the mid-1990s to non-detect after March 1999. This suggests to MEDEP that the flowpath containing vinyl chloride has shifted. It may now be north of MW-NASB-072, as can be interpreted from the potentiometric surface elevation maps in this report. The Department requests that the need for another monitoring well be discussed at the next technical meeting. (RR/MTG)

    Response—We feel the existing groundwater monitoring well network is adequate for monitoring the vinyl chloride along the downgradient site boundary, and data from monitoring wells at Site 9 are sufficient to ensure the plume is not moving offsite. To address this comment, we would like to discuss the adequacy of the monitoring well network within Site 9 during the June 2002 technical meeting.

17. ***Surface Water Sampling Program, Section 3.1.3, Page 3-4***—Both 1,2-DCE and vinyl chloride were detected at surface water station SW-10 in 2000. Given the substantial potential for volatilization and dilution of these compounds once they reach the stream, this finding is noteworthy. It may also be an indication that the flowpath has shifted north of MW-NASB-072 (see Specific Comment No. 15). It may be necessary to discuss an additional monitoring well. (RR/MTG)

    Response—This issue should be discussed during the meeting to optimize the Site 9 Long-Term Monitoring Program. No changes were made to the 2000 Annual Report based on this comment.

18. ***Recommendations, Section 3.2, Page 3-5***

    (a) MEDEP agrees with the recommendations in Bullets 1, 2, 4, and 6. (NR)

Response—No response required.

(b) ***Bullet 3***—While MEDEP agrees in theory with expanding the use of aqueous diffusion samplers for Site 9, the number of rounds using multiple samplers and low flow sampling should be discussed and consensus reached among the Restoration Advisory Board members. Any change in sampling methods would then need to be incorporated into the Long-Term Monitoring Plan for Site 9. (MTG)

Response—The issue of diffusion samplers was discussed with MEDEP and EPA prior to initiation of the April 2002 monitoring event. A complete discussion of the sampled interval and number of samplers used for each monitoring well will be presented in the Monitoring Event 20 report.

(c) ***Bullet 5***—Please clarify what is meant by "further evaluation is recommended." Is the Navy recommending investigating the possibility of a source of 1,2-DCE in the western part of Site 9? If so, the search should look for former releases of TCE and PCE, since both compounds have been consistently documented in ground-water samples from MW-NASB-227. Two and a half years of laboratory analytical data for this well indicate a flat trend in concentration. Ground-water samples from just above the clay upgradient of this well should be collected. (RR/MTG)

Response—The phrase "further evaluation is recommended" has been revised to read "further evaluation after additional sampling of MW-NASB-227 is recommended." We would be interested in discussing this issue during the upcoming meeting to optimize the Long-Term Monitoring Program for Site 9. The need for additional sampling near MW-NASB-227 to identify the source of chlorinated volatile organic compounds does not appear warranted at this time due to the very low concentrations being recorded at MW-NASB-227.

(d) ***Bullet 6***—The elimination of SVOC analysis should be discussed and consensus reached at a RAB meeting prior to documenting the change in the Long-Term Monitoring Plan for Site 9.

Response—We would be interested in discussing this issue during the upcoming meeting to optimize the Long-Term Monitoring Program for Site 9.

19. ***Appendix A, Figure 33, MW-NASB-227***—For MW-NASB-227, both TCE and PCE should be graphed, regardless if they are not designated as "chemicals of concern" site-wide. After all, it is very likely that 1,2-DCE, and subsequently vinyl chloride, are daughter degradation products of TCE and/or PCE. (ED)

Response—The graphs of Appendix A provide trends for only the Record of Decision specified chemicals of concern for the site. Therefore, we do not feel it is appropriate to add these compounds. Please note that the analytical database supplied with the Geographic Information System project includes the entire chemical database for Site 9, and can be used to graph any individual compound.

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY ON THE
DRAFT 2000 ANNUAL REPORT, MONITORING EVENTS 16 AND 17
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Michael Barry **DATED: 14 November 2001**

Thank you for the opportunity to review the above report which was received by EPA on 9 October 2001 and submitted by EA Engineering, Science, and Technology on behalf of the Navy.

The EPA generally concurs with the conclusions and recommendations of the draft report. We also think it is notable that in 2000, vinyl chloride concentrations have increased whilst 1,2-dichloroethylene (1,2-DCE) has remained stable, indicating that natural dechlorination is underway. Also, the dramatic increase in VOC concentrations observed in 1999 may be leveling off pending the results of the 2001 events. We will look forward to future results and fully support the use of passive diffusion samplers as we believe they could provide added information. More detailed comments are below.

I have modified the format of this comment letter to focus upon the summary, conclusions, and recommendations; your feedback is requested.

GENERAL RESPONSE TO COMMENTS

A review and optimization of the Long-Term Monitoring Program at Site 9 has been scheduled during 2002. As part of this review, it is anticipated that site stakeholders, including the Navy, EPA, MEDEP, and others, will discuss specific sampling requirements and appropriate locations for each sampling point at Site 9. Project reporting issues will also be discussed such as the content of monitoring event reports and annual reports for the site. The findings and outcome of the program optimization will be summarized in a letter to be added to the Administrative Record for the site. It is anticipated that many of the issues raised in this comment letter will be addressed during this program optimization.

COMMENTS TO RECOMMENDATIONS

Section 3.2, Page 3-5

1. Concur with recommendation Bullets 1, 2, 4, and 6 without comment.

   Response—No response required.

2. Recommendation Bullet 3 regarding use of passive diffusion samplers. EPA concurs that one event with high/mid/deep level diffusers with a parallel low-flow sample is sufficient to shift to one passive diffuser sampler. However, this should be discussed at a project meeting and

EPA/MEDEP/Navy must all agree prior to shifting. The specific sampler depth should also be concurred upon and documented by letter until such a time as the pilot project is formalized with a Long-Term Monitoring Plan (LTMP) revision.

Response—Separate discussions with the Technical Evaluation Group have been held with MEDEP and EPA regarding the use of diffusion samplers at Site 9 in advance of the April 2002 sampling event. During these discussions, consensus was reached by the team members for each well. The Monitoring Event 20 Report will document the outcome of these discussions and will summarize how diffusion samplers were employed at Site 9.

3. Recommendation Bullet 5 regarding a potential source of 1,2-DCE west of MW-NASB-227. We also note that trichloroethylene (TCE) has been detected in this well about equal to the 1,2-DCE, yet vinyl chloride has not been detected. This chemical profile leads EPA to believe that it is from a different source. Due to the low concentrations (both chemicals below the MCL) and location downgradient of the flight line, EPA speculates that it may be due to a small historical spill. We concur that this well should be further evaluated by the normal LTMP.

   Response—We agree that the chemical profile for volatile organic compounds at MW-NASB-227 suggests a different source for Site 9. In addition, this well is located west of the main portion of Site 9 and is generally upgradient of the majority of the site. A review and optimization of the Site 9 Long-Term Monitoring Program has been scheduled for 2002 with MEDEP, EPA, and others. It is anticipated that this issue will be discussed during this review and a consensus reached for appropriate further actions. No changes to the 2000 Annual Report will be made based on this comment.

4. Recommendation Bullet 7 regarding SVOC sampling. EPA concurs with eliminating SVOCs from wells MW-NASB-69/70/79 because they have not been detected in 1999/2000. This should be discussed at a future project meeting prior to changing and then be documented by revision to the LTMP. To ensure continued remedy protectiveness and since contaminants remain in the ash landfill, these wells should be sampled for SVOCs on the sampling event prior to the five-year review.

   Response—We agree with this comment. We anticipate resolving this issue during the Site 9 Long-Term Monitoring Program optimization scheduled for 2002. Please see the General Response to Comments above.

5. EPA also has two additional recommendations for the Navy and MEDEP to consider. Both should be discussed at project meetings and implemented only after the concurrence of all parties.

   a. The only TAL metals detected were iron, manganese, and thallium. These metals are naturally occurring and the results have been consistent with sitewide and local background for some time (they are discussed in Section 3.1.2, Pages 3-3 through 3-4). Thus, EPA questions the value in routinely sampling wells MW-NASB-69/70/79 for TAL metals other than on the sampling event prior to the five-year review.

Response—We agree with this comment. We anticipate resolving this issue during the Site 9 Long-Term Monitoring Program optimization scheduled for 2002. Please see the General Response to Comments above.

b. The Navy has recently proposed a new reporting format for the Long-Term Monitoring Program. This was primarily addressed for Sites 1 and 3 and the Eastern Plume, but we assume that whatever structure results will be used for Site 9 as well. Further, as we stated in our letter of 9 November 2001, we do not see that the value of a detailed analysis with each report is worth the effort. EPA would be satisfied with a detailed analysis every third report, with the expectation that recommendations could be made in any report.

   Response—We anticipate resolving this issue during the Site 9 Long-Term Monitoring Program optimization scheduled for 2002. Please see the General Response to Comments above.

COMMENTS TO SUMMARY AND CONCLUSIONS.

Section 3.1.2, VOCs, Pages 3-2 through 3-3

1. ***Fourth Bullet***—It is interesting that VOCs, mostly vinyl chloride, sharply rose this year in MW-NASB-80 after a long-term decrease. It is not known if this is due to an upgradient source, the plume shifting, or merely data scatter. Further events and diffuser samplers may provide more information.

   Response—A review of the vinyl chloride data for MW-NASB-080 through 2001 shows concentrations ranging from 0 to 9 parts per billion. It appears that the concentrations recorded in 2000 were part of the normal data scatter for this compound at the well.

2. ***Fifth Bullet***—We concur that the data supports that a major source of 1,2-DCE on the western part of the site is not likely and that ground water in this area does not flow toward the central part of Site 9. However, this should be discussed in more detail in the results Section 2.2.1 to support the conclusion. Taking the idea of easterly flow from MW-NASB-227 toward Site 9 further, it is very interesting to note that MW-NASB-74 exhibits a chemical profile very similar to MW-NASB-227, i.e., composed of nearly equal TCE and 1,2-DCE with no vinyl chloride. Again, diffusion samplers may shed more light on this since they can more accurately vertically profile contamination.

   Response—We believe that additional discussion related to ground-water flow patterns, and the apparent lack of a western source of 1,2-DCE, is justified. However, we feel that these discussions would be most appropriate during the Site 9 Long-Term Monitoring Program optimization scheduled for 2002. During those discussions, we would anticipate refining the site conceptual model (related to ground-water flow patterns and contaminant distributions). The updated site conceptual model could then be added to future annual reports. The similarity of chemical concentrations noted in MW-NASB-227 and MW-NASB-074 are notable, and could indicate ground-water flows from 227 to 074. However, VOC

concentrations at the upgradient well (MW-NASB-227) are lower than at the downgradient well (MW-NASB-074), suggesting that VOCs from Site 9 may be affecting MW-NASB-074. Due to the speculative nature of this concept, no changes will be made to the 2000 Annual Report.

3. One could speculate that there are two VOC flowpaths into Site 9; a "secondary" TCE/1,2-DCE plume from MW-NASB-227 and a "primary" 1,2-DCE/vinyl chloride plume from MW-NASB-80 to MW-NASB-69 then 76 that is mostly vinyl chloride on either side of central Site 9. However, this is a hypothesis at this time and the effort to prove it is undoubtedly greater than warranted by the risks due to the low concentrations at Site 9.

   Response—We agree that VOCs at Site 9 have different ratios in wells located west of the site compared to those found at the center. Based on existing long-term monitoring data, we believe that the site remedy in place is protective of human health and the environment regardless of whether one or two plumes are present. We anticipate further discussions during the Site 9 optimization scheduled for 2002.

4. A graph of total summed VOC concentrations of all the wells would provide a good visual display of over plume behavior over time and compliment the more detail well and 1,2-DCE/vinyl chloride charts.

   Response—Figure 2-3 shows graphed concentrations of total VOCs for the monitoring wells which have detected historical concentrations of VOCs. Separate charts in Appendix A provide total VOC trend graphs for all wells. Therefore, we believe that no additional graphs are needed.