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1999 Annual Report
Monitoring Events 14 and 15
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
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway
Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Prepared by

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May 2000
FINAL
296.0047

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11 MAY 2000

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QUALITY REVIEW STATEMENT

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Contract Task Order No. 0047
Activity: Naval Air Station, Brunswick, Maine

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Final 1999 Annual Report, Monitoring Events 14 and 15, 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

James A. Shultz 11 May 2000

James A. Shultz, C.P.G. (Date)
Senior Geologist

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1. INTRODUCTION

1.1 BACKGROUND

Under Contract No. N62472-92-D-1296, Contract Task Order No. 0047, Northern Division, 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 1mi 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 participating in 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). This LTMP document 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 document, which is comprised of a Long-Term Monitoring Program and an addendum to the Quality Assurance Project Plan contained in the LTMP for Building 95, Sites 1 and 3, and Eastern Plume (EA 1999b), 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 area. The LTMP for Site 9 was finalized in August 1999.

The objective of the Long-Term Monitoring Program is to obtain data necessary to monitor 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.

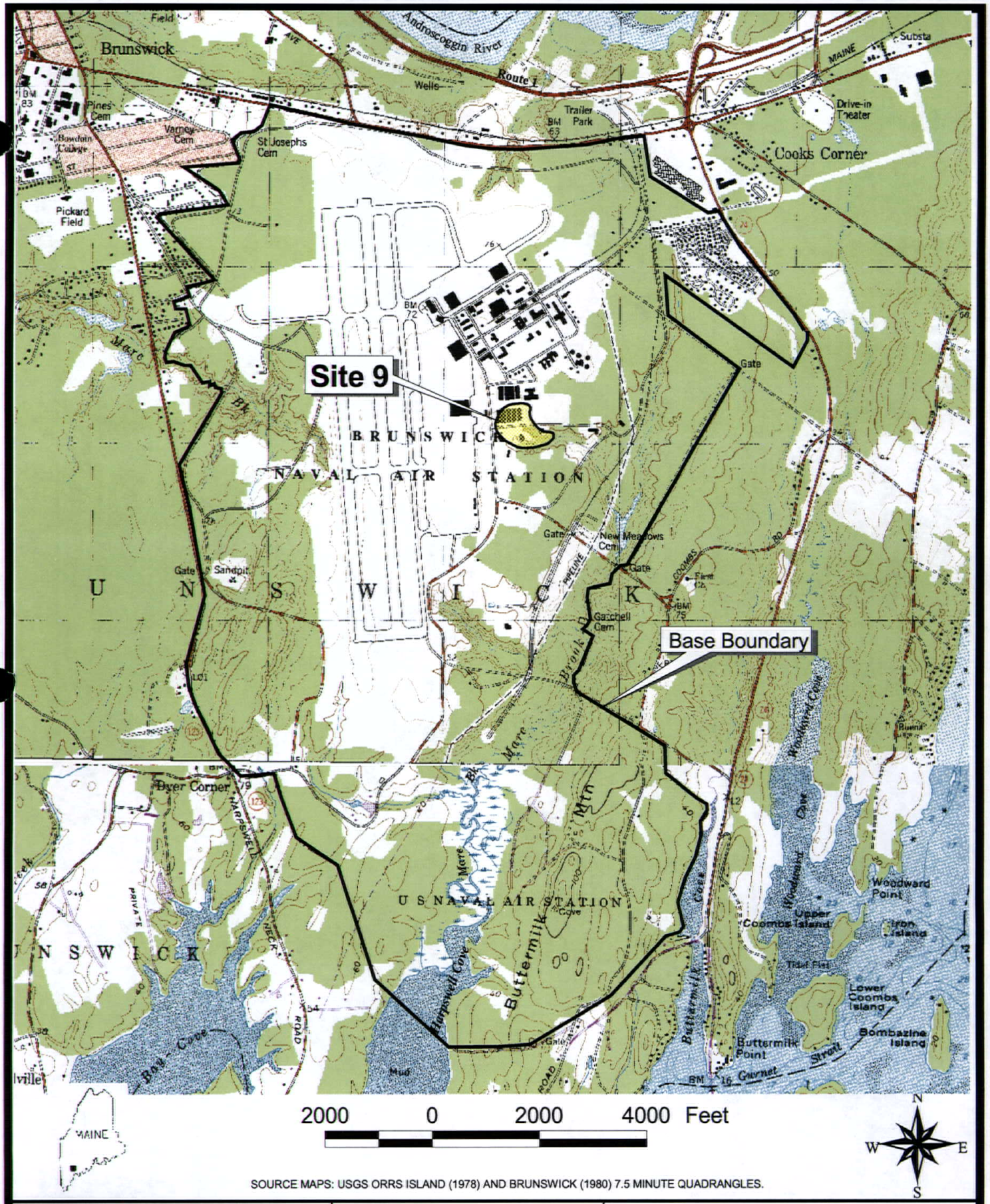
- Assess whether ground water downgradient of the Site 9 landfill is impacted by inorganics from the site.
- Assess variations in the ground-water flow patterns.
- Monitor the structural integrity of the ground-water monitoring wells.

A summary of the sampling and gauging conducted during 1999 is provided in Table 1-1. Although not required by the LTMP, bi-monthly gauging of wells at Site 9 was performed during January, April, June, August, and September 1999 to investigate the potential for seasonal changes in ground-water flow patterns at the site. At the request of the State of Maine Department of Environmental Protection (MEDEP), 9 monitoring wells at the Navy Exchange Service Station site were gauged as part of Monitoring Events 14 and 15 to assess ground-water flow patterns upgradient of Site 9 where an active air sparging system is operating to address petroleum-impacted soil and ground water. Starting in Monitoring Event 15, 3 ground-water samples were collected from wells MW-NASB-069, MW-NASB-070, and MW-NASB-079 and submitted for laboratory analysis by EPA Method 8270C. The semivolatile organic compound (SVOC) analyses were included to assess whether ground water downgradient of the landfill is impacted by SVOCs from the landfill. The analysis of ground-water samples from these wells for SVOCs by EPA Method 8270C has been added to the Long-Term Monitoring Program at Site 9. Ground-water elevation data were gathered to assess whether ground water from the Navy Exchange Service Station air sparging may be flowing to Site 9. Additional information on site gauging and sampling activities completed during 1999 can be found in the reports for Monitoring Events 14 and 15 for Site 9 (EA 1999c, 1999d). 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. A geologic cross-section of the site is shown on Figure 1-3 to illustrate general site geology.

1.3 ANNUAL REPORT ORGANIZATION

The 1999 Annual Report details the project activities conducted as part of the Long-Term Monitoring Program at Site 9 during the two monitoring/sampling events of 1999. The format of the 1999 Annual Report has changed from prior site annual reports based upon discussions with MEDEP and EPA during the 22-23 November 1999 Technical Meeting (EA 1999e). Specifically, the 1999 Annual Report and future annual reports will not include data summary tables and ground-water contour maps presented in the monitoring event reports. The data summary tables, ground-water contour maps, and VOC contour maps will only be presented in the monitoring event reports. When these items are cited in the annual report text, a reference will be made to the appropriate monitoring event report. The site geology and background sections have not changed since 1998 and, therefore, are not be presented within annual reports. If new geologic information is generated which would allow for refinement of the conceptual model as presented in the Final Record of Decision for Site 9 (EA 1999a), then this information would be included in a future annual report.

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 1999. Chapter 3 presents conclusions and recommendations based on site data. Graphs showing trends of data collected during the Long-Term Monitoring Program are presented in Appendix A. Appendix B provides responses to regulator comments received regarding the 1998 Annual and Monitoring Events 14 and 15 reports.



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
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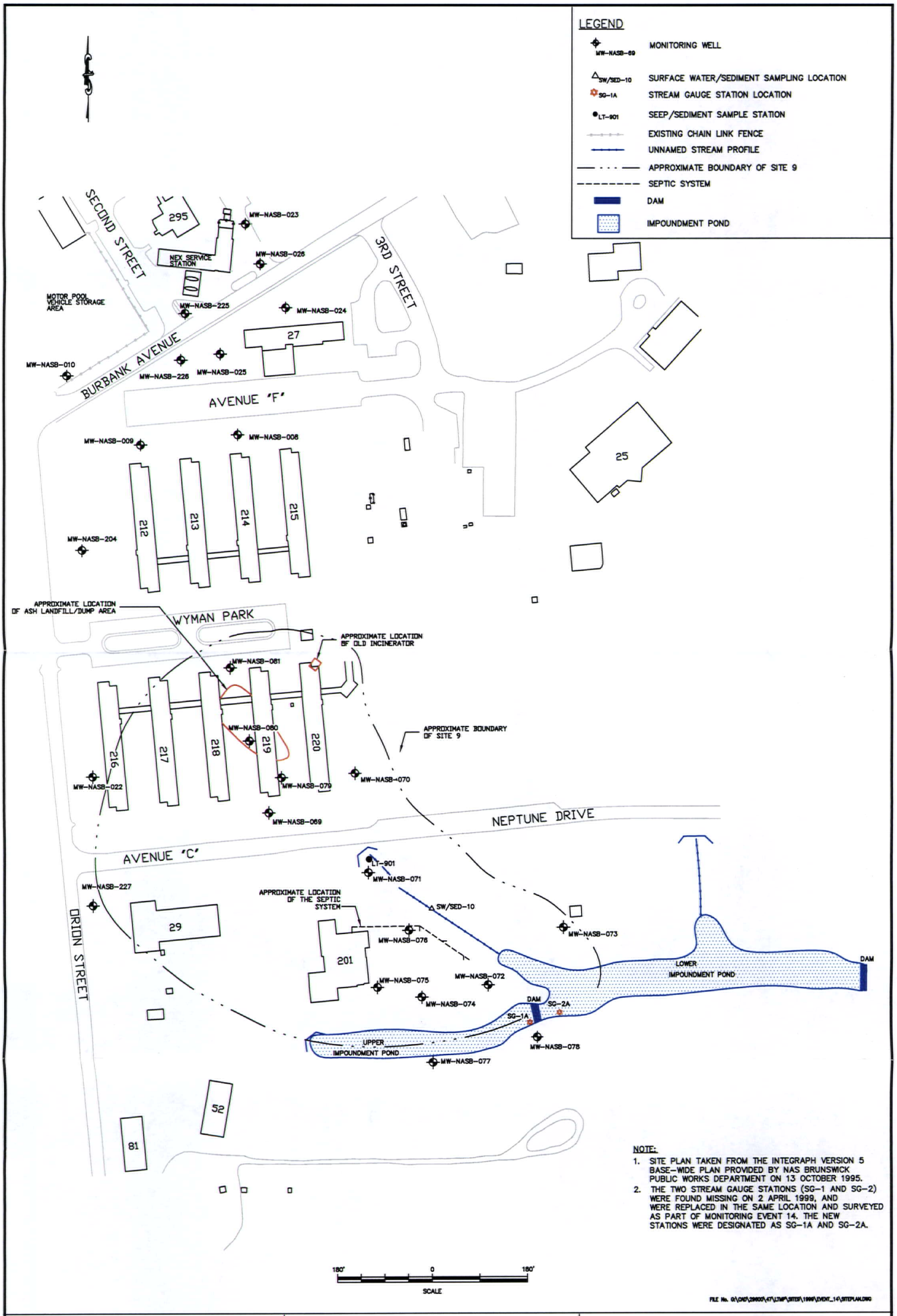


NOTE:

1. SITE PLAN TAKEN FROM THE INTEGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. THE TWO STREAM GAUGE STATIONS (SG-1 AND SG-2) WERE FOUND MISSING ON 2 APRIL 1999, AND WERE REPLACED IN THE SAME LOCATION AND SURVEYED AS PART OF MONITORING EVENT 14. THE NEW STATIONS WERE DESIGNATED AS SG-1A AND SG-2A.

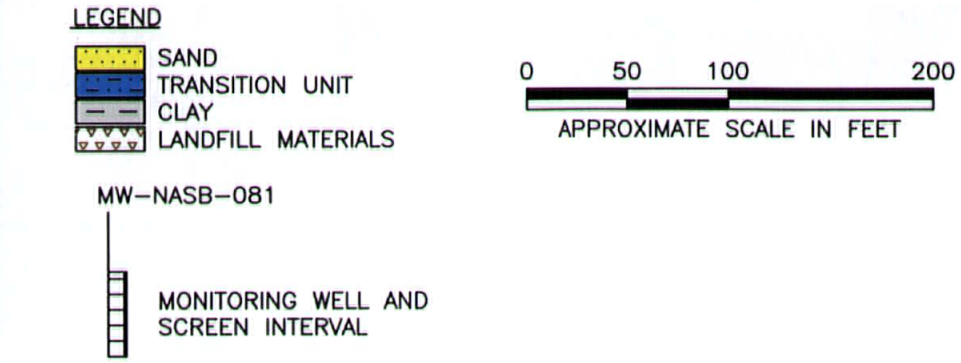
FILE No. G:\CAD\29600\47\LTMP\SITEP\1999\EVENT_14\SITEPLAN.DWG

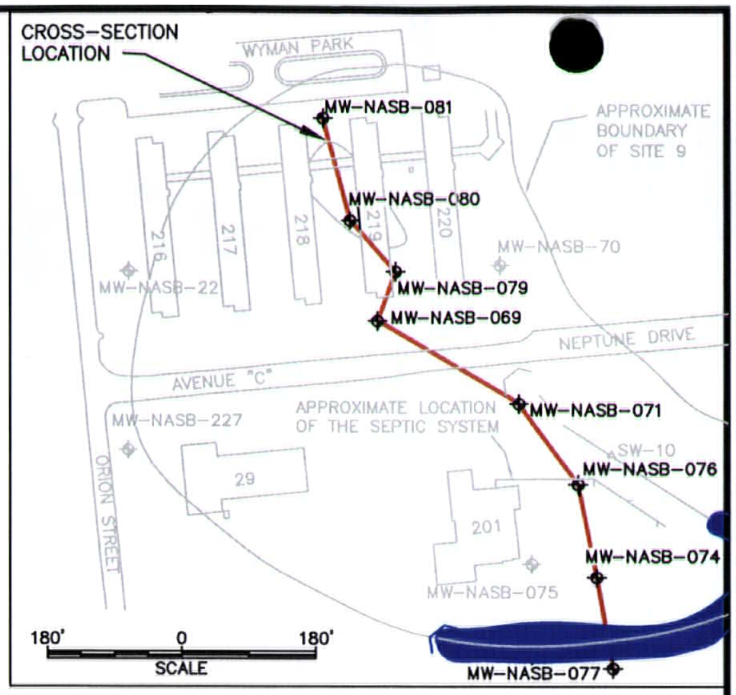
EA ENGINEERING, SCIENCE, AND TECHNOLOGY

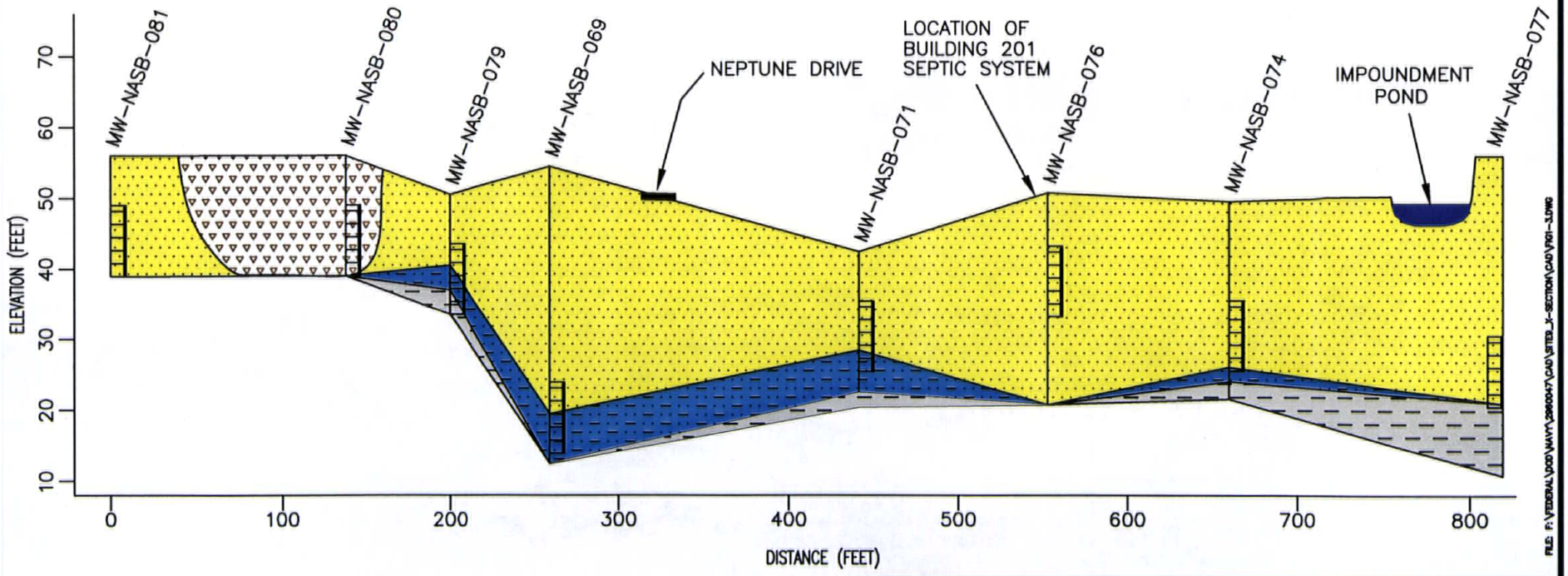
SITE 9
(NEPTUNE DRIVE DISPOSAL SITE)
NAVAL AIR STATION
BRUNSWICK, MAINE

FIGURE 1-2
SITE PLAN

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FILE No.
PLN	SAP	SAP	PLN	1"=180'	18 FEBRUARY 2000	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 1999 LONG-TERM MONITORING PROGRAM AT SITE 9, NAVAL AIR STATION, BRUNSWICK, MAINE

Well Designation	Previous Well Designation	1999 Sampling Dates	Sample Parameters		
			TCL VOC	TAL Elements/SVOC	Water Level Gauging [a]
Monitoring Wells					
MW-NASB-069	MW-901	April, September	X	X[b]	X
MW-NASB-070	MW-902	April, September	---	X[b]	X
MW-NASB-071	MW-903	April, September	X	---	X
MW-NASB-072	MW-904	April, September	X	---	X
MW-NASB-073	MW-905	Not sampled	---	---	X
MW-NASB-074	MW-906	April, September	X	---	X
MW-NASB-075	MW-907	April, September	X	---	X
MW-NASB-076	MW-908	April, September	X	---	X
MW-NASB-077	MW-909	October	X[c]	---	X
MW-NASB-078	MW-910	Not sampled	---	---	X
MW-NASB-079	MW-914	April, September	---	X[b]	X
MW-NASB-080	MW-915	April, September	X	---	X
MW-NASB-081	MW-916	Not sampled	---	---	X
MW-NASB-022	None	April, September	X	---	X
MW-NASB-204	None	Not sampled	---	---	X
MW-NASB-227	None	April, September	X	---	X

Sample Location	1999 Sampling Dates	Sample Parameters	
		TCL VOC	Water Level Gauging
Seep Station			
LT-901 (SEEP)	April, September	X	---
Surface Water			
SW-010	April, September	X	---
Sediment			
SED-010	April, September	X	---
Surface Water Impoundment			
SG-01A[d]	Not sampled	---	X
SG-02A[d]	Not sampled	---	X

(a) Water level gauging was conducted during January, April, June, August, and September 1999.
(b) Sample was analyzed for semivolatile organic compounds by the U.S. Environmental Protection Agency (EPA) Method 8270C and was collected only during the September 1999 monitoring event.
(c) Monitoring well MW-NASB-077 sample was analyzed using EPA Method 8260B Modified for selected ion mass for vinyl chloride.
(d) Stream gauges SG-1 and SG-2 were found missing during the April 1999 gauging event. They were replaced and resurveyed as part of Monitoring Event 14 and designated as SG-1A and SG-2A.

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 January, April, June, August, and September 1999, although they are not part of Site 9.
Dashes (---) indicate sample parameter was not collected.
Sample locations, frequency, and collection methods for 1999 were implemented in accordance with the Long-Term Monitoring Plan (ABB-ES 1994) for Monitoring Event 14 and in accordance with the Final Long-Term Monitoring Plan (EA 1999b) for Monitoring Event 15. Analytical methods and detection limits were established in the Final Record of Decision (EA 1999a).

2. LONG-TERM MONITORING PROGRAM RESULTS—1999

2.1 WATER LEVEL GAUGING PROGRAM

During the 1999 monitoring events, 16 ground-water monitoring wells at Site 9 were gauged to obtain depth to water. Well gauging was also conducted as part of bi-annual sampling events completed on 19 April and 2 September 1999. Although not required by the LTMP, bi-monthly water level measurements were collected from Site 9 monitoring wells on 7 January, 1 June, and 2 August 1999 in order to assess the potential for seasonal changes in ground-water flow direction. Nine additional monitoring wells associated with the Navy Exchange Service Station were gauged as part of Monitoring Events 14 and 15 to assess flow patterns upgradient of Site 9. Two stream gauges (SG-1 and SG-2) were found missing on 2 April 1999, and were subsequently replaced in the same locations and surveyed as part of Monitoring Event 14. The new stream gauges were designated as SG-1A and SG-2A. A summary of 1999 gauging data are presented in the Monitoring Events 14 and 15 reports (EA 1999c, 1999d).

Interpretive water table elevation contour maps were developed from data collected during the bi-annual (April and September 1999) and three bi-monthly gauging events (January, June, and August 1999). The interpreted water table contour maps for the Monitoring Events 14 and 15 are included in the monitoring event reports (EA 1999c, 1999d).

2.2 GROUND-WATER MONITORING AND SAMPLING PROGRAM

Ground-water samples were collected during Monitoring Events 14 and 15 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 those 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 Tables 5 and 6 of the Monitoring Event 14 report and Tables 5, 6, and 7 of the Monitoring Event 15 report. The analytical results of ground-water samples were compared against State of Maine's Maximum Exposure Guidelines (MEG) and Federal Maximum Contaminant Levels (MCL) to assess whether analytes exceeded applicable regulatory criteria.

2.2.1 Volatile Organic Compounds

Vinyl chloride was reported at concentrations above the corresponding Federal MCL or State MEG in samples from 3 monitoring wells during 1999: MW-NASB-069, MW-NASB-076, and MW-NASB-080. During the April 1999 sampling event, vinyl chloride was detected at concentrations of 16 μg/L in MW-NASB-069, 14 μg/L in the duplicate sample from MW-NASB-069, and 3 μg/L in MW-NASB-076 and MW-NASB-080. In September 1999, vinyl chloride was detected at a concentration of 45 μg/L in monitoring well MW-NASB-069 and at 58 μg/L in the

duplicate sample collected at MW-NASB-069, which was the highest reported vinyl chloride concentration detected in 1999. Vinyl chloride was detected at concentrations of 2 μg/L and 4 μg/L in MW-NASB-076 and MW-NASB-080, respectively, in September 1999.

To assess whether VOCs may be entering the site from upgradient sources near the Navy Exchange Service Station, ground-water samples were collected from 3 monitoring wells (MW-NASB-008, MW-NASB-009, and MW-NASB-010) during Monitoring Event 15 for VOC analysis by EPA Method 8260B. No VOCs were detected in the samples collected from these Navy Exchange Service Station monitoring wells during the Site 9 September 1999 sampling event.

No other VOCs were reported above the MEG or MCL in the samples collected during 1999. Graphs showing VOC trends for Monitoring Events 1 through 15 are presented in Appendix A. Contaminants that were detected in the associated method blank have not been used when calculating the total VOC values. VOC results are summarized on Table 5 of the Monitoring Events 14 and 15 reports.

VOC indicators of natural attenuation assessed 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 2-1 illustrates total VOC and vinyl chloride trends for long-term monitoring data collected between 1995 and 1999 for the 7 monitoring wells which have reported vinyl chloride concentrations in this time period. Regression analyses of vinyl chloride data are presented for 1995-1999, and separately for 1998-1999 data to illustrate changing trends with time. The table below summarizes the trends as indicated by the least-mean square regressions shown on Figure 2-1:

Vinyl Chloride Trends			
Well	1995–1999	1998–1999	1999
MW-NASB-069	Increasing	Increasing	Increasing
MW-NASB-071	Steady at non-detection	Steady at non-detection	Increasing
MW-NASB-072	Decreasing	Decreasing	Decreasing
MW-NASB-074	Decreasing	Steady at non-detection	Decreasing
MW-NASB-075	Decreasing	Steady at non-detection	Steady at non-detection
MW-NASB-076	Increasing	Increasing	Decreasing
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 whether dechlorination is occurring in ground water 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) suggests the dechlorination process is occurring. Figure 2-2 shows trend data for the ratio of vinyl chloride to total DCE for Monitoring Events 1 through 15 for wells where both compounds were detected in samples. Figure 2-3 illustrates the sum of vinyl chloride and 1,2-DCE concentrations from all Site 9 monitoring wells for long-term monitoring data collected during each monitoring event between 1995 and 1999. The table below summarizes the trends in the vinyl chloride to total DCE ratios as shown on Figure 2-2:

Vinyl Chloride to DCE Ratio	
Well	1995-1999 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 2-3 shows the sum of vinyl chloride concentrations (daughter compound) and total 1,2-DCE concentrations (parent compound) between 1995 and 1998. The concentrations of both compounds have been increasing, with a higher rate of increase noted based on 1998 and 1999 data.

2.2.4 Semivolatile Organic Compounds

During Monitoring Event 15 in September 1999, ground-water samples were collected from 3 monitoring wells (MW-NASB-069, MW-NASB-070, and MW-NASB-079) and submitted for laboratory analysis of SVOCs by EPA Method 8270C. No SVOCs were detected in the ground-water samples during Monitoring Event 15.

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) and analyzed for metals during the 1999 monitoring events. The concentration of one inorganic analyte (manganese) was detected above the corresponding State MEG (200 μg/L) during both sampling events in 1999. Manganese was detected at concentrations of 709 μg/L and 705 μg/L in monitoring well MW-NASB-069 in April and September 1999, respectively. The duplicate samples collected at MW-NASB-069 had similar detected concentrations of manganese at 655 μg/L and 720 μg/L in April and September 1999, respectively. The inorganic results are summarized in Table 6 of the Monitoring Events 14 and 15 reports.

2.3 SURFACE WATER, SEDIMENT, AND SEEP SAMPLING

Surface water and sediment samples were collected from one location (SW/SED-010) along the northern unnamed stream during 1999. Due to the installation of two surface water impoundments

at Site 9 in 1997, other surface water (SW-011, SW-012, SW-915, SW-916, and SW-919) and sediment sampling locations sampled during previous long-term monitoring events were flooded and have not been sampled since 1997. Table 1-1 summarizes the surface water and sediment sampling and analytical program completed at Site 9 in 1999.

2.3.1 Surface Water Sample

Vinyl chloride was not detected in surface water sample SW-010 during Monitoring Events 14 and 15. One VOC (1,2-DCE) was detected in surface water sample SW-010 at a concentration of 0.9J μg/L during Monitoring Event 14. No other VOCs were detected in the surface water samples collected during Monitoring Events 14 and 15. A summary of analytical results for surface water samples collected during 1999 is provided in Table 8 in Monitoring Event 14 report and Table 9 in Monitoring Event 15 report.

2.3.2 Sediment Sample

There was one reported concentration of vinyl chloride detected in sediment samples collected during 1999. Vinyl chloride was detected in the sediment at 4 μg/L collected during Monitoring Event 14. Vinyl chloride was not detected (<3 μg/L) in the September 1999 sediment sample from Monitoring Event 15. Three VOCs (acetone, carbon disulfide, and trichloroethene) were detected in sediment sample SED-010 collected during Monitoring Event 14. Two VOCs (acetone and 1,2-DCE) were detected in the sediment sample collected during Monitoring Event 15.

A summary of analytical results for sediment samples collected during 1999 is provided in Table 10 in the Monitoring Event 14 report and Table 11 in the Monitoring Event 15 report.

2.3.3 Seep Sample

There were no reported concentrations of vinyl chloride or other VOCs in the seep samples collected during 1999. A summary of analytical results for seep samples collected at sample station LT-901 can be found in Table 9 in the Monitoring Event 14 report and Table 10 in the Monitoring Event 15 report.

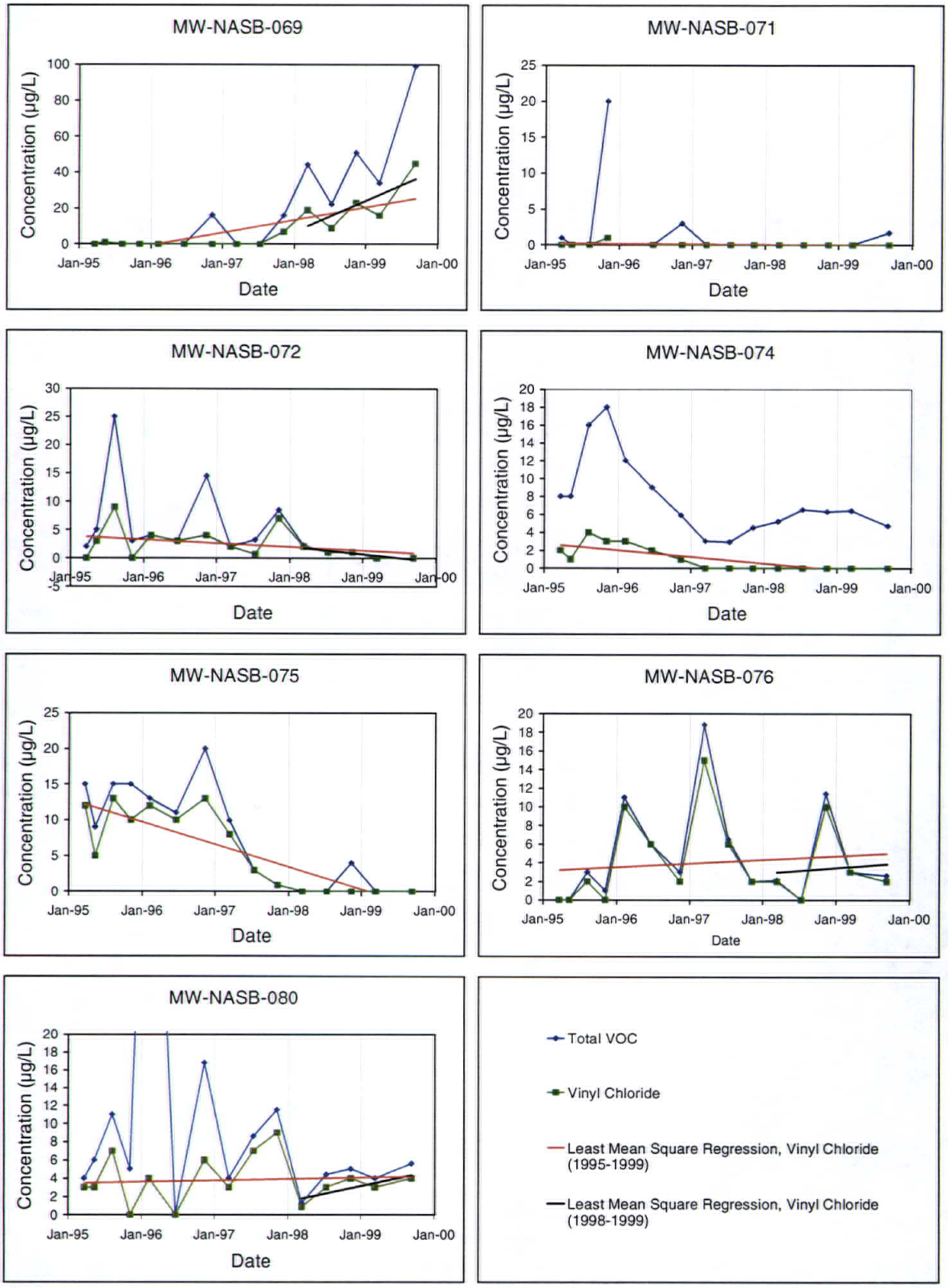
2.4 VISUAL INSPECTION

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

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

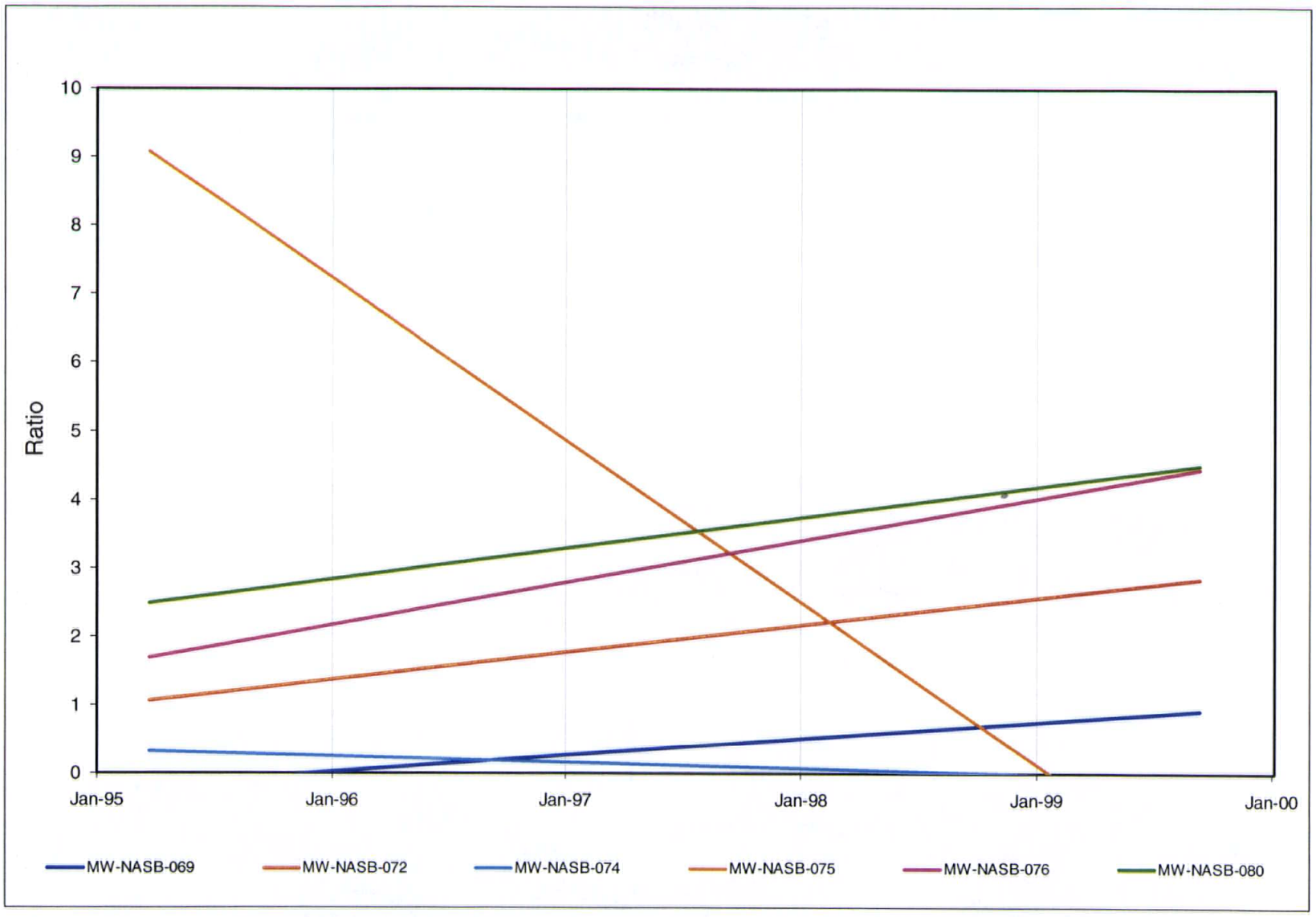
On 20 April 1999 and 16 September 1999, a site inspection was completed by an engineer in accordance with the Final LTMP (EA 1999b). No evidence of stressed vegetation or physical evidence of tampering with site monitoring wells was observed. All monitoring wells at the site were found to be capped, labeled, locked, and in good condition.

Two stream gauges (SG-1 and SG-2) were found missing on 2 April 1999. The gauges were replaced in the same locations, surveyed during Monitoring Event 14, and renumbered as SG-1A and SG-2A.



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 March 1995 is considered laboratory contaminant and is shown off graph scale.

Figure 2-1. Total volatile organic compounds and vinyl chloride trends, 1995-1999.



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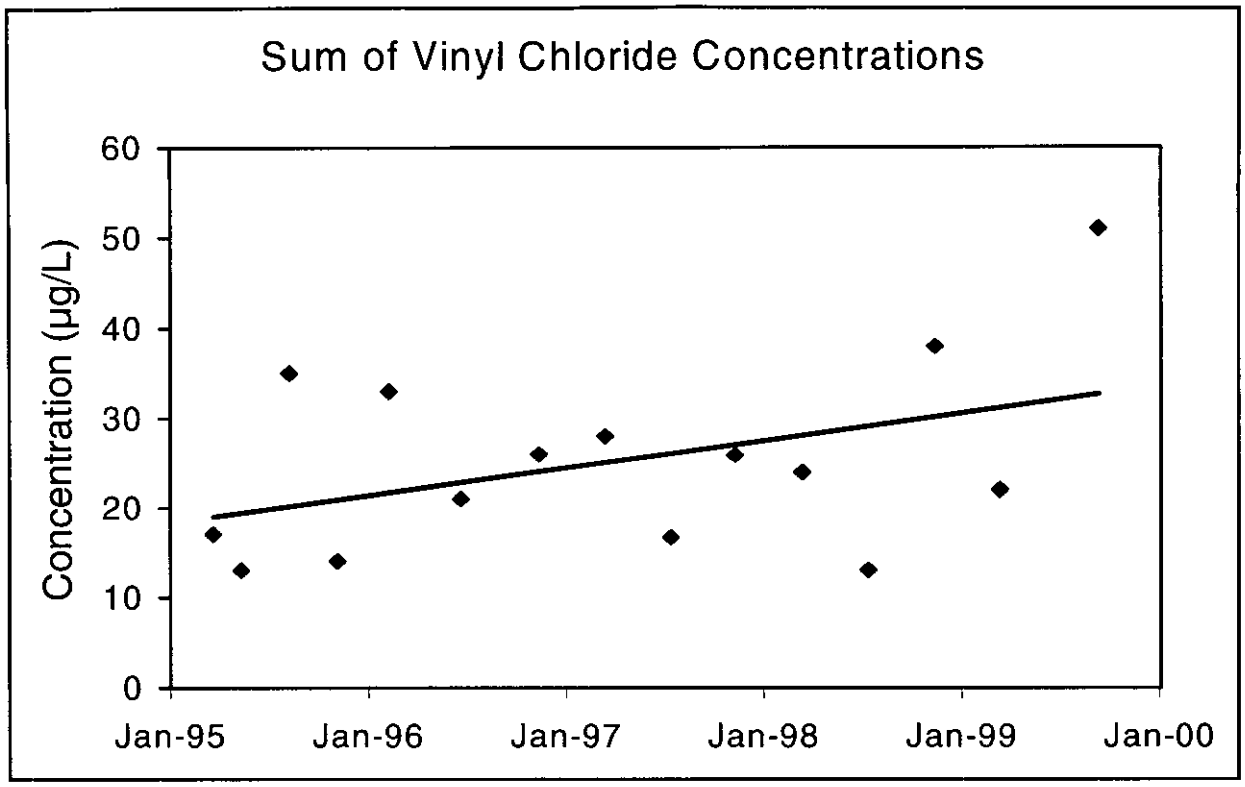
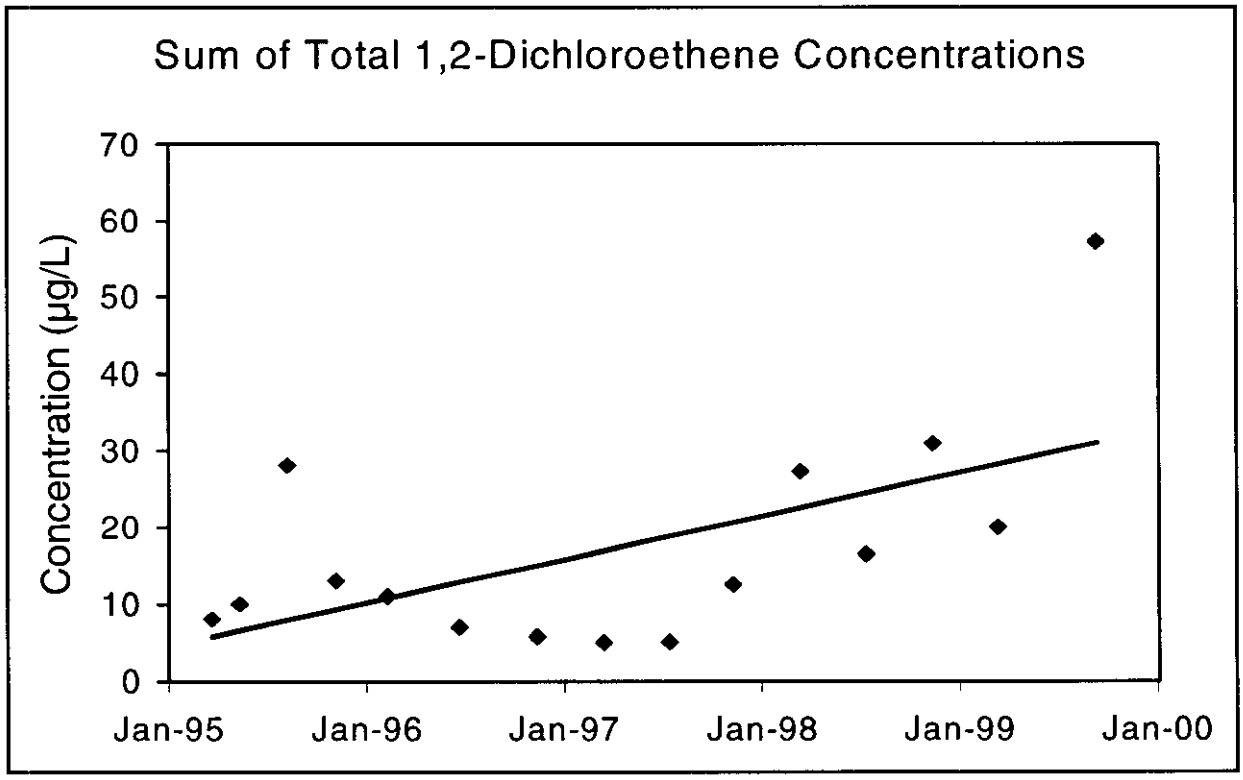
NOTE: Higher vinyl chloride/total 1,2 -dichloroethene ratio indicates increasing dechlorination.
Lines show least mean square regression based on ratios of vinyl chloride to total 1,2-dichloroethene.

Figure 2-2. Vinyl chloride/total 1,2-dichloroethene ratio trends, Monitoring Events 1 through 15.





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

Figure 2-3. Sum of vinyl chloride and 1,2-dichloroethene, total concentration, 1995-1999.

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 1999 indicate that ground-water flow is generally to the south-southeast at Site 9, toward the unnamed stream located south of Neptune Drive. The interpreted flow patterns upgradient of Site 9 are to the southwest based on data collected from monitoring wells at the Navy Exchange Service Station, which is located upgradient of Site 9 based on three rounds of gauging data. 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.

Based on data collected during 1999, the following observations are noted:

- Shallow ground water north of Neptune Drive is likely to flow towards to the northern branch of the unnamed streams and associated branch of the lower impoundment pond. Ground-water flow from the portion of Site 9 west and immediately south of Building 201 is likely to flow towards the upper impoundment pond. Ground-water flow to the north towards 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. Due to the presence of the pond, the quality of shallow ground water south of the pond is not linked to the quality of shallow ground water north of the pond.

- The presence of the Navy Exchange Service Station petroleum remediation system upgradient of Site 9 is likely to be influencing ground-water conditions, notably dissolved oxygen and/or reduction-oxidation (Eh) potential. Beginning with Monitoring Event 15, field water quality parameters (dissolved oxygen and Eh potential) were collected at wells MW-NASB-008, MW-NASB-009, and MW-NASB-010 located at the Navy Exchange Service Station; these data will be collected in future monitoring events.

- In a comparison of Monitoring Event 14 and Monitoring Event 15 dissolved oxygen data, only 3 wells had dissolved oxygen concentrations that demonstrated increased concentrations from Monitoring Event 14 to Monitoring Event 15. The dissolved oxygen concentrations measured in the remaining wells decreased or remained level between these two sampling events. The measured concentrations of dissolved oxygen in the Navy Exchange Service Station wells and in the area of and upgradient of well MW-NASB-080 had similar concentrations of dissolved oxygen in Monitoring Event 15. Within the middle of Site 9, from monitoring well MW-NASB-080 to north of Building

201, there were no measurable concentrations of dissolved oxygen; and, south of this area, dissolved oxygen concentrations increased to levels comparable to concentrations at the Navy Exchange Service Station and northern area of Site 9.

The trend of Eh between Monitoring Events 14 and 15 was a mix of increasing and decreasing values. The Site 9 trend of Eh was decreasing, with 8 wells exhibiting decreased levels of Eh and 3 wells with increasing Eh values between the two sampling events.

3.1.2 Ground-Water Monitoring and Sampling Program

Volatile Organic Compound Concentrations

The results of the ground-water sampling and analysis program conducted at Site 9 during 1999 indicate the following:

- Site monitoring wells showed a mix of increasing and decreasing vinyl chloride concentration trends during 1999 (Figure 2-1). Three monitoring wells (MW-NASB-069, MW-NASB-076, and MW-NASB-080) located within the central portion of Site 9 have shown on average increases in vinyl chloride concentrations over the Long-Term Monitoring Program (1995-1999). From 1998 to 1999, monitoring wells MW-NASB-069, MW-NASB-076, and MW-NASB-080 have shown increasing vinyl chloride concentrations. Monitoring wells outside this central portion of Site 9 generally show steady or decreasing vinyl chloride concentrations.

- Data suggest dechlorination of 1,2-DCE into vinyl chloride continues to occur 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 because of the laboratory methods, and the significant scatter 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.

  — Concentrations of vinyl chloride and 1,2-DCE are increasing as shown on Figure 2-3. Although a significant degree of scatter is present in the site data, these trends suggest a correlation is present between increasing 1,2-DCE concentrations (parent compound) and vinyl chloride (daughter compound) at Site 9. A notable increase has been recorded in total 1,2-DCE concentrations at Site 9 from 1997 to 1999. The

increasing concentrations of parent compounds are likely to be causing the increasing vinyl chloride concentrations as the dechlorination process continues to occur.

- The data presented show similar dissolved oxygen and Eh measurements at the Naval Exchange Service Station, north and south portions of Site 9; however, the vicinity immediately downgradient of the landfill has quite different (lower) dissolved oxygen and Eh measurements. These data suggest that the Naval Exchange Service Station has minimal or no impact to the Site 9 ground-water geochemistry. The possible influence of the Navy Exchange Service Station petroleum remediation system will be investigated further after additional ground-water flow and water quality data are collected. Samples of Site 9 ground water have not reported significant concentrations of VOCs that would be commonly found in gasoline. Diesel range organics and gasoline range organics are not currently included in the analytical program at Site 9. Three wells upgradient of Site 9 at the Navy Exchange Service Station site have been sampled and analyzed for chlorinated VOCs. No VOCs were detected in the ground-water samples collected during Monitoring Event 15 from the Naval Exchange Service Station monitoring wells MW-NASB-008, MW-NASB-009, and MW-NASB-010. Additional water quality data are required before direct comparisons can be made to the Site 9 wells to determine if VOCs should continue to be collected upgradient of Site 9 to monitor any changes to the ground-water geochemistry affecting Site 9. The additional data (VOCs, dissolved oxygen, and Eh) to be collected in 2000 will allow for direct comparison to the Site 9 wells with the selected Navy Exchange Service Station wells and to evaluate potential seasonal variations in the ground-water geochemistry.

- Vinyl chloride was not detected in the sample from monitoring well MW-NASB-227. However, because 1,2-DCE has been detected at MW-NASB-227 and is anticipated to degrade by dechlorination, there could be vinyl chloride migrating from this area in the future. The detection of 1,2-DCE at MW-NASB-227 at 2 μg/L suggests the presence of a source of parent compound that may be entered Site 9. Monitoring well MW-NASB-227 is located along the western Site 9 boundary as shown on Figure 2-2 and hydraulically cross-gradient to MW-NASB-022, which had no VOCs detected during 1999, and to MW-NASB-069, in which 1,2-DCE was detected at an order of magnitude higher than in MW-NASB-227 during both sampling events in 1999. There are no monitoring wells located upgradient of MW-NASB-227 to confirm the 1,2-DCE detected in MW-NASB-227 is originating from a source to the west of Site 9. Therefore, there is a potential that an unidentified source of 1,2-DCE exits west of MW-NASB-227. It is important to note that the observed spikes in VOC and vinyl chloride concentrations followed by decreasing concentrations have been observed in samples from site wells throughout the Long-Term Monitoring Program (Figure 2-1). Similar patterns are expected to continue. The increase and decrease of vinyl chloride concentrations also occurs; however, the overall trend of vinyl chloride detected in samples from MW-NASB-069 over the last 2 years has been increasing.

Inorganic Concentrations

The results of the ground-water sampling and analysis program conducted at Site 9 during 1999 indicate the following:

- Results of samples from the portion of Site 9 downgradient of the landfill reported elevated concentrations of manganese above the corresponding MEG and/or Secondary MCL at well MW-NASB-069. 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 1999 indicate the following:

- 1,2-DCE was reported in the sample collected from the unnamed stream during one event in 1999. However, the result was qualified as estimated because it was identified below the detection limit. The detection of 1,2-DCE in the surface water represents an increased possibility of detection of organic compounds in the stream sediments and indicates that the stream is a potential discharge point for shallow ground water on a seasonal basis (high ground water).

- There were no detections of vinyl chloride in surface water during 1999.

- Continued monitoring of surface water at SW-010 should be used to assess whether vinyl chloride-impacted ground water is discharging to the stream, or if concentrations are increasing with time.

3.1.4 Sediment Sampling Program

Results of the sediment sampling and analysis program conducted during 1999 indicate the following:

- There was one reported concentration of vinyl chloride in the sediment sample collected during Monitoring Event 14 at a concentration of 4 μg/L. The detection in the sediment of the stream suggests that shallow overburden ground water impacted with vinyl chloride is likely discharging to the stream during seasonal high ground-water periods.

- The detection of vinyl chloride in sediment and not surface water may be the result of two factors: vinyl chloride sorbing to organic compounds in sediment, and the volatilization of vinyl chloride while in surface water. Because sediment in the impoundment is removed periodically, further sampling of sediment for analysis of vinyl chloride may provide significant data.

3.1.5 Seep Sampling Program

Results of the seep sampling and analysis program conducted during 1999 indicate the following:

- There were no detected concentrations of vinyl chloride or other VOCs in the seep sample.

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.

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 2000 to assess the effectiveness of natural attenuation with long-term monitoring, the selected remedy for the site.
- Collect bi-annual samples at long-term monitoring sample points in April and October.
- Continue gauging of upgradient monitoring wells during 2000 to collect data on ground-water flow patterns upgradient of Site 9.
- During 2000, assess the following items:
  - — Continue to obtain data to evaluate if the Naval Exchange Service Station is influencing geochemistry at Site 9
  - — Evaluate the source of 1,2-DCE in MW-NASB-227 at the western boundary of Site 9
  - — Evaluate the source of vinyl chloride in stream sediment detected at SED-10.

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. 1999c. Final Report. Monitoring Event 14 – April 1999. Site 9, Naval Air Station, Brunswick, Maine. June.

EA. 1999d. Final Report. Monitoring Event 15 – September 1999. Site 9, Naval Air Station, Brunswick, Maine. November.

EA. 1999e. Minutes from 22-23 November 1999 Technical Meeting.

Appendix A

Analytical Trend Graphs
March 1995 – September-October 1999

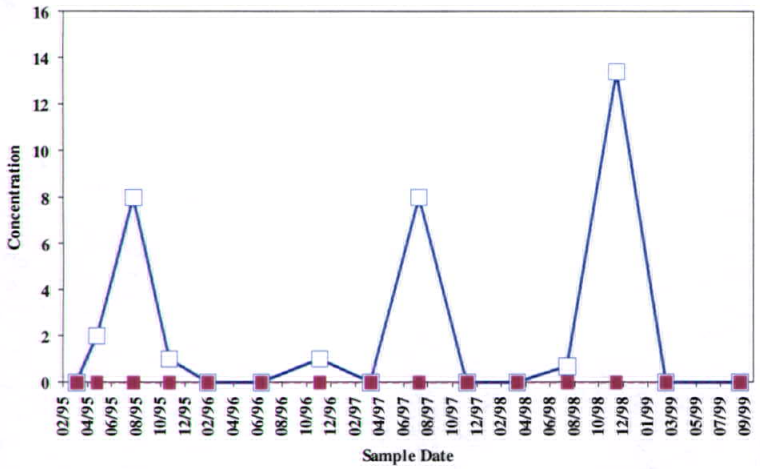
Sample Location:

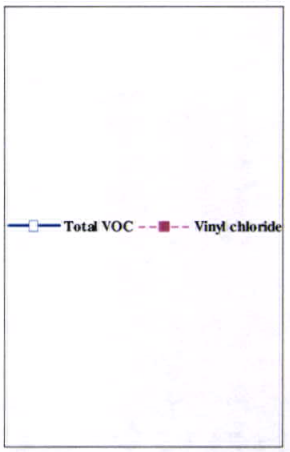
LT-901

Site 9

Leachate

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

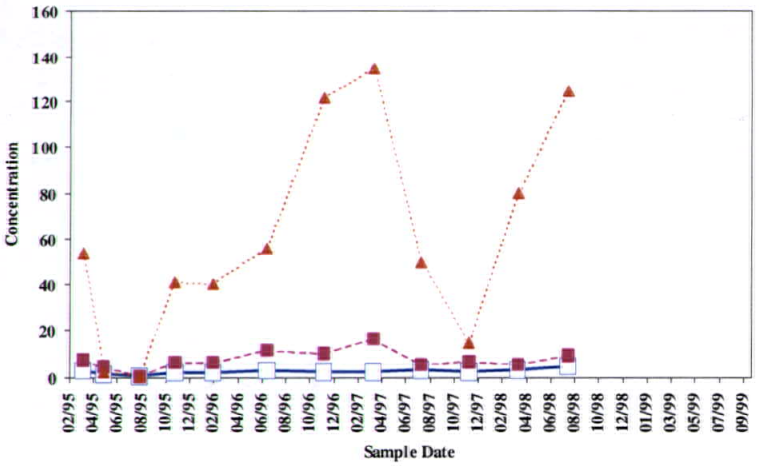
Sample Location:

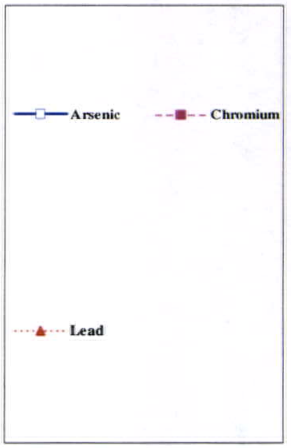
LT-901

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

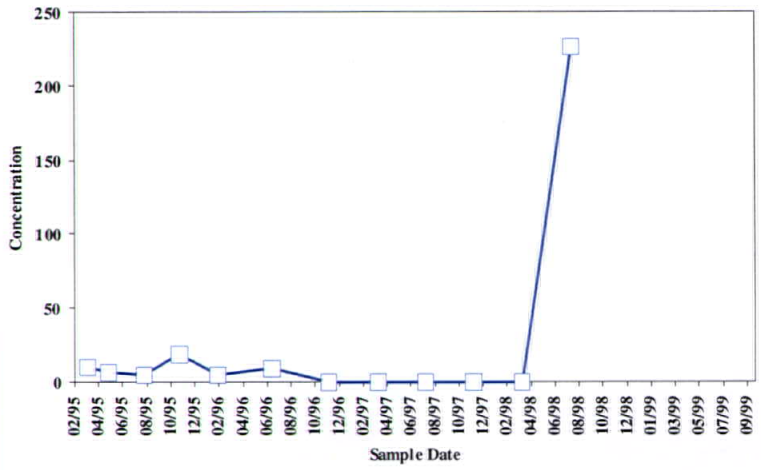
Sample Location:

LT-901

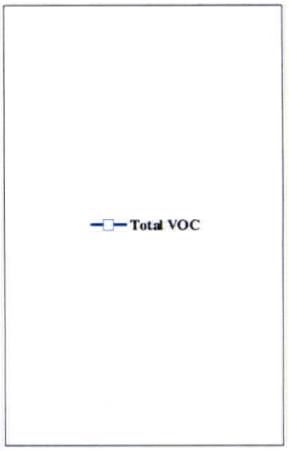
Site 9

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

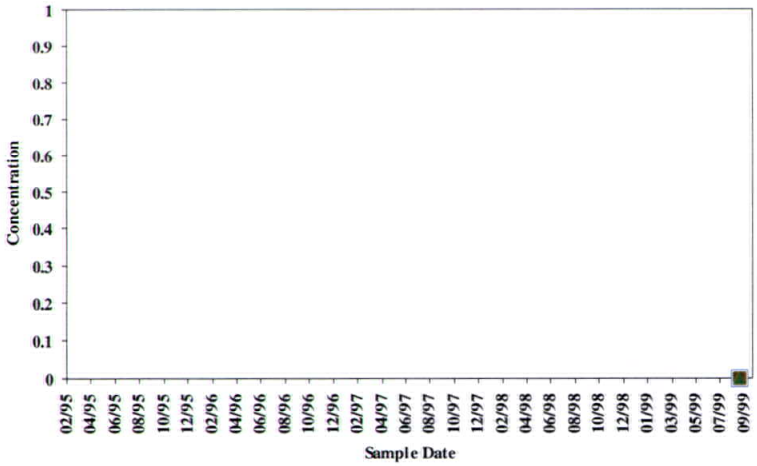
Sample Location:

MW-NASB-008

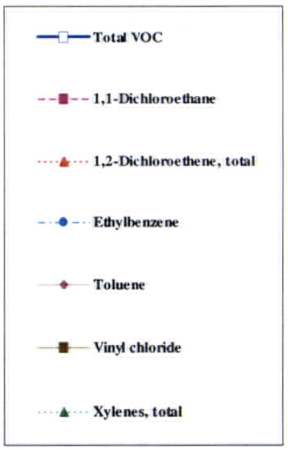
Site 9

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: ug/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

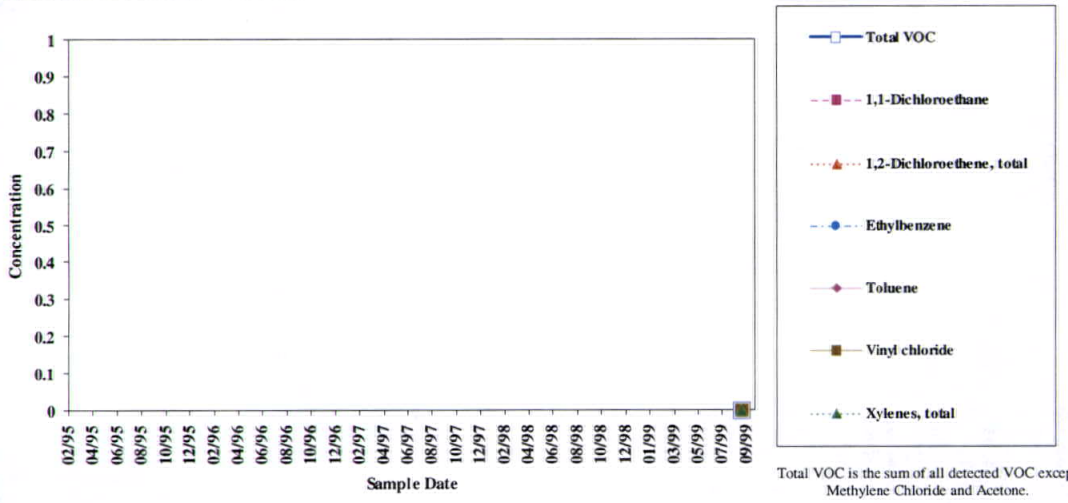
Sample Location:

MW-NASB-009

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: ug/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

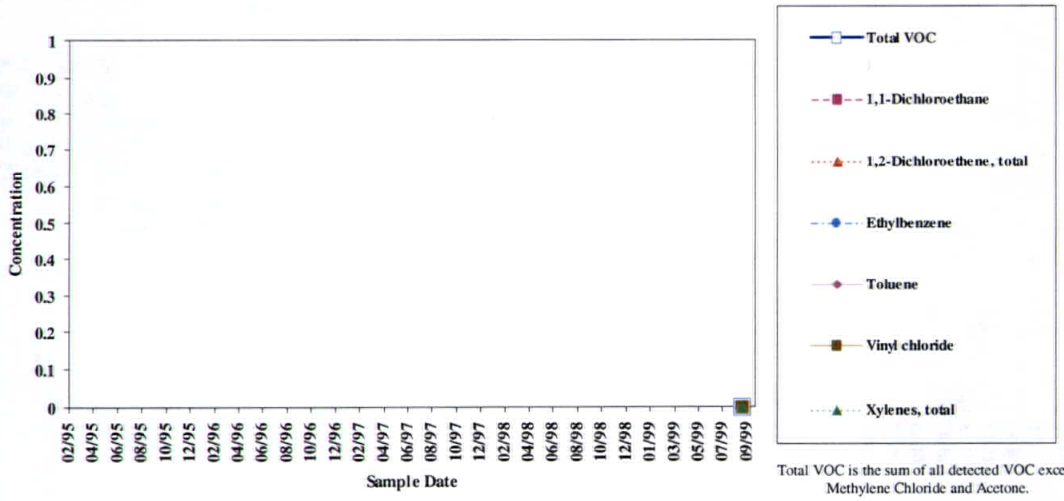
Sample Location:

MW-NASB-010

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: ug/L

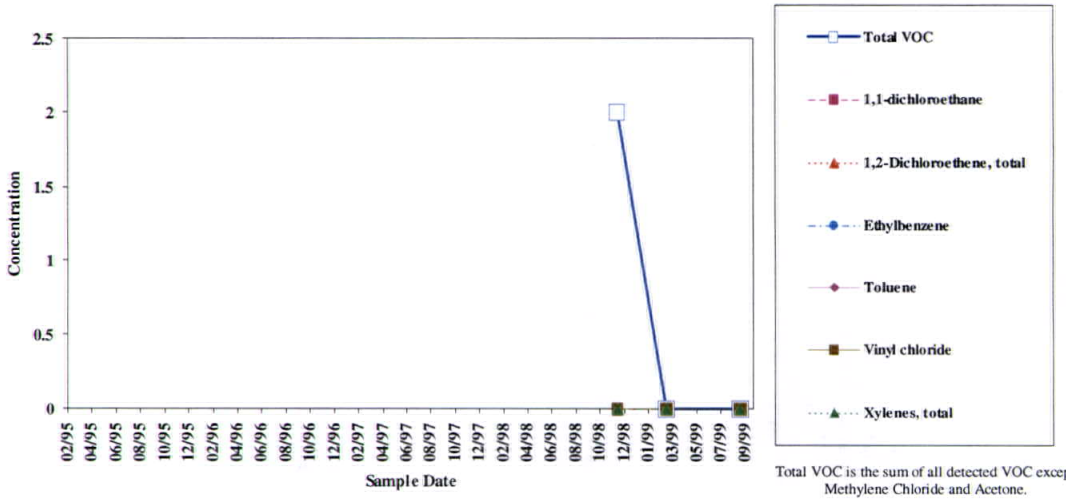
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-022

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

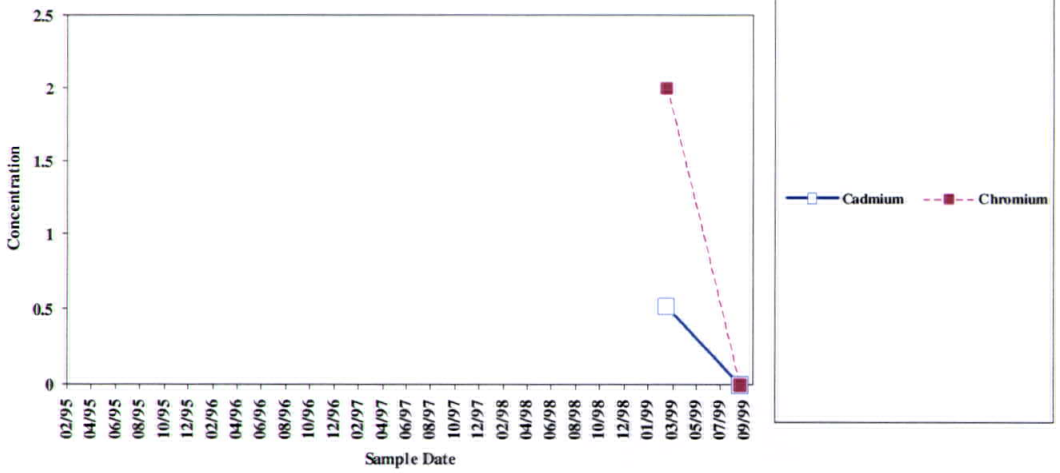
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-069

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: UG/L

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

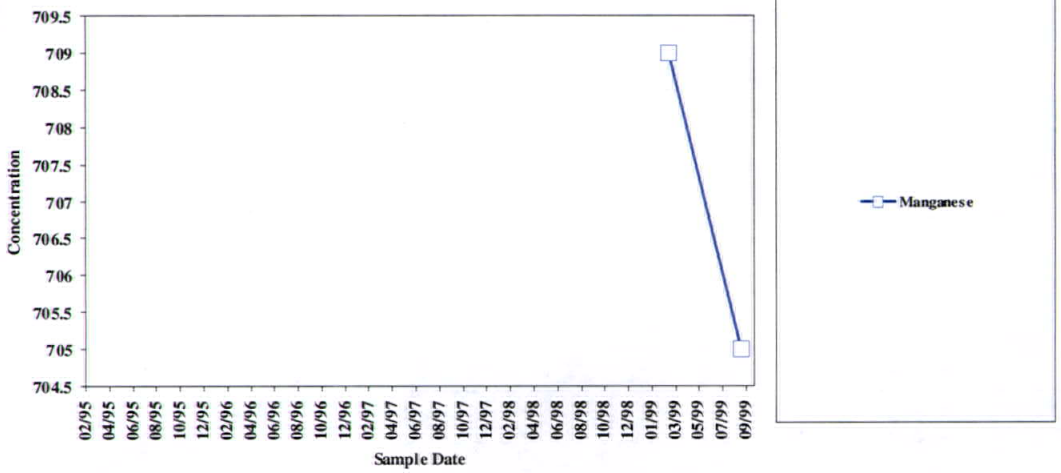
Sample Location:

MW-NASB-069

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: UG/L

Manganese	
MEG:	200
MCL:	50

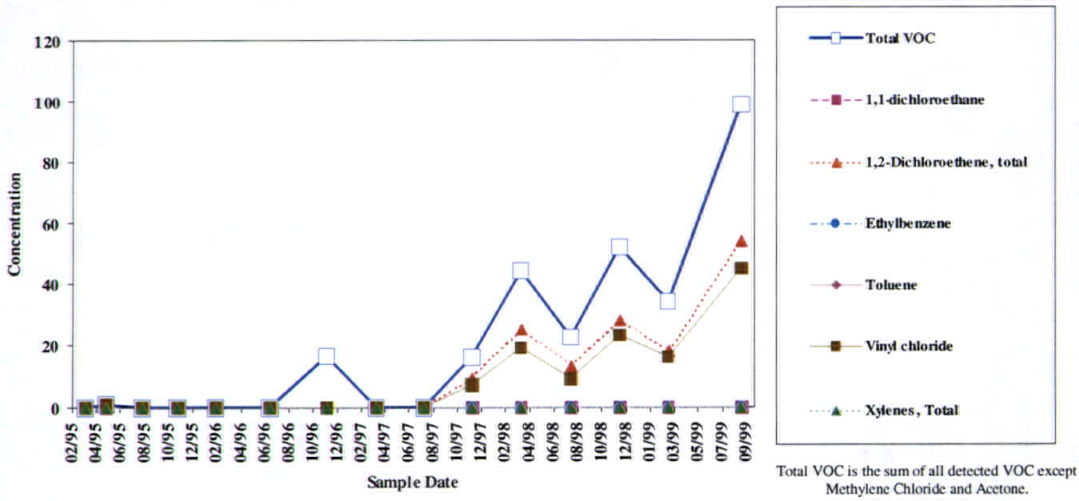
Sample Location:

MW-NASB-069

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.

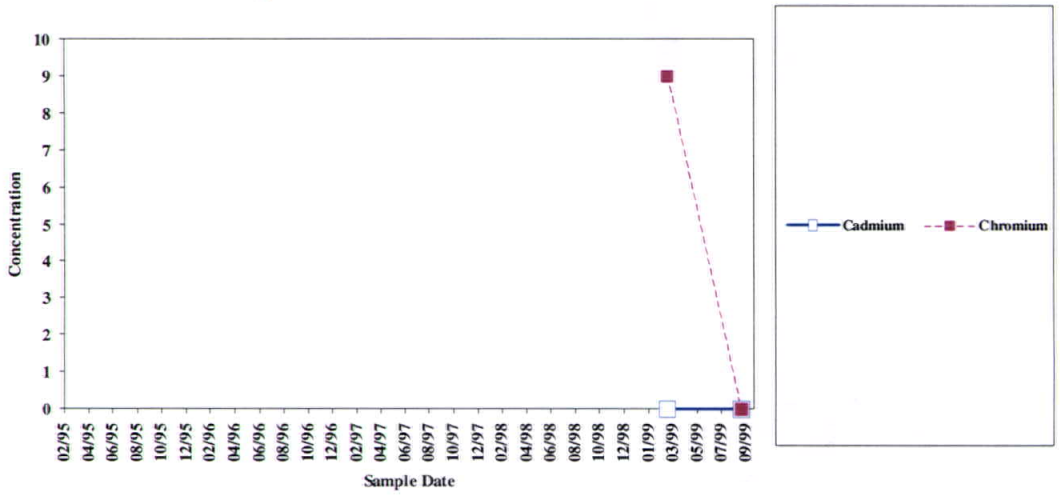
Sample concentration units: µg/L

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: Site 9

MW-NASB-070 Ground water

Chemicals of concern: Inorganics



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

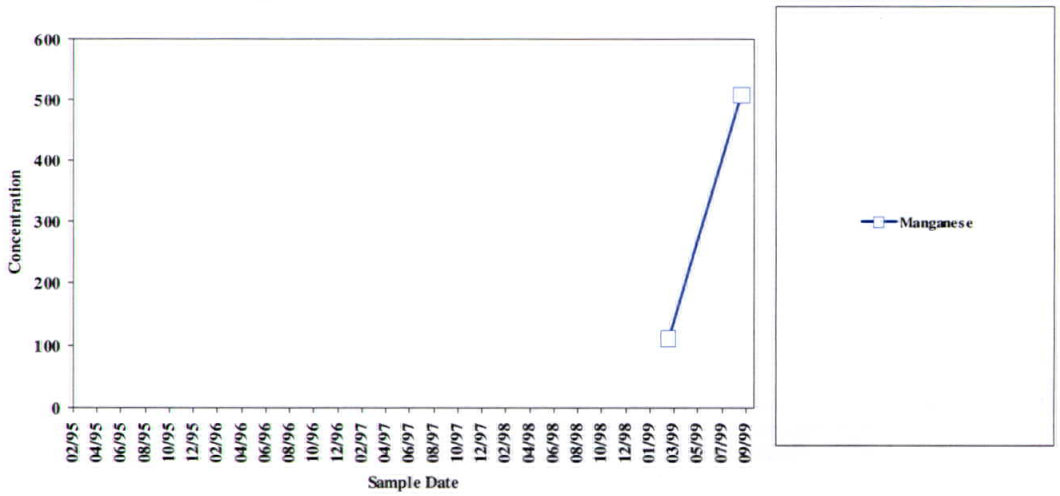
Sample concentration units: UG/L

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

Sample Location: Site 9

MW-NASB-070 Ground water

Chemicals of concern: Inorganics



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

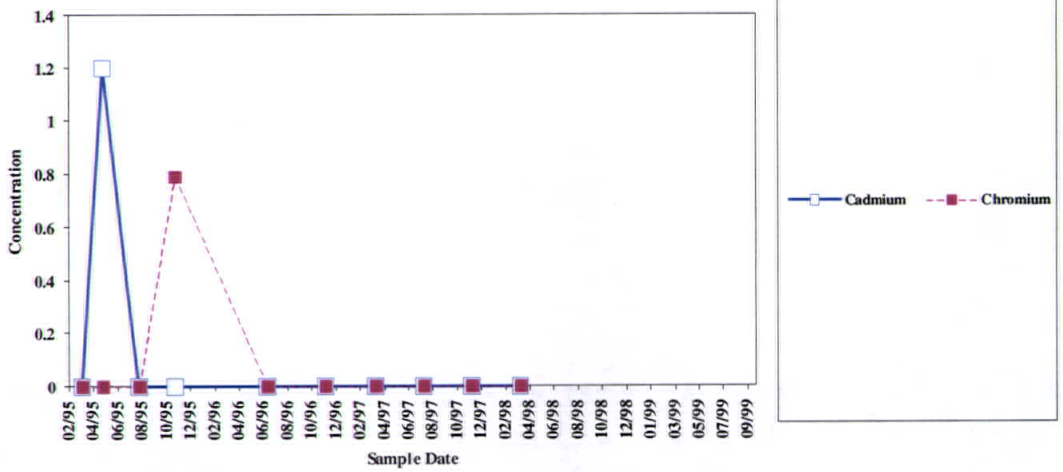
Sample concentration units: UG/L

Manganese	
MEG:	200
MCL:	50

Sample Location: Site 9

MW-NASB-071 Ground water

Chemicals of concern: Inorganics



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

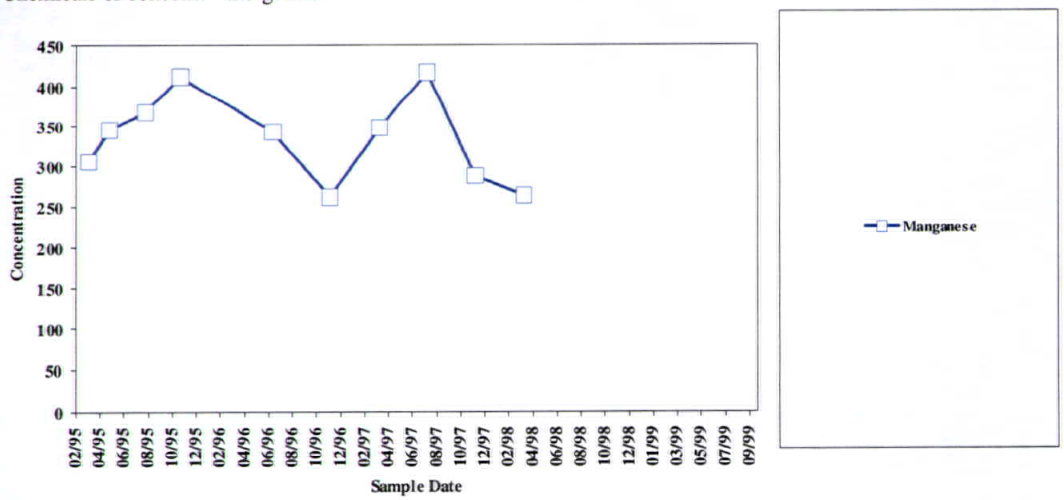
Sample concentration units: µg/L

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

Sample Location: Site 9

MW-NASB-071 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

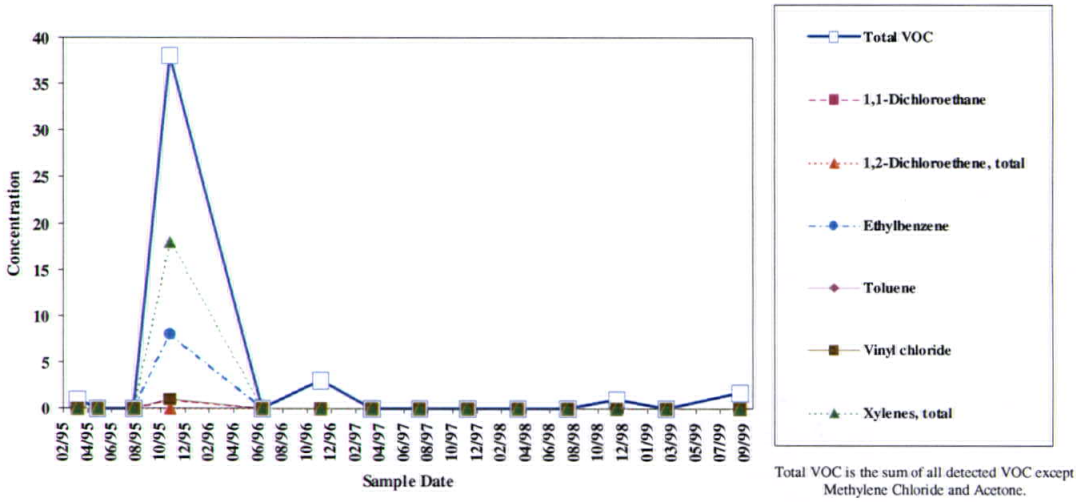
Manganese	
MEG:	200
MCL:	50

Sample Location: Site 9

MW-NASB-071

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

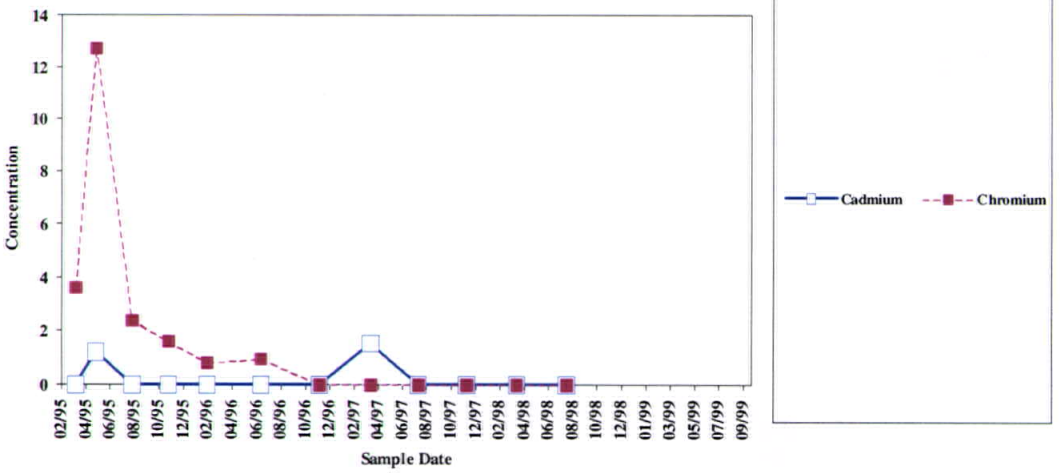
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-072

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

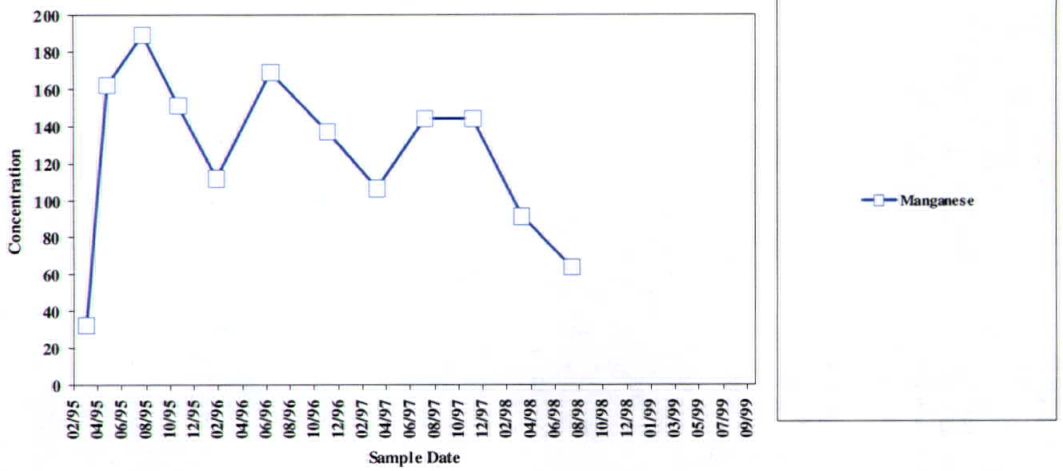
Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location: Site 9

MW-NASB-072

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

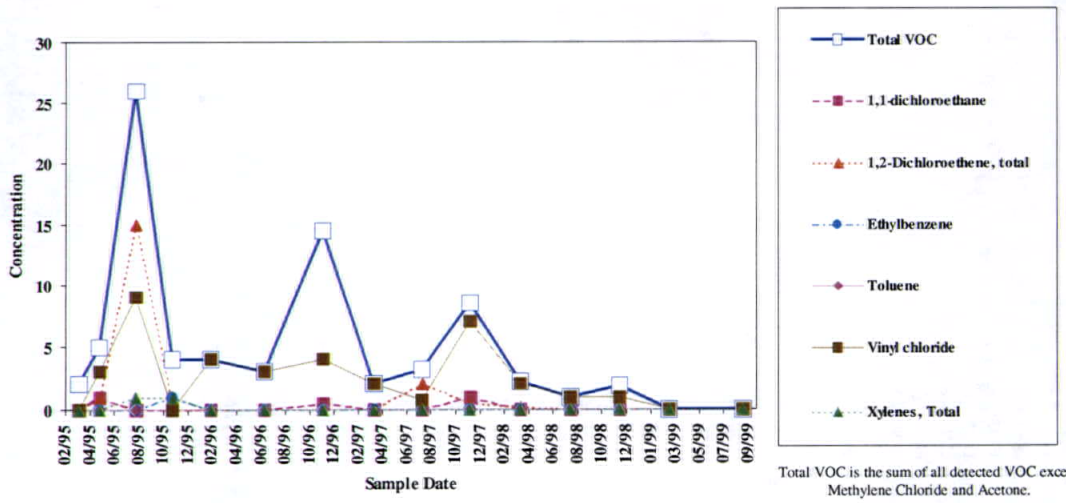
Manganese	
MEG:	200
MCL:	50

Sample Location: Site 9

MW-NASB-072

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

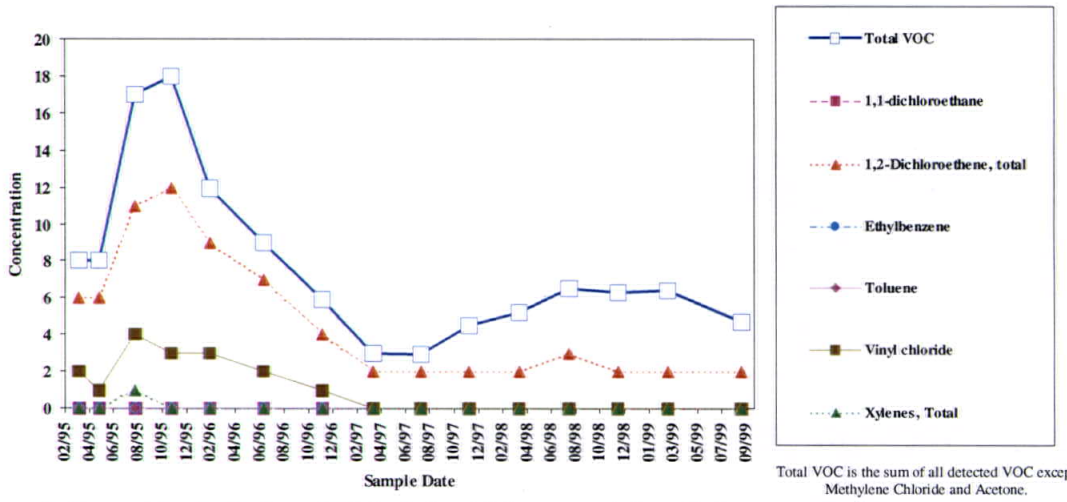
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-074

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

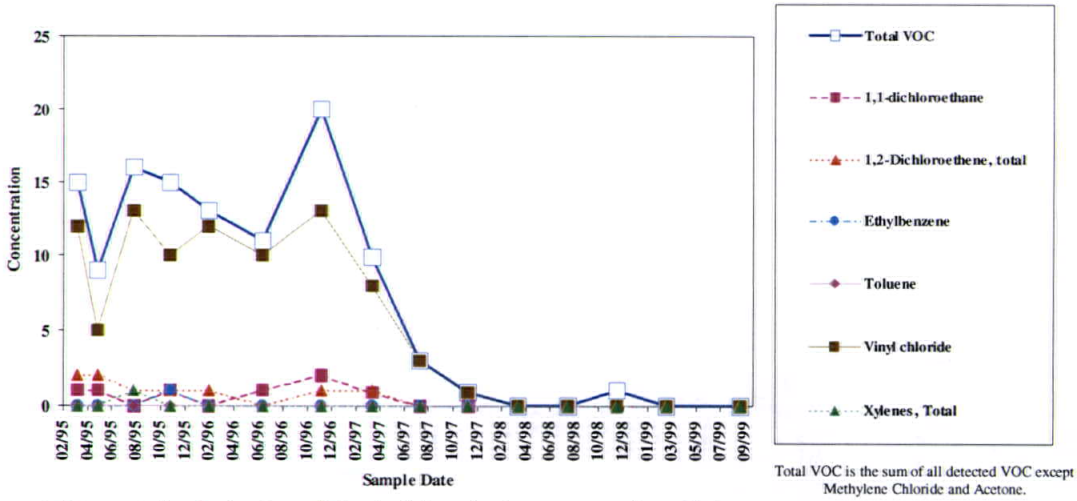
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-075

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

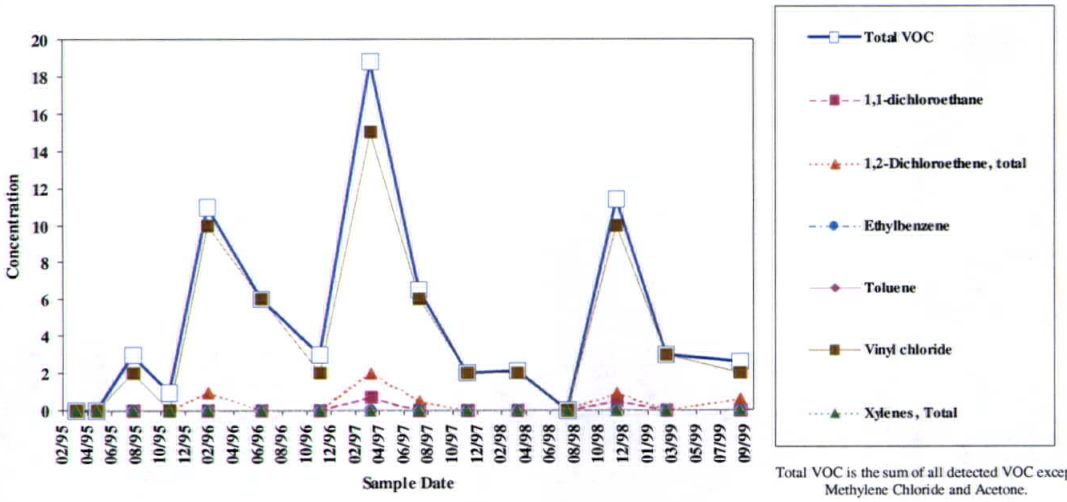
Sample Location:

MW-NASB-076

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

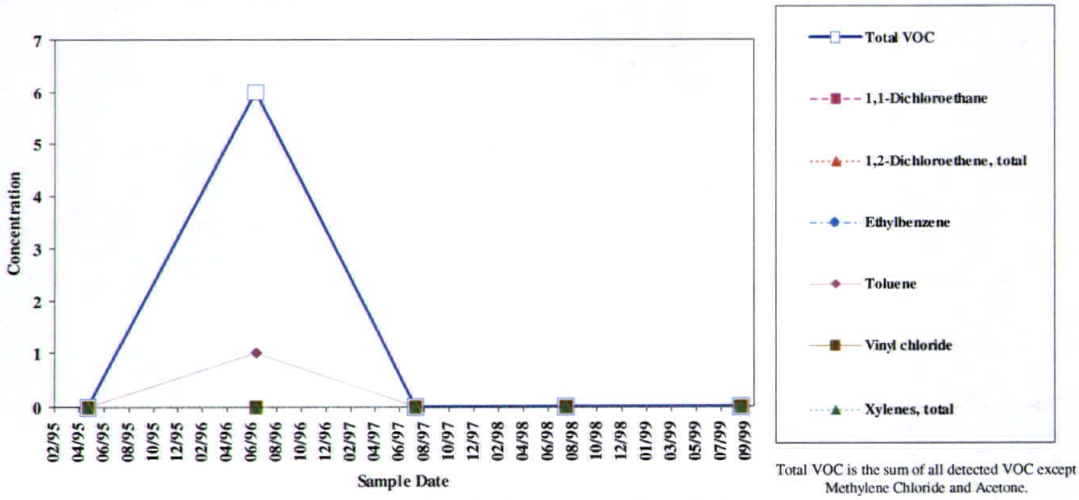
Sample Location:

MW-NASB-077

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: ug/L

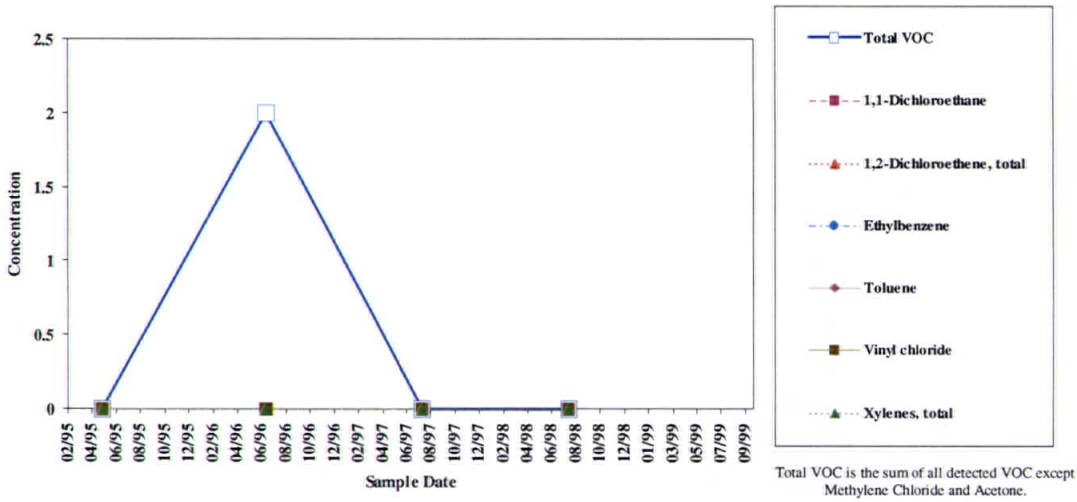
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-078

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

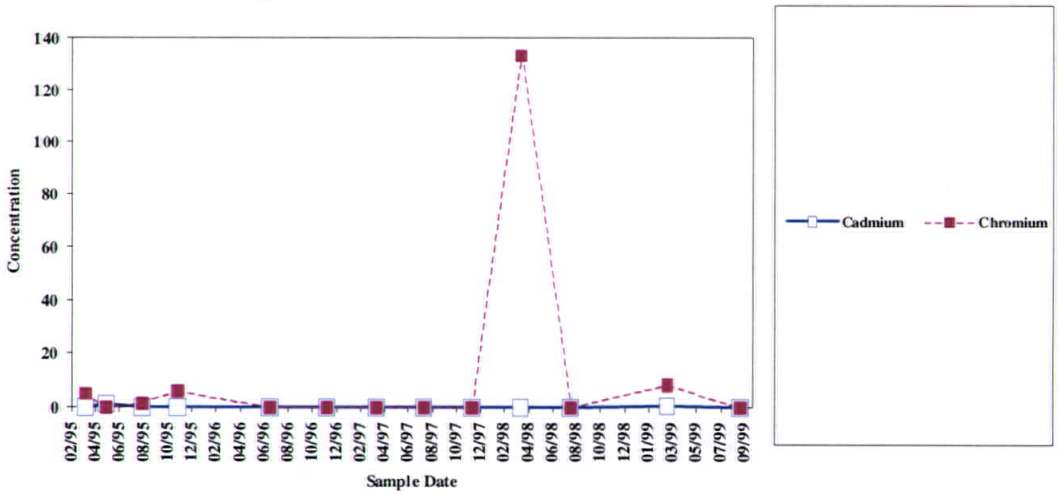
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-079

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

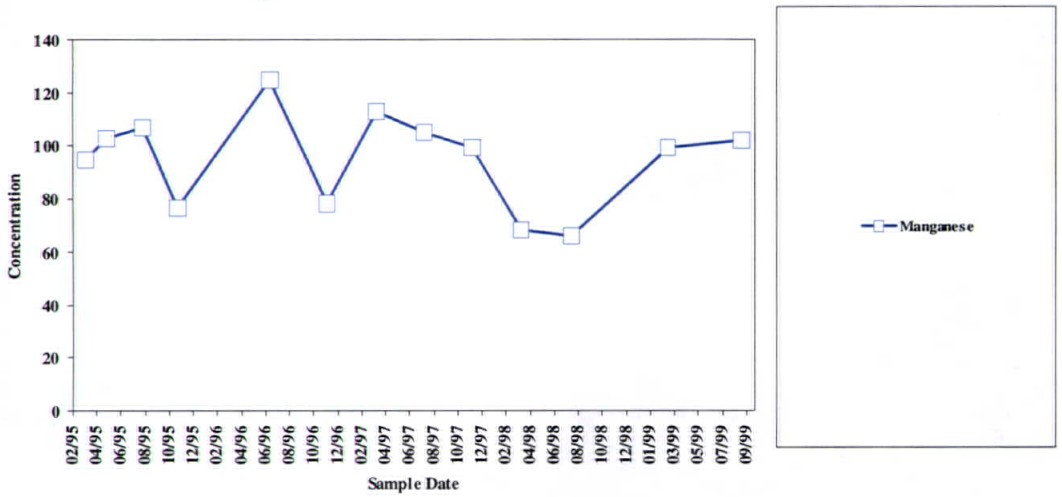
Sample Location:

MW-NASB-079

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

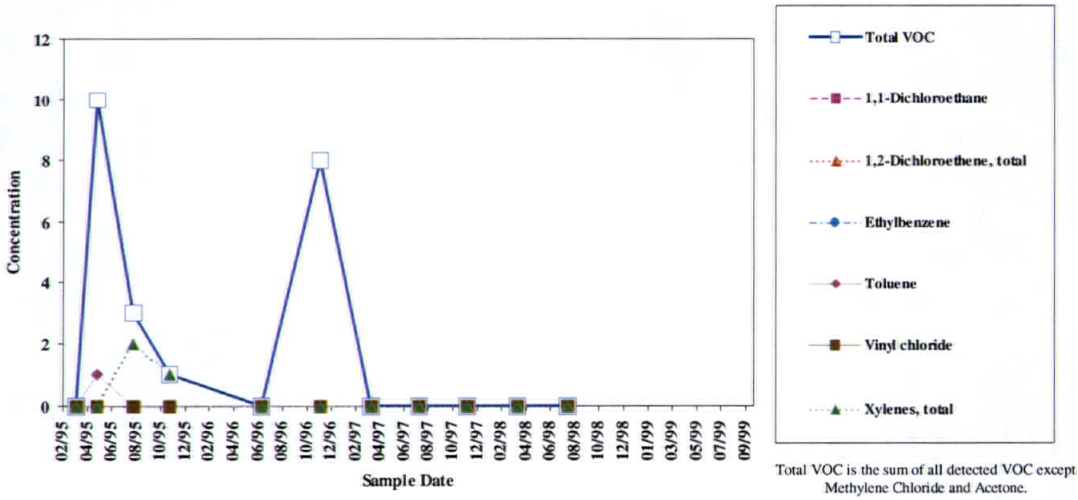
Sample Location:

MW-NASB-079

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.

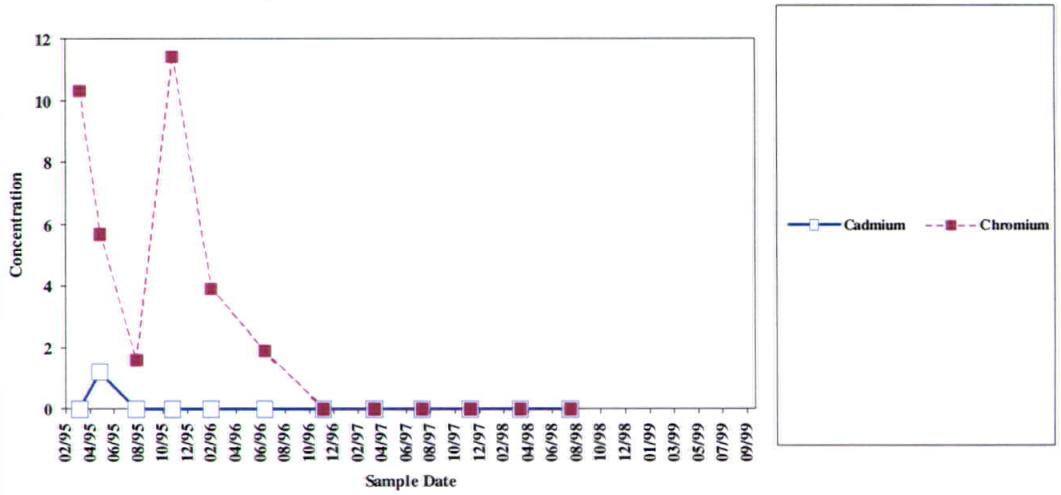
Sample concentration units: µg/L

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: Site 9

MW-NASB-080 Ground water

Chemicals of concern: Inorganics



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

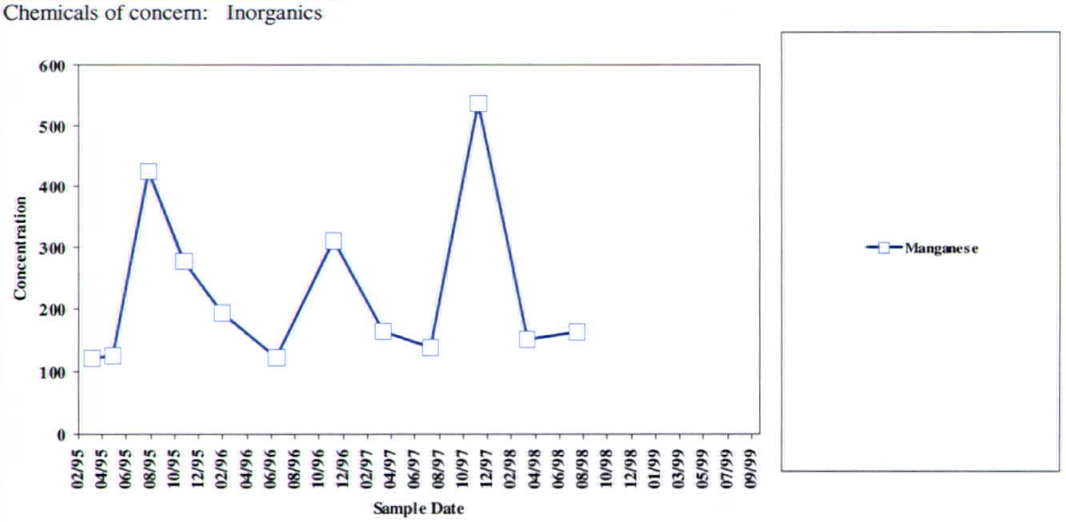
Sample concentration units: µg/L

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

Sample Location: Site 9

MW-NASB-080 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

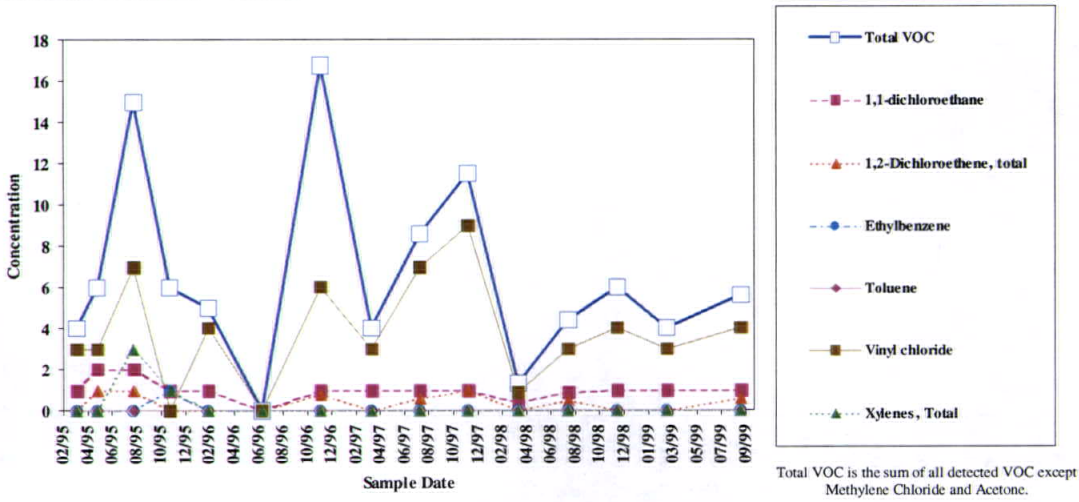
Manganese	
MEG:	200
MCL:	50

Sample Location: Site 9

MW-NASB-080

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

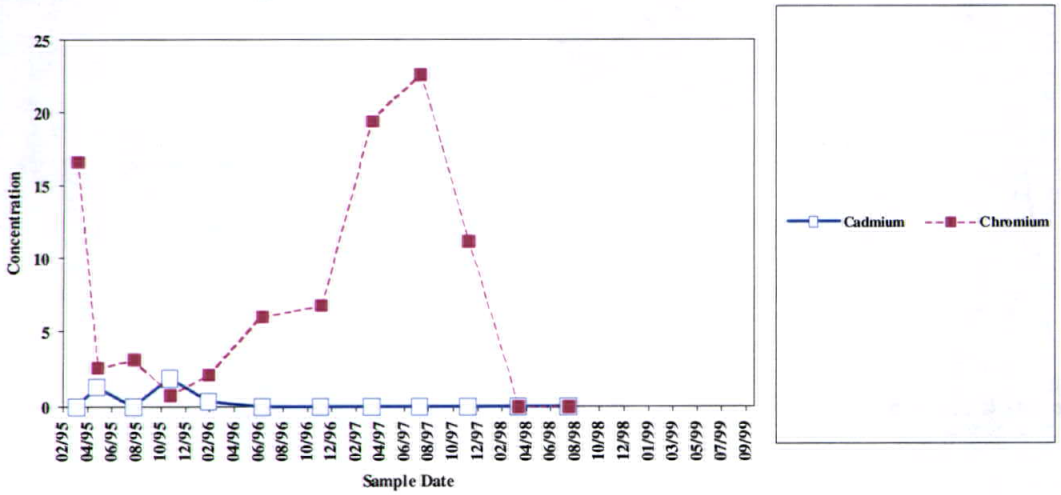
1,1-Dichloroethane		1,2-Dichloroethene, total		Ethylbenzene		Toluene		Vinyl chloride		Xylenes, total	
MEG:	70	MEG:	70	MEG:	700	MEG:	1400	MEG:	0.15	MEG:	600
MCL:	-	MCL:	70	MCL:	700	MCL:	1000	MCL:	2	MCL:	10000

Sample Location: Site 9

MW-NASB-081

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

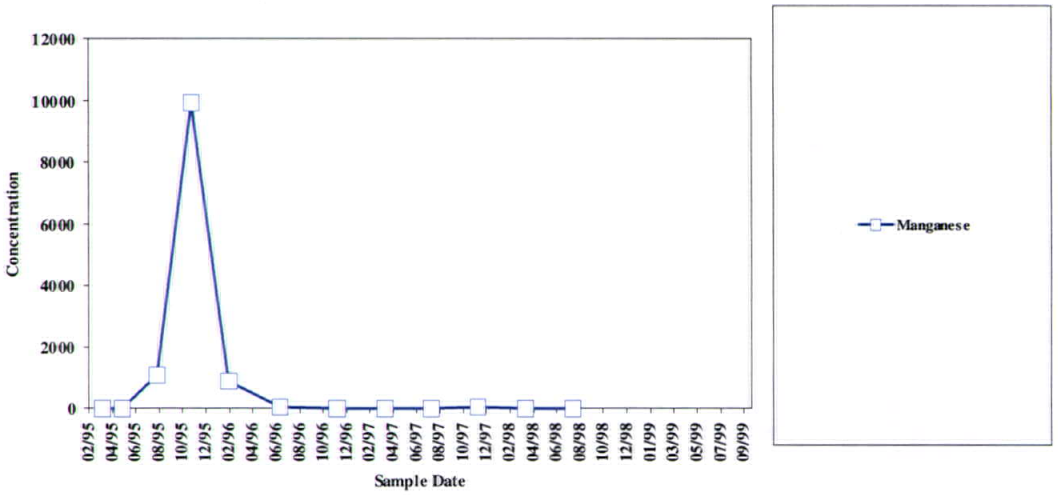
Cadmium		Chromium	
MEG:	5	MEG:	100
MCL:	5	MCL:	100

Sample Location: Site 9

MW-NASB-081

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

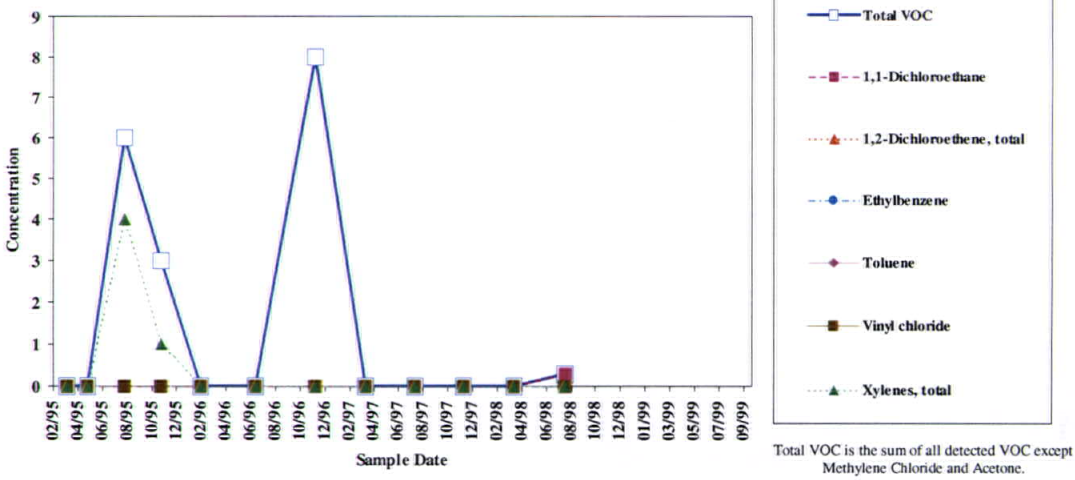
Manganese	
MEG:	200
MCL:	50

Sample Location: Site 9

MW-NASB-081

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

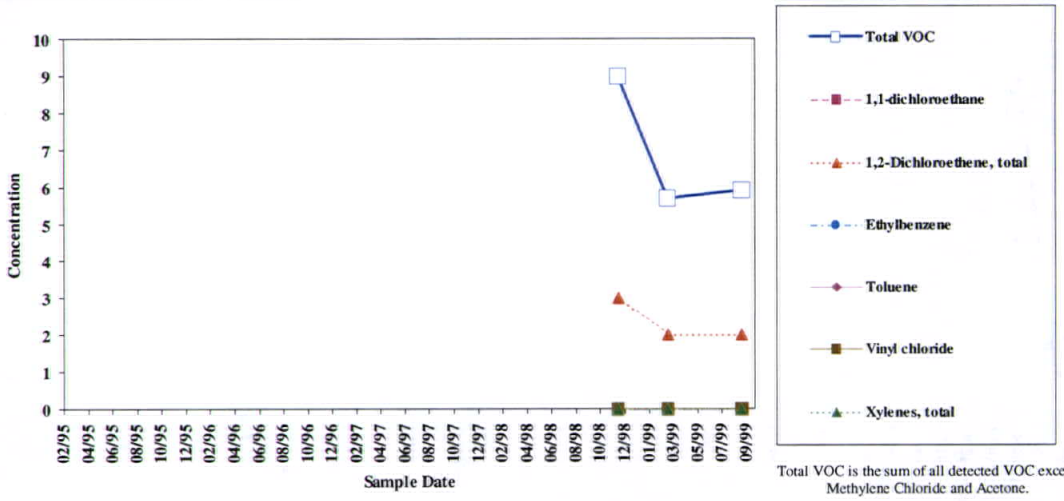
Sample Location:

MW-NASB-227

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

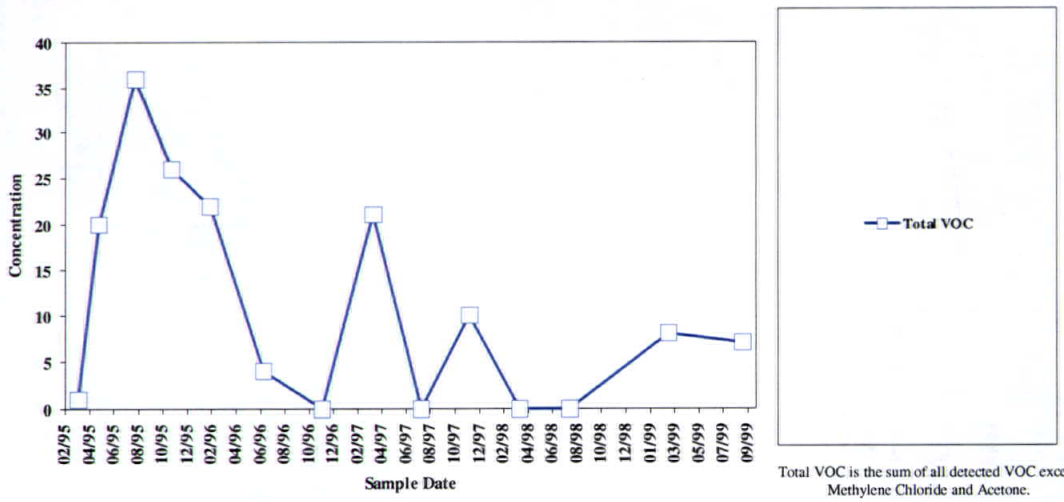
Sample Location:

SED-10

Site 9

Sediment

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/kg

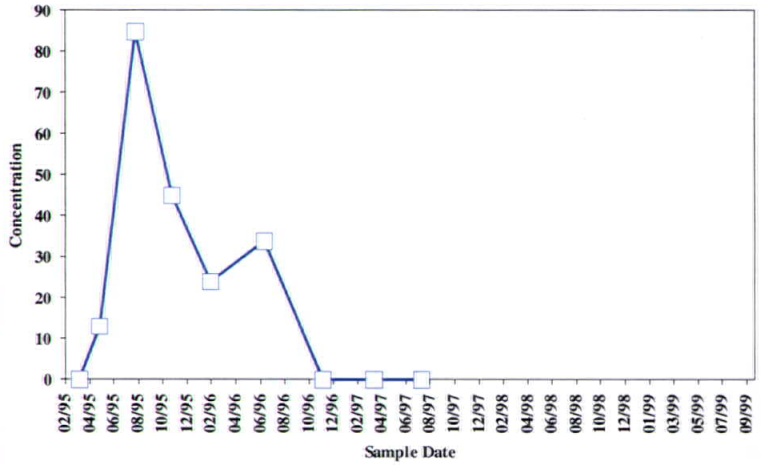
Sample Location:

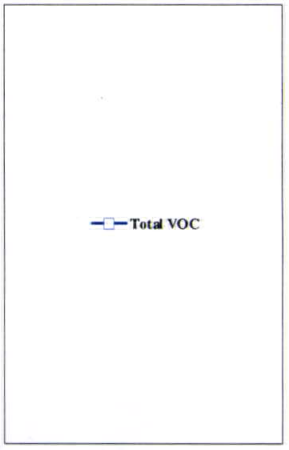
SED-11

Site 9

Sediment

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/kg

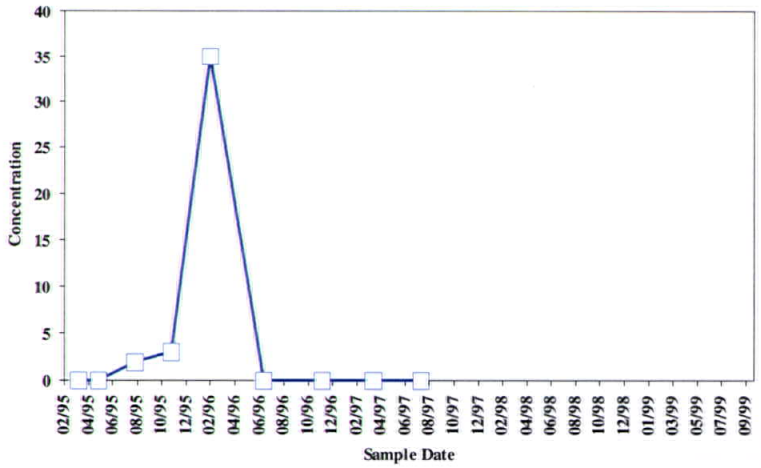
Sample Location:

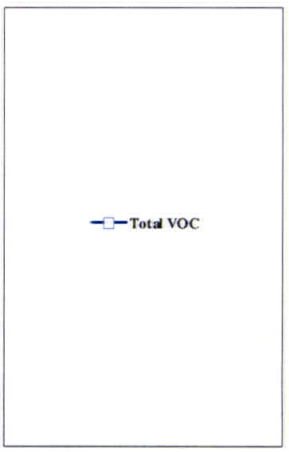
SED-12

Site 9

Sediment

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/kg

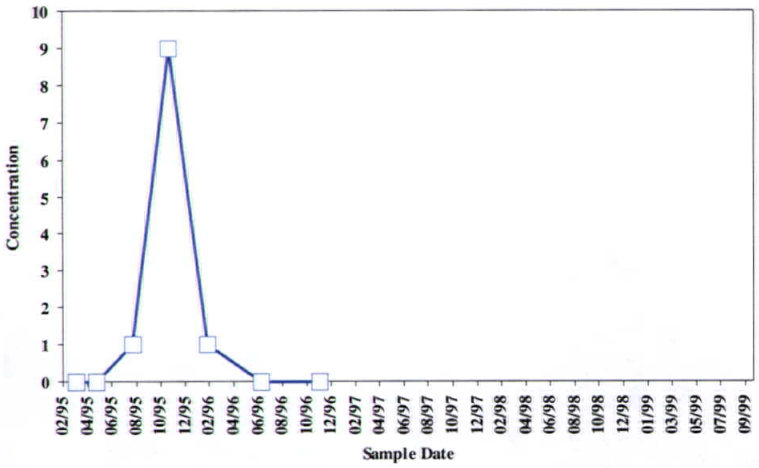
Sample Location:

SED-915

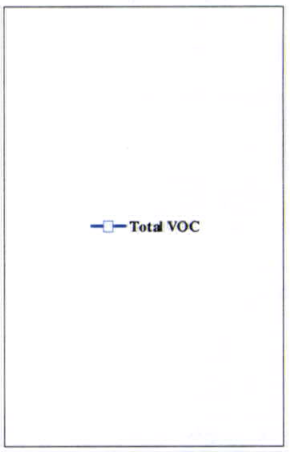
Site 9

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

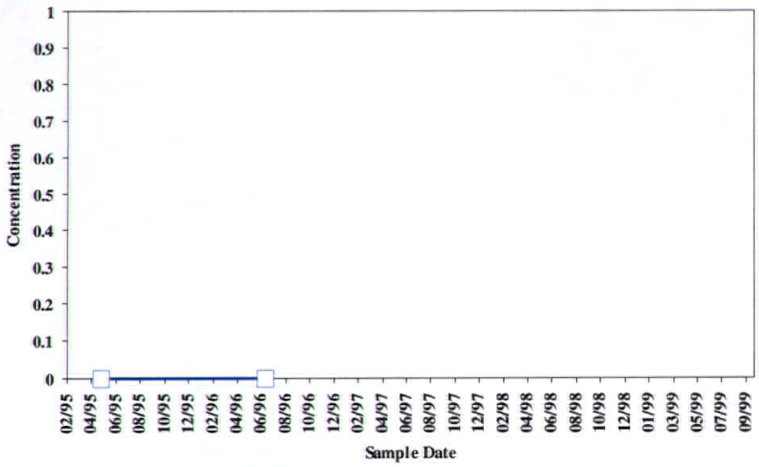
Sample Location:

SED-916

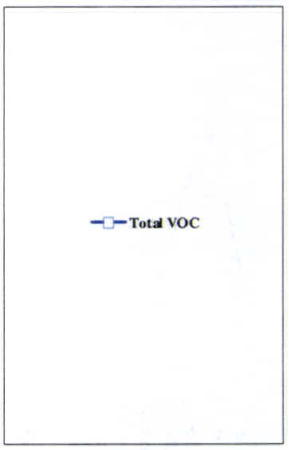
Site 9

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.

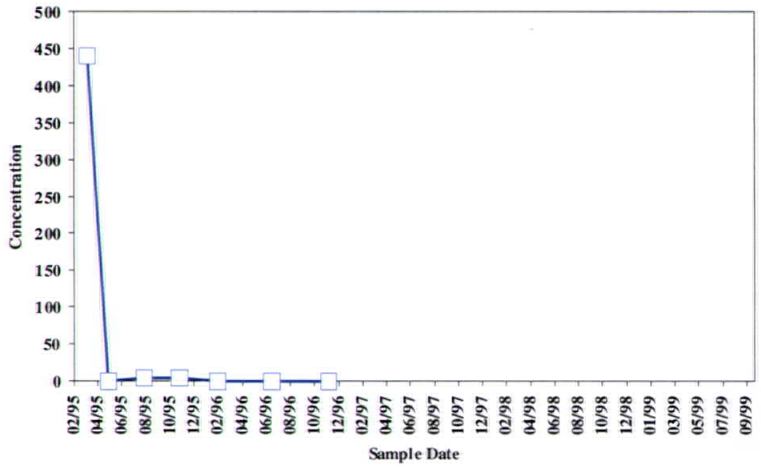
Sample concentration units: µg/kg

Sample Location:

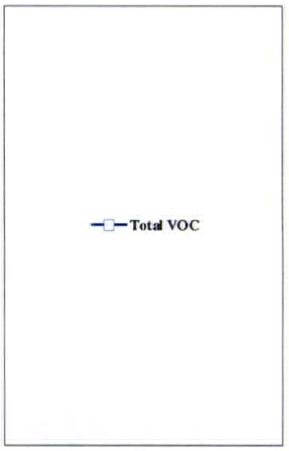
SED-919

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.

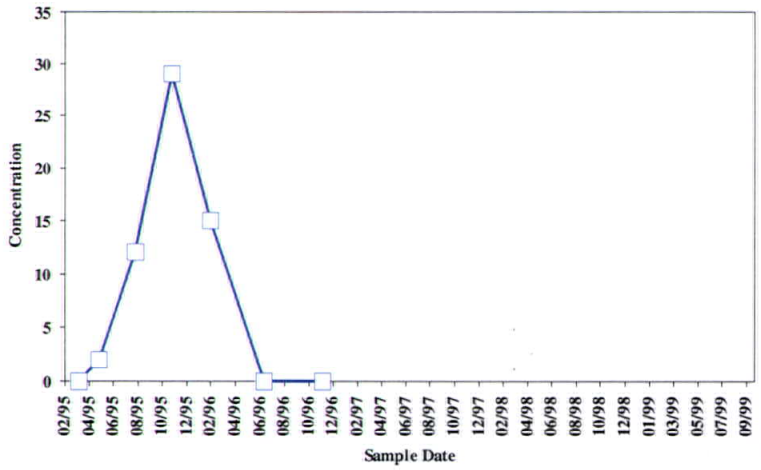
Sample concentration units: µg/kg

Sample Location:

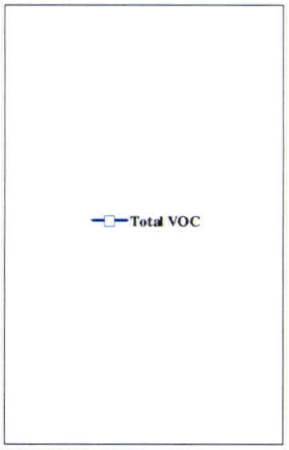
SED-922

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

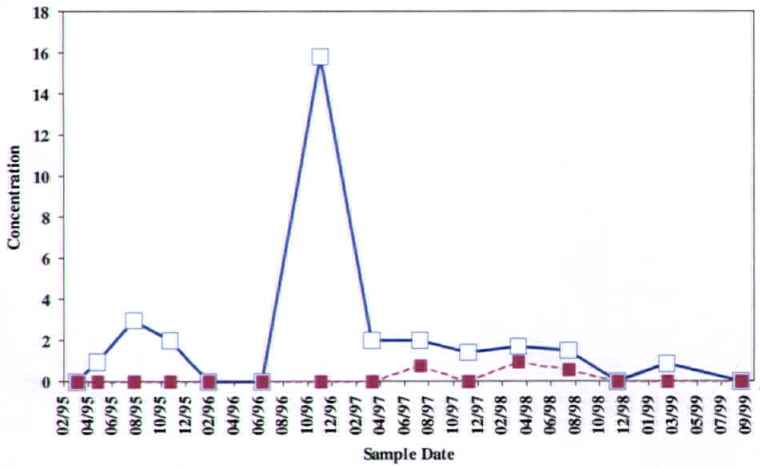
Sample Location:

SW-010

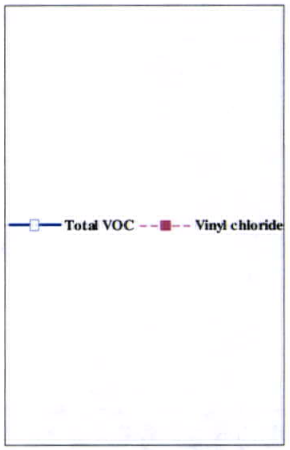
Site 9

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

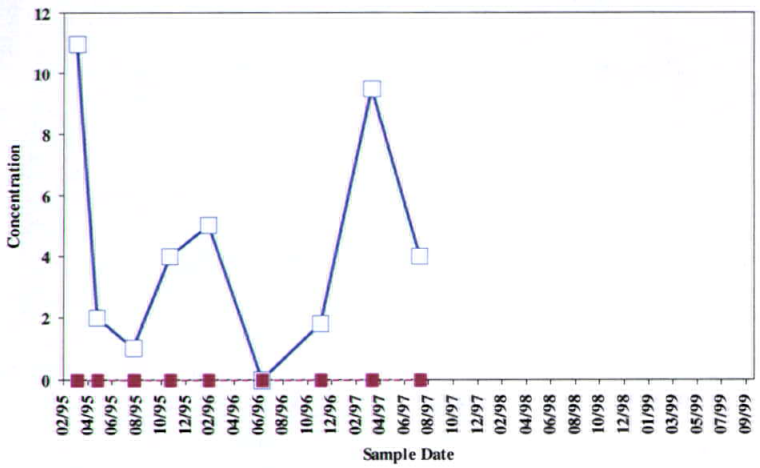
Sample Location:

SW-011

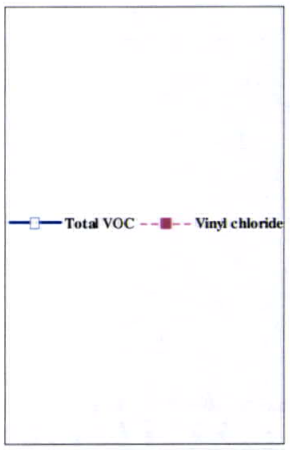
Site 9

Surface water

Chemicals of concern: Volatiles



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



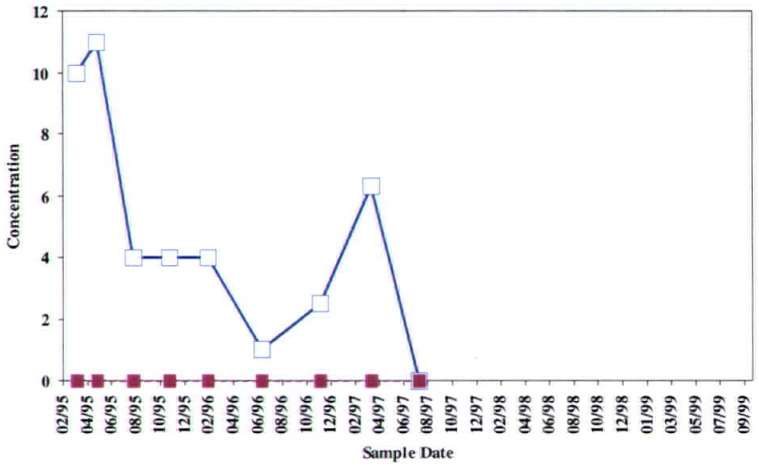
Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

Sample Location: Site 9

SW-012 Surface water

Chemicals of concern: Volatiles



Total VOC — Vinyl chloride

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

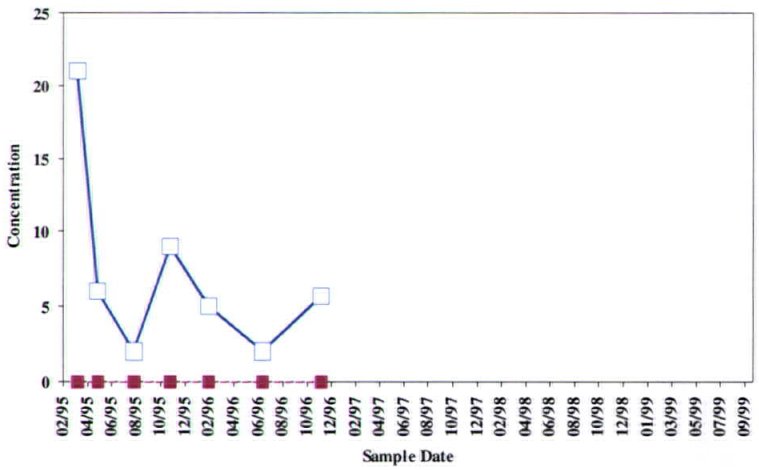
Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

Sample Location: Site 9

SW-915 Surface water

Chemicals of concern: Volatiles



Total VOC — Vinyl chloride

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

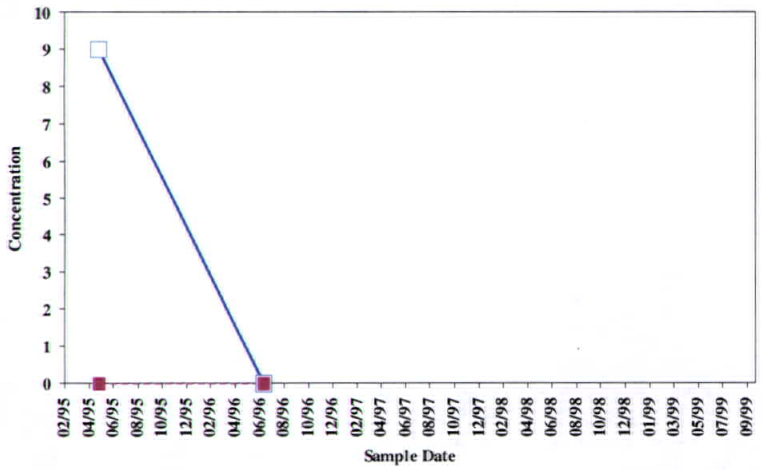
Analyte concentrations less than the sample detection limit are plotted as zero concentration on this chart.

Sample concentration units: µg/L

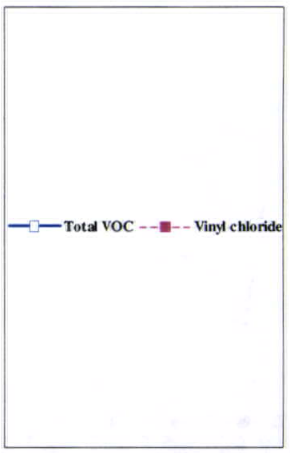
Sample Location: Site 9

SW-916 Surface water

Chemicals of concern: Volatiles



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



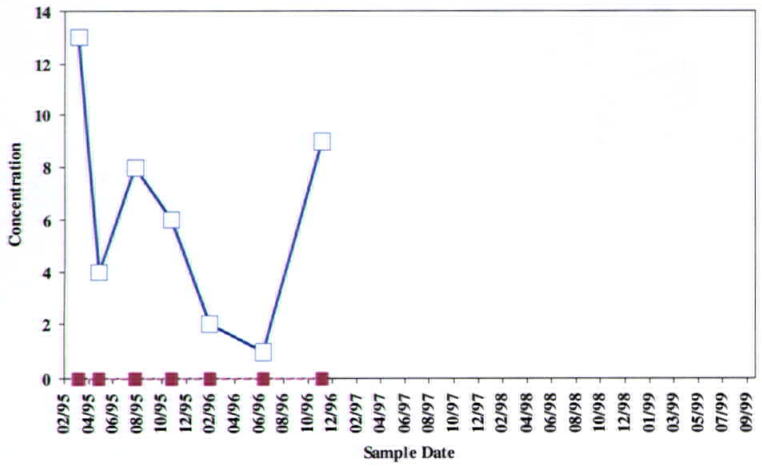
Total VOC is the sum of all detected VOC except Methylene Chloride and Acetone.

Sample concentration units: µg/L

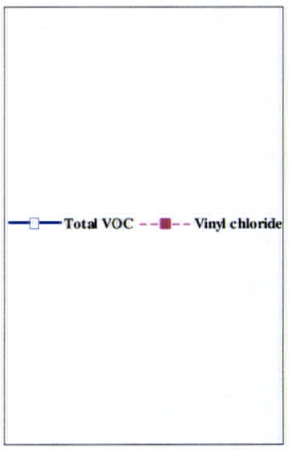
Sample Location: Site 9

SW-919 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

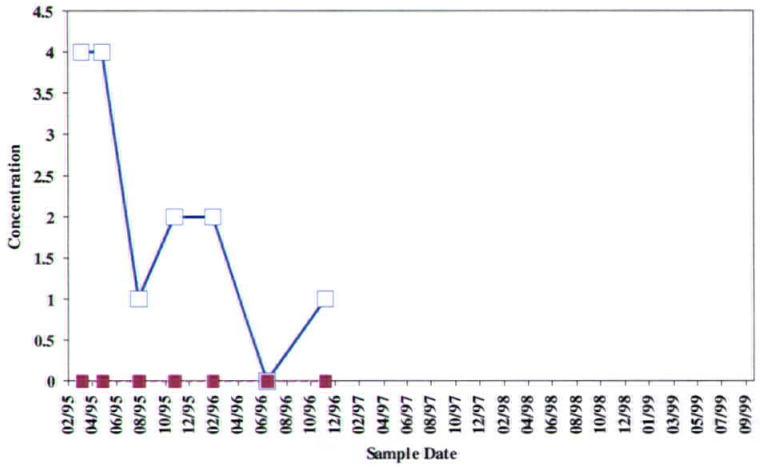
Sample Location:

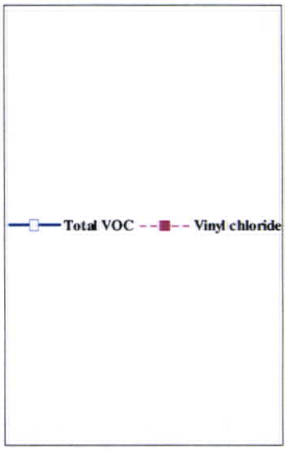
SW-922

Site 9

Surface water

Chemicals of concern: Volatiles





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

Appendix B

Response to Comments for the 1998 Annual and Monitoring Events 14 and 15 Reports

RESPONSE TO COMMENTS FROM THE STATE OF MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION TO THE DRAFT 1998 ANNUAL REPORT FOR SITE 9, NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 23 June 1999**

The Department of Environmental Protection (DEP or Department) has reviewed the report entitled *1998 Annual Report, Monitoring Events 11-13, Site 9*, dated April 1999, prepared by EA Engineering, Science, and Technology. Based on that review, the Department has the following comments and issues.

GENERAL COMMENTS

1. DEP suggests that the Vehicle Maintenance location, just west of the NEX, be labeled on Figure 1-2. Past undocumented activities at the upgradient Vehicle Maintenance grounds represent a likely explanation for the occurrence of vinyl chloride at Site 9 (degradation product of TCE). The age of waste discharge at this location and the shallowness of ground water may have resulted in nearly complete degradation of TCE at the time of the RI (however, low levels of the first level breakdown product 1,2-DCE are still detected). The Department believes that this is a scenario that may explain of the source of vinyl chloride.

   Response—A label has been added to the Motor Pool Vehicle Storage Area, just west of the NEX, on Figure 1-2 and Figure 3-6. Future maps will also contain this label.

2. Ground-water head contour mapping is significantly much improved as the result of adding upgradient wells and measured elevations of the impoundment ponds. Figure 3-6 (November 1998) is the only measurement round in this report that includes these new data. The resulting contouring illuminates hydraulic relationships that the Department envisioned to be important; in particular, the effect of the flooding of the unnamed stream by impoundment ponds of differing head elevations, and the westward bowing of the upgradient flow path.

   Response—November 1998 was the first gauging event in which the 9 site monitoring wells at the NEX were gauged with the Site 9 wells. Subsequent gauging events will continue to include this information.

3. ***Figures 3-2 through 3-6, Section 3.1, Water Level Gauging Program, Page 3.1***—On these maps, as well as some earlier maps, a "tongue" of high head pointing east shows near the north edge of the Upper Pond. This feature results when contouring must accommodate the relatively high potentiometric head consistently measured in monitoring well NASB-074. This tongue looks abnormal, but the implication of an apparent hydraulic barrier has not been previously challenged. In examining the elevations of well screens in the surrounding wells (NASB-072 and NASB-075), it is apparent that the screen in NASB-074 is 9 ft deeper than the others. All wells are located about equidistant from the Upper Pond (approximately 60 ft) and in a thin aquifer that discharges to the pond. In such cases, ground-water flow theory and field experience demonstrates head elevations in deeper wells to be at higher

elevations than shallow wells. It appears that if all three well screens were at the same elevation, the head in NASB-074 would be about 1 ft lower. Therefore, the Department believes that the contouring in this area of Site 9 is wrong (i.e., in reality a tongue of higher head does not exist, and the 41-ft and 42-ft contours on Figures 3 and 4, respectively, should be drawn as heading directly to the west end of the Upper Pond. If implemented, the current small ground-water divide occurring between Building 201 and the pond would disappear, and flow lines drawn perpendicular to the revised contours would be simple, nearly-straight, continuous lines. The resulting interpretation of ground-water flow directions would be more reasonable.

Response—The head difference in these monitoring wells does indicate increasing head with increased well screen interval, as noted in the comment. However, wells at Site 9 have not been segregated into shallow or deep intervals as is suggested by this comment. Site 9 wells are screened in the unconfined sand layer, with no significant confining intervals. Some variation in potentiometric head should be expected, as are observed in these monitoring wells. These differences (approximately 0.5 ft between MW-NASB-074 and MW-NASB-075) are not considered to result in significant differences in flow direction. To prevent overinterpretation of micro-differences in ground-water flow patterns, future reports will use a 2-ft contour interval for ground-water flow maps, although no changes will be made to the contour interval of the 1998 Annual Report figures. The figures of the report have been modified to clarify this situation. Monitoring well MW-NASB-074 has been removed, as per MEDEP request, from water table elevation maps and the following note has been added to Figures 3-2, 3-5, and 3-6:

> *Monitoring well MW-NASB-074 is screened approximately 10 ft deeper than surrounding monitoring wells and shows a higher potentiometric surface, therefore, it is not included in contour map generation.*

SPECIFIC COMMENTS

4. ***Figure 1-1, Site Location Map***—The yellowed area of Site 9 does not extend far enough to the unnamed stream (southward), and appears to extend slightly too far to the north. Please correct its registration on the base map.

   Response—The location of Site 9 has been changed so it is consistent with the map used in the Proposed Plan.

5. ***Figure 1-2, Site Plan***

   a. It is noted that the site boundary (qualified in the legend as approximate) crosses the impoundments on the south and includes one of two monitoring wells across the surface water. Is well MW-NASB-077 included because of the historical vinyl chloride detection?

      Response—The location of Site 9 has been changed so it is consistent with the map used in the Proposed Plan.

b. DEP is pleased to see that this map includes the upgradient area of the NEX Service Station, and associated wells.

Response—The Navy appreciates MEDEP's positive response to the revised figure.

6. ***Long-Term Monitoring Program, Section 1.2, Page 1-1, Second Paragraph***—Please add "*proposed*" immediately before "remedial action" in the first sentence. Until public comments on the PRAP are considered, the currently implemented remedy must be qualified.

Response—The word "proposed" has been added immediately before "remedial action" in the first sentence of the second paragraph of Section 1.2.

7. ***Table 1-1, Summary of 1998 Long-Term Monitoring Program at Site 9***

a. The subheading "Stream Gauge Water" should be changed to "Surface Water Impoundment Gauging," to be more definitive.

Response—The subheading "Stream Gauge Water" on Table 1-1 has been changed to "Surface Water Impoundment Gauging."

b. Under "NOTE "...collected in accordance with..." should be replaced with "*...implemented in accordance with....*"

Response—The word "collected" has been replaced with "implemented" in the fifth note as requested.

8. ***Hydrogeology, Section 2.3, Page 2-2, First Paragraph***—The Department recalls that the drilling log and well construction details for the new monitoring well (MW-NASB-227) were to be included in the 1998 Annual Report. Please add this information to the appendices and reference the specific appendix in this paragraph.

Response—The drilling log and well construction diagram details for monitoring well MW-NASB-227 have been included in the Monitoring Event 13 Report, and will be included in the Final Annual Report as Appendix A.

9. ***Hydrogeology, Section 2.3, Page 2-2, Second Paragraph***—"Based on ground-water elevation data gathered during the Long-Term Monitoring Program, the ground-water flow direction is generally toward the unnamed stream and surface water impoundments."

Within Site 9, no exception exists to the flow direction described. Therefore, please delete "generally."

Response—Disagree. Based on 1998 data, Site 9 ground-water flow is interpreted to be south-southeast. The report is accurate as written.

10. ***Water Level Gauging Program, Section 3.1, Page 3-1, Second Paragraph, and Figures 3-1 to 3-6***—"Figures 3-1 through 3-6 provide the interpreted water table contour maps for the six gauging events."

    a. Ground-water flow patterns are not discussed here as might be expected, but in Section 4.1.1. DEP suggests that a statement be added after the above quoted statement to indicate that interpretation of these figures is discussed in Section 4.1.1.

    Response—Chapter 3 presents the results of the three monitoring events conducted during 1998. Chapter 4 presents conclusions based on site data. No changes will be made.

    b. For the first time, Figures 3-5 and 3-6 include elevations of the impoundments, which show more realistic contouring than Figures 3-1 to 3-4 because of these new data. The "hydraulic draw" on upgradient ground water by the lower impoundment is particularly evident, and is seems likely the lower pond is now receiving the bulk of ground-water discharge from Site 9 instead of the headwaters of the former unflooded drainage. These figures affirm that ground-water flow has shifted to an eastward flow direction in the vicinity of MW-NASB-072, MW-NASB-074, and MW-NASB-075. (No response necessary.)

    Response—No response required.

11. ***Volatile Organic Compounds, Section 3.2, Page 3-2, Second Paragraph***—"Indicators of natural attenuation assessed include...."

    a. Please change to "*VOC* indicators of natural attenuation assessed include...;" other indicators such as field parameters and dissolved metals are also collected and could be utilized.

    Response—The text has been revised as suggested.

    b. A reference to Table 3-1 is needed in this section.

    Response—The following sentence has been added as the last sentence of the first paragraph of the Volatile Organic Compound subsection of Section 3.2:

    VOC results are summarized on Table 3-1.

12. ***Volatile Organic Compounds, Section 3.2, Page 3-2***—An obvious omission is the lack of mention of low level (below MEGs/MCLs) detections of methylene chloride, 1,2-DCE, and TCE. The Department notes that some of these detections are qualified as present in the associated method blanks (B), and others are not. Most noteworthy of these detections are those that equal or exceed the MCL: methylene chloride of 6 μg/L in MW-NASB-079 duplicate (not qualified with B) and TCE of 5 μg/L in MW-NASB-227 (qualified with B). An explanation of why a value of 3 μg/L of TCE at MW-NASB-074 for Monitoring Event 13 does <u>not</u> have a "B" and the value of 5 μg/L of TCE in MW-NASB-227 for Monitoring

Event 13 has a "B" is critical to site interpretation and must be added to the text. From Figure 3-6, it can be inferred that these two wells lie along the same ground-water flow path; therefore, a detection of TCE at the new well (MW-NASB-227) might be expected.

Response—The qualifiers mentioned in this comment are assigned by the analytical laboratory, and are not subject to debate as to whether they should be added. We disagree with MEDEP's interpretation that a detection of TCE in MW-NASB-074 necessarily implies a detection will be seen in MW-NASB-227, which is located approximately 430 ft upgradient. Monitoring wells MW-NASB-074 and MW-NASB-227 were sampled and analyzed on separate days. The method blank associated with monitoring well MW-NASB-227 detected TCE contamination, while the method blank associated with monitoring well MW-NASB-074 did not.

13. ***Vinyl Chloride/Total Dichloroethene Ratio, Section 3.2, Page 3-2, Fourth Paragraph***—Please correct the last sentence to read: "The table below summarizes *trends in* the vinyl chloride to total dichloroethene ratios as shown on Figure *3-8*."

    Response—The last sentence of the Vinyl Chloride/Total Dichloroethene Ratio subsection of Section 3.2 has been revised as follows:

    The table below summarizes the trends in the vinyl chloride to total DCE ratios as shown on Figure 3-8:

14. ***Figure 3-8, Vinyl Chloride/Total 1,2-Dichloroethene Ratio Trends***

    a. Individual event-specific computed ratios (color-coded) for each well would be helpful on this graph. This added information would allow the reader to better judge how well the data points define the trend lines to their data.

       Response—Each regression line is based on up to 13 data points, and adding these data makes the graphs less readable. Therefore, these data were not added to the figure.

    b. Also, a comparison of Figure 3-7 data and Figure 3-8 data shows that, for wells MW-NASB-074 and MW-NASB-075, vinyl chloride was reported as non-detect after March 1996 and December 1997, respectively. Therefore, the ratio lines on Figure 3-8 should not be extended beyond these dates. Please correct.

       Response—Disagree. The lines in Figure 3-8 are least mean square regression lines, and are a best fit for all data. Therefore, it is appropriate to draw these lines as shown.

15. ***Surface Water, Section 3.3, Page 3-3 and Table 3-2***

    a. The table shows 120 μg/L of acetone in the sample from SW-010. The value is not qualified and, therefore, it needs to be mentioned in the text whether or not any explanation is offered. Most other detections of acetone in ground-water samples were much lower, and were qualified as reported in associated method blanks.

Response—The following sentence has been added after the first sentence of the Surface Water subsection of Section 3.3:

> *One VOC (acetone) was detected in surface water sample SW-010 collected during Monitoring Event 12.*

16. ***Sediment Sample, Section 3.3, Page 3-4 and Table 3-4***

    a. The heading of this section should be changed to "Seep Sediment Samples."

    Response—The heading of the subsection in question has been changed to "Seep Sediment Sample."

    b. "A large number of VOC were reported in the sample collected during Monitoring Event 12 at estimated concentrations,...."

    It needs to be stated that these concentrations are very low (i.e., less than 100 μg/kg).

    Response—The second sentence of the Seep Sediment Sample subsection of Section 3.3 has been revised as follows:

    > *A large number of VOC were reported in the sample collected during Monitoring Event 12 at estimated concentrations (less than 100 μg/kg),....*

17. ***Visual Inspection, Section 3.4, Page 3-4, Second Paragraph***—"Snow cover was present at the time of the March 1998 inspection, limiting visual inspection for stressed vegetation and/or signs of adverse impact."

    Given that these are typical winter conditions and the growing season isn't under way until May, visual inspection should be scheduled for summer and fall months.

    Response—Based on the revised LTMP, visual inspections will be conducted at the time of sampling (i.e., April and September) when snow cover will be absent.

18. ***Level Gauging Water Program, Section 4.1.1, Page 4-1, First Paragraph***—"Flow patterns upgradient of Site 9 are to the southwest based on data collected from monitoring wells at the Navy Exchange Service Station."

    a. Documentation of upgradient flow direction is an important addition to the Site 9 report. However, as currently written, the description in this paragraph does not make the connection between the southwest and southeast flow directions. This connection is quite apparent from Figure 3-6. This figure indicates that the upgradient southwest flow changes into a southern flow within a short travel distance downgradient, and then turns to the southeast just to the west of the barracks area. Thus, ground water from the NEX (and likely the vehicle maintenance area, not labeled) migrates via a curved pathway into Site 9.

Response—The paragraph is a summary of the overall ground-water pattern. Additional text has been added to note the connection in ground-water flow from the NEX to Site 9. The relationship of NEX and Site 9 ground-water flow will continue to be evaluated as additional data are collected. Note that the 1998 Annual Report includes only one round of data that include the upgradient NEX wells, therefore, definitive descriptions of upgradient flow patterns (particularly potential seasonal variations) cannot be made at this time.

The following text was added to Section 4.1.1, first paragraph, middle of second sentence, so this relationship is more clearly identified:

...Navy Exchange Service Station, which appears to be upgradient of Site 9....

b. The ground-water elevation measured in MW-NASB-227 during sampling on 18 November is not shown, presumably because it was measured 2 weeks later than the Site 9 gauging round. DEP computed a head elevation of 49.5 ft MSL for this measurement. If it is assumed that levels did not fluctuate much during these 2 weeks, this elevation supports the Figure 3-6 contouring, and extension thereof, in the vicinity of MW-NASB-022. In turn, the flow bending from southwest to southeast is further supported.

   The evidence is sufficient to justify a fuller description of the upgradient flow path to Site 9. Please complete the text description.

   Response—The observations are based on data actually collected in 1998. The water table elevation for MW-NASB-227 was not available at the time of gauging other site wells. The estimation of what the water level at MW-NASB-227 may have been 2 weeks earlier will not be evaluated.

19. ***Level Gauging Water Program, Section 4.1.1, Page 4-1, First Bullet***—"Ground-water flow from the portion of Site 9 east and immediately south of Building 210 is likely to flow towards the upper impoundment pond."

    Please recheck this information. It appears that "west" is the correct direction according to our interpretation of Figures 3-1 to 3-6.

    Response—There is no Building 210 at Site 9, however, there is a Building 201. "East" has been changed to "west" as noted.

20. ***Volatile Organic Compound Concentrations, Section 4.1.2, Page 4-2, First Bullet***

    a. Laboratory variability should be a minor factor in the underlying cause of "scatter" in VOC results, if their QA/QC program is vigorous.

       Response—Due to the low concentrations of VOC detected in Site 9 ground water, laboratory variability may be an important factor, and should not be underestimated. Even with a rigorous QA/QC program, some variations should be expected.

b. "A notable increase has been recorded in total 1,2-DCE concentrations at Site 9 from 1997 to 1998 which may be a precursor to increasing vinyl chloride concentrations as the dechlorination process occurs."

This is not good news. A significant increase in vinyl chloride, while indicating degradation of parent compounds via natural attenuation, is not a comforting occurrence at surface water receptors, and could lead to a need for active remediation instead of natural attenuation. In that a source of VOCs has not been identified and remediated, the increase in 1,2-DCE may indicate pulse emissions from an upgradient source.

Response—The trends of VOC in ground water will continue to be monitored, and recommendations will be made which will be discussed with MEDEP and other RAB members.

21. ***Volatile Organic Compound Concentrations, Section 4.1.2, Page 4-2, Second Bullet***— Degreaser solvents, as well as gasoline, are commonly found in the subsurface at service stations and vehicle maintenance facilities. 1,2-DCE is a degradation product of PCE and TCE, both of which have been measured in ground water at Site 9 at levels below MEGs/MCLs. (See Comment No. 1 above.)

Response—MEDEP's concerns that the NEX or Motor Pool Vehicle Storage Area may be a source of chlorinated compounds is noted. This relationship will be further assessed in the 1999 Annual Report when additional data are available from MW-NASB-022 and MW-NASB-227. However, that assessment will be limited because chlorinated VOC are not part of the analytical program for the NEX site (refer to response to EPA Comment No. 16b).

22. ***Volatile Organic Compound Concentrations, Section 4.1.2, Page 4-2, Second Bullet***— "Vinyl chloride was not detected in the sample from recently installed monitoring well MW-NASB-227. Therefore, based on current data, a source of vinyl chloride to the west of Site 9 does not appear to be likely."

This is true, however, 1,2-DCE and PCE were present, although below MCLs. TCE was detected at 5 μg/L but was also in the method blank, which is a re-occurring and disturbing theme. Since all of these compounds can degrade into vinyl chloride, the above statement does not seem valid. It might be that subsurface conditions are not favorable to dechlorination upgradient of MW-NASB-227. This text needs to be rewritten or deleted.

Response—The fourth bullet of Section 4.1.2 has been revised as follows:

> *Vinyl chloride was not detected in the sample from recently installed monitoring well MW-NASB-227. Therefore, based on current data, a source of vinyl chloride west of that portion of Site 9 does not appear likely. This is not a source in and of itself; however, since DCE has been detected and is anticipated to degrade, there could be vinyl chloride migrating from this area in the future.*

23. ***Inorganic Concentrations, Section 4.1.2, Page 4-3, Only Bullet***—"...including manganese at MW-NASB-071 and chromium at MW-NASB-079."

Please modify to read: "...including *exceedances of MEGs and/or MCLs of* manganese at MW-NASB-071 and chromium at MW-NASB-079."

Response—The first bullet of the Inorganic Concentrations subsection of Section 4.1.2 has been revised as follows:

> *Results of samples from the portion of Site 9 within and downgradient of the landfill reported elevated inorganic concentrations above the corresponding MEG and/or MCL, including manganese at MW-NASB-071 and chromium at MW-NASB-079.*

24. ***Seep Samples, Section 4.1.5, Page 4-3, Second Bullet***—What was the turbidity reading of the seep water? During DEP visits to LT-901, the water appeared clear.

Response—Turbidity of seep sample LT-901 was 38 NTU, 263 NTU, and 0 NTU during Monitoring Events 11 through 13, respectively. This seep can range from clear to turbid, depending on site conditions. Elevated inorganic results do not directly correlate to increased turbidity, likely because turbidity has been measured prior to sampling, and not directly from the sample being collected. During future sampling events, turbidity will be measured directly from the seep sample so the relationship of turbidity and inorganics can be more accurately determined. Note that the second sentence of the second bullet in Section 4.1.5 has been revised to read:

> *These detected concentrations may be the result of sediment becoming suspended in the seep sample following collection of water quality parameters, or the geochemical environment downgradient of the landfill at Site 9, which may have mobilized inorganic species.*

25. ***Recommendations, Section 4.2, Page 4-4***—The Department looks forward to commenting on the Long-Term Monitoring Plan and will provide comments to the proposed revisions as part of our review of that document.

Response—No response required.

RESPONSE TO COMMENTS FROM
U.S. ENVIRONMENTAL PROTECTION AGENCY
ON THE DRAFT 1998 ANNUAL REPORT FOR
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Michael Barry **DATED: 17 May 1999**

The 1998 Annual Report much more clearly shows overall trends. Our comments and several supporting charts are in Attachment 1.

The report indicates to EPA that VOC inflow into the Site 9 area cannot be ruled out. However, discharge from the Site 9 area is well characterized in the monitoring program and the selected remedy in the Draft Proposed Remedial Action Plan remains appropriate. It's also clear that the VOCs are degrading at Site 9, but that this process will take several years.

GENERAL COMMENTS

1. ***Overall***

   a. This year's report is much improved. The new color charts and simple tables that commented on trends were a great improvement and significantly enhanced plume understanding. The charts of vinyl chloride/1,2-DCE ratios (Figure 3-8), total concentrations with a regression line (Figure 3-9), and overall trends of several wells (Figure 3-7) were especially useful and the data presentation much more conductive to analysis.

   Response—The Navy appreciates the EPA's positive response to the added figures and tables.

   b. Our review uncovered one omission error (Comment No. 14) and we disagree with one of the Navy's conclusions (Comment Nos. 3a. and 16c.).

   Response—Data reported in the Monitoring Event 12 report were in error. The correct data are presented in the 1998 Annual Report, which reports no detection of 1,1-DCA. Therefore, the Navy does not feel that additional sampling of this well would be necessary (see response to Comment No. 4a below).

2. ***Response to Comments***—We accept Navy responses to EPA comments on the 1997 Annual, Monitoring Events 11 and 12 Reports and look forward to the Final 1997 Annual Report.

   Response—The Final 1997 Annual Report is scheduled to be issued in September 1999.

3. ***Plume Evolvement***—Natural dechlorination of the parent VOCs in the Site 9 area (effectively all 1,2-DCE) is clearly taking place by the presence of vinyl chloride and rising vinyl chloride ratios in several wells. However, we cannot rule out the possibly of inflow of

parent VOCs which will later degrade to vinyl chloride. Some other factors to consider are:

a. 1,2-DCE was detected at 3 ppb in the new MW-NASB-227. This level itself isn't a concern, but it could cause a vinyl chloride exceedance of the MCL and MEG and is fresh inflow of contaminants. Future monitoring may show a trend. Because MW-NASB-227 is screened just above the clay, this should present the worst-case and MW-NASB-22 just to the north was non-detect.

   Response—We agree with this assessment. Note the fourth bullet of Section 4.1.2 has been revised as follows:

   Vinyl chloride was not detected in the sample from recently installed monitoring well MW-NASB-227. Therefore, based on current data, a source of vinyl chloride west of that portion of Site 9 does not appear likely. This is not a source in and of itself, however, since DCE has been detected and is anticipated to degrade, there could be vinyl chloride migrating from this area in the future.

b. 1,1-DCA was detected at 0.3J ppb in MW-NASB-81 on Monitoring Event 12. This is the first detection of a VOC that will also decay to vinyl chloride at this well.

   Response—As stated in response to Comment No. 1b, the detection of 1,1-DCA at 0.3J was not accurate.

c. Vinyl chloride/1,2-DCE ratio trends don't seem to spatially correlate but there are some similarities with screen depth. The two wells with steady ratios, MW-NASB-69/74, are bracketed by wells with increasing ratios. It's interesting to note that MW-NASB-69/74 are also the deepest wells along the axis of the plume with a history of VOC detections. Both are screened below 30-ft MSL, with the MW-69 screen down to 14.5 ft in sand and MW-NASB-74 to 25.6 ft, just above the clay layer. The other wells in the plume axis are shallower and have never had significant detections. Several other factors which could affect concentration at depth are dissolved oxygen content, VOC density, and the location of the historical source that wasn't located. The attached charts help display this.

   Response—Geologic cross-sections will be utilized in the 1999 Annual Report to help assess the relationship of screen depth versus vinyl chloride detections in wells, and other factors including dissolved oxygen.

d. After never containing vinyl chloride, levels clearly started rising in MW-NASB-69 in late 1997, this followed 200 ft downgradient in MW-NASB-76, 200 ft downgradient, 6 months later in mid-1998 and could indicate a plume moving through the area. Yet the 3 upgradient wells, MW-NASB-79/80/81, were overall steady with low levels of vinyl chloride or non-detect during this period.

   Response—Based on Figure 3-6, monitoring wells MW-NASB-079, MW-NASB-080, and MW-NASB-081 are not directly upgradient of MW-NASB-069 and, therefore, the plume movement noted in this comment is difficult to confirm.

e. MW-NASB-69, 80, and 81 are all upgradient of a long suspected historical source, the Building 201 septic system. This source wasn't found after several investigations but it was located immediately upgradient of MW-NASB-76 which has a history of vinyl chloride that had fallen, but are now rising again.

Response—Although no response is requested for this comment, we would like to note the Additional Source Investigation ruled out the septic system as a current source of vinyl chloride. Therefore, it is likely that rising concentrations of vinyl chloride in monitoring well MW-NASB-076 may be related to degradation of parent compound in ground water due to natural attenuation rather than from the septic system.

f. Future events may reveal longer term trends. To better understand the three-dimensional plume dynamics, a new hydrogeological cross-section that goes through most of the wells should be prepared and included in the 1999 Annual Report. The general location of the new cross-section, C-C', is proposed in the attached charts.

Response—A cross-section has been included as Figure 2-1 to clarify Section 2.2 (Geology).

g. As the report notes, these data, and especially the ratio information, can be thrown off by data quality issues because of the low concentrations involved. Depth and ratios should also be analyzed for any correlation.

Response—The relationship of vinyl chloride concentrations and screen interval will be discussed in future reports. The GIS visualization tool has recently been completed. This analysis will not be completed in the 1998 Annual Report, but will be assessed in the 1999 Annual Report.

4. ***Recommendations***—We concur with all the recommendations for future sampling and also propose:

a. Because of the detection of 1,1-DCA of 0.3J in MW-NASB-81, we think it should be included in the sampling events for several rounds to address our concerns about inflow of VOCs which will later decay to vinyl chloride even though their concentrations are well below the MCL/MEG.

Response—As stated in response to Comment No. 1b, 1,1-DCA was not detected during Monitoring Event 12. Therefore, no additional sampling of this well is planned.

b. Creation of a professional hydrogeological cross-section along the axis of the plume that included all wells with an offset should be prepared to aid trends analysis of the plume; please see EPA figures.

Response—Please see response to Comment No. 3f.

c. The Building 201 septic system is a likely past source of VOCs and its outline should be added to the figures, as are the ash landfill and incinerator.

Response—The outline of the Building 201 septic system has been added to site figures, although it is important to note investigations of this septic system did not indicate it is a current source of vinyl chloride, nor is the septic system a potential source for vinyl chloride detected upgradient.

d. General water quality parameters should also be correlated to the monitoring wells to assess natural attenuation effectiveness, especially in light of a suspect dissolved oxygen "shadow" because of BTEX at the upgradient NEX site.

Response—The assessment of natural attenuation is an important factor. In the 1999 Annual Report, these parameters will be more fully assessed, after additional gauging data from NEX and Site 9 wells have been collected. This will be completed in conjunction with the review of screen depth intervals and vinyl chloride concentrations, as noted in response to Comment No. 3c. However, it should be noted that this assessment will be limited because, as stated in the response to EPA Comment No. 16b, chlorinated VOC are not part of the analytical program for the NEX site.

5. ***Data Quality-Contaminated Blanks***—False TCE and PCE detections caused by either trip or method blank contaminations in the range of 1-2 ppb were encountered in 1998, as well as acetone and methylene chloride. These aren't an issue at Site 9 as the primary COCs are vinyl chloride and 1,2-DCE. However, these could significantly cloud the graphs due to the low concentrations and shouldn't be included, or at least footnoted on the graphs. This has been an ongoing situation at Site 9 and we believe that several of the charts at Appendix A and Figure 3-7 indicate higher than they should. Specific instances are in Comment Nos. 9, 13, and 15.

   Response—The false TCE and PCE results were an anomalous laboratory issue and are believed to be unique to Monitoring Event 13 results. As discussed at the 5 August 1999 Technical Meeting, this information is stated on the summary tables, and data qualified with a "B" qualifier (i.e., method blank contamination) is not included when calculating the total VOC values. Therefore, TCE and PCE were not used when calculating total VOC values.

6. ***Water Level Gauging***—We conclude that after responding to the retention ponds, the historical gradient across Site 9 from MW-NASB-81 to MW-NASB-72 has returned; a least mean squares regression line is nearly level across the whole period. Continued gauging with NEX site data and the new MW-NASB-227 will help refine the flow path.

   Response—We agree, and continued gauging with the NEX wells and new well (MW-NASB-227) will help refine the flow path.

7. ***Detection Limit for Vinyl Chloride***—The reporting limit is 2 ppb. Per previous letter, the Navy can use several methods to near the MEG of 0.15 ppb. See also comments to the draft LTMP.

Response—The detection limit for vinyl chloride was discussed at the 4 May 1999 Technical Meeting. This discussion concluded that analytical methods which can obtain the detection limit of 0.15 μg/L will be used only when monitoring wells are to be deleted from the Long-Term Monitoring Program and when detections of less than 2 μg/L are reported using EPA Method 8260B. Note that text has been added to the LTMP noting that this method will be used before monitoring wells will be considered for removal (see response to Comment No. 4 for EPA for Draft LTMP for Site 9).

SPECIFIC COMMENTS

8. ***Figure 1.2***—The Building 201 septic system should be added, it was just northeast of the northeast corner of the building.

   Response—The approximate outline of the Building 201 septic system has been added to Figure 1-2.

9. ***Figure 3-7***—This figure did a great job displaying long-term trends of wells with VOC detects. However, MW-NASB-74 and MW-NASB-75 seem to falsely indicate higher VOCs due to TCE in the blank for MW-74 and acetone, a likely laboratory artifact, in MW-75. The graphs shouldn't show lab artifacts as actual contamination. Recommend either excluding it or making it a footnote. This would make MW-NASB-75 look more decreasing and MW-NASB-74 less increasing, as is the actual case.

   a. Table 3-1 for MW-NASB-74/75. Same comment as above, neither of these issues seem to be noted in Table 3-1 for these wells.

      Response—As discussed at the 5 August 1999 Technical Meeting, it has been standard policy to not include data with a "B" qualifier (indicates method blank contamination) when calculating the total VOC values. This approach provides the most conservative estimate of VOC trends which may be occurring at Site 9. Therefore, the "J" qualified TCE values at MW-NASB-074 were included in the total VOC calculation. Acetone was included in the total VOC value for monitoring well MW-NASB-075 during Monitoring Event 13 due to the fact that it was not detected in the associated method blank (i.e., not "B" quantified).

      The following note has been added as the second to last sentence of the first paragraph of the Volatile Organic Compounds subsection of Section 3.2:

      Contaminants that were detected in the associated method blank have not been used when calculating the total VOC values.

      Figure 3-4 has been revised to increase the vertical scale, and minimize the acetone result. Table 3-1 has not been changed.

10. ***Figure 3.8***—This figure is a great display for displaying trends.

Response—The Navy appreciates EPA's positive response to the added figure.

11. ***Section 3.2***—Using a simple table to summarize the data on the charts was concise and complete.

Response— The Navy appreciates EPA's positive response to the added table.

12. ***Section 3.2, Inorganics***—We assume since chromium doesn't appear on MW-80 that it was always non-detect (<4.0 ppb).

Response—Chromium was non-detect during both sampling events in 1998 (Monitoring Events 11 and 12). Because chromium is a chemical of concern in ground water, it has been added to Table 3-1 for wells even though it was non-detect.

13. ***Section 3.3, Table 3-2 and Appendix A, Page 26 of 32; SW-10***—Same as in Comment No. 9, but for acetone. The one detection of 120 ppb on Event 12 is of no concern, yet throws off the vertical scale so that the Appendix A chart is useless.

Response—Because the acetone value was not "B" qualified by the laboratory, it was included in the graph. Please see response to Comment No. 9. Note that acetone was detected in 3 monitoring events prior to Monitoring Event 12 ranging in concentrations from 1JB μg/L to 10 μg/L. Acetone was not detected in the sample collected during Monitoring Event 13. Therefore, the acetone concentration of 120 μg/L reported during Monitoring Event 12 is currently assumed to be anomalous. Surface water sample SW-010 will continue to be monitored and if acetone is detected in subsequent monitoring events, it will be addressed at that time.

14. ***Table 3.1, MW-NASB-81***—1,1-DCA was detected on Monitoring Event 12 at 0.3J, yet it doesn't appear on the table; it is accounted for on the graph at Appendix A (Page 24 of 32).

Response—1,1-DCA was reported during Monitoring Event 12 in error. The data set reported in the 1998 Annual Report correctly summarizes the results for this well, and no detection of 1,1-DCA was noted.

15. ***Table 3-1, MW-NASB-227, and Appendix A, Page 25 of 32, MW-NASB-227***—Same as Comment No. 9. The Monitoring Event 13 data quality review indicated that the PCE in MW-NASB-227 was due to blank contamination and should be removed from the chart and footnoted on the table.

Response—The following note will be added to the ground-water subsection of the Standard Notes Table:

> *Contaminants that were detected in the associated method blank have not been used when calculating the total volatile organic compound values.*

16. ***Section 4.1.2, Ground-Water Sampling Program, VOCs***

a. ***Second Bullet, Second Dash***—It appears that VOC may be flowing into the site. Rising 1,2-DCE will eventually cause rising vinyl chloride. Since the MCL for 1,2-DCE is 70 ppb, levels that wouldn't be a concern could be far above the MCL (2 ppb) or MEG (0.15 ppb) as they decay.

Response—The concentrations of parent compounds entering the site are likely to decay into vinyl chloride, although the time scale for these reactions and likely concentrations of daughter products are difficult to predict, as noted in this comment.

b. ***Third bullet***—As stated above, significant VOC levels aren't required at the NEX station to cause a vinyl chloride problem at Site 9. At what level, or to what detection limit if non-detect, have 1,2-DCE, 1,1-DCA, and vinyl chloride been detected at the NEX site?

Response—Monitoring wells at the NEX have been analyzed for BTEX and MTBE, TPH DRO, and TPH GRO. These wells are not currently analyzed for chlorinated VOC, as the concentrations of fuel-related VOC are the primary focus of the NEX remediation system.

c. ***Fourth Bullet***—We do not concur with the conclusion; 3 ppb of 1,2-DCE will eventually decay to vinyl chloride.

Response—The fourth bullet of Section 4.1.2 has been revised as indicated in response to EPA Comment No. 3a.

d. ***Fifth Bullet***—We concur that sporadic results could be expected. However, because it's a natural process with a long half-life, we'd expect natural attenuation to occur at a constant, or slowly changing rate. Due to the low concentrations, extreme care must be exercised in sampling and analysis because of the large effect they have on results. A small change in concentration results could make the ratio graph look very different.

Response—We agree with this comment. Note that the fifth bullet of Section 4.1.2 has been revised as follows:

> *The observed spikes in VOC and vinyl chloride concentrations followed by decreasing concentrations have been noted in site wells. These results are sensitive to a number of factors, including the low concentrations of vinyl chloride, the variability that may be present because of laboratory methods, and the significant scatter of the site data. Similar patterns are expected to continue.*

17. ***Section 4.1.2, Ground-Water Sampling Program, Inorganics***—The detection of chromium in MW-NASB-79 on Monitoring Event 11 seems suspect in light of non-detect/low levels on other events and in the upgradient well MW-80 (actually in the ash landfill footprint).

Response—This result is unusual in light of the other sampling results at this well. However, the concentration reported on the laboratory Form 1s is correct.

18. ***Section 4.1.3, Surface Water Sampling Program***—We note the discharge of vinyl chloride at a rate such that it's measurable in the stream at SW-10. This is probably due to ground-water discharge because the seep, LT-901, has been non-detect for vinyl chloride. Because of the relatively high MDL for vinyl chloride and the stable low levels that are usually detected at SW-10, the Method 8260B SIM could be used here for more accurate measurement.

    Response—The presence of vinyl chloride at SW-010 is not in dispute, as concentrations have been reported at this location in past sampling events. Therefore, further refinement of the method detection limit (from 2 μg/L to 01.5 μg/L) is not considered to be necessary.

19. ***Section 4.2, Recommendations***—See General Comment No. 4 and EPA comments to the draft revised LTMP in Attachment 2.

    Response—This comment refers to adding monitoring well MW-NASB-081 into the sampling program. As stated in response to Comment No. 1b, the detection of 1,1-DCA at 0.3J was not accurate. Therefore, no additional sampling of well MW-NASB-081 is planned.

RESPONSE TO COMMENTS FROM
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
MONITORING EVENT 14 – NOVEMBER 1998
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 8 September 1999**

The Maine Department of Environmental Protection (MEDEP or Department) has reviewed the report entitled *Monitoring Event 14 – November 1998, Site 9: Neptune Drive Disposal Site*, dated June 1999, prepared by EA Engineering, Science, and Technology. Based on that review, the Department has the following comments and issues.

GENERAL COMMENTS:

1. Changes that the Navy has implemented in this monitoring event report, with input from the Restoration Advisory Board, have greatly cut down the review time and the report is now truly a data report. Although the Navy will release interpretation of Site 9 event data only in the annual report, it is important that we compare the concentrations reported in the event reports with trends and historical data as the data becomes available. The Department has reviewed these new data in this fashion.

   Response—No response necessary.

2. MEDEP also agrees with EPA's comments and observations for this monitoring event. No response required.

   Response—No response necessary.

SPECIFIC COMMENTS:

3. ***Introduction, Section 1.1, page 1, 1st Paragraph***—NAS Brunswick is located south of the Androscoggin River between Brunswick and Cooks Corner, Maine (Figure 1).

   This description is rather inaccurate, as Brunswick is not a distinct locality, as is Cooks Corner. A better statement would be:

   NAS Brunswick is located between the Androscoggin River and Middle Bay/Harpswell Cove approximately one mile southwest of Cooks Corner.

   Or use whatever language was decided on the draft Record of Decision for Site 9.

   Response—The text had been changed to the following:

   NAS Brunswick is located between the Androscoggin River and Middle/Harpswells Cove, approximately 1 mi southwest of Cooks Corner.

4. ***Figure 2, Site Plan***—The map and its legend does not indicate which wells are only gauged for water level elevations versus those that are sampled for water quality. Figures 3 and 4 indicate that all wells are gauged, which is correct. However, Figure 2 (or a new map) should indicate which wells are sampled using a color code, and the sampled locations of LT-901 and SED-010 also should be color coded. It would even be possible to show where the different types of analyses are being run; this would benefit all parties.

   Response—This information is included and presented in Table 1-1 of the monitoring event reports and annual reports. Color coding the figures for monitoring event and annual reports will be evaluated.

5. ***Figure 2-4***—The following observation is not new, but has slipped through the cracks in previous reviews.

   These maps show only one headwall culvert outflow into the North Branch of the Unnamed Stream. In the field, we have observed two separate subdrain discharge points into the stream that run under Neptune Drive. On the east, a concrete headwall and spillway exist; to the west a partially plugged smaller culvert contributes water into the head of the wetland at the base of the road embankment. The west seepage joins the east headwall culvert flow at the west side of the concrete spillway. Both features should be shown, and LT-901 appropriately located at one or the other seepage channel. Please make the appropriate changes.

   Response—This will be checked during the field site visits if appropriate figure changes will be made. Current snow cover prevents visual confirmation of these features which is needed prior to revising the figures for the draft 1999 Annual Report.

6. ***Summary of Inorganic Analytical Results for Ground-Water Samples, Table 6***—Why was lead not analyzed in these three ground-water samples? MEDEP requests that lead be added.

   Response— Lead was analyzed as part of the Target Analyte List metal analysis; however, it was not detected above the detection limit during Monitoring Event 14. Table 6 is a summary table of detected analytes; because lead was not detected, it is not listed in Table 6. Target Analyte List metals will continue to be collected for the designated site wells for the monitoring events in 2000 which includes lead.

7. ***Summary of Analytical Results for Surface Water Sample, Table 8***—Shouldn't "Total 1,2-Dichloroethane" actually be Total 1,2-Dichloroethene?

   Response—MEDEP is correct, "Total 1,2-Dichloroethane" should be "Total 1,2-Dichloroethene" in Table 8 of the Monitoring Event 14 Report. This change will be made in the 1999 Annual and Monitoring Event Reports for 2000. This table will be corrected and the corrected table distributed for insertion into the Monitoring Event 14 Report.

8. ***Summary of Analytical Results for Sediment Sample, Table 10***—The Department notes that both vinyl chloride and trichloroethene were found at low levels in the sediment at SED-10. This is the first time since 1995 (two events) that vinyl chloride has been detected at SED-10 location. Trichloroethene has been detected sporadically during the monitoring period. No response required.

   Response—The sediment within the impoundments and streams not only possibly receive recharge from the shallow ground water, but also collect surface runoff/over land flow from offsite areas. The surface water collected within the stream and surface impoundments may have other compounds and similar compounds as Site 9. It should be noted that these impoundments are cleaned (sediment removed) out every 5 years.

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
ON MONITORING EVENT 14 – SEPTEMBER 1998
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Michael Barry **DATED: 30 June 1999**

GENERAL COMMENTS

1. ***Timely Report and Improved Figures***— We commend EA and the Navy for the quick turnaround of this report, which was dated 18 June and received on 22 June. This results in a more real time analysis of the data. The color figures also read easier.

   Response—No response necessary.

2. ***Data Quality***—We are reassured that there were no trichloroethylene (TCE) or tetrachloroethylene (PCE) blank issues on this event and that quality control were confined to the "customary" methylene chloride and other chemicals that aren't contaminants of concern.

   Response—No response necessary.

3. ***Observations***—We have several preliminary observations; response are not required at this time as they will be refined with Monitoring Event 15 results and may be analyzed in the annual report:

   a. The elevation of the well screens may be an important factor in tracking contaminant transport through Site 9. EPA has put together a simple cross-section to help display vertical relationships (enclosed). Consideration should be given to preparing a professional cross section for the annual reports.

   b. Concentrations fell on Monitoring Event 14, but they also did 2 and 5 events ago; perhaps a seasonal (or water level related) variation is developing? The regression lines developed in the 1998 Annual Report are an excellent tool to smooth these out and focus on long-term trends.

   c. The presence of PCE, TCE, and 1,2-dichloroethylene (DCE) without vinyl chloride in MW-227/74 as opposed to DCE and vinyl chloride only in MW-80/69/76 is interesting.

   Response—A cross-section was prepared and presented in the 1998 Annual Report, Monitoring Events 11 through 13, Site 9: Neptune Drive Disposal Site, Naval Air Station, Brunswick, Maine, Figure 2-1. The cross-section has been revised (February 2000) and reissued with the 1998 Annual Report.

4. ***Maintaining a Long-Term View***—It is evident to EPA that individual events and even years shouldn't be taken out of context at Site 9. Due to the relatively low concentrations and limited area of impact, it seems that a sudden and dramatic rise in concentrations would be needed to justify quick, more aggressive action. Alternatively, monitoring changes should continue to be made prior to the 5-year reviews to monitor contaminant evolvement.

   Response—The trend graphs are an excellent tool to evaluate the long-term and short-term trends at Site 9 for the main contaminants of concern (vinyl chloride and 1,2-dichloroethene [1,2-DCE]). The only sudden increase in the short-term trend (2-year period) is at monitoring well MW-NASB-069, which has more than doubled in concentration from 1998 to 1999. This increase in vinyl chloride in MW-NASB-069 over the last 2 years further demonstrates that dechlorination of 1,2-DCE to vinyl chloride is occurring.

SPECIFIC COMMENTS

EPA has no specific comments that require a formal response. As stated in Comment No. 3, we have several observations that we will probably comment to in the 1999 Annual Report, dependent upon Monitoring Event 15 results and analysis in the annual report.

5. The chemical specie along the MW-80/6,9/76 axis and MW-227/74 axis appear different. Other factors, such as dissolved oxygen, screen depth, and relation to the clay layer, are important but weren't considered in detail. Please also see the attached figures (in hard copy only).

   a. A combination of a narrow plume axis and well screen depth may be critical to detecting the VOCs at Site 9. MW-227/69 are by far the deepest wells (MW-74 is shallower, but screened just above the clay) and have yielded sustained and/or high VOC levels.

   b. MW-80/76 are shallower wells, but are directly along the detection axis. VOCs were also detected at low levels along a narrow axis upgradient at MW-81 on Monitoring Event 12.

   c. Several wells have very depressed dissolved oxygen levels (<1.0 ppm), indicating aerobic bacterial activity (MW-69, MW-71, MW-76, MW-79, and MW-227).

	PCE	TCE	DCE/DCA	Vinyl Chloride
MW-80/69/76	None	None	1-17	3-15
MW-227/74	0.7J	3	2	None

   Response—The comments are addressed within the text of the 1999 Annual Report for Site 9.

6. The graph of overall vinyl chloride ratios looks like it is going the wrong way for natural attenuation, but an ongoing inflow of PCE/TCE/DCE would cause this. The linear regression graph that was added in last year's annual report will display the long-term trend as well. Also to consider is that a constant ratio would still indicate successful natural attenuation in the case of a constant inflow of parent VOCs.

   Response—The trend graphs represent an overall increasing vinyl chloride to 1,2-dichloroethene ratio, which indicates dechlorination is occurring.

RESPONSE TO COMMENTS FROM
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
MONITORING EVENT 15 – SEPTEMBER 1999
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 6 January 2000**

GENERAL COMMENTS:

1. This event's VOC data illustrates the importance of comparing the current event concentrations with trends and historical data. The Department reviewed these new data in this fashion, and has attached a graph of concentrations versus time for MW-NASB-069. What the graph shows is that the rising trends for both vinyl chloride and total 1,2-dichloroethene have continued in dramatic fashion, with the September 1999 concentrations being more than double the previous highs (November 1998 event). The DCE concentration of the duplicate sample is nearly at the MCL and MEG of 70 μg/L. Most significantly, vinyl chloride is approximately 25 times greater than its MCL at this location and over 300 times its MEG.

   The Department recognizes that MW-NASB-069 is not the typical monitoring well at Site 9 in that it draws groundwater from a deep elongated depression in the top of the underlying clay. The screens of other monitoring well at Site 9 are shallower, and most are located outside the clay trough. Because vinyl chloride and 1,2- DCE are undoubtedly daughter products of PCE and/or TCE, which are sinkers in aquifers due to their specific gravity being significantly greater than water, it is not surprising that MW-NASB-069 is much more contaminated that other Site 9 wells.

   The increasing trends of vinyl chloride and DCE, in combination with very low dissolved oxygen and relatively high manganese, suggests that natural biodegradation of parent compounds is occurring and apparently has accelerated. A postulated reason for this accelerated breakdown is that the chemical side-effects (e.g., anaerobic state) of fuel contaminant remediation at the NEX (immediately upgradient) have migrated downgradient in the shallow system, and have promoted increased reductive dehalogenation of chlorinated compounds trapped in the uppermost clay layer as a residual from old solvent releases.

   In light of the above trend, the Department has growing concerns that contaminant levels may eventually increase in the Site 9 pond sediments, and possibly in pond water. The point at which the Department will need more subsurface contaminant information in order to continue to support the Natural Attenuation with Monitoring remedy may be fast approaching. Therefore, the Navy should seriously consider making plans to install several new monitoring wells to better define and track this apparent top-of-clay VOC plume, and assume that last year's concentration trend will not soon reverse. MEDEP is ready to assist the Navy in such an endeavor. This should be a topic of discussion at the next technical meeting.

   Response—This will be discussed at the March 2000 Technical Meeting.

2. The Department again recommends qualifying the head measurements for NASB-074 as "affected by a deeper screen placement," and not using NASB-074 measurements for contouring on future maps. (See MEDEP Comment No. 3 for the 1998 Annual Report). The Navy needs to better justify not taking this action, if the requested change is not implemented.

   Response—The Navy does not agree with this comment. The subsurface at Site 9 is adequately characterized for the purposes of monitored natural attenuation. The current monitoring well locations and screen placements are sufficient for the purposes of determining the effectiveness of monitored natural attenuation and monitoring plume migration for a long-term monitoring program.

SPECIFIC COMMENTS

3. ***Introduction, Section 1.1, Page 1, 4th Paragraph***—Temporal trends and other observations based on data collected during bi-annual monitoring (April, September, and October) will be presented in the Annual Report for 1999.

   In the last sentence, the information in the parenthesis should read "*(April and September/October)*" so that it is clear that monitoring is bi-annual.

   Response—The Annual Report will present trends and other observations.

4. ***Sampling Activities, Section 1.4.1, Page 3, Bullets***

   a. The reduction in dissolved oxygen may be largely a function of the nearly doubling of water temperature at the time of sample collection at SW-010 and LT-901 during Monitoring Event 15. Also, Eh readings were much lower (approaching zero), and suggest that these environments have become more anaerobic that in the past.

   b. It is even more interesting that Table 8 shows a pH of 2.08 for the leachate seep. If real, this water poses a human health hazard, as it would be quite corrosive. All prior pH readings have exceeded a value of 6. This reading needs to be checked as soon as possible – before the next monitoring event in April. If a similar value is obtained, the Department recommends that an investigation be undertaken to identify the source of low pH, and that analyses for dissolved metals be reinstated. Please keep the Department informed of the Navy's intent to resample and the sampling timeframe.

      Response— The leachate seep will be rechecked during Monitoring Event 16 in April 2000. This is a field measurement taken with an instrument, which is subject to potential false high or false low readings depending on a number of variables. If the pH measurement observed during Monitoring Event 16 in April 2000 is similar to the pH level recorded in Monitoring Event 15, the appropriate action will be discussed with Navy, and discussed with EPA and MEDEP at a technical meeting.

5. ***Summary of Analytical Results for Sediment Sample, Table 11***—The Department notes that total 1,2-dichloroethene was found at low levels (7 μg/L) in the sediment at SED-10, instead of vinyl chloride and trichloroethene that was detected during Monitoring Event 14. It appears that contaminant type is fluctuating between parent compound and various daughter breakdown compounds. No response needed.

   Response—No response necessary.

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY ON THE
FINAL REPORT ON MONITORING EVENT 15 – SEPTEMBER 1999
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Michael Barry **DATED: 15 December 1999**

1. EPA has no comments to the report that require a response. We have several observations that we will examine more carefully in our review of the soon to be released Draft 1999 Annual Report:

   - Data quality seems much improved, as in Monitoring Event 14, over the previous reports.

     Response—No response necessary.

   - The new geologic cross-section presented in the Final 1998 Annual Report greatly helped understanding vertical relationships. For the Draft 1999 Annual Report, please verify the well screen elevations for MW-069 and MW-077, though they look a bit high.

     Response—A geologic cross-section was developed and presented in the 1998 Annual Report. The cross-section has been revised (February 2000) along with Table 2-1 of the 1998 Annual Report. The screen elevations were corrected for MW-NASB-069, MW-NASB-079, and MW-NASB-077; surface elevation was also corrected. The revised cross-section and table will be distributed for insertion into the 1998 Site 9 Annual Report.

   - VOCs rose in MW-069. However, we think that individual events (and perhaps even years at Site 9) should not be taken out of context of long-term trends.

     Response—No response necessary.

   - The presence of PCE, TCE, and 1,2-dichloroethylene (DCE) without vinyl chloride in MW-227/74 as opposed to DCE and vinyl chloride only in MW-80/69/74 is interesting. Dissolved oxygen levels appear to also be different in these different areas.

     Response—Assuming that that EPA reference to monitoring well MW-NASB-074 is a typographical error and that the correct monitoring well is MW-NASB-076, the detection of PCE and TCE is interesting. It is important to recognize that the detected concentrations in wells MW-NASB-227 and MW-NASB-074 are low. The concentrations of PCE are estimated concentrations (<1 μg/L), and TCE concentrations are low (3 and 2 μg/L) in MW-NASB-227 and MW-NASB-074. These wells are screened within the lower portion of the sand unit and transition unit, where it would be more probable to detect parent compounds at a greater concentration than more shallow screened wells within a chlorinated ground-water plume. The dissolved oxygen concentrations of MW-NASB-227 and MW-NASB-074 were non-detect, 0, and 3.57 mg

during Monitoring Event 15, respectively. The dissolved oxygen concentration in MW-NASB-227 from Monitoring Event 14 was 0.36 mg/L and 2.73 mg/L in MW-NASB-074. The dissolved oxygen levels are not similar between the two wells, but are similar to the wells within the vicinity of MW-NASB-227 and MW-NASB-074.

2. As stated at the meeting on 22-23 November 1999, we do not require the laboratory Form Is in our copy of the reports. We still would like a copy of the field sampling/purging forms, the quality assurance data summary, and the method Detection Limit study.

   Response—The laboratory Form Is will not be included in copies distributed to EPA, and the other items will be continue to be included within the Monitoring Event Reports as requested.

EA Engineering, Science, and Technology

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12 May 2000

Mr. Michael Barry
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 1999 Annual Report, Monitoring Events 14 and 15,
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 Mr. Barry/Ms. Sait:

On behalf of the Department of the Navy, EA Engineering, Science, and Technology is pleased to submit the Final 1999 Annual Report for monitoring and sampling conducted at Site 9 (Neptune Drive Disposal Site). This report is submitted to the U.S. Environmental Protection Agency (EPA) Region 1 and the State of Maine Department of Environmental Protection (MEDEP) for your information. Response to regulator comments for Monitoring Event 14 and 15 reports and the 1998 Annual Report are included as an appendix to this document.

EA's responses to comments received from MEDEP and EPA on the draft version of this report are enclosed.

If additional information is required, please contact Mr. Tony Williams at (207) 921-2445, or Mr. Art Coccoli (610) 595-0724.

Sincerely,

Alexander C. Easterday, P.G.
Project Manager

ACE/caw
Enclosures

cc: Distribution List (RAB Members):

Mr. R. Bernier, Topsham (w/o enclosure)
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RESPONSE TO COMMENTS FROM THE STATE OF MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION ON THE 1999 ANNUAL REPORT, MONITORING EVENTS 14 AND 15 SITE 9: NEPTUNE DRIVE DISPOSAL SITE NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Claudia Sait **DATED: 4 April 2000**

The Maine Department of Environmental Protection (MEDEP or Department) has reviewed the report entitled *1999 Annual Report, Monitoring Events 14 and 15, Site 9: Neptune Drive Disposal Site*, dated February 2000, prepared by EA Engineering, Science, and Technology. Based on that review, the Department has the following comments and issues.

Each of our comments is followed with a code that indicates whether a response is required (RR), no response is required (NR), editorial correction needed (ED), or meeting discussion requested (MTG). No response is required for editorial corrections unless the Navy disagrees with the correction.

GENERAL COMMENTS

1. The Department is pleased that the Navy plans to collect additional data in 2000 for direct comparison of the Site 9 wells with Navy Exchange Service Station wells.

2. The Department is surprised that a pH field-recorded value of 2.08 for leachate seep LT-901 was not checked with a second field meter. While the likely explanation is a faulty meter, the Navy should not make this assumption for surfacing water that is not in a secured area. Historic inorganic analyses for sediment at LT-901 have shown elevated lead concentrations during two time periods prior to the cessation of sediment sampling in August 1998. Low pH and elevated lead levels might be related. If low pH is found during Monitoring Event 16, the Department will ask that inorganic analyses be reinstated and the source of the low pH investigated. (RR)

   Response—This was discussed at the 11 April 2000 Technical Meeting. On 11 April 2000 prior to the Technical Meeting, EA personnel measured the pH of LT-901 and the pH measurements ranged from 6.0 to 6.5, which is similar to all previous measurements with the exception of the erroneous measurement during Monitoring Event 15. Therefore, this measurement is assumed to be related to field or transcription error. For future sampling efforts, if a low or high pH reading (anomalous reading) is recorded in the field, it will be verified by field personnel to confirm the reading is a representative measurement of the field conditions. It is anticipated this field recording protocol will be included in the next revision of the Long-Term Monitoring Plans for each site.

SPECIFIC COMMENTS

3. ***Long-Term Monitoring Program, Section 1.2, Page 2, Bottom of Paragraph***—Ground-water elevation data were gathered to assess whether ground water from the Navy Exchange Service Station air sparging may be flowing to and affecting the ground-water geochemistry of Site 9.

   MEDEP appreciates the Navy including these upgradient wells, however, ground-water elevation data cannot directly be used to assess whether ground-water geochemistry is being affected downgradient. If a hydraulic connection is established using elevation data, then certain geochemistry parameters may be assessed for changes between upgradient and downgradient areas. MEDEP suggests the following change:

   > *Ground-water elevation data were gathered to assess whether ground water from the Navy Exchange Service Station air sparging may be flowing to ~~and affecting the groundwater geochemistry of~~ Site 9.* (ED)

   Response—The text has been changed in the final report as recommended.

4. ***Water Level Gauging Program, Section 3.1.1, Page 1, 1st Bullet***—Shallow ground water south of the upper impoundment pond is hydraulically unrelated to Site 9.

   This is not quite true; the pond is a discharge area for ground water immediately to the south. This statement would be better written as follows:

   > *Due to the presence of the pond, the quality of shallow ground water south of the pond is not linked to the quality of shallow ground water north of the pond.* (ED)

   Response—The text has been changed in the final report as recommended.

5. ***Summary and Conclusions, Sections 3.1.1 and 3.1.2, Pages 2 and 3, Water Level Gauging Program, Section 3.1.1, Page 2, Top of Page***—These dissolved oxygen concentrations measured during 1999 suggest that the ground-water geochemistry at Site 9 is not being affected by the operation of the remedial system at the Naval Exchange Service Station.

   Ground-Water Monitoring and Sampling Program, Section 3.1.2, Pages 2 and 3, 2nd and 3rd Bullets—Samples of Site 9 ground water have not reported significant concentrations of VOCs that would be commonly found in gasoline, which suggests impacts at Site 9 may be limited to potential impacts on site dissolved oxygen or Eh conditions.

   The Department disagrees with the first statement, and partially disagrees with the second statement. The presence of impacts to dissolved oxygen concentrations would be expected to noticeably alter ground-water geochemistry. Although BTEX compounds are virtually absent at wells MW-NASB-8, MW-NASB-9, and MW-NASB-10, diesel range organics are present in MW-NASB-9 and MW-NASB-10. Only 110 ft upgradient of MW-NASB-9, well MW-NASB-226 had a gasoline range organics concentration of 2,300 µg/L in December 1999. Total BTEX concentration at MW-NASB-226 was 1,600 µg/L.

It is our interpretation that oxygen-depleted ground water at the leading edge of the Navy Exchange Service Station fuel plume is migrating into Site 9 where the anaerobic water is causing an increased rate of dechlorination of DCE to vinyl chloride. Thus, the long-term oxygen depletion thought to be caused by BTEX degradation at the NEX could explain the 1998-1999 increasing vinyl chloride concentration trend downgradient. With the exception of MW-NASB-080 (which changed from low to moderate levels of dissolved oxygen in 1999), all other wells in the middle of Site 9 have shown either zero or very low oxygen concentrations. All wells with near normal oxygen concentrations farther downgradient are located within 100 ft of the impoundment drainage. It seems likely that the combined effect of shallowness of the ground water near the ponds and a probable state of exhausted dechlorination (having run its course just upgradient) would promote a recovery of oxygen in ground water downgradient of Building 201.

Response—We disagree with the interpretation noted in this comment that the addition of oxygen upgradient of Site 9 at NEX is likely to increase biodegradation. It is more likely that chlorinated solvent compounds will under go dechlorination in anaerobic conditions. It should be noted that many site conditions could be responsible for the volatile organic compounds trends observed in Site 9 ground water, and dissolved oxygen concentrations. The observations noted in this comment are one possible explanation, although other factors may explain these observed trends (i.e., seasonal fluctuations, precipitation, and/or a combination of seasonal factors).

a. Please eliminate the following sentence from Bullet 3 (Page 2 of 5):

   ~~These dissolved oxygen concentrations measured during 1999 suggest that the ground-water geochemistry at Site 9 is not being affected by operation of the remedial system at the Naval Exchange Service Station.~~ (ED)

   Response—The text has been changed in the final report as recommended.

b. MEDEP recommends the following revision to Bullet 3 (Page 3 of 5):

   Samples of Site 9 ground water have not reported significant concentrations of volatile organic compounds that would be commonly found in gasoline. Diesel range organics and gasoline range organics are not currently included in the analytical program at Site 9. ~~*which suggests impacts at Site 9 may be limited to potential impacts on site dissolved oxygen or Eh conditions*~~. *(ED)*

   Response—The text has been changed in the final report as recommended.

6. ***Ground-Water Monitoring and Sampling Program, Section 3.1.2, Page 3, 2nd Bullet***

   a. Therefore, based on current data, a source of vinyl chloride west of that portion of Site 9 does not appear likely.

      Please delete this sentence as it is contradictory to the rest of the paragraph. (ED)

Response—The text has been changed in the final report as recommended.

b. The second to last sentence does not adequately describe the last 2-year trend at MW-NASB-069, the monitoring well with the highest concentrations of vinyl chloride and 1,2-DCE. While the sentence is acceptable for the other monitoring wells, MW-NASB-069 must be mentioned as an exception to the rise-and-fall pattern of vinyl chloride concentrations. (RR)

Response—The following text has been inserted as the last sentence in Section 3.1.2, Page 3 of 5, 2nd Bullet:

The increase and decrease of vinyl chloride concentrations also occurs; however, the overall trend of vinyl chloride detected in samples from MW-NASB-069 over the last 2 years has been increasing.

7. ***Analytical Trend Graphs, Appendix A***

a. LT-901 Sediment shows that sampling was terminated when the lead level had risen to over 120 mg/L for the second time in two years. If lead was eliminated from the Long-Term Monitoring Program, it may be necessary to reinstate it. What was the justification for discontinuing this sampling? (RR and MTG)

Response—This topic was discussed at the 11 April 2000 Technical Meeting. During discussions related to the revision to the Long-Term Monitoring Plan, metals analysis was added to monitoring wells located immediately downgradient of the landfill as these would better assess metals impact rather than samples from LT-901. In addition, the drainage catchment from LT-901 includes parking areas and industrialized portions of the base. Therefore, water collected from LT-901 may be affected by sources unrelated to Site 9.

b. MW-NASB-227 volatile in ground water is missing all detections for TCE and PCE for Monitoring Events 14 and 15. Please revise this graph. (ED)

Response—The graph has been checked to ensure that detections for TCE and PCE for Monitoring Events 14 and 15 were included. Please note that TCE and PCE detected concentrations are included as part of the "Total VOCs" in the graphs for all the wells.

8. ***Response to Comments from Maine DEP on Monitoring Event 14 – November 1998***

a. Comment No. 5—It is hard to ascertain from the Navy's response when the mentioned field check for verifying a second seep drainage into the North Branch of the Unnamed Stream will be accomplished. No changes are observed on the Site Plan, Figure 1-2 of the 1999 Annual Report. Has the Navy field checked the second seep drainage? If so, please provide more specific information on as to the date of the field check and the outcome. If not, please provide information on when the field check will be performed. (RR)

Response—This issue was discussed at the 11 April 2000 Technical Meeting. The seep was checked during Monitoring Event 16 field events, and will be reported in the Monitoring Event 16 Report.

b. Comment No. 7—The corrected version of Table 8 as promised in the Navy's response, has not been received. When can the Department expect this revised table? (RR)

Response—We suggest that MEDEP make a pen and ink edit to Table 8 in Monitoring Event 14 Report for Site 9 to modify "Total 1,2-Dichloroethane" to "Total 1,2-Dichloroethene."

RESPONSE TO COMMENTS FROM THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
ON THE 1999 ANNUAL REPORT, MONITORING EVENTS 14 AND 15
SITE 9: NEPTUNE DRIVE DISPOSAL SITE
NAVAL AIR STATION, BRUNSWICK, MAINE

COMMENTOR: Michael Barry **DATED: 10 April 2000**

Thank you for the opportunity to review the above report. Upon our review, we generally concur with the findings and conclusions. Natural attenuation by dechlorination and diffusion appears to be occurring at site 9 and with Institutional Controls, the remedy is protective. However, the EPA has several concerns, most notably that source control has been an ongoing problem that has been difficult to resolve at Site 9. We remain committed to keeping monitoring results in the context of the expected 20-year duration of the remedy.

Please see more specific general and specific comments in the attachment. To aid in response, comments are coded as below. General and specific comments have also been combined.

(RR)	Response requested.
(NR)	Means no response required, usually an observation or note.
(ED)	Means editorial comment or suspected typographical/format error.
(MTG)	Means comment should be discussed prior to response.

SPECIFIC COMMENTS

1. (RR/MTG). Regarding rising VOC concentrations. It is true that vinyl chloride concentrations will rise due to higher parent 1,2-dichloroethylene (DCE) concentration as dechlorination occurs. However, incoming vinyl chloride concentrations rose in wells MW-69 and MW-80 and seem to roughly track with DCE concentrations. Perhaps the air sparging remedy at the upgradient Navy Exchange Service Station (NEX) site has some influence upon this. If VOCs continue to rise, at some point enough potential risk would be presented to require some type of source control action (barrier wall, phytoremediation, or actual source location to name a few). Section 3.1.2, second bullet, second dash refers.

   Response—The dissolved oxygen was found to have similar concentrations in NEX wells MW-NASB-008, MW-NASB-009, and MW-NASB-010 and Site 9 monitoring wells MW-NASB-081 and MW-NASB-080. These dissolved oxygen data from Monitoring Event 15 suggest a possible influence, but a small influence since the area immediately downgradient of the landfill area has quite different dissolved oxygen levels than the dissolved oxygen measured in the wells north of the landfill. However, only one round of dissolved oxygen measurements have been collected to date (Monitoring Event 15) from both the NEX and Site 9 wells. Additional data will be collected during Monitoring Events 16 and 17 in 2000 and further evaluated and assessed to determine if the operation of the remedial system at

the NEX is affecting the water quality within Site 9. If the VOC concentrations continue to rise to the point where there is potential risk, a remedial action would be evaluated to reduce the risk.

It should be noted that previous increases (April and November 1998 and September 1999) in DCE and vinyl chloride have been noted in the past, and concentrations have then decreased (July 1998 and February 1999). While the increases at MW-NASB-069 have been larger than previously noted, natural changes in hydrogeologic conditions may reduce VOC concentrations without need for remedial actions.

2. (RR/MTG). Regarding VOCs detected in surface water and sediment at SW/SD-010. We concur with further monitoring as current levels are below risk screening levels. However, because of expected dilution by volatization, their presence is a concern. Consideration should be given to using water diffusion samplers to characterizing local ground-water discharge.

   Response—This issue was discussed at the 11 April 2000 Technical Meeting. Additional surface water sampling would be considered if VOC concentrations in ground water continue to rise, based on discussions with the RAB. As noted during the Technical Meeting, the ambient water quality criteria for VOCs are several orders of magnitude above detected concentrations in ground water. Therefore, the ROD specified remedy of natural attenuation is considered to be effective at this time. This response also relates to EPA's observations in Specific Comment No. 5 below.

3. (NR/MTG). Natural attenuation of DCE to vinyl chloride is clearly occurring due to the high portion of vinyl chloride in many wells of about 50 percent and the rising ratio of vinyl chloride to DCE. As successful as the dechlorination of VOCs is though, a constant inflow of new VOCs into the area will slow the removal of VOCs.

   Response—No response is required, these items were discussed at the 11 April 2000 Technical Meeting (documented by the April meeting minutes) at NAS Brunswick, Maine.

4. (RR/MTG). The NEX site petroleum remediation system and the degradation of BTEX compounds may be causing low dissolved oxygen and Eh readings at Site 9 (except for downgradient of the landfill). This actually presents ideal conditions for dechlorination of the VOCs at Site 9. Because of the remedial system in operation and that BTEX compounds degrade so readily, it is not surprising that they are not detected at Site 9. But is it possible that the BTEX compounds at the NEX are "masking" the low level VOCs migrating to Site 9 by the current testing methods? It's also an interesting coincidence that rising VOCs in MW-69 and MW-80 were detected about the same time the remedial system and the NEX began operation. Section 3.1.2, third bullet refers.

   Response—NEX ground-water samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by U.S. EPA Method 8260. These samples have a detection limit of 1 μg/L for each BTEX compound. Therefore no "masking" of low levels of VOCs at NEX wells is believed to be occurring.

5. (NR/MTG). Several mitigating factors at Site 9 imply that inflow of VOCs is more an issue of how much time will be required to clean up the ground water versus effectiveness of the remedy.

   a. The ground water and surface water in the outflow area is also well characterized in nature and extent and has not been impacted by a level of VOCs that could cause risk to human health or the environment to date. In fact, a moderate amount of VOC discharge will probably be not measurable in the ponds or surface water.

   b. Because of volatization of VOCs, a significant discharge would probably be needed to present a risk (such as at the McKin site) by exceeding the ambient water quality criteria or presenting a vapor hazard to human health.

   c. Though EPA prefers destruction of VOCs through dechlorination, dispersion and diffusion are valid natural attenuation mechanisms and are currently utilized at several Superfund sites. Further, dispersion by volatization are maximized since the downgradient wells have higher percentages of vinyl chloride.

   Response—We agree with these observations. No response is required, as these items were discussed at the 11 April 2000 Technical Meeting at NAS Brunswick, Maine.

6. (NR/MTG). The VOC contamination detected in MW-227 appears to be of different character because of the presence of TCE and PCE. Since an aircraft maintenance area is upgradient of this well, it is possible for there to be either a historical or current undetected source. Evaluating this source should be in context of other issues at Site 9 and the current contamination levels at MW-227 (below the MCL). True, they will decay to vinyl chloride above the MEG, but this area is hydraulically contained within Site 9. Section 3.1.2, fourth bullet refers.

   Response—This issue was discussed at the 11 April 2000 Technical Meeting at NAS Brunswick, Maine. It should be noted that the VOC concentrations detected at NW-NASB-227 are not unique, and are very similar to concentrations detected at MW-NASB-74 during 1999 (refer to Table 5 in Monitoring Event 14 and 15 Reports). Therefore, it is possible that the presence of these compounds may be related to site-wide low level VOC impacts, rather than a specific source located upgradient of MW-NASB-227.

7. (ED). Section 1.2, Paragraph 2. Delete "proposed" as the remedy is now final since the ROD has been signed.

   Response—The text will be edited as recommended.

   "long-term effectiveness of the ~~proposed~~ remedial action...."

8. (ED/MTG). We didn't receive the updated cross-section (Figure 2.1 to the 1998 final report) referred to in the response to comments for Monitoring Events 14 and 15. This figure

should be included in the annual reports as it greatly aids in understanding the 3-dimensional hydrogeology of Site 9. We concur with omitting the rest of the detailed geological information out of the annual reports.

Response—The following text and figure have been added to the end of the last paragraph of Section 1.2:

> *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. A geologic cross-section of the site is shown in Figure 1-3 to illustrate general site geology.*

As noted during the 11 April 2000 Technical Meeting, the description of other site geological information will not be included in the Annual Report, unless additional data are collected that would warrant reassessment of geological conditions.

9. (ED). LT-901 graphs don't have any 1999 data. Also what was the VOC source in December 1998; was it a laboratory artifact?

   Response—There were no detections of VOCs at LT-901 (seep leachate sample) during 1999 (refer to Table 9 in the Monitoring Event 14 Report, and Table 10 in the Monitoring Event 15 Report). We believe the commentator is referring to the November 1998 data; no data were collected during December 1998. The VOCs detected in November 1998 included several compounds detected at concentrations less than 2 µg/L (refer to Table 8 in Monitoring Event Report 13).

10. (ED). Good note on the graphs with the caveats acetone and methylene chloride artifacts not included in total VOCs.

    Response—Comment noted, no response is required.

11. (ED). Merge the two MW-227 graphs on Pages 4 and 34 of 49 into one graph.

    Response—The two MW-227 graphs have been merged into one graph for the Final 1999 Annual Report.

EPA's Comment Summary Table

Number	RR	ED	NR	MTG	Refers to
1	X			X	Rising VOCs
2	X			X	VOCs in SW/SD
3			X	X	Natural Attenuation
4	X			X	NEX Site Affects
5			X	X	Mitigating Factors
6			X	X	MW-227 VOCs
7		X			Text Edit
8		X		X	Geological Cross-Section
9		X			LT-901 Graphs
10		X			----
11		X			Merge MW-227 Graphs

REPORT AND COMMENTS TRACKING FORM, ACTIVE REPORTS FOR LONG-TERM MONITORING PROGRAM
ISSUE DATE: 5/12/2000

Report	Date Distributed	DEP	EPA	Lepage Environmental	Responses to Comments
ANNUAL REPORTS					
1999 Annual Reports					
Draft Site 9	18 FEB 2000	4 APR 2000	10 APR 2000		Includes response to comments on Monitoring Event 14 and 15 Reports, and 1998 Annual Report
Final Site 9	12 MAY 2000				Includes response to comments on Monitoring Event 14 and 15 Reports, and 1998 Annual Report
Draft Sites 1 and 3 and Eastern Plume	20 MAR 2000	7 APR 2000	18 APR 2000		Includes response to comments on Monitoring Event 14 and 15 Reports, and 1998 Annual Report
MONITORING EVENT REPORTS					
Monitoring Event 15 (September 1999)					
Sites 1 & 3 and Eastern Plume	29 NOV 1999	18 JAN 2000	15 DEC 1999		Will respond with Draft 1999 Annual Report
OTHER REPORTS					
LTMP Revisions					
Sites 1 & 3 and Eastern Plume - FINAL	29 FEB 1999				Response to MEDEP and EPA comments on Draft Final included with Final LTMP
Site 2 - FINAL	29 FEB 1999				Response to MEDEP, EPA, and Lepage comments on Draft included with Final LTMP
Building 95 DRAFT	10 MAY 1999	20 JUL 1999	17 MAY 1999		Response to MEDEP and EPA comments on Draft LTMP included with Draft Final LTMP
Building 95 DRAFT FINAL	27 MAR 2000				
Site 9 - FINAL	16 AUG 1999	20 JAN 2000	3 NOV 1999		Will respond with next revision of LTMP
Building 95 Closeout Report					
Building 95 Closeout Report	AUG 1998	8 OCT 1998	22 SEP 1998	16 OCT 1998	Report issued by Harding Lawson Associates

NOTE: Grey areas indicate no comments received.