

Hanscom Field/Hanscom AFB NPL Site – 2nd Five-Year Review

Attachment A – List of Documents Reviewed

GENERAL:

General Plan (replaces Base Comprehensive Plan); prepared by Michael Baker Jr., Inc. October 1998 (Basewide).

Management Action Plan (MAP); prepared by Hanscom AFB, revised February 2002

U.S. Air Force Restoration Program Remedial Project Manager's Handbook; prepared by HQ USAF/ILEVR, revised 2000.

OU-1/IRP Sites 1, 2 and 3:

IRP Removal Actions:

Construction Plans & Specifications, Site 1 Soil Removal and Site Improvement; prepared by Haley & Aldrich, Inc.; April 1987

Construction Plans & Specifications, IRP Drum Removal Phase; prepared by Haley & Aldrich, Inc., April 1987

Demonstration of Vacuum Enhanced Recovery Technology at Site 1, Hanscom AFB, MA (technical report); prepared by Arcadis Geraghty & Miller, June 2000

Feasibility Studies

Final—Focused Feasibility Study, OU-1; prepared by CH2M Hill; May 2000

Proposed Plans

IRP Phase IV-A—Hanscom AFB Area 1, Intro to Remedial Action Plans; prepared by Haley & Aldrich, Inc.; May 1988 (Area 1).

IRP Phase IV-A—Hanscom AFB Area 1, Remedial Action Plan, Site 1; prepared by Haley & Aldrich, Inc.; May 88

IRP Phase IV-A—Hanscom AFB Area 1, Remedial Action Plan, Site 2; prepared by Haley & Aldrich, Inc.; May 88

IRP Phase IV-A—Hanscom AFB Area 1, Remedial Action Plan, Site 3/5; prepared by Haley & Aldrich, Inc.; May 88

IRP Phase IV-A—Hanscom AFB Area 1 Environmental Assessment; prepared by Haley & Aldrich, Inc.; May 1988

Interim Proposed Plan for OU-1; prepared by CH2M Hill; June 2000

Records Of Decision/Decision Documents

Decision Document—Area 1 (Sites 1-5); prepared by Hanscom AFB, April 1988

Decision Document (No Further Response Action Planned for IRP Sites 1, 2, and 3); prepared by Hanscom AFB; April 1992

Final—Interim Record of Decision, Operable Unit 1; prepared by CH2M Hill, November 2000

OU-1 Long Term Monitoring Documents:

Basewide Quality Assurance Project Plan, Long Term Monitoring at Operable Unit 1 and Operable Unit 3 (Site 6 and 21), Hanscom AFB, MA; prepared by IT Corporation, September 2001

Sampling of Volatile Organic Compounds in Groundwater by Diffusion Samplers and a Low-Flow Method, and Collection of Borehole-Flowmeter Data at Hanscom AFB; prepared by USGS, 2000

Evaluation of a Diffusion Sampling Method for Determining Concentrations of Volatile Organic Compounds in Groundwater, Hanscom AFB; prepared by USGS, 2000

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OU-1/IRP Sites 1, 2 and 3 Continued:

Long Term Monitoring Reports prepared by Haley & Aldrich, Inc.,

- Round 4, Report dated November 1990*
- Round 5, Report dated March 1991*
- Round 6, Report dated February 1992*
- Round 6, Revised Report dated June 1994*
- Round 7, Report dated June 1995*
- Round 8, Report dated June 1995*
- Round 9, Report dated January 1997*
- Round 10, Report dated August 1997*
- Round 11, Report dated August 1998*

Analytical Data Package Reports for Long Term Monitoring of Operable Unit 1 prepared by IT Corporation

- Year 1999 Samples*
- April 2000 Samples*
- June 2000 Samples*
- September 2000 Samples*
- November 2000 Samples*
- January 2001 Samples*
- September/November 2001 Samples*
- April 2002 Samples*

Memorandum - Long Term Monitoring of Operable Unit 1 (GC Analysis of May 2001 Samples); prepared by Hanscom AFB; May 2001

Operable Unit 1 Groundwater Collection, Treatment and Recharge System:

Design Analysis Report, Stage II Groundwater Treatment, 2 Volumes; prepared by Haley & Aldrich, Inc., June 1988

Construction Plans & Specifications, Groundwater Treatment Facility—Stage II; prepared by Haley & Aldrich, Inc., June 1988

Report on Bedrock Pump Test Review; prepared by Haley & Aldrich, Inc.; June 1990

IRP Phase IV-B—Recovered Groundwater Treatment System Operations & Management Manual—Revised; prepared by Professional Services Group, Inc., June 1998

Demonstration Plan & Work Plan for In-Situ Substrate Addition to Create Reactive Zones for Treatment of Chlorinated Aliphatic Hydrocarbons (Final); prepared by Arcadis Geraghty & Miller; March 2000

Operable Unit 1 Groundwater Collection, Treatment and Recharge System - Operational Reports:

Start-up Phase Reports for Groundwater Treatment Facility Serving OU-1; prepared by various authors, September 1990 – January 1991

Quarterly Reports on Toxicological Evaluation of Treated Effluent, prepared by various laboratories, January 1991 - 2002

Monthly Discharge Monitoring Reports, 1991-1998; prepared by Metcalf & Eddy, Inc.

Monthly Operation & Discharge Monitoring Reports, 1999 - 2002; prepared by Hanscom AFB & IT Corporation

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OU-2/IRP Site 4:

IRP Phase IV-A—Hanscom AFB Area 1, Remedial Action Plan, Site 4; prepared by Haley & Aldrich, Inc.; May 88

IRP Phase IV-A—Hanscom AFB Area 1 Environmental Assessment; prepared by Haley & Aldrich, Inc.; May 1988 (Area 1—IRP Sites 1, 2, 3/5, and 4).

Decision Document—Area 1 (Sites 1–5); prepared by Hanscom AFB, April 1988

Technical Document to Support No Further Action Planned; prepared by Hanscom AFB, September 1993

Revised Construction Specifications, Site 4 Landfill Cover; prepared by Haley & Aldrich, Inc.; November 1987

Long Term Monitoring Final Summary Report for Site 4; prepared by Environmental Resources Management, Inc.; November 1992

Final Report—Supplemental Sampling and Environmental Update, Site 4 Sanitary Landfill; prepared by O'Brien & Gere Laboratories, Inc., February 1996

Operable Unit 2 Sampling Report; prepared by CH2M Hill, August 1996 (IRP Site 4).

Final—Baseline Human Health Risk Assessment For Operable Unit 2 (Site 4); prepared by CH2M Hill, April 1997 (IRP Site 4).

Final—Baseline Ecological Risk Assessment for Operable Unit 2 (Site 4); prepared by CH2M Hill, April 1997 (IRP Site 4).

Five-Year Review Report #1, Hanscom AFB Superfund Site (OU2-Site 4); prepared by the US Environmental Protection Agency, September 1997 (IRP Site 4).

Final—Operation, Maintenance, and Monitoring of OU-1 and Maintenance of LF04 Quality Program Plan; prepared by IT Corporation, March 2000 (Operable Unit One and Operable Unit 2/IRP Site 4).

OU-2/Site 4 Maintenance: Quarterly Landfill Reports; prepared by IT Corporation, for 1999 to present

OU-3/IRP Site 6:

Final—Ecological Risk Assessment, Site 6 of OU-3; prepared by CH2M Hill, July 1999

Final—Human Health Risk Assessment, Site 6 of OU-3; prepared by CH2M Hill, July 1999

Final—Focused Feasibility Study—OU-3 Site 6 Landfill; prepared by CH2M Hill, May 2000

Final—Proposed Plan for OU-3/Site 6 Landfill; prepared by CH2M Hill, May 2000

Final—Record of Decision, OU-3/Site 6 Landfill; prepared by CH2M Hill, September 2000

Final Design Brief – Remedial Design Operable Unit 3, Site 6 Landfill; prepared by CH2M Hill, April 2001

Final – Environmental Cleanup Plan; prepared by IT Corporation, May 2001

Final – Quality System Plan/Construction Quality Plan; prepared by IT Corporation, May 2001

Final – Remedial Action Report for Landfill Capping Project at Operable Unit 3-Site 6; prepared by IT Corporation, April 2002

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OU-3/IRP Site 6 - Continued:

Interim Remedial Action Report, Site 6 (OU3) Landfill/Former Filter Bed Area; prepared by USEPA, New England Region 1, March 2002

OU-3/IRP Site 6 Long Term Monitoring Documents:

Basewide Quality Assurance Project Plan, Long Term Monitoring at Operable Unit 1 and Operable Unit 3 (Site 6 and 21), Hanscom AFB, MA; prepared by IT Corporation, September 2001

Report on Groundwater Sampling and Analysis at Selected OU-3/Site 6 Monitoring Wells; prepared by Hanscom AFB, February 2001

Final – Baseline Groundwater Monitoring Report for Post-RA Monitoring of Operable Unit 3 Site 6 (December 2001 Samples); prepared by IT Corporation, May 2002

OU-3/IRP Site 21:

Final—Supplemental Remedial Investigation Report, IRP Site 21; prepared by CH2M Hill, July 2000 (IRP Site 21).

Final— Feasibility Study—Operable Unit 3/Site 21; prepared by CH2M Hill, June 2001

Final—Proposed Plan for OU-3/IRP Site 21; prepared by CH2M Hill, July 2001

Final—Record of Decision, OU-3/IRP Site 21; prepared by CH2M Hill, October 2001

AFMC Peer Review Committee Project Summary Report for OU-3/IRP Site 21; prepared by Hanscom AFB, October 2001

OU-3/IRP Site 21 Long Term Monitoring Documents:

Basewide Quality Assurance Project Plan, Long Term Monitoring at Operable Unit 1 and Operable Unit 3 (Site 6 and 21), Hanscom AFB, MA; prepared by IT Corporation, September 2001

Letter Report on April 1999 Groundwater Monitoring at Site 21; prepared by Hanscom AFB

Letter Report on July 1999 Groundwater Monitoring at Site 21; prepared by Hanscom AFB

Letter Report on May 2000 Groundwater Monitoring at Site 21; prepared by Hanscom AFB

Letter Report on Removal Action & October 2000 Groundwater Monitoring at Site 21; prepared by Hanscom AFB

Analytical Data Package Report for Long Term Monitoring of Operable Unit 3/Site 21 (January 2001 Samples); prepared by IT Corporation

Final- May-July 2001 Stage 1 (Pre-RA) Long Term Monitoring Report for OU-3/IRP Site 21; prepared by IT Corporation

Final- October 2001 & January 2002 Stage 1 (Pre-RA) Long Term Monitoring Report for OU-3/IRP Site 21; prepared by IT Corporation

Draft - May 2002 Stage 1 (Pre-RA) Long Term Monitoring Report for OU-3/IRP Site 21; prepared by IT Corporation

Attachment B – Applicable or Relevant and Appropriate Requirements (ARARs)

- B1 - OU1/IRP Sites 1, 2 and 3
- B2 – OU3/IRP Site 6
- B3 – OU3/ IRP Site 21

ATTACHMENT B-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
Hanscom AFB OU-1 Existing Dynamic Groundwater Collection and Treatment System, Institutional Controls and Monitoring ARARs

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Chemical Specific ARARs				
Groundwater	Federal Federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	MCLs are enforceable standards that regulate the concentration of specific organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water supplies. They also may be considered relevant and appropriate for groundwater aquifers potentially used for drinking water. Primary threat COCs in groundwater are VOCs.	The groundwater remediation system will treat extracted groundwater to attain MCLs before discharging the treated groundwater to the recharge basins and drainage ditch. The standards will not be attained within the contaminated plume in the short-term. An interim remedy waiver will be obtained in accordance with CERCLA 121 (d)(4)(A). The selected remedy includes annual groundwater and surface water monitoring in order to track changes in contaminant concentrations over time. MCLs are listed in Table 2-1 for compounds of concern at OU-1.	Relevant and Appropriate
	Federal Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50-141.51)	Non-zero MCLGs are nonenforceable health goals for public water systems. MCLGs are set at levels that would result in no known or expected adverse health effects with an adequate margin of safety. Non-zero MCLGs are to be used as goals when MCLs have not been established for a particular compound of concern.	The groundwater remediation system will treat extracted groundwater to attain MCLGs before discharging the treated groundwater to the recharge basins and drainage ditch. The standards will not be attained in the contaminated plume in the short-term. An interim remedy waiver will be obtained in accordance with CERCLA 121(d)(4)(A). The selected remedy includes annual groundwater and surface water monitoring in order to track changes in contaminant concentrations over time. MCLGs are listed in Table 2-1 for compounds of concern at OU-1.	Relevant and Appropriate
	State Massachusetts Drinking Water Standards (310 CMR 22.00)	These standards establish State MCLs for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water systems. They are to be used where they are more stringent than Federal MCLs.	The groundwater remediation system will treat extracted groundwater to attain State MCLs before discharging the treated groundwater to the recharge basins and drainage ditch. The standards will not be attained in the contaminated plume in the short-term. An interim remedy waiver will be obtained in accordance with CERCLA 121(d)(4)(A). The selected remedy includes annual groundwater and surface water monitoring in order to track changes in contaminant concentrations over time. State MCLs are listed in Table 2-1 for compounds of concern at OU-1.	Relevant and Appropriate
	Massachusetts Contingency Plan (MCP) Method 1 GW-1 Standards (310 CMR 40.0974)	These are promulgated standards for characterizing the risk posed by COCs in groundwater under the MCP. The MCP Method 1 GW-1 standards will only apply for compounds where the standard is more restrictive than the federal MCL or MCLG, or for which no MCL or MCLG currently exists. Primary threat COCs in groundwater are VOCs.	The groundwater remediation system will treat extracted groundwater to attain MCP Method 1 GW-1 standards before discharging the treated groundwater to the recharge basins and drainage ditch. The standards will not be attained within the contaminated plume in the short-term. An interim remedy waiver will be obtained in accordance with CERCLA 121 (d)(4)(A). The selected remedy includes annual groundwater and surface water monitoring in order to track changes in contaminant concentrations over time. MCP Method 1 GW-1 standards are listed in Table 2-1 for compounds of concern at OU-1.	Relevant and Appropriate
Location Specific ARARs				
Surface water and wetlands	Federal Fish and Wildlife Coordination Act (16 USC 661 et seq.)	This act requires consultation with the Fish and Wildlife Service and the state wildlife resource agency if alteration of a body of water, including discharge of pollutants into a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for on-site actions. This provides protection for actions that would affect streams, wetlands, other water bodies or protected habitats. Any action taken should protect fish or wildlife, and include measures developed to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	The selected remedy includes continued operation of the groundwater remediation system and the long-term monitoring of groundwater and short-term monitoring of surface water and sediments. Precautions will be taken to minimize the potential effect on fish and wildlife during these activities.	Relevant and Appropriate
	Wetland sediment and surface water	Federal Protection of Wetlands - Executive Order 11990 (40 CFR 6, Appendix A)	Appendix A of 40 CFR 6 sets forth policy for carrying out provisions of the Protection of Wetlands Executive Order. Under this order, federal agencies are required to minimize the degradation, loss, or destruction of wetlands, and to preserve the natural and beneficial values of wetlands. Appendix A requires that no remedial alternatives adversely affect a wetland if another practicable alternative is available. If no alternative is available, effects from implementing the chosen alternative must be mitigated.	The selected remedy includes continued operation of the groundwater remediation system and the long-term monitoring of groundwater and short-term monitoring of surface water and sediments. No additional actions, other than monitoring, are proposed in the wetlands. No practicable alternative to these remedy components exists. Precautions will be taken to minimize the potential effect on wetlands during these activities.

ATTACHMENT B-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report

Hanscom AFB OU-1 Existing Dynamic Groundwater Collection and Treatment System, Institutional Controls and Monitoring ARARs

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Wetland sediment and surface water	State			
	Massachusetts Wetlands Regulations (310 CMR 10.51-10.60, MGL c. 131, Section 40: Wetlands Protection Act)	These regulations protect inland wetlands such as those found at the site from activities that may alter the resource area. The loss may be permitted with replication of the lost area within two growing seasons.	The selected remedy includes continued operation of the groundwater remediation system and the long-term monitoring of groundwater and short-term monitoring of surface water and sediments. No additional actions, other than monitoring, are proposed in the wetlands. Activities at the site will be performed in compliance with the performance standards of these regulations.	Applicable
Other Natural Resources	Federal			
	Protection of Floodplains, Executive Order 11988 (40 CFR 6, Appendix A)	Appendix A of 40 CFR 6 sets forth policy for carrying out provisions of the Protection of Floodplains Executive Order. Under this order, federal agencies are required to avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial values of the floodplain.	According to the Comprehensive Ecological Analysis (LEC, August 1997), portions of OU-1 are located within a 100-year floodplain. The selected remedy includes continued operation of the existing groundwater remediation system, and the long-term monitoring of groundwater and the short-term monitoring of surface water and sediment. No practicable alternative to these remedy components exists. The floodplain storage capacity and hydraulics will not be changed by this remedy.	Applicable
	State Massachusetts Endangered Species Act, 321 CMR 10.00, (MGL c. 131A)	The Commonwealth of Massachusetts has authority to research, list, and protect any species deemed endangered, threatened, or of other special concern. These species are listed as either endangered, threatened, or species of special concern in the regulations. Actions must be conducted in a manner that minimizes the effect on Massachusetts-listed endangered species and species listed by the Massachusetts Natural Heritage Program.	According to the Massachusetts Natural Heritage Atlas (2000-2001), portions of OU-1 have been designated as Priority Habitats of Rare Species. The selected remedy includes continued operation of the groundwater remediation system and the long-term monitoring of groundwater and the short-term monitoring of surface water and sediment. Precautions will be taken to minimize the potential effect on endangered species.	Applicable
Action Specific ARARs				
Surface water	Federal			
	Clean Water Act National Pollutant Discharge Elimination System (NPDES) Regulations (40 CFR 122-125 and 131)	These regulations establish discharge limitations, monitoring requirements and best management practices for any direct discharge from a point source into surface water.	The selected remedy includes continued operation of the groundwater remediation system, which includes the discharge of effluent from the treatment plant to a drainage channel. The effluent will be sampled and analyzed to ensure compliance with regulatory discharge parameters.	Applicable
	Federal Ambient Water Quality Criteria (AWQC), 33 U.S.C 1314(a); (40 CFR Part 122.44)	Federal AWQC include (1) criteria for protection of human health from toxic properties of contaminants ingested through drinking water and aquatic organisms, and (2) criteria for protection of aquatic life.	Contaminant concentrations in the Wetland B/Beaver Pond Area surface water will be measured during short-term monitoring to determine whether water quality is being impacted by contaminated groundwater migrating from the upper aquifer, and to assure that AWQC are being met.	Relevant and Appropriate
	State Clean Waters Act - Surface Water Discharge Permit Program (314 CMR 3.00; MGL c. 21 Sections 26-53)	This act and program establish the requirements intended to maintain the quality of surface waters by controlling the direct discharge of pollutants to surface waters. Direct discharges of wastewater to surface waters must meet effluent discharge limits established by this program.	The selected remedy includes continued operation of the groundwater remediation system, which includes the discharge of effluent from the treatment plant to a drainage channel. The effluent will be sampled and analyzed to ensure compliance with regulatory discharge parameters.	Applicable
Massachusetts Surface Water Quality Standards (314 CMR 4.05(3)(b)5-8; MGL c.21 Sections 26-53)	These regulations limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained. Discharges may be limited or prohibited to protect existing uses and not interfere with the attainment of designated uses in downstream and adjacent segments. This may pertain to both discharges to surface water as a result of remediation and any onsite surface waters affected by site conditions.	Contaminant concentrations in the Wetland B/Beaver Pond Area surface water will be measured during short-term monitoring to determine whether water quality is being impacted by contaminated groundwater migrating from the upper aquifer, and to assure that Massachusetts Surface Water Quality Standards are being met.	Relevant and Appropriate	
Groundwater	Federal Resource Conservation and Recovery Act (RCRA) 40 CFR Part 264, Subpart F-Releases from Solid Waste Management Units (40 CFR 264.90-264.101 and 265.90-265.94)	General facilities requirements for groundwater monitoring at affected facilities and general requirements for corrective action programs, if required, at the affected facilities.	Groundwater monitoring will be conducted in accordance with these requirements.	Relevant and Appropriate

ATTACHMENT B-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
Hanscom AFB OU-1 Existing Dynamic Groundwater Collection and Treatment System, Institutional Controls and Monitoring ARARs

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Groundwater	State MA Hazardous Waste Management Rules (HWMR) Groundwater Protection (310 CMR 30.660-30.679)	These regulations require groundwater monitoring at specified regulated units that treat, store or dispose of hazardous waste. Maximum concentration limits for the hazardous constituents are specified in 310 CMR 30.668.	Groundwater monitoring will be conducted in accordance with these requirements.	Relevant and Appropriate
	MA Standards for Analytical Data for Remedial Response Action, Bureau of Waste Site Cleanup Policy 300-89.	This policy describes the minimum standards for analytical data submitted to the MADEP.	All sampling plans will be designed with consideration of the analytical methods provided in this policy.	To Be Considered
	Massachusetts Groundwater Discharge Permit Program (314 CMR 5.00; MGL c.21 Sections 26-53)	This program is designed to protect state groundwaters for their highest potential use by regulating discharges of pollutants to state groundwaters and requiring the MADEP to regulate the outlets for groundwater discharges and associated treatment works. These regulations set effluent limits for the discharge of pollutants to groundwater. Recharge wells used exclusively to replenish an aquifer with uncontaminated water are exempt from this requirement. Uncontaminated water is water which upon discharge could not cause a violation of applicable water quality standards.	The selected remedy includes continued operation of the groundwater remediation system, which includes the potential discharge of treated water to the ground via recharge basins. Discharge of treated water to groundwater would comply with the substantive requirements of these regulations.	Relevant and Appropriate
Waste	Federal RCRA Identification and Listing of Hazardous Wastes (40 CFR 261.24)	These requirements establish the maximum concentrations of contaminants for which the waste would be a RCRA-characteristic hazardous waste for toxicity.	The selected remedy includes continued operation of the groundwater remediation system, which includes the potential generation of wastes which may be classified as hazardous. These materials potentially include the activated carbon from the vacuum enhanced recovery system and the waste byproduct from the groundwater treatment plant. Under CERCLA, only the substantive requirements of these regulations would apply to this alternative.	Applicable
	RCRA Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262)	Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations.	The selected remedy includes continued operation of the groundwater remediation system, which includes the potential generation of wastes which may be classified as hazardous. These materials potentially include the activated carbon from the vacuum enhanced recovery system and the waste byproduct from the groundwater treatment plant. Under CERCLA, only the substantive requirements of these regulations would apply to this alternative.	Applicable
	State MA HWMR, Use and Management of Containers, 310 CMR 30.689; Storage and Treatment in Tanks, 310 CMR 30.699	These regulations set forth requirements for use and management of containers and tanks at hazardous waste facilities.	Packing and accumulation of treatment sludges and other materials will adhere to these standards.	Relevant and Appropriate
	Massachusetts Hazardous Waste Management Rules (HWMR), 310 CMR 30.300-30.371, Requirements for Generators	Establishes requirements and standards for generators of hazardous waste that address general waste management measures, including the accumulation of hazardous waste prior to off-site disposal, preparing the hazardous wastes for shipment, and preparing appropriate waste manifests.	The selected remedy includes continued operation of the groundwater remediation system, which includes the potential generation of wastes which may be classified as hazardous. Under CERCLA, only the substantive requirements of these regulations would apply to this alternative.	Relevant and Appropriate

ATTACHMENT B-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report

Hanscom AFB OU-1 Existing Dynamic Groundwater Collection and Treatment System, Institutional Controls and Monitoring ARARs

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Air	<i>Federal</i>			
	RCRA - Air Emission Standards for Process Vents, 40 CFR Part 264, Subpart AA	These regulations establish requirements for controlling emissions from process vents associated with treatment processes that manage hazardous wastes with organic concentrations of 10 ppm or more.	If air stripping involves management of hazardous waste with organic concentrations of at least 10 ppm, equipment used in remedial activities will meet the requirements and be monitored for compliance.	Relevant and Appropriate
	RCRA, Air Emission Standards for Equipment Leaks 40 CFR 264, Subpart BB	Contains air pollutant emission standards for equipment leaks at hazardous waste TSD facilities. Contains design specifications and requirements for monitoring for leak detection. It is applicable to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight.	If groundwater treatment involves management of hazardous waste with organics of at least 10 ppm, equipment will meet the design specifications, and will be monitored for leaks.	Relevant and Appropriate
	USEPA Policy on Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites, Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-28	Provides guidance on the control of air emissions from air strippers used at Superfund sites and distinguishes between requirements for attainment and nonattainment areas for ozone.	Controls on air stripping will be used as necessary to attain state ARARs criteria and guidance.	To Be Considered
	USEPA New England Region memorandum, 12 July 1989 from Louis Gitto to Merrill S. Hohman	States that Superfund air strippers in ozone nonattainment areas generally merit controls on all VOC emissions.	Remedial actions, including air strippers, will include controls to reduce VOC emissions.	To Be Considered
	<i>State</i>			
MADEP Off-Gas Treatment of Point Source Remedial Air Emissions (Policy No. WSC-94-150)	This policy establishes permitting requirements for air stripper installations.	This policy will be considered when planning and designing the use of air strippers in remedial activities at the site.	To Be Considered	
Massachusetts Air Pollution Control Regulations (310 CMR 7.18)	These regulations establish the standards and requirements for air pollution control in the Commonwealth. Section 7.18 details requirements for air pollution controls for volatile organic compounds.	The selected remedy includes the continued operation of the groundwater remediation system. Air from the stripping towers passes through GAC units and is continuously monitored for VOC concentrations prior to discharge to the atmosphere. Air monitoring will continue, and VOC emissions will be managed through engineering controls during treatment activities. Under CERCLA, only the substantive requirements of these regulations would apply to this alternative.	Applicable	
<p>ARARs - Applicable or relevant and appropriate requirements. RCRA - Resource Conservation and Recovery Act. CFR - Code of Federal Regulations. CMR - Code of Massachusetts Regulations CWA - Clean Water Act. EPA - Environmental Protection Agency. MGL - Massachusetts General Laws USC - United States Code.</p> <p>NPDES - National Pollutant discharge elimination system. CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act. SDWA - Safe Drinking Water Act. GAC - Granular Activated Carbon VOC - Volatile Organic Compounds</p>				

**ATTACHMENT B-2, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-3/IRP Site 6 Remedial Action ARARs**

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Chemical Specific ARARs				
Surface Soil	Site Specific Federal-EPA Risk Reference Doses (RfDs) ^(a)	RfDs are dose levels developed based on noncarcinogenic effects and are used to develop Hazard Indices. A Hazard Index of less than or equal to 0.1 is considered acceptable. Primary COCs for surface soil include PAHs and inorganics.	This alternative includes installation of permeable caps over the landfill areas, implementation of institutional controls controlling future land use, and excavation of contaminated wetland sediments to prevent exposure to contaminated soils.	To Be Considered
	Federal-EPA Human Health Assessment Group Cancer Slope Factors ^(a)	Cancer slope factors are developed by the EPA from Health Effects Assessments and are used to develop excess cancer risks. The only COCs for the surface soil were carcinogens, a carcinogenic risk of less than or equal to 1×10^{-6} is acceptable. Primary COCs for surface soil include PAHs and inorganics.	This alternative includes installation of permeable caps over the landfill areas, implementation of institutional controls controlling future land use, and excavation of contaminated wetland sediments to prevent exposure to contaminated soils.	To Be Considered
Groundwater	Federal Federal Safe Drinking Water Act MCLs (40 CFR 141.11-141-16)	This act consists of promulgated standards or levels (concentrations) for a broad range of contaminants of concern (COCs) in public drinking water supplies. It may be considered relevant and appropriate for groundwater aquifers used for drinking water. The site groundwater is not currently being used and will not be used in the future. The applicability of the ARARs will be at the compliance boundary. Primary threat COCs include VOCs, PAHs, and arsenic.	This alternative includes annual groundwater monitoring in order to track changes in contaminant concentrations over time as natural flushing continues to occur.	Relevant & Appropriate
	State Massachusetts Contingency Plan GW 1 Standards (310 CMR 40.0974)	This act consists of promulgated standards or levels (concentrations) for COCs in groundwater under Massachusetts DEP Method 1 standards. The MCP GW-1 standards will only apply for compounds where the state standard is more restrictive than the federal MCL and/or MCLGs or for which no MCL and/or MCLG currently exists. The site groundwater is not currently being used and will not be used in the future. The applicability of the ARARs will be at the compliance boundary. Primary threat COCs include VOCs, PAHs, and arsenic.	This alternative includes annual groundwater monitoring in order to track changes in contaminant concentrations over time as natural flushing continues to occur.	Applicable
	Site Specific Federal-EPA Risk Reference Doses (RfDs) ^(a)	RfDs are dose levels developed based on noncarcinogenic effects and are used to develop Hazard Indices. A Hazard Index of less than or equal to 0.1 is considered acceptable. Primary threat COCs include VOCs, PAHs, and arsenic.	This alternative includes annual groundwater monitoring in order to track changes in contaminant concentrations over time as natural flushing continues to occur.	To Be Considered
	Federal-EPA Human Health Assessment Group Cancer Slope Factors ^(a)	Cancer slope factors are developed by the EPA from Health Effects Assessments and are used to develop excess cancer risks. A carcinogenic risk of less than or equal to 1×10^{-6} is acceptable. Primary threat COCs include VOCs, PAHs, and arsenic.	This alternative includes annual groundwater monitoring in order to track changes in contaminant concentrations over time as natural flushing continues to occur.	To Be Considered
Location Specific ARARs				
Wetlands Surface water	Federal Fish and Wildlife Coordination Act (16 USC 661et seq.)	These acts provide protection and consultation with the US Fish and Wildlife Service and State counterpart for actions that would affect streams, wetlands, other water bodies or protected habitats. Any action taken should protect fish or wildlife, and measures developed to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	Alternative #3 - <i>Permeable Cap</i> includes excavation of contaminated wetland sediments, placement of clean sediment that will support the existing ecological wetlands system, followed by the planting of submerged and bordering species as appropriate. Standard good engineering practices and precautions will be taken to minimize or eliminate the potential effects of these actions on fish and wildlife, and efforts will be made to enhance the overall condition of the wetlands through replication. Consultation with Natural Resource agencies will be performed.	Applicable

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OU-3/IRP Site 6 Remedial Action ARARs**

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Wetland soil and surface water	Federal			
	Protection of Wetlands - Executive Order 11990 (40 CFR 6, Appendix A)	Appendix A of 40 CFR 6 sets forth policy for carrying out provisions of the Protection of Wetlands Executive Order. Under this order, federal agencies are required to minimize the degradation, loss, or destruction of wetlands, and to preserve the natural and beneficial values of wetlands. Appendix A requires that no remedial alternatives adversely affect a wetland if another practicable alternative is available. If no alternative is available, effects from implementing the chosen alternative must be mitigated. Public notice and review of activities involving wetlands is required.	COCs have been detected in wetland soils at the site, therefore, those areas have already been impacted. Alternative #3 - <i>Permeable Cap</i> includes excavation and removal of contaminated wetland sediments, followed by the placement of clean sediment and planting of submerged and bordering plant species that will support the existing ecological wetlands system in the excavated areas. The permeable cap over the Former Filter Bed Area will prevent soil erosion that might transport contaminated soil into the wetland areas. During cap construction and wetland sediment excavation, drainage controls will be constructed and standard engineering practices will be implemented to minimize or eliminate the potential effects of these actions on the surrounding wetlands. There is no practical alternative to this action and it is the least invasive protective action. Public review will be accomplished through the Proposed Plan.	Applicable
	Clean Water Act, (Section 404 (b)(1), 40 CFR 230) Guidelines for Specification of Disposal Sites for Dredged or Fill Material	The purpose of this act is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material. Dredged or fill material should not be discharged into the aquatic ecosystem unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern. Public notice is required.	Alternative #3 - <i>Permeable Cap</i> includes excavation of contaminated wetland sediments, placement of clean sediment that will support the existing ecological wetlands system, followed by the planting of submerged and bordering species as appropriate. Standard engineering practices and precautions will be taken to minimize the potential effect on surface waters through erosion and drainage controls, and efforts will be made to enhance the overall condition of the wetlands through the replication. There is no practical alternative to this action and it is the least invasive protective action. Public review will be accomplished through the Proposed Plan.	Applicable
	State			
	Massachusetts Wetlands Regulations (310 CMR 10.51-10.60, MGL c. 131, Section 40: Wetlands Protection Act)	These regulations protect inland wetlands such as those found at the site from activities that may alter the resource area. The loss may be permitted with replication of the lost area within two growing seasons.	Alternative #3 - <i>Permeable Cap</i> includes excavation and replication of contaminated wetland sediments. Clean sediment that will support the existing ecological wetlands system will be placed in the excavated areas, followed by the planting of submerged and bordering species as appropriate. Activities at the site will be performed in compliance with the performance standards of these regulations.	Applicable
All forms of media at the site	Federal			
	Migratory Bird Treaty Act of 1972, (16 USC Section 703)	This act protects almost all species of native birds in the U.S. from unregulated "taking" which can include poisoning at contaminated or hazardous waste sites.	According to the Comprehensive Ecological Analysis (LEC, August 1997), migratory birds have been observed in Wetland Z. Alternative #3 - <i>Permeable Cap</i> includes the removal of contaminated sediments and the enhanced replication of the wetland. Standard engineering practices and precautions will be taken to minimize the potential effect on migratory birds, and efforts will be made to enhance the overall condition of the wetlands through the replication.	Applicable
	Protection of Floodplains, Executive Order 11988 (40 CFR 6, Appendix A)	Appendix A of 40 CFR 6 sets forth policy for carrying out provisions of the Protection of Floodplains Executive Order. Under this order, federal agencies are required to avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial values of the floodplain. Agencies are also required to circulate a notice explaining why action within the floodplain is proposed.	According to the Comprehensive Ecological Analysis (LEC, August 1997), wetland Z is located within a 100-year floodplain. Alternative #3 - <i>Permeable Cap</i> includes the removal of contaminated sediments, followed by the planting of submerged and bordering plant species and the enhanced replication of the wetland. Efforts will be made to conduct the work during the dry season to avoid potential flooding. The floodplain storage capacity and hydraulics will not be changed significantly by this alternative. There is no practical alternative to this action and it is the least invasive protective action. Public notice and review of proposed activities will be accomplished through the Proposed Plan.	Applicable
	State			
	Massachusetts Endangered Species Act, 321 CMR 10.00, (MGL c. 131A)	The Commonwealth of Massachusetts has authority to research, list, and protect any species deemed endangered, threatened, or of other special concern. These species are listed as either endangered, threatened, or species of special concern in the regulations. Actions must be conducted in a manner that minimizes the effect on Massachusetts-listed endangered species and species listed by the Massachusetts Natural Heritage Program.	According to the Comprehensive Ecological Analysis (LEC, August 1997), the spotted turtle (a species of Special Concern, as listed by Massachusetts), has been observed in Wetland Z. Alternative #3- <i>Permeable Cap</i> includes excavation and replication of contaminated wetland sediments. These activities will be designed to minimize the potential effect on this species and to enhance the overall status of the wetlands.	Applicable

**ATTACHMENT B-2, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-3/IRP Site 6 Remedial Action ARARs**

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Action Specific ARARs				
Surface water	Federal National Pollutant Discharge Elimination System (NPDES) (40 CFR 122-125 and 131), Clean Water Act	Establishes discharge limitations, monitoring requirements and best management practices for any direct discharge from a point source into surface water.	Under Alternative #3 - <i>Permeable Cap</i> , during cap construction drainage controls will be constructed and standard engineering precautions will be taken to minimize/eliminate potential effects of these activities.	Applicable
	State Clean Waters Act - Surface Water Discharge Permit Program (314 CMR 3.00; MGL c. 21 Sections 26-53)	This act and program regulate the requirements intended to maintain the quality of surface waters by controlling the direct discharge of pollutants to surface waters. Direct discharges of wastewater to surface waters must meet effluent discharge limits established by this section. These limits are established on a case-by-case basis.	Under Alternative #3- <i>Permeable Cap</i> construction of the cap will prevent the erosion of contaminated soil into surface waters. During cap construction drainage controls will be constructed and standard engineering precautions will be taken to minimize/eliminate potential effects of the action.	Applicable
	Massachusetts Surface Water Quality Standards (314 CMR 4.05(3)(b)5-8; MGL c.21 Sections 26-53)	These regulations limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained. Discharges may be limited or prohibited to protect existing uses and not interfere with the attainment of designated uses in downstream and adjacent segments. This may pertain to both discharges to surface water as a result of remediation and any onsite surface waters affected by site conditions.	Under Alternative #3- <i>Permeable Cap</i> , during cap construction (and after if permanent point drainage structures are constructed) drainage controls will be constructed and standard engineering precautions will be taken to minimize/eliminate potential effects of the action.	Applicable
Waste	State Solid Waste Disposal Laws (MGL c. 21H, MGL c. 111, 150A-150A 1/2) 310 CMR 19.100-151	These regulations specify general design and performance standards for the South and West landfill cover systems, potential gas control, storm water control, closure, monitoring, corrective action, and post-closure care. These regulations apply to all solid waste management activities and facilities including landfills and dumping grounds.	Under alternative 3 - <i>Permeable Cap</i> , the action includes the excavation of waste material from the area east of the former filter bed area and removal of contaminated wetlands sediment. These materials will be placed within the OU3/Site 6 filter bed area prior to installation of the permeable cap. The alternative will address the relevant and appropriate performance requirements of these regulations for the South and West landfills. A monitoring program will be developed to monitor and maintain the South and West landfill areas after construction.	Relevant & Appropriate
	Hazardous Waste disposal Laws (MGL c.21C), 310 CMR 30.001-009, 30.590-593, 30.633, 30.660-666.	These regulations specify general design and performance standards for the filter bed cover system, potential gas control, storm water control, closure, monitoring, corrective action, and post-closure care. These regulations apply to all hazardous waste management facilities.	Under alternative 3 - <i>Permeable Cap</i> , the action includes the excavation of waste material from the area east of the former filter bed area and removal of contaminated wetlands sediment. These materials will be placed within the OU3/Site 6 filter bed area prior to installation of the permeable cap. The alternative will address the relevant and appropriate performance requirements of these regulations for the former filter bed area. A monitoring program will be developed to monitor and maintain the filter bed area after construction.	Relevant & Appropriate
Air	State Massachusetts Air Pollution Control Regulations (310 CMR 7.09)	These regulations establish the standards and requirements for air pollution control in the Commonwealth. Section 7.09 details requirements for ambient air quality standards (dust, odor) during construction and demolition activities.	Under Alternative #3- <i>Permeable Cap</i> , excavation and material handling operations associated with capping activities could generate ambient air quality issues. Remedial actions will be conducted with air monitoring equipment, and engineering controls will be implemented during construction, as required, to meet the regulations.	Applicable
<p>ARARs - Applicable or relevant and appropriate requirements. RCRA - Resource Conservation and Recovery Act. CFR - Code of Federal Regulations. CWA- Clean Water Act. EO - Executive Order. EPA - Environmental Protection Agency. FR - Federal Register. USC - United States Code.</p> <p>NPDES-National Pollutant discharge elimination system. CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act. SDWA - Safe Drinking Water Act. ⁽⁹⁾ Toxicity information obtained from U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS) 1999, and Health Effects Assessment Summary Tables (HEAST) FY1998</p>				

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**ATTACHMENT B-3, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-3/IRP Site 21 Selected Remedy (Alternative 12) ARARs**

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Chemical Specific ARARs				
Groundwater	Federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)	MCLs are enforceable standards that regulate the concentration of specific organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water supplies. They also may be considered relevant and appropriate for groundwater aquifers potentially used for drinking water. Primary threat COCs in groundwater are VOCs.	Federal Alternative 12 includes excavation of petroleum-saturated soil from LNAPL Pools A and B and "hot spots" in LNAPL Pool C and decreases in the dissolved concentrations of both the LNAPL associated contaminants and the chlorinated VOCs through natural attenuation. Following removal of the contaminant source ORC will be added to the excavation for an initial treatment of groundwater. Following the initial ORC treatment the dissolved-phase contaminant concentrations will continue to decrease through natural attenuation. Alternative 12 also includes contingencies for pumping and/or treating the groundwater in order to contain migration and/or reduce dissolved-phase concentrations. This alternative includes annual groundwater monitoring in order to track decreases in LNAPL volume and dissolved-phase contaminant concentrations over time. MCLs are listed in Table 2-15 for compounds of concern at OU-3/IRP Site 21.	Relevant and Appropriate
	Federal Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50-141.51)	Non-zero MCLGs are nonenforceable health goals for public water systems. MCLGs are set at levels that would result in no known or expected adverse health effects with an adequate margin of safety. Non-zero MCLGs are to be used as goals when MCLs have not been established for a particular compound of concern.	Alternative 12 includes excavation of petroleum-saturated soil from LNAPL Pools A and B and "hot spots" in LNAPL Pool C and decreases in the dissolved concentrations of both the LNAPL associated contaminants and the chlorinated VOCs through natural attenuation. Following removal of the contaminant source ORC will be added to the excavation for an initial treatment of groundwater. Following the initial ORC treatment the dissolved-phase contaminant concentrations will continue to decrease through natural attenuation. Alternative 12 also includes contingencies for pumping and/or treating the groundwater in order to contain migration and/or reduce dissolved-phase concentrations. This alternative includes annual groundwater monitoring in order to track decreases in LNAPL volume and dissolved-phase contaminant concentrations over time.	Relevant and Appropriate
	Massachusetts Drinking Water Standards (310 CMR 22.00)	These standards establish State MCLs for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water systems. They are to be used where they are more stringent than Federal MCLs.	State Alternative 12 includes excavation of petroleum-saturated soil from LNAPL Pools A and B and "hot spots" in LNAPL Pool C and decreases in the dissolved concentrations of both the LNAPL associated contaminants and the chlorinated VOCs through natural attenuation. Following removal of the contaminant source ORC will be added to the excavation for an initial treatment of groundwater. Following the initial ORC treatment the dissolved-phase contaminant concentrations will continue to decrease through natural attenuation. Alternative 12 also includes contingencies for pumping and/or treating the groundwater in order to contain migration and/or reduce dissolved-phase concentrations. This alternative includes annual groundwater monitoring in order to track decreases in LNAPL volume and dissolved-phase contaminant concentrations over time.	Relevant and Appropriate
	Massachusetts Contingency Plan Method 1 GW-1 Standards (310 CMR 40.0974)	These are promulgated standards for characterizing the risk posed by COCs in groundwater under MCP. The MCP Method 1 GW-1 standards will only apply for compounds where the state standard is more restrictive than the federal MCL or MCLG, or for which no MCL or MCLG currently exists. Primary threat COCs in groundwater are VOCs.	Alternative 12 includes excavation of petroleum-saturated soil from LNAPL Pools A and B and "hot spots" in LNAPL Pool C and decreases in the dissolved concentrations of both the LNAPL associated contaminants and the chlorinated VOCs through natural attenuation. Following removal of the contaminant source ORC will be added to the excavation for an initial treatment of groundwater. Following the initial ORC treatment the dissolved-phase contaminant concentrations will continue to decrease through natural attenuation. Alternative 12 also includes contingencies for pumping and/or treating the groundwater in order to contain migration and/or reduce dissolved-phase concentrations. This alternative includes annual groundwater monitoring in order to track decreases in LNAPL volume and dissolved-phase contaminant concentrations over time. MCP Method 1 GW-1, GW-2, and GW-3 standards are listed in Table 2-15 for compounds of concern at OU-3/IRP Site 21.	Relevant and Appropriate

ATTACHMENT B-3, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-3/IRP Site 21 Selected Remedy (Alternative 12) ARARs

Media	Requirement	Requirement Purpose	Action to be Taken to Attain Requirement	Status
Location Specific ARARs Surface water and wetlands	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	This act requires consultation with the Fish and Wildlife Service and the state wildlife resource agency if alteration of a body of water, including discharge of pollutants into a wetland, will occur as a result of off-site remedial activities. Consultation is strongly recommended for on-site actions. This provides protection for actions that would affect streams, wetlands, other water bodies or protected habitats. Any action taken should protect fish or wildlife, and include measures developed to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	Federal According to the Comprehensive Ecological Analysis (LEC, August 1997), the Shawshen River and it's banks are part of the Wetland Z System, however, Alternative 12 does not alter the river or discharge pollutants into a wetland. Since Alternative 12 includes excavating a trench approximately 120 to 200 feet south of the Shawshen River and the discharge of treated groundwater into the base storm drainage system which discharges into the river, precautions will be taken to ensure that the alternative does not alter the river or discharge pollutants into a wetland. These include the installation of hay bales and/or silt fencing between the site and the river to ensure that surface runoff from the open excavation area does not transport silt into the river and/or wetland. Also the effluent from the groundwater treatment system will be sampled and analyzed to ensure compliance with regulatory discharge parameters.	Applicable
Other Natural Resources	Protection of Floodplains, Executive Order 11988 (40 CFR 6, Appendix A)	Appendix A of 40 CFR 6 sets forth policy for carrying out provisions of the Protection of Floodplains Executive Order. Under this order, federal agencies are required to avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial values of the floodplain.	Federal According to the Comprehensive Ecological Analysis (LEC, August 1997), the Shawshen River and it's banks (Zone 5) are located within a 100-year floodplain, however, Alternative 12 does not include any activities within the 100-year floodplain. Also the floodplain storage capacity and hydraulics will not be changed by this alternative. Since Alternative 12 includes excavating a trench approximately 120 to 200 feet south of the Shawshen River, precautions will be taken to ensure that this alternative has no effect on the natural and beneficial values of the floodplain. These include the installation of hay bales and/or silt fencing between the site and the 100-year floodplain to ensure that surface runoff from the open excavation area does not transport silt into the floodplain.	Applicable
	Massachusetts Endangered Species Act, 321 CMR 10.00, (MGL c. 131A)	The Commonwealth of Massachusetts has authority to research, list, and protect any species deemed endangered, threatened, or of other special concern. These species are listed as either endangered, threatened, or species of special concern in the regulations. Actions must be conducted in a manner that minimizes the effect on Massachusetts-listed endangered species and species listed by the Massachusetts Natural Heritage Program.	State According to the Comprehensive Ecological Analysis (LEC, August 1997), the spotted turtle (a species of Special Concern, as listed by Massachusetts), has been observed in the Wetland Z System, however, Alternative 12 does not include any activities within the wetland. Since Alternative 12 includes excavating a trench approximately 120 to 200 feet south of the Shawshen River and long-term monitoring of groundwater including some wells adjacent to the river, precautions will be taken to minimize the potential effect on endangered species. These include the briefing of site workers that if the spotted turtle is observed in the area of site work then actions (stop work or relocate turtle out of danger) are to be taken to preclude threatening or endangering the turtle. The requirement for this briefing will be included in the construction work plan and operation, maintenance, and monitoring plan.	Applicable

**ATTACHMENT B-3, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-3/IRP Site 21 Selected Remedy (Alternative 12) ARARs**

Media	Requirement	Regulatory Cyclopedia	Actions to be Taken to Attain Requirement	Status
Action Specific ARARs				
Surface water	Clean Water Act National Pollutant Discharge Elimination System (NPDES) Regulations (40 CFR 122.125 and 131)	These regulations establish discharge limitations, monitoring requirements and best management practices for any direct discharge from a point source into surface water.	<i>Federal</i> Alternative 12 includes recovery, treatment, and discharge of groundwater to the base storm drainage system which has outfalls in the Shawshen River. The effluent from the groundwater treatment system will be sampled and analyzed to ensure compliance with regulatory discharge parameters.	Relevant and Appropriate
	Federal Ambient Water Quality Criteria (AWQC), 33 U.S.C. 1314(a); (40 CFR Part 122.44)	Federal AWQC include (1) criteria for protection of human health from toxic properties of contaminants ingested through drinking water and aquatic organisms, and (2) criteria for protection of aquatic life.	Contaminant concentrations in monitoring wells adjacent to the Shawshen River will continue to be monitored to determine whether river water quality is being impacted by contaminated groundwater, and to assure that AWQC are being met.	Relevant and Appropriate
	Clean Waters Act - Surface Water Discharge Permit Program (314 CMR 3.00; MGL c. 21 Sections 26-53)	This act and program establish the requirements intended to maintain the quality of surface waters by controlling the direct discharge of pollutants to surface waters. Direct discharges of wastewater to surface waters must meet effluent discharge limits established by this program.	Alternative 12 includes recovery, treatment, and discharge of groundwater to the base storm drainage system which has outfalls in the Shawshen River. The effluent from the groundwater treatment system will be sampled and analyzed to ensure compliance with regulatory discharge parameters.	Relevant and Appropriate
	Massachusetts Surface Water Quality Standards (314 CMR 4.05(3)(b)5-8; MGL c.21 Sections 26-53)	These regulations limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained. Discharges may be limited or prohibited to protect existing uses and not interfere with the attainment of designated uses in downstream and adjacent segments. This may pertain to both discharges to surface water as a result of remediation and any onsite surface waters affected by site conditions.	Contaminant concentrations in monitoring wells adjacent to the Shawshen River will continue to be monitored to determine whether river water quality is being impacted by contaminated groundwater, and to assure that MA standards are being met.	Relevant and Appropriate
Groundwater	<i>Federal</i> RCRA 40 CFR Part 264, Subpart F- Releases from Solid Waste Management Units (40 CFR 264.90-264.101 and 265.90-265.94)	General facilities requirements for groundwater monitoring at affected facilities and general requirements for corrective action programs, if required, at the affected facilities.	Groundwater monitoring will be conducted in accordance with these requirements.	Relevant and Appropriate
	Federal Safe Drinking Water Act Underground Injection Control Program (UIC) Subparts C, D and E (40 CFR 144.21-144.55)	These regulations require acquiring a permit in order to inject wastes, chemicals or other substances into the subsurface.	Alternative 12 includes injection of ORC into the groundwater. To ensure that the ORC injection complies with the substantive requirements of these regulations the proposed quantities to be injected will be included in the design and submitted to EPA and MA DEP for comment and concurrence and the groundwater monitoring program will assess the impact of the ORC. Also the contingency for groundwater recovery from the trenches receiving the ORC can be implemented to remove the ORC if determined to be necessary.	Relevant and Appropriate
	<i>State</i> MA HWMR Groundwater Protection (310 CMR 30.660-30.679)	These regulations require groundwater monitoring at specified regulated units that treat, store or dispose of hazardous waste. Maximum concentration limits for the hazardous constituents are specified in 310 CMR 30.668.	Groundwater monitoring will be conducted in accordance with these requirements.	Relevant and Appropriate
	Massachusetts Groundwater Discharge Permit Program (314 CMR 5.00; MGL c.21 Sections 26-53)	This program is designed to protect state groundwaters for their highest potential use by regulating discharges of pollutants to state groundwater and requiring the MADEP to regulate the outlets for groundwater discharges and associated treatment works. These regulations set effluent limits for the discharge of pollutants to groundwater. Recharge wells used exclusively to replenish an aquifer with uncontaminated water are exempt from this requirement. Uncontaminated water is water which upon discharge could not cause a violation of applicable water quality standards.	Alternative 12 does not include any discharge to groundwater. However, Alternative 12 does include injection of ORC into the groundwater. To ensure that the ORC injection complies with the substantive requirements of these regulations the proposed quantities to be injected will be included in the design and submitted to EPA and MA DEP for comment and concurrence and the groundwater monitoring program will assess the impact of the ORC. Also the contingency for groundwater recovery from the trenches receiving the ORC can be implemented to remove the ORC if determined to be necessary.	Relevant and Appropriate
	MA Application of Remedial Additives (310 CMR 40.0046)	These regulations consist of requirements for the application of remedial additives to the subsurface.	Alternative 12 includes injection of ORC into the groundwater. To ensure that the ORC injection complies with the substantive requirements of these regulations the proposed quantities to be injected will be included in the design and submitted to EPA and MA DEP for comment and concurrence and the groundwater monitoring program will assess the impact of the ORC. Also the contingency for groundwater recovery from the trenches receiving the ORC can be implemented to remove the ORC if determined to be necessary.	Relevant and Appropriate
	MA Standards for Analytical Data for Remedial Response Action, Bureau of Waste Site Cleanup Policy 300-89	This policy describes the minimum standards for analytical data submitted to the MADEP.	All sampling plans will be designed with consideration of the analytical methods provided in this policy.	To Be Considered
	MA Underground Injection Control (UIC) Program (310 CMR 23.01-23.11)	These regulations require acquiring a permit in order to inject wastes, chemicals or other substances into the subsurface.	Alternative 12 includes injection of ORC into the groundwater. To ensure that the ORC injection complies with the substantive requirements of these regulations the proposed quantities to be injected will be included in the design and submitted to EPA and MA DEP for comment and concurrence and the groundwater monitoring program will assess the impact of the ORC. Also the contingency for groundwater recovery from the trenches receiving the ORC can be implemented to remove the ORC if determined to be necessary.	Relevant and Appropriate

**ATTACHMENT B-3, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-3/IRP Site 21 Selected Remedy (Alternative 12) ARARs**

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status	
Action Specific ARARs					
Waste	Federal Resource Conservation and Recovery Act (RCRA) Identification and Listing of Hazardous Wastes (40 CFR 261.24)	These requirements establish the maximum concentrations of contaminants for which the waste would be a RCRA-characteristic hazardous waste for toxicity.	Alternative 12 includes the disposal of recovered petroleum product and petroleum-saturated soil which may be classified as hazardous. Also this alternative includes groundwater treatment. The treatment method would have the potential to generate hazardous wastes such as activated carbon used to treat groundwater. Disposal of these wastes will comply with the substantive requirements of these regulations.	Applicable	
	RCRA Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262)	Massachusetts has been delegated the authority to administer these RCRA standards through its state hazardous waste management regulations.	Alternative 12 includes the disposal of recovered petroleum product and petroleum-saturated soil which may be classified as hazardous. Also this alternative includes groundwater treatment. The treatment method would have the potential to generate hazardous wastes such as activated carbon used to treat groundwater. Disposal of these wastes will comply with the substantive requirements of these regulations.	Applicable	
	State				
	MA HWMR, Use and Management of Containers, 310 CMR 30.689; Storage and Treatment in Tanks, 310 CMR 30.699	These regulations set forth requirements for use and management of containers and tanks at hazardous waste facilities.	Packing and accumulation of recovered product, treatment sludges, and other material will adhere to these standards.	Relevant and Appropriate	
	Massachusetts Hazardous Waste Management Rules (HWMR), 310 CMR 30.300-30.371, Requirements for Generators	Establishes requirements and standards for generators of hazardous waste that address general waste management measures, including the accumulation of hazardous waste prior to off-site disposal, preparing the hazardous wastes for shipment, and preparing appropriate waste manifests.	Alternative 12 includes the disposal of recovered petroleum product and petroleum-saturated soil which may be classified as hazardous. Also this alternative includes groundwater treatment. The treatment method would have the potential to generate hazardous wastes such as activated carbon used to treat groundwater. Disposal of these wastes will comply with the substantive requirements of these regulations.	Applicable	
Solid Waste Disposal Laws (MGL c. 21H, MGL c. 111, Sections 150A-150A 1/2) 310 CMR 19.100-151	These regulations govern the disposal of solid waste in Massachusetts	Disposal of solid waste resulting from remedial activities associated with this alternative will have to be disposed of properly in accordance with these laws.	Relevant and Appropriate		
Air	Federal RCRA - Air Emission Standards for Equipment Leaks (42 USC 6924, 40 CFR 264, Subpart BB)	Contains air pollutant emission standards for equipment leaks at hazardous waste TSD facilities. Contains design specifications and requirements for monitoring for leak detection. It is applicable to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight.	If petroleum product recovery or groundwater treatment involves management of hazardous waste with organics of at least 10 ppm, equipment will meet the design specifications, and will be monitored for leaks.	Relevant and Appropriate	
	State Massachusetts Air Pollution Control Regulations (MGL c.111 Sections 142A-142M, 310 CMR 7.09 and 7.18)	These regulations establish the standards and requirements for air pollution control in the Commonwealth. Section 7.09 details requirements for ambient air quality standards (dust, odor) during construction and demolition activities. Section 7.18 details requirements for air pollution controls for volatile organic compounds.	Alternative 12 includes excavation of petroleum-saturated soils and the excavation and material handling operations could generate ambient air quality issues. Air monitoring will be conducted during excavation and soil management activities such as the potential use of landfarming to treat petroleum contaminated soil on-site. Remedial actions will be conducted with air monitoring equipment, and engineering controls will be implemented as required to meet the regulations. Under CERCLA, only the substantive requirements of these regulations would apply to this alternative.	Applicable	
ARARs - Applicable or relevant and appropriate requirements. RCRA - Resource Conservation and Recovery Act. CFR - Code of Federal Regulations. CMR - Code of Massachusetts Regulations. CWA - Clean Water Act. EPA - Environmental Protection Agency. MGL - Massachusetts General Laws. USC - United States Code.		NPDES - National Pollutant Discharge Elimination System. CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act. SDWA - Safe Drinking Water Act. GAC - Granular Activated Carbon. VOC - Volatile Organic Compounds.			

Attachment C – OU-1 System Operational Data

C - 1 – Key Dates/Milestones

C - 2 – Summary Report of Operations for December 2001

C - 3 – Chart – Groundwater Treated, 1991-2001

C - 4 – Chart – Influent TCE Concentrations, 1991-2002

C - 5 – Table – Quarterly Effluent Toxicity Analysis Summary

C - 6 – Table – Site 1 VER System Liquid Effluent Concentrations (On-Site GC/Lab)

C - 7 – Chart – Site 1 VER System Liquid Effluent Concentrations (On-Site GC/Lab)

C - 8 – Table – Site 1 VER Operational Data

C - 9 – Chart – Site 1 VER System Air Influent On-Site FID Results

C -10 – Table – Sites 1, 2 & 3 Pump Stations On-Site GC Results

C -11 – Chart – Site 1 Pump Station On-Site GC Results

C -12 – Chart – Site 2 Pump Station On-Site GC Results

C -13 – Chart – Site 3 Pump Station On-Site GC Results

C -14– Table – Boundary Interceptor Wells #1, #2 & #3 On-Site GC Results

C -15– Chart – Boundary Interceptor Well #1 On-Site GC Results

C -16– Chart – Boundary Interceptor Well #2 On-Site GC Results

C -17– Chart – Boundary Interceptor Well #3 On-Site GC Results

C -18– Table – Boundary Interceptor Well #4 and IW #5 & #6 On-Site Results

C -19– Chart – Boundary Interceptor Well #4 On-Site GC Results

C -20– Chart – Interceptor Well #5 On-Site GC Results

C -21– Chart – Interceptor Well #6 On-Site GC Results

C -22– Table – Interceptor Wells #7, #8 & #9 On-Site GC Results

C -23– Table – Interceptor Wells #10 On-Site GC Results

C -24– Chart – Interceptor Well #10 On-Site GC Results

C -25– Table – VER Recovery Wells #1 & #2 On-Site GC Results

C -26– Table – VER Recovery Wells #3 & #4 On-Site GC Results

C -27– Chart – VER Recovery Well #1 On-Site GC Results

C -28– Chart – VER Recovery Well #2 On-Site GC Results

C -29– Chart – VER Recovery Well #3 On-Site GC Results

C -30– Chart – VER Recovery Well #4 On-Site GC Results

ATTACHMENT C-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-1 Groundwater Collection, Treatment and Recharge System
Key Dates/Milestones

1989-1990 - Construction - Note there was significant dewatering associated with the construction of the collection trenches. Volume pumped exceeded capacity of temporary/construction stripper and the majority of the water was transferred to holding basins and eventually soaked back into the ground.

Fall 1990 thru March 1991 - startup testing - 1st gallon of contaminated water on 13 Nov 90. Facility operated sporadically through April 91.

23 April 1991 - O&M contractor starts operations, however it appears that the BIW's were not turned on until much later. Records are sketchy but first notes indicate that sporadic operation of BIW's commenced in Jul 93. However, due to insufficient pumping capacity from the Site 1 pump station, operation of BIW's #1 & 2 was minimal until 25 April 95 when the Site 1 pump was replaced by a temporary Flygt pump. Also all treated water was recharged at Sites 2 & 3 until 29 May 91.

7 May 91 - Commenced 24 hour operations - Initially at 238 gpm but immediately started decreasing to a level of 100+/- gpm by the end of Dec 91 where it stabilized. Plant operated at 100+/- gpm thru 11 Feb 1993.

6 Jan 92 - Recharge to Site 2 stopped due to loss of recharge capacity/iron bacteria fouling of recharge piping.

19 Feb 92 - Test pit at Site 2 Recharge Basin confirmed iron bacteria fouling of recharge piping and found evidence of it in the sand & gravel bedding.

4 Mar 92 - Stopped recharging to Site 3 due to loss of recharge capacity/iron bacteria fouling of recharge piping - Commenced discharging everything to drainage ditch.

Feb 93 - Installed booster pumps at 3 pump stations in effort to overcome iron bacteria fouling of the piping between collection trenches and treatment plant. Collecting system pumping capacity increased to 290+/- gpm by 31 May 93 (as adjustments were made), however, following the initial increase, the gpm decreased to a level of 200 +/- gpm as the iron bacteria built backup in the piping from pump stations to the plant.

Apr 93 - Field test of pigging at Site 2.

12-17 Oct 93 - System down for the acid cleaning of the stripping towers.

7 Jun 94 - Periodic pigging of piping between collection trenches and treatment plant begins and gpm increases to 270+/-.

25 Apr 95 - Installed Flygt pump at Site 1 pump station to increase pumping rate to 110+/- gpm which allowed for pumping from BIW #1 & #2. Note, prior to this date, BIW #1 & #2 were only operated intermittently for fear of flooding the pump station. Pump test indicate that Site 3 pumps 140 gpm with Site 1 off but with Site 1 also pumping into the same line to the plant the combined total of Site 1 & 3 = 238 gpm. Site 2 can pump 150+/- gpm when functioning properly.

6 Sep 95 - Pressured cleaned Site 2 recharge piping followed by 2-week recharge test.

27 Mar 96 - BIW #1 failure.

20 May 96 - BIW #1 pump replaced.

16 Jul 96 - Preconstruction meeting on contract to automate the facility and upgrade pump stations.

ATTACHMENT C-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-1 Groundwater Collection, Treatment and Recharge System
Key Dates/Milestones

2-21 Oct 96 – Recharge at Sites 2 & 3.

8 Oct 96 thru 26 Jan 97 – Replaced pumps in all three pump stations with bigger pumps. Facility kept partially operational during period with temporary pumps. Operation of pumps staggered manually as capacity of new pumps exceeds the plant's processing capacity.

9 Dec 96 thru 31 Jan 97 - Recharged at Site 3.

13 Dec 96 – SCADA system operational and system operated automatically (unmanned for evening & night shifts).

13-17 Apr 97 - System down for the acid cleaning of the stripping towers.

25 Apr 97 – BIW #1 failure.

21 May 97 – BIW #1 pump replaced.

12 Aug 97 – Commenced pumping from IW #6 which is screened in the bedrock aquifer downgradient from the Site 1 pump station.

13 Aug 97 – Commenced pumping from IW #5 which is screened in the lower aquifer downgradient from the Site 2 collection trench.

27 Aug 97 – BIW #1 fails again. Determined that the direct burial electrical service from Site 1 transformer had gone bad.

24/25 Sep 97 – Installed flow meters at BIW's.

21 Oct thru 8 Nov 97 – Installed variable speed drives at each pump station to provide the capability to operate all 3 pump stations simultaneously. However, minimum setting at Site 3 is 100 gpm, which is greater than desired. Therefore, Site 3 is operated cyclically to maximize recovery from pump stations at Site 1 & Site 2.

29 Oct 97 – Startup of AFCEE Demonstration Project for Vacuum Enhanced Recovery @ Site 1 in vicinity of monitoring well RAP1-3R.

30 Oct 97 – New electrical service & bigger pump installed at BIW #1.

8 Dec 97 – 20 Jun 98 – VER @ Site 1 operational.

29 Jun 98 thru 10 Jul 98 – System down for the cleaning and repacking of the stripping towers.

23 – 27 Jul 98 – System down due to lightning damage.

1 Sep - 12 Nov 98 – Recharging at Site 2.

1 Oct - 12 Nov 98 – Recharging at Site 3.

13 Oct 98 – Restarted VER @ Site 1, operated thru 6 April 99 when Demonstration Project concluded.

9 Apr 99 – Commenced pumping from 3 VER monitoring wells (GM MW2, 3 & 4) which were converted to groundwater recovery wells. These wells redesignated IW #7, IW #8 & IW #9.

28 Apr 99 - Restarted VER @ Site 1 as component of the OU1 remedial system.

ATTACHMENT C-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-1 Groundwater Collection, Treatment and Recharge System
Key Dates/Milestones

- 29 Jun 99 – VER shutdown due to ineffective carbon/high humidity.
- 21 Jul 99 – Commenced pumping from IW #10 which was installed in the center of the western most Site 1 fire training pit.
- 22 Oct 99 – Restarted VER @ Site 1.
- 26 Oct - 3 Nov 99 – Replace operating computer/system upgrade for Y2K compliance.
- 8 Feb 00 – Shutdown and remove pump at IW #5 as on-off controls were not functioning.
- 15 Mar 00 – Cleaned pump intake screen at Sites 1, 2 & 3.
- 14 Apr 00 – Re-installed IW #5 pump after cleaning.
- 3 – 17 May 00 – G&M drilling wells for IRZ (molasses) demonstration.
- 29 May 00 – Shutdown and removed IW #5, controls malfunctioning again.
- 23-24 Aug 00 – Installed new monitoring wells RAP1-7S and RAP 1-7T in Bedford Community Gardens.
- 20 Aug 00 – BIW #3 failed.
- 30 Aug 00 – Re-installed IW #5 pump after cleaning.
- 25 Sep – 3 Oct 00 – Acid cleaned towers/partial startup 29 Sep – returned to full operation 3 Oct.
- 29 Sep 00 – Commenced recharging at Site 3.
- 3 Oct 00 – Commenced recharging at Site 2.
- 11 Oct 00 – G&M commenced molasses injections.
- 21 Nov 00 – Electrical service for BIW #3 replaced and pump back on line.
- 3 Jan 01 – Recharging at Site 2 stopped (commenced 3 Oct 00) due to fouling of distribution pipes/clogging of beds.
- 23 Mar 01 – Replaced propane vaporizer.
- 3 Apr 01 – Shutdown and removed pump at IW #5, controls malfunctioning again.
- 27 Apr 01 – BIW #3 failed.
- 4-8 May 01 – G&M installed monitoring well IRZ #5.
- 7 May 01 – Re-installed IW #5 pump after cleaning.
- 7 June 01 – BIW #10 failed.
- 11 June 01 – Replaced BIW #3 with bigger pump.

ATTACHMENT C-1, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
OU-1 Groundwater Collection, Treatment and Recharge System

Key Dates/Milestones

18 June 01 – Commenced permanganate injection pilot study/suspended VER system operation and recovery from IW-7 for duration of study. 19 & 21 June injected into VER RW-2. On 20 June attempted to inject into VER RW-1 and IW-7 but both wells would only accept a small amount.

20 – 23 June 01 - System down due to lightning damage.

6 Jul 01 – Recharging at Site 3 stopped (commenced 29 Sep 00) in preparation for the suspension of recovery from site due to low concentrations.

6 Jul 01 – Commenced recharging at Site 2.

13 July 01 – Replaced BIW #10 pump.

6/7 Aug 01 – 2nd permanganate injection. Entire batch injected into RAP1-3S.

22 Aug 01 – Suspended recovery at Site 3 due to low concentrations.

18 Sep 01 – Replaced pumps at the Site 1 and Site 2.

18 Sep 01 – Replaced BIW #4 with bigger pump.

25/26 Oct 01 – 3rd permanganate injection. Split batch between RAP1-3R and IW-9.

26 Dec 01 – Recharging at Site 2 stopped (commenced 6 Jul 01) due to cold weather and fouling of distribution pipes/clogging of beds.

21 Jan 02 – Re-commenced recharging at Site 2 but at low (5-10 gpm) rate.

10 Jul 02 – Power failure and subsequent surges burned out VFDs and other controls at Site 2 and Site 3

12 Jul 02 – Installed Flygt pump at Site 2 as interim measure to allow for semi-normal operations with plant total of 100 gpm.

18 Jul 02 – Installed larger Flygt pump at Site 2 to increase plant total rate to 165 gpm (from 100 gpm).

OU 1 GROUNDWATER COLLECTION, TREATMENT and RECHARGE SYSTEM, HANSCOM AFB, MA
SUMMARY REPORT FOR DECEMBER 2001

<u>I COLLECTION</u>	<u>GALLONS</u>	<u>AVE GPM</u>	<u>% of TOTAL</u>	<u>TCE ppb</u>	<u>CIS 1,2-DCE ppb</u>	<u>TCE-CIS RATIO</u>
<u>SITE 1 PUMP STATION</u>						
SITE 1 COLLECTION TRENCH	312,422	7.0	4.3%	ns	ns	
VER (VW-1 thru VW-4)	0	0.0	0.0%	see breakout by well		
VER (IW-7 thru IW-9)	0	0.0	0.0%	see breakout by well		
INTERCEPTOR WELL NO. 10	3,048	0.1		13	bdl	unk
INTERCEPTOR WELL NO. 1	603,751	13.5	8.4%	104	bdl	unk
INTERCEPTOR WELL NO. 2	499,971	11.2	7.0%	6	24	0.3
INTERCEPTOR WELL NO. 6	151,200 #	3.4	2.1%	3,591	1,535	2.3
TOTAL	1,570,392	35.2	21.9%	291	73	4.0
<u>SITE 2 PUMP STATION</u>						
SITE 2 COLLECTION TRENCH	1,906,693	42.7	26.5%	ns	ns	unk
INTERCEPTOR WELL NO. 3	2,232,000 #	50.0	31.1%	91	27	3.4
INTERCEPTOR WELL NO. 4	1,317,552	29.5	18.3%	237	736	unk
INTERCEPTOR WELL NO. 5	156,240	3.5	2.2%	441	884	0.5
TOTAL	5,612,485	125.7	78.1%	145	304	0.5
<u>SITE 3 PUMP STATION</u>						
SITE 3 COLLECTION TRENCH-TOTAL	0	0.0	0.0%	ns	ns	unk
<u>II TREATMENT</u>						
<u>INFLUENT</u>	<u>GALLONS</u>	<u>AVE GPM</u>				
	7,182,877	160.9				
YEAR TO DATE	127,335,388					
TOTAL SINCE 1991 STARTUP	1,240,870,296					
	<u>Off-site Lab</u>	<u>On-site GC</u>	<u>On-site GC</u>	<u>On-site GC</u>	<u>On-site GC</u>	
VOC's	<u>4-Dec-01</u>	<u>4-Dec-01</u>	<u>13-Dec-01</u>	<u>19-Dec-01</u>	<u>26-Dec-01</u>	
TRICHLOROETHENE - ppb	230	217	214	200	186	
cis-1,2-DICHLOROETHENE - ppb	260	297	285	255	233	
ALL OTHER VOCs - ppb	21.0					
TOTAL - ppb	511.0	514	499	455	419	
AVE OF ALL (4) ON-SITE GC - TCE ppb	204.3					
- CIS ppb	267.5					
<u>III RECHARGE/OFF-SITE DISCHARGE</u>						
	<u>GALLONS</u>	<u>AVE GPM</u>	<u>% of Total</u>			
SITE 2	563,271	12.6	7.8%			
SITE 3	-	0.0	0.0%			
OFF-SITE	6,619,606	148.3	92.2%			
TOTAL	7,182,877	160.9				
	<u>4-Dec-01</u>	<u>4-Dec-01</u>	<u>13-Dec-01</u>	<u>19-Dec-01</u>	<u>26-Dec-01</u>	
MID-POINT- VOC's - ppb	bdl	bdl	bdl	bdl	bdl	
EFFLUENT- VOC's - ppb	bdl	bdl	bdl	bdl	bdl	
<u>IV OTHER DATA</u>						
	<u>UNIT</u>	<u>INFLUENT</u>	<u>EFFLUENT</u>			
Ph	SU/MIN-MAX	6.50-6.86	7.14-7.38			
SODIUM	mg/l	16.0	16.0			
IRON	mg/l	1.800	2.400			
MANGANESE	mg/l	0.360	0.040			
<u>V VER AIR</u>						
VOC's - ppmv	System off line all month		<u>INFLUENT</u>	<u>MID-POINT</u>	<u>EFFLUENT</u>	<u>EFFLUENT #2</u>

NOTES:

Average GPM based on round-the-clock operation for the reporting period
 # = Pumping rate and quantity estimated due to broken flow meters
 VER system shut down 14 June permanganate pilot study
 Air stripper influent-effluent results from off-site lab, Severn Trent Laboratories, on 4 December were analyzed by EPA Method 601/602 & midpoint by 601. All other analysis were only for TCE & CIS by our on-site GC.
 Collection system samples for GC analysis were collected 30 Nov or 3 Dec.
 ns = not sampled
 bdl = below detection limits

ATTACHMENT C-2, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
 OU1 GROUNDWATER COLLECTION, TREATMENT and RECHARGE SYSTEM, HANSCOM AFB, MA, 2001 - YTD SUMMARY

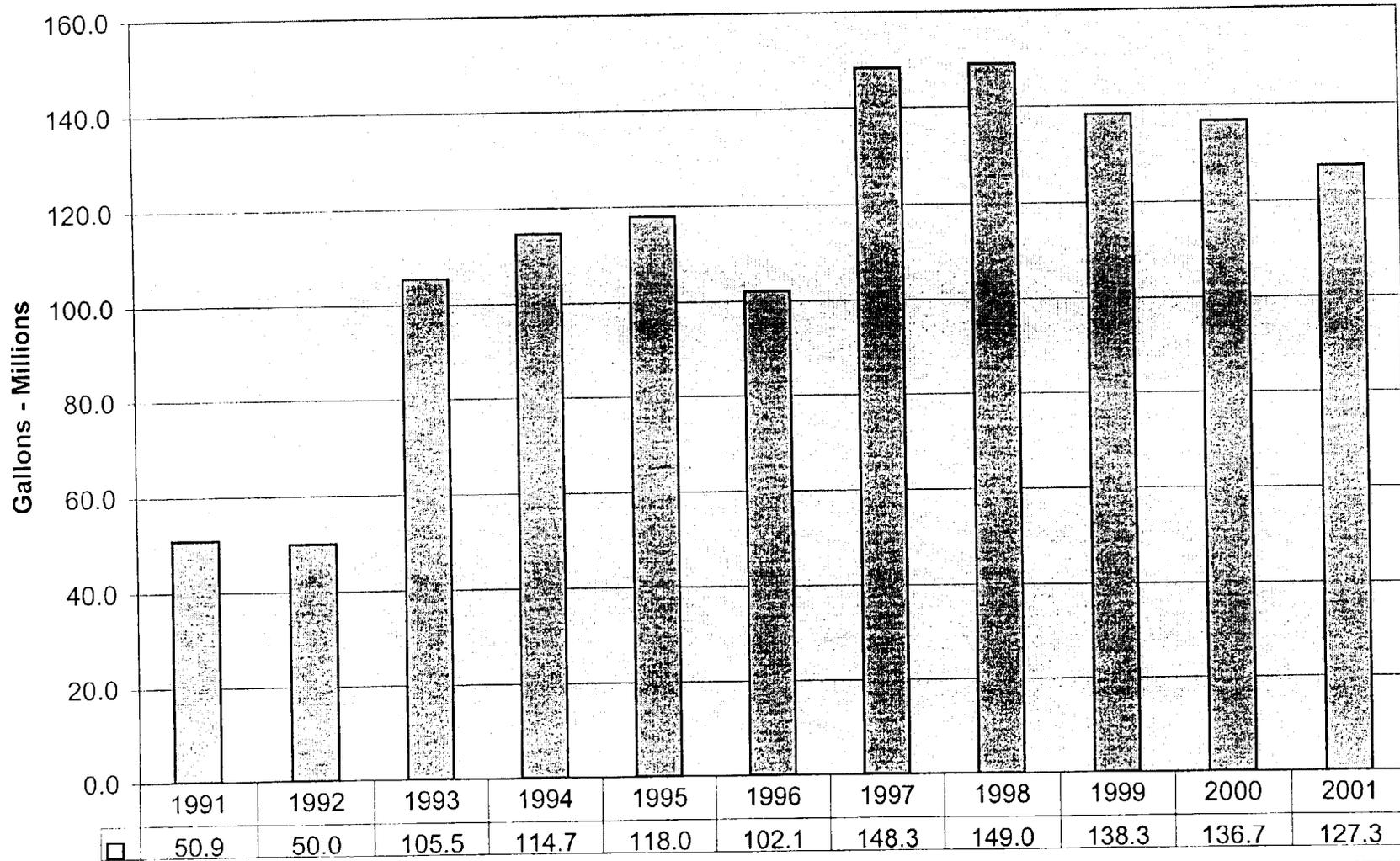
COLLECTION-Gallons

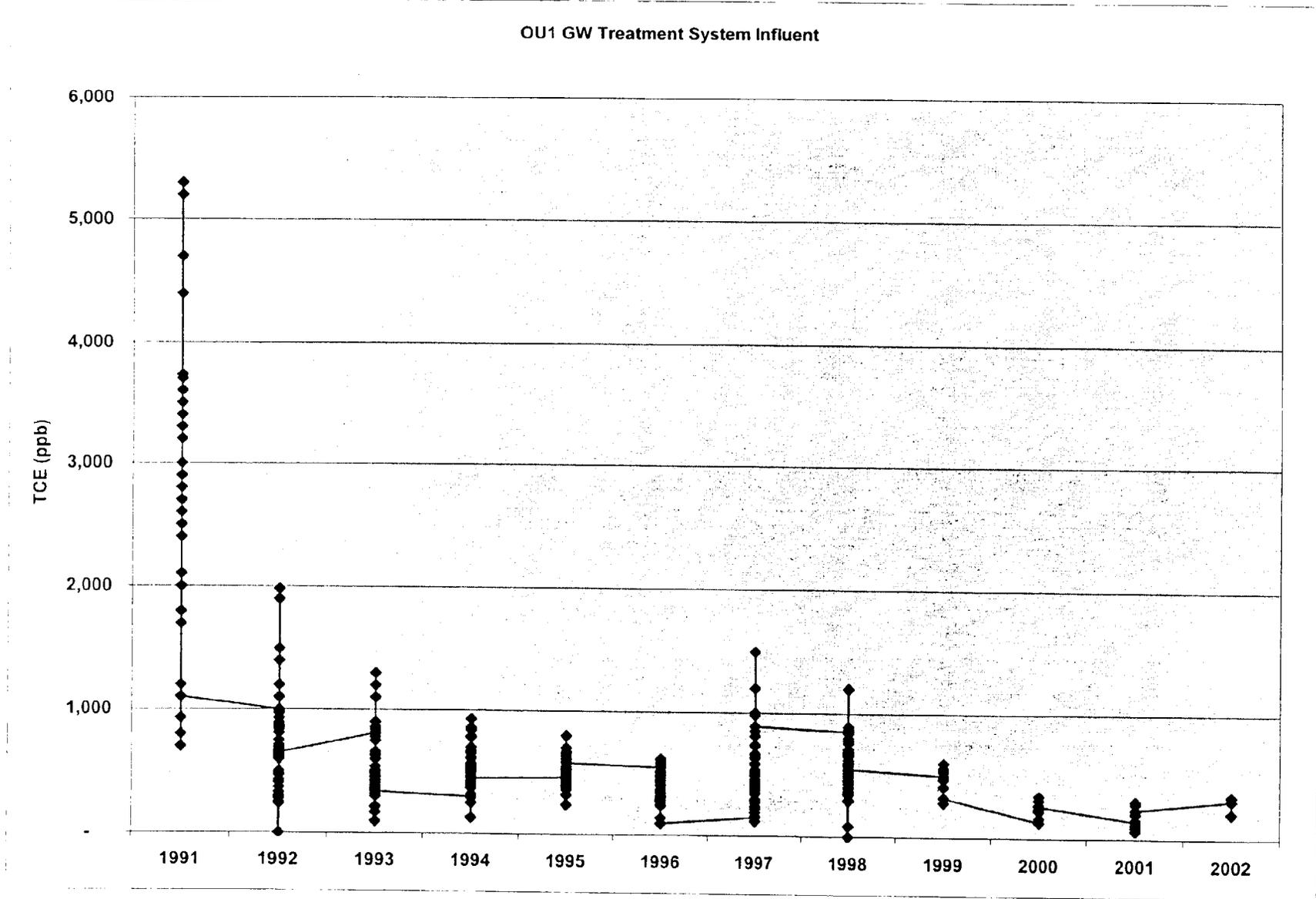
	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	2001 Total	Ave GPM	% of Total
SITE 1 COLLECTION TRENCH	663,475	637,636	691,173	755,165	970,589	743,224	765,759	580,850	389,663	473,394	369,192	312,422	7,352,542	14.0	5.8%
VER (VW-1 thru VW-4)	48,883	60,934	61,301	87,217	33,843	3,170	0	0	0	0	0	0	295,348	0.6	0.2%
VER (IW-7 thru IW-9)	1,098	11,803	1,061	0	31	1,588	0	0	0	0	48	0	15,629	0.0	0.0%
INTERCEPTOR WELL NO. 10	20,685	22,830	55,890	55,899	1,916	0	28,632	43,486	11,933	3,353	2,490	3,048	250,162	0.5	0.2%
INTERCEPTOR WELL NO. 1	877,003	759,134	797,035	865,495	874,052	762,272	836,833	798,201	752,719	707,441	633,773	603,751	9,267,709	17.6	7.3%
INTERCEPTOR WELL NO. 2	330,313	284,757	290,362	276,805	285,271	269,412	280,582	334,073	400,379	449,610	464,497	499,971	4,166,032	7.9	3.3%
INTERCEPTOR WELL NO. 6	224,387	193,997	220,288	209,918	156,240	41,399	100,000	156,240	151,200	156,240	151,200	151,200	1,912,309	3.6	1.5%
SITE 1 PUMP STATION	2,165,844	1,971,091	2,117,110	2,250,499	2,321,942	1,821,065	2,011,806	1,912,850	1,705,894	1,790,038	1,621,200	1,570,392	23,259,731	44.3	18.3%
SITE 2 COLLECTION TRENCH	2,923,197	2,388,257	2,944,676	3,496,595	5,288,234	2,668,546	2,869,557	2,873,316	3,449,684	1,627,163	2,064,465	1,906,693	34,500,383	65.6	27.1%
INTERCEPTOR WELL NO. 3	2,409,286	2,054,491	2,070,460	1,711,031	0	1,907,514	2,232,000	2,232,000	2,160,000	3,124,800	2,160,000	2,232,000	24,293,582	46.2	19.1%
INTERCEPTOR WELL NO. 4	563,369	445,725	500,222	511,266	532,275	472,899	524,549	517,722	627,960	1,123,415	1,240,154	1,317,552	8,377,108	15.9	6.6%
INTERCEPTOR WELL NO. 5	84,979	41,776	1,771	133	81,224	39,133	187,208	205,197	209,468	230,518	246,551	156,240	1,484,198	2.8	1.2%
SITE 2 PUMP STATION	5,980,831	4,930,249	5,517,129	5,719,025	5,901,733	5,088,092	5,813,314	5,828,235	6,447,112	6,105,896	5,711,170	5,612,485	68,655,271	130.6	53.9%
SITE 3 PUMP STATION/COL. TRENCH	4,888,758	4,764,354	4,668,780	4,581,344	4,645,500	4,130,677	4,624,880	3,114,285	0	0	1,808	0	35,420,386	67.4	27.8%
PLANT INFLUENT	13,035,433	11,665,694	12,303,019	12,550,868	12,869,175	11,039,834	12,450,000	10,855,370	8,153,006	7,895,934	7,334,178	7,182,877	127,335,368	242.3	100.0%
GPM	292.0	289.3	275.6	290.5	288.3	255.6	278.9	243.2	188.7	176.9	169.8	160.9			
% of time operating	99.19%	98.68%	94.84%	99.74%	99.95%	89.19%	98.13%	97.35%	98.86%	98.45%	99.79%	99.57%		97.8%	ave time operating
TOTAL VOC's -ppb via off-site lab	276	320	468	181	156	205	187	360	498.9	482	571.0	511	351.32	ave of VOC's-ppb	

DISCHARGE-Gallons

	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Oct-01	Nov-01	Dec-01	2001 Total	Ave GPM	% of Total
SITE 2 Recharge Basin	134,803	-	-	-	-	-	1,110,958	592,471	519,580	396,082	643,467	563,271	3,960,632	7.5	3.1%
SITE 3 Recharge Basin	4,853,794	3,194,090	4,547,718	4,287,022	4,502,507	3,853,436	756,854	-	-	-	-	-	25,995,421	49.5	20.4%
Storm Drainage Ditch/Beaver Pond	8,046,836	8,471,604	7,755,301	8,263,846	8,366,668	7,189,398	10,582,188	10,262,899	7,633,426	7,499,852	6,690,711	6,619,606	97,382,335	185.3	76.5%
TOTAL	13,035,433	11,665,694	12,303,019	12,550,868	12,869,175	11,042,834	12,450,000	10,855,370	8,153,006	7,895,934	7,334,178	7,182,877	127,338,368	242.3	100%

OU-1 Groundwater Treated





OU1 GWT System Quarterly Toxicity Analysis Summary

Ceriodaphnia dubia							Pimephales promelas				
EnviroSystems							LC-50	NOAEL	NOEC-S/G	LOEC-S/G	Chronic V-S/G
DATE	AR#	LC-50	NOAEL	NOEC-S/R	LOEC-S/R	Chronic V/S-R	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Jul-91	121A	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Oct-91	121B	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	Lab problems - No results				
Springborn Laboratories							LC-50	A-NOEC	C-NOEC-S/G	LOEC-S/G	Chronic V-S/G
DATE	AR#	LC-50	A-NOEC	C-NEOC-S/R	LOEC-S/R		>100%	100%	100%/6%	G=12%	
Dec-91	123	>100%	100%	100%/100%			>100%	100%	100%/6%	G=12%	
Dec-91	122						?		100% ?100% est		
Feb-92	124	>100%		100%/100%			>100%		100%/100%		
May-92	139	>100%		100%/100%			>100%		100%/100%		
Sep-92	146	>100%		100%/100%			>100%		25%/100%	S=50%	
Nov-92	147	>100%	100%	50%	100%		>100%	100%	100%/100%		
Feb-93	161	>100%	100%	100%/100%			>100%	100%	100%/100%		
May-93	171	>100%	100%	100%/100%			>100%	100%	100%/100%		
Aug-93	172	>100%	100%	100%/100%			>100%	100%	100%/100%		
Nov-93	173	>100%	100%	100%/100%			>100%	100%	100%/100%		
Feb-94	179	>100%	100%	100%/100%			>100%	100%	100%/100%		
May-94	192	>100%	100%	100%/100%			>100%	100%	100%/100%		
Aug-94	200	>100%	100%	100%/100%			>100%	100%	100%/ok		
Nov-94	212	>100%	100%	100%/100%			>100%	100%	100%/100%		
Feb-95	227	>100%	100%	100%/100%			>100%	100%	100%/100%		
May-95	244	>100%	100%	100%/100%			>100%	100%	100%/100%		
Aug-95	247	>100%	100%	100%/100%			>100%	100%	50%	100%	
Nov-95	252	>100%	100%	50%	100%		>100%	100%	50%	100%	
Feb-96	261	>100%	100%	12.5%	25%		>100%	100%	50%	100%	
EnviroSystems							LC-50	A-NOEC	C-NOEL-S/G	LOEC-S/G	Chronic V/S-G
DATE	AR#	LC-50	A-NOEC	C-NOEL-S/R	LOEC-S/R	Chronic V-S/R	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Jun-96	266	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Aug-96	271	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Jan-97	276	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Mar-97	289	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
May-97	292	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Sep-97	301	>100%	100%	100%/50%	>100%/>100%	>100%/>70.7%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Nov-97	303	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Mar-98	310	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/<6.25%	>100%/>6.25%	>100%/<6.25%
Jul-98	336	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Aug-98	337	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Nov-98	342	>100%	100%	100%/25%	>100%/50%	>100%/35.4%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Severn Trent Laboratories							LC-50	A-NOEC	C-NOEL-S/G	LOEC-S/G	MATC-S/R
DATE	AR#	LC-50	A-NOEC	C-NOEL-S/R	LOEC-S/R	MATC-S/R	>100%	100%	100%/100%	100%/100%	>100%/>100%
Mar-99	351	>100%	100%	100%/100%	100%/100%	>100%/>100%	>100%	100%	25%/NA	50%/NA	>37.5%/NA
Jun-99	358	>100%	100%	100%/100%	100%/100%	>100%/>100%	>100%	100%	100%/100%	100%/100%	>100%/>100%
Sep-99	359	>100%	100%	100%/100%	100%/100%	>100%/>100%	>100%	100%	100%/100%	100%/100%	>100%/>100%
Dec-99	361	>100%	100%	100%/100%	100%/100%	>100%/>100%	>100%	100%	100%/100%	100%/100%	>100%/>100%
EnviroSystems							LC-50	A-NOEC	C-NOEL-S/G	LOEC-S/G	Chronic V/S-G
DATE	AR#	LC-50	A-NOEC	C-NOEL-S/R	LOEC-S/R	Chronic V-S/R	>100%	100%	100%/100%	100%/100%	>100%/>100%
Feb-00	374	>100%	100%	100%/<6.25%	100%/6.25%	100%/<6.25%	>100%	100%	100%/100%	100%/100%	>100%/>100%
May-00	377	>100%	100%	100%/100%	100%/100%	>100%/>100%	>100%	100%	100%/100%	100%/100%	>100%/>100%
Aug-00	397	>100%	100%	100%/<6.25%	100%/6.25%	100%/<6.25%	>100%	100%	100%/100%	100%/100%	>100%/>100%
Dec-00	401	>100%	100%	100%/100%	100%/100%	>100%/>100%	>100%	100%	100%/100%	100%/100%	>100%/>100%
Feb-01	414	>100%	100%	100%/12.5%	>100%/25%	no longer used	>100%	100%	>100%/>100%	100%/100%	no longer used
May-01	425	>100%	100%	100%/25.0%	>100%/50%	no longer used	>100%	100%	>100%/>100%	100%/100%	no longer used
Aug-01	427	>100%	100%	100%/100%	>100%/>100%	no longer used	>100%	100%	50%/50%	100%/100%	no longer used
Nov-01	433	>100%	100%	100%/50.0%	>100%/>100%	no longer used	>100%	100%	>100%/>100%	100%/100%	no longer used
Severn Trent Laboratories							LC-50	A-NOEC	C-NOEL-S/G	LOEC-S/G	MATC-S/R
DATE	AR#	LC-50	A-NOEC	C-NOEL-S/R	LOEC-S/R	MATC-S/R	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Aug-01	428	>100%	100%	100%/100%	>100%/>100%	>100%/>100%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%
Feb-02	443	>100%	100%	100%/25.0%	>100%/50%	>100%/37.5%	>100%	100%	100%/100%	>100%/>100%	>100%/>100%

NOTES:

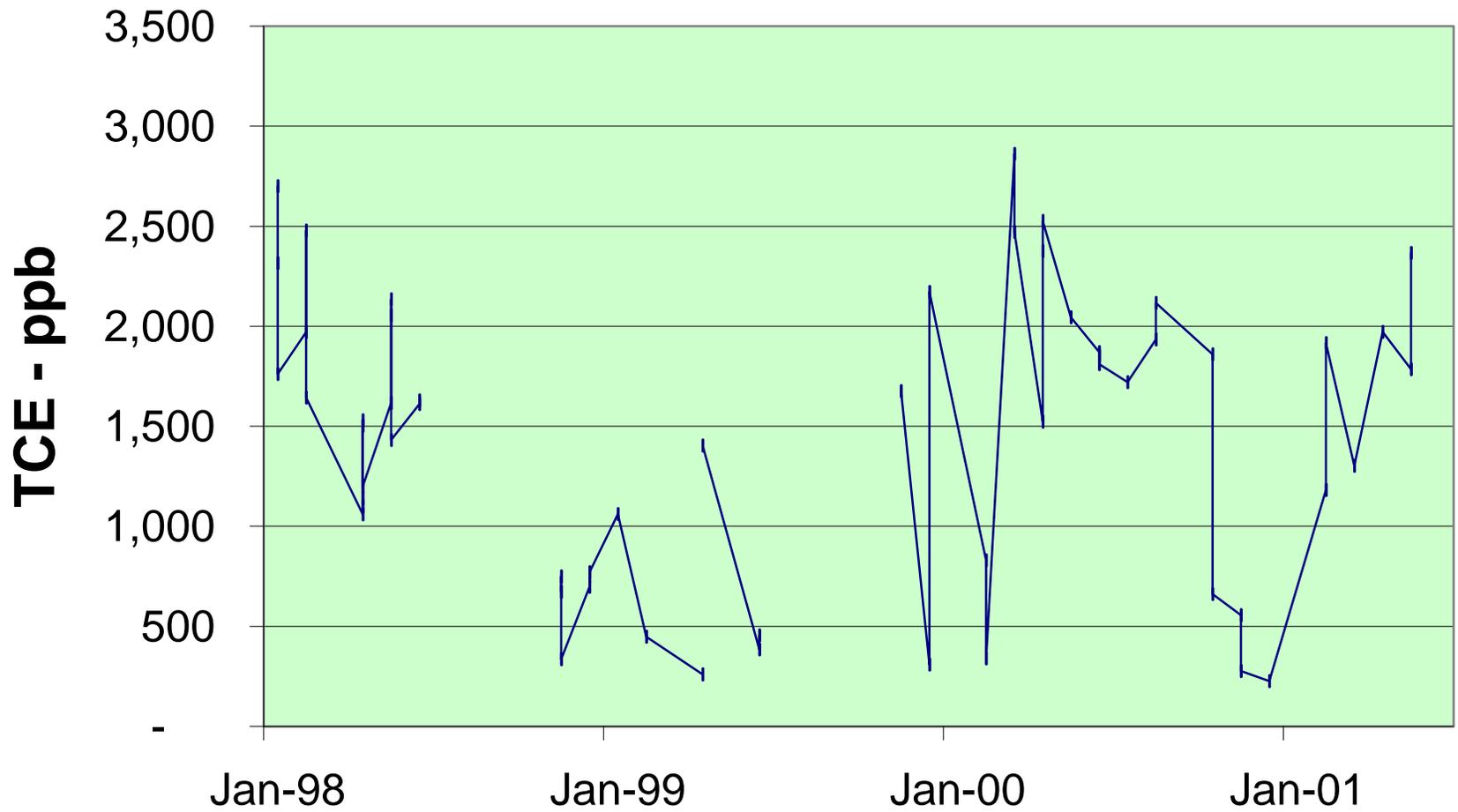
Ceriodaphnia dubia - Survival & Reproduction
 Pimephales promelas (fathead minnow) - Survival & Growth
 AR# = Admin Record Document Number
 LC = Lethal Concentration; LC-50 = effluent concentrations which kills 1/2 of test animals
 LOEC = Lowest Observed Effect Concentration
 NOEC = No Observed Effect Concentration
 NOAEL = No Observed Acute Effect Concentration Level
 MATC = Maximum Allowable Toxicant Concentration (arithmetic mean of C-NOEC & LOEC)

ATTACHMENT C-6, Hanscom Field/Hanscom AFB NPL Superfund Site 2nd Five-Year Review Report

OU1 Site 1 VER System/Recovery Wells 1998-2002 On-site GC Results

<u>SAMPLE DATE</u>	<u>TCE ppb</u>	<u>CIS 1-2 ppb</u>	<u>TCE-CIS RATIO</u>	<u>REMARKS</u>	<u>SAMPLE DATE</u>	<u>TCE ppb</u>	<u>CIS 1-2 ppb</u>	<u>TCE-CIS RATIO</u>	<u>REMARKS</u>
VER EFFLUENT					VER EFFLUENT				
08-Dec-97 DEMONSTRATION PROJECT COMMENCES					17-Feb-00	829	343	2.4	system off 1/28-on 2/17
19-Jan-98	2,700	320	8.4	off-site Savannah Lab	21-Feb-00	339	63	5.4	
26-Jan-98	2,316	445	5.2	May be influent	02-Mar-00	2,861	623	4.6	
26-Jan-98	1,761	273	6.5		22-Mar-00	2,471	567	4.4	
02-Feb-98	1969/1970	290/310	6.8/6.4	Duplicate sample	05-Apr-00	1,523	273	5.6	
18-Feb-98	2,478	545	4.5		13-Apr-00	2,376	428	5.6	
26-Feb-98	1,643	195	8.4		24-Apr-00	2,526	554	4.6	
01-Apr-98	1,060	151	7.0		02-May-00	2,045	422	4.8	
01-Apr-98	1,100	160	6.9	off-site Savannah Lab	14-Jun-00	1,870	378	4.9	
08-Apr-98	1,139	129	8.8		26-Jun-00	1,854	353	5.3	
15-Apr-98	1,502	209	7.2		29-Jun-00	1,810	340	5.3	
24-Apr-98	1,530	271	5.6		12-Jul-00	1,721	404	4.3	
24-Apr-98	1,200	?		off-site Savannah Lab	02-Aug-00	1,934	475	4.1	
08-May-98	1,616	199	8.1		30-Aug-00	2,116	371	5.7	
12-May-98	2,134	259	8.2		31-Aug-00				not sampled
19-May-98	2,055	483	4.3		16-Oct-00	1,859	377	4.9	
26-May-98	1,431	257	5.6		25-Oct-00	661	197	3.4	
04-Jun-98	1,611	285	5.7		08-Nov-00	556	142	3.9	
12-Jun-98	1,630	322	5.1		29-Nov-00	276	223	1.2	
20-Jun-98 PHASE 1 ENDS					20-Dec-00	226	689	0.3	
19-Nov-98	672	76	8.8		01-Feb-01	1,181	345	3.4	
19-Nov-98	750	100	7.5	off-site Savannah Lab	21-Feb-01	1,915	469	4.1	
30-Nov-98	335	49	6.8		15-Mar-01	1,303	376	3.5	
21-Dec-98	698	81	8.6		12-Apr-01	1,972	491	4.0	
21-Dec-98	750	150	5.0	Off-site-STL	01-May-01	1,785	533	3.3	
21-Dec-98	770	85	9.1	off-site Savannah Lab	17-May-01	2,366	973	2.4	
20-Jan-99	1,061	134	7.9		18-Jun-01 VER SUSPENDED FOR PERMANGANATE PILOT STUDY				
25-Feb-99	448	100	4.5						
01-Apr-99	260	31	8.4						
06-Apr-99 PHASE 2/DEMONSTRATION PROJECT ENDS									
28-Apr-99 RESTARED AS COMPONENT OF REMEDIAL ACTION									
30-Apr-99	1,403	216	6.5						
02-Jun-99	384	58	6.6						
10-Jun-99	455	64	7.1	system off 6/29					
17-Nov-99	1,676	251	6.7	system on 10/22					
01-Dec-99	309	53	5.8						
23-Dec-99	2,171	538	4.0						

Site 1 VER System Groundwater Influent TCE Concentrations



OU 1 - Site 1 VER System Air-Discharge Operational Data

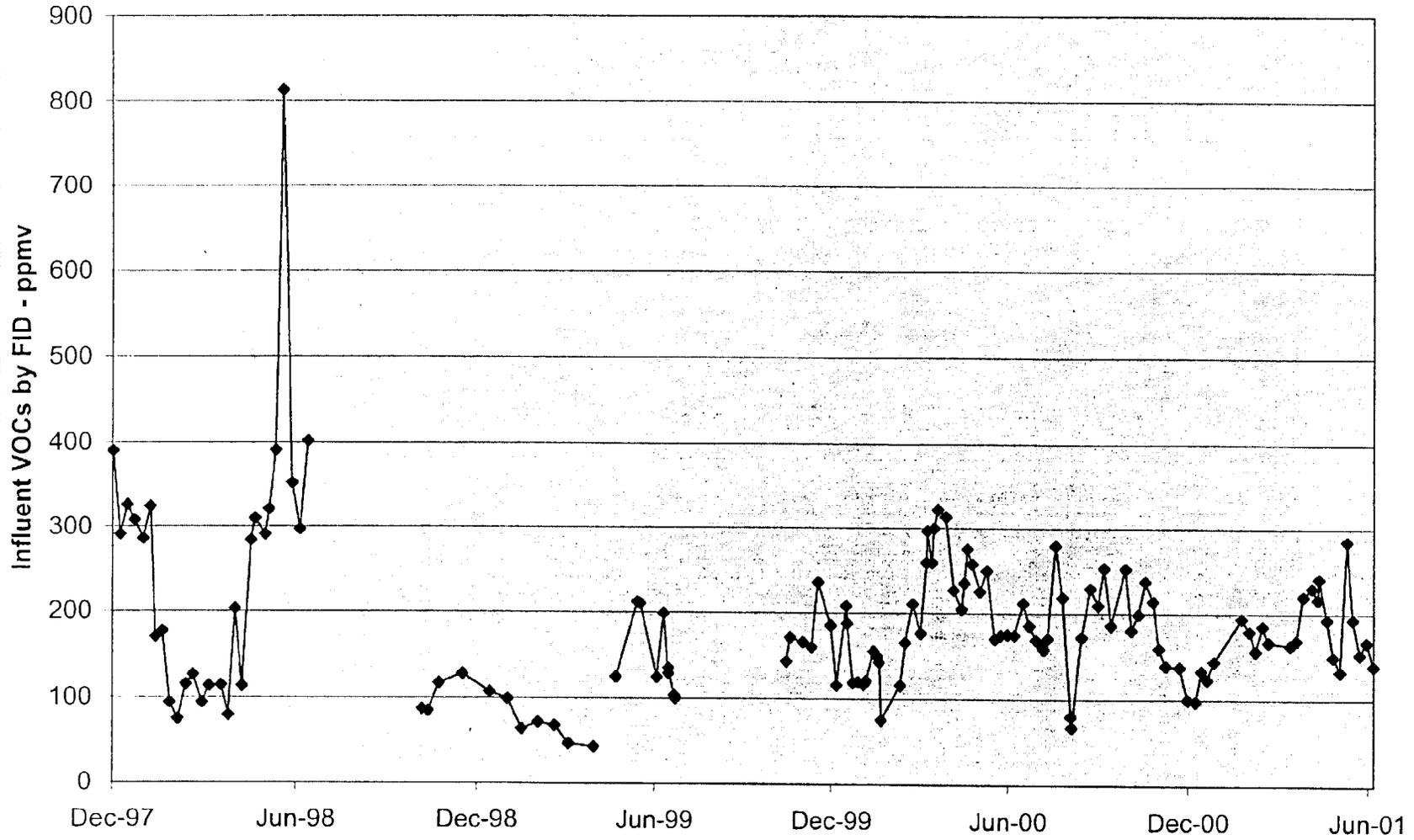
DATE	INLET VACUUM	AIR FLOW	AIR STREAM - ppmv			WELLHEAD VACUUM				GW METER gallons
			INFLUENT	MIDPOINT	EFFLUENT	in. w.c				
Startup			FID			RW-1	RW-2	RW-3	RW-4	
28-Apr-99	20.5	34.0				11.5	5.5	10.3	15.8	708,358
29-Apr-99			130-5.4	7-5.01	5-5					710,519
21-May-99			221-9.30	6.94-6.95	6.4-7.23					765,693
24-May-99			220-9.92	7.5-7.1	5.95-5.98					772,291
24-May-99	MICROSEEPS		153.771	0.179	bdl					
10-Jun-99			133-8.44	82.5-7.1	6.35-6.70					806,431
17-Jun-99	22.0	15.0	210-11.47	102-10.85	14.9-10.51	13.5	10.0	16.0	16.0	822,624
22-Jun-99			142-13.3	88.59-9.74	31.2-11.7					
22-Jun-99			148-12.8	80.8-10.28	24.89-8.80					
22-Jun-99	Shutdown for carbon regeneration									
24-Jun-99	On-site regeneration - all day									
25-Jun-99	Restarted system									
28-Jun-99	18.5	26.0	112-8.46	49.5-7.85	37.82-8.17					833,782
29-Jun-99	18.3		108-7.68	48-7.57	37.71-7.51	11.0	8.0	12.0	16.5	843,109
29-Jun-99	Shutdown - too much humidity									
9-Jul-99	Test Operation		110-9.1	34.39-8.83	30.5-8.65					843,180
12-Jul-99	Test Operation		144-14.66	52.3-14.7	37.9-14.3					850,253
14-Sep-99	Test Operation		102-2.97	33.16-2.91	26.24-2.75					850,454
21-Oct-99	Replaced carbon-restarted 10/22									
22-Oct-99	22.3		153-9.81	8.61-15.14	6.5-5.51					850,561
26-Oct-99	23.0		178-7.17	11.53-6.67	3.05-2.57					862,613
8-Nov-99	23.0	11.0	171-5.51	5.27-5.21	6.42-4.80					891,511
17-Nov-99	23.5	10.0	165-5.16	12.03-5.70	8.67-4.66	13.5	10.0	13.5	15.0	908,968
17-Nov-99	MICROSEEPS		118.993	6.045	0.758					
24-Nov-99	20.0	8.0	244-8.05	31.35-7.58	17.3-8.14	13.5	10.5	12.5	15.5	922,132
7-Dec-99	23.0		188-3.07	27.48-1.45	8.78-1.37	14.5	9.3	13.5	16.5	948,895
13-Dec-99	23.0	17.0	121-5.55	38.31-4.99	13.65-4.01	17.5	8.0	12.5	15.0	957,040
13-Dec-99	MICROSEEPS		97.201	29.508	7.358					
22-Dec-99	Replaced carbon 12/21 & restarted @ noon 12/22									
23-Dec-99	16.5	12.0	218-10.15	17.84-7.62	9.55-7.72	14.5	6.0	10.5	13.8	975,416
24-Dec-99	16.0	12.0	193-5.43	19.04-6.60	1.33-1.55	9.0	6.0	16.0	10.8	975,756
30-Dec-99	15.5	21.0	121-2.41	10.97-2.88	4.99-2.54	8.5	6.5	-	11.5	977,959
04-Jan-00	15.8	19.5	123-3.22	25.86-3.59	3.95-3.65	12.5	6.3	10.3	13.0	991,823
12-Jan-00	16.5	18.5	124-3.48	23.73-3.31	8.75-3.95					1,001,126
20-Jan-00	16.9	15.0	161-5.86	36.22-4.98	5.68-5.04		8.5	14.0		1,031,359
20-Jan-00	MICROSEEPS		120.102	17.172	0.049					
28-Jan-00	21.5	40.0	77.9-2.47	52.05-2.61	27.67-2.77		7.5	13.8		1,051,543
28-Jan-00	Shutdown for carbon regeneration									
17-Feb-00	Replaced carbon 2/15 & restarted @ noon 2/17									
18-Feb-00	25.0	14.0	119-3.14	47.59-4.43	4.02-1.88					1,051,614
23-Feb-00	23.5	24.0	184-18.37	39.43-10.32	6.32-4.43	13.3	6.8	11.5	15.0	1,054,295
02-Mar-00	24.8	10.0	218-7.72	37.3-10.4	20.74-11.17	9.8	4.5	13.3	16.3	1,066,748
07-Mar-00	24.5	17.0	179-4.57	35.14-9.69	29.15-10.59	9.5	12.0	11.0	6.0	1,088,150
10-Mar-00	25.0	20.0	188-11.65	64.72-9.02	50.2-7.32					1,097,075
10-Mar-00	Shutdown - too much moisture in carbon									
16-Mar-00	Start-up after drying carbon									
16-Mar-00	22.5	10.0	271-11.45	43.05-12.28	44.5-11.47	10.0	5.0	11.5	14.5	1,100,753
17-Mar-00	23.0	12.0	315-18.02	29.45-11.46	36.85-11.86					1,104,274
22-Mar-00	23.0		270-10.4	22.5-10.3	26.4-10.58	12.5	7.5	12.2	14.5	1,113,928
24-Mar-00	23.0		311-10.67	34.6-9.8	26.58-9.85	13.0	7.0	12.5	14.5	1,119,903
28-Mar-00	22.4	12.0	332-9.6	39.4-10.44	25.3-11.39	13.0	8.6	12.0	14.8	1,132,498
28-Mar-00	MICROSEEPS		234.5	19.409	8.542					
05-Apr-00	23.0	12.0	331-17.01	59.25-10.78	29.47-10.98	13.6	9.2	12.5	15.1	1,155,887
13-Apr-00	24.5	12.0	236-8.78	65.87-8.05	19.58-7.45	13.3	8.1	13.4	15.5	1,173,920
21-Apr-00	24.5	12.0	209-4.42	103-6.02	18.82-6.05	13.0	8.5	12.5	15.7	1,196,381
24-Apr-00	24.0		245-9.4	93.6-11.24	20.48-9.1	12.8	8.2	12.7	15.5	1,204,660
24-Apr-00	MICROSEEPS		174.1	63.726	9.615					
25-Apr-00	Replaced carbon & restarted @ 2PM									
27-Apr-00	23.5		285-9.47	17.41-8.62	7.07-7.45	12.5	8.0	12.3	15.2	1,207,696
02-May-00	23.5	12.0	267-9.10	32.14-13.27	8.92-8.82	12.5	6.8	12.0	15.2	1,213,891
10-May-00	24.0	10.0	234-8.77	86.23-8.56	9.13-7.94	12.5	7.6	11.2	15.0	1,226,057
17-May-00	23.4		261-10.89	84.55-8.76	7.48-8.27	13.0	7.7	13.5	15.6	1,249,508
17-May-00	MICROSEEPS		173.7	43.598	0.027					1,269,695
25-May-00	22.7	12.0	181-10.88	69.58-5.31	4.65-5.26	13.3	8.3	11.8	14.0	1,291,986
31-May-00	23.5	14.0	184-9.7	109-8.23	5.95-6.35	12.9	8.0	12.5	15.2	1,307,869

OU 1 - Site 1 VER System Air-Discharge Operational Data

DATE	INLET VACUUM	AIR FLOW	AIR STREAM - ppmv			WELLHEAD VACUUM				GW METER gallons
			INFLUENT	MIDPOINT	EFFLUENT	in. w.c				
						FID				
Startup 28-Apr-99						RW-1	RW-2	RW-3	RW-4	
07-Jun-00	23.5		181-5.98	94.37-6.22	6.85-6.07	12.8	8.3	12.5	14.9	1,326,124
14-Jun-00	22.0	15.0	182-7.68	102-7.02	7.06-6.42	12.0	7.6	12.4	14.5	1,339,831
14-Jun-00			MICROSEEPS	138.896	80.905	0.028				
23-Jun-00	23.0	12.0	220-8.46	153-18.33	14.27-12.42	7.3	5.5	11.2	14.7	1,359,104
29-Jun-00	21.0	14.0	194-8.53	187-9.1	27.15-7.22	12.5	7.5	11.5	14.3	1,373,075
06-Jul-00	22.0		175-6.11	142-6.98	8.30-7.26	13.0	7.6	13.3	15.0	1,389,656
11-Jul-00	Replaced carbon & restarted @ 2PM									
12-Jul-00	21.5	15.0	167-5.25	109-5.95	42?? - 5.65	13.3	7.5	12.8	15.0	1,404,598
14-Jul-00	21.5		164-6.11	114-6.58	12.25-6.5	13.1	8.4	12.7	15.0	1,409,926
18-Jul-00	22.0	15.0	177-6.47	135-10.2	15.44-9.75	14.0	9.0	12.6	15.5	1,420,530
18-Jul-00			MICROSEEPS	131.131	109.424	3.505				
26-Jul-00	23.0	15.0	289-9.5	164-10.86	13.15-10.61	15.2	10.5	15.0	16.0	1,440,255
02-Aug-00	22.8	15.0	229-10.62	148-11.74	19.70-11.64	13.8	10.0	12.5	15.5	1,456,981
10-Aug-00	22.5	15.0	88.83-8.67	246.75-8.25	26.04-9.53	13.4	7.2	12.2	15.0	1,475,050
11-Aug-00	22.5		75-7.5	176-8.89	20.02-13.31					1,477,698
21-Aug-00	17.5		202-29.86	131-30.05	32.53-29.22	14.0	9.1	13.5	15.5	1,494,974
21-Aug-00			MICROSEEPS	131.082	74.123	2.279				
30-Aug-00	18.5		269-39.83	158-45.05	51.87-45.6	14.7	9.2	12.7	15.0	1,514,979
07-Sep-00	20.0		251-41.89	162-43.89	55.2-44.02	13.5	9.3	12.8	15.0	1,532,065
13-Sep-00	19.5		303-49.53	254-52.14	86.84-52.57	13.7	9.8	14.3	15.5	1,544,166
20-Sep-00	19.5		220-34	223-40.64	123-38.15	14.0	9.0	12.7	15.2	1,558,194
20-Sep-00			MICROSEEPS	82.575	82.493	39.514				
28-Sep-00	Replaced carbon & restarted @ 3:30 PM									
05-Oct-00	20.5	12.0	298-45.26	137-53.5	48.15-51.32	13.5	10.0	12.5	15.4	1,589,211
11-Oct-00	20.5		213-32.63	62.87-31.48	34.53-35.13	13.2	9.2	12.3	15.1	1,601,680
11-Oct-00			MICROSEEPS	108.239	26.06	0.021				
18-Oct-00	21.0	12.0	238-39.33	145-36.78	34.83-34.77	13.5	9.3	13.0	14.5	1,614,986
25-Oct-00	21.0		274-36.35	152-39.3	42.75-41.64	13.4	9.8	12.7	14.5	1,626,290
02-Nov-00	21.0		258-44.15	89.97-42.78	41.37-40.78	13.4	9.5	12.0	15.0	1,644,020
08-Nov-00	21.0	12.0	187-27.88	121-27.43	26.34-25.06	14.0	8.7	11.0	14.4	1,655,886
15-Nov-00	21.0		148-9.02	87.3-8.65	8.72-8.35	13.7	8.7	12.5	15.0	1,668,350
29-Nov-00	21.0		143-5.37	68.57-5.33	5.15-5.36	12.8	8.0	12.0	14.0	1,699,030
07-Dec-00	21.2	12.0	105-5.20	10.74-3.10	3.35-3.27		7.8	12.0		1,710,822
15-Dec-00	22.0		103-5.15	11.24-3.43	3.48-3.40					1,717,864
15-Dec-00			MICROSEEPS	77.455	8.973	0.017				
21-Dec-00	22.0		138-5.15	16.85-4.65	4.81-4.67					1,722,764
27-Dec-00	22.0		129-5.87	19.17-4.92	5.16-4.77					
03-Jan-01			150-5.78	448-5.62??	38.72-6.58					1,748,013
17-Jan-01	Replaced carbon & re-piped cool down loop									
26-Jan-01	Restarted @ 10:30 AM									
31-Jan-01	10.0		202-8.35	130-8.92	10.75-9.77					1,772,186
08-Feb-01	16.0		192-13.1	375? - 13.3	18.52-12.03					1,784,169
14-Feb-01	17.6		165-8.66	96.4-7.16	4.05-3.68					1,798,000
14-Feb-01			MICROSEEPS	156.741	80.733	0.117				1,812,516
21-Feb-01	18.5		190-5.0	129-7.5	5.52-5.46					1,828,549
27-Feb-01	19.0		174-7.42	85.8-6.2	6.54-6.17					1,843,373
06-Mar-01	Power outage 3 am thru 10 am 12 Mar, startup with only 2 wells, all 4 on-line 15 Mar									
21-Mar-01	14.5		170-6.99	51.85-6.75	8.42-6.18					1,875,227
27-Mar-01	17.0	12.0	176-7.23	38.6-6.23	10.06-6.10					1,892,859
03-Apr-01			228-8.02	42.4-8.8	78.9-9.34					
05-Apr-01	Replaced carbon (system down @ 9am, up 4/6 @ 1pm)									
06-Apr-01	15.0					11.5	2.0	10.5	13.0	1,922,930
12-Apr-01	17.0		241-10.87	171-10.10	10.6-8.81	13.5	0/2	11.5	14.5	1,938,660
18-Apr-01	18.8	12.0	228-11.72	83.28-11.78	8.20-8.15	13.2	5.0	9.5	14.0	1,960,066
19-Apr-01	19.0		251-10.08	78.54-11.35	5.20-5.15	14.0	5.0	11.5	15.0	1,963,447
19-Apr-01			MICROSEEPS	189.729	51.304	0.237				
27-Apr-01	20.5		202-9.27	73.57-9.66	6.00-5.65	12.7	4.5	11.5	14.8	1,985,855
03-May-01	20.8	14.0	161-11.33	196-8.95	5.32-5.30	13.0	5.5	11.5	15.0	2,001,222
10-May-01	20.5	14.0	142-9.16	161-9.63	7.95-7.38	15.0	2.7	11.0	14.2	2,008,829
17-May-01	19.0		308-22.86	160-15.5	12.16-11.30	12.7	4.5	12.5	15.0	2,013,854
17-May-01			MICROSEEPS	236.805	159.211	0.626				
23-May-01	20.5	12.0	203-9.82	115-10.75	8.57-8.11	12.8	6.0	11.5	15.0	2,023,828
30-May-01	20.7	14.0	160-7.28	148-7.45	8.77-6.5	11.5	6.3	10.6	13.5	2,029,055
06-Jun-01	21.0	12.0	177-10.25	184-8.93	14.3-7.33	11.2	7.0	11.0	13.8	2,029,796
13-Jun-01	20.5		147-8.04	205-8.5	73.13-7.54	12.5	5.5	11.0	14.5	2,030,754
13-Jun-01			MICROSEEPS	138.185	187.270	69.094				
14-Jun-01	Shutdown to prep for permanganate pilot study									

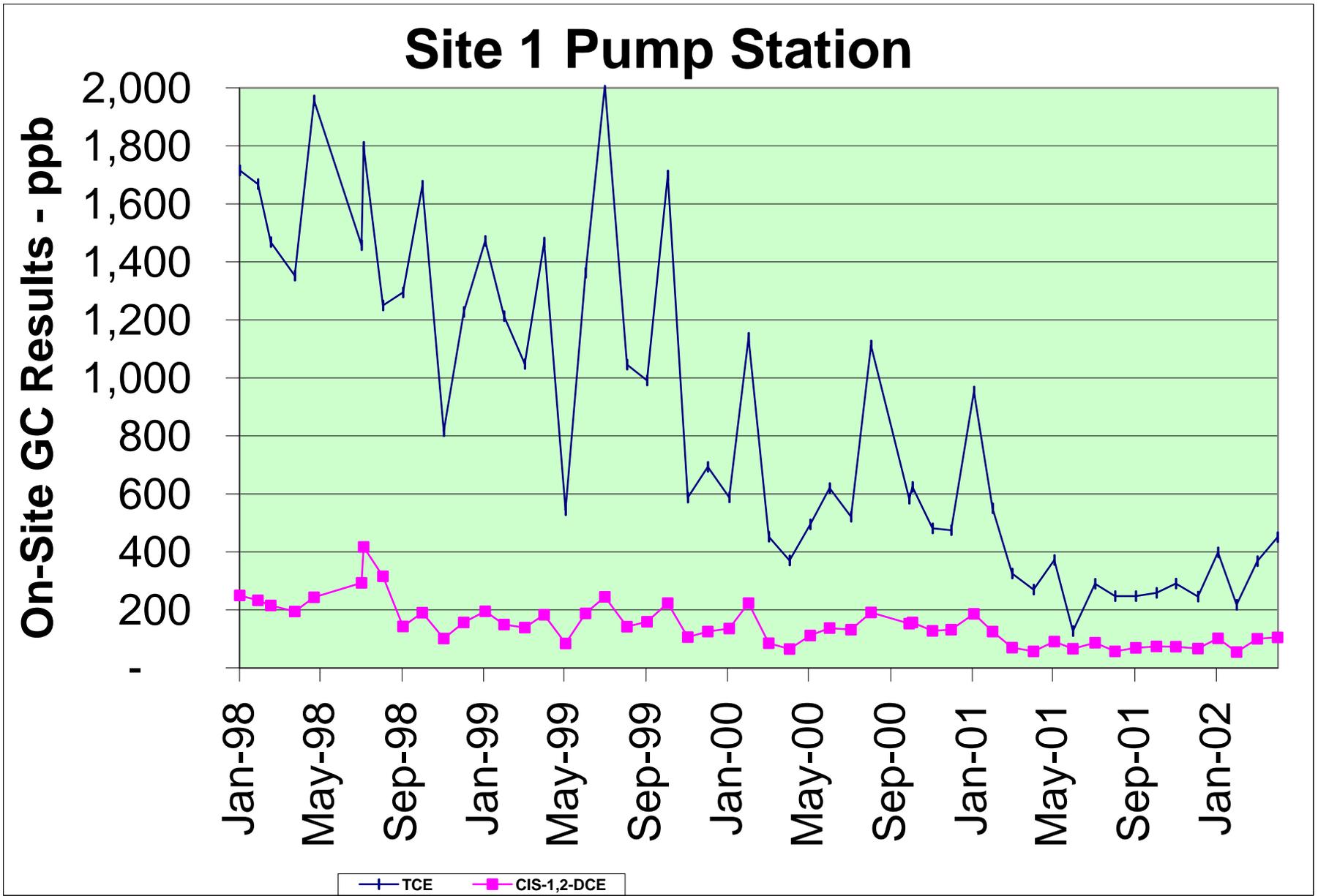
REMARKS: 1st FID number = total VOCs, 2nd = methane component

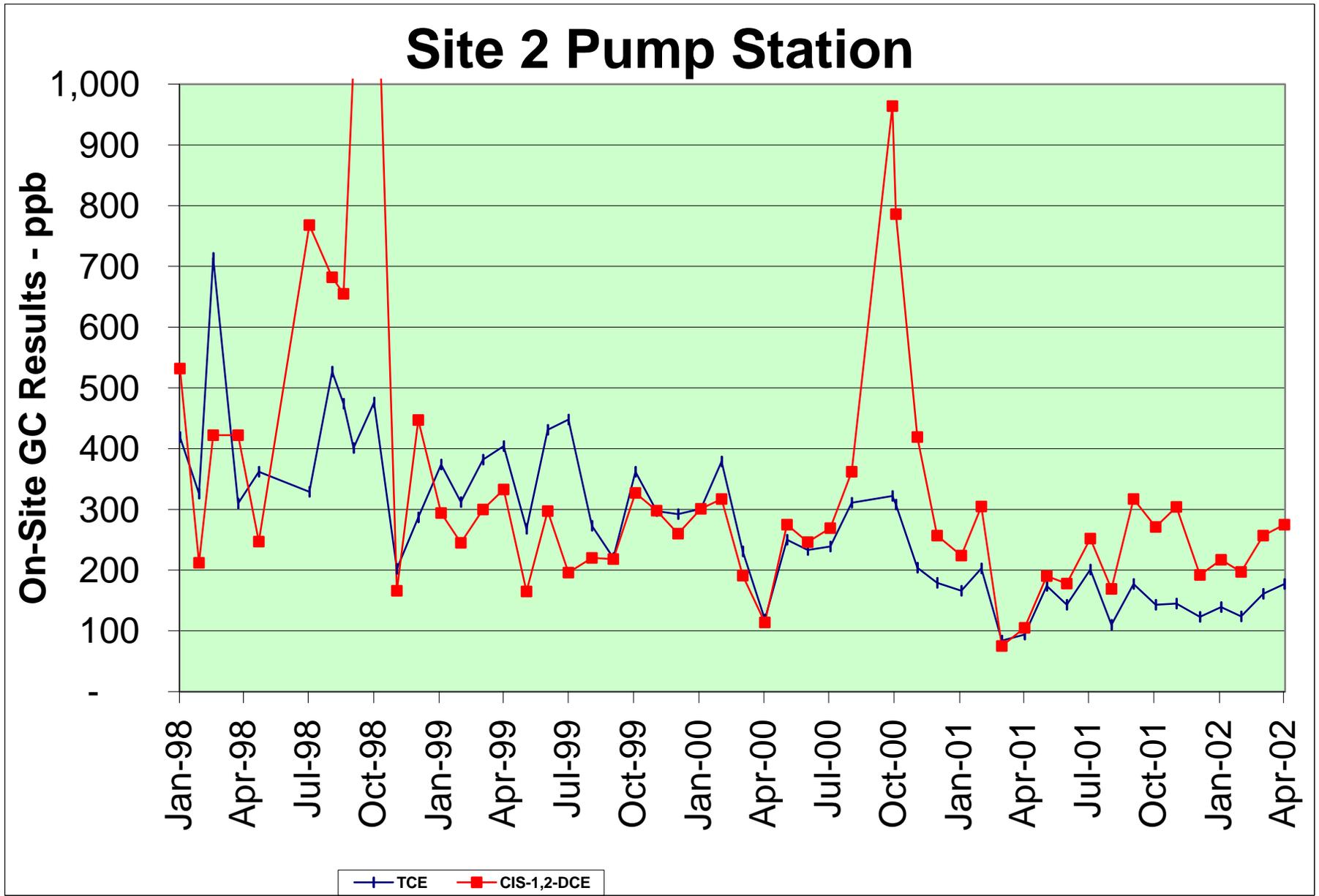
Site 1 VER Treatment System Vapor Influent

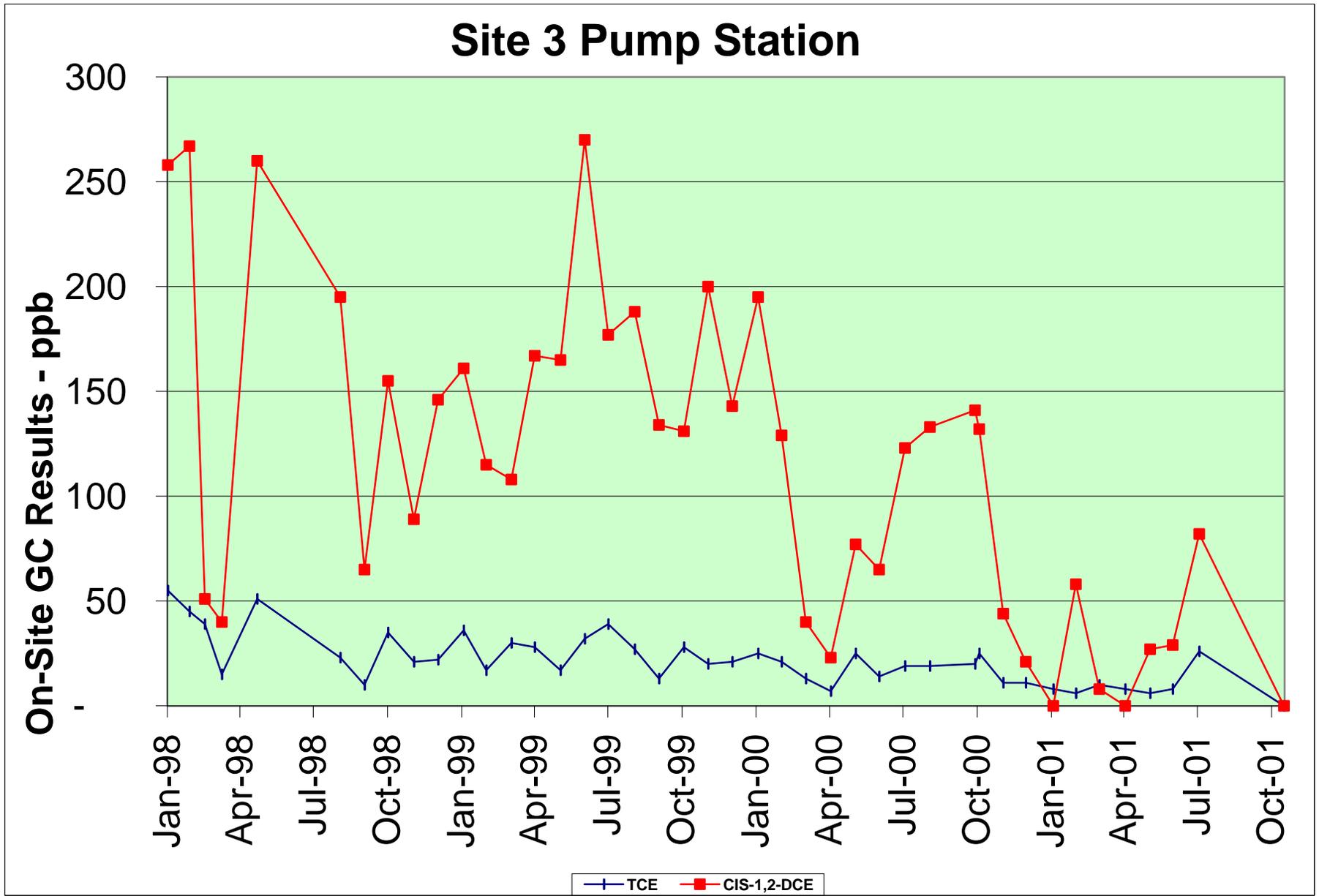


OU1 Groundwater Collection System 1998-2002 On-site GC Results for Pump Stations

SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS
SITE 1 PS Includes collection trench, IW #1, 2 & 6 and VER					SITE 2 PS Includes collection trench, IW #3, 4 & 5					SITE 3 PS Collection trench only				
30-Jan-98	1,716	250	6.9		30-Jan-98	419	532	0.8		30-Jan-98	55	258	0.2	
26-Feb-98	1,668	233	7.2		26-Feb-98	326	212	1.5		26-Feb-98	45	267	0.2	
17-Mar-98	1,468	215	6.8		18-Mar-98	714	422	1.7		17-Mar-98	39	51	0.8	
22-Apr-98	1,353	194	7.0		22-Apr-98	310	422	0.7		07-Apr-98	15	40	0.4	
21-May-98	1,957	243	8.1		21-May-98	362	247	1.5		21-May-98	51	260	0.2	
31-Jul-98	1,458	293	5.0		31-Jul-98	329	768	0.4						
03-Aug-98	1,797	417	4.3		01-Sep-98	527	682	0.8		01-Sep-98	23	195	0.1	
01-Sep-98	1,250	316	4.0		17-Sep-98	474	655	0.7						
01-Oct-98	1,295	143	9.1		01-Oct-98	401	1,038	0.4		01-Oct-98	10	65	0.2	
30-Oct-98	1,663	190	8.8		30-Oct-98	476	1,385	0.3		30-Oct-98	35	155	0.2	
01-Dec-98	816	101	8.1		01-Dec-98	202	166	1.2		01-Dec-98	21	89	0.2	
31-Dec-98	1,227	157	7.8		31-Dec-98	287	447	0.6		31-Dec-98	22	146	0.2	
01-Feb-99	1,472	195	7.5		01-Feb-99	374	294	1.3		01-Feb-99	36	161	0.2	
01-Mar-99	1,213	149	8.1		01-Mar-99	312	245	1.3		01-Mar-99	17	115	0.1	
01-Apr-99	1,048	139	7.5		01-Apr-99	382	300	1.3		01-Apr-99	30	108	0.3	
30-Apr-99	1,467	183	8.0		30-Apr-99	404	333	1.2		30-Apr-99	28	167	0.2	
01-Jun-99	544	84	6.5		01-Jun-99	268	165	1.6		01-Jun-99	17	165	0.1	
01-Jul-99	1,362	188	7.2		01-Jul-99	431	297	1.5		01-Jul-99	32	270	0.1	
30-Jul-99	2,008	245	8.2		30-Jul-99	448	196	2.3		30-Jul-99	39	177	0.2	
01-Sep-99	1,046	142	7.4		01-Sep-99	273	220	1.2		01-Sep-99	27	188	0.1	
01-Oct-99	991	159	6.2		01-Oct-99	220	218	1.0		01-Oct-99	13	134	0.1	
01-Nov-99	1,698	223	7.6		01-Nov-99	362	327	1.1		01-Nov-99	28	131	0.2	
01-Dec-99	587	106	5.5	Suspect, leaky septum	01-Dec-99	297	298	1.0		01-Dec-99	20	200	0.1	
31-Dec-99	693	125	5.5		31-Dec-99	292	260	1.1		31-Dec-99	21	143	0.1	
01-Feb-00	588	136	4.3		01-Feb-00	301	301	1.0		01-Feb-00	25	195	0.1	
01-Mar-00	1,138	223	5.1		01-Mar-00	379	317	1.2		01-Mar-00	21	129	0.2	
31-Mar-00	452	85	5.3		31-Mar-00	231	191	1.2		31-Mar-00	13	40	0.3	
01-May-00	370	65	5.7		01-May-00	119	114	1.0		01-May-00	7	23	0.3	
01-Jun-00	495	112	4.4		01-Jun-00	250	275	0.9		01-Jun-00	25	77	0.3	
30-Jun-00	620	137	4.5		30-Jun-00	233	246	0.9		30-Jun-00	14	65	0.2	
01-Aug-00	521	132	3.9		01-Aug-00	239	269	0.9		01-Aug-00	19	123	0.2	
31-Aug-00	1,112	191	5.8		31-Aug-00	311	362	0.9		01-Sep-00	19	133	0.1	
27-Oct-00	583	153	3.8		27-Oct-00	322	964	0.3		27-Oct-00	20	141	0.1	
01-Nov-00	624	157	4.0		01-Nov-00	308	786	0.4		01-Nov-00	25	132	0.2	
01-Dec-00	481	128	3.8		01-Dec-00	204	419	0.5		01-Dec-00	11	44	0.3	
29-Dec-00	475	132	3.6		29-Dec-00	179	257	0.7		29-Dec-00	11	21	0.5	
01-Feb-01	953	186	5.1		01-Feb-01	166	224	0.7		01-Feb-01	8	bdl	unk	
01-Mar-01	550	125	4.4		01-Mar-01	203	305	0.7		01-Mar-01	6	58	0.1	
30-Mar-01	325	70	4.6		30-Mar-01	84	75	1.1		30-Mar-01	10	8	1.3	
01-May-01	270	57	4.7		01-May-01	94	105	0.9		01-May-01	8	bdl	unk	
01-Jun-01	372	91	4.1		01-Jun-01	174	190	0.9		01-Jun-01	6	27	unk	
29-Jun-01	127	66	1.9		29-Jun-01	143	178	0.8		29-Jun-01	8	29	unk	
01-Aug-01	290	87	3.3		01-Aug-01	201	252	0.8		01-Aug-01	26	82	0.3	2nd run = 29 - 102
31-Aug-01	247	57	4.3		31-Aug-01	110	169	0.7						Not sampled after 1 August
01-Oct-01	247	69	3.6		01-Oct-01	177	317	0.6						Off-line 8/22/01
01-Nov-01	259	74	3.5		01-Nov-01	143	271	0.5						Off-line 8/22/01
30-Nov-01	291	73	4.0		30-Nov-01	145	304	0.5		14-Nov-01	bdl	bdl		pump on 15 minutes
02-Jan-02	246	67	3.7		02-Jan-02	123	192	0.6						
01-Feb-02	398	102	3.9		01-Feb-02	139	217	0.6		Dec-01			Not sampled	Off-line 8/22/01
01-Mar-02	218	55	4.0		01-Mar-02	124	197	0.6		Jan-02			Not sampled	Off-line 8/22/01
01-Apr-02	368	100	3.7		01-Apr-02	161	257	0.6		Feb-02			Not sampled	Off-line 8/22/01
01-May-02	451	105	4.3		01-May-02	177	275	0.6		Mar-02			Not sampled	Off-line 8/22/01
										Apr-02			Not sampled	Off-line 8/22/01
										May-02			Not sampled	Off-line 8/22/01

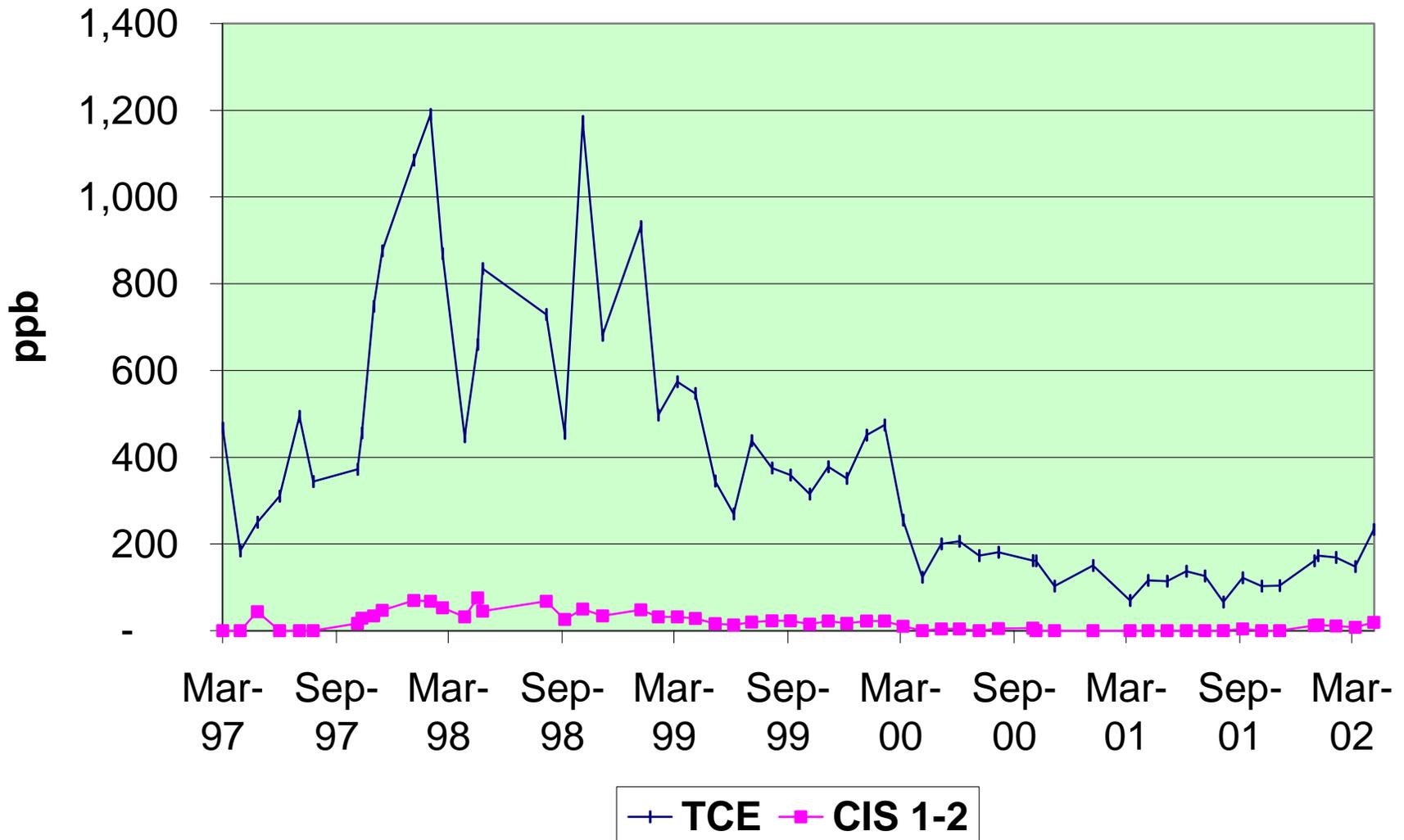




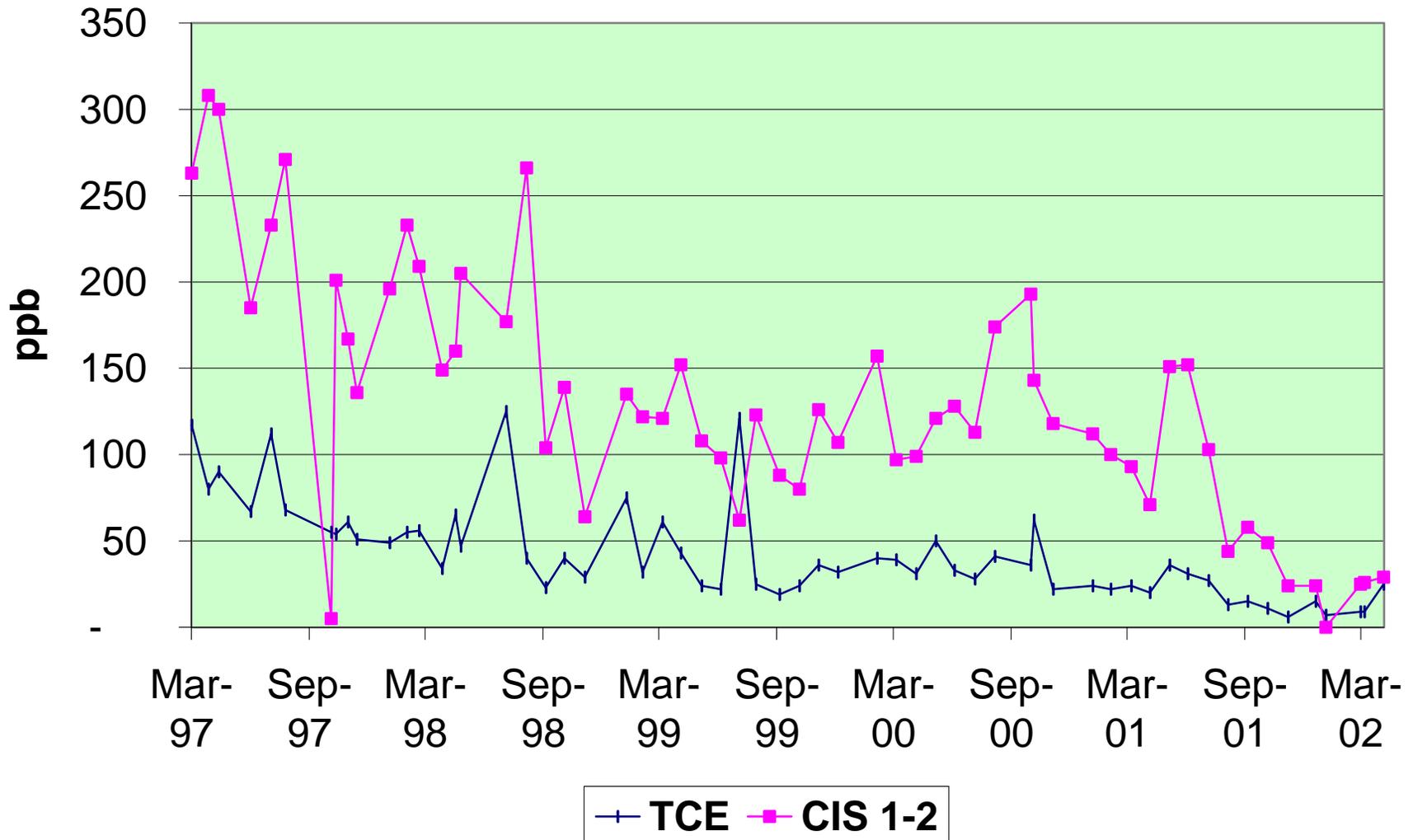


SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS
IW #1					IW #2					IW #3				
27-Mar-97	467	-		DRAWDOWN	27-Mar-97	117	263	0.4	DRAWDOWN	27-Mar-97	580	65	8.9	DRAWDOWN
24-Apr-97	184	-			22-Apr-97	80	308	0.3		22-Apr-97	260	71	3.7	
22-May-97	250	44	5.7	Off-site H&A #10	08-May-97	90	300	0.3	Off-site H&A #10	09-May-97	210	87	2.4	Off-site H&A #10
27-Jun-97	310	-			27-Jun-97	67	185	0.4		27-Jun-97	272	67	4.1	
29-Jul-97	494	-			29-Jul-97	112	233	0.5		29-Jul-97	505	88	5.7	
20-Aug-97	344	-	unk	Pump failed 27 Aug/Bigger in on 30 Oct	20-Aug-97	68	271	0.3		06-Aug-97	301	49	6.1	
31-Oct-97	372	17	21.9		31-Oct-97	55	5	11.0		07-Nov-97	153	42	3.6	
07-Nov-97	456	29	15.7		07-Nov-97	54	201	0.3		26-Nov-97	144	38	3.8	
26-Nov-97	748	34	22.0		26-Nov-97	61	167	0.4		10-Dec-97	167	44	3.8	
10-Dec-97	876	47	18.6		10-Dec-97	51	136	0.4		30-Jan-98	188	66	2.8	12.4 WL 2/2/98
30-Jan-98	1,085	70	15.5	62.6 WL 2/2/98	30-Jan-98	49	196	0.3	13.8 WL 2/2/98	26-Feb-98	198	67	3.0	11.3 WL 3/4/98
26-Feb-98	1,190	68	17.5	56.3 WL 3/4/98	26-Feb-98	55	233	0.2	13.0 WL 3/4/98	18-Mar-98	202	79	2.6	12.3 WL 4/1/98
17-Mar-98	869	53	16.4	59.5 WL 4/1/98	17-Mar-98	56	209	0.3	14.0 WL 4/1/98	22-Apr-98	116	42	2.8	
22-Apr-98	447	32	14.0	65.4 WL 5/1/98	22-Apr-98	34	149	0.2		Off-site H&A #11- Results Suspect				
13-May-98	660	76	8.7	Off-site H&A #11	13-May-98	65	160	0.4	Off-site H&A #11	12-May-98	1,000	450	2.2	
21-May-98	835	45	18.6	65.2 WL 6/1/98	21-May-98	47	205	0.2	14.0 WL 6/1/98	21-May-98	184	50	3.7	11.9 WL 6/1/98
01-Sep-98	729	68	10.7	78.1	31-Jul-98	125	177	0.7		01-Sep-98	131	66	2.0	
01-Oct-98	455	26	17.5	77.5	01-Sep-98	40	266	0.2	15.1	01-Oct-98	95	24	4.0	14.2
30-Oct-98	1,174	50	23.5	77.9 WL 11/2/98	01-Oct-98	23	104	0.2	15.7	30-Oct-98	136	34	4.0	
01-Dec-98	681	34	20.0	71.9	30-Oct-98	40	139	0.3	15.6 WL 11/2/98	03-Nov-98	180	na		Off-site Lab (STL)
01-Feb-99	932	48	19.4	78.0	01-Dec-98	29	64	0.5	16.8	03-Nov-98	144	38	3.8	12.9 Duplicate sample
01-Mar-99	497	32	15.5	78.2	04-Feb-99	75	135	0.6	17.2 WL 2/1/99	01-Dec-98	70	15	4.7	13.8
01-Apr-99	574	32	17.9	78.4	01-Mar-99	32	122	0.3	16.9	31-Dec-98	90	24	3.8	14.2
30-Apr-99	547	28	19.5	78.4	01-Apr-99	61	121	0.5	17.5	01-Feb-99	113	27	4.2	12.9
01-Jun-99	345	16	21.6	78.4	30-Apr-99	43	152	0.3	18.7	01-Mar-99	85	24	3.5	12.4
01-Jul-99	269	13	20.7	78+	01-Jun-99	24	108	0.2	19.8	01-Apr-99	101	23	4.4	12.3
30-Jul-99	438	20	21.9	78.7	01-Jul-99	22	98	0.2	21.1	30-Apr-99	112	30	3.7	13.2
01-Sep-99	375	23	16.3	79.3	01-Jul-99	121	62	2.0	21.8 Results suspect	01-Jun-99	94	24	3.9	13.7
01-Oct-99	359	23	15.6	not obtained-pump cycles on & off	30-Jul-99	22	98	0.2	21.1	01-Jul-99	78	18	4.3	14.2
01-Nov-99	315	15	21.0	not obtained-pump cycles on & off	25-Aug-99	25	123	0.2	24.7	30-Jul-99	73	16	4.6	14.5
01-Dec-99	378	22	17.2	not obtained-pump cycles on & off	01-Sep-99	Unable to extract sample			24.7	01-Sep-99	74	21	3.5	14.8
31-Dec-99	351	17	20.6	81.5	01-Oct-99	19	88	0.2	21.9	01-Oct-99	62	19	3.3	13.2
01-Feb-00	451	22	20.5	81.5	01-Nov-99	24	80	0.3	22.7	01-Nov-99	64	12	5.3	13.0
01-Mar-00	474	22	21.5	10.6 pump tripped off	01-Dec-99	36	126	0.3	23.1	01-Dec-99	76	16	4.8	13.2
31-Mar-00	255	10	25.5	81.0	31-Dec-99	32	107	0.3	24.2	31-Dec-99	70	13	5.4	13.3
01-May-00	123	bdl	n/a	81.5	01-Feb-00	Unable to extract sample			24.5	01-Feb-00	86	18	4.8	13.0
01-Jun-00	200	4	50.0	81.6	01-Mar-00	40	157	0.3	24.9	01-Mar-00	98	24	4.1	12.1
30-Jun-00	206	4	51.5	81.6	31-Mar-00	39	97	0.4	23.3	31-Mar-00	65	10	6.5	11.8
01-Aug-00	173	bdl	n/a	81.7	01-May-00	31	99	0.3	23.6	01-May-00	64	13	4.9	11.5
01-Sep-00	181	5	36.2	81.7	01-Jun-00	50	121	0.4	25.2	01-Jun-00	87	16	5.4	12.4
27-Oct-00	162	6	27.0	WL 10/2 = 17.1	30-Jun-00	33	128	0.3	25.7	30-Jun-00	97	10	9.7	12.3
01-Nov-00	161	bdl	n/a	81.7	01-Aug-00	28	113	0.2	27.1	01-Aug-00	80	16	5.0	12.8 Pump Off
01-Dec-00	103	bdl	n/a	81.7	01-Sep-00	41	174	0.2	28.9	01-Sep-00	no sample			9.8 Pump off all month
01-Feb-01	150	bdl	n/a	81.7	27-Oct-00	36	193	0.2	28.9	02-Oct-00	no sample			9.4 Pump off all month
01-Mar-01				81.8 sample port frozen	01-Nov-00	62	143	0.4	28.6	01-Nov-00	no sample			not obtained Pump off until 11/22
02-Apr-01	70	bdl	n/a	off 3/30-4/2 WL3/30=10.8	01-Dec-00	22	118	0.2	30.3	01-Dec-00	51	9	5.7	18.6
01-May-01	116	bdl	n/a	81.3	01-Feb-01	24	112	0.2	31.2	01-Feb-01	100	20	5.0	17.0
01-Jun-01	114	bdl	n/a	81.7	01-Mar-01	22	100	0.2	32.9	01-Mar-01				19.1 sample port frozen
02-Jul-01	137	bdl	n/a	81.8	02-Apr-01	24	93	0.3	29.6	30-Mar-01	60	14	4.3	18.0 Pump off/dead 3/31
01-Aug-01	126	bdl	n/a	81.8	01-May-01	20	71	0.3	32.1	01-May-01	no sample			7.8 Pump off all month
31-Aug-01	66	bdl	n/a	81.8	01-Jun-01	36	151	0.2	35.2	12-Jun-01	80	13	6.2	8.8 New/bigger pump-6/11
01-Oct-01	122	4	30.5	81.9	29-Jun-01	31	152	0.2	36.5	29-Jun-01	163	52	3.1	26.1
01-Nov-01	103	bdl	n/a	not obtained-pump cycles on & off	01-Aug-01	27	103	0.3	37.8	01-Aug-01	155	39	4.0	27.7
30-Nov-01	104	bdl	n/a	82.1	31-Aug-01	13	44	0.3	37.3	31-Aug-01	83	21	4.0	25.2
25-Jan-02	161	12	13.4	not obtained-pump cycles on & off	01-Oct-01	15	58	0.3	37.5	01-Oct-01	124	35	3.5	27.3
31-Jan-02	173	13	13.3	80.8 pump cycles on & off	01-Nov-01	11	49	0.2	37.2	01-Nov-01	103	27	3.8	not obtained
01-Mar-02	169	11	15.4	81.0	03-Dec-01	6	24	0.3	37.9	30-Nov-01	91	27	3.4	31.0
01-Apr-02	148	8	18.5	82.1	15-Jan-02	15	24	0.6	37.5 w/1 1/2	15-Jan-02	93	25	3.7	33.5 w/1 1/2
01-May-02	233	19	12.3		31-Jan-02	7	bdl	unk	33.3	31-Jan-02	80	21	3.8	33.3
					26-Mar-02	9	25	0.4	34.8	01-Mar-02	78	23	3.4	33.7
					01-Apr-02 8/9	24/26	0.3	33.2 ran twice	01-Apr-02	113	32	3.5	32.6	
					01-May-02	25	29	0.9		01-May-02	89	21	4.2	

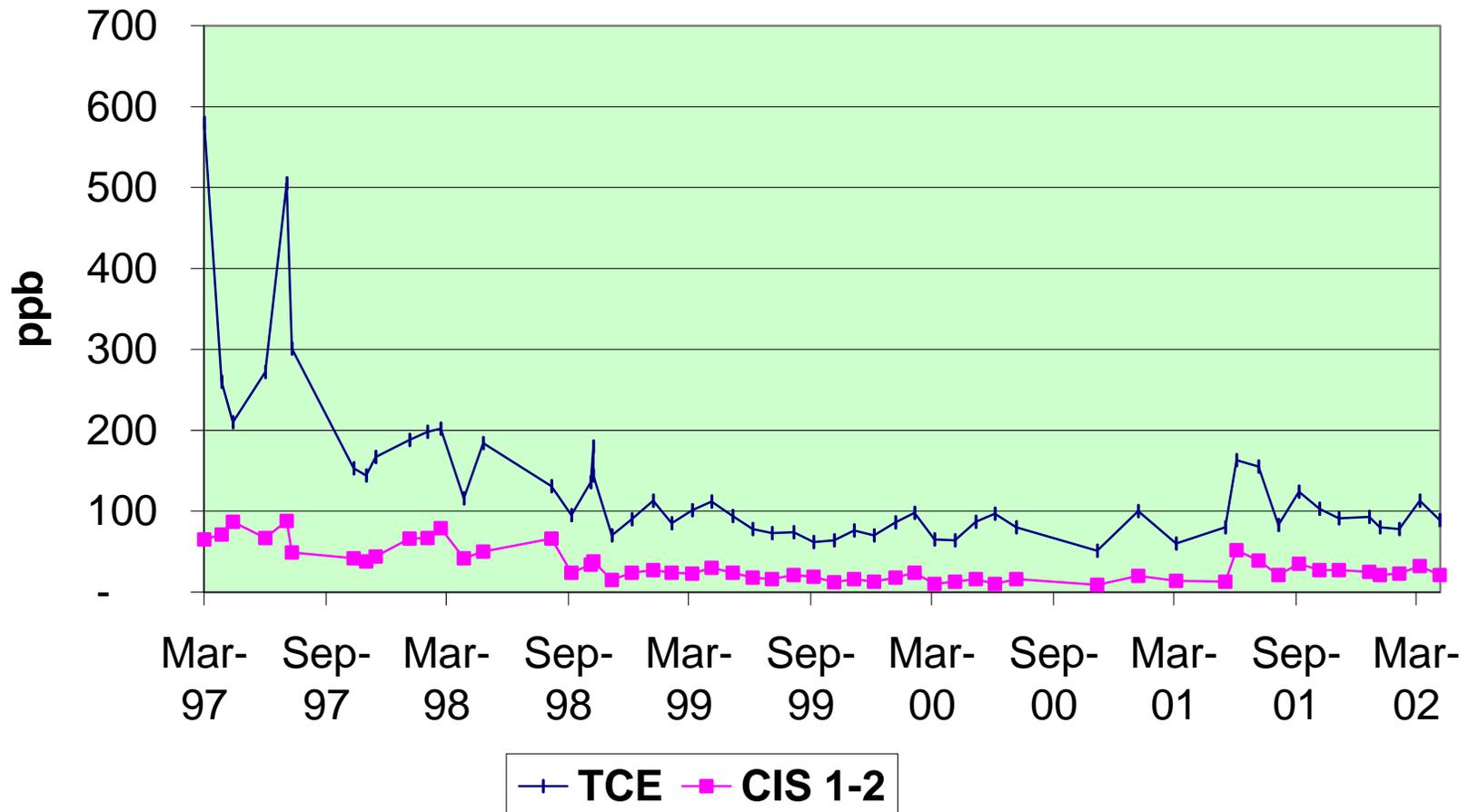
OU-1 Boundary Interceptor Well #1



OU-1 Boundary Interceptor Well #2

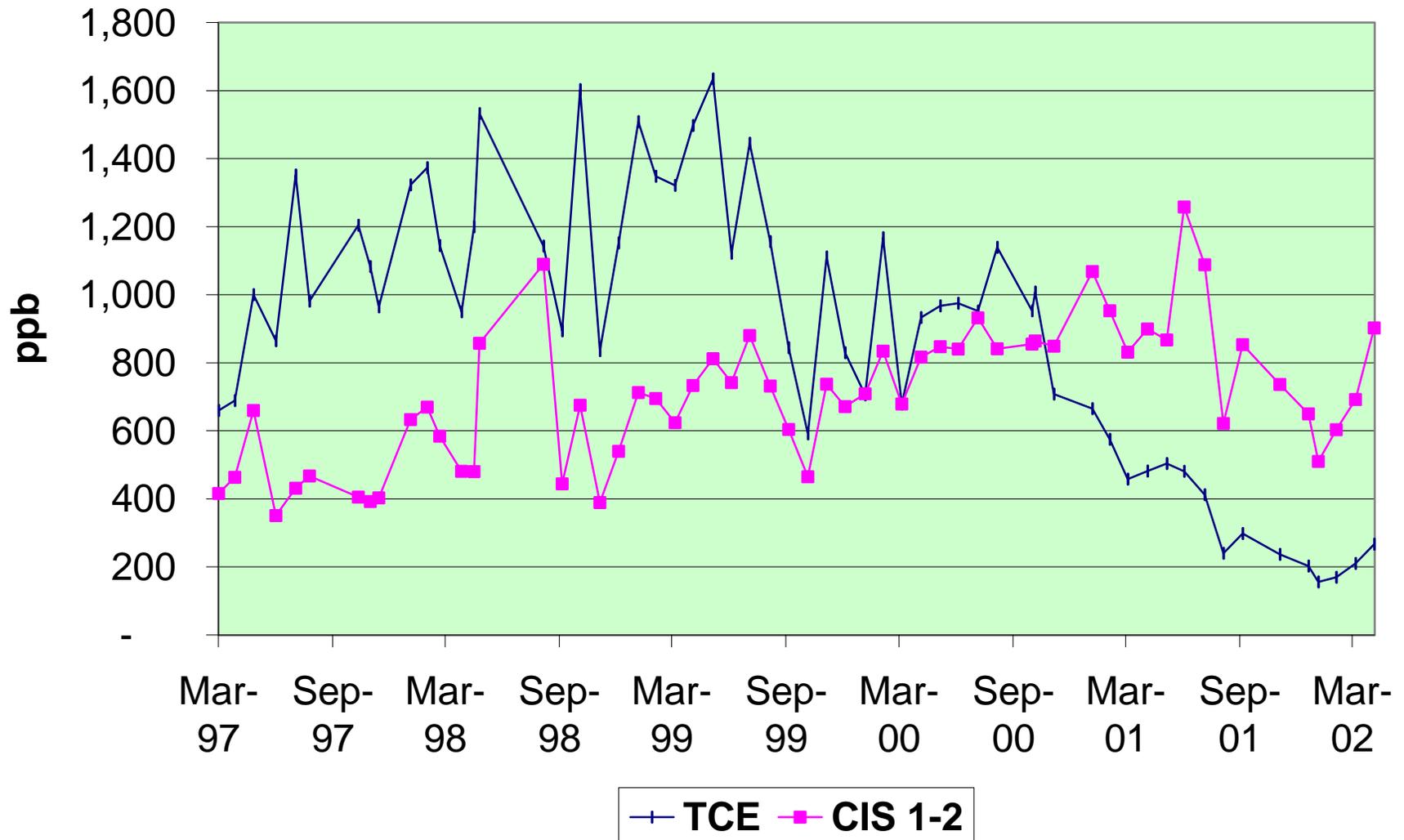


OU-1 Boundary Interceptor Well #3

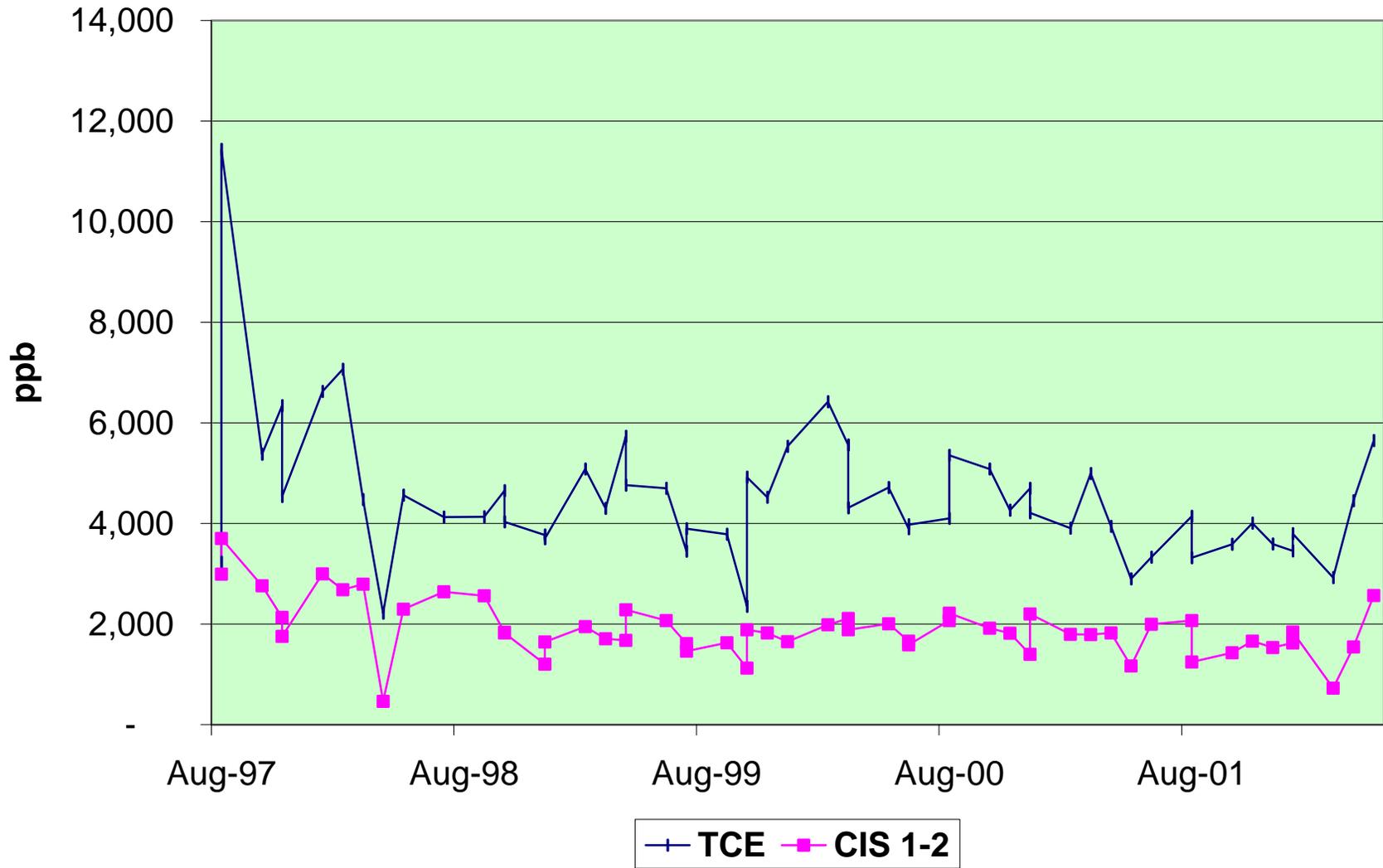


SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS
IW #4			DRAWDOWN		IW #5			Drawdown not obtained-pump cycles on & off		IW #6			Drawdown not obtained-pump cycles on & off	
27-Mar-97	660	416	1.6											
22-Apr-97	689	463	1.5											
22-May-97	1,000	660	1.5	Off-site H&A #10										
27-Jun-97	865	351	2.5											
29-Jul-97	1,352	431	3.1											
20-Aug-97	981	467	2.1											
07-Nov-97	1,204	405	3.0											
26-Nov-97	1,083	392	2.8											
10-Dec-97	964	403	2.4											
30-Jan-98	1,323	633	2.1	39.1 WL 2/2/98										
26-Feb-98	1,373	670	2.0	39.3 WL 3/4/98										
18-Mar-98	1,145	584	2.0	39.7 WL 4/1/98										
22-Apr-98	950	481	2.0											
12-May-98	1,200	480	2.5	Off-site H&A #11										
21-May-98	1,532	857	1.8											
01-Sep-98	1,143	1,090	1.0											
01-Oct-98	894	444	2.0	34.5										
30-Oct-98	1,603	675	2.4	33.1 WL 11/2/98										
01-Dec-98	836	389	2.1	34.3										
31-Dec-98	1,152	540	2.1	34.6										
01-Feb-99	1,509	713	2.1	33.5										
01-Mar-99	1,348	695	1.9	32.5										
01-Apr-99	1,321	624	2.1	32.9										
30-Apr-99	1,497	733	2.0	34.3										
01-Jun-99	1,634	812	2.0	35.5										
01-Jul-99	1,122	742	1.5	35.9										
30-Jul-99	1,445	880	1.6	36.5										
01-Sep-99	1,156	732	1.6	36.5										
01-Oct-99	844	604	1.4	34.8										
01-Nov-99	591	465	1.3	34.3										
01-Dec-99	1,111	737	1.5	35.3										
31-Dec-99	830	671	1.2	36.0										
01-Feb-00	706	709	1.0	36.5										
01-Mar-00	1,168	834	1.4	36.4										
31-Mar-00	679	679	1.0	35.6										
01-May-00	933	817	1.1	35.9										
01-Jun-00	967	847	1.1	38.6										
30-Jun-00	975	840	1.2	36.6										
01-Aug-00	952	932	1.0	37.7										
01-Sep-00	1,139	841	1.4	37.0										
27-Oct-00	953	855	1.1	WL 10/2 = 9.48										
01-Nov-00	1,008	864	1.2	35.3										
01-Dec-00	708	849	0.8	37.0										
29-Dec-00	Not sampled													
01-Feb-01	665	1,068	0.6	34.4										
01-Mar-01	575	953	0.6	36.0										
30-Mar-01	458	831	0.6	32.8										
01-May-01	482	899	0.5	31.4										
01-Jun-01	504	867	0.6	33.3										
29-Jun-01	481	1,258	0.4	35.1										
01-Aug-01	412	1,088	0.4	36.2										
31-Aug-01	240	622	0.4	35.8 2 early unk peaks										
01-Oct-01	298	853	0.3	62.3 early unk peaks										
01-Nov-01	Sample vial broken			62.1 w/ 11/1 - pump cycles										
30-Nov-01	237	736	0.3	80.9										
15-Jan-02	203	650	0.3	60.5 w/ 1/2										
31-Jan-02	156	510	0.3	64.2										
01-Mar-02	170	603	0.3	69.3										
01-Apr-02	210	692	0.3	66.8										
01-May-02	267	902	0.3											
13-Aug-97	3,847	3,497	1.1	Pump installed-commened pumping										
20-Aug-97	2,422	1,807	1.3											
31-Oct-97	1,281	875	1.5											
07-Nov-97	1,587	998	1.6											
26-Nov-97	1,197	884	1.4											
10-Dec-97	1,014	659	1.5											
30-Jan-98	1,115	854	1.3											
26-Feb-98	1,183	934	1.3											
18-Mar-98	869	698	1.2											
22-Apr-98	681	567	1.2											
15-May-98	81	56	1.4	Off-site H&A #11- Results Suspect										
21-May-98	1,123	705	1.6											
31-Jul-98	1,021	1,041	1.0											
01-Sep-98	706	774	0.9											
01-Oct-98	462	343	1.3											
30-Oct-98	680	449	1.5											
01-Dec-98	284	246	1.2											
31-Dec-98	371	323	1.1											
01-Feb-99	467	464	1.0											
01-Mar-99	471	463	1.0											
01-Apr-99	482	419	1.2											
30-Apr-99	491	514	1.0											
01-Jun-99	342	398	0.9											
01-Jul-99	398	440	0.9											
30-Jul-99	426	424	1.0											
01-Sep-99	567	606	0.9											
01-Oct-99	207	334	0.6											
29-Oct-99	461	609	0.8											
01-Dec-99	421	563	0.7											
31-Dec-99	388	478	0.8											
01-Feb-00	376	410	0.9											
01-Mar-00	672	761	0.9											
31-Mar-00	517	1,144	0.5	Pump off for 10 days										
01-May-00	567	626	0.9	Pump off for 12+ days										
01-Jun-00	594	782	0.8	Pump off all month										
29-Jun-00	365	737	0.5	10.0 Pump off all month										
01-Aug-00	288	836	0.3	Pump on 30 Aug										
31-Aug-00	380	329	1.2											
27-Oct-00	374	450	0.8											
01-Nov-00	405	423	1.0											
01-Dec-00	518	558	0.9											
29-Dec-00	635	970	0.7											
01-Feb-01	567	805	0.7											
01-Mar-01	487	679	0.7											
02-Apr-01	487	623	0.8	Pump off all month										
01-May-01	no sample			Pump off all month										
01-Jun-01	524	694	0.8											
29-Jun-01	no sample													
01-Aug-01	729	1,000	0.7											
31-Aug-01	258	367	0.7											
19-Oct-01	382	621	0.6											
01-Nov-01	381	629	0.6											
03-Dec-01	441	884	0.5											
02-Jan-02	259	573	0.5											

OU-1 Boundary Interceptor Well #4



OU-1 Interceptor Well #6

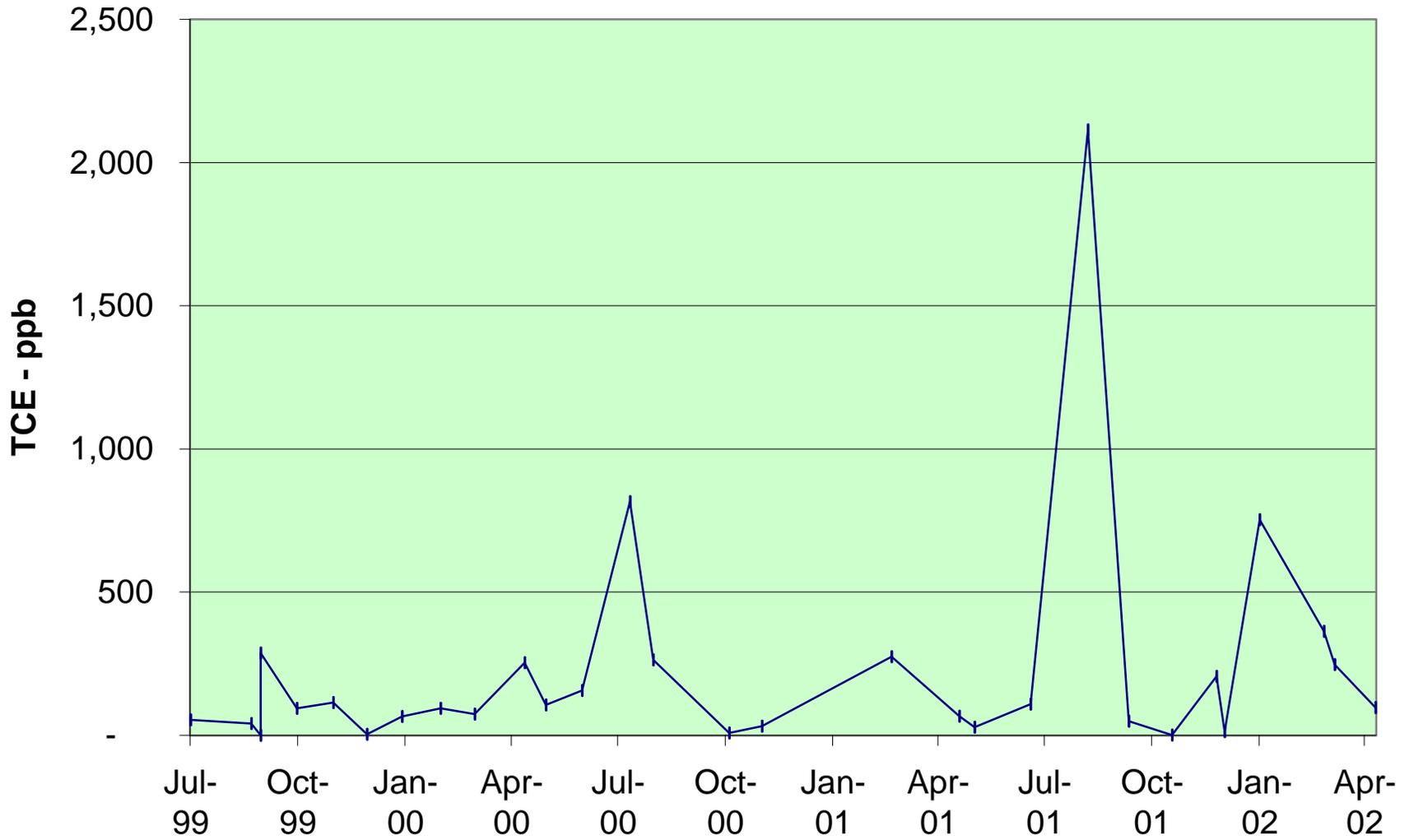


SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS
G&M MW #2 = IW #7					G&M MW #3 = IW #8					G&M MW #4 = IW #9				
				<u>DRAWDOWN</u>					<u>DRAWDOWN</u>					<u>DRAWDOWN</u>
04-Feb-98	6,361	2,379	2.7	Many peaks/1 very late	01-Oct-98	96,000	bdl(<1000)			01-Oct-98	43,740	bdl(<1000)		
01-Oct-98	2,554	634	4.0		30-Nov-98	4,040	2,066	2.0		30-Nov-98	82/77	11/10	7.5/7.7	Ran sample twice
30-Nov-98	13,770	3,860	3.6		15-Apr-99	58,210	3,579	16.3	Many peaks/diluted 100	15-Apr-99	5,563	bdl(<1000)		Many peaks/diluted 100
15-Apr-99	118,600	4,968	23.9	Many peaks/diluted 100	30-Apr-99	10,800	1,242	8.7	Many peaks/diluted 100	30-Apr-99	19,020	498	38.2	Many peaks/diluted 100
30-Apr-99	135,100	3,973	34.0	Many peaks/diluted 100	10-Jun-99	31,360	1,401	22.4	Diluted 100	10-Jun-99	13,540	745	18.2	Diluted 100
10-Jun-99	194,900	7,235	26.9	Diluted 100	01-Jul-99	105,300	3,661	28.8	Diluted 100	01-Jul-99	9,055	1,105	8.2	Diluted 100
01-Jul-99	149,300	6,304	23.7	Diluted 100	23-Aug-99	95,470	2,400	39.8	Diluted 100	23-Aug-99	3,210	2,171	1.5	No dilution
23-Aug-99	165,900	12,980	12.8	Diluted 100	31-Aug-99	122,600	4,808	25.5	Diluted 100	31-Aug-99	2,025	451	4.5	Diluted 100
31-Aug-99	140,400	10,120	13.9	Diluted 100						31-Aug-99	1,891	1,401	1.3	No dilution
					01-Oct-99	110,400	4,219	26.2	Diluted 100	01-Oct-99	3,124	2,087	1.5	No dilution
01-Oct-99	59,380	5,847	10.2	Diluted 100	29-Oct-99	20,520	911	22.5	Diluted 100	29-Oct-99	1,180	1,017	1.2	No dilution
29-Oct-99	50,400	1,940	26.0	Diluted 100	30-Nov-99	104,200	3,312	31.5	Diluted 100	30-Nov-99	5,658	1,086	5.2	No dilution
30-Nov-99	95,750	1,236	77.5	Diluted 100	30-Dec-99	6,256	3,371	1.9	No dilution	30-Dec-99	815	123	6.6	No dilution-pump off
30-Dec-99	61,290	1,909	32.1	Diluted 100	01-Feb-00	6,283	2,857	2.2	No dilution-pump off	01-Feb-00	4,315	328	13.2	No dilution-pump off
01-Feb-00	69,770	750	93.0	Diluted 100-pump off	01-Mar-00	7,628	2,807	2.7	No dilution-pump on	01-Mar-00	4,650	2,551	1.8	No dilution-pump off
01-Mar-00	71,790	762	94.2	Diluted 100-pump off	13-Apr-00	15,890	708	22.4	Diluted 100-pump off	13-Apr-00	4,575	907	5.0	No dilution-pump off
13-Apr-00	1,356	80	17.0	No Dilution-pump off	01-May-00	4,923	1,867	2.6	No dilution-pump off	01-May-00	6,195	466	13.3	No dilution-pump off
01-May-00	28,780	bdl	n/a	Diluted 100-pump off	01-Jun-00	4,529	1,590	2.8	No dilution-pump off	01-Jun-00	4,695	350	13.4	No dilution-pump off
01-Jun-00	447	20	22.4	No Dilution-pump off	29-Jun-00	377	736	0.5	No dilution-pump off	29-Jun-00	2,837	422	6.7	No dilution-pump off
29-Jun-00	516	28	18.4	No Dilution-pump off	01-Aug-00	3,667	761	4.8	No Dilution-pump on	01-Aug-00	2,145	98	21.9	No dilution-pump off
01-Aug-00	6,184	3,754	1.6	No Dilution-pump on	31-Aug-00	17,980	4,693	3.8	No Dilution-pump on	31-Aug-00	651	76	8.6	No dilution-pump off
31-Aug-00	10,905	5,251	2.1	No Dilution-pump on	05-Oct-00	3,205	1,975	1.6	No Dilution-pump off	05-Oct-00	8,994	5,280	1.7	No dilution-pump off
05-Oct-00	9,691	6,082	1.6	No Dilution-pump on	02-Nov-00	4,062	2,239	1.8	No Dilution-pump off	02-Nov-00	2,001	373	5.4	No Dilution-pump off
02-Nov-00	13,450	6,275	2.1	No Dilution-pump on	01-Dec-00	3,135	1,574	2.0	No Dilution-pump off	01-Dec-00	8,380	4,138	2.0	No Dilution-pump off
01-Dec-00	6,620	3,204	2.1	No Dilution-pump on	29-Dec-00	724	1,261	0.6	No Dilution-pump off	29-Dec-00	6,346	3,508	1.8	No Dilution-pump off
29-Dec-00	11,390	4,516	2.5	No Dilution-pump on	01-Feb-01	894	1,292	0.7	No Dilution-pump off	01-Feb-01	9,406	5,973	1.6	No Dilution-pump off
01-Feb-01	9,115	5,390	1.7	No Dilution-pump on	27-Feb-01	583	842	0.7	No Dilution-pump off	27-Feb-01	7,345	4,792	1.5	No Dilution-pump off
27-Feb-01	7,219	3,391	2.1	No Dilution-pump on	02-Apr-01	198	798	0.2	No Dilution-pump off	02-Apr-01	5,754	2,698	2.1	No Dilution-pump off
02-Apr-01	1,806	658	2.7	No Dilution-pump off	01-May-01	239	677	0.4	No Dilution-pump off	01-May-01	6,622	2,623	2.5	No Dilution-pump off
01-May-01	1,740	158	11.0	No Dilution-pump off	01-Jun-01	240	351	0.7	No Dilution-pump off	01-Jun-01	1,819	548	3.3	No Dilution-pump off
01-Jun-01	1,343	70	19.2	No Dilution-pump off	18-Jun-01	158	314	0.5	No Dilution-pump off	18-Jun-01	2,810	1,318	2.1	No Dilution-pump off
18-Jun-01	2,041	491	4.2	No Dilution-pump off	18-Jun-01	194	261	0.7	Off-site lab-diluted-10	18-Jun-01	4,163	614	6.8	Off-site lab-diluted-200
18-Jun-01	2,640	342	7.7	Off-site lab-diluted-200	6/19 permanganate injections commence - pump shutdown for duration of study					6/19 permanganate injections commence - pump shutdown for duration of study				
6/19-21 - some permanganate injected - pump shutdown for duration of study					6/19 permanganate injections commence - pump shutdown for duration of study					6/19 permanganate injections commence - pump shutdown for duration of study				
27-Jun-01	65	767	0.1	No Dilution	27-Jun-01	389	565	0.7	No Dilution	27-Jun-01	1,729	430	4.0	No Dilution
25-Jul-01	104	1,019	0.1	Permanganate consumed	25-Jul-01	186	1,058	0.2	No Dilution	25-Jul-01	4,698	1,148	4.1	No Dilution
06-Aug-01	144	798	0.2	No Dilution	06-Aug-01	247	1,238	0.2	No Dilution	06-Aug-01	1,631	374	4.4	No Dilution
24-Aug-01	123	762	0.2	No Dilution	24-Aug-01	216	912	0.2	No Dilution	24-Aug-01	3,297	343	9.6	No Dilution
29-Aug-01	17/18	86/88	0.2	No Dilution-ran twice	29-Aug-01	193	913	0.2	No Dilution	29-Aug-01	1,535	293	5.2	No Dilution
29-Aug-01	22.2	84.18	0.3	Off-site lab	29-Aug-01	193	593.49	0.3	Off-site lab	29-Aug-01	1,096	215.64	5.1	Off-site lab
12-Sep-01	43	233	0.2	No Dilution	12-Sep-01	164	718	0.2	No Dilution	12-Sep-01	3,298	297	11.1	No Dilution
19-Oct-01	5,016	2,423	2.1	No Dilution	19-Oct-01	2,959	1,469	2.0	No Dilution	19-Oct-01	577	215	2.7	No Dilution
										26-Oct-01	permanganate injection			
14-Nov-01	3,356	643	5.2	No Dilution	14-Nov-01	3,631	1,530	2.4	No Dilution	14-Nov-01	n/s - permanganate remains			
19-Dec-01	5,553	5,126	1.1	No Dilution	19-Dec-01	3,554	2,321	1.5	No Dilution	19-Dec-01	n/s - permanganate remains			
03-Jan-02	5,066	4,232	1.2	No Dilution	03-Jan-02	3,882	2,482	1.6	No Dilution	03-Jan-02	n/s - permanganate remains			
12-Feb-02	371	66			12-Feb-02	2,849	2,512	1.1	No Dilution	12-Feb-02	n/s - permanganate remains			
07-Mar-02	575	221	2.6		07-Mar-02	928/942	665/611	1.4/1.5	Re-ran	07-Mar-02	n/s - permanganate remains			
11-Apr-02	985	219	4.5		11-Apr-02	2,499	1,196	2.1	227 - 978 after operating	11-Apr-02	647	189	3.4	
16-May-02	21	287	0.1		16-May-02	288	1,380	0.2		16-May-02	6	52	0.1	

ATTACHMENT C-23, Hanscom Field/Hanscom AFB NPL Site 2nd Five-Year Review Report
 OU1 Groundwater Collection System 1997-2002 On-site GC Results for Interceptor Wells

<u>SAMPLE DATE</u>	<u>TCE ppb</u>	<u>CIS 1-2 ppb</u>	<u>TCE-CIS RATIO</u>	<u>REMARKS</u>
IW #10	TCE	CIS 1-2	TCE-CIS	<u>DRAWDOWN</u>
02-Jul-99	56/52	bdl/bdl		After drilling/before pump
23-Aug-99	41	bdl		
31-Aug-99	bdl	bdl		Diluted 100
31-Aug-99	287	6	47.8	No dilution
01-Oct-99	94	bdl		No dilution
01-Nov-99	114	bdl		No dilution
30-Nov-99	4	bdl		No dilution
30-Dec-99	66	bdl		No dilution
01-Feb-00	94	bdl		No dilution
01-Mar-00	74	bdl		No dilution
13-Apr-00	253	18	14.1	No dilution
01-May-00	106	bdl		No dilution
01-Jun-00	156	bdl		No dilution
12-Jul-00	816	66	12.4	11.4 No dilution
01-Aug-00	263	bdl		13.3 No dilution
31-Aug-00	Not sampled			
05-Oct-00	8	bdl		No dilution
02-Nov-00	32	b		10.8 No dilution
01-Dec-00	Not sampled			
29-Dec-00	Not sampled			
21-Feb-01	274	15	18.3	No dilution
20-Apr-01	67	bdl		No dilution
03-May-01	28	bdl		No dilution
20-Jun-01	109	bdl		No dilution/pump off
08-Aug-01	2,114	21	100.7	No dilution/pump on
12-Sep-01	49	bdl	unk	No dilution/pump on
19-Oct-01	1	bdl	unk	No dilution/pump on
26-Nov-01	206	bdl	unk	No dilution/pump on
03-Dec-01	13	bdl	unk	No dilution/pump on
02-Jan-02	753	20	37.7	
26-Feb-02	363	9	40.3	
07-Mar-02	247	bdl	unk	
11-Apr-02	97	bdl	unk	

OU-1 Interceptor Well #10



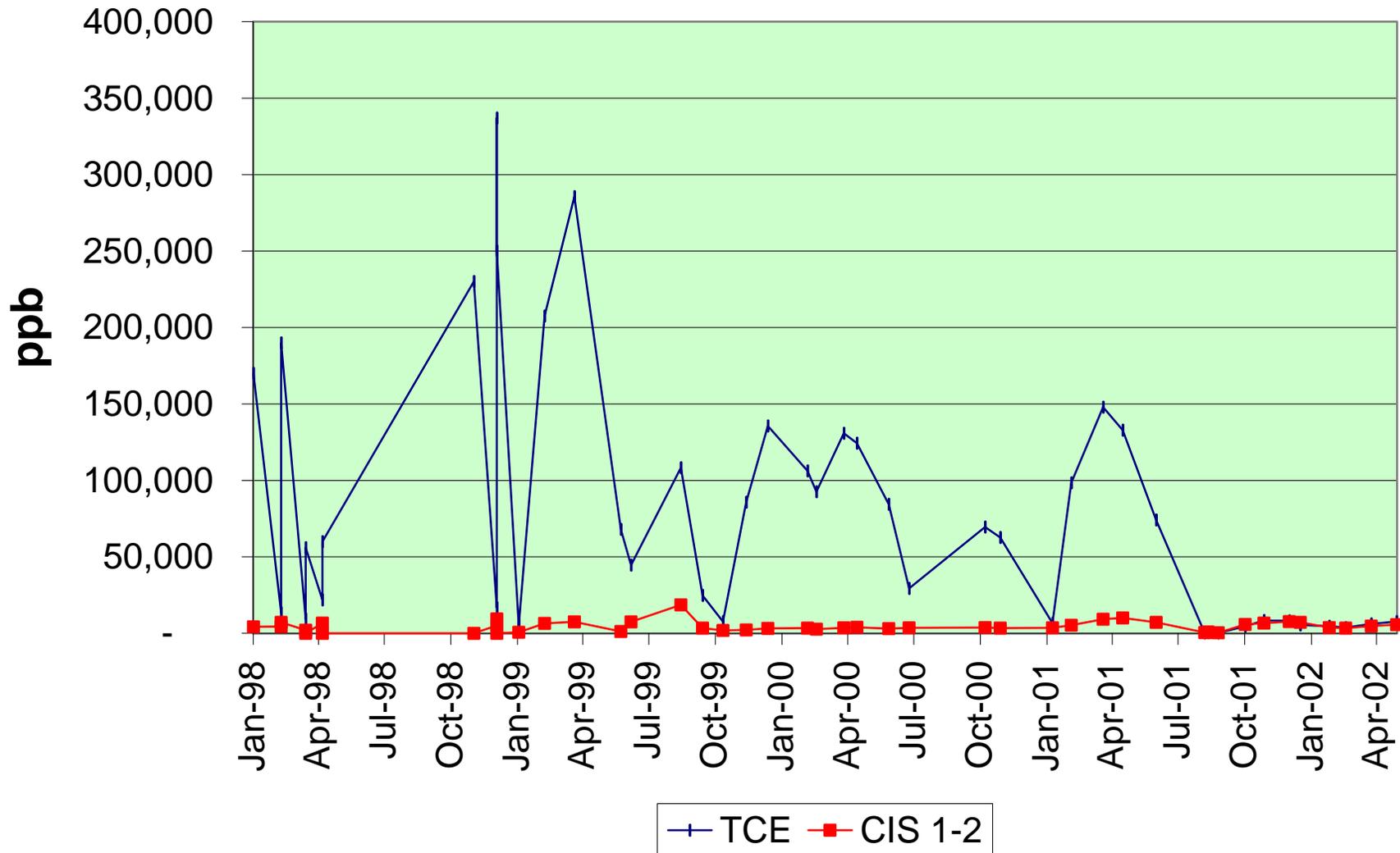
ATTACHMENT C-25, Hanscom Field/Hanscom AFB NPL Superfund Site 2nd Five-Year Review Report
 OU1 Site 1 VER System/Recovery Wells 1998-2002 On-site GC Results

SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS
G&M VER RW #1					G&M VER RW #2				
19-Jan-98	170,000	4,300	39.5	off-site Savannah Lab	19-Jan-98	39,000	3,300	11.8	off-site Savannah Lab
26-Feb-98	13,520	4,379	3.1	many peaks	26-Feb-98	5,522	2,275	2.4	many peaks
26-Feb-98	190,000	7,200	26.4	off-site Savannah Lab	26-Feb-98	9,300	1,000	9.3	off-site Savannah Lab
01-Apr-98	9,444	2,126	4.4		01-Apr-98	7,944	3,396	2.3	
01-Apr-98	56,000	bdl		off-site Savannah Lab	01-Apr-98	38,000	2,700	14.1	off-site Savannah Lab
24-Apr-98	21,820	6,600	3.3	many peaks	24-Apr-98	6,042	3,337	1.8	many peaks
24-Apr-98	60,000	?		off-site Savannah Lab	24-Apr-98	30,000	?		off-site Savannah Lab
19-Nov-98	230,000	<12,000		off-site Savannah Lab	26-May-98	7,231	3,822	1.9	
21-Dec-98	16,822	5,160	3.3		19-Nov-98	19,000	2,400	7.9	off-site Savannah Lab
21-Dec-98	337,000	9,400	35.9	Off-site-STL	21-Dec-98	6,101	2,724	2.2	
21-Dec-98	250,000	<12,000		off-site Savannah Lab	21-Dec-98	31,000	3,100	10.0	Off-site-STL
20-Jan-99	4,906	734	6.7		21-Dec-98	28,000	2,700	10.4	off-site Savannah Lab
25-Feb-99	207,500	6,489	32.0	diluted-100	01-Feb-99	212	54	3.9	
07-Apr-99	285,500	7,560	37.8	diluted-100	25-Feb-99	12,380	1,236	10.0	diluted-100
DEMONSTRATION PROJECT ENDS					DEMONSTRATION PROJECT ENDS				
10-Jun-99	68,050	1,223	55.6	diluted-100	10-Jun-99	8,885	1,050	8.5	diluted-100
24-Jun-99	44,560	7,462	6.0	diluted-100	24-Jun-99	not sampled			
01-Sep-99	108,200	18,640	5.8	diluted-100/system off	31-Aug-99	1,129	2,418	0.5	No dilution/system off
01-Oct-99	24,820	3,497	7.1	diluted-100/system off	31-Aug-99	900	2,539	0.4	diluted-100/system off
29-Oct-99	7,625	1,833	4.2	diluted-100	01-Oct-99	404	1,199	0.3	No dilution/system off
30-Nov-99	85,750	2,290	37.4	diluted-100	29-Oct-99	3,955	2,238	1.8	No dilution
30-Dec-99	135,600	3,263	41.6	diluted-100	30-Nov-99	6,015	2,668	2.3	No dilut-sample like mud
23-Feb-00	106,300	3,412	31.2	diluted-100	30-Dec-99	4,649	1,773	2.6	No dilution
06-Mar-00	92,580	2,747	33.7	diluted-100	23-Feb-00	4,721	2,609	1.8	No dilution
13-Apr-00	130,800	3,604	36.3	diluted-100	06-Mar-00	3,690	1,941	1.9	No dilution
01-May-00	124,400	3,930	31.7	diluted-100	13-Apr-00	4,683	2,474	1.9	No dilution-early peaks
14-Jun-00	84,420	3,133	26.9	diluted-100	01-May-00	3,567	1,986	1.8	No dilution
12-Jul-00	29,430	3,645	8.1	diluted-100	14-Jun-00	3,976	2,268	1.8	No dilution
02-Aug-00				no sample	12-Jul-00	3,810	1,807	2.1	No dilution
31-Aug-00				not sampled	02-Aug-00	3,732	1,907	2.0	No dilution
25-Oct-00	69,500	3,808	18.3	diluted-100	31-Aug-00				not sampled
15-Nov-00	62,710	3,350	18.7	diluted-100	25-Oct-00	5,429	2,278	2.4	No dilution
26-Jan-01	6,686	3,635	1.8	No dilution	15-Nov-00	3,717	1,062	3.5	No dilution
21-Feb-01	98,400	5,316	18.5	diluted-100	26-Jan-01	712	932	0.8	No dilution
06-Apr-01	147,900	9,223	16.0	diluted-100	21-Feb-01	4,621	2,095	2.2	No dilution
03-May-01	132,800	10,020	13.3	diluted-100	06-Apr-01	206	2,925	0.1	No dilution
18-Jun-01	74,130	7,141	10.4	diluted-100	03-May-01	3,949	2,120	1.9	No dilution
18-Jun-01	51,499	4,772	10.8	Off-site-diluted-2,000	18-Jun-01	2,805	2,442	1.1	No dilution
18-Jun-01	43,153	3,917	11.0	Off-site lab-duplicate	18-Jun-01	7,693	2,235	3.4	Off-site lab-diluted-625
VER SUSPENDED FOR DURATION OF PERMANGANATE PILOT STUDY					VER SUSPENDED FOR DURATION OF PERMANGANATE PILOT STUDY				
27-Jun-01	n/s - a little permanganate injected 6/19-21				27-Jun-01	n/s - major point of permanganate injection 6/19-21			
25-Jul-01	n/s - permanganate remains				25-Jul-01	153	346	0.4	permanganate consumed
06-Aug-01	n/s - permanganate remains				06-Aug-01	72	39	1.8	No dilution
24-Aug-01	231	527	0.4	No dilution	24-Aug-01	52	59	0.9	No dilution
29-Aug-01	389	858	0.5	No dilution	29-Aug-01	133	259	0.5	No dilution
29-Aug-01	315.3	475.76	0.7	Off-site lab	29-Aug-01	70.3	104.92	0.7	Off-site lab
12-Sep-01	209	388	0.5	No dilution	12-Sep-01	53	53	1.0	No dilution
19-Oct-01	4,676	5,751	0.8	No dilution	19-Oct-01	1,652	364	4.5	No dilution
14-Nov-01	8,352	6,716	1.2	No dilution	14-Nov-01	140	152	0.9	No dilution
19-Dec-01	8,185	7,722	1.1	Purple tint-No dilution	19-Dec-01	3,714	3,782	1.0	No dilution
03-Jan-02	5,441	7,257	0.7	No dilution	03-Jan-02	3,649	3,956	0.9	No dilution
12-Feb-02	4,635	3,707	1.3	No dilution	12-Feb-02	560	742	0.8	No dilution
07-Mar-02	3,818	3,337	1.1		07-Mar-02	614	499	1.2	
11-Apr-02	6,124	4,833	1.3		11-Apr-02	623	687	0.9	
16-May-02	7,711	5,566	1.4		16-May-02	1,253	1,117	1.1	

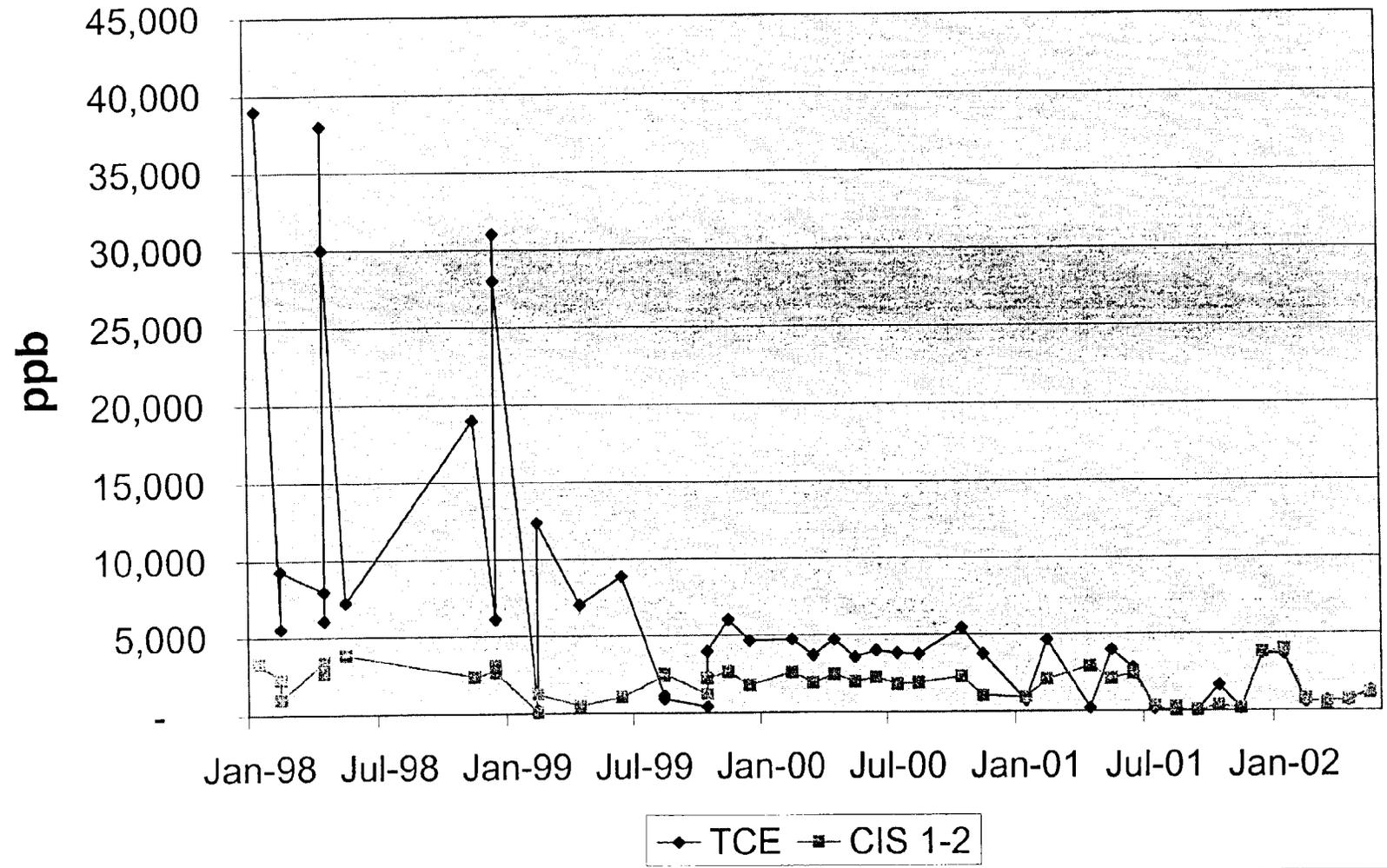
ATTACHMENT C-26, Hanscom Field/Hanscom AFB NPL Superfund Site 2nd Five-Year Review Report
 OU1 Site 1 VER System/Recovery Wells 1998-2002 On-site GC Results

SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS	SAMPLE DATE	TCE ppb	CIS 1-2 ppb	TCE-CIS RATIO	REMARKS
G&M VER RW #3					G&M VER RW #4				
19-Jan-98	8,500	1,600	5.3	off-site Savannah Lab	19-Jan-98	65,000	3,500	18.6	off-site Savannah Lab
26-Feb-98	90,410	bdl		many peaks	26-Feb-98	7,485	2,663	2.8	many peaks
26-Feb-98	20,000	1,800	11.1	off-site Savannah Lab	26-Feb-98	20,000	1,500	13.3	off-site Savannah Lab
01-Apr-98	24,240	bdl			01-Apr-98	6,635	3,111	2.1	
01-Apr-98	20,000	2,700	7.4	off-site Savannah Lab	01-Apr-98	19,000	bdl		off-site Savannah Lab
24-Apr-98	68,320	bdl			24-Apr-98	6,917	3,173	2.2	
24-Apr-98	82,000	?		off-site Savannah Lab	24-Apr-98	18,000	?		off-site Savannah Lab
26-May-98	47,830	bdl			19-Nov-98	10,310	5,252	2.0	
19-Nov-98	63,000	3,500	18.0	off-site Savannah Lab	19-Nov-98	78,000	16,000	4.9	off-site Savannah Lab
21-Dec-98	131,300	3,076	42.7	diluted-100	21-Dec-98	7,939	3,243	2.4	
21-Dec-98	83,000	3,500	23.7	Off-site-STL	21-Dec-98	56,000	4,700	11.9	Off-site-STL
21-Dec-98	78,000	2,900	26.9	off-site Savannah Lab	21-Dec-98	62,000	3,500	17.7	off-site Savannah Lab
20-Jan-99	93,560	2,371	39.5	diluted-100	20-Jan-99	67,560	10,640	6.3	diluted-100
25-Feb-99	153,600	4,385	35.0	diluted-100	25-Feb-99	10,170	2,071	4.9	diluted-100
07-Apr-99	10,440	bdl		diluted-100	07-Apr-99	131,700	6,999	18.8	diluted-100
DEMONSTRATION PROJECT ENDS									
10-Jun-99	110,700	2,055	53.9	diluted-100	10-Jun-99	122,400	8,541	14.3	diluted-100
24-Jun-99	48,490	1,776	27.3	diluted-100	24-Jun-99	64,120	5,517	11.6	diluted-100
31-Aug-99	4,483	1,466	3.1	No dilution/system off	31-Aug-99	3,275	2,005	1.6	No dilution/system off
31-Aug-99	3,855	543	7.1	diluted-100/system off	31-Aug-99	8,499	1,521	5.6	diluted-100/system off
01-Oct-99	866	125	6.9	No dilution/system off	01-Oct-99	3,763	2,212	1.7	No dilution/system off
29-Oct-99	49,950	1,442	34.6	diluted-100	29-Oct-99	51,090	7,496	6.8	diluted-100
30-Nov-99	45,410	734	61.9	diluted-100	30-Nov-99	87,840	7,548	11.6	diluted-100
30-Dec-99	39,630	676	58.6	diluted-100	30-Dec-99	68,890	7,319	9.4	diluted-100
23-Feb-00	43,760	1,468	29.8	diluted-100	23-Feb-00	46,510	6,679	7.0	diluted-100
06-Mar-00	9,395	bdl		No dilution	06-Mar-00	41,790	4,997	8.4	diluted-100
13-Apr-00	31,040	1,122	27.7	diluted-100	13-Apr-00	50,400	6,046	8.3	diluted-100
01-May-00	5,674	2,431	2.3	No dilution	01-May-00	45,180	4,503	10.0	diluted-100
14-Jun-00	5,373	2,259	2.4	No dilution	14-Jun-00	30,750	3,863	8.0	diluted-100
12-Jul-00	9,262	2,995	3.1	No dilution	12-Jul-00	34,500	3,420	10.1	diluted-100
02-Aug-00	8,145	3,218	2.5	No dilution	02-Aug-00	27,390	2,678	10.2	diluted-100
31-Aug-00				not sampled	31-Aug-00				not sampled
25-Oct-00	30,700	1,669	18.4	diluted-100	25-Oct-00	30,320	3,737	8.1	diluted-100
15-Nov-00	29,660	1,341	22.1	diluted-100	15-Nov-00	30,040	3,607	8.3	diluted-100
26-Jan-01	726	172	4.2	No dilution	26-Jan-01	5,159	3,685	1.4	No dilution
21-Feb-01	35,520	2,104	16.9	diluted-100	21-Feb-01	31,610	4,492	7.0	diluted-100
06-Apr-01	3,171	1,874	1.7	No dilution	06-Apr-01	117,400	9,301	12.6	diluted-100
03-May-01	2,196	2,309	1.0	No dilution	03-May-01	49,850	6,907	7.2	diluted-100
18-Jun-01	2,878	2,492	1.2	No dilution	18-Jun-01	37,160	6,188	6.0	diluted-100
18-Jun-01	6,543	1,252	5.2	Off-site lab-diluted-500	18-Jun-01	29,688	4,031	7.4	Off-site lab-diluted-2,500
VER SUSPENDED FOR DURATION OF PERMANGANATE PILOT STUDY									
27-Jun-01	462	1,121	0.4	No dilution	27-Jun-01	82,410	14,510	5.7	diluted-100
25-Jul-01	303/303	873/848	3/4	No dilution	25-Jul-01	3,146	2,188	1.4	No dilution
06-Aug-01	249	612	0.4	No dilution	06-Aug-01	2,604	1,608	1.6	No dilution
24-Aug-01	105	320	0.3	No dilution	24-Aug-01	1,806	971	1.9	No dilution
29-Aug-01	39	880	0.0	No dilution	29-Aug-01	910	1,423	0.6	No dilution
29-Aug-01	61.1	573.63	0.1	Off-site lab	29-Aug-01	692.2	595.79	1.2	Off-site lab
12-Sep-01	44	425	0.1	No dilut.-early unk peak	12-Sep-01	777	809	1.0	No dilution
19-Oct-01	1,109	695	1.6	No dilution	19-Oct-01	4,697	4,484	1.0	No dilution
14-Nov-01	20	96	0.2	No dilution	14-Nov-01	2,633	3,404	0.8	No dilution
19-Dec-01	119	bdl		unk No dilution	19-Dec-01	4,019	3,764	1.1	No dilution
03-Jan-02	733	221	3.3	No dilution	03-Jan-02	3,795	4,269	0.9	No dilution
12-Feb-02	784	447	1.8	No dilution	12-Feb-02	6,224	7,034	0.9	No dilution
07-Mar-02	323	124	2.6		07-Mar-02	4,915	6,133	0.8	
11-Apr-02	261	324	0.8		11-Apr-02	6,138	3,892	1.6	
16-May-02	n/s - permanganate detected				16-May-02	13,630	8,639	1.6	

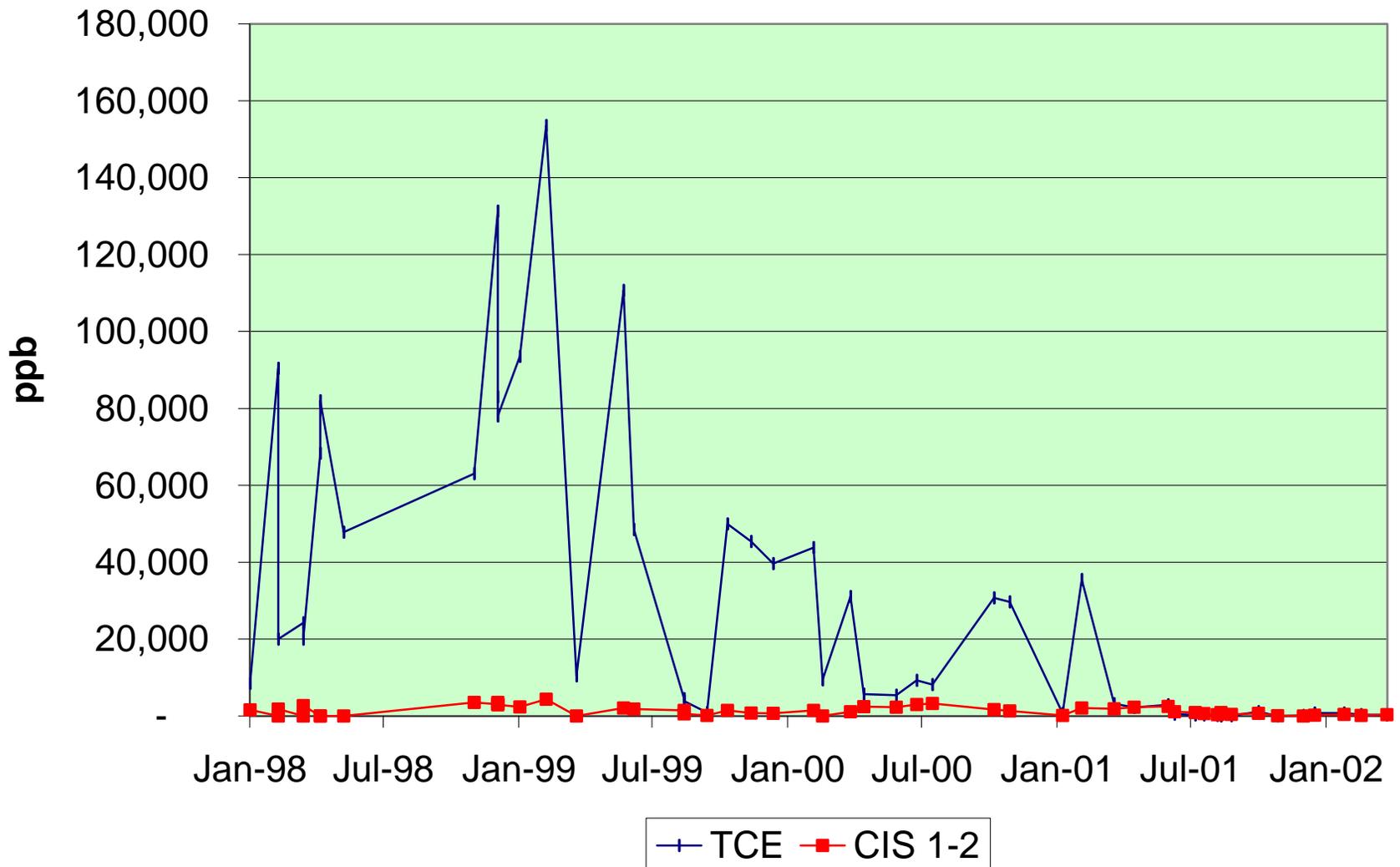
Site 1 VER System - RW #1



Site 1 VER System - RW #2



Site 1 VER System - RW #3



Site 1 VER System - RW #4

