

FINAL

Data Management Plan

**In Situ Thermal Remediation
(Electrical Resistance Heating)
East Gate Disposal Yard
Ft. Lewis, Washington
DACA67-02-C-0218**



**US Army Corps
of Engineers**



THERMAL REMEDIATION SERVICES, INC.

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Abbreviations and Acronyms

CD	compact discs
COC VOCs	contaminants of concern volatile organic compounds
DCE	cis-1,2-dichloroethene
DMP	Data Management Plan
DQO	data quality objective
EDD	electronic data deliverable
EGDY	East Gate Disposal Yard
ERH	electrical resistance heating
GIS	geographic information systems
HCW	hydraulic control well
MPE	multiphase extraction
MW	monitoring well
NAPL	nonaqueous phase liquid
O&M	Operations & Maintenance
PMOM	Process Monitoring Operations and Maintenance Plan
QA	quality assurance
QC	quality control
RAMP	Remedial Action Management Plan
SAP	Sampling and Analysis Plan
SOPs	standard operating procedures
TCE	trichloroethene
TMP	temperature monitoring point
TPH	total petroleum hydrocarbons
TRS	Thermal Remediation Services, Inc.
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VC	vinyl chloride

1.0 DATA MANAGEMENT STRATEGY

Data management is a critical component of the East Gate Disposal Yard (EGDY) project. Monitoring of the electrical resistance heating (ERH) remediation system will be extensive, and in some cases data will be recorded 24 hours a day. The following sections describe the approach developed by the Thermal Remediation Services (TRS) project team to monitor, track, verify, and report the data collected.

This Data Management Plan (DMP) addresses all three areas of concern at the EGDY: nonaqueous phase liquid (NAPL) Treatment Areas 1, 2, and 3. Information obtained during the operation of the ERH system at NAPL Treatment Area 1 will be used to modify the monitoring processes for the remaining two treatment areas. The project team and the United States Army Corps of Engineers (USACE) will work together to implement changes in project protocol as the remediation effort progresses. It is quite possible that sampling and monitoring procedures and locations, as well as the presentation of reports, will change over the course of the project for any of the NAPL Treatment Areas.

A project website will contain daily, weekly and monthly reporting of data and analytical results. USACE will use this information to determine if the project is meeting contract specifications, and as a platform to determine if changes to the protocols provided in the Remedial Action Management Plan (RAMP) could maximize the efficiency of field operations and remediation system monitoring.

Control of data for this project is broken down into four broad categories:

- Collection
- Management
- Report preparation
- Deliverables

A flow chart showing the general relationships between these categories, and where quality control steps occur, is illustrated in Figure 1. Specific activities conducted for each category are described in detail in the following sections.

1.1 Collection

Physical parameter data will be obtained by project team members using either manual or automated means. Chemical data will be obtained from both on-site and off-site (fixed) analytical laboratories that will analyze samples of various media (water, air,

nonaqueous phase liquid (NAPL), etc.) collected by project team members. Collection of this data is described in more detail below.

1.1.1 Manual Data Collection

Manual data collection will be performed at monitoring locations that cannot be fitted with an electronic data logger, or where electronic data logging is not appropriate. In general, temperature, electrical parameters, and groundwater elevation data is collected electronically and other data (such as pressures and flow rates) are collected manually. Manual data collection will involve recording measurements on paper field forms (example forms included in Appendix C of the Sampling and Analysis Plan [SAP]), or entered manually into a handheld computer. The types of parameters to be monitored manually (i.e. using a gage) include: pressures/flow rates/total flows of various water and air streams within the aboveground portion of the remediation treatment system, NAPL thickness at monitoring wells outside the treatment area and in the NAPL storage tank, and noise levels at the compound and perimeter of each treatment area. A complete listing of parameters to be monitored manually is provided in Table 1 of the SAP.

All collected data, whether via electronic or manual means, will be incorporated into the project geographic information system (GIS) database. The database will be in the form of GIS/Key© Version 3.2. Prior to data transfer, field personnel will perform a field comparison of the current day's data with the prior day's data to note any atypical measurements. A note will be added to the current day's field log and daily activities report (i.e., Daily Quality Control Report - Operations, presented in the Contractor Quality Control Plan) when atypical or unexpected measurements are recorded. The note will indicate the likely reason(s) for the atypical or unexpected measurement, and any planned adjustments to the system based on these measurements. If paper field forms are used, the on-site field personnel also will perform a quality control review of the data entry to check for data transfer errors.

The data file will be reviewed for completeness and to ensure that the appropriate units were used during collection of the data. If inappropriate units were used, a conversion will be performed prior to incorporation into the database. The electronic field form will be revised and notated with the correction.

1.1.2 Electronic Data Collection

Electronic data collection will be performed at as many locations as possible to reduce the potential for error during data collection, handling, or processing. Electronic data

collection will involve the use of a data logger to record measurements at specified time intervals. The types of parameters to be monitored electronically include: water levels, bulk soil temperatures, and electrical information. A complete listing of parameters to be monitored electronically is presented as Table 1 of the SAP.

Electronic data will be transferred to the database at regular intervals, in order to support the reporting requirements of the project. The data files will be reviewed for completeness and to identify any obvious irregularities. Any observed irregularity will be reported to the Site Manager (who will inform the Project Manager), noted on that day's field log, and submitted to the Data Manager for use in review of the data logger data during incorporation into the database. Questionable data will be incorporated into the database and appropriately noted.

1.1.3 On-Site Laboratory

Data generated by the on-site laboratory would follow the protocols and standard operating procedures (SOPs) outlined in Appendix E of the SAP. An electronic data deliverable (EDD), supplied by the laboratory, will be incorporated into the project database, and notated using any qualifiers presented by the laboratory. Data entered into the project database will be marked as preliminary until final quality assurance (QA) data review has been performed, and expert review qualifiers added, if necessary.

1.1.4 Off-Site Fixed Laboratory

Data generated by the off-site, fixed laboratory would follow the protocols and SOPs outlined in Appendix F of the SAP. An EDD, supplied by the laboratory, will be incorporated into the project database, and notated using any qualifiers presented by the laboratory. Data entered into the project database will be marked as preliminary until final QA data review has been performed and expert review qualifiers added, if necessary.

1.2 Management

All data collected as presented on the Physical and Chemical Parameter Monitoring Tables (Tables 1 and 2, respectively, in the SAP), would be incorporated into the project database for future use in remediation system operation and remediation progress evaluations.

Data review and verification will be performed for 100 percent of the chemical data generated during ERH remediation to evaluate the quality and usability of the data set.

Additional discussion on the chemical data review and verification of data is presented below in Section 11.0.

All data will receive a quality control review to evaluate atypical, irregular, and unexpected measurements. The results of these evaluations will be included with the daily, weekly, and monthly reports.

1.3 Report Preparation

Daily, weekly, and monthly reporting will be submitted as required by Specification Section 01785. Each report will contain written text, with supporting spreadsheets, tables, charts, and figures as necessary to comply with the specifications. A summary of the contents for daily, weekly, and monthly reports is provided in this document as Tables 1, 2, and 3, respectively. In addition, example daily, weekly, and monthly reports are provided in Appendices A, B, and C, respectively. Additional discussion on the preparation and submittal of status reports is presented below in Section 14.0.

The daily reports will receive a brief, but informal quality control (QC) review due to the short time frame for reporting. Weekly and monthly reports will be prepared with data that has received a final review. Final data review for physical parameters will include a review of trends over time, research of explanations for atypical values (including a description of the corrective action), and other reviews performed as part of data assessment. Chemical data will receive a review as described in the SAP. Both weekly and monthly reports will be reviewed by one or more TRS project team member prior to submittal to the project website.

1.3.1 Daily Reports

Daily reports, submitted to the project website, will consist of the following:

- **Daily Quality Control Report – Operations:**
Describes system operations, maintenance and repair activities, key events, sampling activities, anomalous readings, and corrective actions.
- **Daily Quality Control Report – Chemical Data:**
Describes samples collected (e.g., identification, location, depth, matrix).
- **Figure 1 – Remediation Rates:**
This figure will illustrate mass removal rate in the vapor phase and in the NAPL phase, power input rate, and multiphase extraction (MPE) liquid extraction rate. To allow comparison, the graph will show historical data from the beginning of the remediation.

- **Figure 2 – Average Site Temperature vs. Depth:**
This figure will show the average temperature versus the depths of temperature monitoring points (TMPs) and monitoring wells (MWs) within the treatment area. The graph will also display the temperature requirements of the specifications, the average temperature of the site, and temperatures from the previous day. The minimum temperature at each depth will also be shown. Within the legend of this graph, the percentage of thermocouples that meet the specification will be reported on a daily basis. If the USACE desires to audit the report, the raw data will be posted in the form of an Excel spreadsheet.

1.3.2 Weekly Reports

Weekly reports will consist of the following:

- **Weekly Cover Letter:**
Summary of data provided in daily submittals of that week.
- **Table 1 – Air Analytical Data:**
Final air analytical results from samples collected.
- **Table 2 – Groundwater Analytical Data:**
Final groundwater analytical results from samples collected.
- **Table 3 – Wastewater & NAPL Analytical Data:**
Final wastewater & NAPL analytical results from samples collected.
- **Table 4 – MW and hydraulic control wells (HCW) Groundwater Elevations:**
Daily groundwater elevation measurements for MWs and weekly groundwater elevation measurements for HCWs.
- **Table 5 – Treatment System Operation Data:**
Summary of groundwater extraction rates and volumes, and weekly temperature and pressure data for all sensors.
- **Figure 1 – Remediation Rates:**
Described in the daily report section.
- **Figures 1a through 1d– Mass Removal Rates:**
Figure 1a - Target VOC Mass Removal Per Media:
Cumulative mass of target volatile organic compounds (VOCs) removed per media (air, water, NAPL) and total mass removed.
Figure 1b - Mass Removal of Specific COC VOCs in Air:
Cumulative mass of the contaminants of concern volatile organic compounds (COC VOCs) trichloroethene (TCE), cis-1,2-dichloroethene (DCE), vinyl chloride (VC),

and total petroleum hydrocarbons (TPH) removed in air.

Figure 1c - Mass Removal of Specific COC VOCs in Water:

Cumulative mass of TCE, DCE, VC, and TPH removed in water.

Figure 1d - Mass Removal of Specific COC VOCs in NAPL

Cumulative mass of TCE, DCE, VC, and TPH removed in NAPL.

- Figure 2 – Groundwater Analytical Results:
Groundwater analytical results posted at each monitoring point (plan view). This figure is only prepared if new results are available since the last weekly report.
- Figure 3 – Groundwater Elevation Contour Plot:
Contour plot will illustrate only one point in time for a given week (e.g., the most recent point in time) and will be based on shallow MW data. Deep MW and HCW data will be shown on the plot but will not be used for contouring. MW water levels are measured daily, primarily for monitoring system operation. Should a system upset occur, it would be noted on the Daily Quality Control Report. If warranted, additional contour plots may be generated.
- Figure 4 – Pressure/Vacuum Contour Plot – this plot uses data from all MWs and all TMPs
- Figure 5 – Qualitative Target CVOC Concentrations by MPE Region
- Figure 6 – Temperature Contours:
Contour plot of temperature for each temperature specification depth (6, 11, 16, 21, 26, 31, and 33 feet bgs)
- Figure 7 – Speciation of VOCs at OXIN
Figure 7a – Speciation of VOCs at OWSDW
Figure 7b – Speciation of VOCs at NAPL01
- Figure 8 – Cumulative TCE Air Emissions
- Figure 9 – Average COC VOCs in Groundwater
- Figure 10 – TCE Concentrations in Rejected Water
- Figure 11 – DCE Concentrations in Rejected Water
- Figure 12 – VC Concentrations in Rejected Water
- Weekly Data Packages

1.3.3 Monthly Reports

Monthly reports will consist of the following:

- Monthly Cover Letter:
- Figure 1 – Remediation Rates:
Described in daily report section.
- Figure 1a through 1d – Mass Removal:
Cumulative COC VOC and total mass removal for air, water, NAPL.
Specific COC VOC mass removal per media.
- Figure 2 – Average Site Temperature vs. Depth:
Described in daily report section.
- Figure 5 – Qualitative Target C OC VOC Concentrations by MPE Region
- Figure 7 – OXIN COC VOC Distribution
- Figure 9 – Average COC VOCs in Groundwater
- Monthly Data Package

1.4 Deliverables

Project data and reports will be delivered both electronically, on compact discs (CDs), and as hard copy.

1.4.1 Project Web Page

As required by Specification 01785, all reports will be provided to the U.S. Army Corps of Engineers (USACE) electronically through posting on the project website. In addition to facilitating the electronic delivery of deliverables to the USACE, the project web site will also allow all team members access to project plans, reports, and data. The web site will be used to receive dumps of raw data, which the USACE can use for independent evaluation of system operations and remediation progress. The web site will also contain the daily, weekly, and monthly reports of system operating status, analytical results, and remediation progress.

1.4.2 Hard Copy Reports and CDs

Hard copy reports or compact discs (CDs) will be made available at the request of the USACE. Postings to the project website and report delivery will follow the schedules

set forth in Specification Section 01785, paragraph 1.4. Additional discussion on the preparation and submittal of reports is presented below in Section 14.0.

2.0 PROJECT ROLES

A flow chart illustrating relationships between the primary team members, supporting team members, and the project website, is presented as Figure 2. Table 4 provides detailed information of project contacts, including organization, role, phone number, and e-mail address. This flow chart is intended to show typical communication flow paths for ERH remediation at the EGDY. Project roles for the TRS Project Team are identified in the Contractor Quality Control Plan. Relationships specific to data management are described in more detail in the sections that follow.

2.1 Data Management Team

The Data Management Team will consist of multiple project team member representatives, including the Project Manager, Site Manager, Regulatory Specialist, Environmental Consultant, Project Chemist, and Project Engineer. Other data management team members will report to these team leaders as necessary.

2.2 Database Manager and Data Manager

The Database Manager will manipulate and maintain the database as necessary to meet the reporting requirements and will have a designated backup. The Data Manager will monitor the flow of data into the database and deliverables out to the USACE after the Site Manager or Project Manager has provided final review and approval.

2.3 Sample Manager

The Environmental Consultant will monitor sample management in field.

2.4 Data Quality Reviewers

All chemical data will receive a quality assurance review. The Environmental Consultant will perform chemical data quality review with the assistance of the chemists responsible for on-site and off-site analyses. The Project Chemist will provide senior technical oversight.

Physical data quality review will be performed by the appropriate project team member.

3.0 EXISTING DATA

Previous site data was used by the project team for design of the ERH remediation system and its components. However, this existing data is not planned for inclusion in the project database for each NAPL Treatment Area because this would substantially increase the size of the database.

4.0 PROJECT ENVIRONMENTAL DATA COLLECTION

Environmental data collection will be performed in accordance with the requirements of the Specifications and as modified through the systematic planning process. Environmental data collection and analytical procedures are described in detail in the SAP, and the Process Monitoring and Operations & Maintenance Plan (PMOM).

5.0 FIELD ACTIVITY PREPARATION

Field activity preparation tasks are described in detail in the SAP and its supporting attachments.

6.0 FIELD DATA COLLECTION

Field data collection tasks are described in detail in the SAP and its supporting attachments.

7.0 FIELD DATA

Field data to be collected are described in detail in the SAP, and the PMOM, and their supporting attachments.

8.0 SAMPLE ANALYSIS

Sample analysis methods and tasks are described in detail in the SAP and its supporting attachments.

9.0 LABORATORY ANALYTICAL DATA

Laboratory analytical data generation is described in detail in the SAP and its supporting attachments.

10.0 GEOGRAPHIC INFORMATION SYSTEM COVERAGE

During ERH remediation, data collection and system monitoring will be performed within the boundary of each NAPL Treatment Area, as defined horizontally and

vertically by the results of the Phase II Remedial Investigation, and as presented in the Final Investigation Report for the EGDY (dated October 25, 2002). The outside perimeter of each NAPL Treatment Area, in which hydraulic control and other monitoring wells may be present, also will be included in the project GIS database. Remediation system component coordinates will be established by professional surveying.

11.0 DATA QUALITY REVIEW

Chemical data quality review will be performed as required in Specification Section 01450, paragraph 1.4.4, and following United States Environmental Protection Agency (USEPA) Region 9 RCRA Corrective Action Program Data Review Guidance Manual as stated in Specification Section 01450, paragraph 1.5. Physical data quality review will be performed by appropriate project team members. At a minimum, all data produced onsite and offsite will undergo a desktop data quality review by an independent person.

Validation of the data by the project team is not required as part of ERH remediation (Specification Section 01450, paragraph 1.4.5). Adequate and appropriate data sets will be provided to the USACE such that validation could be performed by USACE at its discretion.

12.0 DATA ASSESSMENT, CONSOLIDATION, ANALYSIS, AND USE

Each data set collected will be reviewed to identify trends, monitor remediation progress, determine if system maintenance is necessary, document water quality conditions, and in general for use in meeting the requirements of the contract to remediate NAPL. Data evaluation will be performed routinely in order to prepare weekly and monthly reports. Information reported to the USACE will be further reviewed and evaluated by the USACE team members such that they can decide at what point ERH remediation has been successful, and the system may be turned off for each NAPL area.

13.0 DATA MANAGEMENT SYSTEM REQUIREMENTS

Data from the project will be managed using the GIS/Key© Version 3.2 electronic data management system. A specific name has been established for each monitoring point at which data will be recorded. These names are presented on the Physical and Chemical Parameter Monitoring Tables (Tables 1 and 2, respectively, in the SAP), and will be used to identify information coming from the specific location on every occasion that information is collected. Even minor deviations from this naming

structure can reduce the effectiveness of the database to identify the data associated with that location. However, additional data points can be added to the database at any time to facilitate monitoring of points not anticipated for monitoring during the RAMP preparation.

14.0 RECORDS MANAGEMENT AND DOCUMENT CONTROL

All data necessary to meet the reporting requirements of the contract will be entered into the project database. As described in Section 1.3, daily, weekly, and monthly reporting will be performed throughout this project as required by Specification 01785. Electronic and hard copy submittals (if requested) will be made to the USACE. Electronic submittals will take place using the project website, as well as the submittal of CDs (if requested).

Daily reports regarding data collected the previous day would be prepared by site personnel and submitted directly to the project website by 5:00 PM daily, excluding weekends and holidays. Weekly reports would be submitted to the project website each Thursday, and cover the system operation for the prior week. Monthly reports would be submitted to the project website by the 10th of each month, covering data for the prior month.

In addition, the USACE has indicated their desire to receive raw data for their own use in evaluation of system operation. Raw data dumps will be performed regularly to the project website, and are anticipated to occur on the same schedule as weekly reporting.

TABLE 1
Daily Reporting Requirements and Proposed Formats
 East Gate Disposal Yard
 Fort Lewis, Washington

Reporting Frequency	Spec. Letter	Specification Description	Display Format	Software	Physical Description	Data Required or Used	Sample ID(s)	Notes/Questions
Daily	A	Brief system status summary	Form	MS Word	Description of system operation (operation time, maintenance & repair activities, key events, sampling activities, anomalous readings and corrective actions). This information will be presented as part of the DQCR or DCQCR.	Notes recorded as part of daily system monitoring.	None	This is a separate file received via e-mail.
Daily	B	Mass removal rate - vapor only	Graph	MS Excel	Presentation as 1 of four rates on a single graph	Pressure, Flow rate, Temperature, Air Analytical Data	OXIN01A1 (OXIN02A1)	Figure 1 - Excel graph of extraction rate vs. time
Daily	C	Subsurface temperature summary	Graph	MS Excel	Graph of average temp vs depth (depth intervals of 1, 6, 11, 16, 21, 26, 31, 33, 38, 43, and 48 feet bgs) based on TMPs and MWs within the treatment area. Graph will also display the temperature requirements of the specifications, the average temperature of the site, and the change from the prior day.	TMPs MWs	Example: MWB9A101	Figure 2 - Excel graph of average temperature with depth
Daily	D	Energy usage and energy input into subsurface soils	Graph	GISKey	Only subsurface energy will be reported. Presentation as 1 of four rates on a single graph	PCU kWatt Power Meter	PCUHA1	Figure 1 - Excel graph of KWH vs. time
Daily	E	NAPL volume recovered	Graph	MS Excel GISKey	Rather than present the volume, presentation of the mass recovered is suggested. This would appear as 1 of four rates on a single graph.	NAPL Tank Water Level NAPL Tank NAPL Level NAPL Tank Geometry	LI105	Figure 1 - Excel graph of NAPL mass recovered vs. time
Daily	F	Operation time with descriptions for non-routine maintenance and repair	Form	MS Word	Description of system operation (operation time, maintenance & repair activities, key events, sampling activities, anomalous readings and corrective actions). This information will be presented as part of the DQCR or DCQCR.	Notes recorded as part of daily system monitoring.	None	This is a separate file received via e-mail.
Daily	G	Daily Chemical Quality Control Reports (DCQRs)	Form	MS Word or MS Excel	Presentation of the DCQCR, as received electronically from the field	Recorded on Field Form	None	This is a separate file received via e-mail.
Daily	H	Daily Quality Control Reports (DCQR)	Form	MS Word or MS Excel	Presentation of the DQCR, as received electronically from the field.	Recorded on Field Form	None	This is a separate file received via e-mail.
Daily	None	Liquid Extraction Rate	Graph	MS Excel	Presentation as 1 of four rates on a single graph	Vapor Liquid Separator Flow Meter Condenser Flow Meter	VLSDW CDDW	Figure 1 - Excel graph of liquid extraction rate vs. time

Notes: Daily reporting requirements from Specification 01785, Page 2, Section 1.5.1.
 DCQCR = Daily Chemical Quality Control Report (Specification 01450, Attachment A)
 DQCR = Daily Quality Control Report (Specification 01451, Attachment A)

TABLE 2
Weekly Reporting Requirements and Proposed Formats
 East Gate Disposal Yard
 Fort Lewis, Washington

Reporting Frequency	Spec. Letter	Specification Description	Display Format	Software	Physical Description	Data Required or Used	Sample ID(s)	Notes/Questions
Weekly	A	A combined summary of all data provided in daily submittals	Written Text	MS Word	This summary is effectively presented by the requirements of the weekly report. There will not be a separate section in the written text for this discussion. Instead, the data from the daily reports will be discussed in the other required sections of the weekly report.	NA	None	None.
Weekly	B	Plots of mass removal rates over time	Graph	MS Excel	Figure 1a - daily/weekly removal rate (y-axis) v. time (x-axis). This graph will illustrate mass recovered via the air stream, the water stream, and from actual NAPL recovery (i.e.. 3 lines on a single graph). Figure 1 will be the same as that presented for the daily reports	Daily/weekly Mass Removed No. of Days of Treatment	OXIN01A1 HCW01A1-HCW03A1 NSTDW01A1 NAPL01A1 LI105	Figure 1 - Removal Rate vs. Time Figures 1a-1d: Air, Water, NAPL mass removal v. time (graphed individually)
Weekly	C	Summary of analytical sampling locations and final air and water analytical sample results for all data produced that week	Table Figure	GISKey	Summary Data Tables by Media (Air, Groundwater, Waste Water, Other)	Air, Water, & NAPL Chemistry Data	OXIN01A1 OXSS01A1 MSTS01A1 COMP01A1 PAM01A1-PAM03A1 MW "Grid ID" A1 HCW01A1-HCW03A1 INJ01A1 OWSD01A1 NSTDW01A1 MPE "Region" "X" A1 NAPL01A1	Table 1 - Air Analytical Data Table 2 - Groundwater Analytical Data Table 3 - Waste Water & NAPL Analytical Data Figure 9 - Average Groundwater Analytical Results for DATE
Weekly	D	A summary description of hydraulic and pneumatic control status with groundwater elevation and vapor pressure measurement data summaries and contour plots to show hydraulic and vapor capture has been achieved	Written Text Tables Figures	MS Word MS Excel GISKey AutoCAD	Description of hydraulic control activities supported by a table of groundwater elevations (by day for MWs, and by week for HCWs) and by 1 contour plot for that week of operation. Vacuum readings from the piezometers in the 20 MWs and 10 TMPs. Summary table of the data to be used for 1 contour plot for that week of operation.	DTW at MWs DTW at HCWs Operation times Pressure measurements from MWs and TMPs	MWs HCWs TMPs	Table 4 - MW and HCW Groundwater Elevations Figure 3 - Groundwater Elevation Contour Plot for DATE Figure 4 - Pressure Contour Plot for DATE (data plotted on figure, so no separate table prepared)
Weekly	E	Cumulative mass removed - combined vapor, dissolved, and NAPL phases	Table	MS Excel	Presentation as 1 Line Item; Math operations required to calculate cumulative mass	Daily Mass Removed No. of Days of Treatment	OXIN NSTDW HCW01A1-HCW03A1 NAPL	Figures 1a-1d: Air, Water, NAPL Mass Removal vs. Time (graphed as a total)

TABLE 2
Weekly Reporting Requirements and Proposed Formats
 East Gate Disposal Yard
 Fort Lewis, Washington

Reporting Frequency	Spec. Letter	Specification Description	Display Format	Software	Physical Description	Data Required or Used	Sample ID(s)	Notes/Questions
Weekly	F	Summary of groundwater extraction rates and volume	Table	Excel GISKey	Presentation as 4 Line Items (each well individually, then a total)	Flow Rate Totalized Flow	HCW01A1-HCW01A3	Table 5 - Treatment System Operation Data
Weekly	G	Summary of vapor extraction rates and volume	Chart	Excel GISKey	Presentation of concentrations from each of the 6 regions (see Figure TAC02 Plot Regions). Air analytical results would be the primary source of data from which the pie chart would be generated. Observation of NAPL could be added as notes to this figure. VOCs from water collected at each MPE is expected to be less than 1% of the total, and so are not included on the chart.	Analytical data for each MPE Region	MPENW MPENC MPENE MPESW MPESC MPESE	Figure 5 - Qualitative Pie Chart of concentrations from each of the 6 regions
Weekly	H	Weekly temperature data for all sensors	Table Graph	GISKey	<p>Presentation of treatment system temperatures 16 Line Items</p> <p>Proposing to provide contour plots of temperature of each of the depths which have a temperature specification (6 through 33-feet bgs).</p> <p>Proposing to provide a contour plot of the temperature at the individual MPE well heads.</p> <p>The previous proposals will require the production of 8 contour plots each week.</p>	MPEs Condenser Influent Condenser Discharge VLS Discharge VOC Oxidizer Influent VOC Oxidizer Reactor OWS Influent OWS Discharge HCWs Injection Water Flow TMPs MWs	E "Grid ID" A1 CDINA1 CDDAA1 CDDWA1 VLSDWA1 OXIN01A1 OXTEMPA1 OWSIN OWSDW01A1 HCW01A1-HCW03A1 INJA1 TMPs MWs	Table 5 - Treatment System Operation Data Figures 6 - Contour plots of temperature for each depth that has a temperature specification
Weekly	I	Summary of volume of NAPL recovered	Graph	Excel GISKey	Rather than present the volume, presentation of the mass recovered is suggested. This would appear as 1 of four rates on a single graph.	NAPL Tank Water Level NAPL Tank NAPL Level NAPL Tank Geometry	LI105	Figure 1 - Excel graph of NAPL mass recovered vs. time
Weekly	J	Laboratory analysis reports	EDD	NA	Presentation of lab reports	NA	None	This is a separate file received via e-mail.
Weekly	K	Near real-time laboratory data packages for primary air and water samples	EDD	NA	Presentation of lab data packages	NA	None	This is a separate file received via e-mail.
Weekly	L	Operation time of system, groundwater extraction wells, and vapor extraction wells with descriptions for non-routine maintenance and repair	Written Text	Word	Description of system operation (operation time, maintenance & repair activities, key events, sampling activities, heating status & strategy, corrective actions)	Notes recorded as part of daily system monitoring. Assessment of data for trends.	None	Cover letter describing weekly reporting requirements and presenting written text

TABLE 2
Weekly Reporting Requirements and Proposed Formats
 East Gate Disposal Yard
 Fort Lewis, Washington

Reporting Frequency	Spec. Letter	Specification Description	Display Format	Software	Physical Description	Data Required or Used	Sample ID(s)	Notes/Questions
Weekly	M	Energy usage	Graph	GISKey	Only subsurface energy will be reported. Presentation as 1 of four rates on a single graph	PCU kWatt Power Meter	PCUHA1	Figure 1 - Excel graph of KWH vs. time
Weekly	N	Raw data for temperature sensors	EXCLUDED	EXCLUDED	EXCLUDED	EXCLUDED	EXCLUDED	This data will be presented as part of weekly raw data dumps, separate from reporting. Therefore, this data is excluded from regular reporting to minimize duplication of effort.
Weekly	O	A summary of vacuum measurements across the site	Table	GISKey	Vacuum readings at the MPE region headers	Pressure measurements from MPE Regions	MPENW MPENC MPENE MPESW MPESC MPESE	Table 5 - Vacuum Measurements at the MPE Region Header (placement depends on available space on Table 5)
Weekly	None	Liquid Extraction Rate	Graph	MS Excel	Presentation as 1 of four rates on a single graph	Vapor Liquid Separator Flow Meter Condenser Flow Meter	VLSDW CDDW	Figure 1 - Excel graph of liquid extraction rate vs. time
Weekly	None	Mass Removal Analyt-Specific Concentrations	Graph	MS Excel	Presentation of Target COC VOC Concentrations on Pie Chart from various locations	Oxidizer Influent Oil Water Separator NAPL01	OXIN OWSDW NAPL01	Figure 7 - 7c-Pie charts indicate mass removal of target COC VOCs
Weekly	None	TCE Discharge from Oxidizer Scrubber Stack and Main Sparge Tank Stack	Graph	MS Excel	Presentation of TCE emissions from Oxidizer Scrubber Stack and Main Sparge Tank Stack and annual emissions limits	Oxidizer scrubber stack discharge and main sparge tank stack discharge	OXSS MSTS	Figure 8 - Excel graph of TCE emissions over time
Weekly	None	GW Monitoring Wells	Graph	MS Excel	Presentation of average COC VOCs GW concentrations in three types of MWs for NAPL Area 1: Deep MWs (3), Shallow treatment area MWs (9), Shallow perimeter (outside treatment area) MWs (8)	Groundwater samples	MWs (MW"Grid Location (ID) Area 1 (A1)	Figure 9 - Excel graph of average COC VOCs over time per well group (deep, internal shallow, external shallow)
Weekly	None	Reinjection water VOC Concentrations	Graph	MS Excel	Presentation of VOC concentrations (TCE, DCE and VC) over time and associated MCLs on separate graphs	Combined System Influent	INJ01	Figure 10 TCE; Figure 11 DCE; Figure 12 VC

TABLE 3
Monthly Reporting Requirements and Proposed Formats
 East Gate Disposal Yard
 Fort Lewis, Washington

Reporting Frequency	Spec. Letter	Specification Description	Display Format	Software	Physical Description	Data Required or Used	Sample ID(s)	Notes/Questions
Monthly	B	Monthly Chemistry Data Package with all final analytical data reported during the month	EDD	NA	Presentation of lab data packages	NA	None	This is a separate file received via e-mail.
Monthly	C	Graphs of data collected during the month	Graphs	Excel	Monthly summations of the Weekly graphs	See Weekly	See Weekly	Figure 1a Cummulative COC VOC total mass removal for air, water and NAPL; Figures 1b-1d Specific COC VOC Mass Removal per Media
Monthly	E	Monthly totals for energy usage	Graph	Excel	Only subsurface energy will be reported. Presentation as 1 of four rates on a single graph	PCU kWatt Power Meter	PCUHA1	Figure 1 - Excel graph of KWH vs. time
Monthly	F	Monthly totals for mass removed	2 Graphs	Excel	The same graphs as presented for the weekly report (Figures 1 and 1a)	See Weekly	See Weekly	Figure 1 - Removal Rate vs. Time Figure 1a - Air, Water, NAPL mass removal v. time (graphed individually)
Monthly	None	Monthly totals for VOC concentrations by MPE region	1	Excel	The same graphs as presented for the weekly report (Figure 5) cummulative values	See Weekly	See Weekly	Figure 5 - MPERegion Total VOC Concentrations by MPE Region
Monthly	G	Monthly totals for groundwater extracted	Table	Excel	Presentation as 4 Line Items (extraction rate and total each well individually, then a total for all wells for the month)	Totalized Flow	HCW01A1- HCW01A3	Presented as part of the cover letter.
Monthly	H	Description summarizing monthly activities and major events or milestones	Written Text	Word	Description of system operation (operation time, maintenance & repair activities, key events, sampling activities, heating status & strategy, corrective actions)	Notes recorded as part of daily system monitoring. Assessment of data for trends.	None	Cover letter describing monthly reporting requirements and presenting written text
Monthly	C	Average Site Temperature for site per depth interval	Graph	MS Excel	Presentation of site temperatures for depth vs. operational period and percentage of locations within heating specifications	See Weekly	See Weekly	Figure 2 - Excel graph showing average site temperatures at depth and percentage of locations meeting contract heating specifications. Provides temperature readings over eight-hour averages per thermocouple interval per locations.
Monthly	None	Oxidizer Influent COC VOC distribution	Graph	MS Excel	Presentation of cummulative distribution of COC VOCs in Oxidizer influent	See Weekly	See Weekly	Figure 7 - Excel pi chart of distribution of COC VOC concentrations for month

Notes: Monthly reporting requirements from Specification 01785, Page 3, Section 1.5.3.

Determine MIN, MAX, AVE, & SD.	How to Analyze and Report
Mass Removal Rates for Air	Use values reported daily. Report as a single table with the mass removal rates for water and NAPL.
Mass Removal Rates for Water	Use values reported weekly. Report as a single table with the mass removal rates for air and NAPL.
Mass Removal Rates for NAPL	Use values reported weekly. Report as a single table with the mass removal rates for water and air.
GW Analytical Testing	Analyze MWs and HCWs as separate groups. Indicate which point the MIN and MAX come from, and provide the associated date.
Waste Water Analytical Testing	Show the MIN and MAX per each sample location (OWSDW, NSTDW, INJ), and provide the date.
Air Analytical Testing	Show the MIN and MAX for the sample locations OXIN, OXSS, and MSTs. Provide the date.
Perimeter Air Analytical Testing	Show the MIN and MAX for all PAM samples, and provide dates.
Groundwater Elevations	Use all MW and HCW data. Show location and date for the MIN and MAX
Groundwater Extraction Rates and Volume	Use daily extraction rates at HCWs. Analyze all 3 wells as a group. Provide location and date.
Vapor Extraction Rates and Volume	Use MPE air analytical data here. Analyze all 6 regions as a group. Give location and date for the MIN and MAX.
Subsurface Temperatures	Show the MIN, MAX, and AVE for the entire site
Treatment System Temperatures	Show the MIN and MAX per monitoring location, and provide the date.
Energy into the ground	Use daily KWH. Provide MIN and MAX and date.
Vacuum Measurements	Use MPE pressure data here. Analyze all 6 regions as a group. Give location and date for the MIN and MAX.

Table 4 Contact Information

Name	Title	Organization	Phone	E-Mail
Rich Wilson	Program Manager	PW-ENDR IRP	253-966-1801	WilsonR@lewis.army.mil
Troy Bussey	Environmental Engineer	PW-ENDR-IRP	253-966-1083	busseyt@lewis.army.mil
Jana Nelson	RCRA Program Manager	PW-ENDR	253-966-6458	Nelsonj2@lewis.army.mil
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Tony Huston	Technician	PW-ENDR	253-966-6457	houstont@lewis.army.mil
David Roden	Contracting Officer Representative	USACE Seattle District	206-764-3448	David.E.Roden@nws02.usace.army.mil
Linnea Norby	Project Manager	USACE Seattle District	206-764-6831	Linnea.N.Wolfe@nws02.usace.army.mil
Kira Lynch	Environmental Scientist	USACE Seattle District	206-764-6918	Kira.P.Lynch@NWS02.usace.army.mil
Richard Smith	Hydrogeologist	USACE Seattle District	206-764-3309	Richard.E.Smith@NWS02.usace.army.mil
Marilyn Eleno	Construction Engineer	USACE Seattle District	253-966-4387	Marilyn.R.Eleno@nws02.usace.army.mil
Kim Calhoun	Industrial Hygienist	USACE Seattle District	206-764-3415	Kimberly.Calhoun@nws02.usace.army.mil
Bryce Jones	Environmental Engineer (Construction QAR)	USACE Seattle District	206-764-3324	bryce.r.jones@nws02.usace.army.mil
Ron Harris	Construction QAR	USACE Seattle District	253-966-4381	Ronald.n.harris@nws02.usace.army.mil
Patrick Cossins, PG	Project Manager	TRS	512-527-8041	pcossins@thermalrs.com
Michael Dodson	Program Manager	TRS	360-425-8121	mdodson@thermalrs.com

Table 4 Contact Information

Name	Title	Organization	Phone	E-Mail
Michael Moore	Site Operations Manager	TRS	425-398-9476	mmoore@thermalrs.com
Greg Beyke, P.E.	Project Engineer	TRS	770-794-1169	gbeyke@thermalrs.com
Jerry Wolf	Director of Operations	TRS	714-378-5418	jwolf@thermalrs.com
Tom Powell	QC Officer	TRS	360-263-3615	tpowell@thermalrs.com
TRS EGDY Site Office	Site Office Trailer, Ft. Lewis	TRS Project Team	253-964-1699	trsegdysitetrailer@thermalrs.com
Heidi Bullock	Project Manager	AMEC	503-639-3400	heidi.bullock@amec.com
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Charles Esler, CHMM	Regulatory Specialist	AMEC	503-639-3400	charles.esler@amec.com
James Feild, Ph.D.	Hydrogeologist	AMEC	503-639-3400	james.field@amec.com
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Pete Stringer	LWMS Site Manager	CDM		
Robert Taaffe	GSA Construction Manager	GSA	425-519-0300	
Mike Webb	Environmental Consultant	GSA	425-519-0300 x217	mikew@gsassoc-inc.com
Robin Larson	Site Safety & Health Officer	GSA	425-519-0300	
Eva Davis	In Situ Thermal Expert/Hydrogeologist	EPA	580-436-8548	Davis.eva@epamail.epa.gov
Paul Brown	DRMO Director	DRMO	253-966-3209	paulebrown@dla.mil
John Holloway	Environmental Prot Tech	DRMO	253-966-3210	johnholloway@dla.mil
Debbie Murff	EPT	DRMO	253-967-3987	debramurff@dla.mil

Table 4 Contact Information

Name	Title	Organization	Phone	E-Mail
Bob Keivit	Remedial Program Manager	EPA	360-753-9014	Kievit.Bob@epamail.epa.gov
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Rick Dinicola	Hydrologist	USGS	253-428-3600	dinicola@usgs.gov
Jim Bush	Technical Group Manager	Batelle PNNL	509-372-1704	Jg.bush@pnl.gov
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Dave Becker	Geologist	USACE HTRW CX	402-697-2655	Dave.J.Becker@nwd02.usace.army.mil
Bill Crawford	Process Engineer	USACE HTRW CX	402-697-2579	William.J.Crawford@nwd02.usace.army.mil
Terry Tomasec	Certified Industrial Hygienist	USACE HTRW CX	402-697-2590	Terry.W.Tomasek@nwd02.usace.army.mil

Figure 1. Data Quality Control Flow Chart

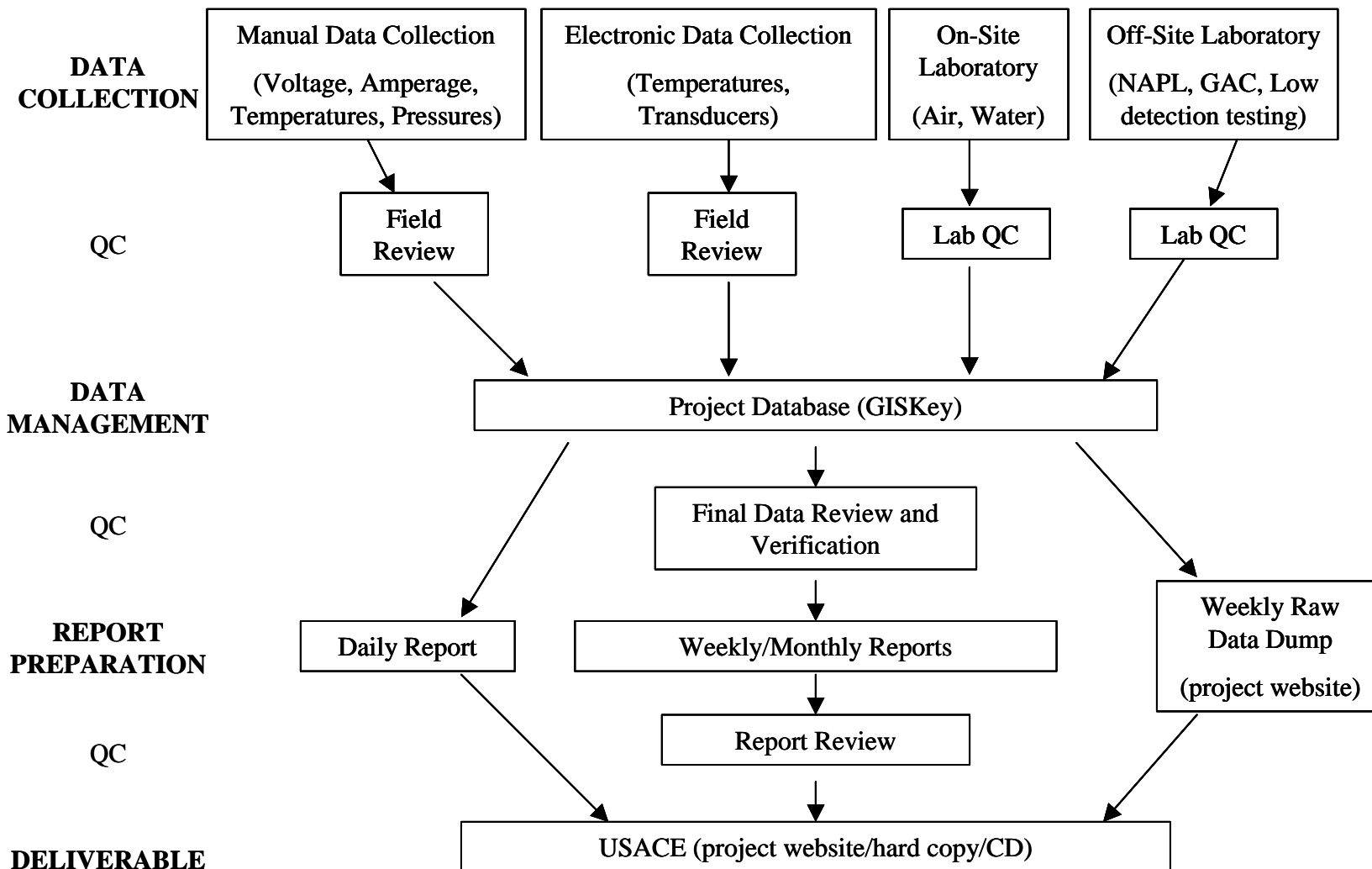
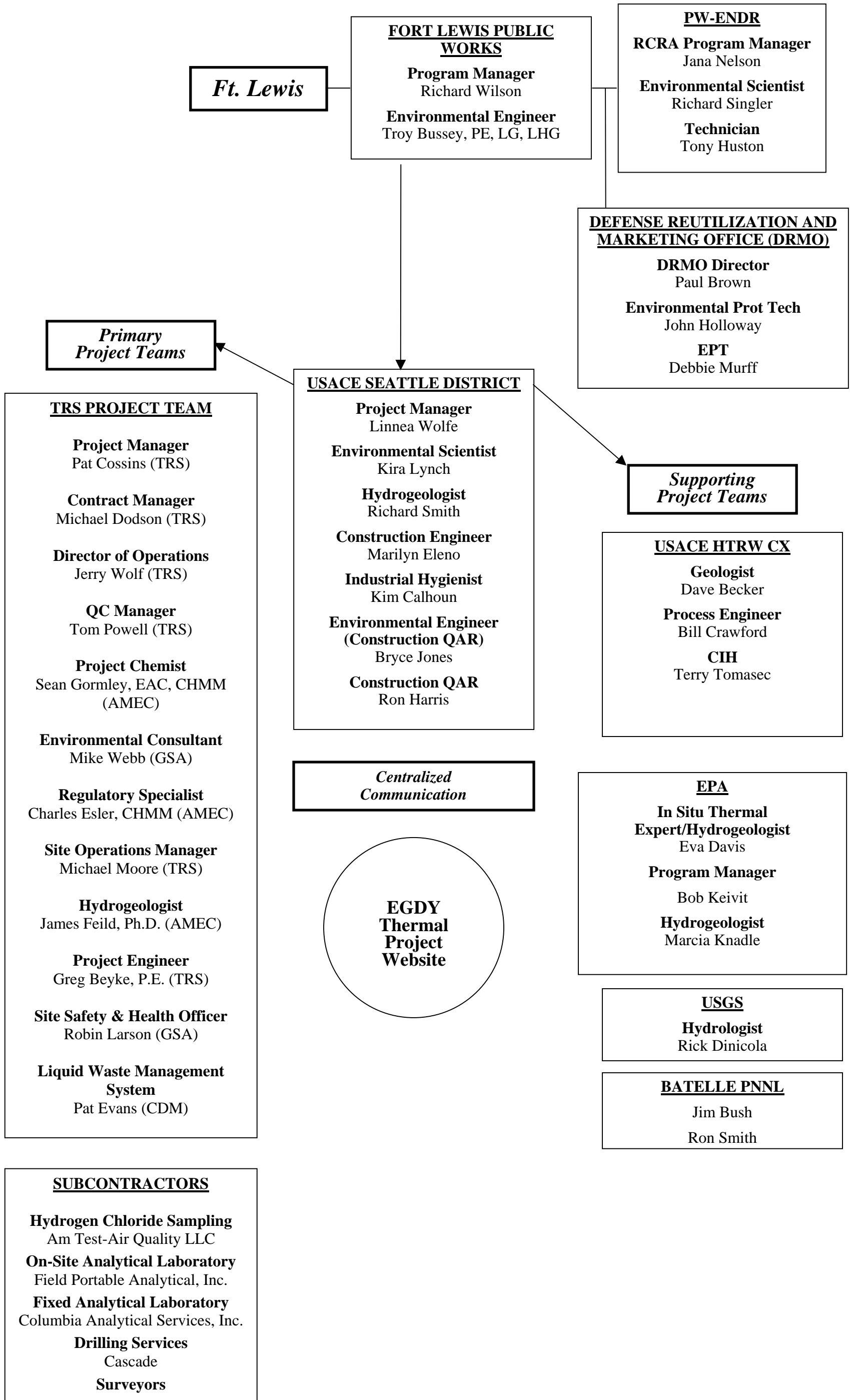


Figure 2 – Communication Flow Chart



APPENDIX A

Daily Report Examples

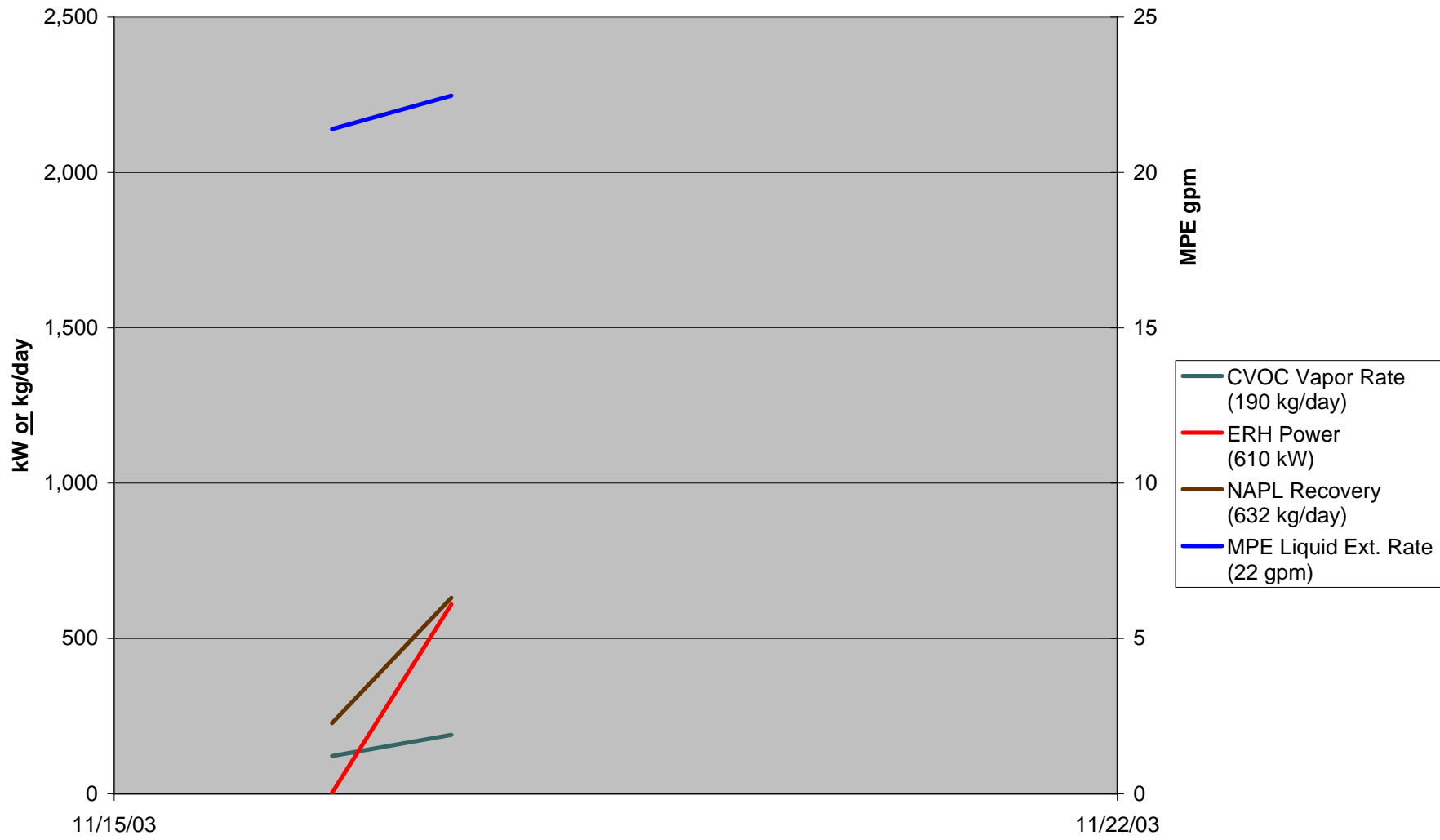
Ft. Lewis EGDY ERH Project
Tacoma, Washington
Daily Contractor Quality Control Report (Operations)
DACA67-02-C-0218

DATE		Site Manager		NAPL Area	
ORGANIZATION Onsite			DAILY OPERATIONS ACTIVITY SUMMARY		
TRS		Site Visitors (name or company)	Time Onsite:	Time Offsite	
AMEC					
CDM					
GSA					
<u>Other Vendors</u>					
			MODIFICATIONS TO SAMPLING OR MONITORING PLANS		
HEALTH AND SAFETY			USACE Approved:		
HS Meeting <input type="checkbox"/> (check) Time: _____					
Topics: Daily Activities <input type="checkbox"/> Hazards <input type="checkbox"/>					
Other: _____					
Signatures of attendees					
1	8	ERH System			
2	9	Lockout/Tagout? <input type="checkbox"/>	Time:		
3	10	Reason:			
4	11				
5	12				
6	13	Daily Equipment Inspection Completed? <input type="checkbox"/>			
7	14	Signature of Inspector			
SSHO			WASTE MANAGEMENT		
PPE: Modified Level D					
AIR MONITORING					
PID Reading (Daily High):					
			EXPECTED WORK FOR NEXT IDate:		
PROBLEMS AND CORRECTIVE ACTIONS					
			ELECTRONIC DATA REPORTING		
			Daily Report Posted on Website? <input type="checkbox"/> Time:		
			Weekly Report Posted on Website? <input type="checkbox"/> Time:		
			Monthly Report Posted on Website? <input type="checkbox"/> Time:		

Signature/Title

Date

**Figure 1 - EGDY Remediation Rates
daily averages through 11/17/03**



CVOC Vapor Rate is the sum of TCE, cDCE, PCE, VC and TCA.

APPENDIX B

Weekly Report Examples

DATE

Contract No. DACA67-02-C-0218

Linnea Wolfe
USACE Project Manager
USACE Seattle District
4735 East Marginal Way South
Seattle, WA 98134-2255
Dear Linnea Wolfe:

**Re: Weekly Reporting For DAY, DATE through DAY, DATE
East Gate Disposal Yard
Fort Lewis, Washington**

As required by the United States Army Corps of Engineers (USACE) Specifications for this thermal remediation project, the Thermal Remediation Services (TRS) project team presents this weekly report as a record of remediation. As required by Specification 01785, Page 3, Section 1.5.2 (Weekly Submittals), items covered in this report, for DAY, DATE through DAY, DATE, include:

- (a) A combined summary of all data provided in daily submittals (discussed below),
- (b) Plot of cumulative mass of COC VOCs removed in each media (air, water, NAPL) and removal rate over time (Figure 1a),
- (c) Plots of the cumulative mass of TCE, DCE, VC and TPH in each media (air, water, and NAPL) and removal rates over time (Figures 1b through 1d).
- (d) Summary of analytical sampling locations and final air and water analytical sample results for all data produced during that week (Tables 1, 2, and 3; Figure 2),
- (e) A summary description of hydraulic and pneumatic control status with groundwater elevation and vapor pressure measurement data summaries and contour plots to show hydraulic and vapor capture has been achieved (Tables 4 and 5; Figures 3 and 4),
- (f) Pie charts of concentrations of COC VOCs in air, water, and NAPL (Figures 7 through 7c)
- (g) Summary of groundwater extraction rates and volume (Table 5),
- (h) Summary of vapor extraction rates and volume (Figure 5),
- (i) Weekly temperature data for all sensors (Table 5 and Figure 6),
- (j) Summary of volume of non-aqueous phase liquid (NAPL) recovered (Figure 1),
- (k) Laboratory analysis reports (reports attached),
- (l) Near real-time laboratory data packages for primary air and water samples (data packages attached),
- (m) Operation time of system, groundwater extraction wells, and vapor extraction well with descriptions for non-routine maintenance and repair (discussed below),
- (n) Energy usage (Figure 1)

- (o) Raw data for temperature sensors (presented ONLY with the raw weekly data “dumps” to the project website), and
- (p) A summary of vacuum measurements across the site (Table 5).

Weekly Synopsis

Corrective Actions

Changes To Field Protocol

Questions regarding the information provided in this weekly report should be directed to Patrick Cossins, TRS Project Manager (512-527-8041).

Sincerely,

The TRS Project Team

Thermal Remediation Services
AMEC Earth & Environmental, Inc.
Gary Struthers & Associates
Camp Dresser & McKee, Inc.

Attachments:

Table 1 – Air Analytical Data
Table 2 – Groundwater Analytical Data
Table 3 – Waste Water & NAPL Analytical Data
Table 4 – MW and HCW Groundwater Elevations
Table 5 – Treatment System Operation Data

Figure 1 – Remediation Rates – Daily Averages
Figure 1a – Mass Removal Rates Per Media
Figures 1b through 1d – Mass of Specific COC VOCs Removed Per Media
Figure 2 – Groundwater Analytical Results for [DATE](#)
Figure 3 – Groundwater Elevation Contour Plot for [DATE](#)
Figure 4 – Pressure/Vacuum Contour Plot for [DATE](#)
Figure 5 - MPE Region Total VOC Concentrations
Figure 6 – Temperature at 6, 11, 16, 21, 26, 31, and 33 feet bgs for [DATE](#)
Figure 7 – OXIN COC VOC Distribution
Figure 7a – OWSOW COC VOC Distribution
Figure 7b – NAPL01 COC VOC Distribution
Figure 8 – Cumulative TCE Air Emissions
Figure 9 – Average COC VOC in Groundwater
Figure 10 – TCE Concentrations in ReInjection Water
Figure 11 – DCE Concentrations in ReInjection Water
Figure 12 – VC Concentrations in ReInjection Water

Laboratory Analytical Reports
Laboratory Analytical Data Packages

Table 1
Air Analytical Data
Week Ending 11/06/2003
 East Gate Disposal Yard
 Fort Lewis, Washington

Site	Date	Time	TCE ug/m3	DCE ug/m3	TCA ug/m3	PCE ug/m3	VC ug/m3	TPH ug/m3	PID Reading ppmV
Compound Air Monitoring									
COMP01A1	01/06/03	00:00	12.2	3.80	4.10	1.90	5.00	9.30	7.90
Main Sparge Tank Stack									
MSTS01A1	01/06/03	00:00	13.5	9.50	8.40	8.70	4.60	<1.00	8.40
VOC Oxidizer Influent									
OXIN01A1	01/06/03	00:00	5.20	14.1	11.8	7.30	8.40	<1.00	12.5
OXIN01A1	01/07/03	00:00	12.1	6.10	12.1	7.60	1.80	2.60	<5.00
OXIN01A1	01/08/03	00:00	2.50	3.30	11.7	12.6	8.40	2.70	<5.00
OXIN01A1	01/09/03	00:00	<1.00	6.20	7.30	2.80	11.3	3.70	13.1
OXIN01A1	01/10/03	00:00	5.40	8.60	2.70	2.10	2.70	11.3	8.60
VOC Oxidizer Scrubber Stack									
OXSS01A1	01/06/03	00:00	13.9	11.6	12.9	7.30	3.30	5.00	12.5
OXSS01A1	01/07/03	00:00	NT	#N/A	#N/A	#N/A	#N/A	#N/A	11.6
OXSS01A1	01/08/03	00:00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	<5.00
OXSS01A1	01/09/03	00:00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	<5.00
OXSS01A1	01/10/03	00:00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	<5.00
Perimeter Air Monitoring									
PAM01A1	01/06/03	00:00	12.2	3.00	7.50	10.0	9.20	8.80	13.9
PAM02A1	01/06/03	00:00	14.6	12.3	6.80	5.80	7.80	7.70	<5.00
PAM03A1	01/06/03	00:00	10.0	8.40	12.4	5.00	12.4	10.8	7.10
PAM04A1	01/06/03	00:00	10.3	11.6	4.20	4.80	<1.00	14.1	12.9
PAM05A1	01/06/03	00:00	13.2	7.30	13.1	8.80	2.40	10.6	<5.00
PAM06A1	01/06/03	00:00	1.20	13.0	14.5	3.50	12.1	5.40	10.1

NT: Not Tested

Table 2
Groundwater Analytical Data
Week Ending 11/06/2003
 East Gate Disposal Yard
 Fort Lewis, Washington

Site	Date	Time	TCE ug/l	DCE ug/l	TCA ug/l	PCE ug/l	VC ug/l	pH SU	DO mg/l	Conductivity uS/cm	TDS mg/l	Turbidity NTU
Hydraulic Control Wells												
HCW01A1	01/06/03	0:00	11.8	10.5	9.70	6.60	2.60	9.50	6.90	664.5	6.30	4.60
HCW02A1	01/06/03	0:00	7.60	13.8	2.20	11.7	6.60	6.00	2.60	557.5	<1.00	6.20
HCW03A1	01/06/03	0:00	12.6	8.80	3.10	3.50	4.30	5.60	1.40	316.0	12.9	9.70
Monitoring Wells												
MWB09A1	01/06/03	0:00	4.30	9.70	2.00	11.6	8.40	NT	NT	NT	NT	NT
MWD03A1	01/06/03	0:00	13.5	9.30	9.70	<1.00	12.7	NT	NT	NT	NT	NT
MWD14A1	01/06/03	0:00	5.70	1.80	6.10	4.10	13.8	NT	NT	NT	NT	NT
MWF06A1	01/06/03	0:00	8.00	7.30	12.2	9.50	<1.00	NT	NT	NT	NT	NT
MWF10A1	01/06/03	0:00	13.3	8.40	11.6	5.80	7.60	NT	NT	NT	NT	NT
MWG14A1	01/06/03	0:00	12.2	<1.00	7.20	10.1	14.7	NT	NT	NT	NT	NT
MWH02A1	01/06/03	0:00	14.1	8.50	6.40	9.00	5.60	NT	NT	NT	NT	NT
MWH04A1	01/06/03	0:00	8.40	1.60	4.60	7.50	<1.00	NT	NT	NT	NT	NT
MWH10A1	01/06/03	0:00	<1.00	14.0	14.1	6.00	4.20	NT	NT	NT	NT	NT
MWH15A1	01/06/03	0:00	7.30	6.20	5.30	10.1	13.0	NT	NT	NT	NT	NT
MWI05A1	01/06/03	0:00	4.30	7.60	1.20	1.50	14.3	NT	NT	NT	NT	NT
MWJ01A1	01/06/03	0:00	1.50	<1.00	12.6	11.3	6.50	NT	NT	NT	NT	NT
MWJ06A1	01/06/03	0:00	4.40	12.6	<1.00	8.90	9.80	NT	NT	NT	NT	NT
MWK08A1	01/06/03	0:00	9.90	6.70	5.90	13.9	1.90	NT	NT	NT	NT	NT
MWK10A1	01/06/03	0:00	1.10	4.10	6.00	<1.00	<1.00	NT	NT	NT	NT	NT
MWL07A1	01/06/03	0:00	13.4	9.20	2.10	6.00	3.30	NT	NT	NT	NT	NT
MWM12A1	01/06/03	0:00	3.90	2.90	9.10	8.30	14.9	NT	NT	NT	NT	NT
MWN02A1	01/06/03	0:00	6.10	<1.00	11.1	6.80	10.4	NT	NT	NT	NT	NT
MWN09A1	01/06/03	0:00	4.20	<1.00	<1.00	5.70	7.00	NT	NT	NT	NT	NT
MWO07A1	01/06/03	0:00	13.4	13.4	10.7	8.80	4.30	NT	NT	NT	NT	NT

NT: Not Tested
 ug/l: micrograms per liter
 SU: standard units
 mg/l: milligrams per liter
 uS/cm: microsiemens per centimeter
 NTU: nephelometric turbidity units

Table 3
Waste Water and NAPL Analytical Data
Week Ending mm/dd/yyyy
 East Gate Disposal Yard
 Fort Lewis, Washington

Site	Date	Time	TCE ug/l	DCE ug/l	TCA ug/l	PCE ug/l	VC ug/l	pH SU	DO mg/l	Conductivity uS/cm	TDS mg/l	Turbidity NTU
Water Discharged to Injection Gallery												
INJ01A1	01/06/03	00:00	13.2	11.3	11.1	7.80	6.90	5.20	<1.00	1041.6	7.90	<1.00
Multi-phase Extraction Well Regions												
MPENCWA1	01/06/03	00:00	9.80	4.00	7.50	14.1	2.10	NT	NT	NT	NT	NT
MPENEWA1	01/06/03	00:00	7.90	3.00	5.80	10.6	12.5	NT	NT	NT	NT	NT
MPENWWA1	01/06/03	00:00	1.70	14.4	9.40	1.20	10.4	NT	NT	NT	NT	NT
MPESCWA1	01/06/03	00:00	13.4	9.50	11.6	14.9	8.40	NT	NT	NT	NT	NT
MPESEWA1	01/06/03	00:00	6.30	2.10	12.6	10.9	12.6	NT	NT	NT	NT	NT
MPESWWA1	01/06/03	00:00	6.10	3.40	14.0	11.6	9.30	NT	NT	NT	NT	NT
NAPL Stream Sparge Tank Discharge												
NSTDW01A1	01/06/03	00:00	7.30	11.0	10.0	5.60	1.50	5.20	<1.00	1041.6	7.90	<1.00
Oil/Water Separator Discharge												
OWSDW01A1	01/06/03	00:00	13.5	7.20	8.70	9.10	4.50	NT	NT	NT	NT	NT

NT: Not Tested
 ug/l: micrograms per liter
 SU: standard units
 mg/l: milligrams per liter
 uS/cm: microsiemens per centimeter
 NTU: nephelometric turbidity units

Table 4
MW and HCW Groundwater Elevations
Week Ending 11/06/2003

East Gate Disposal Yard
Fort Lewis, Washington

Site	Date	Time	MP Elevation	Depth to Water	Groundwater Elevation
Hydraulic Control Wells					
HCW01A1	01/06/03	00:00	251.65	18.40	233.25
HCW02A1	01/06/03	00:00	246.12	16.50	229.62
HCW03A1	01/06/03	00:00	262.47	11.40	251.07
Monitoring Wells					
MWB09A1	01/06/03	00:00	260.75	10.30	250.45
MWB09A1	01/07/03	00:00	260.75	12.20	248.55
MWB09A1	01/08/03	00:00	260.75	16.60	244.15
MWB09A1	01/09/03	00:00	260.75	12.50	248.25
MWB09A1	01/10/03	00:00	260.75	17.80	242.95
MWD03A1	01/06/03	00:00	254.24	15.80	238.44
MWD03A1	01/07/03	00:00	254.24	10.00	244.24
MWD03A1	01/08/03	00:00	254.24	18.50	235.74
MWD03A1	01/09/03	00:00	254.24	14.60	239.64
MWD03A1	01/10/03	00:00	254.24	16.10	238.14
MWD14A1	01/06/03	00:00	245.65	12.60	233.05
MWD14A1	01/07/03	00:00	245.65	11.00	234.65
MWD14A1	01/08/03	00:00	245.65	13.20	232.45
MWD14A1	01/09/03	00:00	245.65	16.30	229.35
MWD14A1	01/10/03	00:00	245.65	11.90	233.75
MWF06A1	01/06/03	00:00	251.34	11.30	240.04
MWF06A1	01/07/03	00:00	251.34	15.90	235.44
MWF06A1	01/08/03	00:00	251.34	19.20	232.14
MWF06A1	01/09/03	00:00	251.34	19.50	231.84
MWF06A1	01/10/03	00:00	251.34	13.40	237.94
MWF10A1	01/06/03	00:00	255.82	18.70	237.12
MWF10A1	01/07/03	00:00	255.82	10.60	245.22
MWF10A1	01/08/03	00:00	255.82	10.10	245.72
MWF10A1	01/09/03	00:00	255.82	14.50	241.32
MWF10A1	01/10/03	00:00	255.82	10.30	245.52
MWG14A1	01/06/03	00:00	250.74	12.50	238.24
MWG14A1	01/07/03	00:00	250.74	18.10	232.64
MWG14A1	01/08/03	00:00	250.74	10.10	240.64
MWG14A1	01/09/03	00:00	250.74	18.90	231.84
MWG14A1	01/10/03	00:00	250.74	12.30	238.44
MWH02A1	01/06/03	00:00	258.57	11.20	247.37
MWH02A1	01/07/03	00:00	258.57	17.40	241.17
MWH02A1	01/08/03	00:00	258.57	12.80	245.77
MWH02A1	01/09/03	00:00	258.57	16.20	242.37
MWH02A1	01/10/03	00:00	258.57	11.70	246.87
MWH04A1	01/06/03	00:00	276.94	18.00	258.94
MWH04A1	01/07/03	00:00	276.94	10.20	266.74
MWH04A1	01/08/03	00:00	276.94	10.20	266.74
MWH04A1	01/09/03	00:00	276.94	16.90	260.04
MWH04A1	01/10/03	00:00	276.94	19.00	257.94
MWH10A1	01/06/03	00:00	266.95	12.80	254.15
MWH10A1	01/07/03	00:00	266.95	19.60	247.35
MWH10A1	01/08/03	00:00	266.95	17.30	249.65
MWH10A1	01/09/03	00:00	266.95	19.60	247.35
MWH10A1	01/10/03	00:00	266.95	13.20	253.75
MWH15A1	01/06/03	00:00	275.94	16.70	259.24
MWH15A1	01/07/03	00:00	275.94	17.30	258.64
MWH15A1	01/08/03	00:00	275.94	13.20	262.74
MWH15A1	01/09/03	00:00	275.94	11.70	264.24
MWH15A1	01/10/03	00:00	275.94	11.00	264.94
MWI05A1	01/06/03	00:00	245.33	15.90	229.43

Table 4
MW and HCW Groundwater Elevations
Week Ending 11/06/2003

East Gate Disposal Yard
Fort Lewis, Washington

Site	Date	Time	MP Elevation	Depth to Water	Groundwater Elevation
MWI05A1	01/07/03	00:00	245.33	19.30	226.03
MWI05A1	01/08/03	00:00	245.33	14.50	230.83
MWI05A1	01/09/03	00:00	245.33	17.60	227.73
MWI05A1	01/10/03	00:00	245.33	17.80	227.53
MWJ01A1	01/06/03	00:00	261.85	13.80	248.05
MWJ01A1	01/07/03	00:00	261.85	10.30	251.55
MWJ01A1	01/08/03	00:00	261.85	16.70	245.15
MWJ01A1	01/09/03	00:00	261.85	14.30	247.55
MWJ01A1	01/10/03	00:00	261.85	12.50	249.35
MWJ06A1	01/06/03	00:00	271.33	18.50	252.83
MWJ06A1	01/07/03	00:00	271.33	13.70	257.63
MWJ06A1	01/08/03	00:00	271.33	18.40	252.93
MWJ06A1	01/09/03	00:00	271.33	11.40	259.93
MWJ06A1	01/10/03	00:00	271.33	16.20	255.13
MWK08A1	01/06/03	00:00	252.38	16.40	235.98
MWK08A1	01/07/03	00:00	252.38	16.90	235.48
MWK08A1	01/08/03	00:00	252.38	13.90	238.48
MWK08A1	01/09/03	00:00	252.38	18.60	233.78
MWK08A1	01/10/03	00:00	252.38	12.80	239.58
MWK10A1	01/06/03	00:00	253.91	19.00	234.91
MWK10A1	01/07/03	00:00	253.91	18.30	235.61
MWK10A1	01/08/03	00:00	253.91	17.60	236.31
MWK10A1	01/09/03	00:00	253.91	10.10	243.81
MWK10A1	01/10/03	00:00	253.91	17.90	236.01
MWL07A1	01/06/03	00:00	259.65	19.00	240.65
MWL07A1	01/07/03	00:00	259.65	18.00	241.65
MWL07A1	01/08/03	00:00	259.65	16.90	242.75
MWL07A1	01/09/03	00:00	259.65	16.00	243.65
MWL07A1	01/10/03	00:00	259.65	18.20	241.45
MWM12A1	01/06/03	00:00	276.10	12.80	263.30
MWM12A1	01/07/03	00:00	276.10	17.60	258.50
MWM12A1	01/08/03	00:00	276.10	10.10	266.00
MWM12A1	01/09/03	00:00	276.10	10.00	266.10
MWM12A1	01/10/03	00:00	276.10	19.10	257.00
MWN02A1	01/06/03	00:00	270.57	13.30	257.27
MWN02A1	01/07/03	00:00	270.57	12.80	257.77
MWN02A1	01/08/03	00:00	270.57	17.50	253.07
MWN02A1	01/09/03	00:00	270.57	19.00	251.57
MWN02A1	01/10/03	00:00	270.57	15.90	254.67
MWN09A1	01/06/03	00:00	270.19	13.00	257.19
MWN09A1	01/07/03	00:00	270.19	13.90	256.29
MWN09A1	01/08/03	00:00	270.19	13.70	256.49
MWN09A1	01/09/03	00:00	270.19	16.90	253.29
MWN09A1	01/10/03	00:00	270.19	13.60	256.59
MWO07A1	01/06/03	00:00	273.92	11.40	262.52
MWO07A1	01/07/03	00:00	273.92	11.30	262.62
MWO07A1	01/08/03	00:00	273.92	15.70	258.22
MWO07A1	01/09/03	00:00	273.92	12.70	261.22
MWO07A1	01/10/03	00:00	273.92	18.40	255.52

Table 5
Treatment System Operation Data
Week Ending mm/dd/yy
 East Gate Disposal Yard
 Fort Lewis, Washington

Groundwater Extraction Rates and Volume

Hydraulic Control Well	Flow Rate (gallons per minute)	Volume (gallons per week)
HCW01A1	30.0	18,144,000
HCW02A1	30.0	18,144,000
HCW03A1	30.0	18,144,000
Total	90.0	54,432,000

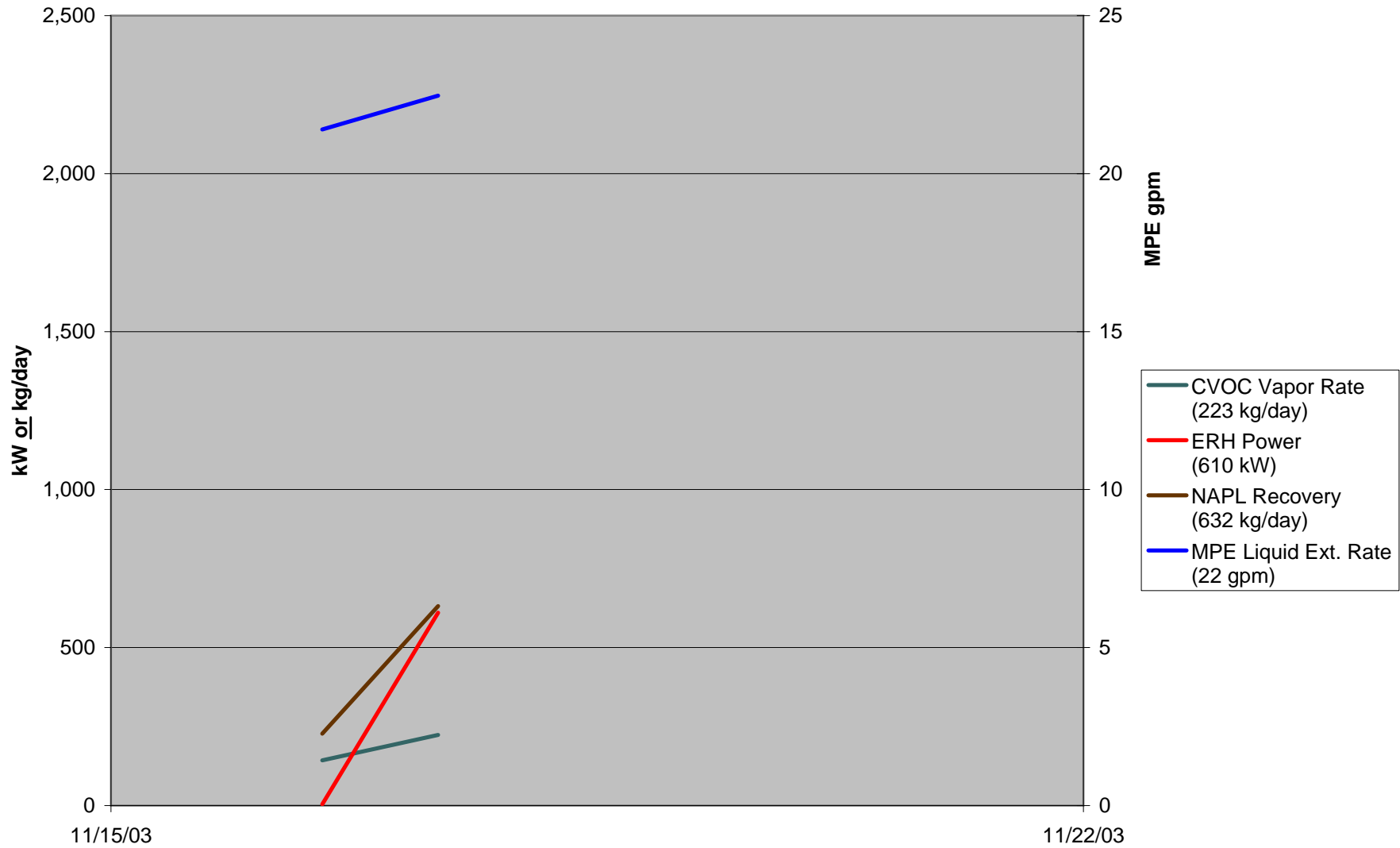
Weekly Temperature Data

Sensor location	Sensor name	Temperature (°C)
Condenser Influent	CDINA1	45.3
Condenser Discharge	CDDAA1	45.3
VLS Discharge	CDDWA1	45.3
VOC Oxidizer Influent	VLSDWA1	45.3
VOC Oxidizer	OXIN01A1	45.3
Reactor	OXEMPA1	45.3
OWS Influent	OWSINA1	45.3
OWS Discharge	OWSDW01A1	45.3
Hydraulic Control Well	HCW01A1	45.3
Hydraulic Control Well	HCW02A1	45.3
Hydraulic Control Well	HCW03A1	45.3
Injection Water Flow	INJA1	45.3

Weekly Pressure Data

Sensor location	Sensor name	Pressure (mmHg)
MPE NW Region	MPENWA1	500
MPE NC Region	MPENCA1	400
MPE NE Region	MPENEA1	350
MPE SW Region	MPESWA1	250
MPE SC Region	MPESCA1	350
MPE SE Region	MPESEA1	300

Figure 1 - EGDY Remediation Rates
daily averages



CVOC Vapor Rate is the sum of TCE, cDCE, PCE, VC and TCA.

Figure 1a
Target CVOC Mass Removal Per Media

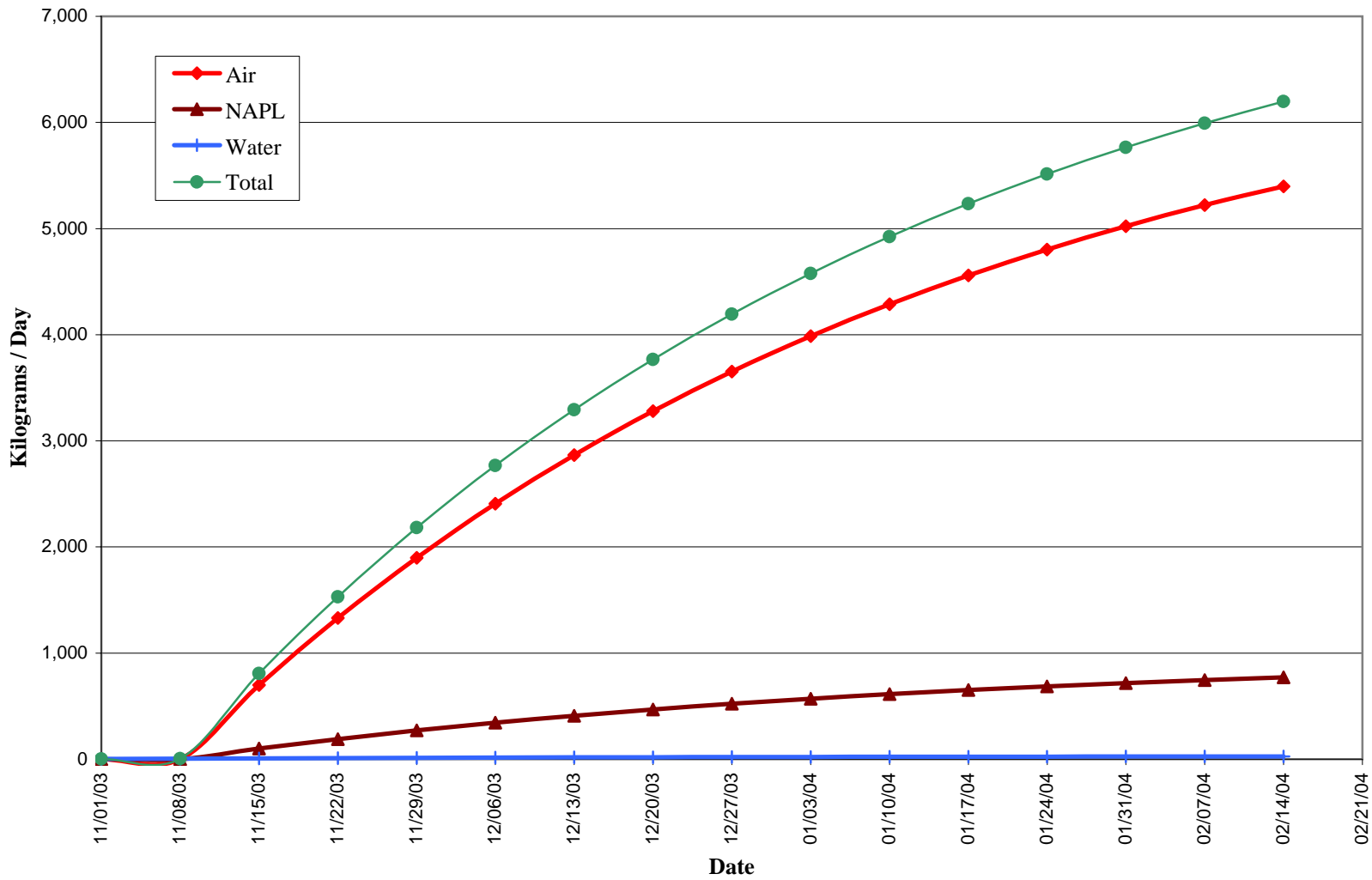


Figure 1b
Mass Removal of Specific COC VOCs in Air as of 01/15/04

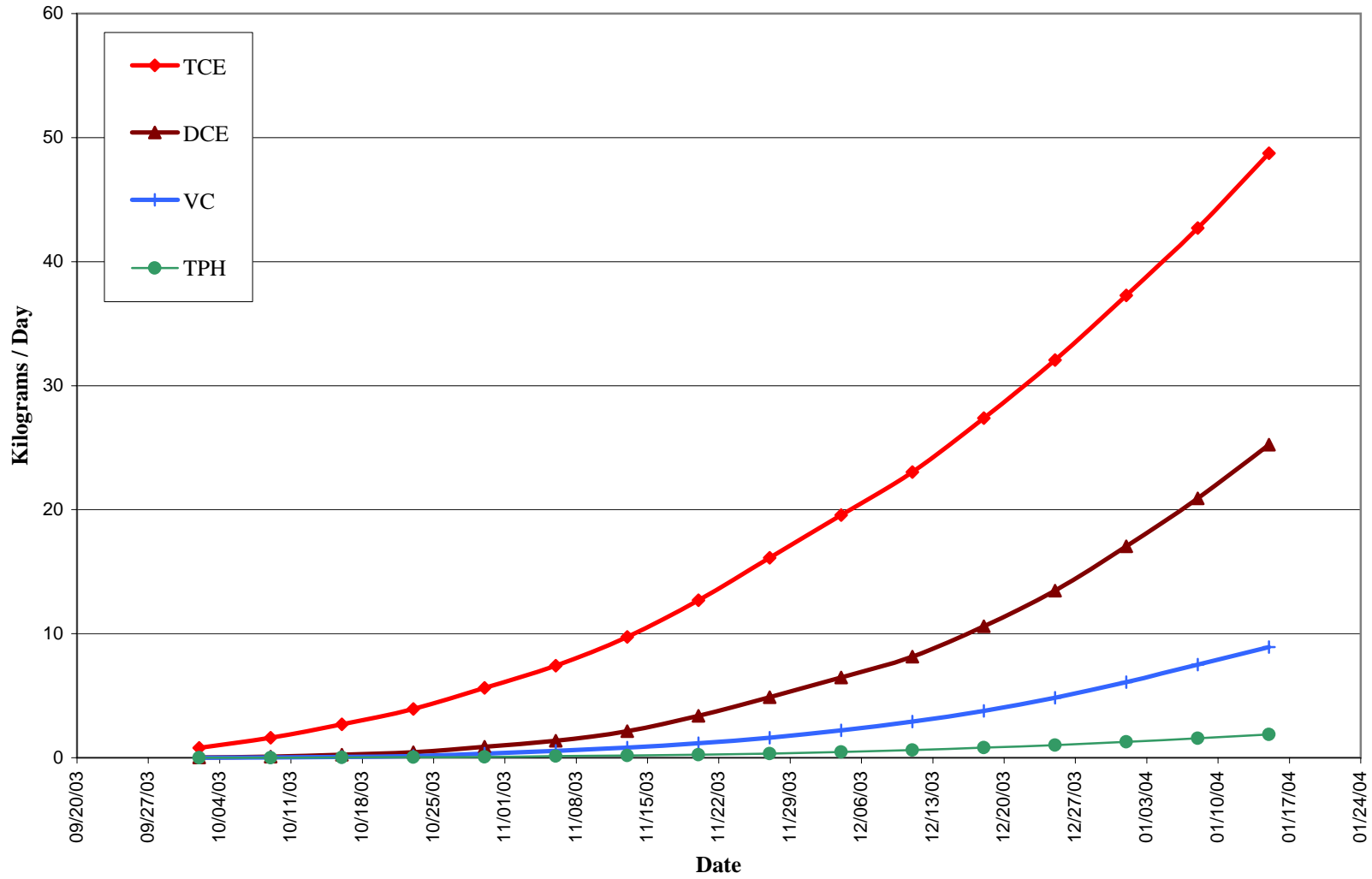


Figure 1c
Mass Removal of Specific COC VOCs in Water as of 01/15/04

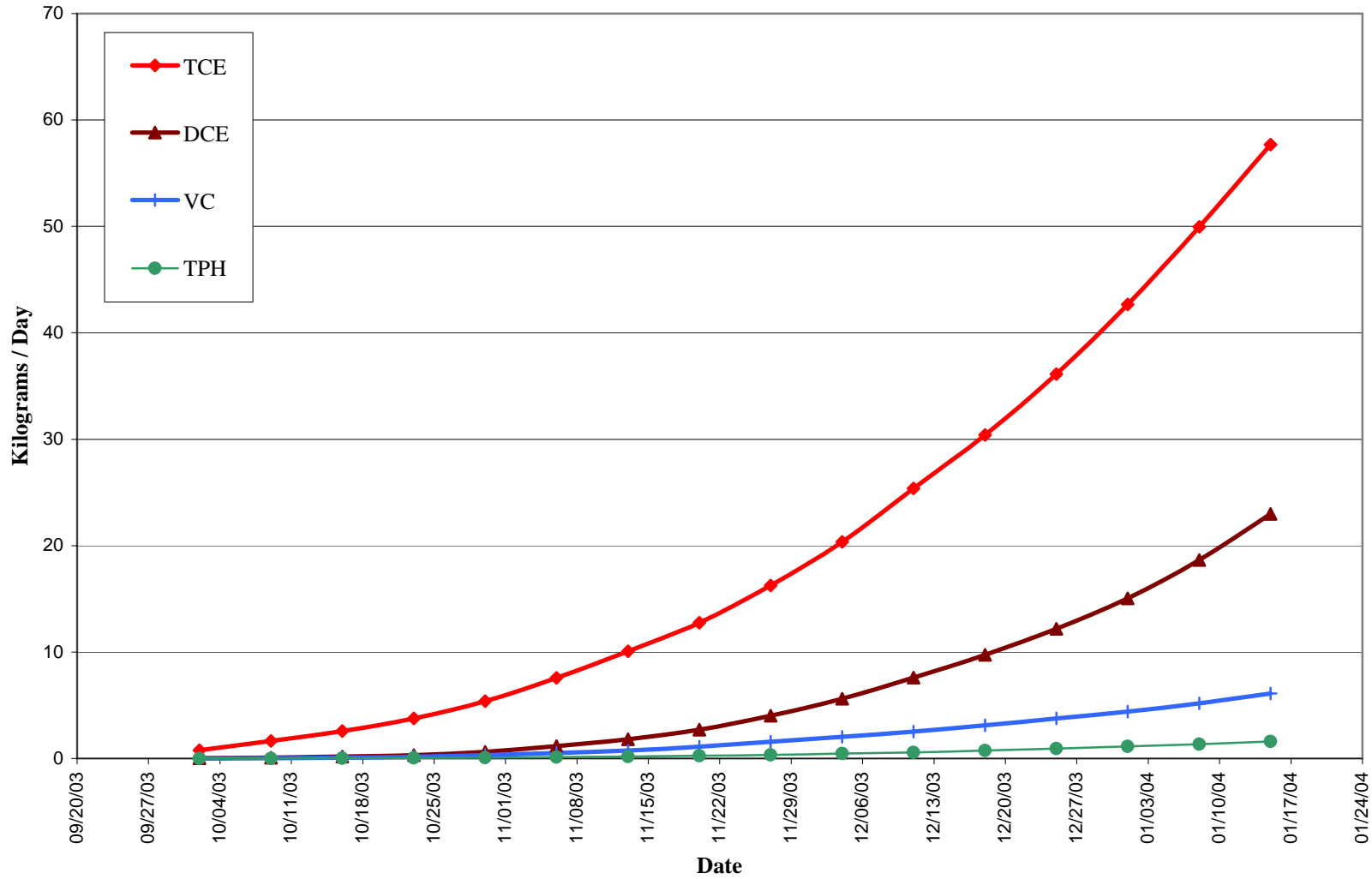
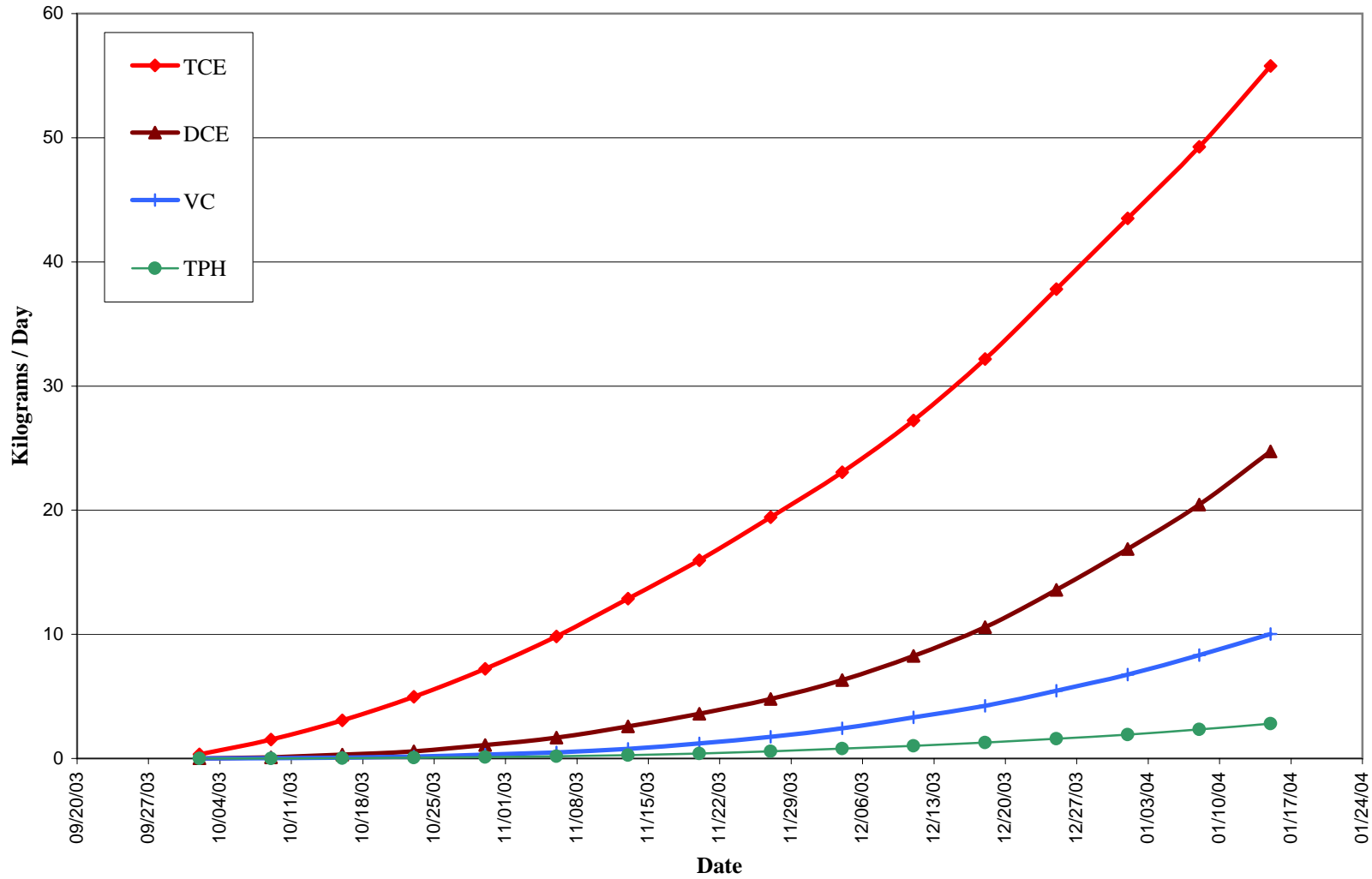
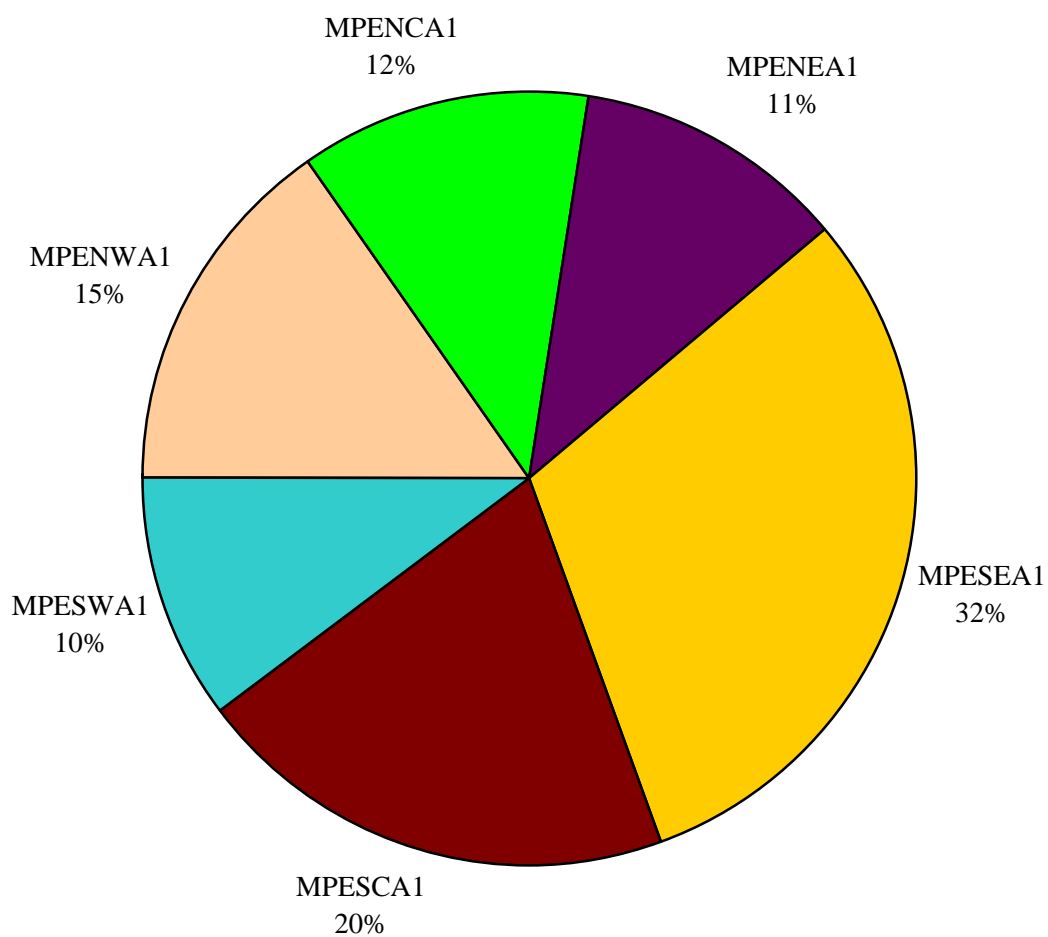


Figure 1D
Mass Removal of Specific COC VOCs in NAPL as of 01/15/04



**Figure 5 - MPE Regions (Subareas)
Target CVOC Concentrations
Qualitative Data - Week ending 11/06/2003**



Notes: NAPL observed at MPE Regions NE and SE this week during sampling.
Percentages are an approximation only, not definitive data.

Figure 7a
COC VOCs Concentrations at OXIN - mg/l

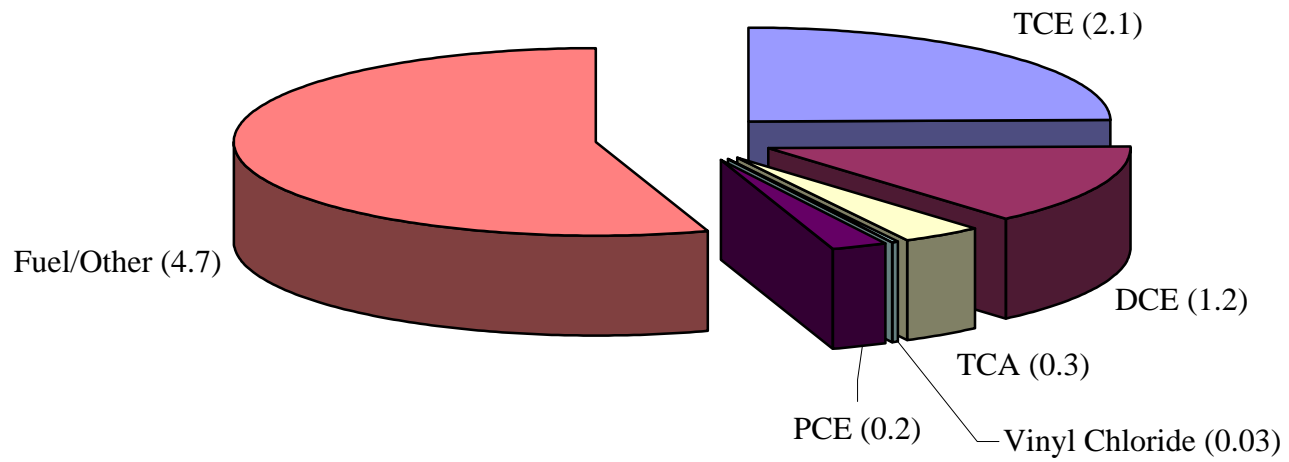


Figure 7b
COC VOCs Concentrations at OWSDW - mg/l

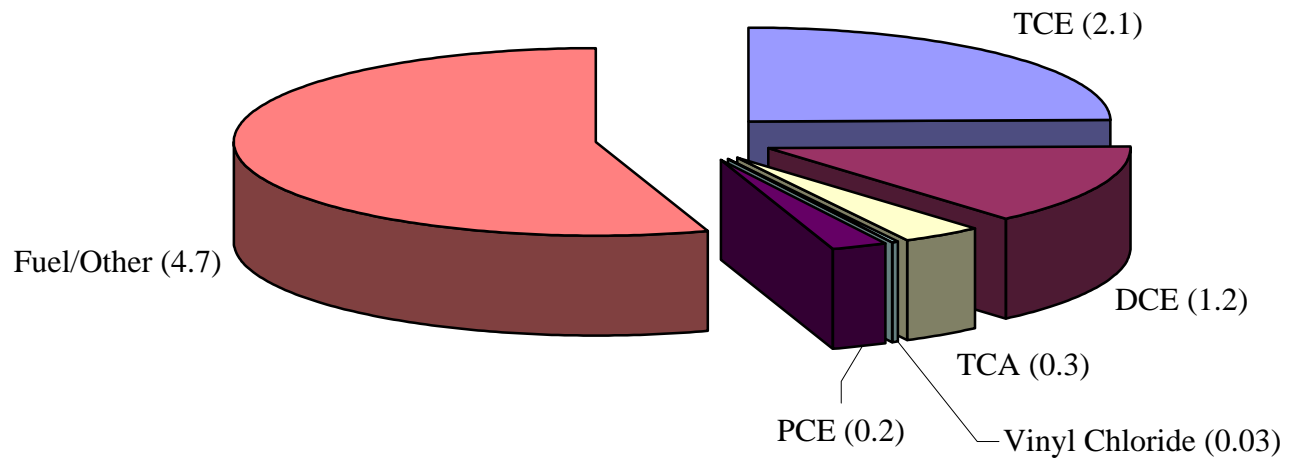


Figure 7c
COC VOCs Concentrations at NAPL01 - mg/l

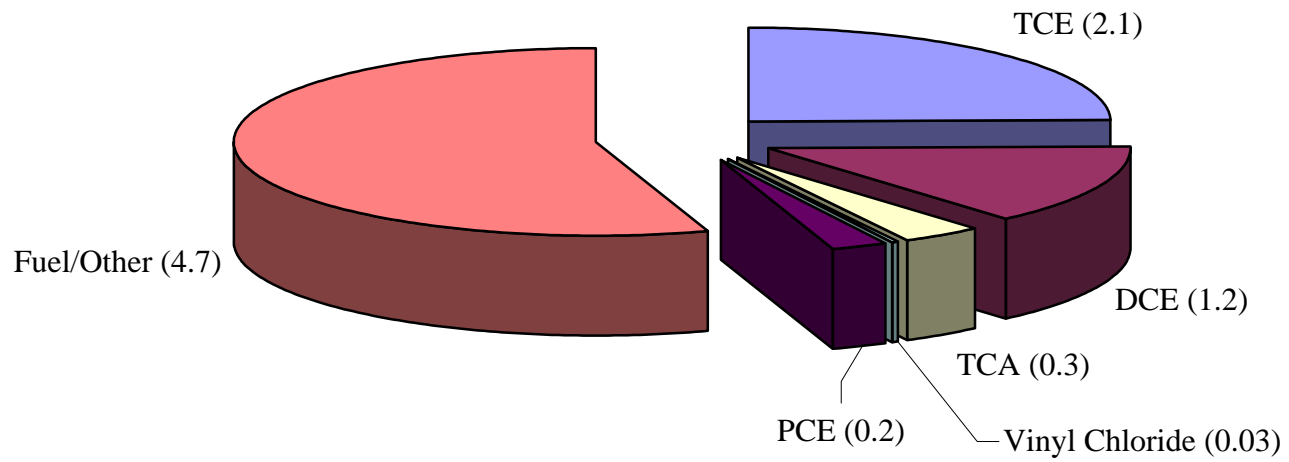


Figure 8
TCE Air Emissions

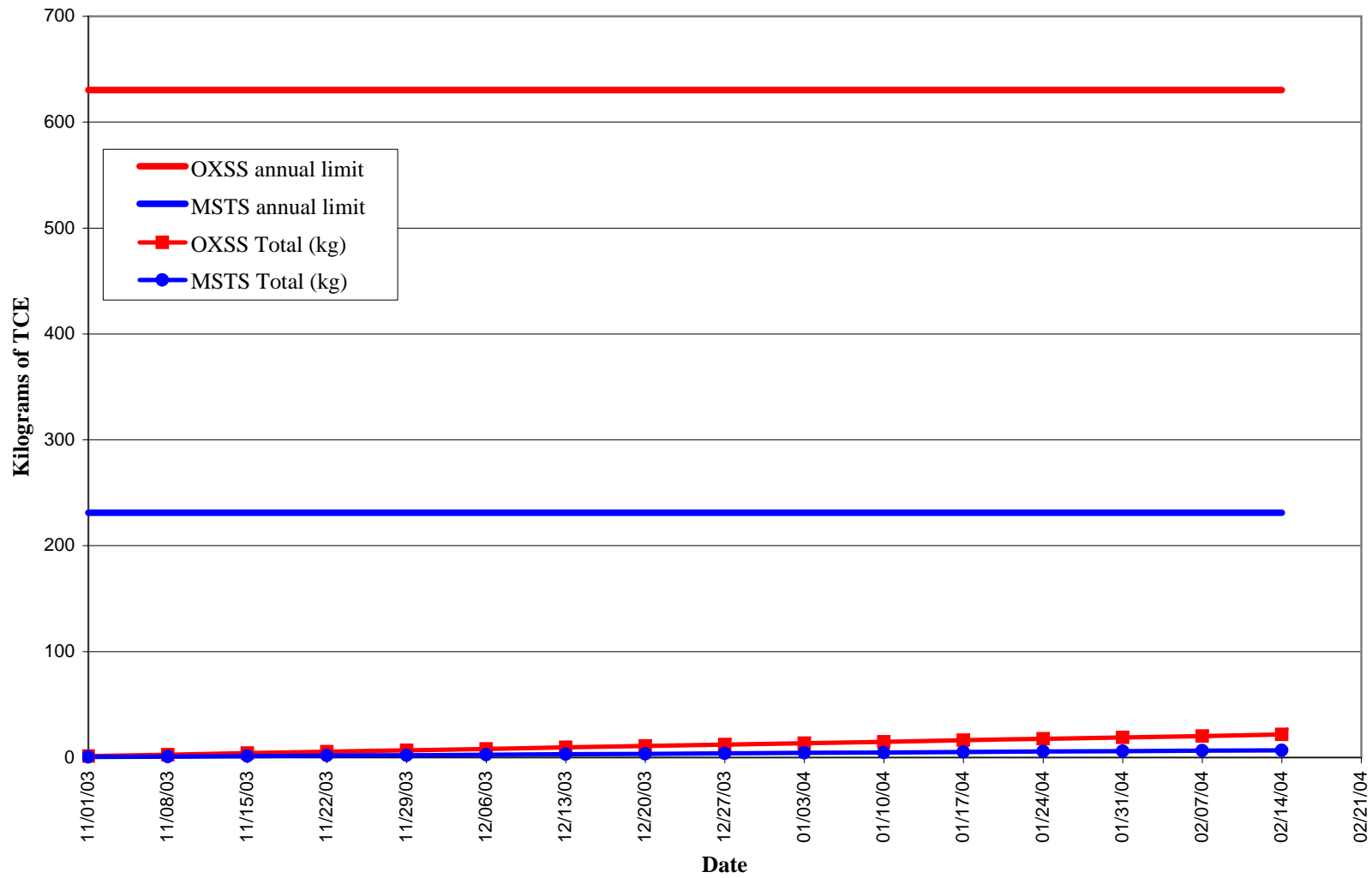


Figure 9 - Average Target COC VOCs in Groundwater

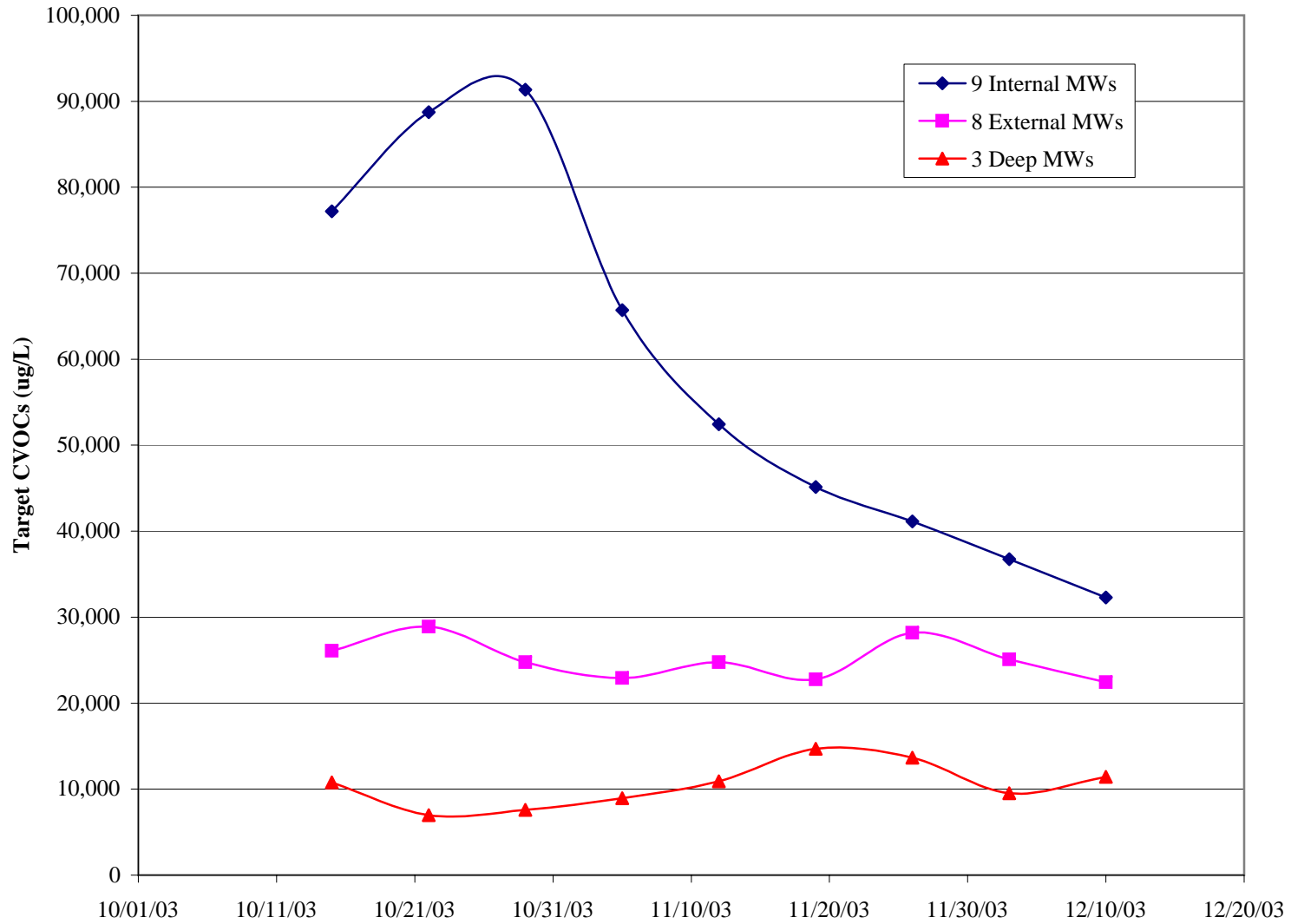


Figure 10 TCE Concentrations in Reinjecting Water

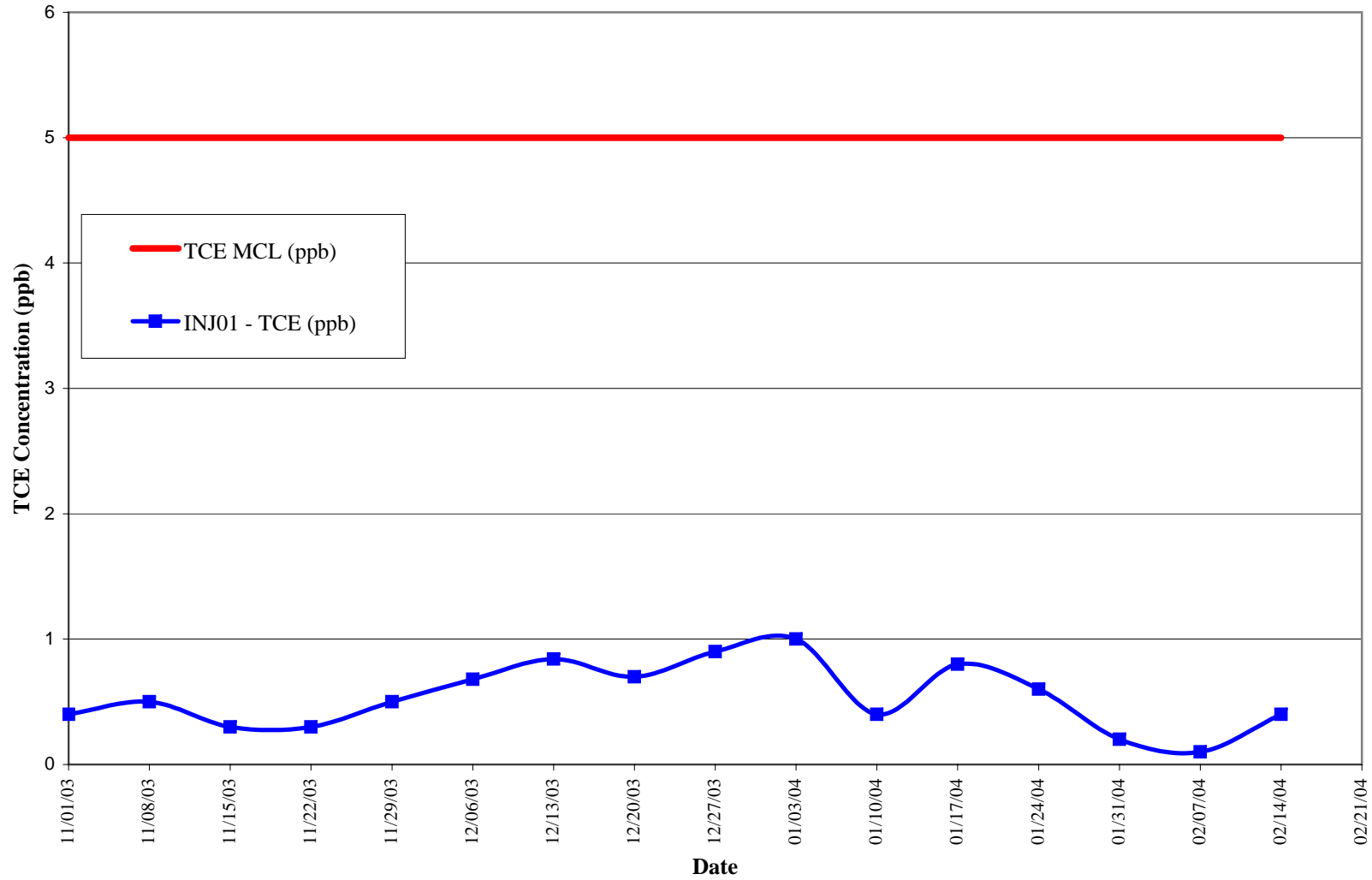


Figure 11 cis-1,2-DCE Concentrations in Reinjecting Water

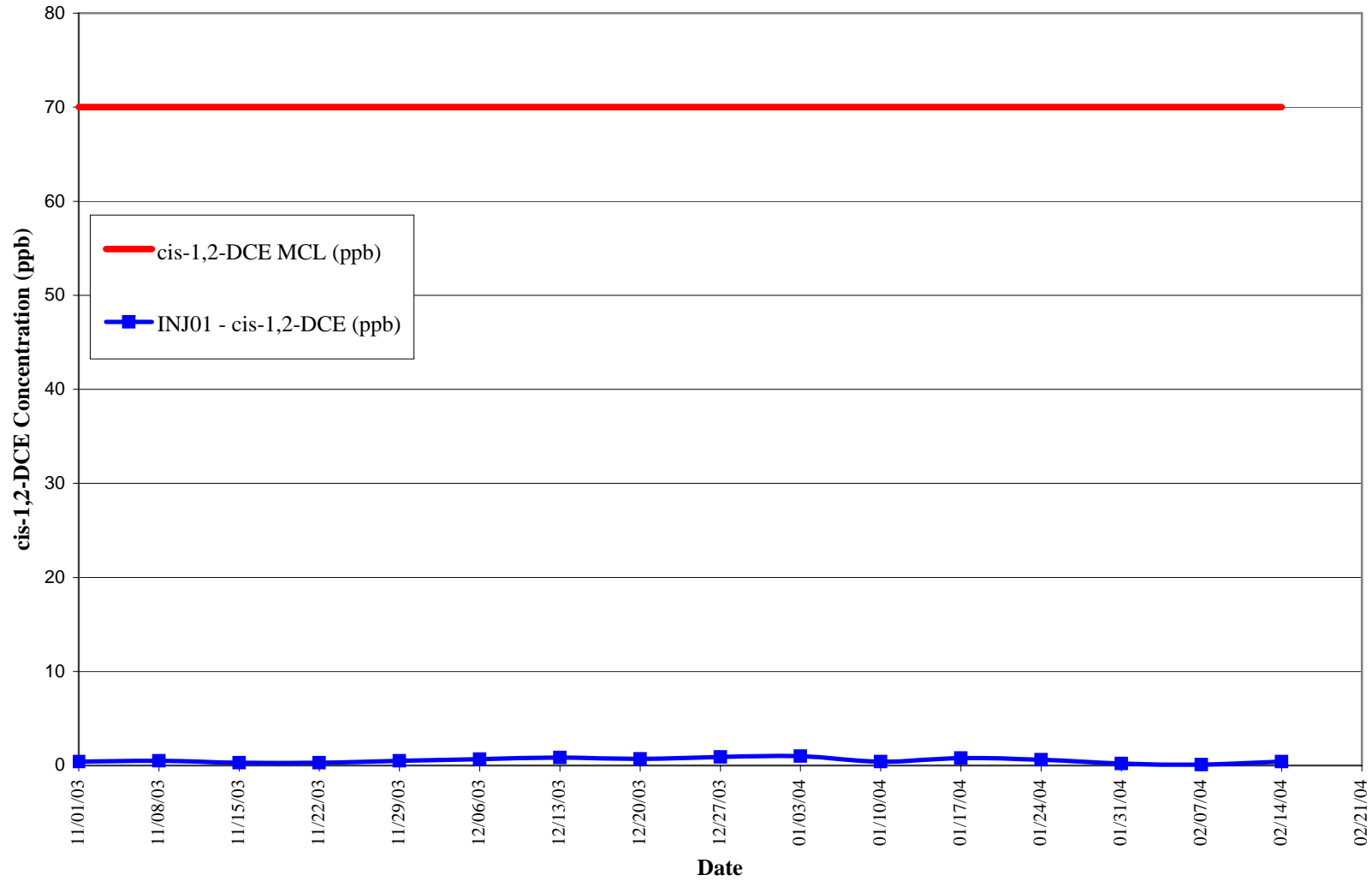


Figure 12 Vinyl Chloride Concentrations in Rejected Water

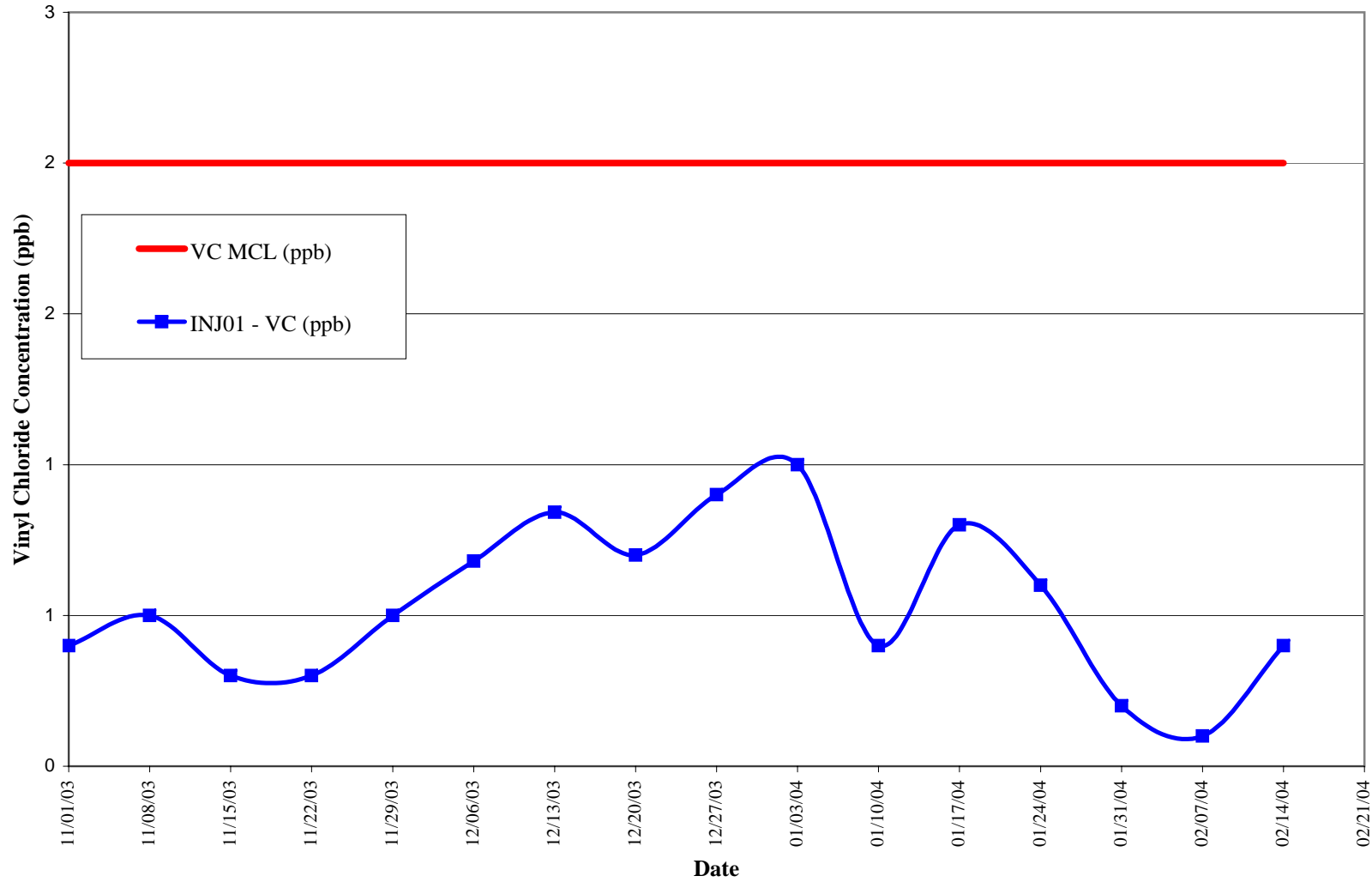


Figure 13 PCE Concentrations in Reinjecting Water

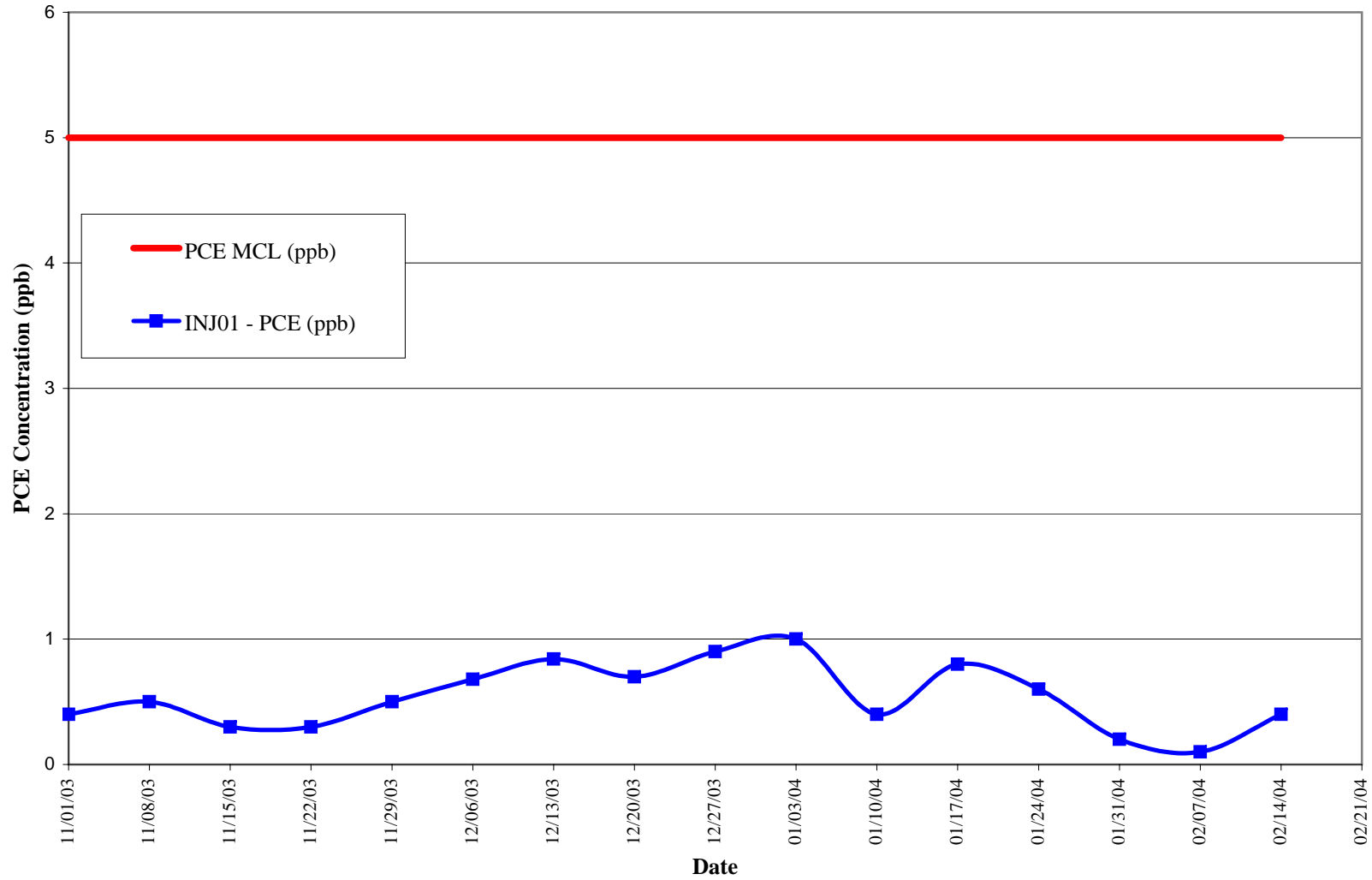
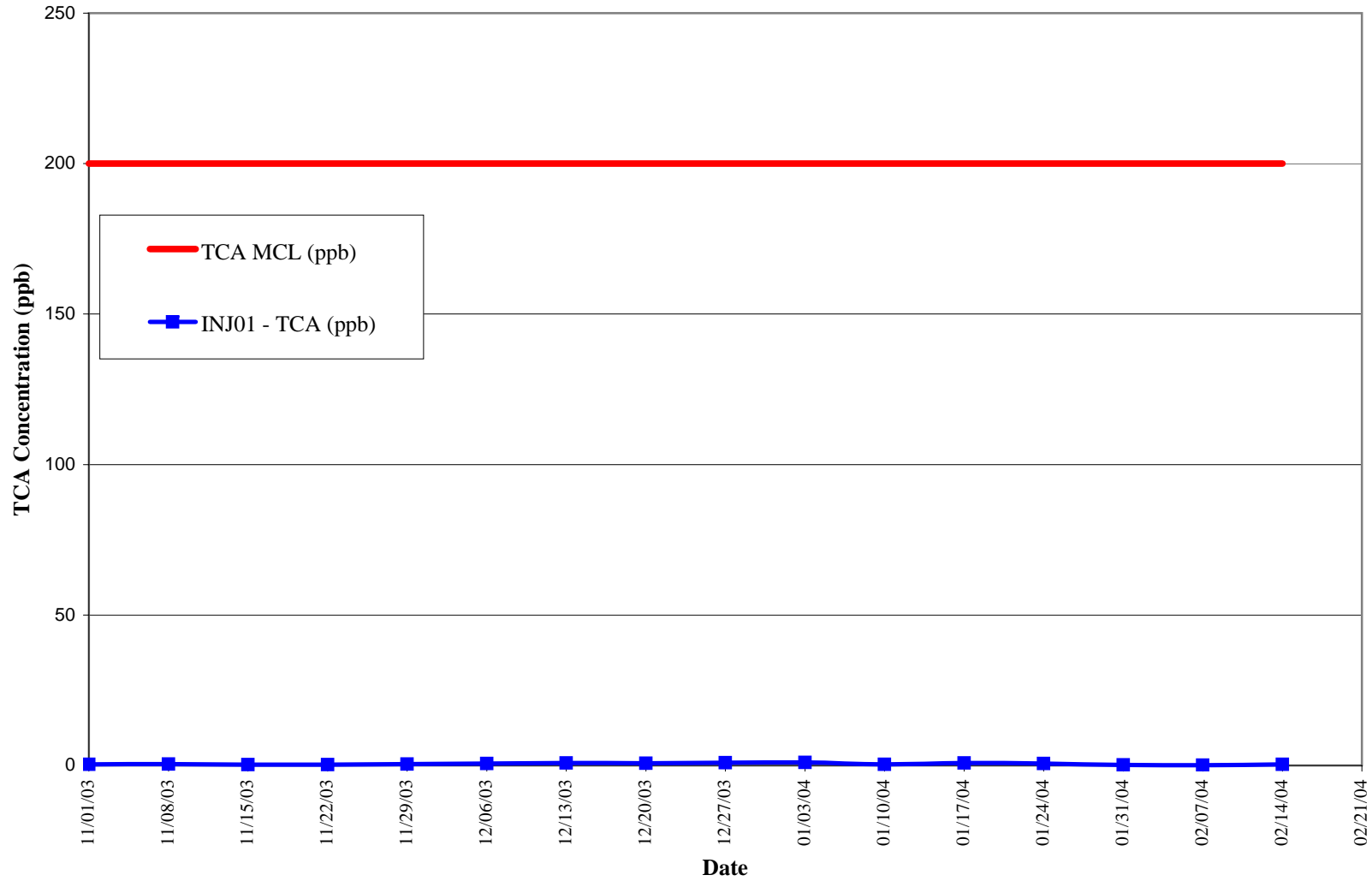


Figure 14 TCA Concentrations in Reinjecting Water



APPENDIX C

Monthly Report Examples

DATE

Contract No. DACA67-02-C-0218

Linnea Wolfe
USACE Project Manager
USACE Seattle District
4735 East Marginal Way South
Seattle, WA 98134-2255
Dear Linnea Wolfe:

**Re: Monthly Reporting For MONTH YEAR
East Gate Disposal Yard
Fort Lewis, Washington**

As required by the United States Army Corps of Engineers (USACE) Specifications for this thermal remediation project, the Thermal Remediation Services (TRS) project team presents this weekly report as a record of remediation. As required by Specification 01785, Page 3, Section 1.5.3 (Monthly Submittals), items covered in this report, for MONTH YEAR include:

- (a) A statistical summary of all information provided in the weekly reports during the month (Table 1),
- (b) Monthly Chemistry Data Package with all final analytical data reported during the month (data packages and reports attached),
- (c) Graphs of data collected during the month (Figures 1 through 1d, 2, 5, and 7),
- (d) Statistical summaries of groundwater physical parameters (conductivity, DO, pH, TDS, turbidity, and temperature) measured during the month (Table 2),
- (e) Monthly totals for energy usage (Figure 1),
- (f) Monthly totals for mass removed (Figure 1),
- (g) Monthly totals for groundwater extracted (reported below), and
- (h) Description summarizing monthly activities and major events or milestones.

Monthly Synopsis

MONTHLY TOTAL FOR GROUNDWATER EXTRACTION WOULD BE REPORTED
HERE

Corrective Actions

Changes to Field Protocol

Questions regarding the information provided in this daily report should be directed to Pat Cossins with TRS (512-527-8041).

Sincerely,

The TRS Project Team

Thermal Remediation Services

AMEC Earth & Environmental, Inc.

Gary Struthers & Associates

Camp Dresser & McKee, Inc.

Attachments:

Table 1 – Statistical Analysis of Weekly Reports

Table 2 – Statistical Analysis of Physical Parameters

Figure 1 – Remediation Rates – Daily Averages

Figure 1a – Cumulative COC VOC and Total Mass Removal for Air, Water, and NAPL

Figures 1b through 1d – Specific COC VOC Mass Removal per Media

Figure 2 – Average Site Temperature vs. Depth

Figure 5 – MPE Region Total VOC Concentrations by MPE Region

Figure 7 – OXIN COC VOC Distribution

Figure 9 – Average Target COC VOCs Concentrations in Groundwater

Final Laboratory Analytical Reports

Monthly Chemistry Data Packages

Figure 1
Remediation Rates - Daily Averages
Week Ending mm/dd/yyyy
 East Gate Disposal Yard
 Fort Lewis, Washington

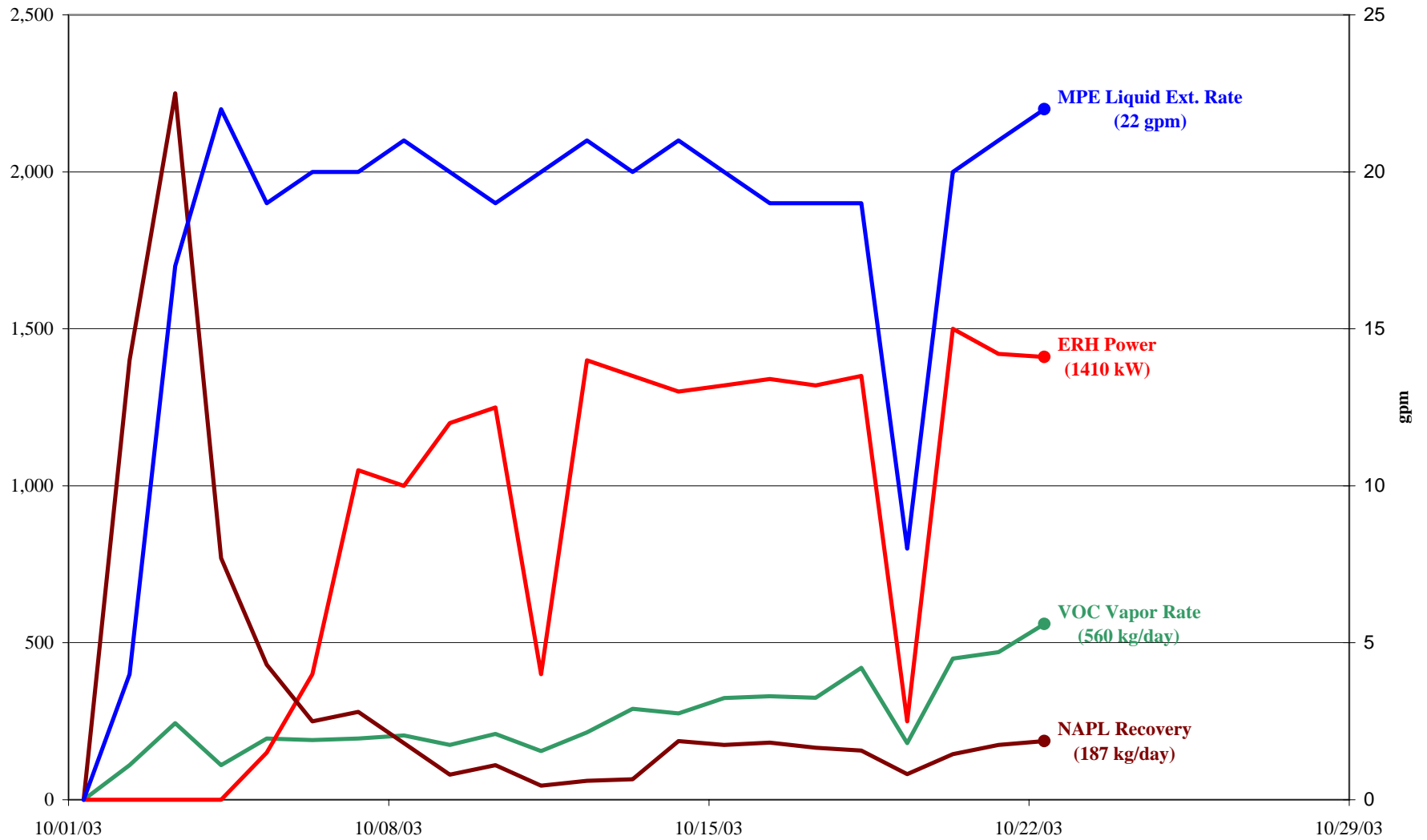


Figure 1a
Target CVOC Mass Removal Per Media

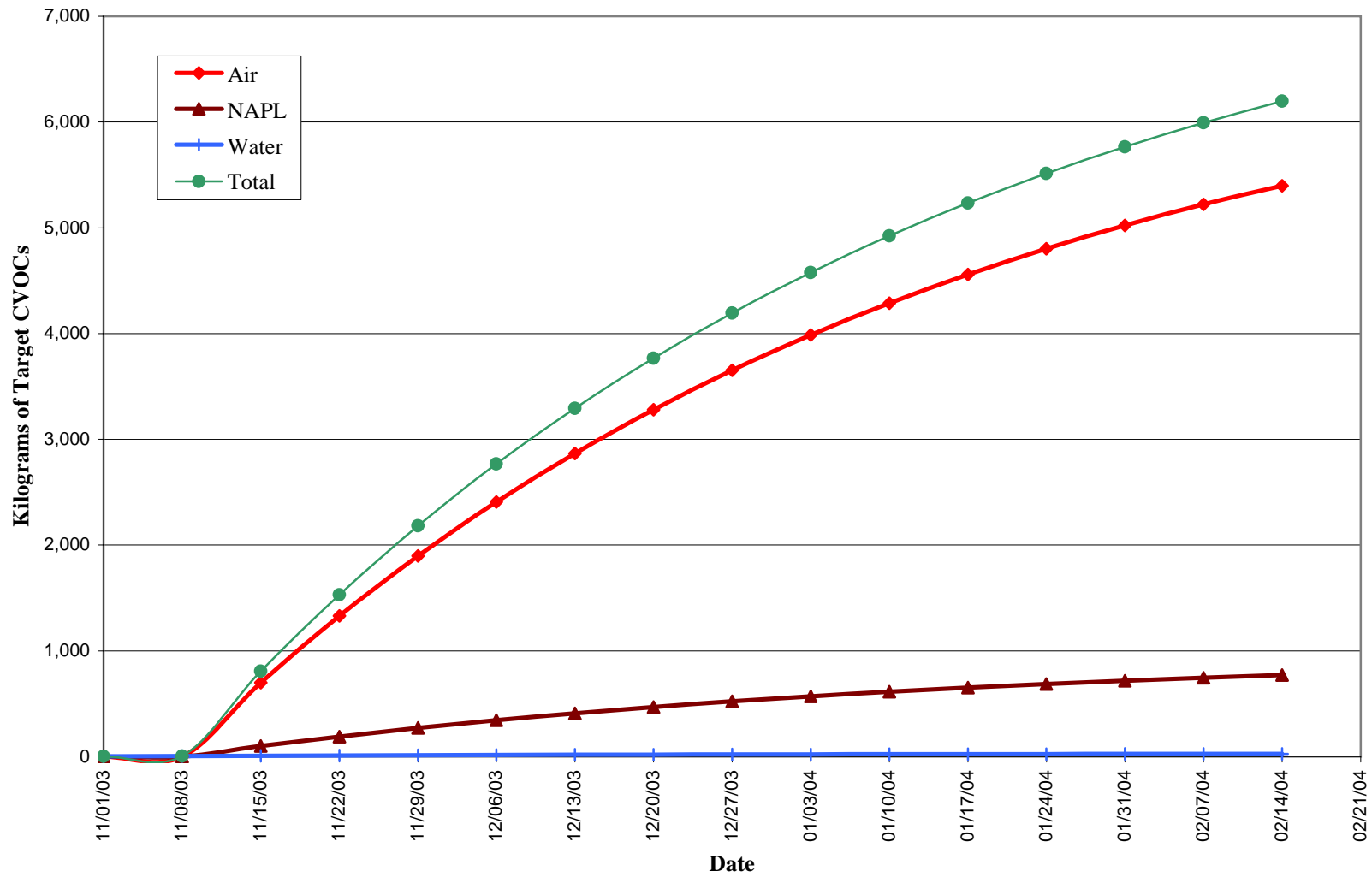
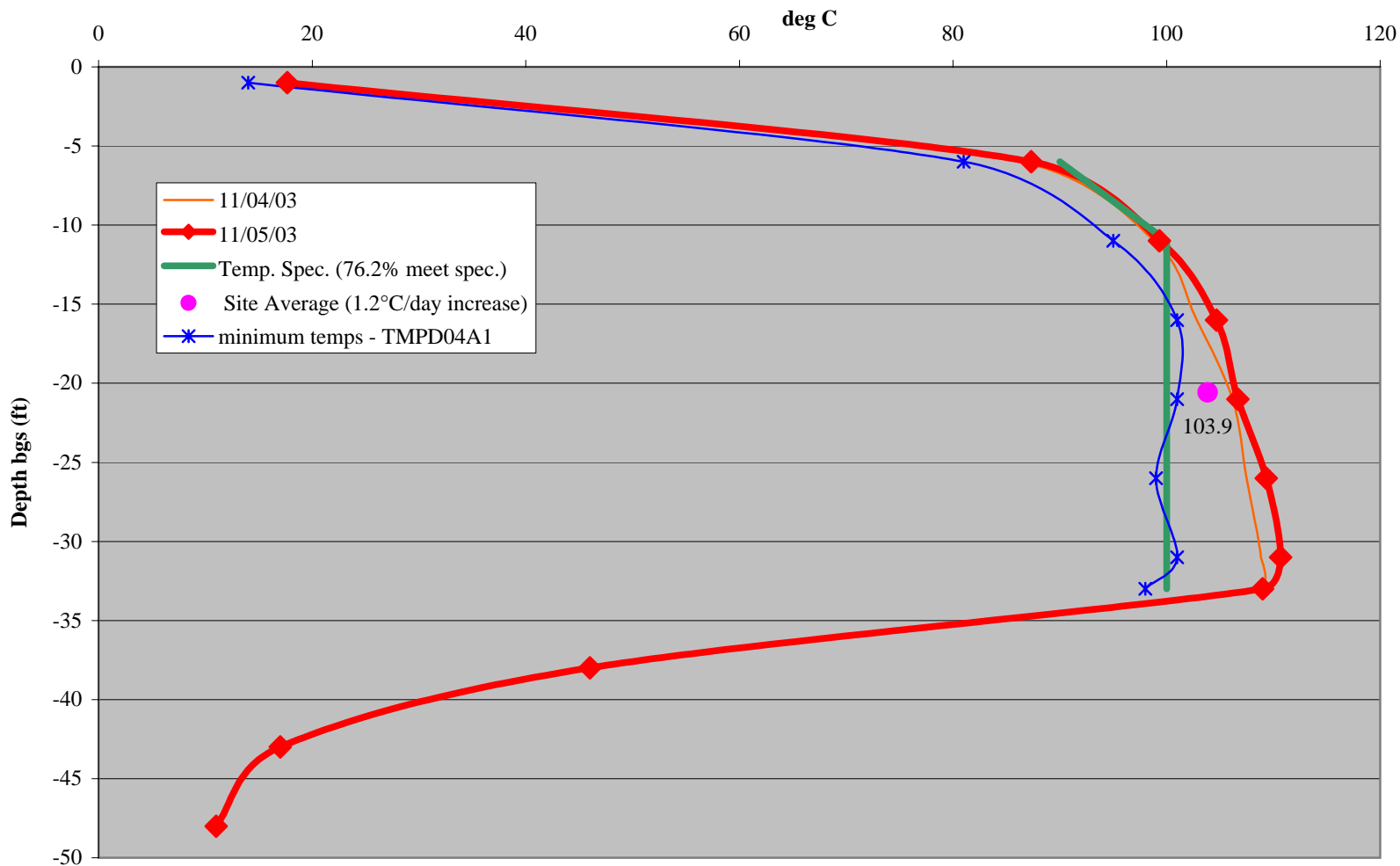
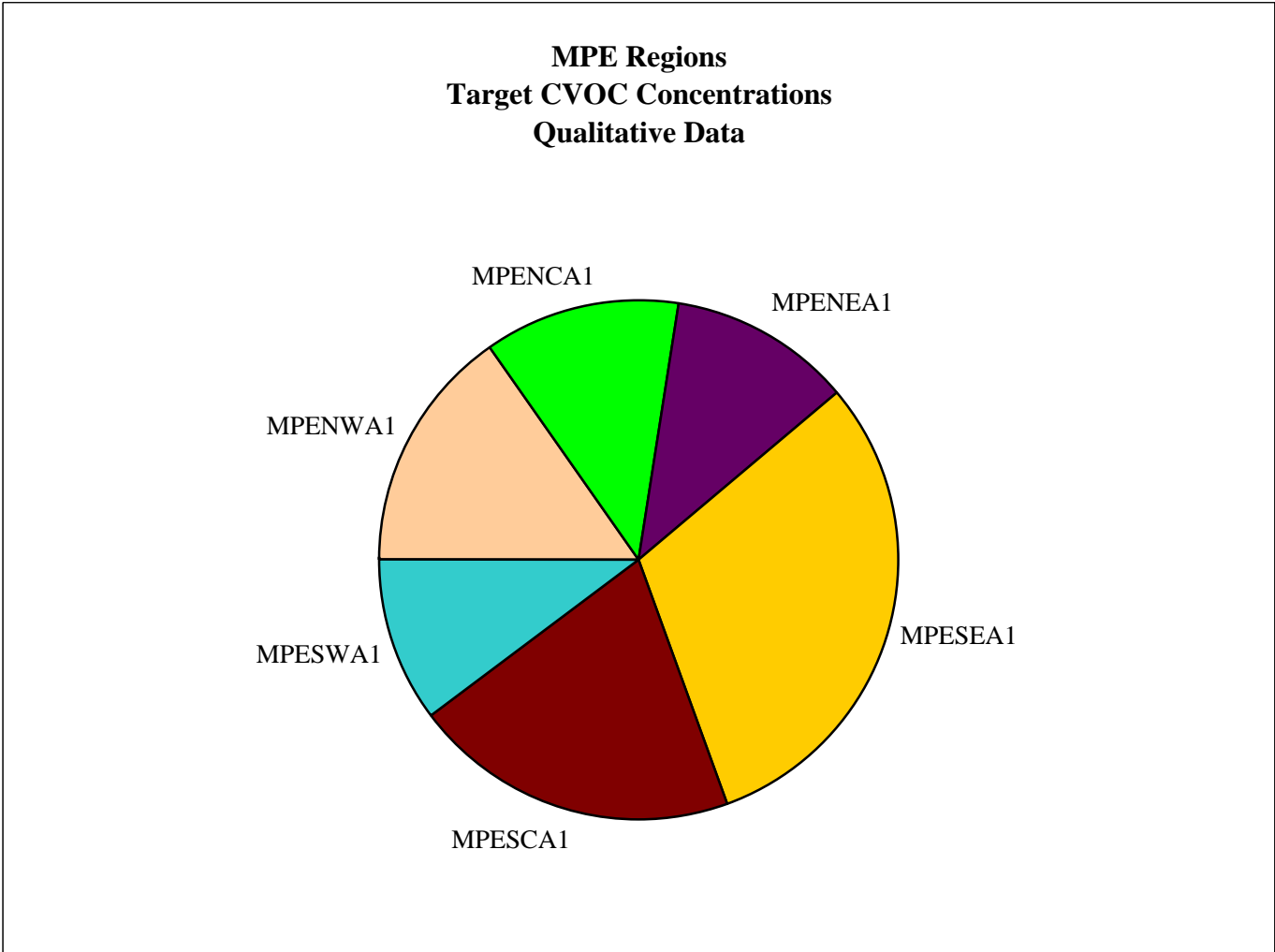


Figure 2
Average Site Temperature
Month ending mm/yyyy
 East Gate Disposal Yard
 Fort Lewis, Washington
EDGY Average Temperature



The "minimum" temperature curve is the minimum temperature at any TMP at that depth. The TMP listed in the legend has the minimum average temperature

Figure 5
MPE Region Total VOC Concentrations
Week Ending mm/dd/yyyy
East Gate Disposal Yard
Fort Lewis, Washington



Notes: NAPL observed at MPE Regions NE and SE this week during sampling.

Figure 8
TCE Air Emissions

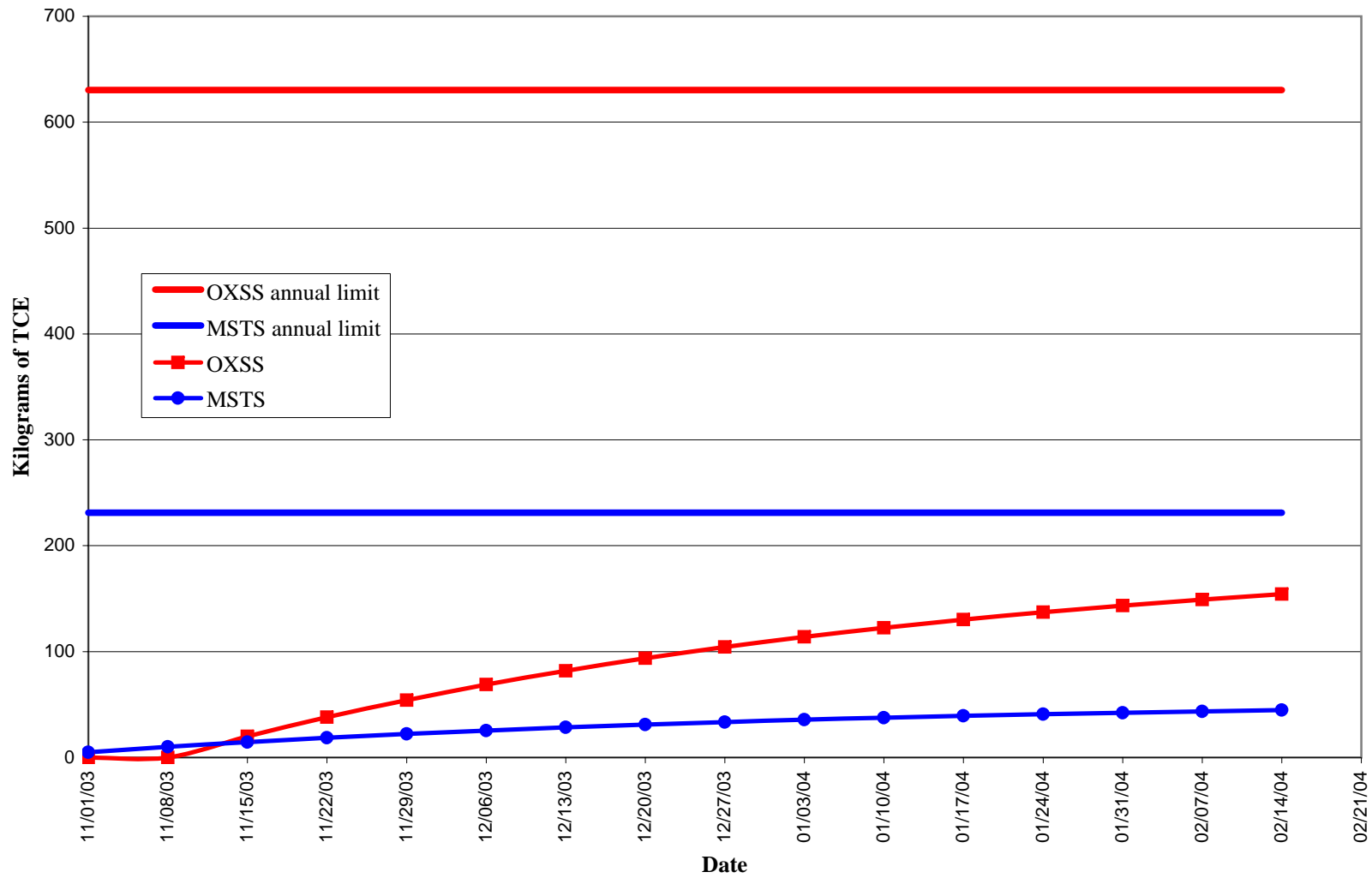


Figure 9 - Average Target COC VOCs in Groundwater

