



Protecting America's Future

**Y-12
NATIONAL
SECURITY
COMPLEX**

**SUPPLEMENTAL ASSESSMENT
OF THE
Y-12 GROUNDWATER PROTECTION PROGRAM
USING
MONITORING AND REMEDIATION
OPTIMIZATION SYSTEM SOFTWARE**

January 2009

Prepared by

**Elvado Environmental LLC and GSI Environmental, Inc.
Under Subcontract No. 4300063119**

for the

**Environmental Compliance Department
Environmental, Safety, and Health Division
Y-12 National Security Complex
Oak Ridge, Tennessee 37831**

Managed by

**Babcock & Wilcox Technical Services Y-12, LLC
for the U.S. DEPARTMENT OF ENERGY
Under Contract No. DE-AC05-00OR22800**

**MANAGED BY
BWXT Y-12, L.L.C.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY**

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ACRONYMS

AFCEE	Air Force Center for Environmental Excellence
B4	Beta 4 Security Pits
B&W Y-12	Babcock & Wilcox Technical Services Y-12, LLC
BCV	Bear Creek Valley
Bear Creek Regime	Bear Creek Hydrogeologic Regime
BCBG	Bear Creek Burial Grounds
BWXT	BWXT Y-12, L.L.C.
BYBY	Boneyard/Burnyard
CDL	Construction/Demolition Landfill
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Chestnut Ridge Regime	Chestnut Ridge Hydrogeologic Regime
COC	contaminant of concern
CPT	Coal Pile Trench
CRBAWP	Chestnut Ridge Borrow Area Waste Pile
CRSDB	Chestnut Ridge Sediment Disposal Basin
CRSP	Chestnut Ridge Security Pits
CTET	carbon tetrachloride
D	decreasing (trend)
DNAPL	dense non-aqueous phase liquid
DOE	U.S. Department of Energy
DQO	data quality objective
East Fork Regime	Upper East Fork Poplar Creek Hydrogeologic Regime
ECRWP	East Chestnut Ridge Waste Pile
Elvado	Elvado Environmental LLC
EMWMF	Environmental Management Waste Management Facility
FF	Fuel Facility (Y-12 East End)
FTF	Fire Training Facility
GSI	GSI Environmental, Inc. (formerly Groundwater Services, Inc.)
GWPP	Groundwater Protection Program
HWDU	Hazardous Waste Disposal Unit
I	increasing (trend)
IL	Industrial Landfill
LTM	long-term monitoring
MAROS	Monitoring and Remediation Optimization System
MCES	Modified Cost Effectiveness Sampling (method)
MCL	maximum contaminant level
MOP	Monitoring Optimization Plan
NA	not applicable, insufficient sample results
ND	non-detected analytical results
NT	no trend
ORR	Oak Ridge Reservation
PCE	tetrachloroethene
PCP	post-closure permit
PD	probably decreasing (trend)
PI	probably increasing (trend)
RCRA	Resource Conservation and Recovery Act
RG	Rust Garage Area
ROD	record of decision

ACRONYMS (continued)

S	stable (trend)
SCF	South Campus Facility
SDWA	Safe Drinking Water Act
SL	Sanitary Landfill
SWDF	Solid Waste Disposal Facility
SY	Salvage Yard (Y-12 Salvage Yard)
Tc-99	technetium-99
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
UEFPC	Upper East Fork Poplar Creek
UNCS	United Nuclear Corporation Site
VC	vinyl chloride
VOC	volatile organic compound
WCPA	Waste Coolant Processing Area
WMA	Waste Management Area
Y-12	Y-12 National Security Complex
11DCE	1,1-dichloroethene
c12DCE	cis-1,2-dichloroethene

1.0 INTRODUCTION

A supplemental quantitative assessment of the Groundwater Protection Program (GWPP) at the Y-12 National Security Complex (Y-12) in Oak Ridge, TN was performed using the *Monitoring and Remediation Optimization System* (MAROS) software. This application was previously used as part of a similar quantitative assessment of the GWPP completed in December 2005, hereafter referenced as the “baseline” MAROS assessment (BWXT Y-12 L.L.C. [BWXT] 2005). The MAROS software contains modules that apply statistical analysis techniques to an existing GWPP analytical database in conjunction with hydrogeologic factors, regulatory framework, and the location of potential receptors, to recommend an improved groundwater monitoring network and optimum sampling frequency for individual monitoring locations.

The goal of this supplemental MAROS assessment of the Y-12 GWPP is to review and update monitoring network optimization recommendations resulting from the 2005 baseline report using data collected through December 2007. The supplemental MAROS assessment is based on the findings of the baseline MAROS assessment and includes only the groundwater sampling locations (wells and natural springs) currently granted “Active” status in accordance with the Y-12 GWPP *Monitoring Optimization Plan* (MOP). The results of the baseline MAROS assessment provided technical rationale regarding the “Active” status designations defined in the MOP (BWXT 2006). One objective of the current report is to provide a quantitative review of data collected from Active but infrequently sampled wells to confirm concentrations at these locations. This supplemental MAROS assessment does not include the extensive qualitative evaluations similar to those presented in the baseline report.

This report was prepared by Elvado Environmental LLC (Elvado) of Knoxville, TN, in collaboration with GSI Environmental, Inc. (GSI), of Houston, TX. Elvado coordinated the performance of the supplemental MAROS assessment and assumed primary responsibility for the preparation of this report. GSI, which performed the baseline MAROS assessment of the Y-12 GWPP (BWXT 2005), provided subject matter expertise, conducted the MAROS analyses, and prepared the MAROS output data tables (Appendix B), MAROS summary reports (Appendix C), and MAROS sampling recommendations (Appendix D).

2.0 SUPPLEMENTAL MAROS ASSESSMENT APPROACH

The following subsections provide an overview of the technical approach for the supplemental MAROS assessment, including the MAROS analysis groups, MAROS contaminant of concern (COC) assessment, COC screening levels, MAROS moment analyses, MAROS statistical trend analyses, and the MAROS sampling frequency evaluation. Detailed information regarding the MAROS technical approach and referenced methods used by the MAROS for statistical analysis and data evaluation are deferred to the baseline MAROS assessment report (BWXT 2005) and the MAROS Users Manual (Air Force Center for Environmental Excellence [AFCEE] 2003).

The hydrogeologic system at Y-12 encompasses a complex combination of fracture-dominated anisotropic flow in low permeability non-carbonate bedrock (primarily shale) and conduit-dominated (karst) flow in more highly permeable carbonate bedrock (limestone and dolostone), with a wide range of hydraulic characteristics evident for both types of bedrock. Also, the shallow subsurface in many areas at

Y-12 was extensively modified by the construction and operation of process facilities and numerous subsurface utilities. Both the baseline and supplemental MAROS assessment assume a simplified hydrogeologic framework for Y-12, including generalized groundwater flow directions in each hydrogeologic regime, a uniform effective porosity (0.01), and an average groundwater flow rate of 200 ft/yr (2×10^{-4} cm/s).

Neither the supplemental MAROS assessment nor the baseline MAROS assessment addresses seasonal changes in contaminant concentrations in the groundwater at Y-12, although such seasonal changes are evident for known contaminants at numerous sampling locations. The influence of seasonality in groundwater concentrations may be significant when estimating short-term exposures; however objectives of long-term monitoring (LTM) networks generally involve evaluation of long-term risks and potential for significant change in status of a groundwater contaminant plume. For this reason, MAROS and most other LTM strategies do not address seasonality (BWXT 2005).

2.1 MAROS ANALYSIS GROUPS

Based primarily on common source areas and geographic proximity, the network of groundwater sampling locations at Y-12 (wells and springs) included in the supplemental MAROS assessment of the Y-12 GWPP are subdivided into the MAROS analysis groups shown in the following summary. Locations of the wells and springs are shown on Figure A.2 for the MAROS analysis groups in the Bear Creek Hydrogeologic Regime (Bear Creek Regime), Figure A.3 for the MAROS analysis groups in the Upper East Fork Poplar Creek Hydrogeologic Regime (East Fork Regime), and Figure A.4 for the MAROS analysis groups in the Chestnut Ridge Hydrogeologic Regime (Chestnut Ridge Regime).

Hydrogeologic regimes and associated MAROS analysis groups included in the supplemental MAROS assessment of the Y-12 GWPP

BEAR CREEK REGIME	EAST FORK REGIME	CHESTNUT RIDGE REGIME
<ul style="list-style-type: none"> ● West S-3 Area ● Oil Landfarm Waste Management Area (WMA) ● Bear Creek Burial Grounds (BCBG) WMA 	<ul style="list-style-type: none"> ● East S-3 Area ● Central Y-12 Area ● East Y-12 Area 	<ul style="list-style-type: none"> ● West Chestnut Ridge ● Chestnut Ridge Security Pits (CRSP) ● Landfills V and VII Area ● East Chestnut Ridge

The same MAROS analysis groups were included in the baseline MAROS assessment of the Y-12 GWPP (BWXT 2005), although the respective suite of sampling locations may differ from those included in the baseline MAROS assessment. For example, 15 of the monitoring wells that were in the baseline report are excluded from the supplement report because they are no longer “Active” wells (see Section 1.0); conversely, 18 monitoring wells with recent sampling results (CY 2005 – CY 2007) had insufficient data for the baseline assessment. Also, for the supplemental MAROS assessment, the MAROS analysis group for the Central Y-12 Area includes seven wells located at the Y-12 East End Fuel Facility (FF), which the baseline MAROS assessment addressed as part of a separate MAROS analysis group. The FF wells were added to the MAROS analysis group for the Central Y-12 Area because the MAROS software requires input data from a minimum of six sampling locations with detected COCs per MAROS analysis group (AFCEE 2003) in order to perform spatial computations. Concentrations in the FF area dropped below detection limits at some locations, resulting in less than six wells with detectable levels of constituents for each sample event.

2.2 COC ASSESSMENT

The COCs detected in each MAROS analysis group were prioritized on the basis of: toxicity, prevalence, and mobility in the groundwater; the findings of the baseline MAROS assessment of the Y-12 GWPP; and professional judgment. Prioritization of COCs was necessary because of the number and diversity of constituents analyzed under the Y-12 GWPP. Monitoring networks for each MAROS analysis group were optimized for the priority constituents identified during the COC Assessment. Collectively, the contaminants evaluated for the supplemental MAROS assessment represent a prioritized subset of the contaminants evaluated for the baseline MAROS assessment.

Priority constituents identified for the each analysis group as a whole were used for the moment analyses and other plume-level evaluations. The MAROS statistical trend analyses for individual wells focused on a single priority COC designated for each sampling location per the technical approach established in the baseline MAROS assessment, which involves determining the normalized ratio between the average concentration of the COC and the corresponding screening level (see Sect. 2.3). For each sampling location, the average concentration of each applicable COC is calculated from available sampling results (non-detect results default to a uniform value corresponding to the lowest analytical reporting limit for the COC). Average concentrations were determined from analytical results that meet the data quality objectives (DQOs) of the Y-12 GWPP. Dividing the average concentration of each COC by the applicable screening level determines the normalized ratio, with the COC having the highest normalized ratio being selected as the representative COC designated for the sampling location.

2.3 COC SCREENING LEVELS

The COC screening levels used for the supplemental MAROS assessment of the Y-12 GWPP are: (1) the Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs) currently adopted by the U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC); (2) the current EPA- and TDEC-approved secondary MCLs for drinking water; and (3) the EPA Region IX preliminary remediation goals for contaminated groundwater. As shown in the following summary, each priority COC for the MAROS analysis groups was selected based on exceeding the applicable MCL. Note that the screening level for gross beta activity is the SDWA threshold value above which the dose equivalent may exceed the drinking water MCL for gross beta activity (4 millirems per year).

Screening levels used for the supplemental MAROS assessment of the Y-12 GWPP

PRIORITY COC	UNITS	MCL
Nitrate	milligrams per liter (mg/L)	10
Cadmium		0.01
Uranium		0.03
Gross alpha activity	picoCuries per liter (pCi/L)	15
Gross beta activity		50
Benzene	micrograms per liter (µg/L)	5
Carbon tetrachloride (CTET)		5
1,1-Dichloroethene (11DCE)		7
cis-1,2-Dichloroethene (c12DCE)		70
Tetrachloroethene (PCE)		5
Trichloroethene (TCE)		5
Vinyl chloride (VC)		2

The baseline MAROS assessment of the Y-12 GWPP used these same screening levels for each applicable COC (BWXT 2005).

2.4 MOMENT ANALYSES

The MAROS moment analysis module provides a relative estimate of groundwater contaminant plume stability in the context of results from other MAROS modules. The MAROS moment analysis algorithms are simple approximations of complex calculations and are meant to roughly estimate changes in total dissolved plume mass (0th Moment), center of plume mass (1st Moment), and distribution of plume mass about the center (2nd Moment). The moment analyses provide a “plume-level” review of constituent mobility. For the supplemental report, the actual MAROS moment analysis results are not reported, but rather the moment trends for the plume mass are indicated for each MAROS analysis group and applicable COC (BWXT 2005).

The MAROS software uses the Mann-Kendall method for statistical analysis of the moment trends. Trend results of the MAROS moment analyses were interpreted as: Decreasing (D), Probably Decreasing (PD), Stable (S), Increasing (I), Probably Increasing (PI), No Trend (NT), no moment analysis because of non-detect (ND) analytical results; and Not Applicable (N/A) due to insufficient sampling results. Details of the statistical algorithm used can be found in the MAROS Users Manual (AFCEE, 2003). Stable to decreasing trends provide evidence that monitoring efforts may be reduced, whereas increasing trends potentially indicate downgradient migration of the plume or generation of daughter products due to biodegradation of parent constituents that may warrant increased monitoring efforts (BWXT 2005). No Trend results indicate the absence of a clear trend in the data and are usually associated with relatively high variability in the data, while Stable (S) usually indicates no definite trend and lower variability in the data.

Moment analysis trends are sensitive to the number and identity of wells used for the moment calculations. Because many sampling locations in the analysis groups are not sampled routinely, the moment analyses are based on annually averaged COC concentrations determined from sampling results that meet the DQOs of the Y-12 GWPP (average values were calculated as described in Section 2.2). Annual moments were calculated for the 1996 to 2007 time period. In order to provide year-to-year comparability in the moment analyses for each analysis group, two datasets were evaluated for certain networks. The first dataset includes data from all of the active wells in the analysis group, while the second dataset includes only data from wells that were sampled frequently at regular intervals during the 1996 to 2007 time interval. The second or “select” dataset includes active wells that were identified as part of the optimized monitoring network in the baseline report, and excludes wells that have not been sampled at least 4 times between 1996 and 2007.

Two datasets were developed for the West S-3 Area, Oil Landfarm WMA, BCBG WMA, and East S-3 Area MAROS analysis groups. By comparing results between the full dataset and the reduced “select” dataset, the statistical impact of intermittently sampled wells can be determined. Significant differences in moments calculated from full and reduced sampling networks may indicate that intermittently sampled wells should be included in the monitoring program on a more frequent basis.

2.5 STATISTICAL TREND ANALYSES

The MAROS software uses the combined results from Mann-Kendall and linear regression methods of statistical trend analysis to evaluate concentration trends for the COC designated for each applicable groundwater sampling location (wells and springs) in each MAROS analytical group. Both trend analysis methods require at least four sampling results for each applicable COC for each sampling location (BWXT 2005).

For each priority COC at each location, the statistical trend analyses addressed the “Recent” trend determined from sampling results obtained between January 1996 and December 2007 and the “Overall” trend determined from sampling results obtained between January 1986 and December 2007. Results of the Recent and Overall trends for each COC were interpreted using the same nomenclature previously described for the MAROS moment trend analyses.

2.6 WELL SUFFICIENCY/REDUNDANCY EVALUATION

The MAROS well sufficiency analysis module is intended to identify/recommend locations for new wells in areas where additional plume information is needed because of high uncertainty in groundwater concentrations between existing wells (BWXT 2005). To evaluate well sufficiency, Delaunay triangulation is performed to determine if plume concentrations at each existing well can be predicted from concentrations at its nearest neighbors. Also, the Delaunay method results are derived solely from the two-dimensional spatial configuration of the existing well network and the spatial pattern of the contaminant plume. Therefore, the well sufficiency analysis does not assess potential new well locations needed outside the existing well network (BWXT 2005).

The MAROS well redundancy analysis module is intended to identify existing wells that are redundant within the current well network and can be removed from routine monitoring with minimal impact on the long-term characterization of a contaminant plume (BWXT 2005). To evaluate well redundancy, MAROS uses the Delaunay triangulation to calculate the network area and the average concentration of the plume using data from multiple contaminants and sampling locations. The relative significance of each well within the network is indicated by a slope factor calculated for each well, with the calculated slope factor used to evaluate if excluding data for the well(s) will significantly change the calculated average plume concentration.

2.7 SAMPLING FREQUENCY EVALUATION

The MAROS software uses the Modified Cost Effective Sampling (MCES) method to evaluate the optimum sampling frequency for each groundwater sampling location in each MAROS analysis group based on the magnitude, direction, and uncertainty of COC concentration trends from recent and historical analytical data. The MCES method combines quantitative and qualitative evaluations to estimate the lowest-frequency sampling schedule (quarterly, semiannual, annual, biennial, or other) for a given sampling location that will still provide needed information for regulatory and remedial decision-making. Quantitatively, the trend and rate of change are determined by Mann-Kendall and linear regression trend analyses and are used to generate a preliminary sampling frequency recommendation for each sampling location. Qualitative review of the preliminary recommendation, based on considerations such as the

regulatory requirements or proximity to key monitoring areas, is then performed to designate the final sampling frequency recommendation.

The MCES method requires data from at least four sampling events to evaluate a sampling frequency, and automatically assigns a default sampling frequency (quarterly) to each sampling location with fewer sampling events.

Output for the MCES analysis of the data for each sampling location was considered the “Preliminary” recommended sampling frequency subsequently evaluated in consideration of other factors, including professional judgment, to determine the “Final” recommended sampling frequency. Additionally, for each applicable well and natural spring associated with the following regulatory-driven groundwater monitoring programs, the “Final” recommended sampling frequency was designated as “Regulated” for the purposes of the Y-12 GWPP.

- Post-closure detection and post-closure corrective action groundwater monitoring at hazardous waste treatment, storage, and disposal units addressed under the respective Resource Conservation and Recovery Act (RCRA) post-closure permit (PCP) for the Bear Creek Regime, East Fork Regime, and Chestnut Ridge Regime;
- Baseline monitoring and remedial action effectiveness monitoring in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) record of decision (ROD) and/or related decision documents for applicable sites in each hydrogeologic regime at Y-12;
- Detection monitoring at the Environmental Management Waste Management Facility (EMWMF), an operating hazardous waste landfill in Bear Creek Valley (BCV) west of Y-12 that receives wastes generated from CERCLA remedial actions on the DOE Oak Ridge Reservation (ORR); and
- Detection monitoring at operating and closed non-hazardous waste landfills on Chestnut Ridge south of Y-12 in accordance with the solid waste disposal facility (SWDF) permit issued by the TDEC and the requirements of the TDEC regulations governing operation, closure, and post-closure care of SWDFs.

3.0 SUPPLEMENTAL MAROS ASSESSMENT RESULTS

This section presents the results of the supplemental MAROS assessment of the Y-12 GWPP, with separate subsections for each MAROS analysis group identified in Section 2.1. Each subsection generally follows a standardized format that includes brief discussions (and applicable data summary tables) of the MAROS output/findings regarding the sampling locations, COC assessment, moment analyses, statistical trend analyses, well sufficiency analyses, and sampling frequency evaluation.

3.1 WEST S-3 AREA

The MAROS analysis group for the West S-3 Area includes groundwater sampling locations BCV near the western end of Y-12, most of which are located near the former S-3 Ponds (Figure A.2), a closed

former hazardous waste surface impoundment that is a principal source of groundwater contamination at Y-12.

Sampling Locations

There are 26 groundwater sampling locations included in the MAROS analysis group for the West S-3 Area (Table B.1): 14 wells completed in the low permeability fractured non-carbonate bedrock (Nolichucky Shale) that underlies the former S-3 Ponds, 11 exit-pathway wells completed in the Maynardville Limestone near the Rust Spoil Area and Spoil Area I, and a natural spring (SS-1) that discharges into Bear Creek approximately 1500 ft west-southwest of the S-3 Ponds (Figure A.2). Twenty-one of the 26 locations were sampled between 2005 and 2007. Several of the wells yield some of the most highly contaminated groundwater in BCV west of Y-12. The baseline MAROS assessment of the Y-12 GWPP included each of these wells and spring SS-1 in the MAROS analysis group for the West S-3 Area (BWXT 2005).

COC Assessment

On the basis of the supplemental MAROS assessment output (see *MAROS COC Assessment* report in Appendix C.1), gross beta activity, nitrate, TCE, PCE, and uranium are designated as a principal COC for at least one of the groundwater sampling locations in the West S-3 Area MAROS analysis group. The results are identical to those of the baseline report. Nitrate exceeded screening levels by the highest margin area-wide and was present above screening levels at the greatest number of sampling locations. The COCs listed above were also found to be priority COCs for at least one of the individual groundwater sampling locations included in the MAROS analysis group for the West S-3 Area.

Moment Analysis

The MAROS moment analyses based on the data for the groundwater sampling locations included in the MAROS analysis group for the West S-3 Area focused on analytical results for gross beta activity, nitrate, PCE, TCE, and uranium (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.1). Also, as described in Section 2.4, moment analyses for each COC were performed using one dataset that included analytical results for all the sampling locations included in the MAROS analysis group, and another dataset that excluded analytical results for a selected subset of these sampling locations.

Results of the MAROS moment analyses for each applicable COC and dataset, summarized below, show largely S trends or NT. Gross beta activity, shows D trends for total dissolved mass and distribution of mass perpendicular to groundwater flow (0th Moment and the 2nd Moment (Sigma YY) for the full dataset. Differences between the moment trends for each COC reflect a combination of various potential influences, including inherent analytical variability, the differential transport and anisotropic distribution in the groundwater, and substantial temporal (seasonal and episodic) concentration fluctuations. Similar trends also are indicated by results of the moment analyses performed under the baseline MAROS assessment of the Y-12 GWPP, which focused on sampling results for PCE and gross beta activity (BWXT 2005). These findings do not indicate significant changes in the estimated dissolved mass, relative mass, movement, and spread of the contaminant plumes that may warrant greater monitoring efforts (i.e., increased sampling locations and/or frequencies) for the West S-3 Area.

Summary of the supplemental MAROS moment trend analysis for the West S-3 Area

PRIORITY COC	MOMENT TREND ¹							
	0 th Moment (Plume Mass)		1 st Moment (Plume Center of Mass)		2 nd Moment (Plume Spread)			
					Sigma XX		Sigma YY	
	All	Select	All	Select	All	Select	All	Select
Gross beta activity	D	S	S	NT	S	NT	D	S
Nitrate	S	S	S	S	S	NT	S	S
PCE	S	S	NT	S	NT	S	NT	S
TCE	S	S	NT	S	NT	S	S	S
Uranium	NT	NT	S	S	NT	NT	S	S

Note:
1. Based on Mann-Kendall statistical trend analysis.
Relative direction of trend denoted by D = Decreasing; NT = No Trend (due to high variability of data); S = Stable

No I or PI trends were found for moments calculated for the West S-3 area. The majority of analyses indicate stable or variable no trend results for both the full network and the select (reduced) network. As shown in the preceding data summary, paired results of the separate moment datasets for each COC show the same trends most frequently for nitrate and uranium, the only COC with no disagreement between paired trends for the 0th Moment, 1st Moment, and 2nd Moments (Sigma XX and Sigma YY). The ‘select’ dataset, with a reduced number of wells, closely represents nitrate and uranium ‘plume’ trends for the full dataset. Conversely, there is less frequent agreement between the respective paired moment trends for TCE, PCE, and gross beta activity, the only COC for which none of the paired trends are the same. Additionally, the separate analyses of the 0th Moment show agreement between paired trends for each COC except gross beta activity, whereas the separate analytes of the 2nd Moments only show agreement for the paired trends for nitrate (Sigma YY) and uranium (Sigma XX and Sigma YY). These findings suggest that data for intermittently sampled individual or combinations of wells included in the full MAROS analysis group for the West S-3 Area may influence the moment trends for gross beta activity and VOCs, but do not appear to affect the moment trends for nitrate and uranium. Overall, the reduced ‘select’ network provides adequate data to evaluate the moment trends for the priority COCs in the West S-3 area.

Statistical Trend Analysis

Statistical trend analysis of data for the groundwater sampling locations included in the MAROS analysis group for the West S-3 Area focused on analytical results for gross alpha activity, gross beta activity, nitrate, PCE, and TCE (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.1). For most of the sampling locations, results of the overall statistical trend analyses (1986 – 2007) show a D, PD, or S concentration trend for the designated COC (Table B.1). Of the 21 wells evaluated for statistical trends, 11 locations show a strongly decreasing concentration trend.

The baseline MAROS assessment of the Y-12 GWPP included sufficient data to determine statistical trends (1996 – 2004) for only five sampling locations (wells GW-276, GW-311, GW-315, GW-829, and spring SS-1). The remaining wells in the network had insufficient recent data to determine a trend. The corresponding results of the statistical analyses also show a D, PD, or S concentration trend for each designated COC (BWXT 2005).

Results of the supplemental MAROS statistical analyses for the overall trends (1986 – 2007) show increasing or probably increasing trends for the priority COC in wells GW-246 (gross beta activity), GW-526 (nitrate), and GW-615 (nitrate). Recent trends (1996 – 2007) for each well are S, S, and NT

respectively. Each well yields contaminated groundwater from the low permeability fractured non-carbonate bedrock (Nolichucky Shale) that underlies the former S-3 Ponds. The increasing overall trend for gross beta activity in well GW-246, which is located adjacent to the former S-3 Ponds (Figure A.2), may be an artifact of slightly lower concentrations found in 1987 and data variability associated with analytical interferences from the high levels of dissolved solids in the acidic groundwater from the well. Increasing overall concentrations of nitrate in the groundwater from wells GW-526 and GW-615 similarly result from slightly lower concentrations found in 1988 – 1989. Recent data indicate more stable trends for each of these wells.

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency for the West S-3 Area MAROS analysis group do not indicate areas of high uncertainty in the concentrations of each COC in the groundwater that warrant the installation of additional wells. The baseline MAROS assessment of the Y-12 GWPP noted some areas of uncertainty in the concentrations of PCE defined by available data for wells near the former S-3 Ponds, and recommended continued routine sampling of specific wells (GW-243, GW-276, and GW-315) to track PCE concentrations (BWXT 2005).

Results of the supplemental MAROS assessment (Appendix D.1) recommend discontinued sampling (i.e., “Elimination”) of the following active wells in the MAROS analysis group for the West S-3 Area that are considered to provide redundant local monitoring coverage in areas with low uncertainty regarding the spatial distribution and concentrations of each applicable COC in the groundwater. Future collection of groundwater samples from these wells will be discontinued if the wells are granted “Inactive” status, as defined and specified in the most current version of the Y-12 GWPP MOP (BWXT 2006).

Summary of supplemental MAROS well sufficiency and well redundancy analysis for the West S-3 Area

WELL NUMBER	BASIS FOR MAROS “ELIMINATION” RECOMMENDATION
GW-122	Overall decreasing trend, redundant with well GW-616.
GW-236	Decreasing COC concentration trend, redundant with spring SS-1.
GW-277	Stable to decreasing trends, redundant with well GW-276.
GW-313	Redundant with well GW-315.

Results of the supplemental MAROS assessment of the sampling locations included in the MAROS analysis group for the West S-3 Area also recommend “Elimination” of wells GW-127, GW-244, GW-245, GW-247, and GW-615 (Appendix D.1). However, these wells are designated as POC wells for RCRA post-closure corrective action monitoring at the former S-3 Ponds and, as noted in Section 2.7, MAROS-based sampling frequency recommendations are not applicable to these wells.

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment of the groundwater sampling frequency appropriate for the sampling locations included in the MAROS analysis group for the West S-3 Area (Appendix D.1), annual sampling is recommended for the 11 sampling locations (10 wells and spring SS-1) that either do not have a regulatory-driven sampling frequency and were not recommended for discontinued sampling (“Elimination”) per the preceding discussion.

3.2 OIL LANDFARM WMA

Located in BCV approximately one mile west of Y-12 (Figure A.2), the Oil Landfarm WMA includes the Oil Landfarm hazardous waste disposal unit (HWDU), the Boneyard/Burnyard (BYBY), the Hazardous Chemical Disposal Area, and Sanitary Landfill I (Figure A.5). Each site is a known or suspected source of groundwater contamination, and the BYBY was the target of CERCLA remedial action, completed in October 2003, that involved the excavation and removal of uranium-related wastes.

Sampling Locations

There are 32 monitoring wells included in the MAROS analysis group for the Oil Landfarm WMA (Table B.2): 17 wells completed in the low permeability bedrock formations that underlie the Oil Landfarm WMA and the EMWMF, and 15 exit-pathway monitoring wells completed in the Maynardville Limestone south and southwest of the Oil Landfarm HWDU (Figure A.2). Of the 32 wells in the analysis group, 29 had new data collected between 2005 and 2007. The baseline MAROS assessment of the Y-12 GWPP also included these wells in the MAROS analysis group for the Oil Landfarm WMA (BWXT 2005).

COC Assessment

On the basis of the supplemental MAROS output for the COC assessment (see *MAROS COC Assessment* report in Appendix C.2), nitrate, TCE, and VC each are designated as a principal COC for one or more of the groundwater sampling locations included in the MAROS analysis group for the Oil Landfarm WMA. These results mirror the findings of the baseline MAROS assessment (BWXT 2005).

Moment Analysis

The MAROS moment analyses based on the data for the groundwater sampling locations included in the MAROS analysis group for the Oil Landfarm WMA focused on analytical results for gross alpha activity, nitrate, PCE, TCE, and VC (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.2). Also, as described in Section 2.4, moment analyses for each COC were performed using one dataset that included analytical results for all the sampling locations included in the MAROS analysis group, and another dataset that excluded analytical results for a selected subset of these sampling locations.

As shown in the following summary, a combination of S trends and NT due to data variability dominate the MAROS moment trends for each COC, with an I trend evident for gross alpha activity (1st Moment) and D trends evident for TCE (0th Moment) and gross alpha activity (2nd Moment, Sigma YY). Similar moment trends were evident from the baseline MAROS assessment, which focused on the data for nitrate, PCE, and VC (BWXT 2005). These findings generally do not indicate widespread changes in the relative mass, movement, and spread of the dissolved VOCs released to the groundwater from sources associated with the Oil Landfarm WMA.

Summary of the MAROS moment trend analysis for the Oil Landfarm WMA

COC	MOMENT TREND ¹							
	0 th Moment (Plume Mass)		1 st Moment (Plume Center of Mass)		2 nd Moment (Plume Spread)			
					Sigma XX		Sigma YY	
	All	Select	All	Select	All	Select	All	Select
Gross alpha activity	NT	NT	I	NT	S	NT	S	D
Nitrate	S	S	S	S	NT	NT	S	S
PCE	NT	NT	S	S	S	S	S	S
TCE	S	D	NT	NT	NT	NT	NT	NT
VC	NT	NT	NT	NT	NT	NT	NT	NT

Note:
1. Based on Mann-Kendall statistical trend analysis.
Relative direction of trend denoted by D = Decreasing; I = Increasing; NT = No Trend (due to high variability of data); S = Stable

Based on the area-wide COC Assessment, TCE is the priority constituent for the Oil Landfarm WMA analysis group. Moment results for TCE indicate NT for first and second moments for both the full and select datasets. The 0th Moments for TCE indicate a stable trend for the full dataset and a decreasing trend for the select well network. The stable trend results from a low confidence factor testing for the decreasing trend. The select network estimates higher average mass in the plume, but a decreasing trend. The select dataset removed well GW-226, a location with relatively high but stable TCE concentration trends.

Moment trends for nitrate indicate a stable plume, and the select network represents the full network accurately. Results for vinyl chloride show variability in data, most likely because only 6 of the sampling locations have detectable concentrations of the COC. The MAROS moment analysis of the gross alpha activity results for all of the wells included in the MAROS analysis group for the Oil Landfarm WMA shows an I trend for the 1st Moment, which potentially indicates an increase in the distance between the source and the center of mass of the COC (BWXT 2005). Uranium isotopes in the groundwater are the source of the gross alpha activity, and uranium-bearing wastes buried at the former BYBY at the Oil Landfarm WMA were a principal source of uranium isotopes in the groundwater and surface water in BCV (DOE 1997). Following excavation and removal of the wastes as part of a CERCLA remedial action completed in March 2003, the center of mass of uranium isotopes released to the groundwater system may now be located at some point downgradient (south-southwest) of the former BYBY, which may be why the data for gross alpha activity show an increasing trend for the 1st Moment.

As shown in the preceding data summary, separate moment analyses for nitrate, PCE, and VC show no disagreement between paired trends for the 0th Moment, 1st Moment, and 2nd Moments (Sigma XX and Sigma YY), whereas paired moment trends for gross alpha activity show the most frequent disagreement. These findings suggest that data for individual or combinations of wells included in the MAROS analysis group for the Oil Landfarm WMA do not appear to disproportionately influence the moment trends for each COC except possibly gross alpha activity.

Statistical Trend Analysis

Statistical trend analysis of the groundwater sampling data for the wells included in the MAROS analysis group for the Oil Landfarm WMA focused on analytical results for nitrate, PCE, TCE, VC, and uranium (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.2). For most of the wells, the results of the MAROS statistical trend analyses show a D trend, PD trend, or no trend because of data variability for the applicable COC (Table B.2).

An I or PI trend is evident for the COC concentrations in several wells, including well GW-008 (PCE, both recent and overall trend), which is a RCRA POC well that yields VOC-contaminated groundwater from the low-permeability fractured non-carbonate bedrock (Nolichucky Shale) underlying the Oil Landfarm HWDU, and exit-pathway wells GW-225 (TCE, recent), GW-226 (TCE, overall), GW-229 (VC, overall), and GW-365 (VC, overall), each of which yield VOC-contaminated groundwater from the Maynardville Limestone south and southwest of the Oil Landfarm WMA (Figure A.2). Results of the statistical trend analyses performed under the baseline MAROS assessment of the Y-12 GWPP likewise show I trends for the COC concentrations in wells GW-008, GW-225, and GW-226 (BWXT 2005). Increasing concentration trends each of these wells except GW-226 potentially reflect corresponding increases in the relative flux of contaminants (VOCs) via the groundwater flowpaths intercepted by the monitored interval in each well; however, the increasing trend for well GW-226 is probably an artifact of the change in groundwater sampling method (B&W Y-12 2008). Increasing trends for vinyl chloride may indicate anaerobic biodegradation of parent TCE and PCE.

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment for well sufficiency for the Oil Landfarm WMA MAROS analysis group do not indicate areas where installation of new wells may be warranted to address high uncertainty regarding the spatial distribution and concentration of each applicable COC in the groundwater. The baseline MAROS assessment reported similar findings, noting some uncertainty in the concentrations of nitrate in area between wells exit-pathways wells GW-225 and GW-795, and did not recommend installation of new wells (BWXT 2005).

Results of the supplemental MAROS assessment recommend discontinued sampling (i.e., “Elimination”) of six monitoring wells in the MAROS analysis group for the Oil Landfarm WMA that are considered to provide redundant local monitoring coverage in areas with low uncertainty regarding COC distribution and concentrations in the groundwater (Appendix D.1). All of these wells (GW-226, GW-227, GW-368, GW-369, GW-736, and GW-739) are in the Maynardville Limestone south of the site (Figure A.2). As noted previously, discontinued sampling under the Y-12 GWPP requires these wells to be granted “Inactive” status in accordance with the most current version of the Y-12 GWPP MOP, unless the wells are used for hydrologic monitoring.

Summary of MAROS well sufficiency and well redundancy analysis for the Oil Landfarm WMA

WELL NUMBER	BASIS FOR MAROS “ELIMINATION” RECOMMENDATION
GW-226	Redundant with GW-225.
GW-227	Long-term decreasing trend confirmed, recent reduction in sampling frequency.
GW-368	Redundant with GW-601; decreasing long-term trend for TCE.
GW-369	Redundant with GW-601; decreasing trend long-term for TCE.
GW-736	Redundant with GW-725; decreasing concentrations of nitrate and TCE.
GW-739	Redundant with GW-740; very stable to decreasing COC concentration trends; low rate of change supports elimination from routine monitoring.

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment of the groundwater sampling frequency appropriate for the wells included in the MAROS analysis group for the Oil Landfarm WMA, annual sampling is recommended for most of the wells that do not currently have a regulatory-driven sampling

frequency (Appendix D.1). Semiannual sampling is recommended for two wells (GW-225 and GW-601) that yield VOC-contaminated groundwater from the Maynardville Limestone south (down dip) of the Oil Landfarm WMA (Figure A.2).

3.3 BEAR CREEK BURIAL GROUNDS WMA

The BCBG WMA is in BCV approximately two miles west of Y-12 (Figure A.2) and encompasses several closed waste disposal sites (Figure A.5) designated as Burial Grounds (BG)-A North, BG-A South, BG-B, BG-C East, BG-C West, BG-D, BG-E, and BG-J; the Walk-In Pits; the Uranium Vaults; and the Oil Retention Ponds (No. 1 and No. 2), which were constructed to collect oils seeping from disposal trenches in BG-A South and BG-A North, respectively. These sites generally consist of shallow (i.e., <25 ft bgs) trenches that a diverse mixture of solid wastes (1955 to 1993) and liquid wastes (1959 to 1979) generated at Y-12, including unknown volumes of waste mop water, all or most of which may have contained varying amounts of radiological contamination.

Sampling Locations

There are 41 groundwater sampling locations included in the MAROS analysis group for the BCBG WMA (Table B.3): 24 wells completed in the low permeability fractured non-carbonate bedrock underlying the various components of the WMA (e.g., BG-A South), 11 exit-pathway monitoring wells completed in the Maynardville Limestone south (hydraulically downgradient) of the WMA, and six springs that discharge into Bear Creek upstream (east) and downstream (west) of the site (Figure A.2). The baseline MAROS assessment of the Y-12 GWPP also included each of these wells and springs in the MAROS analysis group for the BCBG WMA (BWXT 2005), and all but two of these locations have new monitoring data collected 2005 – 2007.

COC Assessment

On the basis of the MAROS output for the COC assessment (see *MAROS COC Assessment* report in Appendix C.3), benzene, PCE, TCE, 11DCE, and VC are designated as a principal COC for one or more of the groundwater sampling locations included in the MAROS analysis group for the BCBG WMA.

Moment Analysis

Moment analyses based on data for the groundwater sampling locations included in the MAROS analysis group for the BCBG WMA focused on the analytical results for gross alpha activity, PCE, TCE, and VC (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.3). Also, as described in Section 2.4, moment analyses for each COC were performed using one dataset that included analytical results for all the sampling locations included in the MAROS analysis group, and another dataset that excluded analytical results for a selected subset of these sampling locations.

As shown in the following summary, results of the MAROS moment analyses show primarily S or D moment trends for each COC. These findings are consistent with results of the moment analyses from the baseline MAROS assessment, which focused on sampling data for gross beta activity and PCE and likewise show primarily S or D moment trends for each COC (BWXT 2005). Together, moment analyses from the baseline and supplemental MAROS assessments indicate generally stable or decreasing mass,

movement, and spread of the intermingled plume of contaminants in the (shallow) groundwater at the BCBG WMA.

Summary of the MAROS moment trend analysis for the BCBG WMA

COC	MOMENT TREND ¹							
	0 th Moment (Plume Mass)		1 st Moment (Plume Center of Mass)		2 nd Moment (Plume Spread)			
					Sigma XX		Sigma YY	
	All	Select	All	Select	All	Select	All	Select
Gross alpha activity	D	S	D	S	PD	S	D	S
PCE	I	NT	D	NT	D	S	D	S
TCE	PI	S	D	S	D	S	D	S
VC	NT	S	D	S	D	S	S	S
Note:								
1. Based on Mann-Kendall statistical trend analysis.								
Relative direction of trend denoted by D = Decreasing; I = Increasing; NT = No Trend; PD = Probably Decreasing;								
PI = Probably Increasing; S = Stable								

As shown in the preceding summary, there is only one instance of agreement (the S trends for VC, 2nd Moment, Sigma YY) between the moment trends determined from data for all the sampling locations and the corresponding moment trends determined after excluding data for a selected subset of sampling locations. The full dataset generally provides a strong indication of overall decreasing dissolved mass, center of mass and distribution of mass around the center (dilution at the edges of the plumes). This suggests that data for individual or combinations of sampling locations included in the MAROS analysis group for the BCBG WMA disproportionately influence the moment trends for each COC. The select network may provide a more conservative interpretation of plume trends in the BCBG WMA.

As shown in the preceding summary, the 0th Moment (total dissolved mass) for PCE and TCE (based on data for all sampling locations) exhibit I and PI trends, respectively. These moment trends may be indicative of an increase in dissolved mass of PCE and TCE that may have occurred in response to a possible re-mobilization or increased release of a mixture of PCE and TCE from the dense non-aqueous phase liquids (DNAPL) encountered more than 250 ft bgs in a borehole drilled for a well (GW-628) in the low permeability non-carbonate bedrock (Nolichucky Shale) on the south side of BG-A South (Haase and King 1990).

Statistical Trend Analysis

Statistical trend analysis of the data for the groundwater sampling locations included in the MAROS analysis group for the BCBG WMA focused on analytical results for benzene, gross alpha activity, gross beta activity, nitrate, PCE, TCE, uranium, VC, and 11DCE (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.3). Results of these analyses show a D trend, PD trend, or NT due to data variability for the applicable COC concentrations in most of the sampling locations (Table B.3), with I trends evident for the COC concentrations in wells GW-071 (benzene, PCE, and 11DCE), GW-289 (PCE and TCE), GW-626 (11DCE and VC), GW-627 (PCE, TCE, 11DCE, and VC), and GW-629 (TCE). These wells are located hydraulically downgradient (either down-dip or along strike) of BG-A South (Figure A.2), and the increasing concentration trends for each COC suggest a corresponding change in the relative flux of dissolved VOCs via the groundwater flowpaths intercepted by the monitored interval in each well. The increased flux of VOCs may be related to the disturbance and potential re-mobilization of the DNAPL noted above.

Well Sufficiency/Redundancy Evaluation

Results of the MAROS well sufficiency analysis for the sampling locations included in the MAROS analysis group for the BCBG WMA indicate an area near BG-A South as having high uncertainty for VOC concentrations (including increasing concentration trends). Although no new wells are recommended for the area, the results of the well sufficiency analysis highlight the need to monitor the source areas carefully. The baseline MAROS assessment reported similar findings (BWXT 2005).

Results of the supplemental MAROS assessment recommend discontinued sampling (i.e., “Elimination”) of the following wells (excluding alternate RCRA monitoring wells) in the MAROS analysis group for the BCBG WMA that are considered to provide redundant local monitoring coverage in areas with low uncertainty regarding the spatial distribution and concentrations of each COC in the groundwater (Appendix D.1). Most of these wells (GW-052, GW-072, GW-089, GW-624, and GW-626) yield groundwater from various depths in the low-permeability fractured non-carbonate bedrock underlying the BCBG WMA, and one well (GW-694) is an exit-pathway well in the Maynardville Limestone approximately 1000 ft southeast (hydraulically upgradient) of the BCBG WMA (Figure A.2).

Summary of MAROS well sufficiency and well redundancy analysis for the BCBG WMA

WELL NUMBER	BASIS FOR MAROS “ELIMINATION” RECOMMENDATION
GW-052	Very few COC detections, decreasing trend for gross alpha activity.
GW-072	Very few COC detections; redundant with well GW-071.
GW-089	Redundant with well GW-242.
GW-624	Redundant with GW-629.
GW-626	Redundant with GW-627.
GW-694	Low COC concentrations and decreasing trends; redundant with wells GW-704 and GW-695.

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment of the appropriate sampling frequency for each groundwater sampling location included in the MAROS analysis group for the BCBG WMA that do not have a regulatory-driven sampling frequency, final frequency recommendations include annual, semiannual, and biennial monitoring (Appendix D.1). Annual sampling is recommended for two springs (SS-4 and SS-5) and four wells (GW-082, GW-242, GW-289, and GW-703). Three of the wells are in low permeability fractured non-carbonate bedrock along the western (GW-289 and GW-02) or northern (GW-242) boundary of the BCBG WMA, and well GW-703 is completed in the Maynardville Limestone southeast of the site (Figure A.2)

Semiannual sampling is recommended for six wells (GW-014, GW-068, GW-071, GW-627, GW-629, and GW-653), most of which are located along the southern boundary of the BCBG WMA (Figure A.2) and yield VOC-contaminated groundwater distinguished by a the mixture of petroleum hydrocarbons (primarily benzene) and PCE and its degradation products (TCE, VC, and c12DCE). These wells generally monitor the DNAPL encountered on the south side of BG-A South (see *Moment Analysis*).

Biennial sampling is recommended for wells GW-053 and GW-058, which yield groundwater from shallow depths in the Maynardville Limestone approximately 500 to 800 ft south of the BCBG WMA (Figure A.2). Groundwater from well GW-053 contains a mixture of VOCs dominated by PCE degradation products (c12DCE and VC), with summed concentrations below 50 µg/L and exhibiting a

decreasing long-term trend, whereas the groundwater from well GW-058 contains elevated uranium concentrations and gross alpha activity that exhibit stable long-term trends (B&W Y-12 2008).

3.4 EAST S-3 AREA

The MAROS analysis group for the East S-3 Area encompasses sampling locations in the East Fork Regime within the westernmost section of Y-12 near several known and suspected sources of groundwater contamination, including the former S-3 Ponds, the S-2 Site, Beta-4 Security Pits (B4), Rust Garage Area (RG), Fire Training Facility (FTF), Y-12 Salvage Yard (SY), Waste Coolant Processing Facility (WCPA).

Sampling Locations

There are 29 monitoring wells included in the MAROS analysis group for the East S-3 Area (Table B.4). Most (27) of the wells yield groundwater from low-permeability fractured non-carbonate bedrock in the vicinity of the former S-3 Ponds, B4, RG, SY, WCPA, and at several of the Y-12 Comprehensive Monitoring Plan grid coordinates (Y-12 Grid) in the west-central section of Y-12 (Figure A.2). Wells at the S-2 Site, FTF, and downgradient (east) exit pathway wells yield groundwater from the Maynardville Limestone near the former headwaters channel of Upper East Fork Poplar Creek (UEFPC), which was extensively reworked (filled) and replaced with a subsurface drainage network to accommodate construction of Y-12. The baseline MAROS assessment of the Y-12 GWPP included all but two of these wells (55-2A and GW-622) in the MAROS analysis group for East S-3 Area (BWXT 2005).

COC Assessment

On the basis of the MAROS output for the COC assessment (see *MAROS COC Assessment* report in Appendix C.4), cadmium, gross alpha activity, nitrate, PCE, and TCE are designated as a principal COC for one or more of the groundwater sampling locations included in the MAROS analysis group for the East S-3 Area. Of the COCs listed, nitrate is present at the highest levels above the screening level area-wide, and PCE is the most widely distributed with 17 monitoring locations affected above screening levels.

Moment Analysis

Moment analyses based on data for the wells included in the MAROS analysis group for the East S-3 Area focused on analytical results for cadmium, gross beta activity, nitrate, PCE, and TCE (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.4). Also, as described in Section 2.4, separate moment analyses for each COC were performed using one dataset that included analytical results for all the wells included in the MAROS analysis group, and another dataset that excluded analytical results for a selected subset of these wells.

As shown in the following summary, results of the moment analyses for each COC generally show S trends, D trends, and NT due to variability of the data. Similar results were obtained from the baseline MAROS assessment, which focused on moment trends for nitrate and PCE (BWXT 2005). These findings do not indicate changes in the relative mass, movement, and spread of the groundwater

contaminant plumes that may warrant greater monitoring efforts (i.e., increased sampling locations and/or frequencies) in the East S-3 Area.

Summary of the MAROS moment trend analysis for the East S-3 Area

COC	MOMENT TREND ¹							
	0 th Moment (Plume Mass)		1 st Moment (Plume Center of Mass)		2 nd Moment (Plume Spread)			
					Sigma XX		Sigma YY	
	All	Select	All	Select	All	Select	All	Select
Cadmium	NT	NT	S	S	NT	NT	S	S
Gross beta activity	NT	NT	PD	S	S	D	D	D
Nitrate	NT	NT	D	PD	PD	S	NT	S
PCE	NT	PI	D	D	NT	NT	S	S
TCE	S	S	NT	NT	S	S	PD	S

Note:
1. Based on Mann-Kendall statistical trend analysis.
Relative direction of trend denoted by D = Decreasing; PD = Potentially Decreasing; PI = Potentially Increasing; NT = No Trend;
S = Stable

Note that D, PD, and S trends dominate the 1st and 2nd Moment trends for two primary components of the groundwater contaminant plume originating from the former S-3 Ponds: nitrate and gross beta activity, which is primarily from a beta particle-emitting radionuclide, technetium-99 (Tc-99), that is considered the “signature” contaminant from the S-3 Ponds (DOE 1997). Nitrate and Tc-99 share similar transport characteristics in the groundwater and these moment trends suggest continuing reductions in the relative movement and spread in the (shallow) groundwater flow system east of the site.

As shown in the preceding data summary, there are no differences between most of the paired moment trends for each COC except nitrate. Moments calculated using the select monitoring network for nitrate provides a similar, but not identical picture of plume stability. The select network indicates a probably decreasing center of mass rather than a strongly decreasing one and indicates that the distribution of mass about the center is stable. These findings suggest that data for individual or combinations of wells included in the MAROS analysis group for the East S-3 Area do not appear to disproportionately influence the moment trends for each COC.

Statistical Trend Analysis

Statistical trend analysis of the groundwater sampling data for the wells included in the MAROS analysis group for the East S-3 Area focused on analytical results for benzene, cadmium, gross alpha activity, gross beta activity, nitrate, PCE, TCE, c12DCE, 11DCE, and VC (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.4). Results of these statistical trend analyses show a stable trend, no trend, and D or PD trends for the COC concentrations in most of the wells (Table B.4).

The MAROS statistical trend analyses show I or PI trends for the applicable COC in several wells (Table B.4), notably GW-274 (PCE, recent and overall trends), GW-275 (nitrate, recent), and GW-633 (benzene recent and overall trends). Each of these wells is completed at a relatively shallow depth in unconsolidated materials (GW-274 and GW-633) or low-permeability fractured non-carbonate bedrock (GW-275) and yields highly contaminated groundwater impacted by the contaminant plume originating from the former S-3 Ponds, which is the principal source of groundwater contamination in the East S-3 Area. Nitrate concentrations at GW-274, in the shallow zone are decreasing, while nitrate concentrations are increasing at the deeper adjacent well GW-275 and at 55-2B and C. The moment results for center of

mass indicate an overall decreasing nitrate trend (lower relative concentrations in tail of plume), but specific locations within the fractured bedrock appear to monitor increasing concentrations. Increasing nitrate concentrations may be following the geologic strike of the bedding while concentrations are decreasing at shallow and off-strike locations.

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency based on data for the wells included in the MAROS analysis group for the East S-3 Area indicate some areas of uncertainty regarding COC concentrations in the groundwater, but installation of new wells is not recommended. These findings mirror those of the baseline MAROS assessment (BWXT 2005).

Results of the supplemental MAROS assessment recommend discontinued sampling (i.e., “Elimination”) of the following wells in the MAROS analysis group for the East S-3 Area that are considered to provide redundant local monitoring coverage in areas with low uncertainty regarding the spatial distribution and concentrations of each COC in the groundwater (Appendix D.2). Three of the wells yield contaminated groundwater from shallow depths (<50 ft bgs) in areas underlain by low-permeability fractured non-carbonate bedrock (Nolichucky Shale) east of the former S-3 Ponds (GW-105), near the SY (GW-270 and GW-273), and the WCPA (GW-336), and one well (GW-617) is part of a clustered pair of exit-pathway wells in the Maynardville Limestone approximately 800 ft northeast of the S-2 Site (Figure A.3).

Summary of MAROS well sufficiency and well redundancy analysis for the East S-3 Area

WELL NUMBER	BASIS FOR MAROS “ELIMINATION” RECOMMENDATION
GW-105	Redundant with well GW-106.
GW-270	Redundant with well GW-505.
GW-273	Redundant with well GW-633; recent ND results for major COCs.
GW-336	Redundant with wells GW-332 and GW-337.
GW-617	Redundant with (clustered) well GW-618.

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment of the appropriate sampling frequency for each groundwater sampling location included in the MAROS analysis group for the East S-3 Area that do not have a regulatory-driven sampling frequency (Appendix D.2), annual sampling is recommended for most (10) of the wells.

Biennial sampling is recommended for five wells: three wells (GW-106, GW-109, and GW-505) that yield contaminated groundwater from the low permeability fractured non-carbonate bedrock east of the former S-3 Ponds in the vicinity of the RG, one well (55-2A) located farther east, and one well (GW-619) in Maynardville Limestone to the south (Figure A.3).

Sampling once every 5 years is recommended for wells near the B4 (GW-192), the northern portion of the SY (GW-265 and GW-269), and approximately 600 ft northeast of the WCPA (55-1A) (Figure A.3). Each well yields moderately contaminated groundwater, with results of the MAROS statistical trend analyses indicating S trends for the applicable COC in wells 55-1A (nitrate) and GW-265 (PCE), a D trend for the COC in well GW-269 (11DCE), and NT (due to data variability) for TCE in well GW-192 (Appendix D.2).

3.5 CENTRAL Y-12 AREA

The MAROS analysis group for the Central Y-12 Area encompasses the primary operations and process facilities that occupy the central section of Y-12 and several known or suspected sources of groundwater contamination, including Bldg. 8110, Bldg. 9201-2, the Coal Pile Trench, and Eastern S-3 Site Plume, which is the eastern extent of the contaminant plume originating from the former S-3 Ponds. The FF MAROS analysis group was included in the Central Y-12 Area for the purpose of the supplemental report because the number of locations with detected concentrations in the FF group fell below 6, the minimum number of wells for the MAROS analysis.

Sampling Locations

The MAROS analysis group for the Central Y-12 Area includes one surface water sampling location (UEFPC-SP17) in the exposed channel of UEFPC and 47 monitoring wells (Table B.5). Most of the wells, including two wells (GW-954 and GW-956) equipped with BarCad samplers that provide samples from multiple discrete depth intervals, yield groundwater from the low-permeability fractured non-carbonate bedrock at several Y-12 Grid locations and at various other general (non-grid) locations within the Central Y-12 Area north of UEFPC. Two exit-pathway wells (GW-605 and GW-606) yield groundwater from the Maynardville Limestone north of the main channel of UEFPC approximately 1,300 ft west (upstream) of New Hope Pond (Figure A.3). Also, seven wells at the FF were included in the Central Y-12 analysis group.

Groundwater sampling results for many of the wells in the MAROS analysis group for the Central Y-12 Area, including several of the Y-12 Grid wells (56-6A, GW-762, GW-763, GW-775, and GW-776), were not included in the MAROS analysis group for the Central Y-12 Area that was evaluated under the baseline MAROS assessment of the Y-12 GWPP (BWXT 2005). Additionally, as noted in Section 2.1, the MAROS analysis group for the Central Y-12 Area includes wells at the FF that the baseline MAROS assessment addressed in a separate MAROS analysis group. Thus, the supplemental MAROS assessment for this MAROS analysis group is more comprehensive than the baseline assessment.

COC Assessment

On the basis of the MAROS output for the COC assessment (see *MAROS COC Assessment* report in Appendix C.5), CTET, PCE, TCE, VC, and uranium are each designated as a principal COC for the Central Y-12 Area. The primary COC for the Central Y-12 analysis group is PCE, based on results above screening levels and number of affected wells in the network. Of the 53 locations analyzed for the COC Assessment, only six locations had results that exceed screening levels for CTET, however, the exceedences at these locations are significant.

Moment Analysis

Moment analyses based on data for the groundwater sampling locations included in the MAROS analysis group for the Central Y-12 Area focused on analytical results for benzene, CTET, PCE, TCE, and uranium (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.5). Under the baseline MAROS assessment of the Y-12 GWPP, the Central Y-12 Area moment analyses were based on groundwater sampling data for PCE and uranium (BWXT 2005).

As shown in the following summary, a combination of moment trends are evident for PCE, TCE, and uranium, including I trends, D trends, S trends, and NT (due to data variability). Moment analysis for benzene was performed because this VOC occurs near the FF. However, of greater interest are the I or PI moment trends for CTET, which is a principal contaminant in the majority of wells that yield VOC-contaminated groundwater from the Maynardville Limestone in the vicinity of New Hope Pond. The CTET-dominated plume apparently originates from an unidentified source upgradient (west) of New Hope Pond and extends thousands of feet eastward in the Maynardville Limestone (parallel with geologic strike of bedding) into Union Valley east of the ORR boundary along Scarboro Road. An ongoing CERCLA remedial action that began full-time operation in October 2000 involves on-site treatment (air stripping) to remove dissolved VOCs from groundwater pumped from an extraction well (GW-845) located east of New Hope Pond (Figure A.3). Mobilization of the CTET induced by the long-term operation of the groundwater extraction well potentially accounts for the increasing and probably increasing moment trends determined for CTET.

Summary of the MAROS moment trend analysis for the Central Y-12 Area

COC	MOMENT TREND ¹			
	0 th Moment (Plume Mass)	1 st Moment (Plume Center of Mass)	2 nd Moment (Plume Spread)	
			Sigma XX	Sigma YY
Benzene	I	I	I	NT
CTET	I	I	I	PI
PCE	NT	S	I	NT
TCE	I	S	NT	D
Uranium	I	S	I	NT

Note:
1. Based on Mann-Kendall statistical trend analysis.
Relative direction of trend denoted by D = Decreasing; I = Increasing; PI = Potentially Increasing; NT = No Trend; S = Stable

Statistical Trend Analysis

Statistical trend analysis of data for the groundwater sampling locations included in the MAROS analysis group for the Central Y-12 Area focused on analytical results for benzene, CTET, PCE, TCE, c12DCE, 11DCE, VC, uranium, gross alpha activity, and gross beta activity (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.5). Results of the statistical trend analyses for the applicable COC in most of the sampling locations show D, PD, and S trends or NT due to data variability (Table B.5). Findings of the baseline MAROS assessment likewise show D, PD, and S trends for the COC in most of the sampling locations included in the MAROS analysis group for the Central Y-12 that had sufficient data for statistical trend analysis (BWXT 2005).

The MAROS statistical analysis show I or PI trends for the applicable COC in several wells included in the MAROS analysis group for the Central Y-12 Area (Table B.5), including wells GW-762 (PCE), GW-769 (CTET), and GW-770 (CTET), which yield groundwater from the low permeability fractured non-carbonate bedrock (Nolichucky Shale) at designated Y-12 Grid locations, and Maynardville Limestone wells GW-691 (PCE) at the Coal Pile Trench, GW-698 (TCE) at Bldg. 8110, and GW-605 (CTET) upgradient (west) of New Hope Pond (Figure A. 3). Increasing concentrations of CTET in wells GW-769 and GW-770 also were evident from the statistical trend analyses performed under the baseline MAROS assessment (BWXT 2005). Increasing concentrations of CTET in the groundwater from well GW-605 potentially reflects a corresponding increase in the eastward flux of CTET toward the extraction well for the groundwater remediation system noted above.

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency based on data for the wells included in the MAROS analysis group for the Central Y-12 Area indicate some areas of uncertainty regarding COC concentrations in the groundwater, but installation of new wells is not recommended. Concentration uncertainty can be explained by heterogeneities in the subsurface geology. Also, none of the wells provide redundant local monitoring coverage in areas having low uncertainty regarding the spatial distribution and concentrations of each COC in the groundwater. Similar findings were obtained from the baseline MAROS assessment (BWXT 2005).

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment of the sampling frequency appropriate for each well included in the MAROS analysis group for the Central Y-12 Area (Table B.5), annual sampling is recommended for most (22) of the wells (including both wells with BarCAD multiport sampling equipment) that do not have a regulatory-driven sampling frequency (Appendix D.2).

Semiannual sampling is recommended for a cluster of wells (55-3A, 55-3B, and 55-3C) that yield contaminated groundwater but have limited sampling histories, and for several wells (GW-691, GW-698, GW-769, and GW-770) that exhibit increasing COC concentration trends.

Biennial sampling is recommended for nine wells (56-6A, 60-1A, GW-204, GW-656, GW-765, GW-775, GW-776, GW-779, and GW-792) that exhibit stable concentration trends for the applicable COC or show no concentration trend because of the variability of the data for the COC.

3.6 EAST Y-12 AREA

The MAROS analysis group for the East Y-12 Area encompasses sampling locations within the easternmost sections of Y-12, primarily in the vicinity of New Hope Pond, a closed former surface impoundment used from 1963 to 1988 to regulate the quantity and quality of water exiting Y-12 via UEFPC, and in Union Valley east of the ORR boundary along Scarboro Road (Figure A.3).

Sampling Locations

There are a total of 27 sampling locations in the MAROS analysis group for the East Y-12 Area (Table B.6), including 25 wells and two natural springs that discharge into unnamed surface drainage features east-southeast of Y-12 (Figure A.3). All but three of the wells yield groundwater from various depths in the Maynardville Limestone; wells GW-744, GW-747, and GW-748 yield groundwater from Y-12 Grid locations underlain by the low permeability fractured non-carbonate bedrock west-northwest of New Hope Pond. All of these sampling locations were included in the East Y-12 Area MAROS analysis group evaluated under the baseline MAROS assessment of the Y-12 GWPP (BWXT 2005).

COC Assessment

On the basis of the MAROS output for the COC assessment (see *MAROS COC Assessment* report in Appendix C.6), CTET, PCE, TCE, and gross alpha activity are designated as a primary COC for one or

more of the sampling locations included in the MAROS analysis group for the East Y-12 Area. The priority COC for the East Y-12 Area analysis group is CTET, based on area-wide exceedence of screening levels, mobility in the subsurface (Kd) and the number of locations that exceed screening levels.

Moment Analysis

Moment analyses of data for the groundwater sampling locations included in the MAROS analysis group for the East Y-12 Area focused on analytical results for CTET, gross alpha activity, PCE, and TCE (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.6). As shown in the following summary, D or PD moment trends dominate for CTET, gross alpha activity, and gross beta activity (both from uranium isotopes and associated daughter products), whereas the moment trends for PCE show an S trend or NT due to data variability. Somewhat similar results were obtained from the moment analyses performed under the baseline MAROS assessment, which were based on data for CTET and showed a PI trend for 0th Moment, a D trend for the 1st Moment, and D and PD trends for the 2nd Moments (BWXT 2005). Results of the moment analyses from the baseline and supplemental MAROS assessments indicate reductions in the relative mass, movement, and spread of CTET and uranium isotopes (gross alpha and gross beta activity), but minimal impact on PCE. These findings suggest that CTET and uranium isotopes may share a common source area and/or primary migration pathway(s) that differ from that of PCE.

Summary of the MAROS moment trend analysis for the East Y-12 Area

COC	MOMENT TREND ¹			
	0 th Moment (Plume Mass)	1 st Moment (Plume Center of Mass)	2 nd Moment (Plume Spread)	
			Sigma XX	Sigma YY
CTET	PD	PD	PD	S
Gross alpha activity	D	D	D	D
Gross beta activity	PD	D	PD	PD
PCE	NT	NT	S	S
Note:				
1. Based on Mann-Kendall statistical trend analysis.				
Relative direction of trend denoted by D = Decreasing; PD = Potentially Decreasing; NT = No Trend; S = Stable				

Statistical Trend Analysis

Statistical trend analysis of the data for the groundwater sampling locations included in the MAROS analysis group for the East Y-12 Area focused on analytical results for CTET, gross alpha activity, gross beta activity, PCE, and TCE (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.6). Results of the statistical trend analyses show D, PD, or S trends for the applicable COC in most (17 wells and two springs) of the sampling locations included in the MAROS analysis group for the East Y-12 Area, with I or PI trends evident only for wells near New Hope Pond (Table B.6). The remaining sampling locations, including several exit-pathways wells in Union Valley, show NT for the designated COC because of data variability, or the trend analysis is not applicable because of insufficient sampling results (the MAROS trend analysis requires at least four sampling results).

The MAROS statistical analysis show I or PI trends for the applicable COC in wells GW-151 (CTET), GW-154 (gross alpha activity), GW-220 (CTET), and GW-383 (c12DCE) in the East Y-12 Area (Table B.6). Increasing concentrations of CTET in the groundwater from wells GW-151 and GW-220

may result from a combination of reduced recharge following closure of NHP and the strong local hydrologic influence of the UEFPC distribution channel underdrain (DOE 1998). Biologically mediated degradation of related parent compounds (PCE and TCE) may account for the increasing trend for c12DCE concentrations in groundwater from well GW-383, which have increased almost 400% since the early 1990s, and increased levels of gross alpha activity indicated by the sampling results for well GW-154 may be an artifact of the groundwater sampling method or reflect a conspicuous “spike” in activity in August 2002 (B&W Y-12 2008).

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency based on data for the sampling locations included in the MAROS analysis group for the East Y-12 Area do not indicate areas of significant uncertainty regarding COC concentrations in the groundwater that warrant installation of new wells. Also, none of the wells provide redundant local monitoring coverage in areas having low uncertainty regarding the spatial distribution and concentrations of contaminants in the groundwater. Similar findings were obtained from the baseline MAROS assessment (BWXT 2005).

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment of the sampling frequency appropriate for each well included in the MAROS analysis group for the East Y-12 Area that do not have a regulatory-driven sampling frequency (Appendix D.2), annual sampling is recommended for three wells (GW-240, GW-735, and GW-763) and biennial sampling is recommended for three wells (GW-148, GW-748, and GW-750).

3.7 WEST CHESTNUT RIDGE

The MAROS analysis group for West Chestnut Ridge includes sampling locations within the westernmost section of the Chestnut Ridge Regime to the south-southwest of Y-12, in the general vicinity of Construction/Demolition Landfill VI (CDL VI), Industrial Landfill IV (IL IV), Sanitary Landfill II (SL II), and the United Nuclear Corporation Site (UNCS). Groundwater monitoring at the landfills is performed in accordance the TDEC regulations governing operation and management of SWDFs and the requirements specified in the operating permit for IL IV, which is an active SWDF, and the respective post-closure care requirements for SL II and CDL VI, which are closed SWDFs. Groundwater sampling at the UNCS is performed as required under a CERCLA ROD for the site.

Sampling Locations

There are 19 sampling locations in the MAROS analysis group for West Chestnut Ridge (Table B.7): three natural springs on the southern flank of Chestnut Ridge that are monitored as exit-pathway locations, four wells at CDL VI, five wells at IL IV, three wells at SL II, and four wells at the UNCS (Figure A.4). The baseline MAROS assessment of the Y-12 GWPP included these same wells and natural springs in the MAROS analysis group for West Chestnut Ridge (BWXT 2005).

COC Assessment

Available groundwater sampling results obtained to date show that all of the sampling locations included in the MAROS analysis group for West Chestnut Ridge yield uncontaminated groundwater except well GW-305 at IL IV, which monitors VOC-contaminated groundwater, and well GW-205 at the UNCS, which monitors groundwater with elevated levels of gross beta activity. Also, historical sampling data show that contaminant concentrations in the groundwater from wells GW-305 and GW-205 rarely exceed applicable screening levels. Thus, the MAROS COC assessment of the sampling data for the West Chestnut Ridge indicated no area-wide priority COCs routinely exceeding screening levels.

Moment Analysis

The baseline MAROS assessment of the Y-12 GWPP included results of MAROS moment analyses based on the gross alpha activity data for the wells and springs included in the MAROS analysis group for West Chestnut Ridge (BWXT 2005). The MAROS moment analyses performed for the supplemental MAROS assessment addressed other analytes in addition to gross alpha activity (see MAROS *Spatial Analysis Summary* report in Appendix C.7). However, results of the MAROS moment analyses seem of limited significance considering the overall lack of groundwater contamination at the sites included in the West Chestnut Ridge MAROS analysis group. Also, although groundwater sampling results indicate contaminant releases to the uppermost aquifer at IL IV (GW-305) and UNCS (GW-205), available data for the existing network of sampling locations at each site suggest generally limited contaminant transport/migration via discreet hydrostratigraphic intervals rather than movement as a diffuse “plume” in the groundwater. Thus, analytical results for the bulk of the groundwater sampling locations included in the MAROS analysis group for West Chestnut Ridge do not seem especially suited to MAROS moment analyses.

Statistical Trend Analysis

Results of the statistical trend analysis of the groundwater sampling data for the sampling locations included in the MAROS analysis group for West Chestnut Ridge are of limited applicability because, as noted previously, only two of the sampling locations (wells GW-205 and GW-305) yield contaminated groundwater (see *MAROS Statistical Trend Analysis Summary* report in Appendix C.7).

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency based on data for the wells included in the MAROS analysis group for West Chestnut Ridge are inconclusive. Areas of significant uncertainty regarding COC concentrations in the groundwater, which may warrant installation of new wells, are not evident and none of the existing wells provide redundant local monitoring coverage in areas having low uncertainty regarding the spatial distribution and concentrations of contaminants in the groundwater. Similar findings were obtained from the baseline MAROS assessment (BWXT 2005).

Sampling Frequency Evaluation

As noted above, each groundwater sampling location included in the MAROS analysis group for West Chestnut Ridge has a regulatory-driven sampling frequency (Appendix D.3). Consequently, as noted in Section 2.7, the final MAROS-based sampling frequency recommendations are not applicable.

3.8 CHESTNUT RIDGE SECURITY PITS

The CRSP are located on the crest of Chestnut Ridge directly south of the Central Y-12 Area (Figure A.4). The CRSP consists of a series of east-west oriented waste disposal trenches that received a variety of nonhazardous, hazardous, and classified wastes between 1973 and 1988, and were covered by a multilayer, low permeability cap installed during RCRA closure of the site in 1989. Wastes disposed at the site are the source of an elongated plume of dissolved VOCs in the groundwater extending over 2000 ft to the east-northeast (parallel with geologic strike) and several hundred ft to the north and south down the flanks of the ridge. The elongated geometry of the VOC plume reflects the preferred, strike-parallel flow of groundwater in the carbonate (karst) aquifer formed by the Knox Group strata that underlie Chestnut Ridge.

Sampling Locations

There are 13 groundwater sampling locations included in the MAROS analysis group for the CRSP (Table B.8): one natural spring (SCR-3.5SP) that discharges into McCoy Branch on the southern flank of Chestnut Ridge approximately 6200 ft south of the CRSP, ten wells that generally surround the waste disposal trenches at the site, with two wells (GW-514 and GW-831) located near the Filled Coal Ash Pond, south-southwest of the site (Figure A.4). The baseline MAROS assessment of the Y-12 GWPP also included these same sampling locations in the MAROS analysis group for the CRSP (BWXT 2005).

COC Assessment

On the basis of the MAROS output for the COC assessment (see *MAROS COC Assessment* report in Appendix C.8), PCE and 11DCE are designated as a principal COC for the CRSP. The baseline MAROS assessment of the Y-12 GWPP also identified each VOC as a COC for the CRSP (BWXT 2005).

Moment Analysis

Moment analyses based on data for the groundwater sampling locations included in the MAROS analysis group for the CRSP focused on analytical results for gross alpha activity, PCE and 11DCE. Results of the moment analyses, summarized below, show S trends or NT because of data variability (see the *MAROS Spatial Moment Analysis Summary* report in Appendix C.8). Similar findings were obtained from the moment analyses performed as part of the baseline MAROS assessment of the sampling locations included in the MAROS analysis group for the CRSP, which focused on the analytical results for PCE (BWXT 2005). Together, results of the moment analyses from the baseline and supplemental MAROS assessments do not indicate significant changes in the relative mass, movement, and spread of VOCs (PCE and 11DCE) in the groundwater at the CRSP.

Summary of the MAROS moment trend analysis for the CRSP MAROS analysis group

COC	MOMENT TREND ¹			
	0 th Moment (Plume Mass)	1 st Moment (Plume Center of Mass)	2 nd Moment (Plume Spread)	
			Sigma XX	Sigma YY
11DCE	NT	S	S	S
Gross alpha activity	NT	NT	S	S
PCE	S	S	S	NT

Note:
1. Based on Mann-Kendall statistical trend analysis. Relative direction of trend denoted by NT = No Trend; S = Stable

Statistical Trend Analysis

Statistical trend analysis of the data for the groundwater sampling locations included in the MAROS analysis group for the CRSP focused on analytical results for gross alpha activity, gross beta activity, PCE, and 11DCE (see the *MAROS Statistical Trend Analysis Summary* report in Appendix C.8). Results of the MAROS statistical trend analyses show a D, PD, and S trends, or NT (due to data variability) for the applicable COC in most (11 wells) of the sampling locations (Table B.8). These findings are consistent with results of the statistical trend analyses performed under the baseline MAROS assessment of the Y-12 GWPP, which were based on analytical results for PCE and other analytes (gross alpha activity and lead), although only eight wells had sufficient data for statistical analysis, including two wells with maximum concentrations below the corresponding screening level for each COC (BWXT 2005).

Results of the MAROS statistical analyses indicate a PI trend for gross alpha activity in groundwater from spring SCR3.5SP (Table B.8). Results of the baseline MAROS assessment noted a PI trend for gross alpha activity in the spring, but qualified the trend as an apparent artifact of analytical detection limits and data variability (BWXT 2005). Concentrations of gross alpha activity do not exceed screening levels at this location.

Results of the MAROS statistical trend analyses of 11DCE concentrations in wells GW-176, GW-177, and GW-178 also show I or PI trends (overall trends) (Table B.8). Increasing concentrations of 11DCE in the groundwater from these wells may be at least partially attributable to the biotic and/or abiotic (spontaneous chemical degradation Vogel and McCarty, 1987) degradation of 111TCA, a parent compound that is a principal component of the VOC plume believed to originate from the western disposal trenches at the CRSP (B&W Y-12 2008). Results of the baseline MAROS assessment of the CRSP did not indicate increasing trends for 11DCE in these wells; there were insufficient sampling data for well GW-176 and the respective statistical trend analyses for wells GW-177 and GW-178 were based on sampling results for lead (BWXT 2005).

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency based on data for the wells included in the MAROS analysis group for the CRSP do not indicate areas of uncertainty regarding COC concentrations in the groundwater that warrant increased monitoring efforts or installation of new wells. Similar findings were obtained from the baseline MAROS assessment (BWXT 2005).

Based on results of the MAROS well redundancy analysis, well GW-173 at the CRSP, which is approximately 200 ft east of the eastern waste disposal trenches at the site (Figure A.4), provides

redundant local monitoring coverage in an area with low uncertainty regarding the spatial distribution and concentrations of each applicable COC in the groundwater, and is recommended for “Elimination” (i.e., discontinued sampling) (Appendix D.3). As noted previously, the well must be granted “Inactive” status for the purposes of the Y-12 GWPP, as defined and specified in the most current version of the Y-12 GWPP MOP, to formally discontinue future groundwater sampling.

Summary of MAROS well sufficiency and well redundancy analysis for the CRSP

WELL NUMBER	BASIS FOR MAROS “ELIMINATION” RECOMMENDATION
GW-173	Probably decreasing trends; redundant with well GW-174

Sampling Frequency Evaluation

Based on results of the supplemental MAROS assessment sampling frequency appropriate for each sampling location included in the MAROS analysis group for the CRSP (Table B.8), biennial sampling is recommended for most (six) of the wells that either do not have a regulatory-driven sampling frequency (Appendix D.3). Annual sampling is recommended for one well at the site and sampling once every five years is recommended for three wells, each of which exhibit decreasing concentration trends for the applicable COC (Appendix D.3).

3.9 LANDFILLS V AND VII AREA

The Landfills V and VII Area MAROS analysis group includes sampling locations associated with IL V and CDL VII, both of which are operating facilities used for the disposal of various non-hazardous solid waste and construction debris generated at Y-12 and elsewhere on the ORR (Figure A.4). Groundwater sampling at each landfill is performed as required by the operating permit for each site and the TDEC regulations governing operation and management of nonhazardous SWDFs.

Sampling Locations

There are 10 sampling locations in the MAROS analysis group for the Landfills V and VII Area (Table B.9), including a natural spring on the southern flank of Chestnut Ridge, four wells located at CDL VII, and five wells at IL V (Figure A.4). The baseline MAROS assessment of the Y-12 GWPP included these same sampling locations in the MAROS analysis group for the Landfills V and VII Area (BWXT 2005).

COC Assessment

Available groundwater sampling results obtained to date show that all of the sampling locations included in the MAROS analysis group for Landfills V and VII Area yield uncontaminated groundwater except the upgradient/background well (GW-798) at CDL VII, which intercepts groundwater flow/transport pathways for VOCs released from the waste disposal trenches at the CRSP (B&W Y-12 2008). Results of the MAROS COC assessment show that none of the COCs exceed applicable screening levels (Appendix C.9).

Moment Analysis

As noted previously, the sampling locations included in the MAROS analysis group for the Landfills V and VII (except CDL VII upgradient/background well GW-798) yield uncontaminated groundwater. Consequently, results of the MAROS moment analyses are not significant (see *MAROS Spatial Moment Analysis Summary* report in Appendix C.9).

Statistical Trend Analysis

All the sampling locations included in the MAROS analysis group for the Landfills V and VII Area yield uncontaminated groundwater except CDL VII upgradient/background well GW-798. Groundwater samples collected from this well since January 2000 have contained several VOCs, including PCE, TCE, and 111TCA, with the concentrations of these compounds steadily increasing through historical peak concentrations in January 2003 and subsequently decreasing more than 50% through April 2006 (B&W Y-12 2008). The MAROS statistical trend analysis of the PCE data for well GW-798 show an I trend (see *MAROS Statistical Analysis Summary* report in Appendix C.9).

Well Sufficiency/Redundancy Evaluation

The well sufficiency module was not run on the data for the wells included in the MAROS analysis group for the Landfills V and VII Area because of the small number of wells in the group; similar findings were reported in the baseline MAROS assessment of the Y-12 GWPP (BWXT 2005).

Sampling Frequency Evaluation

As noted above, each groundwater sampling location included in the MAROS analysis group for the Landfills V and VII Area has a regulatory-driven sampling frequency (Appendix D.3). Consequently, as noted in Section 2.7, the final MAROS-based sampling frequency recommendations are not applicable.

3.10 EAST CHESTNUT RIDGE

The MAROS analysis group for East Chestnut Ridge includes groundwater sampling locations associated with the following closed waste management sites in the easternmost section of the Chestnut Ridge Regime directly south-southeast of Y-12: the East Chestnut Ridge Waste Pile (ECRWP), Chestnut Ridge Sediment Disposal Basin (CRSDB), Chestnut Ridge Borrow Area Waste Pile (CRBAWP), and Kerr Hollow Quarry (KHQ) (Figure A.4).

Sampling Locations

There are 17 groundwater sampling locations included in the MAROS analysis group for East Chestnut Ridge (Table B.10): five wells at the ECRWP, four wells at the CRSDB, two wells at the CRBAWP, four wells at KHQ, and two wells at the South Campus Facility (SCF), which is located on the ORR near the southeastern corner of the Chestnut Ridge Regime (Figure A.4). The baseline MAROS assessment of the Y-12 GWPP included all but three of these sampling locations (wells GW-161, GW-294, and GW-296 at the ECRWP) in the MAROS analysis group for East Chestnut Ridge (BWXT 2005).

COC Assessment

Historical sampling data show low levels of VOCs (primarily CTET and PCE) in the groundwater from a few wells at KHQ and somewhat higher levels of TCE in wells at the SCF, with more recent data showing either non-detect results for the applicable COC or concentrations that have remained slightly above or decreased below the corresponding screening level for the COC. Data obtained to date show that all the other groundwater sampling locations included in the MAROS analysis group for East Chestnut Ridge currently yield uncontaminated groundwater. Consequently, results of the MAROS COC assessment are not significant (see *MAROS Spatial Moment Analysis Summary* report in Appendix C.10).

Moment Analysis

Historical data for almost all of the wells included in the MAROS analysis group for East Chestnut Ridge do not indicate concentrations of any potential COC that exceed the corresponding screening level. Consequently, results of the MAROS moment analyses generally are not significant (see *MAROS Spatial Moment Analysis Summary* report in Appendix C.10), which also was noted in the baseline MAROS assessment of the Y-12 GWPP (BWXT 2005).

Statistical Trend Analysis

Historical data for almost all of the wells included in the MAROS analysis group for East Chestnut Ridge do not indicate concentrations of any potential COC that exceed the corresponding screening level. Also, elevated COC concentrations indicated by historical data for wells at KHQ and the SCF have decreased to below detection limits or only slightly above the applicable screening level. Consequently, results of the MAROS statistical trend analyses generally are not significant (see *MAROS Statistical Trend Analysis Summary* report in Appendix C.10).

Well Sufficiency/Redundancy Evaluation

Results of the supplemental MAROS assessment of well sufficiency based on data for the wells included in the MAROS analysis group for East Chestnut Ridge are inconclusive and are generally not relevant in light of the contaminant detection-based purpose of the Similar findings were obtained from the baseline MAROS assessment (BWXT 2005).

Sampling Frequency Evaluation

The groundwater sampling locations included in the MAROS analysis group for East Chestnut Ridge have regulatory-driven sampling frequencies (Appendix D.3). Consequently, as noted in Section 2.7, the final MAROS-based sampling frequency recommendations are not applicable to these wells.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Results of the supplemental MAROS assessment of the Y-12 GWPP are consistent with, and generally support, the findings of the baseline MAROS assessment. However, the similar and somewhat duplicative findings suggest diminishing returns from future, fully implemented MAROS assessments. Instead, selected MAROS data evaluation modules could be incorporated into the routine management and implementation of the Y-12 GWPP, specifically the MAROS-recommended sampling frequency and the MAROS moment analyses. Moreover, both MAROS assessments included data evaluations that do not seem applicable and/or appropriate for monitoring data from wells and springs that yield uncontaminated groundwater, and should be excluded from any future MAROS-based evaluations.

The MCES-based sampling frequency evaluation method used by MAROS provides the Y-12 GWPP with a fairly non-subjective technical process to establish an appropriate sampling frequency for each well and spring. The overall technical approach could be incorporated into the Y-12 GWPP MOP, which would define the schedule (e.g., biennial) and scope (e.g., wells and springs sampled during biennial periods) of the sampling frequency evaluations and serve as the forum to document the results of the evaluations. Additionally, the Y-12 GWPP should adopt the MAROS-based sampling frequencies recommended for the groundwater sampling locations that serve a regulatory compliance-driven monitoring program, i.e., RCRA post-closure detection monitoring and RCRA post-closure corrective action monitoring, CERCLA baseline monitoring, remedial effectiveness monitoring, and ROD-specified monitoring; and detection monitoring at operating and closed SWDFs. All the wells and springs associated with these monitoring programs maintain “Active” status per the Y-12 GWPP MOP, and the MAROS-recommended sampling frequency would apply only if these wells or springs were to be sampled for non-regulatory compliance purposes.

The MAROS well sufficiency/redundancy evaluations performed for this supplemental assessment involved a slightly different set of locations than the set used for the baseline assessment, although the total number of sampling locations were similar. As described in Section 1.0, the assessment is performed only on “Active” monitoring locations, and the current monitoring well network excludes 15 wells deemed “Inactive”, primarily reflecting recommendations of the baseline assessment. Also, monitoring results for 18 wells (mostly located in the Central Y-12 MAROS analysis group) that had insufficient data for the baseline assessment were included in the supplemental assessment. Based primarily on the well sufficiency/redundancy evaluations of the sampling locations in the supplemental assessment, a total of 32 monitoring wells received recommendations to discontinue sampling (i.e., “Elimination”), including 26 wells in the Bear Creek Regime (Appendix D.1), five wells in the East Fork Regime (Appendix D.2), and one well in the Chestnut Ridge Regime (Appendix D.3).

The MAROS moment analyses of selected COC concentrations in the groundwater provide an effective approach for monitoring for significant changes in the hydrochemical dynamics within groundwater contaminant plumes that may warrant appropriate response actions (e.g., increased or decreased sampling frequency). Results of the moment analyses for each COC foster evaluation of concentration trends within the plume as a whole, an approach that dovetails two principal strengths of the Y-12 GWPP: the extensive network of sampling locations in most of the areas with groundwater contamination, and the large database of long-term sampling results for many of these sampling locations. This approach also seems more technically robust than an evaluation focused on plume boundary conditions, particularly considering the widespread intermingling of contaminant plumes in many areas of Y-12 and the relatively limited number of plume boundary sampling locations.

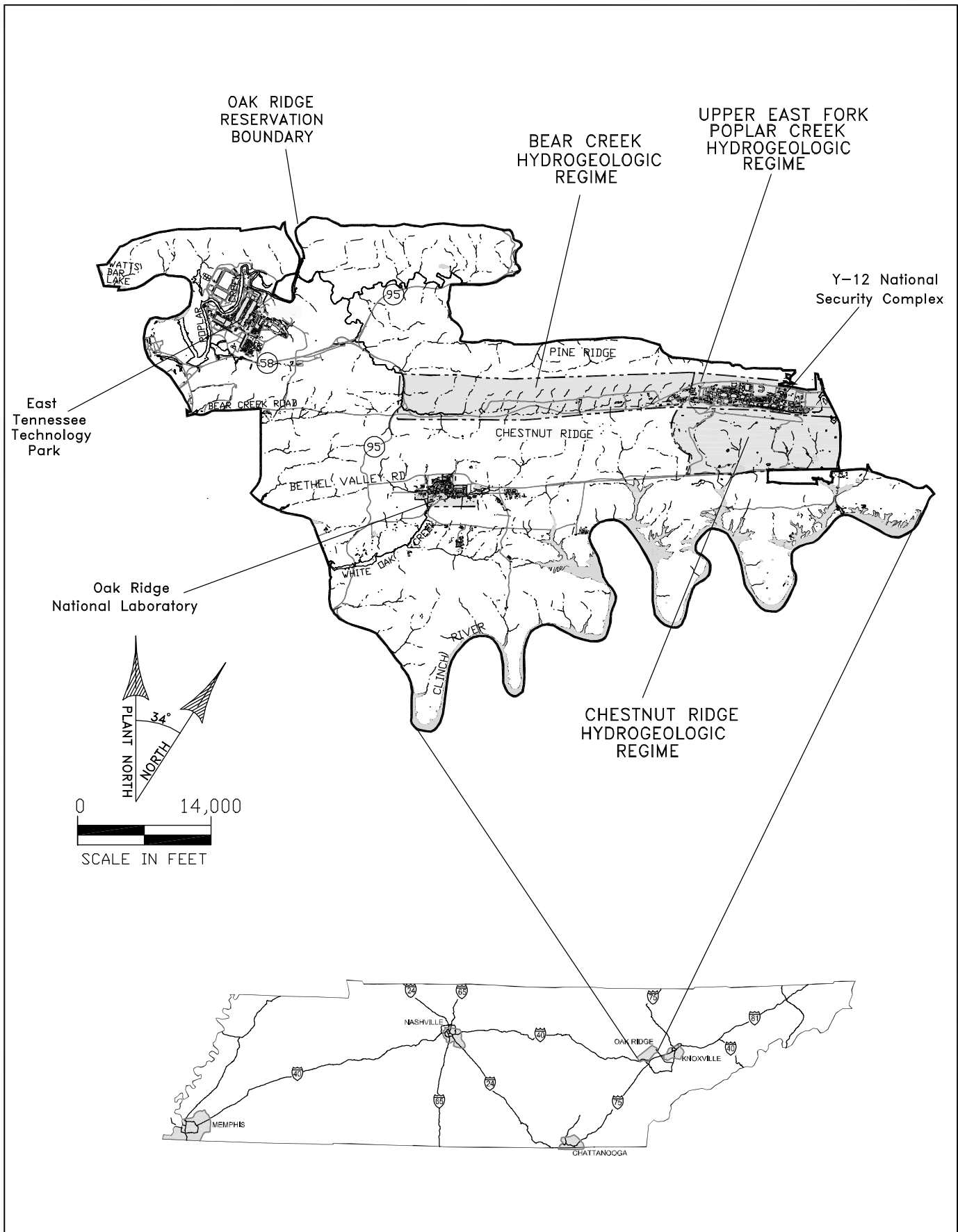
Results of the baseline and supplemental MAROS assessments indicate that the data evaluations performed by most of the MAROS modules are not particularly applicable to groundwater monitoring results obtained at each waste management facility in the Chestnut Ridge Regime except the CRSP. Some of the MAROS data evaluations (e.g., statistical trend analysis) are inappropriate because all but a few of the wells and springs associated with these sites yield uncontaminated groundwater. Also, the findings and results for other MAROS data evaluations (e.g., well sufficiency/redundancy and sampling frequency) are not actionable because regulatory (and permit) requirements, rather than purely technical considerations, define the site-specific groundwater sampling protocols. In light of these technical and regulatory constraints, only the groundwater sampling locations associated with the CRSP should be included in any future MAROS-based assessments or evaluations.

5.0 REFERENCES

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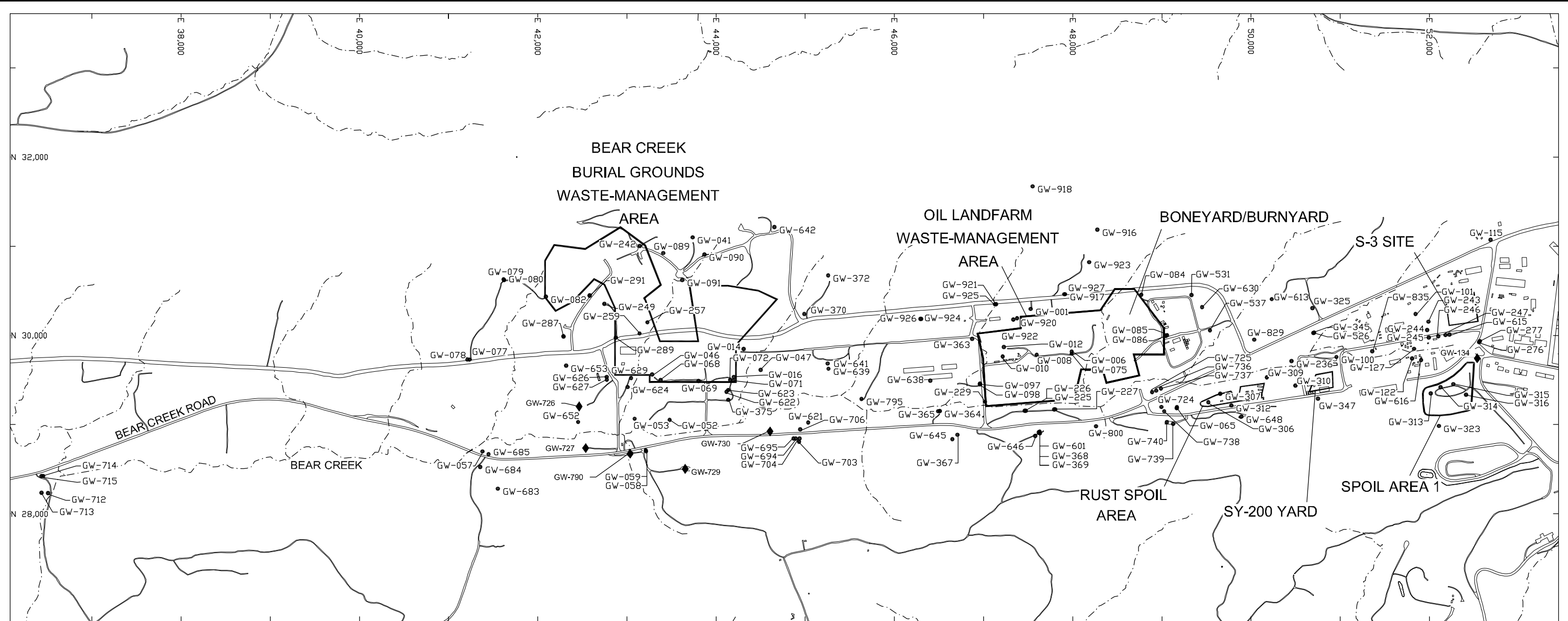
APPENDIX A

FIGURES



GWPP Fig1

Fig. A.1. Hydrogeologic regimes at the Y-12 National Security Complex.



EXPLANATION

- Active groundwater monitoring well
- ◆ Active Westbay groundwater monitoring well
- - - Surface drainage feature
- ▭ Principal Waste Management Sites

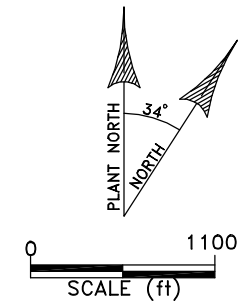
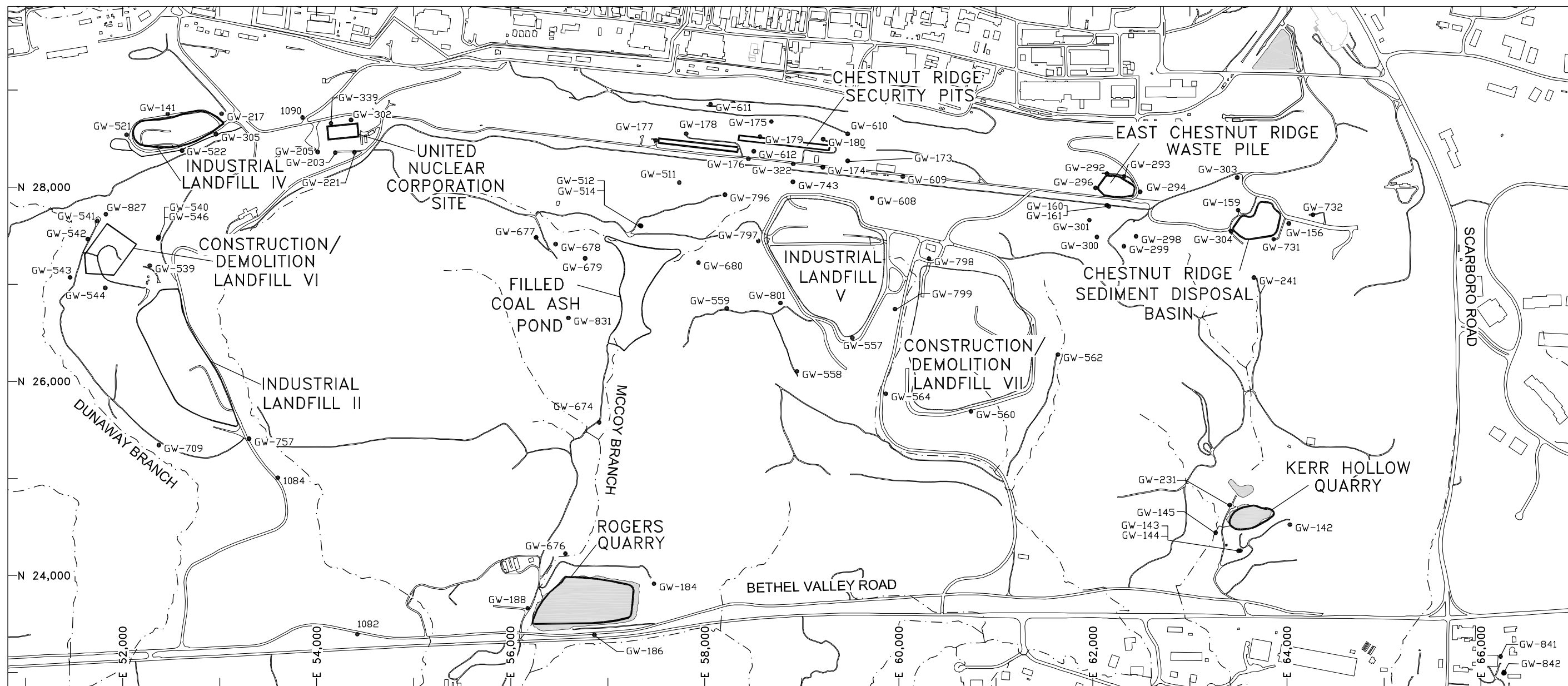


Fig. A.2. Groundwater monitoring wells in the Bear Creek Hydrogeologic Regime.



EXPLANATION

- Active groundwater monitoring well
- - - Surface drainage feature
- Principal Waste Management Sites

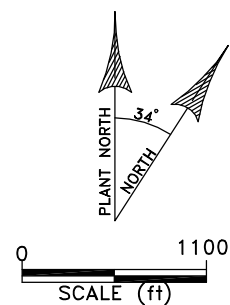
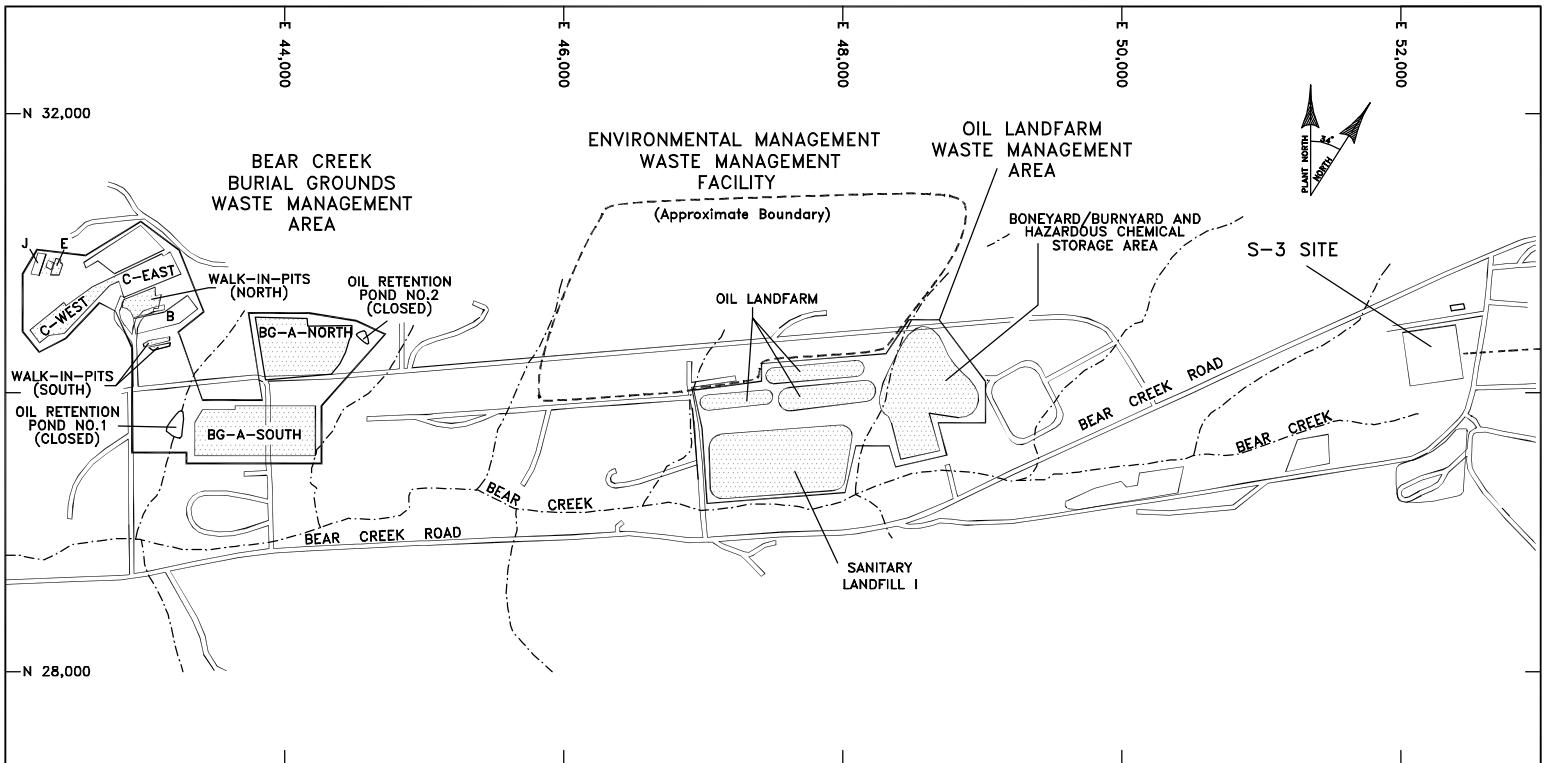


Fig. A.4. Groundwater monitoring wells in the Chestnut Ridge Hydrogeologic Regime.



Component of Waste Management Area

Fig. A.5. Components of the Bear Creek Burial Grounds and Oil Landfarm Waste Management Areas.

APPENDIX B

TABLES

TABLE B.1
Supplemental MAROS assessment results for the West S-3 Area MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-100	01/22/86	05/07/07	WL	3	Yes	NITRATE	N/A	PD	Quarterly
GW-101	01/23/86	05/09/07	WL	3	Yes	NITRATE	N/A	D	Quarterly
GW-122	12/12/86	05/09/07	WL	4	Yes	NITRATE	S	D	Annual
GW-127	12/12/86	05/07/07	WL	3	Yes	GROSS ALPHA ACTIVITY	N/A	D	Quarterly
GW-236	04/05/88	05/03/07	WL	3	Yes	NITRATE	N/A	D	Quarterly
GW-244	11/17/87	10/24/05	WL	2	Yes	NITRATE	N/A	D	Quarterly
GW-245	11/23/87	10/25/05	WL	2	Yes	NITRATE	N/A	S	Quarterly
GW-246	03/16/87	08/15/07	WL	6	Yes	GROSS BETA ACTIVITY	S	PI	Annual
GW-247	11/23/87	10/25/05	WL	2	Yes	NITRATE	N/A	S	Quarterly
GW-276	10/29/86	07/09/07	WL	24	Yes	URANIUM	D	D	Annual
GW-277	10/29/86	05/14/07	WL	3	Yes	NITRATE	N/A	S	Quarterly
GW-307	11/27/89	05/01/07	WL	3	Yes	TRICHLOROETHYLENE (TCE)	N/A	D	Quarterly
GW-310	05/09/89	09/06/06	WL	3	Yes	TRICHLOROETHYLENE (TCE)	N/A	D	Quarterly
GW-312	05/05/89	08/17/05	WL	2	Yes	TRICHLOROETHYLENE (TCE)	N/A	S	Quarterly
GW-313	03/15/90	05/01/07	WL	3	Yes	TETRACHLOROETHYLENE(PCE)	N/A	NT	Quarterly
GW-315	03/06/90	05/01/07	WL	22	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Annual
GW-526	09/28/88	07/25/06	WL	5	Yes	NITRATE	S	I	Annual
GW-615	05/16/90	05/14/07	WL	4	Yes	NITRATE	NT	I	Quarterly
GW-616	05/17/90	05/10/07	WL	6	Yes	NITRATE	S	NT	SemiAnnual
GW-829	06/27/95	02/15/06	WL	12	Yes	NITRATE	D	D	Quarterly
SS-1	08/30/90	04/19/06	SP	21	Yes	URANIUM	D	D	Annual
Locations with no Data 2005-2007				1986 -2007			1996 - 2005	1986 - 2007	
GW-306	05/09/89	04/26/91	WL	8	Yes	TRICHLOROETHYLENE (TCE)	N/A	NT	Biennial
GW-309	02/09/88	08/30/92	WL	16	Yes	GROSS BETA ACTIVITY	N/A	D	Biennial
GW-314	03/06/90	08/15/92	WL	11	Yes	TETRACHLOROETHYLENE(PCE)	N/A	S	Annual
GW-531	12/15/88	06/24/91	WL	9	No	GROSS ALPHA ACTIVITY	N/A	S	Biennial
GW-648	01/15/91	07/23/92	WL	6	No	GROSS ALPHA ACTIVITY	N/A	S	Biennial

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.2
Supplemental MAROS assessment results for the Oil Landfarm WMA MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-008	01/26/98	07/02/07	WL	20	100%	Yes	TETRACHLOROETHYLENE(PCE)	I	I	Quarterly
GW-085	11/05/87	08/15/07	WL	23	100%	Yes	NITRATE	S	D	Annual
GW-098	03/17/87	04/23/07	WL	8	100%	Yes	TRICHLOROETHYLENE (TCE)	NT	NT	Annual
GW-225	01/12/86	08/13/07	WL	14	100%	Yes	TRICHLOROETHYLENE (TCE)	I	D	Quarterly
GW-226	01/12/86	08/13/07	WL	20	100%	Yes	TRICHLOROETHYLENE (TCE)	S	I	Annual
GW-227	01/14/86	09/08/05	WL	2	100%	Yes	TRICHLOROETHYLENE (TCE)	N/A	D	Quarterly
GW-229	01/14/86	04/23/07	WL	10	100%	Yes	VINYL CHLORIDE	NT	I	Annual
GW-363	09/21/88	08/15/07	WL	39	2%	No	BENZENE	NT	NT	Annual
GW-365	09/21/88	09/01/05	WL	4	75%	Yes	VINYL CHLORIDE	NT	PI	Quarterly
GW-368	09/24/88	04/26/07	WL	3	100%	Yes	TRICHLOROETHYLENE (TCE)	N/A	D	Quarterly
GW-369	09/22/88	04/30/07	WL	1	100%	Yes	TRICHLOROETHYLENE (TCE)	N/A	D	Quarterly
GW-537	12/06/89	05/03/07	WL	21	100%	Yes	NITRATE	D	D	Annual
GW-601	03/05/90	04/24/07	WL	4	100%	Yes	TRICHLOROETHYLENE (TCE)	S	D	Quarterly
GW-724	05/20/92	08/20/07	WL	22	100%	Yes	TRICHLOROETHYLENE (TCE)	D	NT	Annual
GW-725	05/21/92	08/20/07	WL	22	100%	Yes	TRICHLOROETHYLENE (TCE)	NT	D	SemiAnnual
GW-736	05/22/92	08/02/05	WL	4	100%	Yes	TRICHLOROETHYLENE (TCE)	S	D	Quarterly
GW-738	05/26/92	08/21/07	WL	22	100%	Yes	TRICHLOROETHYLENE (TCE)	D	D	Annual
GW-739	05/27/92	07/27/05	WL	4	100%	Yes	TRICHLOROETHYLENE (TCE)	S	S	Quarterly
GW-740	06/02/92	08/21/07	WL	22	100%	Yes	TRICHLOROETHYLENE (TCE)	D	D	Annual
GW-916	04/18/06	08/14/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-917	04/03/01	08/09/07	WL	22	5%	No	TRICHLOROETHYLENE (TCE)	NT	NT	Biennial
GW-918	04/02/01	08/14/07	WL	22	9%	No	TRICHLOROETHYLENE (TCE)	NT	NT	Biennial
GW-920	04/18/06	08/08/07	WL	6	33%	No	URANIUM	NT	NT	Biennial
GW-921	04/24/06	08/07/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-922	04/04/01	08/08/07	WL	22	5%	No	TETRACHLOROETHYLENE(PCE)	NT	NT	Biennial
GW-923	04/02/01	04/24/07	WL	16	6%	No	TRICHLOROETHYLENE (TCE)	NT	NT	Biennial
GW-924	03/29/01	08/13/07	WL	8	0%	No	VINYL CHLORIDE	ND	ND	Annual
GW-925	04/19/06	08/08/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-926	04/02/01	08/13/07	WL	22	5%	No	TRICHLOROETHYLENE (TCE)	NT	NT	Annual
GW-927	05/30/01	05/20/03	WL	5	60%	No	GROSS ALPHA ACTIVITY	NT	N/A	Annual
Locations with no data collected 2005-2007								1996 - 2005		
GW-006	11/11/98	08/02/00	WL	8	100%	No	TRICHLOROETHYLENE (TCE)	S	S	Annual
GW-367	09/19/88	05/11/91	WL	12	100%	Yes	TRICHLOROETHYLENE (TCE)	N/A	D	Biennial

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.3
Supplemental MAROS assessment results for the Bear Creek Burial Grounds WMA MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-014	03/14/87	08/07/07	WL	8	100%	Yes	VINYL CHLORIDE	NT	D	Quarterly
GW-046	03/14/87	07/02/07	WL	20	95%	Yes	TETRACHLOROETHYLENE(PCE)	NT	I	Annual
GW-052	06/22/90	02/12/07	WL	3	100%	Yes	GROSS ALPHA ACTIVITY	N/A	PD	Quarterly
GW-053	06/22/90	02/13/07	WL	14	93%	No	GROSS ALPHA ACTIVITY	NT	NT	SemiAnnual
GW-058	11/24/87	06/12/06	WL	1	100%	Yes	GROSS ALPHA ACTIVITY	N/A	S	Quarterly
GW-068	03/18/87	06/08/06	WL	3	100%	Yes	VINYL CHLORIDE	N/A	I	Quarterly
GW-071	03/17/87	08/09/07	WL	10	100%	Yes	BENZENE	I	I	Quarterly
GW-072	03/17/87	03/21/07	WL	5	100%	No	1,1-DICHLOROETHENE	NT	I	Quarterly
GW-077	01/25/05	07/31/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-078	01/25/05	07/31/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-079	01/25/05	07/31/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-080	01/25/05	07/31/07	WL	6	17%	No	URANIUM	NT	NT	Biennial
GW-082	03/23/87	02/07/07	WL	17	100%	Yes	VINYL CHLORIDE	NT	I	Quarterly
GW-089	06/19/90	02/12/07	WL	1	100%	No	NITRATE	N/A	NT	Annual
GW-242	11/12/87	10/05/05	WL	5	100%	Yes	VINYL CHLORIDE	NT	NT	Quarterly
GW-257	06/23/89	02/08/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	SemiAnnual
GW-289	04/11/88	02/08/07	WL	8	100%	Yes	TETRACHLOROETHYLENE(PCE)	I	S	Quarterly
GW-291	05/14/88	10/10/05	WL	6	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Quarterly
GW-624	06/28/90	10/12/05	WL	4	100%	Yes	VINYL CHLORIDE	S	S	Quarterly
GW-626	02/14/90	08/02/07	WL	10	70%	Yes	VINYL CHLORIDE	I	I	Quarterly
GW-627	02/13/90	08/06/07	WL	25	100%	Yes	TETRACHLOROETHYLENE(PCE)	I	I	Quarterly
GW-629	06/30/90	08/06/07	WL	7	57%	Yes	TETRACHLOROETHYLENE(PCE)	PI	PI	Quarterly
GW-639	12/06/90	08/14/07	WL	22	5%	No	TRICHLOROETHYLENE (TCE)	S	S	Biennial
GW-653	03/23/91	02/07/07	WL	22	91%	No	TETRACHLOROETHYLENE(PCE)	NT	I	Annual
GW-683	05/24/91	08/01/07	WL	23	100%	No	GROSS ALPHA ACTIVITY	D	D	Annual
GW-684	05/30/91	07/26/07	WL	24	100%	No	GROSS ALPHA ACTIVITY	D	PD	Annual
GW-694	06/19/91	08/16/07	WL	10	90%	No	GROSS ALPHA ACTIVITY	NT	D	Annual
GW-703	06/18/91	08/16/07	WL	22	95%	Yes	TRICHLOROETHYLENE (TCE)	D	D	Annual
GW-704	06/20/91	08/01/07	WL	24	96%	Yes	TRICHLOROETHYLENE (TCE)	D	D	Annual
GW-706	06/20/91	08/01/07	WL	24	96%	Yes	TRICHLOROETHYLENE (TCE)	NT	I	Annual
GW-712	12/09/91	07/02/07	WL	22	77%	No	GROSS BETA ACTIVITY	NT	NT	Biennial
GW-713	06/13/92	07/03/07	WL	24	4%	No	TRICHLOROETHYLENE (TCE)	NT	NT	Annual
GW-714	09/03/92	07/02/07	WL	23	70%	No	GROSS ALPHA ACTIVITY	S	PD	Biennial
SS-4	08/30/90	08/01/07	SP	23	100%	Yes	NITRATE	S	D	Annual
SS-5	08/30/90	08/01/07	SP	25	100%	Yes	NITRATE	NT	D	Annual
SS-6_6	03/08/05	08/17/06	SP	4	0%	No	URANIUM	ND	ND	Biennial
SS-6E	11/01/90	07/02/07	SP	14	86%	No	GROSS ALPHA ACTIVITY	NT	I	Biennial
SS-7	09/21/05	08/17/06	SP	3	67%	No	URANIUM	N/A	N/A	Annual
SS-8	08/30/90	08/17/06	SP	18	50%	No	GROSS BETA ACTIVITY	NT	NT	Biennial
Locations with no data collected 2005-2007				1986 - 2007				1996 - 2005	1986 - 2007	
GW-259	06/22/89	03/05/90	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	N/A	NT	Annual
GW-623	06/27/90	09/27/92	WL	8	100%	Yes	TETRACHLOROETHYLENE(PCE)	N/A	I	Annual

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]).
Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.4
Supplemental MAROS assessment results for the East S-3 Area MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
55-1A	06/05/96	06/11/07	WL	5	100%	No	NITRATE	S	S	Annual
55-2A	02/23/06	08/23/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Annual
55-2B	06/10/96	08/23/07	WL	9	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	SemiAnnual
55-2C	06/09/96	02/20/07	WL	10	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Quarterly
GW-105	01/24/86	06/14/07	WL	4	100%	Yes	NITRATE	NT	D	Quarterly
GW-106	01/24/86	06/18/07	WL	4	100%	Yes	NITRATE	S	D	Quarterly
GW-108	01/29/86	07/10/07	WL	11	100%	Yes	NITRATE	D	D	SemiAnnual
GW-109	01/29/86	06/20/07	WL	6	100%	Yes	NITRATE	NT	NT	Quarterly
GW-192	03/17/86	06/11/07	WL	15	87%	No	TRICHLOROETHYLENE (TCE)	NT	I	SemiAnnual
GW-251	06/10/86	06/25/07	WL	23	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	D	Annual
GW-253	06/10/86	03/08/07	WL	17	100%	Yes	CADMIUM	NT	S	Quarterly
GW-265	10/28/86	10/17/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	D	Annual
GW-269	10/28/86	10/17/07	WL	6	100%	Yes	1,1-DICHLOROETHENE	D	I	Annual
GW-270	10/30/86	06/06/07	WL	3	100%	Yes	NITRATE	N/A	D	Quarterly
GW-272	10/30/86	03/14/07	WL	3	100%	Yes	NITRATE	N/A	I	Quarterly
GW-273	10/31/86	06/06/07	WL	1	0%	No	NITRATE	ND	D	Annual
GW-274	11/04/86	03/13/07	WL	6	100%	Yes	TETRACHLOROETHYLENE(PCE)	I	I	Quarterly
GW-275	11/04/86	03/13/07	WL	6	100%	Yes	NITRATE	PI	S	Quarterly
GW-332	05/24/89	03/06/07	WL	5	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Quarterly
GW-336	05/25/89	03/06/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	NT	Quarterly
GW-337	05/25/89	03/06/07	WL	8	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	D	Quarterly
GW-505	12/29/88	06/18/07	WL	4	100%	Yes	GROSS ALPHA ACTIVITY	S	NT	SemiAnnual
GW-617	05/14/90	05/16/06	WL	6	100%	No	NITRATE	S	NT	Annual
GW-618	05/14/90	03/08/07	WL	20	100%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Quarterly
GW-619	05/10/90	05/15/06	WL	6	100%	Yes	TETRACHLOROETHYLENE(PCE)	PD	D	Quarterly
GW-620	05/10/90	06/19/07	WL	24	96%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Annual
GW-633	03/11/91	05/10/06	WL	11	100%	Yes	BENZENE	I	I	Quarterly
Locations with no data collected 2005-2007				1986 - 2007				1996 - 2005	1986 - 2007	
GW-190	06/20/90	10/21/03	WL	18	89%	Yes	TETRACHLOROETHYLENE(PCE)	ND	NT	Biennial
GW-508	12/11/90	03/02/94	WL	11	100%	Yes	BENZENE	N/A	D	Not Evaluated

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.5
Supplemental MAROS assessment results for the Central Y-12 Area MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
55-3A	11/17/05	08/22/07	WL	5	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Quarterly
55-3B	11/17/05	08/22/07	WL	5	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Quarterly
55-3C	03/01/06	08/27/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Quarterly
56-1A	05/22/06	10/15/07	WL	4	25%	No	GROSS BETA ACTIVITY	NT	--	Biennial
56-2A	03/23/98	03/01/07	WL	5	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Annual
56-2B	03/23/98	03/05/07	WL	5	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Annual
56-2C	03/24/98	03/05/07	WL	7	100%	Yes	TETRACHLOROETHYLENE(PCE)	PD	PD	Quarterly
56-3A	03/06/06	08/30/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Annual
56-3B	03/06/06	09/04/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Quarterly
56-3C	03/06/06	09/05/07	WL	4	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Annual
56-4A	03/02/06	09/05/07	WL	4	75%	No	TETRACHLOROETHYLENE(PCE)	NT	NT	Annual
56-6A	03/02/06	09/06/07	WL	4	50%	No	GROSS BETA ACTIVITY	NT	--	Biennial
56-8A	05/23/06	10/12/06	WL	2	50%	No	GROSS ALPHA ACTIVITY	N/A	N/A	Annual
60-1A	06/15/06	11/19/07	WL	4	25%	No	GROSS BETA ACTIVITY	NT	--	Biennial
GW-204	06/19/90	11/13/07	WL	17	100%	Yes	GROSS ALPHA ACTIVITY	S	I	SemiAnnual
GW-219	09/04/98	11/28/07	WL	15	100%	Yes	URANIUM	S	S	Quarterly
GW-605	08/26/91	07/09/07	WL	26	96%	Yes	TRICHLOROETHYLENE (TCE)	I	I	Quarterly
GW-606	08/26/91	07/09/07	WL	26	100%	Yes	CARBON TETRACHLORIDE	D	D	Annual
GW-656	03/07/91	11/13/07	WL	6	100%	Yes	TRICHLOROETHYLENE (TCE)	D	D	Quarterly
GW-686	06/06/06	10/18/07	WL	4	50%	Yes	VINYL CHLORIDE	NT		Annual
GW-690	06/08/96	10/22/07	WL	7	100%	Yes	TETRACHLOROETHYLENE(PCE)	PD	PD	Quarterly
GW-691	06/08/96	10/22/07	WL	5	100%	Yes	TETRACHLOROETHYLENE(PCE)	PI	PI	Quarterly
GW-692	06/08/96	10/16/07	WL	5	80%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Annual
GW-698	06/09/96	10/16/07	WL	17	100%	Yes	TRICHLOROETHYLENE (TCE)	I	I	Quarterly
GW-700	06/08/96	10/25/07	WL	7	100%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Quarterly
GW-765	07/28/92	12/03/07	WL	3	67%	No	GROSS ALPHA ACTIVITY	N/A	D	Annual
GW-769	01/27/93	11/13/07	WL	25	96%	Yes	CARBON TETRACHLORIDE	I	I	Quarterly
GW-770	01/27/93	11/12/07	WL	25	80%	Yes	CARBON TETRACHLORIDE	I	I	Annual
GW-779	06/09/94	09/10/07	WL	3	67%	No	GROSS ALPHA ACTIVITY	N/A	NT	Annual
GW-781	06/15/94	11/27/07	WL	11	73%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Annual
GW-782	06/16/94	11/27/07	WL	24	100%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Annual
GW-783	06/16/94	11/28/07	WL	11	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	D	Quarterly
GW-791	06/07/94	11/12/07	WL	23	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	D	Annual
GW-792	06/07/94	11/12/07	WL	11	100%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	SemiAnnual
GW-820	03/26/98	11/20/07	WL	10	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	S	Annual
GW-954-1	06/13/06	10/30/07	WL	3	67%	No	GROSS ALPHA ACTIVITY	N/A	N/A	--
GW-954-2	06/13/06	10/30/07	WL	4	50%	No	GROSS ALPHA ACTIVITY	NT	NT	--
GW-954-3	06/13/06	10/30/07	WL	4	100%	No	1,1-DICHLOROETHENE	S	S	--
GW-956-1	06/14/06	10/29/07	WL	4	25%	No	TETRACHLOROETHYLENE(PCE)	NT	NT	--
GW-956-2	06/14/06	10/29/07	WL	4	50%	No	GROSS ALPHA ACTIVITY	NT	NT	--

TABLE B.5
Supplemental MAROS assessment results for the Central Y-12 Area MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-956-3	06/14/06	10/29/07	WL	4	50%	No	GROSS ALPHA ACTIVITY	NT	NT	--
GW-956-4	06/14/06	10/29/07	WL	3	33%	No	GROSS ALPHA ACTIVITY	N/A	N/A	--
GW-959	03/30/05	11/20/07	WL	7	71%	Yes	VINYL CHLORIDE	NT	NT	Annual
GW-960	02/28/07	09/10/07	WL	2	50%	No	GROSS BETA ACTIVITY	N/A	N/A	Annual
UEFPC-SP17	03/25/96	04/24/06	SP	4	100%	Yes	NITRATE	NT	NT	SemiAnnual
Fuel Station Area										
GW-281	05/04/89	05/01/07	WL	5	0%	No	TETRACHLOROETHYLENE(PCE)	ND	NT	Biennial
GW-658	04/21/05	05/01/07	WL	9	89%	Yes	BENZENE	NT	NT	Quarterly
GW-762	02/07/05	08/06/07	WL	18	100%	Yes	TETRACHLOROETHYLENE(PCE)	I	I	Quarterly
GW-763	06/28/05	12/03/07	WL	24	63%	Yes	TETRACHLOROETHYLENE(PCE)	NT	NT	Annual
GW-775	11/29/07	11/29/07	WL	12	100%	No	TRICHLOROETHYLENE (TCE)	S	NT	SemiAnnual
GW-776	11/29/07	11/29/07	WL	12	92%	No	TRICHLOROETHYLENE (TCE)	PD	D	Annual
GW-802	04/21/05	05/01/07	WL	7	0%	No	BENZENE	ND	ND	Biennial
Locations with no data collected 2005-2007								1996 - 2005	1986 - 2007	
GW-193	06/18/90	07/13/04	WL	31	84%	Yes	BENZENE	D	D	Biennial

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling. If insufficient recent data (2005-2007) were available for evaluation, then no Preliminary Frequency was assigned (--).

TABLE B.6
Supplemental MAROS assessment results for the East Y-12 Area MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-148	01/19/06	01/19/06	WL	1	100%	No	CIS-1,2-DICHLOROETHENE	N/A	N/A	--
GW-151	02/20/86	08/01/07	WL	25	96%	Yes	CARBON TETRACHLORIDE	I	I	Quarterly
GW-153	02/24/86	03/08/07	WL	24	96%	Yes	CARBON TETRACHLORIDE	D	D	Annual
GW-154	02/23/86	08/15/07	WL	26	100%	Yes	GROSS ALPHA ACTIVITY	I	I	Quarterly
GW-169	02/08/05	08/02/07	WL	8	13%	No	TRICHLOROETHYLENE (TCE)	S	S	Annual
GW-170	06/04/90	08/02/07	WL	36	100%	Yes	CARBON TETRACHLORIDE	NT	D	Annual
GW-171	09/27/94	08/19/03	WL	16	100%	No	GROSS BETA ACTIVITY	NT	NT	--
GW-172	09/26/94	08/19/03	WL	15	67%	No	GROSS BETA ACTIVITY	NT	NT	--
GW-220	02/20/86	11/20/07	WL	28	100%	Yes	CARBON TETRACHLORIDE	I	I	Quarterly
GW-223	02/25/86	08/06/07	WL	21	100%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Annual
GW-230	04/20/05	03/07/07	WL	4	25%	No	VINYL CHLORIDE	S	S	Biennial
GW-240	02/25/86	03/08/07	WL	10	100%	Yes	CARBON TETRACHLORIDE	S	D	Annual
GW-380	12/22/88	08/15/07	WL	21	81%	No	GROSS ALPHA ACTIVITY	S	D	Annual
GW-381	12/17/88	12/04/07	WL	14	100%	Yes	CARBON TETRACHLORIDE	D	D	Annual
GW-382	12/10/88	08/02/07	WL	17	100%	Yes	CARBON TETRACHLORIDE	D	D	Annual
GW-383	08/23/88	11/19/07	WL	27	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	I	Annual
GW-733	04/28/92	07/09/07	WL	27	100%	Yes	CARBON TETRACHLORIDE	D	D	Annual
GW-735	04/28/92	03/08/07	WL	18	83%	No	GROSS ALPHA ACTIVITY	NT	NT	Annual
GW-744	10/25/92	03/15/07	WL	19	84%	No	GROSS ALPHA ACTIVITY	PD	S	Annual
GW-747	04/13/93	03/15/07	WL	17	82%	No	GROSS ALPHA ACTIVITY	S	NT	Biennial
GW-748	08/08/92	01/10/06	WL	4	75%	No	GROSS ALPHA ACTIVITY	S	D	Biennial
GW-750	08/09/92	03/07/07	WL	21	90%	No	GROSS BETA ACTIVITY	S	S	Biennial
GW-816	09/21/94	03/07/07	WL	24	83%	No	GROSS BETA ACTIVITY	D	D	Annual
GW-832	05/14/96	08/15/07	WL	23	100%	Yes	CARBON TETRACHLORIDE	D	D	Annual
SCR7_1SP	12/13/95	01/18/07	SP	23	39%	No	CARBON TETRACHLORIDE	D	D	Annual
SCR7_8SP	04/09/97	01/18/07	SP	21	19%	No	TETRACHLOROETHYLENE(PCE)	D	D	Biennial
Locations with no data collected 2005-2007								1996 - 2005	1986 - 2007	
GW-222	02/23/86	11/30/04	WL	36	94%	Yes	TETRACHLOROETHYLENE(PCE)	S	NT	Annual

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling. If insufficient recent data (2005-2007) were available for evaluation, then no Preliminary Frequency was assigned (--).

TABLE B.7
Supplemental MAROS assessment results for the West Chestnut Ridge MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
1090	02/13/86	07/25/07	WL	22	64%	No	GROSS ALPHA ACTIVITY	S	D	Biennial
GW-141	02/18/88	07/16/07	WL	24	21%	No	CADMIUM	I	I	Biennial
GW-203	02/06/86	07/25/07	WL	21	67%	No	GROSS ALPHA ACTIVITY	NT	I	Biennial
GW-205	02/06/86	07/26/07	WL	22	95%	Yes	GROSS BETA ACTIVITY	I	I	Annual
GW-217	02/17/88	07/12/07	WL	23	61%	No	GROSS BETA ACTIVITY	NT	D	Biennial
GW-221	02/07/86	07/25/07	WL	22	41%	No	GROSS ALPHA ACTIVITY	NT	D	Annual
GW-305	01/18/05	10/31/07	WL	12	100%	No	1,1-DICHLOROETHENE	NT	NT	Annual
GW-521	09/08/89	07/12/07	WL	21	29%	No	GROSS BETA ACTIVITY	D	D	Biennial
GW-522	01/18/05	07/12/07	WL	6	83%	No	NITRATE	S	S	Biennial
GW-540	03/16/91	07/18/07	WL	20	50%	No	GROSS BETA ACTIVITY	NT	PD	Biennial
GW-542	03/17/91	07/18/07	WL	22	77%	No	GROSS BETA ACTIVITY	D	D	Biennial
GW-543	01/24/05	07/18/07	WL	6	83%	No	NITRATE	NT	NT	Biennial
GW-544	01/24/05	07/18/07	WL	6	100%	No	NITRATE	NT	NT	Biennial
GW-709	06/19/91	07/16/07	WL	21	48%	No	GROSS ALPHA ACTIVITY	NT	D	Biennial
GW-757	10/12/92	07/16/07	WL	24	100%	No	GROSS BETA ACTIVITY	I	I	Biennial
GW-827	11/05/96	07/18/07	WL	22	50%	No	GROSS BETA ACTIVITY	PD	PD	Biennial
SCR1_25SP	02/16/99	07/17/07	SP	18	78%	No	GROSS ALPHA ACTIVITY	NT	NT	Biennial
SCR2_1SP	04/07/97	05/02/07	SP	17	82%	No	GROSS ALPHA ACTIVITY	D	D	Annual
SCR2_2SP	03/15/95	07/19/04	SP	14	14%	No	LEAD	NT	NT	Annual

Notes:

- Well sample dates taken from Y-12 Analytical Database 2008.
- WL = Groundwater Monitoring Well; SP = Spring.
- Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
- Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
- Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
- The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.8
Supplemental MAROS assessment results for the Chestnut Ridge Security Pits MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-174	02/04/86	05/15/07	WL	3	100%	Yes	TETRACHLOROETHYLENE(PCE)	N/A	D	Quarterly
GW-175	08/17/88	05/01/06	WL	6	100%	Yes	TETRACHLOROETHYLENE(PCE)	S	D	Annual
GW-176	02/04/86	05/17/07	WL	2	100%	Yes	1,1-DICHLOROETHENE	N/A	I	Quarterly
GW-177	02/04/86	07/11/07	WL	13	92%	No	1,1-DICHLOROETHENE	S	I	Annual
GW-178	03/12/88	05/02/06	WL	3	100%	No	1,1-DICHLOROETHENE	N/A	PI	Annual
GW-179	02/10/86	05/21/07	WL	2	100%	Yes	1,1-DICHLOROETHENE	N/A	D	Quarterly
GW-180	03/11/88	05/16/07	WL	2	100%	Yes	TETRACHLOROETHYLENE(PCE)	N/A	D	Quarterly
GW-322	03/12/88	05/08/06	WL	4	100%	Yes	1,1-DICHLOROETHENE	S	NT	Annual
GW-514	02/11/89	05/01/06	WL	3	67%	No	GROSS ALPHA ACTIVITY	N/A	S	Annual
GW-609	02/14/90	05/02/06	WL	15	87%	Yes	TETRACHLOROETHYLENE(PCE)	D	D	Annual
GW-612	02/10/90	05/17/07	WL	6	100%	Yes	1,1-DICHLOROETHENE	S	D	Annual
GW-831	01/13/05	07/10/06	WL	4	50%	Yes	GROSS BETA ACTIVITY	NT	NT	Quarterly
SCR3_5SP	04/08/97	07/17/07	SP	19	58%	No	GROSS ALPHA ACTIVITY	PI	PI	Annual

Notes:

1. Well sample dates taken from Y-12 Analytical Database 2008.
2. WL = Groundwater Monitoring Well; SP = Spring.
3. Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
4. Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
5. Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
6. The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.9
Supplemental MAROS assessment results for the Landfills V and VII Area MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-557	01/20/05	07/16/07	WL	6	83%	No	NITRATE	PD	PD	Annual
GW-560	01/19/05	07/17/07	WL	6	17%	No	GROSS ALPHA ACTIVITY	NT	NT	Annual
GW-562	01/19/05	07/17/07	WL	6	17%	No	GROSS ALPHA ACTIVITY	NT	NT	Annual
GW-564	01/19/05	07/17/07	WL	6	83%	No	NITRATE	S	S	Annual
GW-796	01/18/05	07/16/07	WL	6	33%	No	GROSS BETA ACTIVITY	S	S	Annual
GW-797	01/20/05	07/17/07	WL	6	100%	No	NITRATE	I	I	Annual
GW-798	06/23/93	07/17/07	WL	27	70%	No	TETRACHLOROETHYLENE(PCE)	I	I	Annual
GW-799	01/20/05	07/17/07	WL	6	33%	No	GROSS ALPHA ACTIVITY	S	S	Annual
GW-801	01/19/05	07/16/07	WL	6	83%	No	NITRATE	S	S	Annual
SCR4_3SP	02/14/94	07/17/07	SP	24	0%	No	TETRACHLOROETHYLENE(PCE)	ND	ND	Biennial

Notes:

1. Well sample dates taken from Y-12 Analytical Database 2008.
2. WL = Groundwater Monitoring Well; SP = Spring.
3. Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
4. Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
5. Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
6. The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

TABLE B.10
Supplemental MAROS assessment results for the East Chestnut Ridge MAROS analysis group

Location Name	Earliest Sample Date	Most Recent Sample Date	Location Type	Number of Samples 1996-2007	Percent Detection 1996-2007	Average Concentration Exceeds Screening Level	Historic Priority Constituent	Trend for Priority Constituent 1996-2007	Trend for Priority Constituent 1986 - 2007	Preliminary Frequency
GW-143	04/07/05	01/08/07	WL	5	100%	No	GROSS BETA ACTIVITY	S	S	Biennial
GW-144	02/28/86	01/04/07	WL	24	96%	No	GROSS ALPHA ACTIVITY	NT	D	Biennial
GW-145	03/05/86	01/08/07	WL	24	100%	No	GROSS ALPHA ACTIVITY	S	D	Annual
GW-156	01/18/95	01/08/07	WL	22	45%	No	URANIUM	D	D	Biennial
GW-159	01/15/95	01/08/07	WL	22	45%	No	URANIUM	D	D	Biennial
GW-161	01/25/07	07/10/07	WL	2	50%	No	CADMIUM	N/A	N/A	Quarterly
GW-231	04/07/05	01/04/07	WL	5	40%	No	GROSS BETA ACTIVITY	S	S	Biennial
GW-292	01/23/07	07/10/07	WL	2	100%	No	NITRATE	N/A	N/A	Annual
GW-293	01/24/07	07/10/07	WL	2	100%	No	NITRATE	N/A	N/A	Annual
GW-294	01/22/07	07/11/07	WL	2	100%	No	NITRATE	N/A	N/A	Annual
GW-296	01/22/07	07/10/07	WL	2	100%	No	NITRATE	N/A	N/A	Annual
GW-298	02/03/88	07/09/07	WL	3	67%	No	GROSS ALPHA ACTIVITY	N/A	NT	Annual
GW-301	01/13/05	07/10/06	WL	4	50%	Yes	GROSS BETA ACTIVITY	NT	NT	Quarterly
GW-731	01/17/95	01/09/07	WL	22	23%	No	URANIUM	NT	NT	Biennial
GW-732	01/18/95	01/09/07	WL	22	41%	No	URANIUM	PD	D	Biennial
GW-841	02/06/97	03/08/07	WL	13	100%	Yes	TRICHLOROETHYLENE (TCE)	PD	PD	Quarterly
GW-842	02/05/97	03/08/07	WL	16	94%	No	TRICHLOROETHYLENE (TCE)	NT	NT	Annual

Notes:

1. Well sample dates taken from Y-12 Analytical Database 2008.
2. WL = Groundwater Monitoring Well; SP = Spring.
3. Trend = Insufficient Data (N/A), Decreasing (D), Probably Decreasing (PD), Stable (S), Probably Increasing (PI), and Increasing (I), No Trend (NT); and non-detect for all sample events (ND).
4. Number of samples between 1996-2007 is the count of analytical samples acquired at the location based on the Analytical Database (2008).
5. Priority Constituent is the COC with the highest average concentration from the full dataset normalized by the screening level. (e.g. MAX [Ave Conc./Screening Level]). Priority constituent indicated for wells where average concentrations do not exceed screening levels may be background level.
6. The Preliminary Frequency is the sampling frequency recommended by MAROS for results 1996 -2007. Low number of samples triggers default quarterly sampling.

APPENDIX C

SUPPLEMENTAL MAROS ASSESSMENT SUMMARY REPORTS

APPENDIX C.1

WEST S-3 AREA

MAROS COC Assessment

Project: BC West S3

User Name: MV

Location: West S-3

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
NITRATE	1.5E+03	1.0E+01	14633.8%
GROSS BETA ACTIVITY	1.5E+03	5.0E+01	2972.3%
CADMIUM	7.0E-02	5.0E-03	1294.4%
GROSS ALPHA ACTIVITY	1.2E+02	1.5E+01	722.1%
URANIUM	2.2E-01	3.0E-02	635.2%
TETRACHLOROETHYLENE(PCE)	9.9E-03	5.0E-03	97.5%
TRICHLOROETHYLENE (TCE)	9.3E-03	5.0E-03	86.3%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
NITRATE	INO	22	19	86.4%	22
GROSS BETA ACTIVITY	INO	22	13	59.1%	22
GROSS ALPHA ACTIVITY	INO	22	13	59.1%	22
URANIUM	MET	22	7	31.8%	22
TETRACHLOROETHYLENE(PCE)	ORG	22	7	31.8%	18
CADMIUM	MET	22	6	27.3%	6
TRICHLOROETHYLENE (TCE)	ORG	22	5	22.7%	13

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
NITRATE	
GROSS BETA ACTIVITY	
GROSS ALPHA ACTIVITY	
TRICHLOROETHYLENE (TCE)	0.297
TETRACHLOROETHYLENE(PCE)	0.923
CADMIUM	15
URANIUM	2960

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

NITRATE

Project: BC West S3

User Name: MV

Location: West S-3

State: Tennessee

TRICHLOROETHYLENE (TCE)

TETRACHLOROETHYLENE(PCE)

URANIUM

GROSS BETA ACTIVITY

MAROS Spatial Moment Analysis Summary

Project: BC West S3

User Name: MV

Location: West S-3

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
GROSS BETA ACTIVITY							
7/1/2004	1.1E+04	51,951	29,819	338	109,137	15,266	10
7/1/2005	8.9E+03	52,204	29,904	330	41,290	12,072	16
7/1/2006	7.7E+03	51,948	29,864	294	185,647	10,892	11
7/1/2007	5.1E+03	52,206	29,820	399	55,340	6,534	13
NITRATE							
7/1/2004	1.8E+04	51,802	29,899	318	91,516	20,861	8
7/1/2005	2.2E+04	51,637	29,835	476	307,867	17,378	16
7/1/2006	5.2E+04	51,539	29,871	533	131,684	10,834	11
7/1/2007	1.3E+04	52,037	29,874	285	123,436	27,145	13
TETRACHLOROETHYLENE(PCE)							
7/1/2004	6.3E-01	51,693	29,751	501	136,757	20,842	10
7/1/2005	4.2E-01	51,657	29,676	584	444,759	34,547	16
7/1/2006	4.3E-01	51,569	29,713	610	299,393	28,376	11
7/1/2007	3.5E-01	51,699	29,709	532	340,457	31,787	13
TRICHLOROETHYLENE (TCE)							
7/1/2004	2.6E-01	51,367	29,652	801	197,781	33,101	10
7/1/2005	4.2E-01	50,854	29,511	1,306	466,970	36,365	16
7/1/2006	2.2E-01	51,122	29,640	1,010	287,888	30,200	11
7/1/2007	2.5E-01	51,148	29,589	1,015	332,238	30,110	13
URANIUM							
7/1/2004	2.0E+00	52,195	29,863	357	60,560	14,928	10
7/1/2005	6.8E-01	51,905	29,748	415	561,050	23,108	16
7/1/2006	2.5E+00	52,192	29,795	412	120,142	5,085	11
7/1/2007	3.5E+00	52,155	29,883	318	88,937	15,570	13

Project: BC West S3

User Name: MV

Location: West S-3

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	GROSS BETA ACTIVITY	0.30	-6	95.8%	D
	NITRATE	0.67	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.26	-4	83.3%	S
	TRICHLOROETHYLENE (TCE)	0.31	-2	62.5%	S
	URANIUM	0.54	4	83.3%	NT
1st Moment: Distance to Source					
	GROSS BETA ACTIVITY	0.13	0	37.5%	S
	NITRATE	0.30	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.09	2	62.5%	NT
	TRICHLOROETHYLENE (TCE)	0.20	2	62.5%	NT
	URANIUM	0.13	-2	62.5%	S
2nd Moment: Sigma XX					
	GROSS BETA ACTIVITY	0.67	0	37.5%	S
	NITRATE	0.60	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.42	2	62.5%	NT
	TRICHLOROETHYLENE (TCE)	0.35	2	62.5%	NT
	URANIUM	1.14	0	37.5%	NT
2nd Moment: Sigma YY					
	GROSS BETA ACTIVITY	0.32	-6	95.8%	D
	NITRATE	0.36	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.21	2	62.5%	NT
	TRICHLOROETHYLENE (TCE)	0.09	-4	83.3%	S
	URANIUM	0.50	0	37.5%	S

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 Saturated Thickness: Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: BC West S3

User Name: MV

Location: West S-3

State: Tennessee

Time Period: 1/1/1996 to 7/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS BETA ACTIVITY								
GW-100	T	3	2	1.4E+00	1.5E+00	No	N/A	N/A
GW-101	T	3	2	2.8E+00	2.3E+00	No	N/A	N/A
GW-122	T	4	1	4.0E+00	1.0E-02	No	NT	NT
GW-127	T	3	2	1.2E+01	1.5E+01	No	N/A	N/A
GW-236	T	4	4	6.2E+01	6.3E+01	No	D	D
GW-244	T	2	2	4.0E+03	4.0E+03	No	N/A	N/A
GW-245	T	2	2	1.0E+03	1.0E+03	No	N/A	N/A
GW-246	S	6	6	1.7E+04	1.7E+04	No	S	NT
GW-247	T	2	2	3.9E+03	3.9E+03	No	N/A	N/A
GW-276	S	23	23	4.3E+02	3.7E+02	No	D	D
GW-277	T	3	3	9.6E+02	1.1E+03	No	N/A	N/A
GW-307	T	3	2	8.3E+00	1.1E+01	No	N/A	N/A
GW-310	T	3	3	1.7E+01	1.8E+01	No	N/A	N/A
GW-311	T	16	13	5.7E+00	4.3E+00	No	D	D
GW-312	T	2	2	8.0E+00	8.0E+00	No	N/A	N/A
GW-313	T	3	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-315	T	22	22	2.6E+01	2.6E+01	No	S	D
GW-526	T	18	10	8.3E+01	2.7E+01	No	NT	NT
GW-615	S	4	4	6.6E+02	7.1E+02	No	S	NT
GW-616	T	5	1	1.3E-01	1.0E-02	No	NT	D
GW-829	T	13	12	4.9E+01	4.5E+00	No	NT	D
SS-1	T	21	21	4.0E+01	3.7E+01	No	NT	NT
NITRATE								
GW-100	T	3	3	4.7E+01	5.1E+01	No	N/A	N/A
GW-101	T	3	3	5.7E+01	6.1E+01	No	N/A	N/A
GW-122	T	4	4	3.6E+02	3.4E+02	No	S	S
GW-127	T	3	2	1.3E-01	1.4E-01	No	N/A	N/A
GW-236	T	3	3	5.3E+01	5.3E+01	No	N/A	N/A
GW-244	T	2	2	4.3E+03	4.3E+03	No	N/A	N/A
GW-245	T	2	2	2.2E+03	2.2E+03	No	N/A	N/A
GW-246	S	6	6	3.0E+03	2.9E+03	No	NT	NT
GW-247	T	2	2	3.2E+03	3.2E+03	No	N/A	N/A
GW-276	S	12	12	7.6E+01	7.2E+01	No	D	D
GW-277	T	3	3	4.1E+02	4.1E+02	No	N/A	N/A

MAROS Statistical Trend Analysis Summary

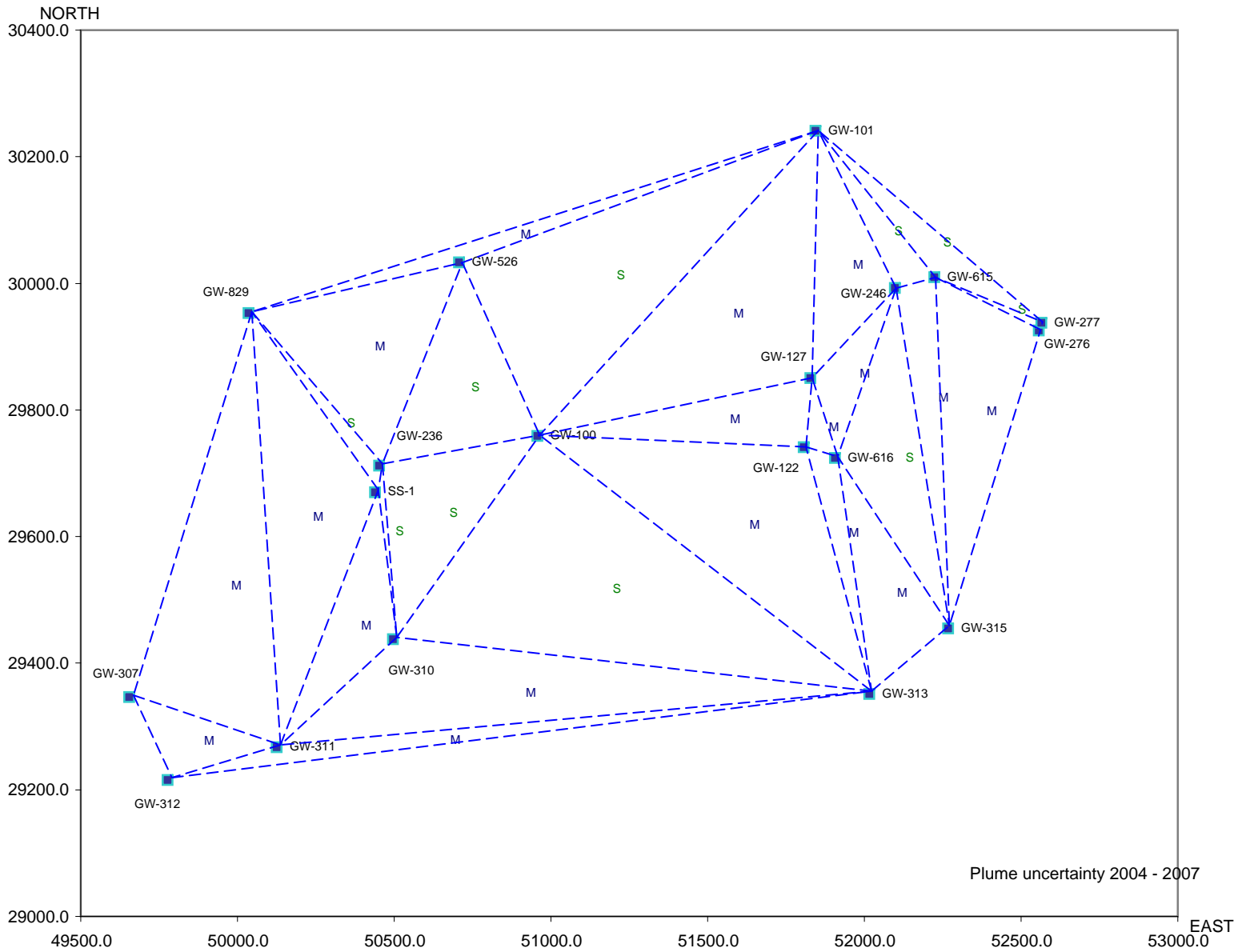
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
NITRATE								
GW-307	T	3	3	2.0E+00	2.2E+00	No	N/A	N/A
GW-310	T	3	3	6.9E+00	7.3E+00	No	N/A	N/A
GW-311	T	20	20	3.5E-01	3.3E-01	No	S	S
GW-312	T	2	2	5.7E-01	5.7E-01	No	N/A	N/A
GW-313	T	3	3	1.3E+00	1.5E+00	No	N/A	N/A
GW-315	T	21	21	7.6E+00	7.8E+00	No	D	S
GW-526	T	5	5	1.2E+03	1.2E+03	No	S	S
GW-615	S	4	4	1.1E+04	1.1E+04	No	NT	NT
GW-616	T	6	6	2.6E+02	2.7E+02	No	S	S
GW-829	T	12	12	2.6E+01	2.4E+01	No	D	PD
SS-1	T	21	21	1.4E+01	1.4E+01	No	PD	PD
TETRACHLOROETHYLENE(PCE)								
GW-100	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-101	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-122	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-127	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-236	T	4	2	1.0E-03	7.5E-04	No	NT	NT
GW-244	T	2	2	5.5E-03	5.5E-03	No	N/A	N/A
GW-245	T	2	2	2.5E-03	2.5E-03	No	N/A	N/A
GW-246	S	6	6	1.1E-01	1.1E-01	No	S	D
GW-247	T	2	2	8.0E-03	8.0E-03	No	N/A	N/A
GW-276	S	24	24	1.1E-02	1.0E-02	No	D	D
GW-277	T	3	3	2.1E-02	1.8E-02	No	N/A	N/A
GW-307	T	3	1	1.0E-03	5.0E-04	No	N/A	N/A
GW-310	T	3	3	2.3E-03	2.0E-03	No	N/A	N/A
GW-311	T	21	1	5.2E-04	5.0E-04	No	NT	NT
GW-312	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-313	T	3	3	5.7E-03	6.0E-03	No	N/A	N/A
GW-315	T	22	22	1.1E-02	1.0E-02	No	D	D
GW-526	T	15	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-615	S	8	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-616	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-829	T	13	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-1	T	21	4	6.9E-04	5.0E-04	No	D	D
TRICHLOROETHYLENE (TCE)								
GW-100	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-101	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-122	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-127	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-236	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-244	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-245	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-246	S	6	6	1.7E-03	2.0E-03	No	S	S
GW-247	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TRICHLOROETHYLENE (TCE)								
GW-276	S	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-277	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-307	T	3	3	1.8E-02	2.1E-02	No	N/A	N/A
GW-310	T	3	3	5.7E-03	5.0E-03	No	N/A	N/A
GW-311	T	21	21	5.5E-03	4.0E-03	No	D	D
GW-312	T	2	2	3.8E-02	3.8E-02	No	N/A	N/A
GW-313	T	3	3	2.0E-03	2.0E-03	No	N/A	N/A
GW-315	T	22	20	4.5E-03	5.0E-03	No	D	S
GW-526	T	15	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-615	S	8	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-616	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-829	T	13	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-1	T	21	2	6.4E-04	5.0E-04	No	S	D
URANIUM								
GW-100	T	3	2	7.2E-04	6.9E-04	No	N/A	N/A
GW-101	T	3	3	2.5E-03	1.8E-03	No	N/A	N/A
GW-122	T	4	4	1.6E-03	1.6E-03	No	I	I
GW-127	T	3	3	2.6E-02	2.8E-02	No	N/A	N/A
GW-236	T	4	4	8.0E-03	6.4E-03	No	NT	NT
GW-244	T	2	2	2.3E-03	2.3E-03	No	N/A	N/A
GW-245	T	2	2	3.7E-02	3.7E-02	No	N/A	N/A
GW-246	S	6	6	5.3E-01	4.5E-01	No	NT	NT
GW-247	T	2	2	2.4E-02	2.4E-02	No	N/A	N/A
GW-276	S	24	24	7.9E-01	7.5E-01	No	D	D
GW-277	T	3	3	2.8E-02	6.1E-03	No	N/A	N/A
GW-307	T	3	3	1.6E-03	1.6E-03	No	N/A	N/A
GW-310	T	3	3	3.8E-03	3.8E-03	No	N/A	N/A
GW-311	T	21	9	2.7E-04	1.0E-05	No	NT	NT
GW-312	T	2	1	4.3E-04	4.3E-04	No	N/A	N/A
GW-313	T	3	1	2.6E-04	1.0E-05	No	N/A	N/A
GW-315	T	22	21	2.1E-03	2.3E-03	No	NT	NT
GW-526	T	15	2	6.0E-05	1.0E-05	No	NT	D
GW-615	S	8	8	8.4E-01	7.9E-01	No	NT	NT
GW-616	T	6	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-829	T	13	13	6.4E-03	1.3E-03	No	I	NT
SS-1	T	21	21	3.5E-02	4.1E-02	No	D	D

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location
Analysis for

NITRATE

Existing
Locations

**Potential areas for
new locations** are
indicated by triangles
with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high
estimation error ->
possible need for
new locations

Low SF -> low
estimation error ->
no need for new
locations

**Back to
Access**

APPENDIX C.2
OIL LANDFARM WMA

MAROS COC Assessment

Project: BC OLF WMA

User Name: MV

Location: OLFA

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
TRICHLOROETHYLENE (TCE)	3.6E-02	5.0E-03	611.2%
NITRATE	5.6E+01	1.0E+01	462.4%
VINYL CHLORIDE	3.6E-03	2.0E-03	81.7%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
TRICHLOROETHYLENE (TCE)	ORG	32	17	53.1%	26
NITRATE	INO	21	10	47.6%	20
VINYL CHLORIDE	ORG	32	4	12.5%	4

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
NITRATE	
VINYL CHLORIDE	0.042
TRICHLOROETHYLENE (TCE)	0.297

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

TRICHLOROETHYLENE (TCE)

NITRATE

VINYL CHLORIDE

MAROS Spatial Moment Analysis Summary

Project: BC EMWMF

User Name: MV

Location: OLFA

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
GROSS ALPHA ACTIVITY							
7/1/2004	2.1E+02	48,474	29,397	724	242,112	55,816	10
7/1/2005	5.9E+02	48,055	29,423	1,137	107,373	16,164	19
7/1/2006	2.1E+01	47,596	29,371	1,583	380,264	20,395	10
7/1/2007	1.4E+02	47,429	29,150	1,741	77,235	10,080	12
NITRATE							
7/1/2004	6.5E+03	48,795	29,590	544	150,060	37,737	10
7/1/2005	3.4E+03	48,928	29,613	483	174,313	54,798	18
7/1/2006	4.1E+03	48,855	29,605	516	156,133	35,210	10
7/1/2007	4.6E+03	48,769	29,548	533	196,118	54,482	13
TETRACHLOROETHYLENE(PCE)							
7/1/2004	2.6E-01	48,033	29,633	1,217	212,173	145,823	23
7/1/2005	4.6E-01	48,109	29,598	1,134	198,793	119,252	31
7/1/2006	6.5E-01	48,141	29,594	1,103	163,154	81,238	23
7/1/2007	4.5E-01	48,100	29,612	1,147	209,031	112,088	26
TRICHLOROETHYLENE (TCE)							
7/1/2004	7.7E+00	48,183	29,341	997	167,152	29,903	23
7/1/2005	4.7E+00	48,025	29,227	1,145	320,796	50,988	31
7/1/2006	5.2E+00	48,128	29,337	1,051	220,187	34,817	23
7/1/2007	4.9E+00	48,060	29,260	1,110	260,854	43,244	26
VINYL CHLORIDE							
7/1/2004	1.3E-01	48,257	29,494	960	369,526	41,859	11
7/1/2005	2.1E-01	47,884	29,353	1,295	576,684	59,199	19
7/1/2006	1.3E-01	48,239	29,491	976	383,533	41,862	11
7/1/2007	4.1E-01	47,864	30,057	1,564	479,831	368,081	26

Project: BC EMWMF

User Name: MV

Location: OLFA

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	GROSS ALPHA ACTIVITY	1.02	-2	62.5%	NT
	NITRATE	0.29	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.35	2	62.5%	NT
	TRICHLOROETHYLENE (TCE)	0.24	-2	62.5%	S
	VINYL CHLORIDE	0.61	4	83.3%	NT
1st Moment: Distance to Source					
	GROSS ALPHA ACTIVITY	0.35	6	95.8%	I
	NITRATE	0.05	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.04	-2	62.5%	S
	TRICHLOROETHYLENE (TCE)	0.06	2	62.5%	NT
	VINYL CHLORIDE	0.24	4	83.3%	NT
2nd Moment: Sigma XX					
	GROSS ALPHA ACTIVITY	0.69	-2	62.5%	S
	NITRATE	0.12	4	83.3%	NT
	TETRACHLOROETHYLENE(PCE)	0.11	-2	62.5%	S
	TRICHLOROETHYLENE (TCE)	0.27	2	62.5%	NT
	VINYL CHLORIDE	0.21	2	62.5%	NT
2nd Moment: Sigma YY					
	GROSS ALPHA ACTIVITY	0.80	-4	83.3%	S
	NITRATE	0.23	0	37.5%	S
	TETRACHLOROETHYLENE(PCE)	0.23	-4	83.3%	S
	TRICHLOROETHYLENE (TCE)	0.23	2	62.5%	NT
	VINYL CHLORIDE	1.26	4	83.3%	NT

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 Saturated Thickness: Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: BC EMWMF

User Name: MV

Location: OLFA

State: Tennessee

Time Period: 1/1/1996 to 7/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
NITRATE								
GW-008	T	2	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-085	T	23	23	1.3E+02	1.0E+02	No	S	S
GW-097	T	2	1	5.0E-02	5.0E-02	No	N/A	N/A
GW-098	T	8	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-225	S	14	14	3.8E+01	3.8E+01	No	I	PI
GW-226	T	19	19	1.6E+01	1.4E+01	No	NT	S
GW-227	T	2	2	3.4E+00	3.4E+00	No	N/A	N/A
GW-229	S	10	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-363	T	4	1	2.2E-02	2.0E-02	No	NT	NT
GW-364	T	4	3	2.8E-01	1.5E-01	No	NT	D
GW-365	T	4	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-368	T	3	3	8.8E+00	8.9E+00	No	N/A	N/A
GW-369	T	1	1	9.3E+00	9.3E+00	No	N/A	N/A
GW-537	T	21	21	6.3E+02	6.3E+02	No	D	D
GW-601	T	4	4	1.8E+01	1.9E+01	No	NT	I
GW-724	T	21	21	2.3E+01	2.3E+01	No	D	D
GW-725	S	21	21	3.1E+01	2.4E+01	No	D	D
GW-736	T	4	4	1.4E+01	1.3E+01	No	D	D
GW-738	T	21	21	1.4E+01	1.4E+01	No	S	S
GW-739	T	4	4	1.5E+00	1.5E+00	No	NT	NT
GW-740	T	21	21	2.5E+00	2.3E+00	No	D	D
TETRACHLOROETHYLENE(PCE)								
GW-008	T	20	20	4.0E-02	3.7E-02	No	I	I
GW-085	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-097	T	4	1	7.9E-04	5.0E-05	No	NT	NT
GW-098	T	8	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-225	S	14	10	1.0E-03	1.0E-03	No	I	I
GW-226	T	20	4	2.9E-04	5.0E-05	No	PI	I
GW-227	T	2	2	1.0E-03	1.0E-03	No	N/A	N/A
GW-229	S	10	2	2.4E-04	5.0E-05	No	NT	NT
GW-363	T	26	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-364	T	4	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-365	T	4	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-368	T	3	0	5.0E-05	5.0E-05	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TETRACHLOROETHYLENE(PCE)								
GW-369	T	1	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-537	T	22	1	9.3E-05	5.0E-05	No	NT	PD
GW-601	T	4	1	5.4E-04	5.0E-05	No	NT	NT
GW-724	T	22	16	2.3E-03	3.0E-03	No	PI	I
GW-725	S	22	13	1.5E-03	1.3E-03	No	I	I
GW-736	T	4	3	1.3E-03	1.5E-03	No	NT	NT
GW-738	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-739	T	4	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-740	T	22	1	9.3E-05	5.0E-05	No	NT	PI
GW-916	T	22	1	1.4E-04	5.0E-05	No	NT	NT
GW-917	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-918	T	22	1	7.0E-05	5.0E-05	No	NT	NT
GW-920	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-921	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-922	T	22	1	9.3E-05	5.0E-05	No	NT	PI
GW-923	T	16	1	6.6E-05	5.0E-05	No	NT	NT
GW-924	T	23	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-925	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-926	T	22	2	8.2E-05	5.0E-05	No	NT	NT
GW-927	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
TRICHLOROETHYLENE (TCE)								
GW-008	T	20	20	9.5E-03	9.5E-03	No	I	I
GW-085	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-097	T	4	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-098	T	8	8	7.9E-03	7.0E-03	No	NT	NT
GW-225	S	14	14	2.3E-01	2.3E-01	No	I	I
GW-226	T	20	20	1.3E-01	1.3E-01	No	S	S
GW-227	T	2	2	1.7E-02	1.7E-02	No	N/A	N/A
GW-229	S	10	8	8.6E-03	8.5E-03	No	NT	I
GW-363	T	26	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-364	T	4	4	6.5E-03	6.0E-03	No	S	S
GW-365	T	4	4	2.8E-02	2.7E-02	No	S	D
GW-368	T	3	3	5.2E-02	5.0E-02	No	N/A	N/A
GW-369	T	1	1	4.6E-02	4.6E-02	No	N/A	N/A
GW-537	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-601	T	4	4	8.5E-02	8.5E-02	No	S	S
GW-724	T	22	22	9.9E-02	1.0E-01	No	D	NT
GW-725	S	22	22	4.7E-02	1.8E-02	No	NT	NT
GW-736	T	4	4	8.0E-03	8.0E-03	No	S	S
GW-738	T	22	22	3.1E-02	3.0E-02	No	D	D
GW-739	T	4	4	3.4E-02	3.5E-02	No	S	D
GW-740	T	22	22	5.7E-02	5.7E-02	No	D	D
GW-916	T	22	2	5.1E-04	5.0E-05	No	NT	NT
GW-917	T	22	1	6.6E-05	5.0E-05	No	NT	NT
GW-918	T	22	2	1.5E-04	5.0E-05	No	NT	NT

MAROS Statistical Trend Analysis Summary

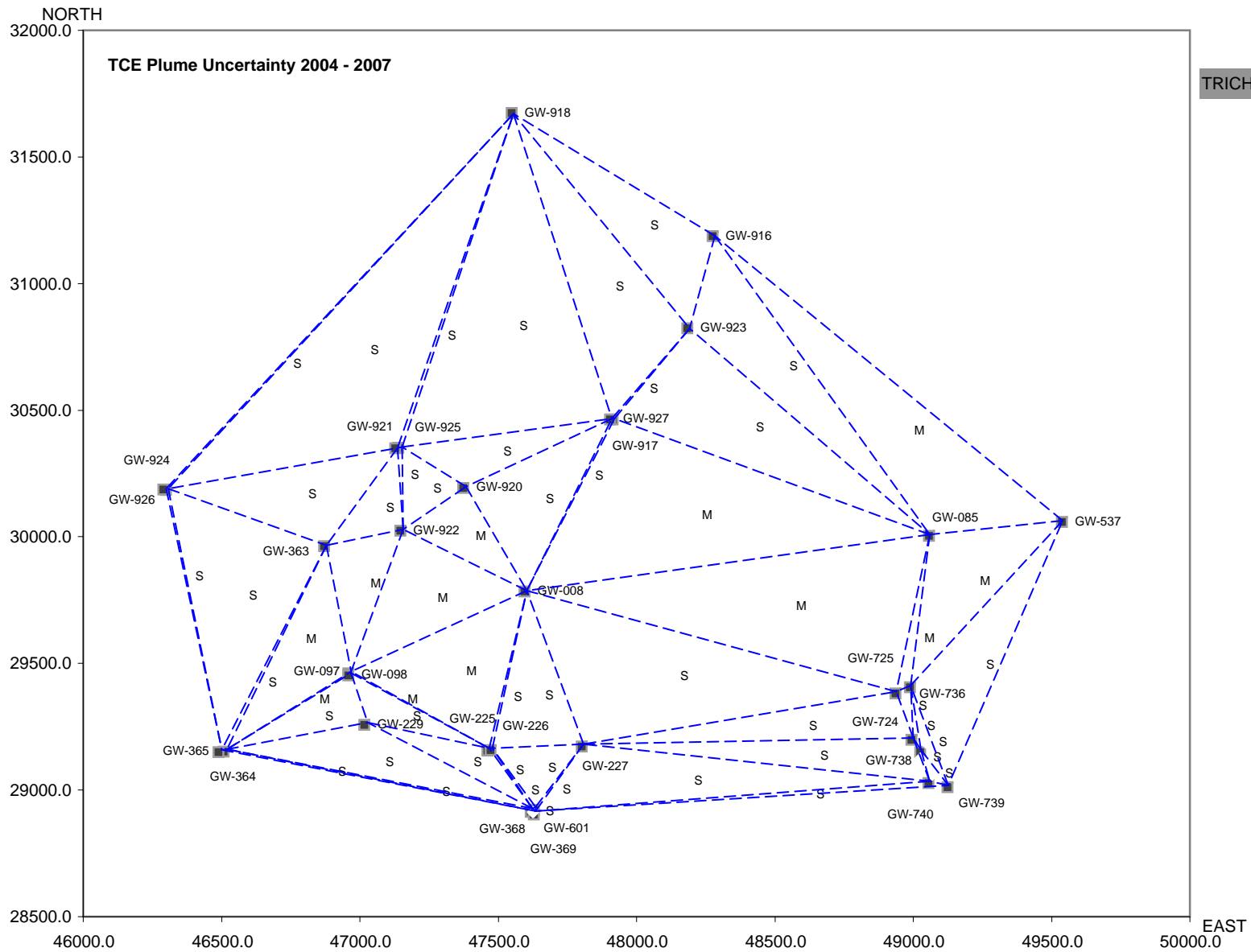
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TRICHLOROETHYLENE (TCE)								
GW-920	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-921	T	22	1	5.2E-05	5.0E-05	No	S	D
GW-922	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-923	T	16	1	1.7E-04	5.0E-05	No	NT	NT
GW-924	T	23	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-925	T	22	2	6.4E-05	5.0E-05	No	NT	NT
GW-926	T	22	1	2.3E-04	5.0E-05	No	NT	NT
GW-927	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
URANIUM								
GW-008	T	6	2	2.0E-05	4.6E-06	No	NT	I
GW-085	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-097	T	2	2	6.4E-04	6.4E-04	No	N/A	N/A
GW-098	T	4	4	1.5E-03	1.5E-03	No	S	PD
GW-225	S	6	6	2.9E-03	2.9E-03	No	NT	S
GW-226	T	6	6	7.6E-03	6.8E-03	No	S	S
GW-227	T	2	2	5.3E-02	5.3E-02	No	N/A	N/A
GW-229	S	4	4	1.7E-01	1.7E-01	No	NT	NT
GW-363	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-364	T	2	2	1.9E-03	1.9E-03	No	N/A	N/A
GW-365	T	2	2	8.1E-04	8.1E-04	No	N/A	N/A
GW-368	T	3	3	1.7E-03	1.6E-03	No	N/A	N/A
GW-369	T	1	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-537	T	4	4	1.2E-03	1.2E-03	No	S	S
GW-601	T	3	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-724	T	4	3	5.5E-04	6.8E-04	No	S	S
GW-725	S	4	4	1.0E-02	1.1E-02	No	NT	NT
GW-736	T	2	2	3.1E-02	3.1E-02	No	N/A	N/A
GW-738	T	4	4	2.6E-03	2.6E-03	No	NT	NT
GW-739	T	2	2	6.2E-04	6.2E-04	No	N/A	N/A
GW-740	T	4	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-916	T	6	1	6.5E-04	4.6E-06	No	NT	PD
GW-917	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-918	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-920	T	6	2	1.1E-03	4.6E-06	No	NT	PD
GW-921	T	6	1	1.2E-03	4.6E-06	No	NT	PD
GW-922	T	6	1	7.2E-04	4.6E-06	No	NT	PD
GW-923	T	4	1	1.6E-03	4.6E-06	No	NT	PD
GW-924	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-925	T	6	1	9.0E-04	4.6E-06	No	NT	NT
GW-926	T	6	3	1.7E-03	1.1E-03	No	NT	D
GW-927	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
VINYL CHLORIDE								
GW-008	T	20	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-085	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
VINYL CHLORIDE								
GW-097	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-098	T	8	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-225	S	14	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-226	T	20	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-227	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-229	S	10	10	3.3E-02	3.1E-02	No	NT	S
GW-363	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-364	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-365	T	4	3	3.1E-03	3.5E-03	No	NT	PI
GW-368	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-369	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-537	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-601	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-724	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-725	S	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-736	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-738	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-739	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-740	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-916	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-917	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-918	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-920	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-921	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-922	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-923	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-924	T	8	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-925	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-926	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-927	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
TRICHLOROETHYLENE (TCE)

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

Back to Access

APPENDIX C.3

BEAR CREEK BURIAL GROUNDS WMA

MAROS COC Assessment

Project: BC Burial Grounds

User Name: MV

Location: Bear Creek Burial Grounds

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
TETRACHLOROETHYLENE(PCE)	7.1E-01	5.0E-03	14080.5%
TRICHLOROETHYLENE (TCE)	3.9E-01	5.0E-03	7765.4%
VINYL CHLORIDE	6.7E-02	2.0E-03	3232.9%
BENZENE	3.2E-02	5.0E-03	532.7%
cis-1,2-DICHLOROETHYLENE	2.6E-01	7.0E-02	265.6%
1,1-DICHLOROETHENE	2.4E-02	7.0E-03	249.7%
CARBON TETRACHLORIDE	1.2E-02	5.0E-03	144.1%
1,2-DICHLOROETHANE	1.2E-02	5.0E-03	143.4%
1,1-DICHLOROETHANE	1.1E-01	8.1E-02	34.5%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
TRICHLOROETHYLENE (TCE)	ORG	41	17	41.5%	29
VINYL CHLORIDE	ORG	41	16	39.0%	16
TETRACHLOROETHYLENE(PCE)	ORG	41	13	31.7%	25
1,1-DICHLOROETHENE	ORG	41	11	26.8%	19
BENZENE	ORG	41	9	22.0%	22
cis-1,2-DICHLOROETHYLENE	ORG	41	8	19.5%	26
1,1-DICHLOROETHANE	ORG	41	7	17.1%	19
1,2-DICHLOROETHANE	ORG	41	6	14.6%	10
CARBON TETRACHLORIDE	ORG	41	5	12.2%	11

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
VINYL CHLORIDE	0.042
1,1-DICHLOROETHANE	0.0573
1,2-DICHLOROETHANE	0.0679
cis-1,2-DICHLOROETHYLENE	0.0724
BENZENE	0.0984
1,1-DICHLOROETHENE	0.13
CARBON TETRACHLORIDE	0.277
TRICHLOROETHYLENE (TCE)	0.297
TETRACHLOROETHYLENE(PCE)	0.923

Project: BC Burial Grounds

User Name: MV

Location: Bear Creek Burial Grounds

State: Tennessee

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume f_{oc} = 0.001, and K_d's for metals).

Contaminants of Concern (COC's)

TETRACHLOROETHYLENE(PCE)

TRICHLOROETHYLENE (TCE)

VINYL CHLORIDE

BENZENE

1,1-DICHLOROETHENE

MAROS Spatial Moment Analysis Summary

Project: BC Burial Ground

User Name: MV

Location: Bear Creek Burial Grounds

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
GROSS ALPHA ACTIVITY							
7/1/1996	1.1E+04	41,134	29,089	2,201	3,049,075	115,977	17
7/1/1997	4.6E+03	41,259	28,829	2,153	6,117,309	129,101	24
7/1/1998	7.9E+03	39,613	29,132	3,696	14,187,110	256,925	32
7/1/1999	1.1E+04	39,168	29,107	4,141	12,757,027	98,789	21
7/1/2000	4.8E+03	41,654	28,808	1,796	11,663,396	84,297	24
7/1/2001	4.1E+03	42,121	28,845	1,367	5,170,597	98,504	22
7/1/2002	9.1E+03	42,879	28,930	751	1,526,762	79,578	26
7/1/2003	4.8E+03	42,300	28,900	1,186	2,315,758	97,143	19
7/1/2004	5.8E+03	41,451	28,994	1,920	2,753,573	87,936	15
7/1/2005	9.3E+02	42,549	28,884	1,001	3,992,575	99,284	28
7/1/2006	9.8E+02	41,865	28,893	1,569	4,811,866	80,278	24
7/1/2007	1.8E+03	42,673	28,781	992	1,585,966	45,727	23
TETRACHLOROETHYLENE(PCE)							
7/1/1996	1.2E+00	41,670	29,202	1,654	2,830,090	134,905	18
7/1/1997	1.9E+00	38,378	29,235	4,917	13,306,682	172,560	25
7/1/1998	8.2E+00	41,755	29,866	1,559	7,075,371	279,412	32
7/1/1999	8.2E+00	41,965	29,585	1,319	7,652,905	160,136	26
7/1/2000	6.8E+00	41,699	29,445	1,589	8,336,983	113,558	24
7/1/2001	7.2E+00	41,835	29,528	1,449	8,172,749	121,125	24
7/1/2002	3.9E+01	42,885	29,752	442	1,750,761	90,430	28
7/1/2003	1.2E+01	42,313	29,461	976	5,540,474	130,122	23
7/1/2004	4.5E+01	43,245	29,671	115	920,297	38,165	24
7/1/2005	4.0E+01	43,127	29,796	282	1,027,640	80,603	34
7/1/2006	6.1E+01	42,987	29,613	302	655,905	64,956	31
7/1/2007	5.7E+01	43,062	29,730	278	295,286	46,091	31
TRICHLOROETHYLENE (TCE)							
7/1/1996	1.8E+00	42,356	29,125	1,026	2,887,021	125,444	18
7/1/1997	2.3E+00	39,169	29,134	4,137	14,557,612	153,735	25
7/1/1998	1.3E+01	42,788	29,492	501	5,776,002	187,810	32
7/1/1999	1.8E+01	42,989	29,559	295	4,566,656	162,435	26
7/1/2000	1.1E+01	42,632	29,297	704	6,167,351	97,077	24
7/1/2001	1.1E+01	42,603	29,386	703	6,245,095	108,856	24
7/1/2002	2.3E+01	42,985	29,510	303	3,139,120	133,477	28
7/1/2003	1.3E+01	42,602	29,367	710	5,322,219	115,353	23
7/1/2004	8.1E+00	42,733	29,408	572	4,317,234	103,898	24
7/1/2005	2.2E+01	43,197	29,706	168	1,882,923	118,790	34
7/1/2006	1.8E+01	43,077	29,494	218	2,454,621	80,661	31

Project: BC Burrial Ground
Location: Bear Creek Burial Grounds

User Name: MV
State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
TRICHLOROETHYLENE (TCE)							
7/1/2007	1.6E+01	43,160	29,587	126	947,769	86,251	31
URANIUM							
7/1/2005	2.3E+00	43,050	28,776	820	2,224,008	47,465	35
7/1/2006	1.9E+00	42,636	28,764	1,029	5,589,823	59,898	33
7/1/2007	2.8E+00	42,554	28,887	995	3,144,909	38,522	29
VINYL CHLORIDE							
7/1/1996	9.0E-01	41,210	29,099	2,125	2,643,358	141,754	18
7/1/1997	2.1E+00	38,747	29,262	4,546	13,886,210	208,505	25
7/1/1998	8.7E+00	42,085	29,686	1,205	8,532,893	220,956	32
7/1/1999	1.1E+01	42,216	29,825	1,100	6,842,224	224,829	26
7/1/2000	3.5E+00	40,647	29,298	2,650	13,502,526	139,278	24
7/1/2001	1.2E+01	42,392	29,706	903	5,549,706	99,593	24
7/1/2002	5.9E+00	41,719	29,540	1,565	9,214,245	150,058	28
7/1/2003	1.6E+01	42,551	29,733	752	4,308,663	85,671	23
7/1/2004	3.4E+00	41,418	29,430	1,870	7,130,354	179,406	23
7/1/2005	1.2E+01	42,887	29,739	435	3,324,239	175,896	33
7/1/2006	6.6E+00	42,592	29,495	695	5,261,212	135,274	30
7/1/2007	5.0E+00	42,879	29,727	437	2,389,302	187,983	31

Project: BC Burrial Ground

User Name: MV

Location: Bear Creek Burial Grounds

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	GROSS ALPHA ACTIVITY	0.64	-32	98.4%	D
	TETRACHLOROETHYLENE(PCE)	0.95	50	100.0%	I
	TRICHLOROETHYLENE (TCE)	0.52	24	94.2%	PI
	URANIUM	0.00	0	0.0%	N/A
	VINYL CHLORIDE	0.64	18	87.5%	NT
1st Moment: Distance to Source					
	GROSS ALPHA ACTIVITY	0.56	-34	99.0%	D
	TETRACHLOROETHYLENE(PCE)	1.05	-48	100.0%	D
	TRICHLOROETHYLENE (TCE)	1.38	-36	99.3%	D
	URANIUM	0.00	0	0.0%	N/A
	VINYL CHLORIDE	0.77	-38	99.6%	D
2nd Moment: Sigma XX					
	GROSS ALPHA ACTIVITY	0.77	-24	94.2%	PD
	TETRACHLOROETHYLENE(PCE)	0.87	-40	99.7%	D
	TRICHLOROETHYLENE (TCE)	0.72	-32	98.4%	D
	URANIUM	0.00	0	0.0%	N/A
	VINYL CHLORIDE	0.56	-26	95.7%	D
2nd Moment: Sigma YY					
	GROSS ALPHA ACTIVITY	0.49	-36	99.3%	D
	TETRACHLOROETHYLENE(PCE)	0.55	-44	99.9%	D
	TRICHLOROETHYLENE (TCE)	0.26	-32	98.4%	D
	URANIUM	0.00	0	0.0%	N/A
	VINYL CHLORIDE	0.28	-8	68.1%	S

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: BC Burial Grounds

User Name: MV

Location: Bear Creek Burial Grounds

State: Tennessee

Time Period: 1/1/1996 to 7/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
GW-014	S	8	8	7.2E-02	7.7E-02	No	NT	I
GW-046	S	20	20	9.1E-02	8.3E-02	No	S	PD
GW-052	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-053	T	15	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-058	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-068	T	3	3	1.2E-01	1.1E-01	No	N/A	N/A
GW-071	S	10	10	1.2E-01	1.3E-01	No	I	I
GW-072	T	5	5	6.8E-03	6.0E-03	No	NT	NT
GW-077	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-078	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-079	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-080	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-082	S	17	10	1.4E-02	1.0E-03	No	NT	NT
GW-089	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-242	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-257	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-289	T	8	1	5.6E-04	5.0E-04	No	NT	NT
GW-291	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-624	S	4	4	1.1E-01	1.1E-01	No	NT	NT
GW-626	S	10	10	4.1E-02	2.6E-02	No	NT	PI
GW-627	T	25	25	1.8E-02	1.5E-02	No	I	I
GW-629	T	7	3	1.3E-01	5.0E-04	No	I	I
GW-639	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-653	T	22	10	1.5E-03	5.0E-04	No	NT	NT
GW-683	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-684	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-694	T	10	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-703	T	22	3	7.0E-04	5.0E-04	No	S	D
GW-704	T	24	21	3.9E-03	4.0E-03	No	D	D
GW-706	T	24	3	6.9E-04	5.0E-04	No	PI	I
GW-712	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-713	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-714	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-4	T	23	3	6.5E-04	5.0E-04	No	NT	NT
SS-5	T	26	0	5.0E-04	5.0E-04	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
SS-6_6	T	16	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-6E	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-7	T	13	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-8	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
BENZENE								
GW-014	S	8	7	2.6E-03	2.5E-03	No	NT	I
GW-046	S	20	19	4.2E-02	2.3E-02	No	NT	NT
GW-052	T	3	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-053	T	15	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-058	T	1	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-068	T	3	3	4.5E-02	4.7E-02	No	N/A	N/A
GW-071	S	10	10	1.5E+00	1.3E+00	No	I	I
GW-072	T	5	2	3.4E-04	5.0E-05	No	NT	NT
GW-077	T	21	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-078	T	21	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-079	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-080	T	23	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-082	S	17	11	1.4E-02	1.0E-03	No	NT	NT
GW-089	T	1	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-242	T	5	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-257	T	4	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-289	T	8	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-291	T	6	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-624	S	4	3	1.9E-02	2.2E-02	No	NT	NT
GW-626	S	10	6	5.8E-02	9.0E-03	No	NT	PI
GW-627	T	25	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-629	T	7	3	2.6E-03	5.0E-05	No	PI	I
GW-639	T	19	1	3.1E-04	5.0E-05	No	NT	D
GW-653	T	22	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-683	T	23	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-684	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-694	T	10	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-703	T	22	1	9.3E-05	5.0E-05	No	NT	NT
GW-704	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-706	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-712	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-713	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
GW-714	T	24	0	5.0E-05	5.0E-05	Yes	ND	ND
SS-4	T	23	0	5.0E-05	5.0E-05	Yes	ND	ND
SS-5	T	26	0	5.0E-05	5.0E-05	Yes	ND	ND
SS-6_6	T	16	1	1.1E-04	5.0E-05	No	NT	NT
SS-6E	T	14	0	5.0E-05	5.0E-05	Yes	ND	ND
SS-7	T	13	0	5.0E-05	5.0E-05	Yes	ND	ND
SS-8	T	14	0	5.0E-05	5.0E-05	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TETRACHLOROETHYLENE(PCE)								
TETRACHLOROETHYLENE(PCE)								
GW-014	S	8	8	3.2E-02	2.9E-02	No	NT	I
GW-046	S	20	19	2.0E+00	1.2E+00	No	NT	NT
GW-052	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-053	T	15	4	7.7E-04	5.0E-04	No	S	S
GW-058	T	1	1	4.0E-03	4.0E-03	No	N/A	N/A
GW-068	T	3	3	4.3E-03	2.0E-03	No	N/A	N/A
GW-071	S	10	10	8.6E-01	9.2E-01	No	I	I
GW-072	T	5	1	6.5E-04	5.0E-04	No	S	NT
GW-077	T	21	1	5.2E-04	5.0E-04	No	S	PD
GW-078	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-079	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-080	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-082	S	17	2	7.4E-04	5.0E-04	No	NT	NT
GW-089	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-242	T	5	1	6.0E-04	5.0E-04	No	NT	NT
GW-257	T	4	4	2.1E-01	2.1E-01	No	NT	NT
GW-289	T	8	8	6.5E-01	6.4E-01	No	I	I
GW-291	T	6	6	4.3E-01	4.1E-01	No	S	PD
GW-624	S	4	4	3.8E-01	3.8E-01	No	S	NT
GW-626	S	10	10	3.4E-01	2.5E-01	No	PI	I
GW-627	T	25	25	5.1E-01	4.7E-01	No	I	I
GW-629	T	7	4	7.0E+00	8.0E-04	No	PI	I
GW-639	T	22	1	4.9E-04	5.0E-04	No	S	S
GW-653	T	22	20	4.5E-03	3.5E-03	No	NT	NT
GW-683	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-684	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-694	T	10	1	6.5E-04	5.0E-04	No	S	S
GW-703	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-704	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-706	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-712	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-713	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-714	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-4	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-5	T	26	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-6_6	T	16	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-6E	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-7	T	13	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-8	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
TRICHLOROETHYLENE (TCE)								
GW-014	S	8	8	2.2E-01	2.2E-01	No	NT	I
GW-046	S	20	20	1.8E+00	1.5E+00	No	D	D
GW-052	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TRICHLOROETHYLENE (TCE)								
GW-053	T	15	15	2.7E-03	3.0E-03	No	NT	I
GW-058	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-068	T	3	3	7.4E-02	7.0E-02	No	N/A	N/A
GW-071	S	10	10	1.2E-01	1.1E-01	No	NT	PI
GW-072	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-077	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-078	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-079	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-080	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-082	S	17	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-089	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-242	T	5	4	1.7E-03	2.0E-03	No	NT	NT
GW-257	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-289	T	8	8	1.4E-02	1.4E-02	No	I	I
GW-291	T	6	6	4.8E-02	4.4E-02	No	S	PD
GW-624	S	4	4	5.6E-01	4.5E-01	No	S	S
GW-626	S	10	10	2.2E-01	1.6E-01	No	PI	I
GW-627	T	25	24	1.6E-01	1.5E-01	No	I	I
GW-629	T	7	6	1.8E+00	5.0E-03	No	I	I
GW-639	T	22	1	5.0E-04	5.0E-04	No	S	S
GW-653	T	22	15	2.7E-03	2.0E-03	No	NT	NT
GW-683	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-684	T	24	1	4.8E-04	5.0E-04	No	S	D
GW-694	T	10	9	3.0E-03	3.0E-03	No	D	PD
GW-703	T	22	21	1.4E-02	1.5E-02	No	D	NT
GW-704	T	24	23	4.8E-02	4.3E-02	No	D	S
GW-706	T	24	23	1.1E-02	1.1E-02	No	NT	NT
GW-712	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-713	T	24	1	6.0E-04	5.0E-04	No	NT	PI
GW-714	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-4	T	23	22	7.6E-03	7.0E-03	No	PD	D
SS-5	T	26	5	7.5E-04	5.0E-04	No	S	S
SS-6_6	T	16	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-6E	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-7	T	13	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-8	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
VINYL CHLORIDE								
GW-014	S	8	8	1.8E-01	1.5E-01	No	NT	PI
GW-046	S	20	20	5.1E-01	4.7E-01	No	D	D
GW-052	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-053	T	15	12	3.8E-03	5.0E-03	No	D	D
GW-058	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-068	T	3	3	2.8E-01	2.7E-01	No	N/A	N/A
GW-071	S	10	9	6.0E-03	4.0E-03	No	PI	I
GW-072	T	5	2	1.1E-03	5.0E-04	No	NT	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
VINYL CHLORIDE								
GW-077	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-078	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-079	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-080	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-082	S	17	17	1.4E-01	1.2E-01	No	NT	PI
GW-089	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-242	T	5	5	3.3E-02	3.2E-02	No	NT	S
GW-257	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-289	T	8	3	9.4E-04	5.0E-04	No	S	S
GW-291	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-624	S	4	4	3.6E-01	3.1E-01	No	S	S
GW-626	S	10	7	4.5E-01	9.6E-02	No	I	PI
GW-627	T	25	22	1.8E-02	1.3E-02	No	I	I
GW-629	T	7	3	1.3E-02	5.0E-04	No	PI	I
GW-639	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-653	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-683	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-684	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-694	T	10	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-703	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-704	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-706	T	24	1	4.8E-04	5.0E-04	No	S	D
GW-712	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-713	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-714	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-4	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-5	T	26	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-6_6	T	16	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-6E	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-7	T	13	0	5.0E-04	5.0E-04	Yes	ND	ND
SS-8	T	14	0	5.0E-04	5.0E-04	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.

MAROS Statistical Trend Analysis Summary

Project: BC Burial Grounds

User Name: MV

Location: Bear Creek Burial Grounds

State: Tennessee

Time Period: 1/1/1996 to 7/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
GW-014	S	7	4	3.4E+00	9.3E-01	No	NT	NT
GW-046	S	20	15	1.5E+00	1.1E+00	No	NT	D
GW-052	T	3	3	2.0E+01	1.7E+01	No	N/A	N/A
GW-053	T	14	13	2.8E+00	2.0E+00	No	NT	NT
GW-058	T	1	1	1.7E+01	1.7E+01	No	N/A	N/A
GW-068	T	3	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-071	S	8	3	3.3E+00	1.0E-02	No	PD	D
GW-072	T	4	1	8.5E-02	1.0E-02	No	NT	D
GW-077	T	11	2	3.2E-01	1.0E-02	No	NT	NT
GW-078	T	11	4	5.9E-01	1.0E-02	No	NT	NT
GW-079	T	12	5	1.1E+00	1.0E-02	No	PD	D
GW-080	T	14	9	1.6E+00	7.8E-01	No	D	D
GW-082	S	14	9	1.2E+00	4.3E-01	No	NT	NT
GW-242	T	4	2	6.6E+00	1.6E+00	No	NT	D
GW-257	T	1	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-289	T	8	4	7.7E-01	2.8E-01	No	NT	NT
GW-291	T	6	3	6.9E-01	3.0E-01	No	NT	NT
GW-624	S	4	1	9.1E-01	1.0E-02	No	NT	NT
GW-626	S	6	2	3.2E-01	1.0E-02	No	NT	NT
GW-627	T	16	10	2.5E+00	1.3E+00	No	D	D
GW-629	T	7	2	2.9E+00	1.0E-02	No	NT	NT
GW-639	T	5	1	6.3E-01	1.0E-02	No	NT	NT
GW-653	T	13	9	7.1E-01	4.0E-01	No	D	D
GW-683	T	23	23	1.4E+01	1.1E+01	No	D	D
GW-684	T	24	24	1.4E+01	1.3E+01	No	D	D
GW-694	T	10	9	1.4E+01	1.3E+01	No	NT	PI
GW-703	T	22	19	4.5E+00	3.9E+00	No	NT	D
GW-704	T	22	20	5.2E+00	4.2E+00	No	NT	PD
GW-706	T	25	25	4.3E+01	4.2E+01	No	D	D
GW-712	T	23	10	1.2E+00	1.0E-02	No	D	D
GW-713	T	21	12	2.7E+00	1.2E+00	No	PD	D
GW-714	T	23	16	2.0E+00	1.9E+00	No	S	PD
SS-4	T	23	23	4.7E+01	4.2E+01	No	D	D
SS-5	T	22	21	2.3E+01	2.0E+01	No	PD	PD
SS-6_6	T	7	6	4.8E+00	4.1E+00	No	NT	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
SS-6E	T	14	12	4.5E+00	4.8E+00	No	NT	S
SS-7	T	7	5	2.9E+00	1.5E+00	No	NT	NT
SS-8	T	8	3	4.7E-01	1.0E-02	No	NT	NT
GROSS BETA ACTIVITY								
GW-014	S	7	2	3.1E+00	1.0E-02	No	NT	NT
GW-046	S	20	17	3.8E+00	4.1E+00	No	NT	D
GW-052	T	3	3	1.7E+01	1.7E+01	No	N/A	N/A
GW-053	T	14	11	2.2E+00	2.0E+00	No	D	D
GW-058	T	1	1	1.7E+01	1.7E+01	No	N/A	N/A
GW-068	T	3	3	1.2E+01	1.1E+01	No	N/A	N/A
GW-071	S	7	1	4.4E-01	1.0E-02	No	NT	D
GW-072	T	5	3	2.8E+00	4.1E-01	No	NT	NT
GW-077	T	11	11	6.3E+00	3.2E+00	No	NT	PD
GW-078	T	11	7	2.6E+00	1.4E+00	No	NT	NT
GW-079	T	13	12	3.3E+00	2.4E+00	No	S	S
GW-080	T	13	10	6.4E+00	2.6E+00	No	NT	NT
GW-082	S	15	10	3.9E+00	4.3E+00	No	S	D
GW-089	T	1	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-242	T	5	3	1.1E+01	3.3E+00	No	PD	D
GW-257	T	4	2	1.2E+00	1.2E+00	No	NT	D
GW-289	T	7	3	1.9E+00	1.0E-02	No	D	D
GW-291	T	6	3	1.2E+00	8.5E-01	No	NT	NT
GW-624	S	4	2	2.0E+00	1.4E+00	No	NT	D
GW-626	S	8	3	2.2E+00	1.0E-02	No	NT	D
GW-627	T	16	10	5.1E+00	3.9E+00	No	D	D
GW-629	T	7	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-639	T	5	1	9.5E-01	1.0E-02	No	NT	NT
GW-653	T	17	13	2.1E+00	2.7E+00	No	D	D
GW-683	T	23	23	2.1E+01	1.9E+01	No	PD	S
GW-684	T	24	24	2.5E+01	2.3E+01	No	S	S
GW-694	T	9	9	2.2E+01	2.0E+01	No	NT	NT
GW-703	T	22	22	4.5E+01	4.6E+01	No	I	I
GW-704	T	24	24	2.1E+01	1.6E+01	No	PI	I
GW-706	T	25	25	9.9E+01	8.6E+01	No	S	S
GW-712	T	22	17	3.9E+00	3.5E+00	No	NT	D
GW-713	T	23	18	6.3E+00	2.9E+00	No	NT	D
GW-714	T	24	22	4.2E+00	4.1E+00	No	S	D
SS-4	T	23	23	9.3E+01	6.5E+01	No	NT	I
SS-5	T	26	26	3.5E+01	2.9E+01	No	NT	NT
SS-6_6	T	16	15	8.8E+00	5.5E+00	No	NT	NT
SS-6E	T	13	13	1.1E+01	9.2E+00	No	NT	NT
SS-7	T	16	12	5.5E+00	5.3E+00	No	I	PI
SS-8	T	18	9	1.3E+00	4.7E-01	No	NT	NT

NITRATE

MAROS Statistical Trend Analysis Summary

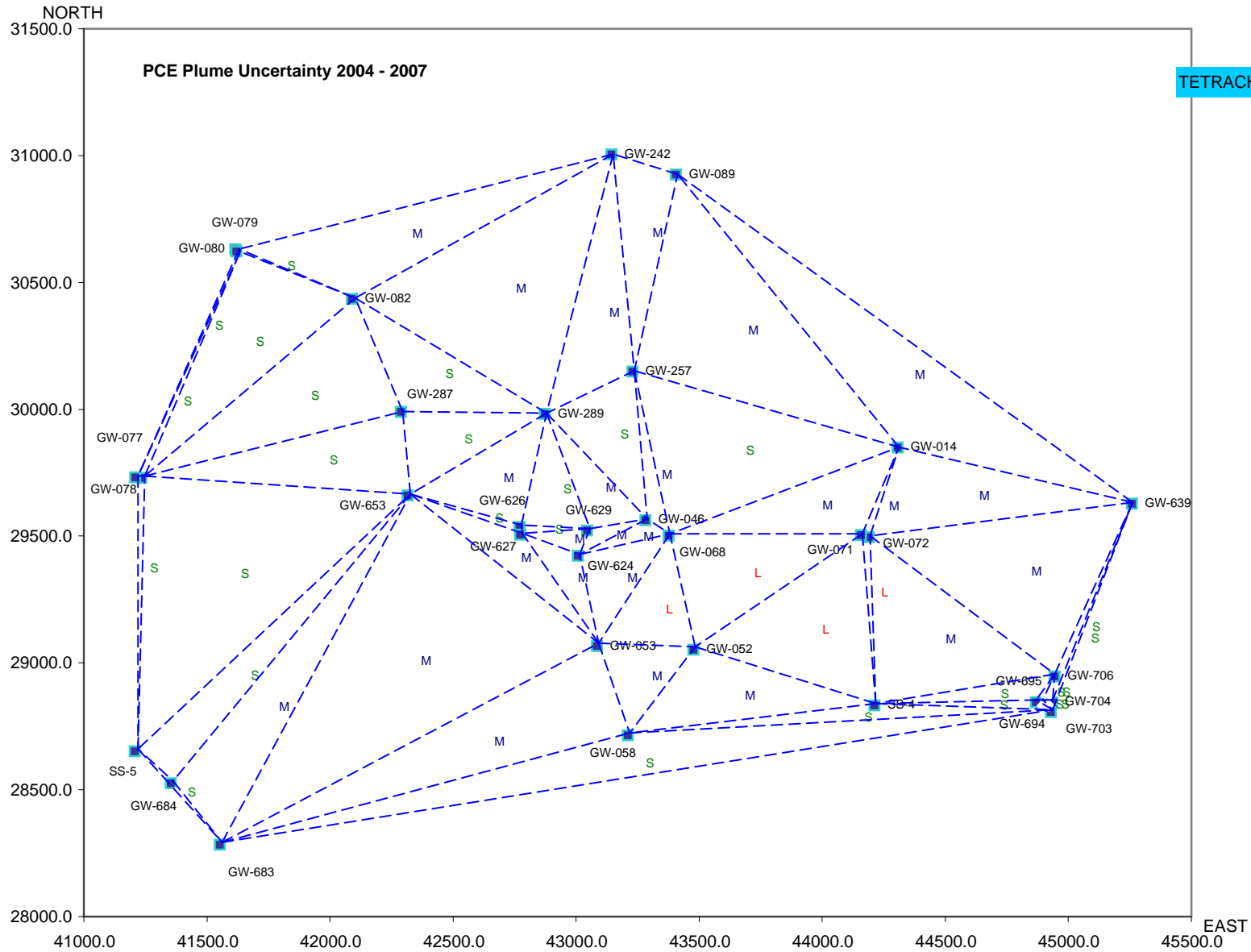
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
NITRATE								
GW-014	S	8	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-046	S	2	2	7.2E-01	7.2E-01	No	N/A	N/A
GW-052	T	3	3	2.6E+00	2.9E+00	No	N/A	N/A
GW-053	T	14	1	2.2E-02	2.0E-02	No	S	S
GW-058	T	1	1	3.7E+00	3.7E+00	No	N/A	N/A
GW-068	T	3	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-071	S	10	1	2.1E-02	2.0E-02	No	S	D
GW-072	T	5	1	2.5E-02	2.0E-02	No	S	S
GW-079	T	4	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-080	T	4	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-082	S	13	3	3.0E-02	2.0E-02	No	S	S
GW-089	T	1	1	5.0E-02	5.0E-02	No	N/A	N/A
GW-242	T	3	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-257	T	4	4	2.8E-01	2.8E-01	No	I	I
GW-289	T	6	6	2.9E-01	3.0E-01	No	NT	NT
GW-291	T	4	4	2.5E-01	2.4E-01	No	NT	NT
GW-624	S	2	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-626	S	8	4	3.6E-02	2.5E-02	No	S	D
GW-627	T	23	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-629	T	3	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-653	T	21	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-683	T	18	18	5.7E+00	4.1E+00	No	D	D
GW-684	T	19	19	4.6E+00	4.1E+00	No	PD	D
GW-694	T	8	8	6.4E+00	5.8E+00	No	NT	S
GW-703	T	21	21	1.7E+01	1.8E+01	No	I	PI
GW-704	T	23	22	1.0E+01	1.3E+01	No	D	S
GW-706	T	23	23	2.9E+01	2.4E+01	No	PD	S
GW-712	T	12	6	7.6E-02	2.1E-02	No	D	D
GW-713	T	12	3	1.2E-01	2.0E-02	No	PD	D
GW-714	T	12	10	1.2E+00	5.4E-01	No	D	NT
SS-4	T	23	23	2.5E+01	1.8E+01	No	S	D
SS-5	T	25	25	1.0E+01	6.4E+00	No	NT	I
SS-6_6	T	5	5	4.2E-01	3.8E-01	No	S	S
SS-6E	T	12	12	1.3E+00	1.3E+00	No	S	PD
SS-7	T	4	4	4.6E-01	3.9E-01	No	NT	NT
SS-8	T	5	5	2.9E-01	2.8E-01	No	S	NT
URANIUM								
GW-014	S	6	6	1.8E-03	1.7E-03	No	S	S
GW-046	S	6	2	2.2E-05	4.6E-06	No	NT	I
GW-052	T	1	1	4.6E-02	4.6E-02	No	N/A	N/A
GW-053	T	3	3	2.8E-03	3.0E-03	No	N/A	N/A
GW-058	T	1	1	3.1E-02	3.1E-02	No	N/A	N/A
GW-068	T	3	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-071	S	6	1	9.4E-05	4.6E-06	No	NT	NT
GW-072	T	3	0	4.6E-06	4.6E-06	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
URANIUM								
GW-077	T	6	1	1.9E-05	4.6E-06	No	NT	NT
GW-078	T	6	1	4.1E-05	4.6E-06	No	NT	NT
GW-079	T	6	1	1.5E-05	4.6E-06	No	NT	NT
GW-080	T	6	1	1.2E-05	4.6E-06	No	NT	NT
GW-082	S	4	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-089	T	1	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-242	T	2	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-257	T	2	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-289	T	4	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-291	T	2	1	7.2E-04	7.2E-04	No	N/A	N/A
GW-624	S	2	2	1.6E-03	1.6E-03	No	N/A	N/A
GW-626	S	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-627	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-629	T	3	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-639	T	6	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-653	T	4	0	4.6E-06	4.6E-06	Yes	ND	ND
GW-683	T	4	4	1.2E-02	1.2E-02	No	NT	PI
GW-684	T	4	4	1.6E-02	1.5E-02	No	NT	PI
GW-694	T	4	4	3.3E-02	3.2E-02	No	NT	I
GW-703	T	4	4	1.0E-02	9.7E-03	No	NT	NT
GW-704	T	6	3	7.5E-03	6.1E-03	No	NT	NT
GW-706	T	6	6	6.4E-02	6.3E-02	No	S	S
GW-712	T	6	2	5.8E-05	4.6E-06	No	NT	I
GW-713	T	6	2	1.9E-05	4.6E-06	No	NT	I
GW-714	T	6	2	5.4E-04	4.6E-06	No	NT	I
SS-4	T	5	5	7.3E-02	7.0E-02	No	S	NT
SS-5	T	7	7	2.4E-02	2.5E-02	No	I	I
SS-6_6	T	4	0	4.6E-06	4.6E-06	Yes	ND	ND
SS-6E	T	6	5	6.9E-03	8.8E-03	No	NT	NT
SS-7	T	3	2	9.0E-03	1.2E-02	No	N/A	N/A
SS-8	T	4	0	4.6E-06	4.6E-06	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
TETRACHLOROETHYLENE(PCE)

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

Back to Access

APPENDIX C.4

EAST S-3 AREA

MAROS COC Assessment

Project: EF East S3 Beta 4

User Name: MV

Location: East S-3

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
NITRATE	2.0E+03	1.0E+01	20143.7%
CADMIUM	2.8E-01	5.0E-03	5523.0%
TETRACHLOROETHYLENE(PCE)	2.2E-01	5.0E-03	4272.6%
TRICHLOROETHYLENE (TCE)	1.3E-01	5.0E-03	2493.4%
GROSS BETA ACTIVITY	1.0E+03	5.0E+01	1961.0%
VINYL CHLORIDE	2.6E-02	2.0E-03	1219.5%
cis-1,2-DICHLOROETHYLENE	6.7E-01	7.0E-02	853.0%
BENZENE	3.5E-02	5.0E-03	590.9%
NICKEL	3.8E-01	7.3E-02	424.2%
COPPER	4.1E+00	1.0E+00	305.8%
MERCURY	8.1E-03	2.0E-03	303.5%
1,1-DICHLOROETHENE	2.8E-02	7.0E-03	301.3%
1,2-DICHLOROETHANE	1.7E-02	5.0E-03	232.6%
GROSS ALPHA ACTIVITY	4.6E+01	1.5E+01	206.4%
CARBON TETRACHLORIDE	1.5E-02	5.0E-03	193.6%
LEAD	2.6E-02	1.5E-02	74.6%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
TETRACHLOROETHYLENE(PCE)	ORG	27	18	66.7%	24
TRICHLOROETHYLENE (TCE)	ORG	27	16	59.3%	24
NITRATE	INO	27	15	55.6%	27
CADMIUM	MET	27	15	55.6%	21
GROSS ALPHA ACTIVITY	INO	27	12	44.4%	26
VINYL CHLORIDE	ORG	27	12	44.4%	12
1,1-DICHLOROETHENE	ORG	27	10	37.0%	16
cis-1,2-DICHLOROETHYLENE	ORG	27	9	33.3%	19
GROSS BETA ACTIVITY	INO	27	9	33.3%	26
NICKEL	MET	26	7	26.9%	26
LEAD	MET	23	6	26.1%	23
BENZENE	ORG	27	7	25.9%	11
CARBON TETRACHLORIDE	ORG	27	5	18.5%	6
1,2-DICHLOROETHANE	ORG	26	4	15.4%	7
MERCURY	MET	14	2	14.3%	14
COPPER	MET	21	1	4.8%	21

Project: EF East S3 Beta 4

User Name: MV

Location: East S-3

State: Tennessee

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
GROSS BETA ACTIVITY	
GROSS ALPHA ACTIVITY	
NITRATE	
VINYL CHLORIDE	0.042
1,2-DICHLOROETHANE	0.0679
cis-1,2-DICHLOROETHYLENE	0.0724
BENZENE	0.0984
1,1-DICHLOROETHENE	0.13
CARBON TETRACHLORIDE	0.277
TRICHLOROETHYLENE (TCE)	0.297
TETRACHLOROETHYLENE(PCE)	0.923
LEAD	10
CADMIUM	15
NICKEL	16
COPPER	40
MERCURY	52

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

NITRATE
TETRACHLOROETHYLENE(PCE)
TRICHLOROETHYLENE (TCE)
CADMIUM
GROSS ALPHA ACTIVITY

MAROS Spatial Moment Analysis Summary

Project: EF S3 Beta 4

User Name: MV

Location: East S-3

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
CADMIUM							
7/1/1996	0.0E+00						3
7/1/1997	0.0E+00						2
7/1/1998	0.0E+00						4
7/1/1999	0.0E+00						5
7/1/2000	2.8E+00	53,853	29,812	695	113,054	13,414	7
7/1/2001	0.0E+00						4
7/1/2002	0.0E+00						5
7/1/2003	2.8E+00	53,825	29,821	666	69,864	12,920	9
7/1/2004	0.0E+00						1
7/1/2005	9.6E-01	54,171	29,569	1,086	19,460	3,277	6
7/1/2006	6.9E-01	53,615	29,731	530	111,453	13,881	23
7/1/2007	6.9E-01	53,665	29,742	563	161,410	13,170	24
GROSS BETA ACTIVITY							
7/1/1996	3.3E+04	53,570	30,024	366	96,883	49,852	14
7/1/1997	9.6E+03	53,664	29,965	469	94,925	36,947	7
7/1/1998	7.0E+03	53,602	29,911	426	92,693	42,062	9
7/1/1999	6.9E+03	53,637	29,923	454	113,916	62,770	8
7/1/2000	5.4E+04	53,453	30,030	249	50,250	31,748	12
7/1/2001	5.2E+03	53,664	29,968	469	67,537	36,011	6
7/1/2002	1.1E+04	53,494	29,866	352	116,755	14,151	6
7/1/2003	8.6E+04	53,474	29,976	283	42,075	28,916	15
7/1/2004	3.0E+04	53,733	30,035	527	132,679	28,895	6
7/1/2005	8.9E+03	53,362	29,951	196	97,952	3,875	6
7/1/2006	1.1E+04	53,260	30,042	60	29,322	21,990	23
7/1/2007	9.7E+02	53,462	29,938	287	43,458	28,148	24
NITRATE							
7/1/1996	1.5E+04	53,953	29,873	772	152,900	33,796	10
7/1/1997	1.5E+04	53,922	29,829	755	171,753	13,860	6
7/1/1998	8.2E+03	53,512	29,822	393	81,997	39,714	9
7/1/1999	0.0E+00						4
7/1/2000	8.1E+04	53,749	29,956	554	153,260	17,283	8
7/1/2001	0.0E+00						2
7/1/2002	0.0E+00						3
7/1/2003	6.8E+04	53,542	30,037	337	72,532	35,656	14
7/1/2004	0.0E+00						5
7/1/2005	7.3E+03	53,518	29,787	421	115,383	13,297	6
7/1/2006	4.9E+04	53,519	29,972	327	65,339	32,432	23

Project: EF S3 Beta 4

Location: East S-3

User Name: MV

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells	
	Estimated Mass (kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)		
NITRATE								
7/1/2007	5.2E+04	53,585	29,997	385	97,438	37,834	24	
TETRACHLOROETHYLENE(PCE)								
7/1/1996	1.6E+00	53,980	29,600	905	119,244	26,882	11	
7/1/1997	1.3E+00	54,101	29,983	898	161,503	18,739	7	
7/1/1998	1.7E+01	54,319	29,900	1,125	150,350	66,157	11	
7/1/1999	1.6E+01	54,004	29,741	862	143,724	23,758	8	
7/1/2000	2.8E+01	53,998	29,906	808	219,225	58,690	12	
7/1/2001	2.8E+00	53,955	29,836	784	133,573	55,847	6	
7/1/2002	2.3E+00	53,781	29,663	703	139,760	17,787	6	
7/1/2003	2.6E+01	54,042	29,908	851	204,694	48,640	19	
7/1/2004	1.2E+00	53,897	29,875	717	417,763	23,701	6	
7/1/2005	2.2E+00	53,832	29,684	735	124,584	17,535	6	
7/1/2006	2.6E+01	53,771	29,885	594	139,283	65,243	23	
7/1/2007	1.4E+01	54,004	29,830	832	201,826	24,607	24	
TRICHLOROETHYLENE (TCE)								
7/1/1996	2.1E+00	54,165	29,812	992	64,999	58,312	11	
7/1/1997	2.6E+00	53,867	29,953	670	181,222	28,484	7	
7/1/1998	1.5E+01	54,234	29,919	1,038	139,237	65,103	11	
7/1/1999	1.4E+01	54,108	29,798	941	75,602	38,735	8	
7/1/2000	1.4E+01	54,355	29,910	1,159	137,108	77,880	12	
7/1/2001	2.8E+00	53,990	29,883	805	116,822	51,491	6	
7/1/2002	2.3E+00	53,865	29,669	770	115,131	14,566	6	
7/1/2003	1.2E+01	54,338	29,869	1,148	95,673	57,997	19	
7/1/2004	5.8E-01	53,941	29,879	759	384,654	23,315	6	
7/1/2005	1.3E+00	54,013	29,688	892	42,655	14,375	6	
7/1/2006	8.6E+00	54,135	29,752	981	123,183	38,891	23	
7/1/2007	5.1E+00	54,306	29,786	1,135	99,899	36,251	24	

Project: EF S3 Beta 4

User Name: MV

Location: East S-3

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	CADMIUM	1.60	17	86.0%	NT
	GROSS BETA ACTIVITY	1.16	-10	72.7%	NT
	NITRATE	1.20	2	52.7%	NT
	TETRACHLOROETHYLENE(PCE)	0.95	4	58.0%	NT
	TRICHLOROETHYLENE (TCE)	0.85	-12	77.0%	S
1st Moment: Distance to Source					
	CADMIUM	0.31	-4	75.8%	S
	GROSS BETA ACTIVITY	0.39	-22	92.4%	PD
	NITRATE	0.37	-18	98.4%	D
	TETRACHLOROETHYLENE(PCE)	0.16	-38	99.6%	D
	TRICHLOROETHYLENE (TCE)	0.18	4	58.0%	NT
2nd Moment: Sigma XX					
	CADMIUM	0.56	2	59.2%	NT
	GROSS BETA ACTIVITY	0.42	-14	81.0%	S
	NITRATE	0.36	-12	91.1%	PD
	TETRACHLOROETHYLENE(PCE)	0.46	6	63.1%	NT
	TRICHLOROETHYLENE (TCE)	0.67	-8	68.1%	S
2nd Moment: Sigma YY					
	CADMIUM	0.40	0	40.8%	S
	GROSS BETA ACTIVITY	0.48	-42	99.8%	D
	NITRATE	0.40	2	54.8%	NT
	TETRACHLOROETHYLENE(PCE)	0.53	-8	68.1%	S
	TRICHLOROETHYLENE (TCE)	0.48	-20	90.2%	PD

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 Saturated Thickness: Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: EF East S3 Beta 4

User Name: MV

Location: East S-3

State: Tennessee

Time Period: 1/1/1996 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
CADMIUM								
55-1A	T	2	0	5.1E-06	5.1E-06	Yes	ND	ND
55-2A	T	4	0	5.1E-06	5.1E-06	Yes	ND	ND
55-2B	T	4	0	5.1E-06	5.1E-06	Yes	ND	ND
55-2C	T	2	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-105	T	4	2	1.1E-03	1.1E-03	No	NT	D
GW-106	T	4	2	3.8E-04	2.9E-04	No	NT	D
GW-108	S	7	1	2.5E-04	5.1E-06	No	NT	D
GW-109	S	7	7	1.6E+00	1.7E+00	No	D	D
GW-192	T	2	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-251	T	23	23	9.7E-02	8.8E-02	No	PD	S
GW-253	T	17	17	3.7E+00	3.7E+00	No	NT	NT
GW-265	T	4	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-269	T	4	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-270	T	1	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-272	T	2	1	1.0E-03	1.0E-03	No	N/A	N/A
GW-273	T	1	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-274	S	5	3	7.2E-04	8.2E-04	No	PD	D
GW-275	S	2	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-332	T	2	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-336	T	2	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-337	T	4	2	9.1E-04	3.5E-04	No	NT	D
GW-505	T	1	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-617	T	1	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-618	T	18	17	7.8E-03	5.1E-03	No	D	D
GW-619	T	1	0	5.1E-06	5.1E-06	Yes	ND	ND
GW-620	T	6	2	2.3E-04	5.1E-06	No	NT	D
GW-633	S	9	6	6.5E-04	6.9E-04	No	D	D
GROSS ALPHA ACTIVITY								
55-1A	T	4	2	3.3E-01	1.1E-01	No	NT	D
55-2A	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
55-2B	T	8	3	4.9E+00	1.0E-02	No	NT	NT
55-2C	T	10	6	2.0E+00	1.4E+00	No	NT	NT
GW-105	T	3	2	5.1E+01	3.2E+00	No	N/A	N/A
GW-106	T	4	2	4.0E+01	6.6E-01	No	NT	PD

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
GW-108	S	23	18	2.3E+02	1.4E+02	No	NT	NT
GW-109	S	7	5	1.2E+02	8.6E+01	No	PD	D
GW-192	T	9	8	1.2E+00	9.0E-01	No	D	D
GW-251	T	22	21	6.9E+00	7.5E+00	No	D	D
GW-253	T	18	18	4.5E+01	3.8E+01	No	S	S
GW-265	T	3	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-269	T	5	2	6.7E-01	1.0E-02	No	NT	NT
GW-270	T	2	2	4.3E+00	4.3E+00	No	N/A	N/A
GW-272	T	3	3	2.2E+01	2.0E+01	No	N/A	N/A
GW-273	T	1	1	1.1E+00	1.1E+00	No	N/A	N/A
GW-274	S	5	3	4.0E+01	2.0E+00	No	D	D
GW-275	S	6	4	7.5E+01	7.8E+01	No	S	D
GW-332	T	3	1	3.4E-01	1.0E-02	No	N/A	N/A
GW-336	T	2	2	3.1E+00	3.1E+00	No	N/A	N/A
GW-337	T	6	4	6.8E-01	6.7E-01	No	D	D
GW-505	T	4	4	3.0E+01	2.6E+01	No	S	D
GW-617	T	4	3	6.7E-01	5.3E-01	No	D	D
GW-618	T	18	12	1.4E+00	9.6E-01	No	D	D
GW-619	T	4	3	2.1E+00	2.5E+00	No	D	D
GW-620	T	17	15	1.6E+00	1.0E+00	No	D	D
GW-633	S	9	8	3.2E+01	1.6E+01	No	NT	NT
NITRATE								
55-1A	T	5	5	9.7E+00	8.8E+00	No	S	PD
55-2A	T	4	4	1.8E+02	1.8E+02	No	S	S
55-2B	T	9	9	2.1E+02	2.3E+02	No	I	I
55-2C	T	10	10	1.6E+02	1.5E+02	No	I	I
GW-105	T	4	4	6.1E+02	6.6E+02	No	NT	NT
GW-106	T	4	4	7.1E+02	7.1E+02	No	S	PD
GW-108	S	11	11	1.8E+04	1.1E+04	No	D	NT
GW-109	S	6	6	9.4E+03	9.2E+03	No	NT	I
GW-192	T	6	4	3.0E-02	3.0E-02	No	D	D
GW-251	T	23	23	5.4E+01	5.6E+01	No	PD	S
GW-253	T	5	5	6.3E+02	5.5E+02	No	S	S
GW-265	T	4	4	1.1E-01	1.1E-01	No	NT	NT
GW-269	T	6	6	5.9E-01	6.1E-01	No	NT	I
GW-270	T	3	3	7.1E+01	6.5E+01	No	N/A	N/A
GW-272	T	3	3	4.7E+02	4.2E+02	No	N/A	N/A
GW-273	T	1	0	2.9E-04	2.9E-04	Yes	ND	ND
GW-274	S	6	6	3.3E+03	3.0E+03	No	D	D
GW-275	S	6	6	7.5E+03	7.3E+03	No	PI	I
GW-332	T	3	3	1.9E+00	1.9E+00	No	N/A	N/A
GW-336	T	4	4	1.7E+00	1.7E+00	No	S	S
GW-337	T	2	2	3.1E+00	3.1E+00	No	N/A	N/A
GW-505	T	3	3	2.7E-01	1.8E-01	No	N/A	N/A
GW-617	T	6	6	1.7E+00	2.2E+00	No	S	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
NITRATE								
GW-618	T	11	10	8.3E-01	4.1E-01	No	D	D
GW-619	T	4	4	1.0E+00	1.0E+00	No	NT	NT
GW-620	T	23	23	1.6E+00	1.3E+00	No	D	D
GW-633	S	10	10	1.4E+03	1.4E+03	No	D	D
TETRACHLOROETHYLENE(PCE)								
55-1A	T	5	0	6.0E-06	6.0E-06	Yes	ND	ND
55-2A	T	4	4	2.6E-01	2.6E-01	No	D	D
55-2B	T	9	9	5.8E-01	5.7E-01	No	NT	NT
55-2C	T	10	10	4.9E-01	5.0E-01	No	S	S
GW-105	T	4	0	6.0E-06	6.0E-06	Yes	ND	ND
GW-106	T	4	0	6.0E-06	6.0E-06	Yes	ND	ND
GW-108	S	23	17	1.8E-03	2.0E-03	No	I	I
GW-109	S	7	7	1.4E-01	1.5E-01	No	D	D
GW-192	T	15	10	2.1E-03	2.0E-03	No	NT	NT
GW-251	T	23	23	2.0E-01	1.6E-01	No	S	S
GW-253	T	17	16	5.6E-01	5.7E-01	No	S	NT
GW-265	T	4	4	2.5E-02	2.4E-02	No	S	S
GW-269	T	6	6	2.4E-02	2.4E-02	No	D	D
GW-270	T	3	0	6.0E-06	6.0E-06	Yes	ND	ND
GW-272	T	3	0	6.0E-06	6.0E-06	Yes	ND	ND
GW-273	T	3	0	6.0E-06	6.0E-06	Yes	ND	ND
GW-274	S	6	6	1.1E+00	1.1E+00	No	I	I
GW-275	S	6	3	2.2E-03	1.0E-03	No	NT	NT
GW-332	T	5	5	1.0E+00	9.4E-01	No	NT	NT
GW-336	T	4	4	3.6E-01	2.7E-01	No	S	S
GW-337	T	8	8	6.8E-01	6.1E-01	No	S	PD
GW-505	T	3	0	6.0E-06	6.0E-06	Yes	ND	ND
GW-617	T	6	1	1.2E-03	6.0E-06	No	NT	NT
GW-618	T	20	20	7.5E-03	6.3E-03	No	D	D
GW-619	T	6	6	3.3E-02	2.9E-02	No	PD	D
GW-620	T	24	23	4.3E-02	1.3E-02	No	D	D
GW-633	S	11	11	2.1E-01	2.0E-01	No	PI	PI
TRICHLOROETHYLENE (TCE)								
55-1A	T	5	0	5.0E-06	5.0E-06	Yes	ND	ND
55-2A	T	4	4	1.2E-01	1.1E-01	No	S	PD
55-2B	T	9	9	2.4E-01	2.3E-01	No	D	D
55-2C	T	10	10	2.6E-01	2.3E-01	No	D	D
GW-105	T	4	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-106	T	4	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-108	S	23	22	3.0E-03	3.0E-03	No	I	I
GW-109	S	7	7	3.9E-03	4.0E-03	No	D	D
GW-192	T	15	13	3.7E-03	3.0E-03	No	NT	NT
GW-251	T	23	23	8.8E-02	7.6E-02	No	S	S
GW-253	T	17	16	4.8E-01	4.6E-01	No	S	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TRICHLOROETHYLENE (TCE)								
GW-265	T	4	4	4.0E-03	4.0E-03	No	S	S
GW-269	T	6	6	3.7E-03	4.0E-03	No	S	S
GW-270	T	3	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-272	T	3	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-273	T	3	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-274	S	6	6	1.1E-02	1.1E-02	No	S	I
GW-275	S	6	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-332	T	5	5	2.5E-01	2.5E-01	No	S	S
GW-336	T	4	4	3.6E-01	3.2E-01	No	S	PD
GW-337	T	8	8	7.2E-01	7.3E-01	No	PD	D
GW-505	T	3	0	5.0E-06	5.0E-06	Yes	ND	ND
GW-617	T	6	1	1.0E-03	5.0E-06	No	NT	NT
GW-618	T	20	20	1.1E-02	1.1E-02	No	D	D
GW-619	T	6	6	9.2E-03	9.5E-03	No	S	D
GW-620	T	24	18	1.3E-02	6.0E-03	No	D	D
GW-633	S	11	11	7.0E-03	8.0E-03	No	D	PD

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.

MAROS Statistical Trend Analysis Summary

Project: EF East S3 Beta 4

User Name: MV

Location: East S-3

State: Tennessee

Time Period: 1/1/1996 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
55-1A	T	5	0	8.0E-06	8.0E-06	Yes	ND	ND
55-2A	T	4	4	8.3E-03	8.0E-03	No	S	S
55-2B	T	9	8	2.0E-02	1.9E-02	No	S	NT
55-2C	T	10	8	2.6E-02	3.0E-02	No	S	PI
GW-105	T	4	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-106	T	4	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-108	S	23	5	2.7E-04	8.0E-06	No	PI	I
GW-109	S	7	2	4.3E-04	8.0E-06	No	NT	NT
GW-192	T	15	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-251	T	23	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-253	T	17	10	2.0E-03	2.0E-03	No	I	I
GW-265	T	4	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-269	T	6	6	1.7E-01	1.6E-01	No	D	PD
GW-270	T	3	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-272	T	3	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-273	T	3	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-274	S	6	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-275	S	6	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-332	T	5	5	4.6E-02	3.7E-02	No	S	S
GW-336	T	4	4	8.2E-02	8.3E-02	No	S	D
GW-337	T	8	8	1.1E-01	1.1E-01	No	D	D
GW-505	T	3	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-617	T	6	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-618	T	20	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-619	T	6	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-620	T	24	0	8.0E-06	8.0E-06	Yes	ND	ND
GW-633	S	11	7	1.9E-03	2.5E-03	No	NT	PI
BENZENE								
55-1A	T	5	0	1.0E-06	1.0E-06	Yes	ND	ND
55-2A	T	4	0	1.0E-06	1.0E-06	Yes	ND	ND
55-2B	T	9	0	1.0E-06	1.0E-06	Yes	ND	ND
55-2C	T	10	1	1.1E-05	1.0E-06	No	NT	NT
GW-105	T	4	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-106	T	4	0	1.0E-06	1.0E-06	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
BENZENE								
GW-108	S	23	8	3.9E-04	1.0E-06	No	I	I
GW-109	S	7	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-192	T	15	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-251	T	23	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-253	T	17	1	6.0E-05	1.0E-06	No	NT	NT
GW-265	T	4	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-269	T	6	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-270	T	3	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-272	T	3	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-273	T	3	2	4.3E-03	6.0E-03	No	N/A	N/A
GW-274	S	6	6	1.1E-01	1.2E-01	No	I	I
GW-275	S	6	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-332	T	5	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-336	T	4	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-337	T	8	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-505	T	3	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-617	T	6	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-618	T	20	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-619	T	6	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-620	T	24	0	1.0E-06	1.0E-06	Yes	ND	ND
GW-633	S	11	11	1.1E+00	8.7E-01	No	I	I
cis-1,2-DICHLOROETHYLENE								
55-1A	T	5	0	9.0E-06	9.0E-06	Yes	ND	ND
55-2A	T	4	4	4.1E-01	4.2E-01	No	S	S
55-2B	T	9	9	1.1E+00	8.5E-01	No	D	D
55-2C	T	10	10	1.5E+00	1.6E+00	No	D	D
GW-105	T	4	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-106	T	4	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-108	S	23	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-109	S	7	1	2.9E-04	9.0E-06	No	NT	NT
GW-192	T	15	15	1.8E-02	2.1E-02	No	NT	NT
GW-251	T	23	18	5.6E-03	5.0E-03	No	NT	NT
GW-253	T	17	17	2.2E-01	2.3E-01	No	I	I
GW-265	T	4	3	7.5E-04	1.0E-03	No	S	S
GW-269	T	6	6	5.4E-02	5.8E-02	No	S	S
GW-270	T	3	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-272	T	3	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-273	T	3	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-274	S	6	6	1.4E-02	1.3E-02	No	I	I
GW-275	S	6	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-332	T	5	5	1.9E+00	1.2E+00	No	S	S
GW-336	T	4	4	1.8E+00	1.8E+00	No	S	D
GW-337	T	8	8	3.8E+00	4.1E+00	No	D	D
GW-505	T	3	0	9.0E-06	9.0E-06	Yes	ND	ND
GW-617	T	6	2	1.8E-03	9.0E-06	No	NT	NT

MAROS Statistical Trend Analysis Summary

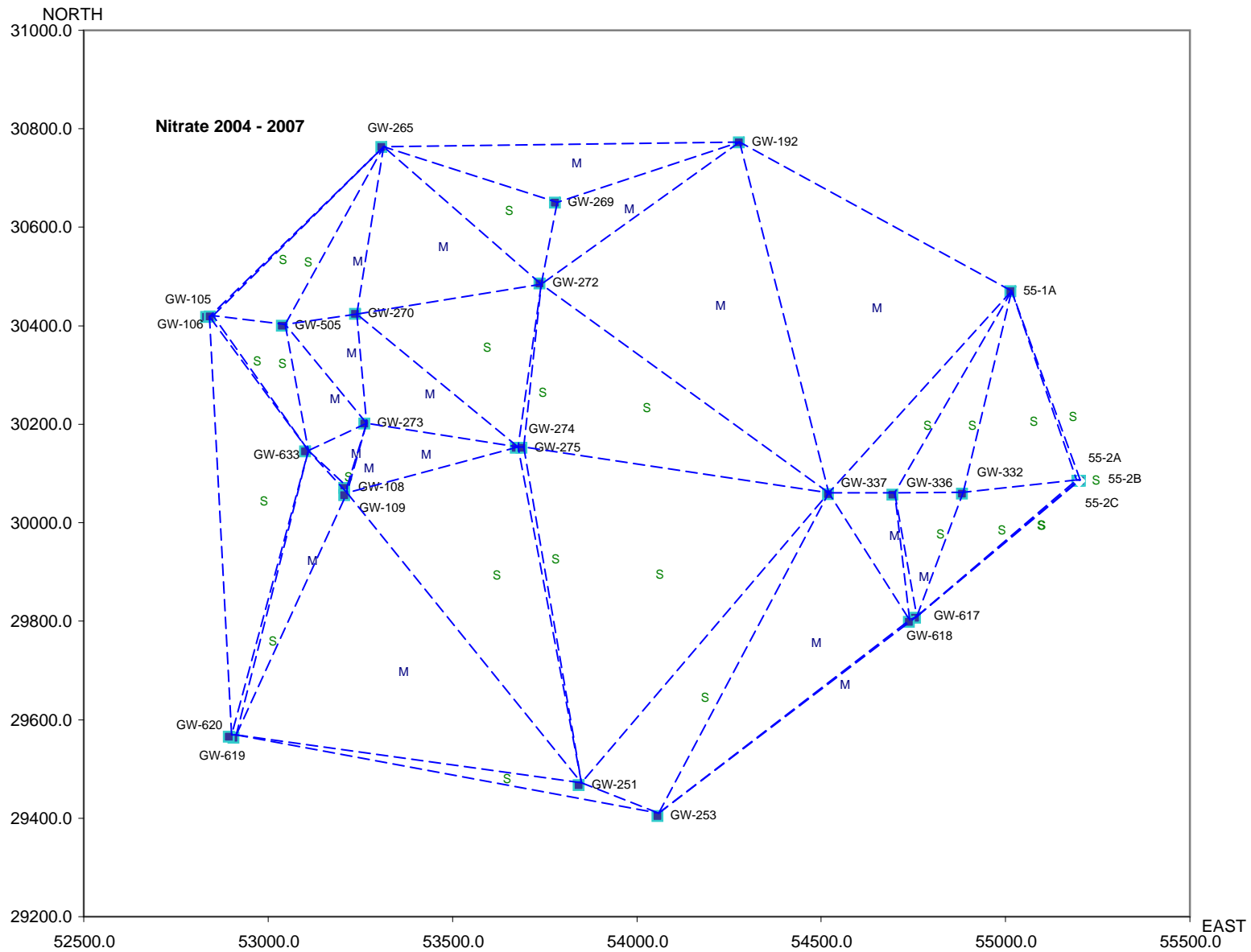
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
cis-1,2-DICHLOROETHYLENE								
GW-618	T	20	20	2.3E-02	2.2E-02	No	D	D
GW-619	T	6	6	1.1E-02	1.0E-02	No	D	D
GW-620	T	24	20	3.3E-02	1.4E-02	No	D	D
GW-633	S	11	11	1.1E-02	1.1E-02	No	NT	NT
GROSS BETA ACTIVITY								
55-1A	T	4	2	4.9E+00	3.7E-01	No	NT	NT
55-2A	T	4	0	9.9E-04	9.9E-04	Yes	ND	ND
55-2B	T	9	9	2.4E+01	2.0E+01	No	I	I
55-2C	T	10	9	1.5E+01	1.1E+01	No	NT	S
GW-105	T	2	0	9.9E-04	9.9E-04	Yes	ND	ND
GW-106	T	2	1	3.4E+01	3.4E+01	No	N/A	N/A
GW-108	S	24	24	1.1E+04	1.2E+04	No	I	I
GW-109	S	7	7	1.0E+04	7.4E+03	No	S	S
GW-192	T	13	12	4.0E+00	3.8E+00	No	S	D
GW-251	T	22	18	5.6E+00	5.0E+00	No	D	D
GW-253	T	18	18	2.9E+01	2.7E+01	No	S	S
GW-265	T	4	0	9.9E-04	9.9E-04	Yes	ND	ND
GW-269	T	6	4	7.8E+00	6.9E+00	No	S	S
GW-270	T	3	3	1.4E+01	1.5E+01	No	N/A	N/A
GW-272	T	1	0	9.9E-04	9.9E-04	Yes	ND	ND
GW-273	T	1	0	9.9E-04	9.9E-04	Yes	ND	ND
GW-274	S	7	7	6.6E+03	6.0E+03	No	S	NT
GW-275	S	6	4	2.3E+02	2.2E+02	No	D	D
GW-332	T	3	1	1.3E+00	9.9E-04	No	N/A	N/A
GW-336	T	4	2	1.2E+00	4.7E-01	No	NT	D
GW-337	T	7	5	3.4E+00	3.4E+00	No	NT	D
GW-505	T	4	3	1.1E+01	9.9E+00	No	NT	NT
GW-617	T	3	2	1.9E+00	2.4E-01	No	N/A	N/A
GW-618	T	19	18	4.5E+00	5.0E+00	No	PI	NT
GW-619	T	4	4	1.3E+01	1.2E+01	No	NT	NT
GW-620	T	21	20	1.2E+01	1.2E+01	No	NT	S
GW-633	S	12	12	3.3E+03	3.4E+03	No	S	I
VINYL CHLORIDE								
55-1A	T	5	0	1.0E-05	1.0E-05	Yes	ND	ND
55-2A	T	4	4	7.8E-03	9.0E-03	No	NT	S
55-2B	T	9	9	2.5E-02	1.9E-02	No	D	D
55-2C	T	10	9	2.9E-02	2.8E-02	No	D	NT
GW-105	T	4	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-106	T	4	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-108	S	23	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-109	S	7	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-192	T	15	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-251	T	23	1	5.3E-05	1.0E-05	No	NT	PI
GW-253	T	17	17	5.5E-02	5.3E-02	No	I	I

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
VINYL CHLORIDE								
GW-265	T	4	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-269	T	6	2	3.4E-04	1.0E-05	No	NT	NT
GW-270	T	3	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-272	T	3	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-273	T	3	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-274	S	6	1	3.4E-04	1.0E-05	No	NT	PI
GW-275	S	6	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-332	T	5	4	2.2E-02	2.0E-02	No	S	NT
GW-336	T	4	4	2.8E-02	2.7E-02	No	S	D
GW-337	T	8	8	4.2E-02	4.6E-02	No	D	D
GW-505	T	3	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-617	T	6	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-618	T	20	10	1.2E-03	5.1E-04	No	NT	NT
GW-619	T	6	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-620	T	24	0	1.0E-05	1.0E-05	Yes	ND	ND
GW-633	S	11	0	1.0E-05	1.0E-05	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for

NITRATE

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

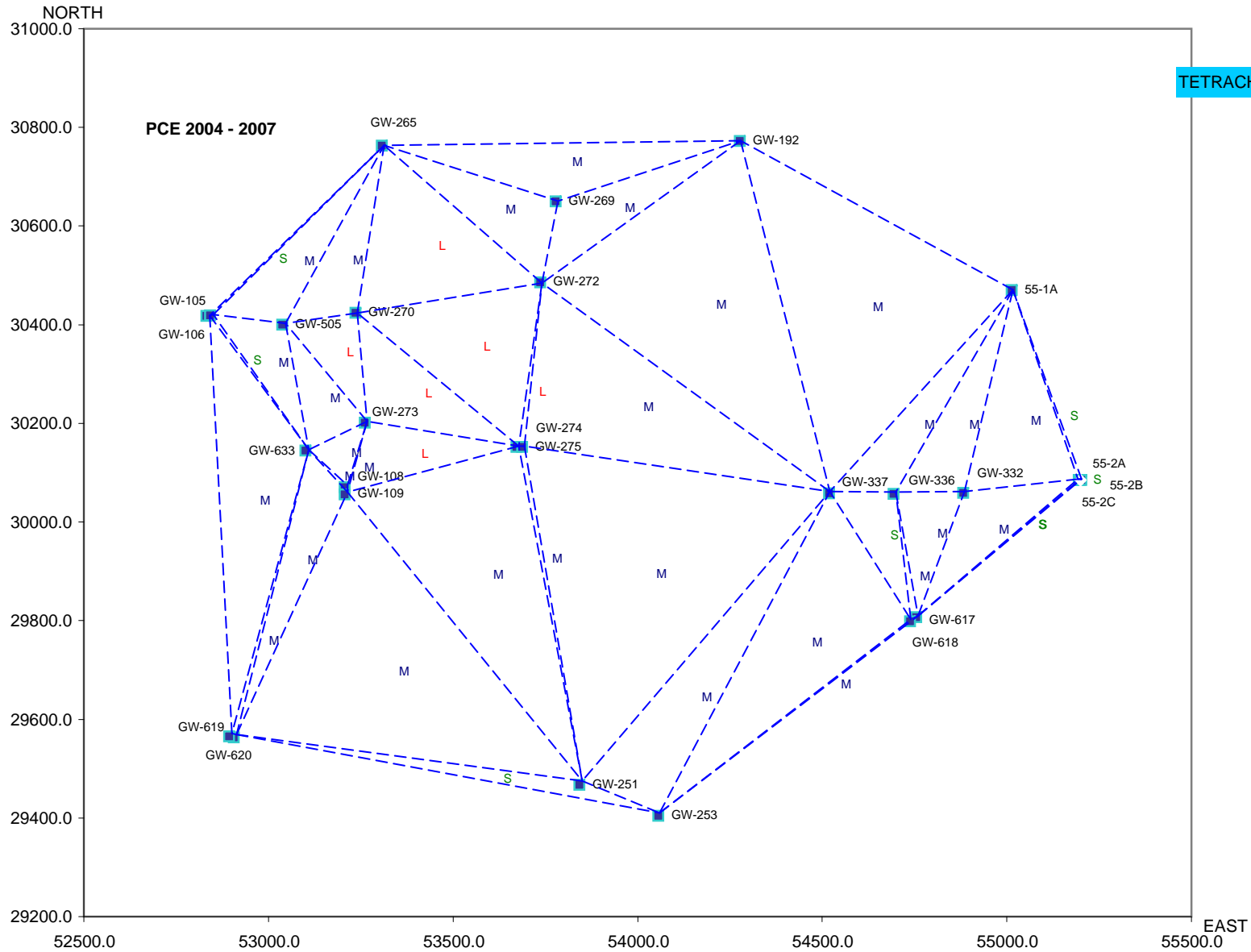
Estimated SF Level:

- S - Small
- M - Moderate
- L - Large
- E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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New Location Analysis for

TETRACHLOROETHYLENE(PCE)

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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APPENDIX C.5
CENTRAL Y-12 AREA

MAROS COC Assessment

Project: EF Central and Fuel

User Name: MV

Location: Central Y-12

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
TETRACHLOROETHYLENE(PCE)	2.3E+00	5.0E-03	46130.1%
TRICHLOROETHYLENE (TCE)	3.9E-01	5.0E-03	7765.8%
BENZENE	1.9E-01	5.0E-03	3697.2%
MANGANESE	1.2E+00	5.0E-02	2205.3%
VINYL CHLORIDE	1.7E-02	2.0E-03	729.3%
CARBON TETRACHLORIDE	3.0E-02	5.0E-03	492.1%
1,1-DICHLOROETHENE	2.2E-02	7.0E-03	211.8%
URANIUM	6.2E-02	3.0E-02	106.9%
cis-1,2-DICHLOROETHYLENE	1.4E-01	7.0E-02	100.2%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
MANGANESE	MET	31	17	54.8%	31
TETRACHLOROETHYLENE(PCE)	ORG	53	28	52.8%	37
TRICHLOROETHYLENE (TCE)	ORG	53	22	41.5%	33
URANIUM	MET	50	14	28.0%	26
VINYL CHLORIDE	ORG	53	10	18.9%	14
cis-1,2-DICHLOROETHYLENE	ORG	53	10	18.9%	27
1,1-DICHLOROETHENE	ORG	53	8	15.1%	15
CARBON TETRACHLORIDE	ORG	53	6	11.3%	8
BENZENE	ORG	53	5	9.4%	7

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
VINYL CHLORIDE	0.042
cis-1,2-DICHLOROETHYLENE	0.0724
BENZENE	0.0984
1,1-DICHLOROETHENE	0.13
CARBON TETRACHLORIDE	0.277
TRICHLOROETHYLENE (TCE)	0.297
TETRACHLOROETHYLENE(PCE)	0.923
MANGANESE	50.1
URANIUM	2960

Project: EF Central and Fuel

User Name: MV

Location: Central Y-12

State: Tennessee

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

TETRACHLOROETHYLENE(PCE)

TRICHLOROETHYLENE (TCE)

CARBON TETRACHLORIDE

URANIUM

VINYL CHLORIDE

MAROS Spatial Moment Analysis Summary

Project: EF Central and Fuel

User Name: MV

Location: Central Y-12

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
BENZENE							
7/1/1996	4.6E-01	59,278	29,543	3,071	2,511,944	123,157	18
7/1/1997	2.6E-01	60,176	29,537	3,965	1,370,381	102,992	13
7/1/1998	1.1E+00	60,083	29,605	3,867	1,979,819	101,001	22
7/1/1999	3.0E-01	60,007	29,480	3,803	1,632,404	120,895	17
7/1/2000	3.9E-01	59,349	29,539	3,142	2,595,724	114,498	16
7/1/2001	4.3E-01	59,599	29,442	3,402	2,103,179	104,889	12
7/1/2002	4.5E+00	60,824	29,546	4,611	1,532,822	108,986	15
7/1/2003	9.0E-01	60,282	29,590	4,067	3,169,039	151,354	19
7/1/2004	8.2E-01	60,458	29,465	4,252	3,309,664	87,354	18
7/1/2005	8.4E-01	60,419	29,475	4,213	3,495,616	92,846	17
7/1/2006	1.0E+00	60,420	29,450	4,216	3,977,889	114,102	40
7/1/2007	1.6E+00	60,640	29,493	4,432	3,237,958	168,932	44
CARBON TETRACHLORIDE							
7/1/1996	2.8E+00	59,642	29,249	3,475	603,100	52,977	15
7/1/1997	3.1E-01	59,556	29,548	3,347	1,082,268	134,800	10
7/1/1998	9.1E-01	58,507	29,574	2,302	1,417,373	102,818	17
7/1/1999	3.8E-01	59,076	29,611	2,863	634,064	103,544	13
7/1/2000	6.3E-01	58,845	29,617	2,633	984,575	97,934	14
7/1/2001	1.7E+00	59,296	29,318	3,122	930,693	103,528	10
7/1/2002	1.9E+00	59,444	29,324	3,267	1,169,044	103,045	10
7/1/2003	1.8E+00	59,778	29,475	3,575	1,121,131	151,924	14
7/1/2004	1.9E+00	59,515	29,327	3,336	1,231,300	103,224	13
7/1/2005	3.8E+00	60,068	29,445	3,867	1,991,236	100,193	17
7/1/2006	2.0E+00	59,755	29,587	3,541	2,467,263	119,613	40
7/1/2007	1.8E+00	59,900	29,486	3,695	2,943,573	181,406	44
TETRACHLOROETHYLENE(PCE)							
7/1/1996	5.7E+01	56,956	29,875	730	474,146	19,873	18
7/1/1997	1.5E+00	59,688	29,662	3,469	1,985,709	131,274	13
7/1/1998	4.3E+01	57,332	29,807	1,108	832,182	32,875	22
7/1/1999	4.7E+00	60,341	29,375	4,146	2,595,086	151,150	17
7/1/2000	3.3E+01	58,112	29,767	1,890	1,937,735	66,326	16
7/1/2001	1.7E+01	58,623	29,632	2,410	1,848,698	84,881	12
7/1/2002	1.9E+01	59,288	29,734	3,066	2,272,875	91,630	15
7/1/2003	2.4E+01	58,718	29,742	2,496	3,602,533	187,752	19
7/1/2004	2.3E+01	58,743	29,762	2,520	2,604,222	88,439	18
7/1/2005	4.9E+01	57,670	29,848	1,444	2,458,324	77,231	17
7/1/2006	3.8E+01	58,214	29,548	2,016	3,741,866	117,369	40

Project: EF Central and Fuel

Location: Central Y-12

User Name: MV

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
TETRACHLOROETHYLENE(PCE)							
7/1/2007	2.4E+01	57,677	29,708	1,461	5,590,097	113,425	44
TRICHLOROETHYLENE (TCE)							
7/1/1996	2.9E+00	58,601	29,592	2,393	3,603,171	116,229	18
7/1/1997	5.5E-01	60,542	29,416	4,341	1,757,296	120,161	13
7/1/1998	8.9E+00	57,883	29,682	1,669	2,214,880	87,778	22
7/1/1999	2.7E+00	61,119	29,183	4,943	1,606,134	74,277	17
7/1/2000	8.9E+00	57,925	29,640	1,716	1,913,560	57,181	16
7/1/2001	2.3E+01	57,669	29,595	1,471	499,658	18,338	12
7/1/2002	5.7E+00	59,124	29,497	2,923	3,509,661	80,878	15
7/1/2003	8.6E+00	58,830	29,607	2,619	3,914,738	125,885	19
7/1/2004	5.2E+00	58,867	29,502	2,668	3,731,954	75,932	18
7/1/2005	1.6E+01	57,523	29,676	1,314	2,622,524	59,608	17
7/1/2006	2.9E+01	58,100	29,504	1,912	1,966,337	63,023	40
7/1/2007	2.4E+01	57,695	29,619	1,492	2,057,661	40,109	44
URANIUM							
7/1/1996	2.5E-01	59,629	29,354	3,444	2,359,312	91,263	16
7/1/1997	6.4E-02	61,111	29,056	4,955	557,744	57,768	10
7/1/1998	4.2E-01	58,593	29,349	2,426	1,058,565	54,595	15
7/1/1999	8.1E-01	58,307	29,599	2,101	203,658	15,378	13
7/1/2000	9.9E-01	58,405	29,417	2,229	876,311	44,700	13
7/1/2001	1.2E+00	58,452	29,362	2,286	801,530	29,649	10
7/1/2002	1.2E+00	58,146	29,425	1,974	1,057,733	39,944	10
7/1/2003	8.1E-01	58,662	29,409	2,482	1,071,761	104,697	15
7/1/2004	2.2E+00	59,413	29,250	3,250	1,169,270	68,788	15
7/1/2005	1.1E+00	59,319	29,207	3,166	1,390,651	68,121	14
7/1/2006	1.8E-01	58,093	29,643	1,883	5,572,059	208,678	37
7/1/2007	1.5E+00	59,280	29,164	3,138	1,348,628	87,928	41

Project: EF Central and Fuel

User Name: MV

Location: Central Y-12

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	BENZENE	1.10	30	97.8%	I
	CARBON TETRACHLORIDE	0.61	26	95.7%	I
	TETRACHLOROETHYLENE(PCE)	0.60	8	68.1%	NT
	TRICHLOROETHYLENE (TCE)	0.83	34	99.0%	I
	URANIUM	0.69	28	96.9%	I
1st Moment: Distance to Source					
	BENZENE	0.13	34	99.0%	I
	CARBON TETRACHLORIDE	0.14	30	97.8%	I
	TETRACHLOROETHYLENE(PCE)	0.45	-2	52.7%	S
	TRICHLOROETHYLENE (TCE)	0.47	-18	87.5%	S
	URANIUM	0.31	-10	72.7%	S
2nd Moment: Sigma XX					
	BENZENE	0.33	38	99.6%	I
	CARBON TETRACHLORIDE	0.52	44	99.9%	I
	TETRACHLOROETHYLENE(PCE)	0.54	44	99.9%	I
	TRICHLOROETHYLENE (TCE)	0.43	6	63.1%	NT
	URANIUM	0.96	30	97.8%	I
2nd Moment: Sigma YY					
	BENZENE	0.20	2	52.7%	NT
	CARBON TETRACHLORIDE	0.28	20	90.2%	PI
	TETRACHLOROETHYLENE(PCE)	0.49	18	87.5%	NT
	TRICHLOROETHYLENE (TCE)	0.42	-26	95.7%	D
	URANIUM	0.69	16	84.5%	NT

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: EF Central and Fuel

User Name: MV

Location: Central Y-12

State: Tennessee

Time Period: 1/1/1996 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
CARBON TETRACHLORIDE								
55-2A	S	4	0	5.0E-04	5.0E-04	Yes	ND	ND
55-3A	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
55-3B	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
55-3C	S	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2A	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2B	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2C	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
56-3A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-3B	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-3C	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-4A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-6A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-8A	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
60-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-204	S	16	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-219	S	15	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-281	S	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-605	S	26	26	7.0E-02	3.9E-02	No	NT	NT
GW-606	T	26	26	2.0E-01	8.7E-02	No	D	D
GW-656	S	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-658	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-686	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-690	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-691	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-692	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-698	S	17	15	7.9E-03	9.0E-03	No	NT	NT
GW-700	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-762	T	6	1	7.5E-04	5.0E-04	No	S	S
GW-763	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-765	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-769	T	25	24	5.9E-02	5.8E-02	No	I	I
GW-770	T	25	20	8.5E-03	5.0E-03	No	I	I
GW-775	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-776	T	1	0	5.0E-04	5.0E-04	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
CARBON TETRACHLORIDE								
GW-779	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-781	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-782	T	24	4	1.1E-03	5.0E-04	No	NT	PD
GW-783	T	11	4	9.5E-04	5.0E-04	No	NT	S
GW-791	S	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-792	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-802	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-820	S	10	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-2	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-2	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-4	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-959	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-960	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
UEFPC-SP17	T	9	0	5.0E-04	5.0E-04	Yes	ND	ND
TETRACHLOROETHYLENE(PCE)								
55-2A	S	4	4	2.6E-01	2.6E-01	No	D	D
55-3A	S	5	5	1.8E+01	1.3E+01	No	NT	NT
55-3B	S	5	5	7.3E+01	7.2E+01	No	NT	NT
55-3C	S	4	4	1.9E+01	1.9E+01	No	NT	NT
56-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2A	T	5	5	2.0E-02	1.3E-02	No	S	PD
56-2B	T	5	5	9.4E-01	8.7E-01	No	S	I
56-2C	T	7	7	1.2E+00	9.7E-01	No	PD	D
56-3A	T	4	4	4.7E-02	4.9E-02	No	S	NT
56-3B	T	4	4	2.1E-01	2.4E-01	No	NT	NT
56-3C	T	4	4	5.6E-01	5.5E-01	No	S	S
56-4A	T	4	3	3.4E-03	2.0E-03	No	NT	NT
56-6A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-8A	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
60-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-204	S	16	1	1.5E-03	5.0E-04	No	NT	PD
GW-219	S	15	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-281	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-605	S	26	25	3.7E-02	3.0E-02	No	I	I
GW-606	T	26	23	5.6E-03	6.0E-03	No	S	I
GW-656	S	6	6	5.3E-02	5.2E-02	No	D	D
GW-658	T	9	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-686	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-690	T	7	7	1.6E-01	4.8E-02	No	PD	D
GW-691	S	5	5	1.3E+00	1.3E+00	No	PI	I
GW-692	T	5	4	6.9E-03	4.0E-03	No	NT	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TETRACHLOROETHYLENE(PCE)								
GW-698	S	17	16	1.2E-01	1.4E-01	No	PI	NT
GW-700	T	7	7	1.5E-01	1.3E-01	No	D	D
GW-762	T	18	18	2.3E+00	2.3E+00	No	I	I
GW-763	T	24	15	1.6E-02	8.5E-03	No	NT	NT
GW-765	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-769	T	25	24	1.1E-02	1.1E-02	No	I	I
GW-770	T	25	1	5.2E-04	5.0E-04	No	NT	NT
GW-775	T	12	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-776	T	12	4	9.2E-04	5.0E-04	No	D	D
GW-779	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-781	T	11	8	1.0E-02	4.0E-03	No	NT	NT
GW-782	T	24	24	1.7E-01	1.7E-01	No	D	D
GW-783	T	11	11	2.1E-02	1.1E-02	No	S	S
GW-791	S	23	23	5.6E-01	4.1E-01	No	S	PD
GW-792	T	11	11	6.3E-03	6.0E-03	No	D	D
GW-802	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-820	S	10	10	3.7E+00	3.0E+00	No	S	S
GW-954-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-2	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-1	T	4	1	1.6E-03	5.0E-04	No	NT	NT
GW-956-2	T	4	4	4.0E-03	4.0E-03	No	S	D
GW-956-3	T	4	1	6.3E-04	5.0E-04	No	NT	NT
GW-956-4	T	4	1	6.3E-04	5.0E-04	No	S	S
GW-959	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-960	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
UEFPC-SP17	T	9	0	5.0E-04	5.0E-04	Yes	ND	ND
TRICHLOROETHYLENE (TCE)								
55-2A	S	4	4	1.2E-01	1.1E-01	No	S	PD
55-3A	S	5	5	9.9E-01	1.1E+00	No	NT	NT
55-3B	S	5	5	6.2E+00	5.8E+00	No	NT	NT
55-3C	S	4	4	1.6E+00	1.6E+00	No	NT	NT
56-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2A	T	5	4	3.7E-03	3.0E-03	No	S	S
56-2B	T	5	5	6.0E-02	5.8E-02	No	S	NT
56-2C	T	7	7	5.6E-01	4.1E-01	No	S	S
56-3A	T	4	4	4.8E-03	4.5E-03	No	NT	NT
56-3B	T	4	4	1.6E-02	1.7E-02	No	NT	NT
56-3C	T	4	4	3.7E-02	3.6E-02	No	NT	NT
56-4A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-6A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-8A	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
60-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-204	S	16	1	5.9E-04	5.0E-04	No	S	PD
GW-219	S	15	1	6.0E-04	5.0E-04	No	S	S

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TRICHLOROETHYLENE (TCE)								
GW-281	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-605	S	26	25	3.8E-02	3.2E-02	No	I	I
GW-606	T	26	1	1.1E-03	5.0E-04	No	NT	NT
GW-656	S	6	6	3.8E+00	4.0E+00	No	D	D
GW-658	T	9	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-686	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-690	T	7	7	1.2E-02	6.0E-03	No	S	D
GW-691	S	5	5	1.0E-02	8.0E-03	No	NT	NT
GW-692	T	5	4	1.9E-03	2.0E-03	No	I	I
GW-698	S	17	17	3.5E-01	3.4E-01	No	I	I
GW-700	T	7	7	1.2E-02	1.1E-02	No	S	S
GW-762	T	18	18	1.4E-01	1.5E-01	No	NT	NT
GW-763	T	24	15	4.8E-03	4.0E-03	No	S	S
GW-765	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-769	T	25	20	2.6E-03	3.0E-03	No	I	I
GW-770	T	25	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-775	T	12	12	4.6E-03	4.5E-03	No	S	PD
GW-776	T	12	11	2.9E-03	3.0E-03	No	PD	PD
GW-779	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-781	T	11	3	1.7E-03	5.0E-04	No	NT	NT
GW-782	T	24	24	5.3E-02	5.3E-02	No	D	PD
GW-783	T	11	10	9.0E-03	6.0E-03	No	S	S
GW-791	S	23	13	2.2E-03	2.0E-03	No	NT	NT
GW-792	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-802	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-820	S	10	10	6.4E-01	5.7E-01	No	NT	NT
GW-954-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-2	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-2	T	4	4	1.5E-03	1.5E-03	No	S	PD
GW-956-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-4	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-959	T	7	3	1.1E-03	5.0E-04	No	S	S
GW-960	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
UEFPC-SP17	T	9	0	5.0E-04	5.0E-04	Yes	ND	ND
URANIUM								
55-2A	S	4	4	4.4E-03	4.3E-03	No	S	S
55-3A	S	5	5	9.1E-04	9.6E-04	No	S	D
55-3B	S	5	0	5.9E-06	5.9E-06	Yes	ND	ND
55-3C	S	4	0	5.9E-06	5.9E-06	Yes	ND	ND
56-1A	T	4	4	2.3E-03	1.9E-03	No	D	PD
56-2A	T	5	2	2.2E-04	5.9E-06	No	NT	NT
56-2B	T	5	0	5.9E-06	5.9E-06	Yes	ND	ND
56-2C	T	7	0	5.9E-06	5.9E-06	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
URANIUM								
56-3A	T	4	4	8.2E-04	8.1E-04	No	S	S
56-3B	T	4	4	7.4E-04	7.3E-04	No	S	PD
56-3C	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
56-4A	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
56-6A	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
56-8A	T	2	0	5.9E-06	5.9E-06	Yes	ND	ND
60-1A	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-204	S	16	16	6.4E-02	4.6E-02	No	S	S
GW-219	S	15	15	3.9E-01	3.4E-01	No	S	S
GW-605	S	26	26	1.3E-01	9.8E-02	No	PD	D
GW-606	T	26	21	4.1E-03	5.0E-03	No	S	NT
GW-656	S	6	2	2.2E-04	5.9E-06	No	NT	NT
GW-686	T	6	6	8.4E-04	8.5E-04	No	PI	NT
GW-690	T	7	1	1.3E-04	5.9E-06	No	NT	D
GW-691	S	5	5	8.5E-04	7.9E-04	No	NT	S
GW-692	T	5	4	3.8E-04	3.3E-04	No	S	S
GW-698	S	15	14	1.1E-03	1.1E-03	No	S	S
GW-700	T	7	6	5.8E-04	6.3E-04	No	NT	S
GW-762	T	6	1	2.5E-05	5.9E-06	No	NT	NT
GW-763	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-765	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-769	T	25	1	2.6E-05	5.9E-06	No	NT	I
GW-770	T	25	21	8.8E-04	7.6E-04	No	NT	NT
GW-775	T	1	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-776	T	1	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-779	T	5	1	2.0E-03	5.9E-06	No	NT	NT
GW-781	T	11	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-782	T	24	24	1.2E-03	1.2E-03	No	D	D
GW-783	T	12	12	1.1E-03	1.1E-03	No	NT	S
GW-791	S	23	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-792	T	11	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-820	S	10	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-954-1	T	4	2	3.3E-04	3.0E-04	No	NT	D
GW-954-2	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-954-3	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-956-1	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-956-2	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-956-3	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-956-4	T	4	0	5.9E-06	5.9E-06	Yes	ND	ND
GW-959	T	7	7	1.3E-03	1.0E-03	No	S	S
GW-960	T	2	0	5.9E-06	5.9E-06	Yes	ND	ND
UEFPC-SP17	T	7	5	1.1E-03	1.3E-03	No	S	I
VINYL CHLORIDE								
55-2A	S	4	4	7.8E-03	9.0E-03	No	NT	S
55-3A	S	5	4	3.2E-02	3.7E-02	No	NT	PI

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
VINYL CHLORIDE								
55-3B	S	5	4	2.5E-01	3.2E-01	No	I	PI
55-3C	S	4	4	1.8E-01	1.7E-01	No	NT	NT
56-1A	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
56-2A	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
56-2B	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
56-2C	T	2	2	2.6E-02	2.6E-02	No	N/A	N/A
56-3A	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
56-3B	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
56-3C	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
56-4A	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
56-6A	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
56-8A	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
60-1A	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-204	S	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-219	S	3	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-281	S	3	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-605	S	6	2	1.3E-03	1.0E-03	No	NT	NT
GW-606	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-656	S	2	2	5.0E-03	5.0E-03	No	N/A	N/A
GW-658	T	3	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-686	T	4	2	2.3E-03	1.5E-03	No	NT	NT
GW-690	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-691	S	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-692	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-698	S	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-700	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-762	T	6	4	3.8E-03	5.0E-03	No	S	S
GW-763	T	4	1	1.3E-03	1.0E-03	No	S	S
GW-765	T	1	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-769	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-770	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-775	T	1	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-776	T	1	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-779	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-781	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-782	T	4	1	1.5E-03	1.0E-03	No	S	S
GW-783	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-791	S	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-792	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-802	T	3	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-820	S	4	4	7.6E-02	7.6E-02	No	NT	NT
GW-954-1	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-954-2	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-954-3	T	4	1	1.0E-03	1.0E-03	No	S	S
GW-956-1	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-956-2	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
VINYL CHLORIDE								
GW-956-3	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-956-4	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-959	T	7	5	2.1E-02	1.0E-02	No	NT	PD
GW-960	T	2	0	1.0E-03	1.0E-03	Yes	ND	ND
UEFPC-SP17	T	1	0	1.0E-03	1.0E-03	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.

MAROS Statistical Trend Analysis Summary

Project: EF Central and Fuel

User Name: MV

Location: Central Y-12

State: Tennessee

Time Period: 1/1/1996 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
55-2A	S	4	4	8.3E-03	8.0E-03	No	S	S
55-3A	S	5	4	1.8E-02	2.3E-02	No	NT	PI
55-3B	S	5	4	1.2E-01	1.6E-01	No	I	PI
55-3C	S	4	4	4.2E-02	3.9E-02	No	NT	NT
56-1A	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
56-2A	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
56-2B	T	2	1	2.0E-03	2.0E-03	No	N/A	N/A
56-2C	T	2	2	1.5E-02	1.5E-02	No	N/A	N/A
56-3A	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
56-3B	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
56-3C	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
56-4A	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
56-6A	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
56-8A	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
60-1A	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-204	S	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-219	S	3	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-281	S	3	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-605	S	6	1	2.8E-03	3.0E-03	No	S	S
GW-606	T	6	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-656	S	2	2	1.9E-01	1.9E-01	No	N/A	N/A
GW-658	T	3	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-686	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-690	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-691	S	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-692	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-698	S	6	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-700	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-762	T	6	6	5.6E-02	6.2E-02	No	S	PD
GW-763	T	4	1	2.5E-03	3.0E-03	No	NT	NT
GW-765	T	1	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-769	T	6	6	1.5E-03	1.5E-03	No	NT	NT
GW-770	T	6	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-775	T	1	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-776	T	1	0	3.0E-03	3.0E-03	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
GW-779	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-781	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-782	T	4	4	4.8E-02	5.0E-02	No	S	S
GW-783	T	2	2	4.0E-03	4.0E-03	No	N/A	N/A
GW-791	S	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-792	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-802	T	3	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-820	S	4	4	5.0E-03	5.0E-03	No	S	S
GW-954-1	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-954-2	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-954-3	T	4	4	2.8E-03	2.5E-03	No	S	S
GW-956-1	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-956-2	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-956-3	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-956-4	T	4	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-959	T	7	0	3.0E-03	3.0E-03	Yes	ND	ND
GW-960	T	2	0	3.0E-03	3.0E-03	Yes	ND	ND
UEFPC-SP17	T	1	0	3.0E-03	3.0E-03	Yes	ND	ND
BENZENE								
55-2A	S	4	0	5.0E-04	5.0E-04	Yes	ND	ND
55-3A	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
55-3B	S	5	4	1.5E-03	2.0E-03	No	NT	NT
55-3C	S	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2A	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2B	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
56-2C	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
56-3A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-3B	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-3C	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-4A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-6A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
56-8A	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
60-1A	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-204	S	16	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-219	S	15	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-281	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-605	S	26	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-606	T	26	5	7.9E-04	5.0E-04	No	S	S
GW-656	S	6	2	1.0E-03	5.0E-04	No	S	S
GW-658	T	9	8	8.0E+00	8.1E+00	No	NT	PI
GW-686	T	6	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-690	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-691	S	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-692	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
BENZENE								
GW-698	S	17	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-700	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-762	T	18	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-763	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-765	T	3	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-769	T	25	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-770	T	25	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-775	T	12	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-776	T	12	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-779	T	5	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-781	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-782	T	24	2	6.3E-04	5.0E-04	No	S	S
GW-783	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-791	S	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-792	T	11	1	6.4E-04	5.0E-04	No	S	S
GW-802	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-820	S	10	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-2	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-954-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-1	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-2	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-3	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-956-4	T	4	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-959	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-960	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
UEFPC-SP17	T	9	0	5.0E-04	5.0E-04	Yes	ND	ND
cis-1,2-DICHLOROETHYLENE								
55-2A	S	4	4	4.1E-01	4.2E-01	No	S	S
55-3A	S	5	5	9.9E-01	1.0E+00	No	NT	NT
55-3B	S	5	5	1.4E+00	1.3E+00	No	PI	PI
55-3C	S	4	4	1.9E+00	2.0E+00	No	S	S
56-1A	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
56-2A	T	2	1	6.0E-03	6.0E-03	No	N/A	N/A
56-2B	T	2	2	7.0E-02	7.0E-02	No	N/A	N/A
56-2C	T	2	2	8.3E-01	8.3E-01	No	N/A	N/A
56-3A	T	4	4	8.3E-03	8.0E-03	No	S	S
56-3B	T	4	4	2.7E-02	2.7E-02	No	NT	NT
56-3C	T	4	4	6.7E-02	6.8E-02	No	NT	I
56-4A	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
56-6A	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
56-8A	T	2	2	2.2E-02	2.2E-02	No	N/A	N/A
60-1A	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-204	S	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-219	S	3	0	5.0E-03	5.0E-03	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
cis-1,2-DICHLOROETHYLENE								
GW-281	S	3	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-605	S	6	6	1.2E-01	9.7E-02	No	I	I
GW-606	T	6	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-656	S	2	2	1.5E-01	1.5E-01	No	N/A	N/A
GW-658	T	3	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-686	T	4	4	2.2E-02	2.2E-02	No	S	NT
GW-690	T	2	2	6.5E-03	6.5E-03	No	N/A	N/A
GW-691	S	2	2	1.4E-02	1.5E-02	No	N/A	N/A
GW-692	T	2	2	2.9E-02	2.9E-02	No	N/A	N/A
GW-698	S	6	6	3.1E-02	3.4E-02	No	NT	NT
GW-700	T	2	2	4.3E-02	4.3E-02	No	N/A	N/A
GW-762	T	6	6	5.7E-02	6.6E-02	No	S	PD
GW-763	T	4	3	1.4E-02	1.1E-02	No	S	PD
GW-765	T	1	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-769	T	6	6	3.2E-03	3.0E-03	No	NT	PI
GW-770	T	6	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-775	T	1	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-776	T	1	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-779	T	2	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-781	T	2	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-782	T	4	4	1.8E-02	1.7E-02	No	NT	NT
GW-783	T	2	2	5.0E-03	5.0E-03	No	N/A	N/A
GW-791	S	4	1	4.0E-03	5.0E-03	No	NT	NT
GW-792	T	2	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-802	T	3	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-820	S	4	4	1.0E+00	1.0E+00	No	S	NT
GW-954-1	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-954-2	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-954-3	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-956-1	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-956-2	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-956-3	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-956-4	T	4	0	5.0E-03	5.0E-03	Yes	ND	ND
GW-959	T	7	7	9.7E-02	6.1E-02	No	PD	D
GW-960	T	2	0	5.0E-03	5.0E-03	Yes	ND	ND
UEFPC-SP17	T	1	0	5.0E-03	5.0E-03	Yes	ND	ND
GROSS ALPHA ACTIVITY								
55-2A	S	4	0	1.0E-02	1.0E-02	Yes	ND	ND
55-3A	S	5	0	1.0E-02	1.0E-02	Yes	ND	ND
55-3B	S	5	0	1.0E-02	1.0E-02	Yes	ND	ND
55-3C	S	4	1	1.5E+00	1.0E-02	No	NT	NT
56-1A	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
56-2A	T	4	2	6.0E-01	5.1E-01	No	NT	D
56-2B	T	4	3	9.0E-01	1.1E+00	No	S	S
56-2C	T	6	5	1.9E+00	1.6E+00	No	NT	S

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
56-3A	T	3	0	1.0E-02	1.0E-02	Yes	ND	ND
56-3B	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
56-3C	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
56-4A	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
56-6A	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
56-8A	T	2	1	3.1E+00	3.1E+00	No	N/A	N/A
60-1A	T	4	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-204	S	17	17	4.8E+01	3.7E+01	No	S	S
GW-219	S	15	15	1.2E+02	1.1E+02	No	S	NT
GW-605	S	25	25	6.9E+01	5.2E+01	No	S	S
GW-606	T	26	25	7.0E+00	7.0E+00	No	I	NT
GW-656	S	4	3	1.9E+00	1.9E+00	No	S	S
GW-658	T	2	2	1.1E+00	1.1E+00	No	N/A	N/A
GW-686	T	5	1	3.2E+00	1.0E-02	No	NT	D
GW-690	T	6	4	5.4E+00	3.1E+00	No	D	D
GW-691	S	3	2	1.4E+00	1.4E+00	No	N/A	N/A
GW-692	T	6	4	4.8E+00	3.2E+00	No	NT	NT
GW-698	S	16	11	4.6E+00	2.6E+00	No	NT	D
GW-700	T	7	5	1.5E+00	1.7E+00	No	PD	D
GW-762	T	18	6	6.9E-01	1.0E-02	No	NT	NT
GW-763	T	17	14	2.6E+00	8.2E-01	No	NT	PD
GW-765	T	3	2	1.0E+00	1.3E+00	No	N/A	N/A
GW-769	T	20	18	2.5E+00	1.4E+00	No	NT	NT
GW-770	T	19	14	1.2E+00	6.5E-01	No	D	D
GW-775	T	9	8	1.7E+00	1.2E+00	No	PD	D
GW-776	T	9	8	2.6E+00	1.2E+00	No	D	D
GW-779	T	3	2	3.2E+00	2.1E+00	No	N/A	N/A
GW-781	T	6	4	1.5E+00	4.2E-01	No	D	D
GW-782	T	24	24	3.9E+01	4.0E+01	No	D	D
GW-783	T	10	10	4.0E+00	3.0E+00	No	PI	I
GW-791	S	15	11	1.5E+00	1.5E+00	No	D	D
GW-792	T	6	5	2.0E+00	1.6E+00	No	S	S
GW-820	S	9	5	9.3E-01	3.8E-01	No	D	D
GW-954-1	T	3	2	7.3E+00	6.9E+00	No	N/A	N/A
GW-954-2	T	4	2	2.9E+00	2.4E+00	No	NT	NT
GW-954-3	T	3	2	2.9E+00	3.8E+00	No	N/A	N/A
GW-956-1	T	3	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-956-2	T	4	2	5.5E+00	2.5E+00	No	NT	D
GW-956-3	T	4	2	5.1E+00	3.7E+00	No	NT	NT
GW-956-4	T	3	1	2.1E+00	1.0E-02	No	N/A	N/A
GW-959	T	7	1	3.2E-01	1.0E-02	No	NT	NT
GW-960	T	2	0	1.0E-02	1.0E-02	Yes	ND	ND
UEFPC-SP17	T	9	8	2.4E+00	1.9E+00	No	D	D
GROSS BETA ACTIVITY								
55-2A	S	4	0	2.1E+00	2.1E+00	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

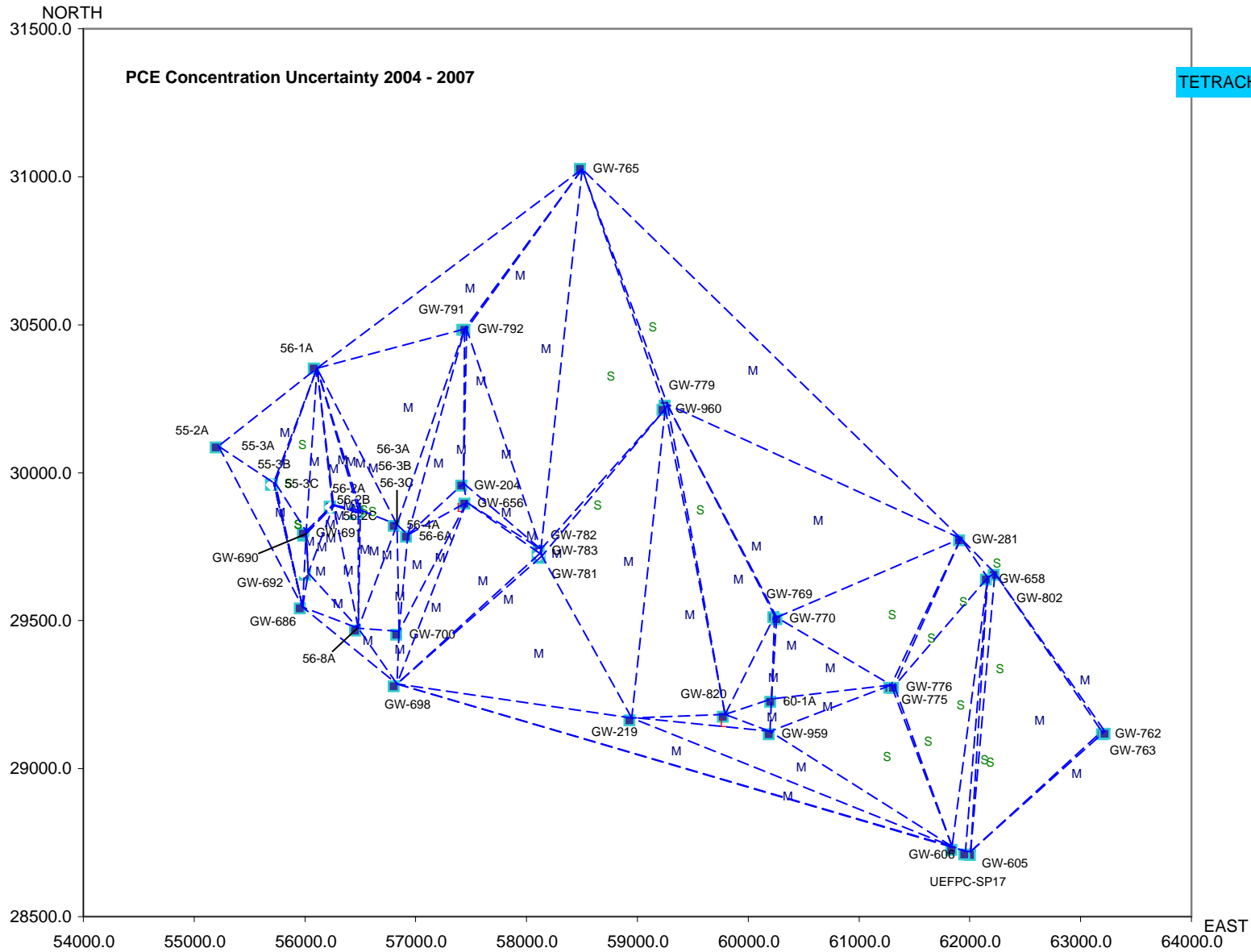
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS BETA ACTIVITY								
55-3A	S	5	2	4.3E+00	2.1E+00	No	PI	I
55-3B	S	5	1	3.6E+00	2.1E+00	No	S	S
55-3C	S	4	4	1.0E+01	1.1E+01	No	S	S
56-1A	T	4	1	4.3E+00	2.1E+00	No	NT	NT
56-2A	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
56-2B	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
56-2C	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
56-3A	T	4	1	3.3E+00	2.1E+00	No	S	S
56-3B	T	4	0	2.1E+00	2.1E+00	Yes	ND	ND
56-3C	T	4	0	2.1E+00	2.1E+00	Yes	ND	ND
56-4A	T	4	1	3.2E+00	2.1E+00	No	NT	NT
56-6A	T	4	2	4.6E+00	3.8E+00	No	NT	I
56-8A	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
60-1A	T	4	1	3.8E+00	2.1E+00	No	NT	NT
GW-204	S	4	4	1.3E+01	1.2E+01	No	S	NT
GW-219	S	3	3	5.2E+01	5.6E+01	No	N/A	N/A
GW-605	S	6	6	2.7E+01	2.5E+01	No	S	PD
GW-606	T	6	4	5.4E+00	5.6E+00	No	NT	NT
GW-656	S	2	1	5.9E+00	5.9E+00	No	N/A	N/A
GW-686	T	4	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-690	T	2	1	4.6E+00	4.6E+00	No	N/A	N/A
GW-691	S	2	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-692	T	2	2	9.0E+00	9.0E+00	No	N/A	N/A
GW-698	S	6	1	5.2E+00	2.1E+00	No	NT	PI
GW-700	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-762	T	6	4	5.1E+00	5.7E+00	No	S	PD
GW-763	T	4	2	4.0E+00	3.9E+00	No	S	S
GW-765	T	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-769	T	6	3	6.1E+00	3.9E+00	No	NT	I
GW-770	T	6	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-775	T	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-776	T	1	1	8.3E+00	8.3E+00	No	N/A	N/A
GW-779	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-781	T	2	2	7.8E+00	7.8E+00	No	N/A	N/A
GW-782	T	4	1	5.6E+00	2.1E+00	No	NT	PI
GW-783	T	2	1	5.1E+00	5.1E+00	No	N/A	N/A
GW-791	S	4	1	8.6E+00	2.1E+00	No	NT	PI
GW-792	T	2	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-820	S	4	1	2.8E+00	2.1E+00	No	S	S
GW-954-1	T	4	1	4.0E+00	2.1E+00	No	S	S
GW-954-2	T	4	1	2.6E+00	2.1E+00	No	S	S
GW-954-3	T	4	2	5.3E+00	4.5E+00	No	NT	NT
GW-956-1	T	4	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-956-2	T	4	3	9.1E+00	7.2E+00	No	S	S
GW-956-3	T	4	2	5.6E+00	4.6E+00	No	NT	NT
GW-956-4	T	4	3	6.7E+00	7.5E+00	No	NT	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS BETA ACTIVITY								
GW-959	T	7	3	5.4E+00	2.1E+00	No	NT	NT
GW-960	T	2	1	5.3E+00	5.3E+00	No	N/A	N/A
UEFPC-SP17	T	1	0	2.1E+00	2.1E+00	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
TETRACHLOROETHYLENE(PCE)

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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APPENDIX C.6
EAST Y-12 AREA

MAROS COC Assessment

Project: EF New Hope Pond

User Name: MV

Location: East Y-12

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
CARBON TETRACHLORIDE	3.4E-01	5.0E-03	6768.9%
MANGANESE	7.2E-01	5.0E-02	1342.5%
TETRACHLOROETHYLENE(PCE)	4.1E-02	5.0E-03	717.3%
TRICHLOROETHYLENE (TCE)	1.8E-02	5.0E-03	255.7%
GROSS ALPHA ACTIVITY	1.8E+01	1.5E+01	17.2%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
MANGANESE	MET	25	16	64.0%	25
CARBON TETRACHLORIDE	ORG	26	11	42.3%	15
TETRACHLOROETHYLENE(PCE)	ORG	26	7	26.9%	17
TRICHLOROETHYLENE (TCE)	ORG	26	5	19.2%	9
GROSS ALPHA ACTIVITY	INO	26	1	3.8%	26

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
GROSS ALPHA ACTIVITY	
CARBON TETRACHLORIDE	0.277
TRICHLOROETHYLENE (TCE)	0.297
TETRACHLOROETHYLENE(PCE)	0.923
MANGANESE	50.1

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

CARBON TETRACHLORIDE
 TETRACHLOROETHYLENE(PCE)
 TRICHLOROETHYLENE (TCE)
 GROSS ALPHA ACTIVITY

MAROS Spatial Moment Analysis Summary

Project: EF New Hope Pond

User Name: MV

Location: East Y-12

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
CARBON TETRACHLORIDE							
7/1/1996	5.7E+00	64,976	28,886	2,035	1,098,923	149,058	23
7/1/1997	8.3E+00	64,892	28,774	1,945	1,040,280	137,282	22
7/1/1998	7.0E+00	64,887	28,824	1,942	1,104,444	147,718	21
7/1/1999	8.4E+00	64,639	28,822	1,694	1,123,379	122,194	23
7/1/2000	5.7E+00	64,480	28,977	1,554	1,016,341	177,112	23
7/1/2001	5.5E+00	64,535	28,922	1,600	928,672	166,424	23
7/1/2002	7.2E+00	64,493	28,809	1,547	693,164	106,799	23
7/1/2003	6.5E+00	64,445	28,830	1,502	803,924	117,074	23
7/1/2004	6.2E+00	64,543	28,826	1,599	816,360	122,392	23
7/1/2005	6.0E+00	64,529	28,830	1,585	837,558	123,967	23
7/1/2006	4.5E+00	64,765	28,952	1,832	984,994	146,035	24
7/1/2007	3.6E+00	64,711	28,926	1,776	1,121,547	176,189	24
GROSS ALPHA ACTIVITY							
7/1/1996	2.6E+03	65,329	29,444	2,490	1,904,362	255,843	22
7/1/1997	1.1E+03	64,414	29,316	1,584	1,048,423	323,976	21
7/1/1998	3.4E+03	65,573	29,409	2,715	1,923,427	243,560	20
7/1/1999	2.3E+03	65,323	29,426	2,479	2,028,566	253,872	23
7/1/2000	1.4E+03	64,771	29,567	2,012	1,340,797	274,422	23
7/1/2001	5.4E+03	64,702	29,678	2,001	1,794,920	268,317	20
7/1/2002	2.4E+03	65,349	29,474	2,518	2,197,078	275,619	23
7/1/2003	1.2E+03	64,753	29,246	1,881	1,191,702	201,769	22
7/1/2004	1.9E+03	64,244	29,501	1,515	548,650	325,558	17
7/1/2005	5.0E+02	63,584	29,043	716	120,505	121,484	18
7/1/2006	1.4E+02	63,913	29,152	1,060	383,463	185,349	18
7/1/2007	1.4E+03	63,893	29,382	1,157	147,430	36,484	17
GROSS BETA ACTIVITY							
7/1/1996	4.9E+03	65,912	29,525	3,072	1,839,592	150,839	22
7/1/1997	6.6E+03	65,784	29,568	2,962	1,756,068	207,653	20
7/1/1998	7.7E+03	65,686	29,441	2,833	1,674,243	224,095	20
7/1/1999	6.4E+03	65,530	29,546	2,713	1,964,216	254,547	23
7/1/2000	4.5E+03	65,181	29,382	2,331	1,163,289	405,153	23
7/1/2001	8.5E+03	65,816	29,455	2,962	1,903,932	306,592	23
7/1/2002	1.2E+04	65,173	29,585	2,389	2,269,092	306,857	22
7/1/2003	1.0E+04	65,375	29,457	2,538	2,067,346	277,152	21
7/1/2004	3.2E+03	64,560	29,399	1,752	589,407	286,635	16
7/1/2005	2.4E+02	64,677	29,085	1,768	730,958	142,810	18
7/1/2006	1.2E+03	64,354	29,277	1,514	567,505	268,672	19

Project: EF New Hope Pond

User Name: MV

Location: East Y-12

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
GROSS BETA ACTIVITY							
7/1/2007	2.3E+02	64,148	28,937	1,220	893,784	181,736	19
TETRACHLOROETHYLENE(PCE)							
7/1/1996	2.5E+00	64,618	29,524	1,856	1,454,404	326,501	23
7/1/1997	2.2E+00	64,667	29,456	1,872	1,758,329	414,384	22
7/1/1998	2.7E+00	64,828	29,404	2,002	1,892,006	430,954	21
7/1/1999	3.3E+00	64,402	29,300	1,567	1,576,627	396,519	23
7/1/2000	4.1E+00	64,301	29,459	1,544	1,230,832	300,113	23
7/1/2001	3.8E+00	64,338	29,442	1,569	1,228,333	312,281	23
7/1/2002	3.5E+00	64,491	29,363	1,673	1,310,582	342,025	23
7/1/2003	3.8E+00	64,441	29,360	1,627	1,234,050	335,899	23
7/1/2004	3.6E+00	64,458	29,359	1,642	1,233,876	332,128	23
7/1/2005	3.6E+00	64,466	29,366	1,652	1,258,123	336,867	23
7/1/2006	2.8E+00	64,636	29,422	1,831	1,431,165	352,801	24
7/1/2007	3.3E+00	64,489	29,393	1,684	1,305,355	332,473	24
TRICHLOROETHYLENE (TCE)							
7/1/2005	5.3E+00	64,982	29,475	2,171	1,973,304	377,375	23
7/1/2006	5.6E+00	65,034	29,455	2,213	1,981,410	363,684	24
7/1/2007	5.2E+00	65,041	29,496	2,233	2,097,488	379,949	24

Project: EF New Hope Pond

User Name: MV

Location: East Y-12

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	CARBON TETRACHLORIDE	0.22	-30	97.8%	D
	GROSS ALPHA ACTIVITY	0.72	-26	95.7%	D
	GROSS BETA ACTIVITY	0.70	-22	92.4%	PD
	TETRACHLOROETHYLENE(PCE)	0.18	14	81.0%	NT
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A
1st Moment: Distance to Source					
	CARBON TETRACHLORIDE	0.11	-24	94.2%	PD
	GROSS ALPHA ACTIVITY	0.35	-38	99.6%	D
	GROSS BETA ACTIVITY	0.27	-52	100.0%	D
	TETRACHLOROETHYLENE(PCE)	0.08	2	52.7%	NT
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A
2nd Moment: Sigma XX					
	CARBON TETRACHLORIDE	0.15	-14	81.0%	S
	GROSS ALPHA ACTIVITY	0.63	-32	98.4%	D
	GROSS BETA ACTIVITY	0.43	-20	90.2%	PD
	TETRACHLOROETHYLENE(PCE)	0.16	-16	84.5%	S
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A
2nd Moment: Sigma YY					
	CARBON TETRACHLORIDE	0.17	0	47.3%	S
	GROSS ALPHA ACTIVITY	0.36	-22	92.4%	PD
	GROSS BETA ACTIVITY	0.30	4	58.0%	NT
	TETRACHLOROETHYLENE(PCE)	0.12	-6	63.1%	S
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: EF New Hope Pond

User Name: MV

Location: East Y-12

State: Tennessee

Time Period: 1/1/1996 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
CARBON TETRACHLORIDE								
GW-148	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-151	S	25	24	1.1E+00	1.1E+00	No	I	I
GW-153	T	24	23	1.4E-01	1.3E-01	No	D	S
GW-154	S	26	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-169	T	30	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-170	T	36	36	1.5E-02	4.0E-03	No	NT	D
GW-171	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-172	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-220	T	28	28	7.9E-01	8.0E-01	No	I	I
GW-223	S	21	6	4.8E-03	5.0E-04	No	D	D
GW-230	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-240	T	10	10	7.1E-03	5.5E-03	No	S	D
GW-380	T	22	1	6.1E-04	5.0E-04	No	NT	NT
GW-381	S	14	14	2.2E-01	9.4E-02	No	D	D
GW-382	S	17	17	7.9E-01	7.2E-01	No	D	D
GW-383	S	27	2	6.1E-04	5.0E-04	No	S	D
GW-733	T	27	27	1.3E-02	8.0E-03	No	D	D
GW-735	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-744	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-747	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-748	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-750	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-816	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-832	T	23	23	1.5E-02	1.0E-02	No	D	D
SCR7_1SP	T	23	9	1.4E-03	5.0E-04	No	D	D
SCR7_8SP	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GROSS ALPHA ACTIVITY								
GW-148	T	10	9	1.6E+00	1.4E+00	No	D	D
GW-151	S	23	8	6.6E-01	1.0E-02	No	NT	NT
GW-153	T	23	20	1.9E+00	1.7E+00	No	D	D
GW-154	S	26	26	5.4E+02	5.1E+02	No	I	PI
GW-169	T	30	21	1.2E+00	1.4E+00	No	S	PD
GW-170	T	35	21	1.0E+00	1.0E+00	No	PD	PD
GW-171	T	16	15	3.0E+00	2.3E+00	No	NT	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
GW-172	T	15	6	8.7E-01	1.0E-02	No	NT	NT
GW-220	T	21	14	1.3E+00	8.4E-01	No	D	D
GW-223	S	21	21	1.4E+01	1.3E+01	No	I	I
GW-230	T	14	3	3.5E+00	1.0E-02	No	NT	NT
GW-240	T	7	6	2.0E+00	2.2E+00	No	S	D
GW-380	T	21	17	2.5E+00	2.1E+00	No	S	S
GW-381	S	10	6	1.3E+00	3.3E-01	No	PD	D
GW-382	S	17	12	1.9E+00	2.4E+00	No	S	S
GW-383	S	18	16	2.2E+00	1.1E+00	No	NT	NT
GW-733	T	25	13	1.2E+00	5.1E-01	No	D	D
GW-735	T	18	15	2.4E+00	1.6E+00	No	NT	PD
GW-744	T	19	16	1.7E+00	1.5E+00	No	PD	D
GW-747	T	17	14	1.0E+00	8.4E-01	No	S	D
GW-748	T	4	3	2.7E-01	2.7E-01	No	S	D
GW-750	T	19	17	1.1E+00	8.2E-01	No	D	D
GW-816	T	21	18	1.3E+00	9.5E-01	No	S	D
GW-832	T	23	22	4.7E+00	4.1E+00	No	S	NT
SCR7_1SP	T	15	6	9.2E-01	1.0E-02	No	NT	NT
SCR7_8SP	T	11	3	3.5E-01	1.0E-02	No	NT	NT
GROSS BETA ACTIVITY								
GW-148	T	8	7	3.3E+00	3.6E+00	No	S	D
GW-151	S	21	16	2.7E+00	3.1E+00	No	NT	NT
GW-153	T	19	15	3.0E+00	2.9E+00	No	PD	D
GW-154	S	26	26	1.3E+02	1.0E+02	No	I	I
GW-169	T	30	26	3.4E+00	3.3E+00	No	S	S
GW-170	T	35	35	9.5E+00	7.8E+00	No	I	I
GW-171	T	16	16	1.0E+01	8.7E+00	No	NT	NT
GW-172	T	15	10	4.0E+00	2.5E+00	No	NT	NT
GW-220	T	24	18	3.0E+00	3.1E+00	No	D	D
GW-223	S	20	20	1.1E+01	9.3E+00	No	I	I
GW-230	T	14	12	1.9E+02	3.8E+00	No	I	NT
GW-240	T	9	9	3.8E+00	3.3E+00	No	I	I
GW-380	T	18	16	4.6E+00	4.4E+00	No	NT	S
GW-381	S	10	6	1.6E+00	6.7E-01	No	NT	D
GW-382	S	17	15	5.1E+00	5.4E+00	No	NT	S
GW-383	S	19	13	3.1E+00	2.0E+00	No	NT	D
GW-733	T	25	21	3.0E+00	2.4E+00	No	NT	PD
GW-735	T	18	15	2.6E+00	2.7E+00	No	S	D
GW-744	T	18	15	3.6E+00	3.0E+00	No	S	D
GW-747	T	19	16	3.0E+00	3.1E+00	No	NT	D
GW-748	T	4	3	4.6E-01	3.2E-01	No	D	D
GW-750	T	21	19	3.9E+00	4.4E+00	No	S	S
GW-816	T	24	20	5.2E+00	5.0E+00	No	D	D
GW-832	T	23	20	5.8E+00	5.8E+00	No	PI	NT
SCR7_1SP	T	16	12	2.9E+00	3.3E+00	No	NT	NT

MAROS Statistical Trend Analysis Summary

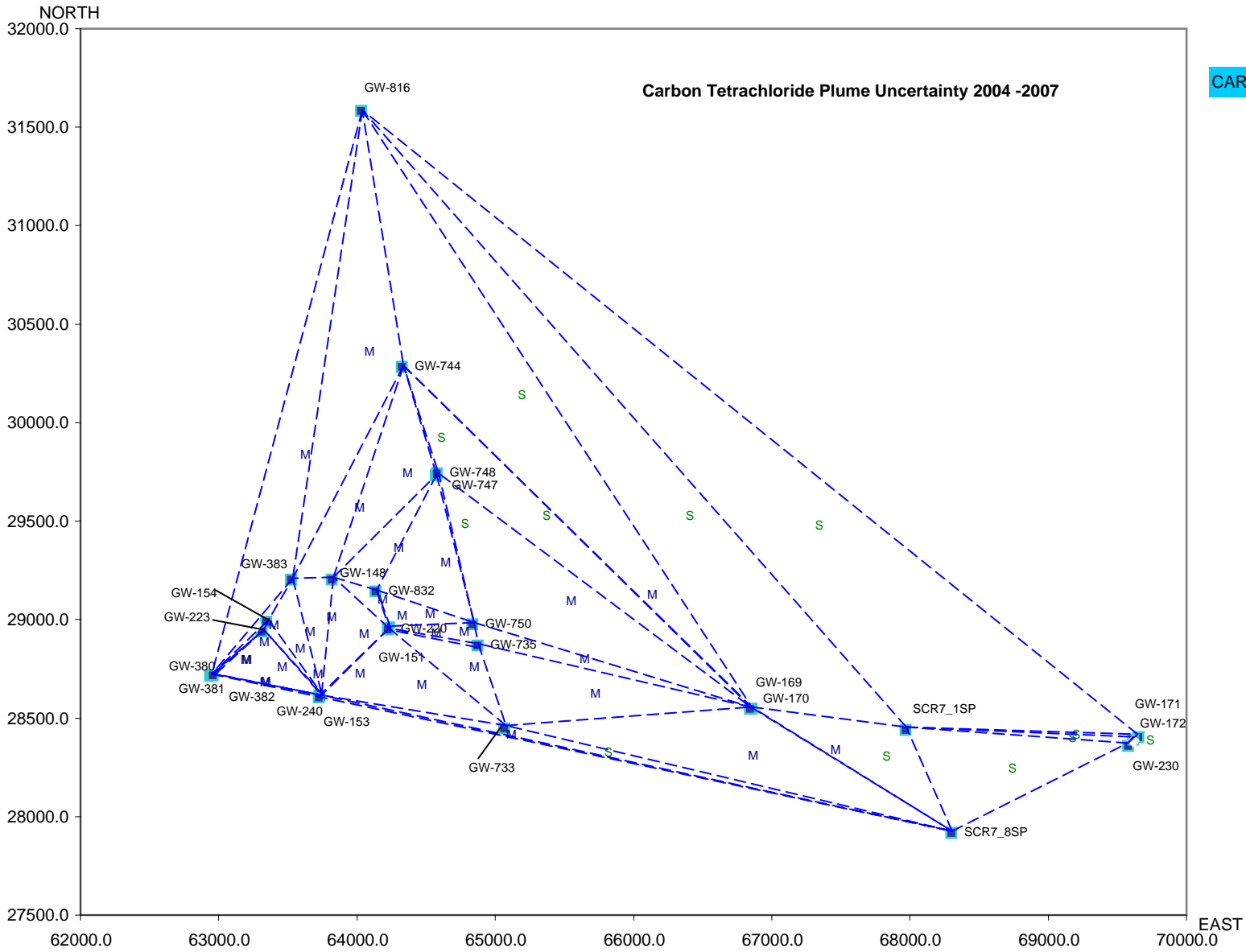
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS BETA ACTIVITY								
SCR7_8SP	T	11	9	1.9E+00	2.0E+00	No	NT	NT
TETRACHLOROETHYLENE(PCE)								
GW-148	T	11	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-151	S	25	25	3.5E-01	2.4E-01	No	I	I
GW-153	T	24	23	4.1E-03	4.0E-03	No	D	D
GW-154	S	26	1	5.6E-04	5.0E-04	No	S	PD
GW-169	T	30	28	1.6E-03	2.0E-03	No	NT	I
GW-170	T	36	35	2.3E-03	2.0E-03	No	D	D
GW-171	T	22	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-172	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-220	T	28	28	2.2E-01	1.1E-01	No	I	I
GW-223	S	21	21	8.6E-02	4.2E-02	No	D	D
GW-230	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-240	T	10	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-380	T	22	1	5.2E-04	5.0E-04	No	S	S
GW-381	S	14	12	3.9E-03	4.0E-03	No	PD	PD
GW-382	S	17	17	2.2E-02	1.3E-02	No	NT	NT
GW-383	S	27	27	4.3E-01	4.0E-01	No	S	D
GW-733	T	27	5	6.2E-04	5.0E-04	No	D	D
GW-735	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-744	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-747	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-748	T	7	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-750	T	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-816	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-832	T	23	23	5.1E-03	5.0E-03	No	S	S
SCR7_1SP	T	23	2	5.4E-04	5.0E-04	No	S	D
SCR7_8SP	T	21	4	7.4E-04	5.0E-04	No	D	D
TRICHLOROETHYLENE (TCE)								
GW-148	T	1	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-151	S	6	6	1.3E-01	1.3E-01	No	D	D
GW-153	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-154	S	6	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-169	T	8	1	2.1E-03	2.0E-03	No	S	S
GW-170	T	9	9	1.8E-03	2.0E-03	No	PD	D
GW-171	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-172	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-220	T	6	6	1.0E-01	1.0E-01	No	NT	NT
GW-223	S	6	6	1.4E-02	1.4E-02	No	S	NT
GW-230	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-240	T	2	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-380	T	6	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-381	S	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-382	S	6	3	2.7E-03	2.0E-03	No	S	D

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TRICHLOROETHYLENE (TCE)								
GW-383	S	6	6	1.6E-01	1.6E-01	No	NT	NT
GW-733	T	6	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-735	T	3	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-744	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-747	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-748	T	1	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-750	T	3	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-816	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND
GW-832	T	6	4	1.2E-03	1.0E-03	No	S	S
SCR7_1SP	T	4	1	1.8E-03	2.0E-03	No	NT	NT
SCR7_8SP	T	4	0	2.0E-03	2.0E-03	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
CARBON TETRACHLORIDE

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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APPENDIX C.7

WEST CHESTNUT RIDGE

MAROS COC Assessment

Project: CR Landfill VI

User Name: MV

Location: West Chestnut Ridge

State: Tennessee

Toxicity:

No priority, plume-wide COCs were found for the West Chestnut Ridge Landfill VI

Prevalence:

Mobility:

Contaminants of Concern (COC's)

MAROS Spatial Moment Analysis Summary

Project: CR Landfill VI

User Name: MV

Location: West Chestnut Ridge

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
1,1-DICHLOROETHENE							
7/1/2005	1.2E+00	52,861	26,571	2,128	234,819	1,112,038	15
7/1/2006	1.2E+00	52,853	26,591	2,115	238,252	1,131,334	15
7/1/2007	1.2E+00	52,859	26,604	2,101	234,750	1,115,457	15
CADMIUM							
7/1/1996	2.4E-02	52,914	27,443	1,430	295,972	678,598	16
7/1/1997	3.3E-02	53,167	26,387	2,148	337,856	1,490,541	17
7/1/1998	2.7E-02	53,095	26,697	1,900	393,663	1,237,287	18
7/1/1999	2.7E-02	53,095	26,697	1,900	392,921	1,246,287	19
7/1/2000	2.7E-02	53,095	26,697	1,900	392,921	1,246,287	19
7/1/2001	2.7E-02	53,095	26,697	1,900	392,921	1,246,287	19
7/1/2002	1.9E-02	52,870	27,202	1,625	332,554	614,408	17
7/1/2003	2.7E-02	53,095	26,697	1,900	392,921	1,246,287	19
7/1/2004	2.7E-02	53,095	26,697	1,900	392,921	1,246,287	19
7/1/2005	3.4E-02	53,091	26,562	2,021	359,753	1,669,734	19
7/1/2006	3.3E-02	53,040	26,810	1,830	382,760	1,264,773	19
7/1/2007	2.8E-02	53,079	26,733	1,877	395,993	1,272,707	19
GROSS ALPHA ACTIVITY							
7/1/1996	2.6E+03	52,817	27,225	1,647	219,206	746,585	15
7/1/1997	2.3E+03	53,087	26,342	2,221	311,236	1,257,658	17
7/1/1998	1.8E+03	53,206	26,661	1,881	274,727	1,029,322	16
7/1/1999	1.9E+03	52,823	26,486	2,219	285,837	1,331,894	19
7/1/2000	3.3E+02	53,489	25,892	2,525	309,155	889,617	19
7/1/2001	5.2E+02	53,523	25,086	3,313	72,091	775,688	19
7/1/2002	3.9E+02	53,585	27,260	1,181	173,998	177,472	17
7/1/2003	8.6E+02	53,528	25,435	2,967	75,275	971,937	19
7/1/2004	7.0E+02	53,596	25,842	2,554	154,008	1,392,220	19
7/1/2005	7.5E+01	53,383	26,741	1,738	223,548	1,604,847	19
7/1/2006	2.4E+02	53,238	26,386	2,122	303,616	898,738	18
7/1/2007	9.3E+01	53,242	26,248	2,249	315,565	874,664	19
GROSS BETA ACTIVITY							
7/1/1996	3.2E+03	52,910	27,083	1,687	163,213	379,810	13
7/1/1997	5.7E+03	52,996	26,696	1,951	213,104	1,156,940	17
7/1/1998	6.6E+03	53,106	26,941	1,684	217,234	782,535	17
7/1/1999	3.9E+03	52,891	26,718	1,988	396,578	730,782	19
7/1/2000	4.9E+02	53,324	26,774	1,730	58,871	535,391	18

Project: CR Landfill VI

Location: West Chestnut Ridge

User Name: MV

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
<hr/> GROSS BETA ACTIVITY <hr/>							
7/1/2001	6.2E+03	53,335	26,979	1,539	90,005	200,392	19
7/1/2002	2.7E+03	53,383	27,145	1,369	248,537	220,328	17
7/1/2003	2.3E+03	53,509	26,492	1,936	232,949	914,658	19
7/1/2004	3.5E+03	53,512	26,470	1,957	171,051	861,333	19
7/1/2005	1.2E+03	53,650	27,124	1,289	92,788	342,211	19
7/1/2006	2.4E+03	53,460	27,235	1,254	143,342	224,166	19
7/1/2007	1.1E+03	53,235	27,090	1,490	25,360	40,895	19
<hr/> NITRATE <hr/>							
7/1/2005	2.9E+02	53,263	26,696	1,826	472,836	1,322,473	19
7/1/2006	2.7E+02	53,295	26,522	1,974	464,840	1,508,834	19
7/1/2007	1.9E+02	53,401	26,234	2,214	391,004	1,452,500	19

Project: CR Landfill VI
Location: West Chestnut Ridge

User Name: MV
State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	1,1-DICHLOROETHENE	0.00	0	0.0%	N/A
	CADMIUM	0.14	12	77.0%	NT
	GROSS ALPHA ACTIVITY	0.92	-44	99.9%	D
	GROSS BETA ACTIVITY	0.62	-28	96.9%	D
	NITRATE	0.00	0	0.0%	N/A
1st Moment: Distance to Source					
	1,1-DICHLOROETHENE	0.00	0	0.0%	N/A
	CADMIUM	0.10	-2	52.7%	S
	GROSS ALPHA ACTIVITY	0.26	10	72.7%	NT
	GROSS BETA ACTIVITY	0.16	-24	94.2%	PD
	NITRATE	0.00	0	0.0%	N/A
2nd Moment: Sigma XX					
	1,1-DICHLOROETHENE	0.00	0	0.0%	N/A
	CADMIUM	0.09	6	63.1%	NT
	GROSS ALPHA ACTIVITY	0.40	4	58.0%	NT
	GROSS BETA ACTIVITY	0.59	-16	84.5%	S
	NITRATE	0.00	0	0.0%	N/A
2nd Moment: Sigma YY					
	1,1-DICHLOROETHENE	0.00	0	0.0%	N/A
	CADMIUM	0.24	30	97.8%	I
	GROSS ALPHA ACTIVITY	0.37	4	58.0%	NT
	GROSS BETA ACTIVITY	0.66	-24	94.2%	PD
	NITRATE	0.00	0	0.0%	N/A

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: CR Landfill VI

User Name: MV

Location: West Chestnut Ridge

State: Tennessee

Time Period: 1/1/1996 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
GW-141	S	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-217	S	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-305	T	12	12	5.7E-03	5.8E-03	No	NT	NT
GW-521	T	6	1	8.6E-04	1.0E-03	No	NT	NT
GW-522	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-540	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-542	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-543	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-544	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-709	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-757	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-827	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
SCR1_25SP	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
SCR2_1SP	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
SCR2_2SP	T	4	0	1.0E-03	1.0E-03	Yes	ND	ND
GROSS ALPHA ACTIVITY								
1090	S	22	14	1.3E+00	1.3E+00	No	S	S
GW-141	S	23	7	1.3E+00	1.0E-02	No	D	D
GW-203	S	21	14	2.2E+00	1.1E+00	No	NT	NT
GW-205	S	23	14	1.6E+00	1.0E+00	No	NT	NT
GW-217	S	21	5	2.9E-01	1.0E-02	No	D	D
GW-221	T	22	9	1.2E+00	1.0E-02	No	NT	NT
GW-305	T	38	11	7.4E-01	1.0E-02	No	PD	D
GW-521	T	21	5	2.7E-01	1.0E-02	No	D	D
GW-522	T	21	5	6.2E-01	1.0E-02	No	D	D
GW-540	T	21	5	4.8E-01	1.0E-02	No	D	D
GW-542	T	21	5	6.8E-01	1.0E-02	No	D	D
GW-543	T	22	6	2.4E-01	1.0E-02	No	D	D
GW-544	T	24	11	1.1E+00	1.0E-02	No	D	D
GW-709	T	21	10	1.2E+00	1.0E-02	No	NT	PD
GW-757	T	24	20	2.5E+00	2.4E+00	No	D	S
GW-827	T	21	6	2.3E-01	1.0E-02	No	D	D
SCR1_25SP	T	18	14	4.2E+00	2.5E+00	No	NT	PD
SCR2_1SP	T	17	14	2.7E+00	2.3E+00	No	D	D

MAROS Statistical Trend Analysis Summary

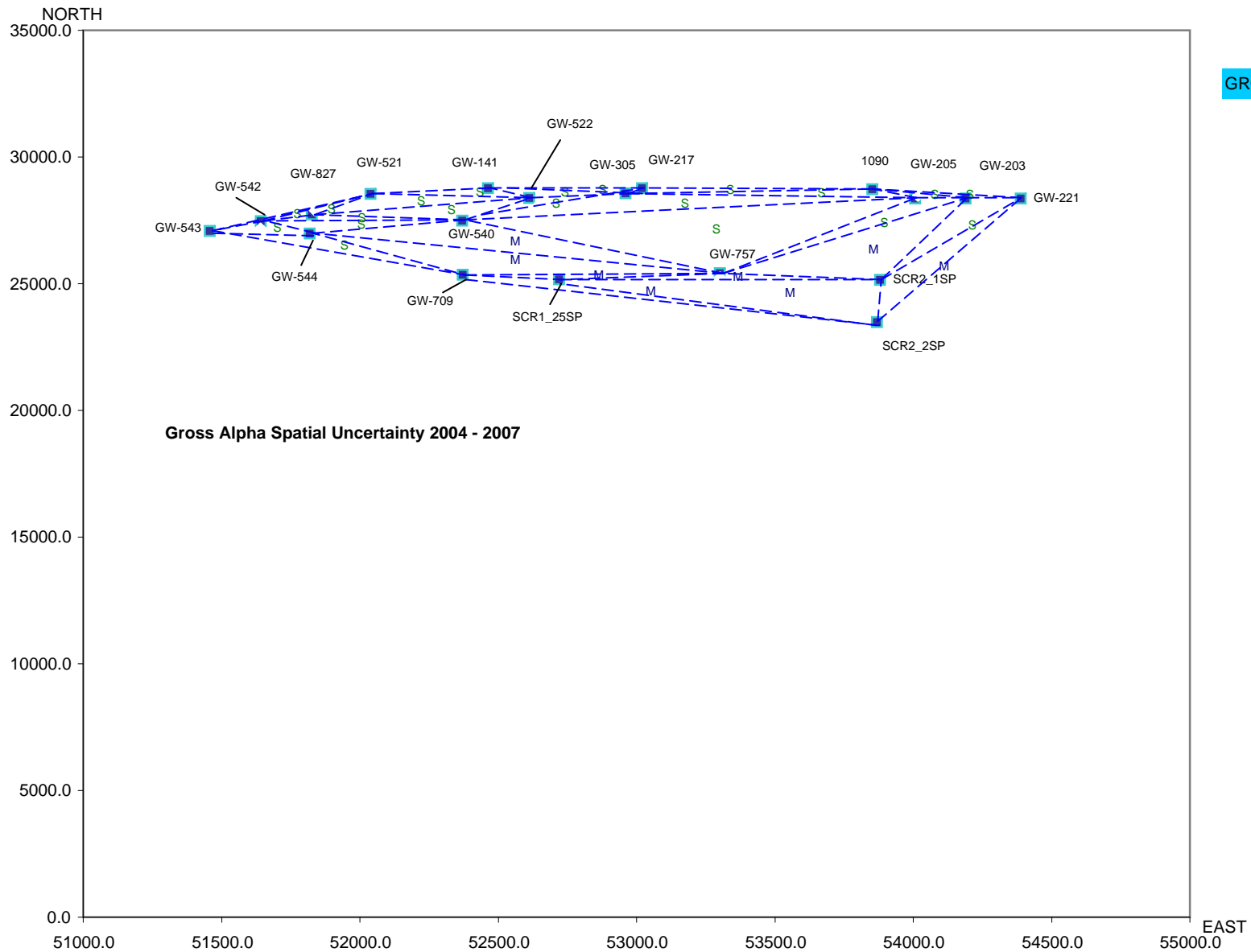
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
SCR2_2SP	T	15	12	1.4E+00	1.2E+00	No	S	D
GROSS BETA ACTIVITY								
1090	S	22	15	3.0E+00	2.6E+00	No	NT	NT
GW-141	S	22	10	2.1E+00	1.0E-03	No	D	D
GW-203	S	20	16	5.7E+00	3.5E+00	No	NT	NT
GW-205	S	22	21	5.8E+01	6.5E+01	No	I	I
GW-217	S	23	14	1.4E+00	1.5E+00	No	NT	PD
GW-221	T	22	12	2.3E+00	7.3E-01	No	NT	NT
GW-305	T	36	8	1.4E+00	1.0E-03	No	PD	D
GW-521	T	21	6	8.3E-01	1.0E-03	No	D	D
GW-522	T	20	5	6.7E-01	1.0E-03	No	D	D
GW-540	T	20	10	1.4E+00	8.0E-01	No	NT	PD
GW-542	T	22	17	2.4E+00	2.5E+00	No	D	S
GW-543	T	23	10	1.1E+00	1.0E-03	No	D	D
GW-544	T	22	12	2.3E+00	2.6E+00	No	D	D
GW-709	T	20	13	2.2E+00	2.1E+00	No	NT	NT
GW-757	T	24	24	1.3E+01	1.5E+01	No	I	I
GW-827	T	22	11	1.7E+00	6.2E-01	No	PD	D
SCR1_25SP	T	18	12	2.0E+00	2.0E+00	No	NT	S
SCR2_1SP	T	15	11	2.1E+00	1.6E+00	No	NT	NT
SCR2_2SP	T	13	9	2.0E+00	1.9E+00	No	D	D
LEAD								
1090	S	17	2	1.2E-04	5.2E-05	No	NT	D
GW-141	S	18	4	1.6E-03	5.2E-05	No	D	D
GW-203	S	16	2	1.3E-04	5.2E-05	No	NT	D
GW-205	S	17	2	2.4E-04	5.2E-05	No	NT	D
GW-217	S	18	5	1.6E-04	5.2E-05	No	D	D
GW-221	T	17	1	1.2E-04	5.2E-05	No	NT	NT
GW-305	T	28	1	9.7E-05	5.2E-05	No	NT	PD
GW-521	T	20	4	2.1E-04	5.2E-05	No	PD	D
GW-522	T	18	5	4.8E-04	5.2E-05	No	D	D
GW-540	T	16	2	1.8E-04	5.2E-05	No	NT	NT
GW-542	T	17	6	2.4E-04	5.2E-05	No	D	D
GW-543	T	18	0	5.2E-05	5.2E-05	Yes	ND	ND
GW-544	T	18	1	6.5E-05	5.2E-05	No	S	S
GW-709	T	18	1	9.4E-05	5.2E-05	No	NT	PD
GW-757	T	18	1	9.2E-05	5.2E-05	No	NT	PD
GW-827	T	18	0	5.2E-05	5.2E-05	Yes	ND	ND
SCR1_25SP	T	12	0	5.2E-05	5.2E-05	Yes	ND	ND
SCR2_1SP	T	14	4	2.0E-04	5.2E-05	No	NT	NT
SCR2_2SP	T	14	2	4.7E-03	5.2E-05	No	NT	D
NITRATE								
1090	S	6	6	6.8E-01	6.7E-01	No	D	D

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
NITRATE								
GW-141	S	6	5	3.3E-01	3.4E-01	No	D	PD
GW-203	S	6	6	7.8E-01	5.7E-01	No	D	D
GW-205	S	6	6	9.0E-02	5.2E-02	No	NT	NT
GW-217	S	6	5	2.9E-01	3.2E-01	No	S	PD
GW-221	T	6	6	4.0E-01	4.1E-01	No	D	S
GW-305	T	12	9	3.7E-01	3.8E-01	No	D	D
GW-521	T	6	5	2.1E-01	2.2E-01	No	S	S
GW-522	T	6	5	3.6E-01	4.0E-01	No	S	PD
GW-540	T	6	2	4.1E-02	2.0E-02	No	PD	D
GW-542	T	6	5	2.5E-01	2.9E-01	No	NT	S
GW-543	T	6	5	2.0E-01	2.3E-01	No	NT	S
GW-544	T	6	6	4.8E-01	4.6E-01	No	NT	NT
GW-709	T	6	3	2.6E-02	2.2E-02	No	S	S
GW-757	T	6	5	2.3E-01	2.6E-01	No	NT	S
GW-827	T	6	5	7.1E-02	7.9E-02	No	S	S
SCR1_25SP	T	6	6	1.1E-01	1.1E-01	No	PI	I
SCR2_1SP	T	4	4	2.2E-01	2.0E-01	No	NT	NT
SCR2_2SP	T	4	4	1.0E+00	8.9E-01	No	S	S

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
GROSS ALPHA ACTIVITY

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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APPENDIX C.8

CHESTNUT RIDGE SECURITY PITS

MAROS COC Assessment

Project: CR Security Pits

User Name: MV

Location: CRSP

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
TETRACHLOROETHYLENE(PCE)	1.5E-02	5.0E-03	201.3%
1,1-DICHLOROETHENE	1.8E-02	7.0E-03	152.3%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
TETRACHLOROETHYLENE(PCE)	ORG	13	8	61.5%	10
1,1-DICHLOROETHENE	ORG	13	4	30.8%	10

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
1,1-DICHLOROETHENE	0.13
TETRACHLOROETHYLENE(PCE)	0.923

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

TETRACHLOROETHYLENE(PCE)

1,1-DICHLOROETHENE

MAROS Spatial Moment Analysis Summary

Project: CR Security Pits

User Name: MV

Location: CRSP

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
1,1-DICHLOROETHENE							
1/1/1997	9.3E-01	57,976	27,560	1,158	234,839	616,057	8
1/1/1999	0.0E+00						4
1/1/2001	9.0E-01	57,959	27,555	1,174	253,151	626,393	9
1/1/2003	0.0E+00						3
1/1/2005	2.6E+00	57,770	27,374	1,434	229,973	668,040	9
1/1/2007	1.4E+00	58,185	27,817	841	243,169	525,230	13
GROSS ALPHA ACTIVITY							
1/1/1997	1.4E+02	57,875	27,059	1,572	259,802	370,064	6
1/1/1999	0.0E+00						3
1/1/2001	6.1E+02	57,763	27,254	1,514	203,896	647,577	8
1/1/2003	0.0E+00						3
1/1/2005	4.6E+02	57,469	26,950	1,936	64,195	523,062	7
1/1/2007	1.1E+02	57,507	26,714	2,075	117,167	308,597	13
GROSS BETA ACTIVITY							
1/1/2005	0.0E+00						3
1/1/2007	4.9E+03	57,662	26,819	1,893	216,269	382,481	13
NITRATE							
1/1/2005	0.0E+00						1
1/1/2007	2.4E+02	58,374	27,101	1,260	213,385	327,238	11
TETRACHLOROETHYLENE(PCE)							
1/1/1997	2.3E+00	58,244	27,243	1,201	382,186	588,949	8
1/1/1999	0.0E+00						4
1/1/2001	1.3E+00	58,137	27,122	1,361	451,458	567,035	9
1/1/2003	0.0E+00						3
1/1/2005	7.2E-01	57,588	27,058	1,775	165,225	622,686	9
1/1/2007	1.3E+00	58,169	27,341	1,167	445,159	703,495	13

Project: CR Security Pits

User Name: MV

Location: CRSP

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	1,1-DICHLOROETHENE	0.99	4	70.3%	NT
	GROSS ALPHA ACTIVITY	1.16	0	42.3%	NT
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.95	-2	57.0%	S
1st Moment: Distance to Source					
	1,1-DICHLOROETHENE	0.21	0	37.5%	S
	GROSS ALPHA ACTIVITY	0.15	4	83.3%	NT
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.20	0	37.5%	S
2nd Moment: Sigma XX					
	1,1-DICHLOROETHENE	0.04	0	37.5%	S
	GROSS ALPHA ACTIVITY	0.54	-4	83.3%	S
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.37	0	37.5%	S
2nd Moment: Sigma YY					
	1,1-DICHLOROETHENE	0.10	0	37.5%	S
	GROSS ALPHA ACTIVITY	0.33	-2	62.5%	S
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.10	4	83.3%	NT

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: CR Security Pits

User Name: MV

Location: CRSP

State: Tennessee

Time Period: 1/1/1986 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

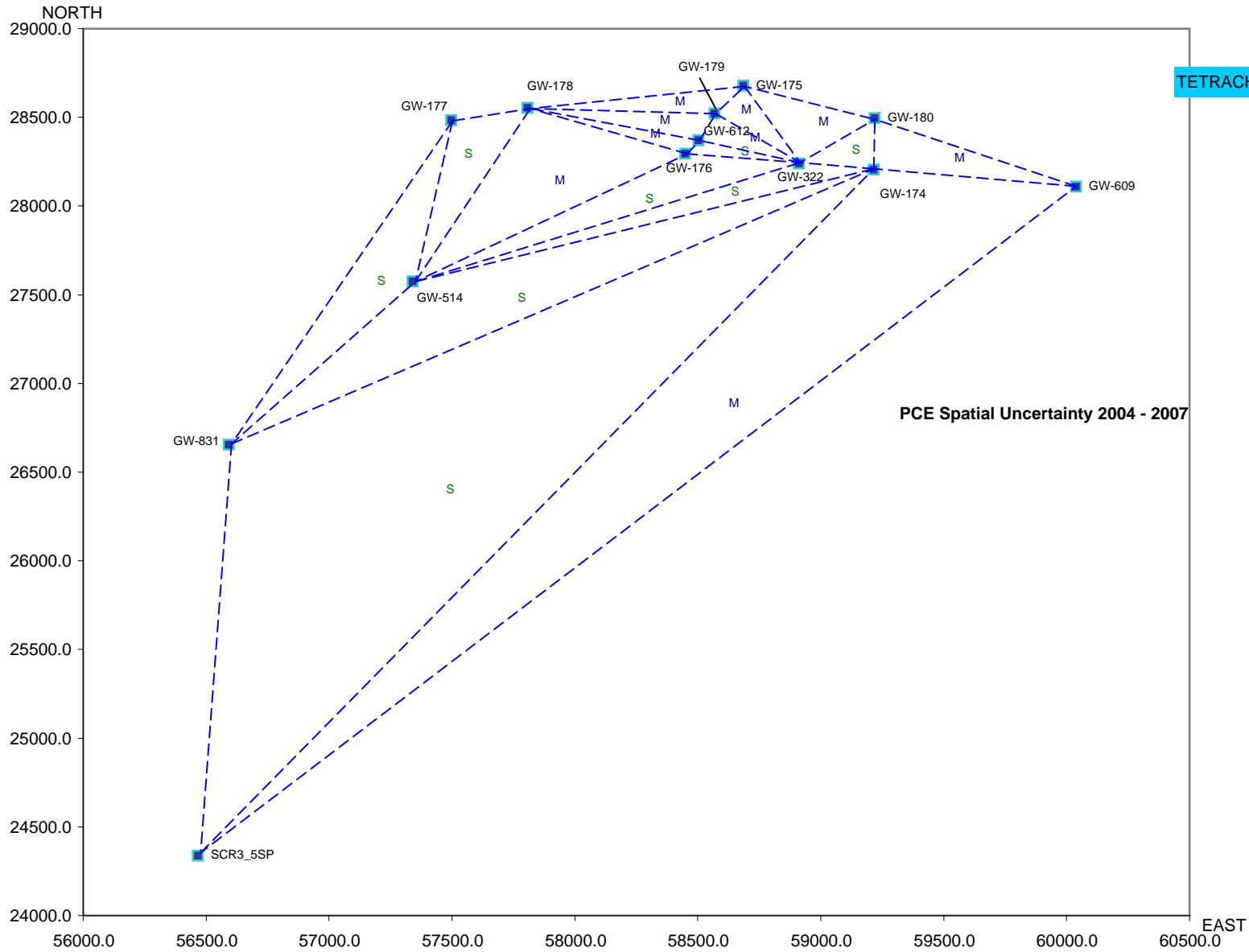
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
1,1-DICHLOROETHENE								
GW-174	S	28	6	6.0E-04	5.0E-04	No	PD	PD
GW-175	T	36	5	6.1E-04	5.0E-04	No	S	S
GW-176	T	30	29	1.6E-02	1.4E-02	No	I	I
GW-177	T	55	37	2.3E-03	2.0E-03	No	I	I
GW-178	T	20	11	1.4E-03	2.0E-03	No	PI	I
GW-179	T	26	26	4.4E-02	4.3E-02	No	D	D
GW-180	S	22	3	6.6E-04	5.0E-04	No	S	S
GW-322	S	23	23	9.9E-02	9.5E-02	No	NT	S
GW-514	T	28	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-609	S	39	1	5.4E-04	5.0E-04	No	NT	NT
GW-612	T	18	18	4.6E-02	4.8E-02	No	D	D
GW-831	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
SCR3_5SP	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND
GROSS ALPHA ACTIVITY								
GW-174	S	27	23	4.0E+00	1.8E+00	No	PD	PD
GW-175	T	25	24	1.6E+00	1.2E+00	No	D	D
GW-176	T	27	21	4.6E+00	1.3E+00	No	NT	NT
GW-177	T	55	50	2.3E+00	2.2E+00	No	I	NT
GW-178	T	16	15	2.8E+00	2.3E+00	No	PD	D
GW-179	T	24	19	3.2E+00	2.8E+00	No	NT	I
GW-180	S	16	15	1.7E+00	1.1E+00	No	NT	D
GW-322	S	19	18	2.9E+00	1.6E+00	No	NT	D
GW-514	T	19	18	1.2E+00	6.9E-01	No	S	D
GW-609	S	30	25	1.4E+00	9.0E-01	No	D	D
GW-612	T	16	14	1.8E+00	1.7E+00	No	PD	D
GW-831	T	21	16	1.8E+00	1.3E+00	No	NT	NT
SCR3_5SP	T	21	11	1.4E+00	1.1E+00	No	NT	NT
GROSS BETA ACTIVITY								
GW-174	S	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-175	T	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-176	T	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-177	T	6	3	3.2E+00	2.6E+00	No	S	S
GW-178	T	1	0	2.0E+00	2.0E+00	Yes	ND	ND

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS BETA ACTIVITY								
GW-179	T	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-180	S	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-322	S	1	1	7.9E+00	7.9E+00	No	N/A	N/A
GW-514	T	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-609	S	1	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-612	T	2	0	2.0E+00	2.0E+00	Yes	ND	ND
GW-831	T	4	2	5.8E+02	2.7E+00	No	NT	NT
SCR3_5SP	T	5	3	3.6E+00	4.2E+00	No	PD	D
NITRATE								
GW-174	S	1	1	6.0E-01	6.0E-01	No	N/A	N/A
GW-175	T	1	1	2.6E-01	2.6E-01	No	N/A	N/A
GW-176	T	1	1	5.4E-01	5.4E-01	No	N/A	N/A
GW-178	T	1	1	3.4E-01	3.4E-01	No	N/A	N/A
GW-179	T	1	1	5.8E-01	5.8E-01	No	N/A	N/A
GW-180	S	1	1	2.7E-01	2.7E-01	No	N/A	N/A
GW-322	S	1	1	4.2E-01	4.2E-01	No	N/A	N/A
GW-514	T	1	0	2.0E-02	2.0E-02	Yes	ND	ND
GW-609	S	1	1	1.2E+00	1.2E+00	No	N/A	N/A
GW-612	T	2	2	1.3E-01	1.3E-01	No	N/A	N/A
SCR3_5SP	T	5	5	2.9E-01	2.5E-01	No	S	S
TETRACHLOROETHYLENE(PCE)								
GW-174	S	28	27	3.1E-02	3.5E-02	No	D	D
GW-175	T	36	36	1.9E-02	1.6E-02	No	D	D
GW-176	T	30	28	7.3E-03	7.0E-03	No	D	PD
GW-177	T	55	11	8.5E-04	5.0E-04	No	D	D
GW-178	T	20	5	8.0E-04	5.0E-04	No	NT	NT
GW-179	T	26	23	7.2E-03	5.0E-03	No	D	D
GW-180	S	22	22	8.6E-02	7.3E-02	No	D	D
GW-322	S	23	20	5.6E-03	6.0E-03	No	I	NT
GW-514	T	28	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-609	S	39	37	1.7E-02	1.3E-02	No	D	D
GW-612	T	18	16	6.7E-03	7.0E-03	No	D	D
GW-831	T	24	0	5.0E-04	5.0E-04	Yes	ND	ND
SCR3_5SP	T	21	0	5.0E-04	5.0E-04	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
TETRACHLOROETHYLENE(PCE)

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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APPENDIX C.9

LANDFILLS V AND VII AREA

MAROS COC Assessment

Project: Landfill V and VII

User Name: MV

Location: LandfillsV and VII

State: Tennessee

Toxicity:

No priority, plume-wide COCs were found for the Landfill V and VII Area.

Prevalence:

Mobility:

Contaminants of Concern (COC's)

MAROS Spatial Moment Analysis Summary

Project: CR Landfill V and VII

User Name: MV

Location: LandfillsV and VII

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
GROSS ALPHA ACTIVITY							
7/1/2005	7.9E+02	60,134	26,484	2,406	589,180	386,340	10
7/1/2006	7.6E+02	60,150	26,463	2,432	598,624	395,169	10
7/1/2007	7.8E+02	60,194	26,444	2,479	608,367	389,993	10
GROSS BETA ACTIVITY							
7/1/2005	6.4E+02	60,100	26,505	2,367	620,886	413,034	10
7/1/2006	8.4E+02	60,102	26,514	2,363	589,817	403,814	10
7/1/2007	7.1E+02	60,225	26,383	2,539	597,525	413,289	10
NITRATE							
7/1/2005	3.0E+02	59,939	26,647	2,153	514,250	375,668	10
7/1/2006	3.0E+02	59,944	26,636	2,163	477,912	379,263	10
7/1/2007	2.2E+02	59,792	26,828	1,928	417,537	312,322	10
TETRACHLOROETHYLENE(PCE)							
7/1/1996	3.1E-01	60,145	26,465	2,427	599,576	394,724	10
7/1/1997	3.1E-01	60,145	26,465	2,427	599,576	394,724	10
7/1/1998	2.2E-01	59,795	26,615	2,059	330,386	324,786	7
7/1/1999	2.2E-01	59,795	26,615	2,059	330,386	324,786	7
7/1/2000	3.9E-01	60,145	26,540	2,383	585,716	375,581	10
7/1/2001	4.4E-01	60,145	26,573	2,364	579,535	363,472	10
7/1/2002	5.0E-01	60,145	26,602	2,347	574,109	351,025	10
7/1/2003	5.4E-01	60,145	26,620	2,337	570,835	342,692	10
7/1/2004	4.6E-01	60,145	26,585	2,357	577,346	358,654	10
7/1/2005	4.5E-01	60,145	26,580	2,359	578,123	360,394	10
7/1/2006	4.5E-01	60,145	26,578	2,361	578,548	361,334	10
7/1/2007	4.6E-01	60,145	26,586	2,356	577,167	358,248	10
TRICHLOROETHYLENE (TCE)							
7/1/2005	5.3E-01	60,145	26,410	2,460	609,896	401,782	10
7/1/2006	5.2E-01	60,145	26,400	2,466	611,736	402,395	10
7/1/2007	5.4E-01	60,145	26,415	2,457	608,883	401,361	10

Project: CR Landfill V and VII

User Name: MV

Location: LandfillsV and VII

State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.27	32	98.4%	I
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A
1st Moment: Distance to Source					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.05	-10	72.7%	S
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A
2nd Moment: Sigma XX					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.18	-10	72.7%	S
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A
2nd Moment: Sigma YY					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TETRACHLOROETHYLENE(PCE)	0.06	-10	72.7%	S
	TRICHLOROETHYLENE (TCE)	0.00	0	0.0%	N/A

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: CR Landfill V and VII

User Name: MV

Location: LandfillsV and VII

State: Tennessee

Time Period: 4/1/1993 to 7/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
GW-557	T	6	0	1.2E+00	1.2E+00	Yes	ND	ND
GW-560	T	6	1	1.2E+00	1.2E+00	No	NT	NT
GW-562	T	6	1	1.6E+00	1.2E+00	No	NT	PI
GW-564	T	6	0	1.2E+00	1.2E+00	Yes	ND	ND
GW-796	S	6	1	1.3E+00	1.2E+00	No	NT	NT
GW-797	S	6	0	1.2E+00	1.2E+00	Yes	ND	ND
GW-798	T	6	1	1.3E+00	1.2E+00	No	S	PD
GW-799	T	6	2	1.3E+00	1.2E+00	No	S	S
GW-801	S	6	0	1.2E+00	1.2E+00	Yes	ND	ND
SCR4_3SP	T	6	0	1.2E+00	1.2E+00	Yes	ND	ND
GROSS BETA ACTIVITY								
GW-557	T	6	2	1.4E+00	1.0E+00	No	NT	NT
GW-560	T	6	1	1.1E+00	1.0E+00	No	NT	NT
GW-562	T	6	0	1.0E+00	1.0E+00	Yes	ND	ND
GW-564	T	6	1	1.2E+00	1.0E+00	No	NT	NT
GW-796	S	6	2	2.0E+00	1.0E+00	No	S	S
GW-797	S	6	1	1.1E+00	1.0E+00	No	S	S
GW-798	T	6	1	1.7E+00	1.0E+00	No	NT	NT
GW-799	T	6	1	1.2E+00	1.0E+00	No	NT	NT
GW-801	S	6	0	1.0E+00	1.0E+00	Yes	ND	ND
SCR4_3SP	T	6	3	1.7E+00	1.5E+00	No	I	I
NITRATE								
GW-557	T	6	5	4.2E-01	4.8E-01	No	PD	PD
GW-560	T	6	5	1.5E-01	1.7E-01	No	NT	S
GW-562	T	6	5	1.8E-01	1.7E-01	No	S	PD
GW-564	T	6	5	3.8E-01	4.6E-01	No	S	S
GW-796	S	6	5	9.7E-02	8.1E-02	No	S	PD
GW-797	S	6	6	2.1E+00	2.1E+00	No	I	I
GW-798	T	6	6	6.9E-01	6.8E-01	No	S	S
GW-799	T	6	6	1.1E+00	1.1E+00	No	NT	PI
GW-801	S	6	5	1.1E-01	9.5E-02	No	S	S
SCR4_3SP	T	6	6	7.7E-01	7.9E-01	No	NT	NT

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
TETRACHLOROETHYLENE(PCE)								
TETRACHLOROETHYLENE(PCE)								
GW-557	T	33	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-560	T	30	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-562	T	30	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-564	T	30	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-796	S	33	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-797	S	33	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-798	T	36	19	2.6E-03	1.5E-03	No	I	I
GW-799	T	33	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-801	S	32	0	5.0E-04	5.0E-04	Yes	ND	ND
SCR4_3SP	T	28	0	5.0E-04	5.0E-04	Yes	ND	ND
TRICHLOROETHYLENE (TCE)								
GW-557	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-560	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-562	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-564	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-796	S	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-797	S	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-798	T	6	6	3.8E-04	4.0E-04	No	S	NT
GW-799	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND
GW-801	S	6	0	1.0E-03	1.0E-03	Yes	ND	ND
SCR4_3SP	T	6	0	1.0E-03	1.0E-03	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.

APPENDIX C.10

EAST CHESTNUT RIDGE

MAROS COC Assessment

Project: CR Kerr Hollow

User Name: MV

Location: East Chestnut Ridge

State: Tennessee

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
TRICHLOROETHYLENE (TCE)	7.8E-03	5.0E-03	56.2%

Note: Top COCs by toxicity were determined by examining a representative concentration for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRG for that compound, with the percentage exceedance from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Exceedances	Percent Exceedances	Total detects
TRICHLOROETHYLENE (TCE)	ORG	17	1	5.9%	10

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total exceedances (values above the chosen PRGs) are compared to the total number of wells to determine the prevalence of the compound.

Mobility:

Contaminant of Concern	Kd
TRICHLOROETHYLENE (TCE)	0.297

Note: Top COCs by mobility were determined by examining each detected compound in the dataset and comparing their mobilities (Koc's for organics, assume foc = 0.001, and Kd's for metals).

Contaminants of Concern (COC's)

GROSS ALPHA ACTIVITY

GROSS BETA ACTIVITY

NITRATE

TRICHLOROETHYLENE (TCE)

URANIUM

MAROS Spatial Moment Analysis Summary

Project: CR East Kerr Hollow

User Name: MV

Location: East Chestnut Ridge

State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
GROSS ALPHA ACTIVITY							
7/1/1996	1.6E+03	63,157	26,787	1,690	157,162	665,443	12
7/1/1997	0.0E+00						5
7/1/1998	0.0E+00						4
7/1/1999	0.0E+00						5
7/1/2000	0.0E+00						5
7/1/2001	0.0E+00						5
7/1/2002	0.0E+00						5
7/1/2003	0.0E+00						5
7/1/2004	0.0E+00						5
7/1/2005	0.0E+00						5
7/1/2006	0.0E+00						5
7/1/2007	3.5E+01	62,923	25,807	2,459	97,631	714,871	10
GROSS BETA ACTIVITY							
7/1/2005	0.0E+00						5
7/1/2006	0.0E+00						5
7/1/2007	6.4E+02	62,825	26,167	2,087	90,568	748,336	10
NITRATE							
7/1/2007	5.0E+00	62,303	27,854	327	7,245	12,890	6
TRICHLOROETHYLENE (TCE)							
7/1/1996	9.6E-02	62,679	26,406	1,814	63,149	634,906	8
7/1/1997	1.8E+00	64,047	24,873	3,781	215,855	357,895	7
7/1/1998	0.0E+00						5
7/1/1999	2.4E+00	64,040	24,885	3,767	191,741	337,697	7
7/1/2000	0.0E+00						5
7/1/2001	1.0E+00	64,044	24,868	3,783	239,713	372,967	7
7/1/2002	1.1E+00	64,069	24,843	3,817	260,138	398,691	7
7/1/2003	7.0E-01	64,010	24,896	3,742	234,671	353,097	7
7/1/2004	4.6E-01	63,966	24,929	3,692	235,290	332,569	7
7/1/2005	8.4E-01	64,007	24,904	3,733	212,527	336,002	7
7/1/2006	1.4E+00	64,069	24,846	3,815	246,302	389,548	7
7/1/2007	1.3E+00	64,031	25,139	3,544	282,342	534,562	13
URANIUM							
7/1/1996	4.9E-02	63,175	26,817	1,676	162,408	1,142,763	12
7/1/1997	3.5E-02	63,574	26,356	2,286	133,642	1,265,790	9

Project: CR East Kerr Hollow
Location: East Chestnut Ridge

User Name: MV
State: Tennessee

Effective Date	<u>0th Moment</u>	<u>1st Moment (Center of Mass)</u>			<u>2nd Moment (Spread)</u>		Number of Wells
	Estimated Mass (kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	
URANIUM							
7/1/1998	3.0E-02	63,395	26,291	2,232	187,024	1,021,137	9
7/1/1999	8.6E-02	63,942	26,280	2,586	388,795	975,566	11
7/1/2000	9.0E-02	63,091	26,212	2,148	73,892	457,644	9
7/1/2001	2.7E-02	63,134	25,674	2,657	97,812	523,423	9
7/1/2002	7.2E-03	63,059	25,903	2,416	78,893	453,097	9
7/1/2003	7.0E-03	63,062	25,914	2,408	79,808	456,647	9
7/1/2004	7.0E-03	63,063	25,918	2,404	80,217	458,186	9
7/1/2005	6.9E-03	63,065	25,925	2,399	80,764	460,199	9
7/1/2006	2.4E-02	63,208	26,064	2,333	128,360	603,227	9
7/1/2007	4.4E-01	63,125	26,464	1,941	125,802	541,046	14

Project: CR East Kerr Hollow
Location: East Chestnut Ridge

User Name: MV
State: Tennessee

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zereth Moment: Mass					
	GROSS ALPHA ACTIVITY	3.39	-1	50.0%	NT
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TRICHLOROETHYLENE (TCE)	0.80	11	74.9%	NT
	URANIUM	1.80	-22	92.4%	PD
1st Moment: Distance to Source					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TRICHLOROETHYLENE (TCE)	0.17	-3	56.9%	S
	URANIUM	0.12	-2	52.7%	S
2nd Moment: Sigma XX					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TRICHLOROETHYLENE (TCE)	0.28	23	97.7%	I
	URANIUM	0.65	-10	72.7%	S
2nd Moment: Sigma YY					
	GROSS ALPHA ACTIVITY	0.00	0	0.0%	N/A
	GROSS BETA ACTIVITY	0.00	0	0.0%	N/A
	NITRATE	0.00	0	0.0%	N/A
	TRICHLOROETHYLENE (TCE)	0.25	-3	56.9%	S
	URANIUM	0.44	-22	92.4%	PD

Note: The following assumptions were applied for the calculation of the Zereth Moment:

Porosity: 0.10 **Saturated Thickness:** Uniform: 50 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events).

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Statistical Trend Analysis Summary

Project: CR Kerr Hollow

User Name: MV

Location: East Chestnut Ridge

State: Tennessee

Time Period: 1/1/1986 to 10/15/2007

Consolidation Period: No Time Consolidation

Consolidation Type: Median

Duplicate Consolidation: Average

ND Values: Specified Detection Limit

J Flag Values : Actual Value

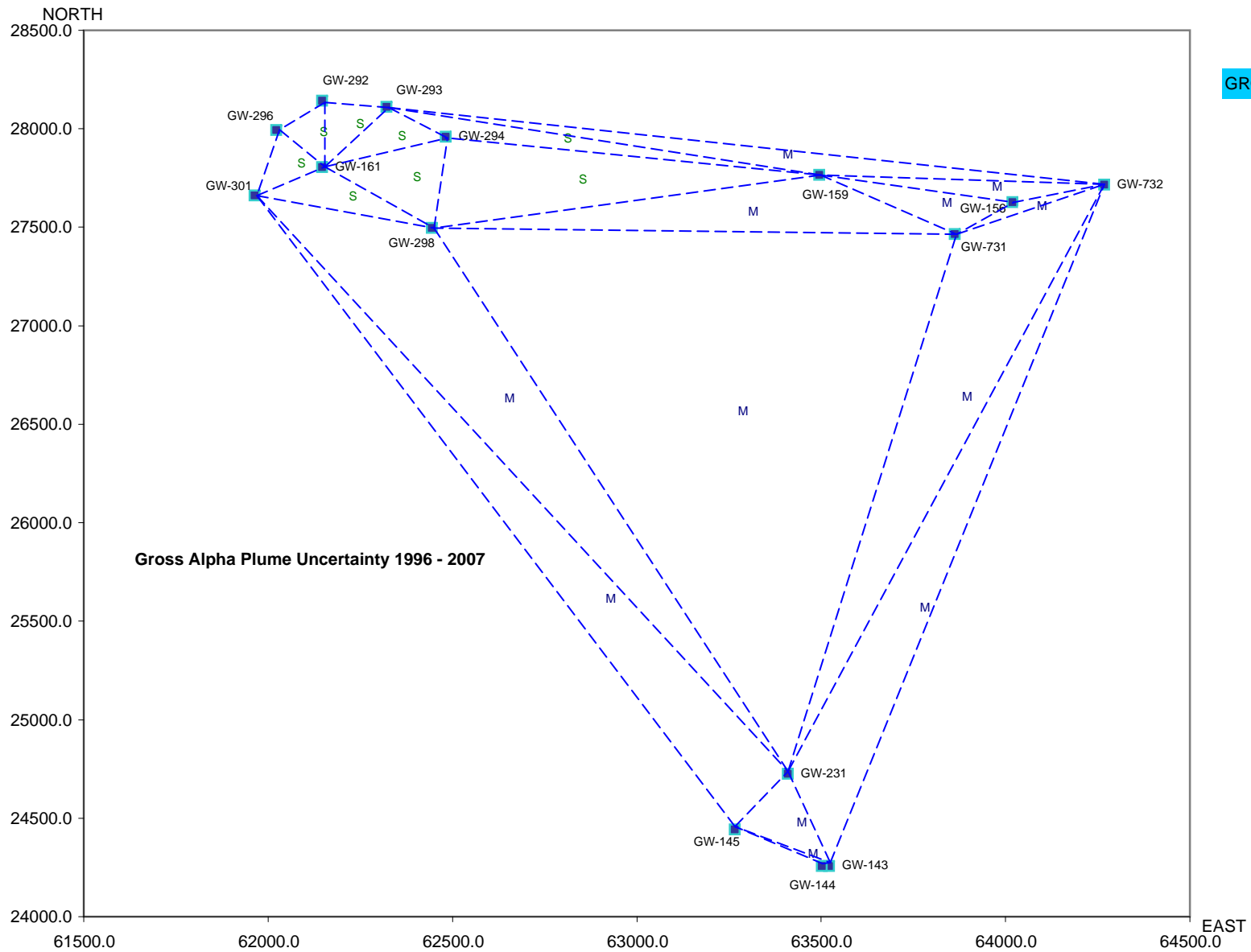
Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
GROSS ALPHA ACTIVITY								
GW-143	T	51	45	3.8E+00	3.5E+00	No	D	S
GW-144	T	51	49	3.0E+00	2.3E+00	No	D	S
GW-145	T	51	51	1.1E+01	1.1E+01	No	D	I
GW-156	T	35	34	1.2E+01	3.2E+00	No	PD	NT
GW-159	T	38	37	6.2E+00	2.8E+00	No	PD	NT
GW-161	T	2	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-231	T	43	32	1.3E+00	8.1E-01	No	D	PD
GW-292	S	21	18	1.1E+00	9.0E-01	No	NT	D
GW-293	S	22	19	1.7E+00	1.7E+00	No	S	D
GW-294	S	2	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-296	S	2	0	1.0E-02	1.0E-02	Yes	ND	ND
GW-298	T	26	25	2.7E+00	1.7E+00	No	NT	D
GW-301	T	43	35	1.5E+00	1.3E+00	No	D	D
GW-731	T	20	20	3.7E+00	1.3E+00	No	D	D
GW-732	T	20	20	1.1E+01	2.6E+00	No	NT	NT
GROSS BETA ACTIVITY								
GW-143	T	5	5	1.8E+01	1.9E+01	No	S	D
GW-144	T	5	3	2.9E+00	3.3E+00	No	S	PD
GW-145	T	5	5	1.7E+01	1.5E+01	No	D	D
GW-161	T	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-231	T	5	2	4.1E+00	2.1E+00	No	S	S
GW-292	S	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-293	S	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-294	S	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-296	S	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-298	T	1	0	2.1E+00	2.1E+00	Yes	ND	ND
GW-301	T	4	2	3.7E+02	2.5E+00	No	NT	NT
NITRATE								
GW-161	T	2	1	1.2E-01	1.2E-01	No	N/A	N/A
GW-292	S	2	2	3.7E-01	3.7E-01	No	N/A	N/A
GW-293	S	2	2	1.5E-01	1.5E-01	No	N/A	N/A
GW-294	S	2	2	1.5E+00	1.5E+00	No	N/A	N/A
GW-296	S	2	2	3.8E-01	3.8E-01	No	N/A	N/A

MAROS Statistical Trend Analysis Summary

Well	Source/ Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
NITRATE								
GW-298	T	2	2	2.4E-01	2.4E-01	No	N/A	N/A
TRICHLOROETHYLENE (TCE)								
GW-143	T	47	1	5.1E-04	5.0E-04	No	D	D
GW-144	T	48	1	5.3E-04	5.0E-04	No	D	D
GW-145	T	47	2	5.3E-04	5.0E-04	No	I	I
GW-156	T	35	1	6.0E-04	5.0E-04	No	S	S
GW-159	T	38	2	5.5E-04	5.0E-04	No	S	PD
GW-161	T	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-231	T	46	1	5.1E-04	5.0E-04	No	I	I
GW-292	S	23	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-293	S	23	1	5.2E-04	5.0E-04	No	S	S
GW-294	S	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-296	S	2	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-298	T	26	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-301	T	47	1	5.3E-04	5.0E-04	No	D	S
GW-731	T	17	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-732	T	17	0	5.0E-04	5.0E-04	Yes	ND	ND
GW-841	T	13	13	8.8E-02	2.4E-02	No	PD	PD
GW-842	T	16	15	4.2E-03	3.0E-03	No	NT	NT
URANIUM								
GW-143	T	28	15	8.2E-04	3.6E-04	No	D	D
GW-144	T	28	16	1.0E-03	1.1E-03	No	D	D
GW-145	T	28	27	1.1E-02	1.2E-02	No	S	NT
GW-156	T	26	14	1.1E-03	9.7E-04	No	D	D
GW-159	T	26	14	7.9E-04	1.1E-03	No	D	D
GW-161	T	2	2	2.2E-04	2.2E-04	No	N/A	N/A
GW-231	T	29	6	2.3E-04	4.9E-06	No	NT	NT
GW-292	S	5	2	1.2E-04	4.9E-06	No	PI	I
GW-293	S	5	2	1.3E-04	4.9E-06	No	NT	I
GW-294	S	2	2	1.5E-04	1.5E-04	No	N/A	N/A
GW-296	S	2	2	1.2E-04	1.2E-04	No	N/A	N/A
GW-298	T	5	5	1.5E-03	1.6E-03	No	S	PD
GW-301	T	24	2	3.1E-05	4.9E-06	No	NT	NT
GW-731	T	26	5	9.6E-05	4.9E-06	No	NT	NT
GW-732	T	26	12	7.5E-04	4.9E-06	No	D	D
GW-841	T	1	0	4.9E-06	4.9E-06	Yes	ND	ND
GW-842	T	1	0	4.9E-06	4.9E-06	Yes	ND	ND

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

The Number of Samples and Number of Detects shown above are post-consolidation values.



New Location Analysis for
GROSS ALPHA ACTIVITY

Existing Locations

Potential areas for new locations are indicated by triangles with a high SF level.

Estimated SF Level:
 S - Small
 M - Moderate
 L - Large
 E - Extremely large

High SF -> high estimation error -> possible need for new locations

Low SF -> low estimation error -> no need for new locations

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APPENDIX D

**SUPPLEMENTAL MAROS ASSESSMENT
SAMPLING RECOMMENDATIONS**

APPENDIX D.1

BEAR CREEK HYDROGEOLOGIC REGIME

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Regulated Locations							
BC	Oil Landfarm WMA	GW-008	I	I	Quarterly	Regulated	Monitor for PCE and TCE center of Oil Landfarm area. Sample as per permit.
BC	Bear Creek Burial Grounds WMA	GW-046	NT	I	Annual	Regulated	Sample as per permit, sample all COCs annually.
BC	Bear Creek Burial Grounds WMA	GW-077	NT	NT	Biennial	Regulated	Sample as per ROD, largely ND well, consider reduced effort.
BC	Bear Creek Burial Grounds WMA	GW-078	NT	NT	Biennial	Regulated	Sample as per ROD, largely ND well, consider reduced effort.
BC	Bear Creek Burial Grounds WMA	GW-079	NT	NT	Biennial	Regulated	Sample as per ROD, concentrations consistent w/Biennial sampling.
BC	Bear Creek Burial Grounds WMA	GW-080	NT	NT	Biennial	Regulated	Sample as per ROD, largely ND well, consider reduced effort.
BC	EMWMF	GW-363	ND	ND	Biennial	Regulated	Alternate RCRA well. Located in largely unaffected area. Eliminate from program if possible or reduce frequency to biennial.
BC	EMWMF	GW-639	S	S	Biennial	Regulated	Sample as per permit/ROD, consider reduced effort.
BC	Exit Pathway - Traverse A	GW-683	D	D	Annual	Regulated	Sample as per ROD, consider annual sampling.
BC	Exit Pathway - Traverse A	GW-684	D	PD	Annual	Regulated	Sample as per ROD, consider annual sampling.
BC	Exit Pathway - Traverse B	GW-704	D	D	Annual	Regulated	Sample as per ROD
BC	Exit Pathway - Traverse B	GW-706	NT	I	Annual	Regulated	Sample as per ROD
BC	Exit Pathway - Traverse W	GW-712	NT	NT	Biennial	Regulated	Sample as per permit; possible outlier, largely non-detect, consider reduced effort
BC	Exit Pathway - Traverse W	GW-713	NT	NT	Annual	Regulated	Sample as per permit, consider annual sampling.
BC	Exit Pathway - Traverse W	GW-714	S	PD	Biennial	Regulated	Sample as per permit, consider annual sampling.
BC	EMWMF	GW-916	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
BC	EMWMF	GW-917	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-918	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-920	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-921	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-922	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-923	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-924	ND	ND	Annual	Regulated	Sample as per permit (non-detect for COPCs; consider reducing sampling frequency in future)
BC	EMWMF	GW-925	NT	NT	Biennial	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-926	NT	NT	Annual	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	EMWMF	GW-927	NT	N/A	Annual	Regulated	Sample as per permit (largely non-detect; consider reducing sampling frequency in future)
BC	Exit Pathway Spring/Surface Water	SS-6_6	ND	ND	Biennial	Regulated	Sampled as spring location SS-6.
BC	Exit Pathway Spring/Surface Water	SS-6E	NT	I	Biennial	Regulated	Sampled as spring SS-6.

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
BC	Exit Pathway Spring/Surface Water	SS-7	N/A	N/A	Annual	Regulated	Sample as per ROD, consider annual sampling.
BC	Exit Pathway Spring/Surface Water	SS-8	NT	NT	Biennial	Regulated	Sample as per ROD.
Semiannual Sampling							
BC	Bear Creek Burial Grounds WMA	GW-014	NT	D	Quarterly	Semiannual	Alternate RCRA location. Sample semi-annually for chlorinated compounds. Overall decreasing trends for VOCs, but recent variability in results. Increasing trends at GW-071.
BC	Bear Creek Burial Grounds WMA	GW-068	N/A	I	Quarterly	Semiannual	Increasing trend for VC and benzene. Provides vertical delineation along with GW-046
BC	Bear Creek Burial Grounds WMA	GW-071	I	I	Quarterly	Semiannual	Sample semi-annually to annually as alternate RCRA location. Increasing overall trend for benzene and PCE.
BC	Oil Landfarm WMA	GW-225	I	D	Quarterly	Semiannual	Sanitary Landfill I area, historic high concentrations, recent data indicate slowly increasing trends for PCE, TCE and Nitrate.
BC	Oil Landfarm WMA	GW-601	S	D	Quarterly	Semiannual	Horizontal delineation of TCE plume south of GW-225. Semiannual sampling recommended to provide information on possible increasing trend at GW-225
BC	Bear Creek Burial Grounds WMA	GW-627	I	I	Quarterly	Semiannual	Surveillance well, Increasing trend for PCE, overall increasing trend.
BC	Bear Creek Burial Grounds WMA	GW-629	PI	PI	Quarterly	Semiannual	Recent sharp increase in chlorinated compound concentrations along center of area.
BC	Bear Creek Burial Grounds WMA	GW-653	NT	I	Annual	Semiannual	Long-term increasing trend for PCE, location is along center-line with GW-071, GW-068, GW-629, GW-627.

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Annual Sampling							
BC	Bear Creek Burial Grounds WMA	GW-082	NT	I	Quarterly	Annual	Variable concentrations, sample as an alternate RCRA location for vinyl chloride.
BC	Oil Landfarm WMA	GW-085	S	D	Annual	Annual	Nitrate is the only major COC, sample annually. On-strike with GW-587 and GW-829, also recommended for annual sampling.
BC	Oil Landfarm WMA	GW-098	NT	NT	Annual	Annual	Deeper location next to GS-097. Surveillance well, vertical delineation.
BC	S-3 Site	GW-100	N/A	PD	Quarterly	Annual	Probably decreasing trend, centerline well
BC	S-3 Site	GW-101	N/A	D	Quarterly	Annual	Limited recent samples; sample annually to delineate northern edge
BC	Oil Landfarm WMA	GW-229	NT	I	Annual	Annual	Monitors VC degradation product. Concentrations may show seasonal effects. Sample in the same season each year to monitor degradation of chlorinated parent compounds.
BC	Bear Creek Burial Grounds WMA	GW-242	NT	NT	Quarterly	Annual	Variable concentrations, low spatial uncertainty, horizontal delineation.
BC	S-3 Site	GW-246	S	PI	Annual	Annual	Monitors Gross Beta in source area, retain at annual frequency.
BC	S-3 Site	GW-276	D	D	Annual	Annual	Sample as per permit, consider annual sampling as trend is decreasing.
BC	Bear Creek Burial Grounds WMA	GW-289	I	S	Quarterly	Annual	Recent increasing trends for PCE and TCE, long-term stable trend.
BC	Rust Spoil Area	GW-307	N/A	D	Quarterly	Annual	Defines downgradient boundary of plume before Exit Pathway Traverse C, limited recent samples, sample annually.
BC	Rust Spoil Area	GW-310	N/A	D	Quarterly	Annual	Long-term decreasing trend, history of sampling at nearby GW-311
BC	Rust Spoil Area	GW-312	N/A	S	Quarterly	Annual	Well GW-311 is inactive, GW-312 provides downgradient delineation of TCE affected groundwater.
BC	Spoil Area I	GW-315	D	D	Annual	Annual	Monitor annually, Decreasing trend

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
BC	Industrial Landfill I	GW-365	NT	PI	Quarterly	Annual	Monitors VC degradation product downgradient from GW-229. Decreasing TCE concentrations may result in increasing VC. Samples provide information on horizontal extent of TCE degradation.
BC	S-3 Site	GW-526	S	I	Annual	Annual	Sample as per ROD, consider annual sampling as trend has stabilized.
BC	Oil Landfarm WMA	GW-537	D	D	Annual	Annual	On strike with GW-085 and GW-829. Long and short-term decreasing trend for Nitrate.
BC	S-3 Site	GW-616	S	NT	Semiannual	Annual	Monitors nitrate downgradient from source, along centerline
BC	Exit Pathway - Traverse B	GW-703	D	D	Annual	Annual	Decreasing trends, but monitored as part of exit pathway, reduced frequency appropriate.
BC	Exit Pathway - Traverse C	GW-724	D	NT	Annual	Annual	Exit pathway surveillance well.
BC	Exit Pathway - Traverse C	GW-725	NT	D	Semiannual	Annual	Intermittent concentration spikes, overall decreasing trend, monitor as part of Exit Pathway Traverse C.
BC	Exit Pathway - Traverse C	GW-738	D	D	Annual	Annual	Surveillance well, overall decreasing trend, monitor as part of Exit Pathway Traverse C.
BC	Exit Pathway - Traverse C	GW-740	D	D	Annual	Annual	Surveillance well, long-term decreasing trend; sample annually to monitor Exit Pathway Traverse C picket.
BC	S-3 Site	GW-829	D	D	Quarterly	Annual	Limited samples between 2001 and 2006, decreasing trend, sample annually.
BC	Exit Pathway Spring/Surface Water	SS-1	D	D	Annual	Annual	Spring shows Decreasing trend, sample annually.
BC	Exit Pathway Spring/Surface Water	SS-4	S	D	Annual	Annual	Spring, potential exposure point, decreasing long-term trend.
BC	Exit Pathway Spring/Surface Water	SS-5	NT	D	Annual	Annual	Spring, potential exposure point, decreasing long-term trend.

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Biennial Sampling							
BC	Bear Creek Burial Grounds WMA	GW-053	NT	NT	Semiannual	Biennial	Decreasing trend for VC, low levels of GA, extensive long-term data record. Sample to monitor decreasing trends over time.
BC	Bear Creek Burial Grounds WMA	GW-058	N/A	S	Quarterly	Biennial	Horizontal delineation. Stable GA trend. Intermittent detections of PCE
Remove from the Active Network							
BC	Bear Creek Burial Grounds WMA	GW-052	N/A	PD	Quarterly	Eliminate	Non-detect for PCE/TCE, overall decreasing trend for Gross Alpha.
BC	Bear Creek Burial Grounds WMA	GW-072	NT	I	Quarterly	Eliminate	Very few detections, shallower than GW-071.
BC	Bear Creek Burial Grounds WMA	GW-089	N/A	NT	Annual	Eliminate	Redundant with GW-242
BC	S-3 Site	GW-122	S	D	Annual	Eliminate	Overall decreasing trend, redundant with GW-616.
BC	S-3 Site	GW-127	N/A	D	Quarterly	Eliminate	Redundant with GW-616, low concentrations of Gross Alpha, not as heavily affected as surrounding wells.
BC	Oil Landfarm WMA	GW-226	S	I	Annual	Eliminate	Redundant with GW-225
BC	Oil Landfarm WMA	GW-227	N/A	D	Quarterly	Eliminate	Long-term decreasing trend confirmed, recent reduction in sampling frequency. Eliminate from routine monitoring.
BC	S-3 Site	GW-236	N/A	D	Quarterly	Eliminate	Decreasing trend, redundant with SS-1.
BC	S-3 Site	GW-244	N/A	D	Quarterly	Eliminate	Stable to decreasing trend, redundant with other locations.
BC	S-3 Site	GW-245	N/A	S	Quarterly	Eliminate	Stable to decreasing trend, redundant with other locations.
BC	S-3 Site	GW-247	N/A	S	Quarterly	Eliminate	Redundant with GW-246.
BC	Bear Creek Burial Grounds WMA	GW-257	NT	NT	Semiannual	Eliminate	Alternate RCRA location. Largely non-detect for most COPCs, concentrations of PCE show no trend. Redundant with GW-289.
BC	S-3 Site	GW-277	N/A	S	Quarterly	Eliminate	Stable to decreasing trend, redundant with other source locations.
BC	Bear Creek Burial Grounds WMA	GW-291	S	S	Quarterly	Eliminate	Alternate RCRA location, historic high concentrations, but stable trends.
BC	Spoil Area I	GW-313	N/A	NT	Quarterly	Eliminate	Redundant with GW-315

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
BC	Industrial Landfill I	GW-368	N/A	D	Quarterly	Eliminate	Redundant with GW-601; long-term decreasing trend for TCE.
BC	Industrial Landfill I	GW-369	N/A	D	Quarterly	Eliminate	Redundant with GW-601; long-term decreasing trend for TCE.
BC	S-3 Site	GW-615	NT	I	Quarterly	Eliminate	High concentrations are largely stable, no rapid changes, redundant with other source area wells.
BC	Bear Creek Burial Grounds WMA	GW-624	S	S	Quarterly	Eliminate	Redundant with GW-629
BC	Bear Creek Burial Grounds WMA	GW-626	I	I	Quarterly	Eliminate	Redundant with GW-627
BC	Exit Pathway - Traverse B	GW-694	NT	D	Annual	Eliminate	Decreasing trends, low concentrations, low slope factor indicate low spatial uncertainty in area. Redundant with GW-704 and GW-695
BC	Exit Pathway - Traverse C	GW-736	S	D	Quarterly	Eliminate	Redundant with GW-725; decreasing concentrations of Nitrate and TCE
BC	Exit Pathway - Traverse C	GW-739	S	S	Quarterly	Eliminate	Redundant with GW-740; very stable to decreasing trend; low rate of change supports elimination from routine monitoring.
Locations with no data 2005 - 2007 (to be sampled in 2008)							
BC	Oil Landfarm WMA	GW-006	S	S	Annual	Biennial	If results still show area of low concentrations, low rate of change, low uncertainty. Monitor biennially to every 5 years to confirm low concentrations.
BC	Bear Creek Burial Grounds WMA	GW-259	N/A	NT	Annual	Every 5 years	Location has historically high concentrations of PCE. May be redundant with GW-257. If concentration of PCE has not changed significantly since 1990 (PCE 2 mg/L) or if concentration has decreased significantly, consider inactive
BC	Rust Spoil Area	GW-306	N/A	NT	Biennial	Every 5 years	Confirm concentrations within expected range (70 ug/L TCE; 10 mg/L NO3).
BC	Rust Spoil Area	GW-309	N/A	D	Biennial	Every 5 years	Confirm concentrations of NO3 and GB in center of Rust Spoils Area.

**APPENDIX D.1
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE BEAR CREEK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
BC	Spoil Area I	GW-314	N/A	S	Annual	<i>Eliminate</i>	If PCE and NO3 concentrations still low, consider inactive status. Redundant with GW-315.
BC	Industrial Landfill I	GW-367	N/A	D	Biennial	Every 5 years	Only well in area to show detections of TCE, unknown screen depth. Monitor every 5 years to confirm decreasing trends of TCE; provides horizontal delineation of affected groundwater.
BC	Lysimeter Demo	GW-531	N/A	S	Biennial	<i>Eliminate</i>	If results still below screening levels, consider inactive status. If concentrations have increased, sample annually until trend confirmed.
BC	Bear Creek Burial Grounds WMA	GW-623	N/A	I	Annual	Semiannual	Location has historically high concentrations of PCE in deep groundwater. The general area shows high spatial uncertainty (see Plume Uncertainty Figure). Sample along with GW-071 to characterize TCE concentrations over time
BC	Rust Spoil Area	GW-648	N/A	S	Biennial	<i>Eliminate</i>	If results still show area is unaffected, consider inactive status. Location could be used as a regulatory point of compliance in the future.

APPENDIX D.2

UPPER EAST FORK POPLAR CREEK HYDROGEOLOGIC REGIME

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Regulated Locations							
EF	S-3 Site	GW-108	D	D	Semiannual	Regulated	Limited recent (2004 -2007) sample events trigger quarterly monitoring recommendation, Historically high concentrations but stable to decreasing trends. Monitors nitrate source area. Continue limited sampling frequency.
EF	New Hope Pond	GW-151	I	I	Quarterly	Regulated	Sample as per ROD
EF	New Hope Pond	GW-153	D	D	Annual	Regulated	Sample as per permit. Decreasing short and long-term trends, horizontal delineation.
EF	New Hope Pond	GW-154	I	I	Quarterly	Regulated	Sample as per ROD
EF	Union Valley - Exit Pathway	GW-169	S	S	Annual	Regulated	Sample as per ROD
EF	Union Valley - Exit Pathway	GW-170	NT	D	Annual	Regulated	Sample as per ROD
EF	Union Valley - Exit Pathway	GW-171	NT	NT	--	Regulated	Sample as per ROD
EF	Union Valley - Exit Pathway	GW-172	NT	NT	--	Regulated	Sample as per ROD
EF	Uranium Oxide Vault	GW-219	S	S	Quarterly	Regulated	Sample as per ROD. Stable long-term trend, but recent (2004 - 2007) results indicate a possible increase -- triggers Quarterly sampling recommendation.
EF	New Hope Pond	GW-220	I	I	Quarterly	Regulated	Sample as per ROD.
EF	New Hope Pond	GW-223	D	D	Annual	Regulated	Sample as per ROD
EF	Union Valley - Exit Pathway	GW-230	S	S	Biennial	Regulated	Sample as per ROD
EF	S-2 Site	GW-253	NT	S	Quarterly	Regulated	Sample as per ROD, High historic cadmium concentrations.
EF	Y-12 Fuel Station	GW-281	ND	NT	Biennial	Regulated	Sample as per ROD
EF	New Hope Pond	GW-380	S	D	Annual	Regulated	Sample as per ROD
EF	New Hope Pond	GW-381	D	D	Annual	Regulated	Sample as per ROD
EF	New Hope Pond	GW-382	D	D	Annual	Regulated	Sample as per ROD
EF	New Hope Pond	GW-383	S	I	Annual	Regulated	Sample as per ROD
EF	Exit Pathway - Traverse I	GW-605	I	I	Quarterly	Regulated	Sample as per ROD or permit
EF	Exit Pathway - Traverse I	GW-606	D	D	Annual	Regulated	Sample as per ROD or permit
EF	Exit Pathway - Traverse E	GW-618	D	D	Quarterly	Regulated	Sample as per ROD, historic high concentrations of VOC and cadmium with largely decreasing trends.

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
EF	Y-12 Fuel Station	GW-658	NT	NT	Quarterly	Regulated	Sample as per ROD
EF	Exit Pathway - Traverse J	GW-733	D	D	Annual	Regulated	Sample as per ROD
EF	Y-12 Grid Well K1	GW-744	PD	S	Annual	Regulated	Sample as per ROD
EF	Y-12 Grid Well K2	GW-747	S	NT	Biennial	Regulated	Sample as per ROD
EF	Y-12 Grid Well J-Primary	GW-762	I	I	Quarterly	Regulated	Sample as per ROD
EF	Y-12 Fuel Station	GW-802	ND	ND	Biennial	Regulated	Sample as per ROD
EF	Exit Pathway Scarborough Road/Pine Ridge	GW-816	D	D	Annual	Regulated	Sample as per ROD
EF	New Hope Pond	GW-832	D	D	Annual	Regulated	Sample as per ROD
EF	Union Valley - Exit Pathway	SCR7_1SP	D	D	Annual	Regulated	Sample as per ROD
EF	Exit Pathway Spring/Surface Water	SCR7_8SP	D	D	Biennial	Regulated	Sample as per ROD
Semiannual Sampling							
EF	--	55-3A	NT	NT	Quarterly	Semiannual	New well monitoring source area. Monitor semiannually until trend stabilizes.
EF	--	55-3B	NT	NT	Quarterly	Semiannual	New well monitoring source area. Monitor semiannually until trend stabilizes.
EF	--	55-3C	NT	NT	Quarterly	Semiannual	New well monitoring source area. Monitor semiannually until trend stabilizes.
EF	Coal Pile Trench	GW-691	PI	PI	Quarterly	Semiannual	Shallow well near GW-690, higher concentrations with possible increasing trends.
EF	Building 8110	GW-698	I	I	Quarterly	Semiannual	Increasing to probably increasing trends, well monitors centerline of Maynardville Limestone, monitor until plume stabilizes.
EF	Y-12 Grid Well G3	GW-769	I	I	Quarterly	Semiannual	Surveillance well, steadily increasing trend for Carbon Tetrachloride. Monitor semiannually.
EF	Y-12 Grid Well G3	GW-770	I	I	Annual	Semiannual	Surveillance well, steadily increasing trend for Carbon Tetrachloride. Monitor semiannually.

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Annual Sampling							
EF	Y-12 Grid Well B3	55-2B	NT	NT	Semiannual	Annual	Increasing concentrations of nitrate, no trend for PCE. Monitor for horizontal and vertical delineation of nitrate and PCE.
EF	Y-12 Grid Well B3	55-2C	S	S	Quarterly	Annual	Surveillance well, Increasing concentrations of nitrate, stable PCE concentrations, monitor annually along with 55-2B to delineate horizontal and vertical concentrations of nitrate and PCE.
EF	--	56-1A	NT	NT	Biennial	Annual	Delineates northern area of plume.
EF	Y-12 Grid Well C3	56-2A	S	S	Annual	Annual	Low concentrations stable trends. Consider reducing frequency if trend continues to be stable.
EF	Y-12 Grid Well C3	56-2B	S	S	Annual	Annual	Stable recent trend, monitors vertical distribution of PCE in center of plume.
EF	Y-12 Grid Well C3	56-2C	PD	PD	Quarterly	Annual	Stable recent trend, monitors vertical distribution of PCE in center of plume.
EF	--	56-3A	S	S	Annual	Annual	Low concentrations stable trends. Consider reducing frequency if trend continues to be stable.
EF	--	56-3B	NT	NT	Quarterly	Annual	Variable recent concentrations, monitors
EF	--	56-3C	S	S	Annual	Annual	Stable recent trend, monitors vertical distribution of PCE in center of plume.
EF	--	56-4A	NT	NT	Annual	Annual	Monitors center of PCE plume, monitor annually along with 56-2 wells.
EF	--	56-8A	N/A	N/A	Annual	Annual	Monitor annually until sufficient samples to determine a trend.
EF	New Hope Pond	GW-240	S	D	Annual	Annual	Decreasing long-term trend, low levels of COPCs.
EF	S-2 Site	GW-251	S	D	Annual	Annual	Surveillance well, horizontal delineation to the south, Centerline of Maynardville Limestone, supports data from GW-253 on VOC plume
EF	Y-12 Salvage Yard	GW-272	N/A	I	Quarterly	Annual	No recent trend information, long-term increasing trend. Monitor for nitrate along center-line of plume, along with GW-505 for possible movement of nitrate.
EF	Y-12 Salvage Yard	GW-274	I	I	Quarterly	Annual	Alternate RCRA regulatory location. Decreasing trend for nitrate, long and short-term increasing trends for PCE.

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
EF	Y-12 Salvage Yard	GW-275	PI	S	Quarterly	Annual	Alternate RCRA regulatory location. Recent increasing trend in nitrate, long-term stable trend.
EF	Waste Coolant Processing Facility	GW-332	NT	NT	Quarterly	Annual	Historic high concentrations with limited rate of change for PCE. Monitor center-line of PCE with 55-2B and GW-337.
EF	Waste Coolant Processing Facility	GW-337	S	D	Quarterly	Annual	Historic high concentrations with long-term decreasing trend for PCE. Monitor center-line of PCE with 55-2B and GW-332.
EF	Fire Training Facility	GW-620	D	D	Annual	Annual	Surveillance well in deeper groundwater near GW-619. Monitor annually to document decreasing concentrations of PCE, delineates both horizontally and vertically.
EF	Rust Garage Area	GW-633	I	I	Quarterly	Annual	Surveillance well, Increasing trend for benzene, monitor for benzene trend.
EF	Coal Pile Trench	GW-686	NT	NT	Annual	Annual	Delineates plume south of source area, monitor annually for chlorinated hydrocarbons.
EF	Coal Pile Trench	GW-690	PD	PD	Quarterly	Annual	Surveillance well with probably decreasing trends.
EF	Coal Pile Trench	GW-692	NT	NT	Annual	Annual	Low concentrations, monitor along with other wells in Coal Pile Trench area.
EF	Building 8110	GW-700	D	D	Quarterly	Annual	Strongly decreasing trend for PCE in shallow groundwater.
EF	Exit Pathway - Traverse J	GW-735	NT	NT	Annual	Annual	Exit pathway well, low detections of COPCs, monitor annually as early warning for possible migration.
EF	Y-12 Grid Well J-Primary	GW-763	NT	NT	Annual	Annual	Delineates shallow groundwater near GW-762.
EF	Y-12 Grid Well E3	GW-781	NT	NT	Annual	Annual	Concentration spiked in 1998, decreasing since, annual monitoring to confirm decreasing recent trend.
EF	Y-12 Grid Well E3	GW-782	D	D	Annual	Annual	Surveillance well, Concentration of VOC decreasing. Monitors shallow groundwater
EF	Y-12 Grid Well E3	GW-783	S	D	Quarterly	Annual	Stable to decreasing trend with fairly low concentrations. Monitor annually with GW-781 and 782.

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
EF	Y-12 Grid Well D2	GW-791	S	D	Annual	Annual	Stable to decreasing trend in area of high concentrations of VOCs, long-term monitoring record, monitors affected deeper groundwater in northern area of plume.
EF	Building 9201-2	GW-820	S	S	Annual	Annual	Along line of GW-219 and GW-959. Higher concentrations of VOC, but stable trend.
EF	--	GW-954-1	N/A	N/A	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-954-2	NT	NT	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-954-3	S	S	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-956-1	NT	NT	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-956-2	NT	NT	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-956-3	NT	NT	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-956-4	N/A	N/A	--	Annual	Low level detections, monitor annually to delineate horizontal distribution of COPCs.
EF	--	GW-959	NT	NT	Annual	Annual	Monitors degradation of VOC in plume, downgradient from GW-820, monitor annually.
EF	--	GW-960	N/A	N/A	Annual	Annual	New well near GW-779, outside of VOC plume. Delineates groundwater to the north. Sample annually and evaluate trend.
EF	Exit Pathway Spring/Surface Water	UEFPC-SP17	NT	NT	Semiannual	Annual	Sample as per permit.
Biennial Sampling							
EF	Y-12 Grid Well B3	55-2A	D	D	Annual	Biennial	Shallow well in nested group, decreasing recent trends for PCE.
EF	Y-12 Grid Well C2	56-6A	NT	NT	Biennial	Biennial	Low concentrations of Gross Beta and nitrate, non-detect for other site COPCs.
EF	Y-12 Plant Site	60-1A	NT	NT	Biennial	Biennial	Very limited detections, delineation of plumes horizontally.
EF	S-3 Site	GW-106	S	D	Quarterly	Biennial	Surveillance well, Limited recent (2004 -2007) sample events trigger quarterly monitoring recommendation, stable to decreasing trends. Monitors nitrate source area.

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
EF	S-3 Site	GW-109	NT	NT	Quarterly	Biennial	Limited recent (2004 -2007) sample events trigger quarterly monitoring recommendation, Historically high concentrations but stable to decreasing trends. Monitors nitrate source area. Alternate regulatory location. Continue limited sampling frequency.
EF	New Hope Pond	GW-148	N/A	N/A	--	Biennial	Monitors shallow groundwater between GW-383 and GW-832, delineates plume, largely non-detect results
EF	Y-12 Plant Site	GW-204	S	I	Semiannual	Biennial	Surveillance well, Sample biennially, monitor trend for Gross Alpha
EF	Rust Garage Area	GW-505	S	NT	Semiannual	Biennial	Surveillance well. Low levels of gross alpha and nitrate, stable to decreasing trends. Limited VOC detections. Stable to no trend.
EF	Fire Training Facility	GW-619	PD	D	Quarterly	Biennial	Decreasing trends for VOCs, in shallow groundwater.
EF	Y-12 Plant Site	GW-656	D	D	Quarterly	Biennial	Strong decreasing trend, relatively high concentrations. Monitor along with GW-204 to delineate VOC plume.
EF	Y-12 Grid Well K2	GW-748	S	D	Biennial	Biennial	Monitors property boundary, decreasing long-term trend, monitor biennially as early warning for possible migration.
EF	Exit Pathway - Traverse J	GW-750	S	S	Biennial	Biennial	Monitors property boundary, stable long-term trend, monitor biennially as early warning for possible migration.
EF	Y-12 Grid Well E1	GW-765	N/A	D	Annual	Biennial	Occasional sampling to delineate northern extent of affected groundwater.
EF	Y-12 Grid Well H3	GW-775	S	NT	Semiannual	Biennial	Monitors deeper groundwater at the eastern end of the Central Y-12/Fuel Station. Stable trend, reduce sample frequency.
EF	Y-12 Grid Well H3	GW-776	PD	D	Annual	Biennial	Monitors shallow groundwater at the eastern end of the Central Y-12/Fuel Station. Stable trend, reduce sample frequency.
EF	Y-12 Grid Well F2	GW-779	N/A	NT	Annual	Biennial	Low detections, provides unique information, recommended limited sampling.
EF	Y-12 Grid Well D2	GW-792	D	D	Semiannual	Biennial	Located near GW-791, but in shallow zone, much lower concentrations, stable trends, reduce monitoring frequency.
Sample Once Every 5 Years							

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
EF	Y-12 Grid Well B2	55-1A	S	S	Annual	Every 5 years	Delineates northern edge of affected groundwater, limited detections of COPCs, reduce sampling
EF	Beta-4 Security Pits	GW-192	NT	I	Semiannual	Every 5 years	Monitor to delineate northern VOC plume, monitor infrequently, along with 55-1A, to delineate plume.
EF	Y-12 Salvage Yard	GW-265	S	D	Annual	Every 5 years	Stable to decreasing trends, monitor occasionally to delineate southern edge of plume.
EF	Y-12 Salvage Yard	GW-269	D	I	Annual	Every 5 years	Recent decreasing trends, monitor occasionally to delineate southern edge of plume.
Remove from the Active Network							
EF	S-3 Site	GW-105	NT	D	Quarterly	<i>Eliminate</i>	Surveillance well, Limited recent (2004 -2007) sample events trigger quarterly monitoring recommendation, stable to decreasing trends. Monitors nitrate source area. Does not provide unique information.
EF	Y-12 Salvage Yard	GW-270	N/A	D	Quarterly	<i>Eliminate</i>	Redundant with GW-505.
EF	Y-12 Salvage Yard	GW-273	ND	D	Annual	<i>Eliminate</i>	Redundant with GW-633.
EF	Waste Coolant Processing Facility	GW-336	S	NT	Quarterly	<i>Eliminate</i>	Redundant with GW-332 and GW-337.
EF	Exit Pathway - Traverse E	GW-617	S	NT	Annual	<i>Eliminate</i>	Low-level and non-detect results for COPCs. Monitors very shallow groundwater, redundant with GW-618.

**APPENDIX D.2
SUMMARY OF SAMPLING RECOMMENDATIONS FOR THE EAST FORK REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Locations with no data 2005 - 2007							
EF	Y-12 Plant Site	GW-193	D	D	Biennial	Regulated	Sample as per permit. No sample since 2004.
EF	New Hope Pond	GW-222	S	NT	Annual	Annual	Not sampled since 2004, recommendation as per 2005 analysis.
EF	Y-12 Plant Site	GW-190	ND	NT	Biennial	Every 5 years	To be Sampled in 2008. Confirm PCE concentrations below MCLs (or ND), monitor metal concentrations, consider reduced sampling frequency.
EF	Rust Garage Area	GW-508	N/A	D	Remove	Every 5 years	To be Sampled 2008. Area of high benzene concentrations, Nearby GW-633 has increasing trend for benzene. If 2008 results confirm decreasing benzene trend, sample every five years to confirm trend.

APPENDIX D.3

CHESTNUT RIDGE HYDROGEOLOGIC REGIME

**APPENDIX D.3
SUMMARY SAMPLING RECOMMENDATIONS FOR THE CHESTNUT RIDGE REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Regulated Locations							
CR	United Nuclear Corporation Site	1090	S	D	Biennial	Regulated	Sample as per permit
CR	Industrial Landfill IV	GW-141	I	I	Biennial	Regulated	Sample as per permit
CR	Kerr Hollow Quarry	GW-143	S	S	Biennial	Regulated	Sample as per permit or as per ROD
CR	Kerr Hollow Quarry	GW-144	NT	D	Biennial	Regulated	Sample as per permit or as per ROD
CR	Kerr Hollow Quarry	GW-145	S	D	Annual	Regulated	Sample as per permit or as per ROD
CR	Chestnut Ridge Sediment Disposal Basin	GW-156	D	D	Biennial	Regulated	Sample as per permit
CR	Chestnut Ridge Sediment Disposal Basin	GW-159	D	D	Biennial	Regulated	Sample as per permit
CR	East Chestnut Ridge Waste Pile	GW-161	N/A	N/A	Quarterly	Regulated	New well, very limited detections of COPCs, sample annually as sentinel well.
CR	Chestnut Ridge Security Pits	GW-177	S	I	Annual	Regulated	Sample as per permit.
CR	United Nuclear Corporation Site	GW-203	NT	I	Biennial	Regulated	Sample as per permit
CR	United Nuclear Corporation Site	GW-205	I	I	Annual	Regulated	Sample as per permit
CR	Industrial Landfill IV	GW-217	NT	D	Biennial	Regulated	Sample as per permit
CR	United Nuclear Corporation Site	GW-221	NT	D	Annual	Regulated	Sample as per permit
CR	Kerr Hollow Quarry	GW-231	S	S	Biennial	Regulated	Sample as per permit or as per ROD
CR	East Chestnut Ridge Waste Pile	GW-292	N/A	N/A	Annual	Regulated	Non-detect for TCE, limited samples for nitrate and other COPCs. Detection monitoring for any COPCs.
CR	East Chestnut Ridge Waste Pile	GW-293	N/A	N/A	Annual	Regulated	Only one detection of TCE, low levels of gross alpha.
CR	East Chestnut Ridge Waste Pile	GW-294	N/A	N/A	Annual	Regulated	New well, very limited detections of COPCs, sample annually until sufficient samples to detect a trend.
CR	East Chestnut Ridge Waste Pile	GW-296	N/A	N/A	Annual	Regulated	New well, very limited detections of COPCs, sample annually until sufficient samples to detect a trend.
CR	Chestnut Ridge Borrow Area Waste Pile	GW-298	N/A	NT	Annual	Regulated	No-detect for TCE, gross alpha and uranium found at low levels.
CR	Chestnut Ridge Borrow Area Waste Pile	GW-301	NT	NT	Quarterly	Regulated	Sample as per permit

**APPENDIX D.3
SUMMARY SAMPLING RECOMMENDATIONS FOR THE CHESTNUT RIDGE REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
CR	Industrial Landfill IV	GW-305	NT	NT	Annual	Regulated	Sample as per permit
CR	Industrial Landfill IV	GW-521	D	D	Biennial	Regulated	Sample as per permit
CR	Industrial Landfill IV	GW-522	S	S	Biennial	Regulated	Sample as per permit
CR	Industrial Landfill II	GW-540	NT	PD	Biennial	Regulated	Sample as per permit
CR	Construction/Demolition Landfill VI	GW-542	D	D	Biennial	Regulated	Sample as per permit
CR	Construction/Demolition Landfill VI	GW-543	NT	NT	Biennial	Regulated	Sample as per permit
CR	Construction/Demolition Landfill VI	GW-544	NT	NT	Biennial	Regulated	Sample as per permit
CR	Industrial Landfill V	GW-557	PD	PD	Annual	Regulated	Sample as per permit.
CR	Construction/Demolition Landfill VII	GW-560	NT	NT	Annual	Regulated	Sample as per permit.
CR	Construction/Demolition Landfill VII	GW-562	NT	NT	Annual	Regulated	Sample as per permit.
CR	Construction/Demolition Landfill VII	GW-564	S	S	Annual	Regulated	Sample as per permit.
CR	Industrial Landfill II	GW-709	NT	D	Biennial	Regulated	Sample as per permit
CR	Chestnut Ridge Sediment Disposal Basin	GW-731	NT	NT	Biennial	Regulated	Sample as per permit
CR	Chestnut Ridge Sediment Disposal Basin	GW-732	PD	D	Biennial	Regulated	Sample as per permit
CR	Industrial Landfill II	GW-757	I	I	Biennial	Regulated	Sample as per permit
CR	Industrial Landfill V	GW-796	S	S	Annual	Regulated	Sample as per permit.
CR	Industrial Landfill V	GW-797	I	I	Annual	Regulated	Sample as per permit.
CR	Construction/Demolition Landfill VII	GW-798	I	I	Annual	Regulated	Sample as per permit.
CR	Industrial Landfill V	GW-799	S	S	Annual	Regulated	Sample as per permit.
CR	Industrial Landfill V	GW-801	S	S	Annual	Regulated	Sample as per permit.
CR	Construction/Demolition Landfill VI	GW-827	PD	PD	Biennial	Regulated	Sample as per permit
CR	Chestnut Ridge Security Pits	GW-831	NT	NT	Quarterly	Regulated	Sample as per permit.
CR	Chestnut Ridge Security Pits	GW-831	NT	NT	Quarterly	Regulated	Sample as per permit.
CR	South Campus Facility, Bethel Valley	GW-841	PD	PD	Quarterly	Regulated	Sample as per ROD

**APPENDIX D.3
SUMMARY SAMPLING RECOMMENDATIONS FOR THE CHESTNUT RIDGE REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
CR	South Campus Facility, Bethel Valley	GW-842	NT	NT	Annual	Regulated	Sample as per ROD
CR	Exit Pathway Spring/Surface Water	SCR1_25SP	NT	NT	Biennial	Regulated	Sample as per permit or ROD
CR	Exit Pathway Spring/Surface Water	SCR2_1SP	D	D	Annual	Regulated	Sample as per ROD
CR	Exit Pathway Spring/Surface Water	SCR2_2SP	NT	NT	Annual	Regulated	Sample as per ROD
CR	Exit Pathway Spring/Surface Water	SCR3_5SP	PI	PI	Annual	Regulated	Sample as per permit or ROD
CR	Industrial Landfill V	SCR4_3SP	ND	ND	Biennial	Regulated	Sample as per permit.
Annual Sampling							
CR	Chestnut Ridge Security Pits	GW-322	S	NT	Annual	Annual	Stable to variable trend in 11DCE, concentrations above screening level. Monitor extent of 11DCE.
Biennial Sampling							
CR	Chestnut Ridge Security Pits	GW-174	N/A	D	Quarterly	Biennial	Decreasing long-term trend, recent concentration below screening level. Monitor to confirm decreasing trend.
CR	Chestnut Ridge Security Pits	GW-175	S	D	Annual	Biennial	Decreasing long-term trend, recent concentration below screening level. Alternate regulatory point. Monitor to confirm decreasing trend.
CR	Chestnut Ridge Security Pits	GW-176	N/A	I	Quarterly	Biennial	Decreasing trend for PCE, but increasing trend for 11DCE. Sample along with GW-174 and GW-175.
CR	Chestnut Ridge Security Pits	GW-180	N/A	D	Quarterly	Biennial	Decreasing long-term trend for PCE, retain to delineate plume.
CR	Filled Coal Ash Pond	GW-514	N/A	S	Annual	Biennial	Concentrations below screening levels, monitor occasionally to detect any change in concentrations. Alternate regulatory point.
CR	Chestnut Ridge Security Pits	GW-609	D	D	Annual	Biennial	Decreasing short and long-term trends for PCE, recent concentrations below screening levels. Alternate regulatory point. Well provides unique information -- spatially isolated.

**APPENDIX D.3
SUMMARY SAMPLING RECOMMENDATIONS FOR THE CHESTNUT RIDGE REGIME**

Regime	Functional Area	Location Name	Recent Trend	Overall Trend	Preliminary Frequency	Final Frequency	Recommendation
Sample Once Every 5 Years							
CR	Chestnut Ridge Security Pits	GW-178	N/A	PI	Annual	Every 5 years	Intermittent detections, concentrations below screening levels. May be redundant with GW-177.
CR	Chestnut Ridge Security Pits	GW-179	N/A	D	Quarterly	Every 5 years	Decreasing long-term trend. Monitor to confirm decreasing trend. May be redundant with GW-175 and GW-612.
CR	Chestnut Ridge Security Pits	GW-612	S	D	Annual	Every 5 years	Decreasing long-term trend, monitor along with GW-179, to monitor upgradient of increasing DCE trend at GW-176.
Locations with no Data 2005 -2007 (to be sampled in 2008)							
CR	Chestnut Ridge Security Pits	GW-173	N/A	PD	Semiannual	Eliminate	Probably decreasing long-term trends, consider eliminating from program.
CR	Chestnut Ridge Security Pits	GW-608	S	D	Annual	Annual	Sample to support regulatory program, consider annual sampling to delineate PCE.

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