LONG-TERM MONITORING OPTIMIZATION REPORT FOR THE KERR-McGEE CHEMICAL CORPORATION SUPERFUND SITE, TRONOX FACILITY SODA SPRINGS, IDAHO

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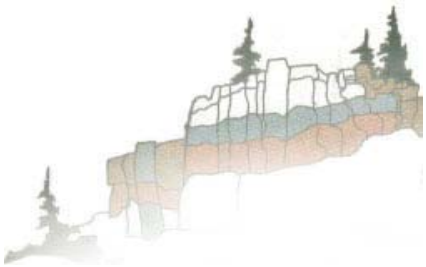

EXECUTIVE SUMMARY

Long-term monitoring optimization (LTMO) was performed on data from the Tronox facility, formerly the Kerr-McGee Superfund Site, in Soda Springs, Idaho. The U.S. Environmental Protection Agency (EPA) recommended LTMO after conducting the second five-year review of site progress. LTMO was used to evaluate the adequacy of the monitoring network in characterizing migration of chemicals of concern (COCs).

The Monitoring and Remediation Optimization System (MAROS) geostatistical software program was selected for data analysis. The MAROS program applies heuristically-derived rules based on trend analysis results and site information to determine the current status of the groundwater plume and utilizes rigorous statistical methods (i.e. Delaunay Triangulation and Cost Effective Sampling) to provide recommendations on the adequacy of the number of wells, sampling frequency, and well density.

To prepare for the evaluation the existing long-term monitoring (LTM) program was documented, the groundwater modeling for the site remedial investigation was critically reviewed, and the conceptual site model was updated to reflect current understanding of site hydrogeologic conditions and transport processes. This preparation was critical in defining and justifying hydrogeologic input parameters and physical site parameters used in the program. The details and dynamics of the complex hydrogeologic system and contaminant transport processes had to be simplified to accommodate the two- and three-dimensional statistical and analytical calculations. The two main COCs at the site, molybdenum and vanadium, were used to represent contaminant trends in the evaluation.

Results from the plume analysis and spatial moment analysis indicate that both molybdenum and vanadium plumes have decreased since LSE was completed in 1997, with some wells reaching a flat slope showing no trend or even a slightly increasing trend. Analyses illustrated that molybdenum and vanadium have different reactions and migration patterns in the subsurface. The optimization of sampling location and frequency concluded that all sampling locations are valid, although sampling frequency could possibly be reduced in select wells. The MAROS data sufficiency analysis of cleanup by well and site confirmed that cleanup has not been attained and may take several years to achieve.

In conclusion, the numerical and statistical evaluation of the LTMO program at Tronox was advantageous in establishing guidelines and techniques that can be used in the future. Although a possible reduction in the frequency of sampling select wells was suggested, implementation of this reduction is not practical at the current time. The combination of the statistical approach with professional judgment provides confidence in the direction of continued LTM as a remedy for COCs in groundwater. The LTMO process should be applied to site data periodically to look for potential reductions in scope and cost of the existing program while maintaining quality and effectiveness. No changes to the sampling program are recommended at this time.

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LONG-TERM MONITORING OPTIMIZATION REPORT FOR THE KERR-McGEE CHEMICAL CORPORATION SUPERFUND SITE, TRONOX FACILITY SODA SPRINGS, IDAHO

1.0 Introduction

Long-term monitoring (LTM) at the Tronox facility is an integral part of the site remedy that was instituted in 1997 and is used to both document changes in concentrations of chemicals of concern (COCs) in groundwater and demonstrate progress toward achieving clean-up goals. The EPA completed a 10-year review of the site in September 2007 and requested an evaluation of the LTM program as part of the overall remedy evaluation (EPA, 2008). The EPA recommended the use of LTM optimization (LTMO) to evaluate the adequacy of the monitoring network in characterizing migration of COCs and suggested the Monitoring and Remediation Optimization System (MAROS) geostatistical software as a tool for the analysis.

The MAROS program (GSI, 2008) was used in assessing spatial and temporal trends in the groundwater analytical data and examining the effectiveness of the current network of monitoring wells. The program evaluation followed guidance for long-term monitoring optimization (LTMO) provided by the Air Force Center for Environmental Excellence (AFCEE) in the MAROS Software User's Guide (AFCEE 2006a) and accompanying publication (AFCEE 2006b), as well as the EPA Roadmap to LTMO (EPA 2005).

This report includes a review of basic site information including site conditions and the status of the monitoring program, an overview of the hydrogeologic setting and COC trends, a review of groundwater model transport simulations made prior to the execution of the remedy, and a discussion of the conceptual site model (CSM). This information provides the justification for application of the software` and rationale for the selection of input parameters used in the MAROS program. A discussion of the optimization approach and results of the geostatistical assessment of the existing LTM program are presented with recommendations for future program monitoring.

2.0 Site Conditions and Monitoring Program

The Tronox site (formerly known as the Kerr-McGee Chemical Corporation site) was constructed in 1963 and began production of vanadium in March 1964. A number of solid and liquid waste impoundments were generated during the time of operation, which continued through January 1999 when the plant was shut down. The site was placed on the National Priorities List, while it was in operation in 1989. The Remedial Investigation (RI) was completed in 1995 and the Feasibility Study (FS) for the entire site was completed in 1996. A supplemental FS for the calcine capping was completed in 2000. Remedial actions for the site remedy were conducted between 1997 and August 2001, followed by LTM.

The RI report (Dames & Moore, 1995a) identified three unlined ponds (S-X pond, scrubber pond, and calcine pond) as the predominant sources of contaminant-bearing seepage observed in groundwater beneath the facility. Total seepage from the ponds was estimated to be about 300 to 350 gallons per minute. Natural leaching of the solid sources was considered to have much smaller impact.

The 80-acre area containing the former plant and waste impoundments is referred to as the plant facility or the on-site area. The plant facility lies within the north-central portion of the Tronox property boundary. Features outside of the plant facility are referred to as off-site, even though they may be on Tronox property. Since plant closure, a landfill was constructed outside the northern edge of the plant facility and a 10-acre pond was created outside the eastern edge of the plant facility. Both the landfills and 10-acre pond are "off-site" meaning outside the plant facility area.

Details of the monitoring well network are provided in the recent report by Global Environmental Technologies (GET, 2008). In summary, the groundwater monitoring network consists of 14 on-site monitor wells (within the plant facility), 4 off-site monitor wells (south of the plant facility but within the Tronox property boundary), and 4 springs that are outside the Tronox property boundary. Nine of the 14 on-site wells have been named point-of-compliance (POC) wells. The POC wells are located on the southern and western edges of the plant facility. Water levels and water quality are monitored in on-site and off-site wells and water quality is monitored in springs on a semi-annual basis, in the spring and fall. The groundwater analytical database for the site contains semi-annual results for wells and springs collected between October 1995 and May 2008. The database also contains several single sampling events at select locations and quality assurance duplicate sample results. Limited data from Monsanto and Evergreen are included in the database.

Six COCs were identified at the site in the RA and include arsenic, manganese, molybdenum, tributyl phosphate, total petroleum hydrocarbons and vanadium. Field parameters are collected during sampling and samples are analyzed for the six COCs as well as additional analytes. Details of the monitoring program are provided in the Groundwater Monitoring Network Evaluation Report (GET, 2008)

3.0 Hydrogeologic Setting

The following discussion of the hydrogeologic setting is summarized from the RI. The site is located about 1.5 miles northeast of the City of Soda Springs, within the Bear River Basin, which is characterized by broad, flat valleys bordered by northwest trending mountain ranges. The valley where the site is situated is part of the Bear Lake Fault Graben Structure, a long narrow graben extending from Bear Lake (south of Soda Springs) to the Blackfoot Reservoir (13 miles north of the site). The facility is located near the center of the valley with the Chesterfield Range and the Soda Springs Hills to the west and the Aspen Range to the east. The facility is within the Blackfoot Lava Field which fills the valley between the mountain ranges and is characterized by irregular surface of numerous cliffs, scarps, collapse structures and fissures.

Site geology, to a depth of about 230 feet, consists of intermittent alluvial deposits, Quaternary basalts and interflow zones, and the Tertiary Salt Lake Formation. The alluvium refers to all of the unconsolidated surficial deposits that overlie bedrock, including alluvium, loess, and weathered basalt. The underlying basalt consists of five individual basalt flows that range from 20 to 80 feet thick. Interflow zones between the basalt flows are predominantly comprised of clay with lesser amounts of basalt, gravel, cinder, and organic materials. The basalts and interflow zones dip gently to the west. The underlying Salt Lake Formation consists of sandstones, conglomerates, and limestones.

Four north-trending faults transect the geology beneath the site. The faults are interpreted from seismic data and surficial features (northern trace of the Finch Spring Fault). The faults are typically downthrown to the west with small (less than 20 feet) displacements.

The shallow groundwater system in the valley consists of groundwater that occurs within the alluvium (limited areas), the basalt sequences and the basalt interflow zones, and the Salt Lake Formation. The basalts form the major aquifer for wells in the region with water occurring in fractures, joints, rubble zones, and inter-layered cinder beds. The Salt Lake Formation is considered a highly unpredictable source of water supply with variable yield. Recharge to the shallow system occurs through infiltration of precipitation, leakage from the Blackfoot Reservoir, and from groundwater originating from the Meade Thrust Aquifer System (originating from the Aspen Range to the east of the site) and the Chesterfield Range Aquifer System (west of the site).

In general, groundwater flows from the mountain ranges toward the center of the valley, then southwest toward the Bear River. Springs occur on both sides of the valley. Finch Spring, Upper and Lower Ledger Springs, and Big Spring are located south of the facility, at distances of 4,000 feet to 2.7 miles south. Big Spring is the most distant sampled spring, located south of the town of Soda Springs.

All the on-site and off-site wells that form the monitoring network were installed within the basalts. Thirteen of the 18 wells are designated as shallow wells, completed with 10 feet of screen across the first occurrence of groundwater noted during drilling (total depths of 45 to 73 feet). Four wells are designated as intermediate-depth wells, completed with 20 feet of screen extending to total depths of 100 to 173 feet. One well is designated as a deep well, completed with 20 feet of screen extending to a total depth of 230 feet. The deep well was completed near the base of the basalt sequence. A production well, PW-10, located near the plant, was drilled to a total depth of 250 feet, which was interpreted to be within the basalt sequence (cross section F'-F" of the RI). The Salt Lake Formation was encountered in core hole CH-3 at a depth of 231 feet below surface.

Changes in depths to groundwater in wells demonstrate cyclic periods of high and low groundwater levels in response to seasonal changes in recharge. Water levels are typically higher by about 2 to 3 feet in the spring compared to levels measured in the fall. Longer term cycles are also apparent with water levels responding to periods of drought lasting several years. Groundwater levels dropped 5 to 8 feet between 1997 and 2001 and have recovered several feet between 2004 and 2007 towards the range of levels observed in 1997. Groundwater pumping at

Monsanto has also resulted in apparent long-term water level declines, primarily on the west side of the site.

The direction and rate of groundwater flow beneath the site is influenced locally by heterogeneities in hydraulic conductivities within the basalts, with higher conductivities found in the basalts on the east side of the site. The flow direction is also affected by groundwater pumping from Monsanto, located west of the property. Instead of flowing south as the regional aquifer does, groundwater flow in the aquifer beneath the west side of the site is to the west toward Monsanto's production wells. A vertical downward gradient is noted on the west side in off-site wells KM-15 and KM-19. This downward gradient may also be due to the influence of pumping the lower part of the basalt aquifer at Monsanto's production wells. Outside the area of influence of the Monsanto wells, flow is to the southwest and south. Groundwater levels beneath the east side of the facility have a more southwesterly flow component, consistent with regional flow patterns. Faults do not appear to be barriers to flow, but may locally increase both vertical and horizontal hydraulic conductivities.

4.0 COC Trends

COC concentration decay trends are documented through temporal changes observed in the existing monitoring well network used in conjunction with the Evergreen, Monsanto, and spring surface water data. Of the six COCs, TBP and TPH are present in very low concentrations on the site. Arsenic, manganese, molybdenum and vanadium exceed RBCs in several of the on-site wells but only molybdenum and vanadium are above the RBCs in off-site wells. Molybdenum is readily soluble in water and is more mobile than vanadium in groundwater. Molybdenum was present at the largest concentrations at Finch Spring when monitoring began in 1991. Increased vanadium concentrations were identified at Finch Spring after 1993.

5.0 Groundwater Model Review

Groundwater modeling was used in a comparative analysis of groundwater remedial action alternatives as part of the RI/FS (Dames & Moore, 1995b). The goals of the modeling evaluation were to address the following questions: 1) what magnitude of decrease in the concentrations of the six COCs would be expected over time when liquid sources were eliminated; and 2) would the magnitude of the decrease in COC concentrations be significantly increased over time if liquid source elimination (LSE) was supplemented by groundwater extraction. Answers to these questions were used to select a remedial action alternative for the site. Several combinations of groundwater remedial alternatives were evaluated ranging from no action to LSE with multiple extraction wells. Caveats listed for the model predictions were that the model was calibrated to within an order of magnitude of observed COC concentrations and should be considered reliable within that range of values. Even more specifically, a list of what the model was not intended to do included: evaluate the extent of contamination, simulate specific flow paths, simulate the exact pattern of flow, or predict the precise future concentrations at specific downgradient locations.

Based on the modeling results, the proposed remedial action alternative was LSE with additional solid source remedial actions including excavation and on-site disposal of S-X and scrubber pond solids, and reuse/recovery of the calcine tailings. With respect to question 1, the magnitude of decrease over time for this alternative was predicted to meet and decrease below risk-based concentrations or maximum contaminant levels within five years (see caveats and limitations listed above). With respect to question 2, no additional groundwater extraction was required.

A one-layer, two-dimensional model was constructed using the USGS MODFLOW program to simulate groundwater flow in the shallow aquifer covering an area of about 3.5 square miles (model domain). The model domain was oriented in the general direction of groundwater flow (southwest) with the plant facility placed near the center. Chemical transport was simulated using the MT3D software package integrated with the MODFLOW program. Backward modeling was used to simulate groundwater flow and contaminant transport between 1963 (plant startup) and 1995 (predicted date when remedy would be in place). Model output was calibrated to November 1992 groundwater flow patterns and May 1993 chemical concentrations. The calibrated model was then used as the basis for simulating a 30-year period of groundwater flow and transport, referred to as the forward model (between 1995 and 2025), with individual model runs used to predict changes in concentrations under the varying conditions of the proposed remedial alternatives..

In the backward model COCs entered the model through 1) recharge from direct seepage from the ponds, and 2) infiltration of precipitation which leached COCs from solid sources. In the forward model, for alternatives with LSE, all pond seepage stopped. After LSE, the only source of COCs assumed in the model was leachate generated when precipitation infiltrated through the solid sources.

Basic flow model and transport assumptions and limitations included:

- Groundwater movement in the saturated basalts and interflow sequences responded in a manner similar to one hydrostratigraphic unit that responded similar to unconsolidated aquifer materials.
- The Salt Lake Formation underling the basalts did not contribute to the groundwater in the basalts and could be modeled as an impermeable barrier.
- Mixing of seepage from the liquid sources and leachate from the solid sources occurred immediately through the entire saturated thickness of the aquifer.
- Four Monsanto production wells and one on-site production well (PW-10) were operated between 1963 and 1995 and were assumed to remain in operation throughout 2025. The rate of pumping of PW-10 was 350 gpm. The Monsanto wells were pumped at rates of 0.5, 500, 2,000, and 2,080 gpm. The wells were assumed to be fully penetrating in the shallow aquifer.
- The Hydrologic Evaluation of Landfill Performance (HELP) model was used to predict infiltration rates. The runoff fraction was set to zero because snowmelt and precipitation had not been noted to leave the active calcine tailings area in the form of runoff.
- Process-water and lysimeter-water analytical data were representative of initial concentrations for pond liquids and solid source leachates. (Some source concentrations were increased in the model to achieve better calibration.)

- Mass was accumulated in the model by adsorption to the aquifer matrix. Mass left the model through constant head boundaries and pumping wells.
- A global mass balance approach provided initial estimates of adsorption coefficients (Kd). (During modeling initial Kd values were slightly adjusted to improve calibration.)

In the discussion of the model in the Comparative Analysis Report (Dames &Moore, 1995), efforts were made to apply an overall conservative approach by using conservative model assumptions and conservative input values. Three examples of conservative model input values that were mentioned included: 1) using a smaller saturated thickness (100 feet instead of 200 feet) to reduce dilution and increase predicted concentrations downgradient, 2) using largest observed concentrations from a source area as representative of the entire area to increase predicted concentrations during forward modeling, and 3) using a higher infiltration rate (1 inch/year) to allow for greater mass of COCs to be leached from the solid sources and transported to the groundwater. Sensitivity analysis showed that the most sensitive input parameters to the model were aquifer thickness, infiltration, and solid source leachate concentration.

In 2008, 13 years post modeling, actual groundwater concentrations remain higher than predicted. Not all wells demonstrate decreasing trends. Changes in timing of remedial events, remedy options, and site conditions compared with those used in the model all had an effect on the current conditions. Upon review, some of the modeling input parameters may also have had a more profound influence on the predicted outcome.

Changes in timing of remedial events and remedy options include:

- LSE with excavation and on-site disposal of S-X and scrubber pond solids was completed in 1997, 2 years after the 1995 modeling date.
- The reuse/recovery of the calcine tailings was not effective and the FS was modified to include capping of the calcine tailings in place, which was completed in 2001, 6 years after the 1995 modeling date.
- The model assumed that the S-X ponds and scrubber ponds would have no infiltration after closure. The S-X and scrubber ponds did not have impermeable caps and would have infiltration and leaching after closure. Wells near the former S-X ponds have the largest concentrations of COC.
- The infiltration estimate assumed no runoff from the active calcine tailing. The capped calcine area has snow buildup and run off which is partially diverted to an infiltration basin, but also ponds near the former scrubber ponds.
- Ponded water is present during the spring around the former scrubber pond and on the S-X pond.
- On site production well PW-10 was no longer used for process water after 2000; limited pumping occurs in the summer for irrigation of landscaped areas.
- Adsorption coefficients for the metals were estimated at very low values compared to literature values. Vanadium has a published value of 1,000 ml/g (Table A-1 of the Groundwater Modeling Report in the KMCC RI/FS), which is also the default valued used in the MAROS program, compared to 0.16 ml/g used in the model. Molybdenum has a published range from 0.4 to 4,000 ml/g from one source and a more limited range

of 9 to 125 ml/g from other sources (Table A-1 listed above), compared to 0.31 used in the model. The default in the MAROS program for molybdenum is a Kd of 20 ml/g. Sensitivity ranges were also very low (0.08 and 0.32 ml/g for vanadium) when evaluated and the conclusion was made that Kd had low sensitivity in the modeling results.

- The effective porosity of 0.08 used in the model and 0.1 used to estimate the mass of COC adsorbed to the aquifer is low. By increasing porosity and adsorption, more mass is present in the model. In the sensitivity analysis only porosity was increased substantially (to 0.25 or 25 percent) and the result was increased predicted vanadium concentrations downgradient from the KMCC site at 5 years, but not a noticeable difference at 10, 20, or 30 years. The increase in porosity and not adsorption (less mass) essentially flushed the vanadium out of the model.
- The forced application of 100 feet for aquifer thickness to calibrate the transport model could be compensated by increasing porosity, infiltration, and leachate concentration. The reduction of aquifer thickness to 100 feet was done to achieve better agreement between predicted and observed/reported COC concentrations in on-site monitor wells and to match drawdown in Monsanto production wells.
- The Monsanto wells are screened from 190-255 feet, pulling from the bottom of the basalts. This deep pumping may explain the vertical downward gradient between paired wells.

6.0 Conceptual Site Models

Figure 1 is an Area Map showing site features referenced in Figures 2 and 3 (Figures located at the end of the report). Figures 2 and 3 are depictions of the current CSM for the hydrogeologic setting and COC transport processes. The base map for these two figures is an aerial map of the site area oriented to the northeast and tilted to the northwest to provide a 3-dimensional perspective. The surface was cut away at a diagonal, from the northeast corner of the plant (east of the reclaimed calcine tailings ponds) to the southwest corner of the Tronox property, crossing Highway 34 and ending at wells TW-11 and TW-12 on the adjacent Monsanto site. Site features such as the former ponds and plant area are labeled. The subsurface geology forms the third dimension in the diagrams and was constructed from geologic cross sections provided in the RI.

6.1 CSM FOR HYDROGEOLOGIC SETTING

The subsurface geology shown in the CSM for the hydrogeologic setting was simplified from cross sections in the RI. The cross sections were originally interpreted from logs of borings for Monsanto wells TW-11 and TW-12 and Tronox wells and core holes KM-15, KM-18, KM-16, KM-8, PW-10, and CH-1. In the site model, the wells and core holes were placed at their intersections with the surface map and made to extend vertically to a projected depth of 300 feet. The wells were interconnected in what is typically referred to as a fence-diagram, where the surface between wells (fence section) changes direction depending on the spatial orientation of the section relative to the diagram. For example the section between Wells KM-15 and KM-16 is oriented southwest to northeast, whereas the section between KM-16 and KM-8 is oriented more south to north.

The thin, discontinuous layer of alluvium is shown on top where noted in borings. The five basalt flows and interflow zones are shown in their relative locations. In general, the basalt flows dip to the west and are offset by faults. Faults are projected from geologic features and seismic interpretations as shown on the cross sections. Water level elevation is interpreted from the cross section and is very general; it does not show variations in groundwater elevations.

The insert in Figure 2 shows the path of water moving in the broken, vesicular and scoriaceous materials at the tops and bottoms of flow beds, through interbedded sediments and through vertical joints in the dense basalt flows. Sources of water in the model are from infiltration from rainfall and snowmelt, pond seepage, and recharge from the aquifer. Water flow paths indicate horizontal flow with a vertical downward component induced by pumping wells at Monsanto. Faults are shown as zones of similar or slightly increased flow. The lower Salt Lake Formation was only detected in one core hole on site (CH-3); for the purpose of the CSM, it is interpreted to be near KM-16 and KM-8 and to have no interconnection with flow in the basalts.

6.2 CSM FOR COC TRANSPORT PROCESSES

Figure 3 shows a conceptual site model for COC transport processes. The same diagram base is shown as used in the CSM for the hydrogeologic setting. Stippling patterns show where COC may be present in the vadose zone beneath former ponds and the main plant site as well as in groundwater migrating downgradient from the site area. A slightly denser stippled pattern is shown beneath the former S-X pond, settling ponds, and plant area indicating areas with continued source leaching.

Contaminant flow paths are illustrated in two inserts in Figure 3. The first insert illustrates the main physical transport processes of advection, dispersion, and diffusion. The second insert shows reactions that affect the transport of COCs on a granular level including precipitation, adsorption, oxidation-reduction, ion exchange, bacterial degradation, complexation and chelation, colloidal transport, and decay.

7.0 MAROS Optimization Approach

The MAROS methodology assumes that the current sampling network adequately delineates the plume (bounding wells have non-detect values) and that the vertical and horizontal dimensions of the plume are characterized. The validity of the results relies on the extent and quality of input data. The MAROS user's guide (AFCEE, 2006) recommends that a conceptual site model be developed prior to the use of the MAROS software to provide more accurate site evaluation through quality data input. As the CSM evolves with increased knowledge of the site over time, the optimization can be updated to reflect these changes.

The MAROS optimization approach was used to evaluate the monitoring and remediation of the two primary COCs: vanadium and molybdenum. Data were compiled from the 13 Tronox monitoring wells with shallow completions (KM-1 through KM-9, KM-13, KM-15, KM-16, and KM-17). Two time periods were evaluated: 1) post LSE to the present - October 1997 through May 2008; and 2) the past 5 years (9 monitoring events) - May 2004 through May 2008.

The monitoring data from the site is collected and published semi-annually, and is accompanied by data validation reports. Although data have been collected since 1995, only data collected after October 1997 are considered representative of post-LSE conditions. Details of the monitoring data are discussed in the Groundwater Monitoring Network Evaluation (GET, 2008). The MAROS guide provides data evaluation strategies and statistical techniques to reduce the probability of making false positive and false negative decisions arising from uncertainty in the sample data. These evaluations were not performed as part of this study as the Tronox monitoring data are considered useable with no significant comparability issues, outliers, or data management problems.

Based on given site details the MAROS program was used to perform a statistical plume analysis, spatial moment analysis and MAROS analysis. Table 1 provides a list of input parameters, values, and justification for use in the MAROS program. Values for input parameters were based on the site characterization from the RI and from values used in the groundwater model with the exception of porosity and adsorption coefficients. A larger value for porosity (0.2 compared to 0.08 used in the model) was used to represent flow through broken basalt and interflow sediments. Similarly, larger values for adsorption coefficients for vanadium (1000 ml/g compared to 0.16 ml/g) and molybdenum (20 ml/g compared to 0.31 ml/g) were used as the larger values were default values programmed into MAROS. Porosity is used in the calculation of seepage velocity and both porosity and adsorption coefficients are used in the spatial moment analysis.

Table 7.1 MAROS Input Parameters

Hydrologic Parameters	Value	Units	Justification
Seepage Velocity (ft/yr)	5475	ft/year	Calculated from Ki/n(365days/yr)
Hydraulic Conductivity (K)	150	ft/day	RI average value
Gradient (i)	0.02	ft/ft	RI average value
Porosity (n)	0.2	--	effective porosity for sand**
SaturatedThickness	100 (200)	ft	RI range of thicknesses
Groundwater flow direction	SW	240 degrees*	Semi-annual monitoring
GW Fluctuations	yes	--	Semi-annual monitoring
COC	**Value**	**Units**	
RBC Vanadium	0.26	mg/L	RI
RBC Molybdenum	0.18	mg/L	RI
Kd Vanadium	1000	ml/g	MAROS default
Kd Molybdenum	20	ml/g	MAROS default
Plume Information	**Value**	**Units**	
Plume Type	metals	--	RI
Current Plume Length	6000	ft	Semi-annual monitoring
Maximum Plume Length	6000	ft	Semi-annual monitoring
Plume Width	3500	ft	Semi-annual monitoring

Table 7.1 MAROS Input Parameters (continued)

Source Information	Value	Units	
Source Location near Well	PW-10	200 ft E/150 feet N	near top of plume/monitoring reps
Source X-Coordinate	659700	ft	Plant Grid
Source Y-Coordinate	372200	ft	Plant Grid
Source Treatment	LTM	--	Site Remedy 1997/2001
Well Information	**ID**		
Source Wells	KM-1 to KM-9, KM-13, KM-17		Inside Plant Facility Boundary
Tail Wells	KM-15, KM-16, Finch Spring		Outside Plant Facility Boundary
Centerline Wells	KM-8, KM-15, KM-16		Semi-annual monitoring
Down-gradient Information	**Value**	**Units**	
Distance from Source to Nearest:			
Downgradient receptor	5300	ft	Finch Spring
Downgradient property line	4000	ft	property line
Distance from Edge of Tail to Nearest:			
Downgradient receptor	-700	ft	Finch Spring
Downgradient property line	-2000	ft	property line

*direction from x-axis (counterclockwise)

**EPA (1996)-BIOSCREEN

7.1 STATISTICAL PLUME ANALYSIS

The statistical plume analysis is an evaluation of plume stability based on concentration changes over time using the Mann-Kendall test and linear regression analysis. Linear regression is commonly used to analyze concentration trends over time assuming the data follow a typical logarithmic decrease, or decay in concentration. However, where there are outliers in the data (high or low concentrations from a single monitoring event) the estimated slope in the linear regression can be biased.

The Mann-Kendall test is a non-parametric statistical procedure used to analyze data that do not follow a normal distribution. The Mann-Kendall statistic (MK(S)) is derived from the differences in concentrations between consecutive sample results. A positive value (+1) is assigned if there is an increase in concentration, a zero value (0) if there is no change, and a negative value (-1) if there is a decrease in concentration. The Mann-Kendall statistic is defined as the sum of the number of positive differences minus the number of negative differences. The strength of the trend is proportional to the magnitude of the MK(S). The confidence in the trend is the statistical probability that the constituent concentration is increasing (S>0) or decreasing (S<0) and is calculated using a Kendall probability table. A relative concentration trend is assigned based on the relationship between the Mann-Kendall statistic and the confidence in the trend. The concentration trend classifications include increasing, probably increasing, no trend, stable, probably decreasing, and decreasing. The difference between no trend and a stable trend is based on the coefficient of variation (COV), which is a statistical measure of how the data vary about the mean value. Values larger than 1 indicate that the data show a greater degree of scatter about the mean. Values less than 1 indicate that the data form a close group about the mean value.

Table 7.2 MAROS Mann-Kendall Analysis Decision Matrix

Mann-Kendall Statistic	Confidence in Trend	Concentration Trend
S>0	> 95%	Increasing
S>0	90-95%	Probably Increasing
S>0	<90%	No Trend
S≤0	<90% and COV ≥1	No Trend
S≤0	<90% and COV <1	Stable
S≤0	90 – 95%	Probably Decreasing
S≤0	>95%	Decreasing

Linear Regression is a parametric statistical procedure that interprets the log slope of the regression line that best fits data over time. This approach is used when there is a normal distribution of the data. The log-slope measures the trend in the data. Positive values indicate an increase in constituent concentrations over time, whereas negative values indicate a decrease in concentrations over time. The confidence in the trend is a statistical probability that the constituent concentration is increasing (log slope >0) or decreasing (log slope<0). Low levels of confidence in the fit correspond to "stable" or "no trend" conditions, while higher levels of confidence indicate the stronger likelihood of an increasing or decreasing trend. The COV is used to distinguish between stable and no trend conditions for negative slopes.

Table 7.3 MAROS Linear Regression Analysis Decision Matrix

Log Slope	Confidence in Trend	Concentration Trend
Positive	> 95%	Increasing
Positive	90-95%	Probably Increasing
Positive	<90%	No Trend
Negative	<90% and COV ≥1	No Trend
Negative	<90% and COV <1	Stable
Negative	90 – 95%	Probably Decreasing
Negative	>95%	Decreasing

7.2 SPATIAL MOMENT ANALYSIS

The spatial moment analysis provides a relative measure of plume stability and condition. The zeroth, first, and second moments provide measures of mass, center of mass, and the spread of the plume at each sample event. Data required for this analysis include concentrations, spatial coordinates, saturated thickness, and porosity.

The zeroth moment shows change in mass over time. The zeroth moment is the sum of concentrations for all monitoring wells and is an estimate of the total dissolved mass in the plume. The 3-D zeroth moment is calculated from concentration; porosity; and x, y, z spatial coordinates. Because the wells are spatially discontinuous (locations do not form an exact grid pattern), a numerical approximation is used to estimate mass in three dimensions. A numerical integration is performed by dividing the horizontal plane (x,y) into contiguous triangular regions with the apex of each triangle defined by a well location (Delaunay Triangulation method). An approximation of mass is calculated as the sum of the mass in each triangular section, calculated as the product of the geometric mean concentration of each triangle, volume of the triangle (the average saturated thickness multiplied by the area of the triangle), and total porosity. The zeroth moment trend is determined by using the Mann-Kendall Trend Methodology using the Mann-Kendall Statistic (MK(S)), confidence in trend, and COV. Results for the trend include: increasing, probably increasing, no trend, stable, probably decreasing, and decreasing. Zeroth moment calculations can show high variability over time, largely due to fluctuating concentrations at the most contaminated wells.

The first moment shows changes in center of mass over time in two dimensions. The first moment estimates the coordinates (x,y) for the center of mass for each sample event. Similar to the zeroth moment calculation, a numerical approximation is required to evaluate the spatially discontinuous data. Analysis of the movement of mass is viewed as it relates to 1) the original source location of contamination and 2) the direction of groundwater flow. Spatial and temporal trends in the center of mass can indicate spreading or shrinking or transient movement based on season variation in rainfall or other hydraulic considerations. No appreciable movement or a neutral trend in the center of mass would indicate plume stability. The first moment trend of the distance to the center of mass over time is determined by using the Mann-Kendall Trend Methodology.

The second moment shows spread of the plume over time in two dimensions--spread in the x-direction and spread in the y-direction (also referred to as the third moment in the MAROS program). The second moment indicates the distribution of concentrations about the center of mass, or the distance of contamination from the center of mass for a particular COC and sample event. The spread of the plume is approximated in terms of an ellipse with the x-axis representing the major migration direction and the y-axis is the lateral spread. The second moment analysis uses the representative groundwater direction input into the program. The second moment trend of the spread of the plume over time is determined by using the Mann-Kendall Trend Methodology. The MK(S) measures the trend in the data. Positive values indicate an increase in the spread of the plume over time (expanding plume), whereas negative

values indicate a decrease in the spread of the plume over time (shrinking plume). The strength of the trend is proportional to the magnitude of the MK(S).

7.3 MAROS Site Results Analysis

The preliminary step in the MAROS optimization is a qualitative evaluation based on site classification, source treatment, and monitoring system category. The second step in MAROS analysis is a well specific evaluation, discussed in the next section below. In the preliminary evaluation, overall trend results for both tail and source wells are used to assign monitoring system categories of extensive (E), moderate (M), and/or limited (L) to the monitoring system. Categories are assigned using a very simple decision matrix. If tail wells are increasing or probably increasing the site is assigned an E for extensive monitoring required, regardless of whether the source is increasing or decreasing. Similarly if there is no trend in the tail wells and the source has no trend, an increasing trend, or probably increasing trend, the site is assigned an E for extensive monitoring. If tail wells are decreasing or probably decreasing and source wells are either stable, probably decreasing or decreasing, the site is assigned an L for limited monitoring required. Other combinations fall into the system category of moderate monitoring required as shown on the diagram below.

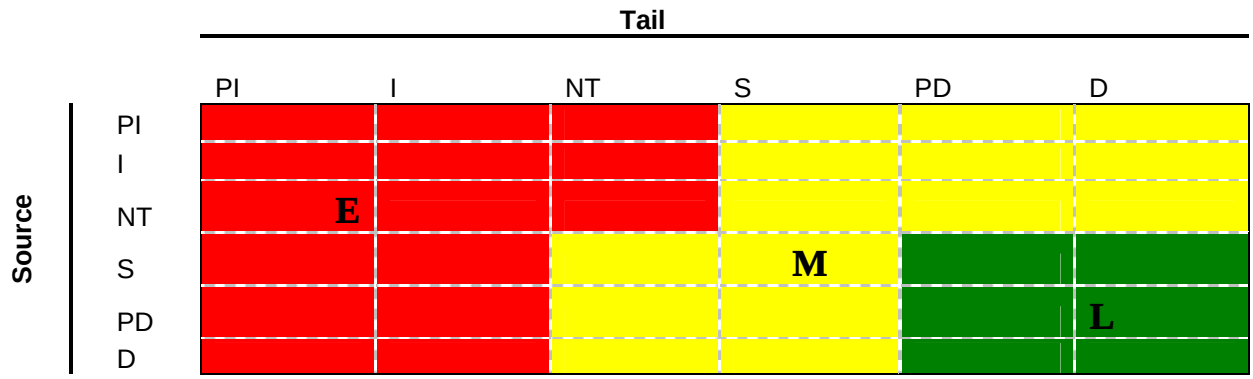


Diagram 7.1. Decision Matrix for Assigning Monitoring System Categories: Moderate(M); Extensive(E); Limited (L); Plume Stability: Increasing (I); Probably Increasing (PIU); No Trend (NT); Stable (S); Probably Decreasing (PD); Decreasing (D)

For frequency, MAROS again uses a simple decision matrix to indicate how often wells at the site should be sampled for adequate groundwater monitoring. Frequency determinations for sites with groundwater fluctuations and monitored natural attenuation are assigned sampling frequencies from quarterly to biennial (2 year interval) based on the monitoring system category and the time to receptor factor (distance to receptor over seepage velocity).

Table 7.4 Frequency Determination- Groundwater Fluctuations and MNA

TTR	Monitoring System Category		
	E	M	L
Close (TTR<2 yrs)	Quarterly	Quarterly	Biannually
Medium (2<TTR<5 yrs)	Quarterly	Biannually	Biannually
Far (TTR >5 yrs)	Biannually	Biannually	Annually

TTR: time to receptor (distance to receptor divided by seepage velocity)

For duration, MAROS uses a simple decision matrix to assess when the groundwater monitoring network should be reassessed for reducing the scope of the system or to stop monitoring altogether. This evaluation is not based on statistics but on experience of the authors. The sampling duration is determined by the Monitoring System Category as well as the length of the sampling record available. Sites with both deceasing Source and Tail results are suggested to end the sampling.

Table 7.5 Duration Determination for Sites with Monitored Natural Attenuation

Sampling Record	Source or Tail Trend Category			
	I or PI Trends	NT or N/A	S Trends	PD or D Trends
Small (<2 yrs)	Consider reassessment of network if concentrations begin to decrease	Insufficient data, continue sampling	6 more years	3 more years
Medium (2<TTR<5 yrs)	Consider reassessment of network if concentrations begin to decrease	Insufficient data, continue sampling	4 more years	2 more years
Large (>10 yrs)	Consider reassessment of network if concentrations begin to decrease	Insufficient data, continue sampling	2 more years	1 more year

For sampling density, MAROS uses an equation based on two large databases of historical plume data for petroleum based and chlorinated solvent plumes:

$$\text{Sampling density (number of wells)} = 1.5(\text{plumelength})^{0.4}$$

Where plume length is in feet and the sampling density is the number of wells for he entire plume. The user is cautioned to consider the well density in light of adequately defining/characterizing the plume through gathering sufficient site information.

7.4 MAROS Sampling Optimization Analysis

The MAROS sampling optimization is a rigorous detailed statistical approach to sampling optimization with modules to optimize sampling location by Delaunay Triangulation, and sampling frequency by the modified cost-effective sampling (CES) Method or Power Analysis. A third option for data sufficiency analysis is offered.

7.4.1 Optimizing Sampling Locations

The sampling location analysis determines sampling locations by the Delaunay method, removing redundant sampling locations from the monitoring network, and/or adding new sampling locations. In MAROS, Delaunay triangulation is first used to generate a grid for the studied site with well sampling locations as its nodes. The triangles are formed by connecting a well with its two closest neighbors (adjacent wells). A slope factor (SF) is generated for each triangle based on the concentration gradient estimated from the concentrations in the three wells. The slope factor is defined as the standardized difference between the concentration measured at a location and a concentration estimated from concentrations at its nearest neighbors. The magnitude of SF ranges from 0 to less than 1. A value of zero means that the concentration at a location can be exactly estimated by its surrounding locations, thus, sampling at this location provides no extra information influencing understanding of the plume. The larger the SF value of a location, the more importance is given to the well location.

To ensure that the elimination of sampling locations from a monitoring network will not cause significant information loss, two indicators were developed to measure the information loss: the average concentration ratio (CR) and the Area Ratio (AR). The average concentration ratio is the average plume concentration estimated after elimination of locations in the current step of optimization divided by the average plume concentration estimated from the original network before elimination of any locations. The Area Ratio is the triangulation area based on location after elimination of location in the current step of optimization divided by the triangulation area from the original network. The optimization process is iterative; where the process repeats until significant information loss occurs. The user can determine the threshold levels for the SF and the area and concentration ratios. The following matrix illustrates the elimination process:

Table 7.6 Decision Process of the Elimination of a Location

Sampling Location Elimination Status		
Interpretation	**SF→0 (Perfect estimation)**	**SF→1 (High estimation error)**
CR or AR far from 1	Keep	Keep
CR→1 and AR→ 1 (less information loss)	Eliminate	Keep

7.4.2 Well Redundancy Analysis: Delaunay Method

The MAROS program offers options for well redundancy analysis. The user can choose to select sampling events for analysis. If one sampling event is selected an Excel module with a graphical interface can be applied. If the access module of the Delaunay method is selected the user can select whether or not a well should be removed from the analysis. For example, a sentinel well might be removed since it cannot be eliminated as redundant. The well redundancy module provides default threshold values for parameters including inside node slope factor (SF), Hull node slope factor, Area Ratio (AR), and Concentration Ratio (CR). These default values can be changed. One or more COCs can be used in the analysis. The option to compare across COCs can identify wells to keep if they are sensitive to one or more COCs.

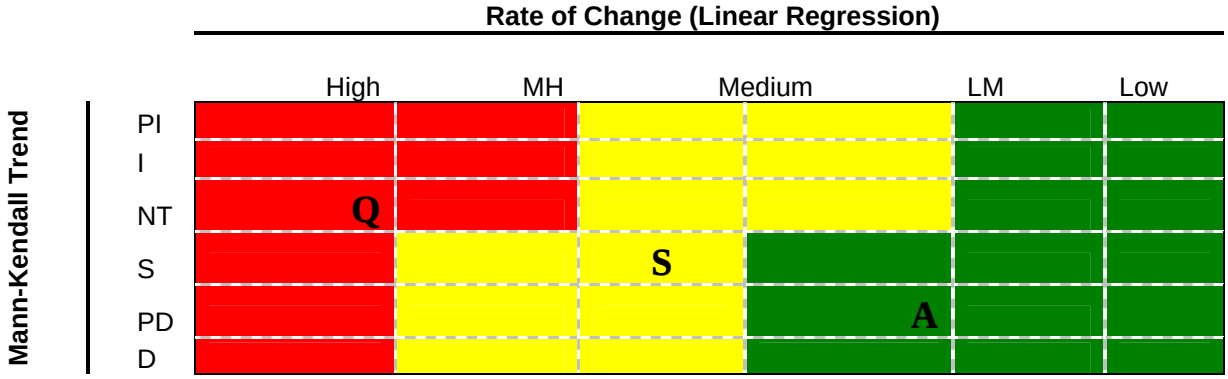
7.4.3 Well Sufficiency Analysis

Well sufficiency analysis is provided to identify areas where new wells could enhance the spatial plume characterization. This method uses the SF values from the location optimization to assess the concentration estimation error or uncertainty in areas within the network. Among these potential areas, those with a high estimation error may be designated as regions for new sampling locations or increased monitoring intensity. Each Delaunay triangle in the triangulated monitoring network is used as a potential area for new sampling locations. Estimated SF values at these potential areas reflect the concentration estimation error at these regions for the time period specified by the sampling events. The estimated SF values are classified into four levels: S-Small (<0.3), M-Moderate (0.3-0.6), L-Large (0.6-0.9), and E-Extremely large (>0.9). The potential areas with Extremely Large or Large levels are candidate regions for new sampling locations. New sampling location can be placed inside these regions (for example at the centroid of the triangle). Professional judgment must be used to decide whether an area for new sampling locations makes sense based on the hydrogeologic site conditions. Note that clustered well sets

cannot be evaluated using the two-dimensional Delaunay method. The representative well from the well cluster should be used such as the one screened in the representative aquifer interval within the same geologic unit.

7.4.4 Sampling Frequency Analysis

In MAROS, the modified CES method is used to evaluate the sampling frequencies at wells for each COC. The modified CES method is designed to set the sampling frequency for a well based on the analysis of time series concentration data at each sampling location, considering both recent trends and long-term trends of the concentration data. The central premise of the CES method is that sampling frequency should be based on the rate of change of constituents at the well rather than well location within the plume. The lowest rate of change, 0-10 ppb per year, is assigned an annual frequency schedule. The highest rate, 30+ ppb, is assigned to a quarterly schedule. Rates of change in between these end points are qualified by variability information, with higher variability leading to a higher sampling frequency. Variability is characterized by a distribution-free version of the coefficient of variation; the range divided by the median concentration with 1.0 as the cut-off threshold. Concentration Trend (CT) is determined by Mann-Kendall analysis. Consistent with the other analytical methods, the Mann-Kendall trend results fall into the same six categories: Decreasing)D), Probably Decreasing (PD), Stable (S), No Trend (NT), Probably Increasing (PI), and Increasing (I). The COV and confidence in trend are used to determine the trend category. Rate of Change (ROC) parameters used for determining the linear trends of COC were generalized to include all possible ranges. The ROC parameters are placed into five categories: Low (L), Low-Medium (LM), Medium (M), Medium-High (MH), and High (H). The ROC is the slope of the line that best fits the data as determined by linear regression. Clean-up goal or primary remediation goal (PRG) is user defined. A low rate of change is, by default, one-half the PRG. The medium rate is the PRG. The high rate is twice the PRG. For wells with sufficient data to determine a trend and low rates of change, annual sampling is recommended. Wells with high rates of change are assigned default quarterly monitoring. The diagram below is a decision matrix illustrative of the results.



Quarterly; S- SemiAnnual; A- Annual

Diagram 7.2. Decision Matrix for Determining Frequency

7.4.5 Data Sufficiency Analysis

Data sufficiency analysis in MAROS includes two methods of statistical power analysis: power analysis for individual well cleanup status and risk-based power analysis for site cleanup evaluation.

Individual Well Cleanup Status

The stability or trend of the contaminant plume must be considered before testing the cleanup status for individual wells. Applying the analysis to wells in an expanding plume may cause incorrect conclusions and is less meaningful. In long-term monitoring the site may require many years to attain site cleanup. Individual wells become clean gradually, beginning with the tail wells and followed by the source wells.

Two tests for the cleanup status of wells are provided in the MAROS program: a modified sequential t-test and a student's t-test. Power analyses parameters involved in the evaluation include:

- PRG,
- target levels - default value set to 0.8 times the PRG (used only in the sequential t-test),
- alpha level - significance level set at 0.05,
- target power - the desired statistical power of all statistical tests in MAROS Data Sufficiency Analysis (default value set to 0.80).

Results from the sequential t-test and the Student's-t test (optional power analysis) include cleanup status, power, and expected sample size for each well (yearly averages or original data), calculated for normal and lognormal distributions.

The "cleanup achieved" parameter from the sequential t-test is designated as "attained" if the mean concentration is significantly below the cleanup goal and has achieved the Target Level. The designation of "not attained" indicates the mean concentration is higher than the cleanup goal. "Continue sampling" indicates that although the mean concentration is below the cleanup goal it is not statistically significant because either 1) the mean concentration does not achieve the Target Level, or 2) the existence of large data variability prevents the test from resulting in significance.

The "Significantly < Cleanup Goal" parameter from the Student's t-test is assigned "yes" if the mean concentration is significantly below the cleanup goal, supported by a power equal to or greater than 50%. A "no" result indicates the mean concentration is either 1) higher than the cleanup goal, or 2) below the cleanup goal but not statistically significant because the existence of large data variability prevents the test from resulting in significance. The power of test is the probability that a well is confirmed to be clean when the mean contaminant concentration is truly below the cleanup goal. The expected sample size is the number of samples required to achieve the expected power with the variability shown in the data. Smaller values indicate smaller data variability and higher statistical power.

Risk-based Power Analysis

The use of risk-based goals in managing contaminated sites requires that cleanup standards be met at the compliance boundary. The risk-based power analysis for site cleanup evaluation is a sufficiency analysis at the compliance boundary. Three steps are performed in order to predict concentrations at the compliance boundary. First, centerline wells are chosen and a regression analysis is performed on the concentrations versus distance to the compliance boundary using an exponential model. Second, concentrations for each monitoring well are projected to the compliance boundary using the exponential model. Third, the group of projected concentrations at the compliance boundary is evaluated by statistical power analysis. Two types of data can be used for the regression analysis: 1) data from monitoring well points located on or close to the centerline (minimum of three wells), and 2) data estimated from hypothetical sampling points on the centerline through plume contouring. The first type is used in the risk-based power analysis. The compliance boundary is assumed to be a line perpendicular to the preferential groundwater flow direction and is located at or upgradient of the nearest downgradient receptor.

To determine the site cleanup status, a significance test is used where t is the test statistic following t distribution with n-1 degrees of freedom. The significance of the site cleanup test is found by comparing the test statistic t with the critical t value under significance level alpha. The site cleanup status, power, and expected sample size for each sampling event with at least six projected concentrations are calculated under both normal and lognormal assumptions. When a sampling event has less than six projected concentrations (N/C-not conducted due to insufficient data) or the mean projected concentration is higher than the cleanup goal (S/E-sample mean significantly exceeds cleanup goal) the analysis is not conducted.

Cleanup is achieved signifies, the mean projected concentration at the compliance boundary is below the cleanup level with statistical significance. Results are reported as Attained, Not Attained, or NC (due to insufficient data). The power of test is the probability that the site is confirmed to be clean when the projected mean concentration level at the compliance boundary is truly below the cleanup goal. The expected sample size is the number of projected concentrations (the number of wells) required to achieve the expected power (i.e. 0.80) with the variability shown in the projected concentrations.

7.5 EMPIRICAL DATA

MAROS allows the user to enter external plume information including statistical modeling results other than Mann-Kendall or Linear Regression. This option was not used in the current analysis.

8.0 Results of MAROS optimization

Results from the MAROS analysis are presented for the general COC assessment, plume analysis, spatial moment analysis, MAROS analysis, sampling location optimization, sampling frequency optimization, risk-based analysis, and plume centerline regression analysis.

Concentration data were evaluated for the two major COCs, molybdenum and vanadium. Well data used in the analysis included all 13 monitoring wells with shallow completions and Finch Spring data. Sampling events were divided into three groupings: 1) all post LSE data from November 1997 to May 2008; 2) yearly averages of post LSE data from November 1997 to May 2008; and 3) recent data from May 2004 to May 2008 (nine monitoring events). Reports from the MAROS analysis are presented in Appendices A, B, and C, respectively.

8.1 COC Assessment

This assessment provides a qualitative evaluation of relative toxicity, prevalence and mobility for each COC and provides a relative ranking of importance. Toxicity is determined by examining a representative concentration (geometric mean) for each compound over the entire site. The compound representative concentrations are then compared with the chosen PRGs and a percentage excedences from the PRGs provide the compounds' relative toxicity. Prevalence is determined by examining a representative concentration for each well location compared to the PRG and calculating the percentage of total excedences compared to the total number of wells. Mobility is based on the magnitude of the default values for adsorption coefficient (a lower Kd value signifies increased mobility). By comparison, molybdenum was ranked as more toxic, more prevalent, and more mobile than vanadium.

Table 8.1 MAROS COC Assessment Summary

Toxicity COC	**Representative Concentration (mg/L)**	**PRG (mg/L)**	**Percent Above PRG**	
Molybdenum	6.2	0.18	3347.70%	
Vanadium	3.6	0.26	1301.90%	
Prevalence COC	**Total Wells (and Spring)**	**Total Excedences**	**Percent Excedences**	**Total Detects**
Molybdenum	14	13	92.90%	14
Vanadium	14	11	78.60%	14
Mobility COC	**Kd ml/g**			
Molybdenum	20			
Vanadium	1000			

8.2 Plume Analysis Summary

The plume analysis summary Table 8.2 provides a statistical analysis for each COC per well. Mann-Kendall trends and linear regression trends are listed for three groupings: 1) post LSE trends from1997 to 2008; 2) post LSE trends from 1997 to 2008 with annual time consolidation; and 3) recent trends from 2004 to 2008. KM-1 was dropped from the evaluation due to insufficient data.

Table 8.2 Plume Analysis Summary

Molybdenum

Wells	Mann-Kendall 1997-2008 all data	Mann-Kendall 1997-2008 yearly	Mann-Kendall 2004-2008 all data	Linear Regression 1997-2008 all data	Linear Regression 1997-2008 yearly	Linear Regression 2004-2008 all data	Range of Trends
KM-2	D	D	D	D	D	D	D
KM-3	D	D	D	D	D	D	D
KM-4	D	D	D	D	D	D	D
KM-5	D	D	NT	D	D	I	D,NT,I
KM-6	D	D	NT	D	D	NT	D-NT
KM-7	D	D	D	D	D	D	D
KM-8	D	D	NT	D	D	NT	D-NT
KM-9	D	D	PD	D	D	PD	D-PD
KM-13	D	D	D	D	D	D	D
KM-15	D	D	D	D	D	PD	D-PD
KM-16	D	D	S	D	D	S	D-S
KM-17	D	PD	D	D	PD	D	D-PD
Finch Spring	D	D	D	D	D	D	D

Vanadium

Wells	Mann-Kendall 1997-2008 all data	Mann-Kendall 1997-2008 yearly	Mann-Kendall 2004-2008 all data	Linear Regression 1997-2008 all data	Linear Regression 1997-2008 yearly	Linear Regression 2004-2008 all data	Range of Trends
KM-2	D	D	NT	D	D	NT	D-NT
KM-3	S	S	S	S	S	S	S
KM-4	D	PD	I	D	D	PI	D,PD,PI,I
KM-5	D	D	S	D	D	S	D-S
KM-6	D	D	NT	D	D	NT	D-NT
KM-7	D	D	D	D	D	PD	D-PD
KM-8	PI	NT	S	I	I	D	D,NT,S,PI,I
KM-9	D	D	D	D	D	D	D
KM-13	D	D	D	D	D	D	D
KM-15	D	D	S	D	D	S	D-S
KM-16	D	D	S	D	D	D	D-S
KM-17	S	PD	NT	S	S	NT	PD,NT,S
Finch Spring	PI	PI	S	I	I	S	S,PI,I

I - increasing; PI - probably increasing; S - Stable; PD - probably decreasing; D - decreasing; NT - no trend

Tan highlighted area indicates significant variation in trend or increasing trend

In general, most trends in wells indicate decreasing concentrations. Overall trends for molybdenum, since the LSE, are decreasing or, in the case of KM-17 (with the yearly consolidation), probably decreasing. However, trends for the past 5 years show more variability, especially in KM-5 (NT and I), KM-6 (NT), and KM-8 (NT). The increasing trend designation for KM-5 is influenced by one comparatively high concentration (0.3 mg/L) from Spring 2006; whereas the remaining concentrations (0.06 to 0.2 mg/L) are very near or below the PRG of

0.18mg/L. Concentration trends in KM-6 (1.1 to 2.0 mg/L) and KM-8 (2.5 to 4.9 mg/L) are relatively flat; however, with respect to the PRG of 0.18 mg/L the concentrations remain high.

Vanadium trends show more variability than trends for molybdenum. In general the overall trends for vanadium, since the LSE, are decreasing, probably decreasing, to stable. Three wells (KM-4 and KM-8) and Finch Springs had designations of probably increasing to increasing. Well KM-4 showed decreasing to probably decreasing trends when all data were analyzed post LSE; only trends for the past 5 years showed probably increasing to increasing. KM-8 had the exact opposite trends with probably increasing, increasing and no trends for the post LSE time period, and stable or decreasing trends for the past 5 years. For Finch Spring, the larger data sets showed probably increasing to increasing trends, whereas the past 5 years shows a stable trend.

8.3 Spatial Moment Analysis

Table 8.3 shows trend designations used in the spatial moment analysis for each COC.

Table 8.3 Moment Analysis

Molybdenum	1997 - 2008 all data	1997 - 2008 yearly trends	2004 - 2008 all data	Trends
Zeroth Moment: Mass	D	D	D	D
1st Moment: Distance to Source	NT	NT	PD	NT-PD
2nd Moment: Sigma XX	PD	D	D	D-PD
3rd Moment: Sigma YY	S	S	D	D-S
Vanadium	**1997 - 2008 all data**	**1997 - 2008 yearly trends**	**2004 - 2008 all data**	**Trends**
Zeroth Moment: Mass	D	D	NT	NT-D
1st Moment: Distance to Source	NT	NT	S	NT-S
2nd Moment: Sigma XX	D	D	NT	NT-D
3rd Moment: Sigma YY	S	NT	NT	NT-S

I - increasing; PI - probably increasing; S - Stable; PD - probably decreasing;
D - decreasing; NT - no trend

In the zeroth moment analysis, molybdenum was assigned a decreasing trend for the change in mass over time. The first moment shows NT in the larger data set and a possibly decreasing trend in the past five years for the distance from the center of mass over time relative to the original source. Note that several source areas are present at the site and a limitation of the MAROS program is that a single source location (x,y) per COC had to be selected as representative of the entire plant area; this source area was placed near the center of the plant by production well PW-10 for both molybdenum and vanadium. The second moment analysis shows the spread of the plume downgradient over time as probably decreasing to decreasing. The third moment analysis shows the spread of the plume cross-gradient over time as stable with the larger data set and decreasing with data from the past five years.

In the zeroth moment analysis, vanadium was assigned a decreasing trend for the change in mass over time using all the post LSE data and no trend for the past five years. The first moment shows no trend in the larger data set for the distance from the center of mass over time relative to the original source; the trend is stable for data from the past five years. The second moment

analysis shows a decreasing trend for the spread of the plume downgradient over time using the post LSE data; the five year data shows no trend. The third moment analysis shows the spread of the plume cross-gradient over time as stable to no trend for the yearly consolidated data and the past five years.

8.4 MAROS SITE RESULTS

The MAROS Site Results are preliminary optimization results based on site classification, source treatment and monitoring system category.

Table 8.4 MAROS Site Results

Molybdenum	**1997 - 2008 all data**	**1997 - 2008 yearly trends**	**2004 - 2008 all data**	**Trends**
Tail Stability	D	D	PD	D-PD
Source Stability	D	D	PD	D-PD
Level of Effort	L	L	L	L
Sampling Duration	End Sampling	End Sampling	Sample 2 more years	End-2 more years
Sampling Frequency	Close Site	Close Site	Semi-Annual	Close/Semi-Annual
Sampling Density	>50	>50	>50	>50
Vanadium	**1997 - 2008 all data**	**1997 - 2008 yearly trends**	**2004 - 2008 all data**	**Trends**
Tail Stability	PD	PD	S	PD-S
Source Stability	PD	PD	S	PD-S
Level of Effort	L	L	M	L-M
Sampling Duration	Sample 1 more year	Sample 1 more year	Sample 4 more years	1-4 years
Sampling Frequency	Semi-Annual	Semi-Annual	Quarterly	semi-annual/quarterly
Sampling Density	>50	>50	>50	>50

Plume Status: I-increasing; PI-probably increasing; S-Stable; PD-probably decreasing; D-decreasing; NT-no trend
Design Categories: (E) Extensive; (M) Moderate; (L) Limited

For molybdenum, MAROS optimization shows tail and plume decreasing in the post LSE data set, but a more conservative probably decreasing for data from the past five years. The recommendation for the smaller data set is at least two more years of sampling on a semi-annual basis.

For vanadium, MAROS optimization shows tail and plume probably decreasing in the post LSE data set, and a stable designation for data from the past five years. The recommendation for the smaller data set is one to four more years of quarterly sampling. See the more detailed MAROS sampling frequency optimization below.

8.5 SAMPLING LOCATION OPTIMIZATION

The MAROS sampling location optimization was performed for individual COCs and all COCs. Results for molybdenum showed that all 12 wells and Finch Spring should be included in the sampling plan. Results for vanadium showed that three wells could possibly be eliminated from the sampling plan: KM-3, KM-6, and KM-7. Overall results were maintained when these three

wells were eliminated. However, the combined consideration is that all sampling locations should be maintained.

8.6 Sampling Frequency Optimization

Sampling frequency optimization was performed for individual COCs. Sampling locations with the largest changes over time were identified for increased sampling frequency. For molybdenum, the only well that fit the criteria for a high rate of change was KM-8, which was set to the highest, quarterly sampling, interval based on current data (past nine events) All other wells were set to annual sampling.

Table 8.5 Sampling Frequency Optimization Results

Molybdenum

Wells	1997-2008 all data	1997-2008 yearly trends	2004-2008 all data
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Annual
KM-5	Annual	Annual	Annual
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Annual	Annual	Quarterly
KM-9	Annual	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Annual	Annual	Annual
Finch Spring	Annual	Annual	Annual

Vanadium

Wells	1997-2008 all data	1997-2008 yearly trends	2004-2008 all data
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Quarterly
KM-5	Annual	Annual	Annual
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Quarterly	Quarterly	Annual
KM-9	Annual	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Annual	Annual	Annual
Finch Spring	Annual	Annual	Annual

Tan highlighted areas indicate significant variation in frequency.

For vanadium, Well KM-4, with a high rate of change, was set to quarterly sampling based on the past nine sampling events. Data from KM-8 in the larger data set specified quarterly

sampling. The smaller data set from the past nine events had a lower rate of change and the frequency was set at annual.

8.7 DATA SUFFICIENCY ANALYSIS

Data sufficiency analysis in MAROS includes two methods of statistical power analysis: power analysis for individual well cleanup status and risk-based power analysis for site cleanup evaluation. The individual well cleanup status also includes an optional analysis as described in the section above.

Individual well cleanup status by the power analysis was performed for each COC. For molybdenum, results showed that the 12 wells and Finch Spring have "not attained" cleanup status assuming a lognormal distribution. For vanadium, Finch Spring and Well KM-17 were designated as "attained" cleanup. The optional analysis had similar results. Wells were ranked as S/E indicating the sample mean significantly exceeds the cleanup goal for molybdenum. For vanadium, Finch Spring and KM-17 were the only two sampling locations designated as having concentrations significantly less than the cleanup goal. Note that according to the database, Finch Spring and KM-17have never had reported concentrations that exceeded PRGs.

The MAROS risk-based power analysis for site cleanup evaluation is a sufficiency analysis at the compliance boundary computed for each COC. For the purpose of this evaluation the compliance boundary was deemed the projection of the southern property boundary on the plume centerline, or 4,000 feet downgradient from the designated source location and approximately 2,000 feet upgradient (-2,000 feet) from the tail edge of the plume, as shown on Figure 1. Results indicated that cleanup status projected at the property boundary, assuming a lognormal distribution of the data, was not attained for either molybdenum or vanadium.

9.0 Conclusions and Recommendations

The purpose of the MAROS evaluation was used to assess the adequacy of the monitoring network in characterizing the migration of COCs. To prepare for the evaluation the existing LTM program was documented, the groundwater modeling for the RI was critically reviewed, and the CSM was updated to reflect current understanding of site hydrogeologic conditions and transport processes. This preliminary evaluation was used to define and justify hydrogeologic input parameters and physical site parameters used in the program. The details and dynamics of the complex hydrogeologic system and contaminant transport processes had to be simplified to accommodate the two- and three-dimensional statistical and analytical calculations. The two main COCs at the site, molybdenum and vanadium, were used to represent contaminant trends in the evaluation:

The MAROS program provided the following:

- Plume analysis
- Spatial moment analysis
- MAROS preliminary evaluation
- Optimization for sampling location and frequency
- MAROS data sufficiency analysis of cleanup by individual well and site

Results from the plume analysis and spatial moment analysis indicate that both molybdenum and vanadium plumes have decreased since LSE was performed in 1997. Concentrations in most wells show a decreasing trend with few exceptions. Recent data, within the past five years, reflect a slower rate of change, with some wells reaching a flat slope showing no trend or even a slightly increasing trend. Both the plume and spatial moment analysis illustrate that molybdenum and vanadium have different reactions and migration patterns in the subsurface. Spatial and temporal variations can be attributed to natural variability inherent in any complex subsurface system. Physical changes in plant operations and movement of solid sources to different site locations have likely resulted in some small changes in trends in the data. However, the statistical evaluation shows a high degree of confidence in the overall trend designations.

The MAROS preliminary evaluation of the monitoring program suggested that the decreasing trends in molybdenum and vanadium could indicate a decrease in sampling duration and frequency is justified. The optimization of sampling location and frequency concluded that all sampling locations are valid but sampling frequency could possibly be reduced in select wells. The reduction in frequency to annual in some wells and an increase to quarterly in others (KM-4 and KM-8) was based on individual COCs and is not practical to implement. However, sensitive wells were identified that require attentive data evaluation.

The MAROS data sufficiency analysis of cleanup by well and site confirmed that cleanup has not been attained and may take several years to achieve.

In conclusion, the numerical and statistical evaluation of the LTMO program at Tronox was advantageous in establishing guidelines and techniques that can be used in the future. The combination of the statistical approach with professional judgment provides confidence in the direction of continued LTM as a remedy for COCs in groundwater. The LTMO process should be applied to site data periodically to look for potential reductions in scope and cost of the existing program while maintaining quality and effectiveness. No changes to the sampling program are recommended at this time.

10.0 References

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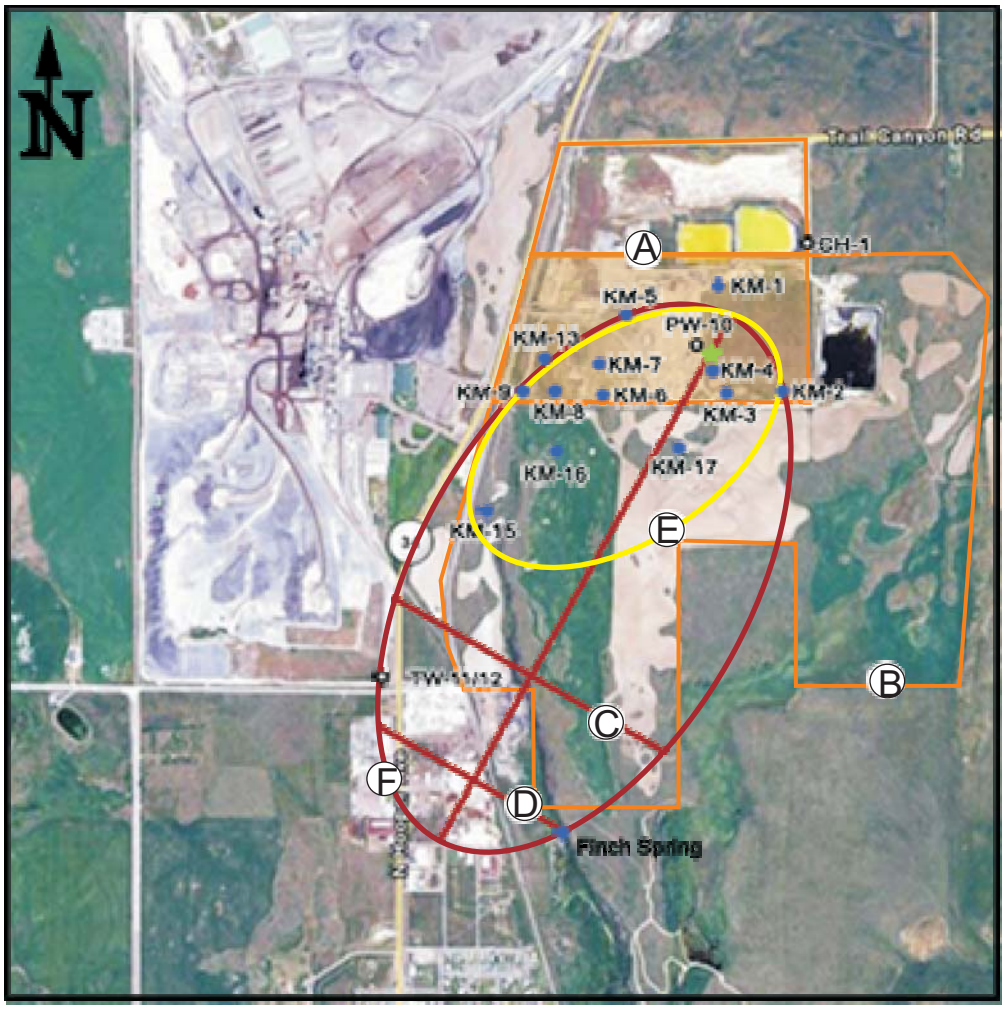


Source Location

A - Plant Facility Area

B - Tronox Property Line

C - Projected Property Line (3500 ft downgradient from source)

D - Nearest Downgradient Receptor (5000 ft downgradient from source)

E - Approx. PRG Boundary May 2007

F - Approx. Historic Plume Boundary

0 2000 4000

Scale (feet)

Monitor well used in MAROS Evaluation

Reference Point

Lori Robison and Associates, L.L.C.

Figure 1
Area Map showing Simplified Plume Dimensions
Tronox Facility
Soda Springs, Idaho

2008-12-18

Figure 2
Hydrogeologic Setting
Conceptual Model
Tronox Facility
Soda Springs, Idaho

Lori Robison and Associates, L.L.C.

Qal - Alluvium

Qb - Basalt Flow Sequences

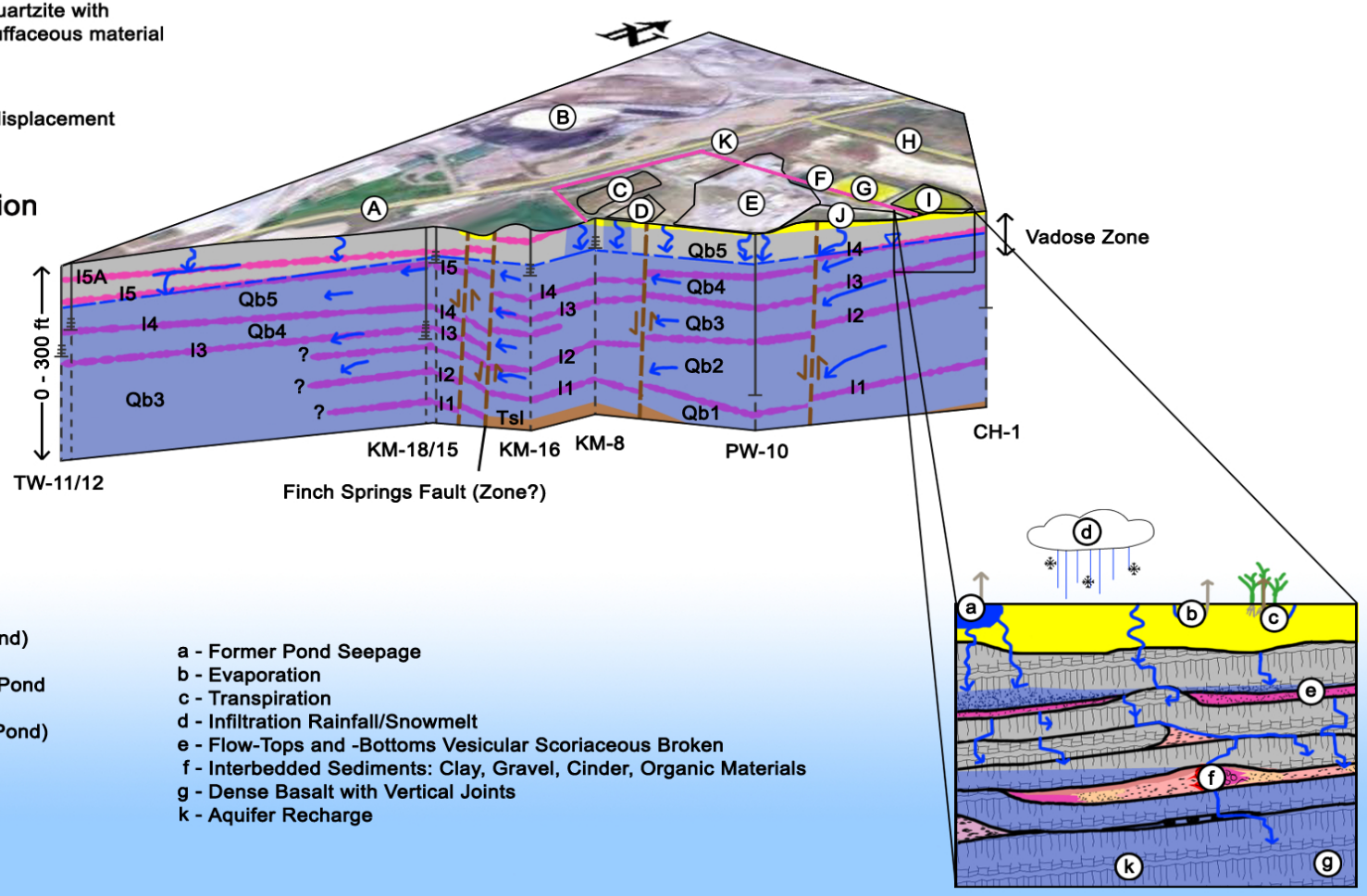
Qi - Basalt Interflow Sequences

Tsl - Salt Lake Formation
Conglomerate, sandstone, quartzite with interbedded limestone and tuffaceous material

Fault Location
Arrows indicate direction of displacement

Water Level Elevation

Water Flow Path



A - Highway 34
B - Monsanto
C - Former S-X Pond
D - Former Settling Ponds
E - Plant
F - Present Landfill Area
G - Emptied Basin (Former Calcine Tailings Pond)
H - Trail Canyon Road
I - Reclaimed Calcine Tailings Pond
J - Capped Calcine Tailings (North of Former Scrubber Pond)
K - Plant Site Boundary

a - Former Pond Seepage
b - Evaporation
c - Transpiration
d - Infiltration Rainfall/Snowmelt
e - Flow-Tops and -Bottoms Vesicular Scoriaceous Broken
f - Interbedded Sediments: Clay, Gravel, Cinder, Organic Materials
g - Dense Basalt with Vertical Joints
k - Aquifer Recharge

Figure not to scale
Basemap: Google Earth 2007

Note: Corehole/well depths are shown with approximate screen intervals where known

2008-12-18

Figure 3
COC Transport Proceses Conceptual Model
Tronox Facility
Soda Springs, Idaho

Lori Robison and Associates, L.L.C.

Qal - Alluvium

Qb - Basalt Flow Sequences

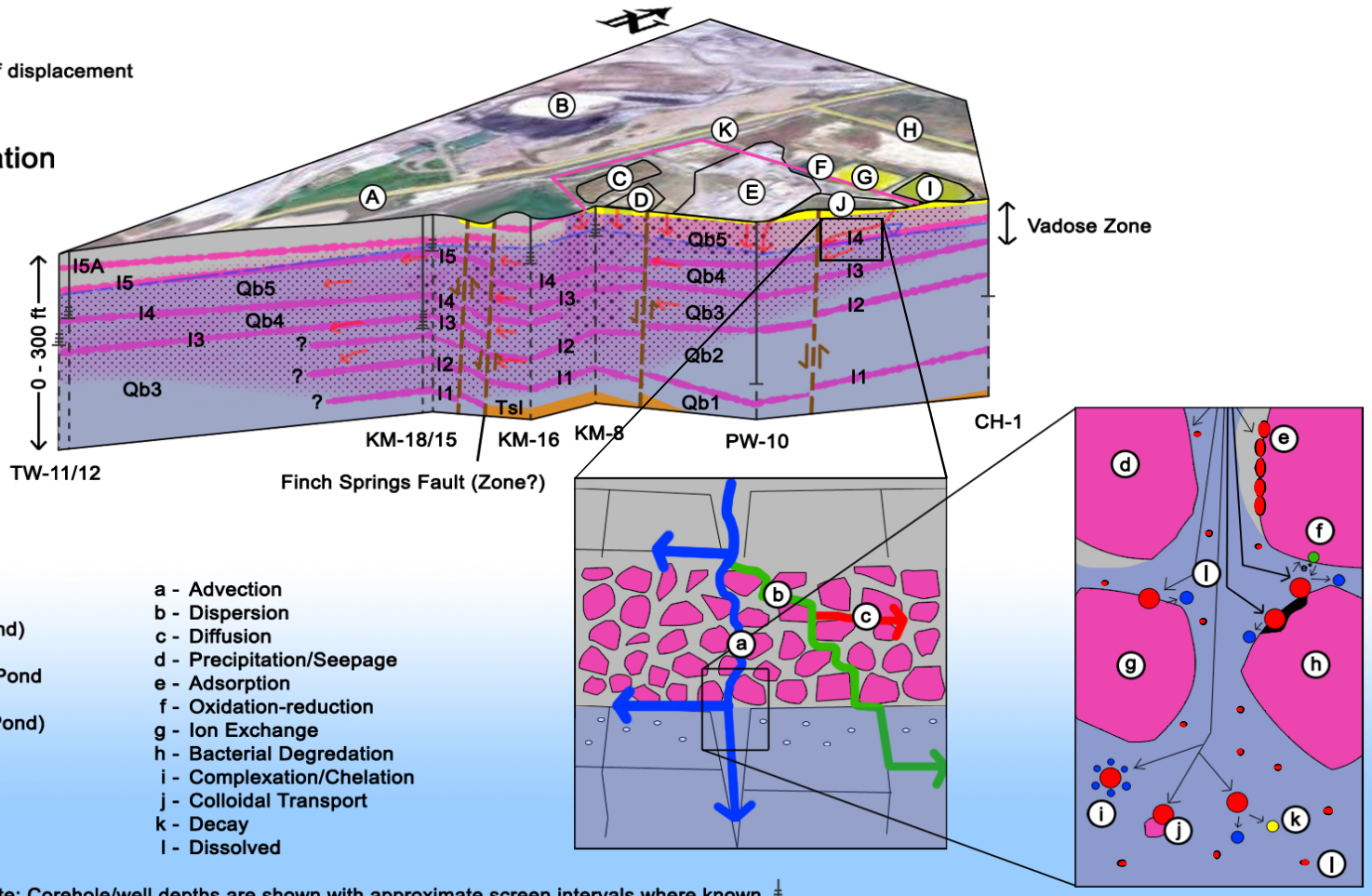
Qi - Basalt Interflow Sequences

Tsl - Salt Lake Formation
Conglomerate, sandstone, quartzite with interbedded limestone and tuffaceous material

Fault Location
Arrows indicate direction of displacement

Water Level Elevation

Contaminant Path



A - Highway 34
B - Monsanto
C - Former S-X Pond
D - Former Settling Ponds
E - Plant
F - Present Landfill Area
G - Emptied Basin (Former Calcine Tailings Pond)
H - Trail Canyon Road
I - Reclaimed Calcine Tailings Pond
J - Capped Calcine Tailings (North of Former Scrubber Pond)
K - Plant Site Boundary

a - Advection
b - Dispersion
c - Diffusion
d - Precipitation/Seepage
e - Adsorption
f - Oxidation-reduction
g - Ion Exchange
h - Bacterial Degredation
i - Complexation/Chelation
j - Colloidal Transport
k - Decay
l - Dissolved

Figure not to scale
Basemap: Google Earth 2007

Note: Corehole/well depths are shown with approximate screen intervals where known

APPENDIX A

MAROS Reports 1997 – 2008

APPENDIX A
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KM-15, KM-16, KM-17

MAROS COC Assessment

Project: Tronox V MO 13 wells Finch All **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
MOLYBDENUM	6.2E+00	1.8E-01	3347.7%
VANADIUM	3.6E+00	2.6E-01	1301.9%

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 excedence from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Excedences	Percent Excedences	Total detects
MOLYBDENUM	MET	14	13	92.9%	14
VANADIUM	MET	14	11	78.6%	14

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total excedences (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
MOLYBDENUM	20
VANADIUM	1000

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)

MOLYBDENUM

VANADIUM

MAROS Mann-Kendall Statistics Summary

Project: Tronox V MO 13 wells Finch All

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND" ?	Concentration Trend
MOLYBDENUM								
KM-3	S	22	22	0.55	-121	100.0%	No	D
KM-9	S	22	22	0.27	-149	100.0%	No	D
KM-13	S	22	22	0.68	-203	100.0%	No	D
KM-8	S	22	22	0.42	-167	100.0%	No	D
KM-7	S	17	17	0.15	-64	99.6%	No	D
KM-6	S	22	22	0.31	-110	99.9%	No	D
KM-5	S	22	22	0.36	-130	100.0%	No	D
KM-17	S	22	22	0.22	-85	99.2%	No	D
KM-4	S	22	22	0.82	-183	100.0%	No	D
KM-2	S	22	22	0.95	-174	100.0%	No	D
KM-15	T	22	22	0.51	-196	100.0%	No	D
KM-16	T	22	22	0.39	-158	100.0%	No	D
Finch Spring	T	22	22	0.38	-207	100.0%	No	D
VANADIUM								
KM-13	S	22	22	0.22	-197	100.0%	No	D
KM-17	S	21	21	0.58	-22	73.5%	No	S
KM-3	S	22	22	0.33	-46	89.6%	No	S
KM-9	S	22	22	0.28	-204	100.0%	No	D
KM-4	S	22	22	0.53	-68	97.1%	No	D
KM-5	S	22	22	0.29	-166	100.0%	No	D
KM-6	S	22	22	0.21	-100	99.8%	No	D
KM-7	S	17	17	0.13	-68	99.8%	No	D
KM-8	S	22	22	0.37	51	92.0%	No	PI
KM-2	S	22	22	0.33	-155	100.0%	No	D
KM-16	T	22	22	0.21	-155	100.0%	No	D
KM-15	T	22	22	0.21	-184	100.0%	No	D
Finch Spring	T	22	22	0.22	57	94.2%	No	PI

Note: 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); Source/Tail (S/T)

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

MAROS Linear Regression Statistics Summary

Project: Tronox V MO 13 wells Finch All

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/30/2008

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Average Conc (mg/L)	Median Conc (mg/L)	Standard Deviation	All Samples "ND" ?	Ln Slope	Coefficient of Variation	Confidence in Trend	Concentration Trend
MOLYBDENUM									
KM-9	S	2.1E-01	1.9E-01	5.6E-02	No	-1.5E-04	0.27	100.0%	D
KM-5	S	2.4E-01	2.0E-01	8.6E-02	No	-1.9E-04	0.36	100.0%	D
KM-13	S	5.2E-01	4.2E-01	3.6E-01	No	-4.4E-04	0.68	100.0%	D
KM-3	S	9.0E+00	7.2E+00	4.9E+00	No	-2.1E-04	0.55	100.0%	D
KM-7	S	4.5E-01	4.4E-01	6.5E-02	No	-1.0E-04	0.15	99.7%	D
KM-4	S	5.2E+00	3.3E+00	4.3E+00	No	-4.9E-04	0.82	100.0%	D
KM-2	S	2.3E+00	1.9E+00	2.2E+00	No	-3.6E-04	0.95	100.0%	D
KM-6	S	1.6E+00	1.4E+00	5.0E-01	No	-1.6E-04	0.31	100.0%	D
KM-17	S	5.4E-01	5.3E-01	1.2E-01	No	-1.0E-04	0.22	99.5%	D
KM-8	S	5.6E+01	5.2E+01	2.3E+01	No	-3.0E-04	0.42	100.0%	D
Finch Spring	T	3.2E-01	2.9E-01	1.2E-01	No	-2.9E-04	0.38	100.0%	D
KM-15	T	6.8E-01	5.5E-01	3.4E-01	No	-3.0E-04	0.51	100.0%	D
KM-16	T	1.1E+00	9.4E-01	4.4E-01	No	-2.5E-04	0.39	100.0%	D
VANADIUM									
KM-17	S	1.0E-02	8.2E-03	6.0E-03	No	-1.2E-04	0.58	83.5%	S
KM-2	S	6.6E+00	6.3E+00	2.2E+00	No	-2.4E-04	0.33	100.0%	D
KM-3	S	3.0E+00	2.8E+00	9.9E-01	No	-6.1E-05	0.33	85.8%	S
KM-13	S	6.3E-01	5.8E-01	1.4E-01	No	-1.6E-04	0.22	100.0%	D
KM-4	S	7.5E+00	6.1E+00	4.0E+00	No	-2.1E-04	0.53	99.7%	D
KM-6	S	4.7E+00	4.4E+00	9.6E-01	No	-9.2E-05	0.21	99.5%	D
KM-7	S	2.4E+00	2.3E+00	3.1E-01	No	-7.3E-05	0.13	99.3%	D
KM-8	S	1.9E+01	1.9E+01	7.0E+00	No	1.9E-04	0.37	99.4%	I
KM-9	S	6.0E-01	5.8E-01	1.7E-01	No	-2.2E-04	0.28	100.0%	D
KM-5	S	1.6E+00	1.4E+00	4.6E-01	No	-2.0E-04	0.29	100.0%	D
KM-16	T	2.9E+00	2.8E+00	6.1E-01	No	-1.5E-04	0.21	100.0%	D
Finch Spring	T	5.9E-02	6.1E-02	1.3E-02	No	9.6E-05	0.22	98.9%	I
KM-15	T	1.1E+00	1.1E+00	2.4E-01	No	-1.6E-04	0.21	100.0%	D

Note: 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); COV = Coefficient of Variation

MAROS Plume Analysis Summary

Project: Tronox V MO 13 wells Finch All

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/30/2008

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values : Actual Value

Constituent	Well	Source/ Tail	Number of Samples	Number of Detects	Average (mg/L)	Median (mg/L)	All Samples "ND" ?	Mann-Kendall	Linear Regression	Modeling	Empirical
MOLYBDENUM											
	KM-3	S	22	22	9.0E+00	7.2E+00	No	D	D	N/A	N/A
	KM-9	S	22	22	2.1E-01	1.9E-01	No	D	D	N/A	N/A
	KM-13	S	22	22	5.2E-01	4.2E-01	No	D	D	N/A	N/A
	KM-8	S	22	22	5.6E+01	5.2E+01	No	D	D	N/A	N/A
	KM-7	S	17	17	4.5E-01	4.4E-01	No	D	D	N/A	N/A
	KM-6	S	22	22	1.6E+00	1.4E+00	No	D	D	N/A	N/A
	KM-5	S	22	22	2.4E-01	2.0E-01	No	D	D	N/A	N/A
	KM-17	S	22	22	5.4E-01	5.3E-01	No	D	D	N/A	N/A
	KM-4	S	22	22	5.2E+00	3.3E+00	No	D	D	N/A	N/A
	KM-2	S	22	22	2.3E+00	1.9E+00	No	D	D	N/A	N/A
	KM-15	T	22	22	6.8E-01	5.5E-01	No	D	D	N/A	N/A
	KM-16	T	22	22	1.1E+00	9.4E-01	No	D	D	N/A	N/A
	Finch Spring	T	22	22	3.2E-01	2.9E-01	No	D	D	N/A	N/A
VANADIUM											
	KM-13	S	22	22	6.3E-01	5.8E-01	No	D	D	N/A	N/A
	KM-17	S	21	21	1.0E-02	8.2E-03	No	S	S	N/A	N/A
	KM-3	S	22	22	3.0E+00	2.8E+00	No	S	S	N/A	N/A
	KM-9	S	22	22	6.0E-01	5.8E-01	No	D	D	N/A	N/A
	KM-4	S	22	22	7.5E+00	6.1E+00	No	D	D	N/A	N/A
	KM-5	S	22	22	1.6E+00	1.4E+00	No	D	D	N/A	N/A
	KM-6	S	22	22	4.7E+00	4.4E+00	No	D	D	N/A	N/A

Project: Tronox V MO 13 wells Finch All **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Constituent	Well	Source/ Tail	Number of Samples	Number of Detects	Average (mg/L)	Median (mg/L)	All Samples "ND" ?	Mann-Kendall	Linear Regression	Modeling	Empirical
VANADIUM											
	KM-7	S	17	17	2.4E+00	2.3E+00	No	D	D	N/A	N/A
	KM-8	S	22	22	1.9E+01	1.9E+01	No	PI	I	N/A	N/A
	KM-2	S	22	22	6.6E+00	6.3E+00	No	D	D	N/A	N/A
	KM-16	T	22	22	2.9E+00	2.8E+00	No	D	D	N/A	N/A
	KM-15	T	22	22	1.1E+00	1.1E+00	No	D	D	N/A	N/A
	Finch Spring	T	22	22	5.9E-02	6.1E-02	No	PI	I	N/A	N/A

Note: 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); Source/Tail (S/T)

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

MAROS Spatial Moment Analysis Summary

Project: Tronox V MO 13 wells Finch All

Location: Soda Springs

User Name: Global Environmental

State: Idaho

	0th Moment	1st Moment (Center of Mass)			2nd Moment (Spread)		
Effective Date	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
MOLYBDENUM							
11/20/1997	1.7E+04	658,948	371,066	1,361	416,438	934,664	12
5/5/1998	1.4E+04	658,808	371,094	1,420	354,991	927,772	12
10/27/1998	1.3E+04	658,883	371,060	1,402	376,429	933,047	12
5/4/1999	1.2E+04	658,825	371,067	1,431	344,161	911,643	12
10/5/1999	1.1E+04	658,838	371,022	1,460	352,137	931,176	12
5/8/2000	1.1E+04	658,803	370,961	1,530	331,737	923,939	13
9/25/2000	9.2E+03	658,821	370,934	1,541	345,045	943,129	13
4/27/2001	9.5E+03	658,786	370,932	1,563	334,295	927,448	13
10/26/2001	9.1E+03	658,818	370,876	1,591	340,709	966,418	13
5/31/2002	8.7E+03	658,821	370,930	1,544	344,124	930,287	13
10/18/2002	8.3E+03	658,835	370,941	1,527	348,997	948,373	13
5/31/2003	7.9E+03	658,844	370,921	1,539	350,135	946,276	13
10/23/2003	7.3E+03	658,836	370,922	1,543	347,173	960,632	13
5/3/2004	7.5E+03	658,849	370,970	1,495	353,448	944,021	13
10/13/2004	6.5E+03	658,830	370,938	1,533	345,286	963,167	13
5/3/2005	7.0E+03	658,802	370,989	1,508	345,273	918,992	13
10/25/2005	6.5E+03	658,833	370,969	1,506	344,793	934,475	13
5/15/2006	7.0E+03	658,767	370,979	1,537	328,271	911,206	13
10/23/2006	6.1E+03	658,812	370,995	1,497	345,488	913,682	13
5/14/2007	5.8E+03	658,792	371,000	1,505	342,660	907,972	13
10/15/2007	5.9E+03	658,830	371,003	1,479	346,430	914,812	13
5/5/2008	5.8E+03	658,795	371,013	1,493	341,124	911,775	13
VANADIUM							
11/20/1997	1.1E+04	658,898	371,723	933	364,272	404,774	12
5/5/1998	1.6E+04	658,846	371,323	1,224	290,642	839,895	11
10/27/1998	9.6E+03	658,872	371,692	972	365,519	446,526	12
5/4/1999	9.7E+03	658,874	371,731	950	355,209	410,341	12
10/5/1999	9.2E+03	658,843	371,650	1,018	362,561	485,361	12
5/8/2000	1.0E+04	658,773	371,624	1,091	343,130	473,459	13
9/25/2000	7.6E+03	658,750	371,647	1,099	353,572	432,128	13
4/27/2001	8.1E+03	658,731	371,647	1,116	347,942	421,823	13
10/26/2001	7.9E+03	658,730	371,627	1,126	346,191	452,600	13
5/31/2002	7.7E+03	658,735	371,679	1,096	361,773	371,379	13
10/18/2002	7.7E+03	658,729	371,691	1,096	349,778	368,600	13
5/31/2003	7.2E+03	658,743	371,694	1,082	354,198	370,304	13
10/23/2003	6.8E+03	658,704	371,660	1,133	338,911	404,914	13
5/3/2004	7.8E+03	658,759	371,624	1,103	348,179	466,673	13
10/13/2004	6.6E+03	658,693	371,633	1,155	323,330	439,755	13

Project: Tronox V MO 13 wells Finch All

Location: Soda Springs

User Name: Global Environmental

State: Idaho

	0th Moment	1st Moment (Center of Mass)			2nd Moment (Spread)		
Effective Date	**Estimated Mass (kg)**	**Xc (ft)**	**Yc (ft)**	**Source Distance (ft)**	**Sigma XX (sq ft)**	**Sigma YY (sq ft)**	**Number of Wells**
VANADIUM							
5/3/2005	6.4E+03	658,755	371,683	1,078	351,051	398,310	13
10/25/2005	6.6E+03	658,717	371,644	1,130	324,212	421,811	13
5/15/2006	8.0E+03	658,783	371,739	1,026	314,225	345,668	13
10/23/2006	7.2E+03	658,745	371,639	1,108	319,837	433,967	13
5/14/2007	7.5E+03	658,778	371,613	1,093	330,251	485,674	13
10/15/2007	7.1E+03	658,754	371,644	1,097	331,495	442,587	13
5/5/2008	7.1E+03	658,802	371,621	1,068	343,745	486,609	13

Project: Tronox V MO 13 wells Finch All

Location: Soda Springs

User Name: Global Environmental

State: Idaho

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	MOLYBDENUM	0.33	-215	100.0%	D
	VANADIUM	0.26	-141	100.0%	D
1st Moment: Distance to Source					
	MOLYBDENUM	0.04	15	65.2%	NT
	VANADIUM	0.06	33	81.4%	NT
2nd Moment: Sigma XX					
	MOLYBDENUM	0.05	-59	94.9%	PD
	VANADIUM	0.05	-95	99.7%	D
2nd Moment: Sigma YY					
	MOLYBDENUM	0.02	-45	89.1%	S
	VANADIUM	0.22	-5	54.4%	S

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

Porosity: 0.20 **Saturated Thickness:** Uniform: 200 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 Site Results

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

User Defined Site and Data Assumptions:

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 5475 ft/yr

Current Plume Length: 6000 ft

Current Plume Width 3500 ft

Number of Tail Wells: 3

Number of Source Wells: 11

Source Information:

Source Treatment: No Current Site Treatment

NAPL is not observed at this site.

Down-gradient Information:

Distance from Edge of Tail to Nearest:

Down-gradient receptor: -700 ft

Down-gradient property: -2000 ft

Distance from Source to Nearest:

Down-gradient receptor: 5300 ft

Down-gradient property: 4000 ft

Data Consolidation Assumptions:

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Plume Information Weighting Assumptions:

Consolidation Step 1. Weight Plume Information by Chemical

Summary Weighting: Weighting Applied to All Chemicals Equally

Consolidation Step 2. Weight Well Information by Chemical

Well Weighting: No Weighting of Wells was Applied.
Chemical Weighting: No Weighting of Chemicals was Applied.

Note: These assumptions were made when consolidating the historical montoring data and lumping the Wells and COCs.

1. Compliance Monitoring/Remediation Optimization Results:

Preliminary Monitoring System Optimization Results: Based on site classification, source treatment and Monitoring System Category the following suggestions are made for site Sampling Frequency, Duration of Sampling before reassessment, and Well Density. These criteria take into consideration: Plume Stability, Type of Plume, and Groundwater Velocity.

COC	Tail Stability	Source Stability	Level of Effort	Sampling Duration	Sampling Frequency	Sampling Density
MOLYBDENUM	D	D	L	End Sampling	Close site	> 50
VANADIUM	PD	PD	L	Sample 1 more year	Biannually (6 months)	> 50

Note:

Plume Status: (I) Increasing; (PI)Probably Increasing; (S) Stable; (NT) No Trend; (PD) Probably Decreasing; (D) Decreasing

Design Categories: (E) Extensive; (M) Moderate; (L) Limited (N/A) Not Applicable, Insufficient Data Available

Level of Monitoring Effort Indicated by Analysi Limited

2. Spatial Moment Analysis Results:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	MOLYBDENUM	0.33	-215	100.0%	D
	VANADIUM	0.26	-141	100.0%	D
1st Moment: Distance to Source					
	MOLYBDENUM	0.04	15	65.2%	NT
	VANADIUM	0.06	33	81.4%	NT
2nd Moment: Sigma XX					
	MOLYBDENUM	0.05	-59	94.9%	PD
	VANADIUM	0.05	-95	99.7%	D
2nd Moment: Sigma YY					
	MOLYBDENUM	0.02	-45	89.1%	S
	VANADIUM	0.22	-5	54.4%	S

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

Porosity: 0.20 **Saturated Thickness:** Uniform: 200 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).

MAROS Sampling Location Optimization Results

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Sampling Events Analyzed: **From** Fall 97 **to** Spring 08

11/20/1997 5/5/2008

Parameters used:

Constituent	Inside SF	Hull SF	Area Ratio	Conc. Ratio
MOLYBDENUM	0.1	0.01	0.95	0.95
VANADIUM	0.1	0.01	0.95	0.95

Well	X (feet)	Y (feet)	Removable?	Average Slope Factor*	Minimum Slope Factor*	Maximum Slope Factor*	Eliminated?
MOLYBDENUM							
Finch Spring	658191.88	367132.03	☑	0.521	0.219	0.637	☐
KM-13	658042.50	372185.75	☑	0.532	0.308	0.802	☐
KM-15	657491.88	370332.03	☑	0.110	0.044	0.208	☐
KM-16	658151.13	371058.75	☑	0.169	0.044	0.238	☐
KM-17	659365.31	371100.34	☑	0.463	0.360	0.646	☐
KM-2	660379.19	371777.03	☑	0.111	0.013	0.256	☐
KM-3	659825.56	371745.66	☑	0.307	0.200	0.414	☐
KM-4	659695.19	372033.81	☑	0.187	0.073	0.290	☐
KM-5	658856.63	372710.72	☑	0.644	0.384	0.736	☐
KM-6	658601.63	371736.94	☑	0.147	0.024	0.224	☐
KM-7	658578.44	372113.19	☑	0.469	0.357	0.586	☐
KM-8	658144.19	371771.97	☑	0.739	0.639	0.795	☐
KM-9	657836.25	371770.47	☑	0.853	0.762	0.922	☐
VANADIUM							
Finch Spring	658191.88	367132.03	☑	0.293	0.055	0.786	☐
KM-13	658042.50	372185.75	☑	0.241	0.162	0.316	☐
KM-15	657491.88	370332.03	☑	0.204	0.022	0.276	☐
KM-16	658151.13	371058.75	☑	0.116	0.078	0.165	☐
KM-17	659365.31	371100.34	☑	0.843	0.727	1.000	☐
KM-2	660379.19	371777.03	☑	0.210	0.102	0.285	☐
KM-3	659825.56	371745.66	☑	0.081	0.010	0.235	☑
KM-4	659695.19	372033.81	☑	0.190	0.116	0.274	☐
KM-5	658856.63	372710.72	☑	0.063	0.019	0.105	☐
KM-6	658601.63	371736.94	☑	0.094	0.032	0.169	☑
KM-7	658578.44	372113.19	☑	0.045	0.021	0.072	☑
KM-8	658144.19	371771.97	☑	0.295	0.170	0.388	☐

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Well	X (feet)	Y (feet)	Removable?	Average Slope Factor*	Minimum Slope Factor*	Maximum Slope Factor*	Eliminated?
KM-9	657836.25	371770.47	☑	0.333	0.221	0.444	☐

Note: The Slope Factor indicates the relative importance of a well in the monitoring network at a given sampling event; the larger the SF value of a well, the more important the well is and vice versa; the Average Slope Factor measures the overall well importance in the selected time period; the state coordinates system (i.e., X and Y refer to Easting and Northing respectively) or local coordinates systems may be used; wells that are NOT selected for analysis are not shown above.
* When the report is generated after running the Excel module, SF values will NOT be shown above.

MAROS Sampling Location Optimization

Results by Considering All COCs

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Sampling Events Analyzed: **From** Fall 97 **to** Spring 08

11/20/1997 5/5/2008

Well	X (feet)	Y (feet)	Number of COCs	COC-Averaged Slope Factor*	Abandoned?
Finch Spring	658191.88	367132.03	2	0.407	☐
KM-13	658042.50	372185.75	2	0.387	☐
KM-15	657491.88	370332.03	2	0.157	☐
KM-16	658151.13	371058.75	2	0.142	☐
KM-17	659365.31	371100.34	2	0.653	☐
KM-2	660379.19	371777.03	2	0.160	☐
KM-3	659825.56	371745.66	2	0.194	☐
KM-4	659695.19	372033.81	2	0.189	☐
KM-5	658856.63	372710.72	2	0.353	☐
KM-6	658601.63	371736.94	2	0.121	☐
KM-7	658578.44	372113.19	2	0.257	☐
KM-8	658144.19	371771.97	2	0.517	☐
KM-9	657836.25	371770.47	2	0.593	☐

Note: the COC-Averaged Slope Factor is the value calculated by averaging those "Average Slope Factor" obtained earlier across COCs; to be conservative, a location is "abandoned" only when it is eliminated from all COCs; "abandoned" doesn't necessarily mean the abandon of well, it can mean that NO samples need to be collected for any COCs.
* When the report is generated after running the Excel module, SF values will NOT be shown above.

MAROS Sampling Frequency Optimization Results

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

The Overall Number of Sampling Events: 22

"Recent Period" defined by events: **From** Fall 97 **To** Spring 08

11/20/1997 5/5/2008

"Rate of Change" parameters used:

Constituent	Cleanup Goal	Low Rate	Medium Rate	High Rate
MOLYBDENUM	0.18	0.09	0.18	0.36
VANADIUM	0.26	0.13	0.26	0.52

Units: Cleanup Goal is in mg/L; all rate parameters are in mg/L/year.

Well	Recommended Sampling Frequency	Frequency Based on Recent Data	Frequency Based on Overall Data
MOLYBDENUM			
Finch Spring	Annual	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Annual	Annual	Annual
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Annual
KM-5	Annual	Annual	Annual
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Annual	Annual	Annual
KM-9	Annual	Annual	Annual
VANADIUM			
Finch Spring	Biennial	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Biennial	Annual	Annual
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Annual
KM-5	Annual	Annual	Annual

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Well	Recommended Sampling Frequency	Frequency Based on Recent Data	Frequency Based on Overall Data
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Quarterly	Quarterly	Quarterly
KM-9	Annual	Annual	Annual

Note: Sampling frequency is determined considering both recent and overall concentration trends. Sampling Frequency is the final recommendation; Frequency Based on Recent Data is the frequency determined using recent (short) period of monitoring data; Frequency Based on Overall Data is the frequency determined using overall (long) period of monitoring data. If the "recent period" is defined using a different series of sampling events, the results could be different.

MAROS Power Analysis for Individual Well Cleanup Status

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

From Period: 7/9/1997 **to** 5/5/2008

Well	Sample Size	Sample Mean	Sample Stdev.	Normal Distribution Assumption Cleanup Status	Lognormal Distribution Assumption Cleanup Status	Alpha Level	Expected Power
MOLYBDENUM			Cleanup Goal (mg/L) = 0.18		Target Level (mg/L) = 0.144		
Finch Spring	22	3.20E-01	1.20E-01	Not Attained	Not Attained	0.05	0.8
KM-13	22	5.22E-01	3.57E-01	Cont Sampling	Not Attained	0.05	0.8
KM-15	22	6.75E-01	3.42E-01	Not Attained	Not Attained	0.05	0.8
KM-16	22	1.13E+00	4.44E-01	Cont Sampling	Not Attained	0.05	0.8
KM-17	22	5.36E-01	1.16E-01	Not Attained	Not Attained	0.05	0.8
KM-2	22	2.33E+00	2.22E+00	Cont Sampling	Not Attained	0.05	0.8
KM-3	22	9.01E+00	4.92E+00	Cont Sampling	Not Attained	0.05	0.8
KM-4	22	5.22E+00	4.27E+00	Cont Sampling	Not Attained	0.05	0.8
KM-5	22	2.36E-01	8.60E-02	Not Attained	Not Attained	0.05	0.8
KM-6	22	1.64E+00	5.04E-01	Cont Sampling	Not Attained	0.05	0.8
KM-7	17	4.47E-01	6.48E-02	Not Attained	Not Attained	0.05	0.8
KM-8	22	5.57E+01	2.33E+01	Cont Sampling	Not Attained	0.05	0.8
KM-9	22	2.08E-01	5.59E-02	Not Attained	Not Attained	0.05	0.8
VANADIUM			Cleanup Goal (mg/L) = 0.26		Target Level (mg/L) = 0.208		
Finch Spring	22	5.92E-02	1.29E-02	Attained	Attained	0.05	0.8
KM-13	22	6.29E-01	1.38E-01	Not Attained	Not Attained	0.05	0.8
KM-15	22	1.10E+00	2.37E-01	Not Attained	Not Attained	0.05	0.8
KM-16	22	2.92E+00	6.11E-01	Not Attained	Not Attained	0.05	0.8
KM-17	21	1.04E-02	6.02E-03	Attained	Attained	0.05	0.8
KM-2	22	6.57E+00	2.15E+00	Cont Sampling	Not Attained	0.05	0.8
KM-3	22	2.96E+00	9.88E-01	Cont Sampling	Not Attained	0.05	0.8
KM-4	22	7.47E+00	3.96E+00	Cont Sampling	Not Attained	0.05	0.8
KM-5	22	1.56E+00	4.61E-01	Not Attained	Not Attained	0.05	0.8
KM-6	22	4.66E+00	9.63E-01	Cont Sampling	Not Attained	0.05	0.8
KM-7	17	2.39E+00	3.08E-01	Not Attained	Not Attained	0.05	0.8
KM-8	22	1.87E+01	6.99E+00	Cont Sampling	Not Attained	0.05	0.8
KM-9	22	6.02E-01	1.69E-01	Not Attained	Not Attained	0.05	0.8

Note: N/C refers to "not conducted" because of insufficient data (N<4); S/E indicates the sample mean significantly exceeds the cleanup level and thus no analysis is conducted; Sample Size is the number of concentration data in a sampling location that are used in the analysis; The Target Level is the expected mean concentration in wells after cleanup attainment, it is only used in individual well celanup status evaluation. The test for evaluating attainment status is from EPA (1992). Refer to Appendix A.6 of MAROS Manual for details.

Individual Well Cleanup Status - Optional Analysis Results

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

From Period: 7/9/1997 **to** 5/5/2008

				Normal Distribution Assumption			Lognormal Distribution Assumption		
Well	**Sample Size**	**Sample Mean**	**Sample Stdev.**	**Significantly < Cleanup Goal?**	**Power**	**Expected Sample Size**	**Significantly < Cleanup Goal?**	**Power**	**Expected Sample Size**
MOLYBDENUM			Cleanup Goal (mg/L) = 0.18		Alpha Level = 0.05		Expected Power = 0.8		
Finch Spring	22	3.20E-01	1.20E-01	NO	S/E	S/E	NO	S/E	S/E
KM-13	22	5.22E-01	3.57E-01	NO	S/E	S/E	NO	S/E	S/E
KM-15	22	6.75E-01	3.42E-01	NO	S/E	S/E	NO	S/E	S/E
KM-16	22	1.13E+00	4.44E-01	NO	S/E	S/E	NO	S/E	S/E
KM-17	22	5.36E-01	1.16E-01	NO	S/E	S/E	NO	S/E	S/E
KM-2	22	2.33E+00	2.22E+00	NO	S/E	S/E	NO	S/E	S/E
KM-3	22	9.01E+00	4.92E+00	NO	S/E	S/E	NO	S/E	S/E
KM-4	22	5.22E+00	4.27E+00	NO	S/E	S/E	NO	S/E	S/E
KM-5	22	2.36E-01	8.60E-02	NO	S/E	S/E	NO	S/E	S/E
KM-6	22	1.64E+00	5.04E-01	NO	S/E	S/E	NO	S/E	S/E
KM-7	17	4.47E-01	6.48E-02	NO	S/E	S/E	NO	S/E	S/E
KM-8	22	5.57E+01	2.33E+01	NO	S/E	S/E	NO	S/E	S/E
KM-9	22	2.08E-01	5.59E-02	NO	S/E	S/E	NO	S/E	S/E
VANADIUM			Cleanup Goal (mg/L) = 0.26		Alpha Level = 0.05		Expected Power = 0.8		
Finch Spring	22	5.92E-02	1.29E-02	YES	1.000	<=3	YES	1.000	<=3
KM-13	22	6.29E-01	1.38E-01	NO	S/E	S/E	NO	S/E	S/E
KM-15	22	1.10E+00	2.37E-01	NO	S/E	S/E	NO	S/E	S/E
KM-16	22	2.92E+00	6.11E-01	NO	S/E	S/E	NO	S/E	S/E
KM-17	21	1.04E-02	6.02E-03	YES	1.000	<=3	YES	1.000	<=3
KM-2	22	6.57E+00	2.15E+00	NO	S/E	S/E	NO	S/E	S/E
KM-3	22	2.96E+00	9.88E-01	NO	S/E	S/E	NO	S/E	S/E
KM-4	22	7.47E+00	3.96E+00	NO	S/E	S/E	NO	S/E	S/E
KM-5	22	1.56E+00	4.61E-01	NO	S/E	S/E	NO	S/E	S/E
KM-6	22	4.66E+00	9.63E-01	NO	S/E	S/E	NO	S/E	S/E
KM-7	17	2.39E+00	3.08E-01	NO	S/E	S/E	NO	S/E	S/E
KM-8	22	1.87E+01	6.99E+00	NO	S/E	S/E	NO	S/E	S/E
KM-9	22	6.02E-01	1.69E-01	NO	S/E	S/E	NO	S/E	S/E

Note: N/C refers to "not conducted" because of insufficient data (N<4); S/E indicates the sample mean significantly exceeds the cleanup level and thus no analysis is conducted; Sample Size is the number of concentration data in a sampling location that are used in the power analysis; Expected Sample Size is the number of concentration data needed to reach the Expected Power under current sample variability; The Target Level is the expected mean concentration in wells after cleanup attainment, it is only used in individual well celanup status evaluation. The Student's t-test on mean difference is used in this analysis. Refer to Appendix A.6 of MAROS Manual for details.

MAROS Risk-Based Power Analysis for Site Cleanup

Project: Tronox 13 Wells Finch All Datta

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Parameters:

Groundwater Flow Direction: 240 degrees **Distance to Receptor:** -1300 feet

From Period: Fall 97 **to** Spring 08

11/20/1997 5/5/2008

Selected Plume Centerline Wells:

Well	Distance to Receptor (feet)
KM-15	1121.3
KM-16	2080.3
KM-8	2694.5

The distance is measured in the Groundwater Flow Angle from the well to the compliance boundary.

				Normal Distribution Assumption			Lognormal Distribution Assumption				
Sample Event	**Sample Size**	**Sample Mean**	**Sample Stdev.**	**Cleanup Status**	**Power**	**Expected Sample Size**	**Celanup Status**	**Power**	**Expected Sample Size**	**Alpha Level**	**Expected Power**
MOLYBDENUM				Cleanup Goal = 0.18							
Fall 97	12	1.14E+00	3.87E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 98	12	1.01E+00	3.40E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 98	12	1.33E+00	4.58E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 99	12	1.00E+00	3.42E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 99	12	1.19E+00	4.08E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 00	13	8.94E-01	3.19E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 00	13	9.75E-01	3.49E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 01	13	9.82E-01	3.52E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 01	13	1.14E+00	4.08E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 02	13	8.44E-01	3.02E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 02	13	8.16E-01	2.92E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 03	13	6.07E-01	2.17E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 03	13	6.53E-01	2.34E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 04	13	5.93E-01	2.12E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 04	13	4.98E-01	1.77E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 05	13	5.86E-01	2.09E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 05	13	3.75E-01	1.33E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 06	13	2.74E-01	9.44E-01	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 06	13	4.17E-01	1.48E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 07	13	4.73E-01	1.69E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 07	13	5.08E-01	1.82E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 08	13	5.97E-01	2.14E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
VANADIUM				Cleanup Goal = 0.26							
Fall 97	12	2.14E-01	1.83E-01	Not Attained	0.212	99	Not Attained	S/E	S/E	0.05	0.8

Project: Tronox 13 Wells Finch All Datta **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

				Normal Distribution Assumption			Lognormal Distribution Assumption				
Sample Event	**Sample Szie**	**Sample Mean**	**Sample Stdev.**	**Cleanup Status**	**Power**	**Expected Sample Size**	**Celanup Status**	**Power**	**Expected Sample Size**	**Alpha Level**	**Expected Power**
VANADIUM				Cleanup Goal = 0.26							
Spring 98	11	2.19E-01	1.81E-01	Not Attained	0.181	>100	Not Attained	0.061	>100	0.05	0.8
Fall 98	12	1.70E-01	1.44E-01	Attained	0.679	17	Not Attained	S/E	S/E	0.05	0.8
Spring 99	12	1.91E-01	1.57E-01	Not Attained	0.435	33	Not Attained	S/E	S/E	0.05	0.8
Fall 99	12	1.28E-01	1.27E-01	Attained	0.968	7	Not Attained	S/E	S/E	0.05	0.8
Spring 00	13	9.41E-02	1.71E-01	Attained	0.960	8	Not Attained	0.131	>100	0.05	0.8
Fall 00	13	7.73E-02	1.42E-01	Attained	0.998	5	Not Attained	0.106	>100	0.05	0.8
Spring 01	13	9.29E-02	1.60E-01	Attained	0.977	7	Not Attained	S/E	S/E	0.05	0.8
Fall 01	13	1.11E-01	2.85E-01	Attained	0.573	24	Not Attained	S/E	S/E	0.05	0.8
Spring 02	13	8.73E-02	1.99E-01	Attained	0.919	9	Not Attained	S/E	S/E	0.05	0.8
Fall 02	13	9.43E-02	2.57E-01	Attained	0.729	16	Not Attained	S/E	S/E	0.05	0.8
Spring 03	13	8.20E-02	1.81E-01	Attained	0.964	8	Not Attained	S/E	S/E	0.05	0.8
Fall 03	13	1.07E-01	3.07E-01	Attained	0.540	26	Not Attained	S/E	S/E	0.05	0.8
Spring 04	13	8.87E-02	2.30E-01	Attained	0.832	12	Not Attained	0.155	>100	0.05	0.8
Fall 04	13	9.94E-02	2.98E-01	Attained	0.597	22	Not Attained	0.090	>100	0.05	0.8
Spring 05	13	7.68E-02	1.66E-01	Attained	0.987	6	Not Attained	0.075	>100	0.05	0.8
Fall 05	13	7.91E-02	2.06E-01	Attained	0.924	9	Not Attained	0.125	>100	0.05	0.8
Spring 06	13	7.52E-02	1.31E-01	Attained	1.000	4	Not Attained	0.057	>100	0.05	0.8
Fall 06	13	7.29E-02	1.72E-01	Attained	0.985	7	Not Attained	0.177	>100	0.05	0.8
Spring 07	13	7.55E-02	1.65E-01	Attained	0.989	6	Not Attained	0.252	81	0.05	0.8
Fall 07	13	8.08E-02	2.12E-01	Attained	0.907	10	Not Attained	0.152	>100	0.05	0.8
Spring 08	13	7.75E-02	1.76E-01	Attained	0.976	7	Not Attained	0.237	89	0.05	0.8

Note: #N/C means "not conducted" due to a small sample size (N<4) or that the mean concentration is much greater than the cleanup level; Sample Size is the number of sampling locations used in the power analysis; Expected Sample Size is the number of concentration data needed to reach the Expected Power under current sample variability.

MAROS Zeroth Moment Analysis

Project: Tronox V MO 13 wells Finch All

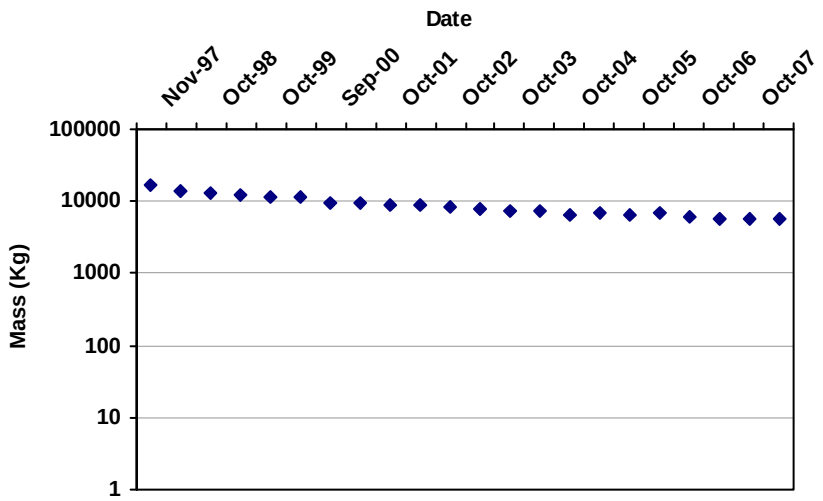
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Dissolved Mass Over Time



Porosity: 0.20

Saturated Thickness:

Uniform: 200 ft

Mann Kendall S Statistic:

-215

Confidence in Trend:

100.0%

Coefficient of Variation:

0.33

Zeroth Moment Trend:

D

Data Table:

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells
11/20/1997	MOLYBDENUM	1.7E+04	12
5/5/1998	MOLYBDENUM	1.4E+04	12
10/27/1998	MOLYBDENUM	1.3E+04	12
5/4/1999	MOLYBDENUM	1.2E+04	12
10/5/1999	MOLYBDENUM	1.1E+04	12
5/8/2000	MOLYBDENUM	1.1E+04	13
9/25/2000	MOLYBDENUM	9.2E+03	13
4/27/2001	MOLYBDENUM	9.5E+03	13
10/26/2001	MOLYBDENUM	9.1E+03	13
5/31/2002	MOLYBDENUM	8.7E+03	13
10/18/2002	MOLYBDENUM	8.3E+03	13
5/31/2003	MOLYBDENUM	7.9E+03	13
10/23/2003	MOLYBDENUM	7.3E+03	13
5/3/2004	MOLYBDENUM	7.5E+03	13
10/13/2004	MOLYBDENUM	6.5E+03	13
5/3/2005	MOLYBDENUM	7.0E+03	13
10/25/2005	MOLYBDENUM	6.5E+03	13
5/15/2006	MOLYBDENUM	7.0E+03	13
10/23/2006	MOLYBDENUM	6.1E+03	13
5/14/2007	MOLYBDENUM	5.8E+03	13
10/15/2007	MOLYBDENUM	5.9E+03	13
5/5/2008	MOLYBDENUM	5.8E+03	13

MAROS Zeroth Moment Analysis

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells

Note: 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); ND = Non-detect. Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V MO 13 wells Finch All

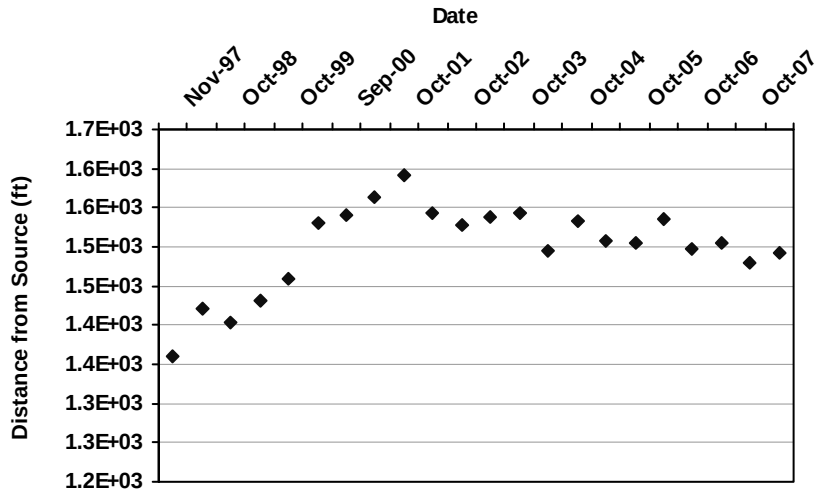
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Distance from Source to Center of Mass



Mann Kendall S Statistic:

15

Confidence in Trend:

65.2%

Coefficient of Variation:

0.04

First Moment Trend:

NT

Data Table:

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
11/20/1997	MOLYBDENUM	658,948	371,066	1,361	12
5/5/1998	MOLYBDENUM	658,808	371,094	1,420	12
10/27/1998	MOLYBDENUM	658,883	371,060	1,402	12
5/4/1999	MOLYBDENUM	658,825	371,067	1,431	12
10/5/1999	MOLYBDENUM	658,838	371,022	1,460	12
5/8/2000	MOLYBDENUM	658,803	370,961	1,530	13
9/25/2000	MOLYBDENUM	658,821	370,934	1,541	13
4/27/2001	MOLYBDENUM	658,786	370,932	1,563	13
10/26/2001	MOLYBDENUM	658,818	370,876	1,591	13
5/31/2002	MOLYBDENUM	658,821	370,930	1,544	13
10/18/2002	MOLYBDENUM	658,835	370,941	1,527	13
5/31/2003	MOLYBDENUM	658,844	370,921	1,539	13
10/23/2003	MOLYBDENUM	658,836	370,922	1,543	13
5/3/2004	MOLYBDENUM	658,849	370,970	1,495	13
10/13/2004	MOLYBDENUM	658,830	370,938	1,533	13
5/3/2005	MOLYBDENUM	658,802	370,989	1,508	13
10/25/2005	MOLYBDENUM	658,833	370,969	1,506	13
5/15/2006	MOLYBDENUM	658,767	370,979	1,537	13
10/23/2006	MOLYBDENUM	658,812	370,995	1,497	13
5/14/2007	MOLYBDENUM	658,792	371,000	1,505	13
10/15/2007	MOLYBDENUM	658,830	371,003	1,479	13
5/5/2008	MOLYBDENUM	658,795	371,013	1,493	13

MAROS First Moment Analysis

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V MO 13 wells Finch All

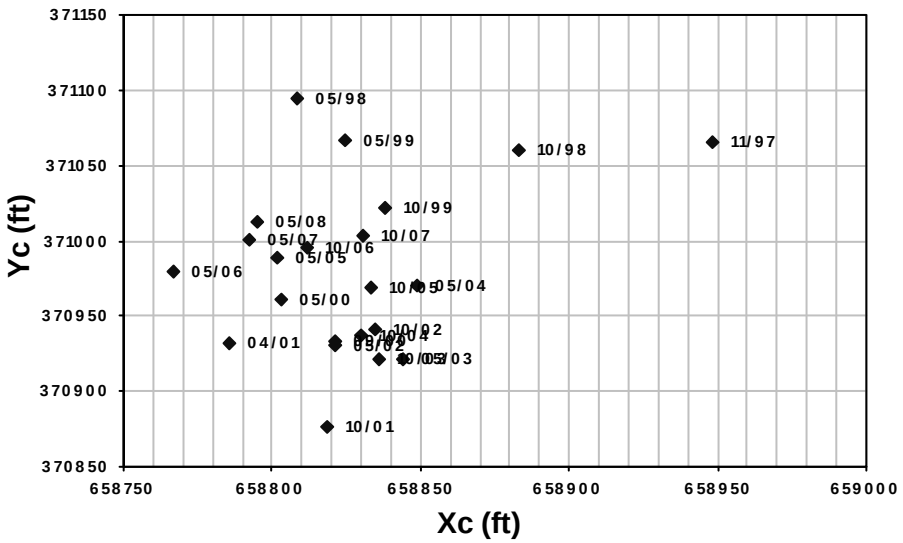
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Location of Center of Mass Over Time



Groundwater Flow Direction:

Source Coordinate:

X: 659,700

Y: 372,200

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
11/20/1997	MOLYBDENUM	658,948	371,066	1,361	12
5/5/1998	MOLYBDENUM	658,808	371,094	1,420	12
10/27/1998	MOLYBDENUM	658,883	371,060	1,402	12
5/4/1999	MOLYBDENUM	658,825	371,067	1,431	12
10/5/1999	MOLYBDENUM	658,838	371,022	1,460	12
5/8/2000	MOLYBDENUM	658,803	370,961	1,530	13
9/25/2000	MOLYBDENUM	658,821	370,934	1,541	13
4/27/2001	MOLYBDENUM	658,786	370,932	1,563	13
10/26/2001	MOLYBDENUM	658,818	370,876	1,591	13
5/31/2002	MOLYBDENUM	658,821	370,930	1,544	13
10/18/2002	MOLYBDENUM	658,835	370,941	1,527	13
5/31/2003	MOLYBDENUM	658,844	370,921	1,539	13
10/23/2003	MOLYBDENUM	658,836	370,922	1,543	13
5/3/2004	MOLYBDENUM	658,849	370,970	1,495	13
10/13/2004	MOLYBDENUM	658,830	370,938	1,533	13
5/3/2005	MOLYBDENUM	658,802	370,989	1,508	13
10/25/2005	MOLYBDENUM	658,833	370,969	1,506	13
5/15/2006	MOLYBDENUM	658,767	370,979	1,537	13
10/23/2006	MOLYBDENUM	658,812	370,995	1,497	13
5/14/2007	MOLYBDENUM	658,792	371,000	1,505	13
10/15/2007	MOLYBDENUM	658,830	371,003	1,479	13
5/5/2008	MOLYBDENUM	658,795	371,013	1,493	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS Second Moment Analysis

Project: Tronox V MO 13 wells Finch All

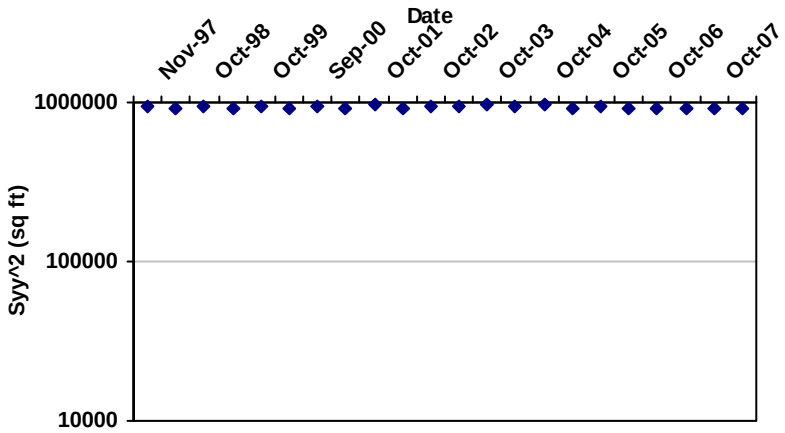
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Plume Spread Over Time

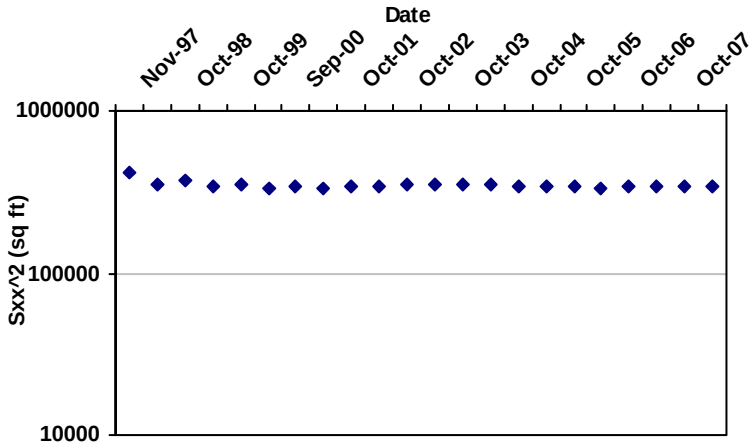


Mann Kendall S Statistic: -45

Confidence in Trend: 89.1%

Coefficient of Variation: 0.02

Second Moment Trend: S



Mann Kendall S Statistic: -59

Confidence in Trend: 94.9%

Coefficient of Variation: 0.05

Second Moment Trend: PD

Data Table:

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
11/20/1997	MOLYBDENUM	416,438	934,664	12
5/5/1998	MOLYBDENUM	354,991	927,772	12
10/27/1998	MOLYBDENUM	376,429	933,047	12
5/4/1999	MOLYBDENUM	344,161	911,643	12
10/5/1999	MOLYBDENUM	352,137	931,176	12
5/8/2000	MOLYBDENUM	331,737	923,939	13
9/25/2000	MOLYBDENUM	345,045	943,129	13
4/27/2001	MOLYBDENUM	334,295	927,448	13
10/26/2001	MOLYBDENUM	340,709	966,418	13
5/31/2002	MOLYBDENUM	344,124	930,287	13
10/18/2002	MOLYBDENUM	348,997	948,373	13
5/31/2003	MOLYBDENUM	350,135	946,276	13

MAROS Second Moment Analysis

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
10/23/2003	MOLYBDENUM	347,173	960,632	13
5/3/2004	MOLYBDENUM	353,448	944,021	13
10/13/2004	MOLYBDENUM	345,286	963,167	13
5/3/2005	MOLYBDENUM	345,273	918,992	13
10/25/2005	MOLYBDENUM	344,793	934,475	13
5/15/2006	MOLYBDENUM	328,271	911,206	13
10/23/2006	MOLYBDENUM	345,488	913,682	13
5/14/2007	MOLYBDENUM	342,660	907,972	13
10/15/2007	MOLYBDENUM	346,430	914,812	13
5/5/2008	MOLYBDENUM	341,124	911,775	13

Note: 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)

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 Zeroth Moment Analysis

Project: Tronox V MO 13 wells Finch All

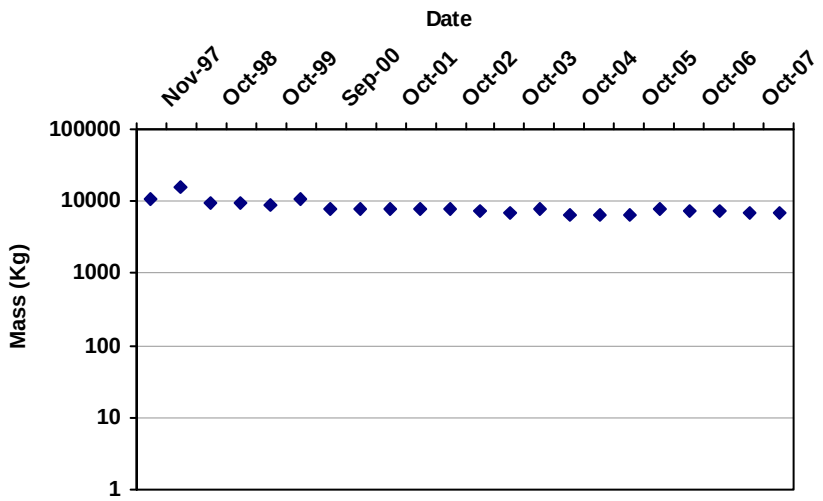
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Dissolved Mass Over Time



Porosity: 0.20

Saturated Thickness:

Uniform: 200 ft

Mann Kendall S Statistic:

-141

Confidence in Trend:

100.0%

Coefficient of Variation:

0.26

Zeroth Moment Trend:

D

Data Table:

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells
11/20/1997	VANADIUM	1.1E+04	12
5/5/1998	VANADIUM	1.6E+04	11
10/27/1998	VANADIUM	9.6E+03	12
5/4/1999	VANADIUM	9.7E+03	12
10/5/1999	VANADIUM	9.2E+03	12
5/8/2000	VANADIUM	1.0E+04	13
9/25/2000	VANADIUM	7.6E+03	13
4/27/2001	VANADIUM	8.1E+03	13
10/26/2001	VANADIUM	7.9E+03	13
5/31/2002	VANADIUM	7.7E+03	13
10/18/2002	VANADIUM	7.7E+03	13
5/31/2003	VANADIUM	7.2E+03	13
10/23/2003	VANADIUM	6.8E+03	13
5/3/2004	VANADIUM	7.8E+03	13
10/13/2004	VANADIUM	6.6E+03	13
5/3/2005	VANADIUM	6.4E+03	13
10/25/2005	VANADIUM	6.6E+03	13
5/15/2006	VANADIUM	8.0E+03	13
10/23/2006	VANADIUM	7.2E+03	13
5/14/2007	VANADIUM	7.5E+03	13
10/15/2007	VANADIUM	7.1E+03	13
5/5/2008	VANADIUM	7.1E+03	13

MAROS Zeroth Moment Analysis

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells

Note: 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); ND = Non-detect. Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V MO 13 wells Finch All

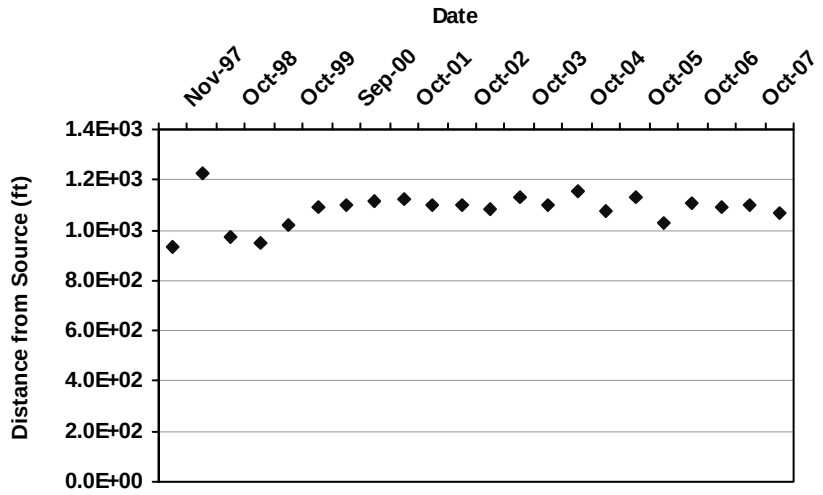
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Distance from Source to Center of Mass



Mann Kendall S Statistic:

33

Confidence in Trend:

81.4%

Coefficient of Variation:

0.06

First Moment Trend:

NT

Data Table:

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
11/20/1997	VANADIUM	658,898	371,723	933	12
5/5/1998	VANADIUM	658,846	371,323	1,224	11
10/27/1998	VANADIUM	658,872	371,692	972	12
5/4/1999	VANADIUM	658,874	371,731	950	12
10/5/1999	VANADIUM	658,843	371,650	1,018	12
5/8/2000	VANADIUM	658,773	371,624	1,091	13
9/25/2000	VANADIUM	658,750	371,647	1,099	13
4/27/2001	VANADIUM	658,731	371,647	1,116	13
10/26/2001	VANADIUM	658,730	371,627	1,126	13
5/31/2002	VANADIUM	658,735	371,679	1,096	13
10/18/2002	VANADIUM	658,729	371,691	1,096	13
5/31/2003	VANADIUM	658,743	371,694	1,082	13
10/23/2003	VANADIUM	658,704	371,660	1,133	13
5/3/2004	VANADIUM	658,759	371,624	1,103	13
10/13/2004	VANADIUM	658,693	371,633	1,155	13
5/3/2005	VANADIUM	658,755	371,683	1,078	13
10/25/2005	VANADIUM	658,717	371,644	1,130	13
5/15/2006	VANADIUM	658,783	371,739	1,026	13
10/23/2006	VANADIUM	658,745	371,639	1,108	13
5/14/2007	VANADIUM	658,778	371,613	1,093	13
10/15/2007	VANADIUM	658,754	371,644	1,097	13
5/5/2008	VANADIUM	658,802	371,621	1,068	13

MAROS First Moment Analysis

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V MO 13 wells Finch All

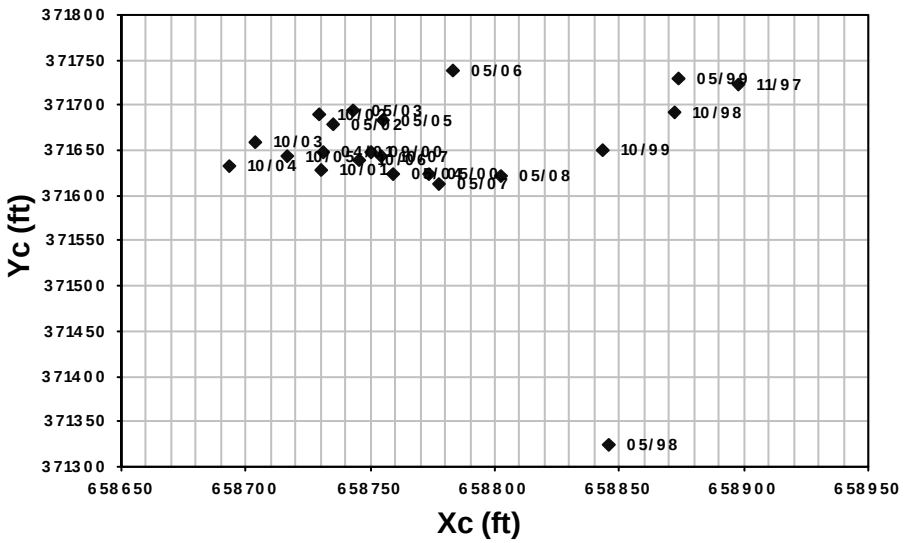
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Location of Center of Mass Over Time



Groundwater Flow Direction:

Source Coordinate:

X: 659,700

Y: 372,200

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
11/20/1997	VANADIUM	658,898	371,723	933	12
5/5/1998	VANADIUM	658,846	371,323	1,224	11
10/27/1998	VANADIUM	658,872	371,692	972	12
5/4/1999	VANADIUM	658,874	371,731	950	12
10/5/1999	VANADIUM	658,843	371,650	1,018	12
5/8/2000	VANADIUM	658,773	371,624	1,091	13
9/25/2000	VANADIUM	658,750	371,647	1,099	13
4/27/2001	VANADIUM	658,731	371,647	1,116	13
10/26/2001	VANADIUM	658,730	371,627	1,126	13
5/31/2002	VANADIUM	658,735	371,679	1,096	13
10/18/2002	VANADIUM	658,729	371,691	1,096	13
5/31/2003	VANADIUM	658,743	371,694	1,082	13
10/23/2003	VANADIUM	658,704	371,660	1,133	13
5/3/2004	VANADIUM	658,759	371,624	1,103	13
10/13/2004	VANADIUM	658,693	371,633	1,155	13
5/3/2005	VANADIUM	658,755	371,683	1,078	13
10/25/2005	VANADIUM	658,717	371,644	1,130	13
5/15/2006	VANADIUM	658,783	371,739	1,026	13
10/23/2006	VANADIUM	658,745	371,639	1,108	13
5/14/2007	VANADIUM	658,778	371,613	1,093	13
10/15/2007	VANADIUM	658,754	371,644	1,097	13
5/5/2008	VANADIUM	658,802	371,621	1,068	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS Second Moment Analysis

Project: Tronox V MO 13 wells Finch All

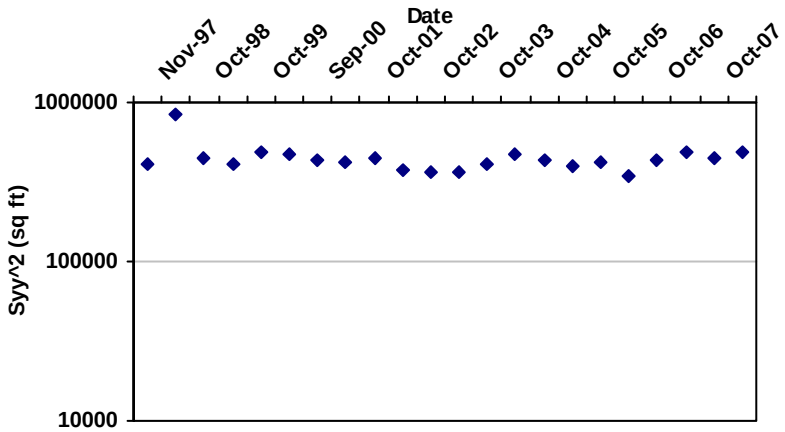
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Plume Spread Over Time

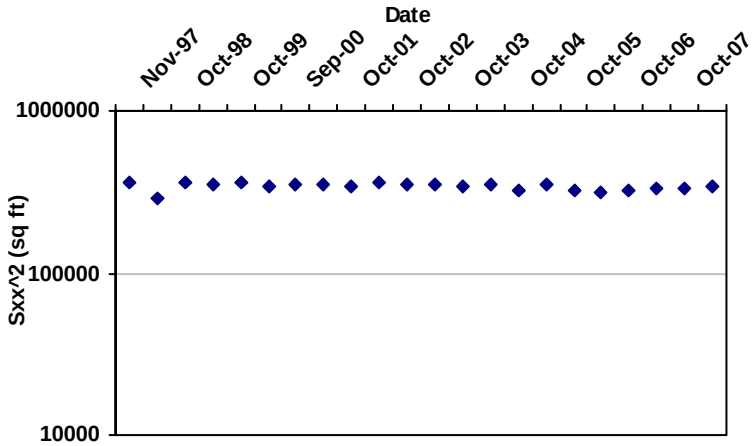


Mann Kendall S Statistic: -5

Confidence in Trend: 54.4%

Coefficient of Variation: 0.22

Second Moment Trend: S



Mann Kendall S Statistic: -95

Confidence in Trend: 99.7%

Coefficient of Variation: 0.05

Second Moment Trend: D

Data Table:

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
11/20/1997	VANADIUM	364,272	404,774	12
5/5/1998	VANADIUM	290,642	839,895	11
10/27/1998	VANADIUM	365,519	446,526	12
5/4/1999	VANADIUM	355,209	410,341	12
10/5/1999	VANADIUM	362,561	485,361	12
5/8/2000	VANADIUM	343,130	473,459	13
9/25/2000	VANADIUM	353,572	432,128	13
4/27/2001	VANADIUM	347,942	421,823	13
10/26/2001	VANADIUM	346,191	452,600	13
5/31/2002	VANADIUM	361,773	371,379	13
10/18/2002	VANADIUM	349,778	368,600	13
5/31/2003	VANADIUM	354,198	370,304	13

MAROS Second Moment Analysis

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
10/23/2003	VANADIUM	338,911	404,914	13
5/3/2004	VANADIUM	348,179	466,673	13
10/13/2004	VANADIUM	323,330	439,755	13
5/3/2005	VANADIUM	351,051	398,310	13
10/25/2005	VANADIUM	324,212	421,811	13
5/15/2006	VANADIUM	314,225	345,668	13
10/23/2006	VANADIUM	319,837	433,967	13
5/14/2007	VANADIUM	330,251	485,674	13
10/15/2007	VANADIUM	331,495	442,587	13
5/5/2008	VANADIUM	343,745	486,609	13

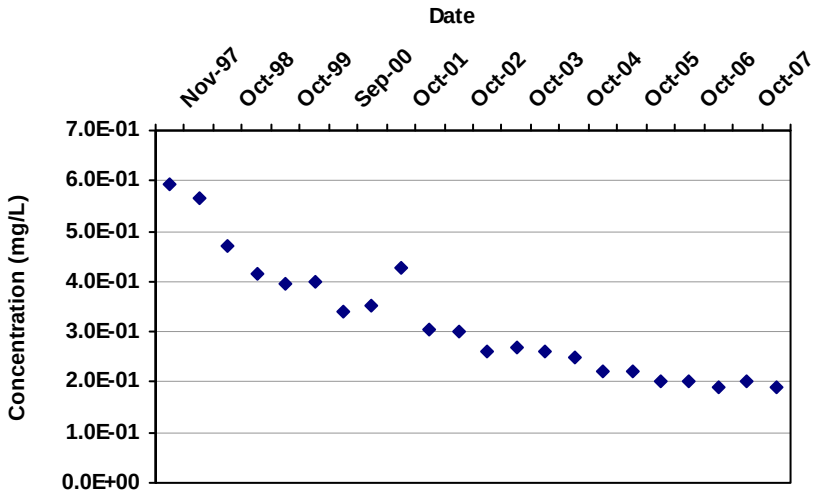
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events)

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 Mann-Kendall Statistics Summary

Well: Finch Spring
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-207

Confidence in Trend:
100.0%

Coefficient of Variation:
0.38

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

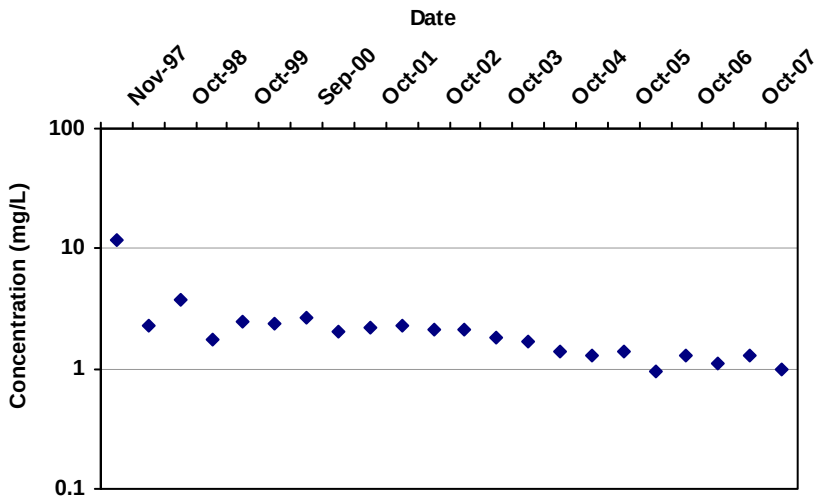
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	11/20/1997	MOLYBDENUM	5.9E-01		1	1
Finch Spring	T	5/5/1998	MOLYBDENUM	5.6E-01		1	1
Finch Spring	T	10/27/1998	MOLYBDENUM	4.7E-01		1	1
Finch Spring	T	5/4/1999	MOLYBDENUM	4.2E-01		1	1
Finch Spring	T	10/5/1999	MOLYBDENUM	4.0E-01		1	1
Finch Spring	T	5/8/2000	MOLYBDENUM	4.0E-01		1	1
Finch Spring	T	9/25/2000	MOLYBDENUM	3.4E-01		1	1
Finch Spring	T	4/27/2001	MOLYBDENUM	3.5E-01		1	1
Finch Spring	T	10/26/2001	MOLYBDENUM	4.3E-01		1	1
Finch Spring	T	5/31/2002	MOLYBDENUM	3.1E-01		1	1
Finch Spring	T	10/18/2002	MOLYBDENUM	3.0E-01		1	1
Finch Spring	T	5/31/2003	MOLYBDENUM	2.6E-01		1	1
Finch Spring	T	10/23/2003	MOLYBDENUM	2.7E-01		1	1
Finch Spring	T	5/3/2004	MOLYBDENUM	2.6E-01		1	1
Finch Spring	T	10/13/2004	MOLYBDENUM	2.5E-01		1	1
Finch Spring	T	5/3/2005	MOLYBDENUM	2.2E-01		1	1
Finch Spring	T	10/25/2005	MOLYBDENUM	2.2E-01		1	1
Finch Spring	T	5/15/2006	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	10/23/2006	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	5/14/2007	MOLYBDENUM	1.9E-01		1	1
Finch Spring	T	10/15/2007	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	5/5/2008	MOLYBDENUM	1.9E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-2
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-174

Confidence in Trend:

100.0%

Coefficient of Variation:

0.95

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

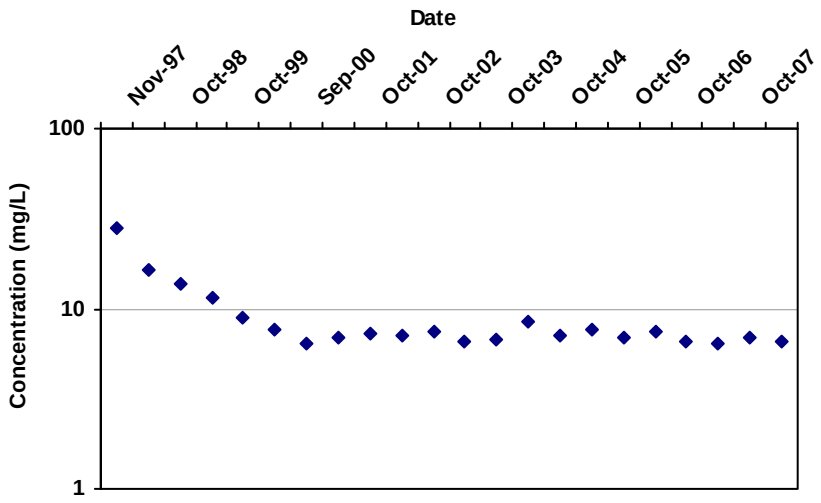
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	11/20/1997	MOLYBDENUM	1.2E+01		1	1
KM-2	S	5/5/1998	MOLYBDENUM	2.3E+00		1	1
KM-2	S	10/27/1998	MOLYBDENUM	3.8E+00		1	1
KM-2	S	5/4/1999	MOLYBDENUM	1.8E+00		1	1
KM-2	S	10/5/1999	MOLYBDENUM	2.5E+00		1	1
KM-2	S	5/8/2000	MOLYBDENUM	2.4E+00		1	1
KM-2	S	9/25/2000	MOLYBDENUM	2.7E+00		1	1
KM-2	S	4/28/2001	MOLYBDENUM	2.1E+00		1	1
KM-2	S	10/26/2001	MOLYBDENUM	2.2E+00		1	1
KM-2	S	5/31/2002	MOLYBDENUM	2.3E+00		1	1
KM-2	S	10/18/2002	MOLYBDENUM	2.1E+00		1	1
KM-2	S	5/31/2003	MOLYBDENUM	2.1E+00		1	1
KM-2	S	10/23/2003	MOLYBDENUM	1.8E+00		1	1
KM-2	S	5/3/2004	MOLYBDENUM	1.7E+00		1	1
KM-2	S	10/17/2004	MOLYBDENUM	1.4E+00		1	1
KM-2	S	5/3/2005	MOLYBDENUM	1.3E+00		1	1
KM-2	S	10/25/2005	MOLYBDENUM	1.4E+00		1	1
KM-2	S	5/16/2006	MOLYBDENUM	9.6E-01		1	1
KM-2	S	10/23/2006	MOLYBDENUM	1.3E+00		1	1
KM-2	S	5/14/2007	MOLYBDENUM	1.1E+00		1	1
KM-2	S	10/15/2007	MOLYBDENUM	1.3E+00		1	1
KM-2	S	5/5/2008	MOLYBDENUM	1.0E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-3
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-121

Confidence in Trend:

100.0%

Coefficient of Variation:

0.55

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

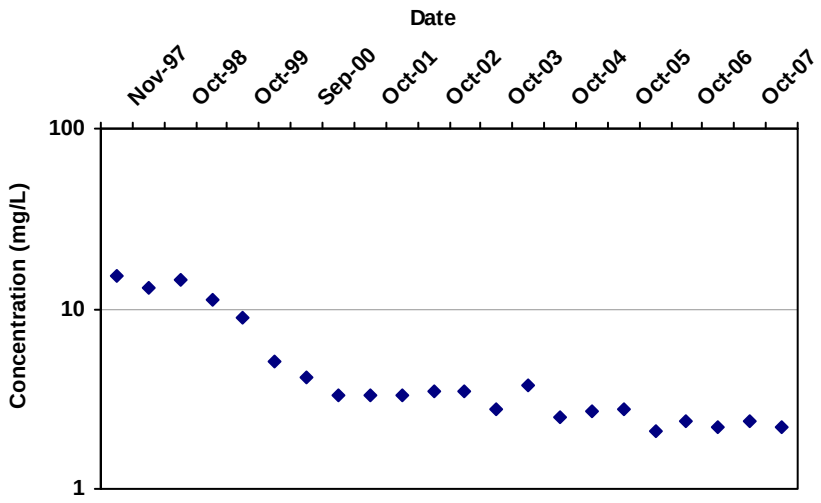
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	11/20/1997	MOLYBDENUM	2.8E+01		1	1
KM-3	S	5/5/1998	MOLYBDENUM	1.6E+01		1	1
KM-3	S	10/27/1998	MOLYBDENUM	1.4E+01		1	1
KM-3	S	5/4/1999	MOLYBDENUM	1.1E+01		1	1
KM-3	S	10/5/1999	MOLYBDENUM	8.8E+00		1	1
KM-3	S	5/8/2000	MOLYBDENUM	7.6E+00		1	1
KM-3	S	9/25/2000	MOLYBDENUM	6.4E+00		1	1
KM-3	S	4/28/2001	MOLYBDENUM	6.9E+00		1	1
KM-3	S	10/26/2001	MOLYBDENUM	7.4E+00		1	1
KM-3	S	5/31/2002	MOLYBDENUM	7.1E+00		1	1
KM-3	S	10/18/2002	MOLYBDENUM	7.5E+00		1	1
KM-3	S	5/31/2003	MOLYBDENUM	6.6E+00		1	1
KM-3	S	10/23/2003	MOLYBDENUM	6.8E+00		1	1
KM-3	S	5/3/2004	MOLYBDENUM	8.4E+00		1	1
KM-3	S	10/17/2004	MOLYBDENUM	7.1E+00		1	1
KM-3	S	5/3/2005	MOLYBDENUM	7.7E+00		1	1
KM-3	S	10/25/2005	MOLYBDENUM	6.9E+00		1	1
KM-3	S	5/16/2006	MOLYBDENUM	7.4E+00		1	1
KM-3	S	10/23/2006	MOLYBDENUM	6.6E+00		1	1
KM-3	S	5/14/2007	MOLYBDENUM	6.4E+00		1	1
KM-3	S	10/15/2007	MOLYBDENUM	6.9E+00		1	1
KM-3	S	5/5/2008	MOLYBDENUM	6.5E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-4
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-183

Confidence in Trend:

100.0%

Coefficient of Variation:

0.82

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

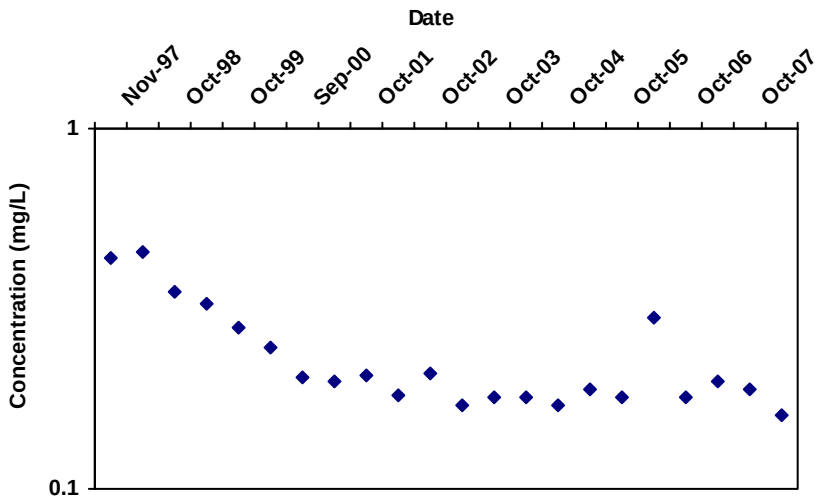
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	11/20/1997	MOLYBDENUM	1.5E+01		1	1
KM-4	S	5/5/1998	MOLYBDENUM	1.3E+01		1	1
KM-4	S	10/27/1998	MOLYBDENUM	1.4E+01		1	1
KM-4	S	5/4/1999	MOLYBDENUM	1.1E+01		1	1
KM-4	S	10/5/1999	MOLYBDENUM	9.0E+00		1	1
KM-4	S	5/8/2000	MOLYBDENUM	5.1E+00		1	1
KM-4	S	9/25/2000	MOLYBDENUM	4.1E+00		1	1
KM-4	S	4/28/2001	MOLYBDENUM	3.3E+00		1	1
KM-4	S	10/26/2001	MOLYBDENUM	3.3E+00		1	1
KM-4	S	5/31/2002	MOLYBDENUM	3.3E+00		1	1
KM-4	S	10/18/2002	MOLYBDENUM	3.5E+00		1	1
KM-4	S	5/31/2003	MOLYBDENUM	3.5E+00		1	1
KM-4	S	10/23/2003	MOLYBDENUM	2.8E+00		1	1
KM-4	S	5/3/2004	MOLYBDENUM	3.8E+00		1	1
KM-4	S	10/17/2004	MOLYBDENUM	2.5E+00		1	1
KM-4	S	5/3/2005	MOLYBDENUM	2.7E+00		1	1
KM-4	S	10/25/2005	MOLYBDENUM	2.8E+00		1	1
KM-4	S	5/16/2006	MOLYBDENUM	2.1E+00		1	1
KM-4	S	10/23/2006	MOLYBDENUM	2.4E+00		1	1
KM-4	S	5/14/2007	MOLYBDENUM	2.2E+00		1	1
KM-4	S	10/15/2007	MOLYBDENUM	2.4E+00		1	1
KM-4	S	5/5/2008	MOLYBDENUM	2.2E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-5
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-130

Confidence in Trend:

100.0%

Coefficient of Variation:

0.36

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

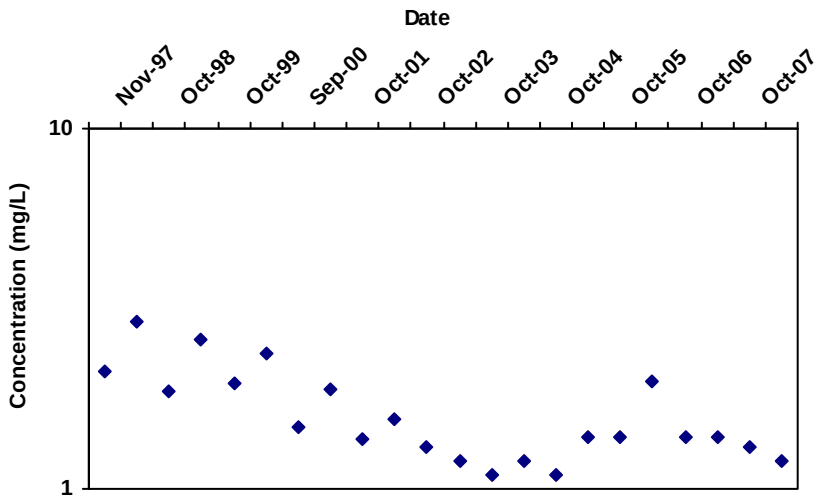
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	11/20/1997	MOLYBDENUM	4.4E-01		1	1
KM-5	S	5/5/1998	MOLYBDENUM	4.5E-01		1	1
KM-5	S	10/27/1998	MOLYBDENUM	3.5E-01		1	1
KM-5	S	5/4/1999	MOLYBDENUM	3.3E-01		1	1
KM-5	S	10/5/1999	MOLYBDENUM	2.8E-01		1	1
KM-5	S	5/8/2000	MOLYBDENUM	2.5E-01		1	1
KM-5	S	9/25/2000	MOLYBDENUM	2.1E-01		1	1
KM-5	S	4/28/2001	MOLYBDENUM	2.0E-01		1	1
KM-5	S	10/26/2001	MOLYBDENUM	2.1E-01		1	1
KM-5	S	5/31/2002	MOLYBDENUM	1.8E-01		1	1
KM-5	S	10/18/2002	MOLYBDENUM	2.1E-01		1	1
KM-5	S	5/31/2003	MOLYBDENUM	1.7E-01		1	1
KM-5	S	10/23/2003	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/3/2004	MOLYBDENUM	1.8E-01		1	1
KM-5	S	10/17/2004	MOLYBDENUM	1.7E-01		1	1
KM-5	S	5/3/2005	MOLYBDENUM	1.9E-01		1	1
KM-5	S	10/25/2005	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/16/2006	MOLYBDENUM	3.0E-01		1	1
KM-5	S	10/23/2006	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/14/2007	MOLYBDENUM	2.0E-01		1	1
KM-5	S	10/15/2007	MOLYBDENUM	1.9E-01		1	1
KM-5	S	5/5/2008	MOLYBDENUM	1.6E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-6
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-110

Confidence in Trend:

99.9%

Coefficient of Variation:

0.31

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

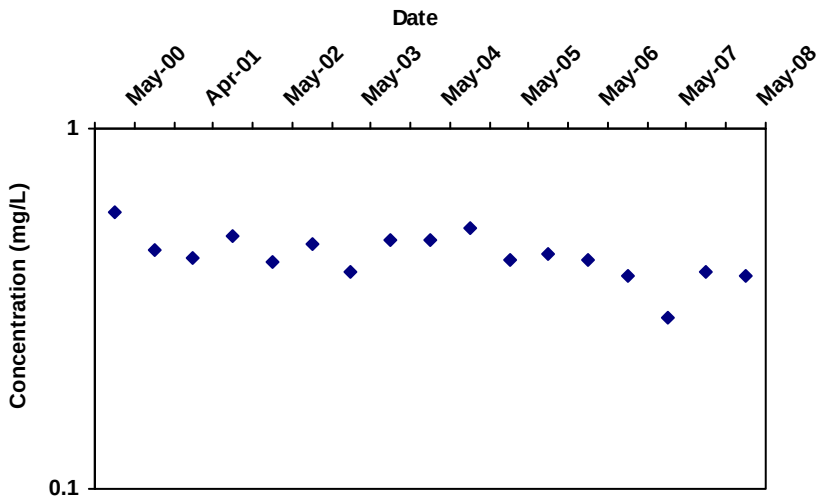
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	11/20/1997	MOLYBDENUM	2.1E+00		1	1
KM-6	S	5/5/1998	MOLYBDENUM	2.9E+00		1	1
KM-6	S	10/27/1998	MOLYBDENUM	1.9E+00		1	1
KM-6	S	5/4/1999	MOLYBDENUM	2.6E+00		1	1
KM-6	S	10/5/1999	MOLYBDENUM	2.0E+00		1	1
KM-6	S	5/8/2000	MOLYBDENUM	2.4E+00		1	1
KM-6	S	9/25/2000	MOLYBDENUM	1.5E+00		1	1
KM-6	S	4/28/2001	MOLYBDENUM	1.9E+00		1	1
KM-6	S	10/26/2001	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/31/2002	MOLYBDENUM	1.6E+00		1	1
KM-6	S	10/18/2002	MOLYBDENUM	1.3E+00		1	1
KM-6	S	5/31/2003	MOLYBDENUM	1.2E+00		1	1
KM-6	S	10/23/2003	MOLYBDENUM	1.1E+00		1	1
KM-6	S	5/3/2004	MOLYBDENUM	1.2E+00		1	1
KM-6	S	10/17/2004	MOLYBDENUM	1.1E+00		1	1
KM-6	S	5/3/2005	MOLYBDENUM	1.4E+00		1	1
KM-6	S	10/25/2005	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/16/2006	MOLYBDENUM	2.0E+00		1	1
KM-6	S	10/23/2006	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/14/2007	MOLYBDENUM	1.4E+00		1	1
KM-6	S	10/15/2007	MOLYBDENUM	1.3E+00		1	1
KM-6	S	5/5/2008	MOLYBDENUM	1.2E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-7
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-64

Confidence in Trend:

99.6%

Coefficient of Variation:

0.15

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

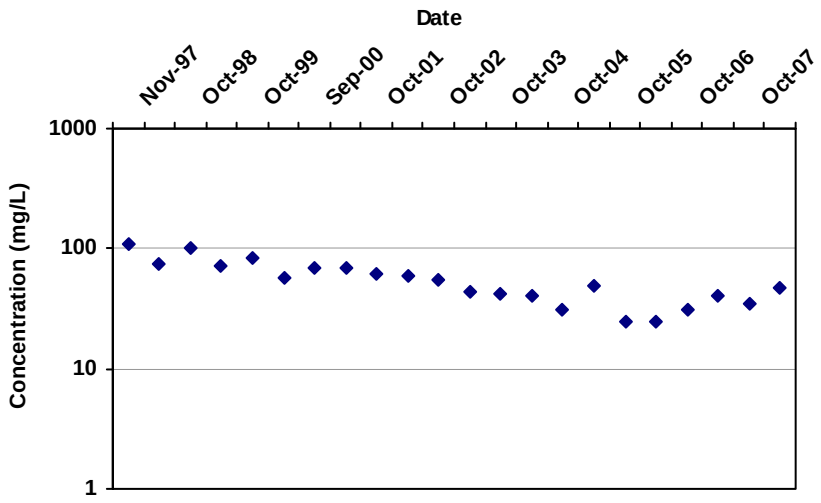
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	5/8/2000	MOLYBDENUM	5.8E-01		1	1
KM-7	S	9/25/2000	MOLYBDENUM	4.6E-01		1	1
KM-7	S	4/28/2001	MOLYBDENUM	4.4E-01		1	1
KM-7	S	10/26/2001	MOLYBDENUM	5.0E-01		1	1
KM-7	S	5/31/2002	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/18/2002	MOLYBDENUM	4.8E-01		1	1
KM-7	S	5/31/2003	MOLYBDENUM	4.0E-01		1	1
KM-7	S	10/23/2003	MOLYBDENUM	4.9E-01		1	1
KM-7	S	5/3/2004	MOLYBDENUM	4.9E-01		1	1
KM-7	S	10/17/2004	MOLYBDENUM	5.3E-01		1	1
KM-7	S	5/3/2005	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/25/2005	MOLYBDENUM	4.5E-01		1	1
KM-7	S	5/16/2006	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/23/2006	MOLYBDENUM	3.9E-01		1	1
KM-7	S	5/14/2007	MOLYBDENUM	3.0E-01		1	1
KM-7	S	10/15/2007	MOLYBDENUM	4.0E-01		1	1
KM-7	S	5/5/2008	MOLYBDENUM	3.9E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-8
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-167

Confidence in Trend:

100.0%

Coefficient of Variation:

0.42

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

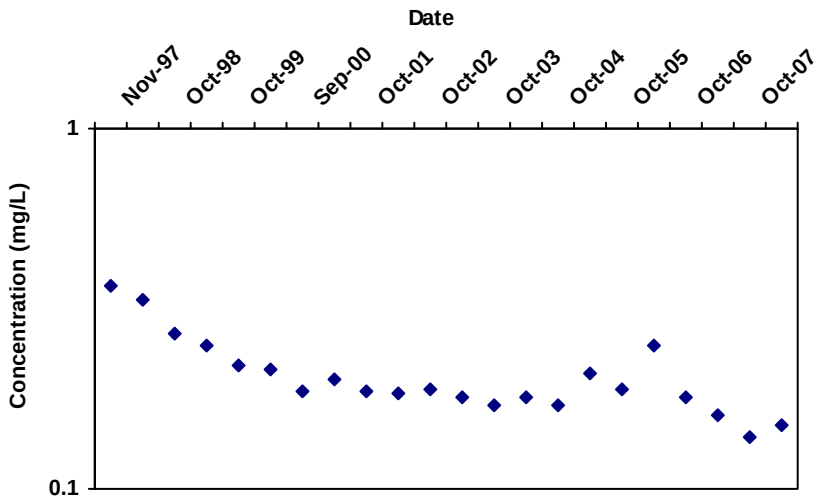
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	11/20/1997	MOLYBDENUM	1.1E+02		1	1
KM-8	S	5/5/1998	MOLYBDENUM	7.4E+01		1	1
KM-8	S	10/27/1998	MOLYBDENUM	1.0E+02		1	1
KM-8	S	5/4/1999	MOLYBDENUM	7.1E+01		1	1
KM-8	S	10/5/1999	MOLYBDENUM	8.4E+01		1	1
KM-8	S	5/8/2000	MOLYBDENUM	5.8E+01		1	1
KM-8	S	9/25/2000	MOLYBDENUM	7.0E+01		1	1
KM-8	S	4/28/2001	MOLYBDENUM	7.0E+01		1	1
KM-8	S	10/26/2001	MOLYBDENUM	6.2E+01		1	1
KM-8	S	5/31/2002	MOLYBDENUM	5.8E+01		1	1
KM-8	S	10/18/2002	MOLYBDENUM	5.5E+01		1	1
KM-8	S	5/31/2003	MOLYBDENUM	4.4E+01		1	1
KM-8	S	10/23/2003	MOLYBDENUM	4.2E+01		1	1
KM-8	S	5/3/2004	MOLYBDENUM	4.0E+01		1	1
KM-8	S	10/17/2004	MOLYBDENUM	3.1E+01		1	1
KM-8	S	5/3/2005	MOLYBDENUM	4.9E+01		1	1
KM-8	S	10/25/2005	MOLYBDENUM	2.5E+01		1	1
KM-8	S	5/16/2006	MOLYBDENUM	2.5E+01		1	1
KM-8	S	10/23/2006	MOLYBDENUM	3.1E+01		1	1
KM-8	S	5/14/2007	MOLYBDENUM	4.1E+01		1	1
KM-8	S	10/15/2007	MOLYBDENUM	3.5E+01		1	1
KM-8	S	5/5/2008	MOLYBDENUM	4.7E+01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-9
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-149

Confidence in Trend:

100.0%

Coefficient of Variation:

0.27

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

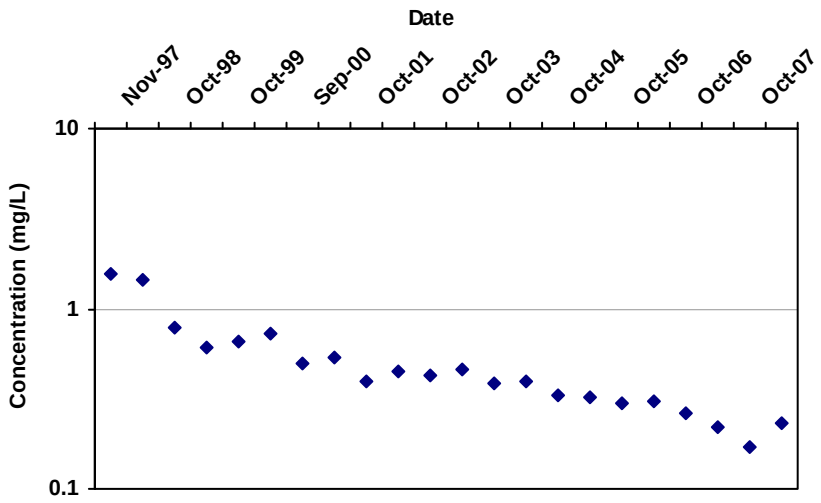
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	11/20/1997	MOLYBDENUM	3.6E-01		1	1
KM-9	S	5/5/1998	MOLYBDENUM	3.4E-01		1	1
KM-9	S	10/27/1998	MOLYBDENUM	2.7E-01		1	1
KM-9	S	5/4/1999	MOLYBDENUM	2.5E-01		1	1
KM-9	S	10/5/1999	MOLYBDENUM	2.2E-01		1	1
KM-9	S	5/8/2000	MOLYBDENUM	2.1E-01		1	1
KM-9	S	9/25/2000	MOLYBDENUM	1.9E-01		1	1
KM-9	S	4/28/2001	MOLYBDENUM	2.0E-01		1	1
KM-9	S	10/26/2001	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/31/2002	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/18/2002	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/31/2003	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/23/2003	MOLYBDENUM	1.7E-01		1	1
KM-9	S	5/3/2004	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/17/2004	MOLYBDENUM	1.7E-01		1	1
KM-9	S	5/3/2005	MOLYBDENUM	2.1E-01		1	1
KM-9	S	10/25/2005	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/16/2006	MOLYBDENUM	2.5E-01		1	1
KM-9	S	10/23/2006	MOLYBDENUM	1.8E-01		1	1
KM-9	S	5/14/2007	MOLYBDENUM	1.6E-01		1	1
KM-9	S	10/15/2007	MOLYBDENUM	1.4E-01		1	1
KM-9	S	5/5/2008	MOLYBDENUM	1.5E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-13
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-203

Confidence in Trend:

100.0%

Coefficient of Variation:

0.68

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

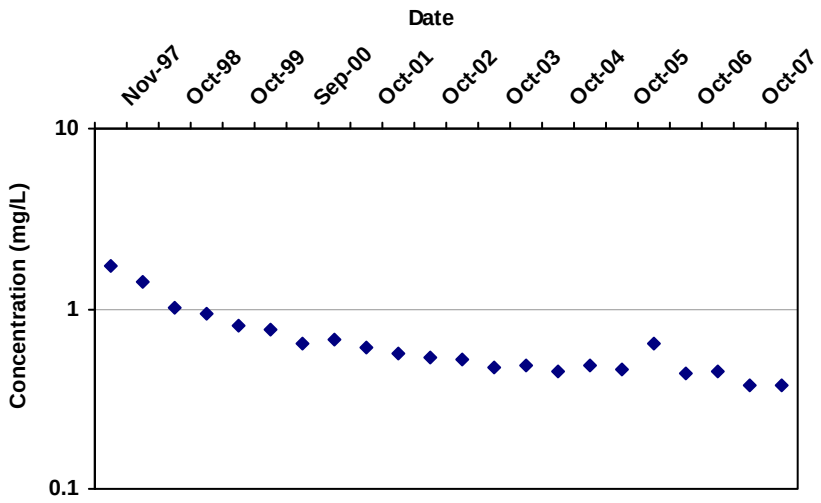
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	11/20/1997	MOLYBDENUM	1.6E+00		1	1
KM-13	S	5/5/1998	MOLYBDENUM	1.4E+00		1	1
KM-13	S	10/27/1998	MOLYBDENUM	7.8E-01		1	1
KM-13	S	5/4/1999	MOLYBDENUM	6.1E-01		1	1
KM-13	S	10/5/1999	MOLYBDENUM	6.5E-01		1	1
KM-13	S	5/8/2000	MOLYBDENUM	7.3E-01		1	1
KM-13	S	9/25/2000	MOLYBDENUM	5.0E-01		1	1
KM-13	S	4/28/2001	MOLYBDENUM	5.4E-01		1	1
KM-13	S	10/26/2001	MOLYBDENUM	4.0E-01		1	1
KM-13	S	5/31/2002	MOLYBDENUM	4.5E-01		1	1
KM-13	S	10/18/2002	MOLYBDENUM	4.3E-01		1	1
KM-13	S	5/31/2003	MOLYBDENUM	4.6E-01		1	1
KM-13	S	10/23/2003	MOLYBDENUM	3.9E-01		1	1
KM-13	S	5/3/2004	MOLYBDENUM	4.0E-01		1	1
KM-13	S	10/17/2004	MOLYBDENUM	3.3E-01		1	1
KM-13	S	5/3/2005	MOLYBDENUM	3.2E-01		1	1
KM-13	S	10/25/2005	MOLYBDENUM	3.0E-01		1	1
KM-13	S	5/16/2006	MOLYBDENUM	3.1E-01		1	1
KM-13	S	10/23/2006	MOLYBDENUM	2.6E-01		1	1
KM-13	S	5/14/2007	MOLYBDENUM	2.2E-01		1	1
KM-13	S	10/15/2007	MOLYBDENUM	1.7E-01		1	1
KM-13	S	5/5/2008	MOLYBDENUM	2.3E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-15
Well Type: T
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-196

Confidence in Trend:

100.0%

Coefficient of Variation:

0.51

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

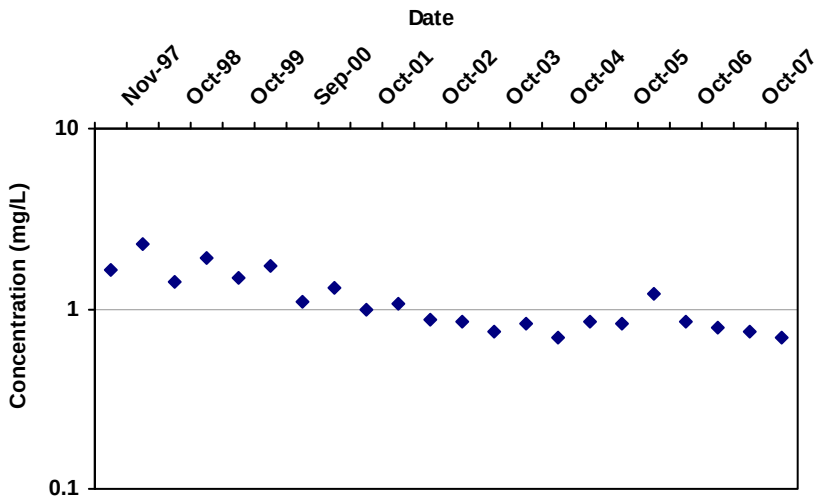
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	11/20/1997	MOLYBDENUM	1.7E+00		1	1
KM-15	T	5/5/1998	MOLYBDENUM	1.4E+00		1	1
KM-15	T	10/27/1998	MOLYBDENUM	1.0E+00		1	1
KM-15	T	5/4/1999	MOLYBDENUM	9.3E-01		1	1
KM-15	T	10/5/1999	MOLYBDENUM	8.1E-01		1	1
KM-15	T	5/8/2000	MOLYBDENUM	7.7E-01		1	1
KM-15	T	9/25/2000	MOLYBDENUM	6.4E-01		1	1
KM-15	T	4/28/2001	MOLYBDENUM	6.7E-01		1	1
KM-15	T	10/26/2001	MOLYBDENUM	6.1E-01		1	1
KM-15	T	5/31/2002	MOLYBDENUM	5.6E-01		1	1
KM-15	T	10/18/2002	MOLYBDENUM	5.3E-01		1	1
KM-15	T	5/31/2003	MOLYBDENUM	5.2E-01		1	1
KM-15	T	10/23/2003	MOLYBDENUM	4.7E-01		1	1
KM-15	T	5/3/2004	MOLYBDENUM	4.9E-01		1	1
KM-15	T	10/17/2004	MOLYBDENUM	4.5E-01		1	1
KM-15	T	5/3/2005	MOLYBDENUM	4.9E-01		1	1
KM-15	T	10/25/2005	MOLYBDENUM	4.6E-01		1	1
KM-15	T	5/16/2006	MOLYBDENUM	6.4E-01		1	1
KM-15	T	10/23/2006	MOLYBDENUM	4.4E-01		1	1
KM-15	T	5/14/2007	MOLYBDENUM	4.5E-01		1	1
KM-15	T	10/15/2007	MOLYBDENUM	3.8E-01		1	1
KM-15	T	5/5/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-16
Well Type: T
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-158

Confidence in Trend:

100.0%

Coefficient of Variation:

0.39

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

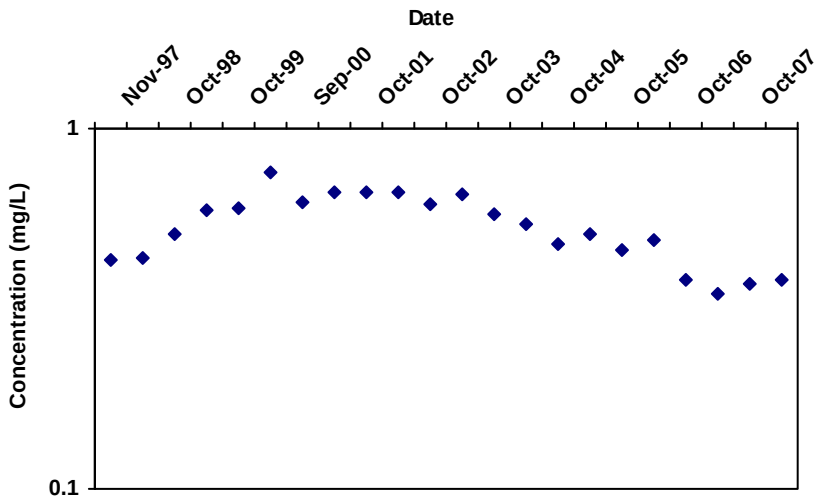
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	11/20/1997	MOLYBDENUM	1.6E+00		1	1
KM-16	T	5/5/1998	MOLYBDENUM	2.3E+00		1	1
KM-16	T	10/27/1998	MOLYBDENUM	1.4E+00		1	1
KM-16	T	5/4/1999	MOLYBDENUM	1.9E+00		1	1
KM-16	T	10/5/1999	MOLYBDENUM	1.5E+00		1	1
KM-16	T	5/8/2000	MOLYBDENUM	1.7E+00		1	1
KM-16	T	9/25/2000	MOLYBDENUM	1.1E+00		1	1
KM-16	T	4/28/2001	MOLYBDENUM	1.3E+00		1	1
KM-16	T	10/26/2001	MOLYBDENUM	1.0E+00		1	1
KM-16	T	5/31/2002	MOLYBDENUM	1.1E+00		1	1
KM-16	T	10/18/2002	MOLYBDENUM	8.8E-01		1	1
KM-16	T	5/31/2003	MOLYBDENUM	8.4E-01		1	1
KM-16	T	10/23/2003	MOLYBDENUM	7.4E-01		1	1
KM-16	T	5/3/2004	MOLYBDENUM	8.2E-01		1	1
KM-16	T	10/17/2004	MOLYBDENUM	7.0E-01		1	1
KM-16	T	5/3/2005	MOLYBDENUM	8.4E-01		1	1
KM-16	T	10/25/2005	MOLYBDENUM	8.2E-01		1	1
KM-16	T	5/16/2006	MOLYBDENUM	1.2E+00		1	1
KM-16	T	10/23/2006	MOLYBDENUM	8.5E-01		1	1
KM-16	T	5/14/2007	MOLYBDENUM	7.8E-01		1	1
KM-16	T	10/15/2007	MOLYBDENUM	7.5E-01		1	1
KM-16	T	5/5/2008	MOLYBDENUM	7.0E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-17
Well Type: T
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-85

Confidence in Trend:

99.2%

Coefficient of Variation:

0.22

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

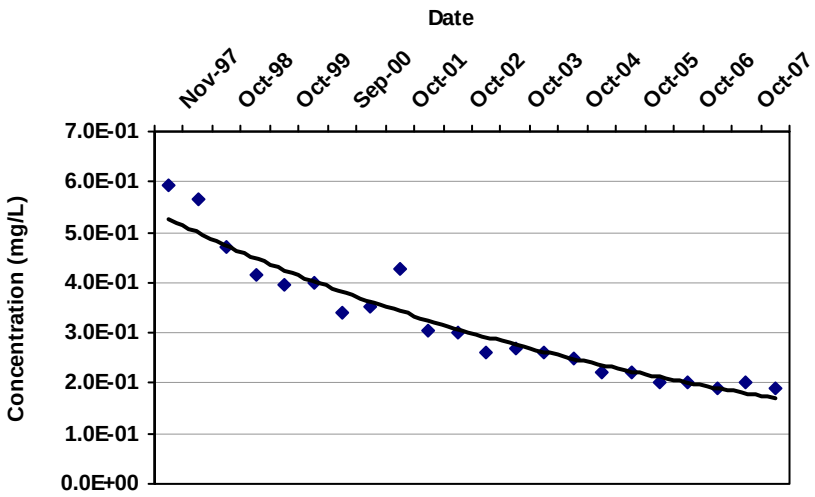
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	T	11/20/1997	MOLYBDENUM	4.3E-01		1	1
KM-17	T	5/5/1998	MOLYBDENUM	4.4E-01		1	1
KM-17	T	10/27/1998	MOLYBDENUM	5.1E-01		1	1
KM-17	T	5/4/1999	MOLYBDENUM	5.9E-01		1	1
KM-17	T	10/5/1999	MOLYBDENUM	6.1E-01		1	1
KM-17	T	5/8/2000	MOLYBDENUM	7.5E-01		1	1
KM-17	T	9/25/2000	MOLYBDENUM	6.3E-01		1	1
KM-17	T	4/28/2001	MOLYBDENUM	6.7E-01		1	1
KM-17	T	10/26/2001	MOLYBDENUM	6.6E-01		1	1
KM-17	T	5/31/2002	MOLYBDENUM	6.7E-01		1	1
KM-17	T	10/18/2002	MOLYBDENUM	6.2E-01		1	1
KM-17	T	5/31/2003	MOLYBDENUM	6.6E-01		1	1
KM-17	T	10/23/2003	MOLYBDENUM	5.8E-01		1	1
KM-17	T	5/3/2004	MOLYBDENUM	5.4E-01		1	1
KM-17	T	10/17/2004	MOLYBDENUM	4.8E-01		1	1
KM-17	T	5/3/2005	MOLYBDENUM	5.1E-01		1	1
KM-17	T	10/25/2005	MOLYBDENUM	4.6E-01		1	1
KM-17	T	5/16/2006	MOLYBDENUM	4.9E-01		1	1
KM-17	T	10/23/2006	MOLYBDENUM	3.8E-01		1	1
KM-17	T	5/14/2007	MOLYBDENUM	3.5E-01		1	1
KM-17	T	10/15/2007	MOLYBDENUM	3.7E-01		1	1
KM-17	T	5/5/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = Non-detect

MAROS Linear Regression Statistics

Well: Finch Spring
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.38

Confidence in Trend: 100.0%

Ln Slope: -2.9E-04

LR Concentration Trend: D

Consolidation Data Table:

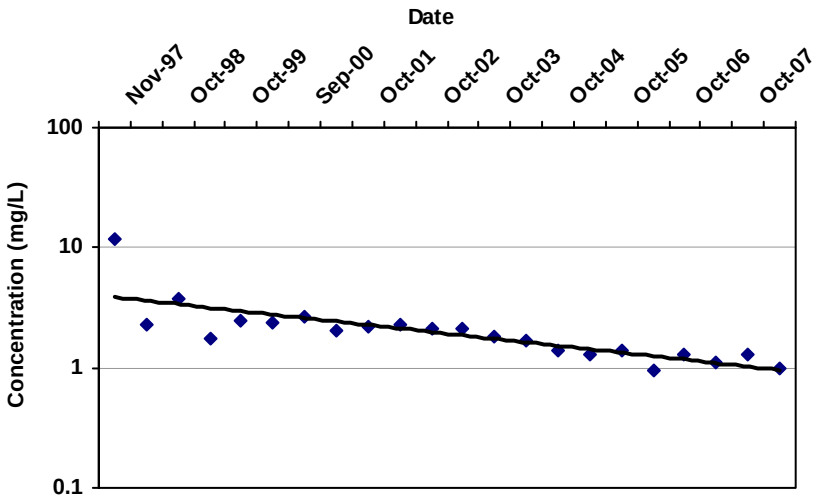
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	11/20/1997	MOLYBDENUM	5.9E-01		1	1
Finch Spring	T	5/5/1998	MOLYBDENUM	5.6E-01		1	1
Finch Spring	T	10/27/1998	MOLYBDENUM	4.7E-01		1	1
Finch Spring	T	5/4/1999	MOLYBDENUM	4.2E-01		1	1
Finch Spring	T	10/5/1999	MOLYBDENUM	4.0E-01		1	1
Finch Spring	T	5/8/2000	MOLYBDENUM	4.0E-01		1	1
Finch Spring	T	9/25/2000	MOLYBDENUM	3.4E-01		1	1
Finch Spring	T	4/27/2001	MOLYBDENUM	3.5E-01		1	1
Finch Spring	T	10/26/2001	MOLYBDENUM	4.3E-01		1	1
Finch Spring	T	5/31/2002	MOLYBDENUM	3.1E-01		1	1
Finch Spring	T	10/18/2002	MOLYBDENUM	3.0E-01		1	1
Finch Spring	T	5/31/2003	MOLYBDENUM	2.6E-01		1	1
Finch Spring	T	10/23/2003	MOLYBDENUM	2.7E-01		1	1
Finch Spring	T	5/3/2004	MOLYBDENUM	2.6E-01		1	1
Finch Spring	T	10/13/2004	MOLYBDENUM	2.5E-01		1	1
Finch Spring	T	5/3/2005	MOLYBDENUM	2.2E-01		1	1
Finch Spring	T	10/25/2005	MOLYBDENUM	2.2E-01		1	1
Finch Spring	T	5/15/2006	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	10/23/2006	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	5/14/2007	MOLYBDENUM	1.9E-01		1	1
Finch Spring	T	10/15/2007	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	5/5/2008	MOLYBDENUM	1.9E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-2
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.95

Confidence in Trend: 100.0%

Ln Slope: -3.6E-04

LR Concentration Trend: D

Consolidation Data Table:

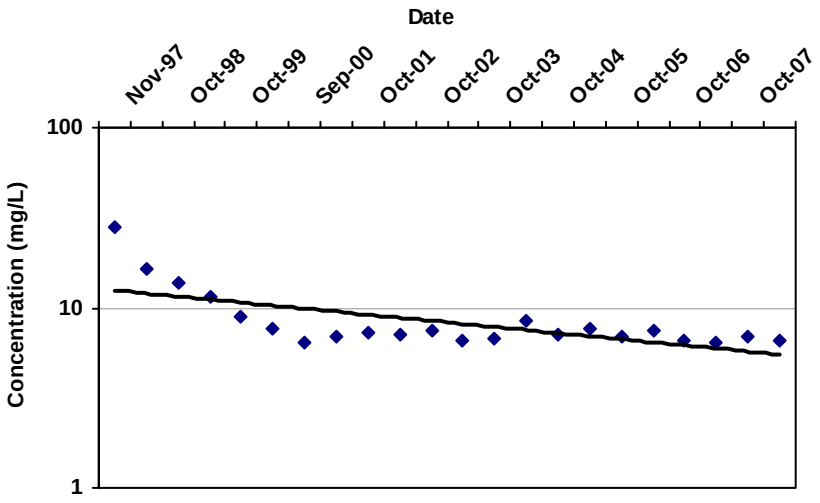
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	11/20/1997	MOLYBDENUM	1.2E+01		1	1
KM-2	S	5/5/1998	MOLYBDENUM	2.3E+00		1	1
KM-2	S	10/27/1998	MOLYBDENUM	3.8E+00		1	1
KM-2	S	5/4/1999	MOLYBDENUM	1.8E+00		1	1
KM-2	S	10/5/1999	MOLYBDENUM	2.5E+00		1	1
KM-2	S	5/8/2000	MOLYBDENUM	2.4E+00		1	1
KM-2	S	9/25/2000	MOLYBDENUM	2.7E+00		1	1
KM-2	S	4/28/2001	MOLYBDENUM	2.1E+00		1	1
KM-2	S	10/26/2001	MOLYBDENUM	2.2E+00		1	1
KM-2	S	5/31/2002	MOLYBDENUM	2.3E+00		1	1
KM-2	S	10/18/2002	MOLYBDENUM	2.1E+00		1	1
KM-2	S	5/31/2003	MOLYBDENUM	2.1E+00		1	1
KM-2	S	10/23/2003	MOLYBDENUM	1.8E+00		1	1
KM-2	S	5/3/2004	MOLYBDENUM	1.7E+00		1	1
KM-2	S	10/17/2004	MOLYBDENUM	1.4E+00		1	1
KM-2	S	5/3/2005	MOLYBDENUM	1.3E+00		1	1
KM-2	S	10/25/2005	MOLYBDENUM	1.4E+00		1	1
KM-2	S	5/16/2006	MOLYBDENUM	9.6E-01		1	1
KM-2	S	10/23/2006	MOLYBDENUM	1.3E+00		1	1
KM-2	S	5/14/2007	MOLYBDENUM	1.1E+00		1	1
KM-2	S	10/15/2007	MOLYBDENUM	1.3E+00		1	1
KM-2	S	5/5/2008	MOLYBDENUM	1.0E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-3
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.55

Confidence in Trend: 100.0%

Ln Slope: -2.1E-04

LR Concentration Trend: D

Consolidation Data Table:

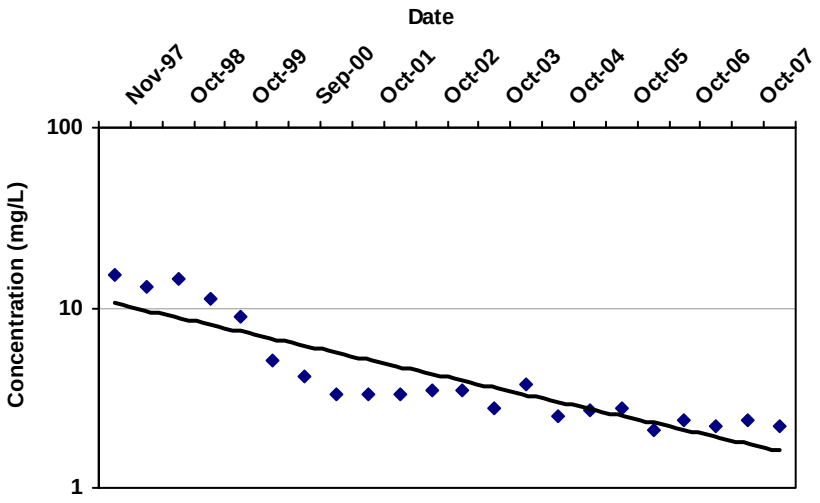
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	11/20/1997	MOLYBDENUM	2.8E+01		1	1
KM-3	S	5/5/1998	MOLYBDENUM	1.6E+01		1	1
KM-3	S	10/27/1998	MOLYBDENUM	1.4E+01		1	1
KM-3	S	5/4/1999	MOLYBDENUM	1.1E+01		1	1
KM-3	S	10/5/1999	MOLYBDENUM	8.8E+00		1	1
KM-3	S	5/8/2000	MOLYBDENUM	7.6E+00		1	1
KM-3	S	9/25/2000	MOLYBDENUM	6.4E+00		1	1
KM-3	S	4/28/2001	MOLYBDENUM	6.9E+00		1	1
KM-3	S	10/26/2001	MOLYBDENUM	7.4E+00		1	1
KM-3	S	5/31/2002	MOLYBDENUM	7.1E+00		1	1
KM-3	S	10/18/2002	MOLYBDENUM	7.5E+00		1	1
KM-3	S	5/31/2003	MOLYBDENUM	6.6E+00		1	1
KM-3	S	10/23/2003	MOLYBDENUM	6.8E+00		1	1
KM-3	S	5/3/2004	MOLYBDENUM	8.4E+00		1	1
KM-3	S	10/17/2004	MOLYBDENUM	7.1E+00		1	1
KM-3	S	5/3/2005	MOLYBDENUM	7.7E+00		1	1
KM-3	S	10/25/2005	MOLYBDENUM	6.9E+00		1	1
KM-3	S	5/16/2006	MOLYBDENUM	7.4E+00		1	1
KM-3	S	10/23/2006	MOLYBDENUM	6.6E+00		1	1
KM-3	S	5/14/2007	MOLYBDENUM	6.4E+00		1	1
KM-3	S	10/15/2007	MOLYBDENUM	6.9E+00		1	1
KM-3	S	5/5/2008	MOLYBDENUM	6.5E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-4
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.82

Confidence in Trend: 100.0%

Ln Slope: -4.9E-04

LR Concentration Trend: D

Consolidation Data Table:

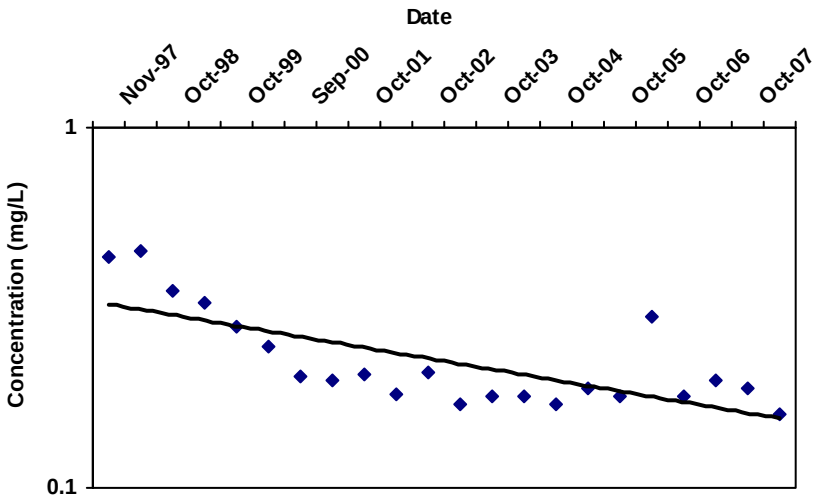
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	11/20/1997	MOLYBDENUM	1.5E+01		1	1
KM-4	S	5/5/1998	MOLYBDENUM	1.3E+01		1	1
KM-4	S	10/27/1998	MOLYBDENUM	1.4E+01		1	1
KM-4	S	5/4/1999	MOLYBDENUM	1.1E+01		1	1
KM-4	S	10/5/1999	MOLYBDENUM	9.0E+00		1	1
KM-4	S	5/8/2000	MOLYBDENUM	5.1E+00		1	1
KM-4	S	9/25/2000	MOLYBDENUM	4.1E+00		1	1
KM-4	S	4/28/2001	MOLYBDENUM	3.3E+00		1	1
KM-4	S	10/26/2001	MOLYBDENUM	3.3E+00		1	1
KM-4	S	5/31/2002	MOLYBDENUM	3.3E+00		1	1
KM-4	S	10/18/2002	MOLYBDENUM	3.5E+00		1	1
KM-4	S	5/31/2003	MOLYBDENUM	3.5E+00		1	1
KM-4	S	10/23/2003	MOLYBDENUM	2.8E+00		1	1
KM-4	S	5/3/2004	MOLYBDENUM	3.8E+00		1	1
KM-4	S	10/17/2004	MOLYBDENUM	2.5E+00		1	1
KM-4	S	5/3/2005	MOLYBDENUM	2.7E+00		1	1
KM-4	S	10/25/2005	MOLYBDENUM	2.8E+00		1	1
KM-4	S	5/16/2006	MOLYBDENUM	2.1E+00		1	1
KM-4	S	10/23/2006	MOLYBDENUM	2.4E+00		1	1
KM-4	S	5/14/2007	MOLYBDENUM	2.2E+00		1	1
KM-4	S	10/15/2007	MOLYBDENUM	2.4E+00		1	1
KM-4	S	5/5/2008	MOLYBDENUM	2.2E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-5
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.36

Confidence in Trend: 100.0%

Ln Slope: -1.9E-04

LR Concentration Trend: D

Consolidation Data Table:

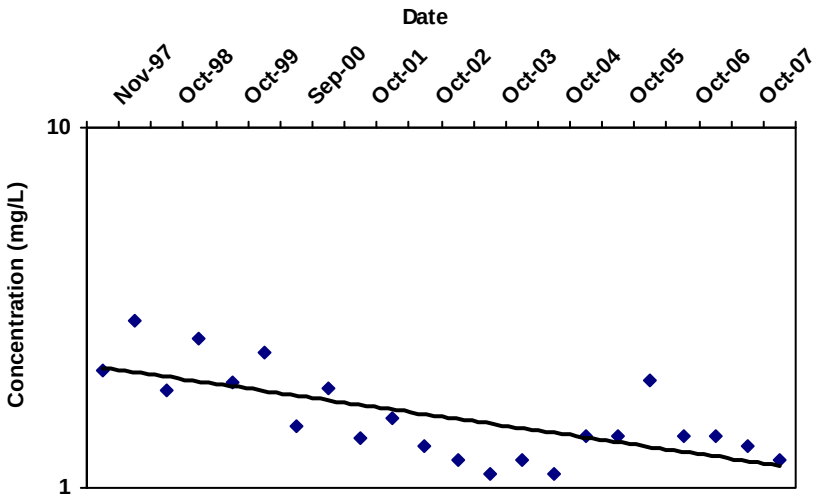
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	11/20/1997	MOLYBDENUM	4.4E-01		1	1
KM-5	S	5/5/1998	MOLYBDENUM	4.5E-01		1	1
KM-5	S	10/27/1998	MOLYBDENUM	3.5E-01		1	1
KM-5	S	5/4/1999	MOLYBDENUM	3.3E-01		1	1
KM-5	S	10/5/1999	MOLYBDENUM	2.8E-01		1	1
KM-5	S	5/8/2000	MOLYBDENUM	2.5E-01		1	1
KM-5	S	9/25/2000	MOLYBDENUM	2.1E-01		1	1
KM-5	S	4/28/2001	MOLYBDENUM	2.0E-01		1	1
KM-5	S	10/26/2001	MOLYBDENUM	2.1E-01		1	1
KM-5	S	5/31/2002	MOLYBDENUM	1.8E-01		1	1
KM-5	S	10/18/2002	MOLYBDENUM	2.1E-01		1	1
KM-5	S	5/31/2003	MOLYBDENUM	1.7E-01		1	1
KM-5	S	10/23/2003	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/3/2004	MOLYBDENUM	1.8E-01		1	1
KM-5	S	10/17/2004	MOLYBDENUM	1.7E-01		1	1
KM-5	S	5/3/2005	MOLYBDENUM	1.9E-01		1	1
KM-5	S	10/25/2005	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/16/2006	MOLYBDENUM	3.0E-01		1	1
KM-5	S	10/23/2006	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/14/2007	MOLYBDENUM	2.0E-01		1	1
KM-5	S	10/15/2007	MOLYBDENUM	1.9E-01		1	1
KM-5	S	5/5/2008	MOLYBDENUM	1.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-6
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.31

Confidence in Trend: 100.0%

Ln Slope: -1.6E-04

LR Concentration Trend: D

Consolidation Data Table:

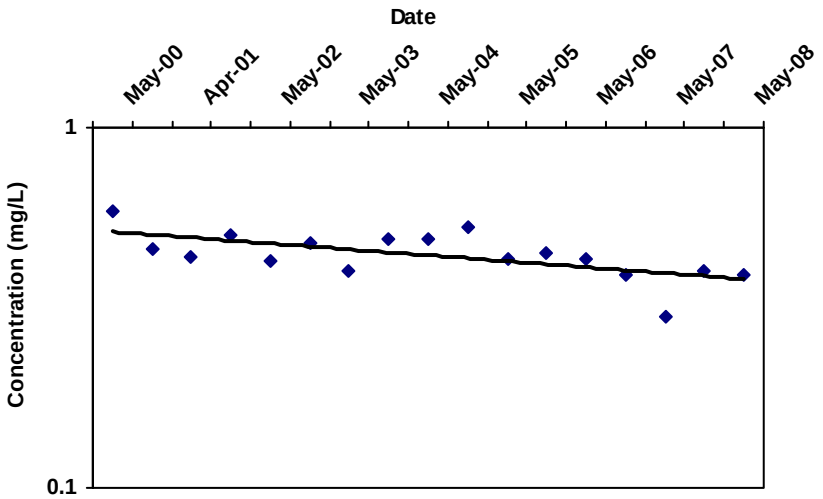
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	11/20/1997	MOLYBDENUM	2.1E+00		1	1
KM-6	S	5/5/1998	MOLYBDENUM	2.9E+00		1	1
KM-6	S	10/27/1998	MOLYBDENUM	1.9E+00		1	1
KM-6	S	5/4/1999	MOLYBDENUM	2.6E+00		1	1
KM-6	S	10/5/1999	MOLYBDENUM	2.0E+00		1	1
KM-6	S	5/8/2000	MOLYBDENUM	2.4E+00		1	1
KM-6	S	9/25/2000	MOLYBDENUM	1.5E+00		1	1
KM-6	S	4/28/2001	MOLYBDENUM	1.9E+00		1	1
KM-6	S	10/26/2001	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/31/2002	MOLYBDENUM	1.6E+00		1	1
KM-6	S	10/18/2002	MOLYBDENUM	1.3E+00		1	1
KM-6	S	5/31/2003	MOLYBDENUM	1.2E+00		1	1
KM-6	S	10/23/2003	MOLYBDENUM	1.1E+00		1	1
KM-6	S	5/3/2004	MOLYBDENUM	1.2E+00		1	1
KM-6	S	10/17/2004	MOLYBDENUM	1.1E+00		1	1
KM-6	S	5/3/2005	MOLYBDENUM	1.4E+00		1	1
KM-6	S	10/25/2005	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/16/2006	MOLYBDENUM	2.0E+00		1	1
KM-6	S	10/23/2006	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/14/2007	MOLYBDENUM	1.4E+00		1	1
KM-6	S	10/15/2007	MOLYBDENUM	1.3E+00		1	1
KM-6	S	5/5/2008	MOLYBDENUM	1.2E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-7
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.15

Confidence in Trend: 99.7%

Ln Slope: -1.0E-04

LR Concentration Trend: D

Consolidation Data Table:

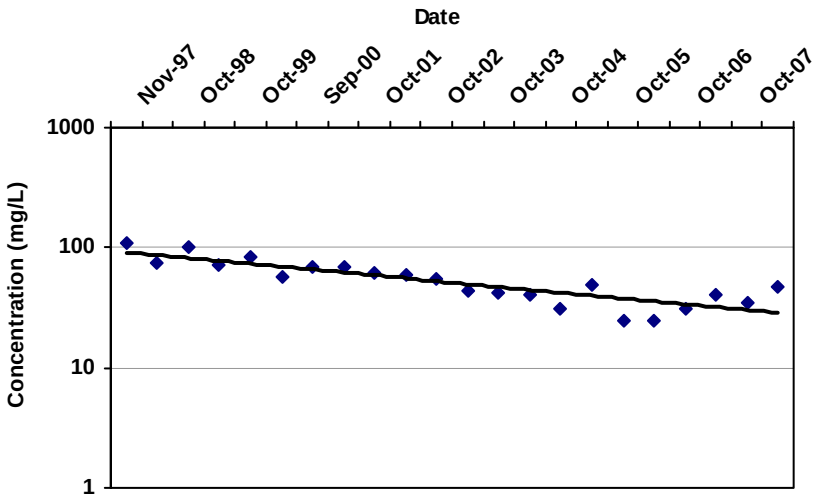
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	5/8/2000	MOLYBDENUM	5.8E-01		1	1
KM-7	S	9/25/2000	MOLYBDENUM	4.6E-01		1	1
KM-7	S	4/28/2001	MOLYBDENUM	4.4E-01		1	1
KM-7	S	10/26/2001	MOLYBDENUM	5.0E-01		1	1
KM-7	S	5/31/2002	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/18/2002	MOLYBDENUM	4.8E-01		1	1
KM-7	S	5/31/2003	MOLYBDENUM	4.0E-01		1	1
KM-7	S	10/23/2003	MOLYBDENUM	4.9E-01		1	1
KM-7	S	5/3/2004	MOLYBDENUM	4.9E-01		1	1
KM-7	S	10/17/2004	MOLYBDENUM	5.3E-01		1	1
KM-7	S	5/3/2005	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/25/2005	MOLYBDENUM	4.5E-01		1	1
KM-7	S	5/16/2006	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/23/2006	MOLYBDENUM	3.9E-01		1	1
KM-7	S	5/14/2007	MOLYBDENUM	3.0E-01		1	1
KM-7	S	10/15/2007	MOLYBDENUM	4.0E-01		1	1
KM-7	S	5/5/2008	MOLYBDENUM	3.9E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-8
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.42

Confidence in Trend: 100.0%

Ln Slope: -3.0E-04

LR Concentration Trend: D

Consolidation Data Table:

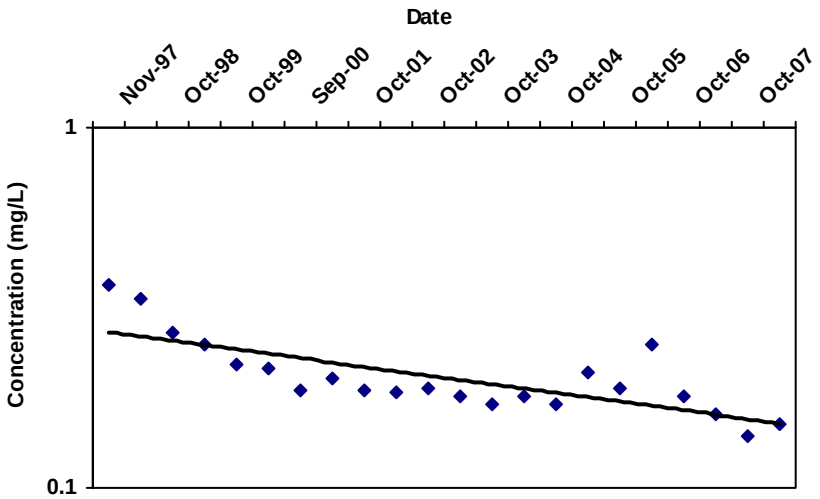
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	11/20/1997	MOLYBDENUM	1.1E+02		1	1
KM-8	S	5/5/1998	MOLYBDENUM	7.4E+01		1	1
KM-8	S	10/27/1998	MOLYBDENUM	1.0E+02		1	1
KM-8	S	5/4/1999	MOLYBDENUM	7.1E+01		1	1
KM-8	S	10/5/1999	MOLYBDENUM	8.4E+01		1	1
KM-8	S	5/8/2000	MOLYBDENUM	5.8E+01		1	1
KM-8	S	9/25/2000	MOLYBDENUM	7.0E+01		1	1
KM-8	S	4/28/2001	MOLYBDENUM	7.0E+01		1	1
KM-8	S	10/26/2001	MOLYBDENUM	6.2E+01		1	1
KM-8	S	5/31/2002	MOLYBDENUM	5.8E+01		1	1
KM-8	S	10/18/2002	MOLYBDENUM	5.5E+01		1	1
KM-8	S	5/31/2003	MOLYBDENUM	4.4E+01		1	1
KM-8	S	10/23/2003	MOLYBDENUM	4.2E+01		1	1
KM-8	S	5/3/2004	MOLYBDENUM	4.0E+01		1	1
KM-8	S	10/17/2004	MOLYBDENUM	3.1E+01		1	1
KM-8	S	5/3/2005	MOLYBDENUM	4.9E+01		1	1
KM-8	S	10/25/2005	MOLYBDENUM	2.5E+01		1	1
KM-8	S	5/16/2006	MOLYBDENUM	2.5E+01		1	1
KM-8	S	10/23/2006	MOLYBDENUM	3.1E+01		1	1
KM-8	S	5/14/2007	MOLYBDENUM	4.1E+01		1	1
KM-8	S	10/15/2007	MOLYBDENUM	3.5E+01		1	1
KM-8	S	5/5/2008	MOLYBDENUM	4.7E+01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-9
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.27

Confidence in Trend: 100.0%

Ln Slope: -1.5E-04

LR Concentration Trend: D

Consolidation Data Table:

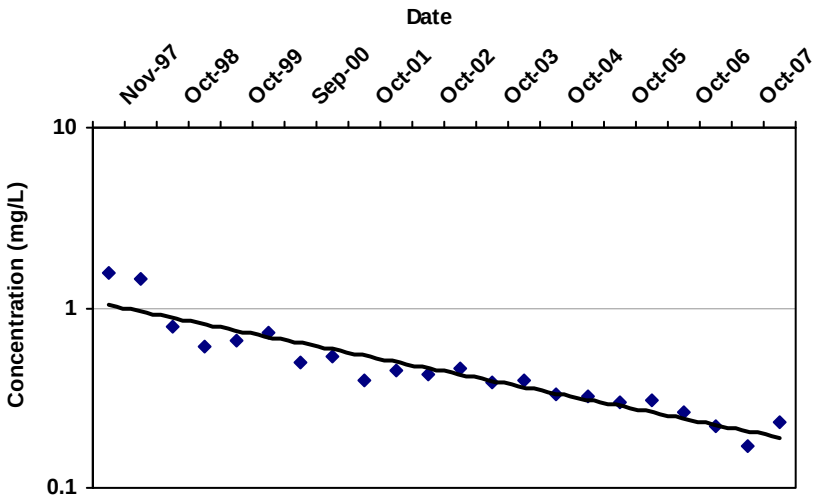
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	11/20/1997	MOLYBDENUM	3.6E-01		1	1
KM-9	S	5/5/1998	MOLYBDENUM	3.4E-01		1	1
KM-9	S	10/27/1998	MOLYBDENUM	2.7E-01		1	1
KM-9	S	5/4/1999	MOLYBDENUM	2.5E-01		1	1
KM-9	S	10/5/1999	MOLYBDENUM	2.2E-01		1	1
KM-9	S	5/8/2000	MOLYBDENUM	2.1E-01		1	1
KM-9	S	9/25/2000	MOLYBDENUM	1.9E-01		1	1
KM-9	S	4/28/2001	MOLYBDENUM	2.0E-01		1	1
KM-9	S	10/26/2001	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/31/2002	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/18/2002	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/31/2003	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/23/2003	MOLYBDENUM	1.7E-01		1	1
KM-9	S	5/3/2004	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/17/2004	MOLYBDENUM	1.7E-01		1	1
KM-9	S	5/3/2005	MOLYBDENUM	2.1E-01		1	1
KM-9	S	10/25/2005	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/16/2006	MOLYBDENUM	2.5E-01		1	1
KM-9	S	10/23/2006	MOLYBDENUM	1.8E-01		1	1
KM-9	S	5/14/2007	MOLYBDENUM	1.6E-01		1	1
KM-9	S	10/15/2007	MOLYBDENUM	1.4E-01		1	1
KM-9	S	5/5/2008	MOLYBDENUM	1.5E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-13
Well Type: S
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.68

Confidence in Trend: 100.0%

Ln Slope: -4.4E-04

LR Concentration Trend: D

Consolidation Data Table:

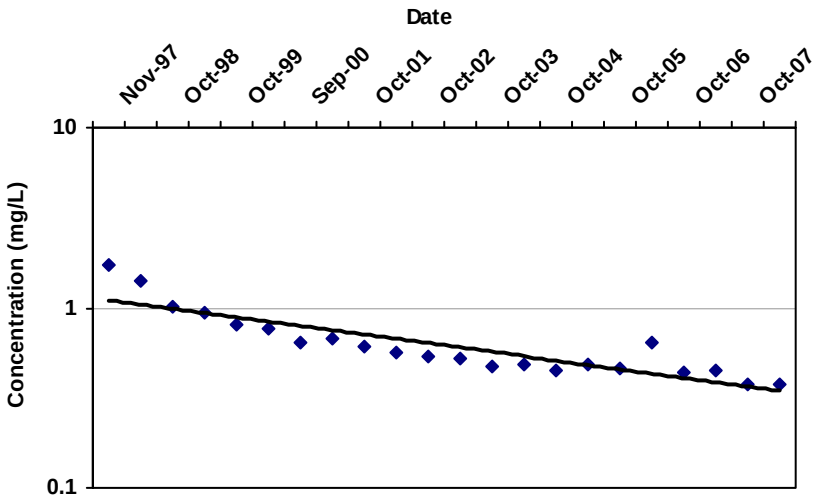
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	11/20/1997	MOLYBDENUM	1.6E+00		1	1
KM-13	S	5/5/1998	MOLYBDENUM	1.4E+00		1	1
KM-13	S	10/27/1998	MOLYBDENUM	7.8E-01		1	1
KM-13	S	5/4/1999	MOLYBDENUM	6.1E-01		1	1
KM-13	S	10/5/1999	MOLYBDENUM	6.5E-01		1	1
KM-13	S	5/8/2000	MOLYBDENUM	7.3E-01		1	1
KM-13	S	9/25/2000	MOLYBDENUM	5.0E-01		1	1
KM-13	S	4/28/2001	MOLYBDENUM	5.4E-01		1	1
KM-13	S	10/26/2001	MOLYBDENUM	4.0E-01		1	1
KM-13	S	5/31/2002	MOLYBDENUM	4.5E-01		1	1
KM-13	S	10/18/2002	MOLYBDENUM	4.3E-01		1	1
KM-13	S	5/31/2003	MOLYBDENUM	4.6E-01		1	1
KM-13	S	10/23/2003	MOLYBDENUM	3.9E-01		1	1
KM-13	S	5/3/2004	MOLYBDENUM	4.0E-01		1	1
KM-13	S	10/17/2004	MOLYBDENUM	3.3E-01		1	1
KM-13	S	5/3/2005	MOLYBDENUM	3.2E-01		1	1
KM-13	S	10/25/2005	MOLYBDENUM	3.0E-01		1	1
KM-13	S	5/16/2006	MOLYBDENUM	3.1E-01		1	1
KM-13	S	10/23/2006	MOLYBDENUM	2.6E-01		1	1
KM-13	S	5/14/2007	MOLYBDENUM	2.2E-01		1	1
KM-13	S	10/15/2007	MOLYBDENUM	1.7E-01		1	1
KM-13	S	5/5/2008	MOLYBDENUM	2.3E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-15
Well Type: T
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.51

Confidence in Trend: 100.0%

Ln Slope: -3.0E-04

LR Concentration Trend: D

Consolidation Data Table:

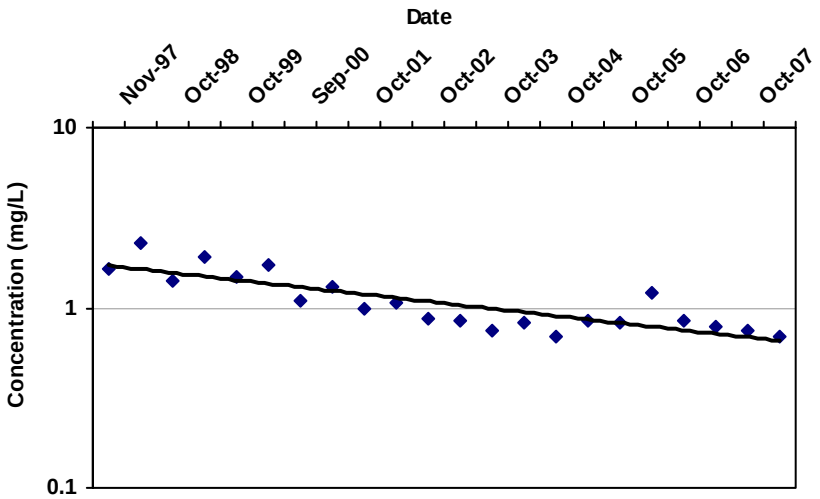
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	11/20/1997	MOLYBDENUM	1.7E+00		1	1
KM-15	T	5/5/1998	MOLYBDENUM	1.4E+00		1	1
KM-15	T	10/27/1998	MOLYBDENUM	1.0E+00		1	1
KM-15	T	5/4/1999	MOLYBDENUM	9.3E-01		1	1
KM-15	T	10/5/1999	MOLYBDENUM	8.1E-01		1	1
KM-15	T	5/8/2000	MOLYBDENUM	7.7E-01		1	1
KM-15	T	9/25/2000	MOLYBDENUM	6.4E-01		1	1
KM-15	T	4/28/2001	MOLYBDENUM	6.7E-01		1	1
KM-15	T	10/26/2001	MOLYBDENUM	6.1E-01		1	1
KM-15	T	5/31/2002	MOLYBDENUM	5.6E-01		1	1
KM-15	T	10/18/2002	MOLYBDENUM	5.3E-01		1	1
KM-15	T	5/31/2003	MOLYBDENUM	5.2E-01		1	1
KM-15	T	10/23/2003	MOLYBDENUM	4.7E-01		1	1
KM-15	T	5/3/2004	MOLYBDENUM	4.9E-01		1	1
KM-15	T	10/17/2004	MOLYBDENUM	4.5E-01		1	1
KM-15	T	5/3/2005	MOLYBDENUM	4.9E-01		1	1
KM-15	T	10/25/2005	MOLYBDENUM	4.6E-01		1	1
KM-15	T	5/16/2006	MOLYBDENUM	6.4E-01		1	1
KM-15	T	10/23/2006	MOLYBDENUM	4.4E-01		1	1
KM-15	T	5/14/2007	MOLYBDENUM	4.5E-01		1	1
KM-15	T	10/15/2007	MOLYBDENUM	3.8E-01		1	1
KM-15	T	5/5/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-16
Well Type: T
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.39

Confidence in Trend: 100.0%

Ln Slope: -2.5E-04

LR Concentration Trend: D

Consolidation Data Table:

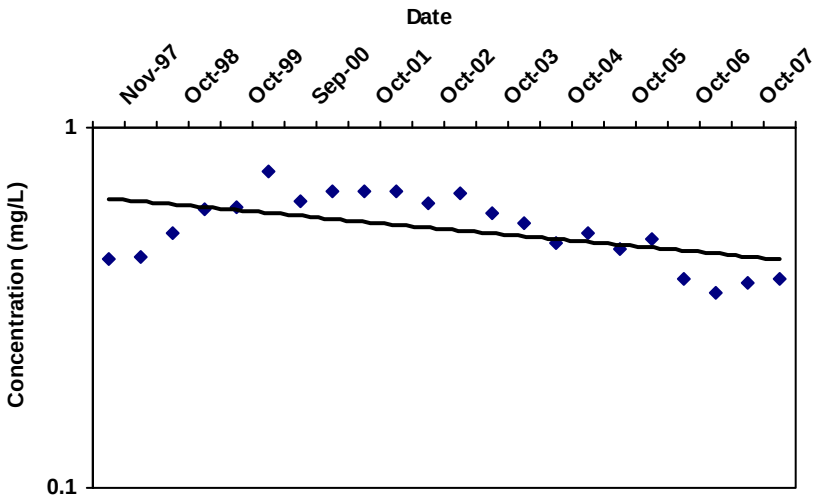
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	11/20/1997	MOLYBDENUM	1.6E+00		1	1
KM-16	T	5/5/1998	MOLYBDENUM	2.3E+00		1	1
KM-16	T	10/27/1998	MOLYBDENUM	1.4E+00		1	1
KM-16	T	5/4/1999	MOLYBDENUM	1.9E+00		1	1
KM-16	T	10/5/1999	MOLYBDENUM	1.5E+00		1	1
KM-16	T	5/8/2000	MOLYBDENUM	1.7E+00		1	1
KM-16	T	9/25/2000	MOLYBDENUM	1.1E+00		1	1
KM-16	T	4/28/2001	MOLYBDENUM	1.3E+00		1	1
KM-16	T	10/26/2001	MOLYBDENUM	1.0E+00		1	1
KM-16	T	5/31/2002	MOLYBDENUM	1.1E+00		1	1
KM-16	T	10/18/2002	MOLYBDENUM	8.8E-01		1	1
KM-16	T	5/31/2003	MOLYBDENUM	8.4E-01		1	1
KM-16	T	10/23/2003	MOLYBDENUM	7.4E-01		1	1
KM-16	T	5/3/2004	MOLYBDENUM	8.2E-01		1	1
KM-16	T	10/17/2004	MOLYBDENUM	7.0E-01		1	1
KM-16	T	5/3/2005	MOLYBDENUM	8.4E-01		1	1
KM-16	T	10/25/2005	MOLYBDENUM	8.2E-01		1	1
KM-16	T	5/16/2006	MOLYBDENUM	1.2E+00		1	1
KM-16	T	10/23/2006	MOLYBDENUM	8.5E-01		1	1
KM-16	T	5/14/2007	MOLYBDENUM	7.8E-01		1	1
KM-16	T	10/15/2007	MOLYBDENUM	7.5E-01		1	1
KM-16	T	5/5/2008	MOLYBDENUM	7.0E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-17
Well Type: T
COC: MOLYBDENUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.22

Confidence in Trend: 99.5%

Ln Slope: -1.0E-04

LR Concentration Trend: D

Consolidation Data Table:

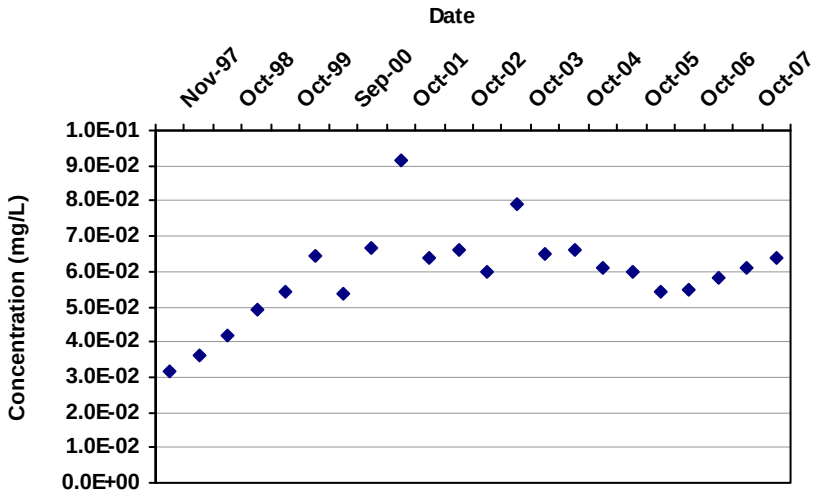
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	T	11/20/1997	MOLYBDENUM	4.3E-01		1	1
KM-17	T	5/5/1998	MOLYBDENUM	4.4E-01		1	1
KM-17	T	10/27/1998	MOLYBDENUM	5.1E-01		1	1
KM-17	T	5/4/1999	MOLYBDENUM	5.9E-01		1	1
KM-17	T	10/5/1999	MOLYBDENUM	6.1E-01		1	1
KM-17	T	5/8/2000	MOLYBDENUM	7.5E-01		1	1
KM-17	T	9/25/2000	MOLYBDENUM	6.3E-01		1	1
KM-17	T	4/28/2001	MOLYBDENUM	6.7E-01		1	1
KM-17	T	10/26/2001	MOLYBDENUM	6.6E-01		1	1
KM-17	T	5/31/2002	MOLYBDENUM	6.7E-01		1	1
KM-17	T	10/18/2002	MOLYBDENUM	6.2E-01		1	1
KM-17	T	5/31/2003	MOLYBDENUM	6.6E-01		1	1
KM-17	T	10/23/2003	MOLYBDENUM	5.8E-01		1	1
KM-17	T	5/3/2004	MOLYBDENUM	5.4E-01		1	1
KM-17	T	10/17/2004	MOLYBDENUM	4.8E-01		1	1
KM-17	T	5/3/2005	MOLYBDENUM	5.1E-01		1	1
KM-17	T	10/25/2005	MOLYBDENUM	4.6E-01		1	1
KM-17	T	5/16/2006	MOLYBDENUM	4.9E-01		1	1
KM-17	T	10/23/2006	MOLYBDENUM	3.8E-01		1	1
KM-17	T	5/14/2007	MOLYBDENUM	3.5E-01		1	1
KM-17	T	10/15/2007	MOLYBDENUM	3.7E-01		1	1
KM-17	T	5/5/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Mann-Kendall Statistics Summary

Well: Finch Spring
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

57

Confidence in Trend:

94.2%

Coefficient of Variation:

0.22

Mann Kendall Concentration Trend: (See Note)

PI

Data Table:

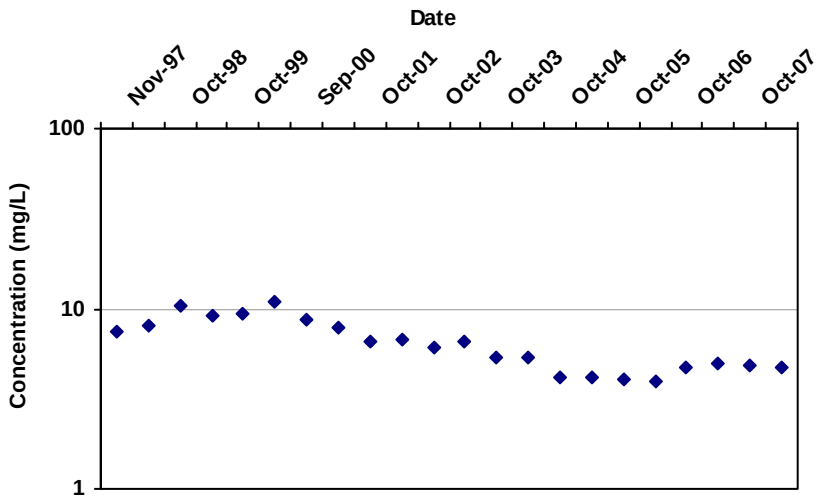
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	11/20/1997	VANADIUM	3.2E-02		1	1
Finch Spring	T	5/5/1998	VANADIUM	3.6E-02		1	1
Finch Spring	T	10/27/1998	VANADIUM	4.2E-02		1	1
Finch Spring	T	5/4/1999	VANADIUM	4.9E-02		1	1
Finch Spring	T	10/5/1999	VANADIUM	5.4E-02		1	1
Finch Spring	T	5/8/2000	VANADIUM	6.5E-02		1	1
Finch Spring	T	9/25/2000	VANADIUM	5.4E-02		1	1
Finch Spring	T	4/27/2001	VANADIUM	6.6E-02		1	1
Finch Spring	T	10/26/2001	VANADIUM	9.2E-02		1	1
Finch Spring	T	5/31/2002	VANADIUM	6.4E-02		1	1
Finch Spring	T	10/18/2002	VANADIUM	6.6E-02		1	1
Finch Spring	T	5/31/2003	VANADIUM	6.0E-02		1	1
Finch Spring	T	10/23/2003	VANADIUM	7.9E-02		1	1
Finch Spring	T	5/3/2004	VANADIUM	6.5E-02		1	1
Finch Spring	T	10/13/2004	VANADIUM	6.6E-02		1	1
Finch Spring	T	5/3/2005	VANADIUM	6.1E-02		1	1
Finch Spring	T	10/25/2005	VANADIUM	6.0E-02		1	1
Finch Spring	T	5/15/2006	VANADIUM	5.4E-02		1	1
Finch Spring	T	10/23/2006	VANADIUM	5.5E-02		1	1
Finch Spring	T	5/14/2007	VANADIUM	5.8E-02		1	1
Finch Spring	T	10/15/2007	VANADIUM	6.1E-02		1	1
Finch Spring	T	5/5/2008	VANADIUM	6.4E-02		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-2
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-155

Confidence in Trend:

100.0%

Coefficient of Variation:

0.33

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

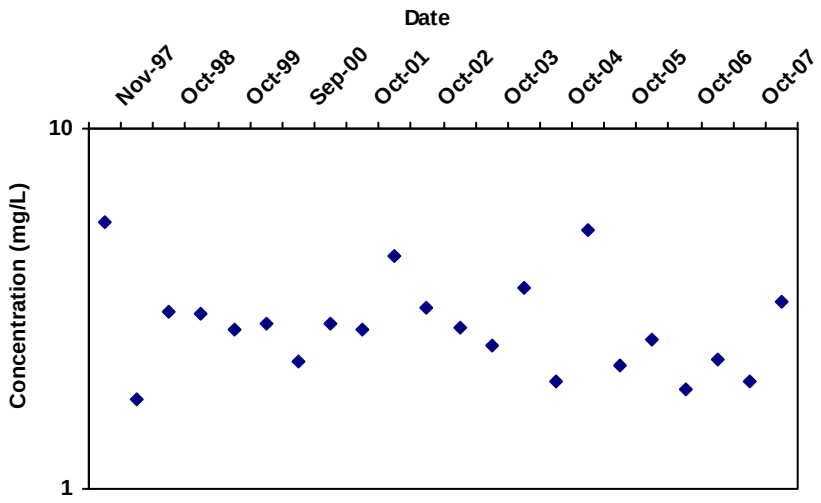
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	11/20/1997	VANADIUM	7.5E+00		1	1
KM-2	S	5/5/1998	VANADIUM	8.1E+00		1	1
KM-2	S	10/27/1998	VANADIUM	1.0E+01		1	1
KM-2	S	5/4/1999	VANADIUM	9.2E+00		1	1
KM-2	S	10/5/1999	VANADIUM	9.5E+00		1	1
KM-2	S	5/8/2000	VANADIUM	1.1E+01		1	1
KM-2	S	9/25/2000	VANADIUM	8.8E+00		1	1
KM-2	S	4/27/2001	VANADIUM	7.8E+00		1	1
KM-2	S	10/26/2001	VANADIUM	6.7E+00		1	1
KM-2	S	5/31/2002	VANADIUM	6.8E+00		1	1
KM-2	S	10/18/2002	VANADIUM	6.1E+00		1	1
KM-2	S	5/30/2003	VANADIUM	6.5E+00		1	1
KM-2	S	10/23/2003	VANADIUM	5.3E+00		1	1
KM-2	S	5/3/2004	VANADIUM	5.4E+00		1	1
KM-2	S	10/13/2004	VANADIUM	4.2E+00		1	1
KM-2	S	5/3/2005	VANADIUM	4.2E+00		1	1
KM-2	S	10/25/2005	VANADIUM	4.1E+00		1	1
KM-2	S	5/15/2006	VANADIUM	4.0E+00		1	1
KM-2	S	10/23/2006	VANADIUM	4.7E+00		1	1
KM-2	S	5/14/2007	VANADIUM	5.0E+00		1	1
KM-2	S	10/15/2007	VANADIUM	4.8E+00		1	1
KM-2	S	5/5/2008	VANADIUM	4.7E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-3
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-46

Confidence in Trend:

89.6%

Coefficient of Variation:

0.33

Mann Kendall Concentration Trend: (See Note)

S

Data Table:

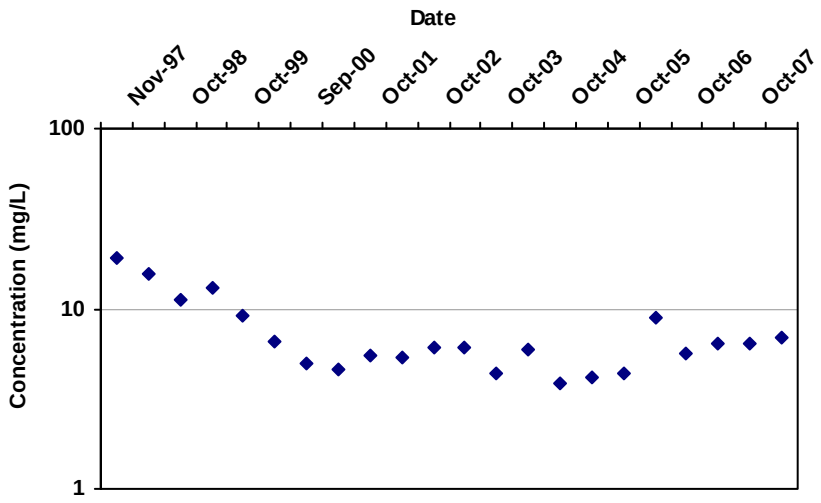
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	11/20/1997	VANADIUM	5.5E+00		1	1
KM-3	S	5/5/1998	VANADIUM	1.8E+00		1	1
KM-3	S	10/27/1998	VANADIUM	3.1E+00		1	1
KM-3	S	5/4/1999	VANADIUM	3.1E+00		1	1
KM-3	S	10/5/1999	VANADIUM	2.8E+00		1	1
KM-3	S	5/8/2000	VANADIUM	2.9E+00		1	1
KM-3	S	9/25/2000	VANADIUM	2.3E+00		1	1
KM-3	S	4/27/2001	VANADIUM	2.9E+00		1	1
KM-3	S	10/26/2001	VANADIUM	2.8E+00		1	1
KM-3	S	5/31/2002	VANADIUM	4.4E+00		1	1
KM-3	S	10/18/2002	VANADIUM	3.2E+00		1	1
KM-3	S	5/30/2003	VANADIUM	2.8E+00		1	1
KM-3	S	10/23/2003	VANADIUM	2.5E+00		1	1
KM-3	S	5/3/2004	VANADIUM	3.6E+00		1	1
KM-3	S	10/13/2004	VANADIUM	2.0E+00		1	1
KM-3	S	5/3/2005	VANADIUM	5.2E+00		1	1
KM-3	S	10/25/2005	VANADIUM	2.2E+00		1	1
KM-3	S	5/15/2006	VANADIUM	2.6E+00		1	1
KM-3	S	10/23/2006	VANADIUM	1.9E+00		1	1
KM-3	S	5/14/2007	VANADIUM	2.3E+00		1	1
KM-3	S	10/15/2007	VANADIUM	2.0E+00		1	1
KM-3	S	5/5/2008	VANADIUM	3.3E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-4
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-68

Confidence in Trend:

97.1%

Coefficient of Variation:

0.53

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

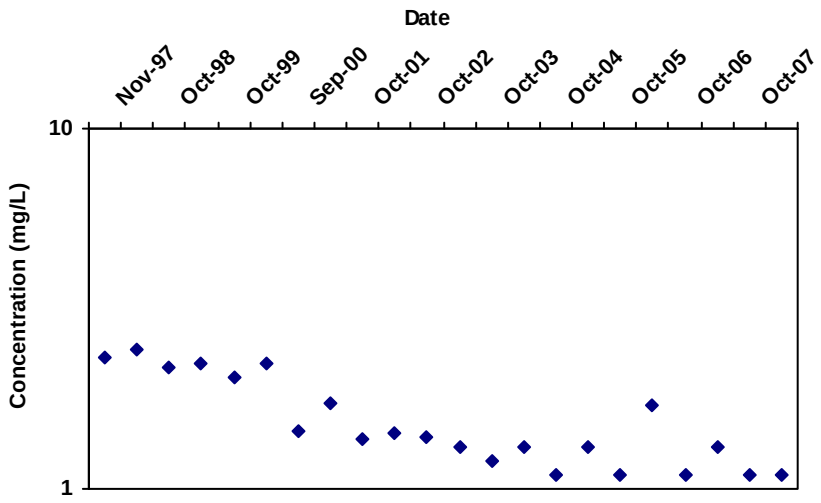
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	11/20/1997	VANADIUM	1.9E+01		1	1
KM-4	S	5/5/1998	VANADIUM	1.6E+01		1	1
KM-4	S	10/27/1998	VANADIUM	1.1E+01		1	1
KM-4	S	5/4/1999	VANADIUM	1.3E+01		1	1
KM-4	S	10/5/1999	VANADIUM	9.0E+00		1	1
KM-4	S	5/8/2000	VANADIUM	6.6E+00		1	1
KM-4	S	9/25/2000	VANADIUM	5.0E+00		1	1
KM-4	S	4/27/2001	VANADIUM	4.7E+00		1	1
KM-4	S	10/26/2001	VANADIUM	5.5E+00		1	1
KM-4	S	5/31/2002	VANADIUM	5.4E+00		1	1
KM-4	S	10/18/2002	VANADIUM	6.1E+00		1	1
KM-4	S	5/30/2003	VANADIUM	6.1E+00		1	1
KM-4	S	10/23/2003	VANADIUM	4.4E+00		1	1
KM-4	S	5/3/2004	VANADIUM	6.0E+00		1	1
KM-4	S	10/13/2004	VANADIUM	3.9E+00		1	1
KM-4	S	5/3/2005	VANADIUM	4.2E+00		1	1
KM-4	S	10/25/2005	VANADIUM	4.4E+00		1	1
KM-4	S	5/15/2006	VANADIUM	9.0E+00		1	1
KM-4	S	10/23/2006	VANADIUM	5.6E+00		1	1
KM-4	S	5/14/2007	VANADIUM	6.4E+00		1	1
KM-4	S	10/15/2007	VANADIUM	6.4E+00		1	1
KM-4	S	5/5/2008	VANADIUM	6.9E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-5
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-166

Confidence in Trend:

100.0%

Coefficient of Variation:

0.29

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

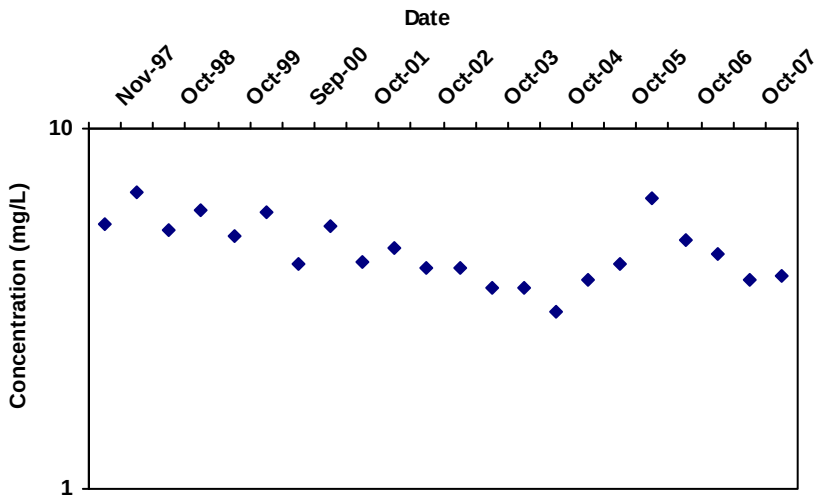
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	11/20/1997	VANADIUM	2.3E+00		1	1
KM-5	S	5/5/1998	VANADIUM	2.4E+00		1	1
KM-5	S	10/27/1998	VANADIUM	2.2E+00		1	1
KM-5	S	5/4/1999	VANADIUM	2.2E+00		1	1
KM-5	S	10/5/1999	VANADIUM	2.0E+00		1	1
KM-5	S	5/8/2000	VANADIUM	2.2E+00		1	1
KM-5	S	9/25/2000	VANADIUM	1.4E+00		1	1
KM-5	S	4/27/2001	VANADIUM	1.7E+00		1	1
KM-5	S	10/26/2001	VANADIUM	1.4E+00		1	1
KM-5	S	5/31/2002	VANADIUM	1.4E+00		1	1
KM-5	S	10/18/2002	VANADIUM	1.4E+00		1	1
KM-5	S	5/30/2003	VANADIUM	1.3E+00		1	1
KM-5	S	10/23/2003	VANADIUM	1.2E+00		1	1
KM-5	S	5/3/2004	VANADIUM	1.3E+00		1	1
KM-5	S	10/13/2004	VANADIUM	1.1E+00		1	1
KM-5	S	5/3/2005	VANADIUM	1.3E+00		1	1
KM-5	S	10/25/2005	VANADIUM	1.1E+00		1	1
KM-5	S	5/15/2006	VANADIUM	1.7E+00		1	1
KM-5	S	10/23/2006	VANADIUM	1.1E+00		1	1
KM-5	S	5/14/2007	VANADIUM	1.3E+00		1	1
KM-5	S	10/15/2007	VANADIUM	1.1E+00		1	1
KM-5	S	5/5/2008	VANADIUM	1.1E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-6
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-100

Confidence in Trend:

99.8%

Coefficient of Variation:

0.21

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

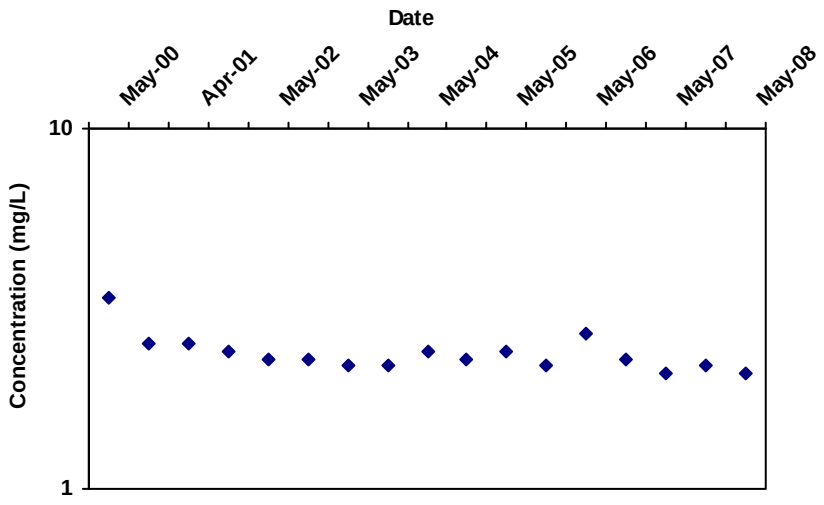
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	11/20/1997	VANADIUM	5.4E+00		1	1
KM-6	S	5/5/1998	VANADIUM	6.6E+00		1	1
KM-6	S	10/27/1998	VANADIUM	5.2E+00		1	1
KM-6	S	5/4/1999	VANADIUM	5.9E+00		1	1
KM-6	S	10/5/1999	VANADIUM	5.1E+00		1	1
KM-6	S	5/8/2000	VANADIUM	5.8E+00		1	1
KM-6	S	9/25/2000	VANADIUM	4.2E+00		1	1
KM-6	S	4/27/2001	VANADIUM	5.4E+00		1	1
KM-6	S	10/26/2001	VANADIUM	4.2E+00		1	1
KM-6	S	5/31/2002	VANADIUM	4.7E+00		1	1
KM-6	S	10/18/2002	VANADIUM	4.1E+00		1	1
KM-6	S	5/30/2003	VANADIUM	4.1E+00		1	1
KM-6	S	10/23/2003	VANADIUM	3.6E+00		1	1
KM-6	S	5/3/2004	VANADIUM	3.6E+00		1	1
KM-6	S	10/13/2004	VANADIUM	3.1E+00		1	1
KM-6	S	5/3/2005	VANADIUM	3.8E+00		1	1
KM-6	S	10/25/2005	VANADIUM	4.2E+00		1	1
KM-6	S	5/15/2006	VANADIUM	6.4E+00		1	1
KM-6	S	10/23/2006	VANADIUM	4.9E+00		1	1
KM-6	S	5/14/2007	VANADIUM	4.5E+00		1	1
KM-6	S	10/15/2007	VANADIUM	3.8E+00		1	1
KM-6	S	5/5/2008	VANADIUM	3.9E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-7
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-68

Confidence in Trend:

99.8%

Coefficient of Variation:

0.13

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

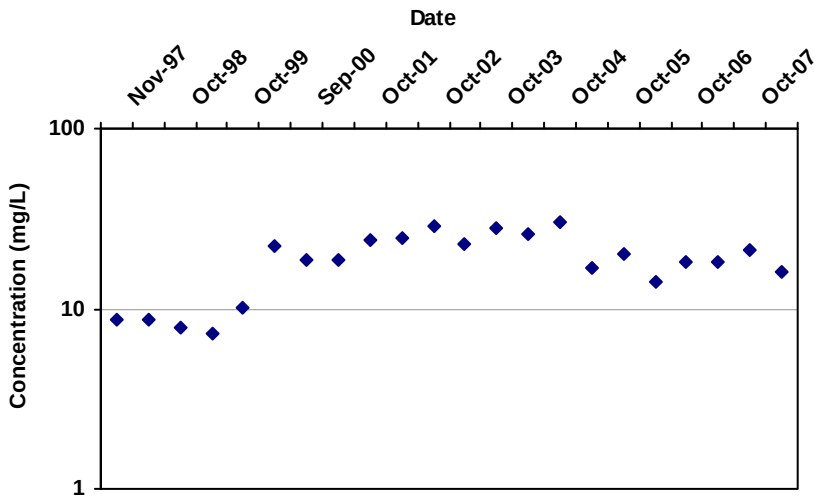
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	5/8/2000	VANADIUM	3.4E+00		1	1
KM-7	S	9/25/2000	VANADIUM	2.5E+00		1	1
KM-7	S	4/27/2001	VANADIUM	2.5E+00		1	1
KM-7	S	10/26/2001	VANADIUM	2.4E+00		1	1
KM-7	S	5/31/2002	VANADIUM	2.3E+00		1	1
KM-7	S	10/18/2002	VANADIUM	2.3E+00		1	1
KM-7	S	5/30/2003	VANADIUM	2.2E+00		1	1
KM-7	S	10/23/2003	VANADIUM	2.2E+00		1	1
KM-7	S	5/3/2004	VANADIUM	2.4E+00		1	1
KM-7	S	10/13/2004	VANADIUM	2.3E+00		1	1
KM-7	S	5/3/2005	VANADIUM	2.4E+00		1	1
KM-7	S	10/25/2005	VANADIUM	2.2E+00		1	1
KM-7	S	5/15/2006	VANADIUM	2.7E+00		1	1
KM-7	S	10/23/2006	VANADIUM	2.3E+00		1	1
KM-7	S	5/14/2007	VANADIUM	2.1E+00		1	1
KM-7	S	10/15/2007	VANADIUM	2.2E+00		1	1
KM-7	S	5/5/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-8
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

51

Confidence in Trend:

92.0%

Coefficient of Variation:

0.37

Mann Kendall Concentration Trend: (See Note)

PI

Data Table:

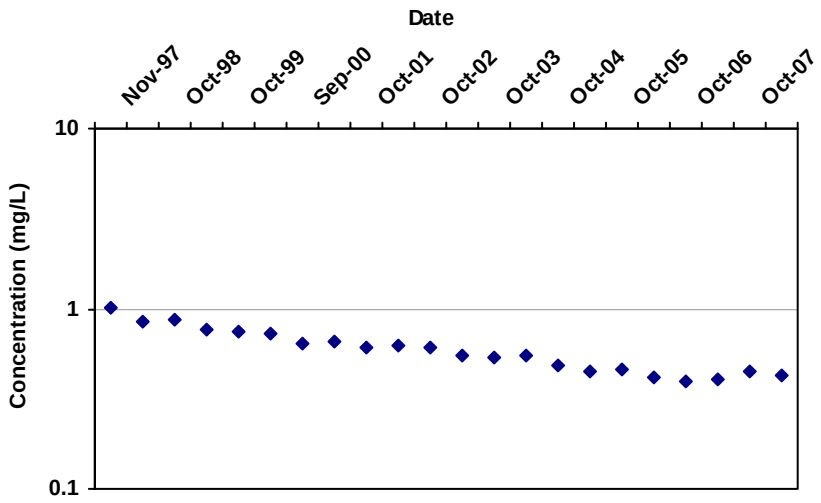
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	11/20/1997	VANADIUM	8.8E+00		1	1
KM-8	S	5/5/1998	VANADIUM	8.7E+00		1	1
KM-8	S	10/27/1998	VANADIUM	7.9E+00		1	1
KM-8	S	5/4/1999	VANADIUM	7.3E+00		1	1
KM-8	S	10/5/1999	VANADIUM	1.0E+01		1	1
KM-8	S	5/8/2000	VANADIUM	2.2E+01		1	1
KM-8	S	9/25/2000	VANADIUM	1.9E+01		1	1
KM-8	S	4/27/2001	VANADIUM	1.9E+01		1	1
KM-8	S	10/26/2001	VANADIUM	2.4E+01		1	1
KM-8	S	5/31/2002	VANADIUM	2.4E+01		1	1
KM-8	S	10/18/2002	VANADIUM	2.9E+01		1	1
KM-8	S	5/30/2003	VANADIUM	2.3E+01		1	1
KM-8	S	10/23/2003	VANADIUM	2.8E+01		1	1
KM-8	S	5/3/2004	VANADIUM	2.6E+01		1	1
KM-8	S	10/13/2004	VANADIUM	3.0E+01		1	1
KM-8	S	5/3/2005	VANADIUM	1.7E+01		1	1
KM-8	S	10/25/2005	VANADIUM	2.0E+01		1	1
KM-8	S	5/15/2006	VANADIUM	1.4E+01		1	1
KM-8	S	10/23/2006	VANADIUM	1.8E+01		1	1
KM-8	S	5/14/2007	VANADIUM	1.8E+01		1	1
KM-8	S	10/15/2007	VANADIUM	2.1E+01		1	1
KM-8	S	5/5/2008	VANADIUM	1.6E+01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-9
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-204

Confidence in Trend:

100.0%

Coefficient of Variation:

0.28

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

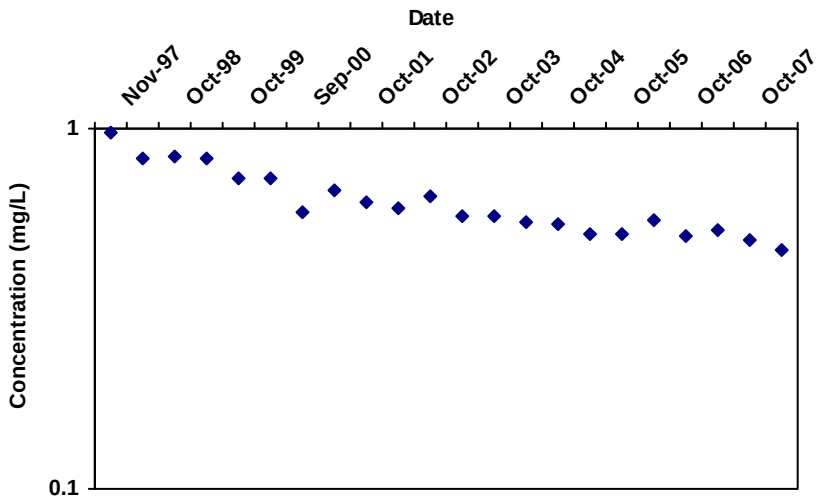
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	11/20/1997	VANADIUM	1.0E+00		1	1
KM-9	S	5/5/1998	VANADIUM	8.5E-01		1	1
KM-9	S	10/27/1998	VANADIUM	8.7E-01		1	1
KM-9	S	5/4/1999	VANADIUM	7.6E-01		1	1
KM-9	S	10/5/1999	VANADIUM	7.5E-01		1	1
KM-9	S	5/8/2000	VANADIUM	7.2E-01		1	1
KM-9	S	9/25/2000	VANADIUM	6.4E-01		1	1
KM-9	S	4/27/2001	VANADIUM	6.5E-01		1	1
KM-9	S	10/26/2001	VANADIUM	6.1E-01		1	1
KM-9	S	5/31/2002	VANADIUM	6.2E-01		1	1
KM-9	S	10/18/2002	VANADIUM	6.1E-01		1	1
KM-9	S	5/30/2003	VANADIUM	5.5E-01		1	1
KM-9	S	10/23/2003	VANADIUM	5.4E-01		1	1
KM-9	S	5/3/2004	VANADIUM	5.5E-01		1	1
KM-9	S	10/13/2004	VANADIUM	4.9E-01		1	1
KM-9	S	5/3/2005	VANADIUM	4.5E-01		1	1
KM-9	S	10/25/2005	VANADIUM	4.6E-01		1	1
KM-9	S	5/15/2006	VANADIUM	4.2E-01		1	1
KM-9	S	10/23/2006	VANADIUM	4.0E-01		1	1
KM-9	S	5/14/2007	VANADIUM	4.1E-01		1	1
KM-9	S	10/15/2007	VANADIUM	4.5E-01		1	1
KM-9	S	5/5/2008	VANADIUM	4.3E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-13
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-197

Confidence in Trend:

100.0%

Coefficient of Variation:

0.22

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

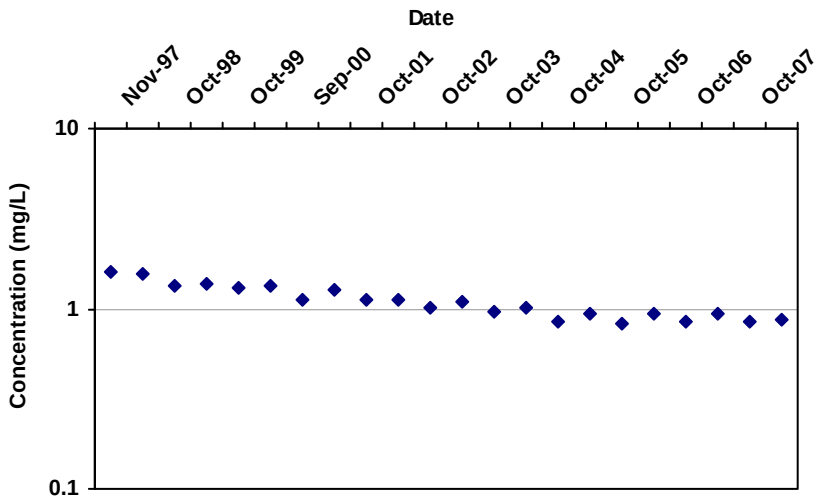
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	11/20/1997	VANADIUM	9.7E-01		1	1
KM-13	S	5/5/1998	VANADIUM	8.3E-01		1	1
KM-13	S	10/27/1998	VANADIUM	8.4E-01		1	1
KM-13	S	5/4/1999	VANADIUM	8.3E-01		1	1
KM-13	S	10/5/1999	VANADIUM	7.3E-01		1	1
KM-13	S	5/8/2000	VANADIUM	7.3E-01		1	1
KM-13	S	9/25/2000	VANADIUM	5.9E-01		1	1
KM-13	S	4/27/2001	VANADIUM	6.7E-01		1	1
KM-13	S	10/26/2001	VANADIUM	6.2E-01		1	1
KM-13	S	5/31/2002	VANADIUM	6.0E-01		1	1
KM-13	S	10/18/2002	VANADIUM	6.5E-01		1	1
KM-13	S	5/30/2003	VANADIUM	5.7E-01		1	1
KM-13	S	10/23/2003	VANADIUM	5.7E-01		1	1
KM-13	S	5/3/2004	VANADIUM	5.5E-01		1	1
KM-13	S	10/13/2004	VANADIUM	5.4E-01		1	1
KM-13	S	5/3/2005	VANADIUM	5.1E-01		1	1
KM-13	S	10/25/2005	VANADIUM	5.1E-01		1	1
KM-13	S	5/15/2006	VANADIUM	5.6E-01		1	1
KM-13	S	10/23/2006	VANADIUM	5.0E-01		1	1
KM-13	S	5/14/2007	VANADIUM	5.2E-01		1	1
KM-13	S	10/15/2007	VANADIUM	4.9E-01		1	1
KM-13	S	5/5/2008	VANADIUM	4.6E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-15
Well Type: T
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-184

Confidence in Trend:

100.0%

Coefficient of Variation:

0.21

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

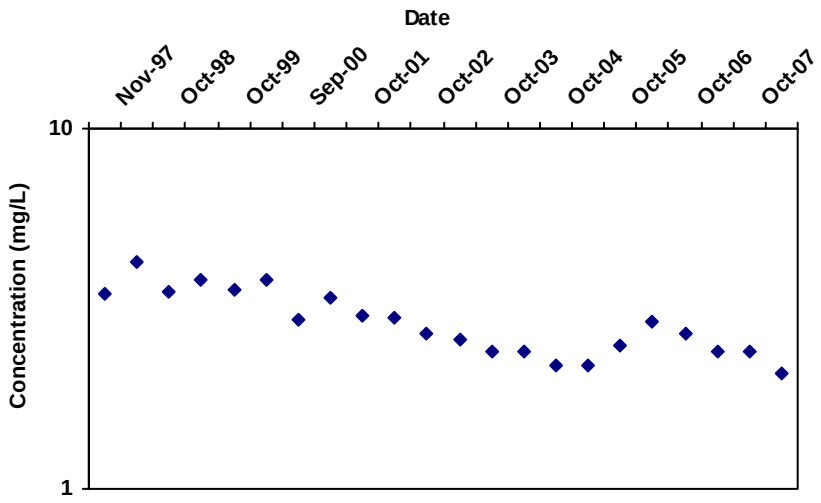
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	11/20/1997	VANADIUM	1.6E+00		1	1
KM-15	T	5/5/1998	VANADIUM	1.6E+00		1	1
KM-15	T	10/27/1998	VANADIUM	1.4E+00		1	1
KM-15	T	5/4/1999	VANADIUM	1.4E+00		1	1
KM-15	T	10/5/1999	VANADIUM	1.3E+00		1	1
KM-15	T	5/8/2000	VANADIUM	1.3E+00		1	1
KM-15	T	9/25/2000	VANADIUM	1.1E+00		1	1
KM-15	T	4/27/2001	VANADIUM	1.3E+00		1	1
KM-15	T	10/26/2001	VANADIUM	1.1E+00		1	1
KM-15	T	5/31/2002	VANADIUM	1.1E+00		1	1
KM-15	T	10/18/2002	VANADIUM	1.0E+00		1	1
KM-15	T	5/30/2003	VANADIUM	1.1E+00		1	1
KM-15	T	10/23/2003	VANADIUM	9.6E-01		1	1
KM-15	T	5/3/2004	VANADIUM	1.0E+00		1	1
KM-15	T	10/13/2004	VANADIUM	8.5E-01		1	1
KM-15	T	5/3/2005	VANADIUM	9.3E-01		1	1
KM-15	T	10/25/2005	VANADIUM	8.3E-01		1	1
KM-15	T	5/15/2006	VANADIUM	9.5E-01		1	1
KM-15	T	10/23/2006	VANADIUM	8.5E-01		1	1
KM-15	T	5/14/2007	VANADIUM	9.4E-01		1	1
KM-15	T	10/15/2007	VANADIUM	8.5E-01		1	1
KM-15	T	5/5/2008	VANADIUM	8.6E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-16
Well Type: T
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-155

Confidence in Trend:

100.0%

Coefficient of Variation:

0.21

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

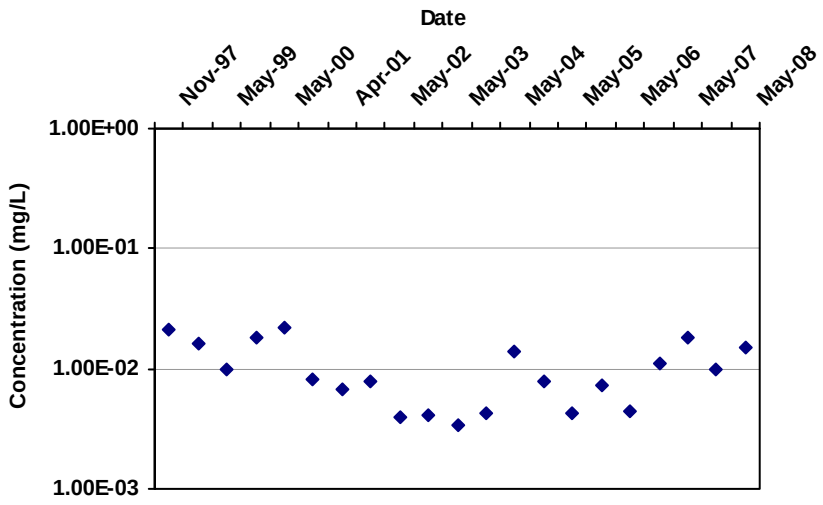
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	11/20/1997	VANADIUM	3.5E+00		1	1
KM-16	T	5/5/1998	VANADIUM	4.3E+00		1	1
KM-16	T	10/27/1998	VANADIUM	3.5E+00		1	1
KM-16	T	5/4/1999	VANADIUM	3.8E+00		1	1
KM-16	T	10/5/1999	VANADIUM	3.6E+00		1	1
KM-16	T	5/8/2000	VANADIUM	3.8E+00		1	1
KM-16	T	9/25/2000	VANADIUM	2.9E+00		1	1
KM-16	T	4/27/2001	VANADIUM	3.4E+00		1	1
KM-16	T	10/26/2001	VANADIUM	3.0E+00		1	1
KM-16	T	5/31/2002	VANADIUM	3.0E+00		1	1
KM-16	T	10/18/2002	VANADIUM	2.7E+00		1	1
KM-16	T	5/30/2003	VANADIUM	2.6E+00		1	1
KM-16	T	10/23/2003	VANADIUM	2.4E+00		1	1
KM-16	T	5/3/2004	VANADIUM	2.4E+00		1	1
KM-16	T	10/13/2004	VANADIUM	2.2E+00		1	1
KM-16	T	5/3/2005	VANADIUM	2.2E+00		1	1
KM-16	T	10/25/2005	VANADIUM	2.5E+00		1	1
KM-16	T	5/15/2006	VANADIUM	2.9E+00		1	1
KM-16	T	10/23/2006	VANADIUM	2.7E+00		1	1
KM-16	T	5/14/2007	VANADIUM	2.4E+00		1	1
KM-16	T	10/15/2007	VANADIUM	2.4E+00		1	1
KM-16	T	5/5/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-17
Well Type: T
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/5/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-22

Confidence in Trend:

73.5%

Coefficient of Variation:

0.58

Mann Kendall Concentration Trend: (See Note)

S

Data Table:

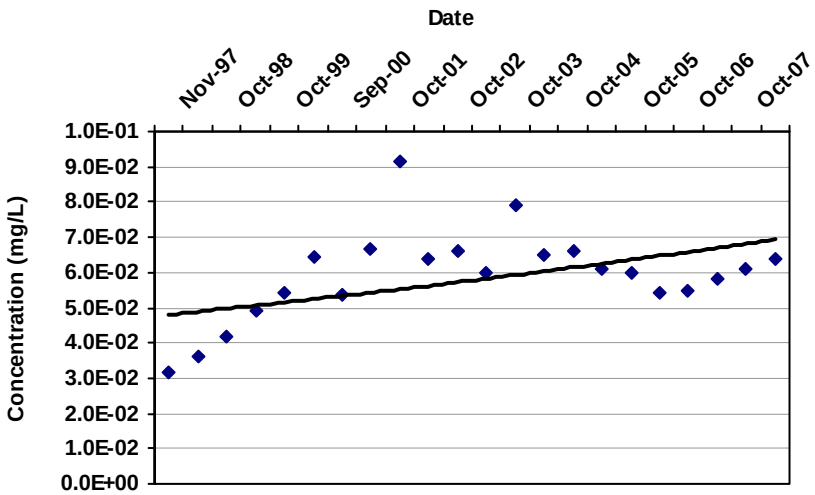
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	T	11/20/1997	VANADIUM	2.1E-02		1	1
KM-17	T	10/27/1998	VANADIUM	1.7E-02		1	1
KM-17	T	5/4/1999	VANADIUM	9.8E-03		1	1
KM-17	T	10/5/1999	VANADIUM	1.9E-02		1	1
KM-17	T	5/8/2000	VANADIUM	2.2E-02		1	1
KM-17	T	9/25/2000	VANADIUM	8.2E-03		1	1
KM-17	T	4/27/2001	VANADIUM	6.8E-03		1	1
KM-17	T	10/26/2001	VANADIUM	7.8E-03		1	1
KM-17	T	5/31/2002	VANADIUM	4.0E-03		1	1
KM-17	T	10/18/2002	VANADIUM	4.1E-03		1	1
KM-17	T	5/30/2003	VANADIUM	3.4E-03		1	1
KM-17	T	10/23/2003	VANADIUM	4.2E-03		1	1
KM-17	T	5/3/2004	VANADIUM	1.4E-02		1	1
KM-17	T	10/13/2004	VANADIUM	8.0E-03		1	1
KM-17	T	5/3/2005	VANADIUM	4.3E-03		1	1
KM-17	T	10/25/2005	VANADIUM	7.4E-03		1	1
KM-17	T	5/15/2006	VANADIUM	4.4E-03		1	1
KM-17	T	10/23/2006	VANADIUM	1.1E-02		1	1
KM-17	T	5/14/2007	VANADIUM	1.8E-02		1	1
KM-17	T	10/15/2007	VANADIUM	1.0E-02		1	1
KM-17	T	5/5/2008	VANADIUM	1.5E-02		1	1

Note: 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); ND = Non-detect

MAROS Linear Regression Statistics

Well: Finch Spring
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.22

Confidence in Trend: 98.9%

Ln Slope: 9.6E-05

LR Concentration Trend: I

Consolidation Data Table:

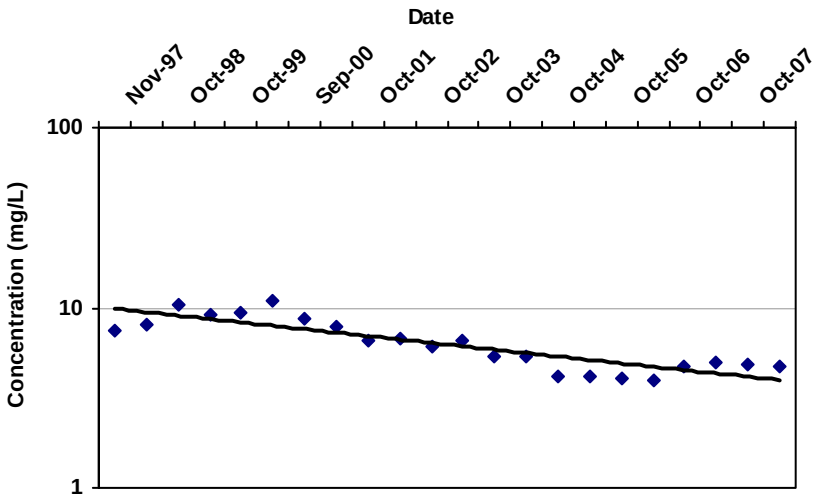
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	11/20/1997	VANADIUM	3.2E-02		1	1
Finch Spring	T	5/5/1998	VANADIUM	3.6E-02		1	1
Finch Spring	T	10/27/1998	VANADIUM	4.2E-02		1	1
Finch Spring	T	5/4/1999	VANADIUM	4.9E-02		1	1
Finch Spring	T	10/5/1999	VANADIUM	5.4E-02		1	1
Finch Spring	T	5/8/2000	VANADIUM	6.5E-02		1	1
Finch Spring	T	9/25/2000	VANADIUM	5.4E-02		1	1
Finch Spring	T	4/27/2001	VANADIUM	6.6E-02		1	1
Finch Spring	T	10/26/2001	VANADIUM	9.2E-02		1	1
Finch Spring	T	5/31/2002	VANADIUM	6.4E-02		1	1
Finch Spring	T	10/18/2002	VANADIUM	6.6E-02		1	1
Finch Spring	T	5/31/2003	VANADIUM	6.0E-02		1	1
Finch Spring	T	10/23/2003	VANADIUM	7.9E-02		1	1
Finch Spring	T	5/3/2004	VANADIUM	6.5E-02		1	1
Finch Spring	T	10/13/2004	VANADIUM	6.6E-02		1	1
Finch Spring	T	5/3/2005	VANADIUM	6.1E-02		1	1
Finch Spring	T	10/25/2005	VANADIUM	6.0E-02		1	1
Finch Spring	T	5/15/2006	VANADIUM	5.4E-02		1	1
Finch Spring	T	10/23/2006	VANADIUM	5.5E-02		1	1
Finch Spring	T	5/14/2007	VANADIUM	5.8E-02		1	1
Finch Spring	T	10/15/2007	VANADIUM	6.1E-02		1	1
Finch Spring	T	5/5/2008	VANADIUM	6.4E-02		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-2
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.33

Confidence in Trend: 100.0%

Ln Slope: -2.4E-04

LR Concentration Trend: D

Consolidation Data Table:

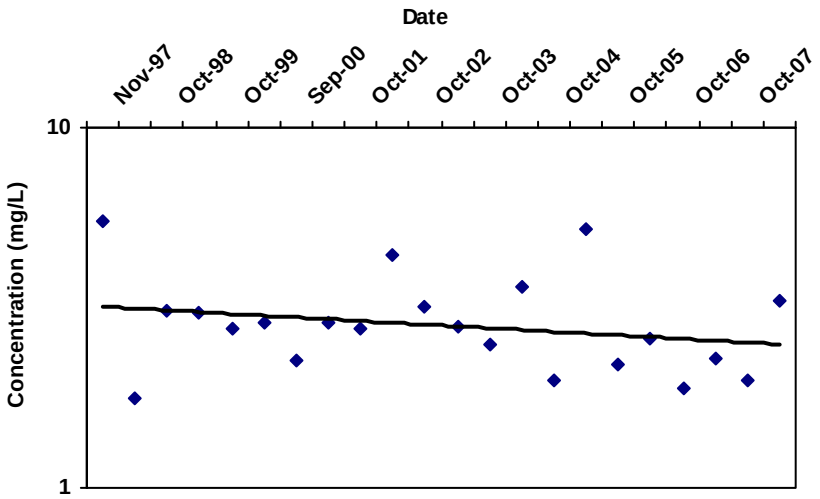
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	11/20/1997	VANADIUM	7.5E+00		1	1
KM-2	S	5/5/1998	VANADIUM	8.1E+00		1	1
KM-2	S	10/27/1998	VANADIUM	1.0E+01		1	1
KM-2	S	5/4/1999	VANADIUM	9.2E+00		1	1
KM-2	S	10/5/1999	VANADIUM	9.5E+00		1	1
KM-2	S	5/8/2000	VANADIUM	1.1E+01		1	1
KM-2	S	9/25/2000	VANADIUM	8.8E+00		1	1
KM-2	S	4/27/2001	VANADIUM	7.8E+00		1	1
KM-2	S	10/26/2001	VANADIUM	6.7E+00		1	1
KM-2	S	5/31/2002	VANADIUM	6.8E+00		1	1
KM-2	S	10/18/2002	VANADIUM	6.1E+00		1	1
KM-2	S	5/30/2003	VANADIUM	6.5E+00		1	1
KM-2	S	10/23/2003	VANADIUM	5.3E+00		1	1
KM-2	S	5/3/2004	VANADIUM	5.4E+00		1	1
KM-2	S	10/13/2004	VANADIUM	4.2E+00		1	1
KM-2	S	5/3/2005	VANADIUM	4.2E+00		1	1
KM-2	S	10/25/2005	VANADIUM	4.1E+00		1	1
KM-2	S	5/15/2006	VANADIUM	4.0E+00		1	1
KM-2	S	10/23/2006	VANADIUM	4.7E+00		1	1
KM-2	S	5/14/2007	VANADIUM	5.0E+00		1	1
KM-2	S	10/15/2007	VANADIUM	4.8E+00		1	1
KM-2	S	5/5/2008	VANADIUM	4.7E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-3
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.33

Confidence in Trend: 85.8%

Ln Slope: -6.1E-05

LR Concentration Trend: S

Consolidation Data Table:

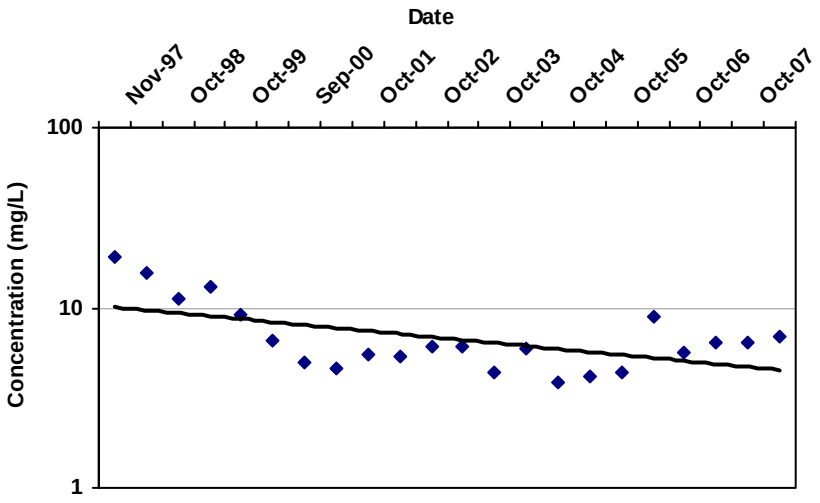
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	11/20/1997	VANADIUM	5.5E+00		1	1
KM-3	S	5/5/1998	VANADIUM	1.8E+00		1	1
KM-3	S	10/27/1998	VANADIUM	3.1E+00		1	1
KM-3	S	5/4/1999	VANADIUM	3.1E+00		1	1
KM-3	S	10/5/1999	VANADIUM	2.8E+00		1	1
KM-3	S	5/8/2000	VANADIUM	2.9E+00		1	1
KM-3	S	9/25/2000	VANADIUM	2.3E+00		1	1
KM-3	S	4/27/2001	VANADIUM	2.9E+00		1	1
KM-3	S	10/26/2001	VANADIUM	2.8E+00		1	1
KM-3	S	5/31/2002	VANADIUM	4.4E+00		1	1
KM-3	S	10/18/2002	VANADIUM	3.2E+00		1	1
KM-3	S	5/30/2003	VANADIUM	2.8E+00		1	1
KM-3	S	10/23/2003	VANADIUM	2.5E+00		1	1
KM-3	S	5/3/2004	VANADIUM	3.6E+00		1	1
KM-3	S	10/13/2004	VANADIUM	2.0E+00		1	1
KM-3	S	5/3/2005	VANADIUM	5.2E+00		1	1
KM-3	S	10/25/2005	VANADIUM	2.2E+00		1	1
KM-3	S	5/15/2006	VANADIUM	2.6E+00		1	1
KM-3	S	10/23/2006	VANADIUM	1.9E+00		1	1
KM-3	S	5/14/2007	VANADIUM	2.3E+00		1	1
KM-3	S	10/15/2007	VANADIUM	2.0E+00		1	1
KM-3	S	5/5/2008	VANADIUM	3.3E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-4
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.53

Confidence in Trend: 99.7%

Ln Slope: -2.1E-04

LR Concentration Trend: D

Consolidation Data Table:

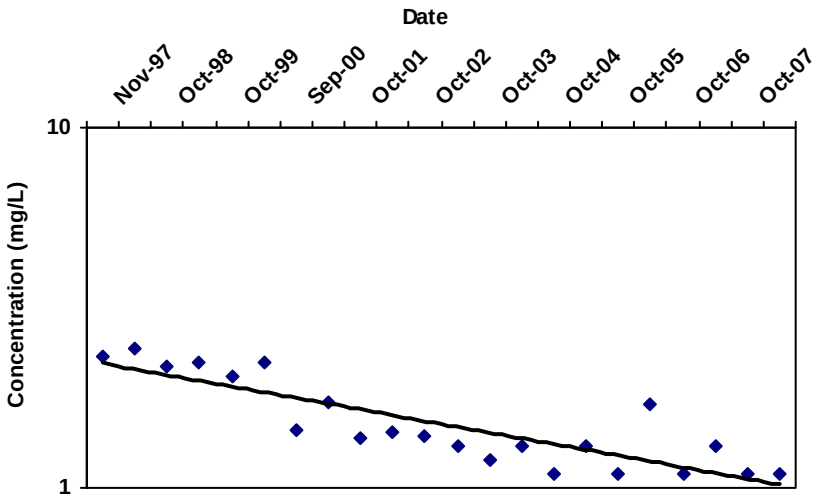
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	11/20/1997	VANADIUM	1.9E+01		1	1
KM-4	S	5/5/1998	VANADIUM	1.6E+01		1	1
KM-4	S	10/27/1998	VANADIUM	1.1E+01		1	1
KM-4	S	5/4/1999	VANADIUM	1.3E+01		1	1
KM-4	S	10/5/1999	VANADIUM	9.0E+00		1	1
KM-4	S	5/8/2000	VANADIUM	6.6E+00		1	1
KM-4	S	9/25/2000	VANADIUM	5.0E+00		1	1
KM-4	S	4/27/2001	VANADIUM	4.7E+00		1	1
KM-4	S	10/26/2001	VANADIUM	5.5E+00		1	1
KM-4	S	5/31/2002	VANADIUM	5.4E+00		1	1
KM-4	S	10/18/2002	VANADIUM	6.1E+00		1	1
KM-4	S	5/30/2003	VANADIUM	6.1E+00		1	1
KM-4	S	10/23/2003	VANADIUM	4.4E+00		1	1
KM-4	S	5/3/2004	VANADIUM	6.0E+00		1	1
KM-4	S	10/13/2004	VANADIUM	3.9E+00		1	1
KM-4	S	5/3/2005	VANADIUM	4.2E+00		1	1
KM-4	S	10/25/2005	VANADIUM	4.4E+00		1	1
KM-4	S	5/15/2006	VANADIUM	9.0E+00		1	1
KM-4	S	10/23/2006	VANADIUM	5.6E+00		1	1
KM-4	S	5/14/2007	VANADIUM	6.4E+00		1	1
KM-4	S	10/15/2007	VANADIUM	6.4E+00		1	1
KM-4	S	5/5/2008	VANADIUM	6.9E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-5
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.29

Confidence in Trend: 100.0%

Ln Slope: -2.0E-04

LR Concentration Trend: D

Consolidation Data Table:

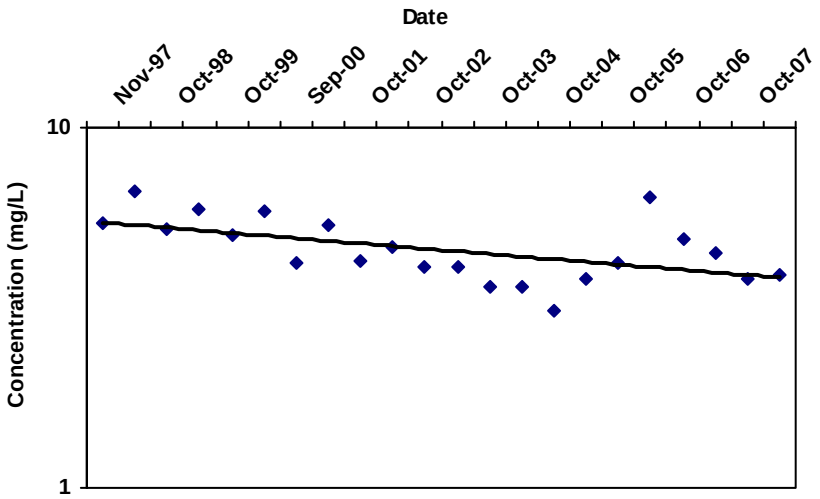
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	11/20/1997	VANADIUM	2.3E+00		1	1
KM-5	S	5/5/1998	VANADIUM	2.4E+00		1	1
KM-5	S	10/27/1998	VANADIUM	2.2E+00		1	1
KM-5	S	5/4/1999	VANADIUM	2.2E+00		1	1
KM-5	S	10/5/1999	VANADIUM	2.0E+00		1	1
KM-5	S	5/8/2000	VANADIUM	2.2E+00		1	1
KM-5	S	9/25/2000	VANADIUM	1.4E+00		1	1
KM-5	S	4/27/2001	VANADIUM	1.7E+00		1	1
KM-5	S	10/26/2001	VANADIUM	1.4E+00		1	1
KM-5	S	5/31/2002	VANADIUM	1.4E+00		1	1
KM-5	S	10/18/2002	VANADIUM	1.4E+00		1	1
KM-5	S	5/30/2003	VANADIUM	1.3E+00		1	1
KM-5	S	10/23/2003	VANADIUM	1.2E+00		1	1
KM-5	S	5/3/2004	VANADIUM	1.3E+00		1	1
KM-5	S	10/13/2004	VANADIUM	1.1E+00		1	1
KM-5	S	5/3/2005	VANADIUM	1.3E+00		1	1
KM-5	S	10/25/2005	VANADIUM	1.1E+00		1	1
KM-5	S	5/15/2006	VANADIUM	1.7E+00		1	1
KM-5	S	10/23/2006	VANADIUM	1.1E+00		1	1
KM-5	S	5/14/2007	VANADIUM	1.3E+00		1	1
KM-5	S	10/15/2007	VANADIUM	1.1E+00		1	1
KM-5	S	5/5/2008	VANADIUM	1.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-6
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.21

Confidence in Trend: 99.5%

Ln Slope: -9.2E-05

LR Concentration Trend: D

Consolidation Data Table:

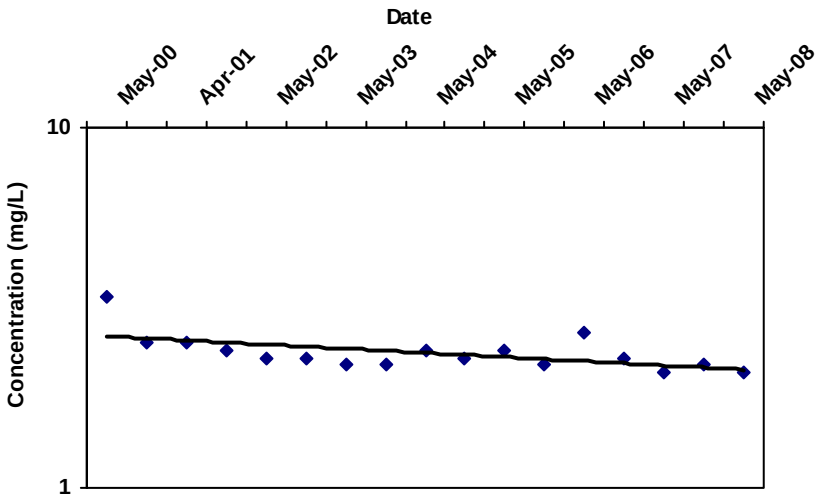
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	11/20/1997	VANADIUM	5.4E+00		1	1
KM-6	S	5/5/1998	VANADIUM	6.6E+00		1	1
KM-6	S	10/27/1998	VANADIUM	5.2E+00		1	1
KM-6	S	5/4/1999	VANADIUM	5.9E+00		1	1
KM-6	S	10/5/1999	VANADIUM	5.1E+00		1	1
KM-6	S	5/8/2000	VANADIUM	5.8E+00		1	1
KM-6	S	9/25/2000	VANADIUM	4.2E+00		1	1
KM-6	S	4/27/2001	VANADIUM	5.4E+00		1	1
KM-6	S	10/26/2001	VANADIUM	4.2E+00		1	1
KM-6	S	5/31/2002	VANADIUM	4.7E+00		1	1
KM-6	S	10/18/2002	VANADIUM	4.1E+00		1	1
KM-6	S	5/30/2003	VANADIUM	4.1E+00		1	1
KM-6	S	10/23/2003	VANADIUM	3.6E+00		1	1
KM-6	S	5/3/2004	VANADIUM	3.6E+00		1	1
KM-6	S	10/13/2004	VANADIUM	3.1E+00		1	1
KM-6	S	5/3/2005	VANADIUM	3.8E+00		1	1
KM-6	S	10/25/2005	VANADIUM	4.2E+00		1	1
KM-6	S	5/15/2006	VANADIUM	6.4E+00		1	1
KM-6	S	10/23/2006	VANADIUM	4.9E+00		1	1
KM-6	S	5/14/2007	VANADIUM	4.5E+00		1	1
KM-6	S	10/15/2007	VANADIUM	3.8E+00		1	1
KM-6	S	5/5/2008	VANADIUM	3.9E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-7
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.13

Confidence in Trend: 99.3%

Ln Slope: -7.3E-05

LR Concentration Trend: D

Consolidation Data Table:

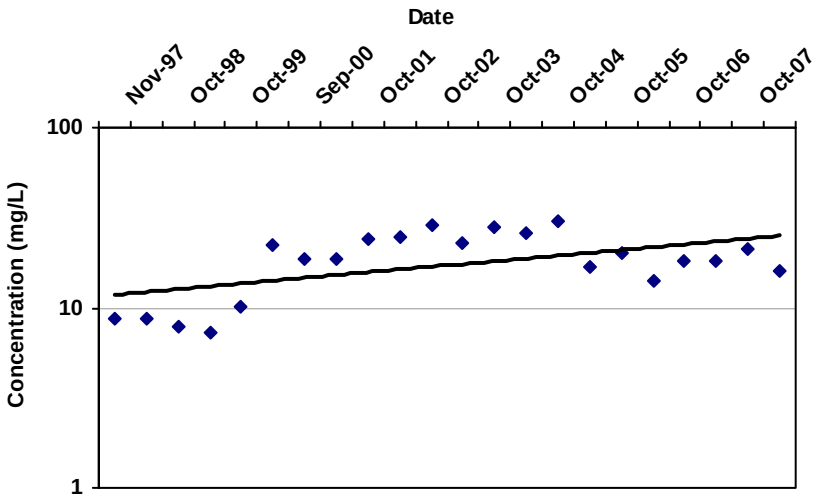
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	5/8/2000	VANADIUM	3.4E+00		1	1
KM-7	S	9/25/2000	VANADIUM	2.5E+00		1	1
KM-7	S	4/27/2001	VANADIUM	2.5E+00		1	1
KM-7	S	10/26/2001	VANADIUM	2.4E+00		1	1
KM-7	S	5/31/2002	VANADIUM	2.3E+00		1	1
KM-7	S	10/18/2002	VANADIUM	2.3E+00		1	1
KM-7	S	5/30/2003	VANADIUM	2.2E+00		1	1
KM-7	S	10/23/2003	VANADIUM	2.2E+00		1	1
KM-7	S	5/3/2004	VANADIUM	2.4E+00		1	1
KM-7	S	10/13/2004	VANADIUM	2.3E+00		1	1
KM-7	S	5/3/2005	VANADIUM	2.4E+00		1	1
KM-7	S	10/25/2005	VANADIUM	2.2E+00		1	1
KM-7	S	5/15/2006	VANADIUM	2.7E+00		1	1
KM-7	S	10/23/2006	VANADIUM	2.3E+00		1	1
KM-7	S	5/14/2007	VANADIUM	2.1E+00		1	1
KM-7	S	10/15/2007	VANADIUM	2.2E+00		1	1
KM-7	S	5/5/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-8
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.37

Confidence in Trend: 99.4%

Ln Slope: 1.9E-04

LR Concentration Trend: I

Consolidation Data Table:

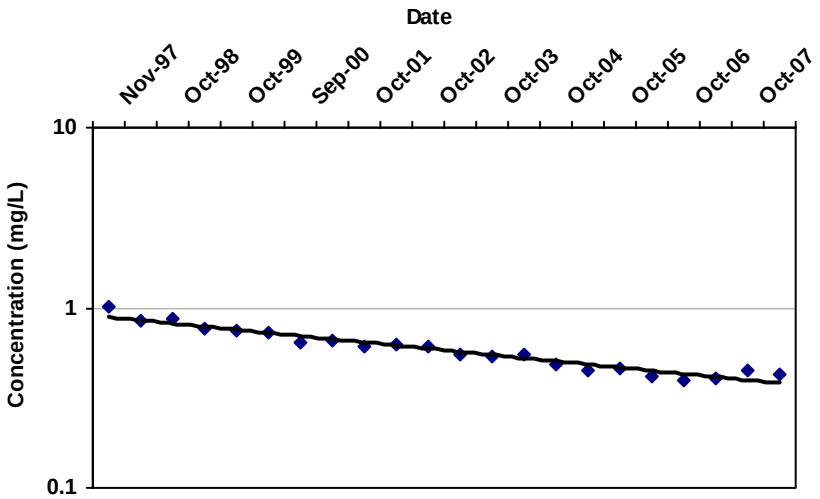
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	11/20/1997	VANADIUM	8.8E+00		1	1
KM-8	S	5/5/1998	VANADIUM	8.7E+00		1	1
KM-8	S	10/27/1998	VANADIUM	7.9E+00		1	1
KM-8	S	5/4/1999	VANADIUM	7.3E+00		1	1
KM-8	S	10/5/1999	VANADIUM	1.0E+01		1	1
KM-8	S	5/8/2000	VANADIUM	2.2E+01		1	1
KM-8	S	9/25/2000	VANADIUM	1.9E+01		1	1
KM-8	S	4/27/2001	VANADIUM	1.9E+01		1	1
KM-8	S	10/26/2001	VANADIUM	2.4E+01		1	1
KM-8	S	5/31/2002	VANADIUM	2.4E+01		1	1
KM-8	S	10/18/2002	VANADIUM	2.9E+01		1	1
KM-8	S	5/30/2003	VANADIUM	2.3E+01		1	1
KM-8	S	10/23/2003	VANADIUM	2.8E+01		1	1
KM-8	S	5/3/2004	VANADIUM	2.6E+01		1	1
KM-8	S	10/13/2004	VANADIUM	3.0E+01		1	1
KM-8	S	5/3/2005	VANADIUM	1.7E+01		1	1
KM-8	S	10/25/2005	VANADIUM	2.0E+01		1	1
KM-8	S	5/15/2006	VANADIUM	1.4E+01		1	1
KM-8	S	10/23/2006	VANADIUM	1.8E+01		1	1
KM-8	S	5/14/2007	VANADIUM	1.8E+01		1	1
KM-8	S	10/15/2007	VANADIUM	2.1E+01		1	1
KM-8	S	5/5/2008	VANADIUM	1.6E+01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-9
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.28

Confidence in Trend: 100.0%

Ln Slope: -2.2E-04

LR Concentration Trend: D

Consolidation Data Table:

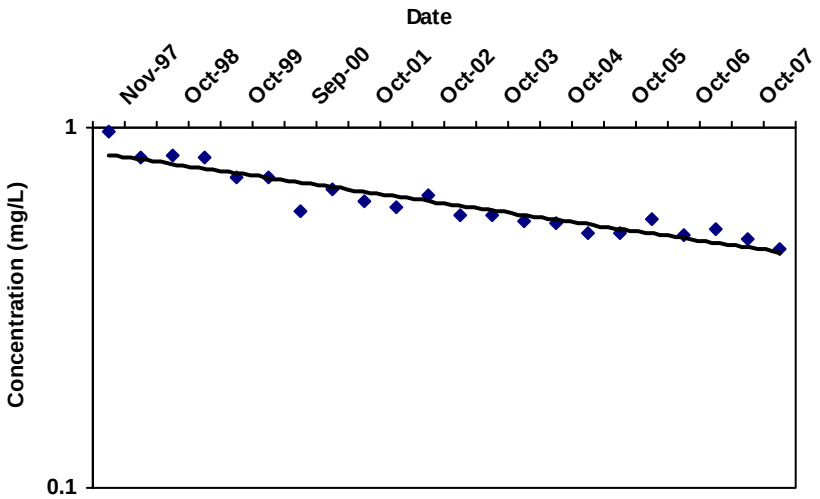
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	11/20/1997	VANADIUM	1.0E+00		1	1
KM-9	S	5/5/1998	VANADIUM	8.5E-01		1	1
KM-9	S	10/27/1998	VANADIUM	8.7E-01		1	1
KM-9	S	5/4/1999	VANADIUM	7.6E-01		1	1
KM-9	S	10/5/1999	VANADIUM	7.5E-01		1	1
KM-9	S	5/8/2000	VANADIUM	7.2E-01		1	1
KM-9	S	9/25/2000	VANADIUM	6.4E-01		1	1
KM-9	S	4/27/2001	VANADIUM	6.5E-01		1	1
KM-9	S	10/26/2001	VANADIUM	6.1E-01		1	1
KM-9	S	5/31/2002	VANADIUM	6.2E-01		1	1
KM-9	S	10/18/2002	VANADIUM	6.1E-01		1	1
KM-9	S	5/30/2003	VANADIUM	5.5E-01		1	1
KM-9	S	10/23/2003	VANADIUM	5.4E-01		1	1
KM-9	S	5/3/2004	VANADIUM	5.5E-01		1	1
KM-9	S	10/13/2004	VANADIUM	4.9E-01		1	1
KM-9	S	5/3/2005	VANADIUM	4.5E-01		1	1
KM-9	S	10/25/2005	VANADIUM	4.6E-01		1	1
KM-9	S	5/15/2006	VANADIUM	4.2E-01		1	1
KM-9	S	10/23/2006	VANADIUM	4.0E-01		1	1
KM-9	S	5/14/2007	VANADIUM	4.1E-01		1	1
KM-9	S	10/15/2007	VANADIUM	4.5E-01		1	1
KM-9	S	5/5/2008	VANADIUM	4.3E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-13
Well Type: S
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.22

Confidence in Trend: 100.0%

Ln Slope: -1.6E-04

LR Concentration Trend: D

Consolidation Data Table:

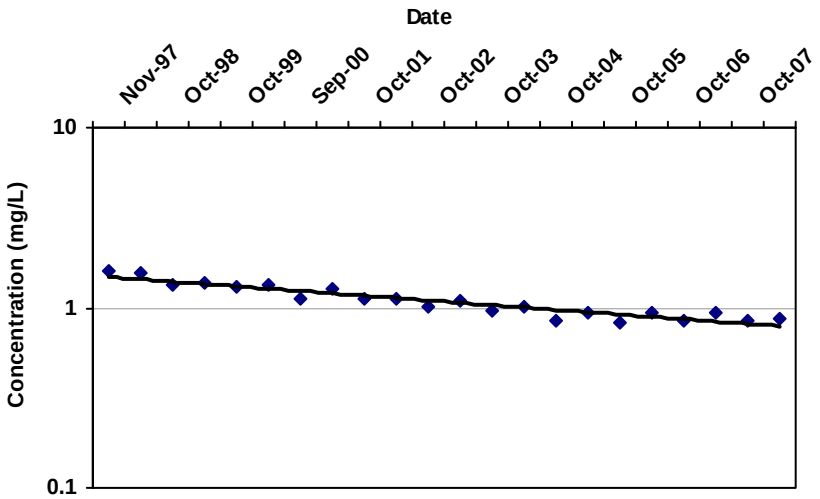
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	11/20/1997	VANADIUM	9.7E-01		1	1
KM-13	S	5/5/1998	VANADIUM	8.3E-01		1	1
KM-13	S	10/27/1998	VANADIUM	8.4E-01		1	1
KM-13	S	5/4/1999	VANADIUM	8.3E-01		1	1
KM-13	S	10/5/1999	VANADIUM	7.3E-01		1	1
KM-13	S	5/8/2000	VANADIUM	7.3E-01		1	1
KM-13	S	9/25/2000	VANADIUM	5.9E-01		1	1
KM-13	S	4/27/2001	VANADIUM	6.7E-01		1	1
KM-13	S	10/26/2001	VANADIUM	6.2E-01		1	1
KM-13	S	5/31/2002	VANADIUM	6.0E-01		1	1
KM-13	S	10/18/2002	VANADIUM	6.5E-01		1	1
KM-13	S	5/30/2003	VANADIUM	5.7E-01		1	1
KM-13	S	10/23/2003	VANADIUM	5.7E-01		1	1
KM-13	S	5/3/2004	VANADIUM	5.5E-01		1	1
KM-13	S	10/13/2004	VANADIUM	5.4E-01		1	1
KM-13	S	5/3/2005	VANADIUM	5.1E-01		1	1
KM-13	S	10/25/2005	VANADIUM	5.1E-01		1	1
KM-13	S	5/15/2006	VANADIUM	5.6E-01		1	1
KM-13	S	10/23/2006	VANADIUM	5.0E-01		1	1
KM-13	S	5/14/2007	VANADIUM	5.2E-01		1	1
KM-13	S	10/15/2007	VANADIUM	4.9E-01		1	1
KM-13	S	5/5/2008	VANADIUM	4.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-15
Well Type: T
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.21

Confidence in Trend: 100.0%

Ln Slope: -1.6E-04

LR Concentration Trend: D

Consolidation Data Table:

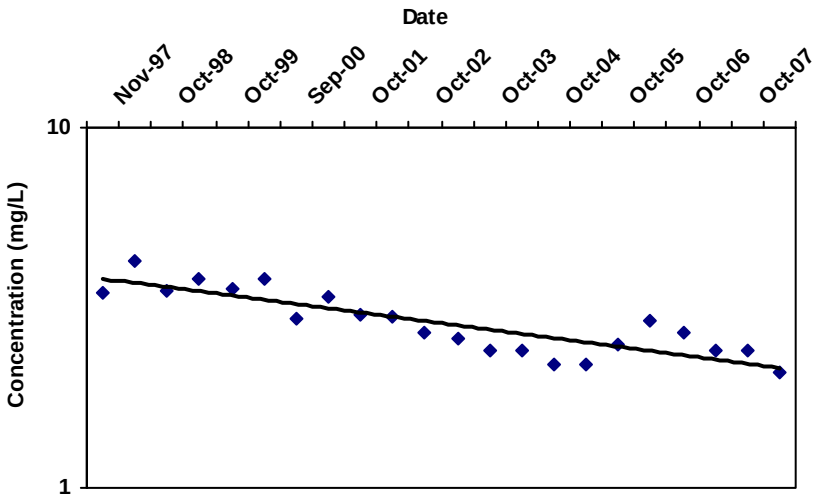
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	11/20/1997	VANADIUM	1.6E+00		1	1
KM-15	T	5/5/1998	VANADIUM	1.6E+00		1	1
KM-15	T	10/27/1998	VANADIUM	1.4E+00		1	1
KM-15	T	5/4/1999	VANADIUM	1.4E+00		1	1
KM-15	T	10/5/1999	VANADIUM	1.3E+00		1	1
KM-15	T	5/8/2000	VANADIUM	1.3E+00		1	1
KM-15	T	9/25/2000	VANADIUM	1.1E+00		1	1
KM-15	T	4/27/2001	VANADIUM	1.3E+00		1	1
KM-15	T	10/26/2001	VANADIUM	1.1E+00		1	1
KM-15	T	5/31/2002	VANADIUM	1.1E+00		1	1
KM-15	T	10/18/2002	VANADIUM	1.0E+00		1	1
KM-15	T	5/30/2003	VANADIUM	1.1E+00		1	1
KM-15	T	10/23/2003	VANADIUM	9.6E-01		1	1
KM-15	T	5/3/2004	VANADIUM	1.0E+00		1	1
KM-15	T	10/13/2004	VANADIUM	8.5E-01		1	1
KM-15	T	5/3/2005	VANADIUM	9.3E-01		1	1
KM-15	T	10/25/2005	VANADIUM	8.3E-01		1	1
KM-15	T	5/15/2006	VANADIUM	9.5E-01		1	1
KM-15	T	10/23/2006	VANADIUM	8.5E-01		1	1
KM-15	T	5/14/2007	VANADIUM	9.4E-01		1	1
KM-15	T	10/15/2007	VANADIUM	8.5E-01		1	1
KM-15	T	5/5/2008	VANADIUM	8.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-16
Well Type: T
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.21

Confidence in Trend: 100.0%

Ln Slope: -1.5E-04

LR Concentration Trend: D

Consolidation Data Table:

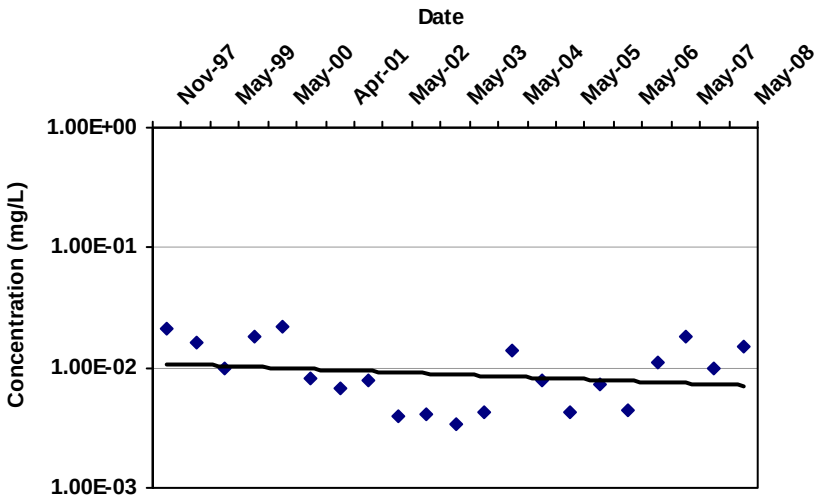
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	11/20/1997	VANADIUM	3.5E+00		1	1
KM-16	T	5/5/1998	VANADIUM	4.3E+00		1	1
KM-16	T	10/27/1998	VANADIUM	3.5E+00		1	1
KM-16	T	5/4/1999	VANADIUM	3.8E+00		1	1
KM-16	T	10/5/1999	VANADIUM	3.6E+00		1	1
KM-16	T	5/8/2000	VANADIUM	3.8E+00		1	1
KM-16	T	9/25/2000	VANADIUM	2.9E+00		1	1
KM-16	T	4/27/2001	VANADIUM	3.4E+00		1	1
KM-16	T	10/26/2001	VANADIUM	3.0E+00		1	1
KM-16	T	5/31/2002	VANADIUM	3.0E+00		1	1
KM-16	T	10/18/2002	VANADIUM	2.7E+00		1	1
KM-16	T	5/30/2003	VANADIUM	2.6E+00		1	1
KM-16	T	10/23/2003	VANADIUM	2.4E+00		1	1
KM-16	T	5/3/2004	VANADIUM	2.4E+00		1	1
KM-16	T	10/13/2004	VANADIUM	2.2E+00		1	1
KM-16	T	5/3/2005	VANADIUM	2.2E+00		1	1
KM-16	T	10/25/2005	VANADIUM	2.5E+00		1	1
KM-16	T	5/15/2006	VANADIUM	2.9E+00		1	1
KM-16	T	10/23/2006	VANADIUM	2.7E+00		1	1
KM-16	T	5/14/2007	VANADIUM	2.4E+00		1	1
KM-16	T	10/15/2007	VANADIUM	2.4E+00		1	1
KM-16	T	5/5/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-17
Well Type: T
COC: VANADIUM

Time Period: 10/10/1997 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.58

Confidence in Trend: 83.5%

Ln Slope: -1.2E-04

LR Concentration Trend: S

Consolidation Data Table:

Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	T	11/20/1997	VANADIUM	2.1E-02		1	1
KM-17	T	10/27/1998	VANADIUM	1.7E-02		1	1
KM-17	T	5/4/1999	VANADIUM	9.8E-03		1	1
KM-17	T	10/5/1999	VANADIUM	1.9E-02		1	1
KM-17	T	5/8/2000	VANADIUM	2.2E-02		1	1
KM-17	T	9/25/2000	VANADIUM	8.2E-03		1	1
KM-17	T	4/27/2001	VANADIUM	6.8E-03		1	1
KM-17	T	10/26/2001	VANADIUM	7.8E-03		1	1
KM-17	T	5/31/2002	VANADIUM	4.0E-03		1	1
KM-17	T	10/18/2002	VANADIUM	4.1E-03		1	1
KM-17	T	5/30/2003	VANADIUM	3.4E-03		1	1
KM-17	T	10/23/2003	VANADIUM	4.2E-03		1	1
KM-17	T	5/3/2004	VANADIUM	1.4E-02		1	1
KM-17	T	10/13/2004	VANADIUM	8.0E-03		1	1
KM-17	T	5/3/2005	VANADIUM	4.3E-03		1	1
KM-17	T	10/25/2005	VANADIUM	7.4E-03		1	1
KM-17	T	5/15/2006	VANADIUM	4.4E-03		1	1
KM-17	T	10/23/2006	VANADIUM	1.1E-02		1	1
KM-17	T	5/14/2007	VANADIUM	1.8E-02		1	1
KM-17	T	10/15/2007	VANADIUM	1.0E-02		1	1
KM-17	T	5/5/2008	VANADIUM	1.5E-02		1	1

Note: 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); ND = All Samples are Non-detect

APPENDIX B

MAROS Reports 1997 – 2008 Yearly Consolidation

APPENDIX B
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MAROS COC Assessment

Project: Tronox V Mo 13 wells Finch **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
MOLYBDENUM	6.2E+00	1.8E-01	3347.7%
VANADIUM	3.6E+00	2.6E-01	1301.9%

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 excedence from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Excedences	Percent Excedences	Total detects
MOLYBDENUM	MET	14	13	92.9%	14
VANADIUM	MET	14	11	78.6%	14

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total excedences (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
MOLYBDENUM	20
VANADIUM	1000

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)

MOLYBDENUM

VANADIUM

MAROS Mann-Kendall Statistics Summary

Project: Tronox V Mo 13 wells Finch

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND" ?	Concentration Trend
MOLYBDENUM								
KM-3	S	12	12	0.64	-42	99.8%	No	D
KM-9	S	12	12	0.30	-41	99.8%	No	D
KM-13	S	12	12	0.73	-64	100.0%	No	D
KM-8	S	12	12	0.43	-48	100.0%	No	D
KM-7	S	9	9	0.12	-28	99.9%	No	D
KM-6	S	12	12	0.26	-39	99.7%	No	D
KM-5	S	12	12	0.38	-43	99.9%	No	D
KM-17	S	12	12	0.22	-24	94.2%	No	PD
KM-4	S	12	12	0.86	-62	100.0%	No	D
KM-2	S	12	12	1.11	-56	100.0%	No	D
KM-15	T	12	12	0.57	-58	100.0%	No	D
KM-16	T	12	12	0.36	-48	100.0%	No	D
Finch Spring	T	12	12	0.41	-64	100.0%	No	D
VANADIUM								
KM-13	S	12	12	0.24	-64	100.0%	No	D
KM-17	S	12	12	0.50	-20	90.2%	No	PD
KM-3	S	12	12	0.30	-12	77.0%	No	S
KM-9	S	12	12	0.31	-60	100.0%	No	D
KM-4	S	12	12	0.56	-22	92.4%	No	PD
KM-5	S	12	12	0.29	-57	100.0%	No	D
KM-6	S	12	12	0.18	-32	98.4%	No	D
KM-7	S	9	9	0.11	-20	97.8%	No	D
KM-8	S	12	12	0.38	14	81.0%	No	NT
KM-2	S	12	12	0.32	-42	99.8%	No	D
KM-16	T	12	12	0.21	-50	100.0%	No	D
KM-15	T	12	12	0.22	-62	100.0%	No	D
Finch Spring	T	12	12	0.22	20	90.2%	No	PI

Note: 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); Source/Tail (S/T)

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

MAROS Linear Regression Statistics Summary

Project: Tronox V Mo 13 wells Finch

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Average Conc (mg/L)	Median Conc (mg/L)	Standard Deviation	All Samples "ND" ?	Ln Slope	Coefficient of Variation	Confidence in Trend	Concentration Trend
MOLYBDENUM									
KM-9	S	2.1E-01	2.0E-01	6.3E-02	No	-1.6E-04	0.30	99.9%	D
KM-5	S	2.4E-01	2.0E-01	9.2E-02	No	-2.0E-04	0.38	99.9%	D
KM-13	S	5.5E-01	4.3E-01	4.0E-01	No	-4.4E-04	0.73	100.0%	D
KM-3	S	9.7E+00	7.2E+00	6.2E+00	No	-2.4E-04	0.64	99.7%	D
KM-7	S	4.4E-01	4.4E-01	5.5E-02	No	-1.0E-04	0.12	99.6%	D
KM-4	S	5.5E+00	3.2E+00	4.7E+00	No	-4.9E-04	0.86	100.0%	D
KM-2	S	2.7E+00	2.0E+00	2.9E+00	No	-4.2E-04	1.11	100.0%	D
KM-6	S	1.6E+00	1.5E+00	4.3E-01	No	-1.5E-04	0.26	99.9%	D
KM-17	S	5.2E-01	5.0E-01	1.1E-01	No	-8.4E-05	0.22	94.9%	PD
KM-8	S	5.7E+01	5.2E+01	2.5E+01	No	-2.8E-04	0.43	100.0%	D
Finch Spring	T	3.3E-01	2.8E-01	1.3E-01	No	-2.9E-04	0.41	100.0%	D
KM-15	T	7.0E-01	5.4E-01	4.0E-01	No	-3.1E-04	0.57	100.0%	D
KM-16	T	1.1E+00	9.9E-01	4.0E-01	No	-2.4E-04	0.36	100.0%	D
VANADIUM									
KM-17	S	1.1E-02	1.2E-02	5.4E-03	No	-1.3E-04	0.50	82.9%	S
KM-2	S	6.5E+00	6.2E+00	2.1E+00	No	-2.1E-04	0.32	100.0%	D
KM-3	S	3.0E+00	2.8E+00	9.2E-01	No	-7.1E-05	0.30	87.4%	S
KM-13	S	6.4E-01	6.0E-01	1.5E-01	No	-1.7E-04	0.24	100.0%	D
KM-4	S	7.9E+00	6.1E+00	4.4E+00	No	-2.1E-04	0.56	98.4%	D
KM-6	S	4.6E+00	4.6E+00	8.3E-01	No	-8.5E-05	0.18	98.5%	D
KM-7	S	2.4E+00	2.3E+00	2.5E-01	No	-7.0E-05	0.11	98.2%	D
KM-8	S	1.8E+01	1.9E+01	6.9E+00	No	1.8E-04	0.38	96.5%	I
KM-9	S	6.1E-01	5.8E-01	1.9E-01	No	-2.2E-04	0.31	100.0%	D
KM-5	S	1.6E+00	1.4E+00	4.6E-01	No	-1.9E-04	0.29	100.0%	D
KM-16	T	2.9E+00	2.8E+00	6.0E-01	No	-1.4E-04	0.21	100.0%	D
Finch Spring	T	5.8E-02	6.0E-02	1.3E-02	No	1.1E-04	0.22	97.7%	I
KM-15	T	1.1E+00	1.0E+00	2.5E-01	No	-1.6E-04	0.22	100.0%	D

Note: 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); COV = Coefficient of Variation

MAROS Plume Analysis Summary

Project: Tronox V Mo 13 wells Finch

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/10/2008

Consolidation Period: Yearly

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values : Actual Value

Constituent	Well	Source/ Tail	Number of Samples	Number of Detects	Average (mg/L)	Median (mg/L)	All Samples "ND" ?	Mann-Kendall	Linear Regression	Modeling	Empirical
MOLYBDENUM											
	KM-3	S	12	12	9.7E+00	7.2E+00	No	D	D	N/A	N/A
	KM-9	S	12	12	2.1E-01	2.0E-01	No	D	D	N/A	N/A
	KM-13	S	12	12	5.5E-01	4.3E-01	No	D	D	N/A	N/A
	KM-8	S	12	12	5.7E+01	5.2E+01	No	D	D	N/A	N/A
	KM-7	S	9	9	4.4E-01	4.4E-01	No	D	D	N/A	N/A
	KM-6	S	12	12	1.6E+00	1.5E+00	No	D	D	N/A	N/A
	KM-5	S	12	12	2.4E-01	2.0E-01	No	D	D	N/A	N/A
	KM-17	S	12	12	5.2E-01	5.0E-01	No	PD	PD	N/A	N/A
	KM-4	S	12	12	5.5E+00	3.2E+00	No	D	D	N/A	N/A
	KM-2	S	12	12	2.7E+00	2.0E+00	No	D	D	N/A	N/A
	KM-15	T	12	12	7.0E-01	5.4E-01	No	D	D	N/A	N/A
	KM-16	T	12	12	1.1E+00	9.9E-01	No	D	D	N/A	N/A
	Finch Spring	T	12	12	3.3E-01	2.8E-01	No	D	D	N/A	N/A
VANADIUM											
	KM-13	S	12	12	6.4E-01	6.0E-01	No	D	D	N/A	N/A
	KM-17	S	12	12	1.1E-02	1.2E-02	No	PD	S	N/A	N/A
	KM-3	S	12	12	3.0E+00	2.8E+00	No	S	S	N/A	N/A
	KM-9	S	12	12	6.1E-01	5.8E-01	No	D	D	N/A	N/A
	KM-4	S	12	12	7.9E+00	6.1E+00	No	PD	D	N/A	N/A
	KM-5	S	12	12	1.6E+00	1.4E+00	No	D	D	N/A	N/A
	KM-6	S	12	12	4.6E+00	4.6E+00	No	D	D	N/A	N/A

Project: Tronox V Mo 13 wells Finch **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Constituent	Well	Source/ Tail	Number of Samples	Number of Detects	Average (mg/L)	Median (mg/L)	All Samples "ND" ?	Mann-Kendall	Linear Regression	Modeling	Empirical
VANADIUM											
	KM-7	S	9	9	2.4E+00	2.3E+00	No	D	D	N/A	N/A
	KM-8	S	12	12	1.8E+01	1.9E+01	No	NT	I	N/A	N/A
	KM-2	S	12	12	6.5E+00	6.2E+00	No	D	D	N/A	N/A
	KM-16	T	12	12	2.9E+00	2.8E+00	No	D	D	N/A	N/A
	KM-15	T	12	12	1.1E+00	1.0E+00	No	D	D	N/A	N/A
	Finch Spring	T	12	12	5.8E-02	6.0E-02	No	PI	I	N/A	N/A

Note: 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); Source/Tail (S/T)

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

MAROS Spatial Moment Analysis Summary

Project: Tronox V Mo 13 wells Finch

Location: Soda Springs

User Name: Global Environmental

State: Idaho

	0th Moment	1st Moment (Center of Mass)			2nd Moment (Spread)		
Effective Date	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance (ft)	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
MOLYBDENUM							
7/1/1997	1.7E+04	658,948	371,066	1,361	416,438	934,664	12
7/1/1998	1.3E+04	658,845	371,077	1,412	366,735	931,172	12
7/1/1999	1.2E+04	658,831	371,045	1,446	348,266	921,983	12
7/1/2000	1.0E+04	658,812	370,947	1,536	338,502	934,069	13
7/1/2001	9.3E+03	658,802	370,904	1,577	337,814	948,110	13
7/1/2002	8.5E+03	658,828	370,936	1,536	346,632	939,381	13
7/1/2003	7.6E+03	658,840	370,921	1,541	348,701	953,440	13
7/1/2004	7.0E+03	658,839	370,954	1,514	349,386	953,830	13
7/1/2005	6.8E+03	658,818	370,978	1,507	345,268	927,098	13
7/1/2006	6.5E+03	658,789	370,987	1,517	337,086	912,925	13
7/1/2007	5.9E+03	658,811	371,002	1,492	344,802	911,562	13
7/1/2008	5.8E+03	658,795	371,013	1,493	341,124	911,775	13
VANADIUM							
7/1/1997	1.1E+04	658,898	371,723	933	364,272	404,774	12
7/1/1998	1.0E+04	658,859	371,708	974	349,730	427,430	12
7/1/1999	9.4E+03	658,859	371,691	983	359,394	447,267	12
7/1/2000	8.9E+03	658,762	371,636	1,095	348,452	452,621	13
7/1/2001	8.0E+03	658,730	371,638	1,121	347,063	436,829	13
7/1/2002	7.7E+03	658,732	371,685	1,096	355,676	370,077	13
7/1/2003	7.0E+03	658,723	371,677	1,108	346,758	387,384	13
7/1/2004	7.2E+03	658,726	371,629	1,129	336,229	453,869	13
7/1/2005	6.5E+03	658,735	371,663	1,104	337,312	410,527	13
7/1/2006	7.5E+03	658,763	371,691	1,066	317,813	388,207	13
7/1/2007	7.3E+03	658,766	371,629	1,095	331,031	464,006	13
7/1/2008	7.1E+03	658,802	371,621	1,068	343,745	486,609	13

Project: Tronox V Mo 13 wells Finch

Location: Soda Springs

User Name: Global Environmental

State: Idaho

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	MOLYBDENUM	0.37	-66	100.0%	D
	VANADIUM	0.17	-48	100.0%	D
1st Moment: Distance to Source					
	MOLYBDENUM	0.04	8	68.1%	NT
	VANADIUM	0.06	18	87.5%	NT
2nd Moment: Sigma XX					
	MOLYBDENUM	0.06	-28	96.9%	D
	VANADIUM	0.04	-46	100.0%	D
2nd Moment: Sigma YY					
	MOLYBDENUM	0.02	-16	84.5%	S
	VANADIUM	0.08	18	87.5%	NT

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

Porosity: 0.20 **Saturated Thickness:** Uniform: 200 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 Site Results

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

User Defined Site and Data Assumptions:

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 5475 ft/yr

Current Plume Length: 6000 ft

Current Plume Width 3500 ft

Number of Tail Wells: 3

Number of Source Wells: 11

Source Information:

Source Treatment: No Current Site Treatment

NAPL is not observed at this site.

Down-gradient Information:

Distance from Edge of Tail to Nearest:

Down-gradient receptor: -700 ft

Down-gradient property: -2000 ft

Distance from Source to Nearest:

Down-gradient receptor: 5300 ft

Down-gradient property: 4000 ft

Data Consolidation Assumptions:

Time Period: 10/1/1997 **to** 5/30/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Plume Information Weighting Assumptions:

Consolidation Step 1. Weight Plume Information by Chemical

Summary Weighting: Weighting Applied to All Chemicals Equally

Consolidation Step 2. Weight Well Information by Chemical

Well Weighting: No Weighting of Wells was Applied.

Chemical Weighting: No Weighting of Chemicals was Applied.

Note: These assumptions were made when consolidating the historical montoring data and lumping the Wells and COCs.

1. Compliance Monitoring/Remediation Optimization Results:

Preliminary Monitoring System Optimization Results: Based on site classification, source treatment and Monitoring System Category the following suggestions are made for site Sampling Frequency, Duration of Sampling before reassessment, and Well Density. These criteria take into consideration: Plume Stability, Type of Plume, and Groundwater Velocity.

COC	Tail Stability	Source Stability	Level of Effort	Sampling Duration	Sampling Frequency	Sampling Density
MOLYBDENUM	D	D	L	End Sampling	Close site	> 50
VANADIUM	PD	PD	L	Sample 1 more year	Biannually (6 months)	> 50

Note:

Plume Status: (I) Increasing; (PI)Probably Increasing; (S) Stable; (NT) No Trend; (PD) Probably Decreasing; (D) Decreasing

Design Categories: (E) Extensive; (M) Moderate; (L) Limited (N/A) Not Applicable, Insufficient Data Available

Level of Monitoring Effort Indicated by Analysi Limited

2. Spatial Moment Analysis Results:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	MOLYBDENUM	0.37	-66	100.0%	D
	VANADIUM	0.17	-48	100.0%	D
1st Moment: Distance to Source					
	MOLYBDENUM	0.04	8	68.1%	NT
	VANADIUM	0.06	18	87.5%	NT
2nd Moment: Sigma XX					
	MOLYBDENUM	0.06	-28	96.9%	D
	VANADIUM	0.04	-46	100.0%	D
2nd Moment: Sigma YY					
	MOLYBDENUM	0.02	-16	84.5%	S
	VANADIUM	0.08	18	87.5%	NT

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

Porosity: 0.20 **Saturated Thickness:** Uniform: 200 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).

MAROS Sampling Location Optimization Results

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Sampling Events Analyzed: **From** Fall 97 (11/20/1997) **to** Spring 08 (5/5/2008)

Parameters used:

Constituent	Inside SF	Hull SF	Area Ratio	Conc. Ratio
MOLYBDENUM	0.1	0.01	0.95	0.95
VANADIUM	0.1	0.01	0.95	0.95

Well	X (feet)	Y (feet)	Removable?	Average Slope Factor*	Minimum Slope Factor*	Maximum Slope Factor*	Eliminated?
MOLYBDENUM							
Finch Spring	658191.88	367132.03	☑	0.521	0.219	0.637	☐
KM-13	658042.50	372185.75	☑	0.532	0.308	0.802	☐
KM-15	657491.88	370332.03	☑	0.110	0.044	0.208	☐
KM-16	658151.13	371058.75	☑	0.169	0.044	0.238	☐
KM-17	659365.31	371100.34	☑	0.463	0.360	0.646	☐
KM-2	660379.19	371777.03	☑	0.111	0.013	0.256	☐
KM-3	659825.56	371745.66	☑	0.307	0.200	0.414	☐
KM-4	659695.19	372033.81	☑	0.187	0.073	0.290	☐
KM-5	658856.63	372710.72	☑	0.644	0.384	0.736	☐
KM-6	658601.63	371736.94	☑	0.147	0.024	0.224	☐
KM-7	658578.44	372113.19	☑	0.469	0.357	0.586	☐
KM-8	658144.19	371771.97	☑	0.739	0.639	0.795	☐
KM-9	657836.25	371770.47	☑	0.853	0.762	0.922	☐
VANADIUM							
Finch Spring	658191.88	367132.03	☑	0.293	0.055	0.786	☐
KM-13	658042.50	372185.75	☑	0.241	0.162	0.316	☐
KM-15	657491.88	370332.03	☑	0.204	0.022	0.276	☐
KM-16	658151.13	371058.75	☑	0.116	0.078	0.165	☐
KM-17	659365.31	371100.34	☑	0.843	0.727	1.000	☐
KM-2	660379.19	371777.03	☑	0.210	0.102	0.285	☐
KM-3	659825.56	371745.66	☑	0.081	0.010	0.235	☑
KM-4	659695.19	372033.81	☑	0.190	0.116	0.274	☐
KM-5	658856.63	372710.72	☑	0.063	0.019	0.105	☐
KM-6	658601.63	371736.94	☑	0.094	0.032	0.169	☑
KM-7	658578.44	372113.19	☑	0.045	0.021	0.072	☑
KM-8	658144.19	371771.97	☑	0.295	0.170	0.388	☐

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Well	X (feet)	Y (feet)	Removable?	Average Slope Factor*	Minimum Slope Factor*	Maximum Slope Factor*	Eliminated?
KM-9	657836.25	371770.47	☑	0.333	0.221	0.444	☐

Note: The Slope Factor indicates the relative importance of a well in the monitoring network at a given sampling event; the larger the SF value of a well, the more important the well is and vice versa; the Average Slope Factor measures the overall well importance in the selected time period; the state coordinates system (i.e., X and Y refer to Easting and Northing respectively) or local coordinates systems may be used; wells that are NOT selected for analysis are not shown above.
* When the report is generated after running the Excel module, SF values will NOT be shown above.

MAROS Sampling Location Optimization

Results by Considering All COCs

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Sampling Events Analyzed: **From** Fall 97 **to** Spring 08

11/20/1997 5/5/2008

Well	X (feet)	Y (feet)	Number of COCs	COC-Averaged Slope Factor*	Abandoned?
Finch Spring	658191.88	367132.03	2	0.407	☐
KM-13	658042.50	372185.75	2	0.387	☐
KM-15	657491.88	370332.03	2	0.157	☐
KM-16	658151.13	371058.75	2	0.142	☐
KM-17	659365.31	371100.34	2	0.653	☐
KM-2	660379.19	371777.03	2	0.160	☐
KM-3	659825.56	371745.66	2	0.194	☐
KM-4	659695.19	372033.81	2	0.189	☐
KM-5	658856.63	372710.72	2	0.353	☐
KM-6	658601.63	371736.94	2	0.121	☐
KM-7	658578.44	372113.19	2	0.257	☐
KM-8	658144.19	371771.97	2	0.517	☐
KM-9	657836.25	371770.47	2	0.593	☐

Note: the COC-Averaged Slope Factor is the value calculated by averaging those "Average Slope Factor" obtained earlier across COCs; to be conservative, a location is "abandoned" only when it is eliminated from all COCs; "abandoned" doesn't necessarily mean the abandon of well, it can mean that NO samples need to be collected for any COCs.
* When the report is generated after running the Excel module, SF values will NOT be shown above.

MAROS Sampling Frequency Optimization Results

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

The Overall Number of Sampling Events: 22

"Recent Period" defined by events: **From** Fall 97 **To** Spring 08

11/20/1997 5/5/2008

"Rate of Change" parameters used:

Constituent	Cleanup Goal	Low Rate	Medium Rate	High Rate
MOLYBDENUM	0.18	0.09	0.18	0.36
VANADIUM	0.26	0.13	0.26	0.52

Units: Cleanup Goal is in mg/L; all rate parameters are in mg/L/year.

Well	Recommended Sampling Frequency	Frequency Based on Recent Data	Frequency Based on Overall Data
MOLYBDENUM			
Finch Spring	Annual	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Annual	Annual	Annual
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Annual
KM-5	Annual	Annual	Annual
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Annual	Annual	Annual
KM-9	Annual	Annual	Annual
VANADIUM			
Finch Spring	Biennial	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Biennial	Annual	Annual
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Annual
KM-5	Annual	Annual	Annual

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Well	Recommended Sampling Frequency	Frequency Based on Recent Data	Frequency Based on Overall Data
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Quarterly	Quarterly	Quarterly
KM-9	Annual	Annual	Annual

Note: Sampling frequency is determined considering both recent and overall concentration trends. Sampling Frequency is the final recommendation; Frequency Based on Recent Data is the frequency determined using recent (short) period of monitoring data; Frequency Based on Overall Data is the frequency determined using overall (long) period of monitoring data. If the "recent period" is defined using a different series of sampling events, the results could be different.

MAROS Power Analysis for Individual Well Cleanup Status

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

From Period: 7/9/1997 **to** 5/5/2008

Well	Sample Size	Sample Mean	Sample Stdev.	Normal Distribution Assumption Cleanup Status	Lognormal Distribution Assumption Cleanup Status	Alpha Level	Expected Power
MOLYBDENUM			Cleanup Goal (mg/L) = 0.18		Target Level (mg/L) = 0.144		
Finch Spring	12	3.26E-01	1.32E-01	Not Attained	Not Attained	0.05	0.8
KM-13	12	5.54E-01	4.03E-01	Cont Sampling	Not Attained	0.05	0.8
KM-15	12	7.07E-01	4.00E-01	Cont Sampling	Not Attained	0.05	0.8
KM-16	12	1.13E+00	4.13E-01	Cont Sampling	Not Attained	0.05	0.8
KM-17	12	5.25E-01	1.15E-01	Not Attained	Not Attained	0.05	0.8
KM-2	12	2.67E+00	2.94E+00	Cont Sampling	Not Attained	0.05	0.8
KM-3	12	9.70E+00	6.24E+00	Cont Sampling	Not Attained	0.05	0.8
KM-4	12	5.51E+00	4.70E+00	Cont Sampling	Not Attained	0.05	0.8
KM-5	12	2.42E-01	9.23E-02	Not Attained	Not Attained	0.05	0.8
KM-6	12	1.64E+00	4.39E-01	Cont Sampling	Not Attained	0.05	0.8
KM-7	9	4.43E-01	5.48E-02	Not Attained	Not Attained	0.05	0.8
KM-8	12	5.76E+01	2.47E+01	Cont Sampling	Not Attained	0.05	0.8
KM-9	12	2.12E-01	6.29E-02	Not Attained	Not Attained	0.05	0.8
VANADIUM			Cleanup Goal (mg/L) = 0.26		Target Level (mg/L) = 0.208		
Finch Spring	12	5.82E-02	1.29E-02	Attained	Attained	0.05	0.8
KM-13	12	6.36E-01	1.54E-01	Not Attained	Not Attained	0.05	0.8
KM-15	12	1.12E+00	2.50E-01	Not Attained	Not Attained	0.05	0.8
KM-16	12	2.91E+00	6.00E-01	Cont Sampling	Not Attained	0.05	0.8
KM-17	12	1.13E-02	5.51E-03	Attained	Attained	0.05	0.8
KM-2	12	6.53E+00	2.07E+00	Cont Sampling	Not Attained	0.05	0.8
KM-3	12	3.08E+00	9.22E-01	Cont Sampling	Not Attained	0.05	0.8
KM-4	12	7.93E+00	4.44E+00	Cont Sampling	Not Attained	0.05	0.8
KM-5	12	1.58E+00	4.56E-01	Cont Sampling	Not Attained	0.05	0.8
KM-6	12	4.66E+00	8.38E-01	Cont Sampling	Not Attained	0.05	0.8
KM-7	9	2.37E+00	2.61E-01	Cont Sampling	Not Attained	0.05	0.8
KM-8	12	1.81E+01	6.90E+00	Cont Sampling	Not Attained	0.05	0.8
KM-9	12	6.13E-01	1.90E-01	Not Attained	Not Attained	0.05	0.8

Note: N/C refers to "not conducted" because of insufficient data (N<4); S/E indicates the sample mean significantly exceeds the cleanup level and thus no analysis is conducted; Sample Size is the number of concentration data in a sampling location that are used in the analysis; The Target Level is the expected mean concentration in wells after cleanup attainment, it is only used in individual well celanup status evaluation. The test for evaluating attainment status is from EPA (1992). Refer to Appendix A.6 of MAROS Manual for details.

Individual Well Cleanup Status - Optional Analysis Results

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

From Period: 7/9/1997 **to** 5/5/2008

				Normal Distribution Assumption			Lognormal Distribution Assumption		
Well	**Sample Size**	**Sample Mean**	**Sample Stdev.**	**Significantly < Cleanup Goal?**	**Power**	**Expected Sample Size**	**Significantly < Cleanup Goal?**	**Power**	**Expected Sample Size**
MOLYBDENUM			Cleanup Goal (mg/L) = 0.18		Alpha Level = 0.05		Expected Power = 0.8		
Finch Spring	12	3.26E-01	1.32E-01	NO	S/E	S/E	NO	S/E	S/E
KM-13	12	5.54E-01	4.03E-01	NO	S/E	S/E	NO	S/E	S/E
KM-15	12	7.07E-01	4.00E-01	NO	S/E	S/E	NO	S/E	S/E
KM-16	12	1.13E+00	4.13E-01	NO	S/E	S/E	NO	S/E	S/E
KM-17	12	5.25E-01	1.15E-01	NO	S/E	S/E	NO	S/E	S/E
KM-2	12	2.67E+00	2.94E+00	NO	S/E	S/E	NO	S/E	S/E
KM-3	12	9.70E+00	6.24E+00	NO	S/E	S/E	NO	S/E	S/E
KM-4	12	5.51E+00	4.70E+00	NO	S/E	S/E	NO	S/E	S/E
KM-5	12	2.42E-01	9.23E-02	NO	S/E	S/E	NO	S/E	S/E
KM-6	12	1.64E+00	4.39E-01	NO	S/E	S/E	NO	S/E	S/E
KM-7	9	4.43E-01	5.48E-02	NO	S/E	S/E	NO	S/E	S/E
KM-8	12	5.76E+01	2.47E+01	NO	S/E	S/E	NO	S/E	S/E
KM-9	12	2.12E-01	6.29E-02	NO	S/E	S/E	NO	S/E	S/E
VANADIUM			Cleanup Goal (mg/L) = 0.26		Alpha Level = 0.05		Expected Power = 0.8		
Finch Spring	12	5.82E-02	1.29E-02	YES	1.000	<=3	YES	1.000	<=3
KM-13	12	6.36E-01	1.54E-01	NO	S/E	S/E	NO	S/E	S/E
KM-15	12	1.12E+00	2.50E-01	NO	S/E	S/E	NO	S/E	S/E
KM-16	12	2.91E+00	6.00E-01	NO	S/E	S/E	NO	S/E	S/E
KM-17	12	1.13E-02	5.51E-03	YES	1.000	<=3	YES	1.000	<=3
KM-2	12	6.53E+00	2.07E+00	NO	S/E	S/E	NO	S/E	S/E
KM-3	12	3.08E+00	9.22E-01	NO	S/E	S/E	NO	S/E	S/E
KM-4	12	7.93E+00	4.44E+00	NO	S/E	S/E	NO	S/E	S/E
KM-5	12	1.58E+00	4.56E-01	NO	S/E	S/E	NO	S/E	S/E
KM-6	12	4.66E+00	8.38E-01	NO	S/E	S/E	NO	S/E	S/E
KM-7	9	2.37E+00	2.61E-01	NO	S/E	S/E	NO	S/E	S/E
KM-8	12	1.81E+01	6.90E+00	NO	S/E	S/E	NO	S/E	S/E
KM-9	12	6.13E-01	1.90E-01	NO	S/E	S/E	NO	S/E	S/E

Note: N/C refers to "not conducted" because of insufficient data (N<4); S/E indicates the sample mean significantly exceeds the cleanup level and thus no analysis is conducted; Sample Size is the number of concentration data in a sampling location that are used in the power analysis; Expected Sample Size is the number of concentration data needed to reach the Expected Power under current sample variability; The Target Level is the expected mean concentration in wells after cleanup attainment, it is only used in individual well celanup status evaluation. The Student's t-test on mean difference is used in this analysis. Refer to Appendix A.6 of MAROS Manual for details.

MAROS Risk-Based Power Analysis for Site Cleanup

Project: Tronox 13 wells Finch yearly

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Parameters:

Groundwater Flow Direction: 240 degrees **Distance to Receptor:** -1300 feet

From Period: Fall 97 **to** Spring 08

11/20/1997 5/5/2008

Selected Plume Centerline Wells:

Well	Distance to Receptor (feet)
KM-15	1121.3
KM-16	2080.3
KM-8	2694.5

The distance is measured in the Groundwater Flow Angle from the well to the compliance boundary.

				Normal Distribution Assumption			Lognormal Distribution Assumption				
Sample Event	**Sample Size**	**Sample Mean**	**Sample Stdev.**	**Cleanup Status**	**Power**	**Expected Sample Size**	**Celanup Status**	**Power**	**Expected Sample Size**	**Alpha Level**	**Expected Power**
MOLYBDENUM				Cleanup Goal = 0.18							
Fall 97	12	1.14E+00	3.87E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 98	12	1.01E+00	3.40E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 98	12	1.33E+00	4.58E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 99	12	1.00E+00	3.42E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 99	12	1.19E+00	4.08E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 00	13	8.94E-01	3.19E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 00	13	9.75E-01	3.49E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 01	13	9.82E-01	3.52E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 01	13	1.14E+00	4.08E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 02	13	8.44E-01	3.02E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 02	13	8.16E-01	2.92E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 03	13	6.07E-01	2.17E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 03	13	6.53E-01	2.34E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 04	13	5.93E-01	2.12E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 04	13	4.98E-01	1.77E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 05	13	5.86E-01	2.09E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 05	13	3.75E-01	1.33E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 06	13	2.74E-01	9.44E-01	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 06	13	4.17E-01	1.48E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 07	13	4.73E-01	1.69E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 07	13	5.08E-01	1.82E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 08	13	5.97E-01	2.14E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
VANADIUM				Cleanup Goal = 0.26							
Fall 97	12	2.14E-01	1.83E-01	Not Attained	0.212	99	Not Attained	S/E	S/E	0.05	0.8

Project: Tronox 13 wells Finch yearly **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

				Normal Distribution Assumption			Lognormal Distribution Assumption				
Sample Event	**Sample Szie**	**Sample Mean**	**Sample Stdev.**	**Cleanup Status**	**Power**	**Expected Sample Size**	**Celanup Status**	**Power**	**Expected Sample Size**	**Alpha Level**	**Expected Power**
VANADIUM				Cleanup Goal = 0.26							
Spring 98	11	2.19E-01	1.81E-01	Not Attained	0.181	>100	Not Attained	0.061	>100	0.05	0.8
Fall 98	12	1.70E-01	1.44E-01	Attained	0.679	17	Not Attained	S/E	S/E	0.05	0.8
Spring 99	12	1.91E-01	1.57E-01	Not Attained	0.435	33	Not Attained	S/E	S/E	0.05	0.8
Fall 99	12	1.28E-01	1.27E-01	Attained	0.968	7	Not Attained	S/E	S/E	0.05	0.8
Spring 00	13	9.41E-02	1.71E-01	Attained	0.960	8	Not Attained	0.131	>100	0.05	0.8
Fall 00	13	7.73E-02	1.42E-01	Attained	0.998	5	Not Attained	0.106	>100	0.05	0.8
Spring 01	13	9.29E-02	1.60E-01	Attained	0.977	7	Not Attained	S/E	S/E	0.05	0.8
Fall 01	13	1.11E-01	2.85E-01	Attained	0.573	24	Not Attained	S/E	S/E	0.05	0.8
Spring 02	13	8.73E-02	1.99E-01	Attained	0.919	9	Not Attained	S/E	S/E	0.05	0.8
Fall 02	13	9.43E-02	2.57E-01	Attained	0.729	16	Not Attained	S/E	S/E	0.05	0.8
Spring 03	13	8.20E-02	1.81E-01	Attained	0.964	8	Not Attained	S/E	S/E	0.05	0.8
Fall 03	13	1.07E-01	3.07E-01	Attained	0.540	26	Not Attained	S/E	S/E	0.05	0.8
Spring 04	13	8.87E-02	2.30E-01	Attained	0.832	12	Not Attained	0.155	>100	0.05	0.8
Fall 04	13	9.94E-02	2.98E-01	Attained	0.597	22	Not Attained	0.090	>100	0.05	0.8
Spring 05	13	7.68E-02	1.66E-01	Attained	0.987	6	Not Attained	0.075	>100	0.05	0.8
Fall 05	13	7.91E-02	2.06E-01	Attained	0.924	9	Not Attained	0.125	>100	0.05	0.8
Spring 06	13	7.52E-02	1.31E-01	Attained	1.000	4	Not Attained	0.057	>100	0.05	0.8
Fall 06	13	7.29E-02	1.72E-01	Attained	0.985	7	Not Attained	0.177	>100	0.05	0.8
Spring 07	13	7.55E-02	1.65E-01	Attained	0.989	6	Not Attained	0.252	81	0.05	0.8
Fall 07	13	8.08E-02	2.12E-01	Attained	0.907	10	Not Attained	0.152	>100	0.05	0.8
Spring 08	13	7.75E-02	1.76E-01	Attained	0.976	7	Not Attained	0.237	89	0.05	0.8

Note: #N/C means "not conducted" due to a small sample size (N<4) or that the mean concentration is much greater than the cleanup level; Sample Size is the number of sampling locations used in the power analysis; Expected Sample Size is the number of concentration data needed to reach the Expected Power under current sample variability.

MAROS Zeroth Moment Analysis

Project: Tronox V Mo 13 wells Finch

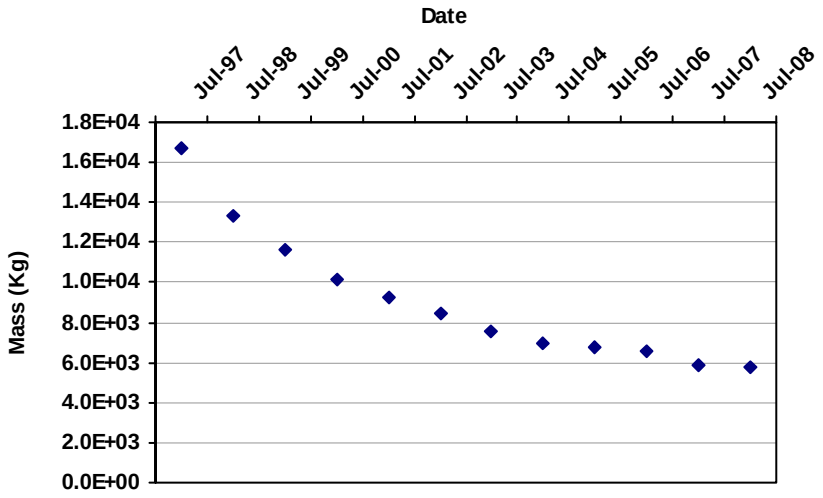
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Dissolved Mass Over Time



Porosity: 0.20

Saturated Thickness:

Uniform: 200 ft

Mann Kendall S Statistic:

-66

Confidence in Trend:

100.0%

Coefficient of Variation:

0.37

Zeroth Moment Trend:

D

Data Table:

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells
7/1/1997	MOLYBDENUM	1.7E+04	12
7/1/1998	MOLYBDENUM	1.3E+04	12
7/1/1999	MOLYBDENUM	1.2E+04	12
7/1/2000	MOLYBDENUM	1.0E+04	13
7/1/2001	MOLYBDENUM	9.3E+03	13
7/1/2002	MOLYBDENUM	8.5E+03	13
7/1/2003	MOLYBDENUM	7.6E+03	13
7/1/2004	MOLYBDENUM	7.0E+03	13
7/1/2005	MOLYBDENUM	6.8E+03	13
7/1/2006	MOLYBDENUM	6.5E+03	13
7/1/2007	MOLYBDENUM	5.9E+03	13
7/1/2008	MOLYBDENUM	5.8E+03	13

Note: 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); ND = Non-detect. Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch

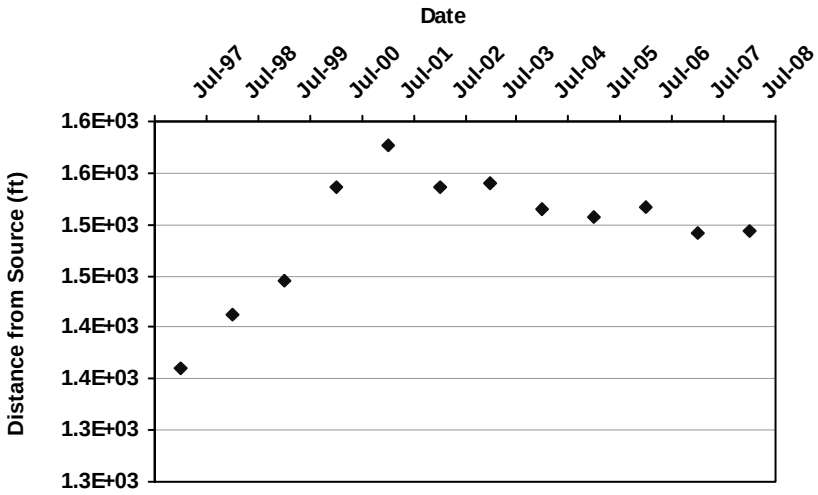
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Distance from Source to Center of Mass



Mann Kendall S Statistic:

8

Confidence in Trend:

68.1%

Coefficient of Variation:

0.04

First Moment Trend:

NT

Data Table:

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
7/1/1997	MOLYBDENUM	658,948	371,066	1,361	12
7/1/1998	MOLYBDENUM	658,845	371,077	1,412	12
7/1/1999	MOLYBDENUM	658,831	371,045	1,446	12
7/1/2000	MOLYBDENUM	658,812	370,947	1,536	13
7/1/2001	MOLYBDENUM	658,802	370,904	1,577	13
7/1/2002	MOLYBDENUM	658,828	370,936	1,536	13
7/1/2003	MOLYBDENUM	658,840	370,921	1,541	13
7/1/2004	MOLYBDENUM	658,839	370,954	1,514	13
7/1/2005	MOLYBDENUM	658,818	370,978	1,507	13
7/1/2006	MOLYBDENUM	658,789	370,987	1,517	13
7/1/2007	MOLYBDENUM	658,811	371,002	1,492	13
7/1/2008	MOLYBDENUM	658,795	371,013	1,493	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch

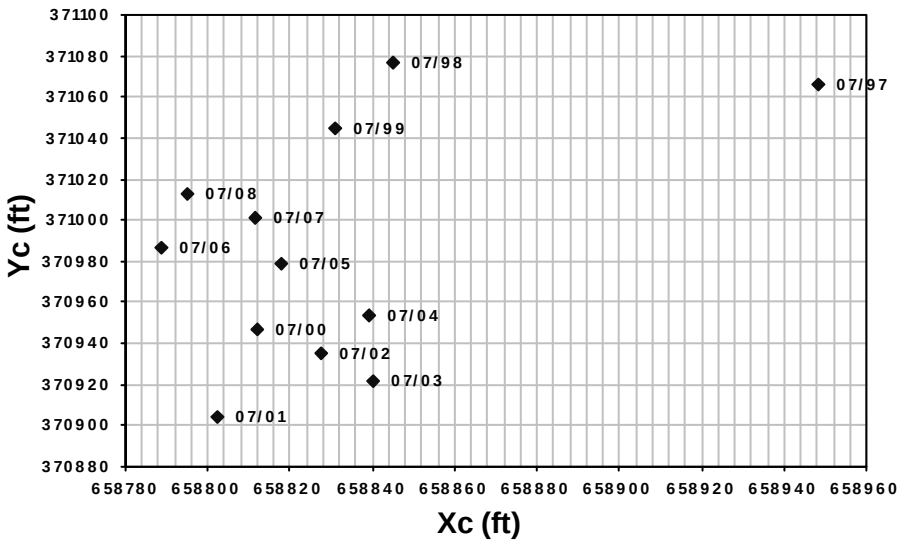
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Location of Center of Mass Over Time



Groundwater Flow Direction:

Source Coordinate:

X: 659,700

Y: 372,200

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
7/1/1997	MOLYBDENUM	658,948	371,066	1,361	12
7/1/1998	MOLYBDENUM	658,845	371,077	1,412	12
7/1/1999	MOLYBDENUM	658,831	371,045	1,446	12
7/1/2000	MOLYBDENUM	658,812	370,947	1,536	13
7/1/2001	MOLYBDENUM	658,802	370,904	1,577	13
7/1/2002	MOLYBDENUM	658,828	370,936	1,536	13
7/1/2003	MOLYBDENUM	658,840	370,921	1,541	13
7/1/2004	MOLYBDENUM	658,839	370,954	1,514	13
7/1/2005	MOLYBDENUM	658,818	370,978	1,507	13
7/1/2006	MOLYBDENUM	658,789	370,987	1,517	13
7/1/2007	MOLYBDENUM	658,811	371,002	1,492	13
7/1/2008	MOLYBDENUM	658,795	371,013	1,493	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS Second Moment Analysis

Project: Tronox V Mo 13 wells Finch

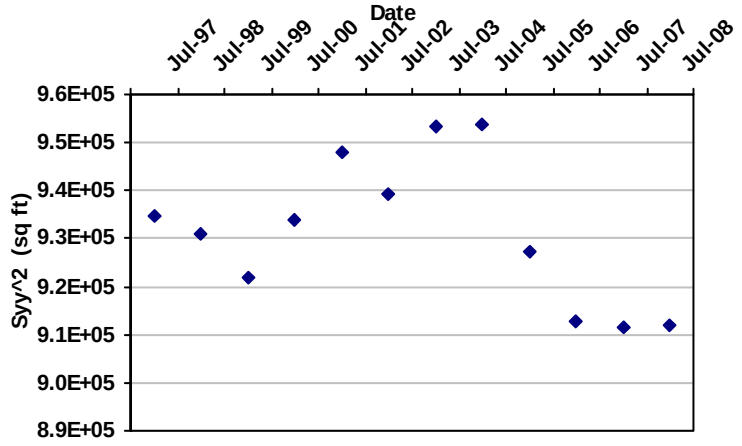
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Plume Spread Over Time

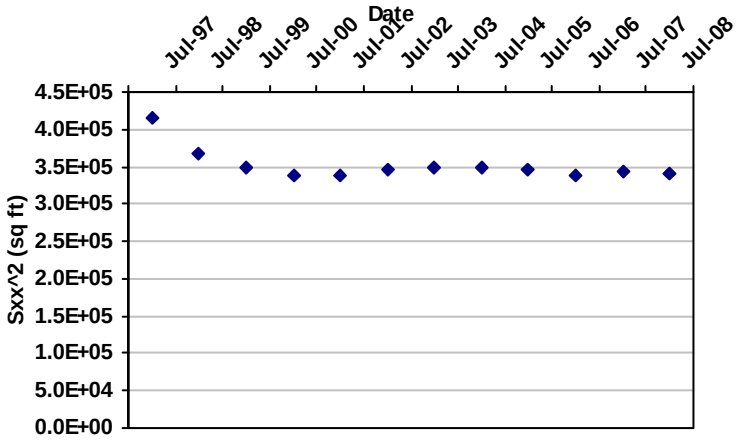


Mann Kendall S Statistic: -16

Confidence in Trend: 84.5%

Coefficient of Variation: 0.02

Second Moment Trend: S



Mann Kendall S Statistic: -28

Confidence in Trend: 96.9%

Coefficient of Variation: 0.06

Second Moment Trend: D

Data Table:

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
7/1/1997	MOLYBDENUM	416,438	934,664	12
7/1/1998	MOLYBDENUM	366,735	931,172	12
7/1/1999	MOLYBDENUM	348,266	921,983	12
7/1/2000	MOLYBDENUM	338,502	934,069	13
7/1/2001	MOLYBDENUM	337,814	948,110	13
7/1/2002	MOLYBDENUM	346,632	939,381	13
7/1/2003	MOLYBDENUM	348,701	953,440	13
7/1/2004	MOLYBDENUM	349,386	953,830	13
7/1/2005	MOLYBDENUM	345,268	927,098	13
7/1/2006	MOLYBDENUM	337,086	912,925	13
7/1/2007	MOLYBDENUM	344,802	911,562	13
7/1/2008	MOLYBDENUM	341,124	911,775	13

MAROS Second Moment Analysis

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells

Note: 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)

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 Zeroth Moment Analysis

Project: Tronox V Mo 13 wells Finch

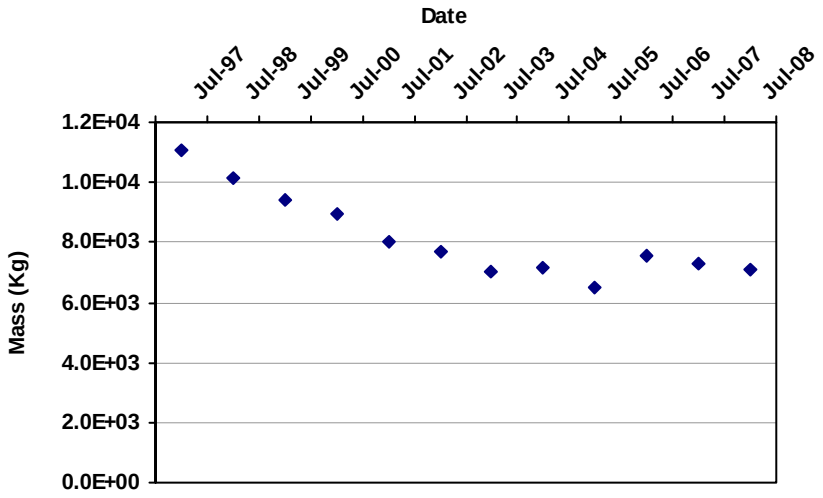
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Dissolved Mass Over Time



Porosity: 0.20

Saturated Thickness:

Uniform: 200 ft

Mann Kendall S Statistic:

-48

Confidence in Trend:

100.0%

Coefficient of Variation:

0.17

Zeroth Moment Trend:

D

Data Table:

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells
7/1/1997	VANADIUM	1.1E+04	12
7/1/1998	VANADIUM	1.0E+04	12
7/1/1999	VANADIUM	9.4E+03	12
7/1/2000	VANADIUM	8.9E+03	13
7/1/2001	VANADIUM	8.0E+03	13
7/1/2002	VANADIUM	7.7E+03	13
7/1/2003	VANADIUM	7.0E+03	13
7/1/2004	VANADIUM	7.2E+03	13
7/1/2005	VANADIUM	6.5E+03	13
7/1/2006	VANADIUM	7.5E+03	13
7/1/2007	VANADIUM	7.3E+03	13
7/1/2008	VANADIUM	7.1E+03	13

Note: 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); ND = Non-detect. Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch

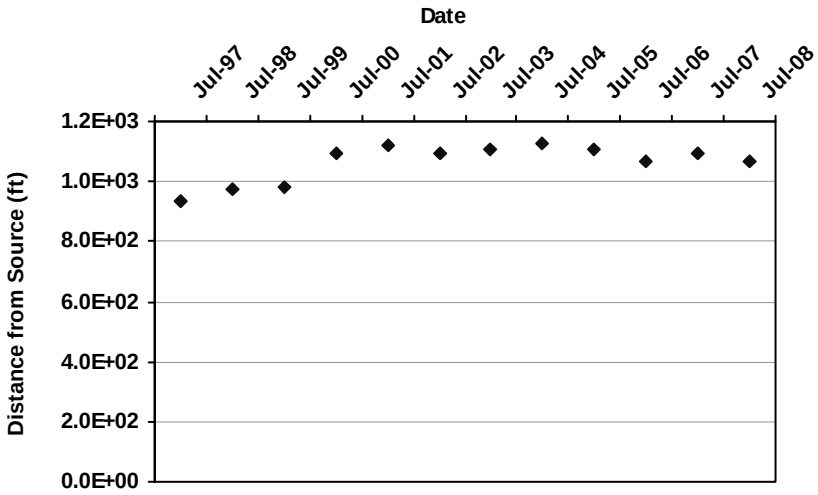
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Distance from Source to Center of Mass



Mann Kendall S Statistic:

18

Confidence in Trend:

87.5%

Coefficient of Variation:

0.06

First Moment Trend:

NT

Data Table:

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
7/1/1997	VANADIUM	658,898	371,723	933	12
7/1/1998	VANADIUM	658,859	371,708	974	12
7/1/1999	VANADIUM	658,859	371,691	983	12
7/1/2000	VANADIUM	658,762	371,636	1,095	13
7/1/2001	VANADIUM	658,730	371,638	1,121	13
7/1/2002	VANADIUM	658,732	371,685	1,096	13
7/1/2003	VANADIUM	658,723	371,677	1,108	13
7/1/2004	VANADIUM	658,726	371,629	1,129	13
7/1/2005	VANADIUM	658,735	371,663	1,104	13
7/1/2006	VANADIUM	658,763	371,691	1,066	13
7/1/2007	VANADIUM	658,766	371,629	1,095	13
7/1/2008	VANADIUM	658,802	371,621	1,068	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch

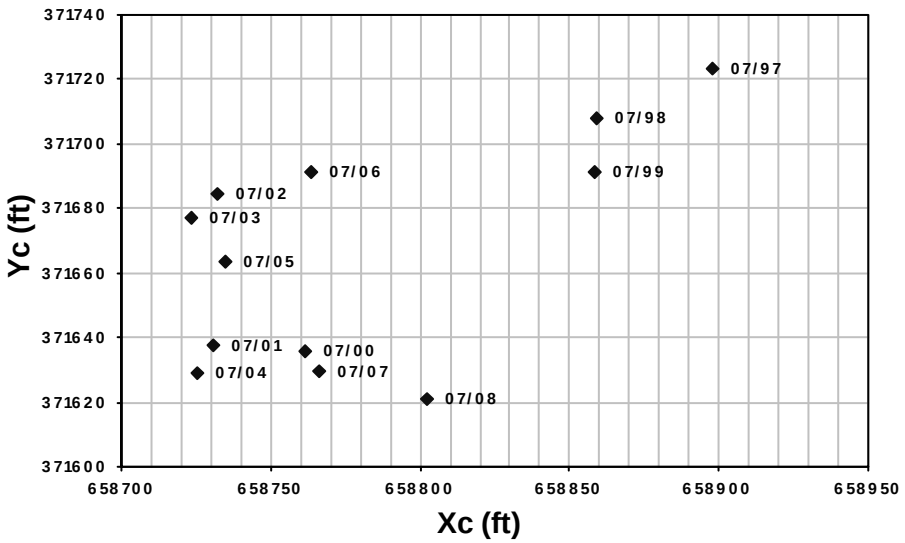
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Location of Center of Mass Over Time



Groundwater Flow Direction:

Source Coordinate:

X: 659,700

Y: 372,200

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
7/1/1997	VANADIUM	658,898	371,723	933	12
7/1/1998	VANADIUM	658,859	371,708	974	12
7/1/1999	VANADIUM	658,859	371,691	983	12
7/1/2000	VANADIUM	658,762	371,636	1,095	13
7/1/2001	VANADIUM	658,730	371,638	1,121	13
7/1/2002	VANADIUM	658,732	371,685	1,096	13
7/1/2003	VANADIUM	658,723	371,677	1,108	13
7/1/2004	VANADIUM	658,726	371,629	1,129	13
7/1/2005	VANADIUM	658,735	371,663	1,104	13
7/1/2006	VANADIUM	658,763	371,691	1,066	13
7/1/2007	VANADIUM	658,766	371,629	1,095	13
7/1/2008	VANADIUM	658,802	371,621	1,068	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS Second Moment Analysis

Project: Tronox V Mo 13 wells Finch

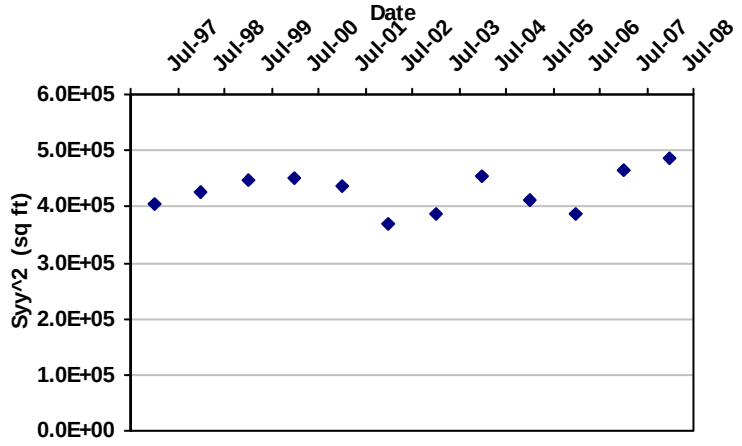
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Plume Spread Over Time

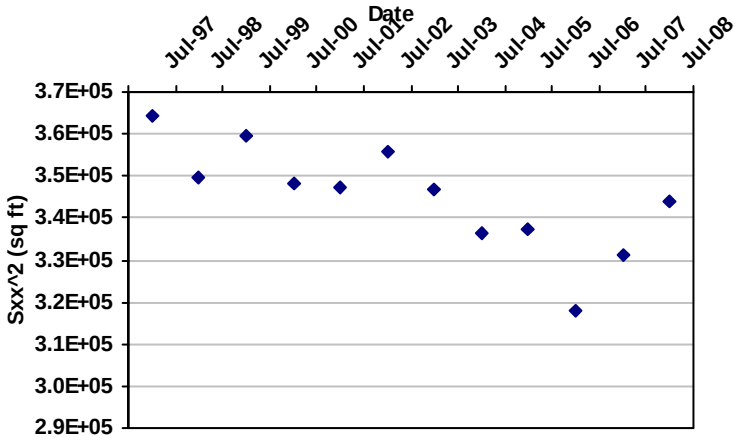


Mann Kendall S Statistic: 18

Confidence in Trend: 87.5%

Coefficient of Variation: 0.08

Second Moment Trend: NT



Mann Kendall S Statistic: -46

Confidence in Trend: 100.0%

Coefficient of Variation: 0.04

Second Moment Trend: D

Data Table:

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
7/1/1997	VANADIUM	364,272	404,774	12
7/1/1998	VANADIUM	349,730	427,430	12
7/1/1999	VANADIUM	359,394	447,267	12
7/1/2000	VANADIUM	348,452	452,621	13
7/1/2001	VANADIUM	347,063	436,829	13
7/1/2002	VANADIUM	355,676	370,077	13
7/1/2003	VANADIUM	346,758	387,384	13
7/1/2004	VANADIUM	336,229	453,869	13
7/1/2005	VANADIUM	337,312	410,527	13
7/1/2006	VANADIUM	317,813	388,207	13
7/1/2007	VANADIUM	331,031	464,006	13
7/1/2008	VANADIUM	343,745	486,609	13

MAROS Second Moment Analysis

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells

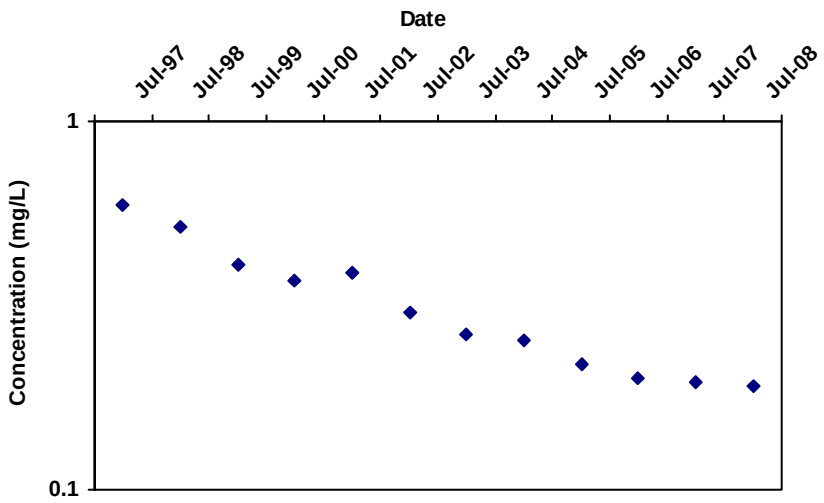
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events)

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 Mann-Kendall Statistics Summary

Well: Finch Spring
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-64

Confidence in Trend:
100.0%

Coefficient of Variation:
0.41

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

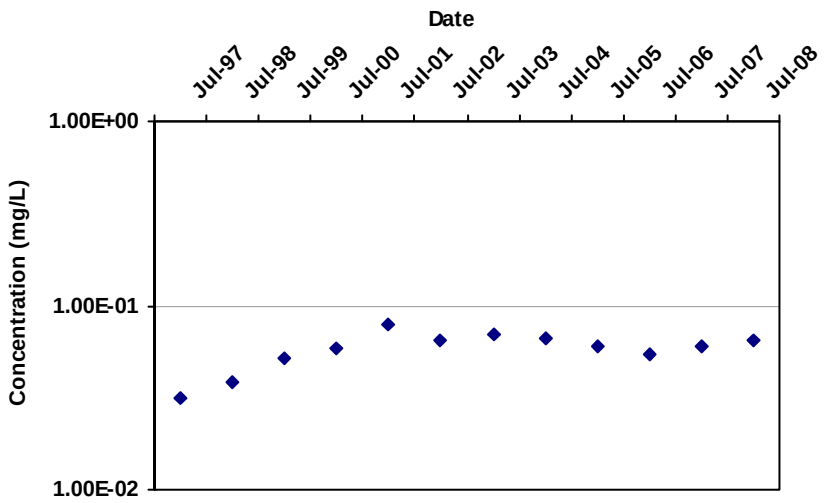
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	7/1/1997	MOLYBDENUM	5.9E-01		1	1
Finch Spring	T	7/1/1998	MOLYBDENUM	5.2E-01		2	2
Finch Spring	T	7/1/1999	MOLYBDENUM	4.1E-01		2	2
Finch Spring	T	7/1/2000	MOLYBDENUM	3.7E-01		2	2
Finch Spring	T	7/1/2001	MOLYBDENUM	3.9E-01		2	2
Finch Spring	T	7/1/2002	MOLYBDENUM	3.0E-01		2	2
Finch Spring	T	7/1/2003	MOLYBDENUM	2.6E-01		2	2
Finch Spring	T	7/1/2004	MOLYBDENUM	2.5E-01		2	2
Finch Spring	T	7/1/2005	MOLYBDENUM	2.2E-01		2	2
Finch Spring	T	7/1/2006	MOLYBDENUM	2.0E-01		2	2
Finch Spring	T	7/1/2007	MOLYBDENUM	1.9E-01		2	2
Finch Spring	T	7/1/2008	MOLYBDENUM	1.9E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: Finch Spring
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
20

Confidence in Trend:
90.2%

Coefficient of Variation:
0.22

Mann Kendall Concentration Trend: (See Note)
PI

Data Table:

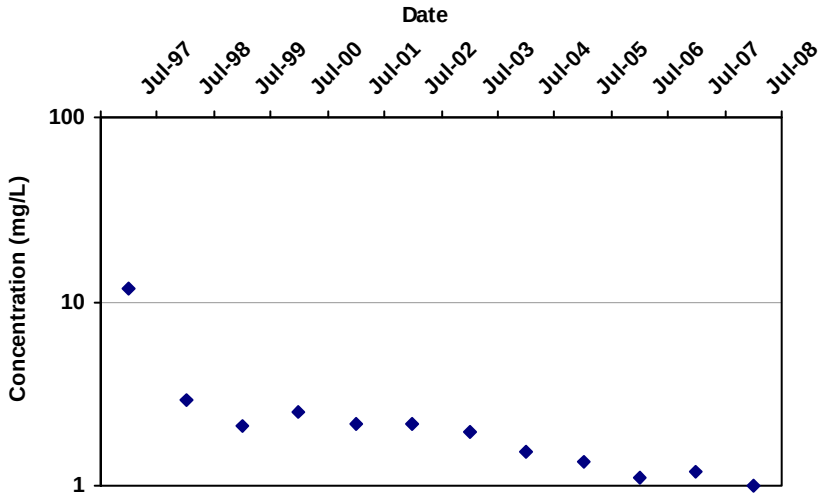
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	7/1/1997	VANADIUM	3.2E-02		1	1
Finch Spring	T	7/1/1998	VANADIUM	3.9E-02		2	2
Finch Spring	T	7/1/1999	VANADIUM	5.2E-02		2	2
Finch Spring	T	7/1/2000	VANADIUM	5.9E-02		2	2
Finch Spring	T	7/1/2001	VANADIUM	7.8E-02		2	2
Finch Spring	T	7/1/2002	VANADIUM	6.5E-02		2	2
Finch Spring	T	7/1/2003	VANADIUM	6.9E-02		2	2
Finch Spring	T	7/1/2004	VANADIUM	6.5E-02		2	2
Finch Spring	T	7/1/2005	VANADIUM	6.0E-02		2	2
Finch Spring	T	7/1/2006	VANADIUM	5.4E-02		2	2
Finch Spring	T	7/1/2007	VANADIUM	5.9E-02		2	2
Finch Spring	T	7/1/2008	VANADIUM	6.4E-02		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-2
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-56

Confidence in Trend:
100.0%

Coefficient of Variation:
1.11

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

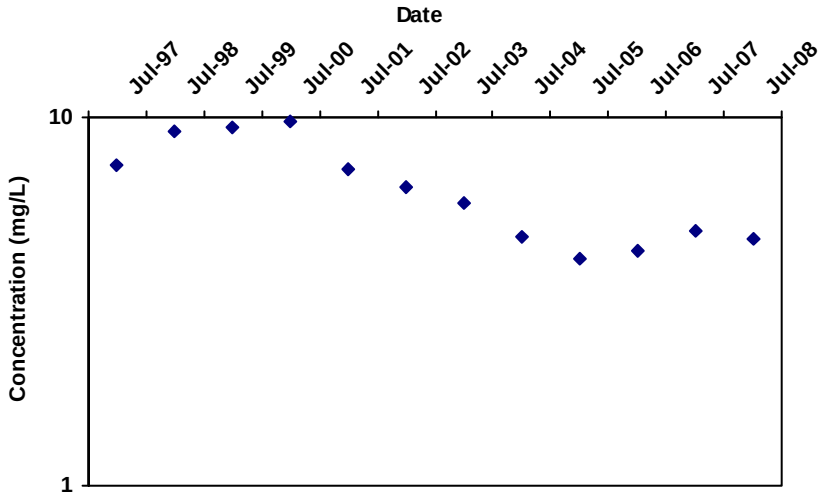
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	7/1/1997	MOLYBDENUM	1.2E+01		1	1
KM-2	S	7/1/1998	MOLYBDENUM	2.9E+00		2	2
KM-2	S	7/1/1999	MOLYBDENUM	2.1E+00		2	2
KM-2	S	7/1/2000	MOLYBDENUM	2.5E+00		2	2
KM-2	S	7/1/2001	MOLYBDENUM	2.1E+00		2	2
KM-2	S	7/1/2002	MOLYBDENUM	2.2E+00		2	2
KM-2	S	7/1/2003	MOLYBDENUM	1.9E+00		2	2
KM-2	S	7/1/2004	MOLYBDENUM	1.5E+00		2	2
KM-2	S	7/1/2005	MOLYBDENUM	1.3E+00		2	2
KM-2	S	7/1/2006	MOLYBDENUM	1.1E+00		2	2
KM-2	S	7/1/2007	MOLYBDENUM	1.2E+00		2	2
KM-2	S	7/1/2008	MOLYBDENUM	1.0E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-2
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-42

Confidence in Trend:

99.8%

Coefficient of Variation:

0.32

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

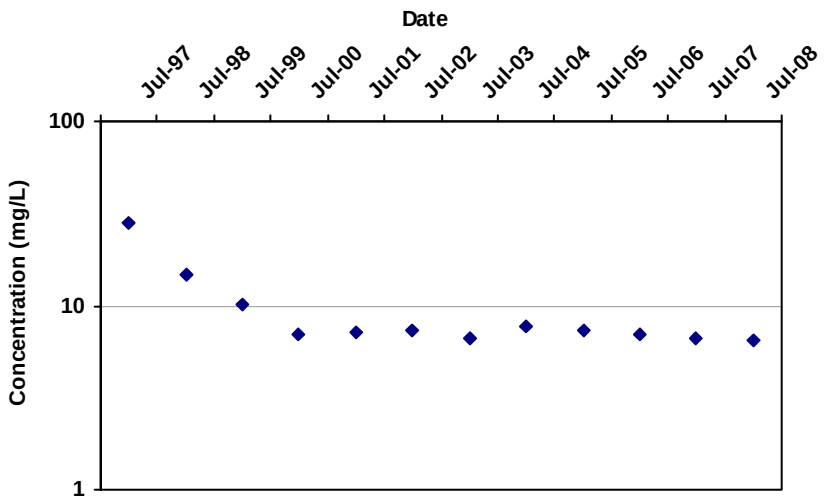
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	7/1/1997	VANADIUM	7.5E+00		1	1
KM-2	S	7/1/1998	VANADIUM	9.2E+00		2	2
KM-2	S	7/1/1999	VANADIUM	9.4E+00		2	2
KM-2	S	7/1/2000	VANADIUM	9.8E+00		2	2
KM-2	S	7/1/2001	VANADIUM	7.2E+00		2	2
KM-2	S	7/1/2002	VANADIUM	6.4E+00		2	2
KM-2	S	7/1/2003	VANADIUM	5.9E+00		2	2
KM-2	S	7/1/2004	VANADIUM	4.8E+00		2	2
KM-2	S	7/1/2005	VANADIUM	4.1E+00		2	2
KM-2	S	7/1/2006	VANADIUM	4.3E+00		2	2
KM-2	S	7/1/2007	VANADIUM	4.9E+00		2	2
KM-2	S	7/1/2008	VANADIUM	4.7E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-3
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-42

Confidence in Trend:
99.8%

Coefficient of Variation:
0.64

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

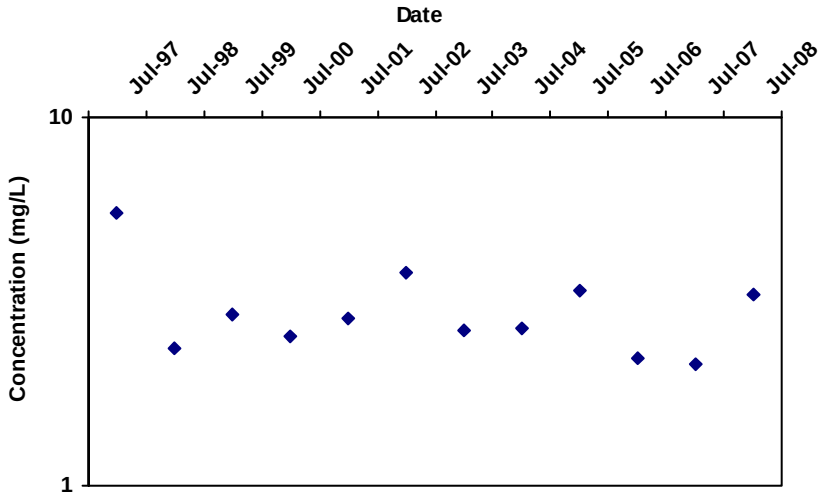
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	7/1/1997	MOLYBDENUM	2.8E+01		1	1
KM-3	S	7/1/1998	MOLYBDENUM	1.5E+01		2	2
KM-3	S	7/1/1999	MOLYBDENUM	1.0E+01		2	2
KM-3	S	7/1/2000	MOLYBDENUM	7.0E+00		2	2
KM-3	S	7/1/2001	MOLYBDENUM	7.1E+00		2	2
KM-3	S	7/1/2002	MOLYBDENUM	7.3E+00		2	2
KM-3	S	7/1/2003	MOLYBDENUM	6.7E+00		2	2
KM-3	S	7/1/2004	MOLYBDENUM	7.7E+00		2	2
KM-3	S	7/1/2005	MOLYBDENUM	7.3E+00		2	2
KM-3	S	7/1/2006	MOLYBDENUM	7.0E+00		2	2
KM-3	S	7/1/2007	MOLYBDENUM	6.6E+00		2	2
KM-3	S	7/1/2008	MOLYBDENUM	6.5E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-3
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-12

Confidence in Trend:
77.0%

Coefficient of Variation:
0.30

Mann Kendall Concentration Trend: (See Note)
S

Data Table:

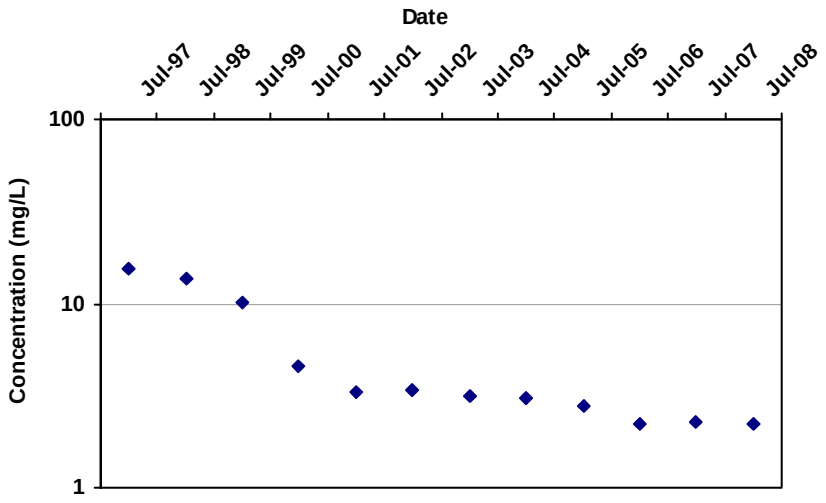
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	7/1/1997	VANADIUM	5.5E+00		1	1
KM-3	S	7/1/1998	VANADIUM	2.3E+00		2	2
KM-3	S	7/1/1999	VANADIUM	2.9E+00		2	2
KM-3	S	7/1/2000	VANADIUM	2.6E+00		2	2
KM-3	S	7/1/2001	VANADIUM	2.8E+00		2	2
KM-3	S	7/1/2002	VANADIUM	3.8E+00		2	2
KM-3	S	7/1/2003	VANADIUM	2.6E+00		2	2
KM-3	S	7/1/2004	VANADIUM	2.7E+00		2	2
KM-3	S	7/1/2005	VANADIUM	3.4E+00		2	2
KM-3	S	7/1/2006	VANADIUM	2.2E+00		2	2
KM-3	S	7/1/2007	VANADIUM	2.1E+00		2	2
KM-3	S	7/1/2008	VANADIUM	3.3E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-4
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-62

Confidence in Trend:
100.0%

Coefficient of Variation:
0.86

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

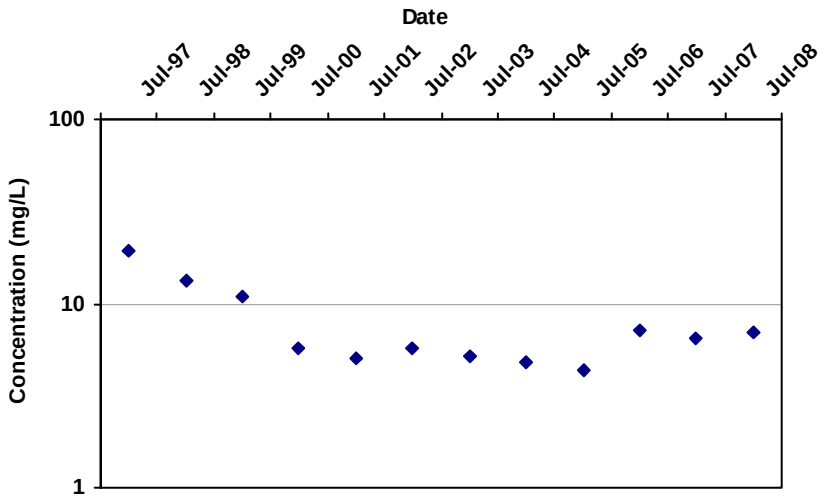
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	7/1/1997	MOLYBDENUM	1.5E+01		1	1
KM-4	S	7/1/1998	MOLYBDENUM	1.4E+01		2	2
KM-4	S	7/1/1999	MOLYBDENUM	1.0E+01		2	2
KM-4	S	7/1/2000	MOLYBDENUM	4.6E+00		2	2
KM-4	S	7/1/2001	MOLYBDENUM	3.3E+00		2	2
KM-4	S	7/1/2002	MOLYBDENUM	3.4E+00		2	2
KM-4	S	7/1/2003	MOLYBDENUM	3.1E+00		2	2
KM-4	S	7/1/2004	MOLYBDENUM	3.1E+00		2	2
KM-4	S	7/1/2005	MOLYBDENUM	2.7E+00		2	2
KM-4	S	7/1/2006	MOLYBDENUM	2.2E+00		2	2
KM-4	S	7/1/2007	MOLYBDENUM	2.3E+00		2	2
KM-4	S	7/1/2008	MOLYBDENUM	2.2E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-4
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-22

Confidence in Trend:
92.4%

Coefficient of Variation:
0.56

Mann Kendall Concentration Trend: (See Note)
PD

Data Table:

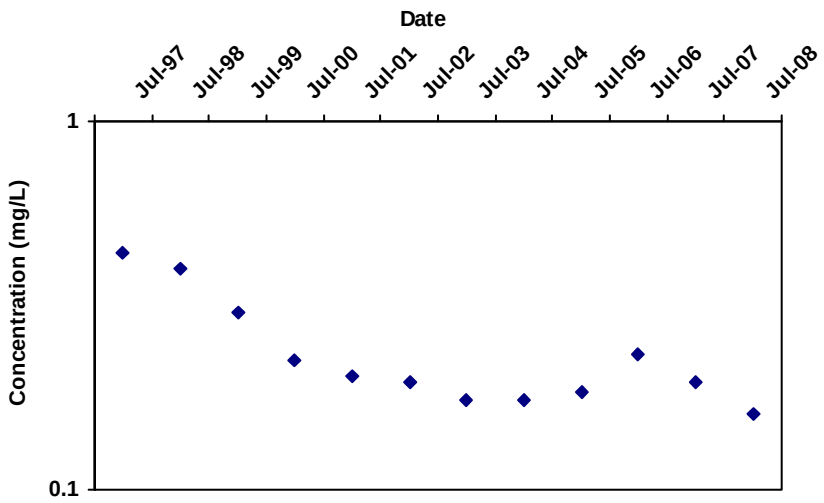
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	7/1/1997	VANADIUM	1.9E+01		1	1
KM-4	S	7/1/1998	VANADIUM	1.3E+01		2	2
KM-4	S	7/1/1999	VANADIUM	1.1E+01		2	2
KM-4	S	7/1/2000	VANADIUM	5.7E+00		2	2
KM-4	S	7/1/2001	VANADIUM	5.0E+00		2	2
KM-4	S	7/1/2002	VANADIUM	5.7E+00		2	2
KM-4	S	7/1/2003	VANADIUM	5.2E+00		2	2
KM-4	S	7/1/2004	VANADIUM	4.8E+00		2	2
KM-4	S	7/1/2005	VANADIUM	4.3E+00		2	2
KM-4	S	7/1/2006	VANADIUM	7.1E+00		2	2
KM-4	S	7/1/2007	VANADIUM	6.4E+00		2	2
KM-4	S	7/1/2008	VANADIUM	6.9E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-5
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-43

Confidence in Trend:
99.9%

Coefficient of Variation:
0.38

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

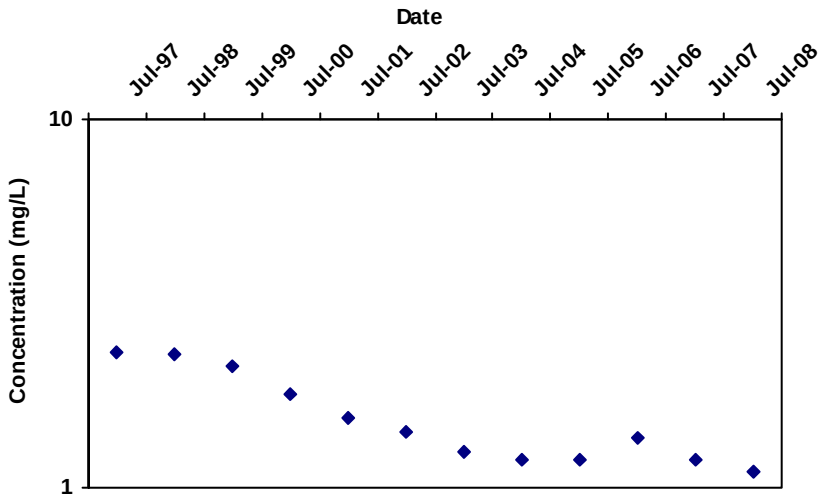
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	7/1/1997	MOLYBDENUM	4.4E-01		1	1
KM-5	S	7/1/1998	MOLYBDENUM	4.0E-01		2	2
KM-5	S	7/1/1999	MOLYBDENUM	3.0E-01		2	2
KM-5	S	7/1/2000	MOLYBDENUM	2.3E-01		2	2
KM-5	S	7/1/2001	MOLYBDENUM	2.0E-01		2	2
KM-5	S	7/1/2002	MOLYBDENUM	1.9E-01		2	2
KM-5	S	7/1/2003	MOLYBDENUM	1.7E-01		2	2
KM-5	S	7/1/2004	MOLYBDENUM	1.7E-01		2	2
KM-5	S	7/1/2005	MOLYBDENUM	1.8E-01		2	2
KM-5	S	7/1/2006	MOLYBDENUM	2.3E-01		2	2
KM-5	S	7/1/2007	MOLYBDENUM	1.9E-01		2	2
KM-5	S	7/1/2008	MOLYBDENUM	1.6E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-5
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-57

Confidence in Trend:

100.0%

Coefficient of Variation:

0.29

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

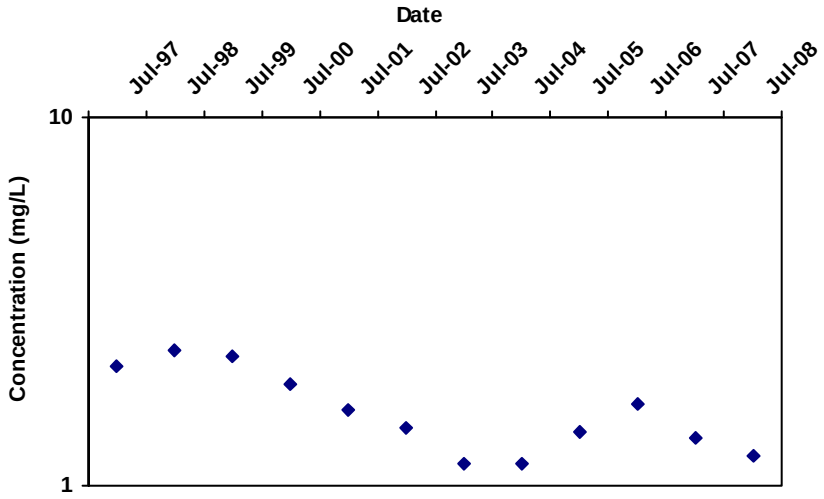
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	7/1/1997	VANADIUM	2.3E+00		1	1
KM-5	S	7/1/1998	VANADIUM	2.3E+00		2	2
KM-5	S	7/1/1999	VANADIUM	2.1E+00		2	2
KM-5	S	7/1/2000	VANADIUM	1.8E+00		2	2
KM-5	S	7/1/2001	VANADIUM	1.5E+00		2	2
KM-5	S	7/1/2002	VANADIUM	1.4E+00		2	2
KM-5	S	7/1/2003	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2004	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2005	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2006	VANADIUM	1.4E+00		2	2
KM-5	S	7/1/2007	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2008	VANADIUM	1.1E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-6
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-39

Confidence in Trend:
99.7%

Coefficient of Variation:
0.26

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

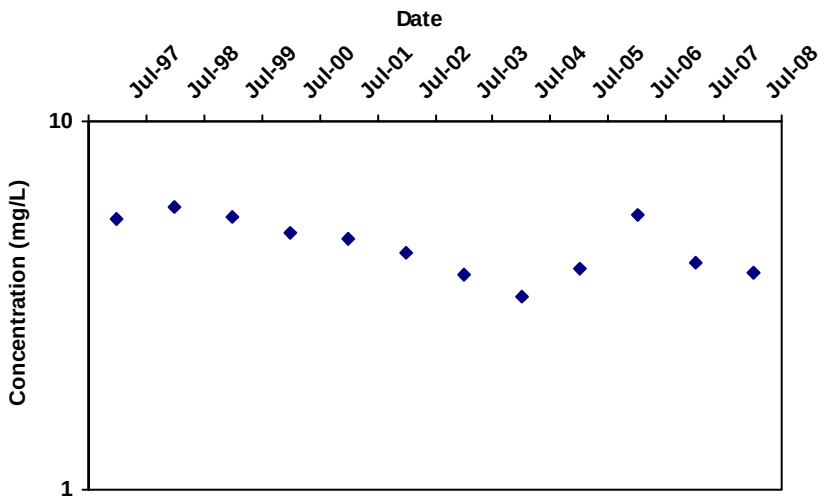
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	7/1/1997	MOLYBDENUM	2.1E+00		1	1
KM-6	S	7/1/1998	MOLYBDENUM	2.3E+00		2	2
KM-6	S	7/1/1999	MOLYBDENUM	2.3E+00		2	2
KM-6	S	7/1/2000	MOLYBDENUM	1.9E+00		2	2
KM-6	S	7/1/2001	MOLYBDENUM	1.6E+00		2	2
KM-6	S	7/1/2002	MOLYBDENUM	1.4E+00		2	2
KM-6	S	7/1/2003	MOLYBDENUM	1.1E+00		2	2
KM-6	S	7/1/2004	MOLYBDENUM	1.1E+00		2	2
KM-6	S	7/1/2005	MOLYBDENUM	1.4E+00		2	2
KM-6	S	7/1/2006	MOLYBDENUM	1.7E+00		2	2
KM-6	S	7/1/2007	MOLYBDENUM	1.3E+00		2	2
KM-6	S	7/1/2008	MOLYBDENUM	1.2E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-6
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-32

Confidence in Trend:
98.4%

Coefficient of Variation:
0.18

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

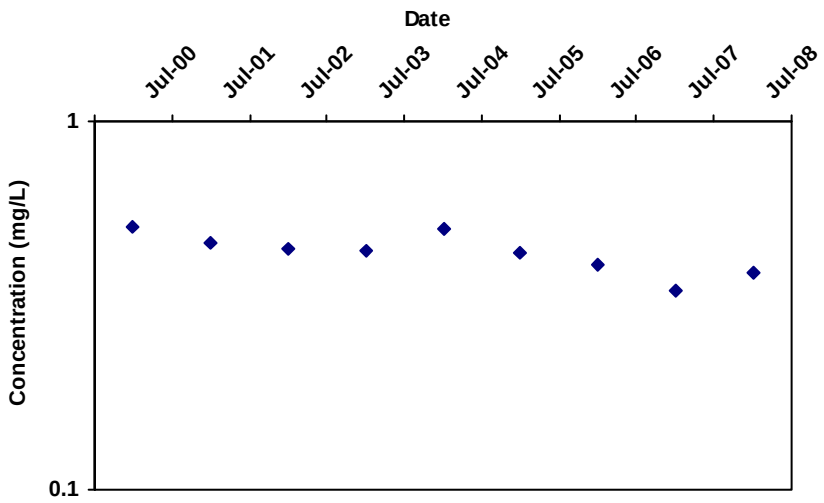
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	7/1/1997	VANADIUM	5.4E+00		1	1
KM-6	S	7/1/1998	VANADIUM	5.9E+00		2	2
KM-6	S	7/1/1999	VANADIUM	5.5E+00		2	2
KM-6	S	7/1/2000	VANADIUM	5.0E+00		2	2
KM-6	S	7/1/2001	VANADIUM	4.8E+00		2	2
KM-6	S	7/1/2002	VANADIUM	4.4E+00		2	2
KM-6	S	7/1/2003	VANADIUM	3.8E+00		2	2
KM-6	S	7/1/2004	VANADIUM	3.3E+00		2	2
KM-6	S	7/1/2005	VANADIUM	4.0E+00		2	2
KM-6	S	7/1/2006	VANADIUM	5.6E+00		2	2
KM-6	S	7/1/2007	VANADIUM	4.1E+00		2	2
KM-6	S	7/1/2008	VANADIUM	3.9E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-7
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-28

Confidence in Trend:
99.9%

Coefficient of Variation:
0.12

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

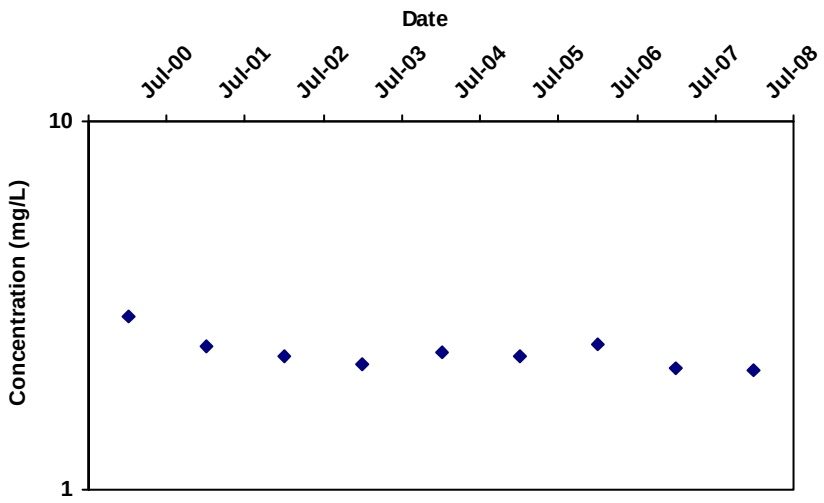
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	7/1/2000	MOLYBDENUM	5.2E-01		2	2
KM-7	S	7/1/2001	MOLYBDENUM	4.7E-01		2	2
KM-7	S	7/1/2002	MOLYBDENUM	4.5E-01		2	2
KM-7	S	7/1/2003	MOLYBDENUM	4.4E-01		2	2
KM-7	S	7/1/2004	MOLYBDENUM	5.1E-01		2	2
KM-7	S	7/1/2005	MOLYBDENUM	4.4E-01		2	2
KM-7	S	7/1/2006	MOLYBDENUM	4.1E-01		2	2
KM-7	S	7/1/2007	MOLYBDENUM	3.5E-01		2	2
KM-7	S	7/1/2008	MOLYBDENUM	3.9E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-7
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-20

Confidence in Trend:
97.8%

Coefficient of Variation:
0.11

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

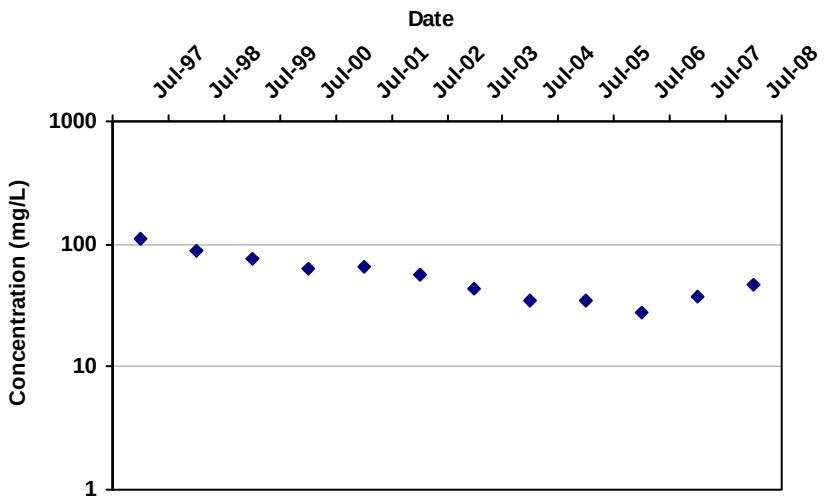
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	7/1/2000	VANADIUM	2.9E+00		2	2
KM-7	S	7/1/2001	VANADIUM	2.5E+00		2	2
KM-7	S	7/1/2002	VANADIUM	2.3E+00		2	2
KM-7	S	7/1/2003	VANADIUM	2.2E+00		2	2
KM-7	S	7/1/2004	VANADIUM	2.3E+00		2	2
KM-7	S	7/1/2005	VANADIUM	2.3E+00		2	2
KM-7	S	7/1/2006	VANADIUM	2.5E+00		2	2
KM-7	S	7/1/2007	VANADIUM	2.1E+00		2	2
KM-7	S	7/1/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-8
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-48

Confidence in Trend:

100.0%

Coefficient of Variation:

0.43

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

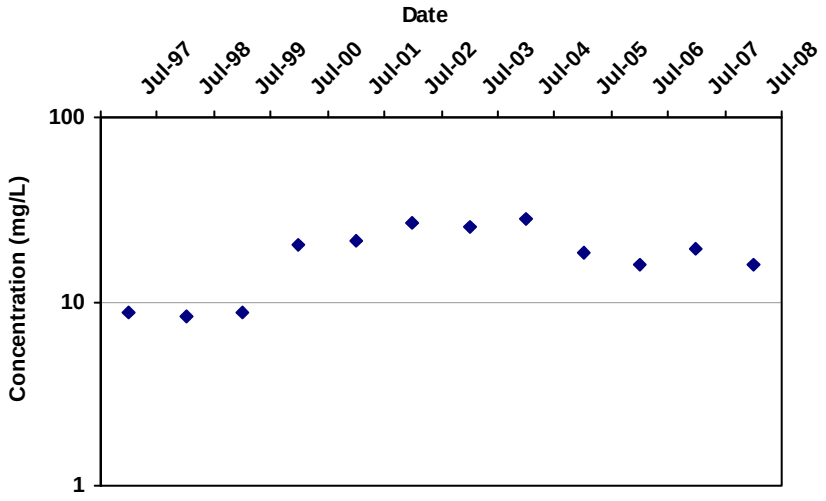
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	7/1/1997	MOLYBDENUM	1.1E+02		1	1
KM-8	S	7/1/1998	MOLYBDENUM	8.8E+01		2	2
KM-8	S	7/1/1999	MOLYBDENUM	7.7E+01		2	2
KM-8	S	7/1/2000	MOLYBDENUM	6.4E+01		2	2
KM-8	S	7/1/2001	MOLYBDENUM	6.6E+01		2	2
KM-8	S	7/1/2002	MOLYBDENUM	5.7E+01		2	2
KM-8	S	7/1/2003	MOLYBDENUM	4.3E+01		2	2
KM-8	S	7/1/2004	MOLYBDENUM	3.5E+01		2	2
KM-8	S	7/1/2005	MOLYBDENUM	3.5E+01		2	2
KM-8	S	7/1/2006	MOLYBDENUM	2.8E+01		2	2
KM-8	S	7/1/2007	MOLYBDENUM	3.8E+01		2	2
KM-8	S	7/1/2008	MOLYBDENUM	4.7E+01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-8
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic: 14

Confidence in Trend: 81.0%

Coefficient of Variation: 0.38

Mann Kendall Concentration Trend: (See Note) NT

Data Table:

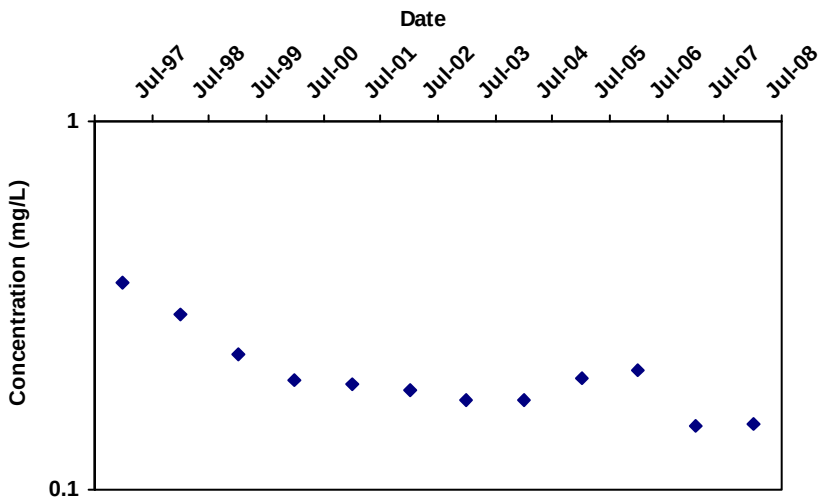
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	7/1/1997	VANADIUM	8.8E+00		1	1
KM-8	S	7/1/1998	VANADIUM	8.3E+00		2	2
KM-8	S	7/1/1999	VANADIUM	8.6E+00		2	2
KM-8	S	7/1/2000	VANADIUM	2.0E+01		2	2
KM-8	S	7/1/2001	VANADIUM	2.1E+01		2	2
KM-8	S	7/1/2002	VANADIUM	2.7E+01		2	2
KM-8	S	7/1/2003	VANADIUM	2.5E+01		2	2
KM-8	S	7/1/2004	VANADIUM	2.8E+01		2	2
KM-8	S	7/1/2005	VANADIUM	1.8E+01		2	2
KM-8	S	7/1/2006	VANADIUM	1.6E+01		2	2
KM-8	S	7/1/2007	VANADIUM	1.9E+01		2	2
KM-8	S	7/1/2008	VANADIUM	1.6E+01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-9
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-41

Confidence in Trend:
99.8%

Coefficient of Variation:
0.30

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

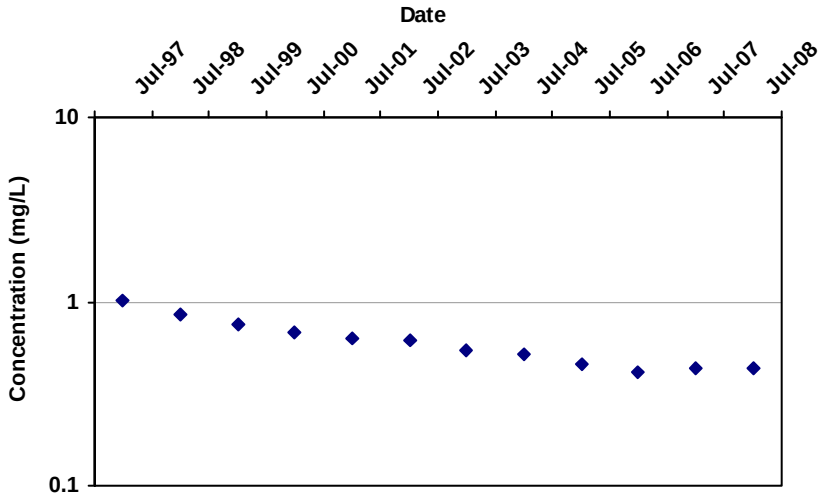
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	7/1/1997	MOLYBDENUM	3.6E-01		1	1
KM-9	S	7/1/1998	MOLYBDENUM	3.0E-01		2	2
KM-9	S	7/1/1999	MOLYBDENUM	2.3E-01		2	2
KM-9	S	7/1/2000	MOLYBDENUM	2.0E-01		2	2
KM-9	S	7/1/2001	MOLYBDENUM	1.9E-01		2	2
KM-9	S	7/1/2002	MOLYBDENUM	1.9E-01		2	2
KM-9	S	7/1/2003	MOLYBDENUM	1.7E-01		2	2
KM-9	S	7/1/2004	MOLYBDENUM	1.7E-01		2	2
KM-9	S	7/1/2005	MOLYBDENUM	2.0E-01		2	2
KM-9	S	7/1/2006	MOLYBDENUM	2.1E-01		2	2
KM-9	S	7/1/2007	MOLYBDENUM	1.5E-01		2	2
KM-9	S	7/1/2008	MOLYBDENUM	1.5E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-9
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-60

Confidence in Trend:
100.0%

Coefficient of Variation:
0.31

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

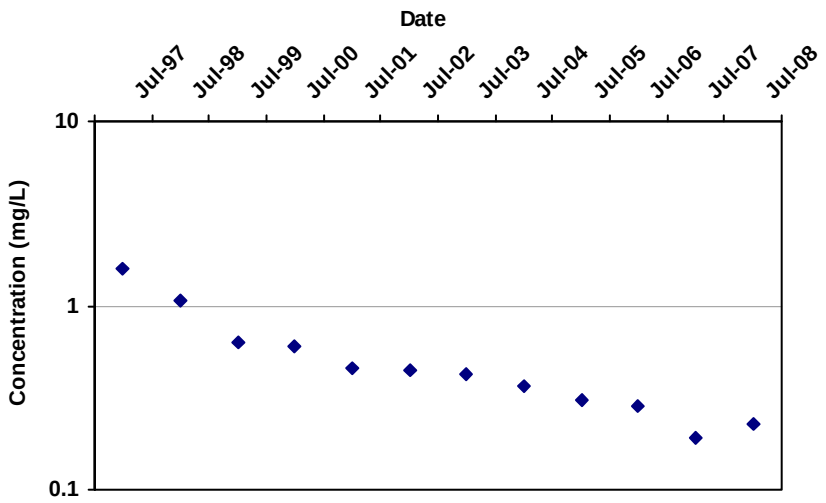
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	7/1/1997	VANADIUM	1.0E+00		1	1
KM-9	S	7/1/1998	VANADIUM	8.6E-01		2	2
KM-9	S	7/1/1999	VANADIUM	7.6E-01		2	2
KM-9	S	7/1/2000	VANADIUM	6.8E-01		2	2
KM-9	S	7/1/2001	VANADIUM	6.3E-01		2	2
KM-9	S	7/1/2002	VANADIUM	6.2E-01		2	2
KM-9	S	7/1/2003	VANADIUM	5.4E-01		2	2
KM-9	S	7/1/2004	VANADIUM	5.2E-01		2	2
KM-9	S	7/1/2005	VANADIUM	4.5E-01		2	2
KM-9	S	7/1/2006	VANADIUM	4.1E-01		2	2
KM-9	S	7/1/2007	VANADIUM	4.3E-01		2	2
KM-9	S	7/1/2008	VANADIUM	4.3E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-13
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:

-64

Confidence in Trend:

100.0%

Coefficient of Variation:

0.73

Mann Kendall Concentration Trend: (See Note)

D

Data Table:

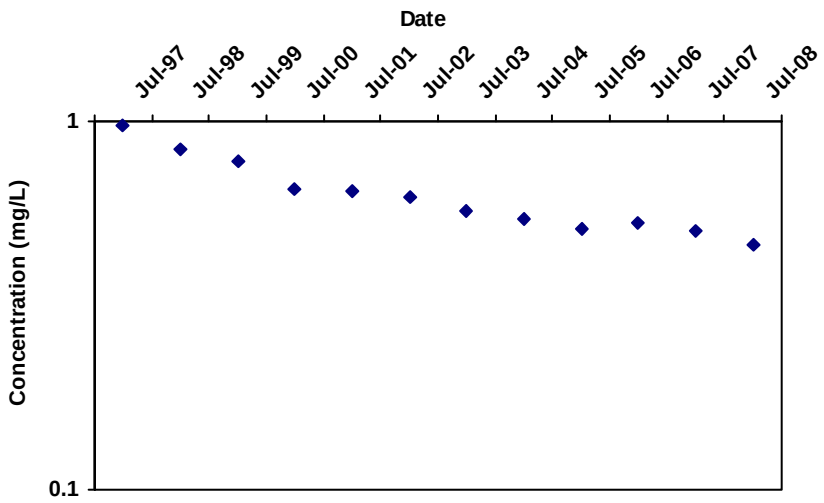
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	7/1/1997	MOLYBDENUM	1.6E+00		1	1
KM-13	S	7/1/1998	MOLYBDENUM	1.1E+00		2	2
KM-13	S	7/1/1999	MOLYBDENUM	6.3E-01		2	2
KM-13	S	7/1/2000	MOLYBDENUM	6.0E-01		2	2
KM-13	S	7/1/2001	MOLYBDENUM	4.6E-01		2	2
KM-13	S	7/1/2002	MOLYBDENUM	4.4E-01		2	2
KM-13	S	7/1/2003	MOLYBDENUM	4.2E-01		2	2
KM-13	S	7/1/2004	MOLYBDENUM	3.6E-01		2	2
KM-13	S	7/1/2005	MOLYBDENUM	3.1E-01		2	2
KM-13	S	7/1/2006	MOLYBDENUM	2.8E-01		2	2
KM-13	S	7/1/2007	MOLYBDENUM	1.9E-01		2	2
KM-13	S	7/1/2008	MOLYBDENUM	2.3E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-13
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-64

Confidence in Trend:
100.0%

Coefficient of Variation:
0.24

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

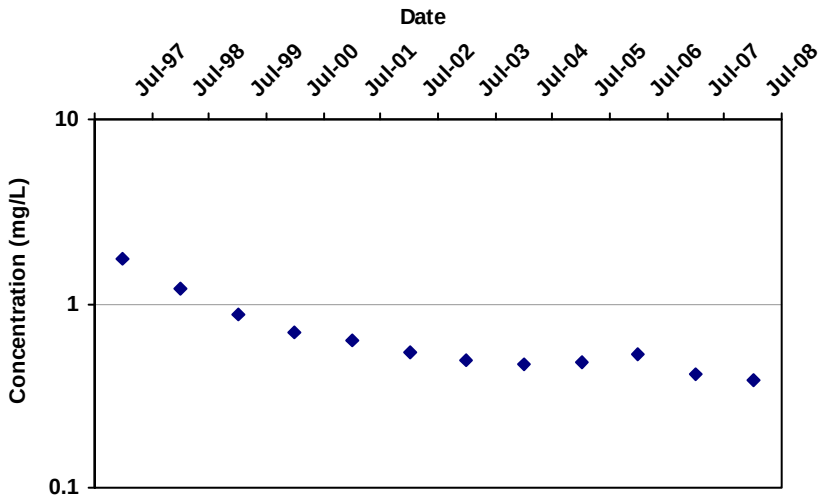
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	7/1/1997	VANADIUM	9.7E-01		1	1
KM-13	S	7/1/1998	VANADIUM	8.3E-01		2	2
KM-13	S	7/1/1999	VANADIUM	7.8E-01		2	2
KM-13	S	7/1/2000	VANADIUM	6.5E-01		2	2
KM-13	S	7/1/2001	VANADIUM	6.5E-01		2	2
KM-13	S	7/1/2002	VANADIUM	6.2E-01		2	2
KM-13	S	7/1/2003	VANADIUM	5.7E-01		2	2
KM-13	S	7/1/2004	VANADIUM	5.4E-01		2	2
KM-13	S	7/1/2005	VANADIUM	5.1E-01		2	2
KM-13	S	7/1/2006	VANADIUM	5.3E-01		2	2
KM-13	S	7/1/2007	VANADIUM	5.0E-01		2	2
KM-13	S	7/1/2008	VANADIUM	4.6E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-15
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-58

Confidence in Trend:
100.0%

Coefficient of Variation:
0.57

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

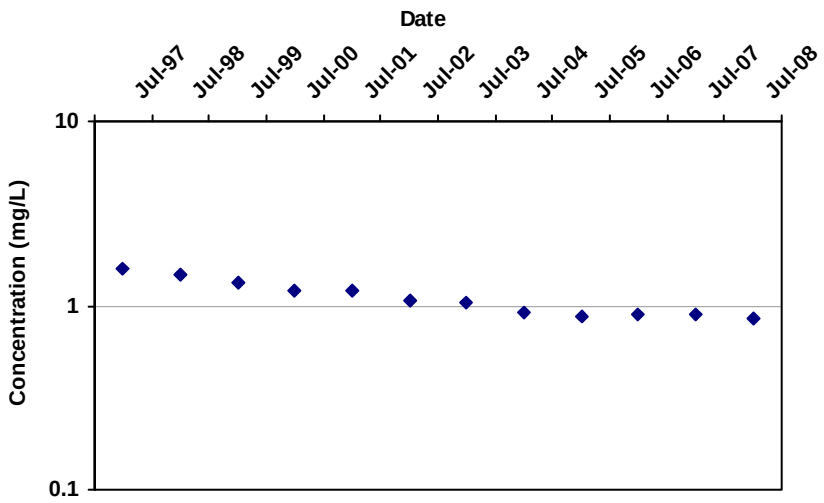
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	7/1/1997	MOLYBDENUM	1.7E+00		1	1
KM-15	T	7/1/1998	MOLYBDENUM	1.2E+00		2	2
KM-15	T	7/1/1999	MOLYBDENUM	8.6E-01		2	2
KM-15	T	7/1/2000	MOLYBDENUM	7.0E-01		2	2
KM-15	T	7/1/2001	MOLYBDENUM	6.4E-01		2	2
KM-15	T	7/1/2002	MOLYBDENUM	5.5E-01		2	2
KM-15	T	7/1/2003	MOLYBDENUM	4.9E-01		2	2
KM-15	T	7/1/2004	MOLYBDENUM	4.7E-01		2	2
KM-15	T	7/1/2005	MOLYBDENUM	4.7E-01		2	2
KM-15	T	7/1/2006	MOLYBDENUM	5.3E-01		2	2
KM-15	T	7/1/2007	MOLYBDENUM	4.1E-01		2	2
KM-15	T	7/1/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-15
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-62

Confidence in Trend:
100.0%

Coefficient of Variation:
0.22

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

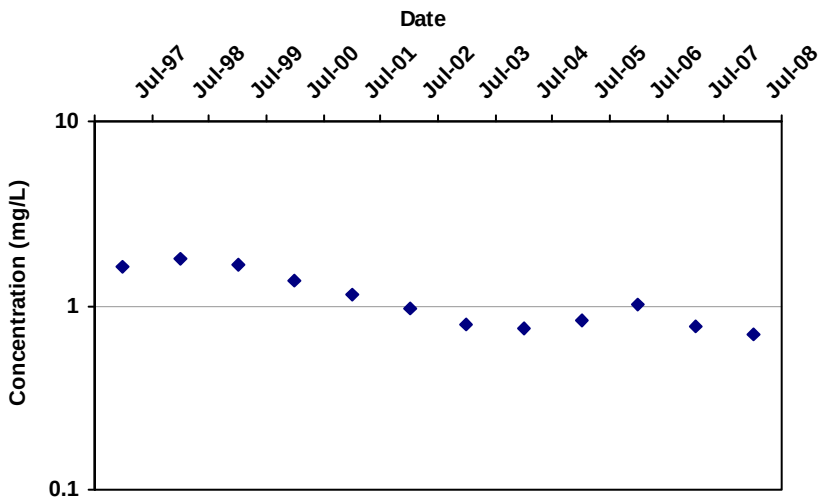
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	7/1/1997	VANADIUM	1.6E+00		1	1
KM-15	T	7/1/1998	VANADIUM	1.5E+00		2	2
KM-15	T	7/1/1999	VANADIUM	1.3E+00		2	2
KM-15	T	7/1/2000	VANADIUM	1.2E+00		2	2
KM-15	T	7/1/2001	VANADIUM	1.2E+00		2	2
KM-15	T	7/1/2002	VANADIUM	1.1E+00		2	2
KM-15	T	7/1/2003	VANADIUM	1.0E+00		2	2
KM-15	T	7/1/2004	VANADIUM	9.2E-01		2	2
KM-15	T	7/1/2005	VANADIUM	8.8E-01		2	2
KM-15	T	7/1/2006	VANADIUM	9.0E-01		2	2
KM-15	T	7/1/2007	VANADIUM	8.9E-01		2	2
KM-15	T	7/1/2008	VANADIUM	8.6E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-16
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-48

Confidence in Trend:
100.0%

Coefficient of Variation:
0.36

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

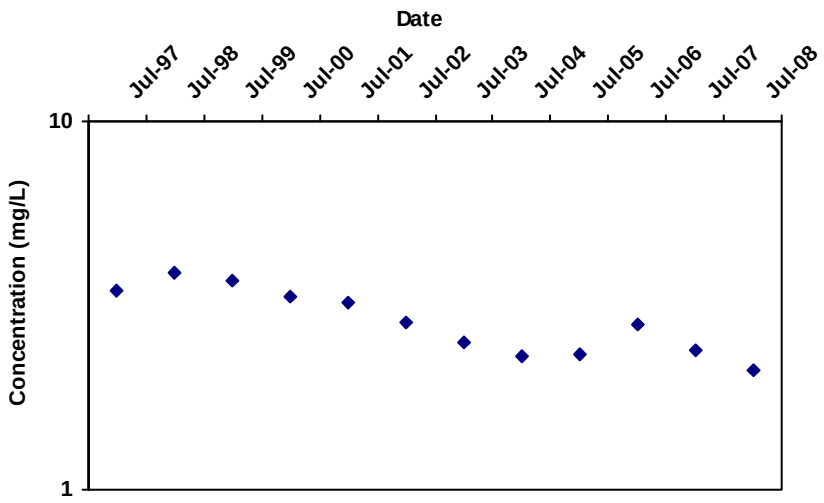
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	7/1/1997	MOLYBDENUM	1.6E+00		1	1
KM-16	T	7/1/1998	MOLYBDENUM	1.8E+00		2	2
KM-16	T	7/1/1999	MOLYBDENUM	1.7E+00		2	2
KM-16	T	7/1/2000	MOLYBDENUM	1.4E+00		2	2
KM-16	T	7/1/2001	MOLYBDENUM	1.1E+00		2	2
KM-16	T	7/1/2002	MOLYBDENUM	9.7E-01		2	2
KM-16	T	7/1/2003	MOLYBDENUM	7.9E-01		2	2
KM-16	T	7/1/2004	MOLYBDENUM	7.6E-01		2	2
KM-16	T	7/1/2005	MOLYBDENUM	8.3E-01		2	2
KM-16	T	7/1/2006	MOLYBDENUM	1.0E+00		2	2
KM-16	T	7/1/2007	MOLYBDENUM	7.6E-01		2	2
KM-16	T	7/1/2008	MOLYBDENUM	7.0E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-16
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-50

Confidence in Trend:
100.0%

Coefficient of Variation:
0.21

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

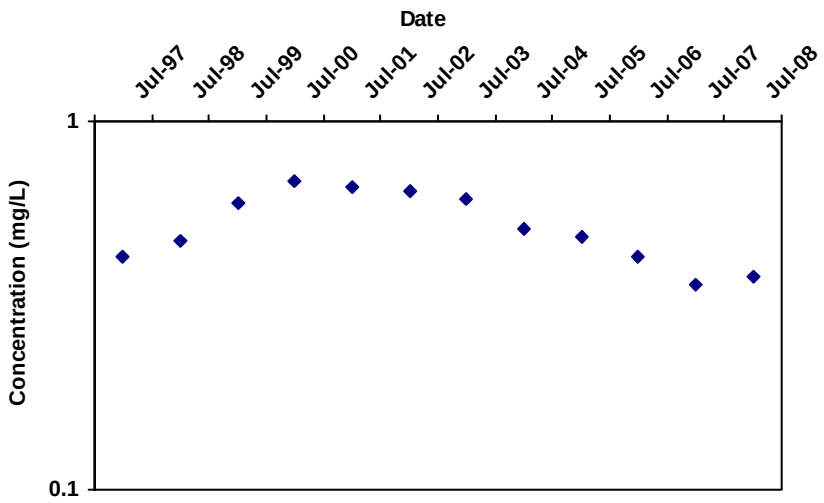
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	7/1/1997	VANADIUM	3.5E+00		1	1
KM-16	T	7/1/1998	VANADIUM	3.9E+00		2	2
KM-16	T	7/1/1999	VANADIUM	3.7E+00		2	2
KM-16	T	7/1/2000	VANADIUM	3.3E+00		2	2
KM-16	T	7/1/2001	VANADIUM	3.2E+00		2	2
KM-16	T	7/1/2002	VANADIUM	2.8E+00		2	2
KM-16	T	7/1/2003	VANADIUM	2.5E+00		2	2
KM-16	T	7/1/2004	VANADIUM	2.3E+00		2	2
KM-16	T	7/1/2005	VANADIUM	2.3E+00		2	2
KM-16	T	7/1/2006	VANADIUM	2.8E+00		2	2
KM-16	T	7/1/2007	VANADIUM	2.4E+00		2	2
KM-16	T	7/1/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-17
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-24

Confidence in Trend:
94.2%

Coefficient of Variation:
0.22

Mann Kendall Concentration Trend: (See Note)
PD

Data Table:

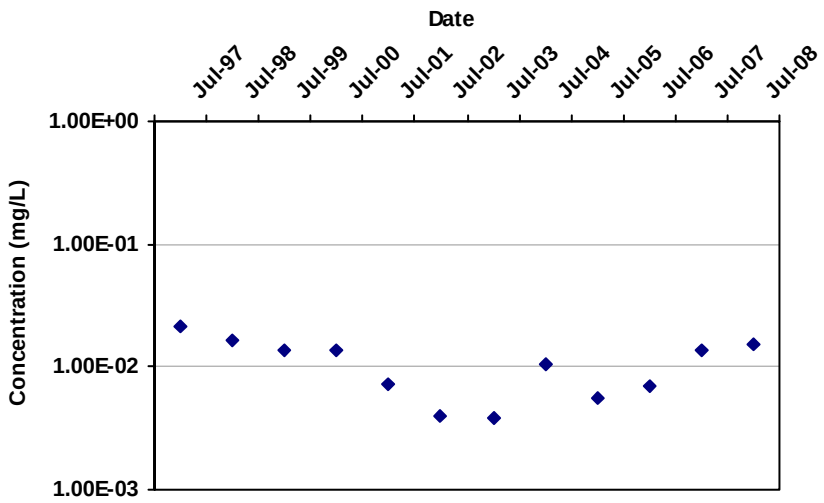
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	S	7/1/1997	MOLYBDENUM	4.3E-01		1	1
KM-17	S	7/1/1998	MOLYBDENUM	4.7E-01		2	2
KM-17	S	7/1/1999	MOLYBDENUM	6.0E-01		2	2
KM-17	S	7/1/2000	MOLYBDENUM	6.9E-01		2	2
KM-17	S	7/1/2001	MOLYBDENUM	6.6E-01		2	2
KM-17	S	7/1/2002	MOLYBDENUM	6.4E-01		2	2
KM-17	S	7/1/2003	MOLYBDENUM	6.2E-01		2	2
KM-17	S	7/1/2004	MOLYBDENUM	5.1E-01		2	2
KM-17	S	7/1/2005	MOLYBDENUM	4.8E-01		2	2
KM-17	S	7/1/2006	MOLYBDENUM	4.3E-01		2	2
KM-17	S	7/1/2007	MOLYBDENUM	3.6E-01		2	2
KM-17	S	7/1/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: KM-17
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-20

Confidence in Trend:
90.2%

Coefficient of Variation:
0.50

Mann Kendall Concentration Trend: (See Note)
PD

Data Table:

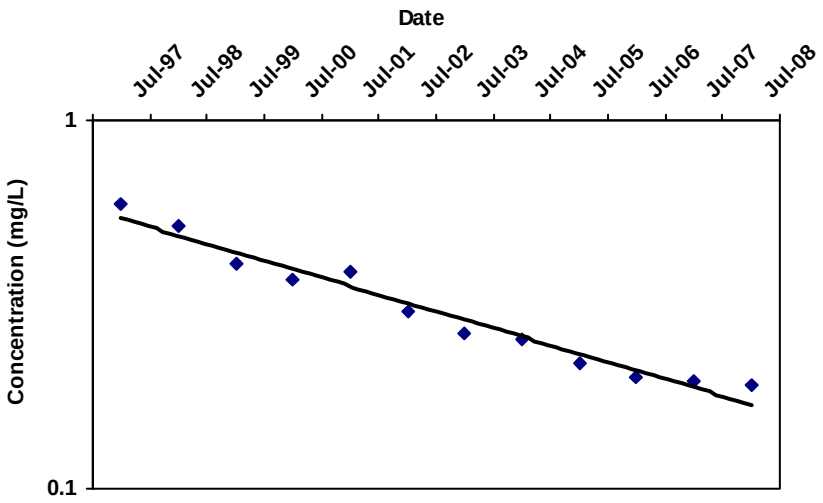
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	S	7/1/1997	VANADIUM	2.1E-02		1	1
KM-17	S	7/1/1998	VANADIUM	1.7E-02		1	1
KM-17	S	7/1/1999	VANADIUM	1.3E-02		2	2
KM-17	S	7/1/2000	VANADIUM	1.3E-02		2	2
KM-17	S	7/1/2001	VANADIUM	7.3E-03		2	2
KM-17	S	7/1/2002	VANADIUM	4.0E-03		2	2
KM-17	S	7/1/2003	VANADIUM	3.8E-03		2	2
KM-17	S	7/1/2004	VANADIUM	1.1E-02		2	2
KM-17	S	7/1/2005	VANADIUM	5.6E-03		2	2
KM-17	S	7/1/2006	VANADIUM	7.0E-03		2	2
KM-17	S	7/1/2007	VANADIUM	1.3E-02		2	2
KM-17	S	7/1/2008	VANADIUM	1.5E-02		1	1

Note: 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); ND = Non-detect

MAROS Linear Regression Statistics

Well: Finch Spring
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.41

Confidence in Trend: 100.0%

Ln Slope: -2.9E-04

LR Concentration Trend: D

Consolidation Data Table:

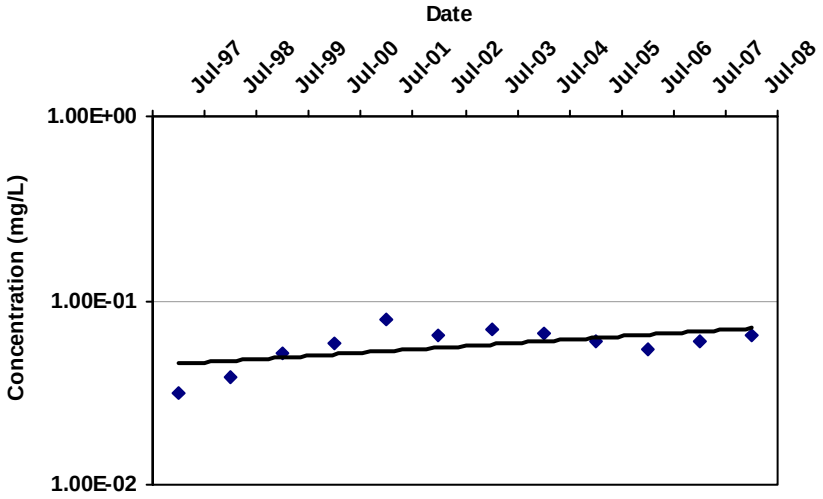
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	7/1/1997	MOLYBDENUM	5.9E-01		1	1
Finch Spring	T	7/1/1998	MOLYBDENUM	5.2E-01		2	2
Finch Spring	T	7/1/1999	MOLYBDENUM	4.1E-01		2	2
Finch Spring	T	7/1/2000	MOLYBDENUM	3.7E-01		2	2
Finch Spring	T	7/1/2001	MOLYBDENUM	3.9E-01		2	2
Finch Spring	T	7/1/2002	MOLYBDENUM	3.0E-01		2	2
Finch Spring	T	7/1/2003	MOLYBDENUM	2.6E-01		2	2
Finch Spring	T	7/1/2004	MOLYBDENUM	2.5E-01		2	2
Finch Spring	T	7/1/2005	MOLYBDENUM	2.2E-01		2	2
Finch Spring	T	7/1/2006	MOLYBDENUM	2.0E-01		2	2
Finch Spring	T	7/1/2007	MOLYBDENUM	1.9E-01		2	2
Finch Spring	T	7/1/2008	MOLYBDENUM	1.9E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: Finch Spring
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.22

Confidence in Trend: 97.7%

Ln Slope: 1.1E-04

LR Concentration Trend: I

Consolidation Data Table:

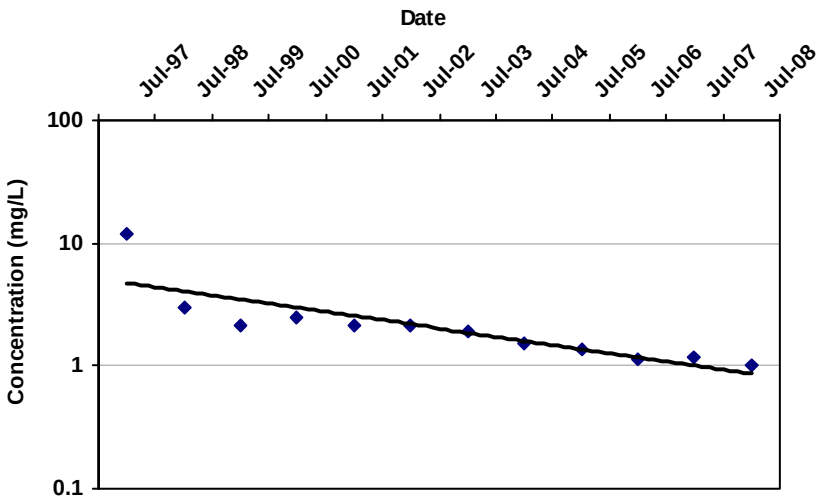
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	7/1/1997	VANADIUM	3.2E-02		1	1
Finch Spring	T	7/1/1998	VANADIUM	3.9E-02		2	2
Finch Spring	T	7/1/1999	VANADIUM	5.2E-02		2	2
Finch Spring	T	7/1/2000	VANADIUM	5.9E-02		2	2
Finch Spring	T	7/1/2001	VANADIUM	7.8E-02		2	2
Finch Spring	T	7/1/2002	VANADIUM	6.5E-02		2	2
Finch Spring	T	7/1/2003	VANADIUM	6.9E-02		2	2
Finch Spring	T	7/1/2004	VANADIUM	6.5E-02		2	2
Finch Spring	T	7/1/2005	VANADIUM	6.0E-02		2	2
Finch Spring	T	7/1/2006	VANADIUM	5.4E-02		2	2
Finch Spring	T	7/1/2007	VANADIUM	5.9E-02		2	2
Finch Spring	T	7/1/2008	VANADIUM	6.4E-02		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-2
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 1.11

Confidence in Trend: 100.0%

Ln Slope: -4.2E-04

LR Concentration Trend: D

Consolidation Data Table:

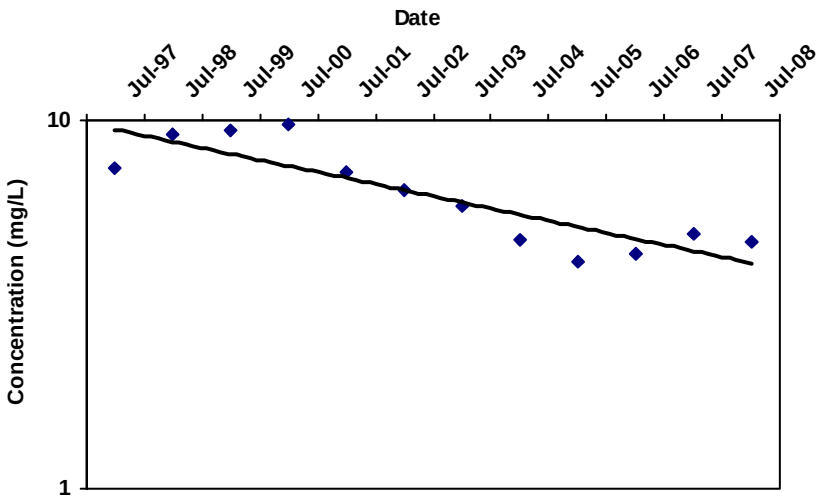
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	7/1/1997	MOLYBDENUM	1.2E+01		1	1
KM-2	S	7/1/1998	MOLYBDENUM	2.9E+00		2	2
KM-2	S	7/1/1999	MOLYBDENUM	2.1E+00		2	2
KM-2	S	7/1/2000	MOLYBDENUM	2.5E+00		2	2
KM-2	S	7/1/2001	MOLYBDENUM	2.1E+00		2	2
KM-2	S	7/1/2002	MOLYBDENUM	2.2E+00		2	2
KM-2	S	7/1/2003	MOLYBDENUM	1.9E+00		2	2
KM-2	S	7/1/2004	MOLYBDENUM	1.5E+00		2	2
KM-2	S	7/1/2005	MOLYBDENUM	1.3E+00		2	2
KM-2	S	7/1/2006	MOLYBDENUM	1.1E+00		2	2
KM-2	S	7/1/2007	MOLYBDENUM	1.2E+00		2	2
KM-2	S	7/1/2008	MOLYBDENUM	1.0E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-2
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.32

Confidence in Trend: 100.0%

Ln Slope: -2.1E-04

LR Concentration Trend: D

Consolidation Data Table:

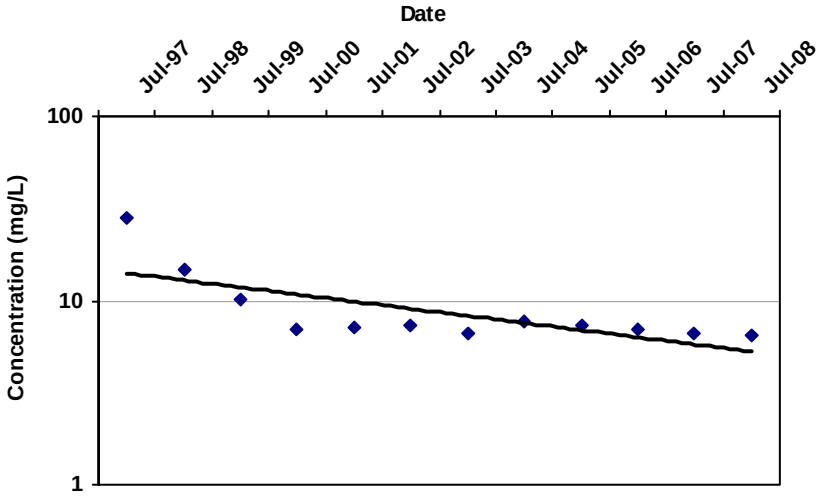
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	7/1/1997	VANADIUM	7.5E+00		1	1
KM-2	S	7/1/1998	VANADIUM	9.2E+00		2	2
KM-2	S	7/1/1999	VANADIUM	9.4E+00		2	2
KM-2	S	7/1/2000	VANADIUM	9.8E+00		2	2
KM-2	S	7/1/2001	VANADIUM	7.2E+00		2	2
KM-2	S	7/1/2002	VANADIUM	6.4E+00		2	2
KM-2	S	7/1/2003	VANADIUM	5.9E+00		2	2
KM-2	S	7/1/2004	VANADIUM	4.8E+00		2	2
KM-2	S	7/1/2005	VANADIUM	4.1E+00		2	2
KM-2	S	7/1/2006	VANADIUM	4.3E+00		2	2
KM-2	S	7/1/2007	VANADIUM	4.9E+00		2	2
KM-2	S	7/1/2008	VANADIUM	4.7E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-3
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.64

Confidence in Trend: 99.7%

Ln Slope: -2.4E-04

LR Concentration Trend: D

Consolidation Data Table:

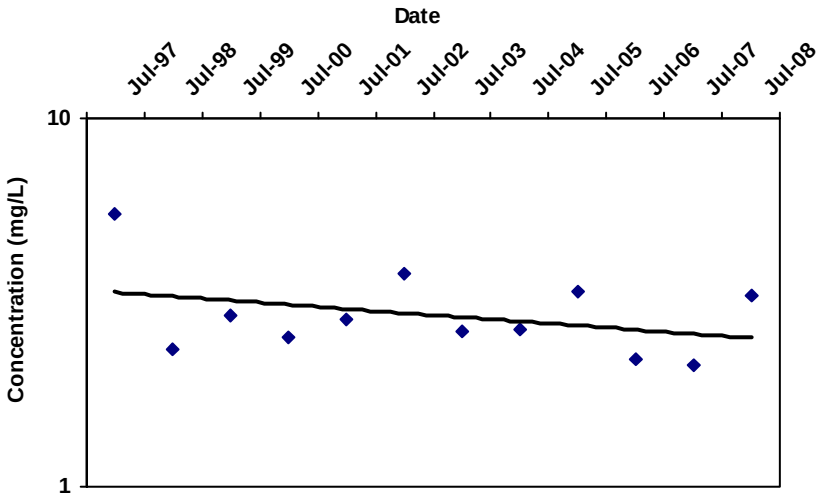
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	7/1/1997	MOLYBDENUM	2.8E+01		1	1
KM-3	S	7/1/1998	MOLYBDENUM	1.5E+01		2	2
KM-3	S	7/1/1999	MOLYBDENUM	1.0E+01		2	2
KM-3	S	7/1/2000	MOLYBDENUM	7.0E+00		2	2
KM-3	S	7/1/2001	MOLYBDENUM	7.1E+00		2	2
KM-3	S	7/1/2002	MOLYBDENUM	7.3E+00		2	2
KM-3	S	7/1/2003	MOLYBDENUM	6.7E+00		2	2
KM-3	S	7/1/2004	MOLYBDENUM	7.7E+00		2	2
KM-3	S	7/1/2005	MOLYBDENUM	7.3E+00		2	2
KM-3	S	7/1/2006	MOLYBDENUM	7.0E+00		2	2
KM-3	S	7/1/2007	MOLYBDENUM	6.6E+00		2	2
KM-3	S	7/1/2008	MOLYBDENUM	6.5E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-3
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.30

Confidence in Trend: 87.4%

Ln Slope: -7.1E-05

LR Concentration Trend: S

Consolidation Data Table:

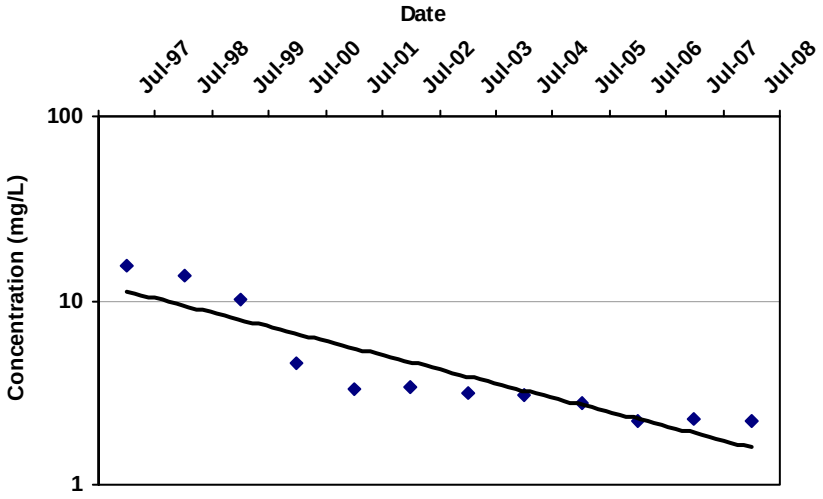
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	7/1/1997	VANADIUM	5.5E+00		1	1
KM-3	S	7/1/1998	VANADIUM	2.3E+00		2	2
KM-3	S	7/1/1999	VANADIUM	2.9E+00		2	2
KM-3	S	7/1/2000	VANADIUM	2.6E+00		2	2
KM-3	S	7/1/2001	VANADIUM	2.8E+00		2	2
KM-3	S	7/1/2002	VANADIUM	3.8E+00		2	2
KM-3	S	7/1/2003	VANADIUM	2.6E+00		2	2
KM-3	S	7/1/2004	VANADIUM	2.7E+00		2	2
KM-3	S	7/1/2005	VANADIUM	3.4E+00		2	2
KM-3	S	7/1/2006	VANADIUM	2.2E+00		2	2
KM-3	S	7/1/2007	VANADIUM	2.1E+00		2	2
KM-3	S	7/1/2008	VANADIUM	3.3E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-4
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.86

Confidence in Trend: 100.0%

Ln Slope: -4.9E-04

LR Concentration Trend: D

Consolidation Data Table:

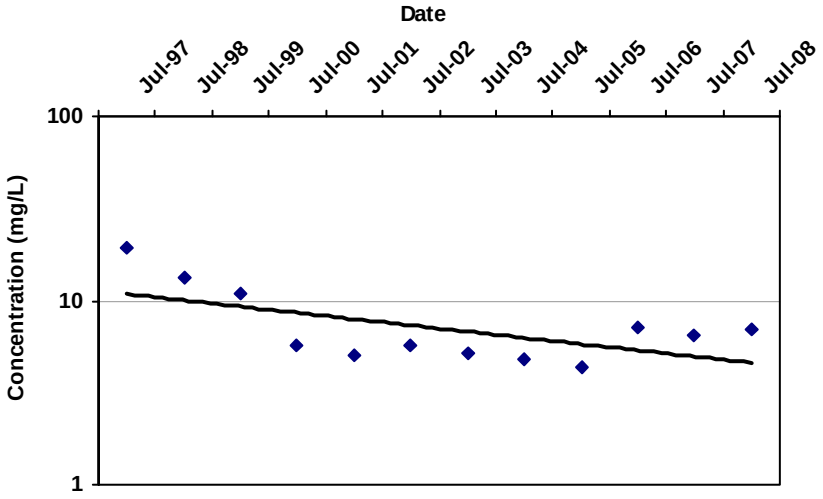
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	7/1/1997	MOLYBDENUM	1.5E+01		1	1
KM-4	S	7/1/1998	MOLYBDENUM	1.4E+01		2	2
KM-4	S	7/1/1999	MOLYBDENUM	1.0E+01		2	2
KM-4	S	7/1/2000	MOLYBDENUM	4.6E+00		2	2
KM-4	S	7/1/2001	MOLYBDENUM	3.3E+00		2	2
KM-4	S	7/1/2002	MOLYBDENUM	3.4E+00		2	2
KM-4	S	7/1/2003	MOLYBDENUM	3.1E+00		2	2
KM-4	S	7/1/2004	MOLYBDENUM	3.1E+00		2	2
KM-4	S	7/1/2005	MOLYBDENUM	2.7E+00		2	2
KM-4	S	7/1/2006	MOLYBDENUM	2.2E+00		2	2
KM-4	S	7/1/2007	MOLYBDENUM	2.3E+00		2	2
KM-4	S	7/1/2008	MOLYBDENUM	2.2E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-4
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.56

Confidence in Trend: 98.4%

Ln Slope: -2.1E-04

LR Concentration Trend: D

Consolidation Data Table:

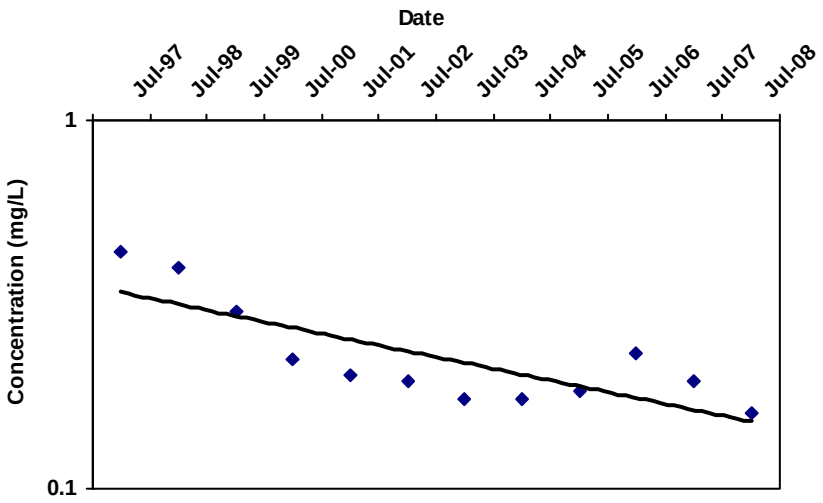
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	7/1/1997	VANADIUM	1.9E+01		1	1
KM-4	S	7/1/1998	VANADIUM	1.3E+01		2	2
KM-4	S	7/1/1999	VANADIUM	1.1E+01		2	2
KM-4	S	7/1/2000	VANADIUM	5.7E+00		2	2
KM-4	S	7/1/2001	VANADIUM	5.0E+00		2	2
KM-4	S	7/1/2002	VANADIUM	5.7E+00		2	2
KM-4	S	7/1/2003	VANADIUM	5.2E+00		2	2
KM-4	S	7/1/2004	VANADIUM	4.8E+00		2	2
KM-4	S	7/1/2005	VANADIUM	4.3E+00		2	2
KM-4	S	7/1/2006	VANADIUM	7.1E+00		2	2
KM-4	S	7/1/2007	VANADIUM	6.4E+00		2	2
KM-4	S	7/1/2008	VANADIUM	6.9E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-5
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.38

Confidence in Trend: 99.9%

Ln Slope: -2.0E-04

LR Concentration Trend: D

Consolidation Data Table:

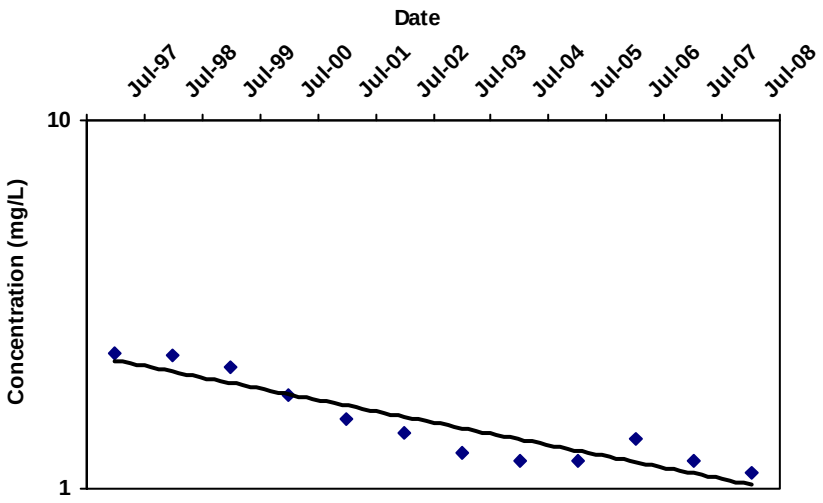
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	7/1/1997	MOLYBDENUM	4.4E-01		1	1
KM-5	S	7/1/1998	MOLYBDENUM	4.0E-01		2	2
KM-5	S	7/1/1999	MOLYBDENUM	3.0E-01		2	2
KM-5	S	7/1/2000	MOLYBDENUM	2.3E-01		2	2
KM-5	S	7/1/2001	MOLYBDENUM	2.0E-01		2	2
KM-5	S	7/1/2002	MOLYBDENUM	1.9E-01		2	2
KM-5	S	7/1/2003	MOLYBDENUM	1.7E-01		2	2
KM-5	S	7/1/2004	MOLYBDENUM	1.7E-01		2	2
KM-5	S	7/1/2005	MOLYBDENUM	1.8E-01		2	2
KM-5	S	7/1/2006	MOLYBDENUM	2.3E-01		2	2
KM-5	S	7/1/2007	MOLYBDENUM	1.9E-01		2	2
KM-5	S	7/1/2008	MOLYBDENUM	1.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-5
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.29

Confidence in Trend: 100.0%

Ln Slope: -1.9E-04

LR Concentration Trend: D

Consolidation Data Table:

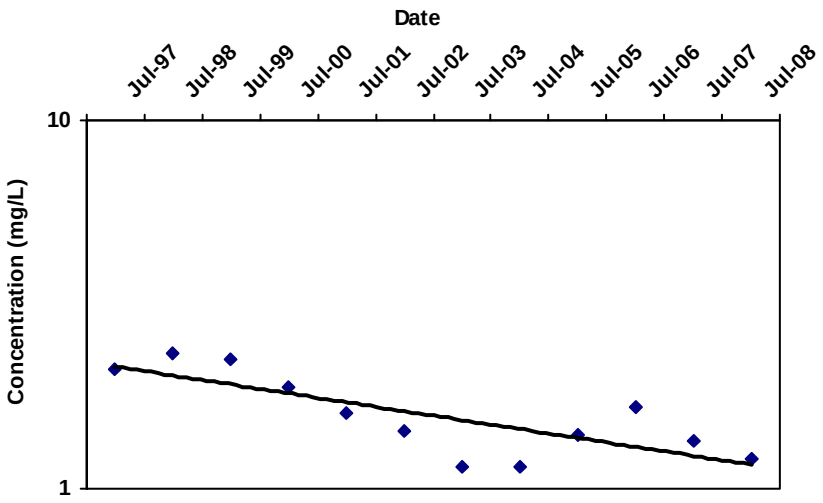
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	7/1/1997	VANADIUM	2.3E+00		1	1
KM-5	S	7/1/1998	VANADIUM	2.3E+00		2	2
KM-5	S	7/1/1999	VANADIUM	2.1E+00		2	2
KM-5	S	7/1/2000	VANADIUM	1.8E+00		2	2
KM-5	S	7/1/2001	VANADIUM	1.5E+00		2	2
KM-5	S	7/1/2002	VANADIUM	1.4E+00		2	2
KM-5	S	7/1/2003	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2004	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2005	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2006	VANADIUM	1.4E+00		2	2
KM-5	S	7/1/2007	VANADIUM	1.2E+00		2	2
KM-5	S	7/1/2008	VANADIUM	1.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-6
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.26

Confidence in Trend: 99.9%

Ln Slope: -1.5E-04

LR Concentration Trend: D

Consolidation Data Table:

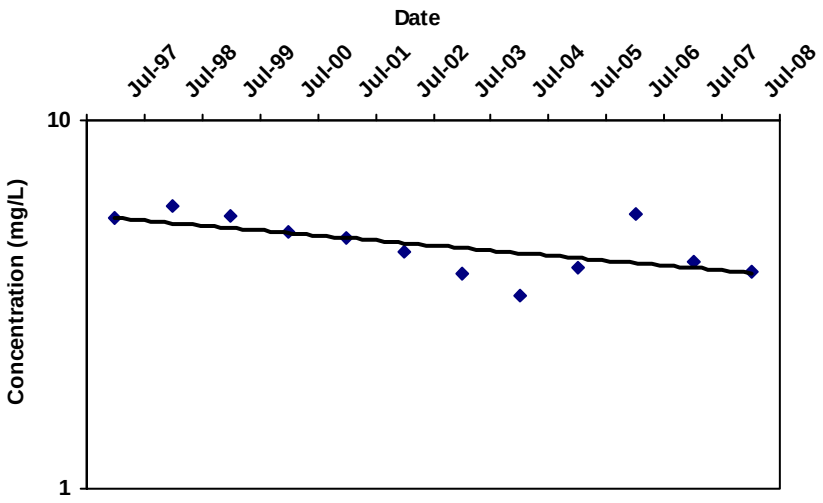
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	7/1/1997	MOLYBDENUM	2.1E+00		1	1
KM-6	S	7/1/1998	MOLYBDENUM	2.3E+00		2	2
KM-6	S	7/1/1999	MOLYBDENUM	2.3E+00		2	2
KM-6	S	7/1/2000	MOLYBDENUM	1.9E+00		2	2
KM-6	S	7/1/2001	MOLYBDENUM	1.6E+00		2	2
KM-6	S	7/1/2002	MOLYBDENUM	1.4E+00		2	2
KM-6	S	7/1/2003	MOLYBDENUM	1.1E+00		2	2
KM-6	S	7/1/2004	MOLYBDENUM	1.1E+00		2	2
KM-6	S	7/1/2005	MOLYBDENUM	1.4E+00		2	2
KM-6	S	7/1/2006	MOLYBDENUM	1.7E+00		2	2
KM-6	S	7/1/2007	MOLYBDENUM	1.3E+00		2	2
KM-6	S	7/1/2008	MOLYBDENUM	1.2E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-6
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.18

Confidence in Trend: 98.5%

Ln Slope: -8.5E-05

LR Concentration Trend: D

Consolidation Data Table:

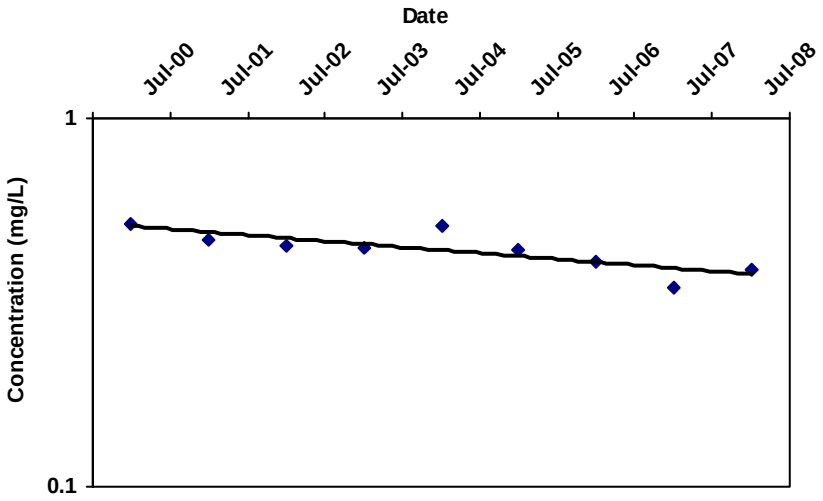
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	7/1/1997	VANADIUM	5.4E+00		1	1
KM-6	S	7/1/1998	VANADIUM	5.9E+00		2	2
KM-6	S	7/1/1999	VANADIUM	5.5E+00		2	2
KM-6	S	7/1/2000	VANADIUM	5.0E+00		2	2
KM-6	S	7/1/2001	VANADIUM	4.8E+00		2	2
KM-6	S	7/1/2002	VANADIUM	4.4E+00		2	2
KM-6	S	7/1/2003	VANADIUM	3.8E+00		2	2
KM-6	S	7/1/2004	VANADIUM	3.3E+00		2	2
KM-6	S	7/1/2005	VANADIUM	4.0E+00		2	2
KM-6	S	7/1/2006	VANADIUM	5.6E+00		2	2
KM-6	S	7/1/2007	VANADIUM	4.1E+00		2	2
KM-6	S	7/1/2008	VANADIUM	3.9E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-7
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.12

Confidence in Trend: 99.6%

Ln Slope: -1.0E-04

LR Concentration Trend: D

Consolidation Data Table:

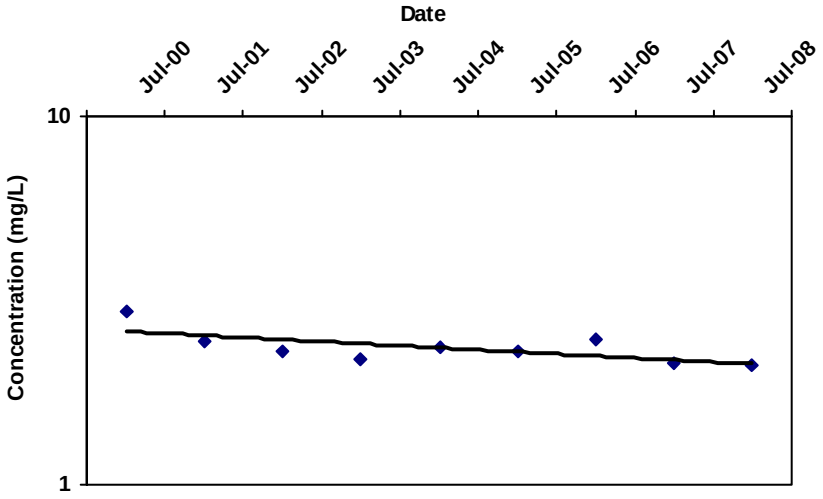
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	7/1/2000	MOLYBDENUM	5.2E-01		2	2
KM-7	S	7/1/2001	MOLYBDENUM	4.7E-01		2	2
KM-7	S	7/1/2002	MOLYBDENUM	4.5E-01		2	2
KM-7	S	7/1/2003	MOLYBDENUM	4.4E-01		2	2
KM-7	S	7/1/2004	MOLYBDENUM	5.1E-01		2	2
KM-7	S	7/1/2005	MOLYBDENUM	4.4E-01		2	2
KM-7	S	7/1/2006	MOLYBDENUM	4.1E-01		2	2
KM-7	S	7/1/2007	MOLYBDENUM	3.5E-01		2	2
KM-7	S	7/1/2008	MOLYBDENUM	3.9E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-7
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.11

Confidence in Trend: 98.2%

Ln Slope: -7.0E-05

LR Concentration Trend: D

Consolidation Data Table:

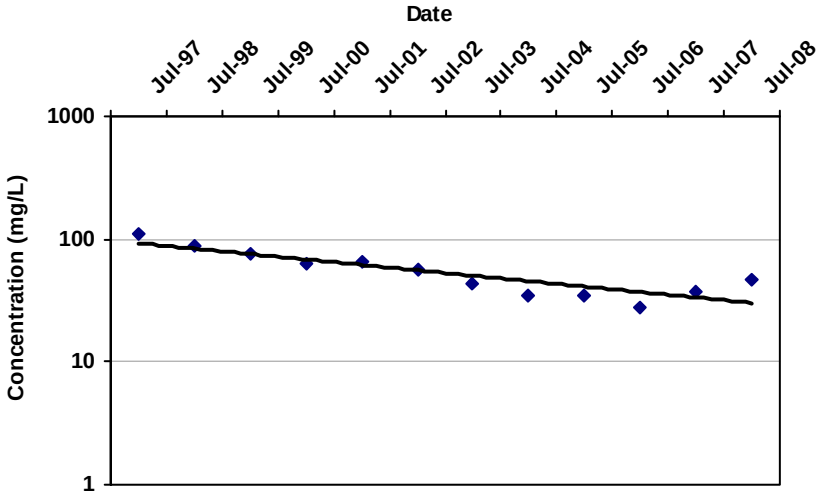
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	7/1/2000	VANADIUM	2.9E+00		2	2
KM-7	S	7/1/2001	VANADIUM	2.5E+00		2	2
KM-7	S	7/1/2002	VANADIUM	2.3E+00		2	2
KM-7	S	7/1/2003	VANADIUM	2.2E+00		2	2
KM-7	S	7/1/2004	VANADIUM	2.3E+00		2	2
KM-7	S	7/1/2005	VANADIUM	2.3E+00		2	2
KM-7	S	7/1/2006	VANADIUM	2.5E+00		2	2
KM-7	S	7/1/2007	VANADIUM	2.1E+00		2	2
KM-7	S	7/1/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-8
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.43

Confidence in Trend: 100.0%

Ln Slope: -2.8E-04

LR Concentration Trend: D

Consolidation Data Table:

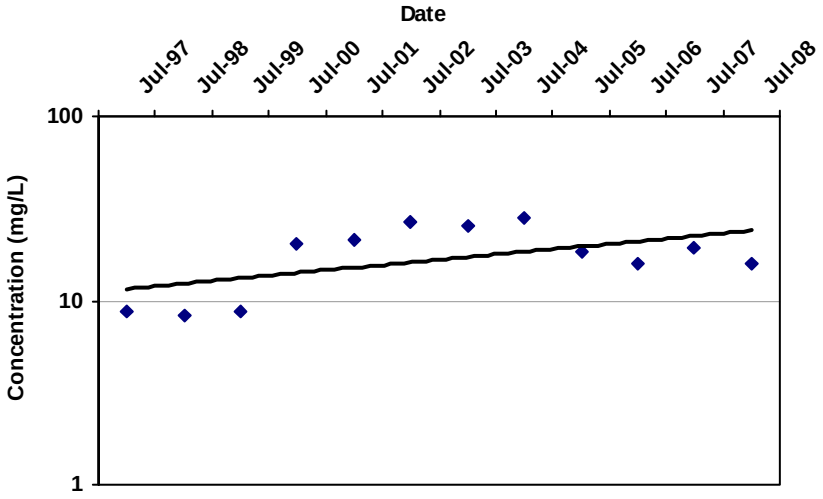
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	7/1/1997	MOLYBDENUM	1.1E+02		1	1
KM-8	S	7/1/1998	MOLYBDENUM	8.8E+01		2	2
KM-8	S	7/1/1999	MOLYBDENUM	7.7E+01		2	2
KM-8	S	7/1/2000	MOLYBDENUM	6.4E+01		2	2
KM-8	S	7/1/2001	MOLYBDENUM	6.6E+01		2	2
KM-8	S	7/1/2002	MOLYBDENUM	5.7E+01		2	2
KM-8	S	7/1/2003	MOLYBDENUM	4.3E+01		2	2
KM-8	S	7/1/2004	MOLYBDENUM	3.5E+01		2	2
KM-8	S	7/1/2005	MOLYBDENUM	3.5E+01		2	2
KM-8	S	7/1/2006	MOLYBDENUM	2.8E+01		2	2
KM-8	S	7/1/2007	MOLYBDENUM	3.8E+01		2	2
KM-8	S	7/1/2008	MOLYBDENUM	4.7E+01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-8
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.38

Confidence in Trend: 96.5%

Ln Slope: 1.8E-04

LR Concentration Trend: I

Consolidation Data Table:

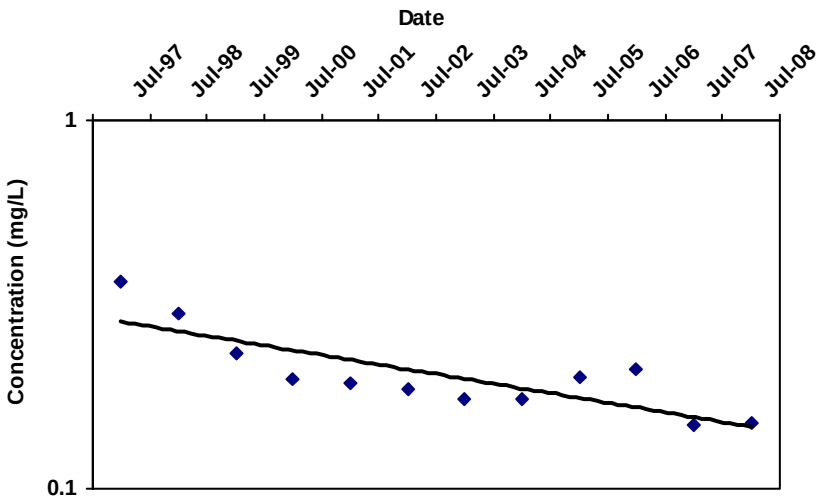
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	7/1/1997	VANADIUM	8.8E+00		1	1
KM-8	S	7/1/1998	VANADIUM	8.3E+00		2	2
KM-8	S	7/1/1999	VANADIUM	8.6E+00		2	2
KM-8	S	7/1/2000	VANADIUM	2.0E+01		2	2
KM-8	S	7/1/2001	VANADIUM	2.1E+01		2	2
KM-8	S	7/1/2002	VANADIUM	2.7E+01		2	2
KM-8	S	7/1/2003	VANADIUM	2.5E+01		2	2
KM-8	S	7/1/2004	VANADIUM	2.8E+01		2	2
KM-8	S	7/1/2005	VANADIUM	1.8E+01		2	2
KM-8	S	7/1/2006	VANADIUM	1.6E+01		2	2
KM-8	S	7/1/2007	VANADIUM	1.9E+01		2	2
KM-8	S	7/1/2008	VANADIUM	1.6E+01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-9
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.30

Confidence in Trend: 99.9%

Ln Slope: -1.6E-04

LR Concentration Trend: D

Consolidation Data Table:

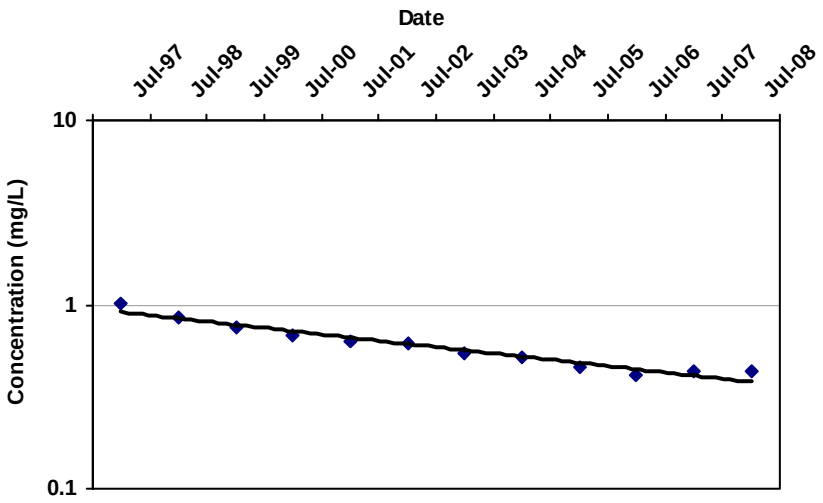
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	7/1/1997	MOLYBDENUM	3.6E-01		1	1
KM-9	S	7/1/1998	MOLYBDENUM	3.0E-01		2	2
KM-9	S	7/1/1999	MOLYBDENUM	2.3E-01		2	2
KM-9	S	7/1/2000	MOLYBDENUM	2.0E-01		2	2
KM-9	S	7/1/2001	MOLYBDENUM	1.9E-01		2	2
KM-9	S	7/1/2002	MOLYBDENUM	1.9E-01		2	2
KM-9	S	7/1/2003	MOLYBDENUM	1.7E-01		2	2
KM-9	S	7/1/2004	MOLYBDENUM	1.7E-01		2	2
KM-9	S	7/1/2005	MOLYBDENUM	2.0E-01		2	2
KM-9	S	7/1/2006	MOLYBDENUM	2.1E-01		2	2
KM-9	S	7/1/2007	MOLYBDENUM	1.5E-01		2	2
KM-9	S	7/1/2008	MOLYBDENUM	1.5E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-9
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.31

Confidence in Trend: 100.0%

Ln Slope: -2.2E-04

LR Concentration Trend: D

Consolidation Data Table:

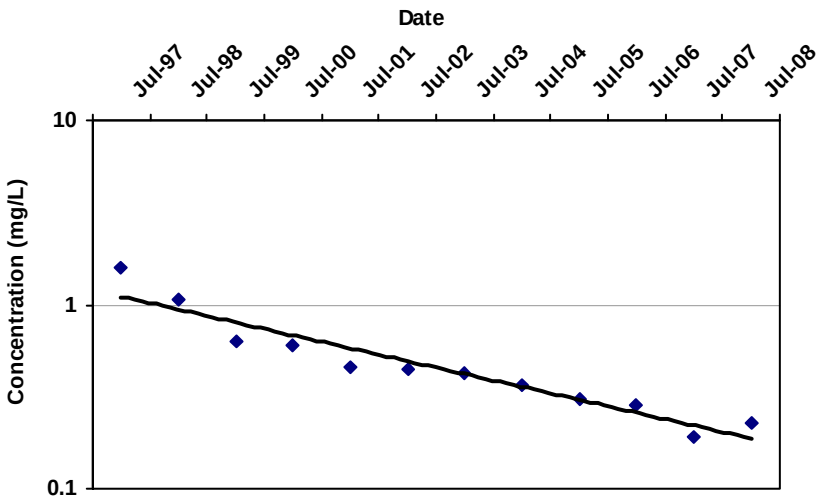
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	7/1/1997	VANADIUM	1.0E+00		1	1
KM-9	S	7/1/1998	VANADIUM	8.6E-01		2	2
KM-9	S	7/1/1999	VANADIUM	7.6E-01		2	2
KM-9	S	7/1/2000	VANADIUM	6.8E-01		2	2
KM-9	S	7/1/2001	VANADIUM	6.3E-01		2	2
KM-9	S	7/1/2002	VANADIUM	6.2E-01		2	2
KM-9	S	7/1/2003	VANADIUM	5.4E-01		2	2
KM-9	S	7/1/2004	VANADIUM	5.2E-01		2	2
KM-9	S	7/1/2005	VANADIUM	4.5E-01		2	2
KM-9	S	7/1/2006	VANADIUM	4.1E-01		2	2
KM-9	S	7/1/2007	VANADIUM	4.3E-01		2	2
KM-9	S	7/1/2008	VANADIUM	4.3E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-13
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.73

Confidence in Trend: 100.0%

Ln Slope: -4.4E-04

LR Concentration Trend: D

Consolidation Data Table:

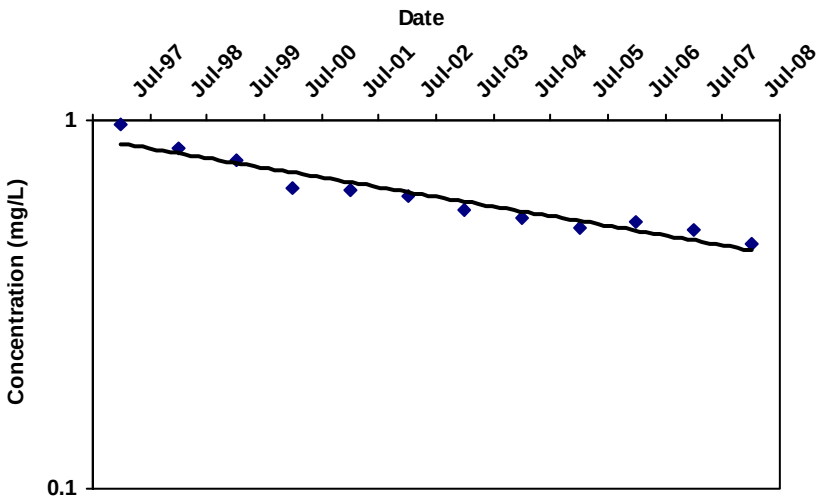
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	7/1/1997	MOLYBDENUM	1.6E+00		1	1
KM-13	S	7/1/1998	MOLYBDENUM	1.1E+00		2	2
KM-13	S	7/1/1999	MOLYBDENUM	6.3E-01		2	2
KM-13	S	7/1/2000	MOLYBDENUM	6.0E-01		2	2
KM-13	S	7/1/2001	MOLYBDENUM	4.6E-01		2	2
KM-13	S	7/1/2002	MOLYBDENUM	4.4E-01		2	2
KM-13	S	7/1/2003	MOLYBDENUM	4.2E-01		2	2
KM-13	S	7/1/2004	MOLYBDENUM	3.6E-01		2	2
KM-13	S	7/1/2005	MOLYBDENUM	3.1E-01		2	2
KM-13	S	7/1/2006	MOLYBDENUM	2.8E-01		2	2
KM-13	S	7/1/2007	MOLYBDENUM	1.9E-01		2	2
KM-13	S	7/1/2008	MOLYBDENUM	2.3E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-13
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.24

Confidence in Trend: 100.0%

Ln Slope: -1.7E-04

LR Concentration Trend: D

Consolidation Data Table:

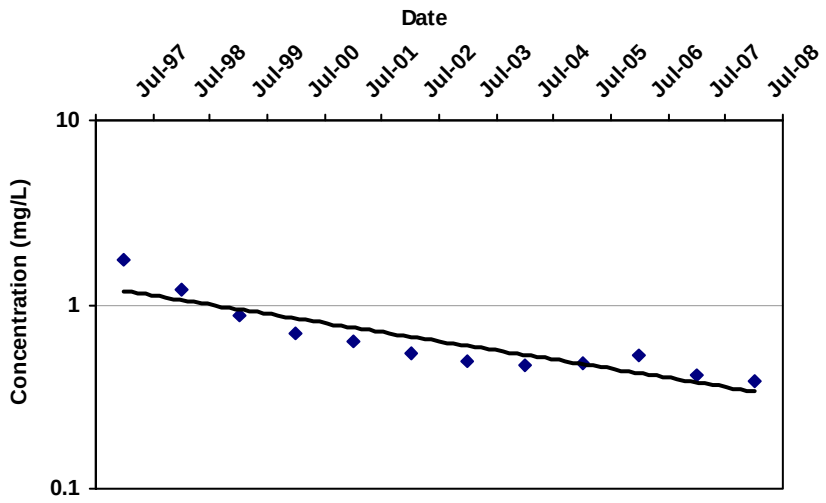
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	7/1/1997	VANADIUM	9.7E-01		1	1
KM-13	S	7/1/1998	VANADIUM	8.3E-01		2	2
KM-13	S	7/1/1999	VANADIUM	7.8E-01		2	2
KM-13	S	7/1/2000	VANADIUM	6.5E-01		2	2
KM-13	S	7/1/2001	VANADIUM	6.5E-01		2	2
KM-13	S	7/1/2002	VANADIUM	6.2E-01		2	2
KM-13	S	7/1/2003	VANADIUM	5.7E-01		2	2
KM-13	S	7/1/2004	VANADIUM	5.4E-01		2	2
KM-13	S	7/1/2005	VANADIUM	5.1E-01		2	2
KM-13	S	7/1/2006	VANADIUM	5.3E-01		2	2
KM-13	S	7/1/2007	VANADIUM	5.0E-01		2	2
KM-13	S	7/1/2008	VANADIUM	4.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-15
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.57

Confidence in Trend: 100.0%

Ln Slope: -3.1E-04

LR Concentration Trend: D

Consolidation Data Table:

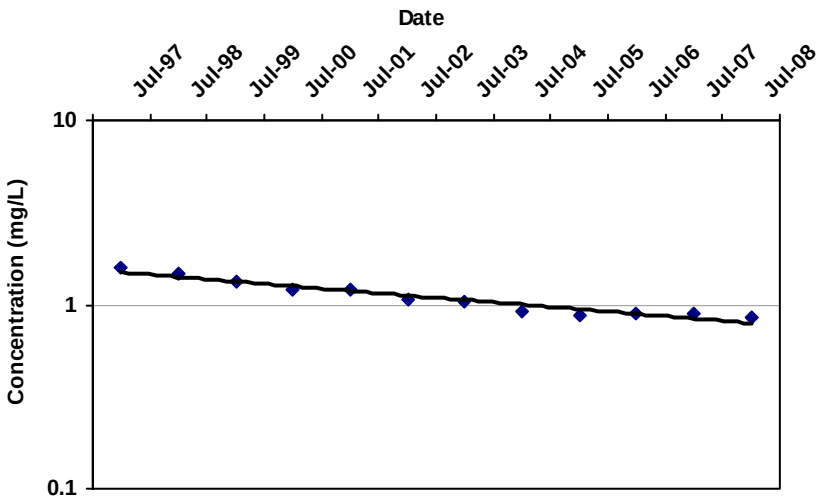
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	7/1/1997	MOLYBDENUM	1.7E+00		1	1
KM-15	T	7/1/1998	MOLYBDENUM	1.2E+00		2	2
KM-15	T	7/1/1999	MOLYBDENUM	8.6E-01		2	2
KM-15	T	7/1/2000	MOLYBDENUM	7.0E-01		2	2
KM-15	T	7/1/2001	MOLYBDENUM	6.4E-01		2	2
KM-15	T	7/1/2002	MOLYBDENUM	5.5E-01		2	2
KM-15	T	7/1/2003	MOLYBDENUM	4.9E-01		2	2
KM-15	T	7/1/2004	MOLYBDENUM	4.7E-01		2	2
KM-15	T	7/1/2005	MOLYBDENUM	4.7E-01		2	2
KM-15	T	7/1/2006	MOLYBDENUM	5.3E-01		2	2
KM-15	T	7/1/2007	MOLYBDENUM	4.1E-01		2	2
KM-15	T	7/1/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-15
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.22

Confidence in Trend: 100.0%

Ln Slope: -1.6E-04

LR Concentration Trend: D

Consolidation Data Table:

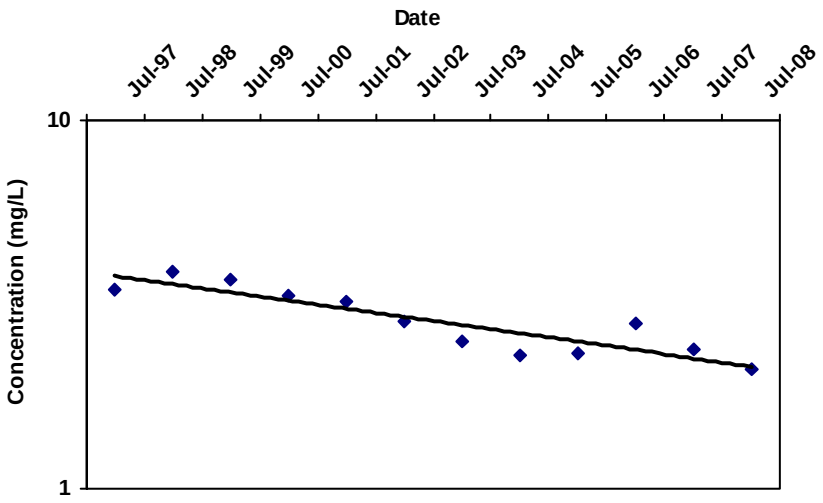
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	7/1/1997	VANADIUM	1.6E+00		1	1
KM-15	T	7/1/1998	VANADIUM	1.5E+00		2	2
KM-15	T	7/1/1999	VANADIUM	1.3E+00		2	2
KM-15	T	7/1/2000	VANADIUM	1.2E+00		2	2
KM-15	T	7/1/2001	VANADIUM	1.2E+00		2	2
KM-15	T	7/1/2002	VANADIUM	1.1E+00		2	2
KM-15	T	7/1/2003	VANADIUM	1.0E+00		2	2
KM-15	T	7/1/2004	VANADIUM	9.2E-01		2	2
KM-15	T	7/1/2005	VANADIUM	8.8E-01		2	2
KM-15	T	7/1/2006	VANADIUM	9.0E-01		2	2
KM-15	T	7/1/2007	VANADIUM	8.9E-01		2	2
KM-15	T	7/1/2008	VANADIUM	8.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-16
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.21

Confidence in Trend: 100.0%

Ln Slope: -1.4E-04

LR Concentration Trend: D

Consolidation Data Table:

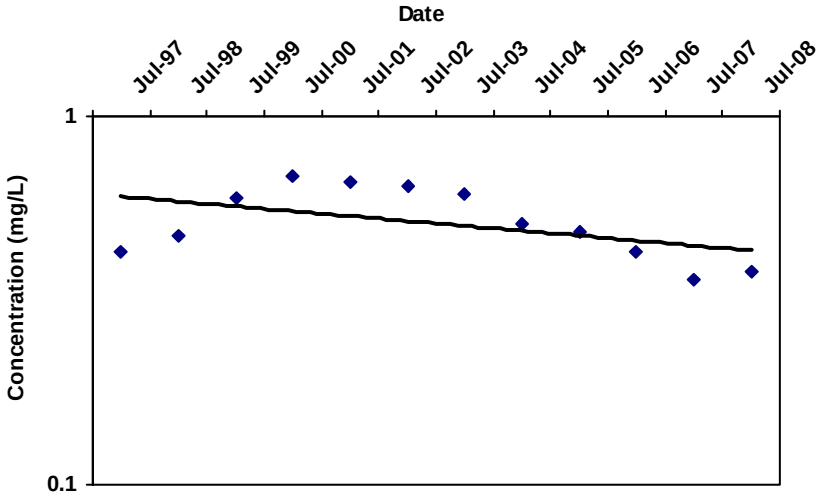
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	7/1/1997	VANADIUM	3.5E+00		1	1
KM-16	T	7/1/1998	VANADIUM	3.9E+00		2	2
KM-16	T	7/1/1999	VANADIUM	3.7E+00		2	2
KM-16	T	7/1/2000	VANADIUM	3.3E+00		2	2
KM-16	T	7/1/2001	VANADIUM	3.2E+00		2	2
KM-16	T	7/1/2002	VANADIUM	2.8E+00		2	2
KM-16	T	7/1/2003	VANADIUM	2.5E+00		2	2
KM-16	T	7/1/2004	VANADIUM	2.3E+00		2	2
KM-16	T	7/1/2005	VANADIUM	2.3E+00		2	2
KM-16	T	7/1/2006	VANADIUM	2.8E+00		2	2
KM-16	T	7/1/2007	VANADIUM	2.4E+00		2	2
KM-16	T	7/1/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-17
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.22

Confidence in Trend: 94.9%

Ln Slope: -8.4E-05

LR Concentration Trend: PD

Consolidation Data Table:

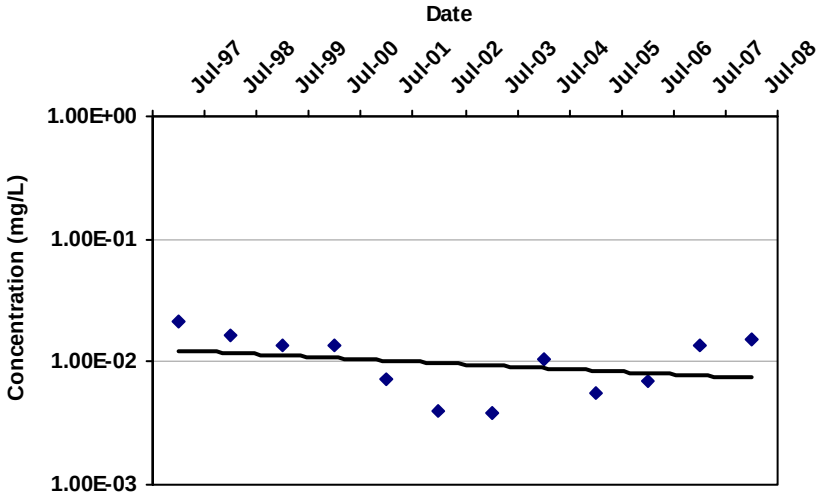
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	S	7/1/1997	MOLYBDENUM	4.3E-01		1	1
KM-17	S	7/1/1998	MOLYBDENUM	4.7E-01		2	2
KM-17	S	7/1/1999	MOLYBDENUM	6.0E-01		2	2
KM-17	S	7/1/2000	MOLYBDENUM	6.9E-01		2	2
KM-17	S	7/1/2001	MOLYBDENUM	6.6E-01		2	2
KM-17	S	7/1/2002	MOLYBDENUM	6.4E-01		2	2
KM-17	S	7/1/2003	MOLYBDENUM	6.2E-01		2	2
KM-17	S	7/1/2004	MOLYBDENUM	5.1E-01		2	2
KM-17	S	7/1/2005	MOLYBDENUM	4.8E-01		2	2
KM-17	S	7/1/2006	MOLYBDENUM	4.3E-01		2	2
KM-17	S	7/1/2007	MOLYBDENUM	3.6E-01		2	2
KM-17	S	7/1/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-17
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 5/10/2008
Consolidation Period: Yearly
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.50

Confidence in Trend: 82.9%

Ln Slope: -1.3E-04

LR Concentration Trend: S

Consolidation Data Table:

Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	S	7/1/1997	VANADIUM	2.1E-02		1	1
KM-17	S	7/1/1998	VANADIUM	1.7E-02		1	1
KM-17	S	7/1/1999	VANADIUM	1.3E-02		2	2
KM-17	S	7/1/2000	VANADIUM	1.3E-02		2	2
KM-17	S	7/1/2001	VANADIUM	7.3E-03		2	2
KM-17	S	7/1/2002	VANADIUM	4.0E-03		2	2
KM-17	S	7/1/2003	VANADIUM	3.8E-03		2	2
KM-17	S	7/1/2004	VANADIUM	1.1E-02		2	2
KM-17	S	7/1/2005	VANADIUM	5.6E-03		2	2
KM-17	S	7/1/2006	VANADIUM	7.0E-03		2	2
KM-17	S	7/1/2007	VANADIUM	1.3E-02		2	2
KM-17	S	7/1/2008	VANADIUM	1.5E-02		1	1

Note: 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); ND = All Samples are Non-detect

APPENDIX C

MAROS Reports 2004 - 2008

APPENDIX C
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MAROS COC Assessment

Project: Tronox V Mo 13 wells Finch 5 yrs **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Toxicity:

Contaminant of Concern	Representative Concentration (mg/L)	PRG (mg/L)	Percent Above PRG
MOLYBDENUM	6.2E+00	1.8E-01	3347.7%
VANADIUM	3.6E+00	2.6E-01	1301.9%

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 excedence from the PRG determining the compound's toxicity. All compounds above exceed the PRG.

Prevalence:

Contaminant of Concern	Class	Total Wells	Total Excedences	Percent Excedences	Total detects
MOLYBDENUM	MET	14	13	92.9%	14
VANADIUM	MET	14	11	78.6%	14

Note: Top COCs by prevalence were determined by examining a representative concentration for each well location at the site. The total excedences (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
MOLYBDENUM	20
VANADIUM	1000

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)

MOLYBDENUM

VANADIUM

MAROS Mann-Kendall Statistics Summary

Project: Tronox V Mo 13 wells Finch 5 yrs

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND" ?	Concentration Trend
MOLYBDENUM								
KM-3	S	9	9	0.09	-23	99.1%	No	D
KM-9	S	9	9	0.18	-15	92.5%	No	PD
KM-13	S	9	9	0.25	-30	100.0%	No	D
KM-8	S	9	9	0.25	6	69.4%	No	NT
KM-7	S	9	9	0.16	-24	99.4%	No	D
KM-6	S	9	9	0.19	1	50.0%	No	NT
KM-5	S	9	9	0.21	2	54.0%	No	NT
KM-17	S	9	9	0.16	-23	99.1%	No	D
KM-4	S	9	9	0.20	-18	96.2%	No	D
KM-2	S	9	9	0.18	-20	97.8%	No	D
KM-15	T	9	9	0.17	-19	97.0%	No	D
KM-16	T	9	9	0.18	-8	76.2%	No	S
Finch Spring	T	9	9	0.12	-29	100.0%	No	D
VANADIUM								
KM-13	S	9	9	0.06	-21	98.3%	No	D
KM-17	S	9	9	0.46	10	82.1%	No	NT
KM-3	S	9	9	0.39	-5	65.7%	No	S
KM-9	S	9	9	0.10	-19	97.0%	No	D
KM-4	S	9	9	0.27	19	97.0%	No	I
KM-5	S	9	9	0.16	-7	72.8%	No	S
KM-6	S	9	9	0.23	11	84.6%	No	NT
KM-7	S	9	9	0.08	-18	96.2%	No	D
KM-8	S	9	9	0.25	-11	84.6%	No	S
KM-2	S	9	9	0.10	2	54.0%	No	NT
KM-16	T	9	9	0.10	-2	54.0%	No	S
KM-15	T	9	9	0.07	-5	65.7%	No	S
Finch Spring	T	9	9	0.07	-7	72.8%	No	S

Note: 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); Source/Tail (S/T)

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

MAROS Linear Regression Statistics Summary

Project: Tronox V Mo 13 wells Finch 5 yrs

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 5/1/2004 **to** 5/30/2008

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values : Actual Value

Well	Source/ Tail	Average Conc (mg/L)	Median Conc (mg/L)	Standard Deviation	All Samples "ND" ?	Ln Slope	Coefficient of Variation	Confidence in Trend	Concentration Trend
MOLYBDENUM									
KM-9	S	1.8E-01	1.8E-01	3.3E-02	No	-1.7E-04	0.18	90.6%	PD
KM-5	S	1.9E-01	1.8E-01	4.1E-02	No	1.2E-06	0.21	100.0%	I
KM-13	S	2.8E-01	3.0E-01	6.9E-02	No	-4.6E-04	0.25	99.9%	D
KM-3	S	7.1E+00	6.9E+00	6.4E-01	No	-1.4E-04	0.09	99.4%	D
KM-7	S	4.2E-01	4.3E-01	6.6E-02	No	-2.4E-04	0.16	99.0%	D
KM-4	S	2.6E+00	2.4E+00	5.2E-01	No	-2.6E-04	0.20	98.7%	D
KM-2	S	1.3E+00	1.3E+00	2.3E-01	No	-2.5E-04	0.18	98.3%	D
KM-6	S	1.4E+00	1.4E+00	2.6E-01	No	5.0E-05	0.19	64.8%	NT
KM-17	S	4.4E-01	4.6E-01	7.0E-02	No	-2.8E-04	0.16	99.9%	D
KM-8	S	3.6E+01	3.5E+01	8.8E+00	No	8.1E-05	0.25	66.2%	NT
Finch Spring	T	2.1E-01	2.0E-01	2.6E-02	No	-2.1E-04	0.12	100.0%	D
KM-15	T	4.6E-01	4.5E-01	7.7E-02	No	-1.5E-04	0.17	91.3%	PD
KM-16	T	8.3E-01	8.2E-01	1.5E-01	No	-4.5E-05	0.18	64.0%	S
VANADIUM									
KM-17	S	1.0E-02	1.0E-02	4.7E-03	No	3.8E-04	0.46	84.0%	NT
KM-2	S	4.6E+00	4.7E+00	4.7E-01	No	3.0E-05	0.10	64.9%	NT
KM-3	S	2.8E+00	2.3E+00	1.1E+00	No	-1.9E-04	0.39	76.3%	S
KM-13	S	5.2E-01	5.1E-01	3.1E-02	No	-8.9E-05	0.06	98.7%	D
KM-4	S	5.9E+00	6.0E+00	1.6E+00	No	2.9E-04	0.27	93.4%	PI
KM-6	S	4.2E+00	3.9E+00	9.6E-01	No	1.3E-04	0.23	80.3%	NT
KM-7	S	2.3E+00	2.3E+00	1.9E-01	No	-8.0E-05	0.08	91.9%	PD
KM-8	S	2.0E+01	1.8E+01	5.1E+00	No	-2.8E-04	0.25	95.2%	D
KM-9	S	4.5E-01	4.5E-01	4.6E-02	No	-1.4E-04	0.10	98.7%	D
KM-5	S	1.2E+00	1.1E+00	2.0E-01	No	-5.6E-05	0.16	68.6%	S
KM-16	T	2.4E+00	2.4E+00	2.5E-01	No	-8.8E-07	0.10	100.0%	D
Finch Spring	T	6.0E-02	6.1E-02	4.2E-03	No	-4.5E-05	0.07	80.2%	S
KM-15	T	9.0E-01	8.6E-01	6.0E-02	No	-4.9E-05	0.07	83.5%	S

Note: 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); COV = Coefficient of Variation

MAROS Plume Analysis Summary

Project: Tronox V Mo 13 wells Finch 5 yrs

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 5/1/2004 **to** 5/30/2008

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values : Actual Value

Constituent	Well	Source/ Tail	Number of Samples	Number of Detects	Average (mg/L)	Median (mg/L)	All Samples "ND" ?	Mann-Kendall	Linear Regression	Modeling	Empirical
MOLYBDENUM											
	KM-3	S	9	9	7.1E+00	6.9E+00	No	D	D	N/A	N/A
	KM-9	S	9	9	1.8E-01	1.8E-01	No	PD	PD	N/A	N/A
	KM-13	S	9	9	2.8E-01	3.0E-01	No	D	D	N/A	N/A
	KM-8	S	9	9	3.6E+01	3.5E+01	No	NT	NT	N/A	N/A
	KM-7	S	9	9	4.2E-01	4.3E-01	No	D	D	N/A	N/A
	KM-6	S	9	9	1.4E+00	1.4E+00	No	NT	NT	N/A	N/A
	KM-5	S	9	9	1.9E-01	1.8E-01	No	NT	I	N/A	N/A
	KM-17	S	9	9	4.4E-01	4.6E-01	No	D	D	N/A	N/A
	KM-4	S	9	9	2.6E+00	2.4E+00	No	D	D	N/A	N/A
	KM-2	S	9	9	1.3E+00	1.3E+00	No	D	D	N/A	N/A
	KM-15	T	9	9	4.6E-01	4.5E-01	No	D	PD	N/A	N/A
	KM-16	T	9	9	8.3E-01	8.2E-01	No	S	S	N/A	N/A
	Finch Spring	T	9	9	2.1E-01	2.0E-01	No	D	D	N/A	N/A
VANADIUM											
	KM-13	S	9	9	5.2E-01	5.1E-01	No	D	D	N/A	N/A
	KM-17	S	9	9	1.0E-02	1.0E-02	No	NT	NT	N/A	N/A
	KM-3	S	9	9	2.8E+00	2.3E+00	No	S	S	N/A	N/A
	KM-9	S	9	9	4.5E-01	4.5E-01	No	D	D	N/A	N/A
	KM-4	S	9	9	5.9E+00	6.0E+00	No	I	PI	N/A	N/A
	KM-5	S	9	9	1.2E+00	1.1E+00	No	S	S	N/A	N/A
	KM-6	S	9	9	4.2E+00	3.9E+00	No	NT	NT	N/A	N/A

Project: Tronox V Mo 13 wells Finch 5 yrs **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Constituent	Well	Source/ Tail	Number of Samples	Number of Detects	Average (mg/L)	Median (mg/L)	All Samples "ND" ?	Mann-Kendall	Linear Regression	Modeling	Empirical
VANADIUM											
	KM-7	S	9	9	2.3E+00	2.3E+00	No	D	PD	N/A	N/A
	KM-8	S	9	9	2.0E+01	1.8E+01	No	S	D	N/A	N/A
	KM-2	S	9	9	4.6E+00	4.7E+00	No	NT	NT	N/A	N/A
	KM-16	T	9	9	2.4E+00	2.4E+00	No	S	D	N/A	N/A
	KM-15	T	9	9	9.0E-01	8.6E-01	No	S	S	N/A	N/A
	Finch Spring	T	9	9	6.0E-02	6.1E-02	No	S	S	N/A	N/A

Note: 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); Source/Tail (S/T)

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

MAROS Spatial Moment Analysis Summary

Project: Tronox V Mo 13 wells Finch 5 yrs

Location: Soda Springs

User Name: Global Environmental

State: Idaho

	0th Moment	1st Moment (Center of Mass)			2nd Moment (Spread)		
Effective Date	**Estimated Mass (Kg)**	**Xc (ft)**	**Yc (ft)**	**Source Distance (ft)**	**Sigma XX (sq ft)**	**Sigma YY (sq ft)**	**Number of Wells**
MOLYBDENUM							
5/3/2004	7.5E+03	658,849	370,970	1,495	353,448	944,021	13
10/13/2004	6.5E+03	658,830	370,938	1,533	345,286	963,167	13
5/3/2005	7.0E+03	658,802	370,989	1,508	345,273	918,992	13
10/25/2005	6.5E+03	658,833	370,969	1,506	344,793	934,475	13
5/15/2006	7.0E+03	658,767	370,979	1,537	328,271	911,206	13
10/23/2006	6.1E+03	658,812	370,995	1,497	345,488	913,682	13
5/14/2007	5.8E+03	658,792	371,000	1,505	342,660	907,972	13
10/15/2007	5.9E+03	658,830	371,003	1,479	346,430	914,812	13
5/5/2008	5.8E+03	658,795	371,013	1,493	341,124	911,775	13
VANADIUM							
5/3/2004	7.8E+03	658,759	371,624	1,103	348,179	466,673	13
10/13/2004	6.6E+03	658,693	371,633	1,155	323,330	439,755	13
5/3/2005	6.4E+03	658,755	371,683	1,078	351,051	398,310	13
10/25/2005	6.6E+03	658,717	371,644	1,130	324,212	421,811	13
5/15/2006	8.0E+03	658,783	371,739	1,026	314,225	345,668	13
10/23/2006	7.2E+03	658,745	371,639	1,108	319,837	433,967	13
5/14/2007	7.5E+03	658,778	371,613	1,093	330,251	485,674	13
10/15/2007	7.1E+03	658,754	371,644	1,097	331,495	442,587	13
5/5/2008	7.1E+03	658,802	371,621	1,068	343,745	486,609	13

Project: Tronox V Mo 13 wells Finch 5 yrs

Location: Soda Springs

User Name: Global Environmental

State: Idaho

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	MOLYBDENUM	0.10	-26	99.7%	D
	VANADIUM	0.08	4	61.9%	NT
1st Moment: Distance to Source					
	MOLYBDENUM	0.01	-14	91.0%	PD
	VANADIUM	0.03	-12	87.0%	S
2nd Moment: Sigma XX					
	MOLYBDENUM	0.02	-12	87.0%	S
	VANADIUM	0.04	2	54.0%	NT
2nd Moment: Sigma YY					
	MOLYBDENUM	0.02	-20	97.8%	D
	VANADIUM	0.10	10	82.1%	NT

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

Porosity: 0.20 **Saturated Thickness:** Uniform: 200 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 Site Results

Project: Tronox 13 wells Finch 04 to 08

User Name: Global Environmental

Location: Soda Springs

State: Idaho

User Defined Site and Data Assumptions:

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 5475 ft/yr

Current Plume Length: 6000 ft

Current Plume Width 3500 ft

Number of Tail Wells: 3

Number of Source Wells: 11

Source Information:

Source Treatment: No Current Site Treatment

NAPL is not observed at this site.

Down-gradient Information:

Distance from Edge of Tail to Nearest:

Down-gradient receptor: -700 ft

Down-gradient property: -2000 ft

Distance from Source to Nearest:

Down-gradient receptor: 5300 ft

Down-gradient property: 4000 ft

Data Consolidation Assumptions:

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Plume Information Weighting Assumptions:

Consolidation Step 1. Weight Plume Information by Chemical

Summary Weighting: Weighting Applied to All Chemicals Equally

Consolidation Step 2. Weight Well Information by Chemical

Well Weighting: No Weighting of Wells was Applied.
Chemical Weighting: No Weighting of Chemicals was Applied.

Note: These assumptions were made when consolidating the historical montoring data and lumping the Wells and COCs.

1. Compliance Monitoring/Remediation Optimization Results:

Preliminary Monitoring System Optimization Results: Based on site classification, source treatment and Monitoring System Category the following suggestions are made for site Sampling Frequency, Duration of Sampling before reassessment, and Well Density. These criteria take into consideration: Plume Stability, Type of Plume, and Groundwater Velocity.

COC	Tail Stability	Source Stability	Level of Effort	Sampling Duration	Sampling Frequency	Sampling Density
MOLYBDENUM	PD	PD	L	Sample 2 more years	Biannually (6 months)	> 50
VANADIUM	S	S	M	Sample 4 more years	Quarterly	> 50

Note:

Plume Status: (I) Increasing; (PI)Probably Increasing; (S) Stable; (NT) No Trend; (PD) Probably Decreasing; (D) Decreasing

Design Categories: (E) Extensive; (M) Moderate; (L) Limited (N/A) Not Applicable, Insufficient Data Available

Level of Monitoring Effort Indicated by Analysi Moderate

2. Spatial Moment Analysis Results:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
Zeroth Moment: Mass					
	MOLYBDENUM	0.10	-26	99.7%	D
	VANADIUM	0.08	4	61.9%	NT
1st Moment: Distance to Source					
	MOLYBDENUM	0.01	-14	91.0%	PD
	VANADIUM	0.03	-12	87.0%	S
2nd Moment: Sigma XX					
	MOLYBDENUM	0.02	-12	87.0%	S
	VANADIUM	0.04	2	54.0%	NT
2nd Moment: Sigma YY					
	MOLYBDENUM	0.02	-20	97.8%	D
	VANADIUM	0.10	10	82.1%	NT

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

Porosity: 0.20 **Saturated Thickness:** Uniform: 200 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).

MAROS Sampling Location Optimization Results

Project: Tronox 13 wells Finch 04 to 08 **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Sampling Events Analyzed: **From** Spring 04 **to** Spring 08

5/3/2004 5/5/2008

Parameters used:

Constituent	Inside SF	Hull SF	Area Ratio	Conc. Ratio
MOLYBDENUM	0.1	0.01	0.95	0.95
VANADIUM	0.1	0.01	0.95	0.95

Well	X (feet)	Y (feet)	Removable?	Average Slope Factor*	Minimum Slope Factor*	Maximum Slope Factor*	Eliminated?
MOLYBDENUM							
Finch Spring	658191.88	367132.03	☑	0.612	0.552	0.637	☐
KM-13	658042.50	372185.75	☑	0.638	0.518	0.802	☐
KM-15	657491.88	370332.03	☑	0.107	0.044	0.166	☐
KM-16	658151.13	371058.75	☑	0.190	0.094	0.236	☐
KM-17	659365.31	371100.34	☑	0.481	0.433	0.545	☐
KM-2	660379.19	371777.03	☑	0.158	0.122	0.256	☐
KM-3	659825.56	371745.66	☑	0.373	0.321	0.414	☐
KM-4	659695.19	372033.81	☑	0.150	0.073	0.208	☐
KM-5	658856.63	372710.72	☑	0.633	0.384	0.727	☐
KM-6	658601.63	371736.94	☑	0.121	0.024	0.202	☐
KM-7	658578.44	372113.19	☑	0.463	0.357	0.586	☐
KM-8	658144.19	371771.97	☑	0.759	0.699	0.795	☐
KM-9	657836.25	371770.47	☑	0.867	0.787	0.922	☐
VANADIUM							
Finch Spring	658191.88	367132.03	☑	0.269	0.093	0.433	☐
KM-13	658042.50	372185.75	☑	0.266	0.197	0.316	☐
KM-15	657491.88	370332.03	☑	0.211	0.164	0.245	☐
KM-16	658151.13	371058.75	☑	0.112	0.078	0.148	☐
KM-17	659365.31	371100.34	☑	0.873	0.730	1.000	☐
KM-2	660379.19	371777.03	☑	0.204	0.152	0.256	☐
KM-3	659825.56	371745.66	☑	0.086	0.043	0.188	☑
KM-4	659695.19	372033.81	☑	0.198	0.116	0.256	☐
KM-5	658856.63	372710.72	☑	0.072	0.041	0.102	☐
KM-6	658601.63	371736.94	☑	0.085	0.032	0.123	☑
KM-7	658578.44	372113.19	☑	0.045	0.021	0.072	☑
KM-8	658144.19	371771.97	☑	0.333	0.246	0.388	☐

Project: Tronox 13 wells Finch 04 to 08 **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Well	X (feet)	Y (feet)	Removable?	Average Slope Factor*	Minimum Slope Factor*	Maximum Slope Factor*	Eliminated?
KM-9	657836.25	371770.47	☑	0.380	0.310	0.444	☐

Note: The Slope Factor indicates the relative importance of a well in the monitoring network at a given sampling event; the larger the SF value of a well, the more important the well is and vice versa; the Average Slope Factor measures the overall well importance in the selected time period; the state coordinates system (i.e., X and Y refer to Easting and Northing respectively) or local coordinates systems may be used; wells that are NOT selected for analysis are not shown above.
* When the report is generated after running the Excel module, SF values will NOT be shown above.

MAROS Sampling Location Optimization

Results by Considering All COCs

Project: Tronox 13 wells Finch 04 to 08 **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Sampling Events Analyzed: **From** Spring 04 **to** Spring 08

5/3/2004 5/5/2008

Well	X (feet)	Y (feet)	Number of COCs	COC-Averaged Slope Factor*	Abandoned?
Finch Spring	658191.88	367132.03	2	0.440	☐
KM-13	658042.50	372185.75	2	0.452	☐
KM-15	657491.88	370332.03	2	0.159	☐
KM-16	658151.13	371058.75	2	0.151	☐
KM-17	659365.31	371100.34	2	0.677	☐
KM-2	660379.19	371777.03	2	0.181	☐
KM-3	659825.56	371745.66	2	0.230	☐
KM-4	659695.19	372033.81	2	0.174	☐
KM-5	658856.63	372710.72	2	0.353	☐
KM-6	658601.63	371736.94	2	0.103	☐
KM-7	658578.44	372113.19	2	0.254	☐
KM-8	658144.19	371771.97	2	0.546	☐
KM-9	657836.25	371770.47	2	0.623	☐

Note: the COC-Averaged Slope Factor is the value calculated by averaging those "Average Slope Factor" obtained earlier across COCs; to be conservative, a location is "abandoned" only when it is eliminated from all COCs; "abandoned" doesn't necessarily mean the abandon of well, it can mean that NO samples need to be collected for any COCs.
* When the report is generated after running the Excel module, SF values will NOT be shown above.

MAROS Sampling Frequency Optimization Results

Project: Tronox 13 wells Finch 04 to 08 **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

The Overall Number of Sampling Events: 9

"Recent Period" defined by events: **From** Spring 04 **To** Spring 08

5/3/2004 5/5/2008

"Rate of Change" parameters used:

Constituent	Cleanup Goal	Low Rate	Medium Rate	High Rate
MOLYBDENUM	0.18	0.09	0.18	0.36
VANADIUM	0.26	0.13	0.26	0.52

Units: Cleanup Goal is in mg/L; all rate parameters are in mg/L/year.

Well	Recommended Sampling Frequency	Frequency Based on Recent Data	Frequency Based on Overall Data
MOLYBDENUM			
Finch Spring	Annual	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Annual	Annual	Annual
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Annual	Annual	Annual
KM-5	Annual	Annual	Annual
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Quarterly	Quarterly	Quarterly
KM-9	Annual	Annual	Annual
VANADIUM			
Finch Spring	Biennial	Annual	Annual
KM-13	Annual	Annual	Annual
KM-15	Annual	Annual	Annual
KM-16	Annual	Annual	Annual
KM-17	Biennial	Annual	Annual
KM-2	Annual	Annual	Annual
KM-3	Annual	Annual	Annual
KM-4	Quarterly	Quarterly	Quarterly
KM-5	Annual	Annual	Annual

Project: Tronox 13 wells Finch 04 to 08 **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Well	Recommended Sampling Frequency	Frequency Based on Recent Data	Frequency Based on Overall Data
KM-6	Annual	Annual	Annual
KM-7	Annual	Annual	Annual
KM-8	Annual	Annual	Annual
KM-9	Annual	Annual	Annual

Note: Sampling frequency is determined considering both recent and overall concentration trends. Sampling Frequency is the final recommendation; Frequency Based on Recent Data is the frequency determined using recent (short) period of monitoring data; Frequency Based on Overall Data is the frequency determined using overall (long) period of monitoring data. If the "recent period" is defined using a different series of sampling events, the results could be different.

MAROS Power Analysis for Individual Well Cleanup Status

Project: Tronox 13 wells Finch 04 to 08

User Name: Global Environmental

Location: Soda Springs

State: Idaho

From Period: 5/3/2004 **to** 5/5/2008

Well	Sample Size	Sample Mean	Sample Stdev.	Normal Distribution Assumption Cleanup Status	Lognormal Distribution Assumption Cleanup Status	Alpha Level	Expected Power
MOLYBDENUM			Cleanup Goal (mg/L) = 0.18		Target Level (mg/L) = 0.144		
Finch Spring	9	2.14E-01	2.55E-02	Not Attained	Not Attained	0.05	0.8
KM-13	9	2.82E-01	6.92E-02	Not Attained	Not Attained	0.05	0.8
KM-15	9	4.64E-01	7.70E-02	Not Attained	Not Attained	0.05	0.8
KM-16	9	8.29E-01	1.50E-01	Not Attained	Not Attained	0.05	0.8
KM-17	9	4.40E-01	7.04E-02	Not Attained	Not Attained	0.05	0.8
KM-2	9	1.27E+00	2.29E-01	Cont Sampling	Not Attained	0.05	0.8
KM-3	9	7.10E+00	6.44E-01	Cont Sampling	Not Attained	0.05	0.8
KM-4	9	2.57E+00	5.17E-01	Cont Sampling	Not Attained	0.05	0.8
KM-5	9	1.94E-01	4.13E-02	Not Attained	Not Attained	0.05	0.8
KM-6	9	1.38E+00	2.59E-01	Cont Sampling	Not Attained	0.05	0.8
KM-7	9	4.23E-01	6.58E-02	Not Attained	Not Attained	0.05	0.8
KM-8	9	3.60E+01	8.83E+00	Cont Sampling	Not Attained	0.05	0.8
KM-9	9	1.81E-01	3.33E-02	Not Attained	Not Attained	0.05	0.8
VANADIUM			Cleanup Goal (mg/L) = 0.26		Target Level (mg/L) = 0.208		
Finch Spring	9	6.04E-02	4.22E-03	Attained	Attained	0.05	0.8
KM-13	9	5.16E-01	3.13E-02	Not Attained	Not Attained	0.05	0.8
KM-15	9	8.96E-01	6.00E-02	Not Attained	Not Attained	0.05	0.8
KM-16	9	2.42E+00	2.54E-01	Cont Sampling	Not Attained	0.05	0.8
KM-17	9	1.02E-02	4.74E-03	Attained	Attained	0.05	0.8
KM-2	9	4.57E+00	4.72E-01	Cont Sampling	Not Attained	0.05	0.8
KM-3	9	2.79E+00	1.08E+00	Cont Sampling	Not Attained	0.05	0.8
KM-4	9	5.87E+00	1.59E+00	Cont Sampling	Not Attained	0.05	0.8
KM-5	9	1.23E+00	2.00E-01	Not Attained	Not Attained	0.05	0.8
KM-6	9	4.24E+00	9.61E-01	Cont Sampling	Not Attained	0.05	0.8
KM-7	9	2.30E+00	1.87E-01	Not Attained	Not Attained	0.05	0.8
KM-8	9	2.00E+01	5.07E+00	Cont Sampling	Not Attained	0.05	0.8
KM-9	9	4.51E-01	4.62E-02	Not Attained	Not Attained	0.05	0.8

Note: N/C refers to "not conducted" because of insufficient data (N<4); S/E indicates the sample mean significantly exceeds the cleanup level and thus no analysis is conducted; Sample Size is the number of concentration data in a sampling location that are used in the analysis; The Target Level is the expected mean concentration in wells after cleanup attainment, it is only used in individual well celanup status evaluation. The test for evaluating attainment status is from EPA (1992). Refer to Appendix A.6 of MAROS Manual for details.

Individual Well Cleanup Status - Optional Analysis Results

Project: Tronox 13 wells Finch 04 to 08

User Name: Global Environmental

Location: Soda Springs

State: Idaho

From Period: 5/3/2004 **to** 5/5/2008

				Normal Distribution Assumption			Lognormal Distribution Assumption		
Well	**Sample Size**	**Sample Mean**	**Sample Stdev.**	**Significantly < Cleanup Goal?**	**Power**	**Expected Sample Size**	**Significantly < Cleanup Goal?**	**Power**	**Expected Sample Size**
MOLYBDENUM			Cleanup Goal (mg/L) = 0.18		Alpha Level = 0.05		Expected Power = 0.8		
Finch Spring	9	2.14E-01	2.55E-02	NO	S/E	S/E	NO	S/E	S/E
KM-13	9	2.82E-01	6.92E-02	NO	S/E	S/E	NO	S/E	S/E
KM-15	9	4.64E-01	7.70E-02	NO	S/E	S/E	NO	S/E	S/E
KM-16	9	8.29E-01	1.50E-01	NO	S/E	S/E	NO	S/E	S/E
KM-17	9	4.40E-01	7.04E-02	NO	S/E	S/E	NO	S/E	S/E
KM-2	9	1.27E+00	2.29E-01	NO	S/E	S/E	NO	S/E	S/E
KM-3	9	7.10E+00	6.44E-01	NO	S/E	S/E	NO	S/E	S/E
KM-4	9	2.57E+00	5.17E-01	NO	S/E	S/E	NO	S/E	S/E
KM-5	9	1.94E-01	4.13E-02	NO	S/E	S/E	NO	S/E	S/E
KM-6	9	1.38E+00	2.59E-01	NO	S/E	S/E	NO	S/E	S/E
KM-7	9	4.23E-01	6.58E-02	NO	S/E	S/E	NO	S/E	S/E
KM-8	9	3.60E+01	8.83E+00	NO	S/E	S/E	NO	S/E	S/E
KM-9	9	1.81E-01	3.33E-02	NO	S/E	S/E	NO	S/E	S/E
VANADIUM			Cleanup Goal (mg/L) = 0.26		Alpha Level = 0.05		Expected Power = 0.8		
Finch Spring	9	6.04E-02	4.22E-03	YES	1.000	<=3	YES	1.000	<=3
KM-13	9	5.16E-01	3.13E-02	NO	S/E	S/E	NO	S/E	S/E
KM-15	9	8.96E-01	6.00E-02	NO	S/E	S/E	NO	S/E	S/E
KM-16	9	2.42E+00	2.54E-01	NO	S/E	S/E	NO	S/E	S/E
KM-17	9	1.02E-02	4.74E-03	YES	1.000	<=3	YES	1.000	<=3
KM-2	9	4.57E+00	4.72E-01	NO	S/E	S/E	NO	S/E	S/E
KM-3	9	2.79E+00	1.08E+00	NO	S/E	S/E	NO	S/E	S/E
KM-4	9	5.87E+00	1.59E+00	NO	S/E	S/E	NO	S/E	S/E
KM-5	9	1.23E+00	2.00E-01	NO	S/E	S/E	NO	S/E	S/E
KM-6	9	4.24E+00	9.61E-01	NO	S/E	S/E	NO	S/E	S/E
KM-7	9	2.30E+00	1.87E-01	NO	S/E	S/E	NO	S/E	S/E
KM-8	9	2.00E+01	5.07E+00	NO	S/E	S/E	NO	S/E	S/E
KM-9	9	4.51E-01	4.62E-02	NO	S/E	S/E	NO	S/E	S/E

Note: N/C refers to "not conducted" because of insufficient data (N<4); S/E indicates the sample mean significantly exceeds the cleanup level and thus no analysis is conducted; Sample Size is the number of concentration data in a sampling location that are used in the power analysis; Expected Sample Size is the number of concentration data needed to reach the Expected Power under current sample variability; The Target Level is the expected mean concentration in wells after cleanup attainment, it is only used in individual well celanup status evaluation. The Student's t-test on mean difference is used in this analysis. Refer to Appendix A.6 of MAROS Manual for details.

MAROS Risk-Based Power Analysis for Site Cleanup

Project: Tronox 13 wells Finch 04 to 08 **User Name:** Global Environmental

Location: Soda Springs **State:** Idaho

Parameters: **Groundwater Flow Direction:** 240 degrees **Distance to Receptor:** -1300 feet

From Period: Spring 04 **to** Spring 08

5/3/2004 5/5/2008

Selected Plume Centerline Wells:

Well	Distance to Receptor (feet)
KM-15	1121.3
KM-16	2080.3
KM-8	2694.5

The distance is measured in the Groundwater Flow Angle from the well to the compliance boundary.

				Normal Distribution Assumption			Lognormal Distribution Assumption				
Sample Event	**Sample Size**	**Sample Mean**	**Sample Stdev.**	**Cleanup Status**	**Power**	**Expected Sample Size**	**Celanup Status**	**Power**	**Expected Sample Size**	**Alpha Level**	**Expected Power**
MOLYBDENUM				Cleanup Goal = 0.18							
Spring 04	13	5.93E-01	2.12E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 04	13	4.98E-01	1.77E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 05	13	5.86E-01	2.09E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 05	13	3.75E-01	1.33E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 06	13	2.74E-01	9.44E-01	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 06	13	4.17E-01	1.48E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 07	13	4.73E-01	1.69E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Fall 07	13	5.08E-01	1.82E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
Spring 08	13	5.97E-01	2.14E+00	Not Attained	S/E	S/E	Not Attained	S/E	S/E	0.05	0.8
VANADIUM				Cleanup Goal = 0.26							
Spring 04	13	8.87E-02	2.30E-01	Attained	0.832	12	Not Attained	0.155	>100	0.05	0.8
Fall 04	13	9.94E-02	2.98E-01	Attained	0.597	22	Not Attained	0.090	>100	0.05	0.8
Spring 05	13	7.68E-02	1.66E-01	Attained	0.987	6	Not Attained	0.075	>100	0.05	0.8
Fall 05	13	7.91E-02	2.06E-01	Attained	0.924	9	Not Attained	0.125	>100	0.05	0.8
Spring 06	13	7.52E-02	1.31E-01	Attained	1.000	4	Not Attained	0.057	>100	0.05	0.8
Fall 06	13	7.29E-02	1.72E-01	Attained	0.985	7	Not Attained	0.177	>100	0.05	0.8
Spring 07	13	7.55E-02	1.65E-01	Attained	0.989	6	Not Attained	0.252	81	0.05	0.8
Fall 07	13	8.08E-02	2.12E-01	Attained	0.907	10	Not Attained	0.152	>100	0.05	0.8
Spring 08	13	7.75E-02	1.76E-01	Attained	0.976	7	Not Attained	0.237	89	0.05	0.8

Note: #N/C means "not conducted" due to a small sample size (N<4) or that the mean concentration is much greater than the cleanup level; Sample Size is the number of sampling locations used in the power analysis; Expected Sample Size is the number of concentration data needed to reach the Expected Power under current sample variability.

MAROS Zeroth Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

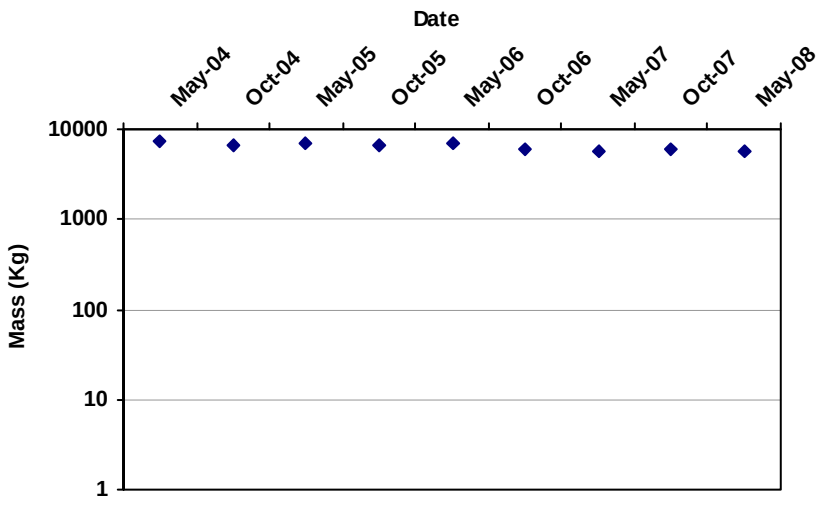
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Dissolved Mass Over Time



Porosity: 0.20

Saturated Thickness:

Uniform: 200 ft

Mann Kendall S Statistic:

-26

Confidence in Trend:

99.7%

Coefficient of Variation:

0.10

Zeroth Moment Trend:

D

Data Table:

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells
5/3/2004	MOLYBDENUM	7.5E+03	13
10/13/2004	MOLYBDENUM	6.5E+03	13
5/3/2005	MOLYBDENUM	7.0E+03	13
10/25/2005	MOLYBDENUM	6.5E+03	13
5/15/2006	MOLYBDENUM	7.0E+03	13
10/23/2006	MOLYBDENUM	6.1E+03	13
5/14/2007	MOLYBDENUM	5.8E+03	13
10/15/2007	MOLYBDENUM	5.9E+03	13
5/5/2008	MOLYBDENUM	5.8E+03	13

Note: 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); ND = Non-detect. Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

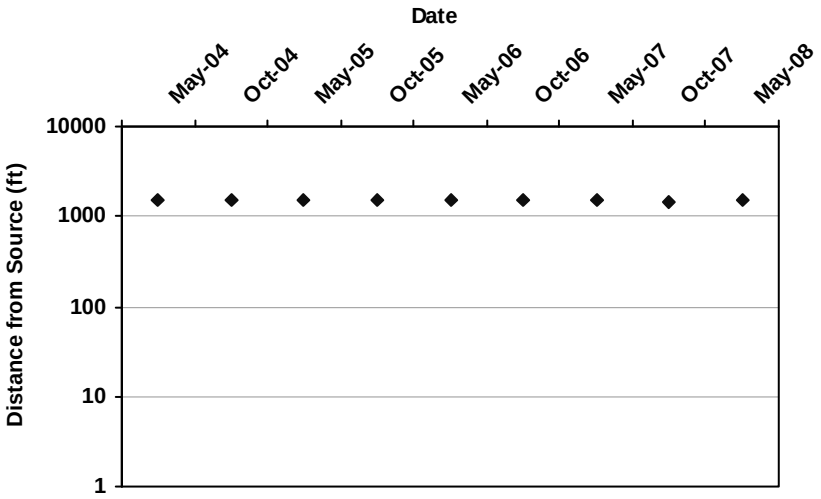
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Distance from Source to Center of Mass



Mann Kendall S Statistic:

-14

Confidence in Trend:

91.0%

Coefficient of Variation:

0.01

First Moment Trend:

PD

Data Table:

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
5/3/2004	MOLYBDENUM	658,849	370,970	1,495	13
10/13/2004	MOLYBDENUM	658,830	370,938	1,533	13
5/3/2005	MOLYBDENUM	658,802	370,989	1,508	13
10/25/2005	MOLYBDENUM	658,833	370,969	1,506	13
5/15/2006	MOLYBDENUM	658,767	370,979	1,537	13
10/23/2006	MOLYBDENUM	658,812	370,995	1,497	13
5/14/2007	MOLYBDENUM	658,792	371,000	1,505	13
10/15/2007	MOLYBDENUM	658,830	371,003	1,479	13
5/5/2008	MOLYBDENUM	658,795	371,013	1,493	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

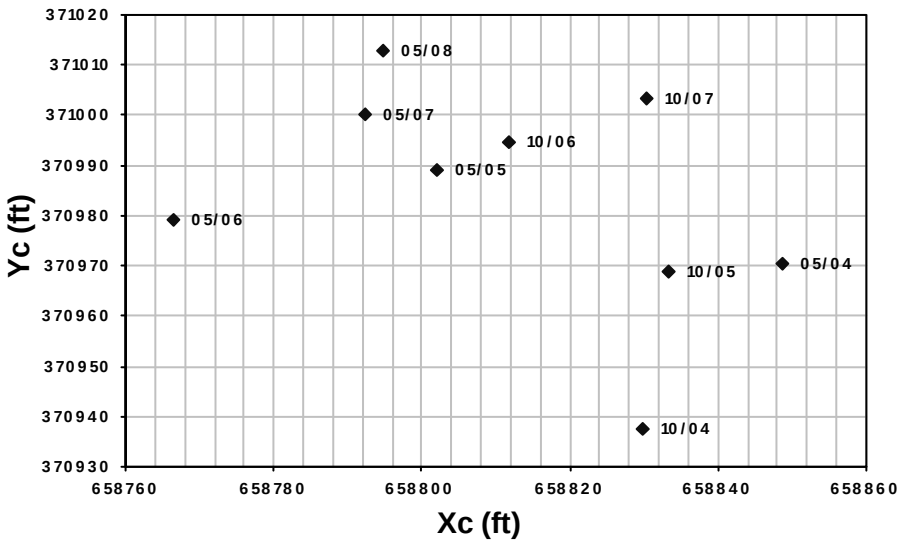
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Location of Center of Mass Over Time



Groundwater Flow Direction:

Source Coordinate:

X: 659,700

Y: 372,200

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
5/3/2004	MOLYBDENUM	658,849	370,970	1,495	13
10/13/2004	MOLYBDENUM	658,830	370,938	1,533	13
5/3/2005	MOLYBDENUM	658,802	370,989	1,508	13
10/25/2005	MOLYBDENUM	658,833	370,969	1,506	13
5/15/2006	MOLYBDENUM	658,767	370,979	1,537	13
10/23/2006	MOLYBDENUM	658,812	370,995	1,497	13
5/14/2007	MOLYBDENUM	658,792	371,000	1,505	13
10/15/2007	MOLYBDENUM	658,830	371,003	1,479	13
5/5/2008	MOLYBDENUM	658,795	371,013	1,493	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS Second Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

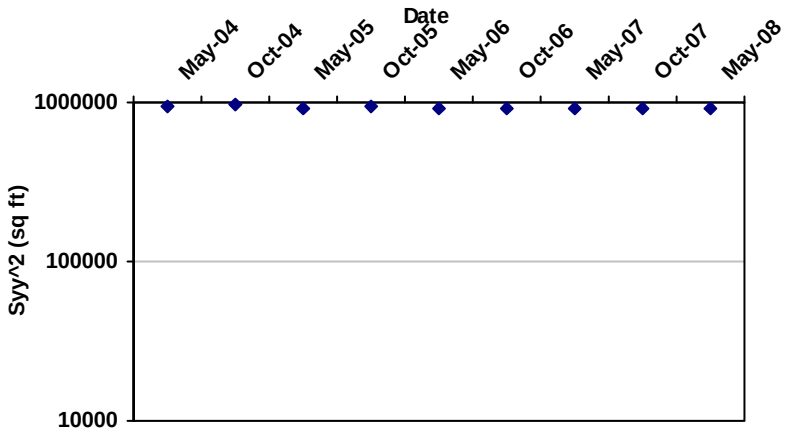
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: MOLYBDENUM

Change in Plume Spread Over Time

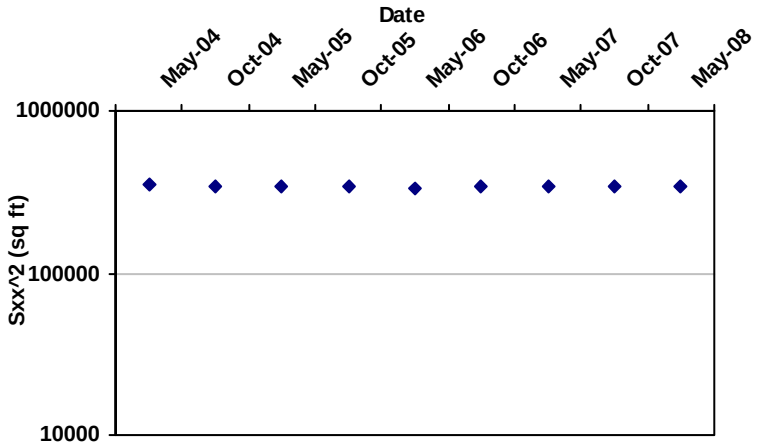


Mann Kendall S Statistic: -20

Confidence in Trend: 97.8%

Coefficient of Variation: 0.02

Second Moment Trend: D



Mann Kendall S Statistic: -12

Confidence in Trend: 87.0%

Coefficient of Variation: 0.02

Second Moment Trend: S

Data Table:

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
5/3/2004	MOLYBDENUM	353,448	944,021	13
10/13/2004	MOLYBDENUM	345,286	963,167	13
5/3/2005	MOLYBDENUM	345,273	918,992	13
10/25/2005	MOLYBDENUM	344,793	934,475	13
5/15/2006	MOLYBDENUM	328,271	911,206	13
10/23/2006	MOLYBDENUM	345,488	913,682	13
5/14/2007	MOLYBDENUM	342,660	907,972	13
10/15/2007	MOLYBDENUM	346,430	914,812	13
5/5/2008	MOLYBDENUM	341,124	911,775	13

MAROS Second Moment Analysis

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells

Note: 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)

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 Zeroth Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

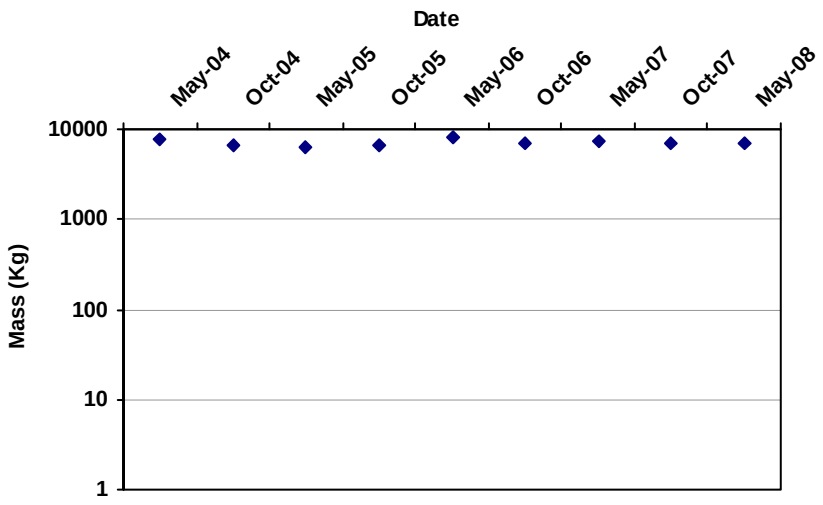
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Dissolved Mass Over Time



Porosity: 0.20

Saturated Thickness:

Uniform: 200 ft

Mann Kendall S Statistic:

4

Confidence in Trend:

61.9%

Coefficient of Variation:

0.08

Zeroth Moment Trend:

NT

Data Table:

Effective Date	Constituent	Estimated Mass (Kg)	Number of Wells
5/3/2004	VANADIUM	7.8E+03	13
10/13/2004	VANADIUM	6.6E+03	13
5/3/2005	VANADIUM	6.4E+03	13
10/25/2005	VANADIUM	6.6E+03	13
5/15/2006	VANADIUM	8.0E+03	13
10/23/2006	VANADIUM	7.2E+03	13
5/14/2007	VANADIUM	7.5E+03	13
10/15/2007	VANADIUM	7.1E+03	13
5/5/2008	VANADIUM	7.1E+03	13

Note: 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); ND = Non-detect. Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

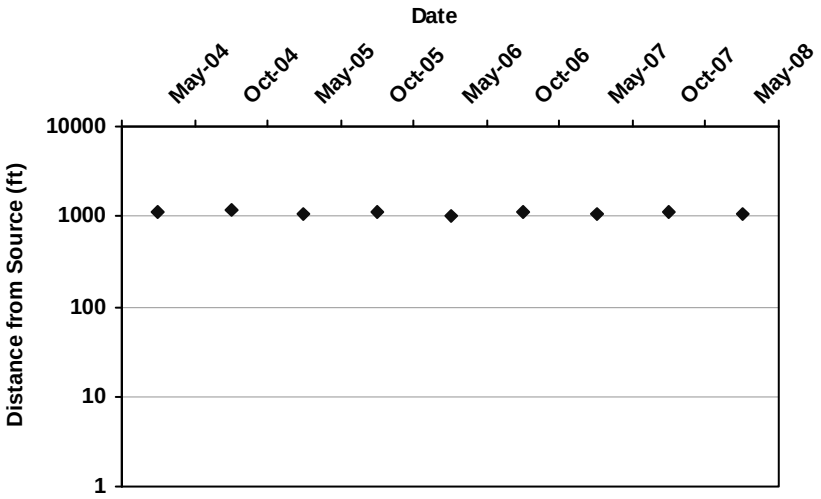
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Distance from Source to Center of Mass



Mann Kendall S Statistic:

-12

Confidence in Trend:

87.0%

Coefficient of Variation:

0.03

First Moment Trend:

S

Data Table:

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
5/3/2004	VANADIUM	658,759	371,624	1,103	13
10/13/2004	VANADIUM	658,693	371,633	1,155	13
5/3/2005	VANADIUM	658,755	371,683	1,078	13
10/25/2005	VANADIUM	658,717	371,644	1,130	13
5/15/2006	VANADIUM	658,783	371,739	1,026	13
10/23/2006	VANADIUM	658,745	371,639	1,108	13
5/14/2007	VANADIUM	658,778	371,613	1,093	13
10/15/2007	VANADIUM	658,754	371,644	1,097	13
5/5/2008	VANADIUM	658,802	371,621	1,068	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS First Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

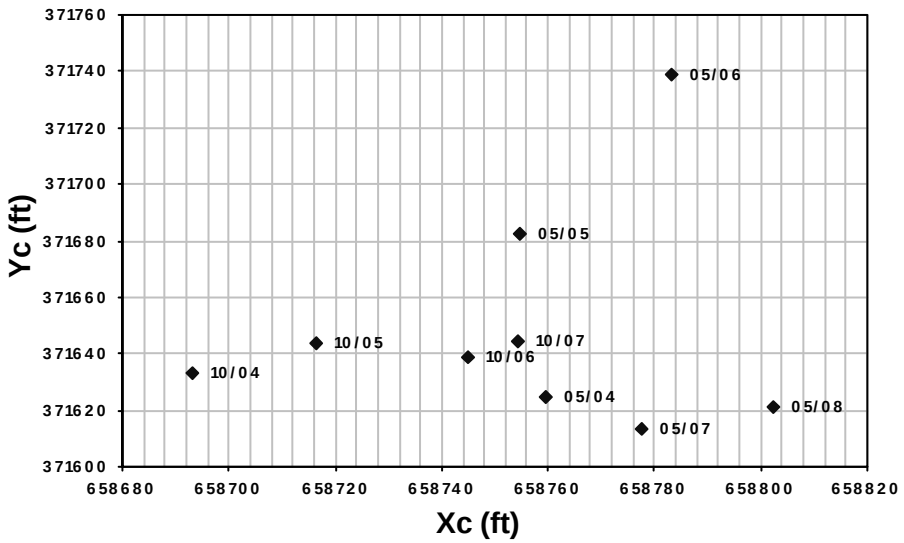
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Location of Center of Mass Over Time



Groundwater Flow Direction:

Source Coordinate:

X: 659,700

Y: 372,200

Effective Date	Constituent	Xc (ft)	Yc (ft)	Distance from Source (ft)	Number of Wells
5/3/2004	VANADIUM	658,759	371,624	1,103	13
10/13/2004	VANADIUM	658,693	371,633	1,155	13
5/3/2005	VANADIUM	658,755	371,683	1,078	13
10/25/2005	VANADIUM	658,717	371,644	1,130	13
5/15/2006	VANADIUM	658,783	371,739	1,026	13
10/23/2006	VANADIUM	658,745	371,639	1,108	13
5/14/2007	VANADIUM	658,778	371,613	1,093	13
10/15/2007	VANADIUM	658,754	371,644	1,097	13
5/5/2008	VANADIUM	658,802	371,621	1,068	13

Note: 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). Moments are not calculated for sample events with less than 6 wells.

MAROS Second Moment Analysis

Project: Tronox V Mo 13 wells Finch 5 yrs

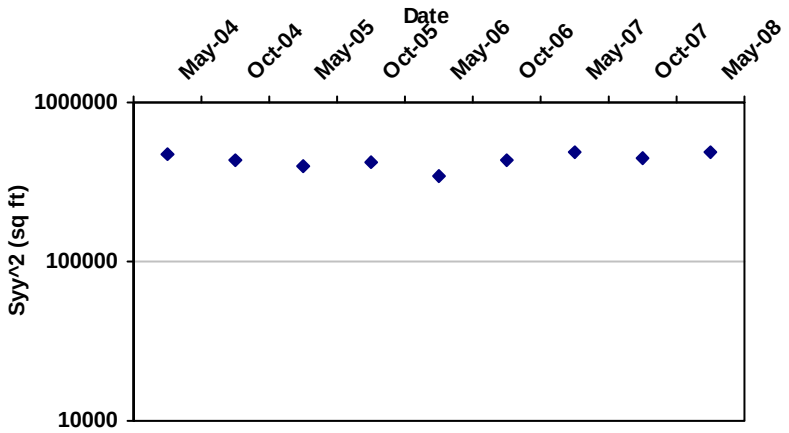
User Name: Global Environmental

Location: Soda Springs

State: Idaho

COC: VANADIUM

Change in Plume Spread Over Time

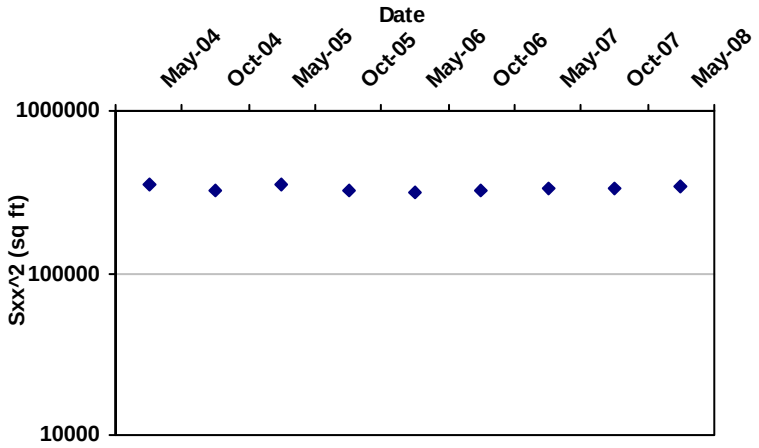


Mann Kendall S Statistic: 10

Confidence in Trend: 82.1%

Coefficient of Variation: 0.10

Second Moment Trend: NT



Mann Kendall S Statistic: 2

Confidence in Trend: 54.0%

Coefficient of Variation: 0.04

Second Moment Trend: NT

Data Table:

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
5/3/2004	VANADIUM	348,179	466,673	13
10/13/2004	VANADIUM	323,330	439,755	13
5/3/2005	VANADIUM	351,051	398,310	13
10/25/2005	VANADIUM	324,212	421,811	13
5/15/2006	VANADIUM	314,225	345,668	13
10/23/2006	VANADIUM	319,837	433,967	13
5/14/2007	VANADIUM	330,251	485,674	13
10/15/2007	VANADIUM	331,495	442,587	13
5/5/2008	VANADIUM	343,745	486,609	13

MAROS Second Moment Analysis

Effective Date	Constituent	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells

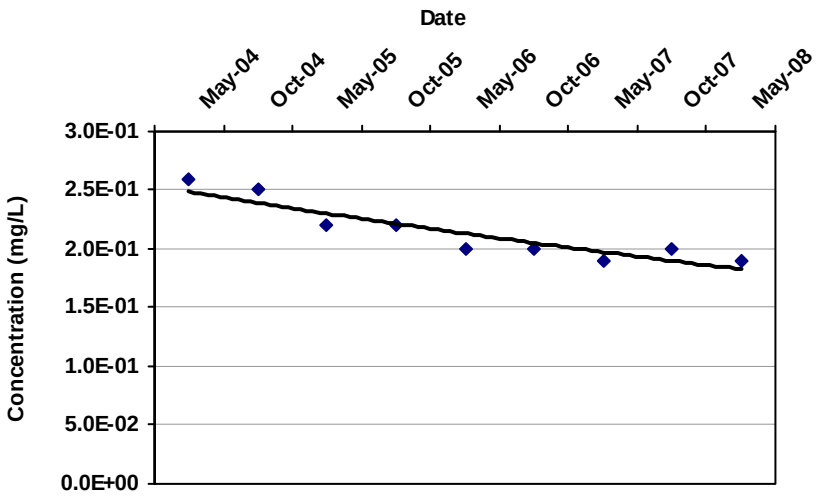
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events)

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 Linear Regression Statistics

Well: Finch Spring
Well Type: T
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.12

Confidence in Trend: 100.0%

Ln Slope: -2.1E-04

LR Concentration Trend: D

Consolidation Data Table:

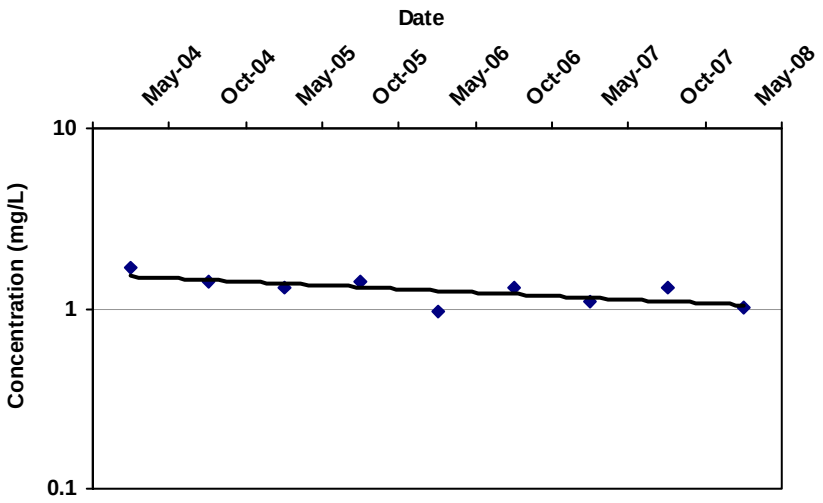
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	5/3/2004	MOLYBDENUM	2.6E-01		1	1
Finch Spring	T	10/13/2004	MOLYBDENUM	2.5E-01		1	1
Finch Spring	T	5/3/2005	MOLYBDENUM	2.2E-01		1	1
Finch Spring	T	10/25/2005	MOLYBDENUM	2.2E-01		1	1
Finch Spring	T	5/15/2006	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	10/23/2006	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	5/14/2007	MOLYBDENUM	1.9E-01		1	1
Finch Spring	T	10/15/2007	MOLYBDENUM	2.0E-01		1	1
Finch Spring	T	5/5/2008	MOLYBDENUM	1.9E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-2
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.18

Confidence in Trend: 98.3%

Ln Slope: -2.5E-04

LR Concentration Trend: D

Consolidation Data Table:

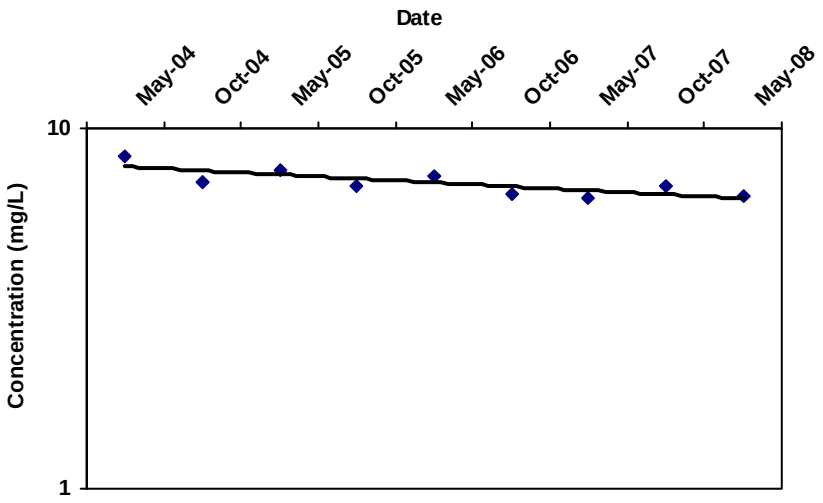
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	5/3/2004	MOLYBDENUM	1.7E+00		1	1
KM-2	S	10/17/2004	MOLYBDENUM	1.4E+00		1	1
KM-2	S	5/3/2005	MOLYBDENUM	1.3E+00		1	1
KM-2	S	10/25/2005	MOLYBDENUM	1.4E+00		1	1
KM-2	S	5/16/2006	MOLYBDENUM	9.6E-01		1	1
KM-2	S	10/23/2006	MOLYBDENUM	1.3E+00		1	1
KM-2	S	5/14/2007	MOLYBDENUM	1.1E+00		1	1
KM-2	S	10/15/2007	MOLYBDENUM	1.3E+00		1	1
KM-2	S	5/5/2008	MOLYBDENUM	1.0E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-3
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.09

Confidence in Trend: 99.4%

Ln Slope: -1.4E-04

LR Concentration Trend: D

Consolidation Data Table:

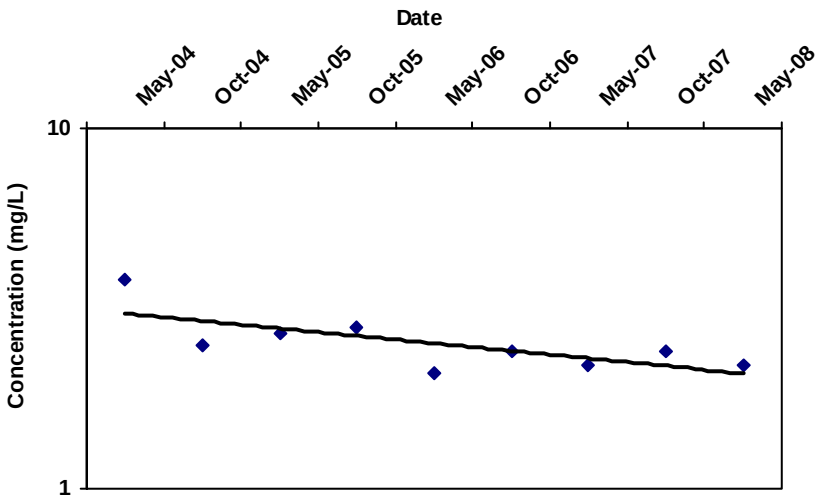
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	5/3/2004	MOLYBDENUM	8.4E+00		1	1
KM-3	S	10/17/2004	MOLYBDENUM	7.1E+00		1	1
KM-3	S	5/3/2005	MOLYBDENUM	7.7E+00		1	1
KM-3	S	10/25/2005	MOLYBDENUM	6.9E+00		1	1
KM-3	S	5/16/2006	MOLYBDENUM	7.4E+00		1	1
KM-3	S	10/23/2006	MOLYBDENUM	6.6E+00		1	1
KM-3	S	5/14/2007	MOLYBDENUM	6.4E+00		1	1
KM-3	S	10/15/2007	MOLYBDENUM	6.9E+00		1	1
KM-3	S	5/5/2008	MOLYBDENUM	6.5E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-4
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.20

Confidence in Trend: 98.7%

Ln Slope: -2.6E-04

LR Concentration Trend: D

Consolidation Data Table:

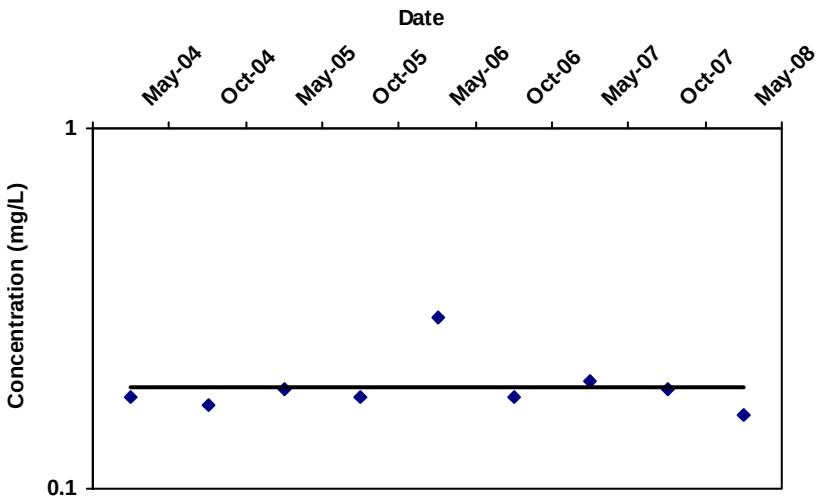
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	5/3/2004	MOLYBDENUM	3.8E+00		1	1
KM-4	S	10/17/2004	MOLYBDENUM	2.5E+00		1	1
KM-4	S	5/3/2005	MOLYBDENUM	2.7E+00		1	1
KM-4	S	10/25/2005	MOLYBDENUM	2.8E+00		1	1
KM-4	S	5/16/2006	MOLYBDENUM	2.1E+00		1	1
KM-4	S	10/23/2006	MOLYBDENUM	2.4E+00		1	1
KM-4	S	5/14/2007	MOLYBDENUM	2.2E+00		1	1
KM-4	S	10/15/2007	MOLYBDENUM	2.4E+00		1	1
KM-4	S	5/5/2008	MOLYBDENUM	2.2E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-5
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.21

Confidence in Trend: 100.0%

Ln Slope: 1.2E-06

LR Concentration Trend: I

Consolidation Data Table:

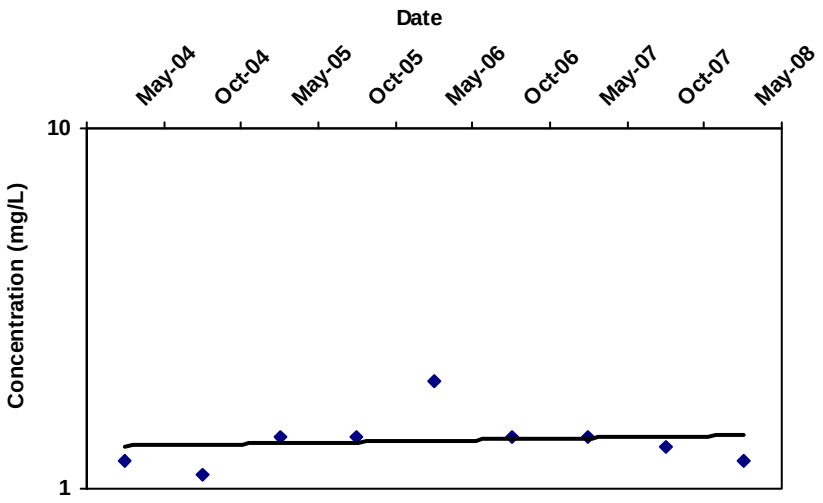
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	5/3/2004	MOLYBDENUM	1.8E-01		1	1
KM-5	S	10/17/2004	MOLYBDENUM	1.7E-01		1	1
KM-5	S	5/3/2005	MOLYBDENUM	1.9E-01		1	1
KM-5	S	10/25/2005	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/16/2006	MOLYBDENUM	3.0E-01		1	1
KM-5	S	10/23/2006	MOLYBDENUM	1.8E-01		1	1
KM-5	S	5/14/2007	MOLYBDENUM	2.0E-01		1	1
KM-5	S	10/15/2007	MOLYBDENUM	1.9E-01		1	1
KM-5	S	5/5/2008	MOLYBDENUM	1.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-6
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.19

Confidence in Trend: 64.7%

Ln Slope: 5.0E-05

LR Concentration Trend: NT

Consolidation Data Table:

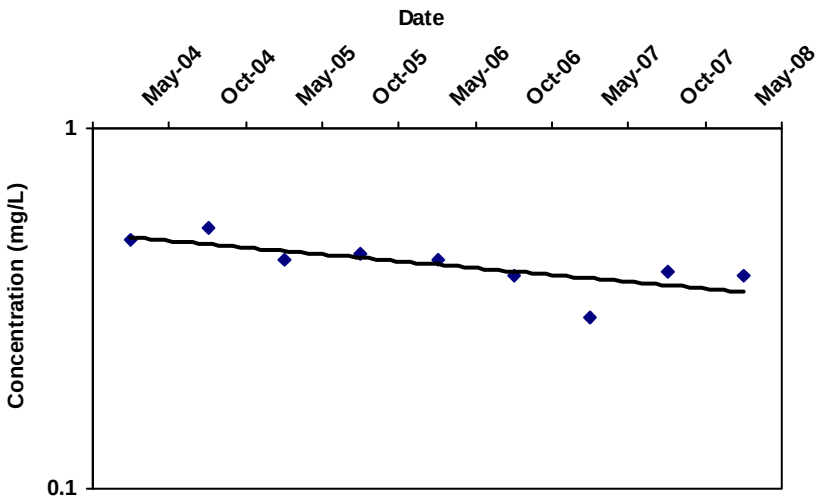
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	5/3/2004	MOLYBDENUM	1.2E+00		1	1
KM-6	S	10/17/2004	MOLYBDENUM	1.1E+00		1	1
KM-6	S	5/3/2005	MOLYBDENUM	1.4E+00		1	1
KM-6	S	10/25/2005	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/16/2006	MOLYBDENUM	2.0E+00		1	1
KM-6	S	10/23/2006	MOLYBDENUM	1.4E+00		1	1
KM-6	S	5/14/2007	MOLYBDENUM	1.4E+00		1	1
KM-6	S	10/15/2007	MOLYBDENUM	1.3E+00		1	1
KM-6	S	5/5/2008	MOLYBDENUM	1.2E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-7
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.16

Confidence in Trend: 98.9%

Ln Slope: -2.4E-04

LR Concentration Trend: D

Consolidation Data Table:

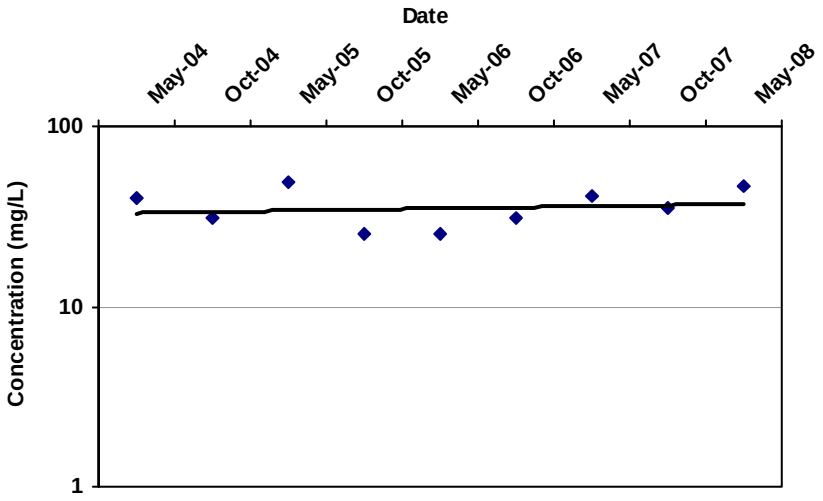
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	5/3/2004	MOLYBDENUM	4.9E-01		1	1
KM-7	S	10/17/2004	MOLYBDENUM	5.3E-01		1	1
KM-7	S	5/3/2005	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/25/2005	MOLYBDENUM	4.5E-01		1	1
KM-7	S	5/16/2006	MOLYBDENUM	4.3E-01		1	1
KM-7	S	10/23/2006	MOLYBDENUM	3.9E-01		1	1
KM-7	S	5/14/2007	MOLYBDENUM	3.0E-01		1	1
KM-7	S	10/15/2007	MOLYBDENUM	4.0E-01		1	1
KM-7	S	5/5/2008	MOLYBDENUM	3.9E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-8
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.25

Confidence in Trend: 66.1%

Ln Slope: 8.1E-05

LR Concentration Trend: NT

Consolidation Data Table:

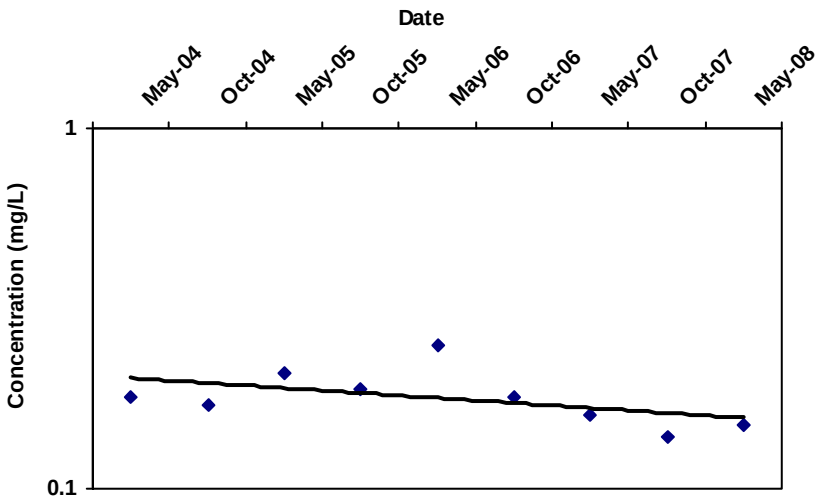
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	5/3/2004	MOLYBDENUM	4.0E+01		1	1
KM-8	S	10/17/2004	MOLYBDENUM	3.1E+01		1	1
KM-8	S	5/3/2005	MOLYBDENUM	4.9E+01		1	1
KM-8	S	10/25/2005	MOLYBDENUM	2.5E+01		1	1
KM-8	S	5/16/2006	MOLYBDENUM	2.5E+01		1	1
KM-8	S	10/23/2006	MOLYBDENUM	3.1E+01		1	1
KM-8	S	5/14/2007	MOLYBDENUM	4.1E+01		1	1
KM-8	S	10/15/2007	MOLYBDENUM	3.5E+01		1	1
KM-8	S	5/5/2008	MOLYBDENUM	4.7E+01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-9
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.18

Confidence in Trend: 90.7%

Ln Slope: -1.7E-04

LR Concentration Trend: PD

Consolidation Data Table:

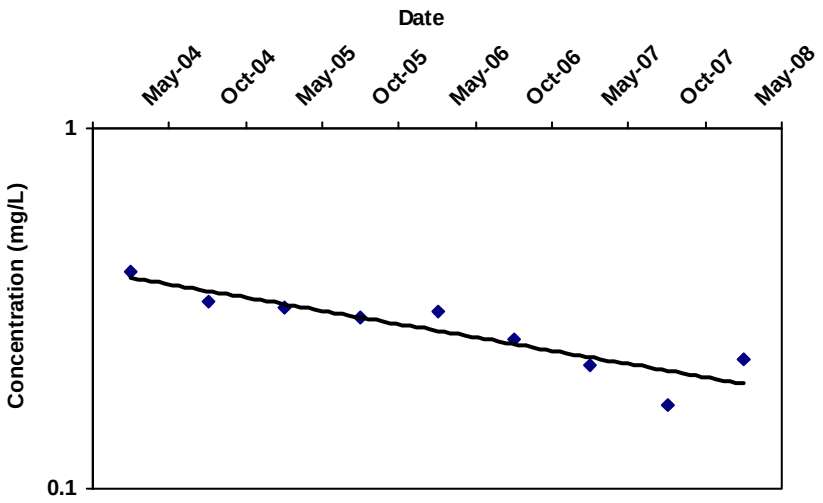
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	5/3/2004	MOLYBDENUM	1.8E-01		1	1
KM-9	S	10/17/2004	MOLYBDENUM	1.7E-01		1	1
KM-9	S	5/3/2005	MOLYBDENUM	2.1E-01		1	1
KM-9	S	10/25/2005	MOLYBDENUM	1.9E-01		1	1
KM-9	S	5/16/2006	MOLYBDENUM	2.5E-01		1	1
KM-9	S	10/23/2006	MOLYBDENUM	1.8E-01		1	1
KM-9	S	5/14/2007	MOLYBDENUM	1.6E-01		1	1
KM-9	S	10/15/2007	MOLYBDENUM	1.4E-01		1	1
KM-9	S	5/5/2008	MOLYBDENUM	1.5E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-13
Well Type: S
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.25

Confidence in Trend: 99.9%

Ln Slope: -4.6E-04

LR Concentration Trend: D

Consolidation Data Table:

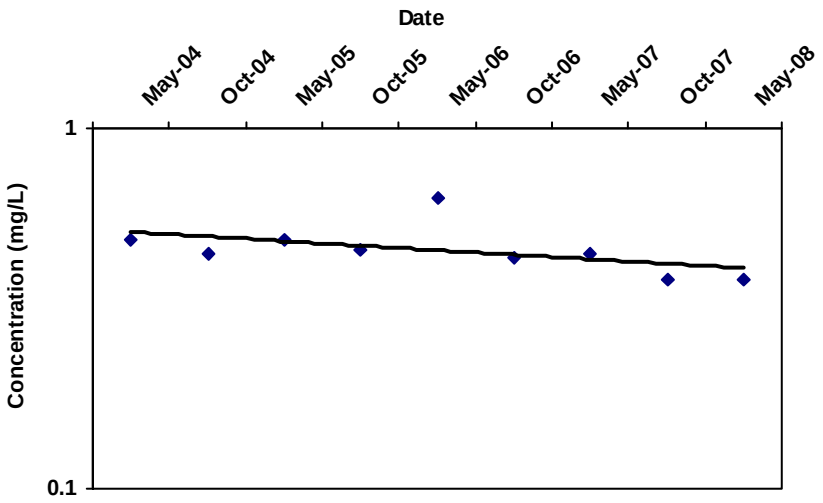
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	5/3/2004	MOLYBDENUM	4.0E-01		1	1
KM-13	S	10/17/2004	MOLYBDENUM	3.3E-01		1	1
KM-13	S	5/3/2005	MOLYBDENUM	3.2E-01		1	1
KM-13	S	10/25/2005	MOLYBDENUM	3.0E-01		1	1
KM-13	S	5/16/2006	MOLYBDENUM	3.1E-01		1	1
KM-13	S	10/23/2006	MOLYBDENUM	2.6E-01		1	1
KM-13	S	5/14/2007	MOLYBDENUM	2.2E-01		1	1
KM-13	S	10/15/2007	MOLYBDENUM	1.7E-01		1	1
KM-13	S	5/5/2008	MOLYBDENUM	2.3E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-15
Well Type: T
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.17

Confidence in Trend: 91.4%

Ln Slope: -1.5E-04

LR Concentration Trend: PD

Consolidation Data Table:

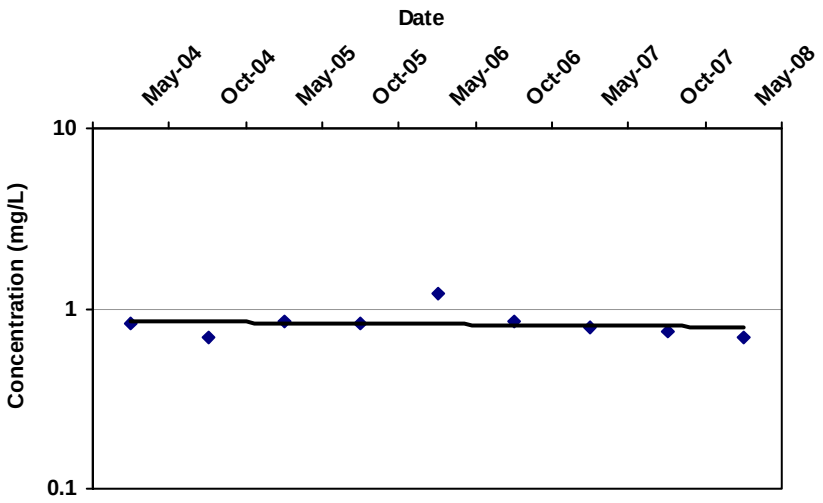
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	5/3/2004	MOLYBDENUM	4.9E-01		1	1
KM-15	T	10/17/2004	MOLYBDENUM	4.5E-01		1	1
KM-15	T	5/3/2005	MOLYBDENUM	4.9E-01		1	1
KM-15	T	10/25/2005	MOLYBDENUM	4.6E-01		1	1
KM-15	T	5/16/2006	MOLYBDENUM	6.4E-01		1	1
KM-15	T	10/23/2006	MOLYBDENUM	4.4E-01		1	1
KM-15	T	5/14/2007	MOLYBDENUM	4.5E-01		1	1
KM-15	T	10/15/2007	MOLYBDENUM	3.8E-01		1	1
KM-15	T	5/5/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-16
Well Type: T
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.18

Confidence in Trend: 64.1%

Ln Slope: -4.5E-05

LR Concentration Trend: S

Consolidation Data Table:

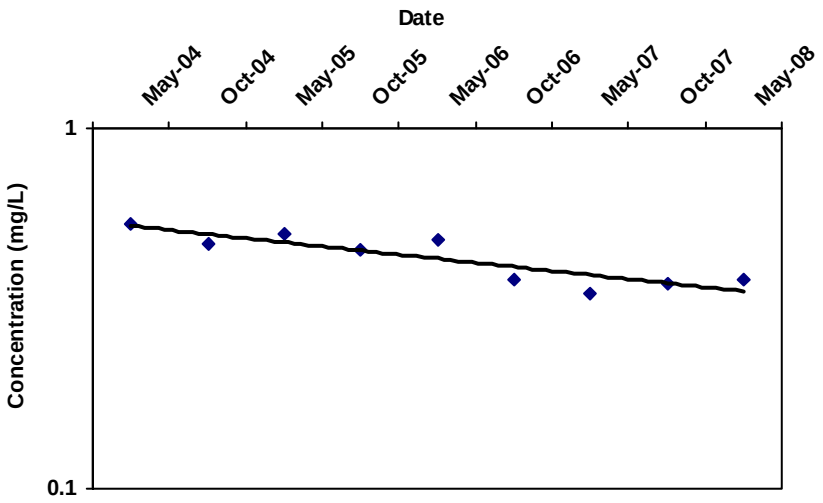
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	5/3/2004	MOLYBDENUM	8.2E-01		1	1
KM-16	T	10/17/2004	MOLYBDENUM	7.0E-01		1	1
KM-16	T	5/3/2005	MOLYBDENUM	8.4E-01		1	1
KM-16	T	10/25/2005	MOLYBDENUM	8.2E-01		1	1
KM-16	T	5/16/2006	MOLYBDENUM	1.2E+00		1	1
KM-16	T	10/23/2006	MOLYBDENUM	8.5E-01		1	1
KM-16	T	5/14/2007	MOLYBDENUM	7.8E-01		1	1
KM-16	T	10/15/2007	MOLYBDENUM	7.5E-01		1	1
KM-16	T	5/5/2008	MOLYBDENUM	7.0E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-17
Well Type: T
COC: MOLYBDENUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.16

Confidence in Trend: 99.9%

Ln Slope: -2.8E-04

LR Concentration Trend: D

Consolidation Data Table:

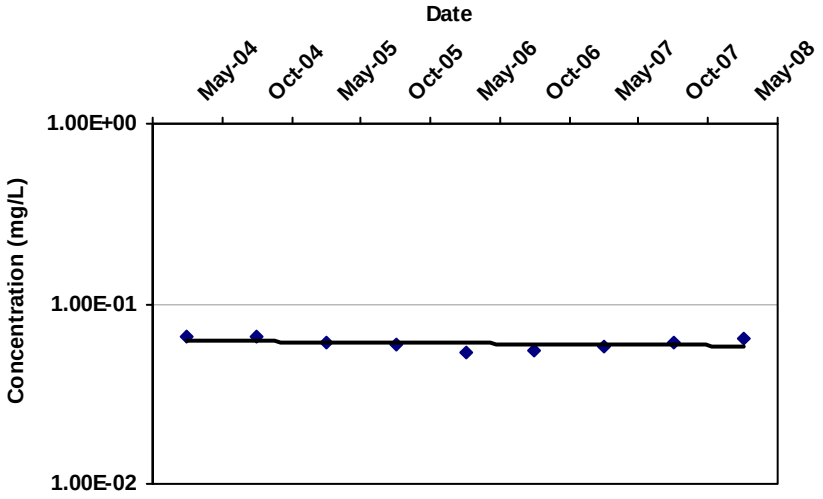
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	T	5/3/2004	MOLYBDENUM	5.4E-01		1	1
KM-17	T	10/17/2004	MOLYBDENUM	4.8E-01		1	1
KM-17	T	5/3/2005	MOLYBDENUM	5.1E-01		1	1
KM-17	T	10/25/2005	MOLYBDENUM	4.6E-01		1	1
KM-17	T	5/16/2006	MOLYBDENUM	4.9E-01		1	1
KM-17	T	10/23/2006	MOLYBDENUM	3.8E-01		1	1
KM-17	T	5/14/2007	MOLYBDENUM	3.5E-01		1	1
KM-17	T	10/15/2007	MOLYBDENUM	3.7E-01		1	1
KM-17	T	5/5/2008	MOLYBDENUM	3.8E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: Finch Spring
Well Type: T
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/30/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.07

Confidence in Trend: 80.2%

Ln Slope: -4.5E-05

LR Concentration Trend: S

Consolidation Data Table:

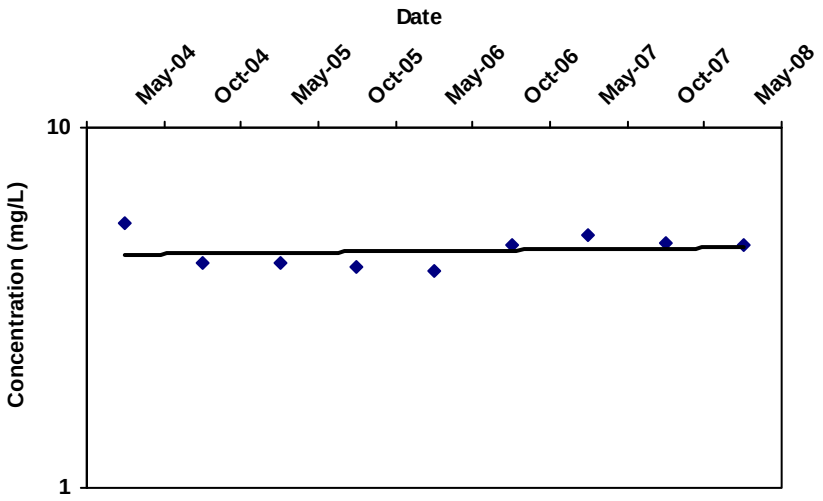
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
Finch Spring	T	5/3/2004	VANADIUM	6.5E-02		1	1
Finch Spring	T	10/13/2004	VANADIUM	6.6E-02		1	1
Finch Spring	T	5/3/2005	VANADIUM	6.1E-02		1	1
Finch Spring	T	10/25/2005	VANADIUM	6.0E-02		1	1
Finch Spring	T	5/15/2006	VANADIUM	5.4E-02		1	1
Finch Spring	T	10/23/2006	VANADIUM	5.5E-02		1	1
Finch Spring	T	5/14/2007	VANADIUM	5.8E-02		1	1
Finch Spring	T	10/15/2007	VANADIUM	6.1E-02		1	1
Finch Spring	T	5/5/2008	VANADIUM	6.4E-02		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-2
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.10

Confidence in Trend: 64.9%

Ln Slope: 3.0E-05

LR Concentration Trend: NT

Consolidation Data Table:

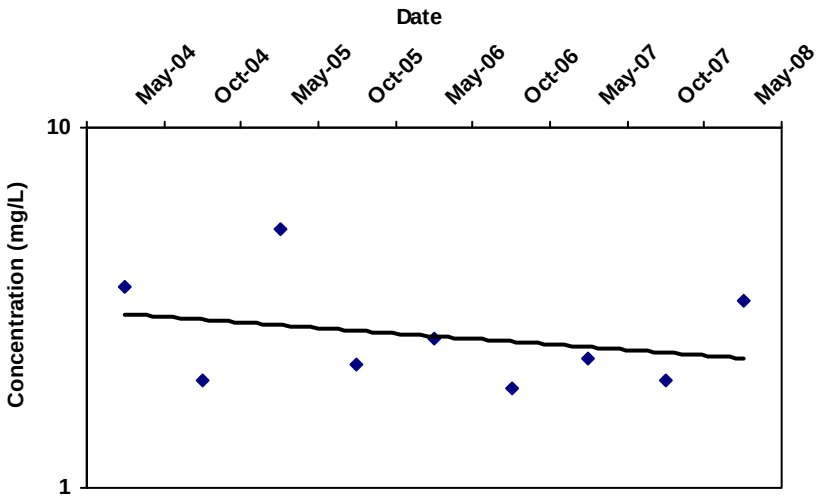
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-2	S	5/3/2004	VANADIUM	5.4E+00		1	1
KM-2	S	10/13/2004	VANADIUM	4.2E+00		1	1
KM-2	S	5/3/2005	VANADIUM	4.2E+00		1	1
KM-2	S	10/25/2005	VANADIUM	4.1E+00		1	1
KM-2	S	5/15/2006	VANADIUM	4.0E+00		1	1
KM-2	S	10/23/2006	VANADIUM	4.7E+00		1	1
KM-2	S	5/14/2007	VANADIUM	5.0E+00		1	1
KM-2	S	10/15/2007	VANADIUM	4.8E+00		1	1
KM-2	S	5/5/2008	VANADIUM	4.7E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-3
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.39

Confidence in Trend: 76.3%

Ln Slope: -1.9E-04

LR Concentration Trend: S

Consolidation Data Table:

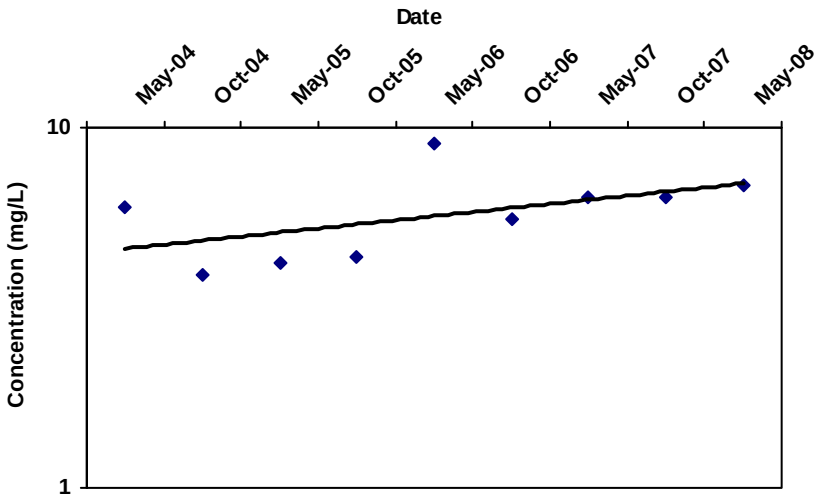
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-3	S	5/3/2004	VANADIUM	3.6E+00		1	1
KM-3	S	10/13/2004	VANADIUM	2.0E+00		1	1
KM-3	S	5/3/2005	VANADIUM	5.2E+00		1	1
KM-3	S	10/25/2005	VANADIUM	2.2E+00		1	1
KM-3	S	5/15/2006	VANADIUM	2.6E+00		1	1
KM-3	S	10/23/2006	VANADIUM	1.9E+00		1	1
KM-3	S	5/14/2007	VANADIUM	2.3E+00		1	1
KM-3	S	10/15/2007	VANADIUM	2.0E+00		1	1
KM-3	S	5/5/2008	VANADIUM	3.3E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-4
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.27

Confidence in Trend: 93.4%

Ln Slope: 2.9E-04

LR Concentration Trend: PI

Consolidation Data Table:

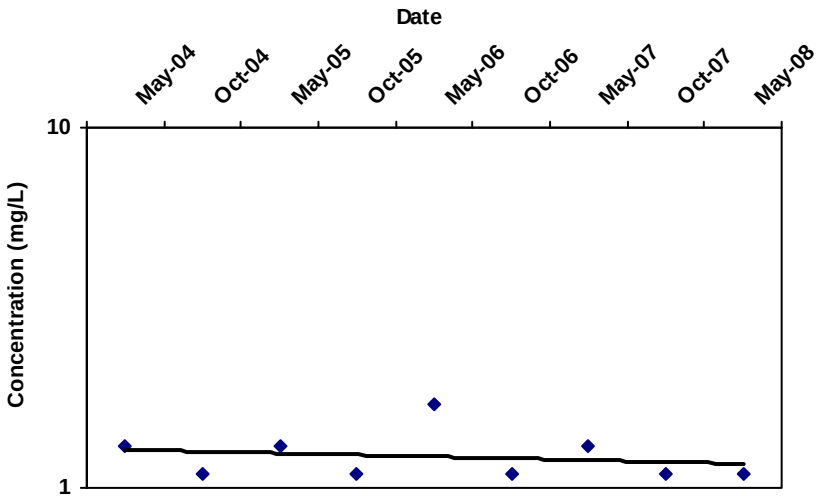
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-4	S	5/3/2004	VANADIUM	6.0E+00		1	1
KM-4	S	10/13/2004	VANADIUM	3.9E+00		1	1
KM-4	S	5/3/2005	VANADIUM	4.2E+00		1	1
KM-4	S	10/25/2005	VANADIUM	4.4E+00		1	1
KM-4	S	5/15/2006	VANADIUM	9.0E+00		1	1
KM-4	S	10/23/2006	VANADIUM	5.6E+00		1	1
KM-4	S	5/14/2007	VANADIUM	6.4E+00		1	1
KM-4	S	10/15/2007	VANADIUM	6.4E+00		1	1
KM-4	S	5/5/2008	VANADIUM	6.9E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-5
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.16

Confidence in Trend: 68.6%

Ln Slope: -5.6E-05

LR Concentration Trend: S

Consolidation Data Table:

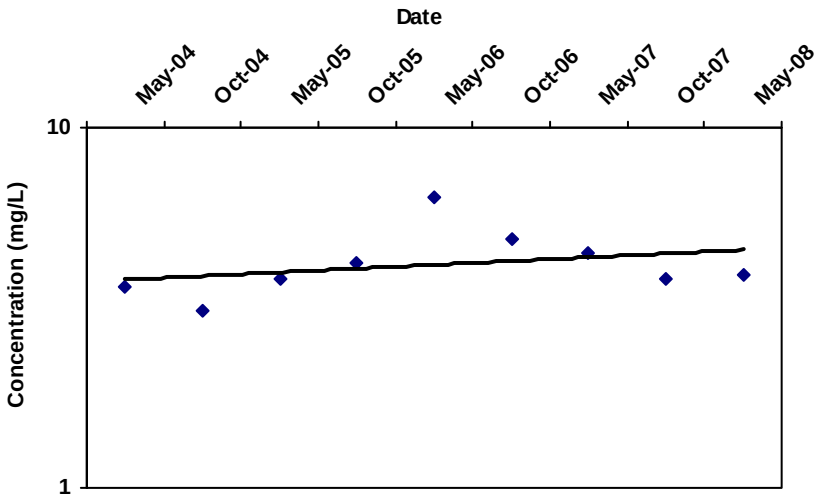
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-5	S	5/3/2004	VANADIUM	1.3E+00		1	1
KM-5	S	10/13/2004	VANADIUM	1.1E+00		1	1
KM-5	S	5/3/2005	VANADIUM	1.3E+00		1	1
KM-5	S	10/25/2005	VANADIUM	1.1E+00		1	1
KM-5	S	5/15/2006	VANADIUM	1.7E+00		1	1
KM-5	S	10/23/2006	VANADIUM	1.1E+00		1	1
KM-5	S	5/14/2007	VANADIUM	1.3E+00		1	1
KM-5	S	10/15/2007	VANADIUM	1.1E+00		1	1
KM-5	S	5/5/2008	VANADIUM	1.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-6
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.23

Confidence in Trend: 80.3%

Ln Slope: 1.3E-04

LR Concentration Trend: NT

Consolidation Data Table:

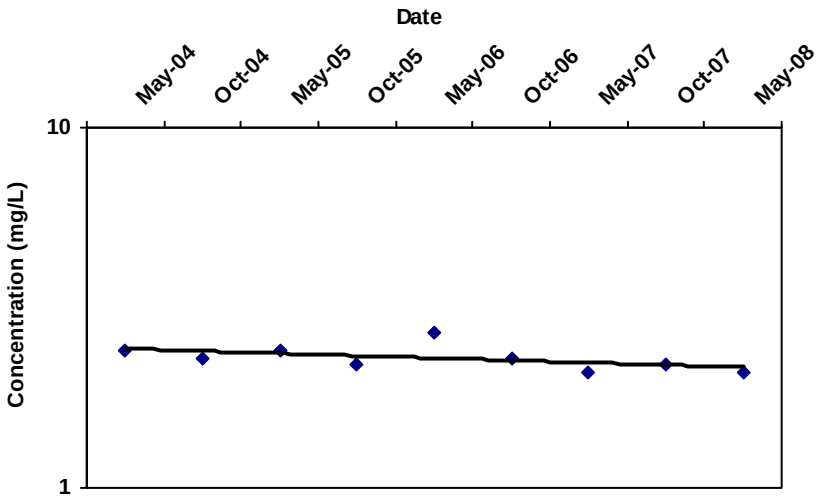
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-6	S	5/3/2004	VANADIUM	3.6E+00		1	1
KM-6	S	10/13/2004	VANADIUM	3.1E+00		1	1
KM-6	S	5/3/2005	VANADIUM	3.8E+00		1	1
KM-6	S	10/25/2005	VANADIUM	4.2E+00		1	1
KM-6	S	5/15/2006	VANADIUM	6.4E+00		1	1
KM-6	S	10/23/2006	VANADIUM	4.9E+00		1	1
KM-6	S	5/14/2007	VANADIUM	4.5E+00		1	1
KM-6	S	10/15/2007	VANADIUM	3.8E+00		1	1
KM-6	S	5/5/2008	VANADIUM	3.9E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-7
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.08

Confidence in Trend: 91.9%

Ln Slope: -8.0E-05

LR Concentration Trend: PD

Consolidation Data Table:

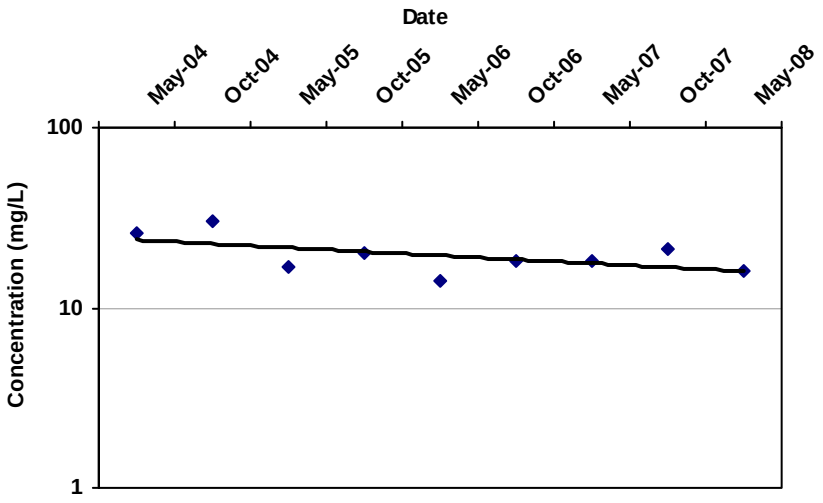
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-7	S	5/3/2004	VANADIUM	2.4E+00		1	1
KM-7	S	10/13/2004	VANADIUM	2.3E+00		1	1
KM-7	S	5/3/2005	VANADIUM	2.4E+00		1	1
KM-7	S	10/25/2005	VANADIUM	2.2E+00		1	1
KM-7	S	5/15/2006	VANADIUM	2.7E+00		1	1
KM-7	S	10/23/2006	VANADIUM	2.3E+00		1	1
KM-7	S	5/14/2007	VANADIUM	2.1E+00		1	1
KM-7	S	10/15/2007	VANADIUM	2.2E+00		1	1
KM-7	S	5/5/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-8
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.25

Confidence in Trend: 95.2%

Ln Slope: -2.8E-04

LR Concentration Trend: D

Consolidation Data Table:

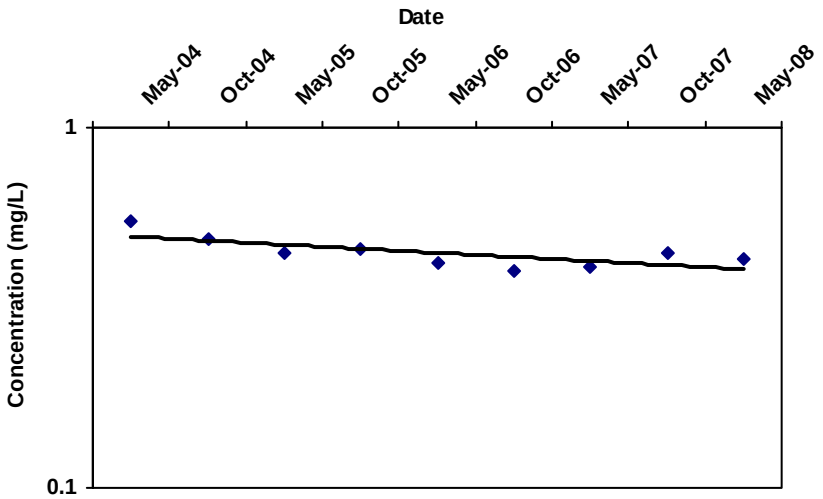
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-8	S	5/3/2004	VANADIUM	2.6E+01		1	1
KM-8	S	10/13/2004	VANADIUM	3.0E+01		1	1
KM-8	S	5/3/2005	VANADIUM	1.7E+01		1	1
KM-8	S	10/25/2005	VANADIUM	2.0E+01		1	1
KM-8	S	5/15/2006	VANADIUM	1.4E+01		1	1
KM-8	S	10/23/2006	VANADIUM	1.8E+01		1	1
KM-8	S	5/14/2007	VANADIUM	1.8E+01		1	1
KM-8	S	10/15/2007	VANADIUM	2.1E+01		1	1
KM-8	S	5/5/2008	VANADIUM	1.6E+01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-9
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.10

Confidence in Trend: 98.7%

Ln Slope: -1.4E-04

LR Concentration Trend: D

Consolidation Data Table:

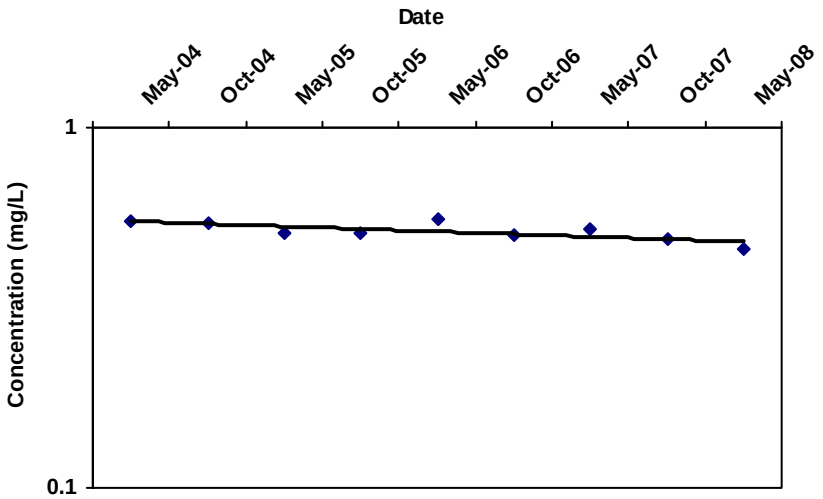
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-9	S	5/3/2004	VANADIUM	5.5E-01		1	1
KM-9	S	10/13/2004	VANADIUM	4.9E-01		1	1
KM-9	S	5/3/2005	VANADIUM	4.5E-01		1	1
KM-9	S	10/25/2005	VANADIUM	4.6E-01		1	1
KM-9	S	5/15/2006	VANADIUM	4.2E-01		1	1
KM-9	S	10/23/2006	VANADIUM	4.0E-01		1	1
KM-9	S	5/14/2007	VANADIUM	4.1E-01		1	1
KM-9	S	10/15/2007	VANADIUM	4.5E-01		1	1
KM-9	S	5/5/2008	VANADIUM	4.3E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-13
Well Type: S
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.06

Confidence in Trend: 98.7%

Ln Slope: -8.9E-05

LR Concentration Trend: D

Consolidation Data Table:

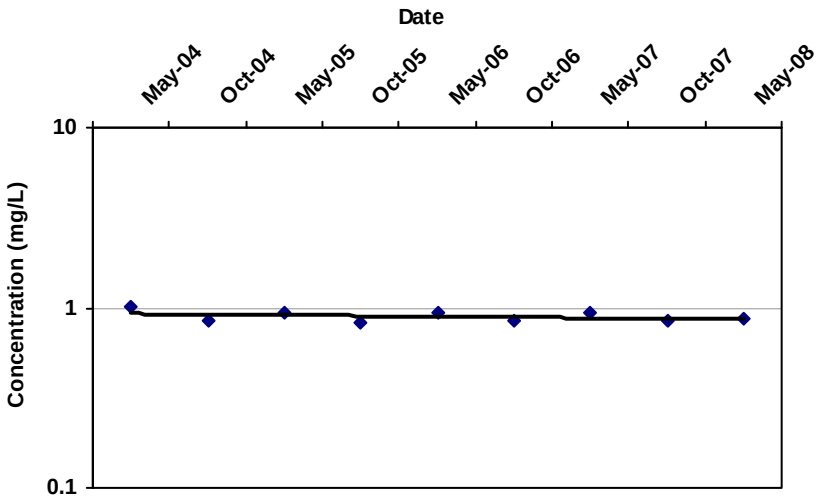
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-13	S	5/3/2004	VANADIUM	5.5E-01		1	1
KM-13	S	10/13/2004	VANADIUM	5.4E-01		1	1
KM-13	S	5/3/2005	VANADIUM	5.1E-01		1	1
KM-13	S	10/25/2005	VANADIUM	5.1E-01		1	1
KM-13	S	5/15/2006	VANADIUM	5.6E-01		1	1
KM-13	S	10/23/2006	VANADIUM	5.0E-01		1	1
KM-13	S	5/14/2007	VANADIUM	5.2E-01		1	1
KM-13	S	10/15/2007	VANADIUM	4.9E-01		1	1
KM-13	S	5/5/2008	VANADIUM	4.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-15
Well Type: T
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.07

Confidence in Trend: 83.5%

Ln Slope: -4.9E-05

LR Concentration Trend: S

Consolidation Data Table:

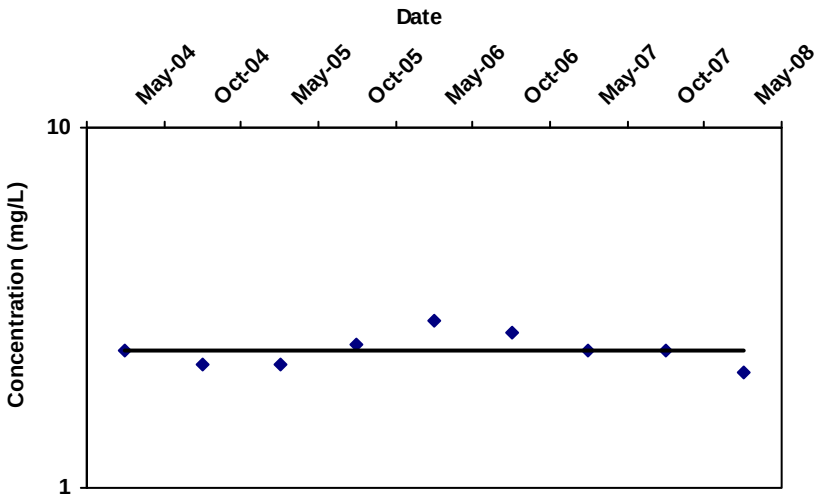
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-15	T	5/3/2004	VANADIUM	1.0E+00		1	1
KM-15	T	10/13/2004	VANADIUM	8.5E-01		1	1
KM-15	T	5/3/2005	VANADIUM	9.3E-01		1	1
KM-15	T	10/25/2005	VANADIUM	8.3E-01		1	1
KM-15	T	5/15/2006	VANADIUM	9.5E-01		1	1
KM-15	T	10/23/2006	VANADIUM	8.5E-01		1	1
KM-15	T	5/14/2007	VANADIUM	9.4E-01		1	1
KM-15	T	10/15/2007	VANADIUM	8.5E-01		1	1
KM-15	T	5/5/2008	VANADIUM	8.6E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-16
Well Type: T
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.10

Confidence in Trend: 100.0%

Ln Slope: -8.8E-07

LR Concentration Trend: D

Consolidation Data Table:

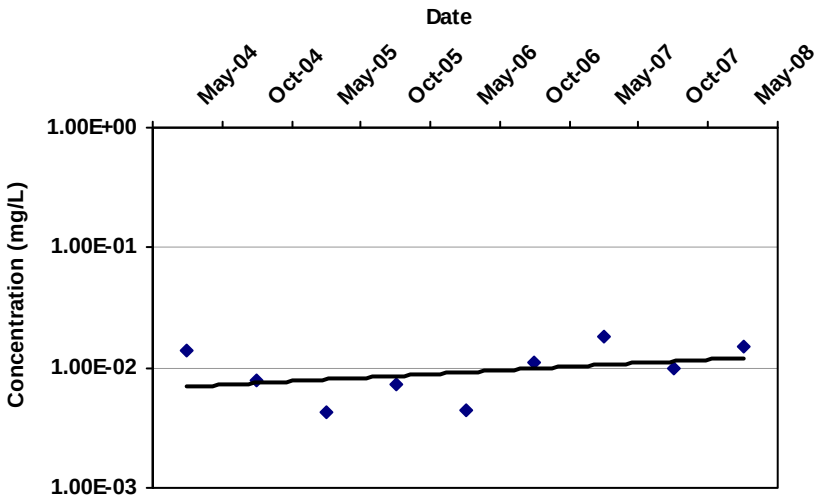
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-16	T	5/3/2004	VANADIUM	2.4E+00		1	1
KM-16	T	10/13/2004	VANADIUM	2.2E+00		1	1
KM-16	T	5/3/2005	VANADIUM	2.2E+00		1	1
KM-16	T	10/25/2005	VANADIUM	2.5E+00		1	1
KM-16	T	5/15/2006	VANADIUM	2.9E+00		1	1
KM-16	T	10/23/2006	VANADIUM	2.7E+00		1	1
KM-16	T	5/14/2007	VANADIUM	2.4E+00		1	1
KM-16	T	10/15/2007	VANADIUM	2.4E+00		1	1
KM-16	T	5/5/2008	VANADIUM	2.1E+00		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: KM-17
Well Type: T
COC: VANADIUM

Time Period: 5/1/2004 **to** 5/8/2008
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.46

Confidence in Trend: 84.0%

Ln Slope: 3.8E-04

LR Concentration Trend: NT

Consolidation Data Table:

Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
KM-17	T	5/3/2004	VANADIUM	1.4E-02		1	1
KM-17	T	10/13/2004	VANADIUM	8.0E-03		1	1
KM-17	T	5/3/2005	VANADIUM	4.3E-03		1	1
KM-17	T	10/25/2005	VANADIUM	7.4E-03		1	1
KM-17	T	5/15/2006	VANADIUM	4.4E-03		1	1
KM-17	T	10/23/2006	VANADIUM	1.1E-02		1	1
KM-17	T	5/14/2007	VANADIUM	1.8E-02		1	1
KM-17	T	10/15/2007	VANADIUM	1.0E-02		1	1
KM-17	T	5/5/2008	VANADIUM	1.5E-02		1	1

Note: 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); ND = All Samples are Non-detect

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Salt Lake City, UT 84109

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February 20, 2009

J. S. Brown
Global Environmental Technology
3630 East Cascade Way
Salt Lake City, UT 84109

RE: Seasonal Kendall Test - Letter Report
For the Kerr-McGee Chemical Corporation Superfund Site, Tronox Facility
Soda Springs, Idaho

Dear JB:

A Seasonal Kendall (SK) test for trends was performed using the U.S. Geological Survey's *Computer Program for the Kendall Family of Trend Tests* (Helsel and others, 2005)[1]. Vanadium concentrations from 12 wells, collected at the Tronox Facility between Fall 1997 and Spring 2008, were used to test for seasonal correlations.

Fluctuations in concentrations based on time of year when samples are collected have been observed and reported at the Tronox Facility. Seasonal variation is important to recognize and compensate for in order to better discern trends in concentration over time. The Seasonal Kendall program by the USGS performs the Mann-Kendall (MK) trend test for individual seasons of the year, where season is defined by the user. It then combines the individual results (from each season) into one overall test for whether the dependent (Y) variable (concentration) changes in a consistent direction over time.

Limitations

Seasonal patterns in ground water concentrations can be the result of various underlying causes. Recharge to the underlying aquifer could be derived mostly from ground water in one season; while during another season recharge may receive a large contribution from infiltration. Infiltration can vary in precipitation volume, be affected by temperature (which in turn affects precipitation type such as rain versus snow), and be influenced by the rate of evapotranspiration. Additional causes of seasonal patterns in concentrations include bio-chemical conditions in soil and ground water, which react with changes in groundwater levels. Natural and managed activities such as plant closures, changes in water usage and disposal, agricultural watering, and fertilization can all have an effect on concentration patterns.

[1] Helsel, D.R., Mueller, D.K., and Slack, J.R., 2005. Computer Program for the Kendall Family of Trend Tests, USGS Scientific Investigations Repoirt 2005-5275

The Seasonal Kendall Test does not identify the cause of or contributions to seasonality. It does however provide a means of evaluating the influence of seasonality on the distribution of the data and provides a quantitative way of evaluating trends. Helsel and Hirsch (2002)[2] recommend that whenever a correlation is statistically evaluated the data should be plotted on a scatter-plot, and remind us that no single numerical measure can substitute for the visual insight gained from a plot.

Seasonal Kendall Test Method

Data were prepared for analysis by creating separate input files for each well and sorting the data in the order of increasing time. Sample dates were converted to decimal years; for example November 21, 1997 was converted to 1997.974. Each sample event was assigned a season. Because only two events are performed per year at approximately the same time, sample events were assigned a number 1 for Spring and number 2 for Fall. The input file for each well contained the decimal year, assigned numerical value for the season, and corresponding concentration. Twelve wells were analyzed with an average of 22 sampling events between Fall 1997 and Spring 2008.

The basis for the Mann-Kendall test is to evaluate the null hypothesis H_o, by comparing it to the alternate hypothesis H_1:

H_o: a) no correlation exists between x and y, or
b) x and y are independent, or
c) the distribution of y does not depend on x, or
d) the probability ($y_i<y_j$ for $i<j$) = ½

versus

H_1: a) x and y are correlated, or
b) x and y are dependent, or
c) the distribution of y (percentiles, etc.) depends on x, or
d) the probability ($y_i<y_j$ for $i<j$) ≠½

The program output file from the Seasonal Kendall test provides the Kendall statistic S_k, the correlation coefficient Tau, the standard normal deviate Z_{Sk}, the p-value for significance of the trend, and a second p-value, which is adjusted to correct for covariance among seasons. The program output also includes the slope and intercept of the Kendall's line describing the overall trend. The definitions of these parameters are summarized from Helsel and Hirsch (2002):

Kendall's S statistic measures the monotonic dependence of y on x. (A monotonic correlation is when y increases or decreases –concentrations go up or down--as x increases—as time progresses). Data pairs are first ordered by increasing x. Kendall's S is calculated by subtracting the number of discordant pairs (M), the number of (x,y) pairs where y decreases as x increases, from the number of concordant pairs (P), where y increases with increasing x. If a positive correlation exists, the y's will increase more often than decrease as x increases. For a negative correlation, the y's will decrease more often than increase. If no correlation exists, the y's will

[2] Helsel, D.R., and Hirsch, R.M., 2002. Chapter A3, Statistical Methods in Water Resources, USGS publication available at http://water.usgs.gov/pubs/twri/twri4a3/

increase and decrease about the same number of times. There are n(n-1)/2 possible comparisons to be made among the n data pairs. The seasonal Kendall test accounts for seasonality by computing the Mann-Kendall test on each season separately, and then combining the results to derive the overall statistic S_k.

Kendall's Tau is a correlation coefficient used to measure the strength of association between two continuous variables. Tau (τ) is simply the S statistic divided by the number of comparisons in the n data pairs: $\tau = (S/(n(n-1)/2)$. If all y values increase along with the x values, tau will equal +1. If all y values decrease with increasing x, tau will equal -1. Tau will generally be lower than values of the traditional correlation coefficient r, for linear associations of the same strength. Strong linear correlations of 0.9 or above correspond to tau values of about 0.7 or above.

The Z_{Sk} statistic is also used to measure the strength of association between variables and is applied to large data sets, when the product of the number of seasons and number of years is more than about 25. The distribution is approximated by a normal distribution. The seasonal Kendall test computes the Mann-Kendall test for each season separately then combines the results to derive S_k. Similarly, variance (σ_{Sk}) is calculated as the sum of the variances from each test. The Z_{Sk} statistic is calculated from S_k and a σ_{Sk} as follows:

$Z_{Sk} = (S_k - 1)/\sigma_{Sk}$ if $S_k > 0$
$Z_{Sk} = 0$ if $S_k = 0$
$Z_{Sk} = (S_k + 1)/\sigma_{Sk}$ if $S_k < 0$

The Z_{Sk} values are used to calculate p-values.

The p-value is the significance level attained by the data. It measures the credibility of the null hypothesis, where the smaller the p-value, the stronger the evidence for rejection of the null hypothesis. The p-value can be compared to the alpha (α) level used in statistical evaluations. The difference between the p-value and the α level is that the p-value is calculated from the data whereas the α level is an assigned level. The p-value is found in a look-up table for a given sample size (n) and the calculated S statistic. For large sample approximations the calculated value of the Z statistic is used in a look-up table of normal distribution for a one-sided quantile. The p-value is calculated as: $p \approx 2*(1\text{-lookup value})$. The adjusted p-value is valid for data with more than 10 annual values per season.

An estimate of the slope for y over time is computed as the median of all slopes between data pairs within the same season.

Results of the Evaluation

Table 1 lists results from the Seasonal Kendall analysis for vanadium in 12 wells and includes S_k, tau, Z_{Sk}, and the p-value and adjusted p-value as percentages. Also listed is a qualitative assignment of seasonal trend from strong negative (tau > ±0.7 and p adjusted << 1%), to a moderate negative (tau > ±0.5 and p adjusted <2%), to no trend (tau < ±0.5 and p adjusted ≥ 5%).

Table 1. Seasonal Kendall Test Results

Wells	S_k	tau	Z_{Sk}	p	p adjusted	Seasonal Trend
KM-2	-80	-0.727	-4.349	0.00%	0.19%	strong trend
KM-3	-33	-0.3	-1.77	7.68%	4.76%	no trend
KM-4	-31	-0.282	-1.654	9.81%	9.81%	no trend
KM-5	-87	-0.791	-4.871	0.00%	0.03%	strong trend
KM-6	-60	-0.545	-3.248	0.12%	1.55%	moderate trend
KM-7	-32	-0.5	-2.548	1.08%	1.27%	moderate trend
KM-8	26	0.236	1.376	16.88%	26.86%	no trend
KM-9	-102	-0.927	-5.577	0.00%	0.01%	strong trend
KM-13	-96	-0.873	-5.23	0.00%	0.01%	strong trend
KM-15	-97	-0.882	-5.314	0.00%	0.01%	strong trend
KM-16	-77	-0.7	-4.203	0.00%	0.22%	strong trend
KM-17	-14	-0.14	-0.763	44.52%	54.73%	no trend

Tan highlighted area indicates significant probability of no seasonal trend

In statistical analyses, often an alpha level is assigned as a risk tolerance level in evaluating trends and in using the results of the statistical evaluation in decision making. Typical alpha levels are between 1 and 5 percent. The qualitative assignment in Table 1 above used similar ranges to highlight wells that are most likely influenced by seasonal trends and those that may be influenced by sources other than (or in addition to) seasonality.

If you have any questions regarding the evaluation or any other aspects of the report, please call.

Sincerely,
Lori Robison and Associates, L.L.C.

Lori C. Robison

Lori C. Robison, P.G.
Senior Hydrogeologist

Attachments:
Computer Printouts for 12 wells

KM7V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-7 Vanadium

The record is 9 complete water years with 2 seasons per year
beginning in water year 2000.

The tau correlation coefficient is -0.500
S = -32.
z = -2.548
p = 0.0108
p = 0.0127 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 2480. + -40.00 * Time

where Time = Year (as a decimal) - 1999.75 (beginning of first water year)

KM8V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-8 Vanadium

The record is 11 complete water years with 2 seasons per year
beginning in water year 1998.

The tau correlation coefficient is 0.236
S = 26.
z = 1.376
p = 0.1688
p = 0.2686 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 0.1310E+05 + 981.7 * Time

where Time = Year (as a decimal) - 1997.75 (beginning of first water year)

KM9V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-9 Vanadium

The record is 11 complete water years with 2 seasons per year
beginning in water year 1998.

The tau correlation coefficient is -0.927
S = -102.
z = -5.577
p = 0.0000
p = 0.0001 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 847.0 + -48.55 * Time

where Time = Year (as a decimal) - 1997.75 (beginning of first water year)

KM13V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-13 Vanadium

The record is 11 complete water years with 2 seasons per year
beginning in water year 1998.

The tau correlation coefficient is -0.873
S = -96.
z = -5.230
p = 0.0000
p = 0.0001 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 781.7 + -36.95 * Time

where Time = Year (as a decimal) - 1997.75 (beginning of first water year)

KM15V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-2 Vanadium

The record is 11 complete water years with 2 seasons per year
beginning in water year 1998.

The tau correlation coefficient is -0.882
S = -97.
z = -5.314
p = 0.0000
p = 0.0001 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 1414. + -66.19 * Time

where Time = Year (as a decimal) - 1997.75 (beginning of first water year)

KM16V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-16 Vanadium

The record is 11 complete water years with 2 seasons per year
beginning in water year 1998.

The tau correlation coefficient is -0.700
S = -77.
z = -4.203
p = 0.0000
p = 0.0022 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 3797. + -181.2 * Time

where Time = Year (as a decimal) - 1997.75 (beginning of first water year)

KM17V_2

Seasonal Kendall Test for Trend
US Geological Survey, 2005

Data set: KM-17 Vanadium

The record is 11 complete water years with 2 seasons per year
beginning in water year 1998.

The tau correlation coefficient is -0.140
S = -14.
z = -0.763
p = 0.4452
p = 0.5473 adjusted for correlation among seasons
(such as serial dependence)
The adjusted p-value should be used only for data with
more than 10 annual values per season.

The estimated trend may be described by the equation:

Y = 11.50 + -0.6000 * Time

where Time = Year (as a decimal) - 1997.75 (beginning of first water year)

John W. Hatmaker
Director Environment, Health & Safety

405-775-5431
405-823-9628
john.hatmaker@tronox.com

December 8, 2009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. William M. Ryan
United States Environmental Protection Agency Region 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

Re: Updated MAROS Analysis Results at the Kerr-McGee Chemical Corporation Superfund Site Tronox Facility Soda Springs, Idaho

Dear Mr. Ryan,

As we discussed during our September 11, 2009 teleconference, Tronox agreed to conduct the Well Sufficiency Analysis with additional well and surface water information for the Spring 2007 sampling event and the Spring 2008 sampling event. These analyses were conducted both with and without monitoring well KM-17 that is located to the southwest of the calcine cap. It was also agreed that for the Well Sufficiency Analysis, molybdenum and vanadium plume directions would be varied to determine the sensitivity of results to plume orientation and direction. The Well Sufficiency Analysis for 2007 and 2008 was completed using data from Tronox results, the Monsanto database provided by EPA, and data from the Evergreen site located to the southwest of the Tronox site in the Soda Springs Industrial Park.

Additional to the Well Sufficiency Analysis, Mann-Kendall and Linear Regression analyses were performed for Evergreen wells EV-1 and EV-2 and Monsanto wells TW-12, TW-33, and TW-38. Two time periods were evaluated for the Monsanto data, including the periods from 1997 to 2009, and for a shorter duration (2004 to 2009). This evaluation was completed in the same manner as the work performed for the remedy evaluation report. However, all of the available data from the two Evergreen wells were utilized due to the limited data set (2003 to 2009). Mann-Kendall and linear regression for well TW-56 and the Lewis Well, Spatial Moment Analysis, and MAROS Site Results Analysis were not included in this MAROS analysis, as discussed in our teleconference. Results of the Well Sufficiency Analysis, Mann-Kendall and Linear Regression are discussed below.

Well Sufficiency Analyses

Two data sets were evaluated in the Well Sufficiency Analysis. Data sets included the results from the Spring of 2007 and the Spring of 2008. Ground water flow direction was not considered in this analysis as it is not used in this module of the MAROS program. As discussed during our September 11, 2009 teleconference, two cases were evaluated in this module. The first case assessed all data including well KM-17, while the second case assessed all mentioned data but excluded well KM-17. Analytical data results for these evaluations included:

- All of the downgradient shallow KM-series wells (KM-2, K-3, KM-4, KM-5, KM-6, KM-7, KM-8, KM-9, KM-13, KM-15, KM-16, and KM-17);
- Upgradient Evergreen Wells (EV-1 and EV-2,);
- Monsanto Wells (TW-33, TW-38, TW-12, and TW-56);
- Lewis Well, and;
- Finch Springs and Upper Ledger Springs

The Well Sufficiency Analysis did not include upgradient well KM-1, which was not sampled in 2007 and 2008. Lower Ledger Springs and Big Spring were not considered as the result of their distance from the site. Intermediate wells KM-10, KM-11, KM-12 and KM-18, and deep well KM-19 were also not considered in these analyses because the MAROS evaluation utilizes data from the shallow aquifer.

Mann-Kendall and Linear Regression Analyses

Mann-Kendall and Linear Regression analyses were performed for upgradient Evergreen Wells EV-1 and EV-2 (all data were used); and east-side Monsanto wells TW-12, TW-33, and TW-38. As agreed upon during our September 11, 2009 teleconference, two time periods were evaluated in the same manner as completed for the remedy evaluation report. These time periods included the post remedial completion period from 1997 to 2009, and the shorter and more recent time period from 2004 to 2009.

Results

Print-outs from the MAROS program showing results for the MAROS analyses are attached. In summary, the Well Sufficiency Analysis demonstrated all triangulated areas within the study area as having small to moderate slope

factors, indicating “no need for new location.” The Mann-Kendall and Linear Regression analyses for the two Evergreen Wells demonstrated decreasing trends. The Mann-Kendall and Linear Regression analyses for the Monsanto wells TW-12, TW-33, and TW-38 showed stable, potentially decreasing, and decreasing trends.

Sincerely,

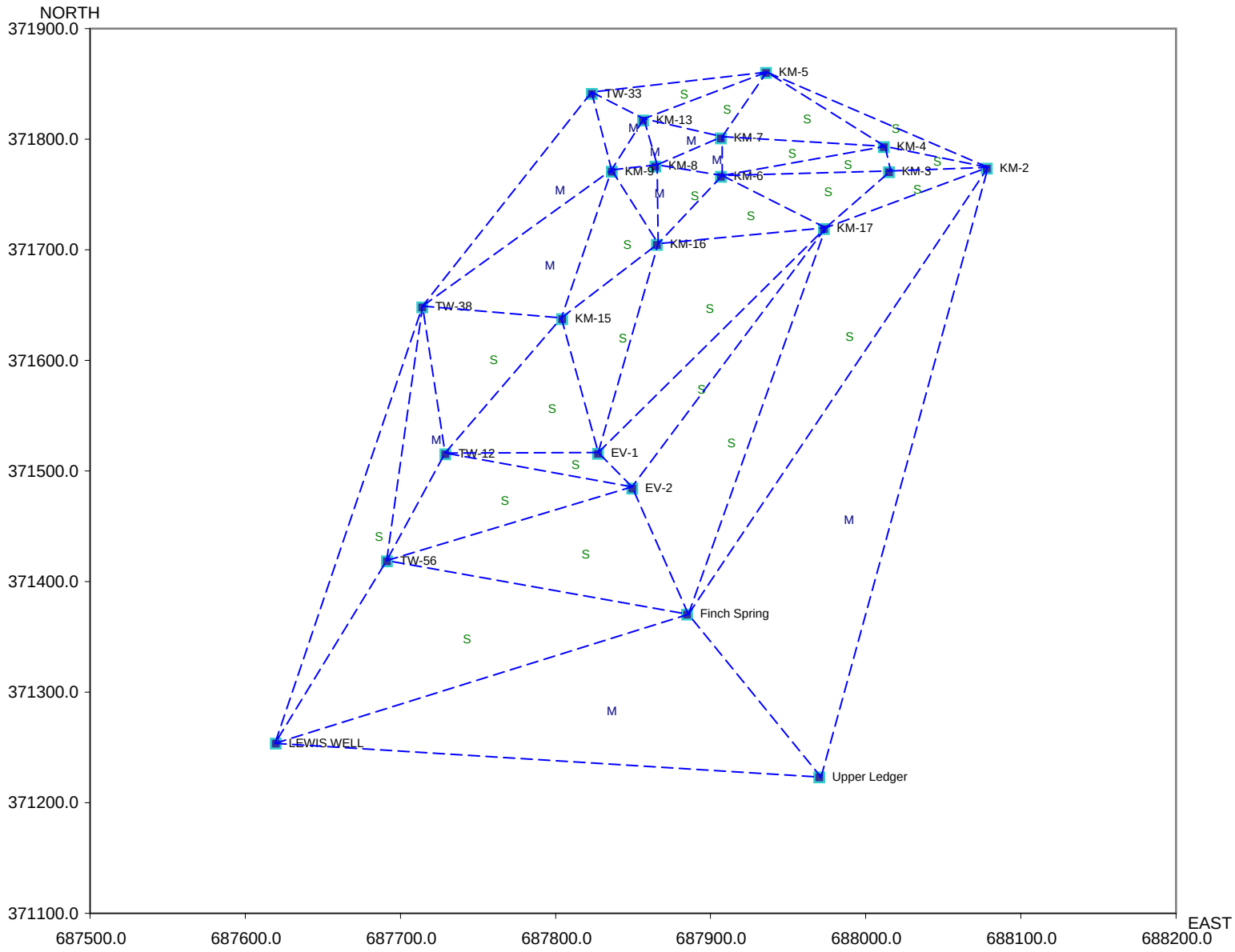
John Hatmaker
Director-Environment, Health & Safety

cc: Boyd Schvaneveldt
Matt Paque
J. Brown
S. Sprague
Lori Robison

JWH

Enclosures: MAROS outputs from Well Sufficiency Analysis, Mann-Kendall and Linear Regression analyses

Tronox Area Well Sufficiency Analysis
Molybdenum - 2007 All Data



New Location Analysis for

MOLYBDENUM

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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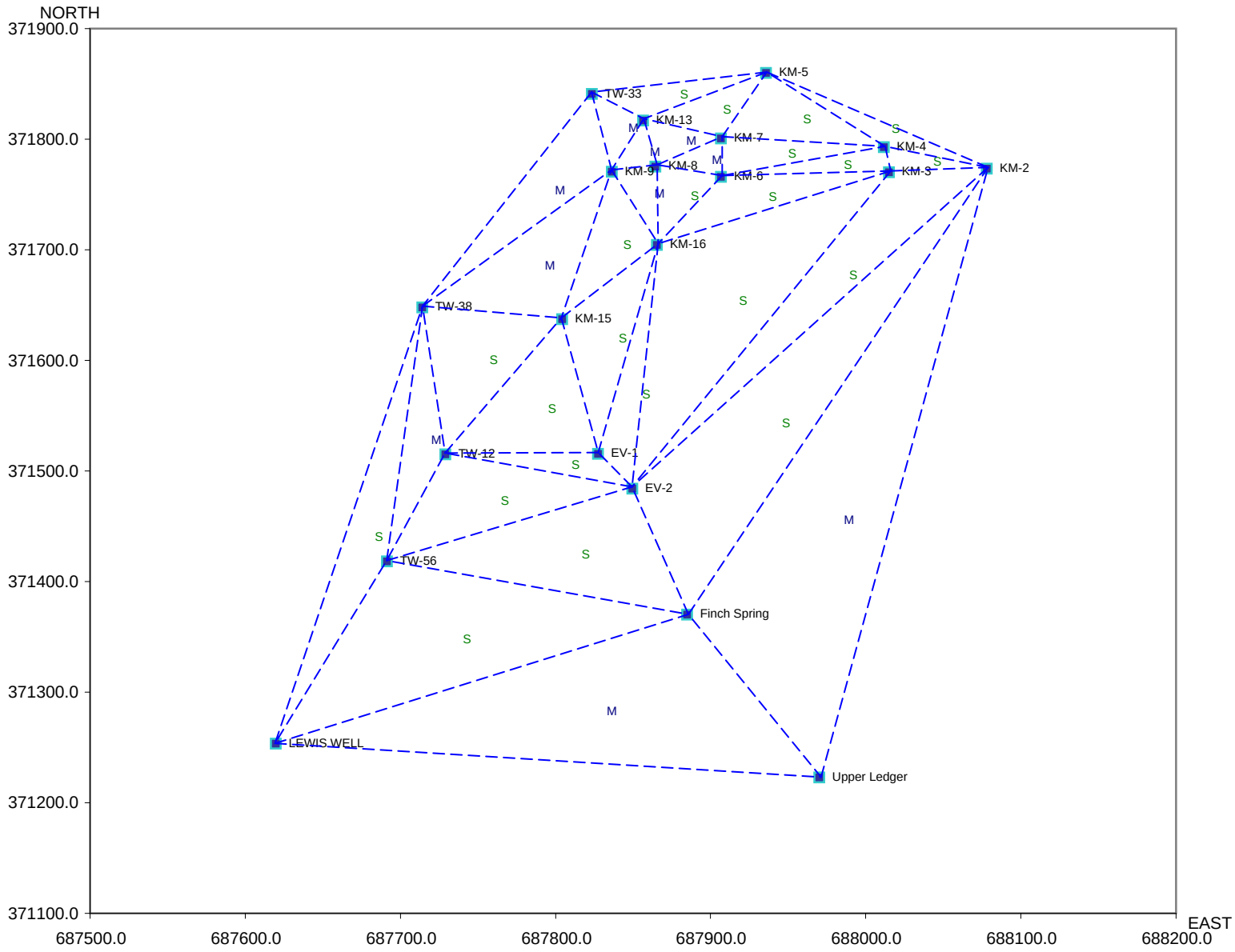
Tronox Area Well Sufficiency Analysis
Molybdenum - 2007 Minus KM-17



New Location Analysis for

MOLYBDENUM

Existing Locations

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L - Large
E - Extremely large

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

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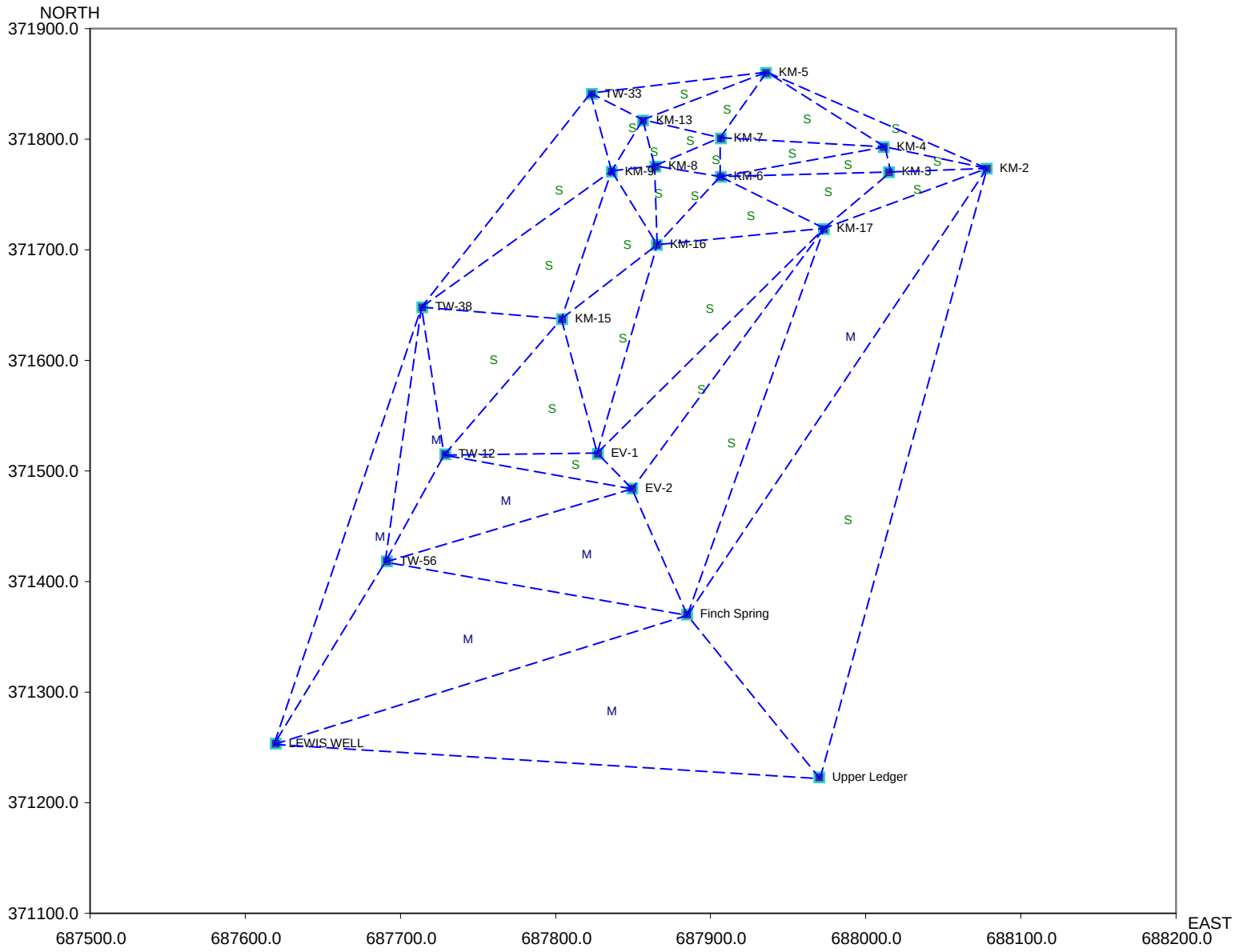
Tronox Area Well Sufficiency Analysis
Vanadium - 2007 All Data



New Location Analysis for

Vanadium

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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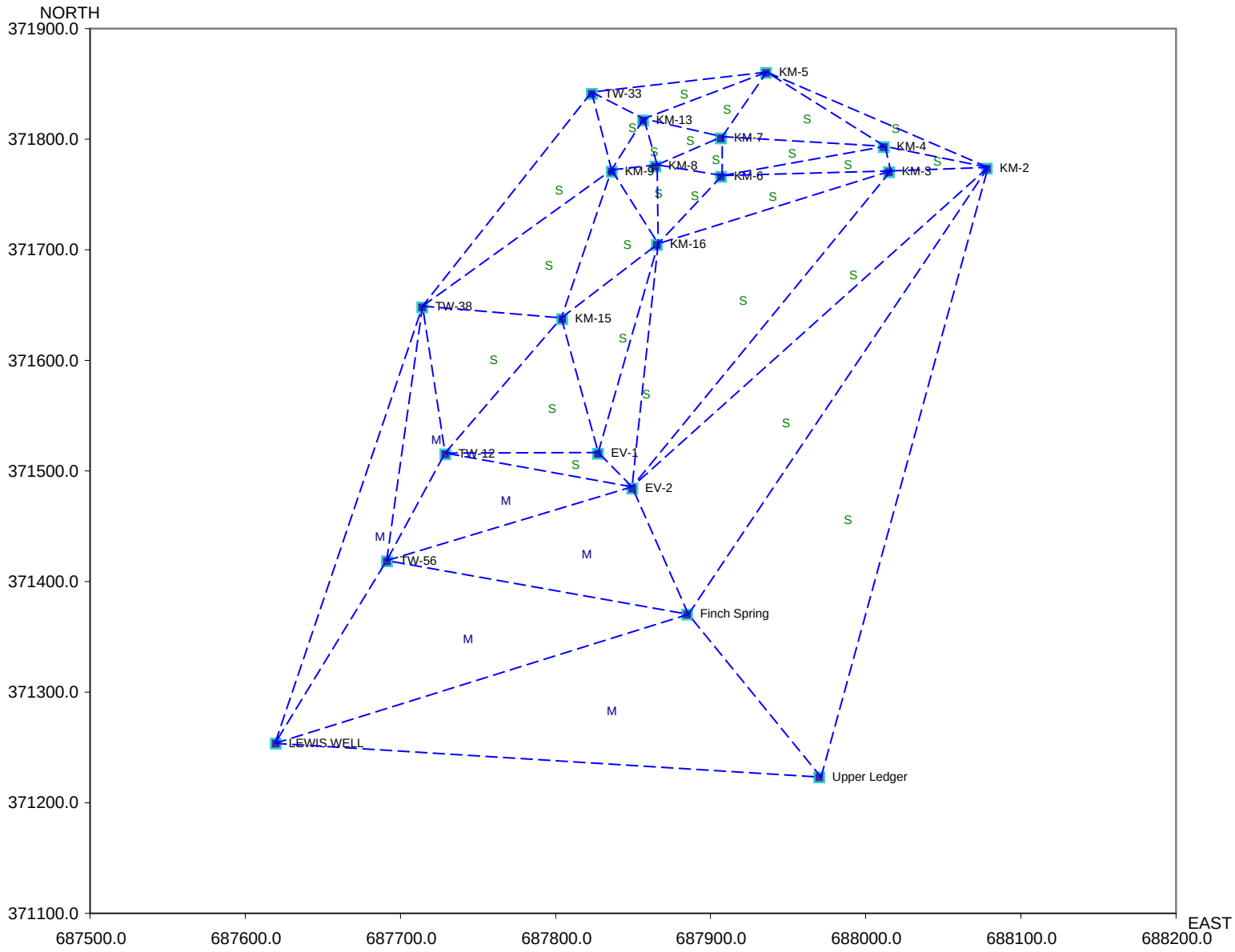
Tronox Area Well Sufficiency Analysis
Vanadium - 2007 Minus KM-17



New Location Analysis for

VANADIUM

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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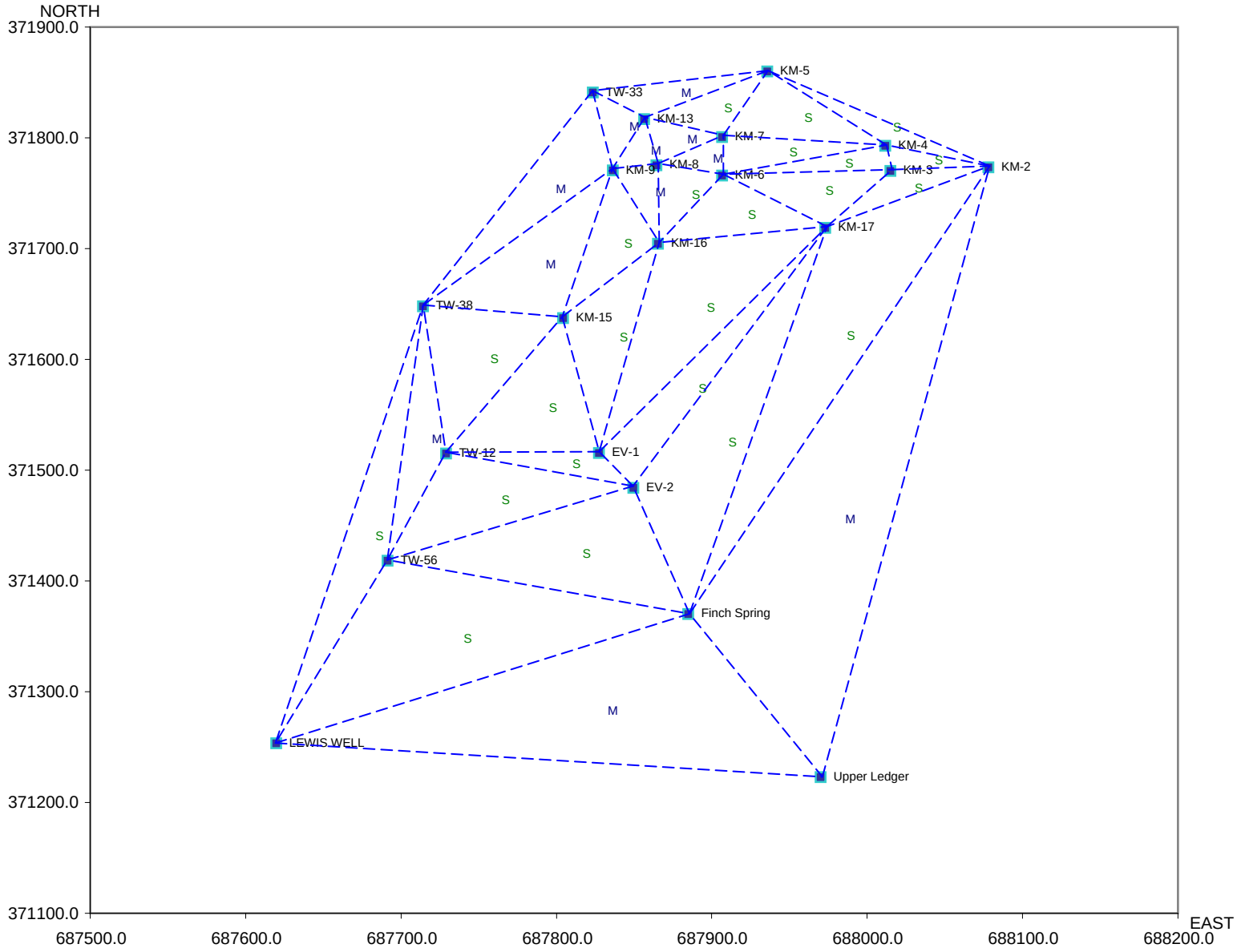
Tronox Area Well Sufficiency Analysis
Molybdenum - 2008 All Data



New Location Analysis for

MOLYBDENUM

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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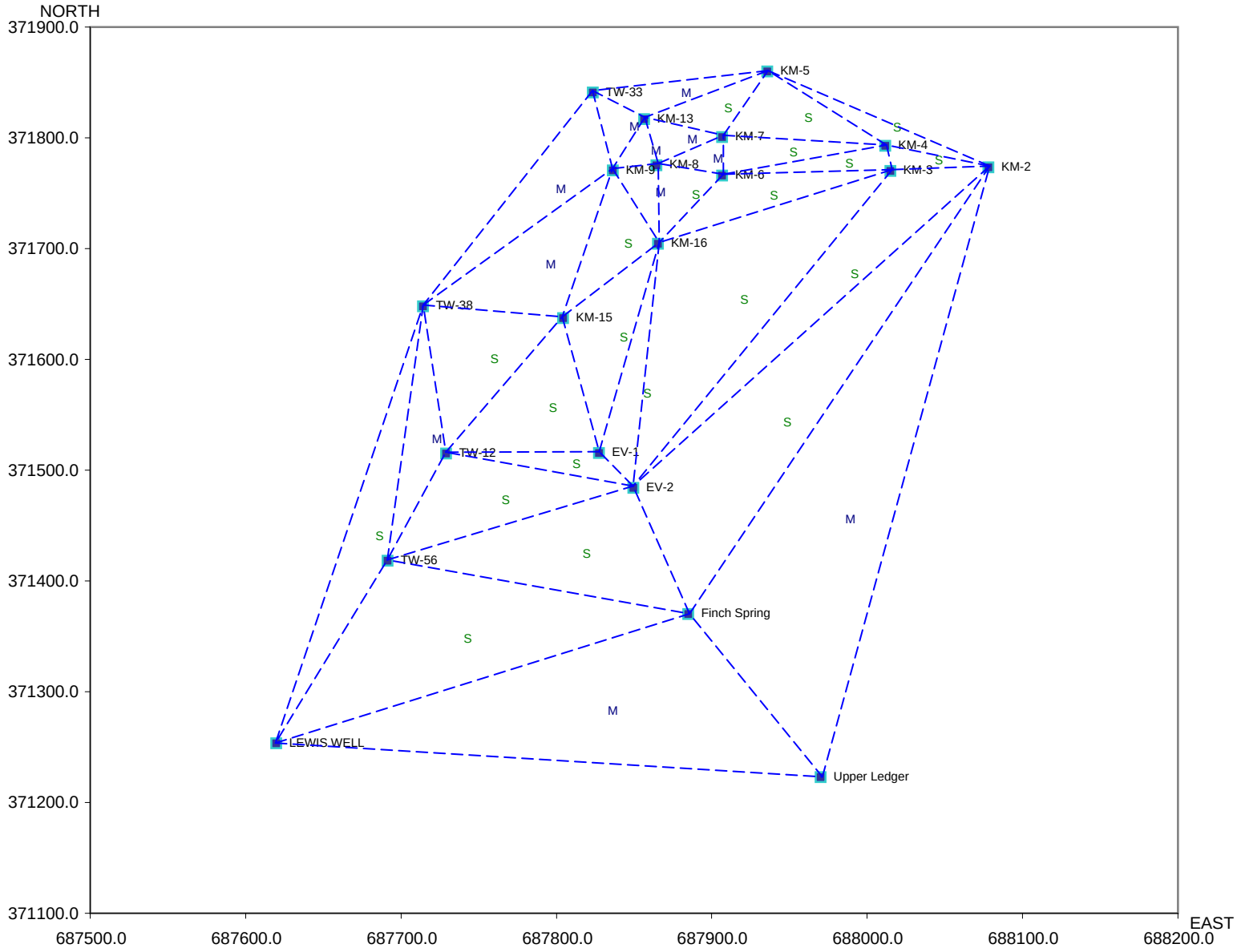
Tronox Area Well Sufficiency Analysis
Molybdenum - 2008 Minus KM-17



New Location Analysis for

MOLYBDENUM

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

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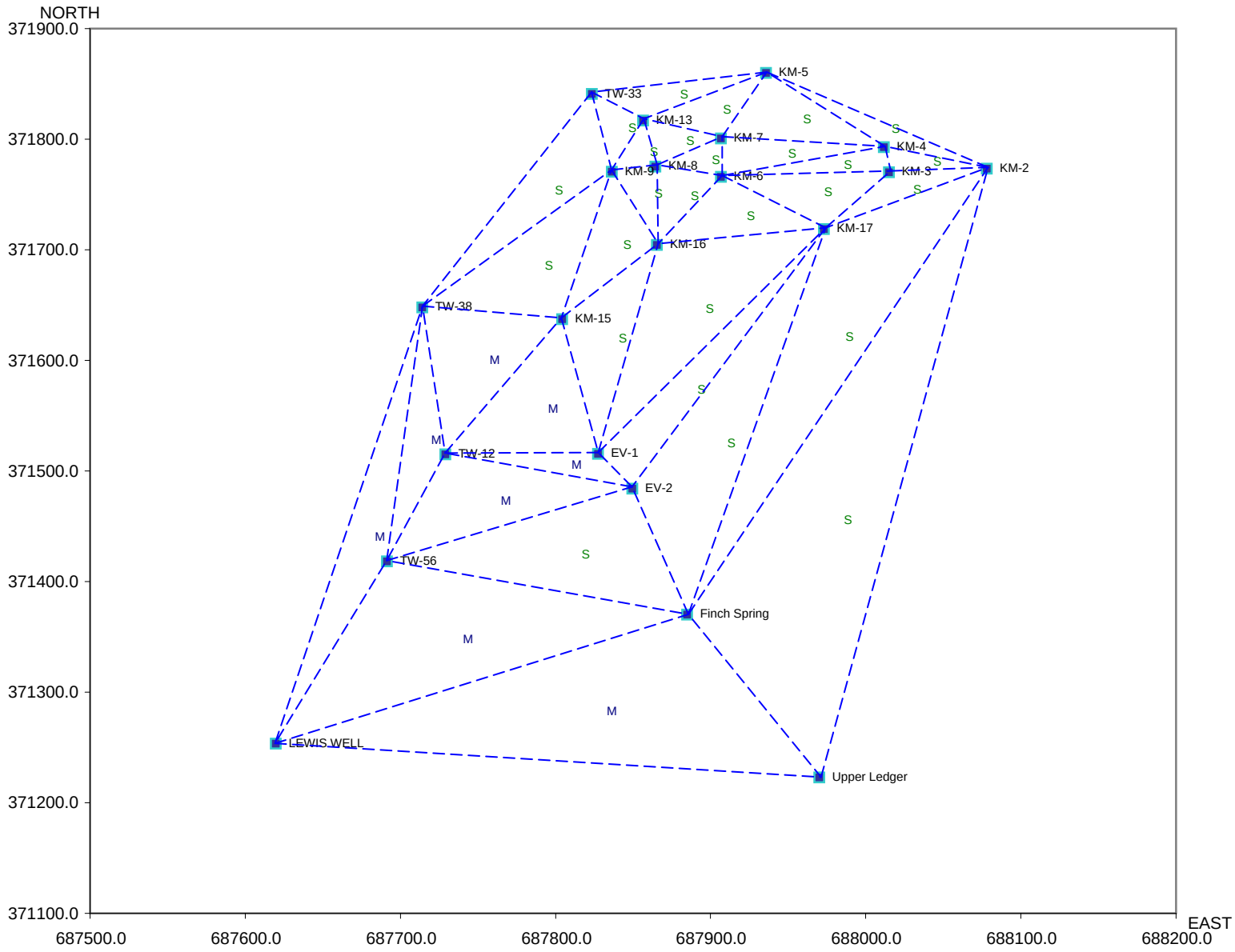
Tronox Area Well Sufficiency Analysis
Vanadium - 2008 All Data



New Location Analysis for

VANADIUM

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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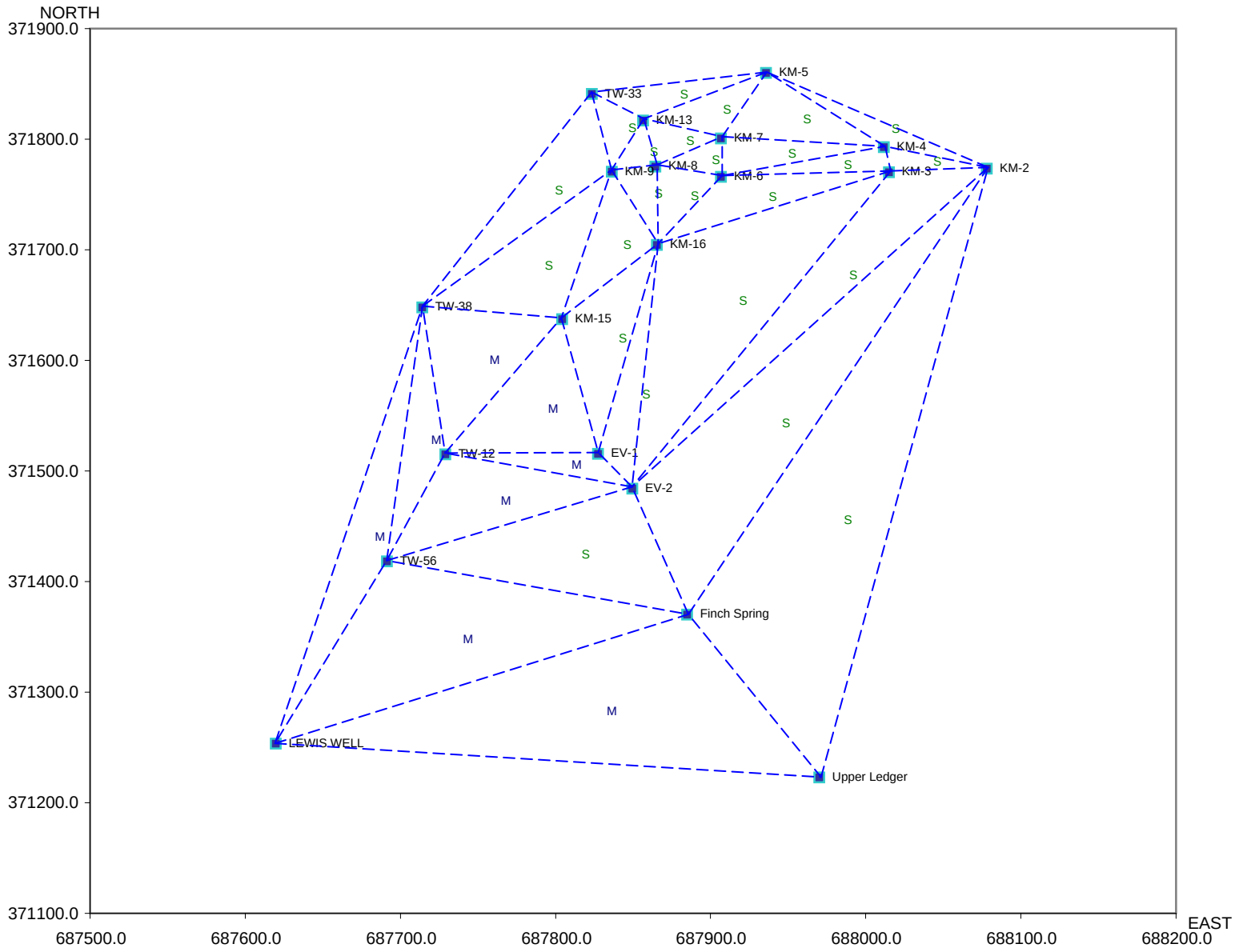
Tronox Area Well Sufficiency Analysis
Vanadium - 2008 Minus KM-17



New Location Analysis for

VANADIUM

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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MAROS Linear Regression Statistics Summary

Project: Monsanto Wells East Side

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Average Conc (mg/L)	Median Conc (mg/L)	Standard Deviation	All Samples "ND" ?	Ln Slope	Coefficient of Variation	Confidence in Trend	Concentration Trend
MOLYBDENUM									
TW-12	S	7.2E-01	7.2E-01	3.0E-01	No	-3.2E-04	0.41	100.0%	D
TW-56	T	8.2E-02	8.0E-02	1.2E-02	No	4.1E-05	0.14	90.5%	PI
TW-38	T	7.3E-02	4.8E-02	6.8E-02	No	-1.1E-04	0.93	76.9%	S
TW-33	T	5.7E-02	5.5E-02	1.5E-02	No	-1.7E-04	0.27	100.0%	D
LEWIS WELL	T	1.3E-01	1.0E-01	5.6E-02	No	-2.5E-04	0.43	100.0%	D
VANADIUM									
TW-12	S	7.7E-01	8.0E-01	3.0E-01	No	-6.2E-04	0.39	91.2%	PD
TW-56	T	5.8E-03	3.5E-03	8.1E-03	No	-2.0E-04	1.39	87.1%	NT
TW-38	T	1.5E-01	1.6E-01	4.4E-02	No	-1.4E-04	0.29	93.6%	PD
TW-33	T	6.4E-01	6.3E-01	2.8E-01	No	-6.7E-04	0.44	95.0%	PD
LEWIS WELL	T	4.9E-03	5.0E-03	2.1E-03	No	-1.3E-04	0.43	75.0%	S

Note: 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); COV = Coefficient of Variation

MAROS Mann-Kendall Statistics Summary

Project: East Side Well Data

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 10/1/1997 **to** 5/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND" ?	Concentration Trend
MOLYBDENUM								
TW-12	S	13	13	0.41	-72	100.0%	No	D
TW-56	T	13	13	0.14	20	87.4%	No	NT
TW-38	T	10	10	0.93	-15	89.2%	No	S
TW-33	T	12	12	0.27	-54	100.0%	No	D
LEWIS WELL	T	13	13	0.43	-44	99.7%	No	D
VANADIUM								
TW-12	S	13	13	0.39	-42	99.5%	No	D
TW-56	T	11	11	1.39	-22	94.9%	No	PD
TW-38	T	10	10	0.29	-17	92.2%	No	PD
TW-33	T	11	11	0.44	-49	100.0%	No	D
LEWIS WELL	T	10	10	0.43	-1	50.0%	No	S

Note: 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); Source/Tail (S/T)

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

MAROS Statistical Trend Analysis Summary

Project: Monsanto Wells East Side

Location: Soda Springs

User Name: Global Environmental

State: Idaho

Time Period: 10/1/1997 **to** 6/30/2009

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 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
MOLYBDENUM								
LEWIS WELL	T	13	13	1.3E-01	1.0E-01	No	D	D
TW-12	S	13	13	7.2E-01	7.2E-01	No	D	D
TW-33	T	12	12	5.7E-02	5.5E-02	No	D	D
TW-38	T	10	10	7.3E-02	4.8E-02	No	S	S
TW-56	T	13	13	8.2E-02	8.0E-02	No	NT	PI
VANADIUM								
LEWIS WELL	T	10	10	4.9E-03	5.0E-03	No	S	S
TW-12	S	13	13	7.7E-01	8.0E-01	No	D	PD
TW-33	T	11	11	6.4E-01	6.3E-01	No	D	PD
TW-38	T	10	10	1.5E-01	1.6E-01	No	PD	PD
TW-56	T	11	11	5.8E-03	3.5E-03	No	PD	NT

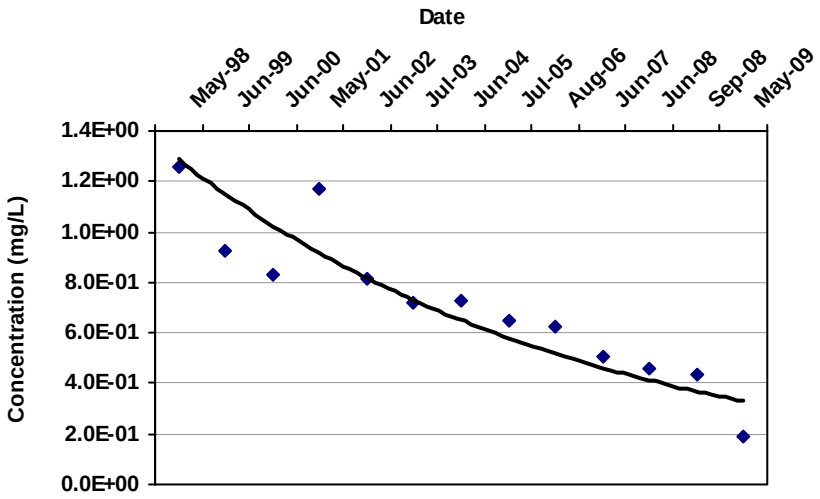
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

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

MAROS Linear Regression Statistics

Well: TW-12
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.41

Confidence in Trend: 100.0%

Ln Slope: -3.2E-04

LR Concentration Trend: D

Consolidation Data Table:

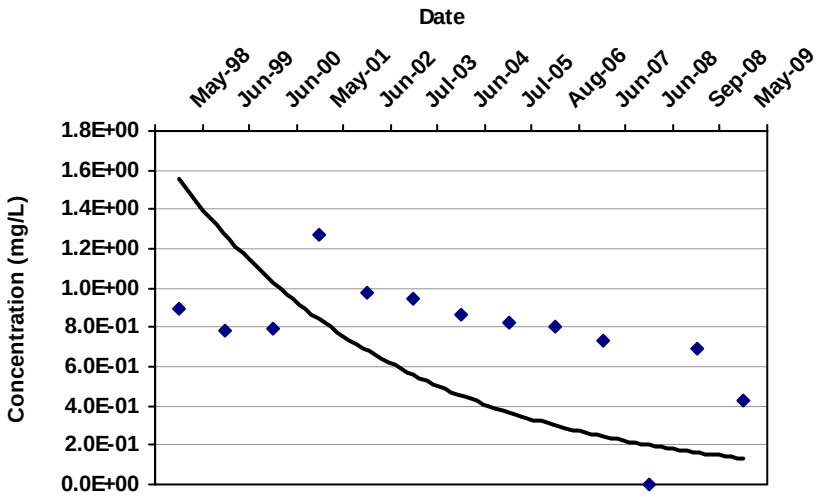
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	5/28/1998	MOLYBDENUM	1.3E+00		1	1
TW-12	S	6/23/1999	MOLYBDENUM	9.3E-01		1	1
TW-12	S	6/8/2000	MOLYBDENUM	8.3E-01		3	3
TW-12	S	5/23/2001	MOLYBDENUM	1.2E+00		4	4
TW-12	S	6/13/2002	MOLYBDENUM	8.2E-01		4	4
TW-12	S	7/8/2003	MOLYBDENUM	7.2E-01		2	2
TW-12	S	6/23/2004	MOLYBDENUM	7.3E-01		2	2
TW-12	S	7/7/2005	MOLYBDENUM	6.5E-01		2	2
TW-12	S	8/10/2006	MOLYBDENUM	6.3E-01		2	2
TW-12	S	6/20/2007	MOLYBDENUM	5.0E-01		2	2
TW-12	S	6/19/2008	MOLYBDENUM	4.6E-01		2	2
TW-12	S	9/23/2008	MOLYBDENUM	4.3E-01		1	1
TW-12	S	5/30/2009	MOLYBDENUM	1.9E-01		2	2

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-12
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.39

Confidence in Trend: 91.2%

Ln Slope: -6.2E-04

LR Concentration Trend: PD

Consolidation Data Table:

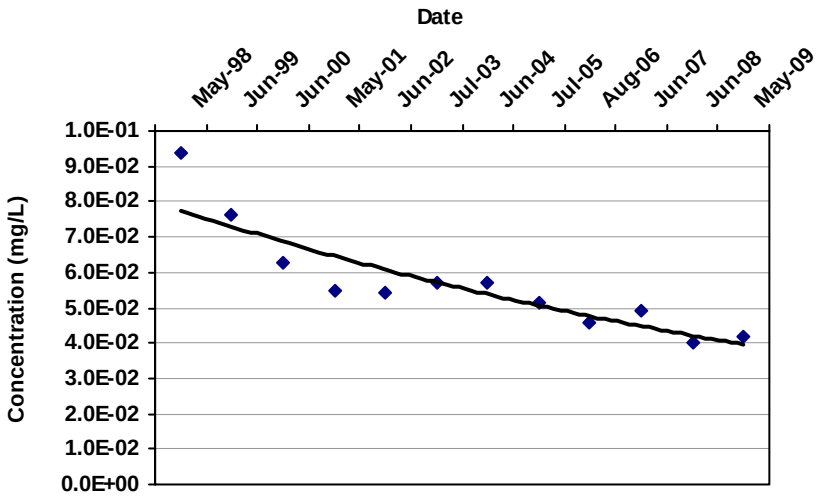
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	5/28/1998	VANADIUM	8.9E-01		1	1
TW-12	S	6/23/1999	VANADIUM	7.9E-01		1	1
TW-12	S	6/8/2000	VANADIUM	7.9E-01		3	3
TW-12	S	5/23/2001	VANADIUM	1.3E+00		4	4
TW-12	S	6/13/2002	VANADIUM	9.8E-01		3	3
TW-12	S	7/8/2003	VANADIUM	9.5E-01		2	2
TW-12	S	6/23/2004	VANADIUM	8.7E-01		2	2
TW-12	S	7/7/2005	VANADIUM	8.2E-01		2	2
TW-12	S	8/10/2006	VANADIUM	8.0E-01		2	2
TW-12	S	6/20/2007	VANADIUM	7.3E-01		2	2
TW-12	S	6/19/2008	VANADIUM	4.2E-04		2	2
TW-12	S	9/23/2008	VANADIUM	6.9E-01		1	1
TW-12	S	5/30/2009	VANADIUM	4.3E-01		2	2

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-33
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.27

Confidence in Trend: 100.0%

Ln Slope: -1.7E-04

LR Concentration Trend: D

Consolidation Data Table:

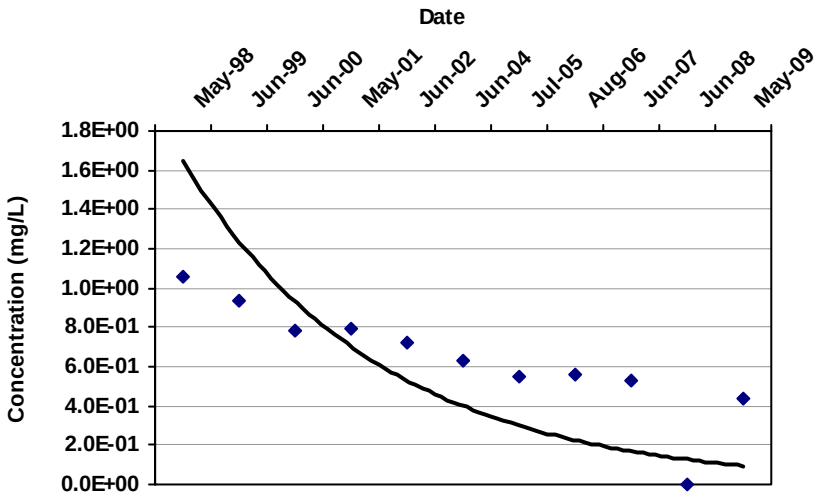
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	5/28/1998	MOLYBDENUM	9.4E-02		1	1
TW-33	T	6/23/1999	MOLYBDENUM	7.7E-02		2	2
TW-33	T	6/8/2000	MOLYBDENUM	6.3E-02		2	2
TW-33	T	5/23/2001	MOLYBDENUM	5.5E-02		2	2
TW-33	T	6/13/2002	MOLYBDENUM	5.4E-02		1	1
TW-33	T	7/8/2003	MOLYBDENUM	5.7E-02		1	1
TW-33	T	6/23/2004	MOLYBDENUM	5.7E-02		3	3
TW-33	T	7/7/2005	MOLYBDENUM	5.1E-02		3	3
TW-33	T	8/10/2006	MOLYBDENUM	4.6E-02		3	3
TW-33	T	6/20/2007	MOLYBDENUM	4.9E-02		3	3
TW-33	T	6/19/2008	MOLYBDENUM	4.0E-02		1	1
TW-33	T	5/30/2009	MOLYBDENUM	4.2E-02		3	3

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-33
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.44

Confidence in Trend: 95.0%

Ln Slope: -6.7E-04

LR Concentration Trend: PD

Consolidation Data Table:

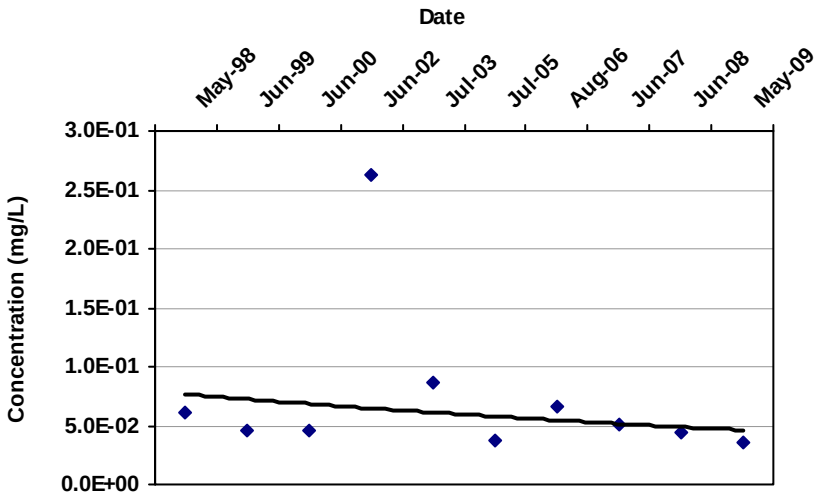
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	5/28/1998	VANADIUM	1.1E+00		1	1
TW-33	T	6/23/1999	VANADIUM	9.4E-01		2	2
TW-33	T	6/8/2000	VANADIUM	7.9E-01		2	2
TW-33	T	5/23/2001	VANADIUM	7.9E-01		2	2
TW-33	T	6/13/2002	VANADIUM	7.3E-01		1	1
TW-33	T	6/23/2004	VANADIUM	6.3E-01		3	3
TW-33	T	7/7/2005	VANADIUM	5.5E-01		3	3
TW-33	T	8/10/2006	VANADIUM	5.5E-01		3	3
TW-33	T	6/20/2007	VANADIUM	5.3E-01		3	3
TW-33	T	6/19/2008	VANADIUM	2.0E-03		1	1
TW-33	T	5/30/2009	VANADIUM	4.4E-01		3	3

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-38
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.93

Confidence in Trend: 76.9%

Ln Slope: -1.1E-04

LR Concentration Trend: S

Consolidation Data Table:

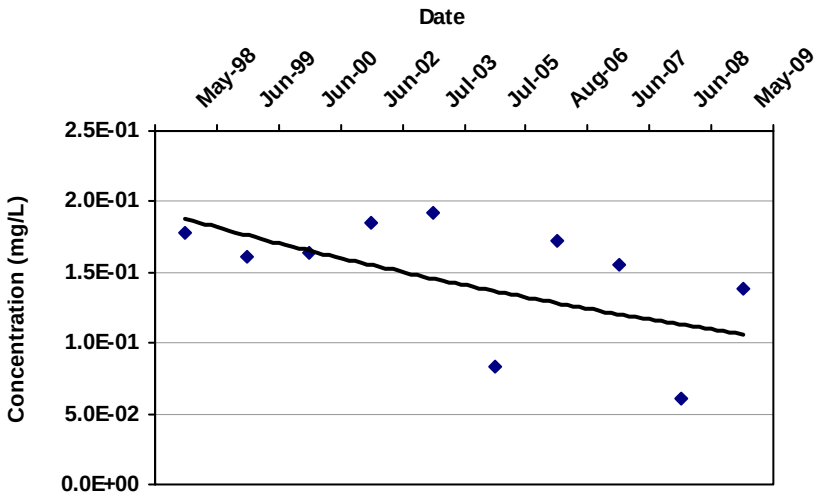
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	5/28/1998	MOLYBDENUM	6.1E-02		1	1
TW-38	T	6/23/1999	MOLYBDENUM	4.5E-02		2	2
TW-38	T	6/8/2000	MOLYBDENUM	4.5E-02		2	2
TW-38	T	6/13/2002	MOLYBDENUM	2.6E-01		3	3
TW-38	T	7/8/2003	MOLYBDENUM	8.7E-02		1	1
TW-38	T	7/7/2005	MOLYBDENUM	3.7E-02		1	1
TW-38	T	8/10/2006	MOLYBDENUM	6.6E-02		1	1
TW-38	T	6/20/2007	MOLYBDENUM	5.0E-02		1	1
TW-38	T	6/19/2008	MOLYBDENUM	4.5E-02		1	1
TW-38	T	5/30/2009	MOLYBDENUM	3.6E-02		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-38
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.29

Confidence in Trend: 93.6%

Ln Slope: -1.4E-04

LR Concentration Trend: PD

Consolidation Data Table:

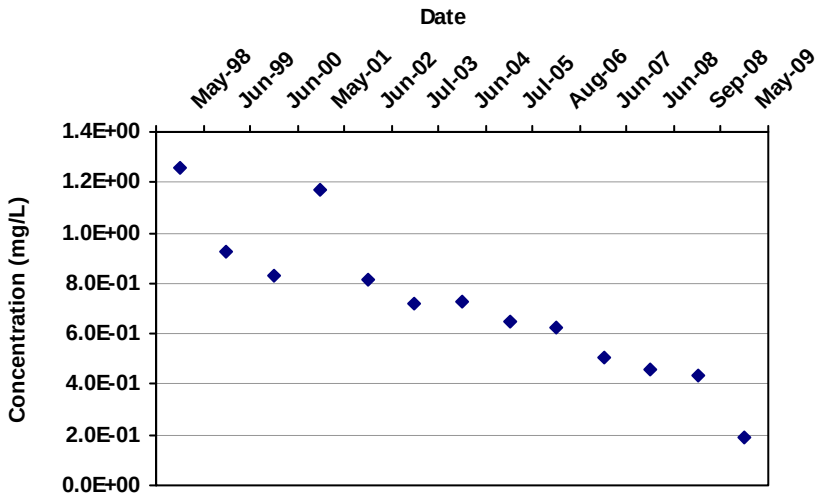
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	5/28/1998	VANADIUM	1.8E-01		1	1
TW-38	T	6/23/1999	VANADIUM	1.6E-01		2	2
TW-38	T	6/8/2000	VANADIUM	1.6E-01		2	2
TW-38	T	6/13/2002	VANADIUM	1.8E-01		3	3
TW-38	T	7/8/2003	VANADIUM	1.9E-01		1	1
TW-38	T	7/7/2005	VANADIUM	8.4E-02		1	1
TW-38	T	8/10/2006	VANADIUM	1.7E-01		1	1
TW-38	T	6/20/2007	VANADIUM	1.6E-01		1	1
TW-38	T	6/19/2008	VANADIUM	6.1E-02		1	1
TW-38	T	5/30/2009	VANADIUM	1.4E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-12
Well Type: S
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-72

Confidence in Trend:
100.0%

Coefficient of Variation:
0.41

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

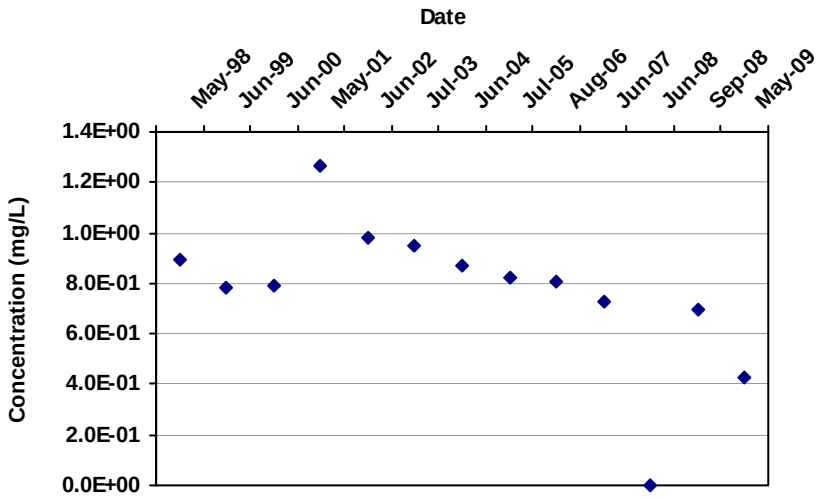
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	5/28/1998	MOLYBDENUM	1.3E+00		1	1
TW-12	S	6/23/1999	MOLYBDENUM	9.3E-01		1	1
TW-12	S	6/8/2000	MOLYBDENUM	8.3E-01		3	3
TW-12	S	5/23/2001	MOLYBDENUM	1.2E+00		4	4
TW-12	S	6/13/2002	MOLYBDENUM	8.2E-01		4	4
TW-12	S	7/8/2003	MOLYBDENUM	7.2E-01		2	2
TW-12	S	6/23/2004	MOLYBDENUM	7.3E-01		2	2
TW-12	S	7/7/2005	MOLYBDENUM	6.5E-01		2	2
TW-12	S	8/10/2006	MOLYBDENUM	6.3E-01		2	2
TW-12	S	6/20/2007	MOLYBDENUM	5.0E-01		2	2
TW-12	S	6/19/2008	MOLYBDENUM	4.6E-01		2	2
TW-12	S	9/23/2008	MOLYBDENUM	4.3E-01		1	1
TW-12	S	5/30/2009	MOLYBDENUM	1.9E-01		2	2

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-12
Well Type: S
COC: VANADIUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-42

Confidence in Trend:
99.5%

Coefficient of Variation:
0.39

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

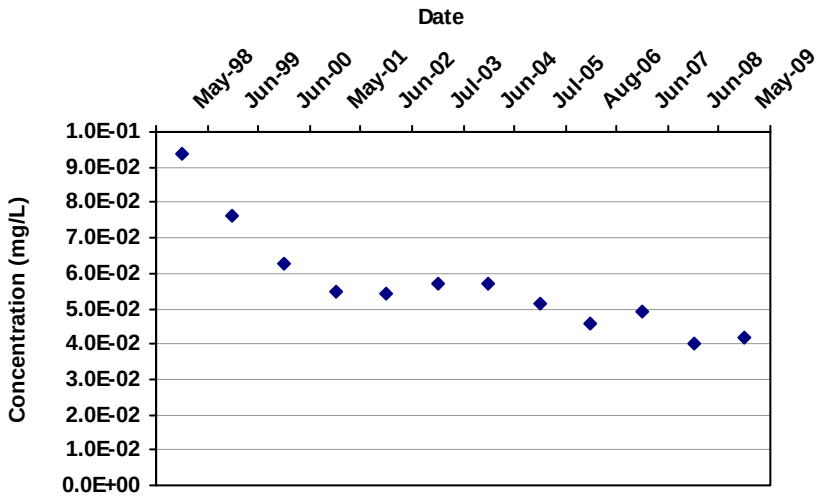
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	5/28/1998	VANADIUM	8.9E-01		1	1
TW-12	S	6/23/1999	VANADIUM	7.9E-01		1	1
TW-12	S	6/8/2000	VANADIUM	7.9E-01		3	3
TW-12	S	5/23/2001	VANADIUM	1.3E+00		4	4
TW-12	S	6/13/2002	VANADIUM	9.8E-01		3	3
TW-12	S	7/8/2003	VANADIUM	9.5E-01		2	2
TW-12	S	6/23/2004	VANADIUM	8.7E-01		2	2
TW-12	S	7/7/2005	VANADIUM	8.2E-01		2	2
TW-12	S	8/10/2006	VANADIUM	8.0E-01		2	2
TW-12	S	6/20/2007	VANADIUM	7.3E-01		2	2
TW-12	S	6/19/2008	VANADIUM	4.2E-04		2	2
TW-12	S	9/23/2008	VANADIUM	6.9E-01		1	1
TW-12	S	5/30/2009	VANADIUM	4.3E-01		2	2

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-33
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-54

Confidence in Trend:
100.0%

Coefficient of Variation:
0.27

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

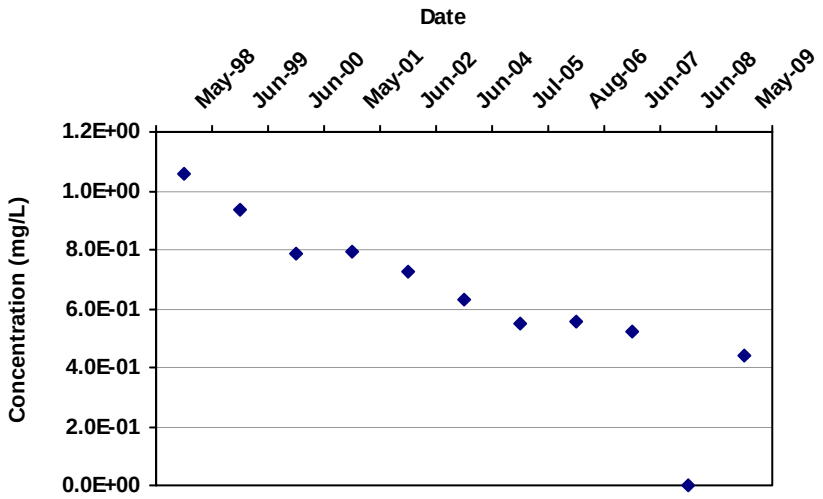
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	5/28/1998	MOLYBDENUM	9.4E-02		1	1
TW-33	T	6/23/1999	MOLYBDENUM	7.7E-02		2	2
TW-33	T	6/8/2000	MOLYBDENUM	6.3E-02		2	2
TW-33	T	5/23/2001	MOLYBDENUM	5.5E-02		2	2
TW-33	T	6/13/2002	MOLYBDENUM	5.4E-02		1	1
TW-33	T	7/8/2003	MOLYBDENUM	5.7E-02		1	1
TW-33	T	6/23/2004	MOLYBDENUM	5.7E-02		3	3
TW-33	T	7/7/2005	MOLYBDENUM	5.1E-02		3	3
TW-33	T	8/10/2006	MOLYBDENUM	4.6E-02		3	3
TW-33	T	6/20/2007	MOLYBDENUM	4.9E-02		3	3
TW-33	T	6/19/2008	MOLYBDENUM	4.0E-02		1	1
TW-33	T	5/30/2009	MOLYBDENUM	4.2E-02		3	3

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-33
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-49

Confidence in Trend:
100.0%

Coefficient of Variation:
0.44

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

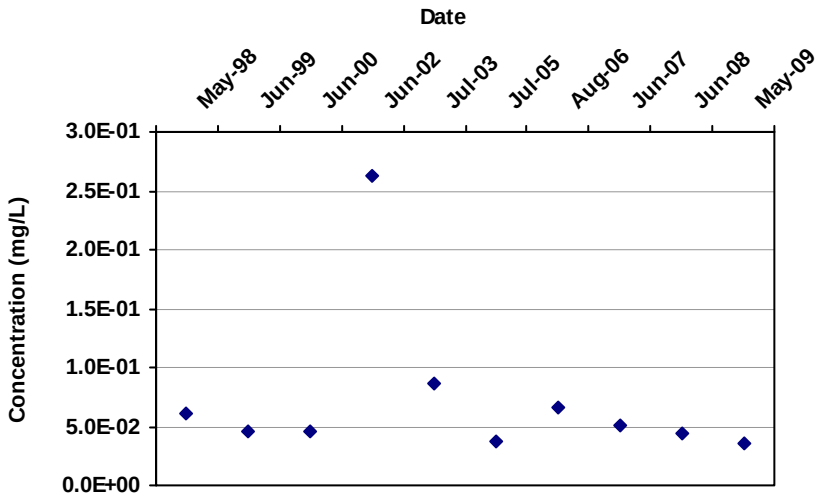
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	5/28/1998	VANADIUM	1.1E+00		1	1
TW-33	T	6/23/1999	VANADIUM	9.4E-01		2	2
TW-33	T	6/8/2000	VANADIUM	7.9E-01		2	2
TW-33	T	5/23/2001	VANADIUM	7.9E-01		2	2
TW-33	T	6/13/2002	VANADIUM	7.3E-01		1	1
TW-33	T	6/23/2004	VANADIUM	6.3E-01		3	3
TW-33	T	7/7/2005	VANADIUM	5.5E-01		3	3
TW-33	T	8/10/2006	VANADIUM	5.5E-01		3	3
TW-33	T	6/20/2007	VANADIUM	5.3E-01		3	3
TW-33	T	6/19/2008	VANADIUM	2.0E-03		1	1
TW-33	T	5/30/2009	VANADIUM	4.4E-01		3	3

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-38
Well Type: T
COC: MOLYBDENUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-15

Confidence in Trend:
89.2%

Coefficient of Variation:
0.93

Mann Kendall Concentration Trend: (See Note)
S

Data Table:

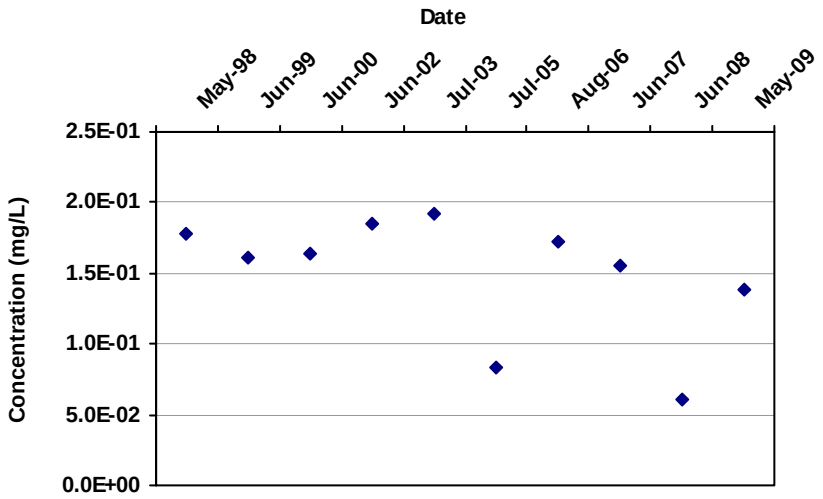
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	5/28/1998	MOLYBDENUM	6.1E-02		1	1
TW-38	T	6/23/1999	MOLYBDENUM	4.5E-02		2	2
TW-38	T	6/8/2000	MOLYBDENUM	4.5E-02		2	2
TW-38	T	6/13/2002	MOLYBDENUM	2.6E-01		3	3
TW-38	T	7/8/2003	MOLYBDENUM	8.7E-02		1	1
TW-38	T	7/7/2005	MOLYBDENUM	3.7E-02		1	1
TW-38	T	8/10/2006	MOLYBDENUM	6.6E-02		1	1
TW-38	T	6/20/2007	MOLYBDENUM	5.0E-02		1	1
TW-38	T	6/19/2008	MOLYBDENUM	4.5E-02		1	1
TW-38	T	5/30/2009	MOLYBDENUM	3.6E-02		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-38
Well Type: T
COC: VANADIUM

Time Period: 10/1/1997 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-17

Confidence in Trend:
92.2%

Coefficient of Variation:
0.29

Mann Kendall Concentration Trend: (See Note)
PD

Data Table:

Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	5/28/1998	VANADIUM	1.8E-01		1	1
TW-38	T	6/23/1999	VANADIUM	1.6E-01		2	2
TW-38	T	6/8/2000	VANADIUM	1.6E-01		2	2
TW-38	T	6/13/2002	VANADIUM	1.8E-01		3	3
TW-38	T	7/8/2003	VANADIUM	1.9E-01		1	1
TW-38	T	7/7/2005	VANADIUM	8.4E-02		1	1
TW-38	T	8/10/2006	VANADIUM	1.7E-01		1	1
TW-38	T	6/20/2007	VANADIUM	1.6E-01		1	1
TW-38	T	6/19/2008	VANADIUM	6.1E-02		1	1
TW-38	T	5/30/2009	VANADIUM	1.4E-01		1	1

Note: 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); ND = Non-detect

MAROS Linear Regression Statistics Summary

Project: Monsanto Wells East Side

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Average Conc (mg/L)	Median Conc (mg/L)	Standard Deviation	All Samples "ND" ?	Ln Slope	Coefficient of Variation	Confidence in Trend	Concentration Trend
MOLYBDENUM									
TW-12	S	5.1E-01	5.0E-01	1.8E-01	No	-5.7E-04	0.35	99.0%	D
TW-56	T	8.7E-02	8.3E-02	8.5E-03	No	-1.2E-04	0.10	98.9%	D
TW-38	T	4.7E-02	4.5E-02	1.2E-02	No	-1.1E-04	0.26	66.1%	S
TW-33	T	4.8E-02	4.8E-02	6.3E-03	No	-1.8E-04	0.13	99.5%	D
LEWIS WELL	T	8.9E-02	8.7E-02	1.0E-02	No	1.1E-04	0.11	94.9%	PI
VANADIUM									
TW-12	S	6.2E-01	7.3E-01	3.1E-01	No	-1.6E-03	0.50	79.0%	S
TW-56	T	3.4E-03	2.7E-03	1.5E-03	No	-6.6E-04	0.45	99.9%	D
TW-38	T	1.2E-01	1.4E-01	4.8E-02	No	-1.7E-06	0.39	100.0%	D
TW-33	T	4.5E-01	5.4E-01	2.3E-01	No	-1.5E-03	0.51	80.7%	S
LEWIS WELL	T	4.8E-03	5.0E-03	2.5E-03	No	-3.4E-04	0.53	68.4%	S

Note: 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); COV = Coefficient of Variation

MAROS Mann-Kendall Statistics Summary

Project: Monsanto Wells East Side

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND" ?	Concentration Trend
MOLYBDENUM								
TW-12	S	7	7	0.35	-21	100.0%	No	D
TW-56	T	7	7	0.10	-13	96.5%	No	D
TW-38	T	5	5	0.26	-4	75.8%	No	S
TW-33	T	6	6	0.13	-11	97.2%	No	D
LEWIS WELL	T	7	7	0.11	11	93.2%	No	PI
VANADIUM								
TW-12	S	7	7	0.50	-17	99.5%	No	D
TW-56	T	7	7	0.45	-18	99.7%	No	D
TW-38	T	5	5	0.39	-2	59.2%	No	S
TW-33	T	6	6	0.51	-11	97.2%	No	D
LEWIS WELL	T	7	7	0.53	-4	66.7%	No	S

Note: 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); Source/Tail (S/T)

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

MAROS Statistical Trend Analysis Summary

Project: Monsanto Wells East Side

Location: Soda Springs

User Name: Global Environmental

State: Idaho

Time Period: 1/1/2004 **to** 6/30/2009

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 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
MOLYBDENUM								
LEWIS WELL	T	7	7	8.9E-02	8.7E-02	No	PI	PI
TW-12	S	7	7	5.1E-01	5.0E-01	No	D	D
TW-33	T	6	6	4.8E-02	4.8E-02	No	D	D
TW-38	T	5	5	4.7E-02	4.5E-02	No	S	S
TW-56	T	7	7	8.7E-02	8.3E-02	No	D	D
VANADIUM								
LEWIS WELL	T	7	7	4.8E-03	5.0E-03	No	S	S
TW-12	S	7	7	6.2E-01	7.3E-01	No	D	S
TW-33	T	6	6	4.5E-01	5.4E-01	No	D	S
TW-38	T	5	5	1.2E-01	1.4E-01	No	S	D
TW-56	T	7	7	3.4E-03	2.7E-03	No	D	D

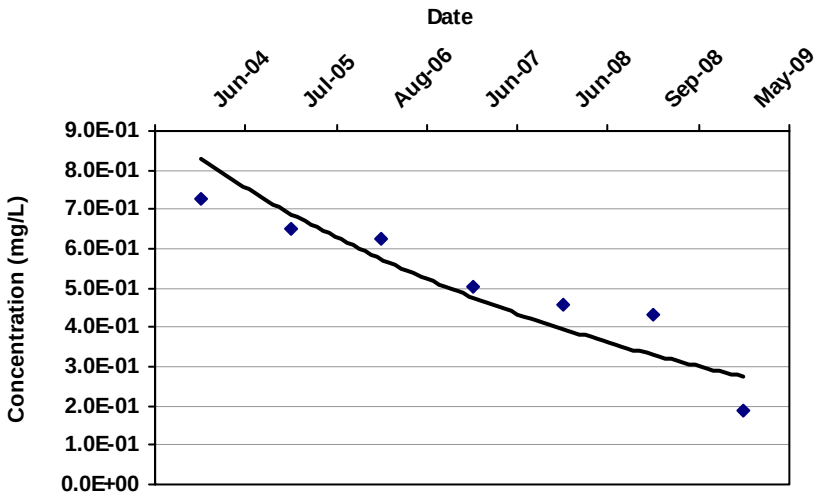
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (NDC)

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

MAROS Linear Regression Statistics

Well: TW-12
Well Type: S
COC: MOLYBDENUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.35

Confidence in Trend: 99.0%

Ln Slope: -5.7E-04

LR Concentration Trend: D

Consolidation Data Table:

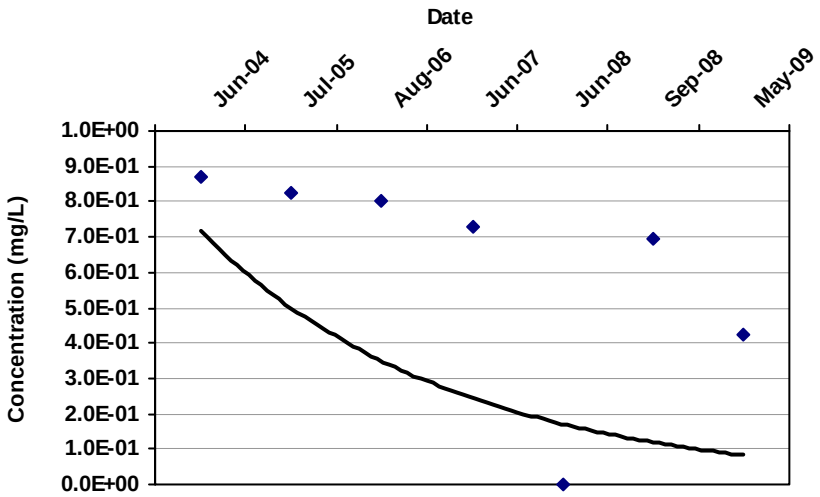
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	6/23/2004	MOLYBDENUM	7.3E-01		2	2
TW-12	S	7/7/2005	MOLYBDENUM	6.5E-01		2	2
TW-12	S	8/10/2006	MOLYBDENUM	6.3E-01		2	2
TW-12	S	6/20/2007	MOLYBDENUM	5.0E-01		2	2
TW-12	S	6/19/2008	MOLYBDENUM	4.6E-01		2	2
TW-12	S	9/23/2008	MOLYBDENUM	4.3E-01		1	1
TW-12	S	5/30/2009	MOLYBDENUM	1.9E-01		2	2

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-12
Well Type: S
COC: VANADIUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.50

Confidence in Trend: 79.0%

Ln Slope: -1.6E-03

LR Concentration Trend: S

Consolidation Data Table:

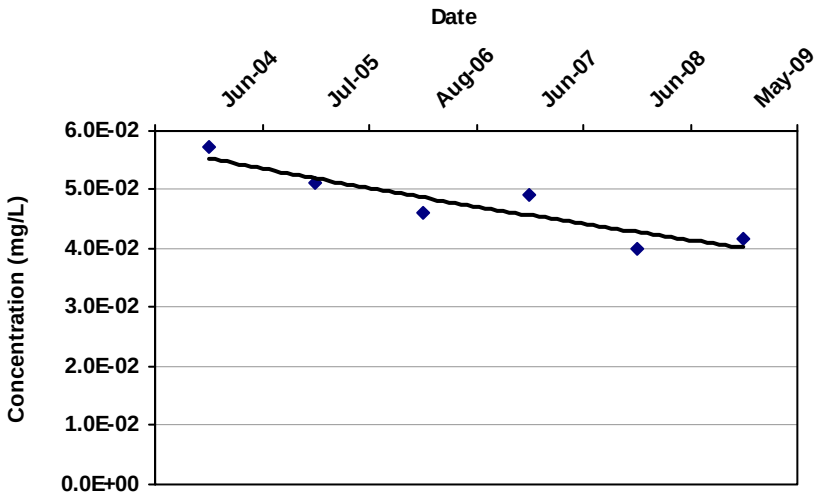
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	6/23/2004	VANADIUM	8.7E-01		2	2
TW-12	S	7/7/2005	VANADIUM	8.2E-01		2	2
TW-12	S	8/10/2006	VANADIUM	8.0E-01		2	2
TW-12	S	6/20/2007	VANADIUM	7.3E-01		2	2
TW-12	S	6/19/2008	VANADIUM	4.2E-04		2	2
TW-12	S	9/23/2008	VANADIUM	6.9E-01		1	1
TW-12	S	5/30/2009	VANADIUM	4.3E-01		2	2

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-33
Well Type: T
COC: MOLYBDENUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.13

Confidence in Trend: 99.5%

Ln Slope: -1.8E-04

LR Concentration Trend: D

Consolidation Data Table:

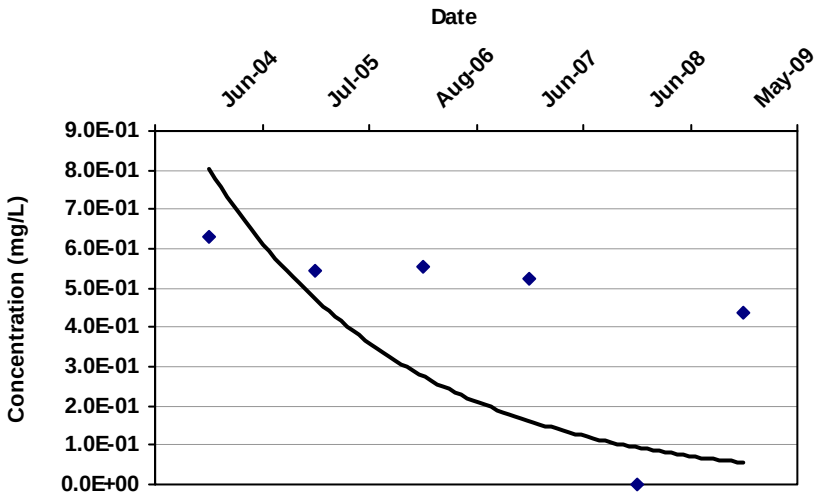
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	6/23/2004	MOLYBDENUM	5.7E-02		3	3
TW-33	T	7/7/2005	MOLYBDENUM	5.1E-02		3	3
TW-33	T	8/10/2006	MOLYBDENUM	4.6E-02		3	3
TW-33	T	6/20/2007	MOLYBDENUM	4.9E-02		3	3
TW-33	T	6/19/2008	MOLYBDENUM	4.0E-02		1	1
TW-33	T	5/30/2009	MOLYBDENUM	4.2E-02		3	3

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-33
Well Type: T
COC: VANADIUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.51

Confidence in Trend: 80.7%

Ln Slope: -1.5E-03

LR Concentration Trend: S

Consolidation Data Table:

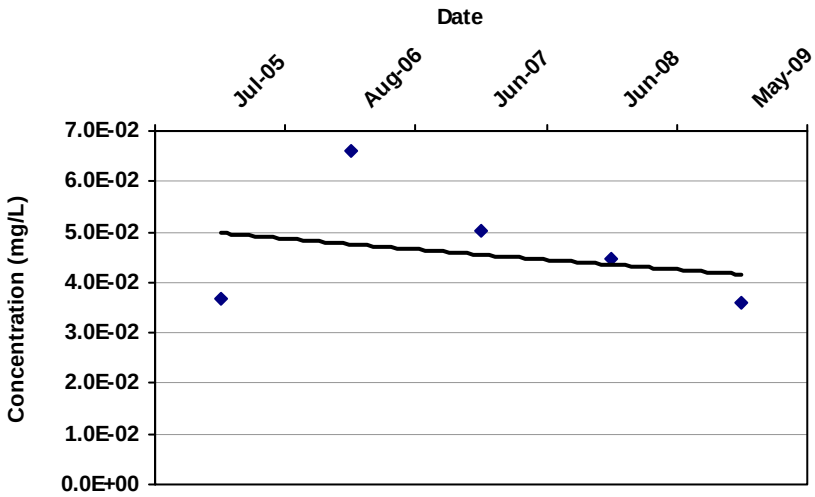
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	6/23/2004	VANADIUM	6.3E-01		3	3
TW-33	T	7/7/2005	VANADIUM	5.5E-01		3	3
TW-33	T	8/10/2006	VANADIUM	5.5E-01		3	3
TW-33	T	6/20/2007	VANADIUM	5.3E-01		3	3
TW-33	T	6/19/2008	VANADIUM	2.0E-03		1	1
TW-33	T	5/30/2009	VANADIUM	4.4E-01		3	3

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-38
Well Type: T
COC: MOLYBDENUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.26

Confidence in Trend: 66.1%

Ln Slope: -1.1E-04

LR Concentration Trend: S

Consolidation Data Table:

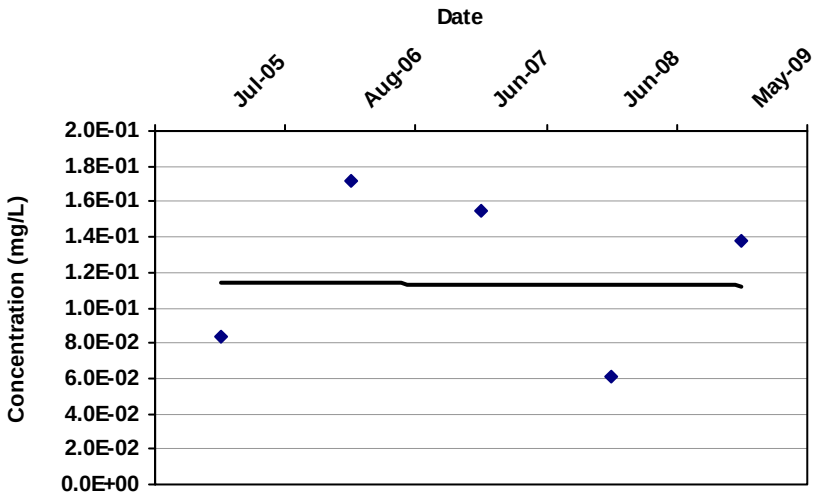
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	7/7/2005	MOLYBDENUM	3.7E-02		1	1
TW-38	T	8/10/2006	MOLYBDENUM	6.6E-02		1	1
TW-38	T	6/20/2007	MOLYBDENUM	5.0E-02		1	1
TW-38	T	6/19/2008	MOLYBDENUM	4.5E-02		1	1
TW-38	T	5/30/2009	MOLYBDENUM	3.6E-02		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: TW-38
Well Type: T
COC: VANADIUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.39

Confidence in Trend: 100.0%

Ln Slope: -1.7E-06

LR Concentration Trend: D

Consolidation Data Table:

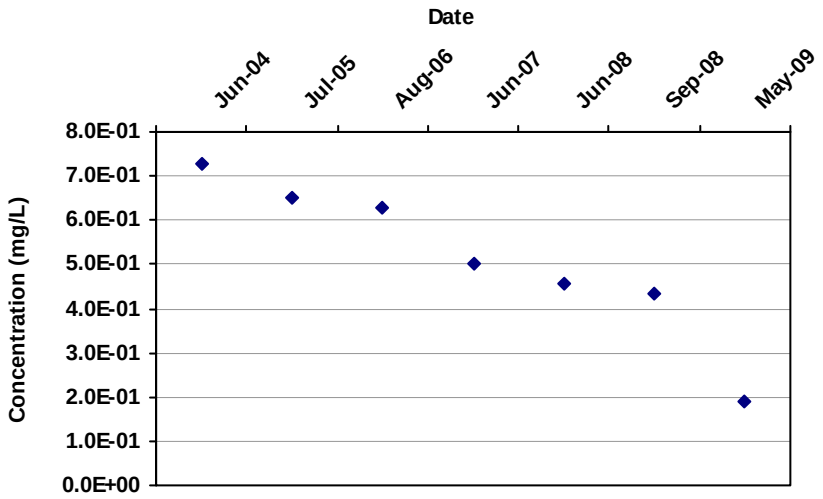
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	7/7/2005	VANADIUM	8.4E-02		1	1
TW-38	T	8/10/2006	VANADIUM	1.7E-01		1	1
TW-38	T	6/20/2007	VANADIUM	1.6E-01		1	1
TW-38	T	6/19/2008	VANADIUM	6.1E-02		1	1
TW-38	T	5/30/2009	VANADIUM	1.4E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-12
Well Type: S
COC: MOLYBDENUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-21

Confidence in Trend:
100.0%

Coefficient of Variation:
0.35

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

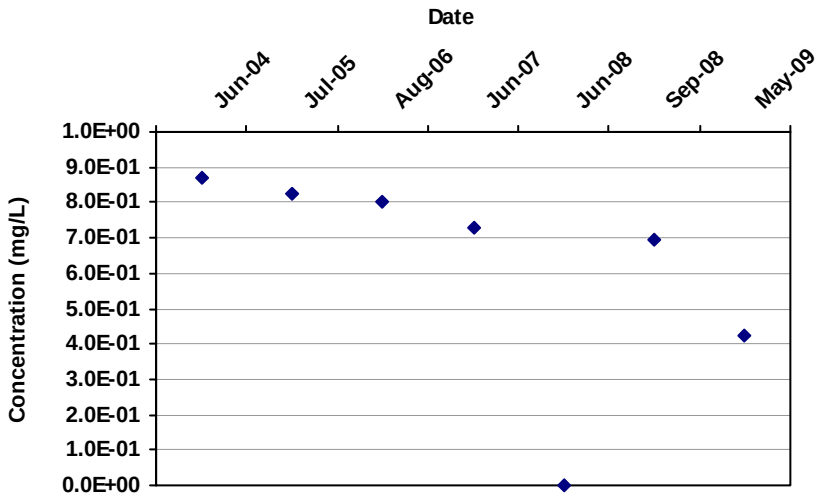
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	6/23/2004	MOLYBDENUM	7.3E-01		2	2
TW-12	S	7/7/2005	MOLYBDENUM	6.5E-01		2	2
TW-12	S	8/10/2006	MOLYBDENUM	6.3E-01		2	2
TW-12	S	6/20/2007	MOLYBDENUM	5.0E-01		2	2
TW-12	S	6/19/2008	MOLYBDENUM	4.6E-01		2	2
TW-12	S	9/23/2008	MOLYBDENUM	4.3E-01		1	1
TW-12	S	5/30/2009	MOLYBDENUM	1.9E-01		2	2

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-12
Well Type: S
COC: VANADIUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-17

Confidence in Trend:
99.5%

Coefficient of Variation:
0.50

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

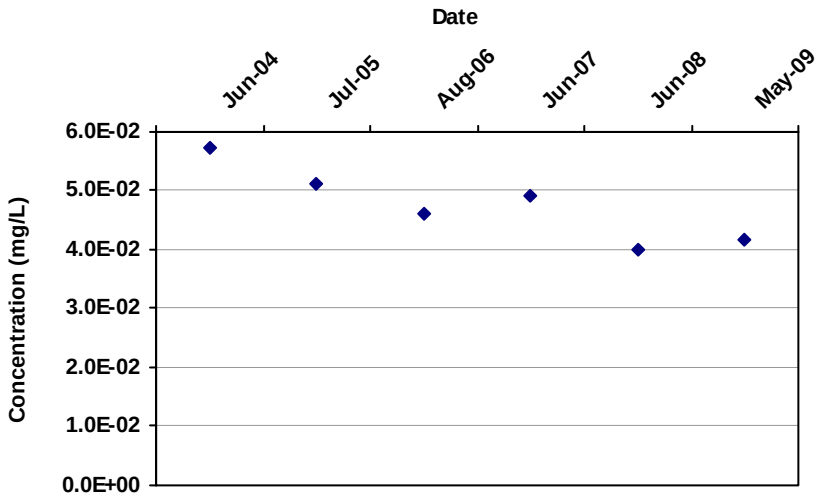
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-12	S	6/23/2004	VANADIUM	8.7E-01		2	2
TW-12	S	7/7/2005	VANADIUM	8.2E-01		2	2
TW-12	S	8/10/2006	VANADIUM	8.0E-01		2	2
TW-12	S	6/20/2007	VANADIUM	7.3E-01		2	2
TW-12	S	6/19/2008	VANADIUM	4.2E-04		2	2
TW-12	S	9/23/2008	VANADIUM	6.9E-01		1	1
TW-12	S	5/30/2009	VANADIUM	4.3E-01		2	2

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-33
Well Type: T
COC: MOLYBDENUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-11

Confidence in Trend:
97.2%

Coefficient of Variation:
0.13

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	6/23/2004	MOLYBDENUM	5.7E-02		3	3
TW-33	T	7/7/2005	MOLYBDENUM	5.1E-02		3	3
TW-33	T	8/10/2006	MOLYBDENUM	4.6E-02		3	3
TW-33	T	6/20/2007	MOLYBDENUM	4.9E-02		3	3
TW-33	T	6/19/2008	MOLYBDENUM	4.0E-02		1	1
TW-33	T	5/30/2009	MOLYBDENUM	4.2E-02		3	3

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-33
Well Type: T
COC: VANADIUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
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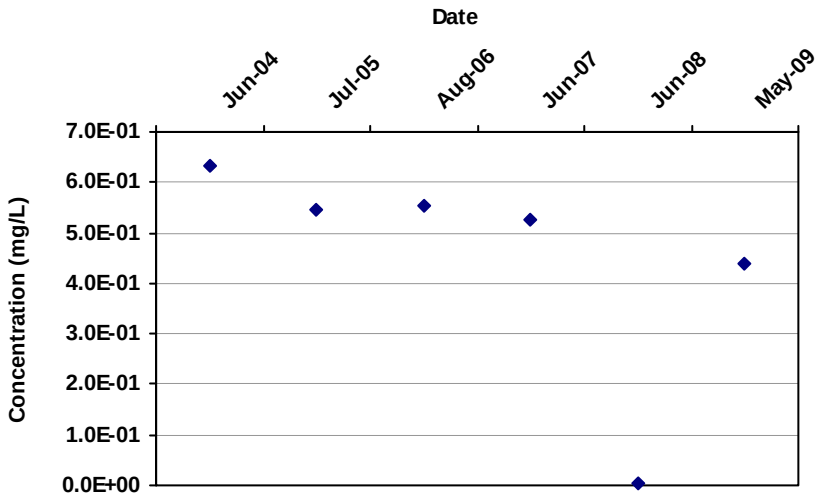
J Flag Values : Actual Value



Mann Kendall S Statistic: -11

Confidence in Trend: 97.2%

Coefficient of Variation: 0.51

Mann Kendall Concentration Trend: (See Note) D

Data Table:

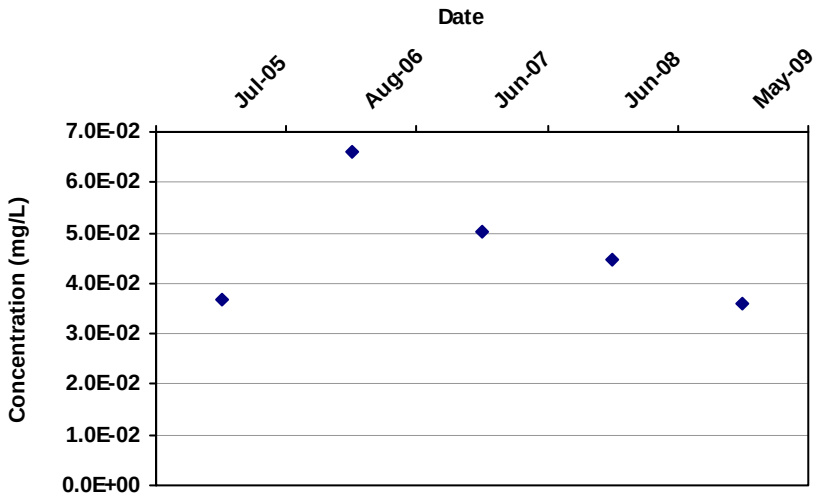
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-33	T	6/23/2004	VANADIUM	6.3E-01		3	3
TW-33	T	7/7/2005	VANADIUM	5.5E-01		3	3
TW-33	T	8/10/2006	VANADIUM	5.5E-01		3	3
TW-33	T	6/20/2007	VANADIUM	5.3E-01		3	3
TW-33	T	6/19/2008	VANADIUM	2.0E-03		1	1
TW-33	T	5/30/2009	VANADIUM	4.4E-01		3	3

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-38
Well Type: T
COC: MOLYBDENUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic: -4

Confidence in Trend: 75.8%

Coefficient of Variation: 0.26

Mann Kendall Concentration Trend: (See Note) S

Data Table:

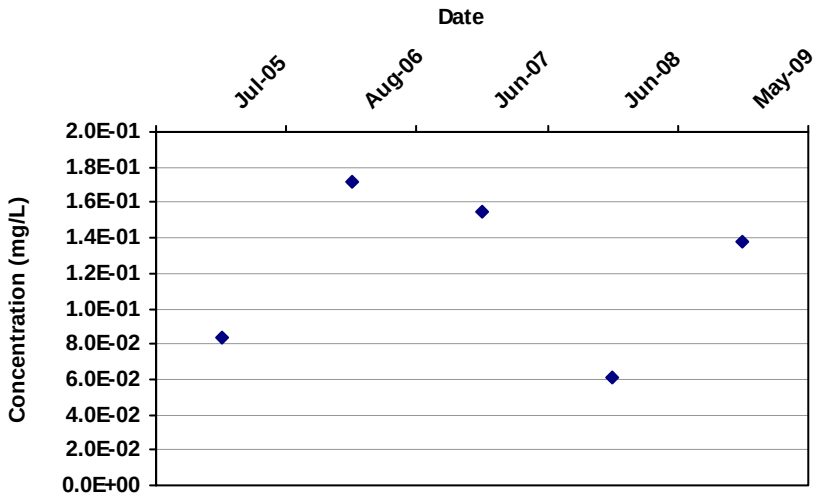
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	7/7/2005	MOLYBDENUM	3.7E-02		1	1
TW-38	T	8/10/2006	MOLYBDENUM	6.6E-02		1	1
TW-38	T	6/20/2007	MOLYBDENUM	5.0E-02		1	1
TW-38	T	6/19/2008	MOLYBDENUM	4.5E-02		1	1
TW-38	T	5/30/2009	MOLYBDENUM	3.6E-02		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: TW-38
Well Type: T
COC: VANADIUM

Time Period: 1/1/2004 **to** 6/30/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-2

Confidence in Trend:
59.2%

Coefficient of Variation:
0.39

Mann Kendall Concentration Trend: (See Note)
S

Data Table:

Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
TW-38	T	7/7/2005	VANADIUM	8.4E-02		1	1
TW-38	T	8/10/2006	VANADIUM	1.7E-01		1	1
TW-38	T	6/20/2007	VANADIUM	1.6E-01		1	1
TW-38	T	6/19/2008	VANADIUM	6.1E-02		1	1
TW-38	T	5/30/2009	VANADIUM	1.4E-01		1	1

Note: 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); ND = Non-detect

MAROS Statistical Trend Analysis Summary

Project: Evergreen Wells

Location: Soda Springs

User Name: Global Environmental

State: Idaho

Time Period: 11/29/2003 **to** 6/2/2009

Consolidation Period: No Time Consolidation

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 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
MOLYBDENUM								
EV-1	S	9	9	7.2E-01	7.3E-01	No	D	D
EV-2	T	9	9	3.3E-01	3.4E-01	No	D	D
EV-3	T	9	9	3.5E-01	3.5E-01	No	D	D
EV-4	T	8	8	4.5E-01	4.7E-01	No	D	D
VANADIUM								
EV-1	S	9	9	1.0E+00	1.0E+00	No	D	D
EV-2	T	9	9	2.2E-01	2.3E-01	No	D	D
EV-3	T	9	9	2.3E-01	2.2E-01	No	NT	NT
EV-4	T	8	8	3.7E-01	3.4E-01	No	NT	NT

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 Mann-Kendall Statistics Summary

Project: Evergreen Wells

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

Well	Source/ Tail	Number of Samples	Number of Detects	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	All Samples "ND" ?	Concentration Trend
MOLYBDENUM								
EV-1	S	9	9	0.14	-26	99.7%	No	D
EV-4	T	8	8	0.08	-21	99.6%	No	D
EV-3	T	9	9	0.14	-33	100.0%	No	D
EV-2	T	9	9	0.15	-31	100.0%	No	D
VANADIUM								
EV-1	S	9	9	0.10	-26	99.7%	No	D
EV-4	T	8	8	0.16	2	54.8%	No	NT
EV-3	T	9	9	0.22	4	61.9%	No	NT
EV-2	T	9	9	0.18	-28	99.9%	No	D

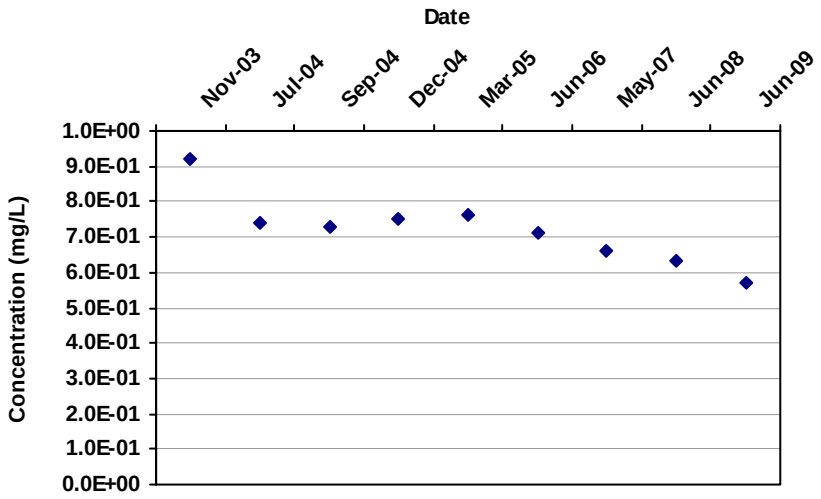
Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); Source/Tail (S/T)

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

MAROS Mann-Kendall Statistics Summary

Well: EV-1
Well Type: S
COC: MOLYBDENUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-26

Confidence in Trend:
99.7%

Coefficient of Variation:
0.14

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

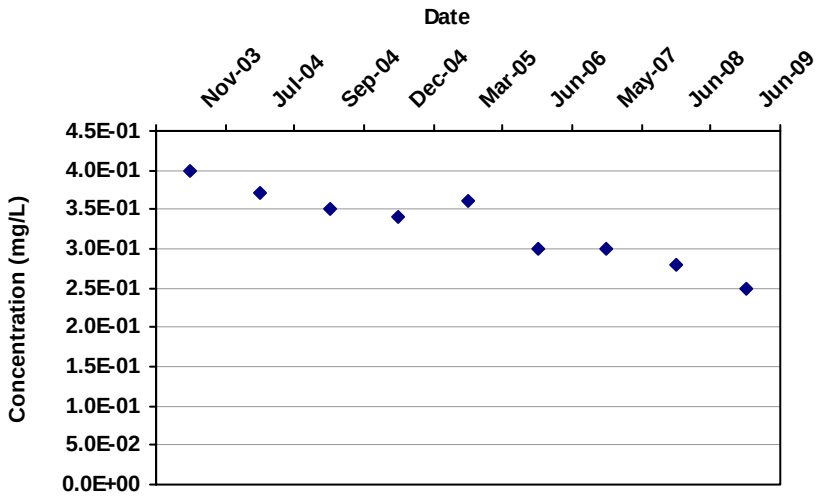
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-1	S	11/29/2003	MOLYBDENUM	9.2E-01		1	1
EV-1	S	7/15/2004	MOLYBDENUM	7.4E-01		1	1
EV-1	S	9/29/2004	MOLYBDENUM	7.3E-01		1	1
EV-1	S	12/26/2004	MOLYBDENUM	7.5E-01		1	1
EV-1	S	3/20/2005	MOLYBDENUM	7.6E-01		1	1
EV-1	S	6/2/2006	MOLYBDENUM	7.1E-01		1	1
EV-1	S	5/28/2007	MOLYBDENUM	6.6E-01		1	1
EV-1	S	6/29/2008	MOLYBDENUM	6.3E-01		1	1
EV-1	S	6/2/2009	MOLYBDENUM	5.7E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: EV-2
Well Type: T
COC: MOLYBDENUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-31

Confidence in Trend:
100.0%

Coefficient of Variation:
0.15

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

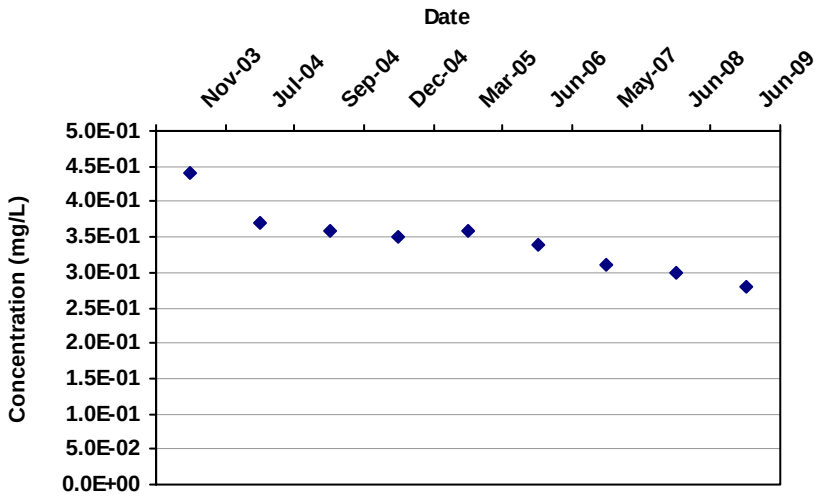
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-2	T	11/29/2003	MOLYBDENUM	4.0E-01		1	1
EV-2	T	7/15/2004	MOLYBDENUM	3.7E-01		1	1
EV-2	T	9/29/2004	MOLYBDENUM	3.5E-01		1	1
EV-2	T	12/26/2004	MOLYBDENUM	3.4E-01		1	1
EV-2	T	3/20/2005	MOLYBDENUM	3.6E-01		1	1
EV-2	T	6/2/2006	MOLYBDENUM	3.0E-01		1	1
EV-2	T	5/28/2007	MOLYBDENUM	3.0E-01		1	1
EV-2	T	6/29/2008	MOLYBDENUM	2.8E-01		1	1
EV-2	T	6/2/2009	MOLYBDENUM	2.5E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: EV-3
Well Type: T
COC: MOLYBDENUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-33

Confidence in Trend:
100.0%

Coefficient of Variation:
0.14

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

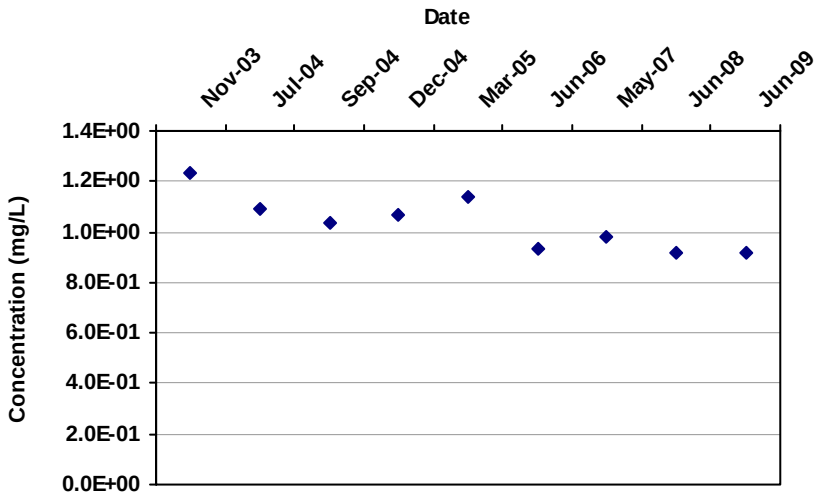
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-3	T	11/29/2003	MOLYBDENUM	4.4E-01		1	1
EV-3	T	7/15/2004	MOLYBDENUM	3.7E-01		1	1
EV-3	T	9/29/2004	MOLYBDENUM	3.6E-01		1	1
EV-3	T	12/26/2004	MOLYBDENUM	3.5E-01		1	1
EV-3	T	3/20/2005	MOLYBDENUM	3.6E-01		1	1
EV-3	T	6/2/2006	MOLYBDENUM	3.4E-01		1	1
EV-3	T	5/28/2007	MOLYBDENUM	3.1E-01		1	1
EV-3	T	6/29/2008	MOLYBDENUM	3.0E-01		1	1
EV-3	T	6/2/2009	MOLYBDENUM	2.8E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: EV-1
Well Type: S
COC: VANADIUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-26

Confidence in Trend:
99.7%

Coefficient of Variation:
0.10

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

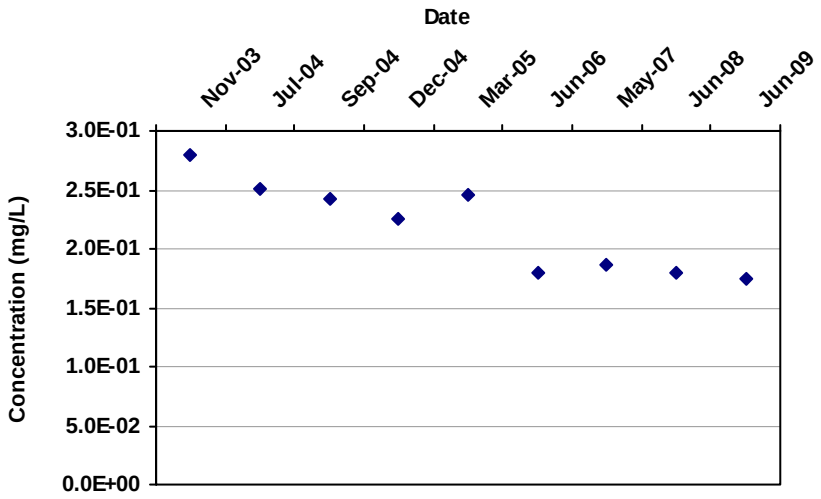
Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-1	S	11/29/2003	VANADIUM	1.2E+00		1	1
EV-1	S	7/15/2004	VANADIUM	1.1E+00		1	1
EV-1	S	9/29/2004	VANADIUM	1.0E+00		1	1
EV-1	S	12/26/2004	VANADIUM	1.1E+00		1	1
EV-1	S	3/20/2005	VANADIUM	1.1E+00		1	1
EV-1	S	6/2/2006	VANADIUM	9.4E-01		1	1
EV-1	S	5/28/2007	VANADIUM	9.8E-01		1	1
EV-1	S	6/29/2008	VANADIUM	9.2E-01		1	1
EV-1	S	6/2/2009	VANADIUM	9.2E-01		1	1

Note: 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); ND = Non-detect

MAROS Mann-Kendall Statistics Summary

Well: EV-2
Well Type: T
COC: VANADIUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



Mann Kendall S Statistic:
-28

Confidence in Trend:
99.9%

Coefficient of Variation:
0.18

Mann Kendall Concentration Trend: (See Note)
D

Data Table:

Well	Well Type	Effective Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-2	T	11/29/2003	VANADIUM	2.8E-01		1	1
EV-2	T	7/15/2004	VANADIUM	2.5E-01		1	1
EV-2	T	9/29/2004	VANADIUM	2.4E-01		1	1
EV-2	T	12/26/2004	VANADIUM	2.3E-01		1	1
EV-2	T	3/20/2005	VANADIUM	2.5E-01		1	1
EV-2	T	6/2/2006	VANADIUM	1.8E-01		1	1
EV-2	T	5/28/2007	VANADIUM	1.9E-01		1	1
EV-2	T	6/29/2008	VANADIUM	1.8E-01		1	1
EV-2	T	6/2/2009	VANADIUM	1.7E-01		1	1

Note: 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); ND = Non-detect

MAROS Linear Regression Statistics Summary

Project: Evergreen Wells

User Name: Global Environmental

Location: Soda Springs

State: Idaho

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value

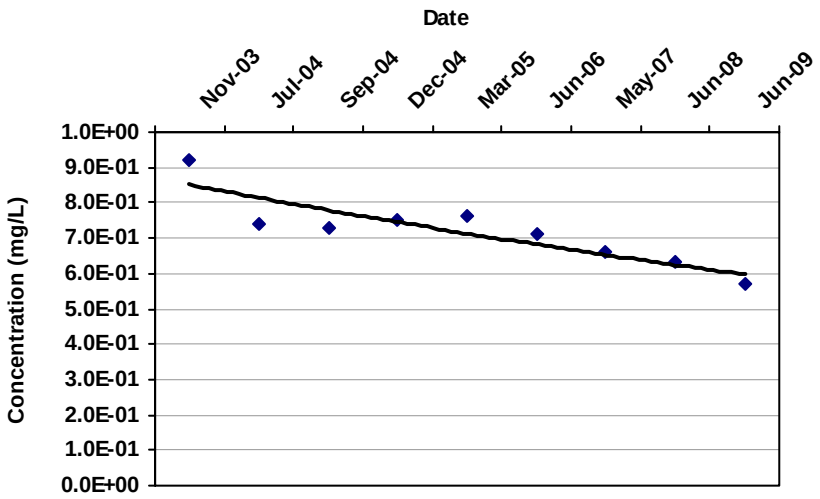
Well	Source/ Tail	Average Conc (mg/L)	Median Conc (mg/L)	Standard Deviation	All Samples "ND" ?	Ln Slope	Coefficient of Variation	Confidence in Trend	Concentration Trend
MOLYBDENUM									
EV-1	S	7.2E-01	7.3E-01	9.8E-02	No	-1.8E-04	0.14	100.0%	D
EV-4	T	4.5E-01	4.7E-01	3.4E-02	No	-1.1E-04	0.08	100.0%	D
EV-3	T	3.5E-01	3.5E-01	4.7E-02	No	-1.8E-04	0.14	100.0%	D
EV-2	T	3.3E-01	3.4E-01	4.8E-02	No	-2.1E-04	0.15	100.0%	D
VANADIUM									
EV-1	S	1.0E+00	1.0E+00	1.1E-01	No	-1.3E-04	0.10	99.9%	D
EV-4	T	3.7E-01	3.4E-01	5.9E-02	No	3.3E-05	0.16	64.3%	NT
EV-3	T	2.3E-01	2.2E-01	5.2E-02	No	9.6E-05	0.22	81.2%	NT
EV-2	T	2.2E-01	2.3E-01	3.9E-02	No	-2.3E-04	0.18	100.0%	D

Note: 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); COV = Coefficient of Variation

MAROS Linear Regression Statistics

Well: EV-1
Well Type: S
COC: MOLYBDENUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.14

Confidence in Trend: 100.0%

Ln Slope: -1.8E-04

LR Concentration Trend: D

Consolidation Data Table:

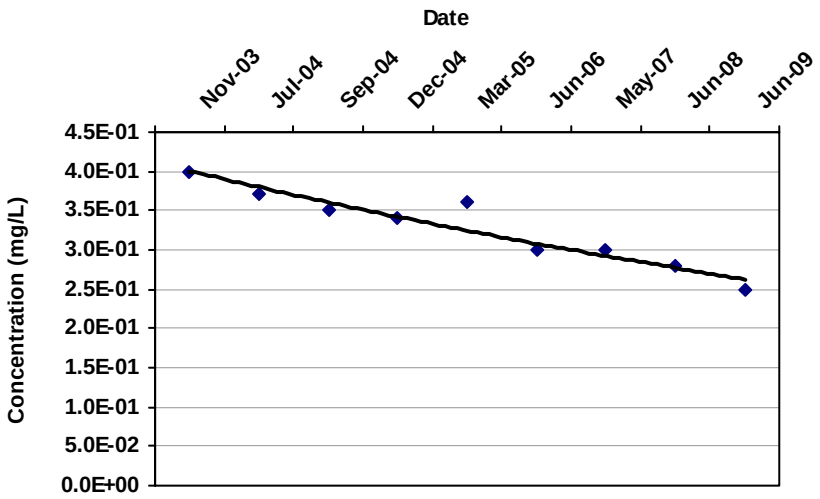
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-1	S	11/29/2003	MOLYBDENUM	9.2E-01		1	1
EV-1	S	7/15/2004	MOLYBDENUM	7.4E-01		1	1
EV-1	S	9/29/2004	MOLYBDENUM	7.3E-01		1	1
EV-1	S	12/26/2004	MOLYBDENUM	7.5E-01		1	1
EV-1	S	3/20/2005	MOLYBDENUM	7.6E-01		1	1
EV-1	S	6/2/2006	MOLYBDENUM	7.1E-01		1	1
EV-1	S	5/28/2007	MOLYBDENUM	6.6E-01		1	1
EV-1	S	6/29/2008	MOLYBDENUM	6.3E-01		1	1
EV-1	S	6/2/2009	MOLYBDENUM	5.7E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: EV-2
Well Type: T
COC: MOLYBDENUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.15

Confidence in Trend: 100.0%

Ln Slope: -2.1E-04

LR Concentration Trend: D

Consolidation Data Table:

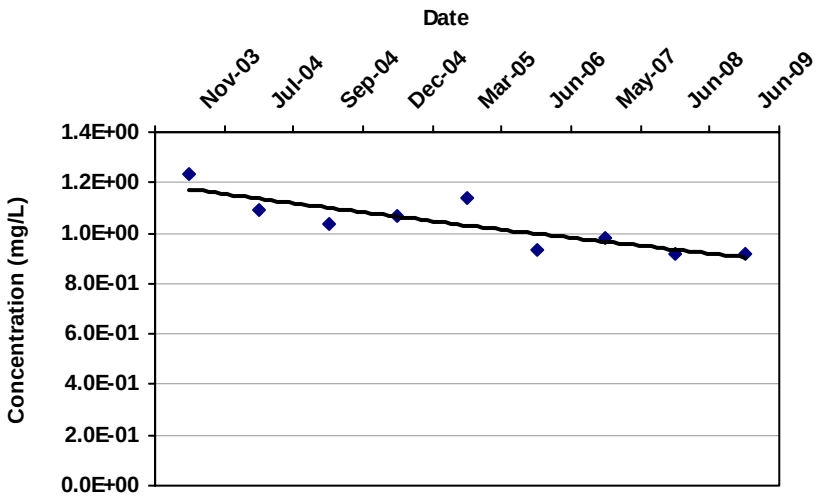
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-2	T	11/29/2003	MOLYBDENUM	4.0E-01		1	1
EV-2	T	7/15/2004	MOLYBDENUM	3.7E-01		1	1
EV-2	T	9/29/2004	MOLYBDENUM	3.5E-01		1	1
EV-2	T	12/26/2004	MOLYBDENUM	3.4E-01		1	1
EV-2	T	3/20/2005	MOLYBDENUM	3.6E-01		1	1
EV-2	T	6/2/2006	MOLYBDENUM	3.0E-01		1	1
EV-2	T	5/28/2007	MOLYBDENUM	3.0E-01		1	1
EV-2	T	6/29/2008	MOLYBDENUM	2.8E-01		1	1
EV-2	T	6/2/2009	MOLYBDENUM	2.5E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: EV-1
Well Type: S
COC: VANADIUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.10

Confidence in Trend: 99.9%

Ln Slope: -1.3E-04

LR Concentration Trend: D

Consolidation Data Table:

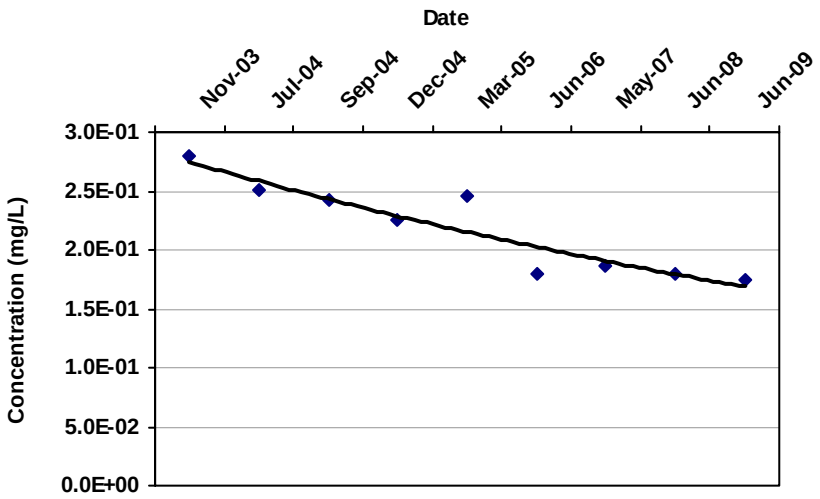
Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-1	S	11/29/2003	VANADIUM	1.2E+00		1	1
EV-1	S	7/15/2004	VANADIUM	1.1E+00		1	1
EV-1	S	9/29/2004	VANADIUM	1.0E+00		1	1
EV-1	S	12/26/2004	VANADIUM	1.1E+00		1	1
EV-1	S	3/20/2005	VANADIUM	1.1E+00		1	1
EV-1	S	6/2/2006	VANADIUM	9.4E-01		1	1
EV-1	S	5/28/2007	VANADIUM	9.8E-01		1	1
EV-1	S	6/29/2008	VANADIUM	9.2E-01		1	1
EV-1	S	6/2/2009	VANADIUM	9.2E-01		1	1

Note: 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); ND = All Samples are Non-detect

MAROS Linear Regression Statistics

Well: EV-2
Well Type: T
COC: VANADIUM

Time Period: 11/29/2003 **to** 6/2/2009
Consolidation Period: No Time Consolidation
Consolidation Type: Geometric Mean
Duplicate Consolidation: Average
ND Values: 1/2 Detection Limit
J Flag Values : Actual Value



COV: 0.18

Confidence in Trend: 100.0%

Ln Slope: -2.3E-04

LR Concentration Trend: D

Consolidation Data Table:

Well	Well Type	Consolidation Date	Constituent	Result (mg/L)	Flag	Number of Samples	Number of Detects
EV-2	T	11/29/2003	VANADIUM	2.8E-01		1	1
EV-2	T	7/15/2004	VANADIUM	2.5E-01		1	1
EV-2	T	9/29/2004	VANADIUM	2.4E-01		1	1
EV-2	T	12/26/2004	VANADIUM	2.3E-01		1	1
EV-2	T	3/20/2005	VANADIUM	2.5E-01		1	1
EV-2	T	6/2/2006	VANADIUM	1.8E-01		1	1
EV-2	T	5/28/2007	VANADIUM	1.9E-01		1	1
EV-2	T	6/29/2008	VANADIUM	1.8E-01		1	1
EV-2	T	6/2/2009	VANADIUM	1.7E-01		1	1

Note: 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); ND = All Samples are Non-detect

FINAL ADDENDUM 1

REMEDY EVALUATION REPORT FOR THE

KERR-McGEE CHEMICAL CORPORATION SUPERFUND SITE

TRONOX FACILITY SODA SPRINGS, IDAHO

APPENDIX A – REMEDY SITE INSPECTION

January 14, 2012

Prepared by:

GLOBAL ENVIRONMENTAL TECHNOLOGIES L.L.C.

SALT LAKE CITY, UTAH

APPENDIX A – REMEDY SITE INSPECTION

Appendix A presents details pertaining to the on-site inspection of the closed ponds and other elements of the remedy that were completed in 2001. The results of the inspection and a photo log are also contained in this appendix. Prior to performing the inspection of the landfill and cap, the monitoring logs were reviewed.

A.1 S-X Pond

The inspection of the S-X pond took place between July 17 and August 6, 2008. Results of the inspection are summarized on Figure A-1. The entire grid was first established and then inspection was initiated. The purpose of the inspection of the covered S-X pond was to observe erosion, evidence of burrowing animals, evidence of standing water and the presence of deep-tap rooted plants that could aid in the infiltration of snow melt water through the vadose zone. The inspection was accomplished by establishing a 50-foot by 50-foot grid over the former pond surface. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the pond boundaries and additional stakes were placed within the pond limits to aid the field engineer to ensure that the field engineer stayed on the proper grid line.

There were 17 lines established oriented east-west, starting at the south boundary of the former pond. Points were established on each line at 50-foot intervals. Point 1 of each line occurred on the east terminus of the line. The line that intersected each of the points on the lines created the north-south line of the grid. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS. The grid was established at the southeast corner of the pond area.

Line 1 was set up outside the pond limits on the south. A total of seventeen lines were set up at 50 foot intervals in a northerly direction. Line 17 is outside the of the former pond limit on the north side of the pond. Points were established along each line at 50

foot intervals. Point 1 of each line makes up the eastern most boundary of the inspection area. Stakes with flagging were placed at 50 foot intervals along Line 1 and at Point 1 of each line in a northerly direction. Additional stakes with flagging were put at each point of Lines 5, 9, 13 and 17 to ensure the correct orientation for the field engineer.

The latitude and longitude coordinates of each intersection of the grid lines is shown in Table A-1. There are 8 points in line 1 and all of these points are outside the former pond boundary. Due to the irregular shape of the former S-X pond:

- Line 2 has 5 points;
- Lines 3, 4, and 5 each have 6 points;
- Line 6 has 7 points and;
- The remaining lines each have 8 points.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above. A photo of each area was taken and all of the photos are shown in the photo log that is contained in this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the S-X pond inspection have the heading S-X Pond Photo Log.

The inspection of the uncapped S-X pond resulted in observing several areas that could hold standing water, areas of erosion and a sink hole. The field engineer also noted that the vegetation growing on the former S-X pond was shorter and browner than the same vegetation growing outside of the pond limits, suggesting that the vegetation was stressed.

Areas on the cover that could hold standing water were located in the southern portion of the former pond and along the inside of the former west dike of the pond. Examples of these low lying areas are shown in Photos 2, 3, 4, 5, 7, 9, 15, 16, 18, 20, 21, 26 and 27. These areas ranged in size from a few square feet to more than 100 square feet.

One sink hole was observed within the boundaries of the former pond. The sink hole is near the west dike of the pond in the southern portion of the pond. A number of sink holes were previously observed near monitor well KM-8 during the RI. The sink hole observed during the inspection is approximately 2.5 feet in diameter and 1.5 feet deep. Photo 10 shows this sink hole.

Several areas of erosion and calcine at the ground surface were observed along the east side of the former S-X pond. Examples of these areas are shown in Photos 14, 29, 33 and 34. This is the result of the covered west calcine deposit where the cover is thin or absent and calcine has been exposed. Animal burrowing has also exposed calcine. Several holes dug by burrowing animals were observed during the inspection. It did not appear that the holes were occupied at the time of the inspection. Photos 36, 38, 40 and 41 show examples of the burrowing animal holes observed

A.2 Former Scrubber Pond

The inspection of the scrubber pond took place August 6 through August 9, 2008. Results of the inspection are summarized on Figure A-2. The entire grid was established prior to the inspection. The former scrubber pond was inspected to observe signs of erosion, evidence of burrowing animals, evidence of standing water and deep-tap rooted plants that could aid in the infiltration of snow melt water through the vadose zone. This inspection was accomplished by establishing a 30-foot by 30-foot grid over the former pond surface. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the pond boundaries and additional stakes

were placed within the pond limits to aid the field engineer to ensure that the field engineer stayed on the proper grid line.

Twenty lines were established, oriented north-south starting at the north boundary of the former pond. The chain-link fence along the north edge of the pond was used as the north boundary of the inspection area. Points were established on each line at 30-foot intervals. Point 1 of each line was on the north end of the line (chain-link fence). The line oriented through each of the points on the lines created the east-west line of the grid. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS.

The grid was set up by starting at the northwest corner of the pond area. Line 1 was set up outside the pond limits on the west. A total of 20 lines were set up at 30 foot intervals in an easterly direction. Line 20 is outside the of the former pond limit on the east side of the pond. Points were established along each line at 30 foot intervals. Point 1 of each line makes up the northern-most boundary of the inspection area. Stakes with flagging were placed at 30-foot intervals along Line 1 and at Point 1 of each line in an easterly direction. Additional stakes with flagging were placed at each point of the lines at 150 foot intervals to ensure that the field engineer was walking along the correct grid line.

The latitude and longitude coordinates of each intersection of the grid lines are shown in Table A-2. Due to the shape of the former pond there are:

- 4 points along lines 1 through Line 4;
- 5 points along lines 5 through line 7;
- 6 points along lines 8 through line 11;
- 7 points along lines 12 through line 15;
- 6 points along lines 16 through line 17, and;
- 5 points along lines 18 through line 20.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above. A photo of each area was taken and all of the photos are shown in the photo log that is attached to this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the former scrubber pond inspection have the heading Scrubber Pond Photo Log.

The inspection of the former scrubber pond resulted in observing several areas that could hold standing water, areas of erosion and some vegetation with deep tap roots. The field engineer also noted that the drains from the plant and the scrubber pond area ran through the inspection area and these areas could also promote infiltration of snow melt water into the vadose zone.

The areas that the field engineer observed that could hold standing water were mainly located in the western portion of the former pond basin. The drains associated with the southern infiltration basin also ran through the western portion of the pond basin. Photos 1, 2, 3, 4, 6, 7, 8, 9, 10, 11 and 12 show the areas that could contain water and the drains oriented through the pond area.

One area of erosion was observed during the inspection. This area is located along the southern portion of the pond area. The eastern portion of the pond area is higher in elevation and the erosion appears to have occurred when water ran from east to west. The erosion rill is shown in Photo 17.

Sagebrush was observed growing in several places in the eastern portion of the pond area. This plant has a tap root that can grow deep into the ground. This sagebrush is shown in Photos 17 and 18.

A.3 Limestone Settling Pond Area

The inspection of the limestone settling pond area took place August 10, 2008. Results of the inspection are summarized on Figure A-3. The entire grid was established prior to the inspection. The purpose of the inspection of the limestone settling pond area was to observe signs of erosion, evidence of burrowing animals, evidence of standing water and deep-tap rooted plants that could aid in the infiltration of snow melt water through the vadose zone. This inspection was accomplished by establishing a 50-foot by 50-foot grid over the former pond area. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the pond boundaries and additional stakes were placed within the pond limits to aid the field engineer and to ensure that the field engineer stayed on the proper grid line.

There were 11 lines established oriented north-south starting at the western boundary of the limestone settling pond area. Points were established on each line at 50-foot intervals. Point 1 of each line was on the north end of the line. The line oriented through each of the points on the lines created the east-west line of the grid. The northern boundary of the inspection area (Point 1 of each line) was the chain link fence oriented along the north portion of the pond area. The chain link fence on the east side of the pond area was the eastern boundary of the inspection area. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS.

The grid was set up by starting at the southwest corner of the pond area. Line 1 was set up outside the pond limits on the west. A total of 11 lines were set up at 50 foot intervals in an easterly direction. Line 11 is outside the of the former pond limit on the east side of the pond area. Points were established along each line at 50 foot intervals. Point 1 of each line makes up the southernmost boundary of the inspection area. Stakes with flagging were placed at 50 foot intervals along Line 1 and at Point 1 of each line in an easterly direction and at Point 5 of each line. Additional stakes with flagging were put at each point of the lines at Lines 5, 9 and 11 to ensure that the field engineer was walking along the correct grid line.

The latitude and longitude coordinates of each intersection of the grid lines is shown in Table A-3. The inspection area was rectangular and each line contains 5 points.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above. A photo of each area was taken and all of the photos are shown in the photo log that is attached to this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the limestone settling pond area inspection have the heading Limestone Settling Pond Photo Log.

The inspection of the limestone settling pond area resulted in observing two areas of standing water, several areas of erosion, several areas that are un-vegetated, evidence of burrowing animal activity and some deep tap-rooted vegetation. The field engineer also noted that the areas of standing water were supporting wetland vegetation including cattails.

The two areas of standing water appear to be connected and the source of the water feeding these areas could be the pipeline used to transport S-X raffinate from the plant when the plant was operating, or a pipe that handled storm water from the former plant. This could not be confirmed during the inspection. Photos 4, 5, 15 and 16 show these areas that hold standing water.

The areas of erosion are along the western, southern and northern portions of the area. The area slopes to the west in most locations and to the southwest along the southern edge of the area. The areas of erosion are shown in Photos 1, 10, 11and 18. There are several un-vegetated areas in the inspection area that border the areas of erosion. These un-vegetated areas are shown in Photos 7, 8, 13, 14 and 19.

The evidence of burrowing animal activity is shown in photos 2, 9 and 17. This activity does not appear to be recent and the animals were not seen during the inspection.

The deep tap rooted vegetation observed during the inspection is a member of the thistle family. Photo 6 shows this vegetation.

A.4 On-Site Landfill

The inspection of the landfill cap took place on August 10, 2008. Results of the inspection are summarized on Figure A-4. The entire grid was established and then the inspection took place. The inspection of the on-site landfill was to observe the cover for settling and erosion, evidence of burrowing animals, evidence of standing water and deep-tap rooted plants that could aid in the infiltration of snow melt water or other precipitation through the engineered cap. The logbook that contains the documentation of inspections conducted at the on-site landfill was reviewed. The logbook contains the inspections conducted from May 1999 to the present. The information contained in the logbook includes measurements of the water level in the sump for most of the inspections. Some of the inspections included information on the condition of the vegetation, condition of the soil cover and the condition of the fence. One problem identified during the review was that the inspections were not being conducted (or documented) at the frequency required by the Operation and Maintenance (O&M) Plan. Another problem was that not all of the information required by the O&M Plan was documented for each inspection.

This inspection was accomplished by establishing a 50-foot by 50-foot grid over the landfill cap surface. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the landfill boundaries and additional stakes were placed within the landfill limits to aid the field engineer to ensure that the field engineer stayed on the proper grid line.

There were 9 lines established oriented east-west starting at the south boundary (chain link fence) of the landfill. Points were established on each line at 50-foot intervals. Point 1 of each line was on the east end of the line (chain link fence). The line oriented through each of the points on the lines created the north-south line of the grid. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS.

The grid was set up by starting at the southeast corner of the landfill area. Line 1 was set up outside the landfill limits along the fence on the south. A total of 9 lines were set up at 50 foot intervals in a northerly direction. Line 9 is outside the of the landfill limit on the north side of the landfill area (near the north fence line). Points were established along each line at 50 foot intervals. Point 1 of each line makes up the eastern boundary of the inspection area and is next to the eastern fence. Stakes with flagging were placed at 50 foot intervals along Line 1 and at Point 1 of each line in a westerly direction and at Point 6 of each line. Additional stakes with flagging were put at each point of the lines at Lines 3, 5 and 7 to ensure that the field engineer was walking along the correct grid line. These additional lines were required due to slope of the landfill.

The latitude and longitude coordinates of each intersection of the grid lines is shown in Table A-4. The inspection area was rectangular and each line contains 6 points.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above or other potential problems. A photo of each area was taken and all of the photos are shown in the photo log contained in this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the on-site landfill inspection have the heading Landfill Photo Log.

The inspection of the landfill resulted in observing several un-vegetated areas that could lead to erosion, evidence of burrowing animal activity and some deep tap rooted vegetation. The field engineer noted that there was no settling on the landfill cover surface or around the sump well.

The un-vegetated areas observed during the inspection were along the south fence line (line 1) and two areas along the west fence. Photos 1, 5, and 8 show these areas.

The evidence of burrowing animal activity is shown in photos 2, 3, 4, 6, 7, and 9. Some of the activity appeared to be old, but one hole looked like it could have been dug this year. However all of these holes were outside the footprint of the landfill.

There is an intrusion of alfalfa and an unidentified deep tap rooted plant on the north side of the landfill but outside of the footprint of the landfill. Photos 10, 11 and 12 show these plants.

A.5 Calcine Cap

The inspection of the calcine cap took place August 16 and 17, 2008. Results of the inspection are summarized on Figure A-5. The entire grid was established prior to the inspection. The calcine cap inspection looked for signs of erosion, evidence of burrowing animals, evidence of standing water or settling and deep-tap rooted plants that could aid in the infiltration of snow melt water through the engineered cap. The logbook that contains the documentation of inspections conducted at the calcine cap was reviewed. The logbook contains documentation of the inspections conducted from January 2002 to the present. Some of the inspections included information on the condition of the vegetation, condition of the soil cover and the condition of the fence. The inspection records from the spring of 2002 identified the erosion on the south side of the cap that was repaired later in 2002. Inspection records for the inspections after the repairs were completed indicate that the repairs were successful. One problem identified during the review was that the inspections were not being conducted at the

frequency required by the Operation and Maintenance (O&M) Plan. Another problem was that not all of the information required by the O&M Plan was documented for each inspection.

This inspection was accomplished by establishing a 50-foot by 50-foot grid over the capped area. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the calcine cap boundaries and additional stakes were placed within the capped area to aid the field engineer to ensure that the field engineer stayed on the proper grid line.

There were 24 lines established oriented east-west starting at the south boundary of the calcine cap area. Points were established on each line at 50-foot intervals. Point 1 of each line was on the east end of the line. The line oriented through each of the points on the lines created the north-south line of the grid. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS.

The grid was set up by starting at the southeast corner of the calcine cap area. Line 1 was set up outside the cap limits along the fence on the south. A total of 24 lines were set up at 50 foot intervals in a northerly direction. Line 24 is outside the of the calcine cap limit on the north side of the capped area (near the north fence line). Points were established along each line at 50 foot intervals. Point 1 of each line makes up the eastern boundary of the inspection area and is next to the eastern fence. Stakes with flagging were placed at 50 foot intervals along Line 1 and at Point 1 of each line. Additional stakes with flagging were put at each point of the lines at Lines 5, 9, 13, 17, 21 and 24 to ensure that the field engineer was walking along the correct grid line. These additional lines were required due to slope of the calcine cap.

The latitude and longitude coordinates of each intersection of the grid lines is shown in Table A-5. The shape of the calcine cap dictated that the inspection area would not be rectangular.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above. A photo of each area was taken and all of the photos are shown in the photo log that is attached to this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the calcine cap inspection have the heading Calcine Cap Photo Log.

The inspection of the calcine cap area resulted in observing several areas of erosion, evidence of burrowing animal activity and some deep tap rooted vegetation. The field engineer noted that no settling of the cap was observed.

There are a few areas of erosion on the south side of the cap. This area had significant erosion following construction, but the damage was repaired and reseeded. The evidence of ongoing erosion is shown in photos 6, 7, and 14.

Numerous holes from burrowing animal activity were observed across the entire calcine cap. Some of this burrowing activity appears to be old, but some of the activity could have occurred in 2008. Examples of the burrowing animal activity observed during the inspection are shown in photos 1, 5, 10, 11, 13, 15, 16, 17 and 18.

Intrusion of deep tap rooted vegetation was observed during the inspection. The intruding species included members of the thistle family on the southern portion of the cap and alfalfa on the northern portion of the cap. Photos 2, 3, 8, 9, 12, 19 and 20 show examples of these deep tap rooted plants.

A.6 MAP Ponds

The inspection of the MAP ponds area took place on September 18, 2008. Results of the inspection are summarized on Figure A-6. The entire grid was established prior to the inspection. The purpose of the inspection of the former MAP pond area was to observe signs of erosion, evidence of burrowing animals, evidence of standing water and deep-tap rooted plants that could aid in the infiltration of snow melt water through the vadose zone. This inspection was accomplished by establishing a 50-foot by 50-foot grid over the former pond surface. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the pond boundaries and additional stakes were placed within the pond limits to aid the field engineer to ensure that the field engineer stayed on the proper grid line.

There were 4 lines established oriented east-west starting at the south boundary of the former pond. Points were established on each line at 50-foot intervals. Point 1 of each line was on the east end of the line. The line oriented through each of the points on the lines created the north-south line of the grid. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS.

The grid was set up by starting at the southeast corner of the MAP pond area. Line 1 was set up outside the MAP pond limits to the south of the ponds and north of the plant access road. A total of 4 lines were set up at 50-foot intervals in a northerly direction. Line 4 is outside the of the MAP pond limit near the warehouse to the north of the former pond area. Points were established along each line at 50 foot intervals. Point 1 of each line makes up the eastern boundary of the inspection area. Stakes with flagging were placed at 50 foot intervals along Line 1 and at Point 1 of each line. Additional stakes with flagging were put at each point of the lines at Lines 2 and 4 to ensure that the field engineer was walking along the correct grid line.

The latitude and longitude coordinates of each intersection of the grid lines is shown in Table A-6. The inspection area was roughly square with 4 lines and 4 points on each line.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above. A photo of each area was taken and all of the photos are shown in the photo log that is attached to this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the MAP pond inspection have the heading MAP Pond Photo Log.

The inspection of the MAP pond area resulted in observing one area that could hold standing water, areas of erosion and evidence of storm water run-on. The vegetation growing on the pond area was very tall and showed no signs of stress.

The areas of erosion observed were along the north and south boundaries of the pond area. The erosion is occurring because storm water runoff from the plant site flows downhill onto the pond area. The areas affected by the storm water run-on and erosion are shown in photos 1, 3, 6 and 7.

One area that showed evidence of holding water is located near the western edge of the pond area. Water that accumulates in this area could come from snow melt on the surface and storm water run-on from the plant site. This area is shown in photos 2 and 5.

A.7 Former Vanadium Plant

The footprint of the former vanadium plant was inspected to observe signs of erosion, evidence of burrowing animals, evidence of standing water and deep-tap rooted plants that could aid in the infiltration of snow melt water through the vadose zone. This inspection was accomplished by establishing a 50-foot by 50-foot grid over the former plant footprint. This grid was established using a compass and tape. Stakes with flagging were placed on the outside of the plant footprint and additional stakes were

placed within the plant area to aid the field engineer to ensure that the field engineer stayed on the proper grid line.

There were 5 lines established oriented east-west starting at the south boundary of the former pond. Points were established on each line at 50-foot intervals. Point 1 of each line was on the west end of the line. The line oriented through each of the points on the lines created the north-south line of the grid. The intersection of each grid line was located using a Garmin Colorado 400t hand-held GPS.

The field engineer walked each east-west line and the north-south line. The field engineer noted any areas that could lead to infiltration of snow melt water as described above. A photo of each area was taken and all of the photos are shown in the photo log that is attached to this appendix. The field engineer also determined the location of each problem area with the Garmin Colorado 400t hand-held GPS. A description of the problem area and the location coordinates (latitude and longitude) are in the caption beneath each photo. The photos from the former vanadium plant area inspection have the heading Former Vanadium Plant Photo Log.

The inspection of the former plant are took place on August 9, 2008. The entire grid was established and then the inspection took place. The grid was set up by starting at the southwest corner of the former vanadium plant area. Line 1 was set up outside the former plant footprint along the south side of the plant area. A total of 5 lines were set up at 50 foot intervals in a northerly direction. Line 5 is outside the of the north limit of the former vanadium plant. Points were established along each line at 50 foot intervals. Point 1 of each line makes up the western boundary of the inspection area. Stakes with flagging were placed at 50 foot intervals along Line 1 and at Point 1 of each line. Additional stakes with flagging were put at each point of the lines at Lines 3 and 5 to ensure that the field engineer was walking along the correct grid line. The latitude and longitude coordinates of each intersection of the grid lines is shown in Table 3-7. The inspection area was rectangular with 5 lines and 6 points on each line.

The inspection of the former vanadium plant area resulted in observing several areas that could hold standing water. The field engineer also noted that there were several concrete foundations and floors that had not been covered with fine limestone. Examples of areas of exposed concrete are shown in Figures 1, 2 and 3.

A few areas that could accumulate water were observed during the inspection. These areas were either wet or holding water from a rain storm that occurred prior to the inspection. The areas that were observed holding water are shown in photos 5, 6, 7 and 8.

TABLE A-1

S-X POND POINTS

Line	Point 1		Point 2		Point 3		Point 4		Point 5	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1	42°41.113	111°34.693	42°41.113	111°34.704	42°41.113	111°34.717	42°41.113	111°34.727	42°41.112	111°34.738
2	42°41.123	111°34.693	42°41.120	111°34.708	42°41.119	111°34.715	42°41.125	111°34.729	42°41.118	111°34.737
3	42°41.126	111°34.693	42°41.129	111°34.703	42°41.128	111°34.712	42°41.131	111°34.726	42°41.131	111°34.740
4	42°41.136	111°34.691	42°41.136	111°34.703	42°41.137	111°34.714	42°41.139	111°34.726	42°41.139	111°34.736
5	42°41.146	111°34.692	42°41.147	111°34.702	42°41.146	111°34.715	42°41.145	111°34.724	42°41.144	111°34.734
6	42°41.152	111°34.690	42°41.151	111°34.702	42°41.151	111°34.711	42°41.150	111°34.723	42°41.149	111°34.737
7	42°41.161	111°34.689	42°41.158	111°34.701	42°41.159	111°34.711	42°41.158	111°34.723	42°41.161	111°34.732
8	42°41.170	111°34.690	42°41.169	111°34.699	42°41.170	111°34.710	42°41.171	111°34.723	42°41.171	111°34.732
9	42°41.178	111°34.686	42°41.176	111°34.698	42°41.177	111°34.709	42°41.177	111°34.720	42°41.178	111°34.729
10	42°41.184	111°34.685	42°41.184	111°34.696	42°41.184	111°34.706	42°41.183	111°34.718	42°41.183	111°34.727
11	42°41.194	111°34.685	42°41.193	111°34.695	42°41.192	111°34.707	42°41.190	111°34.719	42°41.189	111°34.728
12	42°41.199	111°34.686	42°41.197	111°34.693	42°41.197	111°34.707	42°41.199	111°34.717	42°41.197	111°34.729
13	42°41.210	111°34.686	42°41.207	111°34.197	42°41.206	111°34.704	42°41.205	111°34.715	42°41.205	111°34.726
14	42°41.215	111°34.684	42°41.217	111°34.693	42°41.220	111°34.704	42°41.217	111°34.715	42°41.216	111°34.725
15	42°41.224	111°34.685	42°41.224	111°34.694	42°41.224	111°34.707	42°41.226	111°34.717	42°41.226	111°34.728
16	42°41.233	111°34.683	42°41.230	111°34.693	42°41.229	111°34.703	42°41.229	111°34.714	42°41.230	111°34.724
17	42°41.242	111°34.678	42°41.241	111°34.689	42°41.241	111°34.705	42°41.243	111°34.714	42°41.244	111°34.726

TABLE A-1

S-X POND POINTS (cont.)

Line	Point 6		Point 7		Point 8	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1	42°41.112	111°34.748	42°41.112	111°34.761	42°41.112	111°34.772
2						
3	42°41.128	111°34.746				
4	42°41.138	111°34.746				
5	42°41.144	111°34.744				
6	42°41.147	111°34.743	42°41.144	111°34.756		
7	42°41.162	111°34.743	42°41.161	111°34.754	42°41.164	111°34.764
8	42°41.172	111°34.745	42°41.172	111°34.755	42°41.171	111°34.761
9	42°41.178	111°34.740	42°41.178	111°34.751	42°41.178	111°34.758
10	42°41.182	111°34.743	42°41.182	111°34.748	42°41.182	111°34.761
11	42°41.188	111°34.738	42°41.188	111°34.750	42°41.188	111°34.759
12	42°41.198	111°34.735	42°41.197	111°34.745	42°41.196	111°34.758
13	42°41.205	111°34.735	42°41.205	111°34.749	42°41.206	111°34.755
14	42°41.215	111°34.735	42°41.215	111°34.742	42°41.214	111°34.756
15	42°41.225	111°34.736	42°41.226	111°34.741	42°41.228	111°34.751
16	42°41.230	111°34.731	42°41.231	111°34.739	42°41.231	111°34.751
17	42°41.244	111°34.733	42°41.244	111°34.742	42°41.244	111°34.748

TABLE A-2

SCRUBBER POND POINTS

	Point 1		Point 2		Point 3		Point 4		Point 5	
Line	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1	42°41.131	111°34.417	42°41.127	111°34.416	42°41.124	111°34.414	42°41.117	111°34.414		
2	42°41.131	111°34.411	42°41.130	111°34.408	42°41.128	111°34.408	42°41.122	111°34.408		
3	42°41.133	111°34.400	42°41.132	111°34.400	42°41.125	111°34.401	42°41.122	111°34.401		
4	42°41.134	111°34.396	42°41.131	111°34.396	42°41.124	111°34.396	42°41.120	111°34.397	42°41.113	111°34.397
5	42°41.134	111°34.390	42°41.129	111°34.388	42°41.127	111°34.388	42°41.123	111°34.389	42°41.115	111°34.388
6	42°41.133	111°34.384	42°41.130	111°34.381	42°41.129	111°34.382	42°41.122	111°34.383	42°41.117	111°34.383
7	42°41.133	111°34.376	42°41.131	111°34.377	42°41.131	111°34.377	42°41.124	111°34.376	42°41.116	111°34.377
8	42°41.136	111°34.371	42°41.131	111°34.371	42°41.128	111°34.372	42°41.124	111°34.373	42°41.117	111°34.373
9	42°41.136	111°34.362	42°41.132	111°34.363	42°41.128	111°34.363	42°41.124	111°34.363	42°41.117	111°34.363
10	42°41.137	111°34.357	42°41.133	111°34.356	42°41.132	111°34.356	42°41.124	111°34.354	42°41.118	111°34.354
11	42°41.139	111°34.351	42°41.134	111°34.349	42°41.128	111°34.349	42°41.124	111°34.349	42°41.119	111°34.349
12	42°41.138	111°34.344	42°41.134	111°34.342	42°41.130	111°34.343	42°41.127	111°34.344	42°41.121	111°34.344
13	42°41.139	111°34.338	42°41.136	111°34.337	42°41.131	111°34.338	42°41.126	111°34.339	42°41.123	111°34.338
14	42°41.137	111°34.331	42°41.137	111°34.331	42°41.136	111°34.330	42°41.129	111°34.331	42°41.119	111°34.333
15	42°41.135	111°34.325	42°41.134	111°34.325	42°41.128	111°34.324	42°41.122	111°34.326	42°41.119	111°34.325
16	42°41.131	111°34.319	42°41.126	111°34.318	42°41.120	111°34.318	42°41.114	111°34.320	42°41.112	111°34.319
17	42°41.126	111°34.314	42°41.127	111°34.312	42°41.124	111°34.312	42°41.117	111°34.313	42°41.113	111°34.313
18	42°41.127	111°34.306	42°41.123	111°34.306	42°41.117	111°34.306	42°41.113	111°34.305	42°41.108	111°34.305
19	42°41.128	111°34.299	42°41.124	111°34.298	42°41.118	111°34.298	42°41.112	111°34.297	42°41.108	111°34.298
20	42°41.120	111°34.294	42°41.120	111°34.292	42°41.114	111°34.290	42°41.108	111°34.292	42°41.106	111°34.291

TABLE A-2

SCRUBBER POND POINTS (cont.)

Line	Point 6		Point 7	
	Latitude	Longitude	Latitude	Longitude
1				
2				
3				
4	42°41.111	111°34.396		
5				
6				
7				
8	42°41.116	111°34.373		
9	42°41.114	111°34.363		
10	42°41.115	111°34.354		
11	42°41.115	111°34.350		
12	42°41.114	111°34.345	42°41.109	111°34.344
13	42°41.118	111°34.339	42°41.112	111°34.339
14	42°41.117	111°34.333	42°41.111	111°34.333
15	42°41.113	111°34.325	42°41.108	111°34.326
16	42°41.106	111°34.318		
17	42°41.107	111°34.312		
18				
19				
20				

TABLE A-3

LIMESTONE SETTLING PONDS

Line	Point 1		Point 2		Point 3		Point 4		Point 5	
	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1	42°41.133	111°34.649	42°41.139	111°34.649	42°41.148	111°34.649	42°41.158	111°34.648	42°41.165	111°34.648
2	42°41.131	111°34.639	42°41.141	111°34.639	42°41.147	111°34.639	42°41.156	111°34.637	42°41.164	111°34.637
3	42°41.132	111°34.628	42°41.139	111°34.627	42°41.149	111°34.627	42°41.157	111°34.626	42°41.163	111°34.625
4	42°41.133	111°34.617	42°41.139	111°34.617	42°41.146	111°34.616	42°41.155	111°34.615	42°41.164	111°34.613
5	42°41.132	111°34.608	42°41.139	111°34.606	42°41.147	111°34.605	42°41.156	111°34.604	42°41.163	111°34.601
6	42°41.129	111°34.595	42°41.138	111°34.594	42°41.146	111°34.593	42°41.154	111°34.594	42°41.162	111°34.591
7	42°41.130	111°34.582	42°41.139	111°34.583	42°41.146	111°34.583	42°41.156	111°34.581	42°41.163	111°34.579
8	42°41.130	111°34.572	42°41.138	111°34.571	42°41.146	111°34.571	42°41.155	111°34.568	42°41.162	111°34.570
9	42°41.131	111°34.563	42°41.139	111°34.560	42°41.147	111°34.559	42°41.155	111°34.559	42°41.161	111°34.558
10	42°41.130	111°34.550	42°41.138	111°34.550	42°41.146	111°34.548	42°41.153	111°34.549	42°41.162	111°34.549
11	42°41.131	111°34.537	42°41.136	111°34.537	42°41.144	111°34.536	42°41.152	111°34.536	42°41.160	111°34.535

TABLE A-4

LANDFILL POINTS

	Point 1		Point 2		Point 3		Point 4		Point 5		Point 6	
Line	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**
1	42°41.325	111°34.473	42°41.326	111°34.485	42°41.328	111°34.496	42°41.328	111°34.508	42°41.329	111°34.519	42°41.328	111°34.525
2	42°41.333	111°34.473	42°41.333	111°34.482	42°41.333	111°34.493	42°41.334	111°34.508	42°41.335	111°34.520	42°41.335	111°34.525
3	42°41.342	111°34.472	42°41.344	111°34.482	42°41.344	111°34.494	42°41.345	111°34.504	42°41.345	111°34.516	42°41.345	111°34.525
4	42°41.350	111°34.470	42°41.351	111°34.480	42°41.352	111°34.492	42°41.351	111°34.504	42°41.352	111°34.515	42°41.352	111°34.524
5	42°41.359	111°34.470	42°41.359	111°34.481	42°41.360	111°34.492	42°41.361	111°34.503	42°41.361	111°34.514	42°41.361	111°34.524
6	42°41.366	111°34.470	42°41.366	111°34.478	42°41.367	111°34.490	42°41.366	111°34.503	42°41.367	111°34.514	42°41.367	111°34.523
7	42°41.375	111°34.468	42°41.375	111°34.480	42°41.375	111°34.492	42°41.374	111°34.503	42°41.376	111°34.513	42°41.375	111°34.523
8	42°41.383	111°34.468	42°41.382	111°34.475	42°41.381	111°34.848	42°41.381	111°34.503	42°41.381	111°34.513	42°41.380	111°34.523
9	42°41.392	111°34.467	42°41.391	111°34.479	42°41.392	111°34.489	42°41.392	111°34.501	42°41.391	111°34.513	42°41.392	111°34.523

TABLE A-5

CALCINE CAP POINTS

	Point 1		Point 2		Point 3		Point 4		Point 5	
Line	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1	42°41.121	111°34.167	42°41.120	111°34.180	42°41.119	111°34.189	42°41.120	111°34.200	42°41.120	111°34.211
2	42°41.128	111°34.166	42°41.127	111°34.177	42°41.128	111°34.188	42°41.126	111°34.200	42°41.125	111°34.212
3	42°41.133	111°34.163	42°41.136	111°34.175	42°41.137	111°34.188	42°41.137	111°34.188	42°41.136	111°34.209
4	42°41.144	111°34.163	42°41.143	111°34.175	42°41.144	111°34.186	42°41.143	111°34.197	42°41.144	111°34.209
5	42°41.154	111°34.162	42°41.152	111°34.175	42°41.154	111°34.186	42°41.153	111°34.196	42°41.154	111°34.208
6	42°41.160	111°34.162	42°41.159	111°34.174	42°41.158	111°34.185	42°41.158	111°34.199	42°41.160	111°34.217
7	42°41.167	111°34.160	42°41.168	111°34.174	42°41.168	111°34.184	42°41.168	111°34.194	42°41.167	111°34.206
8	42°41.177	111°34.160	42°41.176	111°34.172	42°41.175	111°34.182	42°41.177	111°34.196	42°41.177	111°34.206
9	42°41.185	111°34.159	42°41.185	111°34.173	42°41.185	111°34.184	42°41.188	111°34.195	42°41.187	111°34.206
10	42°41.193	111°34.158	42°41.193	111°34.173	42°41.194	111°34.182	42°41.193	111°34.194	42°41.195	111°34.205
11	42°41.200	111°34.157	42°41.200	111°34.172	42°41.202	111°34.184	42°41.203	111°34.196	42°41.203	111°34.206
12	42°41.209	111°34.157	42°41.211	111°34.170	42°41.210	111°34.180	42°41.212	111°34.193	42°41.212	111°34.205
13	42°41.216	111°34.158	42°41.218	111°34.172	42°41.219	111°34.182	42°41.220	111°34.193	42°41.221	111°34.203
14	42°41.226	111°34.157	42°41.227	111°34.170	42°41.228	111°34.179	42°41.229	111°34.191	42°41.229	111°34.204
15	42°41.234	111°34.156	42°41.233	111°34.170	42°41.236	111°34.180	42°41.237	111°34.192	42°41.237	111°34.203
16	42°41.243	111°34.155	42°41.244	111°34.171	42°41.245	111°34.182	42°41.245	111°34.194	42°41.246	111°34.205
17	42°41.251	111°34.155	42°41.252	111°34.169	42°41.252	111°34.181	42°41.254	111°34.192	42°41.254	111°34.202
18	42°41.261	111°34.155	42°41.260	111°34.170	42°41.261	111°34.180	42°41.261	111°34.191	42°41.265	111°34.202
19	42°41.267	111°34.155	42°41.267	111°34.168	42°41.269	111°34.179	42°41.269	111°34.189	42°41.272	111°34.201
20			42°41.279	111°34.166	42°41.278	111°34.180	42°41.279	111°34.189	42°41.279	111°34.200
21			42°41.286	111°34.168	42°41.285	111°34.178	42°41.286	111°34.189	42°41.288	111°34.200
22			42°41.292	111°34.171	42°41.294	111°34.180	42°41.293	111°34.189	42°41.296	111°34.201
23			42°41.301	111°34.169	42°41.302	111°34.178	42°41.303	111°34.188	42°41.304	111°34.199
24					42°41.308	111°34.178	42°41.310	111°34.189	42°41.311	111°34.199

TABLE A-5

CALCINE CAP POINTS (cont.)

	Point 6		Point 7		Point 8		Point 9		Point 10	
Line	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1	42°41.118	111°34.222	42°41.117	111°34.233	42°41.116	111°34.245	42°41.115	111°34.255	42°41.117	111°34.266
2	42°41.127	111°34.221	42°41.127	111°34.232	42°41.127	111°34.243	42°41.127	111°34.254	42°41.125	111°34.264
3	42°41.138	111°34.220	42°41.136	111°34.231	42°41.137	111°34.243	42°41.137	111°34.253	42°41.136	111°34.265
4	42°41.144	111°34.219	42°41.143	111°34.231	42°41.144	111°34.241	42°41.143	111°34.252	42°41.144	111°34.263
5	42°41.153	111°34.218	42°41.152	111°34.230	42°41.152	111°34.242	42°41.151	111°34.264	42°41.151	111°34.264
6	42°41.160	111°34.218	42°41.158	111°34.231	42°41.157	111°34.241	42°41.155	111°34.253	42°41.157	111°34.264
7	42°41.169	111°34.217	42°41.167	111°34.229	42°41.167	111°34.239	42°41.166	111°34.252	42°41.166	111°34.263
8	42°41.177	111°34.218	42°41.177	111°34.227	42°41.176	111°34.241	42°41.176	111°34.259	42°41.175	111°34.262
9	42°41.189	111°34.217	42°41.188	111°34.228	42°41.188	111°34.240	42°41.188	111°34.250	42°41.188	111°34.260
10	42°41.196	111°34.217	42°41.197	111°34.227	42°41.198	111°34.238	42°41.198	111°34.249	42°41.198	111°34.260
11	42°41.203	111°34.214	42°41.205	111°34.225	42°41.206	111°34.238	42°41.206	111°34.250	42°41.206	111°34.262
12	42°41.213	111°34.217	42°41.214	111°34.227	42°41.215	111°34.235	42°41.215	111°34.246	42°41.216	111°34.259
13	42°41.220	111°34.216	42°41.221	111°34.227	42°41.221	111°34.240	42°41.223	111°34.250	42°41.223	111°34.261
14	42°41.230	111°34.216	42°41.229	111°34.225	42°41.230	111°34.234	42°41.232	111°34.247	42°41.232	111°34.258
15	42°41.239	111°34.214	42°41.240	111°34.225	42°41.240	111°34.225	42°41.240	111°34.248	42°41.240	111°34.260
16	42°41.247	111°34.214	42°41.247	111°34.224	42°41.249	111°34.238	42°41.249	111°34.248	42°41.249	111°34.259
17	42°41.254	111°34.214	42°41.255	111°34.224	42°41.255	111°34.237	42°41.257	111°34.246	42°41.257	111°34.257
18	42°41.265	111°34.214	42°41.264	111°34.227	42°41.264	111°34.236	42°41.264	111°34.249	42°41.264	111°34.260
19	42°41.272	111°34.213	42°41.273	111°34.223	42°41.272	111°34.235	42°41.272	111°34.248	42°41.274	111°34.257
20	42°41.279	111°34.211	42°41.281	111°34.222	42°41.280	111°34.233	42°41.283	111°34.245	42°41.283	111°34.259
21	42°41.288	111°34.212	42°41.289	111°34.221	42°41.289	111°34.233	42°41.291	111°34.245	42°41.292	111°34.254
22	42°41.296	111°34.211	42°41.297	111°34.221	42°41.297	111°34.234	42°41.298	111°34.243	42°41.299	111°34.255
23	42°41.304	111°34.210	42°41.305	111°34.221	42°41.304	111°34.234	42°41.306	111°34.242	42°41.307	111°34.254
24	42°41.311	111°34.211	42°41.311	111°34.221	42°41.312	111°34.232	42°41.311	111°34.241	42°41.315	111°34.254

TABLE A-5

CALCINE CAP POINTS (cont.)

	Point 11		Point 12		Point 13		Point 14		Point 15	
Line	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1										
2	42°41.127	111°34.277								
3	42°41.135	111°34.277	42°41.136	111°34.287	42°41.136	111°34.297	42°41.136	111°34.309	42°41.136	111°34.320
4	42°41.142	111°34.275	42°41.143	111°34.285	42°41.142	111°34.297	42°41.143	111°34.308	42°41.142	111°34.339
5	42°41.151	111°34.274	42°41.152	111°34.285	42°41.152	111°34.297	42°41.151	111°34.308	42°41.150	111°34.320
6	42°41.156	111°34.276	42°41.156	111°34.286	42°41.155	111°34.297	42°41.156	111°34.308	42°41.156	111°34.318
7	42°41.166	111°34.272	42°41.167	111°34.284	42°41.166	111°34.296	42°41.166	111°34.367	42°41.164	111°34.317
8	42°41.175	111°34.272	42°41.177	111°34.286	42°41.175	111°34.297	42°41.177	111°34.306	42°41.177	111°34.317
9	42°41.188	111°34.272	42°41.189	111°34.284	42°41.191	111°34.295	42°41.189	111°34.306	42°41.192	111°34.316
10	42°41.199	111°34.271	42°41.200	111°34.282	42°41.200	111°34.293	42°41.201	111°34.305	42°41.201	111°34.316
11	42°41.207	111°34.272	42°41.208	111°34.282	42°41.210	111°34.291	42°41.211	111°34.304	42°41.210	111°34.314
12	42°41.217	111°34.270	42°41.215	111°34.283	42°41.218	111°34.294	42°41.221	111°34.305	42°41.221	111°34.316
13	42°41.223	111°34.272	42°41.225	111°34.293	42°41.225	111°34.293	42°41.225	111°34.305	42°41.226	111°34.316
14	42°41.232	111°34.270	42°41.233	111°34.281	42°41.232	111°34.292	42°41.234	111°34.304	42°41.235	111°34.314
15	42°41.241	111°34.270	42°41.242	111°34.282	42°41.242	111°34.293	42°41.243	111°34.303	42°41.242	111°34.314
16	42°41.250	111°34.269	42°41.249	111°34.280	42°41.252	111°34.290	42°41.254	111°34.301	42°41.253	111°34.313
17	42°41.258	111°34.269	42°41.260	111°34.277	42°41.259	111°34.292	42°41.261	111°34.304	42°41.260	111°34.315
18	42°41.265	111°34.270	42°41.264	111°34.282	42°41.267	111°34.292	42°41.268	111°34.303	42°41.269	111°34.314
19	42°41.276	111°34.270	42°41.276	111°34.278	42°41.275	111°34.292	42°41.276	111°34.302	42°41.276	111°34.313
20	42°41.283	111°34.268	42°41.284	111°34.280	42°41.284	111°34.290	42°41.284	111°34.300	42°41.285	111°34.311
21	42°41.291	111°34.266	42°41.291	111°34.277	42°41.293	111°34.290	42°41.292	111°34.299	42°41.293	111°34.309
22	42°41.299	111°34.266	42°41.299	111°34.277	42°41.301	111°34.287	42°41.302	111°34.298	42°41.303	111°34.309
23	42°41.307	111°34.265	42°41.307	111°34.276	42°41.311	111°34.286	42°41.311	111°34.296	42°41.308	111°34.311
24	42°41.317	111°34.276	42°41.317	111°34.276	42°41.318	111°34.286	42°41.318	111°34.297	42°41.318	111°34.309

TABLE A-5

CALCINE CAP POINTS (cont.)

	Point 16		Point 17		Point 18		Point 19		Point 20	
Line	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1										
2										
3										
4	42°41.143	111°34.331	42°41.143	111°34.340	42°41.142	111°34.349	42°41.142	111°34.359	42°41.141	111°34.370
5	42°41.149	111°34.330	42°41.151	111°34.340	42°41.150	111°34.351	42°41.148	111°34.362	42°41.148	111°34.374
6	42°41.154	111°34.329	42°41.155	111°34.340	42°41.154	111°34.362	42°41.154	111°34.362	42°41.153	111°34.373
7	42°41.164	111°34.328	42°41.163	111°34.340	42°41.164	111°34.351	42°41.162	111°34.362	42°41.163	111°34.373
8	42°41.177	111°34.327	42°41.177	111°34.337	42°41.176	111°34.350	42°41.177	111°34.362	42°41.175	111°34.273
9	42°41.190	111°34.328	42°41.191	111°34.339	42°41.191	111°34.350	42°41.191	111°34.361	42°41.192	111°34.372
10	42°41.201	111°34.327	42°41.202	111°34.337	42°41.203	111°34.351	42°41.204	111°34.360	42°41.204	111°34.369
11	42°41.210	111°34.327	42°41.211	111°34.337	42°41.212	111°34.349	42°41.213	111°34.361	42°41.214	111°34.369
12	42°41.224	111°34.326	42°41.223	111°34.337	42°41.223	111°34.345	42°41.221	111°34.357	42°41.221	111°34.369
13	42°41.226	111°34.316	42°41.227	111°34.337	42°41.227	111°34.350	42°41.227	111°34.361	42°41.228	111°34.370
14	42°41.235	111°34.325	42°41.235	111°34.335	42°41.236	111°34.346	42°41.236	111°34.357	42°41.237	111°34.371
15	42°41.244	111°34.325	42°41.243	111°34.336	42°41.245	111°34.347	42°41.246	111°34.357	42°41.245	111°34.368
16	42°41.253	111°34.325	42°41.256	111°34.336	42°41.255	111°34.346	42°41.255	111°34.357	42°41.258	111°34.384
17	42°41.261	111°34.326	42°41.261	111°34.336	42°41.261	111°34.348	42°41.262	111°34.357	42°41.264	111°34.370
18	42°41.269	111°34.326	42°41.271	111°34.334	42°41.273	111°34.345	42°41.272	111°34.357	42°41.272	111°34.357
19	42°41.277	111°34.324	42°41.277	111°34.334	42°41.278	111°34.345	42°41.278	111°34.356	42°41.278	111°34.367
20	42°41.286	111°34.324	42°41.286	111°34.335	42°41.288	111°34.345	42°41.288	111°34.355	42°41.290	111°34.367
21	42°41.293	111°34.321	42°41.293	111°34.332	42°41.295	111°34.343	42°41.297	111°34.355	42°41.297	111°34.367
22	42°41.303	111°34.319	42°41.303	111°34.330	42°41.305	111°34.342	42°41.304	111°34.353		
23	42°41.311	111°34.319								
24										

TABLE A-5

CALCINE CAP POINTS (cont.)

	Point 21		Point 22		Point 23		Point 24		Point 25	
Line	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
1										
2										
3										
4	42°41.141	111°34.385	42°41.139	111°34.396						
5	42°41.146	111°34.305	42°41.145	111°34.397						
6	42°41.152	111°34.388	42°41.152	111°34.396						
7	42°41.163	111°34.389	42°41.163	111°34.395						
8	42°41.176	111°34.383	42°41.176	111°34.395						
9	42°41.193	111°34.384	42°41.193	111°34.394						
10	42°41.202	111°34.379	42°41.206	111°34.392						
11	42°41.214	111°34.380	42°41.214	111°34.391						
12	42°41.225	111°34.382	42°41.223	111°34.391						
13	42°41.229	111°34.381	42°41.230	111°34.393						
14	42°41.237	111°34.381	42°41.237	111°34.392						
15	42°41.246	111°34.380	42°41.247	111°34.390	42°41.247	111°34.403				
16	42°41.258	111°34.384	42°41.257	111°34.392	42°41.257	111°34.402				
17	42°41.264	111°34.380	42°41.265	111°34.394	42°41.285	111°34.402				
18	42°41.274	111°34.379	42°41.274	111°34.391	42°41.275	111°34.402				
19	42°41.280	111°34.378	42°41.281	111°34.390	42°41.280	111°34.402				
20	42°41.290	111°34.381	42°41.290	111°34.390	42°41.292	111°34.402				
21	42°41.298	111°34.377								
22										
23										
24										

TABLE A-6

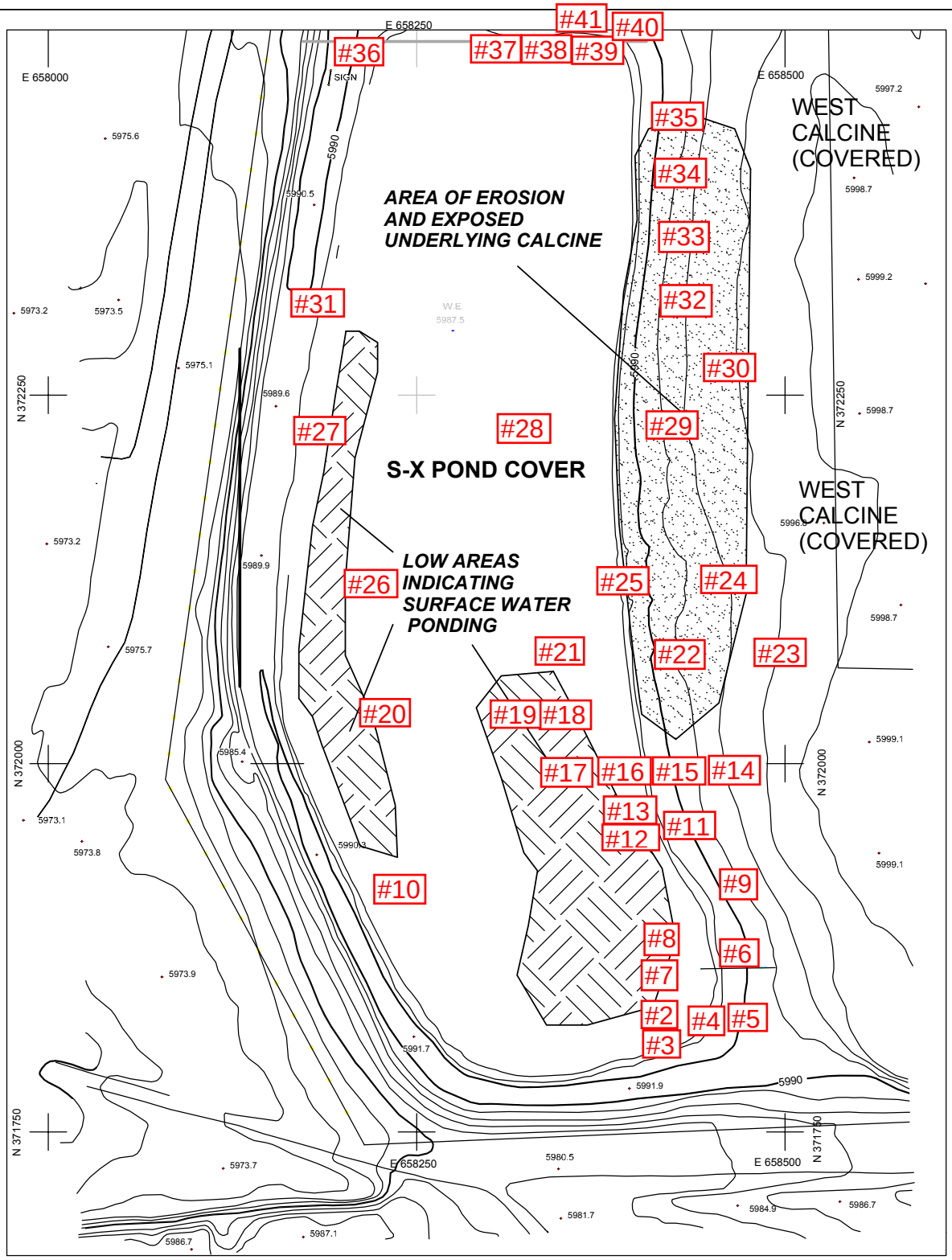
MAP POND POINTS

	Point 1		Point 2		Point 3		Point 4	
Line	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**
1	42°41.273	111°34.527	42°41.276	111°34.537	42°41.274	111°34.550	42°41.274	111°34.560
2	42°41.279	111°34.528	42°41.281	111°34.540	42°41.281	111°34.551	42°41.282	111°34.560
3	42°41.287	111°34.525	42°41.291	111°34.536	42°41.287	111°34.548	42°41.290	111°34.557
4	42°41.296	111°34.525	42°41.296	111°34.536	42°41.296	111°34.545	42°41.295	111°34.558

TABLE A-

FORMER PLANT SITE POINTS

	Point 1		Point 2		Point 3		Point 4		Point 5		Point 6	
Line	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**	**Latitude**	**Longitude**
1	42°41.198	111°34.505	42°41.199	111°34.494	42°41.199	111°34.482	42°41.198	111°34.469	42°41.198	111°34.458	42°41.198	111°34.449
2	42°41.204	111°34.504	42°41.203	111°34.492	42°41.206	111°34.483	42°41.205	111°34.472	42°41.206	111°34.464	42°41.206	111°34.451
3	42°41.211	111°34.503	42°41.212	111°34.484	42°41.212	111°34.480	42°41.212	111°34.473	42°41.212	111°34.461	42°41.212	111°34.448
4	42°41.220	111°34.504	42°41.219	111°34.492	42°41.218	111°34.479	42°41.220	111°34.469	42°41.220	111°34.458	42°41.220	111°34.446
5	42°41.228	111°34.504	42°41.229	111°34.489	42°41.227	111°34.474	42°41.227	111°34.470	42°41.226	111°34.458	42°41.228	111°34.450



50 25 0 50 100 150

SCALE 1"=50'

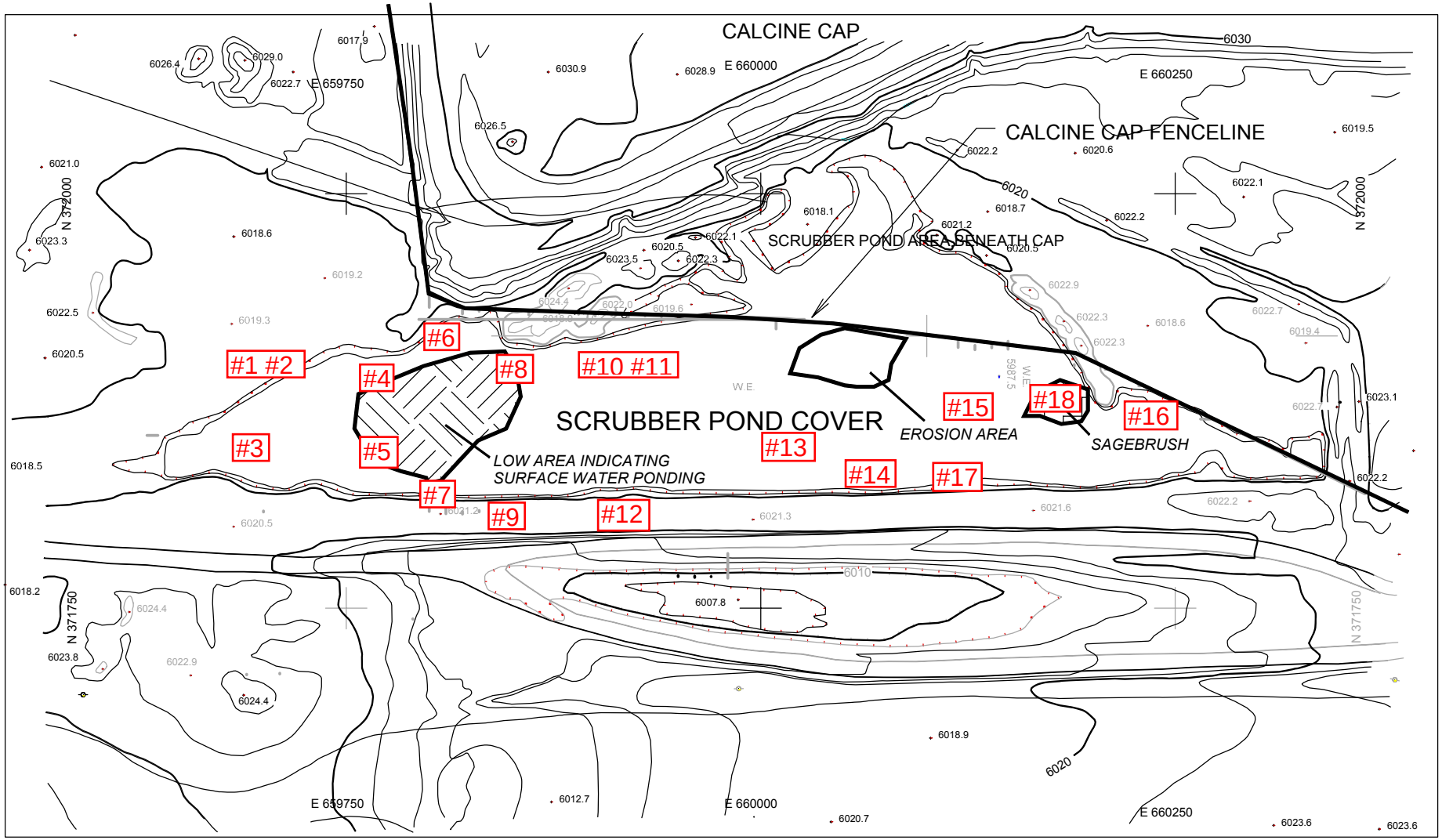
CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

TRONOX SODA SPRINGS, IDAHO
DRAFT REMEDY EVALUATION REPORT

S-X POND COVER INSPECTION RESULTS

FIGURE A-1



50 25 0 50 100 150

SCALE as shown

CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

DRAFT REMEDY EVALUATION REPORT

TITLE

SCRUBBER POND COVER INSPECTION RESULTS

SIZE	CAGE CODE	DWG NO	REV
A			1

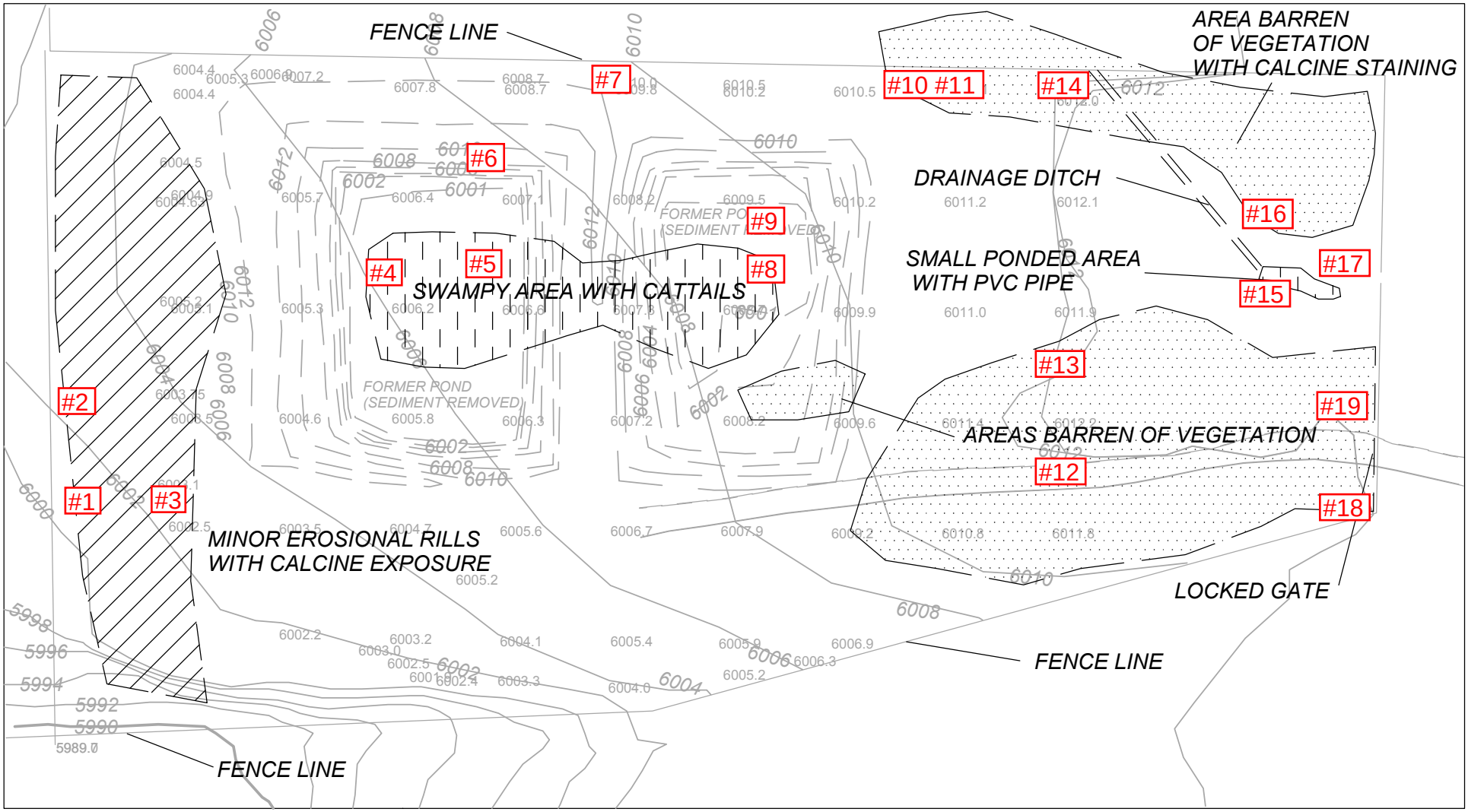
DRAWN BY J.S.BROWN P.G.

DATE: 2/14/09

SCALE

SHEET

FIGURE- A-2



50 25 0 50 100 150

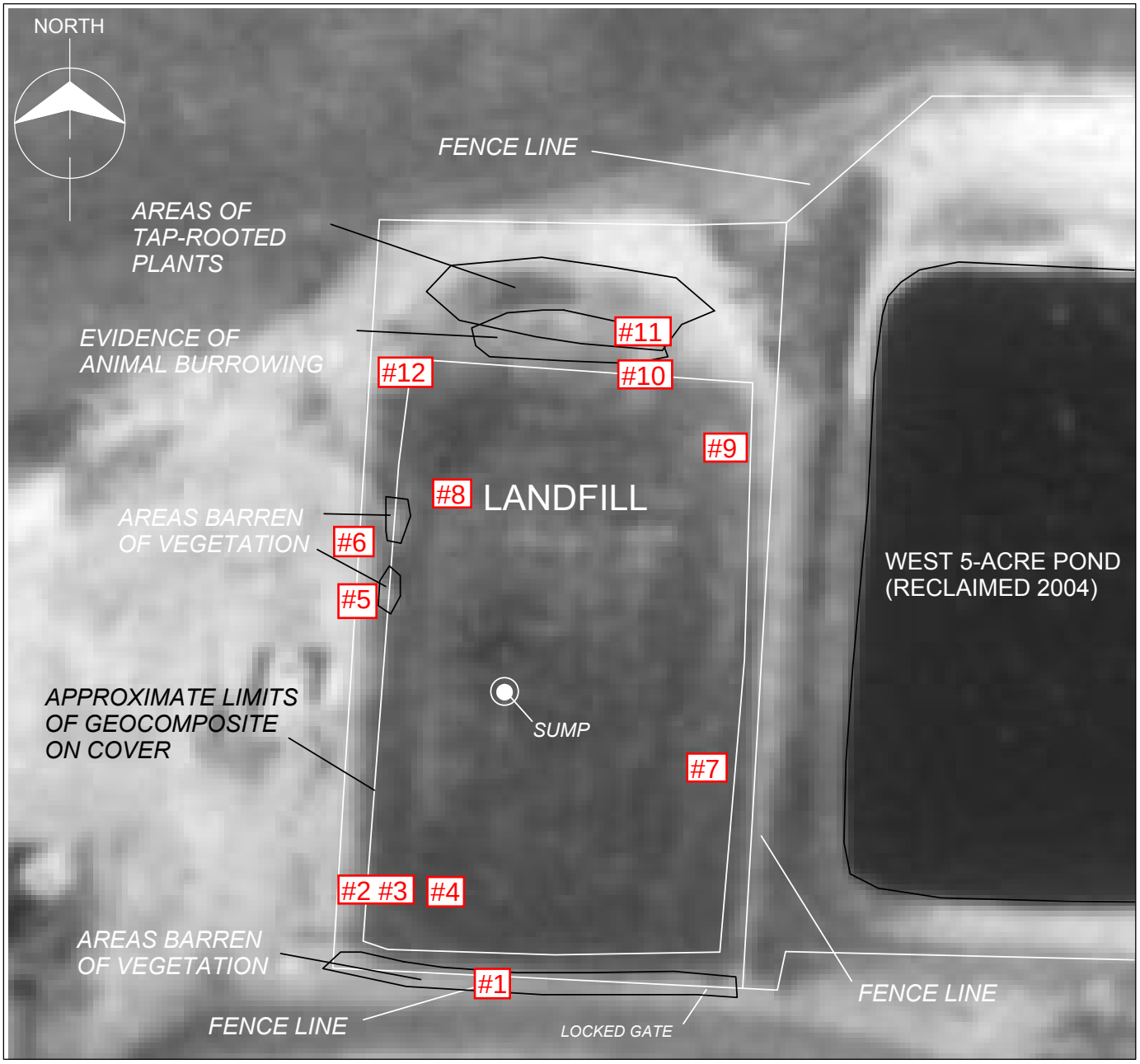
REMEDIAL INVESTIGATION REPORT, DAMES & MOORE, 1995

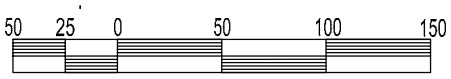
DRAFT REMEDY EVALUATION REPORT

TITLE

LIMESTONE SETTLING PONDS INSPECTION RESULTS

DRAWN BY J.S.BROWN P.G.	SIZE A	CAGE CODE	DWG NO	REV 1
DATE: 2/16/09	SCALE		SHEET	FIGURE- A-3



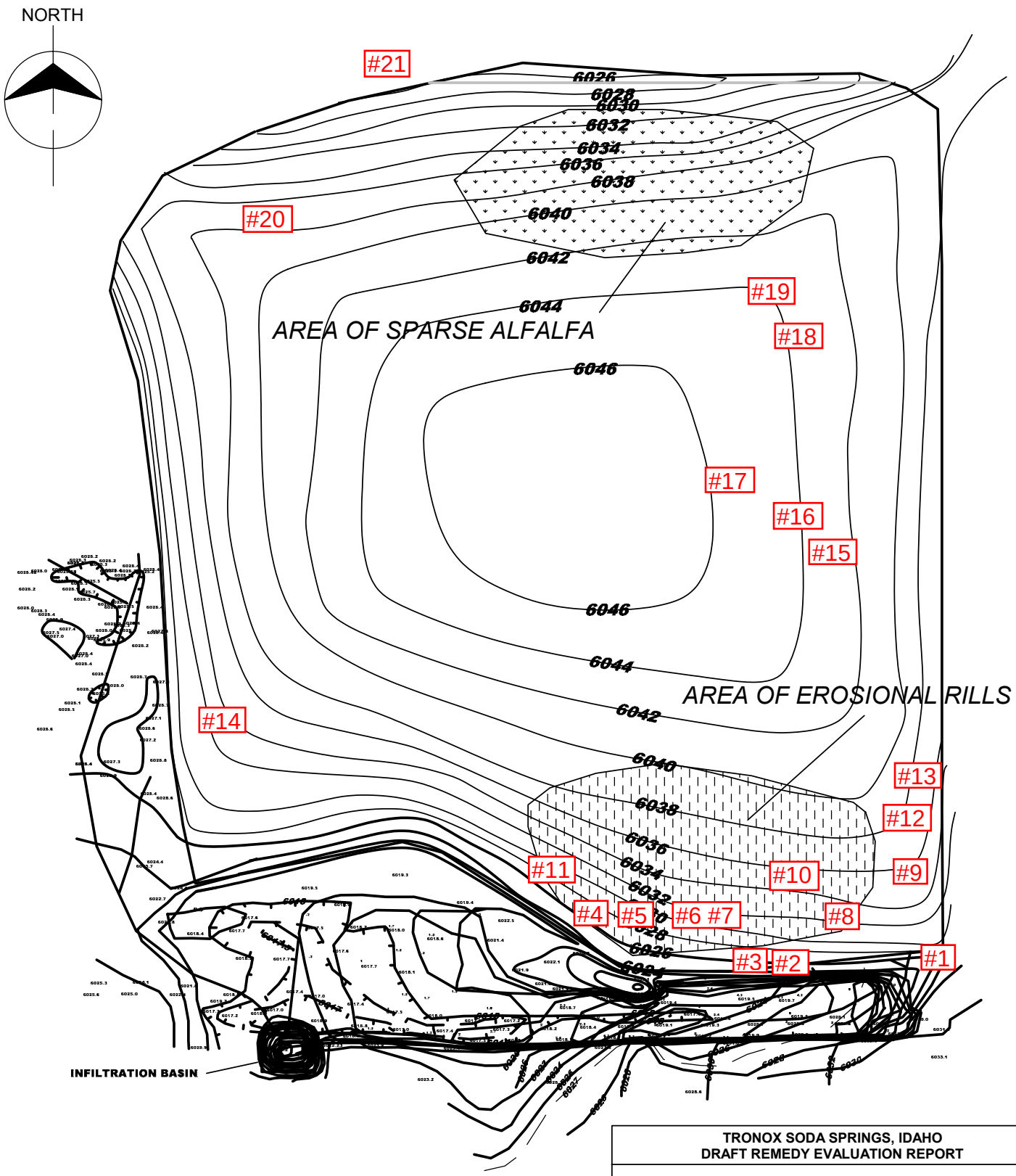


DATE OF PHOTOGRAPHY SEPTEMBER 7, 2000

DRAFT REMEDY EVALUATION REPORT

ON-SITE LANDFILL INSPECTION RESULTS

FIGURE A-4



50 25 0 50 100 150

SCALE

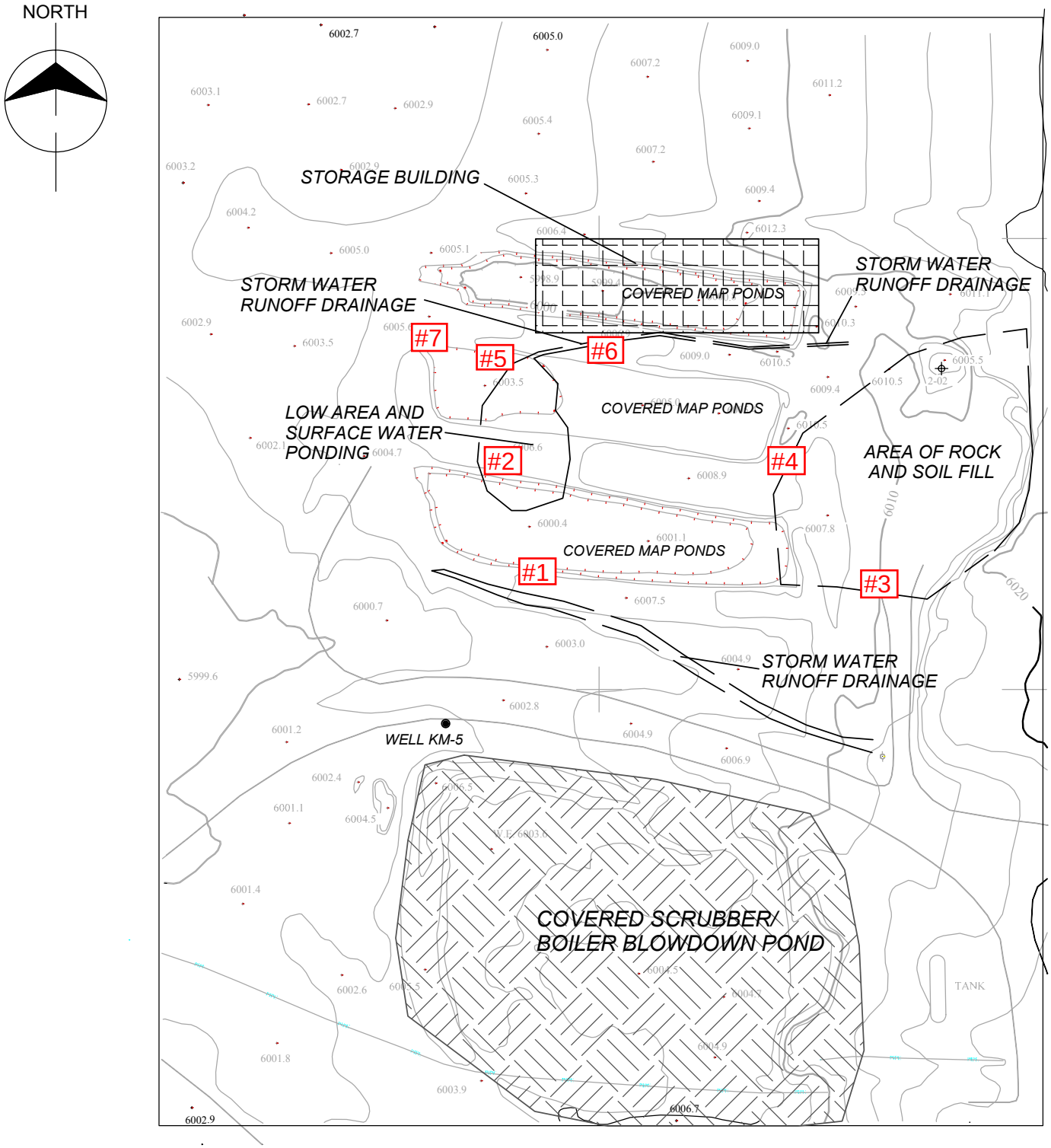
CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

TRONOX SODA SPRINGS, IDAHO
DRAFT REMEDY EVALUATION REPORT

CALCINE CAP INSPECTION RESULTS

FIGURE A-5



TRONOX SODA SPRINGS, IDAHO
DRAFT REMEDY EVALUATION REPORT

MAP PONDS INSPECTION RESULTS

SCALE

CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

FIGURE A-6

S-X POND
PHOTO LOG

Photo 2: Lat: 42°41.119 Long: 111°34.715
Low area, no vegetation, possible standing water. Photo taken from the east.

Photo 3: Lat: 42°41. 124 Long: 111°34.719
No vegetation with possible standing water. Photo taken from the south.

S-X POND
PHOTO LOG

Photo 4: Lat: 42°41.122 Long: 111°34.704
Low area, no vegetation. Photo taken from the south.

Photo 5: Lat: 42°41.122 Long: 111°34.694
Area with no vegetation. Photo taken from the southeast.

S-X POND
PHOTO LOG

Photo 6: Lat: 42°41.125 Long: 111°34.696
Four areas of no vegetation. Photo taken from the southeast.

Photo 7: Lat: 42°41.130 Long: 111°34.713
Low areas with no vegetation. Photo taken from the southeast.

S-X POND
PHOTO LOG

Photo 8: Lat: 42°41.129 Long: 111°34.713
Area with no vegetation, possible water accumulation. Photo taken from the north.

Photo 9: Lat: 42°41.141 Long: 111°34.698
Area of no vegetation with possible standing water drains to NW. Taken from SE.

S-X POND
PHOTO LOG

Photo 10: Lat: 42°41.138 Long: 111°34.146
Sink Hole about 2.5 ft in dia. And 18" deep. Photo taken from the east.

Photo 11: Lat: 42°41.147 Long: 111°34.702
Photo taken from east low area runs NW, SE.

S-X POND
PHOTO LOG

Photo 12: Lat: 42°41.147 Long:111°34.711
Low area with no vegetation. Photo taken from the east.

Photo 13: Lat: 42°41.146 Long: 111°34.715
Low area with water accumulation, drainage to the NW. Photo taken from the east.

S-X POND
PHOTO LOG

Photo 14: Lat: 42°41.154 Long: 111°34.60
Large bare area. Calcine exposed in rills. Photo taken from the south.

Photo 15: Lat: 42°41.154 Long: 111°34.700
Bare area, photo taken from the south.

S-X POND
PHOTO LOG

Photo 16: Lat: 42°41.151 Long: 111°34.706
Low area with no vegetation. Photo taken from southeast.

Photo 17: Lat: 42°41.151 Long: 111°34.719
Bare area running SE-NW. Photo taken from southeast.

S-X POND
PHOTO LOG

Photo 18: Lat: 42°41.159 Long: 111°34.719
Bare area connected to Photo 17. Photo from northeast.

Photo 19: Lat: 42°41.161 Long: 111°34.720
Bare area, photo taken from the southeast.

S-X POND
PHOTO LOG

Photo 20: Lat: 42°41.161 Long: 111°34.754
Bare area running N-S. Photo taken from the south.

Photo 21: Lat: 42°41.171 Long: 111°34.718
Bare area running N-S. Photo taken from the south.

S-X POND
PHOTO LOG

Photo 22: Lat: 42°41.169 Long: 111°34.718 (south end)
Bare area, photo taken from south.

Photo 23: Lat: 42°41.169 Long: 111°34.687
Bare area running N-S. Photo taken from the south.

S-X POND
PHOTO LOG

Photo 24: Lat: 42°41.177 Long: 111°34.687
Exposed calcine. Photo taken from the east.

Photo 25: Lat: 42°41.176 Long: 111°34.711
Bare area, photo taken from the northeast.

S-X POND
PHOTO LOG

Photo 26: Lat: 42°41.177 Long: 111°34.728
Bare area, possible water accumulation, photo taken from north/northwest.

Photo 27: Lat: 42°41.188 Long: 111°34.750
N-S bare area, photo taken from the south.

S-X POND
PHOTO LOG

Photo 28: Lat: 42°41.190 Long: 111°34.719
Bare area. Photo taken from the south.

Photo 29: Lat: 42°41.193 Long: 111°34.695
Exposed calcine, photo taken from the west.

S-X POND
PHOTO LOG

Photo 30: Lat: 42°41.199 Long: 111°34.686
Bare area with ant hill. Photo taken from the north.

Photo 31: Lat: 42°41. 206 Long: 111°34.748
Bare area, photo taken from the north.

S-X POND
PHOTO LOG

Photo 32: Lat: 42°41.207 Long:111°34.697
Bare spot at east edge of pond, photo taken from the south.

Photo 33: Lat: 42°41.219 Long: 111°34.694
Bare area with calcine just above pond's east edge. Photo taken from the south.

S-X POND
PHOTO LOG

Photo 34: Lat: 42°41.224 Long: 111°34.694
Bare area with exposed calcine. Photo taken from the south.

Photo 35: Lat: 42°41.234 Long: 111°34.699
Bare area at ponds NE edge. Photo taken from the southeast.

S-X POND
PHOTO LOG

Photo 36: Lat: 42°41.242 Long: 111°34.730
Burrowing animal hole. Photo taken from the east.

Photo 37: Lat: 42°41.243 Long: 111°34.714
Bare area at edge of pond. Photo taken from the west.

S-X POND
PHOTO LOG

Photo 38: Lat: 42°41.155 Long: 111°34.698
Burrowing animal hole. Photo taken from the west.

Photo 39: Lat: 42°41.229 Long: 111°34.715
Bare area, photo taken from the west.

S-X POND
PHOTO LOG

Photo 40: Lat: 42°41.143 Long: 111°34.734
Burrowing animal hole. Photo taken from the north.

Photo 41: Lat: 42°41.216 Long: 111°34.740
Burrowing animal hole. Photo taken from the west.

SCRUBBER POND
PHOTO LOG

Photo 1: Lat: 42°41.130 Long: 111°34.408
Drain from west side calcine photo taken from south.

Photo 2: Lat: 42°41.130 Long: 111°34.408
Drain from west side of cap, photo taken from the west.

SCRUBBER POND
PHOTO LOG

Photo 3: Lat: 42°41.127 Long: 111°34.408
Bare area, photo taken from the south.

Photo 4: Lat: 42°41.131 Long: 111°34.392
Large bare area, photo taken from the west.

SCRUBBER POND
PHOTO LOG

Photo 5: Lat: 42°41.123 Long: 111°34.396
Bare area, photo taken from the west.

Photo 6: Lat: 42°41.130 Long: 111°34.377
Bare area, evidence of water accumulation, photo taken from the northwest.

SCRUBBER POND
PHOTO LOG

Photo 7: Lat: 42°41.123 Long: 111°34.389
Bare area connected to area in photo 6. Taken from the west.

Photo 8: Lat: 42°41.131 Long: 111°34.377
Evidence of standing water, drain to infiltration basin. Photo from NW.

SCRUBBER POND
PHOTO LOG

Photo 9: Lat: 42°41.104 Long: 111°34.361
Infiltration basin. Photo taken from the north.

Photo 10: Lat: 42°41.153 Long: 111°34.356
Large bare area, photo taken from the northeast.

SCRUBBER POND
PHOTO LOG

Photo 11: Lat: 42°41.153 Long: 111°34.356
Large bare area, photo taken from the northeast.

Photo 12: Lat: 42°41.108 Long: 111°34.356
Pond drain into basin. Photo taken from the north.

SCRUBBER POND
PHOTO LOG

Photo 13: Lat: 42°41.126 Long: 111°34.339
Bare area eastern side of pond. Photo taken from the west.

Photo 14: Lat: 42°41.120 Long: 111°34.337
Bare area, photo taken from the west.

SCRUBBER POND
PHOTO LOG

Photo 15: Lat: 42°41.114 Long: 111°34.370
Bare area, photo taken from the east.

Photo 16: Lat: 42°41.120 Long: 111°34.292
Crusted limestone (old road?) photo taken from the west.

SCRUBBER POND
PHOTO LOG

Photo 17: Lat: 42°41.106 Long: 111°34.306
Erosional rill along south edge of high area. Photo taken from the east.

Photo 18: East half of cover.
Volunteer sagebrush.

LIMESTONE SETTLING POND PHOTO LOG

Photo 1: Lat: 42°41.133 Long: 111°34.649
Erosional rill, photo taken from the west.

Photo: 2 Lat: 42°41.139 Long: 111°34.649
Burrowing animal holes. Photo taken from the west.

LIMESTONE SETTLING POND PHOTO LOG

Photo 3: Lat: 42°41.131 Long: 111°34.639
Bare spot, photo taken from the south.

Photo 4: Lat: 42°41.146 Long: 111°43.616
Surface runoff, photo taken from the west.

LIMESTONE SETTLING POND PHOTO LOG

Photo 5: Lat: 42°41.163 Long: 111°34.601
West edge of cattails, photo taken from the west.

Photo 6: Lat: 42°41.156 Long: 111°34.604
Deep taproot plant, photo taken from the west.

LIMESTONE SETTLING POND PHOTO LOG

Photo 7: Lat: 42°41.162 Long: 111°34.591
Bare area, photo taken from the north.

Photo 8: Lat: 42°41.146 Long: 111°34.583
Bare area. Photo taken from the west.

LIMESTONE SETTLING POND PHOTO LOG

Photo 9: Lat: 42°41.146 Long: 111°34.583
Animal hole. Photo taken from the east.

Photo 10: Lat: 42°41.162 Long: 111°34.570
Large bare area with calcine staining. Photo taken from the east.

LIMESTONE SETTLING POND PHOTO LOG

Photo 11: Lat: 42°41.162 Long: 111°34.570
Drainage ditch at the east end of the fenced area. Photo taken from the northeast.

Photo 12: Lat: 42°41.130 Long: 111°34.572
Access road, photo taken from the west.

LIMESTONE SETTLING POND PHOTO LOG

Photo 13: Lat: 42°41.1.39 Long: 111°34.560
Edge of large bare area, photo taken from the west.

Photo 14: Lat: 42°41.161 Long: 111°34.558
Large bare area, photo taken from the east.

LIMESTONE SETTLING POND PHOTO LOG

Photo 15: Lat: 42°41.146 Long: 111°34.548
Small pond near east fence. Photo taken from the south.

Photo 16: Lat: 42°41.146 Long: 111°34.548
Bare area north of small pond. Photo taken from the southeast.

LIMESTONE SETTLING POND PHOTO LOG

Photo 17: Lat: 42°41.147 Long: 111°34.545
Animal hole on the east side of small pond. Photo taken from the north.

Photo 18: Lat: 42°41.131 Long: 111°34.537
Drainage along south fence. Photo taken from the east.

LIMESTONE SETTLING POND PHOTO LOG

Photo 19: Lat: 42°41.140 Long: 111°34.543 (center)
Bare area with calcine staining. Photo taken from the south.

ON-SITE LANDFILL
PHOTO LOG

Photo 1: Bare area along south fence.
Photo taken from the west.

Photo 2: Lat: 42° 41.335 Long: 111° 34.525
Burrowing animal hole. Photo taken from the west.

ON-SITE LANDFILL
PHOTO LOG

Photo 3: Lat: 42°41.335 Long: 111°34.525
Burrowing animal hole. Photo taken from the west.

Photo 4: Lat: 42°41.335 Long: 111°34.520
Burrowing animal hole. Photo from the south.

ON-SITE LANDFILL
PHOTO LOG

Photo 5: Lat: 42°41.361 Long: 111°34.524 (outside of landfill boundaries)
Area of dead vegetation. Photo taken from the west.

Photo 6: Burrow hole under fence.
Picture from the east.

ON-SITE LANDFILL
PHOTO LOG

Photo 7: Lat: 42° 41.344 Long: 111° 34.482
Evidence of burrowing animals. Photo taken from the north.

Photo 8: Lat: 42°41.375 Long: 111°34.523
Clear area with sparse vegetation. Photo taken from the west.

ON-SITE LANDFILL
PHOTO LOG

Photo 9: Lat: 42°41.382 Long: 111°34.475
Big burrowing animal hole outside of landfill footprint.

Photo 10: Lat: 42°41.392 Long: 111°34.489
Unidentified deep taproot plant outside of landfill footprint. Photo taken from the north.

ON-SITE LANDFILL
PHOTO LOG

Photo 11: Lat: 42°41.392 Long: 111°34.489
Clump of alfalfa near north fence. Photo taken from the south.

Photo 12: Lat: 42°41.372 Long: 111°34.523
Clump of alfalfa outside of landfill footprint. Photo taken from the west.

CALCINE CAP
PHOTO LOG

Photo 1: Lat: 42°41.121 Long: 111°34.167
Animal digging under the fence. Photo taken from the north.

Photo 2: Lat: 42°41.120 Long: 111°34.211
Tumbleweeds, photo taken from the west.

CALCINE CAP
PHOTO LOG

Photo 3: Lat: 42°41.118 Long: 111°34.222
Thistles, photo taken from the east.

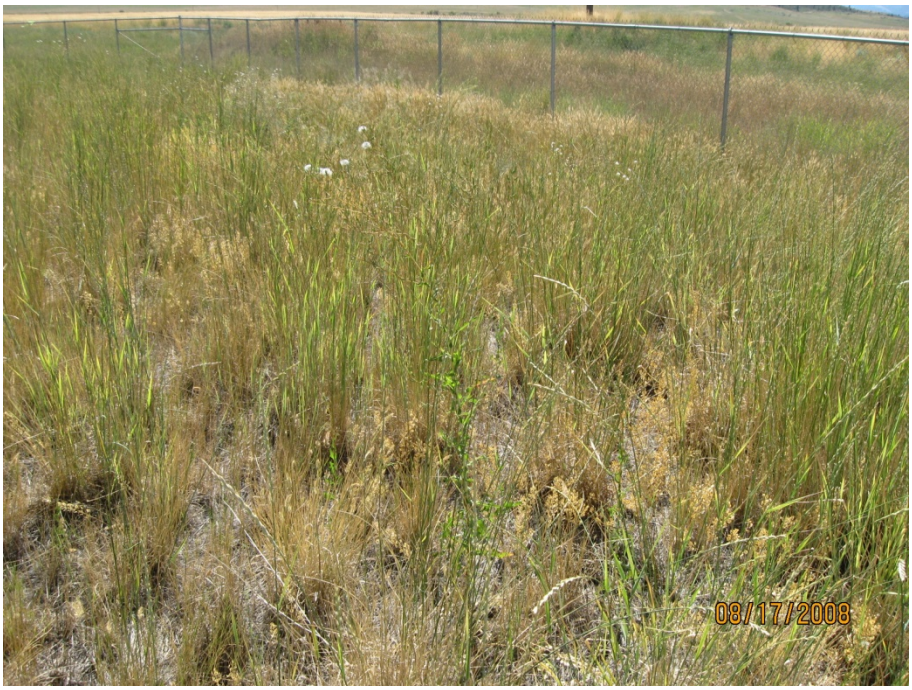


Photo 4: Lat: 42°41.927 Long: 111°34.277
Possible deep taproot plant. Photo taken from the north.

CALCINE CAP
PHOTO LOG

Photo 5: Lat: 42°41.125 Long: 111°34.265
Burrowing animal hole, photo taken from the north.

Photo 6: Lat: 42°41.128 Long: 111°34.248
Erosion rill, photo taken from the south.

CALCINE CAP
PHOTO LOG

Photo 7: Lat: 42°41.127 Long: 111°34.240
Erosion rill, photo taken from the south.

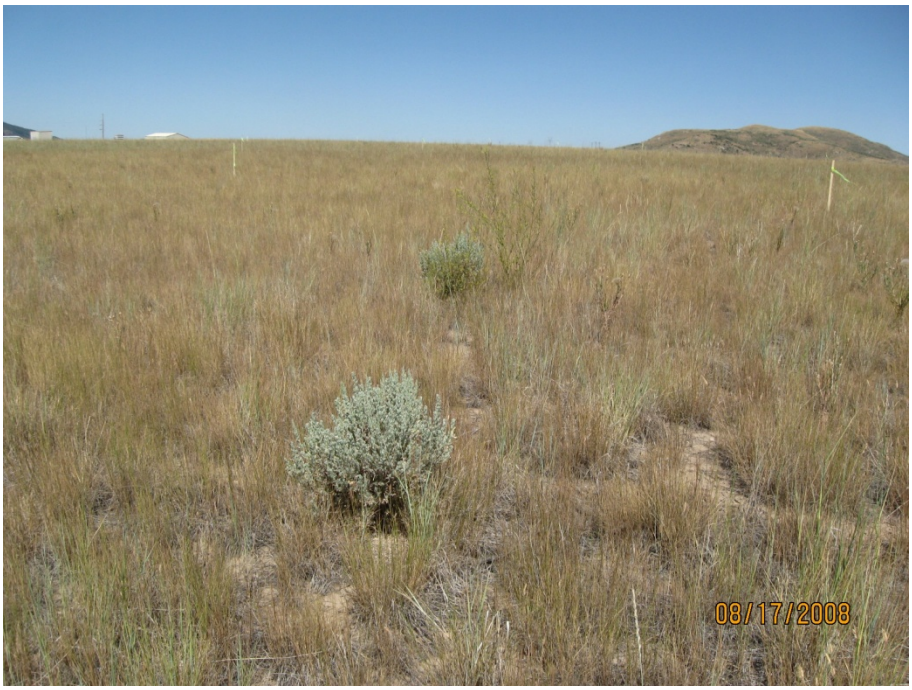


Photo 8: Lat: 42°41. 126 Long: 111°34.200
Sagebrush, photo taken from the east.

CALCINE CAP
PHOTO LOG

Photo 9: Lat: 42°41.138 Long: 111°34.167
Alfalfa, photo taken from the east.

Photo 10: Lat: 42°41.137 Long: 111°34.217
Animal hole, photo taken from the north.

CALCINE CAP
PHOTO LOG

Photo 11: Lat: 42°41.138 Long: 111°34.295
Animal hole, photo taken from the northwest.

Photo 12: Lat: 42°41.143 Long: 111°34.175
Sagebrush, photo taken from the east.

CALCINE CAP
PHOTO LOG

Photo 13: Lat: 42°41.154 Long: 111°34.171
Animal holes, photo taken from the east.

Photo 14: Lat: 42°41.155 Long: 111°34.355
Erosion rill, photo taken from the north.

CALCINE CAP
PHOTO LOG

Photo 15: Lat: 42°41.203 Long: 111°34.195
Animal hole, photo taken from the southeast.

Photo 16: Lat: 42°41.214 Long: 111°34.232
Animal hole, photo taken form the northwest.

CALCINE CAP
PHOTO LOG

Photo 17: Lat: 42°41.226 Long: 111°34.357
Animal hole, photo taken from the north.

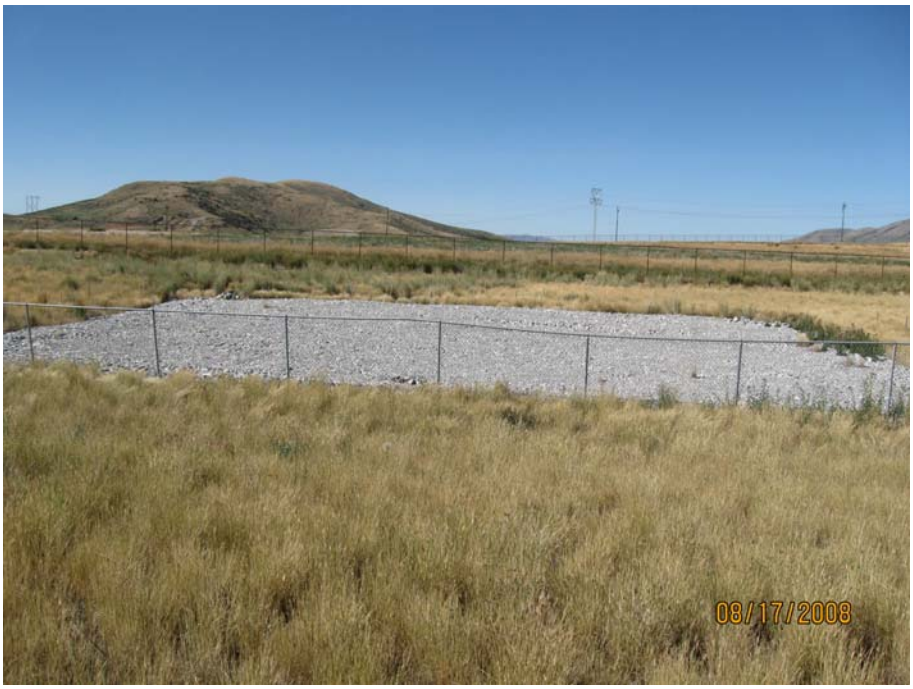
Photo 18: Lat: 42°41.245 Long: 111°34.219
Animal hole, photo taken from the southwest.

CALCINE CAP
PHOTO LOG

Photo 19: Lat: 42°41.272 Long: 111°34.225
Canadian thistle, photo taken from the southeast.

Photo 20: Lat: 42°41.290 Long: 111°34.381
Alfalfa.

CALCINE CAP
PHOTO LOG



North infiltration basin.

FORMER VANADIUM PLANT PHOTO LOG

Photo 1: West side of old plant.
Old concrete floors exposed, photo taken from the southwest.

Photo 2: South side of plant.
Old concrete floors exposed, photo from the south.

FORMER VANADIUM PLANT PHOTO LOG

Photo 3: Lat: 42° 41.199' Long: 111° 34.482'
Exposed concrete. Old S-X Floor.

Photo 4: Former plant site from the south.

FORMER VANADIUM PLANT PHOTO LOG

Photo 5: Lat: 42° 41.198' Long: 111° 34.469'
Water accumulation area. Photo taken from the south.

Photo 6: Lat: 42° 41.212' Long: 111° 34.484'
Wet area near old leach area. Photo taken from the south.

FORMER VANADIUM PLANT PHOTO LOG

Photo 7: Lat: 42° 41.212' Long: 111° 34.448'
Water accumulation area. Photo taken from the south.

Photo 8: Lat: 42° 41.219' Long: 111° 34.492'
Water accumulation area. Photo taken from the north.

FORMER VANADIUM PLANT PHOTO LOG

Photo 10: Area of coarser material on surface.
Photo taken from the northwest.

MAP POND
PHOTO LOG

Photo 1: Lat: 42°41.275 Long: 111°34.556
Storm water drainage across southern edge. Photo taken from the west.

Photo 2: Lat: 42°41.282 Long: 111°34.552
Low spot in pond area, photo taken from the south.

MAP POND
PHOTO LOG

Photo 3: Lat: 42°41.276 Long: 111°34.528
Storm water, run onto pond area. Photo taken from the west.

Photo 4: Lat: 42°41.285 Long: 111°34.532
Fill material, photo taken from the west.

MAP POND
PHOTO LOG

Photo 5: Lat: 42°41.287 Long: 111°34.544
Bare area, photo taken from the northwest.

Photo 6: Lat: 42°41.296 Long: 111°34.525
Storm water run on to pond area, photo taken from the west.

MAP POND
PHOTO LOG

Photo 7: Lat: 42°41.295 Long: 111°34.558
Bare area and storm water run on. Photo taken from the west.

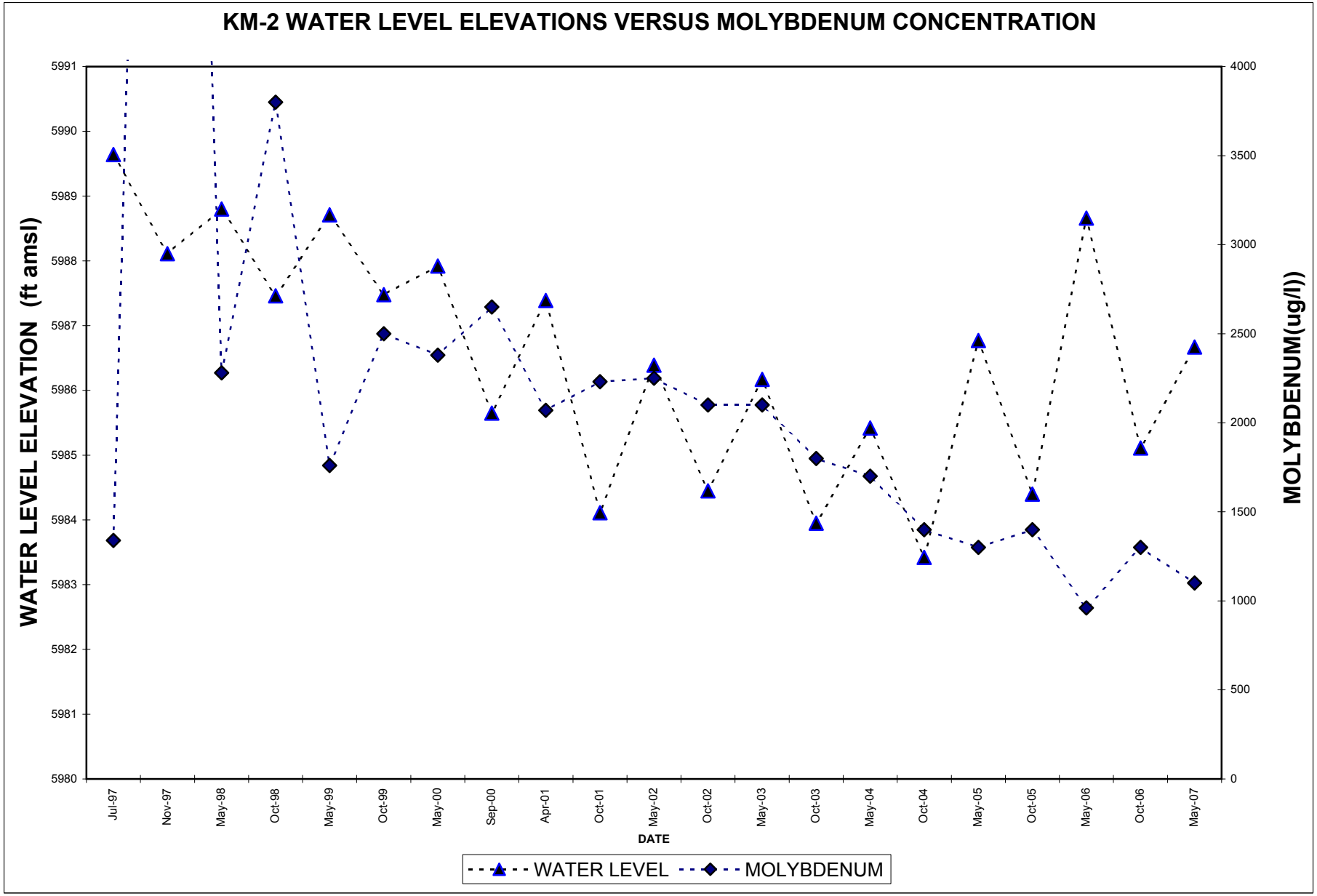

KM-2 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5991
5990
5989
5988
5987
5986
5985
5984
5983
5982
5981
5980
4000
3500
3000
2500
2000
1500
1000
500
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-1

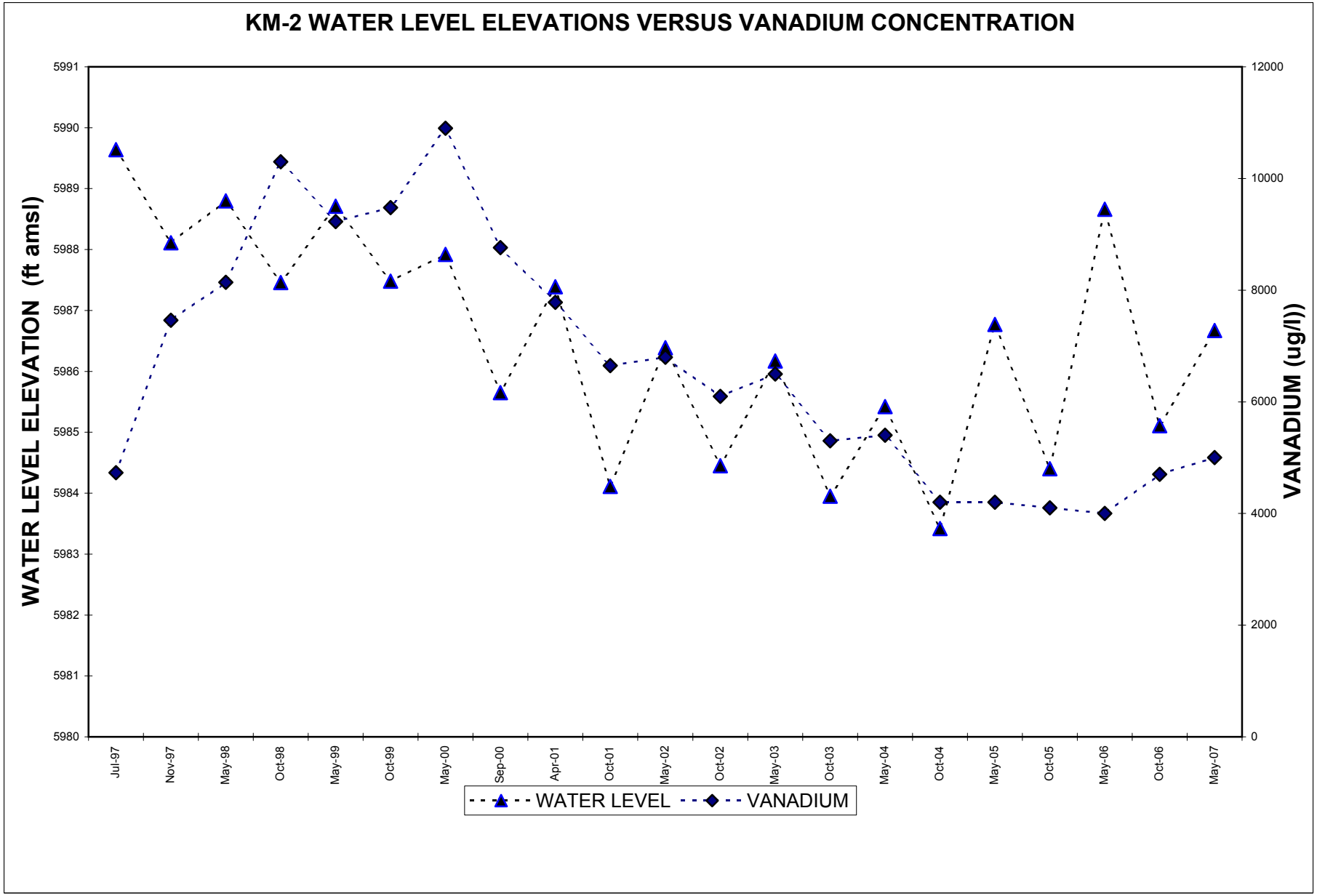

KM-2 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5991
5990
5989
5988
5987
5986
5985
5984
5983
5982
5981
5980
12000
10000
8000
6000
4000
2000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
WATER LEVEL
VANADIUM

FIGURE C-2

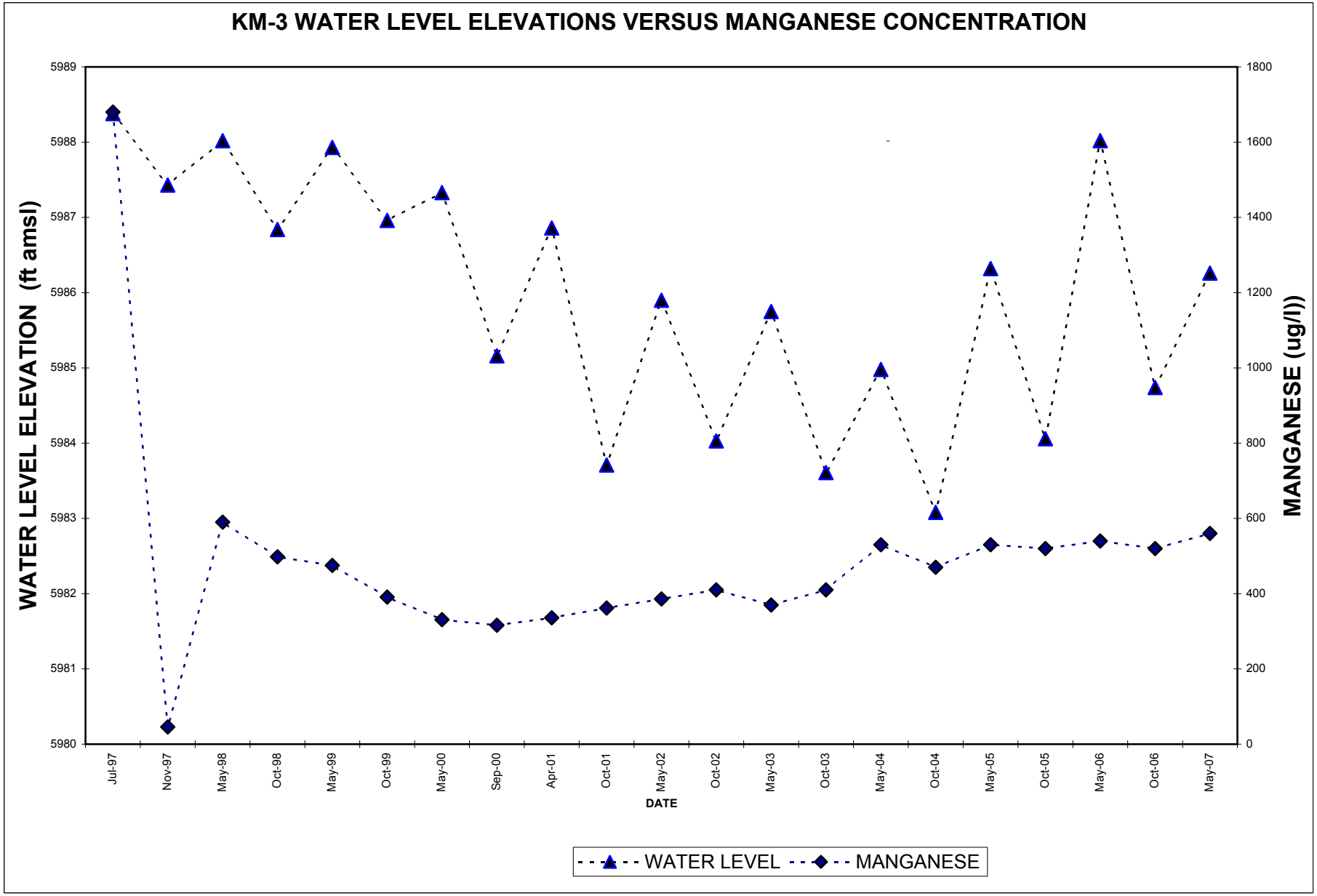

KM-3 WATER LEVEL ELEVATIONS VERSUS MANGANESE CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MANGANESE (ug/l))
5989
5988
5987
5986
5985
5984
5983
5982
5981
5980
1800
1600
1400
1200
1000
800
600
400
200
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MANGANESE

FIGURE C-3

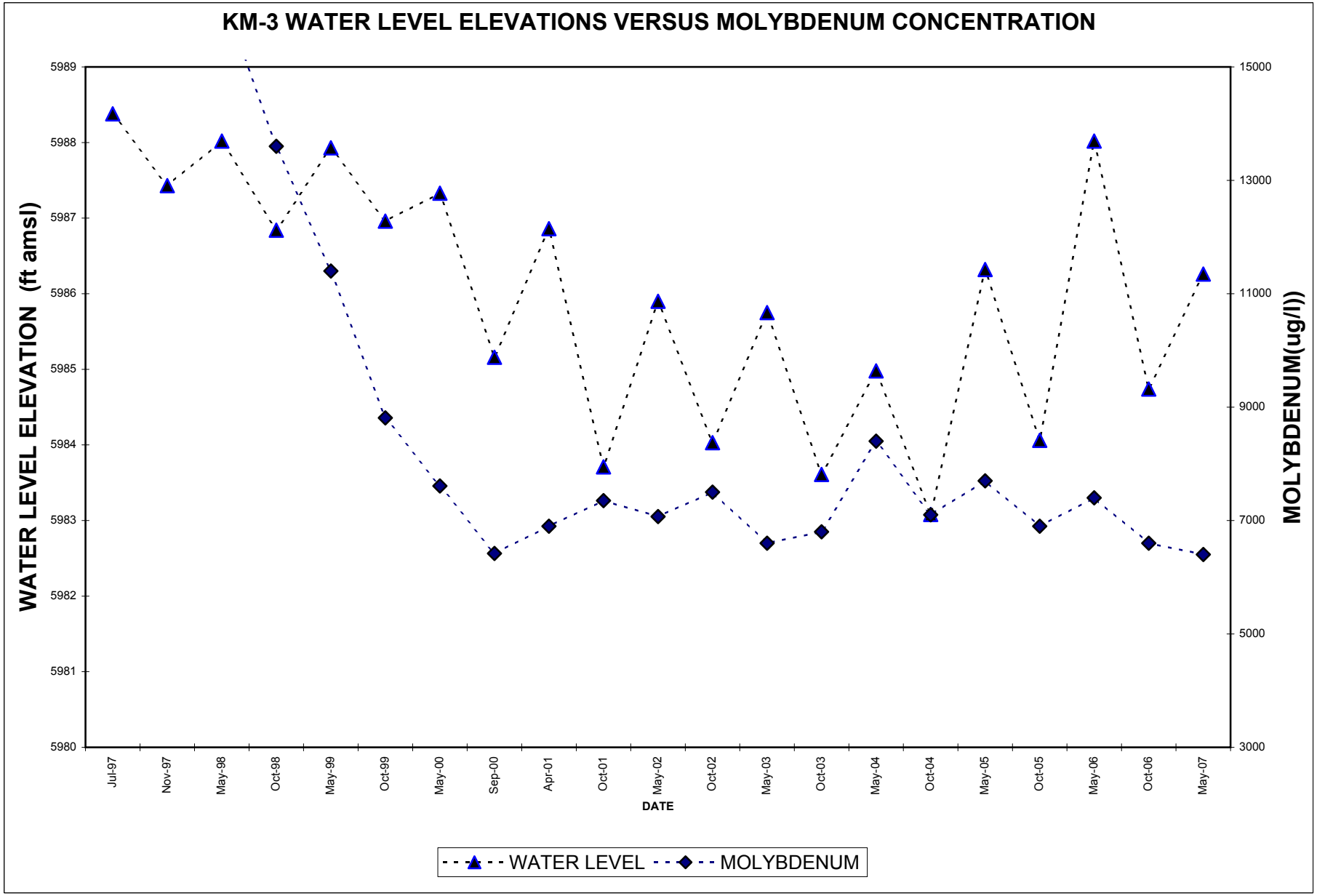

KM-3 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5989
5988
5987
5986
5985
5984
5983
5982
5981
5980
15000
13000
11000
9000
7000
5000
3000
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-4

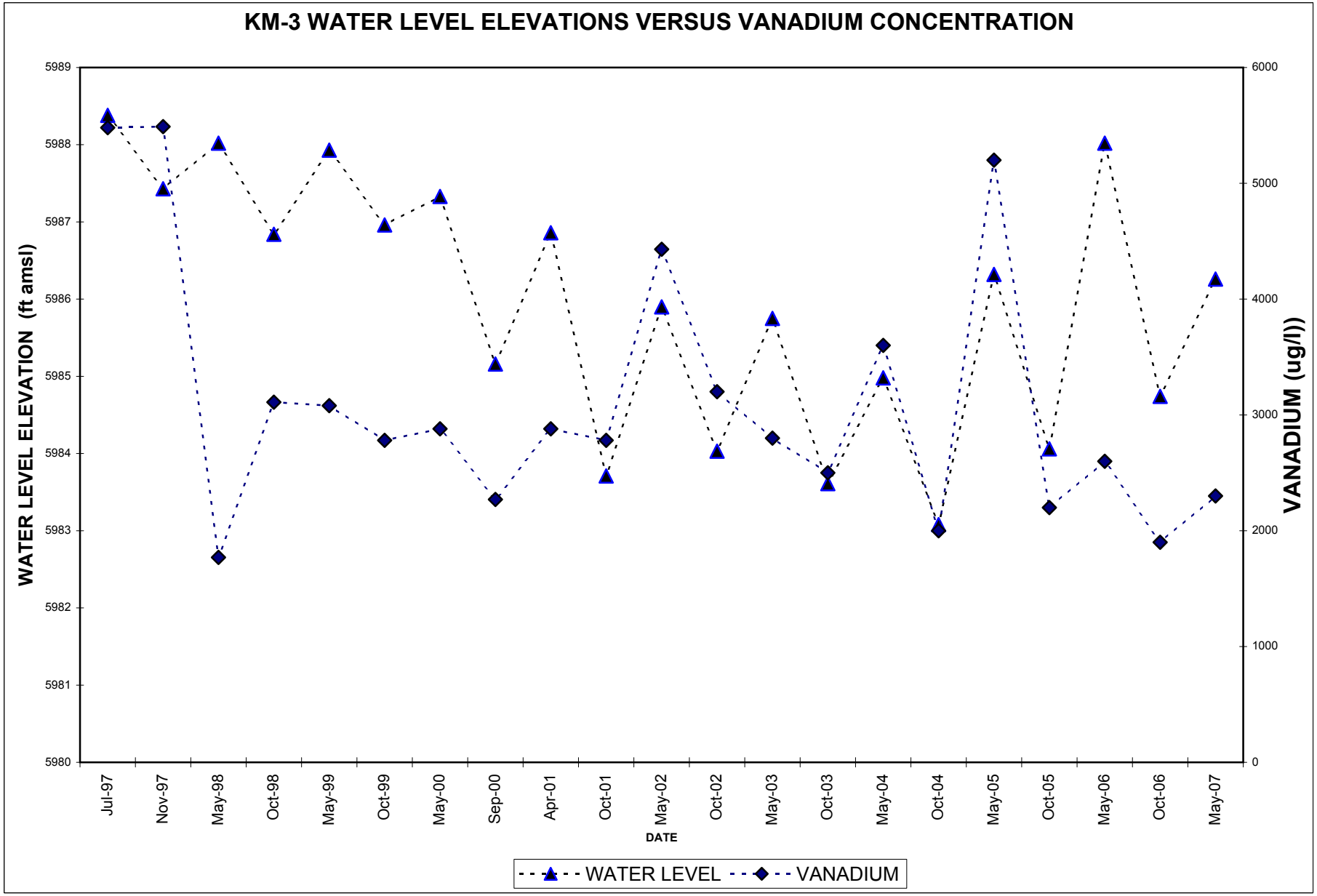

KM-3 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5989
5988
5987
5986
5985
5984
5983
5982
5981
5980
6000
5000
4000
3000
2000
1000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-5

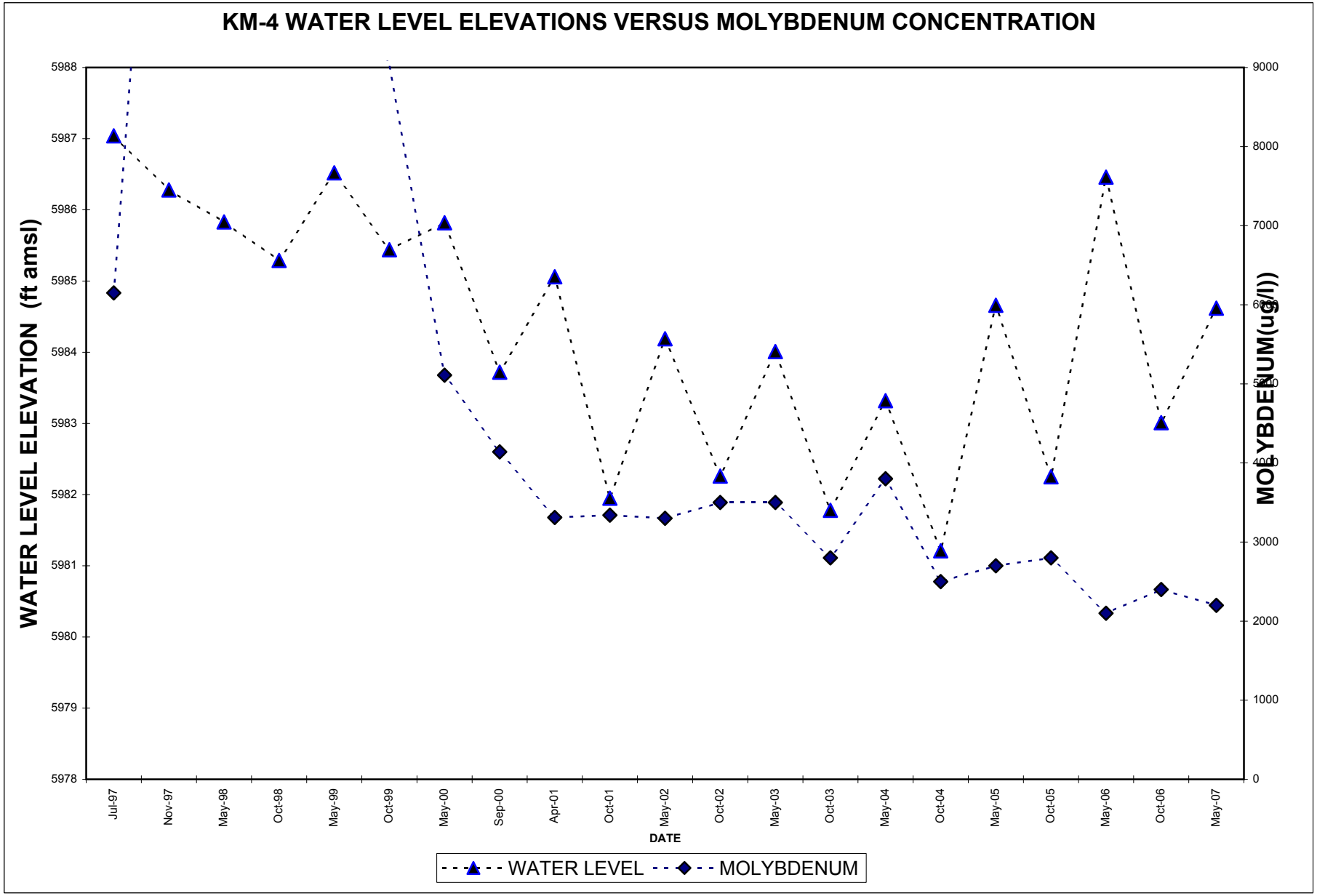

KM-4 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5988
5987
5986
5985
5984
5983
5982
5981
5980
5979
5978
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-6

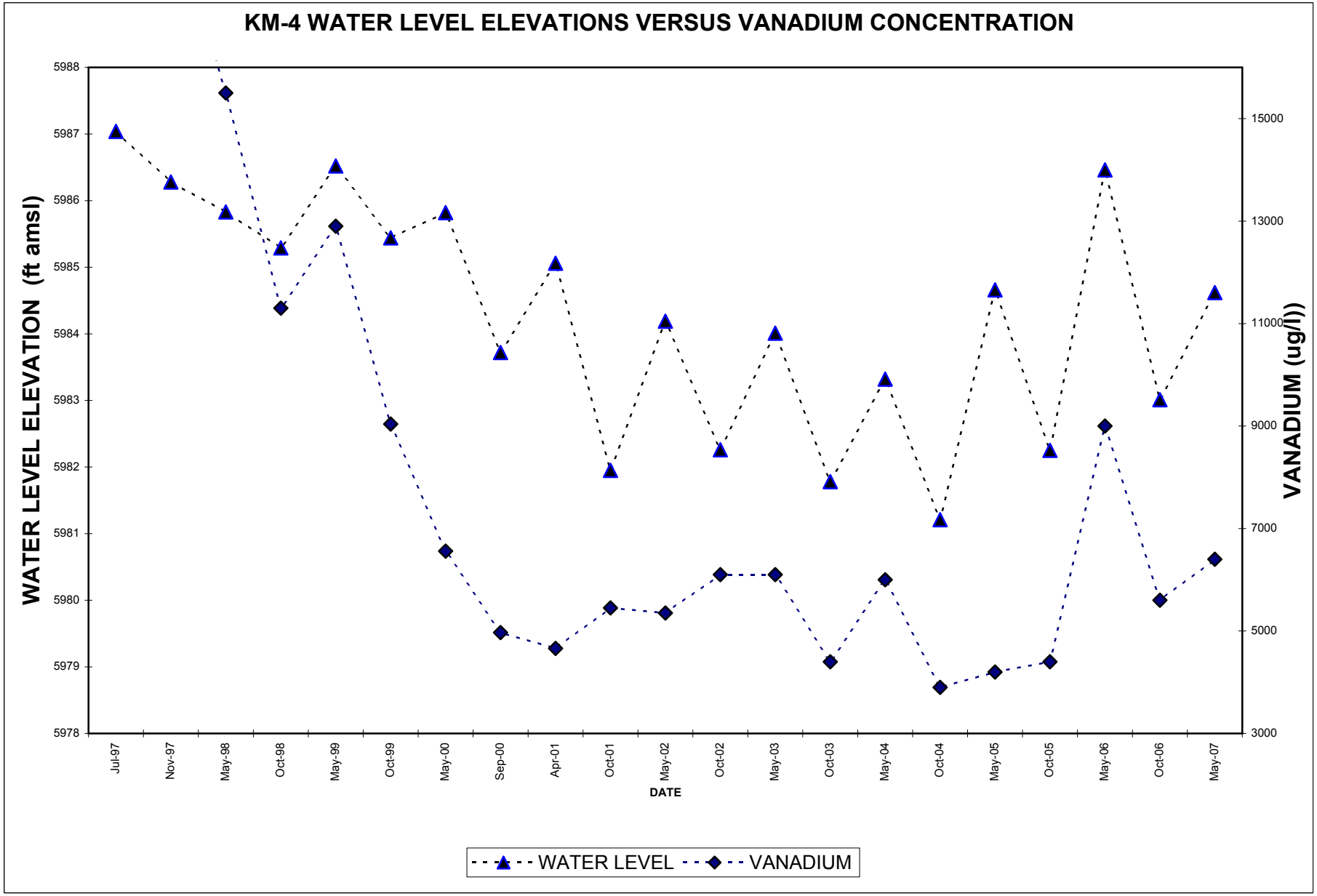

KM-4 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5988
5987
5986
5985
5984
5983
5982
5981
5980
5979
5978
15000
13000
11000
9000
7000
5000
3000
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-7

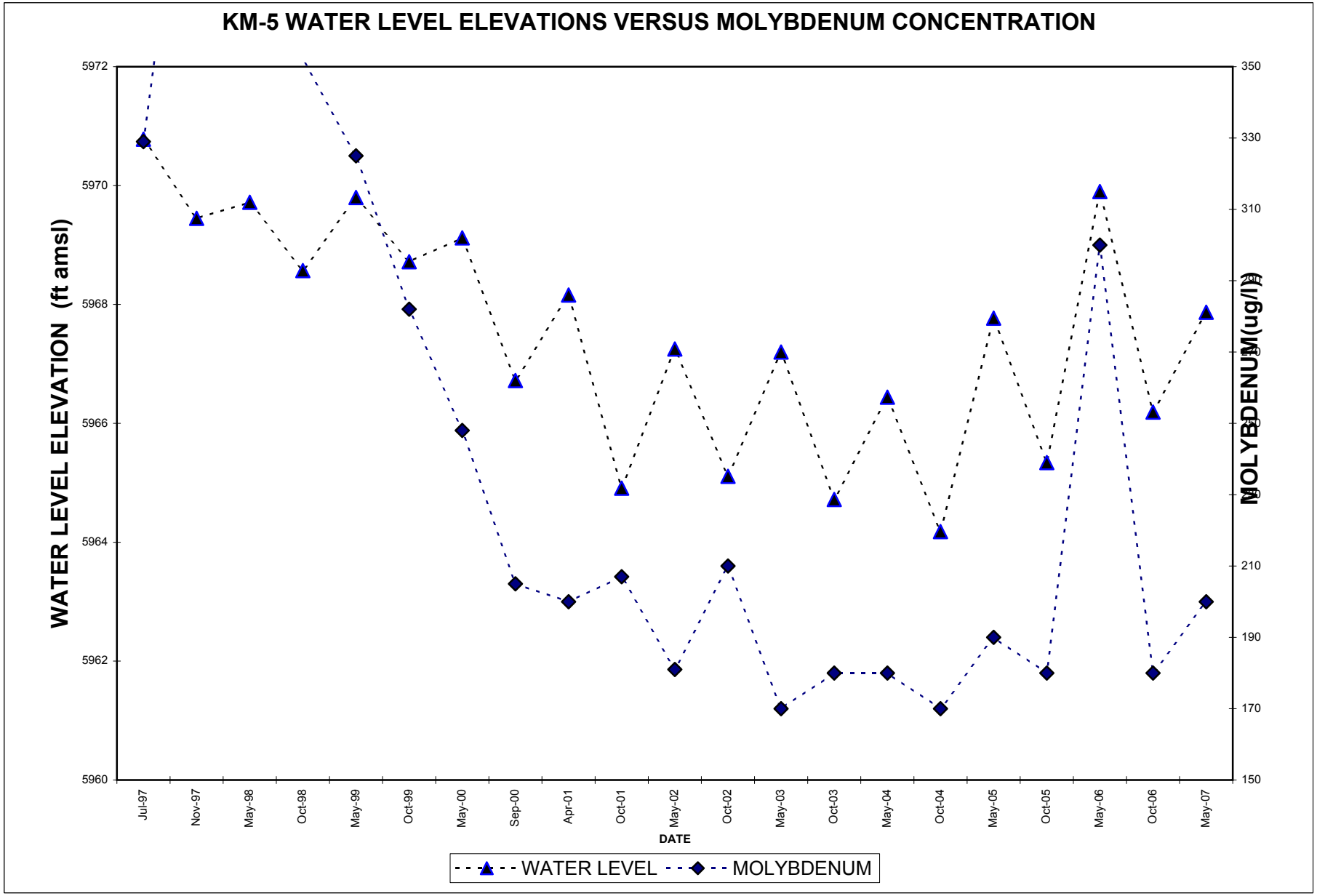

KM-5 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l)
5972
5970
5968
5966
5964
5962
5960
350
330
310
290
270
250
230
210
190
170
150
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-8

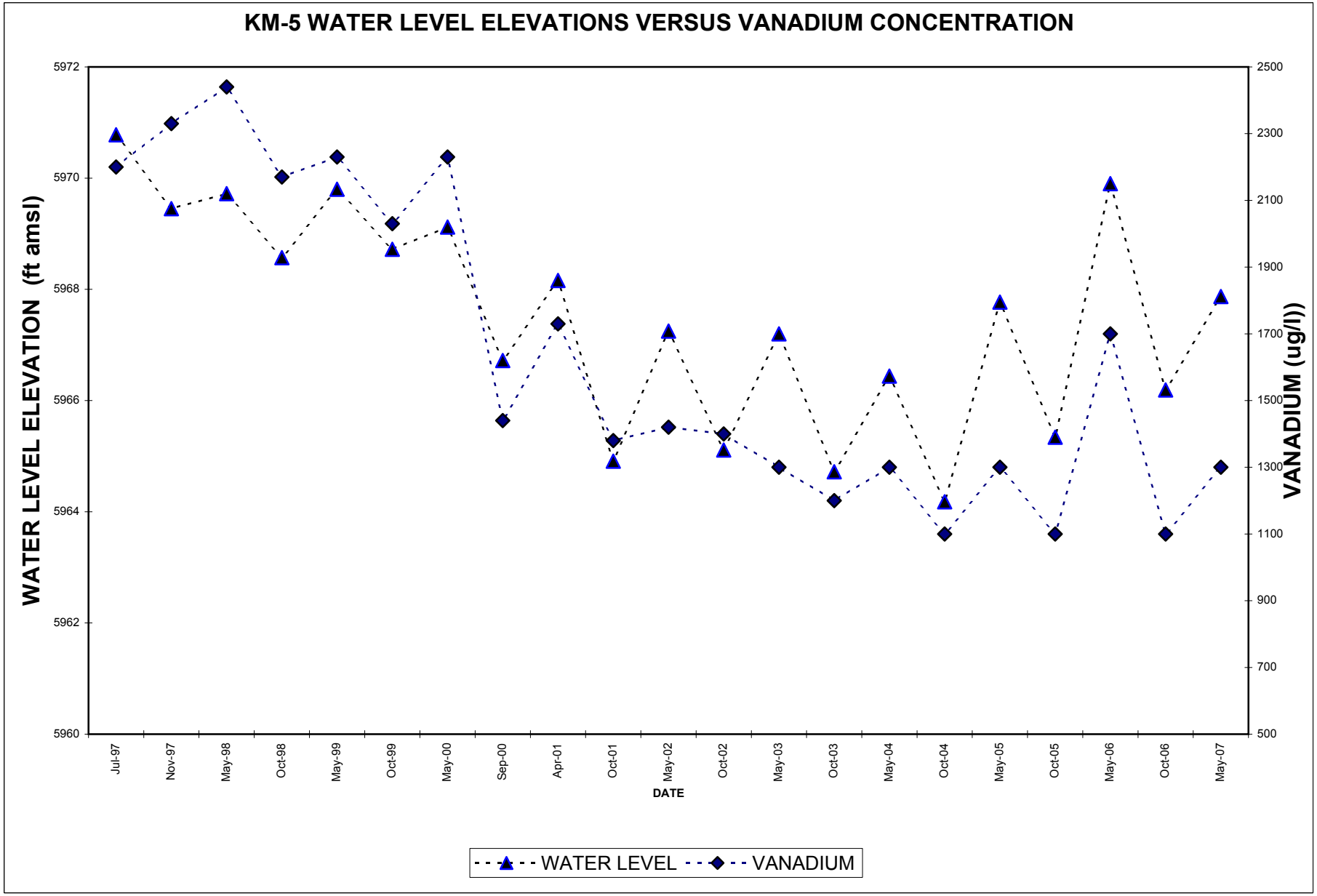

KM-5 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5972
5970
5968
5966
5964
5962
5960
2500
2300
2100
1900
1700
1500
1300
1100
900
700
500
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-9

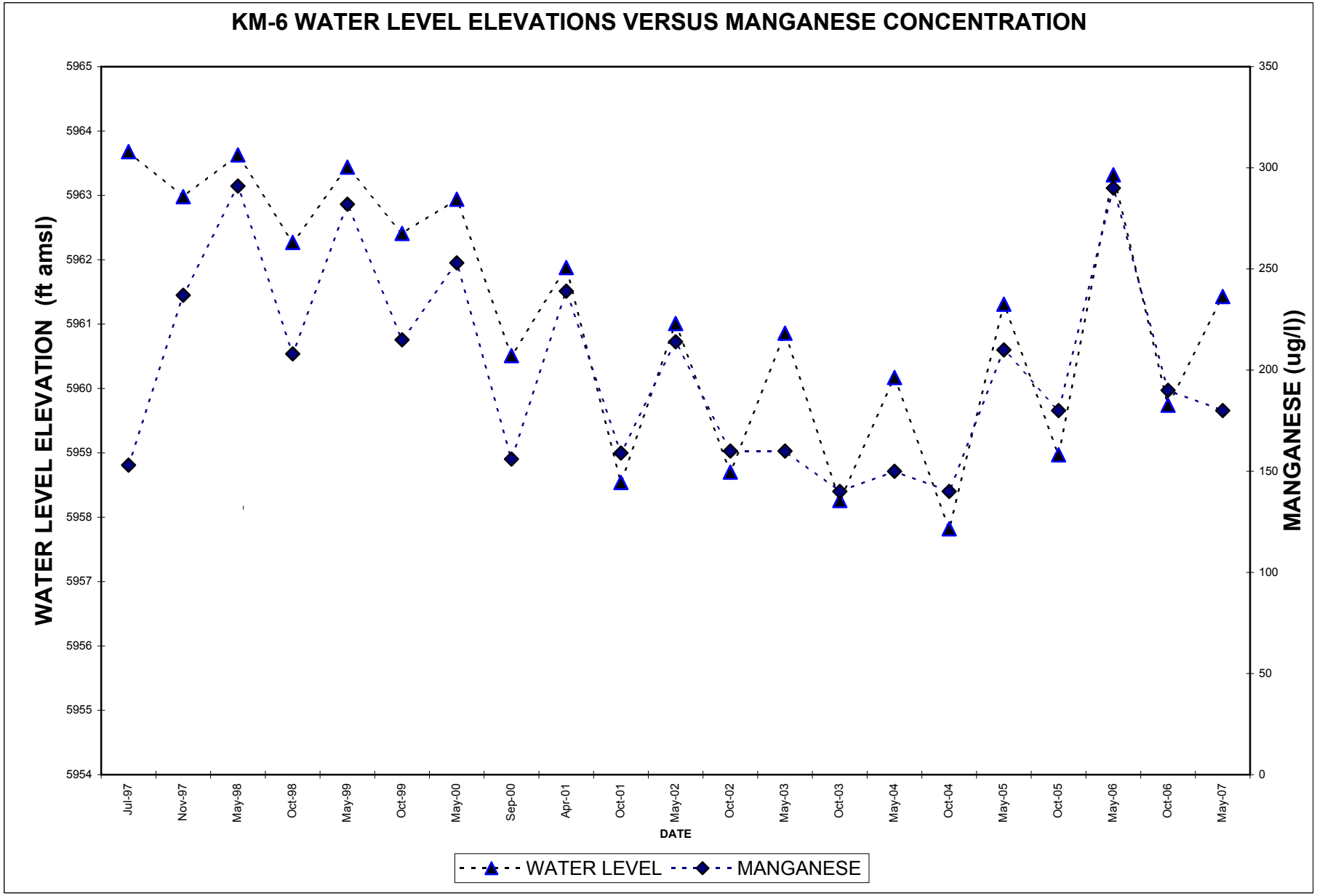

KM-6 WATER LEVEL ELEVATIONS VERSUS MANGANESE CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MANGANESE (ug/l))
5965
5964
5963
5962
5961
5960
5959
5958
5957
5956
5955
5954
350
300
250
200
150
100
50
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MANGANESE

FIGURE C-10

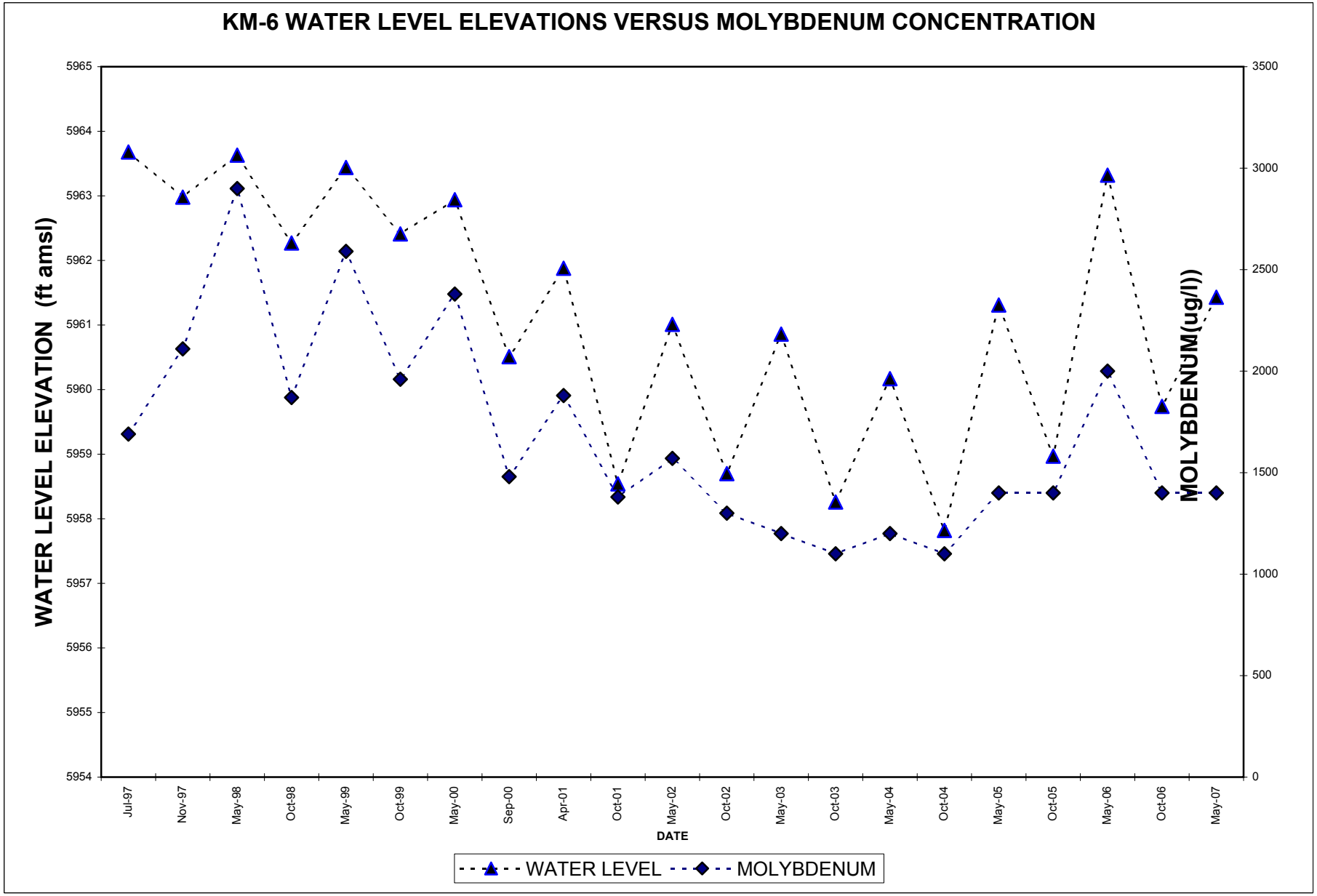

KM-6 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5965
5964
5963
5962
5961
5960
5959
5958
5957
5956
5955
5954
3500
3000
2500
2000
1500
1000
500
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-11

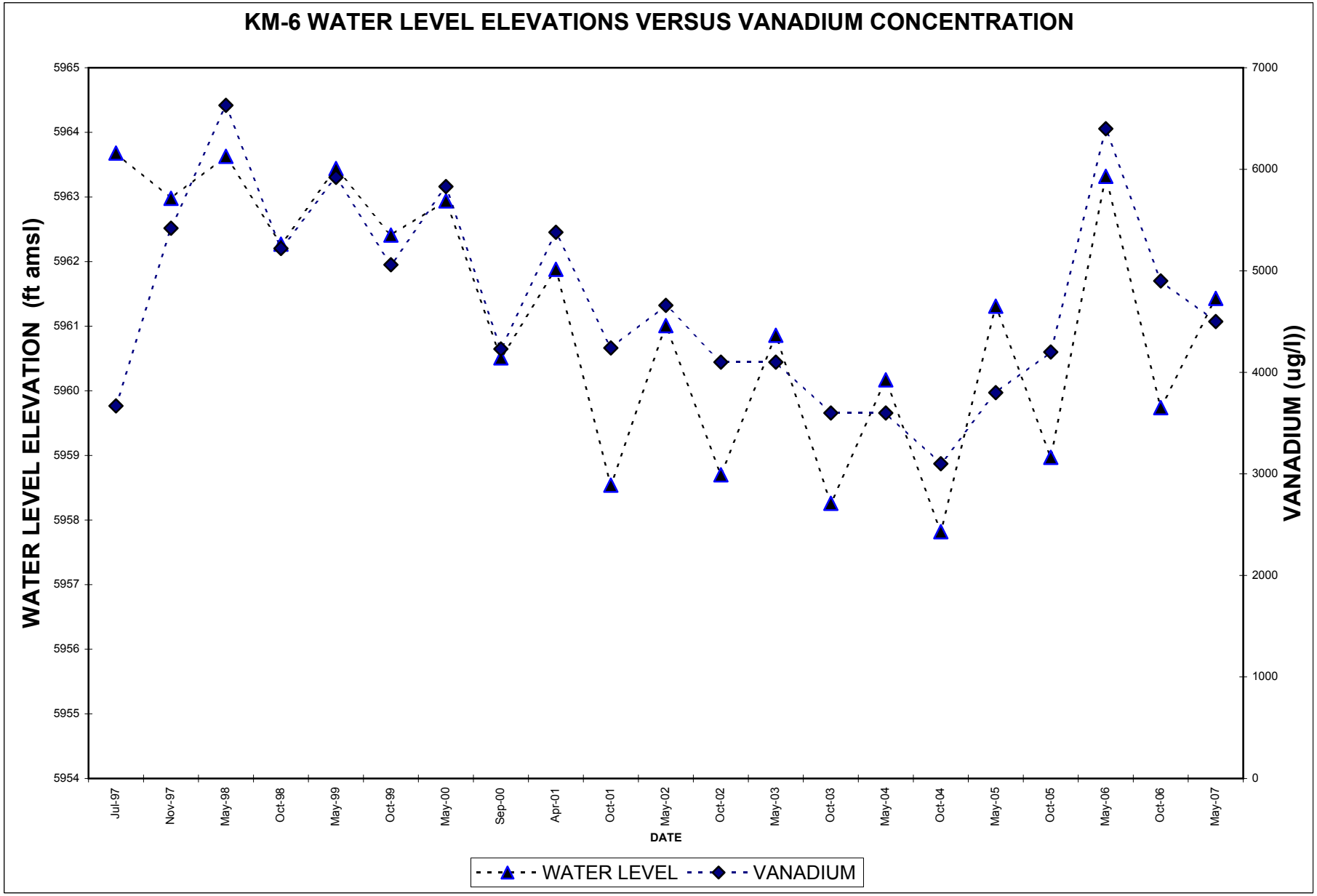

KM-6 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5965
5964
5963
5962
5961
5960
5959
5958
5957
5956
5955
5954
7000
6000
5000
4000
3000
2000
1000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-12

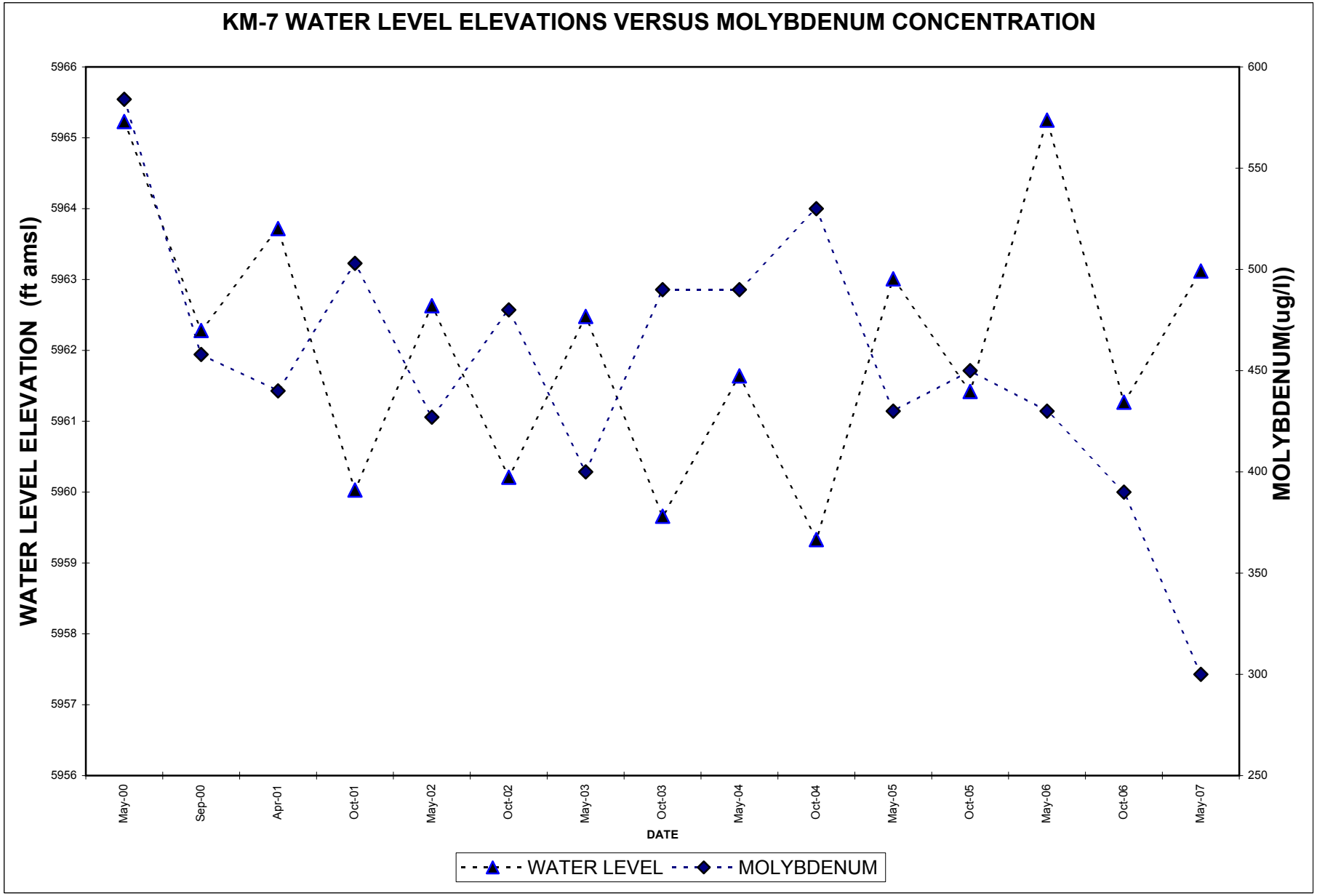

KM-7 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5966
5965
5964
5963
5962
5961
5960
5959
5958
5957
5956
600
550
500
450
400
350
300
250
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-13

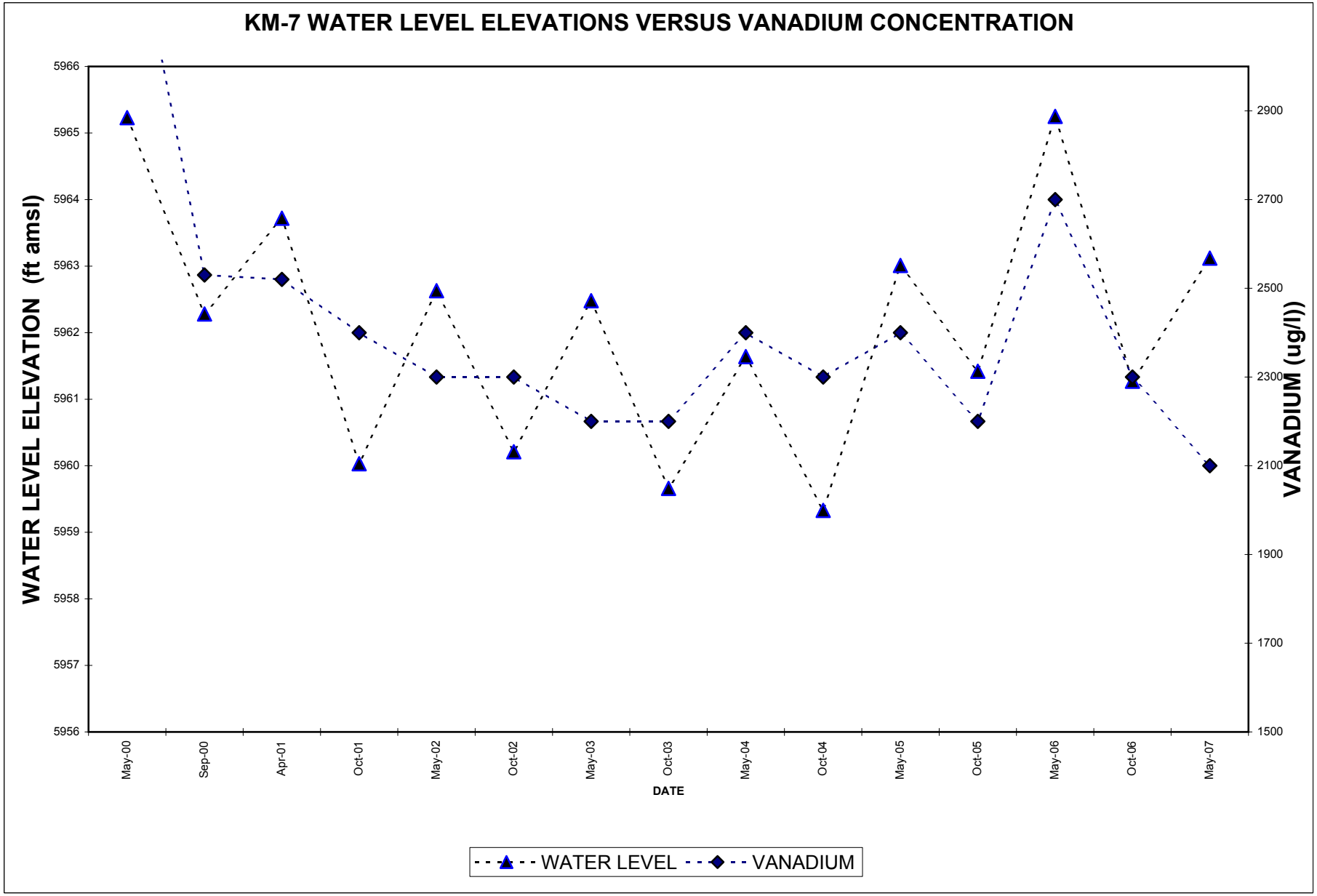

KM-7 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5966
5965
5964
5963
5962
5961
5960
5959
5958
5957
5956
2900
2700
2500
2300
2100
1900
1700
1500
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-14

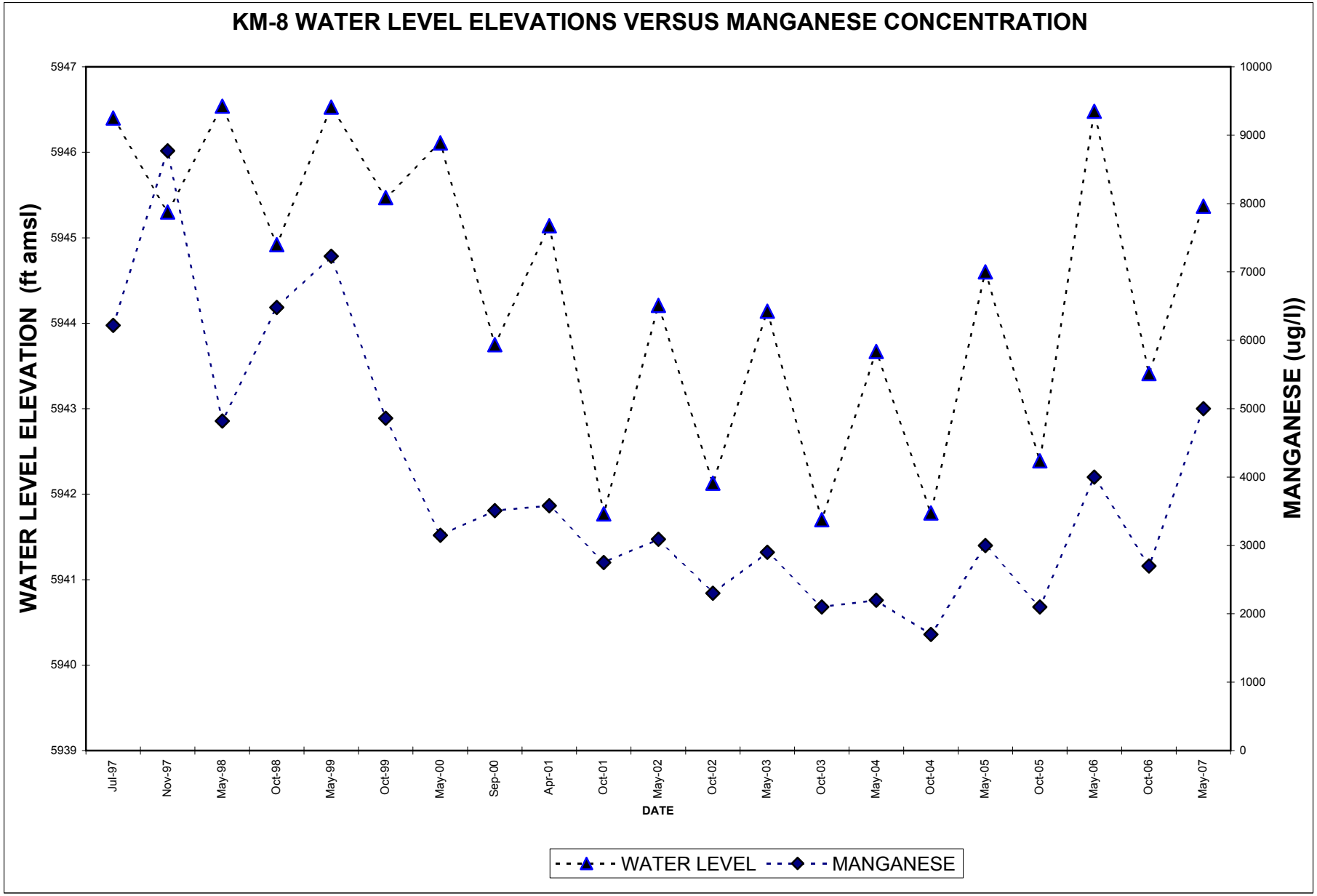

KM-8 WATER LEVEL ELEVATIONS VERSUS MANGANESE CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MANGANESE (ug/l))
5947
5946
5945
5944
5943
5942
5941
5940
5939
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MANGANESE

FIGURE C-15

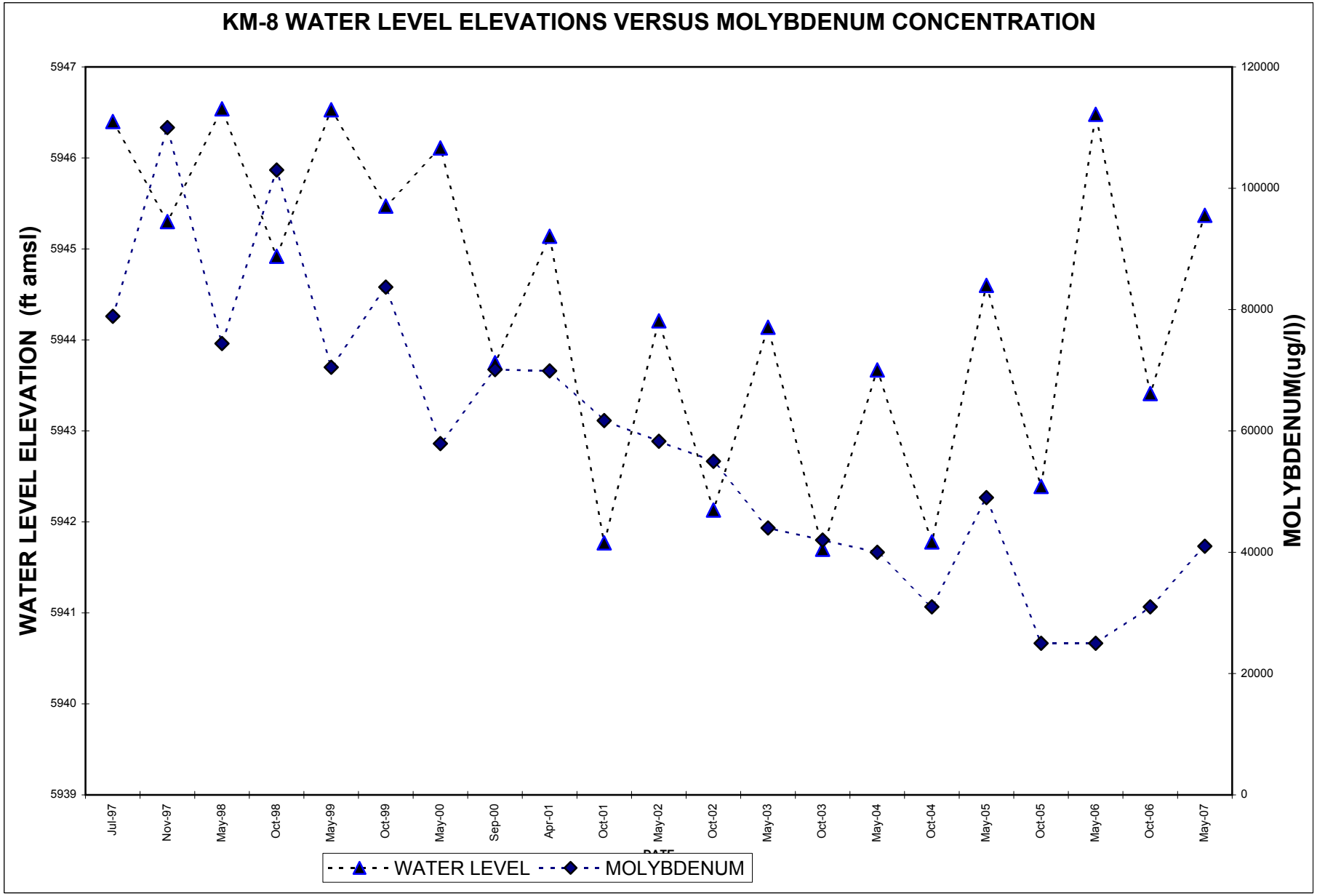

KM-8 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5947
5946
5945
5944
5943
5942
5941
5940
5939
120000
100000
80000
60000
40000
20000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
WATER LEVEL
MOLYBDENUM

FIGURE C-16

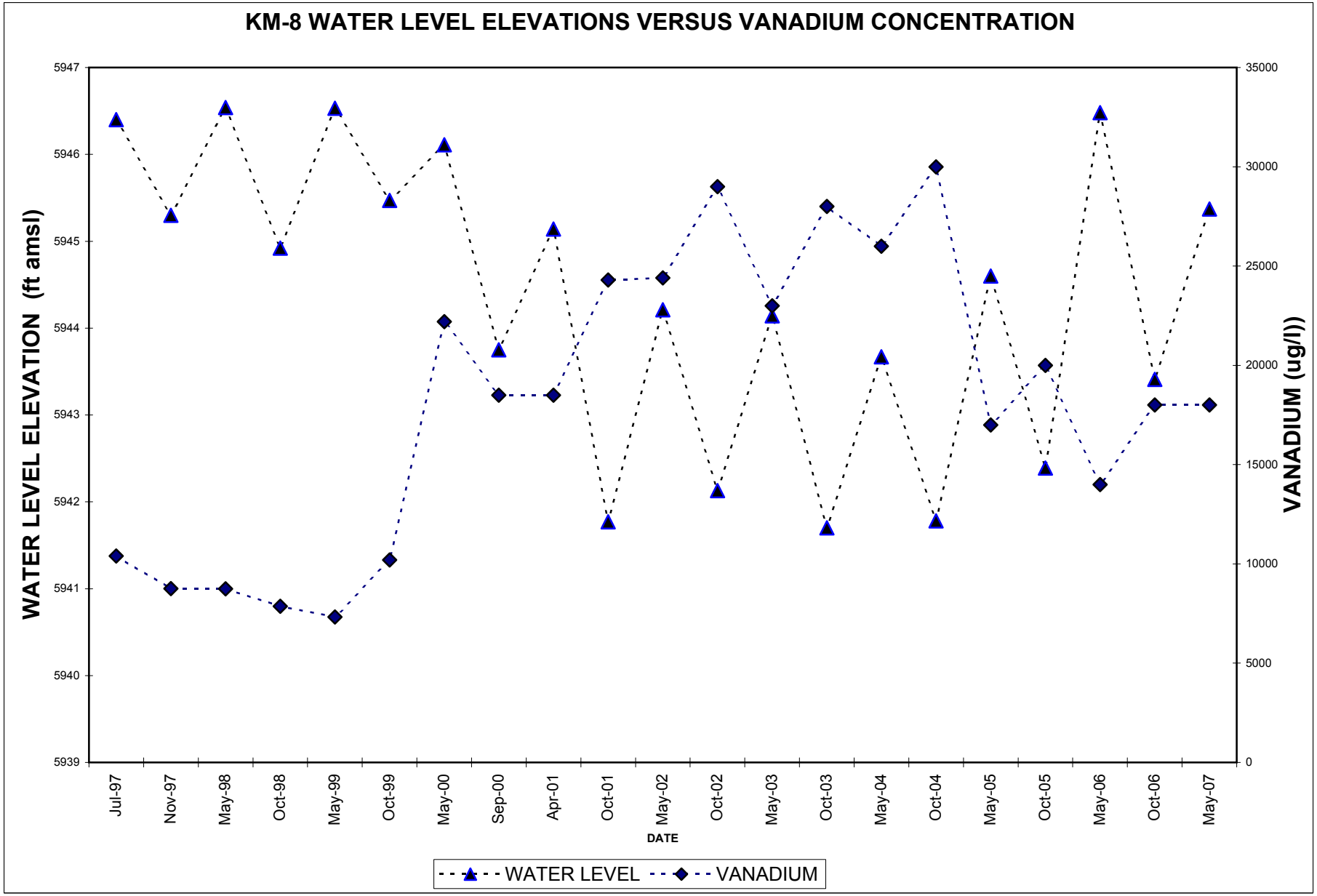

KM-8 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5947
5946
5945
5944
5943
5942
5941
5940
5939
35000
30000
25000
20000
15000
10000
5000
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-17

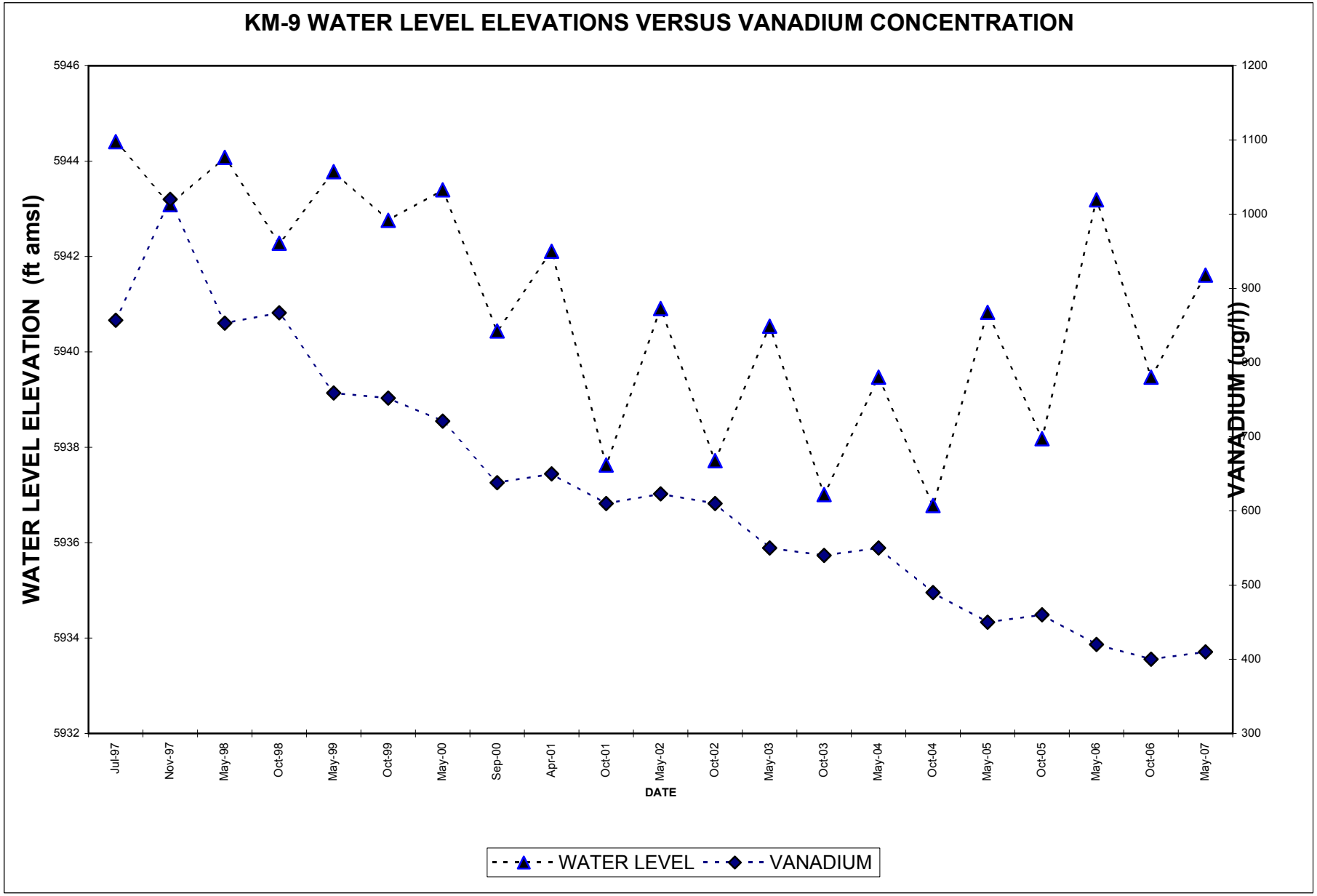

KM-9 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5946
5944
5942
5940
5938
5936
5934
5932
1200
1100
1000
900
800
700
600
500
400
300
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-18

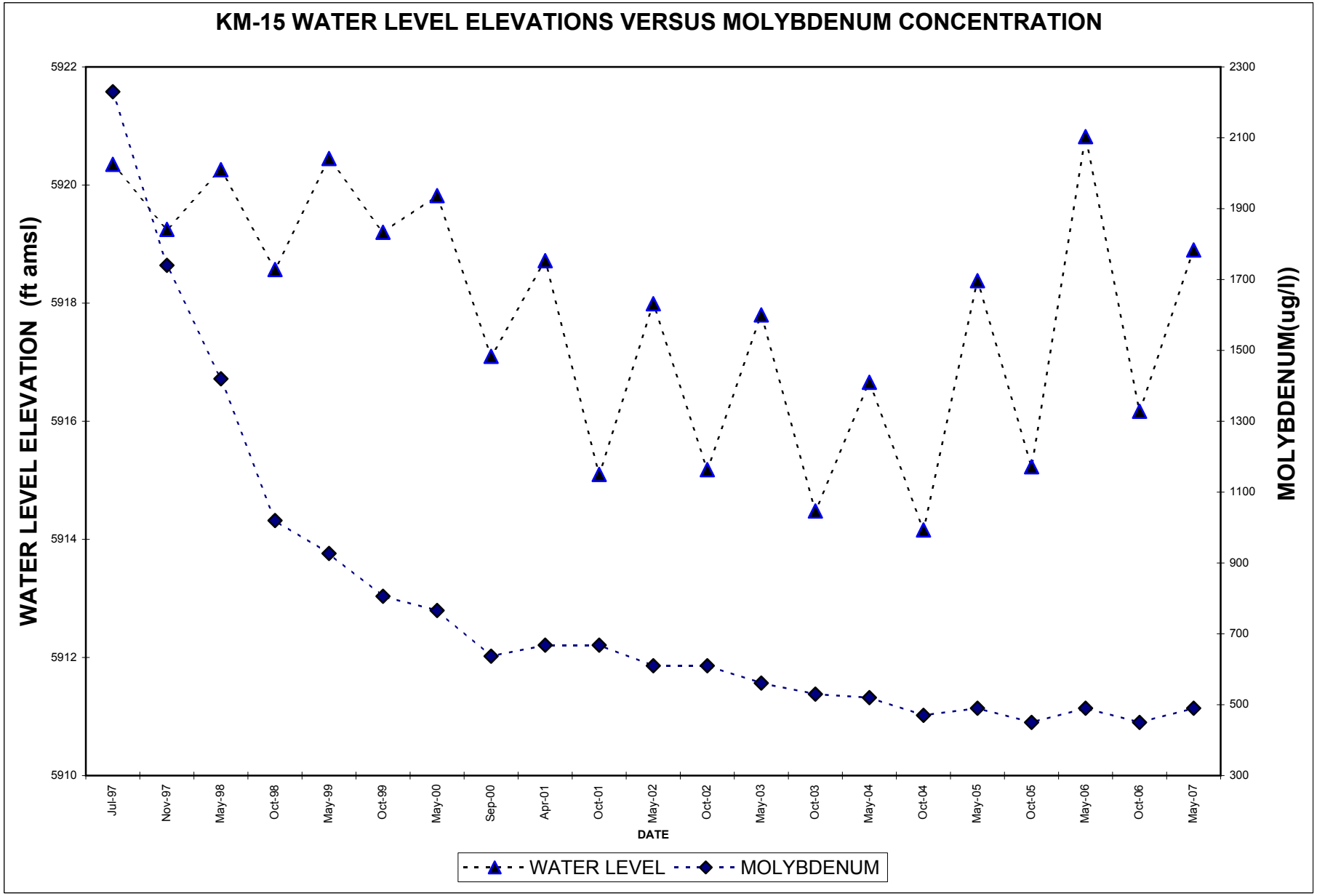

KM-15 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5922
5920
5918
5916
5914
5912
5910
2300
2100
1900
1700
1500
1300
1100
900
700
500
300
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-19

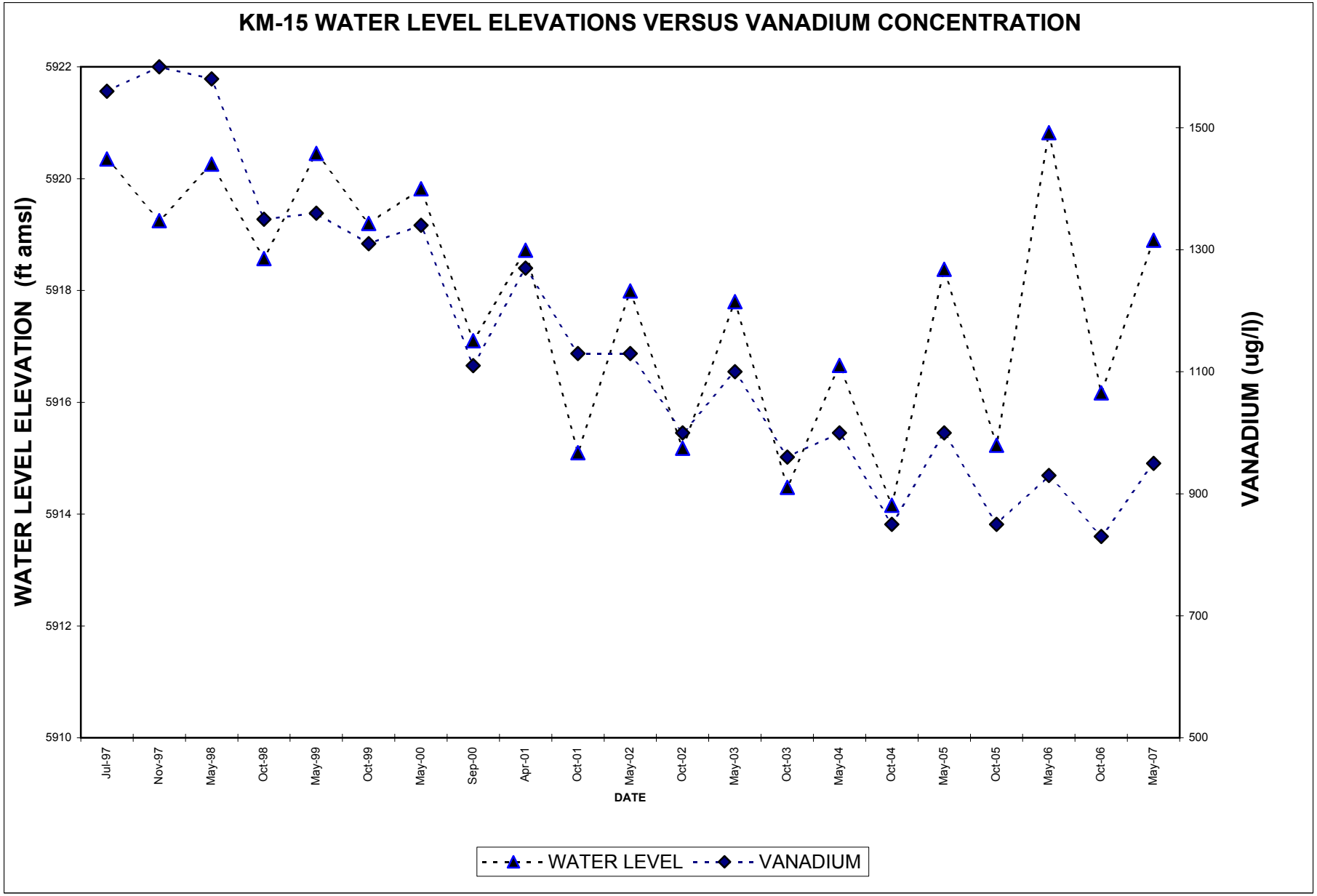

KM-15 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5922
5920
5918
5916
5914
5912
5910
1500
1300
1100
900
700
500
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-20

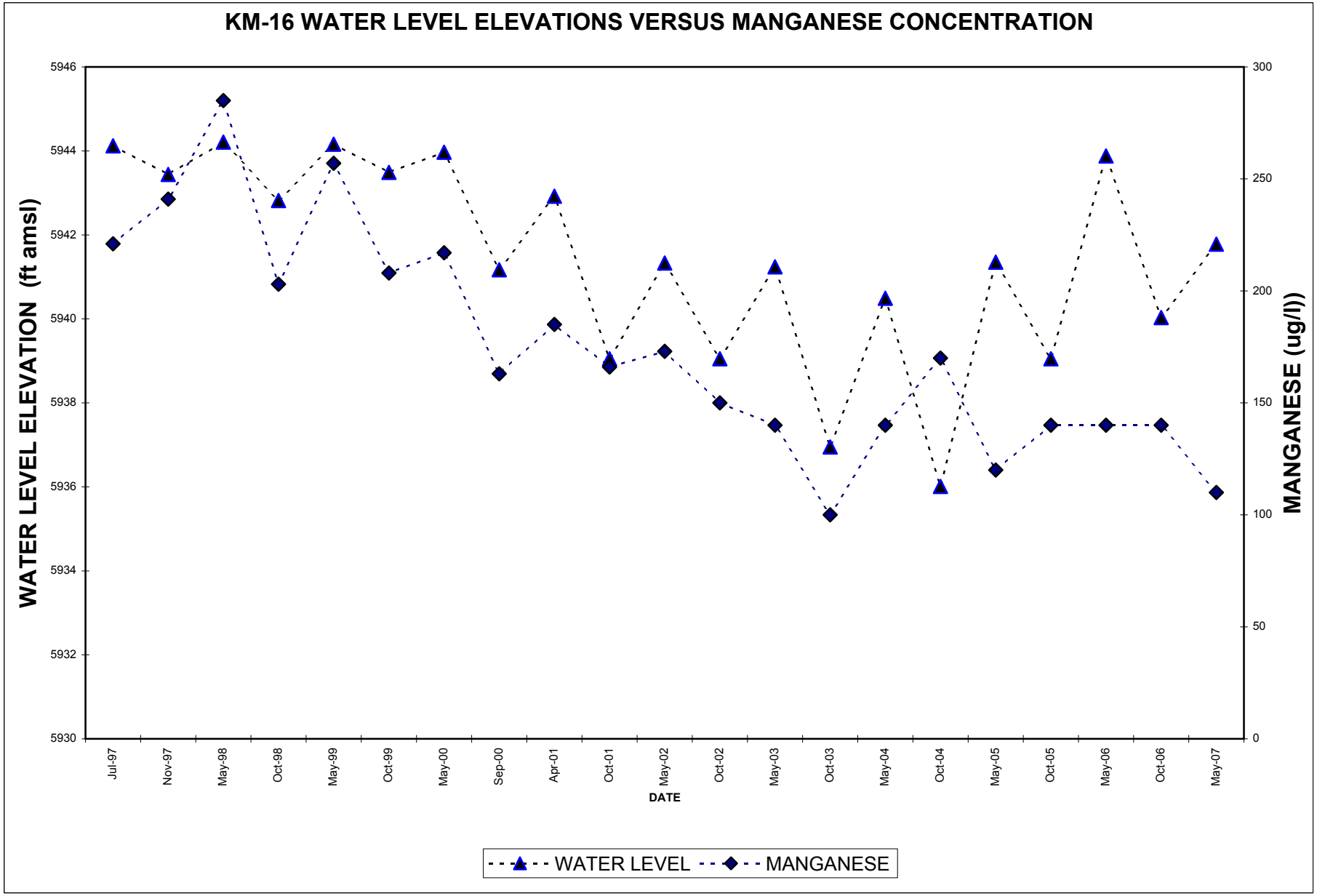

KM-16 WATER LEVEL ELEVATIONS VERSUS MANGANESE CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MANGANESE (ug/l))
5946
5944
5942
5940
5938
5936
5934
5932
5930
300
250
200
150
100
50
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MANGANESE

FIGURE C-21

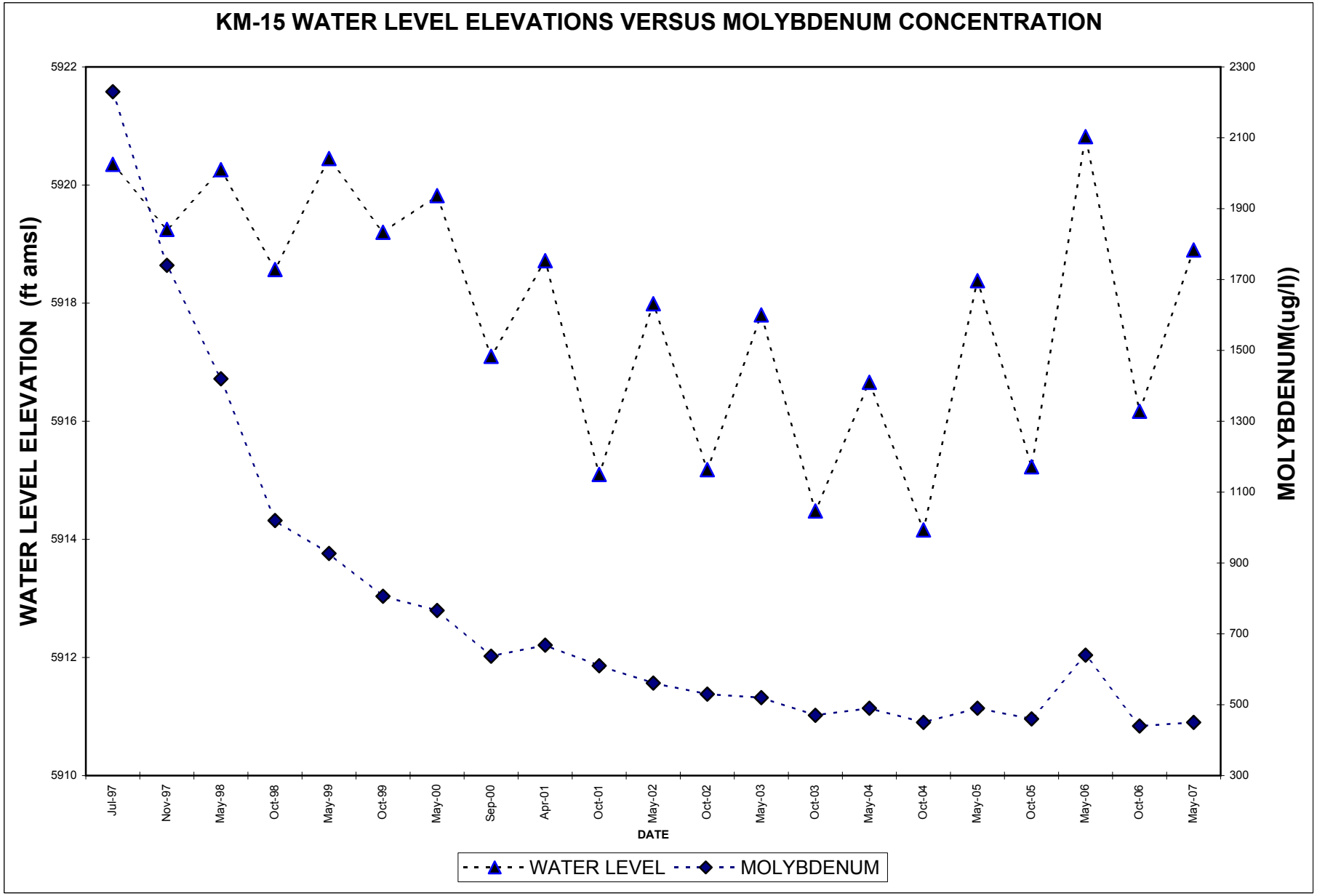

KM-15 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5922
5920
5918
5916
5914
5912
5910
2300
2100
1900
1700
1500
1300
1100
900
700
500
300
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-22

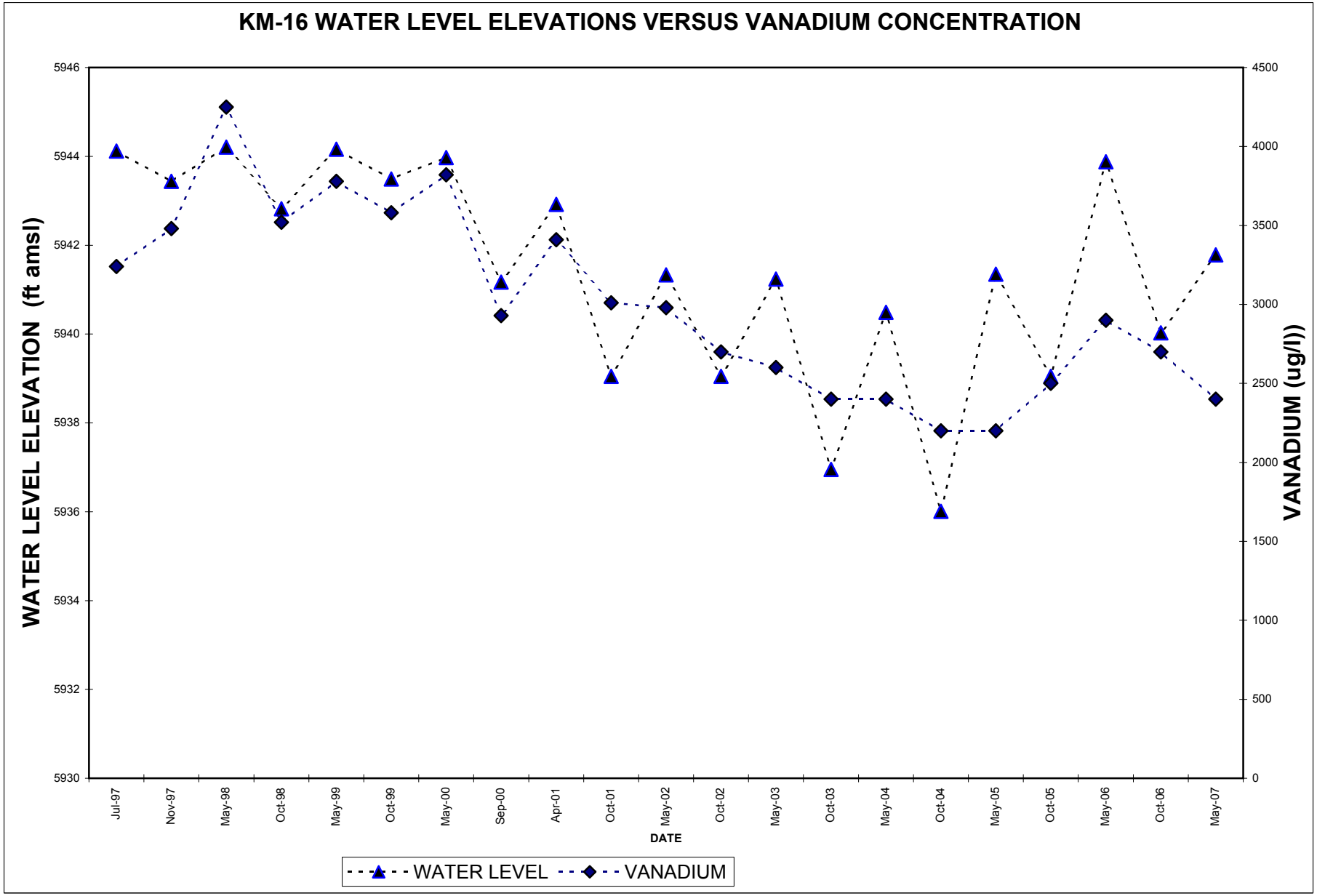

KM-16 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5946
5944
5942
5940
5938
5936
5934
5932
5930
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-23

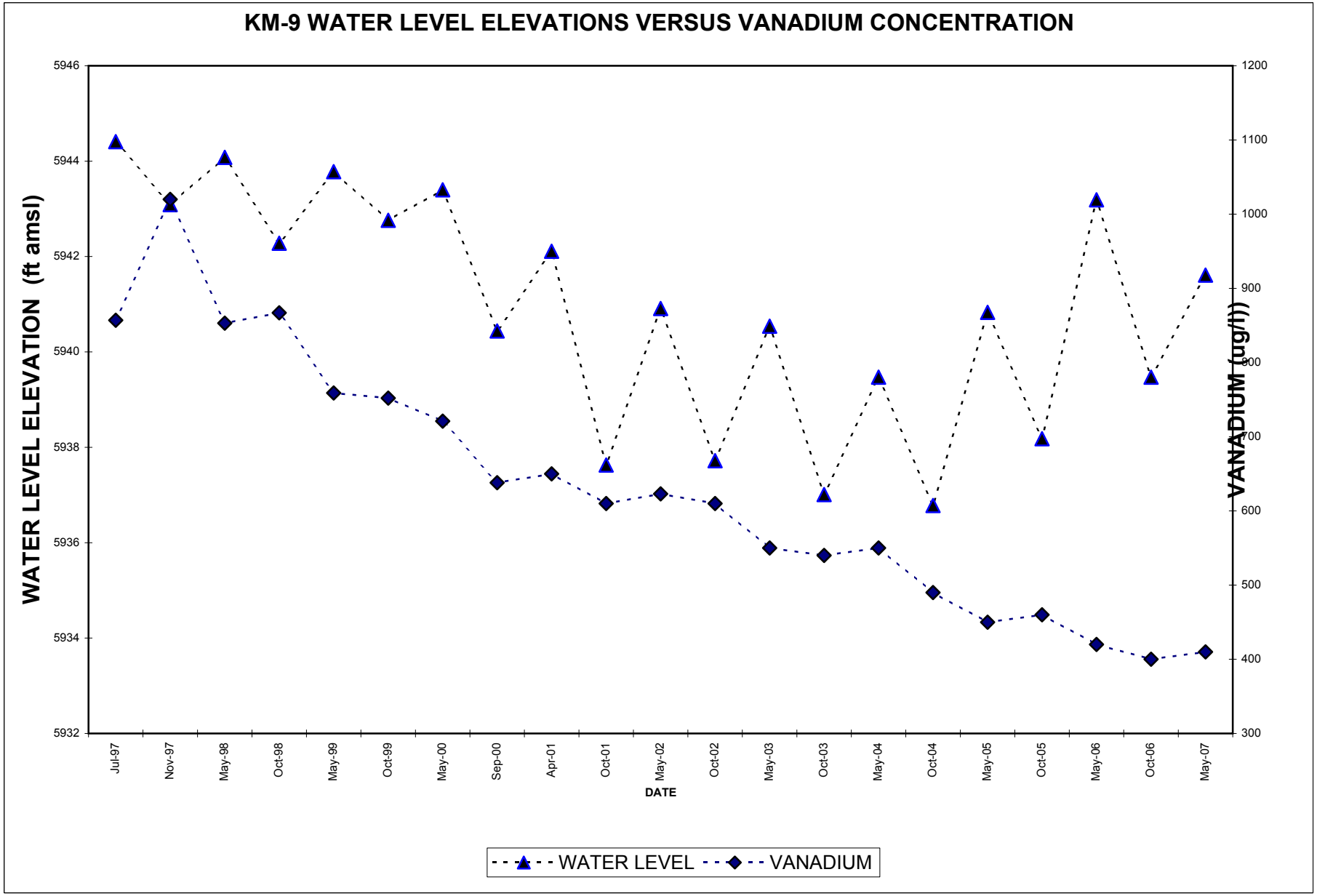

KM-9 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5946
5944
5942
5940
5938
5936
5934
5932
1200
1100
1000
900
800
700
600
500
400
300
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

FIGURE C-24

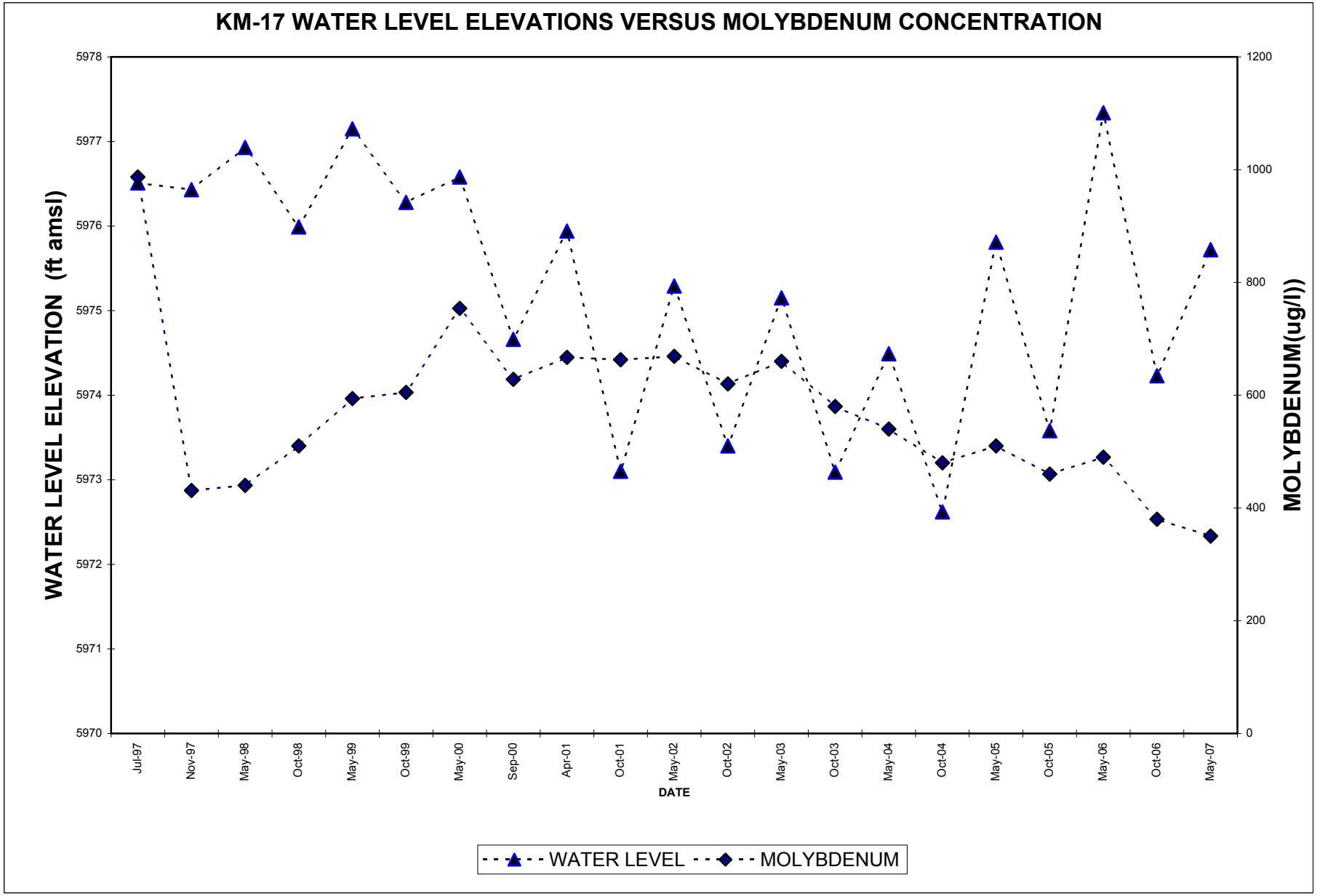

KM-17 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5978
5977
5976
5975
5974
5973
5972
5971
5970
1200
1000
800
600
400
200
0
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-25

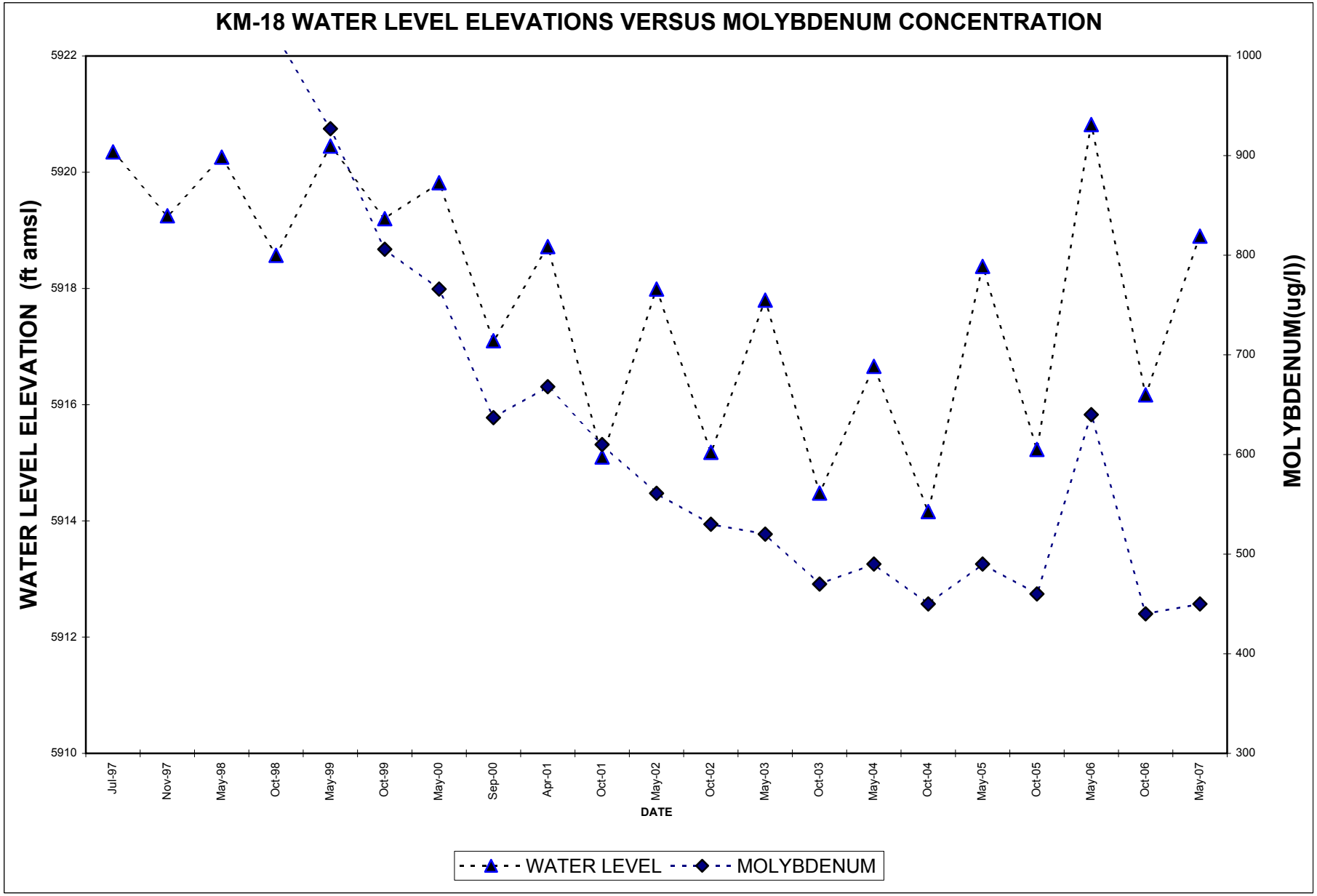

KM-18 WATER LEVEL ELEVATIONS VERSUS MOLYBDENUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
MOLYBDENUM(ug/l))
5922
5920
5918
5916
5914
5912
5910
1000
900
800
700
600
500
400
300
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
MOLYBDENUM

FIGURE C-26

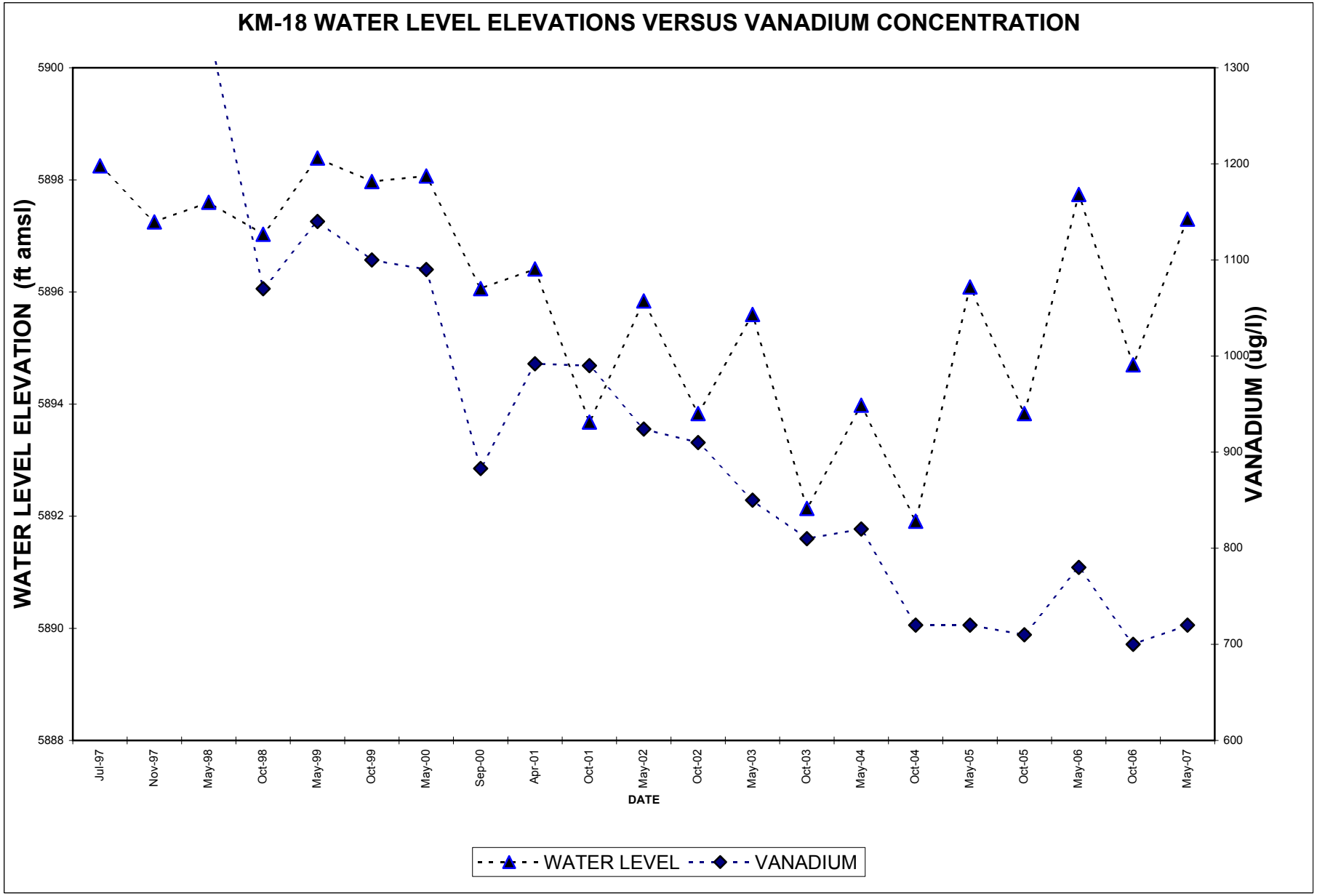
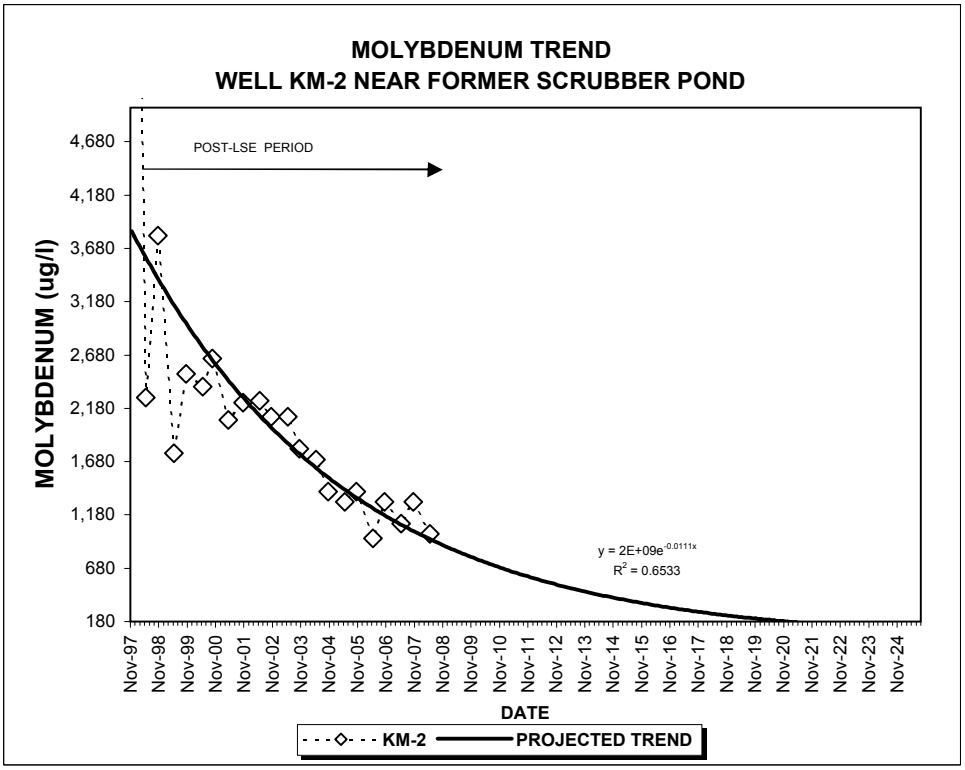
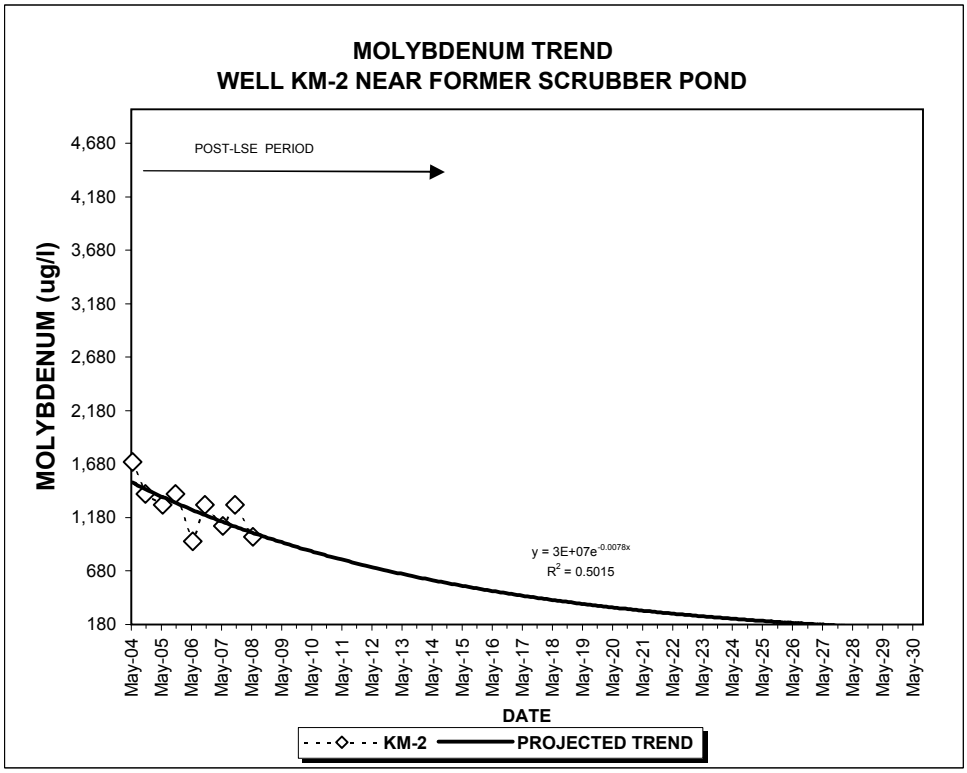
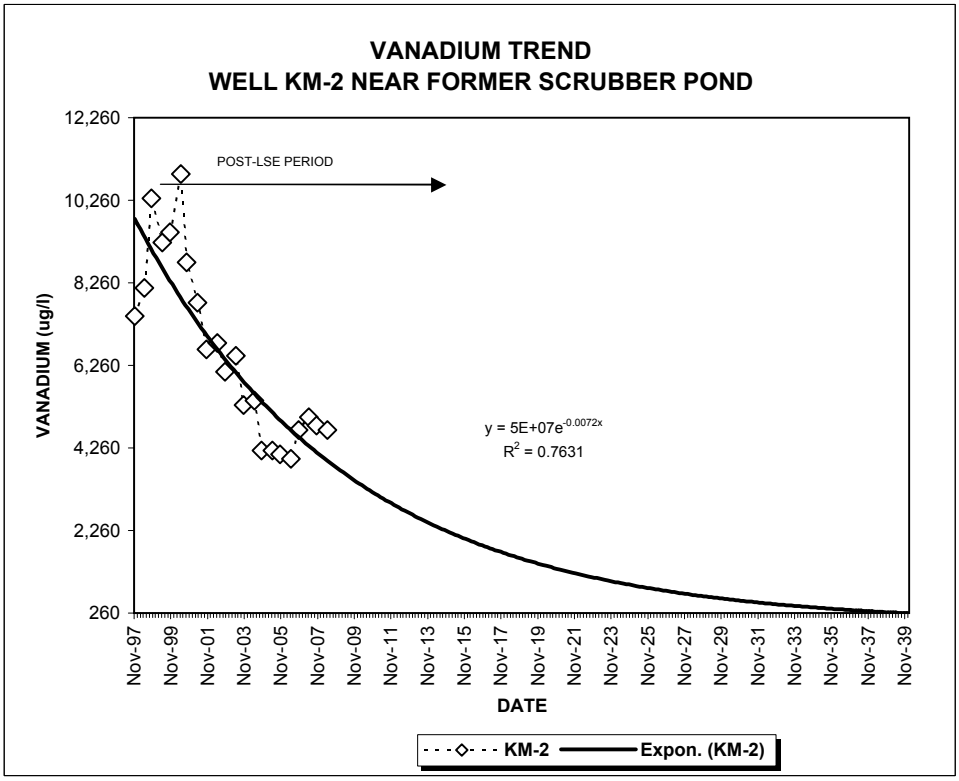
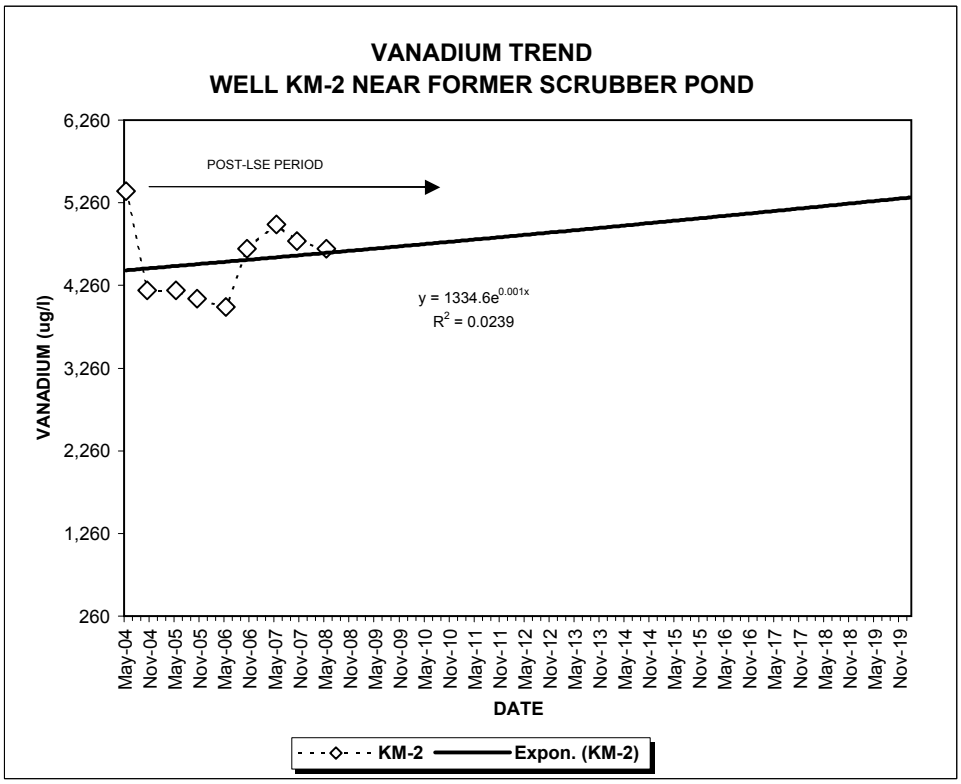

KM-18 WATER LEVEL ELEVATIONS VERSUS VANADIUM CONCENTRATION
WATER LEVEL ELEVATION (ft amsl)
VANADIUM (ug/l))
5900
5898
5896
5894
5892
5890
5888
1300
1200
1100
1000
900
800
700
600
Jul-97
Nov-97
May-98
Oct-98
May-99
Oct-99
May-00
Sep-00
Apr-01
Oct-01
May-02
Oct-02
May-03
Oct-03
May-04
Oct-04
May-05
Oct-05
May-06
Oct-06
May-07
DATE
WATER LEVEL
VANADIUM

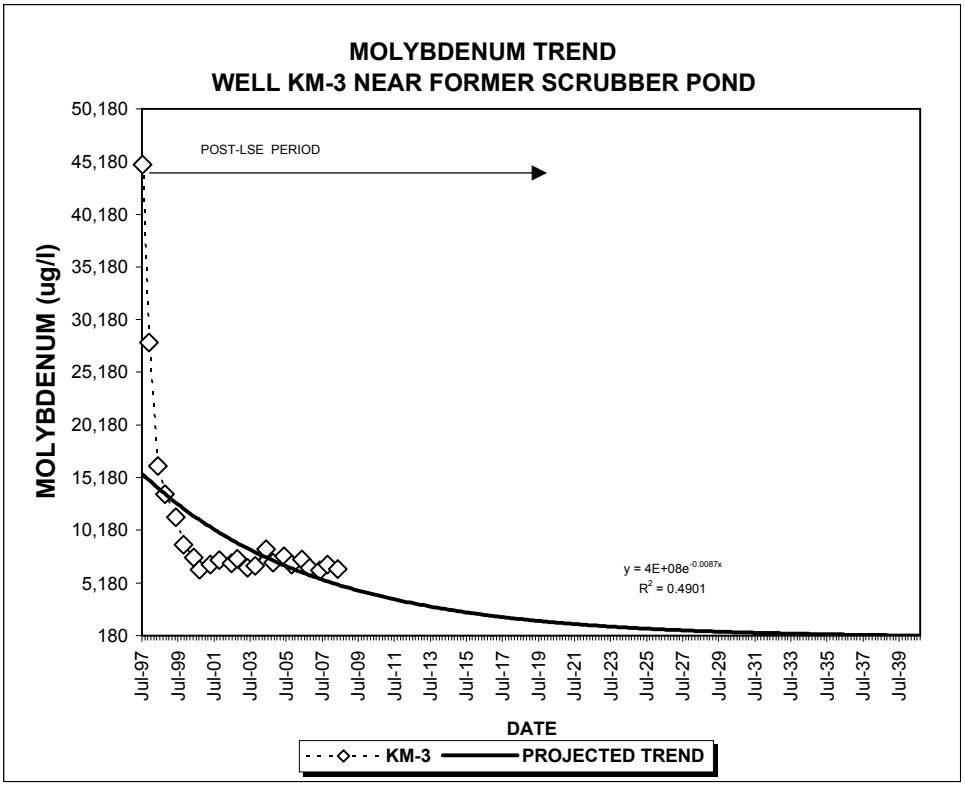
FIGURE C-27

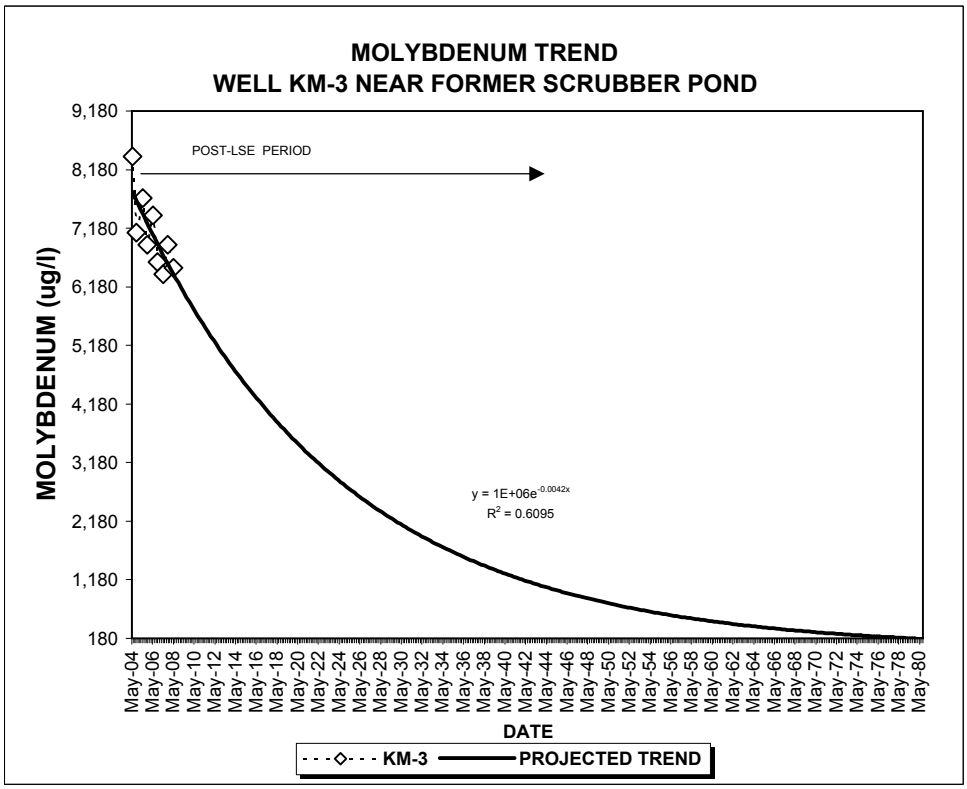

MOLYBDENUM TREND
WELL KM-2 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
MOLYBDENUM (ug/l)
4,680
4,180
3,680
3,180
2,680
2,180
1,680
1,180
680
180
y = 2E+09e-0.0111x
R2 = 0.6533
Nov-97
Nov-98
Nov-99
Nov-00
Nov-01
Nov-02
Nov-03
Nov-04
Nov-05
Nov-06
Nov-07
Nov-08
Nov-09
Nov-10
Nov-11
Nov-12
Nov-13
Nov-14
Nov-15
Nov-16
Nov-17
Nov-18
Nov-19
Nov-20
Nov-21
Nov-22
Nov-23
Nov-24
DATE
KM-2
PROJECTED TREND

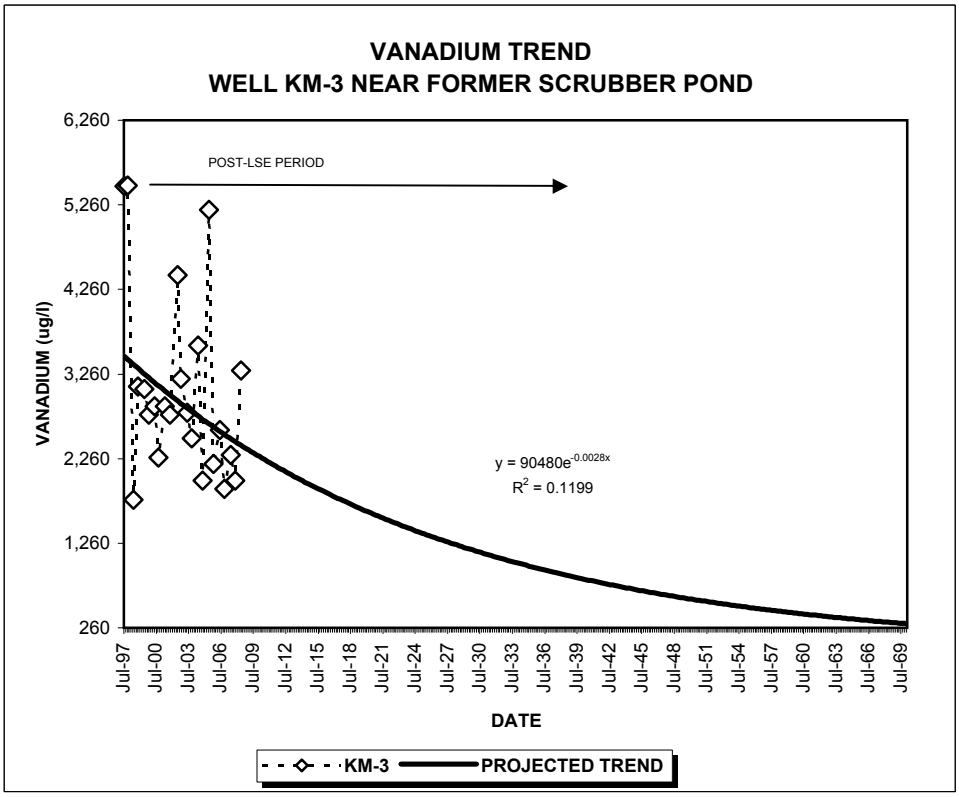

MOLYBDENUM TREND
WELL KM-2 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
MOLYBDENUM (ug/l)
4,680
4,180
3,680
3,180
2,680
2,180
1,680
1,180
680
180
y = 3E+07e-0.0078x
R2 = 0.5015
May-04
May-05
May-06
May-07
May-08
May-09
May-10
May-11
May-12
May-13
May-14
May-15
May-16
May-17
May-18
May-19
May-20
May-21
May-22
May-23
May-24
May-25
May-26
May-27
May-28
May-29
May-30
DATE
KM-2
PROJECTED TREND

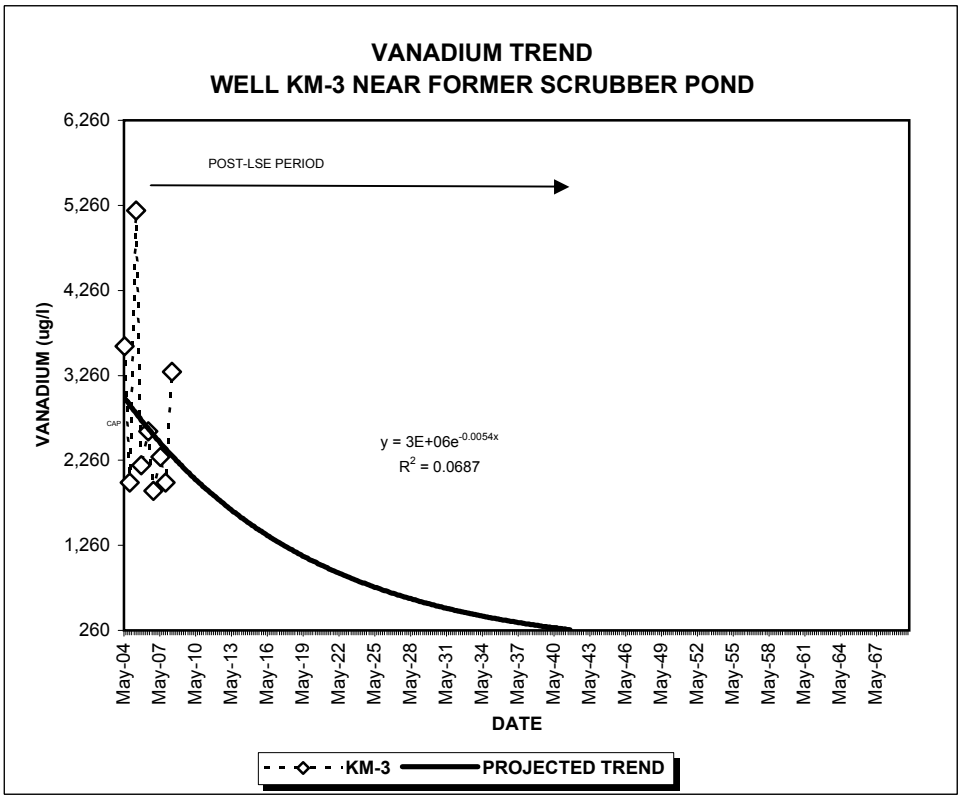

VANADIUM TREND
WELL KM-2 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
y = 5E+07e^-0.0072x
R^2 = 0.7631
VANADIUM (ug/l)
12,260
10,260
8,260
6,260
4,260
2,260
260
Nov-97
Nov-99
Nov-01
Nov-03
Nov-05
Nov-07
Nov-09
Nov-11
Nov-13
Nov-15
Nov-17
Nov-19
Nov-21
Nov-23
Nov-25
Nov-27
Nov-29
Nov-31
Nov-33
Nov-35
Nov-37
Nov-39
DATE
KM-2
Expon. (KM-2)


VANADIUM TREND
WELL KM-2 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
y = 1334.6e^0.001x
R^2 = 0.0239
VANADIUM (ug/l)
6,260
5,260
4,260
3,260
2,260
1,260
260
May-04
Nov-04
May-05
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
May-11
Nov-11
May-12
Nov-12
May-13
Nov-13
May-14
Nov-14
May-15
Nov-15
May-16
Nov-16
May-17
Nov-17
May-18
Nov-18
May-19
Nov-19
DATE
KM-2
Expon. (KM-2)

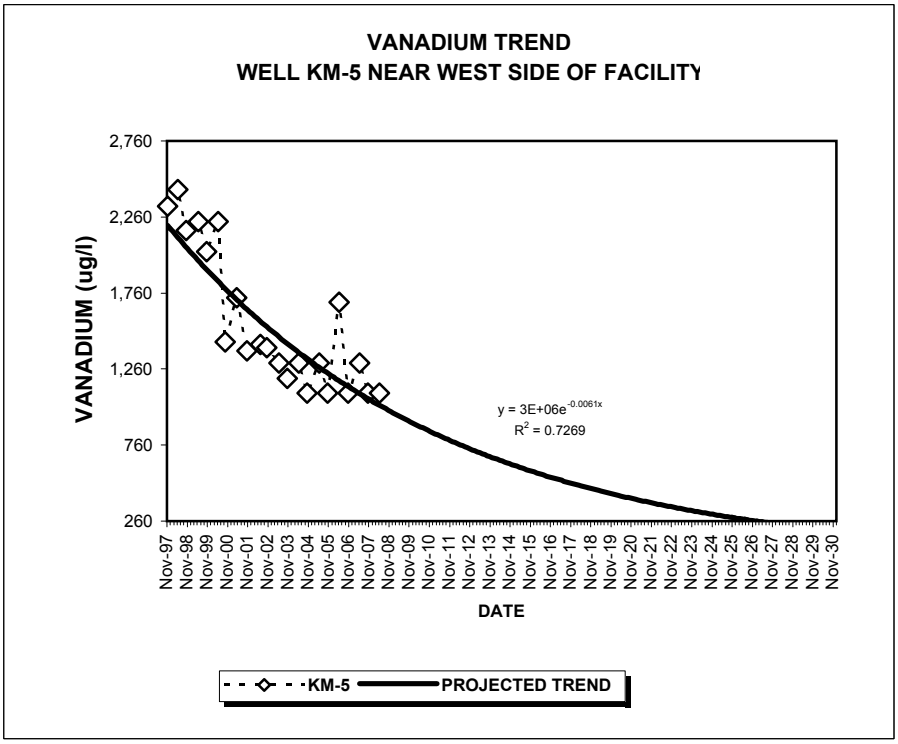

MOLYBDENUM TREND
WELL KM-3 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
MOLYBDENUM (ug/l)
50,180
45,180
40,180
35,180
30,180
25,180
20,180
15,180
10,180
5,180
180
y = 4E+08e^-0.0087x
R^2 = 0.4901
Jul-97
Jul-99
Jul-01
Jul-03
Jul-05
Jul-07
Jul-09
Jul-11
Jul-13
Jul-15
Jul-17
Jul-19
Jul-21
Jul-23
Jul-25
Jul-27
Jul-29
Jul-31
Jul-33
Jul-35
Jul-37
Jul-39
DATE
KM-3
PROJECTED TREND

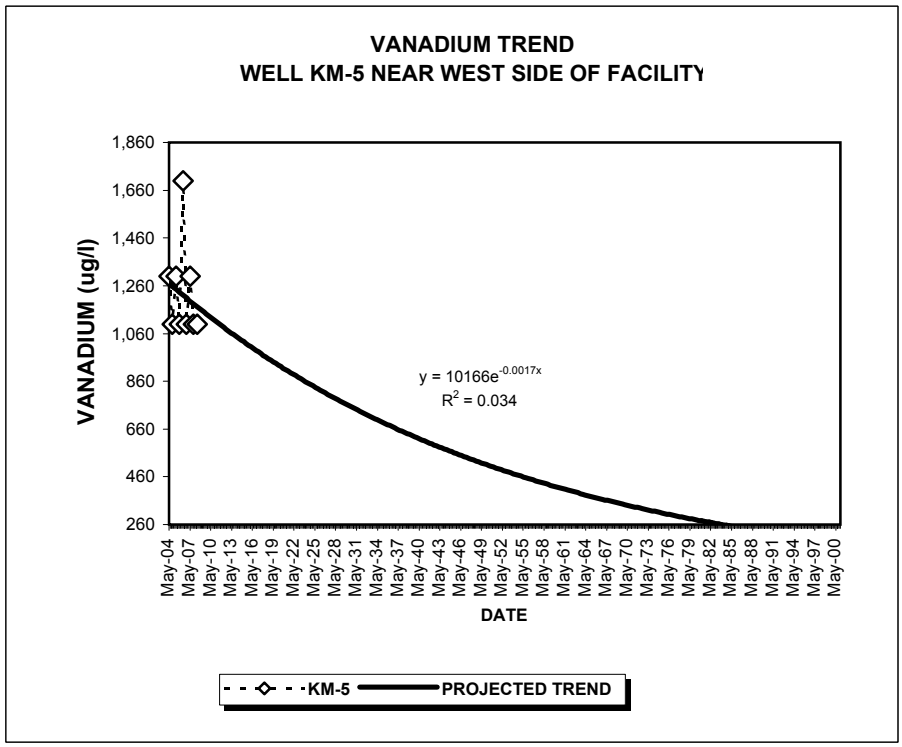

MOLYBDENUM TREND
WELL KM-3 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
MOLYBDENUM (ug/l)
9,180
8,180
7,180
6,180
5,180
4,180
3,180
2,180
1,180
180
y = 1E+06e^-0.0042x
R^2 = 0.6095
May-04
May-06
May-08
May-10
May-12
May-14
May-16
May-18
May-20
May-22
May-24
May-26
May-28
May-30
May-32
May-34
May-36
May-38
May-40
May-42
May-44
May-46
May-48
May-50
May-52
May-54
May-56
May-58
May-60
May-62
May-64
May-66
May-68
May-70
May-72
May-74
May-76
May-78
May-80
DATE
KM-3
PROJECTED TREND


VANADIUM TREND
WELL KM-3 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
y = 90480e-0.0028x
R2 = 0.1199
VANADIUM (ug/l)
6,260
5,260
4,260
3,260
2,260
1,260
260
Jul-97
Jul-00
Jul-03
Jul-06
Jul-09
Jul-12
Jul-15
Jul-18
Jul-21
Jul-24
Jul-27
Jul-30
Jul-33
Jul-36
Jul-39
Jul-42
Jul-45
Jul-48
Jul-51
Jul-54
Jul-57
Jul-60
Jul-63
Jul-66
Jul-69
DATE
KM-3
PROJECTED TREND


VANADIUM TREND
WELL KM-3 NEAR FORMER SCRUBBER POND
POST-LSE PERIOD
CAP
y = 3E+06e-0.0054x
R2 = 0.0687
VANADIUM (ug/l)
6,260
5,260
4,260
3,260
2,260
1,260
260
May-04
May-07
May-10
May-13
May-16
May-19
May-22
May-25
May-28
May-31
May-34
May-37
May-40
May-43
May-46
May-49
May-52
May-55
May-58
May-61
May-64
May-67
DATE
KM-3
PROJECTED TREND

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS

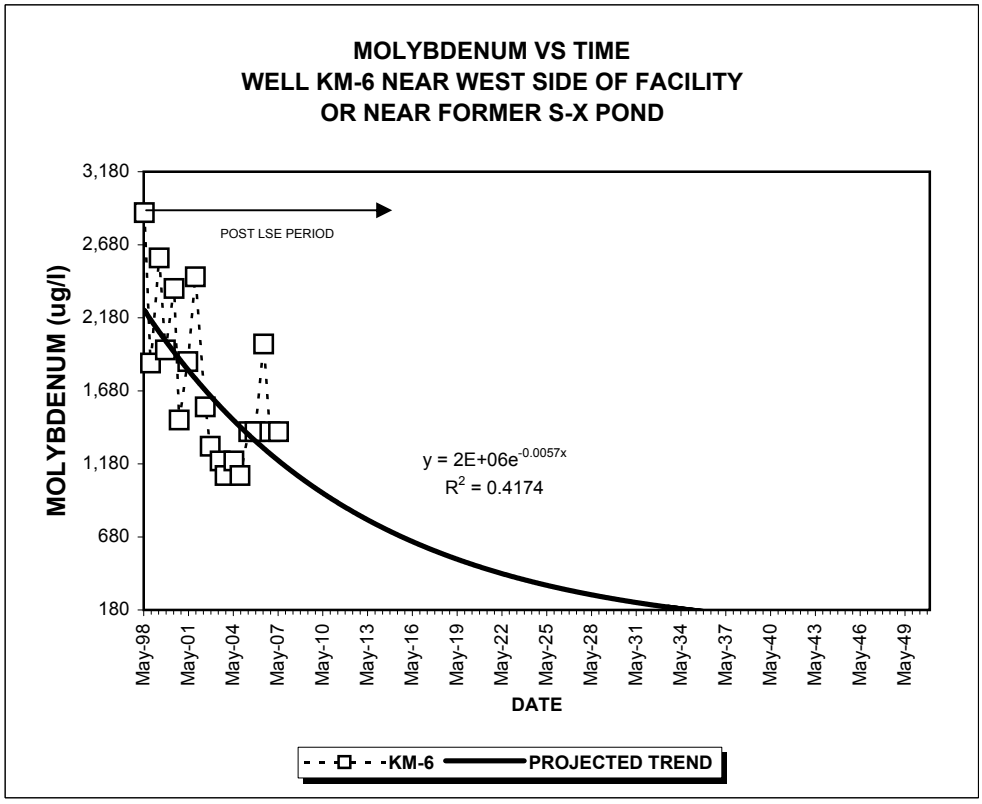




RBC FOR VANADIUM IS 260 UG/L
KM-5 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING LSE

FIGURE C-32

COC CONCENTRATIONS AND PROJECTED TRENDS VERSUS TIME



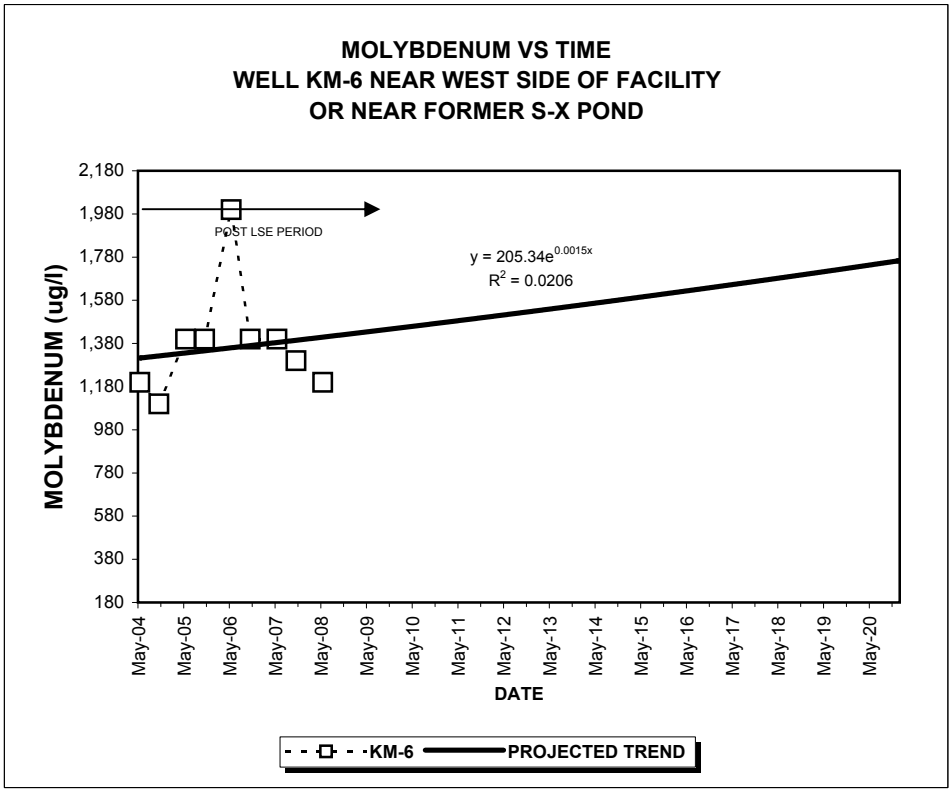
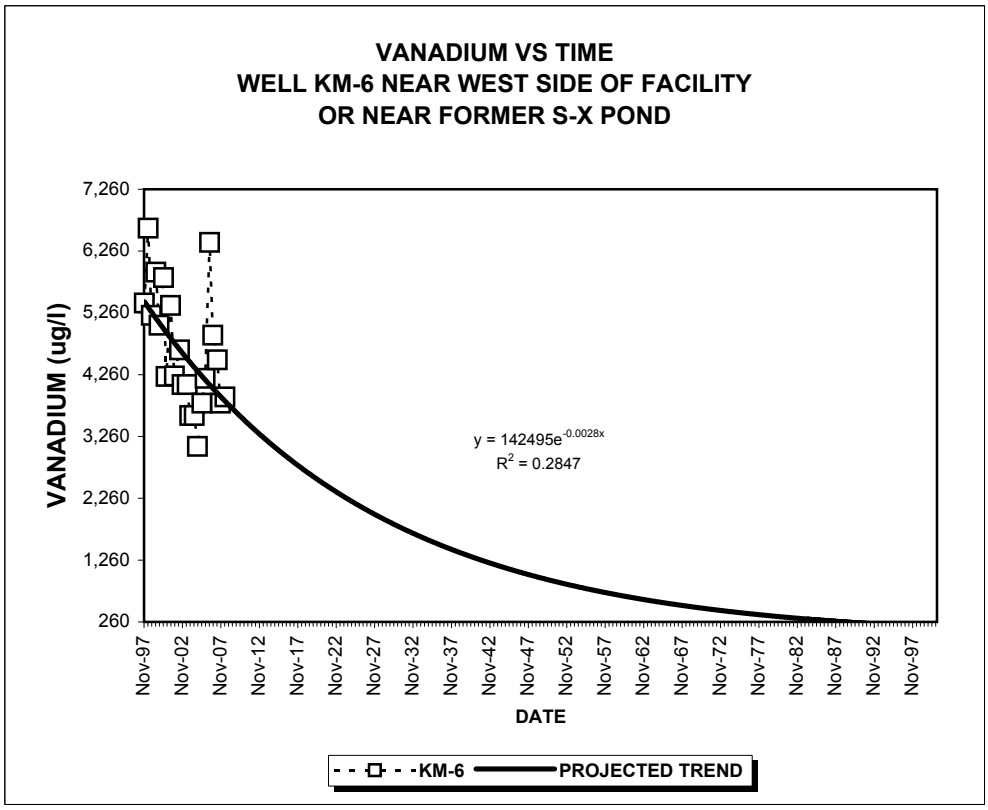


FIGURE C-33

RBC FOR MOLYBDENUM IS 180 UG/L

COC CONCENTRATIONS AND PROJECTED TRENDS VERSUS TIME



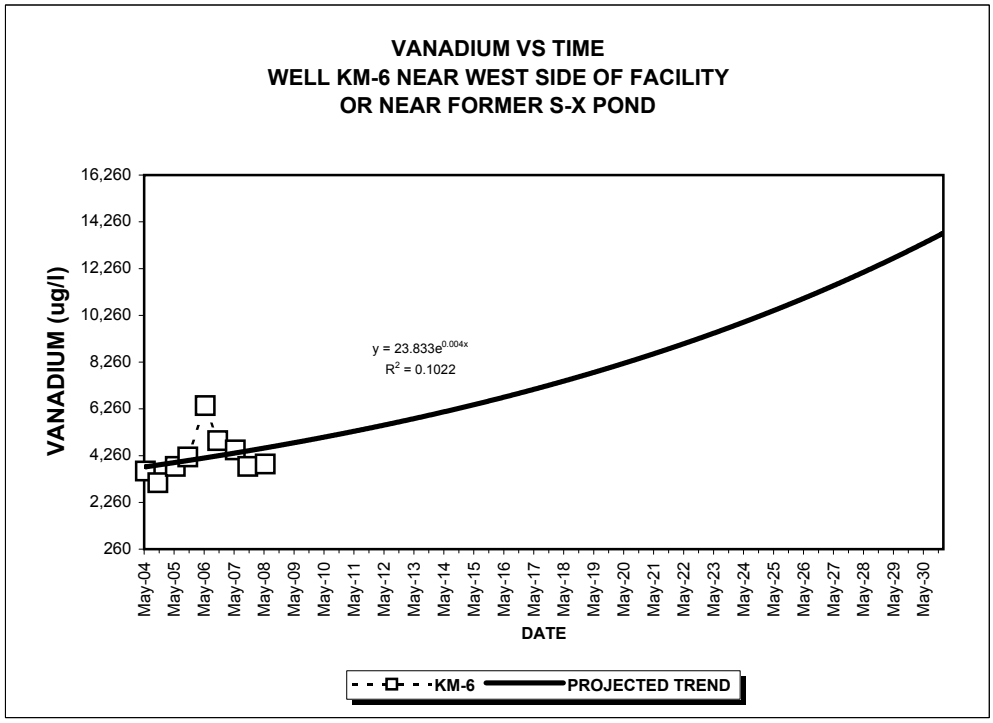
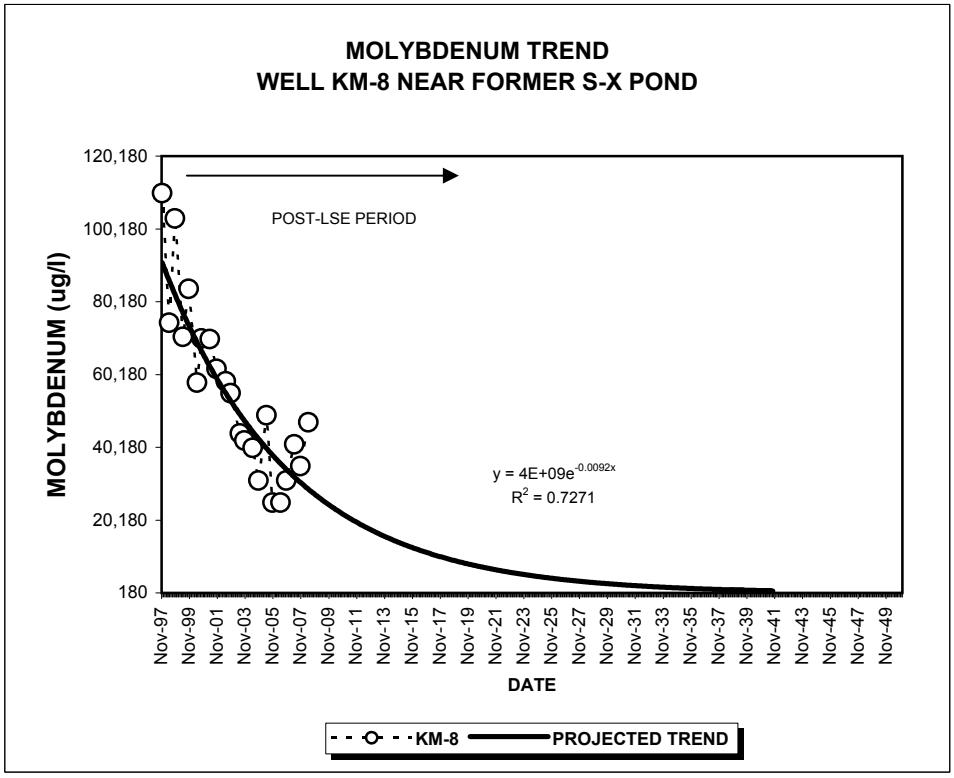


FIGURE C-34

RBC FOR VANADIUM IS 260 UG/L

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS



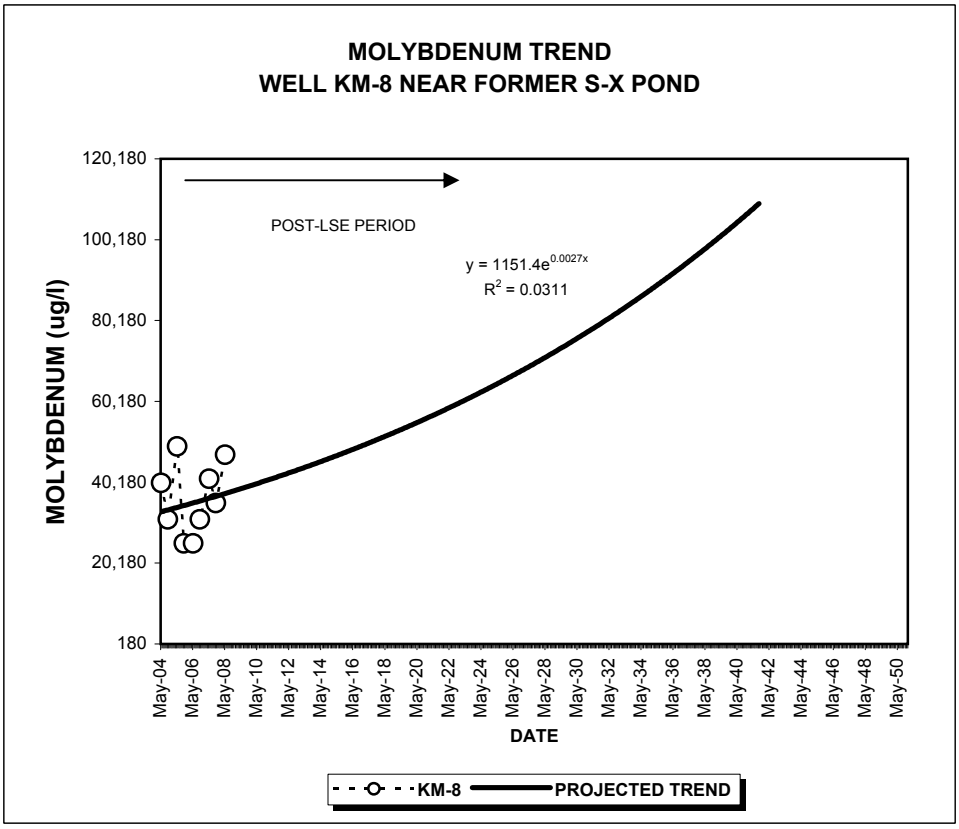
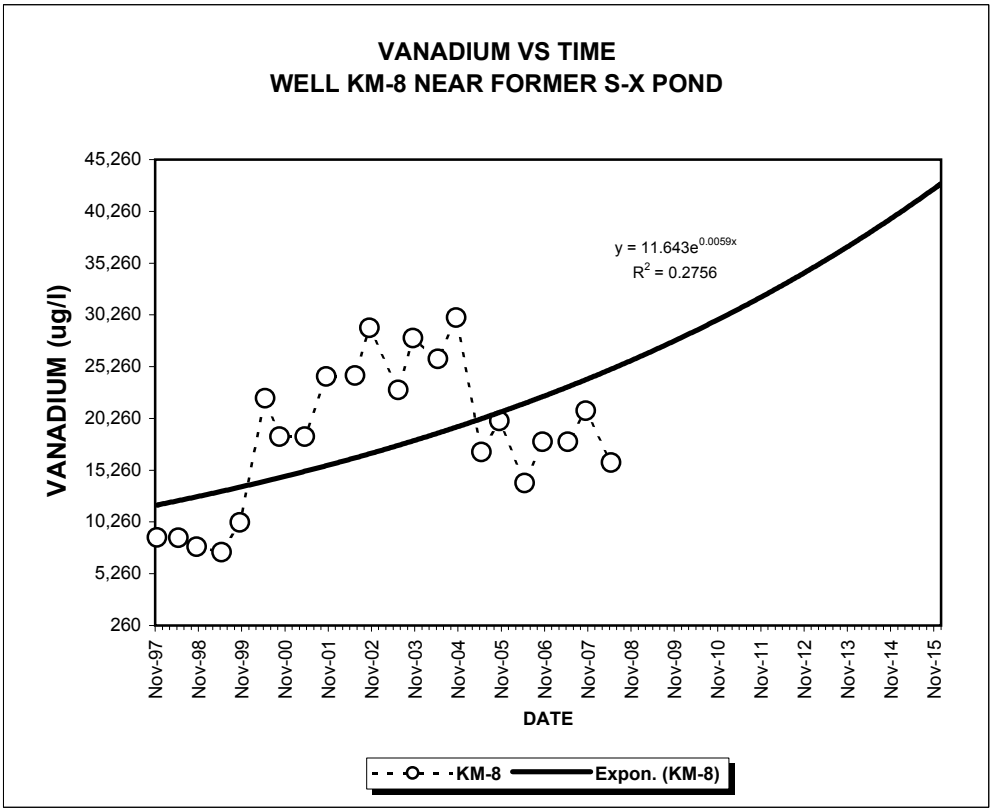
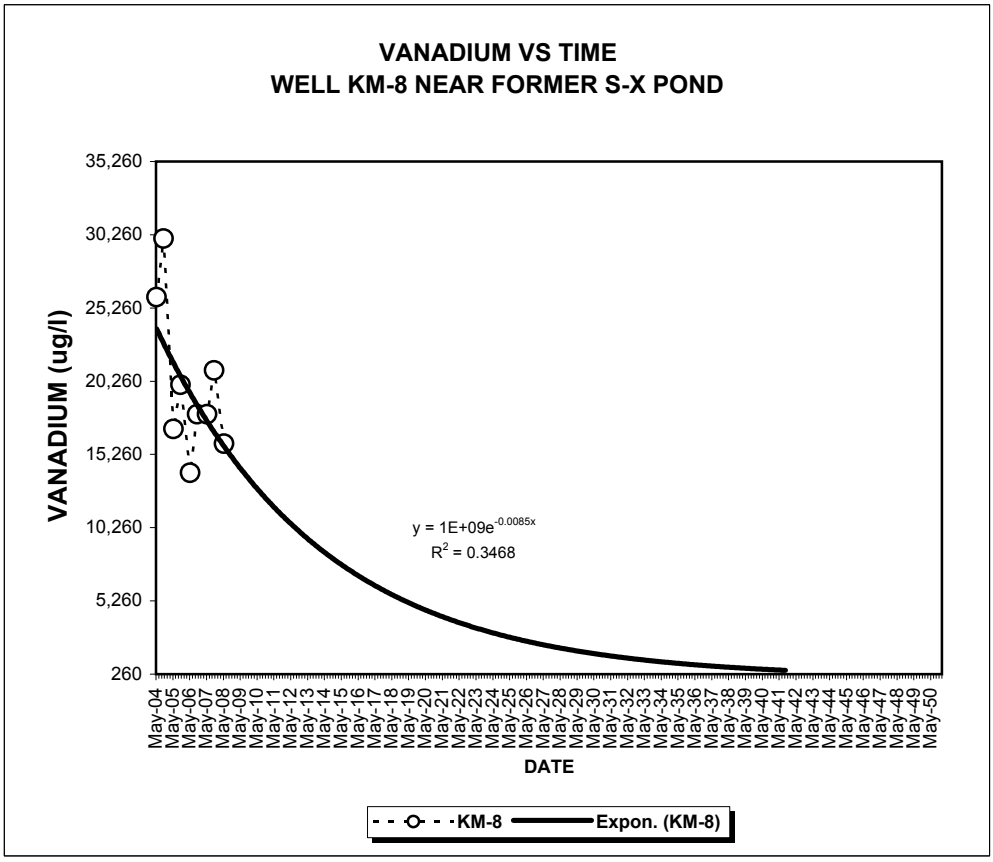


FIGURE C-35

RBC FOR MOLYBDENUM IS 180 UG/L
KM-8 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING LSE AND RECLAMATION

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS

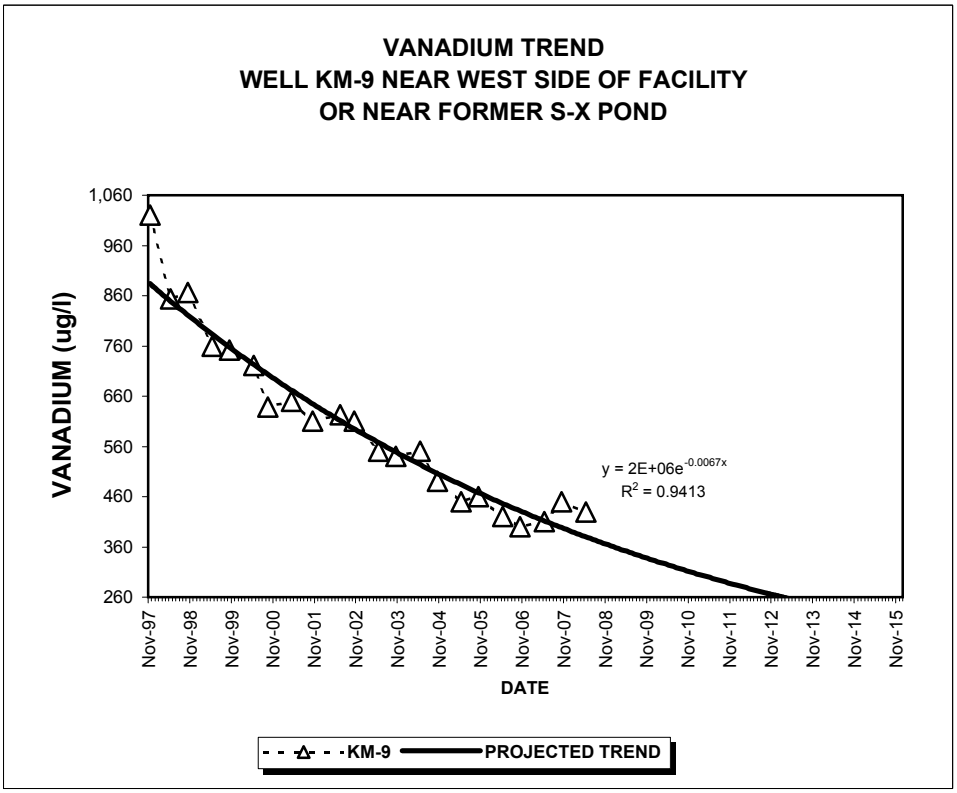


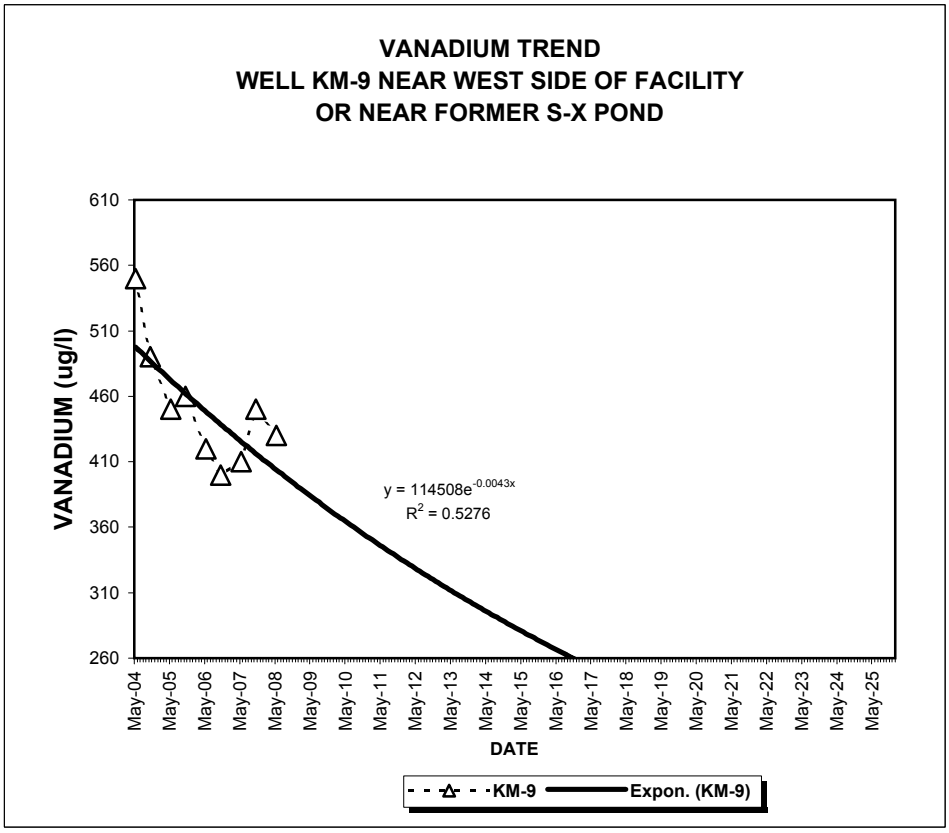


RBC FOR VANADIUM IS 260 UG/L
KM-8 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING LSE AND RECLAMATION

FIGURE C-36

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS

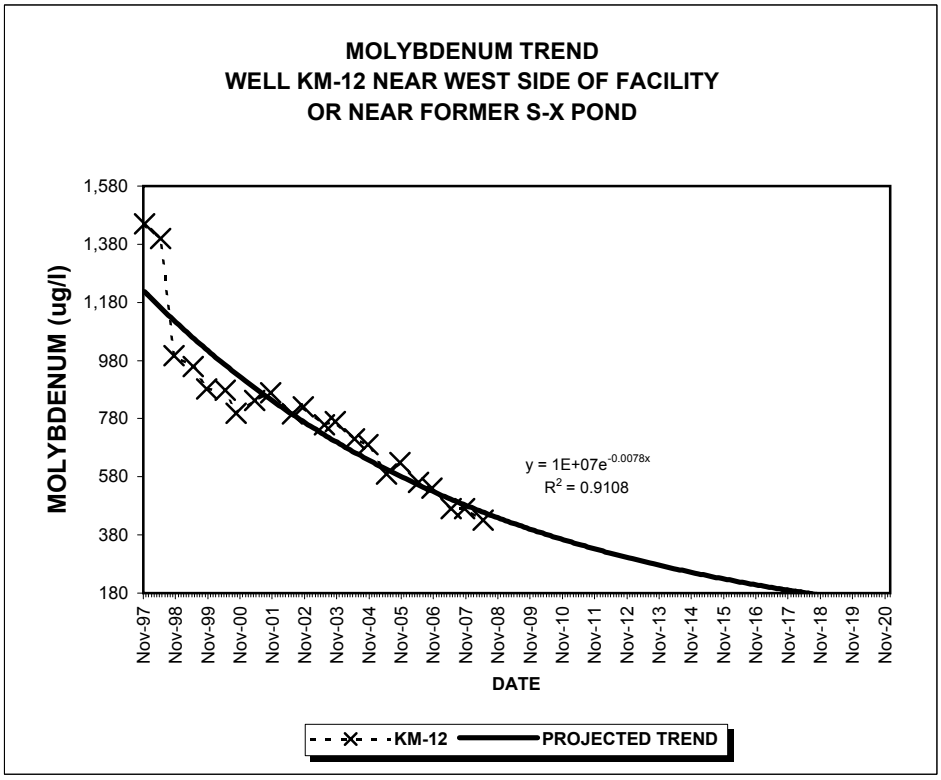


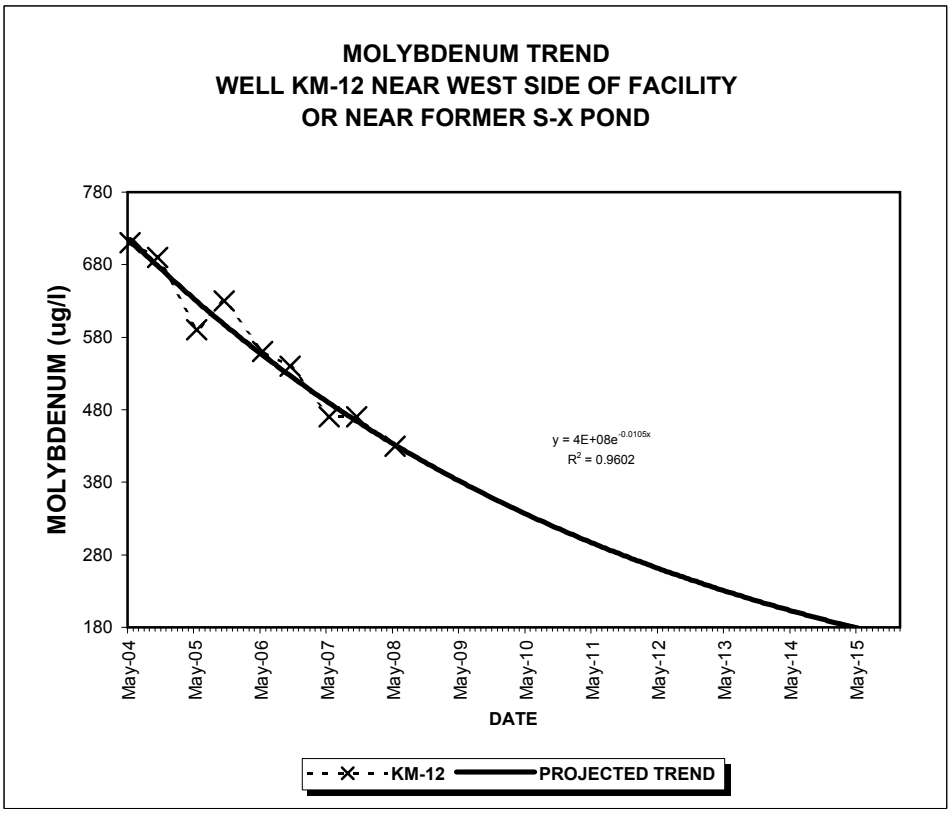


RBC FOR VANADIUM IS 260 UG/L
KM-9 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING REROUTING OF S-X STREAM

FIGURE C-37

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS

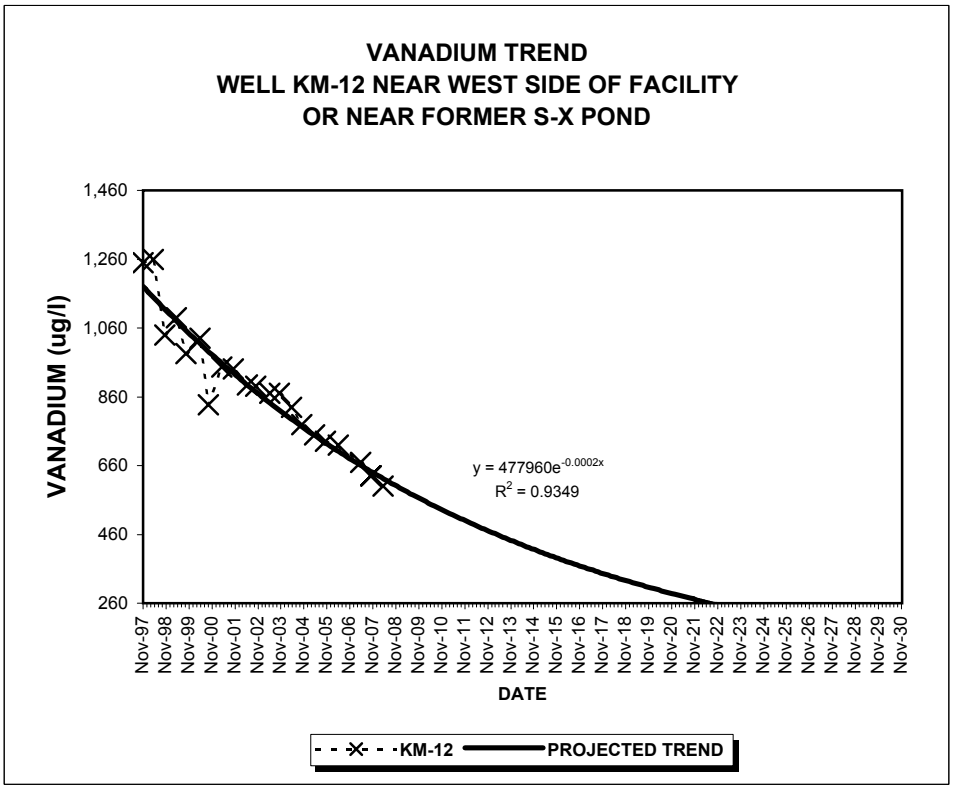


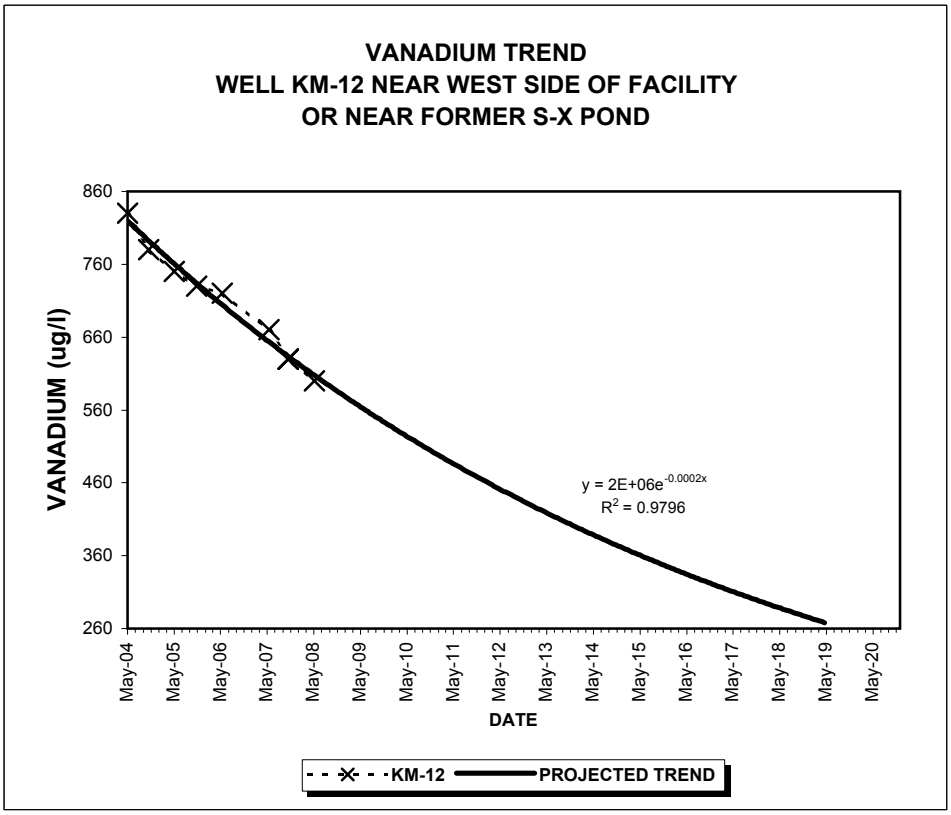


RBC FOR MOLYBDENUM IS 180 UG/L
KM-12 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING REROUTING OF THE S-X STREAM

FIGURE C-38

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS

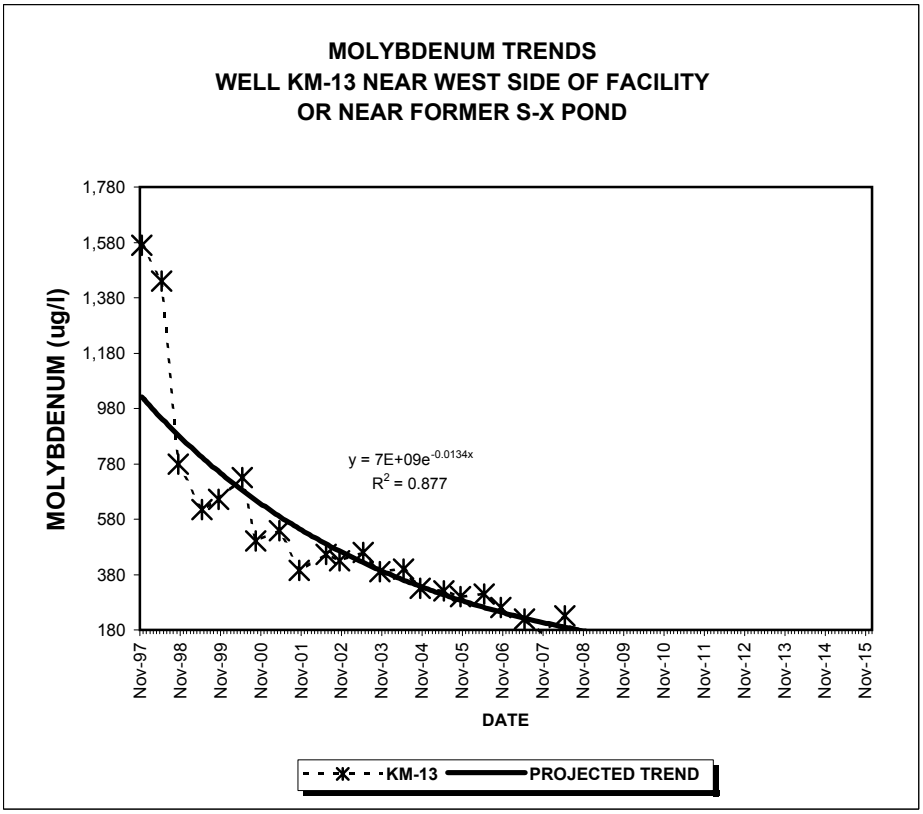


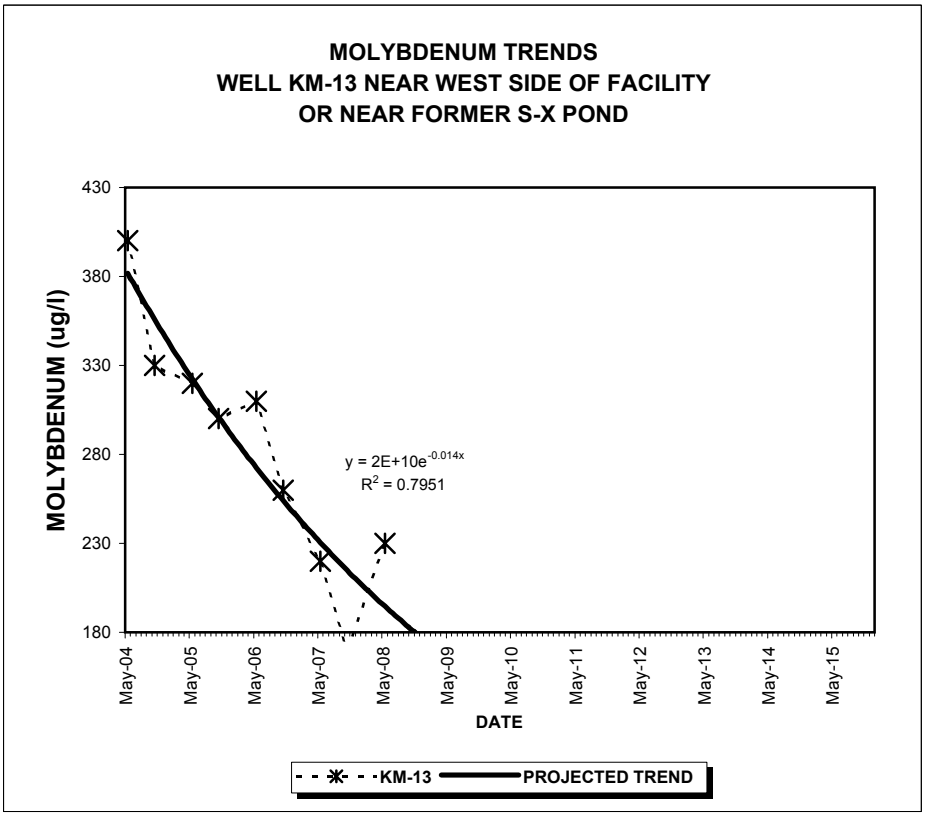


RBC FOR VANADIUM IS 260 UG/L
KM-12 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING REROUTING OF THE S-X STREAM

FIGURE C-39

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS

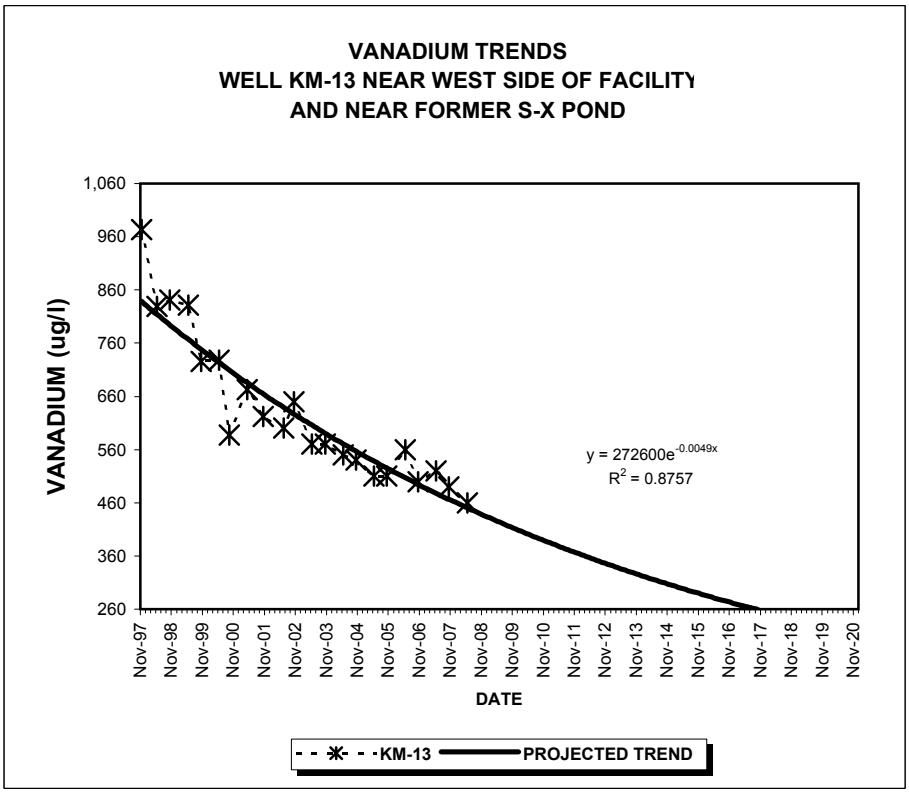




RBC FOR MOLYBDENUM IS 180 UG/L
KM-13 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING REROUTING OF THE S-X STREAM

FIGURE C-40

COC CONCENTRATION TRENDS WITH TIME AND PROJECTED TRENDS



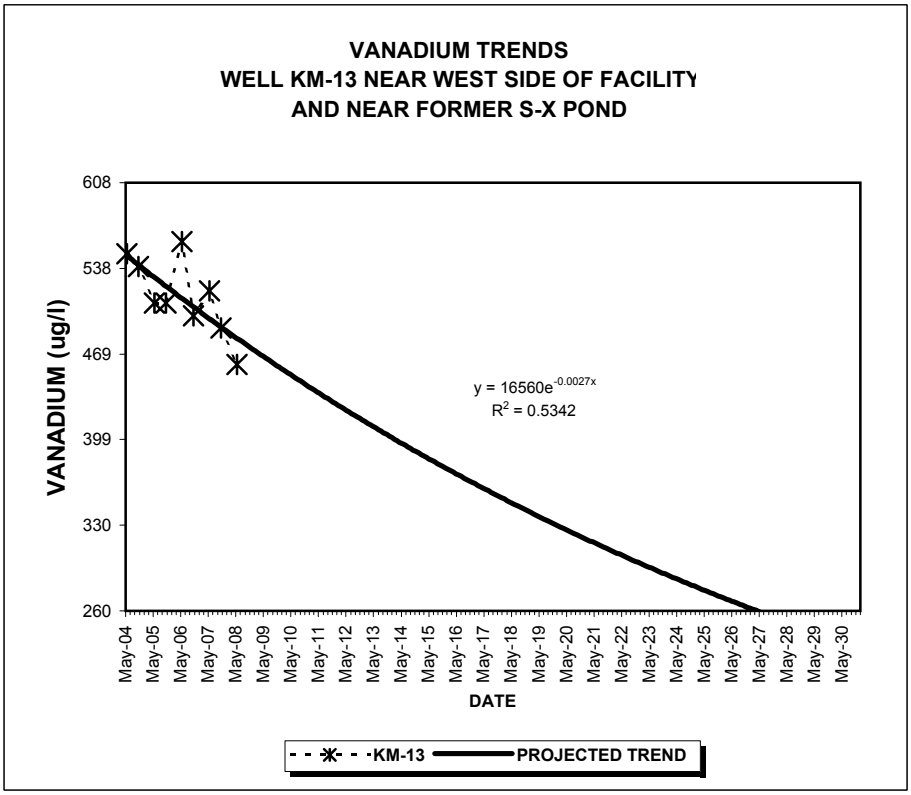
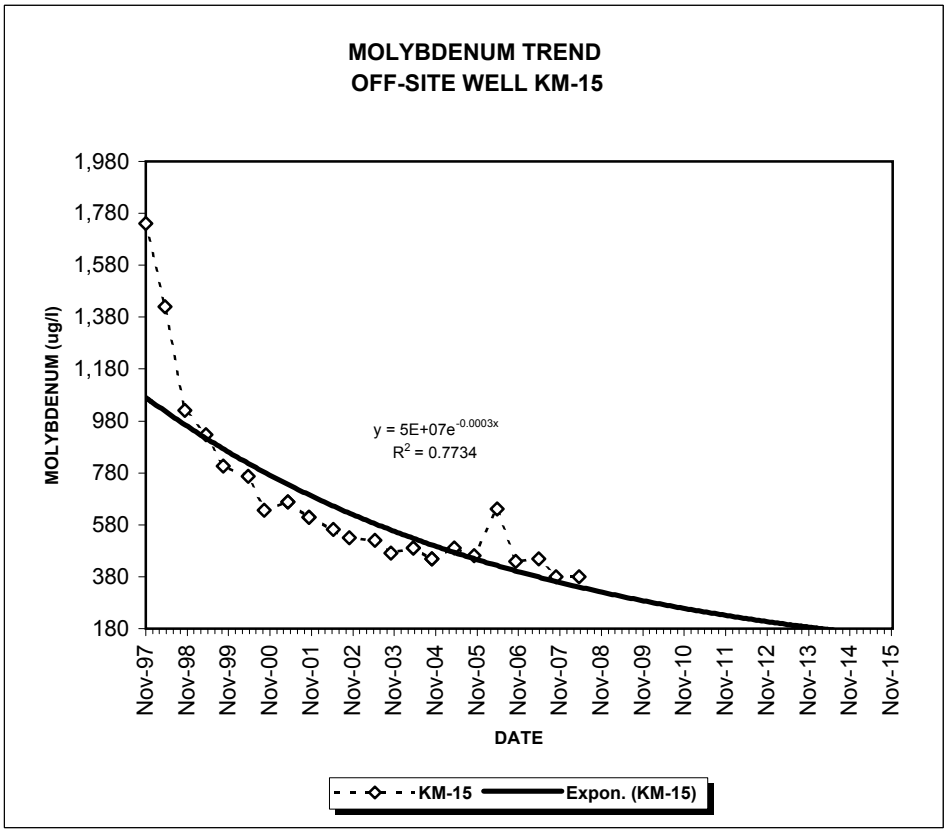


FIGURE C-41

RBC FOR VANADIUM IS 260 UG/L
KM-13 IS A POC WELL
PROJECTED TRENDS BASED ON OBSERVATIONS FOLLOWING REROUTING OF THE S-X STREAM

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



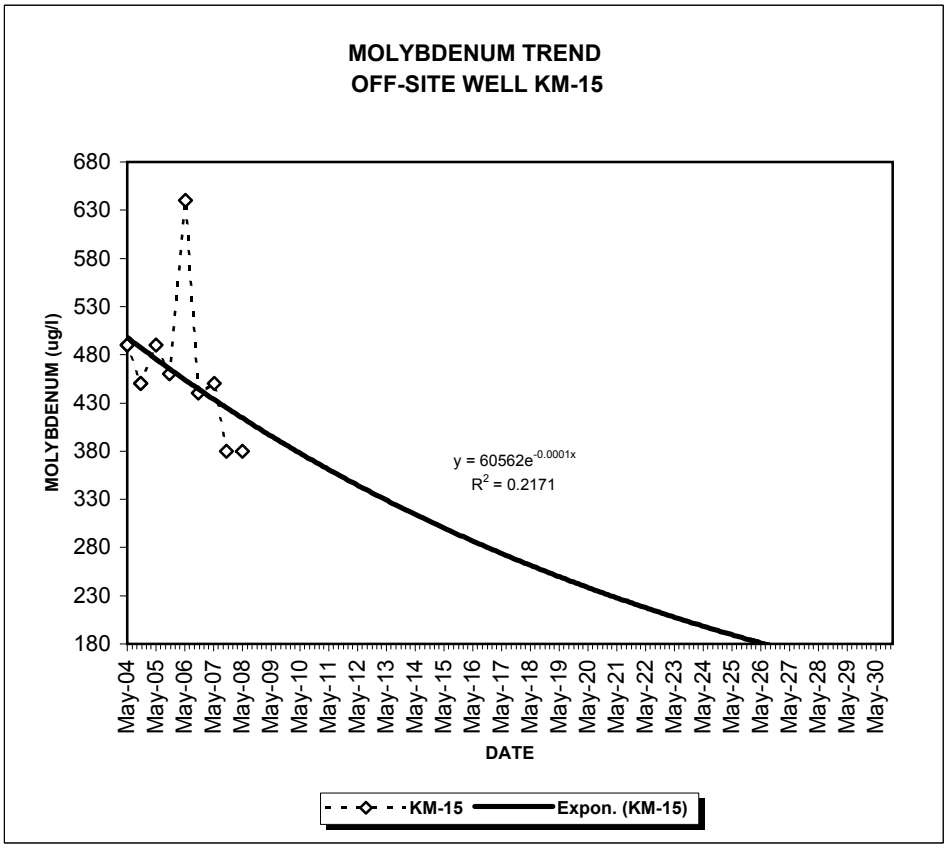
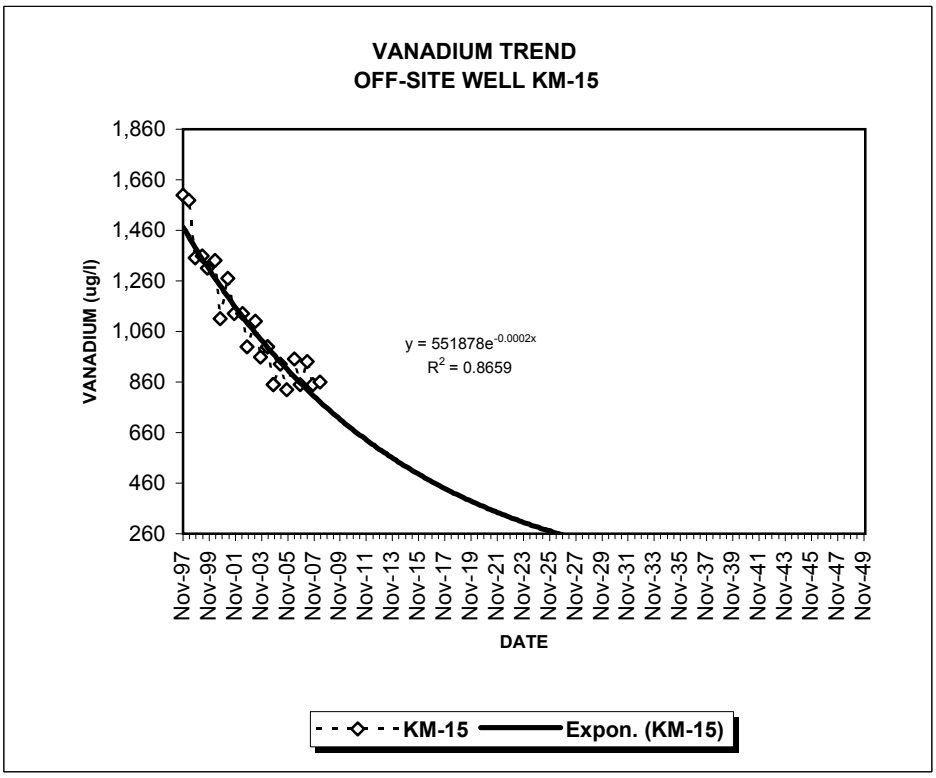


FIGURE C-42

RBC FOR MOLYBDENUM IS 180 UG/L

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



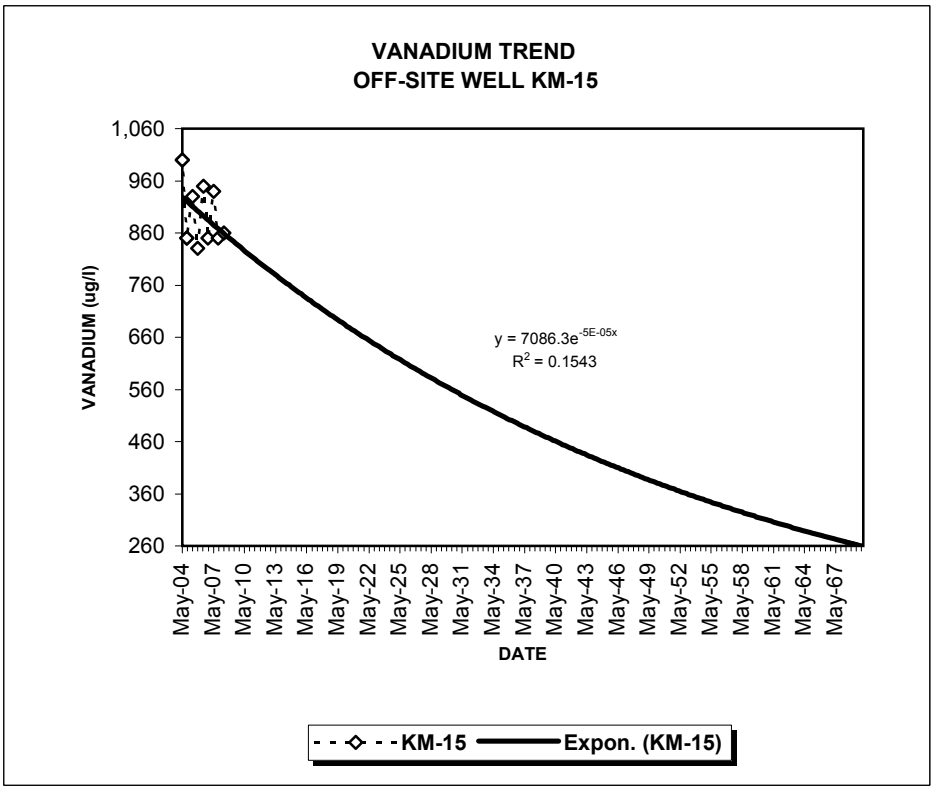
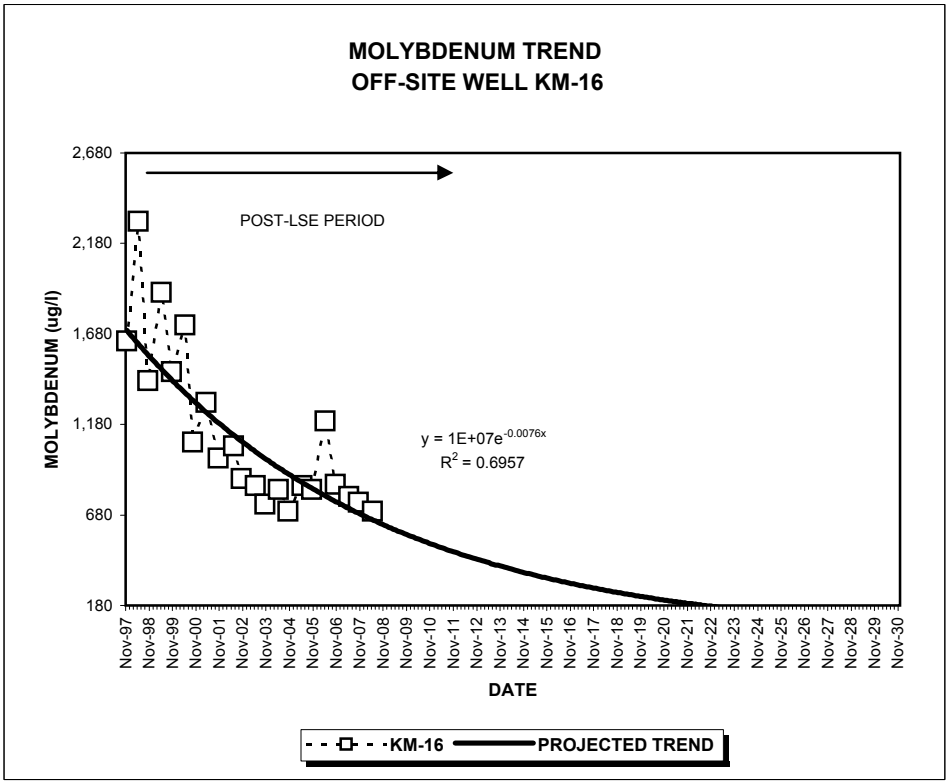


FIGURE C-43

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



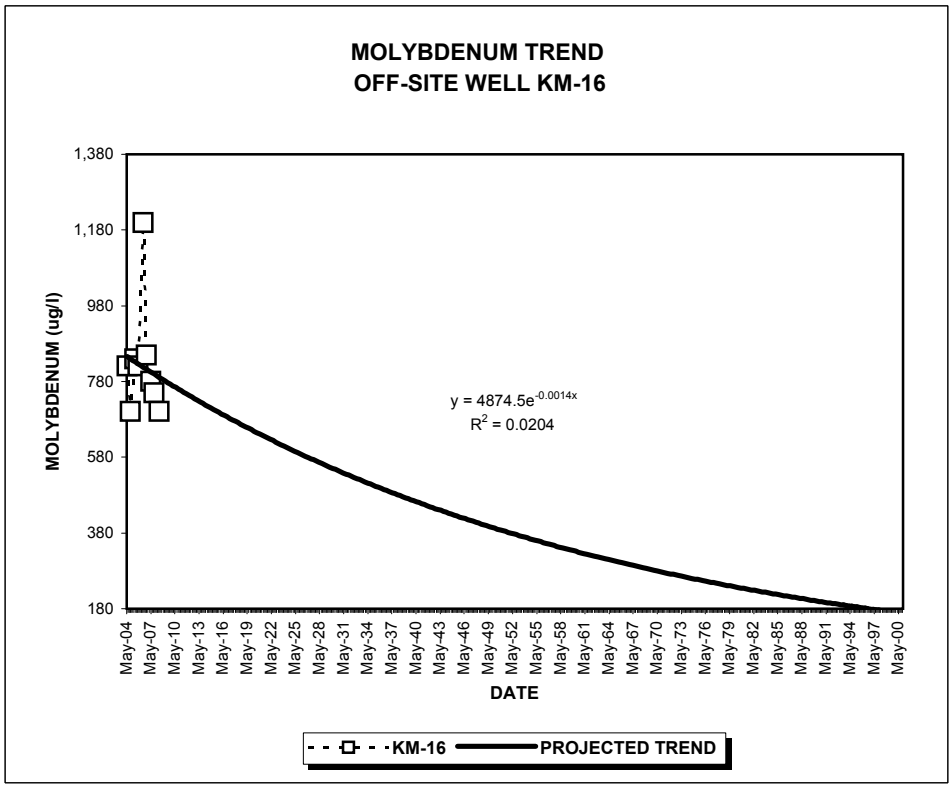
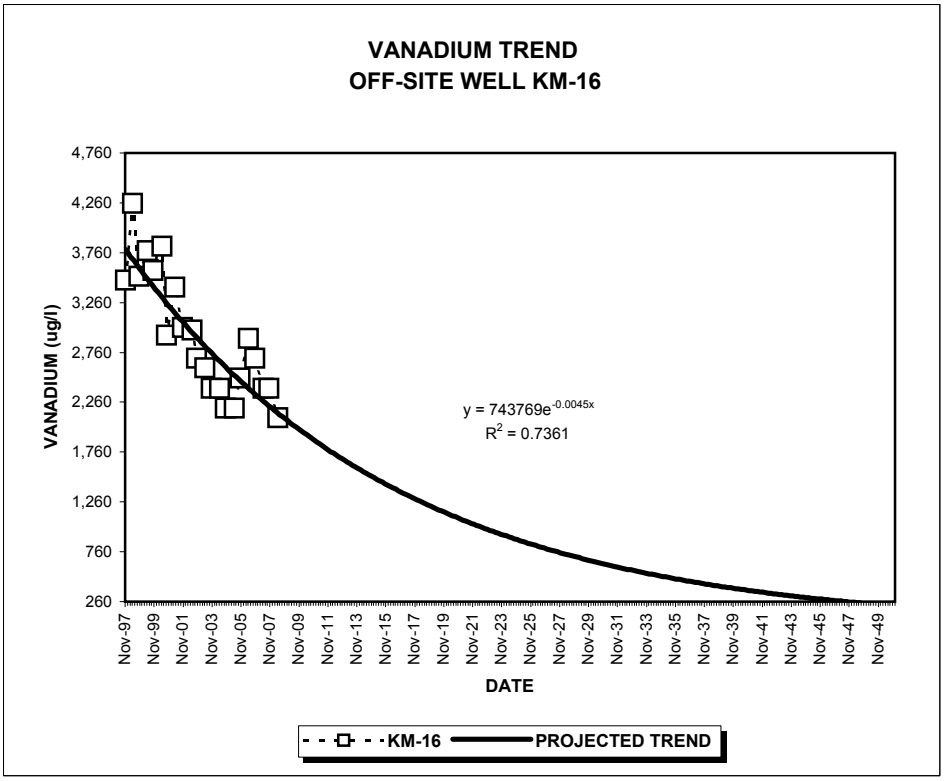


FIGURE C-44

PROJECTED TREND BASED ON OBSERVATIONS FOLLOWING COMPLETION OF LSE AND RECLAMATION

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



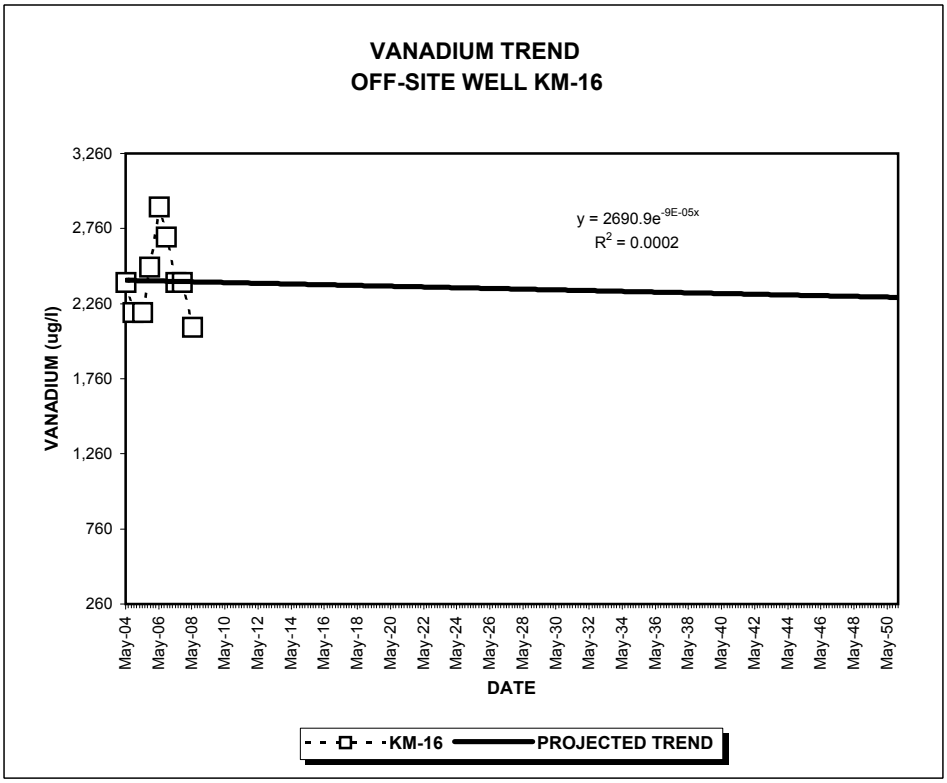
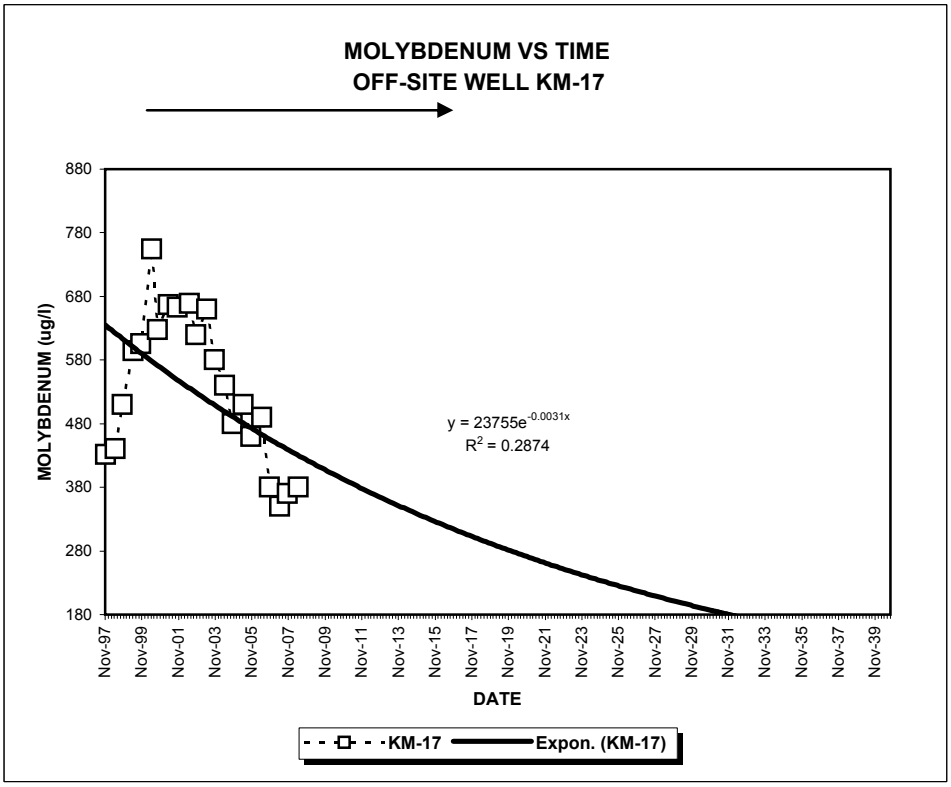


FIGURE C-45

RBC FOR VANADIUM IS 260 UG/L
PROJECTED TREND BASED ON OBSERVATIONS FOLLOWING
COMPLETION OF LSE AND RECLAMATION

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



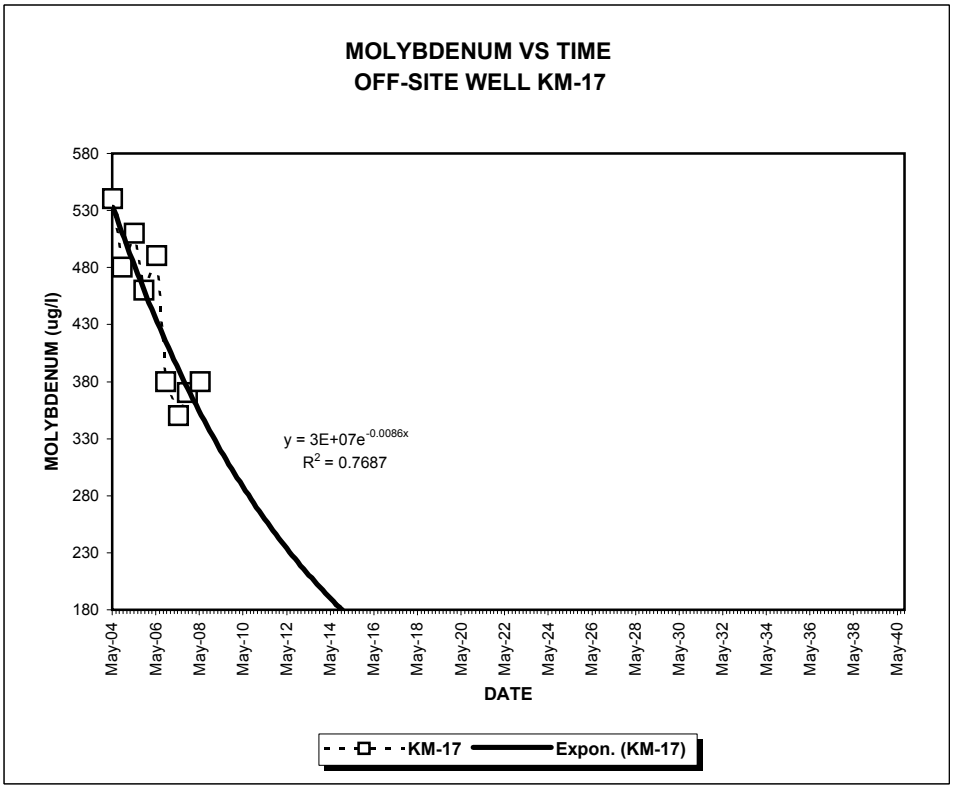
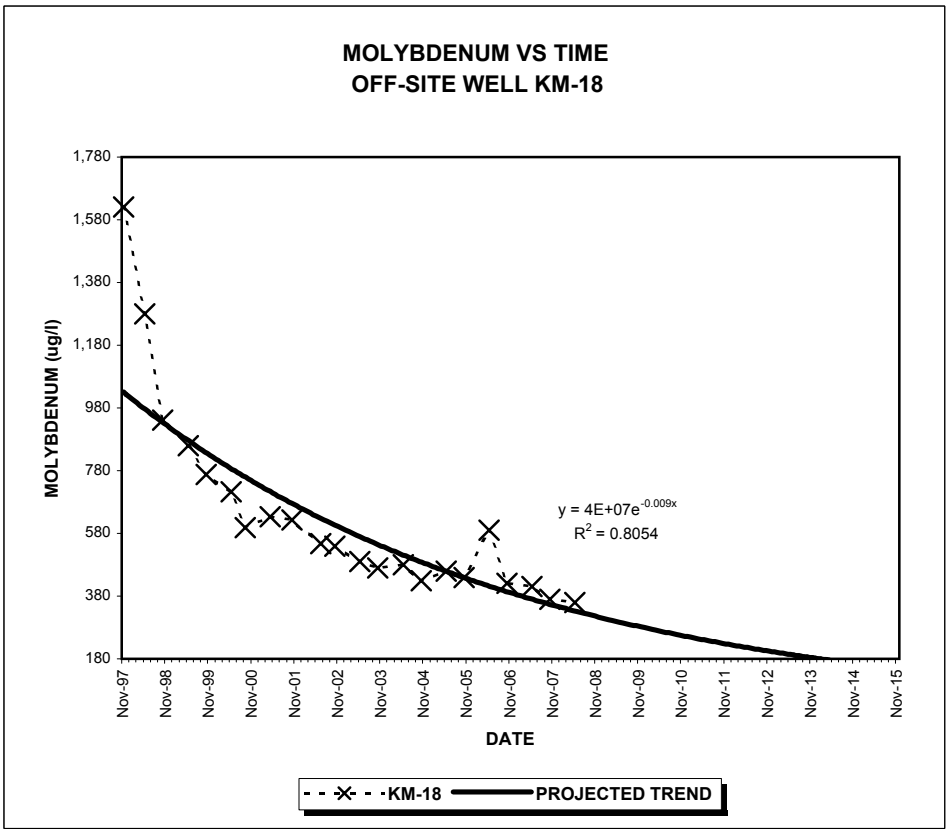


FIGURE C-46

RBC FOR MOLYBDENUM IS 180 UG/L
PROJECTED TREND BASED ON OBSERVATIONS FOLLOWING
COMPLETION OF LSE AND RECLAMATION

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



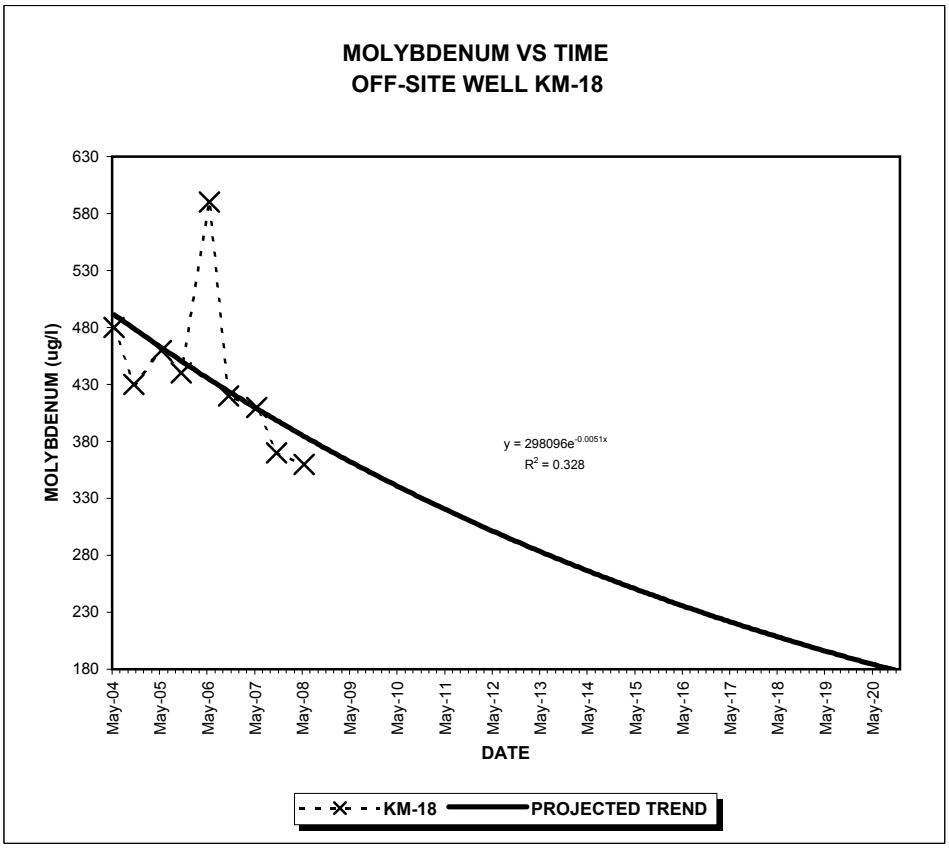
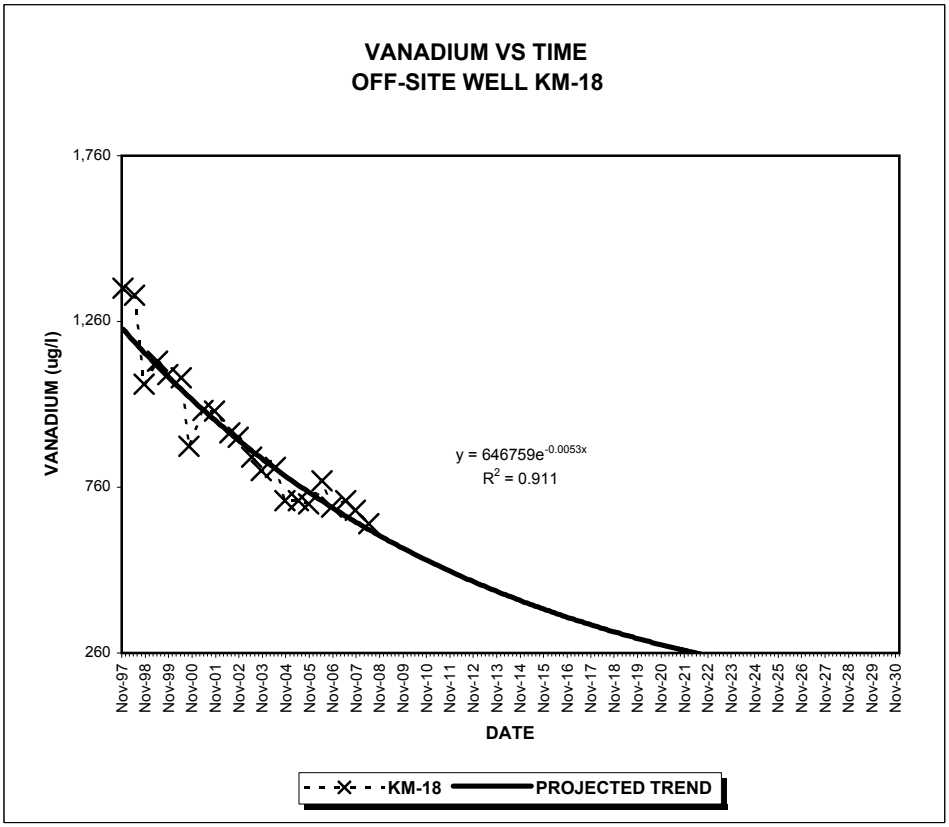


FIGURE C-47

RBC FOR MOLYBDENUM IS 180 UG/L

COC CONCENTRATIONS WITH TIME AND PROJECTED TRENDS



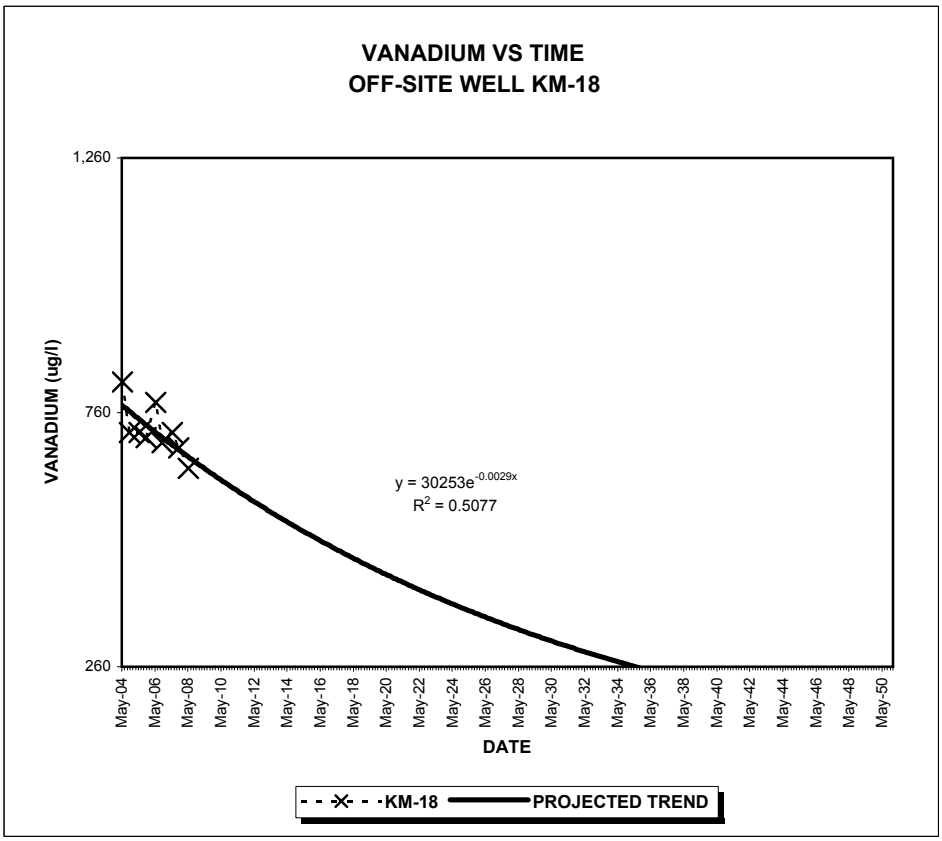
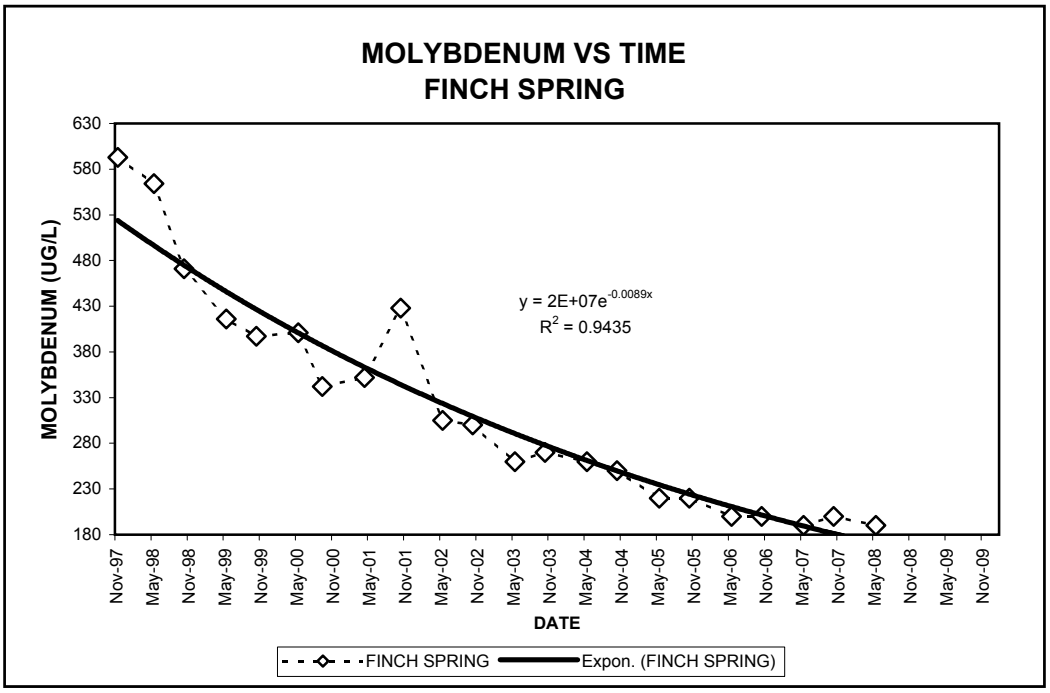
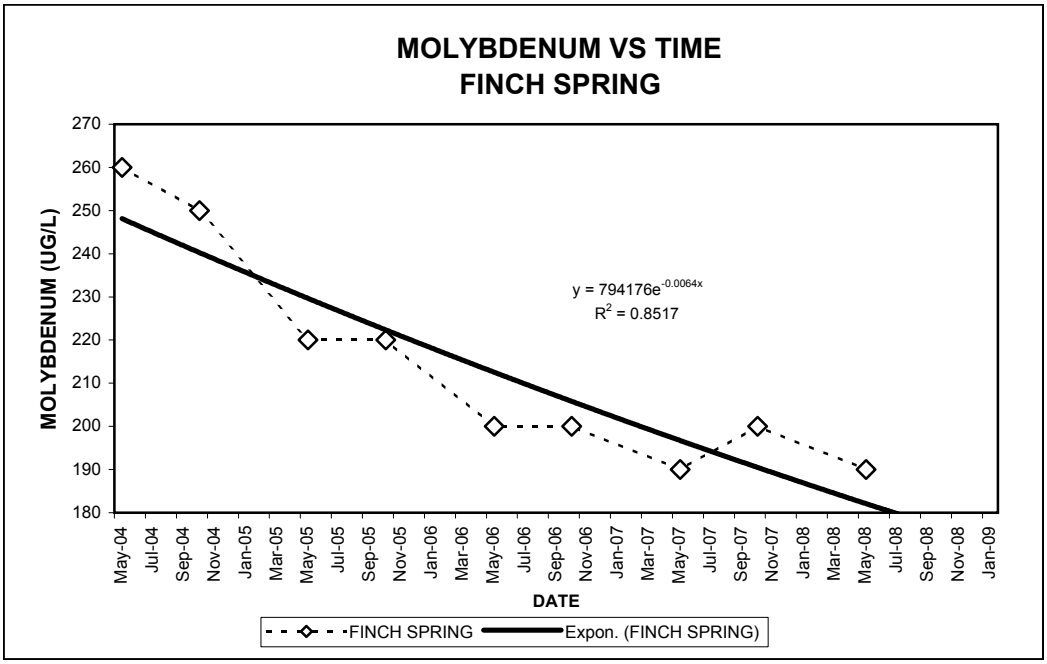
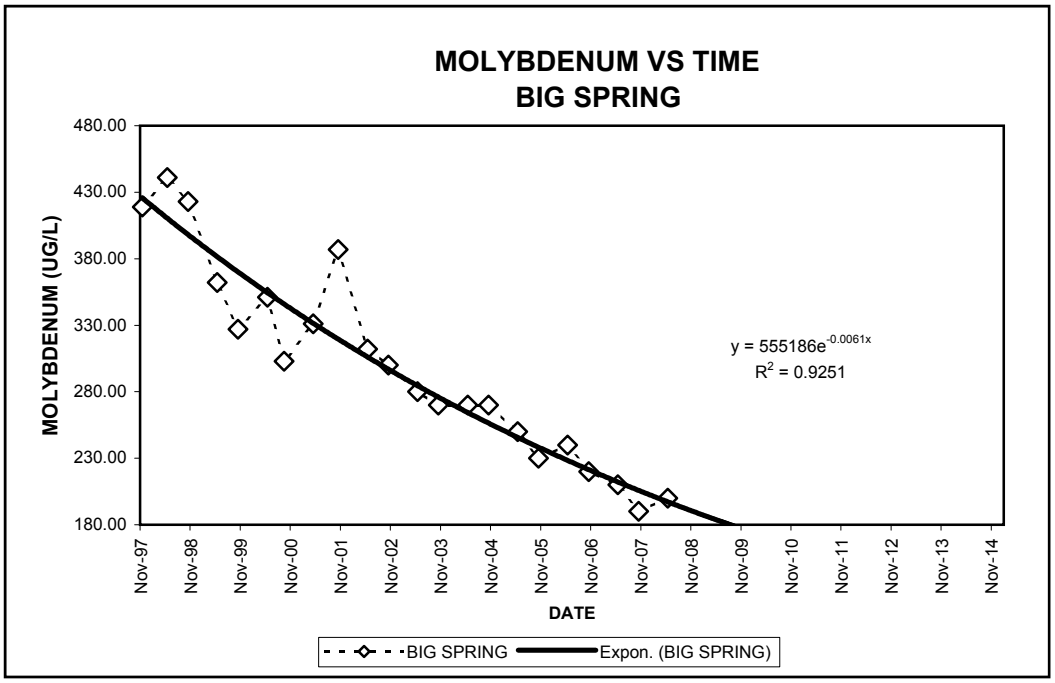


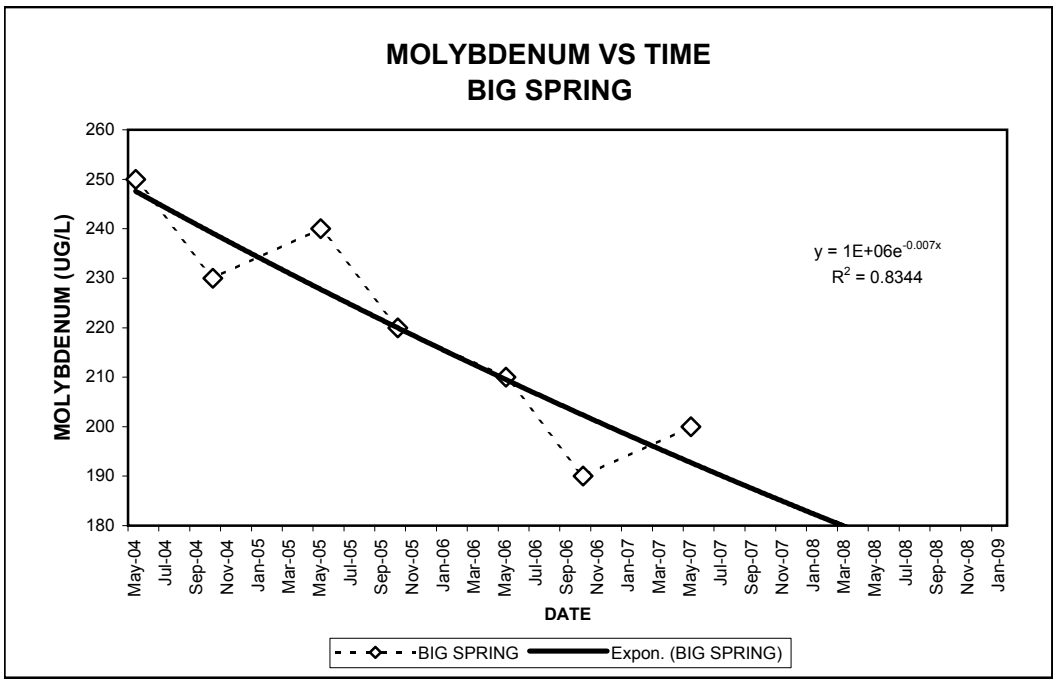
FIGURE C-48

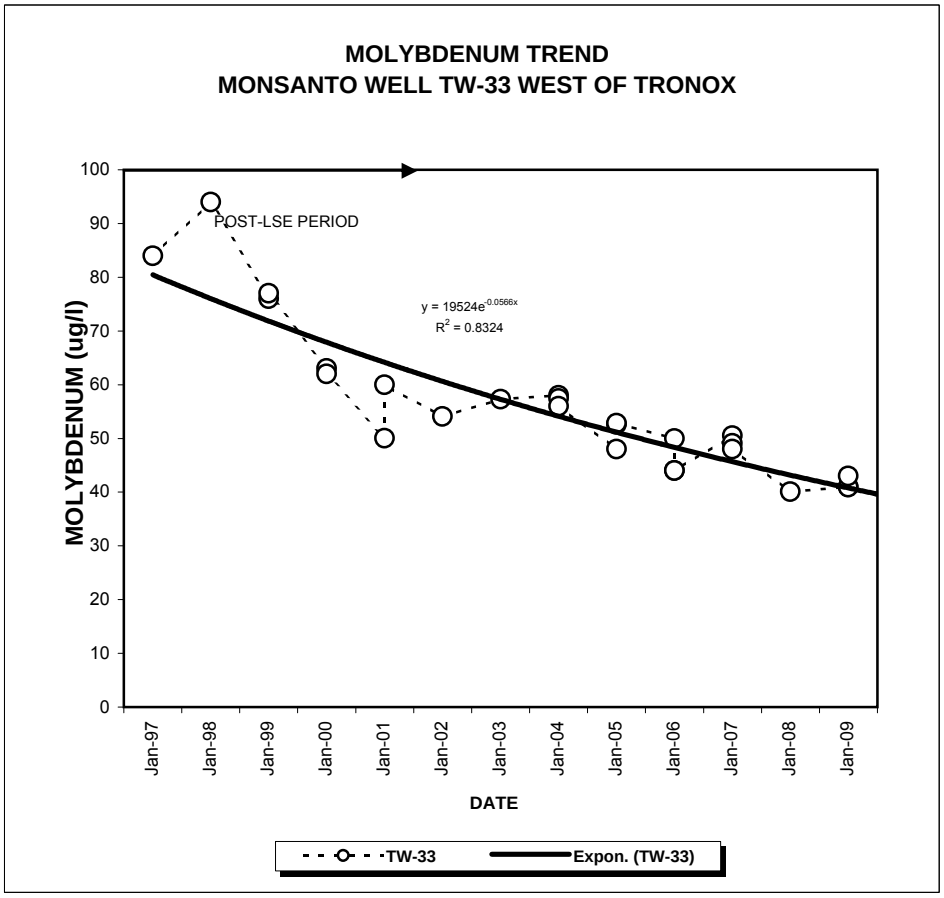
RBC FOR VANADIUM IS 260 UG/L

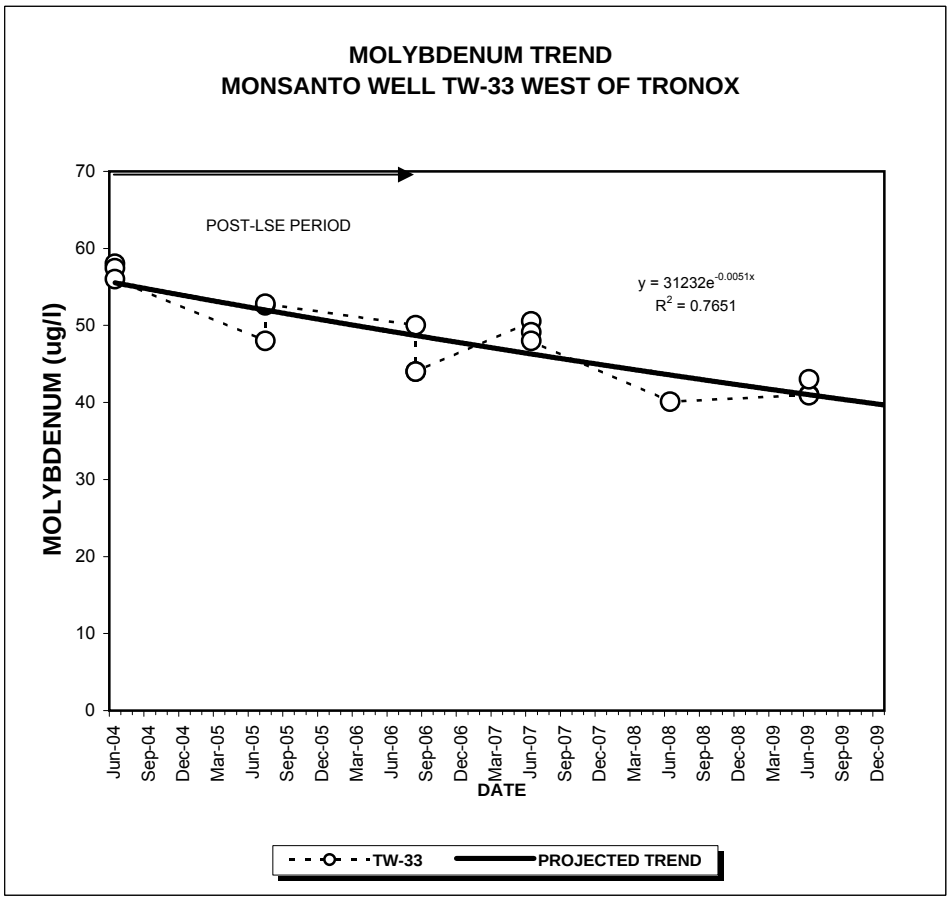

MOLYBDENUM VS TIME
FINCH SPRING
MOLYBDENUM (UG/L)
630
580
530
480
430
380
330
280
230
180
y = 2E+07e-0.0089x
R2 = 0.9435
Nov-97
May-98
Nov-98
May-99
Nov-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Nov-04
May-05
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
DATE
FINCH SPRING
Expon. (FINCH SPRING)

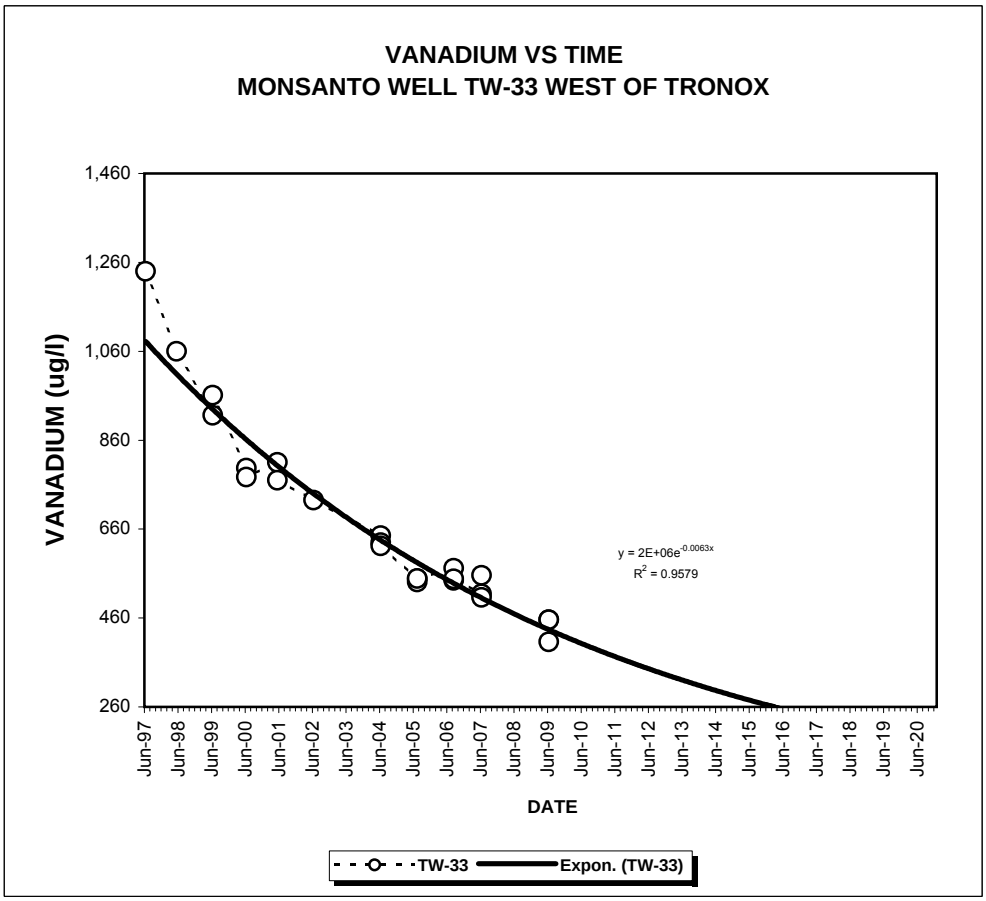

MOLYBDENUM VS TIME
FINCH SPRING
MOLYBDENUM (UG/L)
270
260
250
240
230
220
210
200
190
180
y = 794176e-0.0064x
R2 = 0.8517
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
DATE
FINCH SPRING
Expon. (FINCH SPRING)

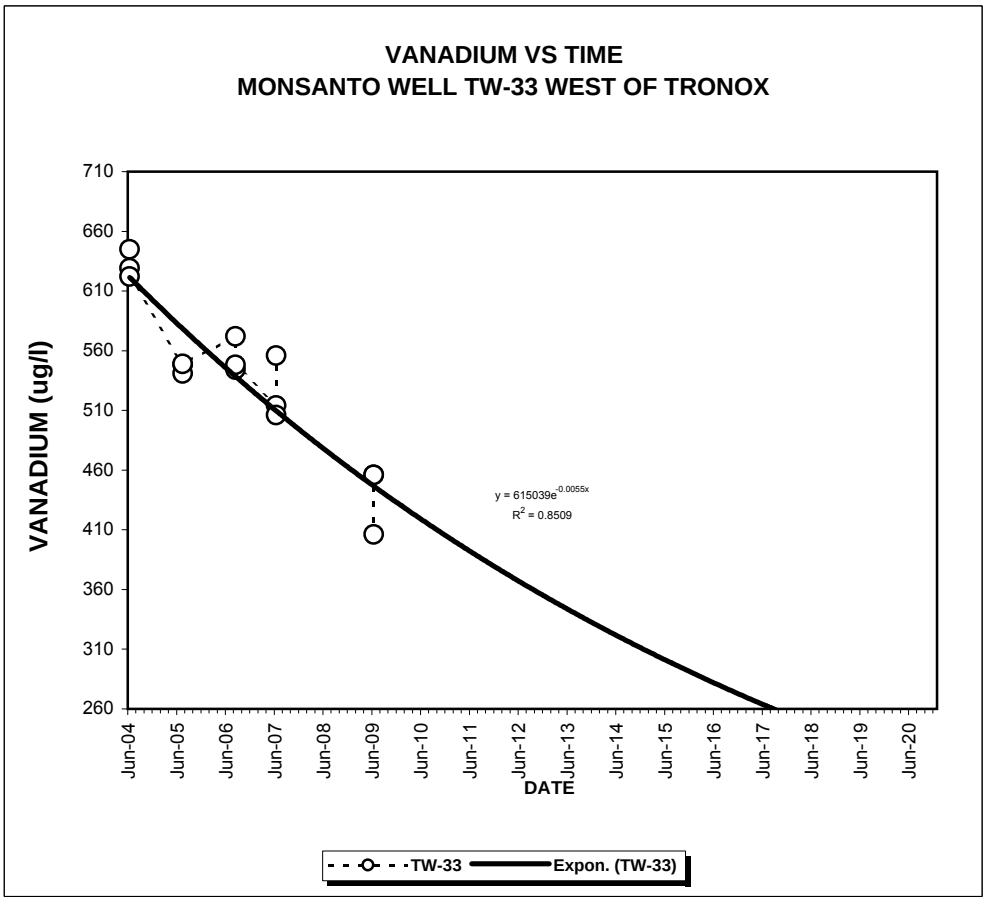

MOLYBDENUM VS TIME
BIG SPRING
MOLYBDENUM (UG/L)
480.00
430.00
380.00
330.00
280.00
230.00
180.00
Nov-97
Nov-98
Nov-99
Nov-00
Nov-01
Nov-02
Nov-03
Nov-04
Nov-05
Nov-06
Nov-07
Nov-08
Nov-09
Nov-10
Nov-11
Nov-12
Nov-13
Nov-14
DATE
y = 555186e-0.0061x
R2 = 0.9251
BIG SPRING
Expon. (BIG SPRING)


MOLYBDENUM VS TIME
BIG SPRING
MOLYBDENUM (UG/L)
260
250
240
230
220
210
200
190
180
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
DATE
y = 1E+06e-0.007x
R2 = 0.8344
BIG SPRING
Expon. (BIG SPRING)


MOLYBDENUM TREND
MONSANTO WELL TW-33 WEST OF TRONOX
POST-LSE PERIOD
y = 19524e^-0.0566x
R^2 = 0.8324
MOLYBDENUM (ug/l)
100
90
80
70
60
50
40
30
20
10
0
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
DATE
TW-33
Expon. (TW-33)


MOLYBDENUM TREND
MONSANTO WELL TW-33 WEST OF TRONOX
POST-LSE PERIOD
y = 31232e^-0.0051x
R^2 = 0.7651
MOLYBDENUM (ug/l)
70
60
50
40
30
20
10
0
Jun-04
Sep-04
Dec-04
Mar-05
Jun-05
Sep-05
Dec-05
Mar-06
Jun-06
Sep-06
Dec-06
Mar-07
Jun-07
Sep-07
Dec-07
Mar-08
Jun-08
Sep-08
Dec-08
Mar-09
Jun-09
Sep-09
Dec-09
DATE
TW-33
PROJECTED TREND


VANADIUM VS TIME
MONSANTO WELL TW-33 WEST OF TRONOX
VANADIUM (ug/l)
1,460
1,260
1,060
860
660
460
260
y = 2E+06e^-0.0063x
R^2 = 0.9579
Jun-97
Jun-98
Jun-99
Jun-00
Jun-01
Jun-02
Jun-03
Jun-04
Jun-05
Jun-06
Jun-07
Jun-08
Jun-09
Jun-10
Jun-11
Jun-12
Jun-13
Jun-14
Jun-15
Jun-16
Jun-17
Jun-18
Jun-19
Jun-20
DATE
TW-33
Expon. (TW-33)


VANADIUM VS TIME
MONSANTO WELL TW-33 WEST OF TRONOX
VANADIUM (ug/l)
710
660
610
560
510
460
410
360
310
260
y = 615039e^-0.0055x
R^2 = 0.8509
Jun-04
Jun-05
Jun-06
Jun-07
Jun-08
Jun-09
Jun-10
Jun-11
Jun-12
Jun-13
Jun-14
Jun-15
Jun-16
Jun-17
Jun-18
Jun-19
Jun-20
DATE
TW-33
Expon. (TW-33)

FINAL ADDENDUM 1
REMEDY EVALUATION REPORT FOR THE KERR-McGEE CHEMICAL CORPORATION SUPERFUND SITE TRONOX FACILITY SODA SPRINGS, IDAHO

January 14, 2012

Prepared by:

GLOBAL ENVIRONMENTAL TECHNOLOGIES L.L.C.

SALT LAKE CITY, UTAH

GLOBAL ENVIRONMENTAL TECHNOLOGIES L.L.C.

January 14, 2012

Marc Weinreich, Vice President
Greenfield Environmental Multistate Trust LLC
1928 Eagle Crest Drive
Draper, UT 84020

RE: TRANSMITTAL OF FINAL ADDENDUM 1 REMEDY EVALUATION REPORT FOR THE KERR-MCGEE CHEMICAL CORPORATION SUPERFUND SITE TRONOX FACILITY SODA SPRINGS, IDAHO DATED JANUARY 6, 2012

Dear Marc:

Please find transmitted the final Remedy Evaluation Report for the Kerr-McGee Chemical Corporation Superfund Site Tronox Facility Soda Springs, Idaho. This report presents a review of the remedial actions that were completed at the site in 1997 and 2001. This evaluation fulfills the Task 3.2 deliverable requirements of the final Addendum 1 to the Statement of Work of Remedial Design/Remedial Action Consent Decree for the Kerr-McGee Superfund Site (Addendum 1) from EPA dated April 9, 2008, and was prepared in accordance with the approved Draft Final Addendum 1 Work Plan for the Kerr-McGee Chemical Corporation Superfund Site Tronox Facility Soda Springs Idaho (Work Plan) dated January 14, 2009 and EPA and IDEQ comments to previous drafts. This final report was produced in accordance with the approved changes to the September 26, 2011 draft document and EPA and the Trust's direction to produce the final report.

We appreciate the opportunity to work with you on this project. If you have any questions regarding this transmittal, please contact us.

Very truly yours,
Global Environmental Technologies, LLC

John S. Brown, P.G.
Principal/Owner

xc: Bill Ryan — EPA Region X – (4 hard copies; 4 -CD copies)
Doug Tanner — IDEQ Pocatello –hard copy/CD copy
Clyde Cody - IDEQ Boise - (2) hard copy/CD copy
Ty Griffith - Greenfield Environmental Multistate Trust LLC - CD Copy
Tim Mosko - CH2MHILL - hard copy/CD copy

FINAL ADDENDUM 1
REMEDY EVALUATION REPORT FOR THE
KERR-McGEE CHEMICAL CORPORATION SUPERFUND SITE
TRONOX FACILITY SODA SPRINGS, IDAHO

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1.0 INTRODUCTION

1.1 General

The following report evaluates the existing remedy for the Kerr-McGee Chemical Corporation Soda Springs, Idaho Superfund Site. This remedy evaluation report presents the results of the analyses and tasks completed that were detailed in the Draft Final Addendum 1 Work Plan submitted on January 14, 2009. The work plan was conditionally approved with the EPA requested modifications to section 3.4 in the work plan approval on January 29, 2009.

The Kerr-McGee Chemical Corporation Soda Springs, Idaho Superfund Site was placed on the National Priorities List on October 4, 1989. The effective date of the consent order to conduct a remedial investigation and feasibility study (RI/FS) was October 4, 1990. The remedial investigation required by the consent order was completed in 1995. The Record of Decision (ROD) was signed in September 1995 and amended in 2000. The feasibility study (FS) for the entire site was completed in 1996 and a supplemental feasibility study for the calcine capping was completed in 2000. The remedial actions were completed in two phases; the first phase completed in 1997 and the second phase completed in 2001.

In 2005, Kerr-McGee spun off several operating divisions (including the division that owned the Soda Springs site) into a new and separate company called Tronox. In January 2009, Tronox filed for reorganization under Chapter 11 of the U.S. Bankruptcy Code due to its extensive, legacy environmental liabilities throughout the country. In February of 2011, a reorganized Tronox emerged from bankruptcy after entering into a settlement agreement with EPA and a number of State governments, including the State of Idaho. Under this consent decree and environmental settlement agreement ("Consent Decree"), Tronox relinquished ownership of hundreds of contaminated sites throughout the country and provided initial funds to perform critical cleanup activities at those sites. The Multistate Environmental Response Trust ("MST") was created as part of that settlement for the purposes of: taking ownership of many of these sites including

the Soda Springs Idaho Superfund Site.

Greenfield Environmental Multistate Trust LLC is the court-appointed managing Trustee for the MST. Consistent with the terms of the Consent Decree, the MST is the current owner of the site and will work with the MST site beneficiaries (the United States and the State of Idaho) to manage and facilitate environmental response actions at the Soda Springs Idaho Superfund site.

1.2 Site Location

The Tronox site (formerly known as the Kerr-McGee Chemical Corporation site) is located in Caribou County, Idaho approximately 1.5 miles north of Soda Springs, as shown in Figure 1-1. The Tronox site is on the east side of State Highway 34. The site is bordered by agricultural land on three sides (north, east and south) and by the Monsanto Chemical Company elemental phosphorus plant on the west (on the west side of the highway), as shown on Figures 1-1 and 1-2.

Figure 1-3 shows the location of the monitor wells sited near source areas investigated as part of the remedial investigation (RI) (Dames & Moore, 1995). The location of the landfill that was constructed as part of the remedial actions and the lined solvent extraction ponds are shown on Figure 1-3. Currently, the double lined 10-acre pond is the only remaining pond at the site.

1.3 Site Investigations

Site investigations that were performed as part of the RI/FS included:

- A preliminary geological reconnaissance to develop a conceptual hydrogeological model of the site;
- Core drilling activities at five locations across the site to characterize both geological and hydrogeological conditions;

- Borehole geophysical logging of coreholes, deep monitor well borings, existing monitor wells and off site monitor wells;
- Aquifer testing of ground water monitoring wells and coreholes to characterize the hydrogeology, which included packer tests, slug tests and both long-and short-term pumping tests;
- Ground water monitor well installation to evaluate both background and downgradient water quality data and hydrologic data at locations both on and off the site;
- Surface soil and source material sampling to evaluate chemical and physical properties, and to evaluate potentials for airborne particulate release from the site;
- Sampling of liquid sources to characterize the chemical quality of pond waters at the site;
- Sampling and physical analysis of soils collected from various pond berms and liner materials to evaluate the physical characteristics of the materials and to estimate potential seepage rates;
- Drilling and sampling of solid sources and overlying and underlying soils to characterize physical properties of the soils and sources for evaluation of the vadose zone;
- Installation and sampling of lysimeters to characterize the quality of leachate being generated in the vadose zone;
- Collection of twelve rounds of ground water samples from newly constructed on-and off-site wells to characterize ground water quality;
- Off-site sampling of springs and existing private wells to evaluate water quality and identify potential impacts, if any, to ground water at off-site locations;
- Air Pathway Modeling of stack and source emissions from the site, and analysis of impacts from emissions to soils and human health, and;
- Ground water modeling of the site and off-site locations.

Subsequent investigations were performed during the remedial design/remedial action (RD/RA) project phase. These investigations were performed to support the design and construction of the on-site landfill and the calcine cap, and to monitor the performance of the ground water following remedial measures specified in the ROD. These studies included:

- S-X and scrubber pond sediments investigations;
- Geotechnical evaluation of the S-X and scrubber pond sediments, calcine and native soils;
- Soils investigations in the area of the landfill, the soil borrow area, and at locations surrounding the calcine impoundment, and;
- On-going semiannual ground water and surface spring monitoring.

Locations of the investigated media for the RI/FS and locations of borings and sampled locations are presented on Figures 1-5 through 1-7.

1.4 Site History

Construction of the vanadium production plant facility was completed in the summer of 1963 and full operation began in March 1964. Operation of the vanadium plant continued until January 1999 when the plant was shut down. A number of waste impoundments generated during vanadium plant production are shown on Figures 1-3 and 1-4. The vanadium plant facility was demolished in 2002 and the site surface was covered and graded with limestone fines.

In 1997 and 1998, Kerr-McGee constructed a fertilizer production plant facility that was intended to process the calcine produced by the vanadium plant and process material from the calcine impoundment on the east side of the plant facility. The plant operated intermittently until July 2000 when the plant ceased operation after it was determined by EPA that Kerr-McGee would be unable to reduce the calcine impoundment within a specified timeframe of 8 years. Calcine was dewatered in the building above the former MAP ponds and taken in a loader to the east calcine area until vanadium operations ceased. The calcine was capped in August 2001 and the fertilizer plant was demolished in 2002 and 2003.

The Tronox facility also produced lithium-manganese oxide. Production of this material began in 1999 and ended in 2010. This material was used to produce rechargeable batteries. There were no liquid discharges from the operation to the environment.

Site activities and a chronology of process changes are shown in Table 1-1. This table includes activities prior to and following implementation of the site remedies.

1.5 Summary of Baseline Risk Assessment

A Baseline Risk Assessment of the site was completed by SAIC for the EPA (1993) to evaluate potential impacts to human and ecological receptors from exposure to site-related contaminants in the absence of remedial action. The risk assessment was divided in two sections: one section addressed the potential impacts to human health and the other looked at potential impacts to ecological receptors. Additional sampling of the sediments in Finch Pond located approximately 4,000 feet to the south of the site was completed and this information was used to further investigate the potential impacts to ecological receptors.

Evaluations of human health risks were performed for three scenarios, including:

- The current industrial scenario;
- A future industrial scenario; and
- A future residential scenario.

The future residential scenario evaluated risks for receptors on both the northern and southern property boundaries of the site. For the current industrial scenario, lifetime excess cancer risks from exposure to combined radionuclides in the ferrophos ore were not much greater than background.

The future industrial scenario yielded similar results. Future exposures to radionuclides from on-site sources were not much higher than background. Ingestion of vanadium in the roaster reject area resulted in a hazard quotient of 1.7.

For the future residential scenario at a location to the south of the site, conservative estimates of risk were calculated based upon longer durations of exposure in comparison with the industrial scenarios. Five contaminants of concern (COC), their hazard quotients (HQ), and risk based concentrations (RBCs) were identified for the future residential scenario. The COC, HQs, and RBCs include:

- Manganese; HQ = 3, RBC = 0.18 mg/l;
- Molybdenum; HQ = 32, RBC = 0.18 mg/l;
- TBP; HQ = 3, RBC = 0.18 mg/l;
- TPH; HQ = 3, RBC = 0.73 mg/l; and
- Vanadium; HQ = 14, RBC = 0.26 mg/l.

Exposures to inorganic and organic chemicals in the ground water to the south of the site indicated a risk to human health; however, the shallow ground water was not likely to be used for drinking water purposes because municipal water from the town of Soda Springs is readily available.

Carcinogenic risks from uranium-238 and decay progeny in the soils were not much greater than the background risk. No significant risks or potential adverse health effects were indicated to the north of the facility.

Results of the ecological risk assessment suggested that substantial ecosystem risks from exposure to site related contaminants were not probable. This assessment concluded that there were no substantial ecosystem risks from chemical releases from the facility. This was confirmed by sediment sampling at Finch Pond. These results indicated that there were no substantial risks to ecological receptors by contacting or ingesting the sediments in this pond.

1.6 Exposure Pathways

The exposure pathways investigated during the RI included:

- Contact/ingestion of ground water;
- Contact with roaster reject;
- Contact with areas of windblown calcine;
- Inhalation of material from the site;
- Contact/ingestion of surface water; and
- Contact with off-site soils.

All of the exposure pathways were investigated as part of the risk assessment discussed above. The exposure pathways of concern included:

- Contact/ingestion of ground water;
- Contact/ingestion of the roaster reject, and;
- Contact with the windblown calcine.

The other exposure pathways were shown to have no significant risk and no further action was taken to address these pathways. Remedial Action Objectives (RAOs) were developed for the three pathways of concern.

1.7 Remedial Action Objectives

Based on the Draft Human Health Risk Assessment, the primary medium of concern was the ground water and the primary concern with ground water was ingestion. Therefore, the RAOs for the site with respect to ground water included:

- Prevent the transport of COCs to the ground water from facility sources that may result in COC concentrations in ground water exceeding RBCs or MCLs;

- Prevent ingestion by humans of ground water containing COCs having concentrations exceeding RBCs or MCLs, and;

- Prevent transport of COCs from ground water to surface water in concentrations that may result in exceedences of RBCs or MCLs in the receiving surface water body.

A secondary concern at the site was the roaster reject area. The RAO associated with this material was:

- Prevent the ingestion/direct contact with the roaster reject area material having vanadium concentrations in excess of 14,000 mg/kg.

Although the risk assessment concluded that there were no substantial ecosystem risks due to releases from the facility, there were localized areas that were impacted by the solid sources (saltation of calcine). The risk assessment indicated that these areas may pose a risk to sensitive plants and field mice in the area. The RAO associated with the ecosystems include:

- Prevent the transport of COCs from the solid sources to the ecosystem in amounts that exceed the 95 percent upper threshold limit (UTL) concentration in background soils.

1.8 Performance Expectations

Kerr-McGee was notified by EPA on October 31, 1995, that all the requirements of the Administrative Order on Consent had been fulfilled. Kerr-McGee and EPA entered into a Consent Decree on September 30, 1996, to complete the remedial actions described in the ROD. During 1997, many of the remedial actions listed in the ROD were completed to address LSE and closure of these facilities. A complete compilation of the Remedial Action Completion activities completed in 1997 is described in the Draft Remedial Action Completion Report Revision I (GET, 1999).

Performance expectations for the Kerr-McGee Soda Springs facility were defined in the Consent Decree, the ROD, and stated in the EPA SOW. Performance expectations

were consistent with CERCLA, the NCP, and state and federal standards. Performance expectations included:

- Clean up standards, substantive requirements, criteria or limitations and ARAR specified in the ROD, Consent Decree and SOW;
- Clean up efforts of solid sources from the S-X pond and the scrubber pond as specified in the ROD; and,
- Performance standards that may be identified during the Remedial Design period of the project.

The performance standards for ground water are MCL, non-zero MCLG, State of Idaho standards, COC with cancer risk exceeding 10^{-6} (arsenic only), and non-cancer COC that exceed the RBC.

1.9 Summary of Record of Decision

The Record of Decision (ROD) for the Kerr-McGee Chemical Superfund site was signed September 28, 1995. The remedial actions required by the 1995 ROD included:

- Elimination of uncontrolled liquid discharges from the facility to soil, surface or ground water;
- Excavation and reuse/recycling of buried calcine tailings within an 8-year period;
- Excavation and on-site disposal of S-X and scrubber pond solids in a lined and covered on-site landfill cell;
- Semi-annual ground water monitoring to determine the effectiveness of source control measures and a comprehensive evaluation of ground and surface water monitoring data;
- Establishment of Institutional Controls to curb ground water use for as long as the ground water exceeds the performance standards;
- Resource recovery/reuse of the roaster reject in the vanadium production facility, and;

- Excavation and on-site disposal of the windblown calcine.

During April 2000, EPA revised the original site cleanup plan, and drafted the proposed change to the cleanup plan that included capping the calcine in place. Public comment on the EPA changed plan was from April 20 to May 22, 2000. The amendment was signed on July 13, 2000. The ROD amendment called for capping the calcine tailing on the east side of the industrial facility in place. The roaster reject and off-spec fertilizer from the fertilizer plant was to be included in the material placed under the cap. The roaster reject was included because the vanadium plant was not operating. The off-spec fertilizer was included because there was no market for the material and additional material was needed to fill the area. All other requirements of the September 1995 ROD remained in effect.

The EPA ROD amendment addressed:

- Changes to the original cleanup plan;
- Completed clean up actions;
- Other available alternatives;
- Evaluation of the alternatives;
- Compliance with regulations;
- Reduction of toxicity, mobility and volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- State and community acceptance; and
- Proposed revision to the ROD.

The final remedy selection included capping of the calcine, roaster reject, and rejected (off-spec) fertilizer.

1.10 Summary of 5-Year Reviews

The Five-Year Review is required by statute because the ROD was signed after October 17, 1986, and hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure. In September 2002, five years following the completion of the remedial action in 1997, EPA performed an inspection and completed the first 5-year review for the site. EPA concluded during September 2002 that "hazardous waste cleanup continues to be effective, and that people and the environment are protected as the cleanup continues". According to EPA, "Kerr-McGee Chemical Corporation is doing an excellent job managing the site, and the cleanup is moving forward. The results of groundwater monitoring show that contaminant levels are decreasing, and the contaminant plume has not increased in size" (EPA, 2002). EPA further concluded "Now that the contaminant sources are under control, natural processes, such as biodegradation and dilution, will gradually make the groundwater useable" (EPA, 2002). Ground and surface water data in 2002 indicated that ground water clean-up goals had been met for arsenic in all but one well (KM-8), clean-up goals had been met for tributyl phosphate in all but one well (KM-8), clean-up goals had been met for manganese in all but two wells (KM-3 and KM-8), and clean-up goals had been met for TPH in all wells except one well (KM-8). Vanadium and molybdenum remained dispersed in the ground water aquifer beyond the property boundaries in 2002.

EPA Region 10 conducted a second Five-Year Review of the remedial actions implemented at the site from June 2007 through September 2007. The U.S. Army Corps of Engineers (USACE) provided support to EPA in the data analysis and evaluation of remedy protectiveness for the second Five-Year Review. The USACE conducted the site inspection on behalf of EPA. A site inspection was conducted on July 25, 2007. The purpose of the second Five Year Review inspection was to assess the protectiveness of the remedy, including the integrity of the caps, the condition of the monitoring wells and restrictive fencing. The second Five Year Review found that the remedies were constructed in accordance with the requirements of the ROD, however a protectiveness

determination of the remedy was not made because levels of COC in ground water and surface water remained above cleanup goals. COC trends, such as those noted in wells KM-3, KM-8, KM-6 and KM-16 following 2004, questioned the probability of achieving those goals in the foreseeable future. The second Five Year Review identified the following actions to be taken for EPA to issue a protectiveness determination for the site.

- Evaluate the likelihood of the remedy achieving cleanup goals within a specifiable timeframe;
- Evaluate adequacy of current ground water monitoring network for identifying the offsite migration of COCs;
- Assess whether current ground water and surface water performance standards are still adequately protective; and
- Work with the laboratory providing analytical services to reduce the ground water detection and reporting limits to less than the current Maximum Contaminant Level (MCL) for arsenic (EPA, 2008).

The reduction of the detection limits for arsenic was completed in October 2007 through a change in the analytical method. This new method will be used for all future analytical work. A letter report documenting the change in the analytical method and an analysis including previous results was transmitted to EPA on March 26, 2008. Analyses indicated that the EPA Method 6020 ICP-MS method did not result in a substantially different outcome with respect to the arsenic MCL when compared with previous testing results.

1.11 Conceptual Site Model

A conceptual site model was prepared prior to the RI (Dames & Moore, 1991) as a requisite to developing the remedial action objectives and the general response actions for the site. The site model indicated the principal sources of potentially elevated concentrations of constituents in ground water occurred from direct seepage from the effluent ponds and past incidents of spills (Dames & Moore, 1991). Precipitation,

infiltration and leaching of piles and soils were occurring. It was believed that the primary potential pathway for migration and exposure was the ground water. This eventually was shown in the RI/FS to be the primary exposure pathway.

The early conceptual site model stated that spills were assumed to be important because prior pond containment failures had occurred over relatively short times (less than a day to about a week) (Dames & Moore, 1991). The failures initiated a slug of COC to ground water which moved relatively rapidly through the ground water system. The early conceptual site model stated the surficial soils were not considered to be a significant source of elevated concentrations or a primary exposure pathway, which was eventually demonstrated through risk assessment. Site spills were reported to have been minor (with the exception of the two pond containment failures described). Precipitation falling on the site was contained within the solid source and pond areas, and surface water runoff was apparently nonexistent. Precipitation evaporated, infiltrated, or was contained within the S-X, scrubber, MAP, and calcine ponds. Ground water was assumed to discharge to surface water at downgradient locations based on prior sampling results.

The RI/FS did not expand on the conceptual site model. A conceptual site model was not presented in the RI/FS, although a simplistic conceptual site model was developed for the risk assessment performed by EPA (SAIC, 1993) and is presented on Figures 1-8 and 1-9 (SAIC, 1993). The most important pathway remained ground water and the ground water impact to surface water, as demonstrated on Figure 1-10 (ROD, USEPA, 1995). Surface water does not leave the site, so the surface water pathway was no longer a consideration. Solid sources, including the calcine tailing, roaster reject and scrubber solids on or buried beneath the ground surface, were noted to have potential impacts to ground water by forming leachate in the vadose zone. Chemical and physical properties of the underlying soils were shown to reduce the COC in the vadose zone. Paired lysimeters in the vadose zone confirmed this effect, demonstrating that the attenuating properties of the native soils were important in reducing the COC. Data

from these lysimeters were considered in the model. However, no lysimeters were placed in the scrubber or S-X ponds or underlying soils at that time.

Vanadium plant closure actions and dismantling of the plant in 2002 represented the greatest changes at the site since the RI/FS and the ROD. No liquids are generated at the site and no waste products are exposed at the surface.

In order to assess the trends in ground water COC as presented in the MAROS evaluation (Appendix B) report, the conceptual site model was refined and illustrated prior to performing the analysis. Figure 1-11 and 1-12 are depictions of the current CSM for the hydrogeologic setting and COC transport processes. The base map for these two figures is an aerial map of the site area oriented to the northeast and tilted to the northwest to provide a 3-dimensional perspective. The surface was cut away at a diagonal, from the northeast corner of the plant (east of the capped calcine tailings ponds) to the southwest corner of the property, crossing Highway 34 and ending at paired deep and shallow wells TW-11 and TW-12 on the adjacent Monsanto site. Site features such as the former ponds and plant area are labeled. The subsurface geology forms the third dimension in the diagrams and was constructed from geologic cross sections provided in the RI.

1.11.1 CSM for Hydrogeologic Setting

The subsurface geology shown in the CSM for the hydrogeologic setting was simplified from cross sections in the RI (Dames & Moore, 1995). The cross sections were originally interpreted from logs of borings for Monsanto wells TW-11 and TW-12 and Tronox wells and core holes KM-15, KM-18, KM-16, KM-8, PW-10, and CH-1. In the site model, the wells and core holes were placed at their intersections with the surface map and made to extend vertically to a projected depth of 300 feet. The wells were interconnected in what is typically referred to as a fence-diagram, where the surface between wells (fence section) changes direction depending on the spatial orientation of the section relative to the diagram. For example the section between Wells KM-15 and

KM-16 is oriented southwest to northeast, whereas the section between KM-16 and KM-8 is oriented more south to north.

The thin, discontinuous layer of alluvium is shown on top where noted in borings. The five basalt flows and interflow zones are shown in their relative locations. In general, the basalt flows dip to the west and are offset by faults. Faults are projected from geologic features and seismic interpretations as shown on the cross sections. Water level elevation is interpreted from the cross section and is generalized; it does not show variations in ground water elevations.

The insert in Figure 1-11 shows the path of water moving in the broken, vesicular and scoriaceous materials at the tops and bottoms of flow beds, through interbedded sediments and through vertical joints in the dense basalt flows. Sources of water in the model are from infiltration from rainfall and snowmelt, pond seepage, and recharge from the aquifer. Water flow paths indicate horizontal flow with a vertical downward component induced by pumping wells at Monsanto. Faults are shown as zones of similar or slightly increased flow. The lower Salt Lake Formation is interpreted to be near wells KM-8 and KM-19 and does not interconnect with flow in the basalts.

1.11.2 CSM for COC Transport Processes

Figure 1-12 shows a conceptual site model for COC transport processes. The same diagram base is shown as used in the CSM for the hydrogeologic setting. Stippling patterns show where COC may be present in the vadose zone beneath former ponds and the main plant site as well as in ground water migrating downgradient from the site area. A slightly denser stippled pattern is shown beneath the former S-X pond, settling ponds, and plant area indicating areas with continued source leaching.

Contaminant flow paths are illustrated in two inserts in Figure 1-12. The first insert illustrates the main physical transport processes of advection, dispersion, and diffusion. The second insert shows reactions that affect the transport of COCs on a granular level

including precipitation, adsorption, oxidation-reduction, ion exchange, bacterial degradation, complexation and chelation, colloidal transport, and radioactive decay.

2.0 HYDROGEOLOGY

2.1 Hydrogeologic Setting

The following discussion of the hydrogeologic setting is summarized from the RI. The site is located about 1.5 miles northeast of the City of Soda Springs, within the Bear River Basin, which is characterized by broad, flat valleys bordered by northwest trending mountain ranges. The valley where the site is situated is part of the Bear Lake Fault Graben Structure, a long narrow graben extending from Bear Lake (south of Soda Springs) to the Blackfoot Reservoir (13 miles north of the site). The facility is located near the center of the valley with the Chesterfield Range and the Soda Springs Hills to the west and the Aspen Range to the east. The facility is within the Blackfoot Lava Field which fills the valley between the mountain ranges and is characterized by irregular surface of numerous cliffs, scarps, collapse structures and fissures.

The shallow ground water system in the valley consists of ground water that occurs within the alluvium (limited areas), the basalt sequences and the basalt interflow zones, and the Salt Lake Formation. The basalts form the major aquifer for wells in the region with water occurring in fractures, joints, rubble zones, and inter-layered cinder beds. The Salt Lake Formation is considered a highly unpredictable source of water supply with variable yield. Recharge to the shallow system occurs through infiltration of precipitation, leakage from the Blackfoot Reservoir, and from ground water originating from the Meade Thrust Aquifer System (originating from the Aspen Range to the east of the site) and the Chesterfield Range Aquifer System (west of the site).

In general, ground water flows from the mountain ranges toward the center of the valley, then southwest toward the Bear River. Springs occur on both sides of the valley. Finch Spring, Upper and Lower Ledger Springs, and Big Spring are located south of the facility, at distances of 4,000 feet to about three miles to the south. Big Spring is the most distant spring, located south of the town of Soda Springs.

2.2 Site Hydrogeology

The following discussion of the site hydrogeology is summarized from the RI report. Site geology, to a depth of about 230 feet, consists of intermittent alluvial deposits, Quaternary basalts and interflow zones, and the Tertiary Salt Lake Formation. The alluvium refers to all of the unconsolidated surficial deposits that overlie bedrock, including alluvium, loess, and weathered basalt. The underlying basalt consists of five individual basalt flows that range from 20 to 80 feet thick. Interflow zones between the basalt flows are predominantly comprised of clay with lesser amounts of basalt, gravel, cinder, and organic materials. The basalts and interflow zones dip gently to the west. The underlying Salt Lake Formation consists of sandstones, conglomerates, and limestones.

Four north-trending faults transect the geology beneath the site. The faults are interpreted from seismic data and surficial features (northern trace of the Finch Spring Fault). The faults are typically downthrown to the west with small (less than 20 feet) displacements.

All the on-site and off-site wells that form the monitoring network were installed within the basalts sequences and interflow zones. Thirteen of the 18 wells are designated as shallow wells, completed with 10 feet of screen across the first occurrence of groundwater noted during drilling (total depths of 45 to 73 feet). Four wells are designated as intermediate-depth wells, completed with 20 feet of screen extending to total depths of 100 to 173 feet. One well is designated as a deep well, completed with 20 feet of screen extending to a total depth of 230 feet. The deep well was completed near the base of the basalt sequence. A production well, PW-10, located near the plant, was drilled to a total depth of 250 feet, which was interpreted to be within the basalt sequence (cross section F'-F" of the RI). The Salt Lake Formation was encountered in core hole CH-3 at a depth of 231 feet below surface.

Remedial investigations completed between 1991 and 1994 indicated that ground water beneath and downgradient from the Tronox site exists within the basalt sequences, the basalt interflow zones, and within limited areas of the alluvium. Ground water exists within the Tertiary Salt Lake Formation that underlies the basalt. Although ground water occurs in the Salt Lake Formation and within a limited area of the alluvium on-site, the basalts are considered the principal aquifer beneath the Tronox site.

The hydrogeologic properties of the basalts and interflow zones were characterized for the RI/FS, using:

- Geologic, geophysical, hydraulic head, hydraulic gradient, and hydraulic conductivity parameters from the installed wells;
- Hydraulic response data observed in the monitor wells; and
- Observation and testing data from 14 on-site monitor wells, 4 off-site monitor wells and 5 on-site coreholes.

Table 2-1 was taken from the RI (Dames & Moore, 1995). This table shows that the Salt Lake Formation has a hydraulic conductivity that is one to three orders of magnitude smaller than the hydraulic conductivity of the basalt aquifer. The basalt aquifer is the principle site aquifer that that lies unconformably above the Salt Lake Formation. Table 2-1 lists the results of hydraulic conductivity testing of the current monitoring well system in decreasing order, and identifies the locations, elevations and the completed depths and screened intervals for these wells.

2.2.1 The Salt Lake Formation

The Tertiary Salt Lake Formation is comprised of tuffaceous sandstones, conglomerates and limestones that yield small amounts of ground water for domestic and stock purposes, and are unpredictable as a water-supply source. The Salt Lake Formation is not considered part of the shallow ground water system. The Salt Lake Formation was

cored on-site in corehole CH-3 from 231 to 250 feet (total depth of corehole CH-3) and was found to consist of fractured quartzite, sandstone, and clay with a packer test hydraulic conductivity of 0.77 ft/day. This is within, but at the low end of the range of packer-test hydraulic conductivities estimated for the deeper part of the overlying basalt sequence. No wells at the Tronox site were completed within the Salt Lake formation because the hydraulic conductivity of the formation is small, and the ground water quality monitored at the most downgradient location on the site in the deepest portion of the basalt aquifer (well KM-19) meets the risk-based concentration (RBC) for the site COC. Therefore, the vertical extent of the ground water quality impacted by site COC was defined in the RI to be within the overlying basalt aquifer.

2.2.2 Alluvium

Seismic refraction studies performed as part of the RI indicated that alluvium is thickest and extends to the greatest depth on the eastern side of the plant facility. Based on geologic data from well KM-2, an area of saturated alluvium overlies the basalt in the eastern part of the Tronox facility at well KM-2 where the elevation of the basalt/alluvium contact falls below the elevation of the water table. The area of saturated alluvium appears to be limited near the east side of the facility, extending a short distance to the north and south of the capped calcine tailings. The alluvium has not been noted to contain ground water at other locations on the Tronox site.

2.2.3 Basalt Aquifer

The basalts and interflow zones of the mid-Pleistocene Blackfoot Lava Field comprise the principal aquifer beneath the Tronox site. All on-site Tronox monitor wells, with the exception of monitor well KM-2, are screened exclusively within these basalts and interflow zones as shown in Table 2-1. The Monsanto production wells are screened within the basalt aquifer to the top of the Tertiary Salt Lake formation.

The basalt sequence at the Tronox site, described in the Final Remedial Investigation Report (Dames and Moore, 1995) is comprised of five identifiable basalt flows (Basalts Nos. Qb_1 through Qb_5) and associated interflow zones (Interflow Zones Nos. I_1 through I_4). Two younger basalts (Qb_{5a} and Qb_{5b}) and associated interflows were identified to the south and west of the site and are believed to have occurred as post-faulting flows. These basalts and interflow zones are believed to be stratigraphically similar to basalt flows identified at the Monsanto Site by Golder (1985 and 1992a).

However, the hydrogeologic characteristics of the basalt flows between the two sites appear to be different. Magnitudes of hydraulic conductivities of the basalt flows and interflow zones at the Tronox site are relatively similar as shown in Table 2-1, whereas basalts and interflow units at the Monsanto site are indicated to differ substantially. Testing during the RI indicated magnitude of hydraulic conductivities observed at the KMCC site (0.01 to 340 ft/day) is less than the magnitude range reported for the Monsanto site for basalts and interflow zones (1 to 10,000 ft/day). Local water level elevation and water quality differences exist between adjacent shallow, intermediate-depth and deep wells at Monsanto. Water quality and aquifer test data for Tronox indicate that the entire thickness of saturated basalt is in relatively good vertical hydraulic connection over the area of the Tronox site.

Faults are considered to represent zones of increased transmissivity at the Tronox site. The fractured bedrock and interconnected nature of the fractures within the basalt aquifer beneath the Tronox site allow for notable mixing of site COC within the shallow and intermediate depths of the aquifer. This is particularly notable at nested sites KM-15 and KM-18 to the west (downgradient) of the Finch Spring Fault. Ground water flow directions from the Tronox site are normal to (across) structural geologic features such as mapped fractures and the Finch Spring Fault. Faults were interpreted to be barriers to flow at the Monsanto site. Based on interpreted ground water contours for the Monsanto site, direction of ground water flow is interpreted to be in the same approximate bearing as the trend mapped faulted features to the south of the Monsanto production wells. Therefore,

faults at the Monsanto represent more of an obstacle to flow by offsetting more permeable against less permeable zones in the aquifer.

2.3.3.1 Hydraulic Conductivities of the Basalt Aquifer

Primary permeability of unbroken basalt is small. Most ground water in basalt is transmitted along secondary features such as joints or fractures. Vertical columnar joints are a common feature observed in basalt exposed to the south and southwest of the site along the trace of the Finch Spring Fault. The presence of intensely fractured or vesicular zones, rubble zones, and/or cinder zones can greatly increase the ability of basalt to transmit water. Interflow zones are comprised of subaerial deposited materials, including clays, cinderaceous deposits, alluvial sands and gravels, organic debris and weathered and broken basalt. Variations in the ability of interflow zones to transmit water result from changes in the character and thickness of these materials.

Observed hydraulic conductivities estimated from the slug, specific capacity, and pumping tests conducted in the shallow, intermediate-depth, and deep wells shown in Table 2-1 include the following:

- Basalts ranged from 2.3 to 340 ft/day;
- Interflow zones ranged from 90 to more than 200 ft/day;
- Basalts and interflow zones together ranged from 2 to more than 100 ft/day.
- Basalt No. Qb_5 (shallow basalt represented by shallow well screened zones including KM-2, KM-5, KM-6, KM-7, KM-8, KM-9, KM-13, KM-15 and KM-16) ranged from about 9 to 340 ft/day;
- Basalt No. Qb_3 (Deeper basalt screened in wells KM-10, KM-11, KM-12, and KM-18) ranged from 8 to almost 100 ft/day; and
- Hydraulic conductivities estimated for monitor well KM-19 screened in Basalt No. Qb_2 and Interflow Zone No. I_1 ranged from about 15 to almost 70 ft/day.

Distribution of the hydraulic conductivity across the site is shown on Figure 2-1. Generalizations about hydraulic conductivities observed within the basalt aquifer at the Tronox site shown in Table 2-1 include the following (Dames & Moore, 1995):

- The hydraulic conductivities of interflow zones are not significantly greater than those of the basalt flows;
- Hydraulic conductivities of the shallower basalts (Basalt No. Qb_5) are generally greater but not significantly greater than those of the deeper basalts (Basalt No. Qb_3);
- A horizontal layer of significantly smaller hydraulic conductivity which could greatly limit or prevent vertical movement of ground water was not identified;
- A continuous horizontal layer of significantly larger hydraulic conductivity along which horizontal ground water flow could be localized was not identified; and
- Hydraulic conductivities in the shallow wells on the east side of the plant (KM-1, KM-2, KM-3, and KM-4) range from 90 to 270 ft/day and appear to be greater than hydraulic conductivities in shallow wells on the west side of the plant (KM-5, KM-8, KM-9, and KM-13), which range from 9 to 48 ft/day.

In the Ground Water Network Evaluation Report (GET, 2010), a data gap was identified to the southeast of the site, southeast of well KM-17. The potentiometric gradient, ground water concentrations and aquifer conditions to the south of the calcine cap and former scrubber pond are unknown, and a potential flow path through this area could potentially result in the observed COC distribution noted to the south-southwest of the site. Limited hydrogeologic information in this area to the south of the calcine cap and former scrubber pond is a potential data gap in the understanding of flow paths off the industrial site. Therefore, data obtained from a shallow monitoring well placed to the south of the calcine cap and scrubber pond and to the east or southeast of well KM-17 would provide supplemental information to confirm the current understanding of off-site flow paths between Tronox and properties not owned by Tronox, or would result in the identification of additional off-site flow paths to the south of the site. Justification for additional investigation in this area includes:

- The hydraulic conductivity for KM-17 (2.3 to 5 ft/day) is relatively low compared to other wells on the site;

- The comparatively high hydraulic conductivity at KM-2 (266 ft/day) and the unknown hydraulic gradient to the east of KM-17 could suggest the potential presence of a comparatively permeable shallow aquifer zone to the east of KM-17;

- A due-south ground water flow direction is indicated in the vicinity of wells KM-2 and KM-3 at the south end of the Calcine Cap (May 2008 water table map, Figure 2-4);

- Vanadium and molybdenum concentrations remain elevated above RBC directly south of the calcine cap at KM-2 and KM-3 (well KM-3 is also increasing in manganese); and

- A more permeable zone east of KM-17 may exist and act as a zone of preferential flow around the east side of KM-17. Impacted ground water may be flowing south around the east side of KM-17 if the smaller hydraulic conductivity measured in well KM-17 is localized and not representative of the area south of the calcine cap.

2.4 Site Water Levels and Site Precipitation

Figure 2-2 presents annual rainfall totals for Soda Springs, Idaho between 1990 and 2007, obtained from Tigert Airport in Soda Springs. Annual totals peaked at about 17.5 inches in 1994 and 1997. Annual precipitation rates declined after 1997 to about 11.5 inches in 2001. Annual precipitation rates increased on average between 2001 and 2005, to just over 15 inches annual average, then decreased dramatically in 2007 to less than 10 inches.

Site ground water level changes over time correlate with variation in the annual average precipitation, rates, although general rises in site water levels lag the precipitation by about three years, based on the observation of the low annual average in 2001 and recovery in water levels in site wells after 2004. Overall, water levels dropped on average 5 to 8 feet between 1997 and October 2001, and then remained at lowered levels in the fall through 2004, as indicated on Figure 2-3. Water levels recovered several feet between 2004 and 2006, and then declined between 2006 and 2008. Seasonal water levels are typically higher by about 2 to 3 feet in the spring when compared with the fall water levels.

2.5 Ground Water Level Elevations

Figure 2-3 presents ground water level changes the monitoring wells. Changes in depths to ground water in wells demonstrate cyclic periods of high and low ground water levels in response to seasonal changes in recharge. Longer term cycles are apparent with water levels responding to periods of drought lasting several years. Ground water levels dropped 5 to 8 feet between 1997 and 2001 and have recovered several feet between 2004 and 2007 towards the range of levels observed in 1997. Ground water pumping at Monsanto has resulted in apparent long-term water level declines, primarily on the west side of the site.

2.6 Ground Water Flow Direction

Ground water flows in response to hydraulic gradients from areas of higher hydraulic head to areas of lower hydraulic head at rates that are proportional to hydraulic conductivity and hydraulic gradient and inversely proportional to effective porosity of the aquifer. Ground water can flow vertically through aquifers or between aquifers in response to vertical hydraulic gradients and horizontally within aquifers in response to horizontal gradients. Ground water in the Shallow Aquifer System generally flows southward from the topographically higher Blackfoot Reservoir (about 12 miles north of the Tronox facility) to seeps and springs along the topographically lower Bear River.

The direction and rate of ground water flow beneath the site is influenced locally by heterogeneities in hydraulic conductivities within the basalts, with higher conductivities found in the basalts on the east side of the site. The flow direction is also affected by ground water pumping from Monsanto, located west of the property. Instead of flowing south as the regional aquifer does, ground water flow in the aquifer beneath the west side of the site is to the west toward Monsanto's production wells. A vertical downward gradient is noted on the west side in off-site wells KM-15 and KM-18. This downward gradient is the result of the influence of pumping the lower part of the basalt aquifer at Monsanto's production wells (Golder, 2007). Outside the area of influence of the

Monsanto wells, flow is to the southwest and south. Ground water levels beneath the east side of the facility have a more southwesterly flow component, consistent with regional flow patterns. Faults do not appear to be barriers to flow, but may locally increase both vertical and horizontal hydraulic conductivities.

Horizontal hydraulic gradients and ground water flow directions within the shallow basalt units at the site are indicated by water level elevations measured during May 2008 and are contoured on Figure 2-4. Site gradient averaged about 0.02 ft/ft in 2008.

Ground water potentiometric gradient changes over time for the site were evaluated to assess the impacts to water levels and flow directions, and to evaluate whether changes in flow directions resulted in changes in COC concentrations. Ground water elevation contours were evaluated for the following periods:

- November 1992 (during site and pond operation with production well operating) shown on Figure 2-5;
- October 2001 shown on Figure 2-6 (following LSE and plant closure); and
- May 2008 shown on Figure 2-4.

Comparisons of water levels elevations for the three periods indicate similar gradients over time with little change with respect to flow directions across the site and little change with respect to vertical gradients between the shallow and intermediate-depth wells. The calcine cap construction in 2001 may have resulted in subtle changes in the water level gradients when comparing water level elevations in wells KM-2, KM-3 and KM-4. However, these changes do not affect the overall gradient beneath the site over time. Therefore, when comparing the COC concentration and gradient maps from the RI with recent COC concentration and gradient maps, it does not appear that changes in COC concentrations were affected by the limited site gradient changes or changes in flow paths over time.

2.7 Distribution of COC

COC concentration decay trends are documented through temporal changes observed in the existing monitoring well network used in conjunction with the Evergreen, Monsanto, and spring surface water data. Of the six COC, both tributyl phosphate (TBP) and total petroleum hydrocarbons (TPH) are present in very low concentrations on the site. Arsenic, manganese, molybdenum and vanadium exceed RBC in several of the on-site wells but only molybdenum and vanadium are above the RBCs in off-site wells. Molybdenum is readily soluble in water and is more mobile than vanadium in ground water. A pulse of molybdenum reached Finch Spring by the time monitoring began in 1991. May 2008 COC concentrations and historic concentrations are presented in Table 2-2.

2.7.1 Manganese Distribution in the Basalt Aquifer

Manganese concentrations decreased with time in nearly all wells following LSE and remedial actions completed in 1997. Manganese concentrations decreased more rapidly than vanadium and molybdenum concentrations following LSE. However, manganese currently exceeds the RBC in two of the Tronox monitor wells. Well KM-3 ground water indicates an increasing manganese trend since 2001. The ground water manganese concentration in monitor well KM-8 is seasonal. Ground water concentrations decreased substantially in KM-8 between 1997 and 2004, but currently concentrations of manganese are increasing and remain an order of magnitude greater than the RBC.

Manganese concentrations in ground water for May 2007 are shown on Figure 2-7 and extend from the west side of the former scrubber pond in KM-3 in a westerly direction towards KM-6 and KM-8. The largest manganese concentrations appear centered about the south end of the covered S-X pond basin, with a trend towards the south toward well KM-16. Manganese concentrations decreased with time in nearly all of the monitoring wells relatively quickly following LSE.

May 2007 manganese concentrations in ground water for on-site Tronox wells ranged from less than detection in well KM-19 to 5,000 ug/l in well KM-8. The RBC for manganese (180 ug/l) was exceeded in two POC wells, KM-3 (560 ug/l) and KM-8 (5,000 ug/l). Manganese does not exceed the RBC to the south or west of the POC wells in either the Evergreen wells or in the Monsanto wells utilized in this evaluation. Manganese was reported to be less than the detection limit to 2.6 ug/l at Upper and Lower Ledger Spring. Manganese was also less than the detection limit Finch and Big Springs during May 2007. The current monitor well network defines the off-site migration of manganese. Downgradient wells at Evergreen and Monsanto confirm this finding.

2.7.2 Molybdenum Distribution in the Basalt Aquifer

Molybdenum exceeds the RBC (180 ug/l) in all of the on-site wells with the exception of wells KM-5, KM-9 and KM-19. The molybdenum RBC is exceeded at all Tronox well locations to the south of the industrial facility, and at Finch Spring and Big Spring. Molybdenum was less than the detection limit in Upper and Lower Ledger Spring during May 2007. However, molybdenum was reported at the RBC (180 ug/l) in October 2008 at Finch Spring. Figure 2-8 illustrates that concentrations of molybdenum are elevated in areas centered to the south end of the former S-X pond and about the perimeter of the covered scrubber pond. This area of elevated molybdenum in the ground water follows the zone of larger hydraulic conductivity to the southwest towards wells KM-15 and KM-18, Evergreen well EV-1, and as far west as Monsanto well TW-12. Monsanto wells TW-33 and TW-38 located to the west of the Tronox facility show molybdenum concentrations in the range of 50 ug/l. This concentration is slightly greater than the average molybdenum concentrations being removed the Monsanto production wells PW-1 through PW-4 that are shown on Figure 2-8.

2.7.3 Vanadium Distribution in the Basalt Aquifer

Vanadium is detected at concentrations above the RBC (260 ug/l) in all of the on-site wells with the exceptions of intermediate well KM-11 and deep well KM-19. Vanadium

concentrations in May 2007 ranged between 10 ug/l in KM-11, to 18,000 ug/l in well KM-8. During May 2007, the vanadium concentration in Finch Spring was 58 ug/l and 2.5 ug/l in Big Spring. Vanadium was less than the detection limit of 10 ug/l in Upper and Lower Ledger Springs.

Figure 2-9 illustrates the distribution of vanadium concentration in ground water beneath and downgradient of the site. Larger vanadium concentrations are consistently identified near the south end of the reclaimed S-X pond and west of the southern half of the calcine cap and the covered scrubber pond. Vanadium concentrations in off-site Tronox monitor wells located southwest of the site exceed the vanadium RBC, as well as Monsanto well TW-12 and Evergreen well EV-1. Based on the concentration in well TW-33 at Monsanto, vanadium persists on the eastern portion of the Monsanto site in as ground water impacted from the Tronox site is drawn in the direction towards the production wells shown on Figure 2-9 and discharged.

To the south of the industrial facility boundary, ground water from monitor well KM-17 (18 ug/l) remains substantially less than the RBC for vanadium, and defines the eastern boundary of vanadium detection in the ground water. Elevated vanadium concentrations extend southwesterly along a zone of larger hydraulic conductivity from the industrial facility boundary towards the Evergreen facility, defining the southeastern position of vanadium in ground water in an area close to Finch Spring. The largest concentrations of vanadium are projected to be found between KM-15 and the Evergreen facility. The areas of highest vanadium concentration in ground water are projected to be found between highway 34 and Finch Spring. Monsanto wells TW-56 and to the south, the Lewis well, show vanadium at or near the detection limit.

2.8 Ground Water Geochemistry

Ground water at the site is classified as a calcium-magnesium bicarbonate type. Major ion concentrations in wells background wells KM-1 and KM-10 are similar to the off-site upgradient wells (Dames & Moore, 1995). Plots of the major ions for the site wells

indicate mixing of background type waters beneath the site with pond seepage and contributions from leachate produced in the vadose zone. Water flowing onto the site is relatively high in calcium and low in sodium and potassium. Waters are compositionally high in bicarbonate. Waters mixed beneath the site increase significantly in sodium, potassium, sulfate and chloride.

2.8.1 pH

The pH range in ground water historically indicated neutral to slightly alkaline conditions in the past. Between 1999 and 2001, field pH was found to be lower in many of the wells near the reclaimed S-X pond including samples from wells KM-6, KM-7, KM-8, KM-12, KM-19, and near the reclaimed scrubber pond (KM-2, KM-3, KM-4, and KM-11). The lower ground water pH (range of 6.1 to 6.9) likely had some affect on concentration trends for metals during the 1999 through 2001 period, potentially resulting in metals concentration increases during this period.

Current site distribution of pH is shown on Figure 2-10. During the October 2008 sampling event, pH indicated slightly lower values south of the covered S-X pond area toward well KM-16with the lowest pH occurring in the vicinity of well KM-16. . The pH is slightly more alkaline (~7.3) in the former scrubber pond area. Additional observations include:

- The range in pH values recorded in October 2008 (6.85 to 7.3) is relatively narrow compared to past years;
- The slightly acidic pH wells (KM-6, KM-8 and KM-16) indicate remnant influence of the S-X Pond, whereas, the remainder of site wells are now essentially neutral; and
- The slightly alkaline pH in wells KM-2 and KM-3 does not appear to correlate with elevated molybdenum and vanadium concentrations associated with the Calcine and Scrubber Ponds; KM-4 shows a neutral pH yet molybdenum and vanadium concentrations indicate an impact from the ponds.

2.8.2 Dissolved Oxygen and Oxidation Reduction Potential (ORP)

Dissolved oxygen (DO) and redox potential (ORP) provide indicators of either oxygenated or anaerobic conditions within the aquifer. In general, DO measurements of less than 1 ppm suggest that anaerobic conditions may be present in the ground water. Anaerobic microbial processes will occur at strongly negative redox potentials. The ORP of ground water suggests the relative oxidizing or reducing nature of the ground water system. Redox potential field data result from interactions between chemical species present in the ground water and microbial byproducts.

Dissolved oxygen and ORP measurements were obtained in the field during October 2008. The meter was calibrated each day prior to sampling as required by the manufacturer. Results of the DO and ORP measurements obtained during low-flow well purging and immediately prior to sampling are shown on Figures 2-11 and 2-12 respectively. Results indicate that dissolved oxygen concentrations in the aquifer are reduced across the site in a southerly direction, as shown on Figure 2-11, with more than 7 mg/l dissolved oxygen in ground water from background well KM-1. The remaining wells on the site and off site with the exception of KM-5 (2.4 mg/l) and KM-7 (1.13 mg/l) have less than 1 mg/l dissolved oxygen.

ORP measurements indicate negative values at KM-3 and KM-9. Generally, ORP is smaller on the east side of the site near cap and downgradient of the cap.

2.8.3 Ammonia

Ammonia is a nutrient required for microbial growth and activity and provides a nitrogen source for bacteria. Biodegradation activity within the aquifer can be controlled by the concentrations of ammonia within the ground water.

Ammonia concentrations in shallow wells and off-site locations for October 2008 are shown on Figure 2-13. Concentrations range from near detection in well KM-1 to more

than 690 mg/l in KM-8. Ammonia was predominant in the S-X raffinate stream, however the S-X raffinate was also routed to the scrubber pond. Ammonia concentrations shown on Figure 2-13 indicate elevated in shallow well KM-3 (150 mg/l).

2.8.4 Dissolved Manganese

Manganese concentrations are decreasing with time in nearly all of the wells. During October 2008 dissolved manganese concentrations in Tronox monitor wells were obtained. Results are shown on Figure 2-14. Dissolved manganese concentrations in ground water for on-site wells range from 1.3 ug/l in well KM-19 to 1,900 ug/l in well KM-8. Well KM-3 (670 ug/l) indicates increasing concentrations since 2001.

2.8.5 Dissolved Iron

Dissolved iron concentrations were obtained from the monitor wells in October 2008. During the RI, iron was detected at small concentrations in all of the pond waters, with maximum concentrations identified at the now out-of-service boiler blowdown pond (1.63 mg/l). Comparisons of iron concentrations in unfiltered (total) and filtered (dissolved) samples collected during the RI indicated that iron concentrations were large in unfiltered samples, but were generally much smaller or less than detection in corresponding filtered samples. Therefore, it appeared during the RI that iron concentrations were increased by increases in turbidity.

During October 2008, ground water samples were analyzed for dissolved iron. Distribution of dissolved iron across the site is shown on Figure 2-15. This figure indicates that dissolved iron concentrations are larger in the central portion of the industrial site south of the covered boiler blowdown pond and smaller immediately downgradient (east) of the calcine cap. The largest dissolved iron concentrations are found to the west of the S-X pond. Intermediate depth wells typically have slightly larger dissolved iron concentrations.

Some inconsistencies in iron concentration are expected as fine colloidal material can result in falsely inflated values for dissolved concentrations. The dissolved iron concentration in KM-9 is notably high suggesting that there may be a local high or that matrix interference is influencing the reported iron concentration in this well.

2.8.6 Total Organic Carbon

Ground water samples for total organic carbon (TOC) were obtained in October 2008. Results indicate that TOC was less than detection in the background wells KM-1 and KM-10, wells KM-5, KM-6 and KM-13 and off site wells KM-15, KM-16 and KM-17. TOC concentrations were largest in KM-8 (4.4 mg/l) and KM-3 (1.6 mg/l). The remainder of the wells indicates TOC concentrations are less than 1 mg/l. The carbon source resulted from the No. 2 fuel oil carrier used in the S-X process.

2.8.7 Silica

Ground water samples for silica were obtained in October 2008. Results indicate that silica concentrations range from 15 to 24 mg/l, with well KM-8 yielding results of 50 mg/l. The reported range of dissolved silica is normal to somewhat high for basaltic rock environment. Concentrations in KM-8 probably indicated industrial source contamination. Since this well is already known to be quite impacted by the facility, the silica does not provide new information. No further silica monitoring is recommended.

3.0 CURRENT REMEDY DESCRIPTION

A complete discussion of the remedial action completion activities is described in the Draft Remedial Action Completion Report Revision I (GET, 1999) and the Draft Remedial Action Completion Report for Calcine Capping, 2000 through 2001 (GET, 2003). Remedial Actions for the Tronox vanadium facility addressed the selected site remedy from the Record of Decision (ROD, September 1995) and subsequent amendment to the ROD (July 2000). The Remedial Action for the site included:

- Elimination of uncontrolled liquid discharges from the site;
- Landfilling solids from the scrubber and S-X ponds at an on-site landfill;
- In-place capping of the wind-blown calcine, roaster reject, reject fertilizer, and active calcine tailings during 2000 and 2001;
- Semi-annual ground water monitoring to determine the effectiveness of source control; and
- Establishment of institutional controls in affected off-site areas to prevent ingestion of ground water for as long as the ground water exceeds the RBC.

3.1 Elimination of Uncontrolled Liquid Sources

Four uncontrolled liquid sources (S-X Pond, scrubber pond, calcine ponds and Magnesium Ammonium Phosphate (MAP) Ponds) were identified during the Remedial Investigation. The Record of Decision (U.S. EPA, September 1995) called for the elimination of the uncontrolled liquid sources as soon as practicable. This work was completed between 1993 and 1997. The purpose of the liquid source elimination portion of the project was to eliminate the infiltration of 300 to 350 gpm of process water. These liquid discharges included solvent extraction raffinate, roaster scrubber water, process water used to sluice MAP to the MAP ponds and process water used to sluice the calcine to the calcine ponds.

The MAP ponds were eliminated in 1993 by installing filters to collect the solids for sale while the water was recycled in the vanadium plant. The MAP ponds were eliminated during the RI in 1993 and no investigations were completed in the MAP ponds area.

The solvent extraction raffinate stream was redirected to a series of lined ponds constructed in 1995 and 1997 (shown on Figures 1-2 and 1-3). After the dismantling of the vanadium plant, the two five-acre ponds were consolidated in 2004 to the 10-acre pond and the liners were removed. The 10-acre pond constructed in 1997 still exists on the site and contains about 20,000 cubic yards of S-X solids and salts.

Baghouses were installed on the roasters replacing the wet scrubbers, which eliminated the scrubber water stream. The scrubber pond was dewatered in 1997 and solids removed and impounded in the on-site landfill.

The calcine produced by the vanadium facility was handled by a mechanical de-watering system. The process water used to transport the calcine to the de-watering system was returned to the vanadium plant for reuse and the “de-watered calcine” was transported to the storage area by means of loaders.

3.2 On-Site Landfill Construction

The 1995 ROD required construction of a landfill to contain process sediments from the S-X and scrubber pond basins. The sediments remaining in the S-X and scrubber pond basins were excavated to native soil or to the calcine material beneath the S-X pond and placed in a lined on-site landfill, shown on Figure 1-3. The landfill construction was completed in 1997.

Approximately 13,000 cubic yards of material were removed from the two ponds and placed in the on-site landfill. The landfill was constructed with a composite liner, comprised of a geomembrane overlying a geosynthetic clay liner (GCL); a leachate collection system; and an engineered geomembrane cap and soil cover. Details of the

landfill design are presented on Figures 3-1 and 3-2. The cover was seeded to prevent erosion and the landfill footprint area was fenced to control access. Excess liquid contained by the waste when it was compacted in the landfill was removed through the leachate collection system. This liquid was pumped to the west 5-acre lined pond until 2004. The sump discharges a small volume at this time which is currently pumped to a lined concrete impoundment.

Following excavation of the sediments from the S-X and scrubber ponds, the pond basins were backfilled with clean native soil and contoured with a positive slope. The cover material was seeded to prevent erosion.

3.3 Calcine Capping

The 2000 ROD amendment (U.S. EPA, July 2000) required that calcine used as a feedstock for the fertilizer process, roaster reject and off-spec fertilizer be capped within the existing footprint of the calcine impoundment. The cap construction was completed in 2001. The roaster reject and off-spec fertilizer were compacted within the calcine area prior to capping. The calcine material was compacted and sloped and an engineered geomembrane cap was placed over the material. The engineered cap consisted of linear low-density polyethylene (LLDPE), overlying geocomposite, subsoil and topsoil. After the topsoil was placed and smoothed, the entire area was seeded to control erosion. The entire area was fenced to control access.

3.4 Institutional Controls

The institutional controls for the site were reviewed in conjunction with the requirements found in the Consent Decree and the requirements found in the following guidance document: EPA 540-F-00-005 OSWER 9355.0-74FS-P dated September 2000.

Institutional controls required in the 1995 ROD included deed restrictions, access restrictions, well drilling restrictions and wellhead protection. Deed restrictions were

placed on the property to the south of the facility in 1995 because COC were identified in ground water in this area in off-site wells KM-15 through KM-18. Kerr-McGee/Tronox subsequently purchased this property in 2004 and the deed restrictions placed on the property in 1995 are still maintained. The City of Soda Springs currently implements restrictions on land development and use through the building permit requirements, but the City does not have an enforceable means of restricting the development of ground water as a drinking water source. The property west of the facility includes a railroad right-of-way, highway right-of-way and property owned by Monsanto Chemical Company. Beneficial ground water development on any of these parcels is not likely. Ground water to the north and to the east of the site is upgradient and not impacted by the former plant operations.

3.5 Site Changes Following RI/FS Completion

3.5.1 Vanadium Plant Demolition

Although not required by the 1995 ROD or the 2000 ROD amendment, Kerr-McGee/Tronox elected to dismantle the vanadium plant between November 2001 and May 2002. Process buildings and equipment associated with the vanadium facility were razed and removed from the site. Materials removed from the site were sent to an appropriate landfill or recycled. The concrete foundations below grade were left in place. The footprint of the former plant site was covered with fine limestone. The cover was contoured to shed water away from the former plant site footprint.

3.5.2 Reclaim Limestone Settling/Storm water Runoff Ponds

Between the months of September 2003 and October 2003, Kerr-McGee reclaimed the former limestone settling/storm water runoff ponds. Plans to close and reclaim the ponds were discussed in advance with the Idaho Department of Environmental Quality (IDEQ) in a number of previous meetings in early 2003, and again at a meeting at the site on July 30, 2003. IDEQ agreed that a consent order for pond reclamation would not

be necessary based on their review of sediment and pond water characterization results provided to them. IDEQ agreed that sampling of the underlying material was not necessary since it was anticipated that the material would be calcine, a material that was investigated during the RI and prior to the production of the calcine fertilizer.

The water was pumped from the ponds to the 10-acre pond. The solids were then removed to the 10-acre pond along with the liners. Backfill used to regrade the site to match the existing topography was obtained from within the perimeter of the fenced area surrounding the ponds. Regrading and seeding of the pond basins occurred in October 2003. Much of the regrading material was calcine that was obtained from the pond berms, since calcine was the material that was removed when the ponds were originally excavated. Compaction was performed using the dozers and the water truck. Immediately above the regraded calcine and soil pond backfill, a nominal 8-inch layer of topsoil was placed. Following completion of cover placement, a survey was completed on the regraded surface. An estimated 6,800 cubic yards of subsoil backfill were used to regrade both ponds to match the existing site topography. Clean up of the ponds was documented in a report dated April 3, 2004 that was sent to IDEQ and to EPA.

3.5.3 Reclaim 5-Acre Ponds

The east and west 5-acre double-lined evaporation ponds were permitted through the IDEQ in 1995, and approved in a letter dated December 12, 1995. IDEQ requested in its approval letter of the 5-acre ponds that Kerr-McGee provide a closure plan prior to performing any reclamation on the ponds.

The west pond had a capacity of about 9.7 million gallons. Dimensions of the west pond measured 560 feet in an east-west direction and 400 feet in a north-south direction. The east pond had a 8.4 million gallon capacity, with dimensions of about 600 feet by 450 feet. The west 5-acre pond was sloped to a sump area at the southeast corner and the east pond was sloped to the southwest corner, at approximately 0.004 percent. Pond construction consisted of recompacted native silty clay soils placed in

lifts, overlain by two 40-mil HDPE liners separated by a geonet layer. At the time that the vanadium plant was closed, the ponds were nearly completely full and could not receive any additional process water. An evaporative system was set up on each pond to reduce the volume through evaporation.

Surface waters in the 5-acre ponds were investigated in the fall of 1999 and again in 2001. Results of the analyses were presented to IDEQ in 2003 prior to closure. Results indicated that the ponds had field pH values of 3.2 to 3.9 units. October 2001 data indicated that the ponds were elevated in sodium, magnesium, potassium, molybdenum, vanadium, chloride, sulfate, copper, nickel, arsenic, and selenium. TDS in the ponds ranged from 136,000 to 411,000 mg/l. Organics were present in the ponds, with TPH ranging from 32 to 33 mg/l. Organics present in the ponds are the breakdown products of the fuel carrier (diesel fuel) that was used in the S-X circuit, and the breakdown of tributyl phosphate into unknown semi volatile compounds.

Solids in the east and west 5-acre ponds were also sampled in October 2001. Solids included salt-like materials, soils, sediments, and fertilizer materials. The soils noted in the ponds likely resulted from a mixture of windblown calcine, windblown native soils adjacent to the ponds, and sediment precipitated from the process. Solids sampling results indicated that the pond salts were highly elevated in sodium, calcium, magnesium, potassium, vanadium, and smaller amounts of copper, nickel and molybdenum. TPH was found in the sediments and soils in the 5-acre ponds. TPH concentrations were generally less than detection in the salts. Semi volatile organics and unknown compounds were present in the sediments in trace amounts. The pH of the salts and sediments were 3.4 units to near normal. Semi-volatile organics and unknown compounds were present in the sediments in trace amounts. Sediment samples did not exceed TCLP limits therefore were not considered hazardous according to RCRA.

Soil investigations beneath the ponds were performed in March 2005 in the west 5-acre pond, approximately 4 months following cleaning out of the pond and removal of the

liners. Investigations included logging of 14 test pits and collection of geotechnical soil samples in advance of a landfill design. Findings of the investigations indicated that the soils beneath the west 5-acre pond consisted of unconsolidated and nearly uniform deposits of silt and silty clay ranging in thickness from about 8.5 to greater than 16 feet. This uniformly fine-grained native soil material is of low hydraulic conductivity (typically 10^{-5} to 10^{-6} cm/sec) and rests on bedrock. Bedrock consisted of a series of volcanic basalt flows, although a veneer of travertine limestone from fresh water spring deposits is known to occur in the vicinity of the site directly beneath the soil mantle. Depth to ground water near the former 5-acre ponds is about 44 feet below ground surface, indicated by ground water levels in nearby paired wells KM-1 and KM-10.

Plans to close and reclaim the 5-acre ponds were discussed in advance with the IDEQ in a meeting on May 22, 2003 and again at a meeting at the site on July 30, 2003. The details contained within this report document the pond closures that were cleaned out and reclaimed in accordance with the methods presented to the IDEQ in the 2003 meetings. In July 2003, IDEQ agreed that a consent order for pond reclamation would not be necessary based on its review of sediment and pond water quality characterization results provided to them in 2003.

The west 5-acre pond was completely cleaned out and an estimated 7,100 yards of sludge were pumped from the west 5-acre pond to the 10-acre pond over an approximate period of twenty-nine days. An estimated 5,200 yards of sludge were removed from the east 5-acre pond. The liner systems were removed by cutting with hook blades and rolling the liners into rolls approximately 3 feet in diameter. Liner materials were then transported to the northeast corner of the west 5-acre pond basin and compacted with the track hoe and loaders to further reduce the volume. Soils beneath the removed pond liners showed no direct visual evidence of leakage from the reclaimed ponds. At a few locations, incidental volumes of rain water runoff contacting contaminated areas ran onto the pond bottom soils. Efforts were made to remove the soils to the 10-acre pond soon after these incidents occurred. The remainder was bladed up and placed in the 10-acre pond prior to job completion. Following removal of

the liners, the pond bottoms were surveyed to determine grade. The west pond was not regraded, but was surveyed and provided with a central drainage trench sloping to the west to prevent ponding of rain and snow melt in the basin. The west 5-acre pond basin location is proposed for additional excavation and siting of a landfill cell to receive the solids from the 10-acre pond. At the site of the reclaimed east 5-acre pond, clean backfill was used to regrade the site to match the existing topography. Backfill was obtained from within the perimeter of the fenced area surrounding the east pond. Compaction was completed using the D-8 dozer and track hoe. An estimated 14,600 cubic yards of subsoil backfill were used to regrade the east 5-acre pond to match the existing site topography and to provide positive drainage.

3.5.4 Calcine Cap Drainage Improvements

A number of drainage improvements were made around the cap to collect clean runoff water. Runoff from the calcine was not an issue at the site prior to cap placement as the result of the increased infiltration rate through this material. Surface water runoff from the cap began to interfere with plant operations. In the spring of 2002 following completion of the cap, a pond formed on the north side that encroached on the cap. An infiltration basin was constructed on the north side of the calcine cap at the lowest topographic elevation immediately adjacent to the calcine cap fence line in clean soil. The project was completed in October 2002 and documented in the calcine cap infiltration basin as-built report, (GET, 2002). To date, no standing water has been noted in the depression north of the cap since the construction of this basin was completed.

Periodic standing water resulting from runoff to the west and south of the cap persisted through June 2005. Much of this standing water was present in an area south of the limestone pile, and at a location immediately south of the cap on the site of the former roaster scrubber pond. Cover grade above the former scrubber pond was maintained at or near the elevation of the road since the cover fill was placed in 1998. However, localized soil settlement resulted in low areas that periodically collected water from cap

runoff. Snow accumulation south of the cap during winter months is substantial which results in increased surface water. During 2005, approximately 7,400 yards of soil were used to fill and regrade areas south of the cap. Fills ranged between 0.5 to about 7 feet. The site was graded such that drainage in the basin south of the cap sloped gently to the west toward an infiltration basin that was constructed south of the former scrubber pond in a barley field.

4.0 REMEDY EVALUATION

4.1 Description of Evaluation Tasks

4.1.1 Former S-X Pond Basin

The Addendum I work plan included an inspection of the former S-X pond basin area. The covered area of the former S-X pond shown on Figure 4-1 was inspected in 2008 to observe for evidence of erosion, deep tap-rooted plants, burrowing animals and areas where standing water may have been present following snow melt. The purpose of this inspection was to determine if a potential exists for infiltration of concentrated surface water runoff through the former pond basin. This inspection was completed by initially establishing 50 foot^2 grid on the former S-X pond cover. The grid lines were established in a north-south and east-west direction. The grids were set in the field by placing stakes or flagging at 50-foot intervals on each side of the S-X pond basin using a compass and tape. These stakes were used to align the field engineer during the inspection to ensure that the grid completely encompassed the footprint of the cover. The grid points across the entire pond basin were located using a Garmin Colorado 400t hand-held GPS. More details concerning this inspection are presented in Appendix A to this report.

Each grid line was inspected for any of the conditions listed above. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not hinder the observer. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS.

4.1.2 Former Scrubber Pond Basin

The Addendum I work plan included an inspection of the former scrubber pond basin area. The covered area of the former scrubber pond shown on Figure 4-2 was inspected to observe evidences of erosion, deep tap-rooted plants, burrowing animals and areas where standing water may have been present following snow melt. The purpose of this inspection was to assess the potential for infiltration of concentrated surface water runoff through the former pond basin. This inspection was completed by establishing a 30 foot^2 grid on the former scrubber pond cover footprint. The grid lines were oriented in a north-south and east-west direction. The grids were established by placing stakes or flagging at 30-foot intervals on each side of the scrubber pond basin using a compass and tape. These stakes were used to align the field engineer during the inspection to ensure that the grid was covered. The grid points across the entire pond basin were located using a Garmin Colorado 400t hand-held GPS.

Each grid line was inspected for the conditions listed above. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not hinder the observer. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS. Details are presented in Appendix A.

4.1.3 Former Limestone Settling Ponds

The Addendum I work plan included an inspection of the former limestone settling pond area. The covered areas of the former limestone settling ponds, areas shown on Figure 4-3 were inspected in 2008 for signs of erosion, deep tap-rooted plants, burrowing animals and areas where standing water may have been present following snow melt. The purpose of this inspection was to determine if there is a potential for infiltration of concentrated surface water runoff through the former pond basin. This inspection was

completed by establishing a 50 foot^2 grid on the limestone settling pond area. The grid lines were set in a north-south and east-west direction. The grids were established by placing stakes or flagging at 50-foot intervals on each side of the limestone settling pond area using a compass and tape. These stakes were used to align the field engineer during the inspection to ensure that the grid was covered. The grid points across the entire pond basin were located using a Garmin Colorado 400t hand-held GPS.

Each grid line was inspected for the conditions listed above. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not obscure site features. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS. Details of the inspection are presented in Appendix A.

4.1.4 On-Site Landfill

The Addendum I work plan included an inspection of the on-site landfill. Details of the inspection are presented on Figure 4-4. The on-site landfill was inspected in 2008 to look for signs of erosion, deep tap-rooted plants, burrowing animals, tension cracks, settlement and areas where standing water may have been present following snow melt. The results of this review are presented in Appendix A. A water sample was obtained from the landfill sump for chemical analysis in October 2008. The purpose of this inspection was to assess the potential for infiltration of concentrated surface water runoff through the landfill. This inspection was completed by establishing a 50 foot^2 grid on the on-site landfill cap. The grid lines were set in a north-south and east-west direction. The grids were established by placing stakes or flagging at 50-foot intervals on each side of the on-site landfill cap using a compass and tape. These stakes were used to align the field engineer during the inspection to ensure that the grid was

covered. The grid points across the entire area were located using a Garmin Colorado 400t hand-held GPS.

Each grid line was inspected for any of the conditions listed above. The field engineer looked for settling around the well that is used to remove water from the sump. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not hinder the observer. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS.

Although the 2002 and 2007 5-year reviews stated that the landfill was constructed as designed, this evaluation included a review of the landfill construction documents. The purpose of the landfill construction review was to determine if the landfill was constructed as designed. The operation and maintenance documentation was reviewed to determine if the inspections and other O&M procedures described in the approved landfill design document were being completed as required. The results of this review are presented in Appendix A.

4.1.5 Calcine Cap

The Addendum I work plan included an inspection of the calcine cap. Details are presented on Figure 4-5. The calcine cap was examined for evidence of erosion, deep tap-rooted plants, burrowing animals, tension cracks and areas where standing water may have been present following snow melt. The purpose of this inspection was to determine if there is a potential for infiltration of concentrated surface water runoff through the calcine cap. This inspection was completed by establishing a 50 foot^2 grid on the cap. The grid lines were set in a north-south and east-west direction. The grids were established by placing stakes or flagging at 50-foot intervals on each side of the cap using a compass and tape. Stakes were used to align the field engineer during the

inspection to ensure that the grid was covered. The grid points across the entire capped area were located using a Garmin Colorado 400t hand-held GPS. The outside edge of the calcine cap was walked to determine if there is evidence of water flowing out of the geonet that could lead to erosion and possible failure of the liner system. The results of this review are presented in Appendix A.

Each grid line was inspected for any of the conditions listed above. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not hinder the observer. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS.

Although the 2007 5-year review stated that the cap was constructed as designed this evaluation included a review of the calcine cap construction documents. The purpose of this review was to determine if the calcine cap was constructed as designed. The operation and maintenance documentation was reviewed to determine if the inspections and other O&M procedures described in the approved calcine cap design document were being completed as required. The results of this review are presented in Appendix A.

4.1.6 Former MAP Ponds

The Addendum I work plan included an inspection of the former MAP ponds area. Details are presented on Figure 4-6. The uncapped area of the former MAP ponds, now partially covered by a site building formerly used for calcine dewatering, was inspected in 2008 to investigate evidence of erosion, deep tap-rooted plants, burrowing animals and areas of settlement where standing water may have been present following snow melt. The purpose of the inspection was to determine if there is a potential for infiltration of concentrated surface water runoff through the MAP ponds area. This

inspection was completed by establishing a 50 foot^2 grid on the areas of the former MAP ponds. The grid lines were set in a north-south and east-west direction. The grids were established by placing stakes or flagging at 50-foot intervals on each side of the former pond area using a compass and tape. These stakes were used to align the field engineer during the inspection to ensure that the grid was covered. The grid points across the entire pond area were located using a Garmin Colorado 400t hand-held GPS. The results of this review are presented in Appendix A.

Each grid line was inspected for any of the conditions listed above. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not hide noteworthy features. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS.

4.1.7 Former Vanadium Plant

The Addendum I work plan included an inspection of the former vanadium plant area. The uncapped area of the former vanadium plant was inspected for cover amount and to observe whether former features of the plant remain above the cover. The plant footprint was inspected for erosion, signs of vegetation, burrowing animals and areas where standing water may have been present following snow melt. The purpose of the 2008 inspection was to determine if there is a potential for infiltration of concentrated surface water runoff through the former vanadium plant area or whether a potential exists for impacts from the former facility to ground water. The inspection was completed by establishing a 50 foot by 50 foot grid on the former plant area. The grid lines were set in a north-south and east-west direction. The grids were established by placing stakes or flagging at 50-foot intervals on each side of the on-site landfill cap using a compass and tape. These stakes were used to align the field engineer during the inspection to ensure that the grid was covered. The grid points across the entire

former plant area were located using a Garmin Colorado 400t hand-held GPS. The results of this review are presented in Appendix A.

Each grid line was inspected for any of the conditions listed above. The field engineer walked slowly enough so that the areas on both sides of the grid line were observed and so that the vegetation did not obscure noteworthy features. The field engineer walked the grid lines in both the north-south and east-west directions. Observations made while walking each grid line were recorded in a field notebook. Photographs were taken of each problem area that was observed during the inspection. These problem areas were located using the hand-held GPS.

4.1.8 Additional Geochemical Assessment

In order to assess potential geochemical factors potentially influencing COC concentrations in ground water and surface water, Tronox collected dissolved oxygen (DO) and oxygen-reduction potential (ORP) field parameters in October 2008 during the semiannual sampling event. These additional field parameters were added to gain a better understanding of the redox conditions beneath the site in ground water. Additional analytes added to the analyte list for the laboratory included dissolved iron, dissolved manganese, ammonia, total organic carbon (TOC), and silica.

4.1.9 Institutional Controls

The institutional controls that have been in place since 1995 were reviewed. These controls were compared to the requirements found in EPA 540-F-00-005 OSWER 9355.0-74FS-P dated September 2000.

4.2 Results of Remedy Evaluation

4.2.1 Former S-X Pond

Ground water sampling analytical results indicated that the ground water to the south of the former S-X pond remains among the most heavily impacted ground water areas for COC beneath and downgradient of the site. This observation is made in ground water for the periods during vanadium production, S-X pond operation and following LSE.

The former S-X pond water was sampled during the RI. Results indicated that the S-X water contained up to 117 mg/l vanadium, the largest concentration of all liquid sources identified on site that discharged to unlined ponds. Molybdenum concentrations were large in the S-X pond. RI results indicated molybdenum at concentrations as large as 155 mg/l in the S-X stream that flowed through the limestone settling ponds and to the former S-X pond. The largest concentrations of 12 of 26 detected metals during the RI were found in the limestone settling ponds and in the S-X pond. Conclusions made during the RI were that the inorganic constituents in the S-X circuit waters were up to three orders of magnitude larger than other uncontained liquid pond discharges. Sediments removed from the bottom of the S-X pond were elevated in both molybdenum (444 mg/kg) and vanadium (7770 mg/kg). The sediments were removed from the pond basin to native soils or calcine prior to covering the scraped pond with a soil cover.

The RI does not indicate that any investigative methods, such as soil borings were performed in this area, nor were samples obtained from the remaining soils or calcine underlying the removed sediment prior to recovering the pond basin with soils. Soil thickness in the S-X pond basin area ranges from about 10 to 22 feet. The soils include silty clay of low to medium plasticity, formation rock, caliche, calcine tailing and silt. Soil descriptions are based on the logs for wells KM-7 KM-8, KM-12, KM-13, KM-19, and boring B-2. None of the borings were completed in the pond basin. Therefore, the soil conditions are relatively unknown beneath the S-X pond basin.

As part of the remedy evaluation, an inspection of the former S-X pond area was conducted between July 17 and August 6, 2008. The inspection included surface conditions evaluations only. Details are presented on Figure 4-1. After a reconnaissance of the site area, the inspection grid was established as previously described and described in Appendix A. The photo log of the inspection that includes the photographs, latitude and longitude coordinates and a brief description of the problem are attached in Appendix A.

The former S-X pond area is covered with vegetation that is mainly wheat grass and other grasses. No deep tap-rooted plants were observed during the inspection. The inspection was conducted in late July and the plant growth was complete and the grasses had already produced heads. The vegetation within the former pond area was shorter and was starting to turn brown when compared to the grasses outside the former pond area indicating stress.

The inspection showed numerous areas that may have contained standing water following snow melt, several areas of erosion, areas of exposed calcine, a few burrowing animal holes and one possible sink hole within the boundaries of the former pond. The areas that showed evidence of holding water were scattered throughout the pond area and ranged in size from relatively small to greater than 100 ft^2 in size. The areas of erosion and exposed calcine were observed along the eastern side of the former pond. The sink hole was observed near the western edge of the pond (Line 4 and Point 5). The sink hole is approximately 2.5 feet in diameter and 1.5 feet deep. The larger areas indicating standing water, areas of erosion, exposed calcine and the sink hole are shown on Figure 4-1.

4.2.2 Former Scrubber Pond

The S-X pond discharge was frequently rerouted to the scrubber pond, as discussed in the RI and indicated in Table 1-1. The S-X pond and the limestone settling pond waters were shown in the RI to have the larger COC concentration when compared with other

unlined pond discharges. During the RI, one sample of scrubber pond water and two sediment samples were obtained from the scrubber pond. Molybdenum concentrations were generally much smaller in scrubber pond water and sediments when compared with the S-X pond media. However, the vanadium concentrations in the scrubber water and scrubber sediments that were removed from the pond prior to closure were about an order of magnitude less than the S-X pond.

The RI does not indicate that any investigative methods, such as soil borings were performed in the scrubber pond basin soils, nor were samples obtained from the remaining soils or calcine underlying the removed sediment prior to recovering the pond basin with soils. Soil thickness in the scrubber pond basin area is substantially greater than at other locations on the plant site, ranging from about 10 to 47 feet. The soils include silty clay of low to medium plasticity, calcine tailing, and silty sand. Soil descriptions are based on the logs for wells KM-2 KM-3, and boring B-10. It is possible that some of the alluvial sequence beneath the former scrubber pond is saturated based on RI investigation results. None of the RI borings were completed in the pond basin. Because no borings or samples were obtained from beneath the scrubber pond, the conditions beneath this pond basin are relatively unknown. Ground water sampling analytical results for wells KM-2, KM-3 and KM-4 continue to indicate that the shallow ground water in the vicinity of the former scrubber pond is heavily impacted from COC. This observation is made in ground water for the periods during vanadium production, scrubber pond operation and for the RD/RA period following LSE.

The scrubber pond cover receives more moisture than would normally occur as the result of the runoff from the calcine cap, located immediately to the north of the scrubber pond. Approximately 35 percent of the cap will drain directly to the scrubber pond cover. Runoff models performed for the calcine cap during the design indicated that runoff from the cap varies from about 4,400 to 235,000 cubic feet per year with an annual average of 99,810 cubic feet. Therefore, on an annual average, the scrubber pond cover potentially receives about 35,000 cubic feet of water generated off the cap. An infiltration basin was installed to infiltrate this water in a non-impacted area

Periodic standing water resulting from runoff to the south of the cap was noted between 2002 and 2005 on the former pond cover. During that time, localized soil settlement on the scrubber cover resulted in lowered areas that periodically collected water from cap runoff. Snow accumulation south of the cap on the scrubber pond cover during winter months was substantial as the result of previous excavations south of the former pond that held snow. This area was regraded in 2005 to eliminate snowpack on the scrubber cover and to provide positive drainage. Approximately 7,400 yards of soil were used to fill and regrade areas south of the cap. Fills ranged between 0.5 to about 7 feet. The site was graded such that drainage in the basin south of the cap sloped gently to the west toward an infiltration basin that was constructed in clean native soil in the agricultural field to the south of the site.

As part of the remedy evaluation during 2008, an inspection of the closed and covered scrubber pond area was conducted between August 6 and August 9, 2008. Details are presented on Figure 4-2. Following a brief reconnaissance of the area, the inspection grid was established as previously described and described in Appendix A.

A grid system was initially established on the scrubber pond cover. Next, the field engineer walked the grid along the east-west and north-south lines. Where the field engineer observed areas of erosion, evidence of burrowing animals, deep tap-rooted plants or areas standing water that may have been present, the area was located using the hand-held GPS and a photograph of the area was taken. Noted areas are shown on Figure 4-2. The photo log of the inspection that includes the photographs, latitude and longitude coordinates and a brief description of the problem are attached in Appendix A.

Results of the inspection indicate the former pond area is covered with vegetation that is predominantly wheat grass and other grasses. One deep tap-rooted plant was observed during the inspection. This plant was a member of the sagebrush family, silver sagebrush. The intrusion of this plant was limited to the eastern half of the former scrubber pond. The 2008 inspection showed numerous barren areas that likely contained standing water following snow melt. The areas that showed evidence of

standing water were located principally on the western half of the pond cover. A number of locations of barren areas are observed on the eastern portion of the cover. The largest areas that indicate settlement and appear to hold water are close to the trenches dug to install the piping for the infiltration galley that drains the west side of the cap runoff water. These trenches are filled with cinders to allow the water to infiltrate into the French drain, but there is evidence that the volume of water that is present in this location is greater than the capacity of the French drain and water stands on the surface for some time. The eastern portion of the pond area has a few feet of additional fill that creates a small hill in this area. The larger areas that could hold water and the area that contains additional fill material are shown on Figure 4-2.

Based on the results of the 2008 inspection, it is clear that settlement continues to occur on the scrubber pond cover and that runoff from the cap contributes to standing water on the cover. It is not clear whether the continued settlement since 2005 is the result of cover settlement or whether settlement is occurring within the soils beneath the former pond.

4.2.3 Limestone Settling Pond Area

As shown on Figure 1-4, three unlined and two lined limestone settling ponds were located directly to the east of the S-X pond cover. The ROD did not require the removal of these ponds. During the RI, one water sample and one sediment sample were obtained from the settling ponds for organics analysis. Results indicate that the sediment in the limestone settling ponds was similar to the S-X sediments with respect to organic COC concentrations. Monitor well drilling and soil boring investigations were performed in the vicinity of, but not directly in the former limestone settling ponds during the RI. Findings indicated that the site occupied by the reclaimed limestone settling ponds is underlain by calcine and unconsolidated deposits of silt and silty clay ranging in thickness from 13 to 15 feet, as shown in cross section on Figure 4-7. This fine-grained native soil material is of low hydraulic conductivity and rests on bedrock.

Bedrock is predominantly a series of volcanic basalt flows to depths of approximately 200 feet. Depth to ground water is about 30 to 40 feet below ground surface.

The S-X raffinate was contained within a series of these ponds that allowed limestone to settle and clarify prior to discharging to the former S-X pond. Between 1974 and 1988, three unlined settling ponds used in the vanadium solvent extraction process were present at this location. These ponds settled neutralizing limestone fines en-route to the unlined S-X pond, and were reclaimed and covered by 1988. These ponds ranged in capacity from 500,000 to 1,000,000 gallons. A fourth pond (approximately 0.4 acres) experienced two failures in 1989. The pond was reconstructed and lined with a 30-mil single liner following these failures. A fifth pond of nearly identical size was constructed and lined immediately west of this pond, and brought on line in 1993. The fourth and fifth ponds were eventually used for the storm water runoff from the historic vanadium plant once a new series of lined ponds was constructed. Configuration of all of these historic ponds is shown in Figure 1-4. The lined settling ponds were closed in 2003 during a voluntary cleanup action by Kerr-McGee. Prior to excavation of the sediment, the contractor removed incoming PVC drain piping from the east pond. The sediments, water and liners were removed from the final two ponds and placed in the 10-acre pond. Volume of sediment was estimated to be about 4,500 yards. An estimated 6,800 cubic yards of subsoil backfill were used to regrade both ponds to match the existing site topography.

The inspection of the former limestone settling pond area was conducted on August 10, 2008. After a brief reconnaissance of the area, the inspection grid was established as previously described and described in Appendix A. Details of the inspection are presented on Figure 4-3.

After the grid system was established, the field engineer walked the grid along the east-west and north-south lines. Areas of erosion, evidence of burrowing animals, deep tap-rooted plants or areas standing water were located using the hand-held GPS and a photograph of the area was also obtained. Noted areas are shown on Figure 4-3. The

photo log of the inspection that includes the photographs, latitude and longitude coordinates and a brief description of the problem are attached in Appendix A.

The covered limestone settling pond area is covered with vegetation that is mainly wheat grass and other grasses. Several deep tap-rooted plants were observed during the inspection. These plants included several species of brush. The most noteworthy feature is a marshy area that exists in the central part of the former pond site. The source of the water is assumed to originate from the former vanadium plant facility through a pipeline. This water source may be plant runoff, although water on the surface appears to persist into late summer. Two areas of cattails were observed within these marshy areas. Both of these areas were associated with standing water and are likely to overlie buried calcine deposits and promote COC generation within the vadose zone. The source of the water to these ponded areas could not be confirmed. The two areas of standing water appear to be connected but the means of water transport was not readily evident. A drainage ditch from the eastern body of standing water has been constructed to divert water to the northwest. This diversion may have accompanied the reclamation of the two ponds in September 2003. Water discharging from the western body of water flows to the west and has produced several erosion rills. These areas of standing water and erosion rills are shown in Figure 4-3.

4.2.4 On-Site Landfill

The S-X pond was taken out of operation during 1996. During November 1996, the S-X pond sediments and underlying soils were scraped to the south end of the pond and covered with plastic. This allowed an extended period of time for the S-X solids to dry and consolidate. The scrubber pond came out of service in April 1997 and was drained prior to sediment thickness investigation. Therefore, the scrubber solids contained a higher percentage of moisture compared with the S-X solids.

The on-site landfill is a composite-lined containment facility holding the scrubber and S-X solids that was designed and constructed to meet RCRA Subtitle D design landfill

facility requirements. Construction details of the on-site landfill are presented on figures 3-1 and 3-2. The facility is essentially rectangular in shape. The cell was over excavated by three feet so that the silt foundation could be recompacted in 12-inch lifts to optimum moisture and compaction. Settlement of the landfill is expected to be negligible since the bottom lift rests directly on or just above the bedrock surface. However, geotechnical consolidation testing performed on samples of these soils indicated that the soils are slightly over-consolidated with limited immediate compressibility of the soil upon loading. Falling head permeability tests were completed on recompacted soil samples. Results ranged from about 8.2×10^{-7} to 1.7×10^{-6} cm/sec. Laboratory compaction testing indicated that a substantial decrease in soil permeabilities resulted from recompacting the native soil samples.

For these loess-type soils, compaction tests were performed using the Standard Proctor Test ASTM D 698. Tests results indicated maximum soil densities for these soils are approximately 104 to 106 pounds per cubic foot (pcf) with optimum soil moisture content of about 19 percent. A minimum of 4 density tests were performed for each lift. Difficulties that were initially encountered during compaction of the base and the side slopes of the cell were the result of not having enough moisture to achieve optimum compaction. This was resolved by the QC engineer ripping out soil lifts and then recompacting, and specifying additional water trucks and water applications to the soils. Compaction was in nearly all cases 90 to 97 percent.

A geosynthetic clay liner (a GCL), the lower component of the composite liner, was placed on the smoothed and compacted surface. Apparently, some of the GCL became hydrated but was not removed and was handled according to the manufacturer's recommendations. Soils were comprised of silts with almost no sand. Therefore, the surface was completely smooth and accepted by the liner contractor, documented in the remedial action completion report. A 60-mil HDPE geomembrane, the upper component of the composite liner, was placed directly on the GCL, and a geocomposite layer was placed directly on the geomembrane. Directly above the geocomposite, an 18-inch soil cushion layer was placed to protect the liner system. A sump was constructed into the

lowest level of the landfill with coarse gravel surrounding the screen inlet. This sump was installed to remove residual construction water used in the compaction of the waste materials from the scrubber and S-X ponds.

A mixture ratio of approximately 3:1 scrubber to S-X waste was windrowed and premixed before placement into the landfill to achieve the most desirable moisture content and maximum compaction. Following removal of the waste from the pond basins, as confirmed by the IDEQ and EPA, an 18-inch layer of native silt soil was placed directly on the compacted waste. Directly on the compacted native soil layer, a flexible membrane cover consisting of liner low density polyethylene (LLDPE) was placed into an anchor trench outside of the liner trench. A geocomposite layer was placed directly on the LLDPE and anchored into the same trench. Three feet of native soil was placed on this geocomposite in 8-inch loose lifts.

During the last week of September, the Idaho Department of Environmental Quality (IDEQ) inspected the pond basins and determined that all of the pond solids had been removed from the pond basins prior to bringing in clean native soil for cover material. Pond reclamation activities occurred during the last week of September and during the first week of October. Following removal of sediment materials from the pond basins and approval of closure from the IDEQ, completeness of sediment removal from pond basins was documented with photographs. Dikes were pushed in at both pond basins, and 2 feet of clean native soils were imported into the basins to cover the excavated grades. The overall site slopes were graded and sloped to enhance runoff away from the preexisting pond locations. Both sites were top soiled and seeded during 1997.

The landfill sump is pumped to a concrete holding sump that has been specifically coated for chemical resistance. The landfill was pumped to the west 5-acre pond through September 2004. The landfill is pumped about 4 to 6 times per year, discharging up to several hundred gallons. Analyzed results indicate about 150,000 ug/l molybdenum and 30,000 ug/l vanadium in these waters bailed from the sump.

The 2008 inspection of the on-site landfill cover was conducted August 10, 2008. Details of the inspection are presented on Figure 4-4. After a brief reconnaissance of the area and review of the landfill monitoring log, the inspection grid was established as previously described and described in Appendix A.

After the grid system was established, the field engineer walked the grid along the east-west and north-south lines. Discernable areas of erosion, evidence of burrowing animals, deep tap-rooted plants and areas standing water may have been present were located using the hand-held GPS. Noted areas are shown on Figure 4-4 Photographic documentation was completed. The photo log of the inspection that includes the photographs, latitude and longitude coordinates and a brief description of the noted items and issues are attached in Appendix A.

The on-site landfill cap is covered with vegetation that is mainly wheat grass and other grasses. Several deep tap-rooted plants were observed during the inspection. These plants included alfalfa and an unidentified plant. The intrusion of these plants was limited to the north slope of the landfill cap outside of the landfill cover anchor trench limits, but within the fenced area.

There was evidence of burrowing animal activity at several locations in the landfill area. The depth of these holes could not be determined at the time of the inspection because the holes had already caved in and did not appear to be active. Some of these may possibly be shallow coyote diggings. There was no settling observed around the sump well or at other locations on the landfill cap. The area along the southern fence is bare of vegetation. There are two other areas barren of vegetation just east of the western fence (near point 6 between lines 5 and 6 and near point 6 on line 7). These noted areas are shown on Figure 4-4. Currently, the fence around the landfill is in good condition and both gates are locked.

4.2.4.1 Landfill Construction Evaluation

As part of the remedy evaluation, the construction documents for the landfill were reviewed by a registered professional engineer. Construction of the on-site landfill is described in the Draft Remedial Action Completion Report (GET, March 1998). The design document (TriTechnics, May 1997) and the completion report referenced above were reviewed as part of the remedy evaluation for the on-site landfill. Based on the review the information contained in these documents, all aspects of the landfill construction were completed as designed. The construction of the on-site landfill was completed between July and November 1997. The design document (Remedial Design/Remedial Action Final Landfill Design Plans and Specifications) was prepared by TriTechnics in May 1997. This design was subsequently approved by EPA. The designed called for excavation and recompaction of the foundation soils, installation of the geosynthetic clay liner (GCL), installation of the primary liner (60-mil high density polyethylene (HDPE)), installation of the lower geocomposite drainage layer, installation of the protective soil layer, installation and compaction of the waste materials, installation the 40-mil linear low-density polyethylene flexible membrane cap, installation of the upper geocomposite drainage layer, installation of the soil cover, seeding of the soil cover and installation of the chain link fence.

As part of the landfill construction management plan construction oversight was provided by Gordon Brown of the Idaho Department of Environmental Quality (IDEQ). Following completion of construction a final inspection was conducted on November 5, 1997 by Gordon Brown of IDEQ, Peter Contreras of EPA and representatives from Kerr-McGee. Following this inspection, EPA and IDEQ agreed that the construction was complete.

Construction of the on-site landfill is described in the Draft Remedial Action Completion Report (GET, March 1998). The design document (TriTechnics, May 1997) and the completion report referenced above were reviewed as part of the remedy evaluation for the on-site landfill. This review is presented below.

Site Excavation and Foundation Construction

The design called for excavating the landfill to a depth three feet lower in elevation than the final grade elevation. This soil was stockpiled so that it could be used to construct the recompacted floor of the landfill. The documentation indicates that the excavation was completed as designed and was verified by the licensed surveyor and construction quality assurance (CQA) inspection engineer assigned to the project.

The design called for a minimum of 8 inches of the landfill foundation to be scarified and re-compacted. This was accomplished using paddle-footed rollers and loaded scrapers. Construction of the foundation was completed by placing the excavated soil in the bottom of the landfill in 8-inch lifts and then compacting each lift. At least 4 density measurements were made on each lift for the floor and all four berms of the landfill foundation. The documentation indicates that water was added to the soil followed by additional compaction, additional compaction was performed, portions of a lift were removed and replaced or the soils were allowed to dry followed by additional compaction at several locations before additional density testing showed that the area met the compaction requirements. The documentation indicates that the entire foundation met the compaction requirements of the project.

Geosynthetic Clay Liner (GCL) Installation

The contractor hired to place the GCL inspected the foundation of the landfill and provided written acceptance of the foundation. This written acceptance is included in the documentation. The documentation contains the quality control certificates for each roll of GCL received from the manufacturer. All of the GCL material used to construct the landfill met the requirements of the project.

The CQA inspection engineer observed the unloading of each truckload of GCL. The documentation indicates that none of the rolls were damaged during the unloading process. All of the rolls were covered to protect them from the weather.

The design called for running the GCL panels down the grade and not across the grade. The as-built drawing shows that the GCL panels were installed as designed. The panels in the corners of the landfill were oddly shaped and the as-built drawing shows that these panels were installed down the grade. The documentation indicates that the GCL was lapped as required and that bentonite powder was placed between the two panels at each point there was an overlap. According to the documentation, a total of 80 GCL panels were installed.

GCL placement was not conducted during a rain storm or within standing water. The documentation indicates that the GCL was covered by the 60-mil HDPE material to protect the GCL from the elements. On August 18, 1997, a sudden rainstorm that lasted about 20 minutes prematurely hydrated several GCL panels on the berm of the landfill before they could be covered by the HDPE material. The documentation indicates that this event was investigated and the decision to leave the panels in place was made. Based on the information in the documentation, this appears to be a correct decision and the integrity of the construction was not compromised.

60-mil HDPE Flexible Membrane Liner (FML) Placement

The 60-mil HDPE material used to construct the liner met the quality requirements of the project. The Remedial Action Completion Report (GET, 1998) contains the quality control certificates for all of the rolls used. The as-built drawing in the documentation shows that the FMC panels were placed running downhill as required by the design. The odd shapes needed to complete the corners of the landfill were placed to minimize wrinkling and ran downhill. A total of 33 panels were used to construct the primary liner of the landfill.

The quality control activities for the liner installation included logging the liner material when it was received. This log includes the roll number, batch number, roll size and any damage to the roll. This allowed for tracking each roll from the time it was received through the time it was used.

During the seaming operation, trial seams were completed twice a day and the seam tested in the field for peel strength. This testing was done on extrusion and fusion welds. There were a few cases where the fusion trial welds did not meet the project requirements for peel strength. In these cases the settings on the welder were changed to produce a seam that met the peel strength requirements. All of the extrusion trial seams met the peel strength requirements of the project.

The project called for destructive and non-destructive testing of the seams. The destructive test samples were cut from a seam. A total of six destructive test samples were tested. Four of the samples were tested for peel and shear strength in the field. Two samples were sent to an outside lab for testing. In all cases the seams met the peel and shear strength requirements of the project. The liner was repaired according to the project requirements following the collection of each sample.

Each seam underwent non-destructive testing. This testing was done by applying air pressure along the entire length of the seam or vacuum box to test repair seams. In all cases this testing showed that the seams met the requirements of the project.

Geocomposite Drainage Layer Placement

The CQA inspection engineer inspected and logged each roll of geocomposite as it arrived at the site. Any damage was noted on the form. The certificate of analysis for this material shows that it meets the requirements of this project.

The as-built drawing shows that 57 panels were installed. The panels ran downhill in all cases. There were continuous panels placed in each corner of the landfill. The photo log verifies that the protective layer was placed on the geocomposite before any waste material was place in the landfill.

Sump Construction

The leachate collection sump was installed in the location required by the design. The sump pit was lined with all three liner materials and then filled with gravel that was wrapped by nonwoven geotextile. The 6-inch schedule 80 PVC riser was installed as required. This riser can be seen coming through the vegetative cap that covers the landfill. The riser is clear of obstructions and has been used to measure water depth in the sump and a pump has been installed in the sump through this riser to evacuate water that accumulates in the sump.

Placement of Waste Material

The sludge for the S-X and scrubber ponds was placed in the landfill in lifts. Each lift was compacted using a pad footed roller, loaded scrapers and dozers. The compaction of each lift was tested to determine if there had been sufficient compaction. At least four density measurements were made on each lift. The documentation shows that the compaction of each lift met the requirements of the project.

The surface of the waste material was rolled smooth. The liner contractor inspected the surface and found it to be acceptable for placement of the 40-mil linear low-density polyethylene (LLDPE) material. This certification is part of the documentation.

40-mil LLDPE Flexible Membrane Cover (FMC) Installation

The rolls of 40-mil LLDPE were inspected and logged by the CQA inspection engineer when they arrived at the site. Any damage to this material was noted and the damaged material was not used. The material met the specification of the project as shown by the quality certificates that are part of the documentation.

The as-built drawings show that 10 panels of the LLDPE material were installed over the waste material. These panels ran north and south.

During the seaming operation, trial seams were completed twice a day and the seam tested in the field for peel strength. This testing was done on extrusion and fusion welds. The documentation shows that all of the trial seams met the peel strength requirements of the project.

The project called for destructive and non-destructive testing of the seams. The destructive test samples were cut from a seam. A total of 5 destructive test samples were tested. Four of the samples were tested for peel and shear strength in the field. One sample was sent to an outside lab for testing. In all cases the seams met the peel and shear strength requirements of the project. The liner was repaired according to the project requirements following the collection of each sample.

Each seam underwent non-destructive testing. This testing was done by applying air pressure along the entire length of the seam. In all cases this testing showed that the seams met the requirements of the project.

Geocomposite Drainage Layer Placement

The CQA inspection engineer inspected and logged each roll of geocomposite as it arrived at the site. Any damage was noted on the form. The certificate of analysis for this material shows that it meets the requirements of this project. The as-built drawing shows that 46 panels were installed. The panels ran east west and the drawing shows that the geocomposite material went beyond the extent of the LLDPE cover in all directions.

Soil Cover and Vegetation

The geocomposite layer was covered by subsoil and top soil. The design called for at least 2 feet of subsoil and 1 foot of topsoil. The completion report (GET, 1998) states that this amount of material was placed, and the field notes indicate that the earthwork

contractor measured the depth of each material as it was being placed. The 2008 field inspection noted that there was drainage off of the cover surface.

The surface was seeded with a mixture of grasses. The field inspection conducted in 2008 shows that the vegetation is doing well and is well established.

Security Fence

The landfill design called for a security fence around the perimeter of the landfill. This fence was constructed in 1997 following the construction of the landfill. The fence is in good condition.

Regulatory Agency Oversight

The landfill design was submitted to US EPA Region X for review. The design was approved by the EPA prior to construction commencing. Regulatory agency oversight of the landfill construction was provided by Gordon Brown of the Idaho Department of Environmental Quality (IDEQ). Mr. Brown was on-site for most of the construction and was present whenever the construction moved into a new phase. The EPA project manager, Peter Contreras, was informed of the progress and any problems during the construction. Both of these individuals were at the site on November 5, 1997 to conduct a final inspection of the landfill construction. Following this inspection, EPA and IDEQ agreed that the construction was complete.

Conclusions

Based on the review the information contained in the design and completion report documents, all aspects of the landfill construction were completed as designed.

4.2.5 Calcine Cap

The calcine tailing capped during 2001 was impounded in an alternating series of diked ponds on the east side of the plant site. The calcine impoundment was located on top of native soils that include silts and silty clays. The silts and clays have vertical hydraulic conductivities that range from 1 X 10^{-5} to 1 X 10^{-4} centimeters per second (cm/sec) (GET, 2000). These sediments reduced seepage rates from the calcine ponds. The dikes were constructed using calcine with native soil, or native soil borrowed from on-site locations adjacent to the facility.

Calcine is the generic term for the fine-grained, cohesionless black-colored sandy material resulting from vanadium production. Calcine tailing was originally impounded on the west side of the plant for the first ten years of plant operation in the vicinity of the S-X pond and limestone settling ponds. In 1973, this west calcine area shown on Figure 1-4 was covered with topsoil and seeded. Calcine was deposited after this time on the east side of the site as shown on Figures 1-3 and 1-4 until the closure of the vanadium plant.

Calcine was characterized in the RI (Dames & Moore, 1995). Chemical analysis of the calcine obtained during the RI in the calcine tailings area included four samples (CAL-l, CAL-2, CAL-3, and CAL-4). Metals in the calcine included chromium (567 to 685 mg/kg), copper (1,220 to 1,380 mg/kg), molybdenum (9.6 to 13.3 mg/kg), manganese (654 to 915 mg/kg), nickel (1,210 to 1,490 mg/kg) and vanadium (1,550 to 2,000 mg/kg). While vanadium was detected in calcine at concentrations of 1,550 to 2,000 mg/kg, very little molybdenum is associated with the calcine.

One calcine pond water sample was obtained during the RI for analysis. Calcine pond water results indicated that vanadium concentrations were found at levels (89,600 ug/l) comparable with the S-X pond raffinate water (117,000 ug/l), but that molybdenum concentrations (2400 ug/l) were about two orders of magnitude smaller than the S-X water (155,000 ug/l). One lysimeter (L-3) was placed in the calcine area during the RI.

Concentrations of soil water samples from L-3 indicated molybdenum (up to 13,000 ug/l) and vanadium (up to 586,000 ug/l). These results were about an order of magnitude larger than concentrations observed in the calcine pond water.

During 2008, the inspection of the calcine cap was conducted on August 16 and 17, 2008. After a brief reconnaissance of the area, the inspection grid was established as previously described and described in Appendix A. Details of the inspection are presented on Figure 4-5. The field engineer walked the grid along the east-west and north-south lines. Where the field engineer observed areas of erosion, evidence of burrowing animals, deep tap-rooted plants or areas standing water, the area was noted and located using the hand-held GPS. Photographs of the areas of interest were also obtained of the cap cover. The photo log of the cover evaluation inspection that includes the photographs, latitude and longitude coordinates and a brief description of the problem are attached in Appendix A.

Results of the cap inspection indicate that the calcine cap is covered with vegetation that is mainly wheat grass and other grasses. Several deep tap-rooted plants were observed during the inspection. These plants included alfalfa, goldenrod, sagebrush and members of the thistle family. The intrusion of these plants is predominately on the south, east and north slopes of the caline cap.

There was evidence of burrowing animal activity at several locations in the capped area. The depth of these holes could not be determined at the time of the inspection because the holes had already caved in and did not appear to be active. There was no settling observed on the surface of the cap. There is evidence of some erosion occurring on the south facing slope of the cap. The erosion is not substantial at this time, may not be currently active, but could worsen if steps are not taken to correct this problem. The fence around the calcine cap is in good condition and the gate is locked.

4.2.5.1 Calcine Cap Construction Evaluation

The Addendum I work plan included an evaluation of the calcine cap construction details. As part of the remedy evaluation, the construction documents for the calcine cap were reviewed by a registered professional engineer. Following the engineering review, the engineer concluded that the calcine cap was constructed in accordance with the design plans and specifications.

The calcine cap design and construction activities were described in the Draft Remedial Action Project Implementation Plan and Final Design Plans and Specifications (GET, May 2000). This document was subsequently approved by EPA and construction of the calcine cap began in October 2000 with the excavation, transport and compaction of the calcine material stored at the Evergreen facility in the northwest area of the calcine impoundment. Construction activities began again in May 2001 and construction was completed in August 2001. The design of the calcine area cap included transportation of the roaster reject material and off-spec fertilizer into the calcine area, regrading and compaction of the material in the calcine area, installation of 40-mil linear low density polyethylene (LLDPE) flexible membrane cover, installation of a geocomposite drainage layer, placement of the soil cover, seeding of the soil cover and installation of the security fence around the calcine cap area. The construction of the calcine cap is described in the Draft Remedial Action Completion Report – Calcine Capping (GET, February 2002).

Calcine Area Contouring and Compaction

Before the calcine impoundment area could be capped, additional material was required to fill the area, the material required compaction and the area had to be shaped for proper drainage. In October 2000, calcine from Evergreen Resources, previously originating from the vanadium plant was placed in the calcine impoundment area in a series of 2-foot lifts. Four lifts were placed and each lift was tested for compaction in at least 8 locations. If a section of a lift did not meet the compaction specifications, steps

such as adding water and additional compaction were taken and the density was re-tested. This process was repeated until the compaction met the specifications of the project.

Beginning in May 2001 the roaster reject and off-spec fertilizer was placed in the calcine impoundment area. These materials were placed in the calcine impoundment area in 9 2-foot lifts. Each lift was tested for compaction in at least 8 locations. If the testing indicated that the density at a particular location was smaller than the project specification, additional water and/or compaction was done. This was repeated until the areas met the compaction requirements of the project.

The surface of the calcine impoundment area was shaped to provide the proper drainage. The final surface was surveyed to provide the basis elevations for the as-built drawings. The surface was then smooth rolled in preparation of the 40-mil LLDPE placement. The liner contractor accepted the final grade of the calcine impoundment area. The signed acceptance forms were reviewed and are located in the completion report (GET, 2002).

40-mil LLDPE FMC Material Placement

The LLDPE material was logged in by the CQA inspection engineer when it was delivered. The lot number, roll number, date of delivery and any damage was noted on the material log. Certificates of analysis were received for each lot of material. The certificates of analysis were reviewed and the material that was received met the specifications of the project.

The liner contactor placed 131 LLDPE panels over the calcine impoundment area. The panels were placed in a north-south direction. Each panel was logged on the panel placement form that contained the panel and roll number, panel length and width and the date the panel was installed.

The quality assurance program for the LLDPE placement included testing for peel and shear strength by an outside laboratory. A total of 96 destructive test samples were collected and sent to the outside lab for testing. In all cases the peel and shear strength results exceeded the minimum peel and shear strengths required for this project. All repairs made to the LLDPE were completed according to the project requirements.

Geocomposite Drainage Layer Placement

The geocomposite material was logged in by the CQA inspection engineer when it was delivered. The lot number, roll number, date of delivery and any damage was noted on the material log. Certificates of analysis were received for each lot of material. The certificates of analysis were reviewed and the material that was received met the specifications of the project.

The liner contactor placed 469 geocomposite panels over the 40-mil LLDPE that was placed earlier in the project. The panels were placed in a north-south direction on the north and south portions of the calcine impoundment area and the panels were placed in an east-west direction in the central portion of the impoundment area. Each panel was logged on the panel placement form that contained the panel and roll number, panel length and width and the date the panel was installed.

The quality assurance program for the geocomposite material placement included testing for peel adhesion strength by an outside laboratory. A total of 78 destructive test samples were collected and sent to the outside lab for testing. In all cases the peel adhesion strength results exceeded the minimum peel adhesion strength required for this project.

Soil Cover Placement

The soil cover was placed on the geocomposite in two stages. The first stage was to place a nominal 2-foot layer of subsoil on the geocomposite. The documentation

indicates that the soil was pushed onto the geocomposite using dozers and that there was no direct dumping of subsoil on the geocomposite. The thickness of the subsoil placement was measured by the earthwork contractor on a continuous basis during the placement operation.

The second phase of the soil cover placement was to place a nominal 1-foot layer of topsoil on top of the subsoil layer. The topsoil layer was pushed over the subsoil layer by dozers. To avoid compaction trucks were not allowed to drive on the topsoil layer. The thickness of the topsoil was measured by the earthwork contractor during the placement operation. The topsoil layer was smoothed in preparation of fertilizing and seeding the cap.

Vegetation Seeding and Fence Installation

The completion report indicates that the smoothed surface of the cap was seeded in the fall of 2001. The 2008 inspection showed that the vegetation on the cap was predominately wheat grass. This is the species that was planted following construction.

The design called for a chain-link fence surrounding the cap. The 2008 inspection showed that his fence is in good condition and that the gates are locked.

Regulatory Agency Oversight

Prior to construction the cap design was approved by the US EPA Region X. Oversight during the construction of the cap was provided by Carl Kitz of EPA. Mr. Kitz made several trips to the site during the construction. When the construction of the cap was nearing completion EPA sent an engineering representative from Ecology & Environment to review the project.

A pre-final inspection of the calcine cap was conducted on July 18, 2001. Present at the inspection was Neil Thompson and Carl Kitz of EPA and representative from Kerr-

McGee. Following this inspection EPA agreed that the construction was complete and that the final inspection would take place in 2002. The final inspection was part of the 5-year review that took place in June 2002.

Conclusions

Based on the review the information contained in the referenced documents, all aspects of the calcine cap construction were completed as designed.

4.2.6 MAP Ponds

The MAP ponds (solids and liquids) were sampled during the RI. Three MAP samples were collected from two separate MAP ponds. COC metals in the MAP ponds included molybdenum (832 ug/l) and 10,100 ug/l of vanadium.

Analysis of the MAP solids indicated pH values of 6.3 to 6.6 units. Analysis of metals concentration indicates concentrations had a wide range of vanadium (621 to 10,400 mg/kg). However, molybdenum concentrations were relatively small (2.7 to 141 mg/kg). Concentrations for manganese were small and ranged from 20.9 to 59.5 mg/kg. Figure 1-6 shows that only one boring (B-6) penetrated the MAP pond area, with bedrock occurring at 10 feet. It is likely that the MAP ponds rested directly on bedrock while operational based on this boring. The MAP ponds were eliminated in 1993 during the RI. As the result of the elimination of these ponds, no additional actions were taken for this site during the FS nor were any actions required by the ROD. The current level of information does not allow for the assessment impact from these former facilities to ground water.

The inspection of the uncapped MAP pond area was conducted September 18, 2008. After a brief reconnaissance of the area, the inspection grid was established as previously described and described in Appendix A. Details of the inspection are presented on Figure 4-6. The field engineer walked the grid along the east-west and

north-south lines. Where the field engineer observed areas of erosion, evidence of burrowing animals, deep tap-rooted plants or areas standing water that may have been present, the area was located using the hand-held GPS and a photograph of the area was taken. The photo log of the inspection that includes the photographs, latitude and longitude coordinates and a brief description of the problem are attached in Appendix A.

The MAP pond area is covered with vegetation that is mainly wheat grass and other grasses. No deep tap-rooted plants were observed during the inspection. No evidence of burrowing animals was observed during the inspection. The eastern portion of the former pond area is covered by fill material. There is a relatively large low area to the west of the fill area that showed signs of standing runoff water. Erosion is evident along the northern and southern boundaries where storm water from the plant area flows to the west. There is evidence that some of this storm water runs onto the MAP pond area.

4.2.7 Former Vanadium Plant

No investigation was competed in the vicinity of the vanadium plant during the RI, or following that time. The vanadium plant was removed in 2002, leaving only the foundation exposed in a few locations. The area was covered with limestone fines and sloped to provide positive drainage away from the foundations.

The inspection of the vanadium plant was conducted August 9, 2008. After a brief reconnaissance of the area, the inspection grid was established as previously described and described in Appendix A. Following the establishment of the grid, the field engineer walked the grid along the east-west and north-south lines. Where the field engineer observed areas of erosion, evidence of burrowing animals, deep tap-rooted plants or areas standing water may have been present, the area was located using the hand-held GPS and a photograph of the area was taken. The photo log of the inspection that includes the photographs, latitude and longitude coordinates and a brief description of the problem are attached in Appendix A.

The former vanadium plant foundation is currently covered in most locations with fine limestone and no vegetation was observed. No evidence of burrowing animals was observed. Several areas that showed evidence of standing water are present in the inspection area on the vanadium plant footprint cover. There are several areas where the concrete foundations from the vanadium plant are exposed through the cover material. This could be a conduit for infiltration of storm water. The former plant area and cover is relatively flat and no storm water runoff direction could be determined.

4.2.8 Boiler Blowdown Scrubber Pond

The boiler blowdown pond covers a former scrubber pond that is about an acre in size based on Figure 1-4. The roaster scrubber solids were impounded west of the vanadium plant for about 10 years until a new pond was opened south of the calcine that is now capped. The mineralized water resulting from water softener regeneration and blow-down of the boilers was contained in this original roaster scrubber pond. This material was discharged to the pond since the plant became operational, but this pond was abandoned, covered, and seeded during 1992.

Three samples were collected from boiler blowdown pond solids (BBP-1, BBP-2, and BBP) during the RI. Analytical results indicate that pH ranged from 7.0 to 9.2. Total metals concentrations of note included chromium (1,330 to 2,530 mg/kg), copper (1,360 to 2,720 mg/kg), iron (22,700 to 39,600 mg/kg), nickel (632 to 1,010 mg/kg), manganese (232 to 248 mg/kg), molybdenum (86.3 to 116 mg/kg), zinc (296 to 330 mg/kg) and vanadium (2,750 to 3,920 mg/kg).

Review of the lysimeter data from the RI indicated that deeper lysimeter L-4 (completed in soil) and shallow L-5 (completed in the scrubber solids beneath the boiler blowdown pond) were installed in boring B-5. The boiler blowdown scrubber pond cover was described as covered with a sparse to thin grass cover. Molybdenum concentrations were smaller in deeper lysimeter L-4 (0.1 to 1 mg/l) than in shallow lysimeter L-5 (0.6 to 2.2 mg/l), but the decrease in concentration did not appear to be significant in the

underlying soils. Vanadium concentrations actually increased by an order of magnitude with depth from about 0.05 to 0.2 mg/l in shallow lysimeter L-5 to about 0.5 to 1.6 mg/l in deep lysimeter L-4. Therefore, the observed metal concentrations in deep lysimeter L-4 are likely to best represent leachate that could reach ground water from this area. No actions were taken for this site during the FS or in the ROD.

4.2.9 West Calcine

Calcine from the early operation of the facility (1963 through 1972) was impounded on the west side of the facility as shown on Figures 1-3 and 1-4. This impoundment was loosely covered with native soil ranging in thickness from about 6 inches to 5 feet and seeded after the calcine impoundment area was moved to the east side of the facility in 1972. This impoundment area covers approximately 13 to 17 acres, although the exact boundary is not delineated. The approximate area is shown on Figure 4-8. This area was investigated in 1992 during the RI through a series of borings (B-1 through B-4 locations shown on Figure 1-5) and by installing a lysimeter in the calcine and in the soil below the calcine in one boring (B-1). Data indicate that the calcine rests on bedrock in at least one location.

Review of the RI lysimeter data indicated that molybdenum and vanadium concentrations were larger (by three orders of magnitude) in the shallow lysimeter (in the calcine) than in the deeper lysimeter (L-1). Deep lysimeter L-1 was completed at about 10.5 feet in native soil and shallow lysimeter L-2 was completed in covered calcine tailings, as shown on Figure 4-7. RI data indicated that molybdenum concentrations in deep lysimeter L-1 were about 0.1 mg/l, in comparison with about 195 mg/l in shallow lysimeter L-2. Reported vanadium concentrations were about 0.06 mg/l in lysimeter L-1 versus about 34 to 46 mg/l in shallow lysimeter L-2. Shallow lysimeter L-2 did not yield any water prior to June of 1993, although the deeper lysimeter L-1 yielded samples in 1992 and 1993. The RI concluded that the apparent correlation of poor water recovery and large metal concentrations in the shallow lysimeter compared with good water recovery and small metals concentrations in the deep lysimeter indicate

that: 1) metals were concentrated by evapotranspiration in the upper soil horizon; 2) metals in the soil water were adsorbed or exchanged with the native soils beneath the sources; and 3) metal concentrations in the deep lysimeters were more representative of the character of leachate that could reach ground water in this area. However, there are known locations where calcine rests directly on bedrock, negating the mitigating effects of metal ion exchange in soil.

4.2.10 O&M Review

Both the landfill and calcine cap have O&M plans to ensure the long-term success of the facilities. Each of these two plans was prepared at the time the remedial actions were designed prior to construction. These plans were reviewed by the field engineer as part of the remedy evaluation and prior to the site inspection completed for the remedy evaluation. The field engineer reviewed the plans to obtain an understanding of the inspection and documentation requirements shown in each plan.

The two O&M plans currently address the cap and the landfill. The plans require that the caps be inspected every two months. There is not a formal O&M plan to address site grading, runoff, establishment or maintenance of vegetation, or cover maintenance for the scrubber ponds, limestone settling ponds, west calcine, map ponds, plant and areas surrounding the plant building foundation. There is no formal O&M plan for the 10-acre pond, or for monitoring the un-reclaimed west 5-acre pond basin. Currently, all O&M monitoring documentation is contained within a hard-bound logbook maintained in the main office. Monitoring is generally done each month. Landfill and cap monitoring requirements are bimonthly, with monthly measurements of the sump water level. During winter months, much of the site can be inaccessible due to snow cover, so limited records are available for these periods.

The inspection records required by the landfill O&M Plan were reviewed prior to conducting the field inspection. This review is discussed in Appendix A. These records demonstrated that the water in the sump was being pumped out periodically.

Information contained in these records, i.e. depth to water, indicate that the water content of the material in the landfill is decreasing over time because the amount of water pumped from the sump is decreasing, based on the records. However, these records did not appear to document all of the cover inspections of the landfill area. In some instances the environmental logbook reportedly completed by Tronox for the past few years did not include data for inspections that were documented in monthly reports to EPA. Therefore it is assumed that on some occasions a written record of an inspection was not entered by Tronox in the logbook. It was also noted that the documentation prepared by Tronox did not contain all of the information required by the O&M Plan. The inspections of the landfill did not include checks for good vegetation cover, deep tap-rooted plants, signs of ponded water, erosion or burrowing animals. Some inspections contained all of the information, but some did not. Some inspections included a statement regarding the security fence and some did not.

The inspections records required by the calcine cap O&M Plan were reviewed prior to conducting the field inspection. The records were prepared and maintained by Tronox. The review of the O&M Plan documentation is presented in Appendix A. However, these records did not appear to document all of the cover inspections of the calcine cap. In some instances the environmental logbook reportedly completed by Tronox for the past few years did not include data for inspections that were documented in monthly reports to EPA. Therefore it is assumed that on some occasions a written record of an inspection was not entered by Tronox in the logbook. It was also noted that the documentation did not contain all of the information required by the O&M Plan. The inspections of the calcine cap did not include checks for good vegetation cover, deep tap-rooted plants, signs of ponded water, erosion or burrowing animals. Some inspections contained all of the information, but some did not. Some inspections included a statement regarding the security fence and some did not.

Results of inspections have triggered corrective actions in the past. Corrective actions based on identified problems during routine O&M are documented in the monthly report sent to EPA. Repairs to the covers are made as soon as practicable based on access

conditions. A number of repairs to the facilities have been completed in the past. Rill repairs were completed in 2002 following erosion on the southeast side of the cap. An infiltration basin was completed in 2002 to manage clean water runoff from the cap on the north side. An additional infiltration basin was constructed in 2005 to manage clean water runoff from the west and south sides of the cap. The fences have been repaired at both the landfill and on the calcine cap on a number of occasions following winter damage to the fence fabric or rails. On a number of occasions weed control measures were enacted to suppress tap rooted plants and noxious weed species.

Currently, the cap and landfill do not indicate problems with respect to cover integrity or condition. Minor burrowing or digging has been noted, but the covers are in good condition and the vegetation is well-established. Many of the cover issues identified during the site inspections are at sites that are not currently required for monitoring on a routine basis. In order to ensure that O&M practices are implemented in a manner that ensures the long-term integrity and functionality of the current remedy, it is recommended that an O&M plan be developed for the site as a whole. A checklist should be developed to ensure that all aspects of the inspections are completed and that identified problems be addressed within a specified timeframe. The site-wide O&M plan would address:

- Normal Operation and Maintenance - Long-term maintenance of the completed remedial actions consisting of inspections and maintenance of any problems identified in the inspections at all facilities where remediation has been completed and a timeframe for the correction of problems and reporting measures. Maintenance activities will be initiated if a problem is identified during a routine inspection or monitoring activity, or at any time when issues are identified.

- Assessment of Potential Problems - Potential foreseeable problems that could be encountered on the site, including addressing concentrated runoff from site areas onto potentially unmitigated sources, standing water, addressing any lack of vegetative growth, the occurrence of plants with deep tap roots or trees that become established on the covers, weed control, erosion of the soil covers, berms, slopes or settling of the covers, and addressing damage caused by burrowing animals.

- Safety requirements for inspection activities to address the exposure during the routine inspections and personnel protective equipment requirements.
- Routine and emergency reporting requirements.
- Personnel and training requirements.
- Record keeping including the bimonthly inspections, and other inspections required including records of the monitoring activities and maintenance records.

4.2.11 RI/FS Ground Water Model Review

Ground water modeling was performed in a comparative analysis of ground water remedial action alternatives as part of the RI/FS (Dames & Moore, 1995b). The goals of the modeling evaluation were to address the following questions:

1. What magnitude of decrease in the concentrations of the six COCs would be expected over time when liquid sources were eliminated, and;
2. Would the magnitude of the decrease in COC concentrations be significantly increased over time if liquid source elimination (LSE) was supplemented by ground water extraction.

Answers to these questions were used to select a remedial action alternative for the site. Several combinations of ground water remedial alternatives were evaluated ranging from no action to LSE with multiple extraction wells. Caveats listed for the model predictions were that the model was calibrated to within an order of magnitude of observed COC concentrations and should be considered reliable within that range of values. Even more specifically, a list of what the model was not intended to do included: evaluate the extent of contamination, simulate specific flow paths, simulate the exact pattern of flow, or predict the precise future concentrations at specific downgradient locations.

Based on the modeling results, the proposed remedial action alternative was LSE with additional solid source remedial actions, including excavation and on-site disposal of S-X and scrubber pond solids, and reuse/recovery of the calcine tailings. With respect to

question 1 (what magnitude of decrease in the concentrations of the six COCs would be expected over time when liquid sources were eliminated), the magnitude of decrease over time for this alternative was predicted to meet and decrease below risk-based concentrations or maximum contaminant levels within five years (see caveats and limitations listed above). With respect to question 2, (would the magnitude of the decrease in COC concentrations be significantly increased over time if liquid source elimination (LSE) was supplemented by ground water extraction) no additional ground water extraction was required because extraction did not substantially change the results.

A one-layer, two-dimensional model was constructed using the USGS MODFLOW program to simulate ground water flow in the shallow aquifer covering an area of about 3.5 square miles (model domain). The model domain was oriented in the general direction of ground water flow (southwest) with the plant facility placed near the center. Chemical transport was simulated using the MT3D software package integrated with the MODFLOW program. Backward modeling was used to simulate ground water flow and contaminant transport between 1963 (plant startup) and 1995 (predicted date when remedy would be in place). Model output was calibrated to November 1992 ground water flow patterns and May 1993 chemical concentrations. The calibrated model was then used as the basis for simulating a 30-year period of ground water flow and transport, referred to as the forward model (between 1995 and 2025), with individual model runs used to predict changes in concentrations under the varying conditions of the proposed remedial alternatives.

In the backward model COCs entered the model through 1) recharge from direct seepage from the ponds, and 2) infiltration of precipitation which leached COCs from solid sources. In the forward model, for alternatives with LSE, all pond seepage stopped. After LSE, the only source of COC assumed in the model was leachate generated when precipitation infiltrated through the solid sources.

Basic flow model and transport assumptions and limitations included:

- Ground water movement in the saturated basalts and interflow sequences responded in a manner similar to one hydrostratigraphic unit that responded similar to unconsolidated aquifer materials.

- The Salt Lake Formation underling the basalts did not contribute to the ground water in the basalts and could be modeled as an impermeable barrier.

- Mixing of seepage from the liquid sources and leachate from the solid sources occurred immediately through the entire saturated thickness of the aquifer.

- Four Monsanto production wells and one on-site production well (PW-10) were operated between 1963 and 1995 and were assumed to remain in operation throughout 2025. The rate of pumping of PW-10 was 350 gpm. The Monsanto wells were pumped at rates of 0.5, 500, 2,000, and 2,080 gpm. The wells were assumed to be fully penetrating in the shallow aquifer.

- The Hydrologic Evaluation of Landfill Performance (HELP) model was used to predict infiltration rates. The runoff fraction was set to zero because snowmelt and precipitation had not been noted to leave the active calcine tailings area in the form of runoff.

- Process-water and lysimeter-water analytical data were representative of initial concentrations for pond liquids and solid source leachates. (Some source concentrations were increased in the model to achieve better calibration.)

- Mass was accumulated in the model by adsorption to the aquifer matrix. Mass left the model through constant head boundaries and pumping wells.

- A global mass balance approach provided initial estimates of adsorption coefficients (Kd). (During modeling initial Kd values were slightly adjusted to improve calibration.)

In the discussion of the model in the Comparative Analysis Report (Dames & Moore, 1995b), efforts were made to apply an overall conservative approach by using conservative model assumptions and conservative input values. Three examples of conservative model input values that were mentioned included: 1) using a smaller saturated thickness (100 feet instead of 200 feet) to reduce dilution and increase predicted concentrations downgradient, 2) using largest observed concentrations from a source area as representative of the entire area to increase predicted concentrations during forward modeling, and 3) using a higher infiltration rate (1 inch/year) to allow for greater mass of COCs to be leached from the solid sources and transported to the

ground water. Sensitivity analysis showed that the most sensitive input parameters to the model were aquifer thickness, infiltration, and solid source leachate concentration.

In 2008, 13 years post-modeling, actual ground water concentrations remain higher than predicted. Although most wells show decreasing COC concentrations trends over time, not all wells demonstrate decreasing trends. Changes in timing of remedial events, remedy options, and site conditions compared with those used in the model all had an effect on the current conditions. Upon review of the 2008 inspection and review of site conditions since the RI/FS and ROD, some of the modeling input parameters may have had a more profound influence on the predicted outcome.

Changes in timing of remedial events and remedy options include:

- LSE with excavation and on-site disposal of S-X and scrubber pond solids was completed in 1997, 2 years after the 1995 modeling date.
- The reuse/recovery of the calcine tailings was not effective and the FS was modified to include capping of the calcine tailings in place, which was completed in 2001, 6 years after the 1995 modeling date and four years after LSE, delaying the effects of LSE by providing a significant on-going solid source COC contribution to ground water prior to capping.
- The model assumed that the S-X ponds and scrubber ponds would have no infiltration after closure. The S-X and scrubber ponds did not have impermeable caps and would have infiltration and leaching after closure. Wells near the former S-X ponds have the largest concentrations of COC. Results of the 2008 inspections indicate water is collecting on these covers and promoting infiltration.
- The infiltration estimate assumed no runoff from the active calcine tailing (this was prior to capping because capping had not been selected during the FS). The capped calcine area has snow buildup and run off which is partially diverted to an infiltration basin, but also ponds near and on the former scrubber pond cover.
- Ponded water is present during the spring around the former scrubber pond and on the S-X pond.
- On site production well PW-10 was no longer used for process water after 2000; limited pumping occurs in the summer for irrigation of landscaped areas.

- Adsorption coefficients for the metals were estimated at very low values compared to literature values. Vanadium has a published value of 1,000 ml/g (Table A-1 of the Ground Water Modeling Report in the KMCC RI/FS), which is also the default valued used in the MAROS program, compared to 0.16 ml/g used in the model. Molybdenum has a published range from 0.4 to 4,000 ml/g from one source and a more limited range of 9 to 125 ml/g from other sources (Table A-1 listed above), compared to 0.31 used in the model. The default in the MAROS program for molybdenum is a Kd of 20 ml/g. Sensitivity ranges were also very low (0.08 and 0.32 ml/g for vanadium) when evaluated and the conclusion was made that Kd had low sensitivity in the modeling results.

- The effective porosity of 0.08 used in the model and 0.1 used to estimate the mass of COC adsorbed to the aquifer is low. By increasing porosity and adsorption, more mass is present in the model. In the sensitivity analysis only porosity was increased substantially (to 0.25 or 25 percent) and the result was increased predicted vanadium concentrations downgradient from the KMCC site at 5 years, but not a noticeable difference at 10, 20, or 30 years. The increase in porosity and not adsorption (less mass) essentially flushed the vanadium out of the model.

- The forced application of 100 feet for aquifer thickness to calibrate the transport model could be compensated by increasing porosity, infiltration, and leachate concentration. The reduction of aquifer thickness to 100 feet was done to achieve better agreement between predicted and observed/reported COC concentrations in on-site monitor wells and to match drawdown in Monsanto production wells.

- The Monsanto wells are screened from 190-255 feet, pulling from the bottom of the basalts. This deep pumping may explain the vertical downward gradient between paired wells.

4.2.12 Ground Water Levels and COC Concentration Changes

Previously in this evaluation, the correlation between annual increasing and decreasing precipitation rates was shown to have both immediate and long-term influence to rising and falling water level elevations at the site. Increasing COC concentrations noted at several wells following the winter of 2004-2005 are in part observed to correlate with rising water levels in the aquifer following years of drought and lowered water levels. Some of this apparent correlation could be caused by changes in precipitation in general rather than changes in water levels as demonstrated by the correlation between precipitation and water levels. However, seasonal COC concentration fluctuation trends are suggested at a number of site well locations, including wells KM-2, KM-3, KM-6,

KM-8, KM-15, KM-16 and KM-18. Figures C-1 through C-27 in Appendix C present the relationship between seasonal changes in COC and changes in the water levels. Evaluations of these charts indicate the following:

- KM-2 – Molybdenum concentrations continue to decrease over time and are unaffected by the rising ground water level trends after 2004. Vanadium is seasonal and concentrations flatten out after 2004. Capping of the calcine does not appear to have affected COC concentrations in this well.

- KM-3 - Manganese concentrations do not appear seasonal nor appear affected by the cap construction. Molybdenum concentrations became seasonal after 2001 and flattened out, indicating a potential influence from the cap shedding water to the scrubber pond cover. Vanadium is seasonal and concentrations show substantial concentration variance after 2003 when annual moisture increased.

- KM-4 – The decline in molybdenum concentration slowed considerably after 2001, but concentrations continued to fall over time and are unaffected by the rising ground water level trends after 2004. Vanadium is seasonal and concentrations flattened after 2001, but appear to increase with the rising ground water level trends after 2004.

- KM-5 – Molybdenum concentrations appear seasonal and declined below the RBC, but concentrations were affected by the rising ground water level trends after 2004. Vanadium is seasonal and concentrations correlate with the rising ground water level trends after 2004.

- KM-7 – Molybdenum concentrations appear seasonal with the larger concentrations occurring in the fall (lower water levels) through 2003. Following 2004, the molybdenum concentrations declined. Vanadium is seasonal and concentrations appear opposed to molybdenum but correlate with the rising ground water level trends after 2004.

- KM-8 - Manganese concentrations appear seasonal and correlate with the changes in the water levels in this well and with annual trends in precipitation. Molybdenum concentrations were seasonal prior to the drought in 2001 but were less seasonal through the drought until 2004. Molybdenum concentrations bottomed out in 2006. Vanadium concentrations are inverse to the water level trends. As water levels fell in this well between 2000 and 2005, vanadium concentrations increased. Vanadium concentrations fell after 2004 during rising water level elevations. Increased vanadium is correlated with increased salinity and decreased head.

- KM-9 - Vanadium is not seasonal and concentrations continue to decline and appear unaffected by the increased moisture after 2004.

- KM-15 - Molybdenum concentrations do not appear seasonal, continue to fall over time and are unaffected by the rising ground water level trends after 2004. Vanadium is very seasonal and concentrations continue to decline and appear unaffected by the increased moisture after 2004, with an exception of a spike in 2005.

- KM-17- Molybdenum concentrations do not appear seasonal, and appear to decline after capping of the calcine in 2001.

- KM-18 - Molybdenum concentrations do not appear seasonal, continue to fall over time and are unaffected by the rising ground water level trends after 2004. Vanadium is not as seasonal in this well as the nested shallow counterpart KM-15. Concentrations continue to decline and appear unaffected by the increased moisture after 2004.

Wells KM-6 and KM-16 suggest consistent COC ground water concentration changes seasonally when compared with changes in ground water levels and overall annual changes in moisture. These seasonal effects are notable between 2001 and in 2005 for molybdenum and vanadium, but seasonal effects for manganese are still observed to a smaller degree. Increasing COC in wells KM-6 and KM-16 following 2004 appear correlative to rising water levels in the aquifer following years of drought. Wells KM-6 and KM-16 are centrally positioned within the larger hydraulic conductivity areas directing larger concentrations of COC to be transported in a southwesterly direction. Both wells indicate seasonal fluctuations and demonstrate a delayed response to LSE in 1997. The delayed response may be due to the increased distance to these well locations.

These observations of increasing annual moisture and increased concentrations in a number of the wells, and noted increases in the spring following snowmelt suggests that former source areas, most notably those of the former S-X and scrubber ponds may be contributing to COC in ground water on the site and downgradient of the site.

4.2.13 Institutional Controls

The Consent Decree required that institutional controls be placed on the industrial site and the private property to the south of the site. The Consent Decree required that

these institutional controls must be protective of human health and the environment and allow EPA and its contractors access to the property. The institutional controls at the facility include deed restriction on the former Hopkins property immediately to the south of the Tronox facility. This land was purchased by Tronox in 2004 and the deed restrictions are still in place. This control appears to be adequate.

Access to the facility is limited to individuals that are involved with environmental actions, site maintenance, or approved vendors. These individuals must pass through a card key operated gate to gain access to the facility. Access to the on-site landfill and calcine cap is further restricted because both facilities are surrounded by a security fence and the gates are locked. Only authorized individuals have access to the keys that open the gates. These controls appear to be adequate.

The Consent Decree requires that Tronox implement controls that will not allow the consumption of ground water except for the treating and monitoring of ground water contamination and no use or activity will disturb any remedial actions that have been taken. An additional requirement of the Consent Decree is that any monitor wells installed to treat or monitor ground water contamination will be installed according to approved work plans. These requirements are consistent with the requirements of the Proprietary Controls (EPA, 2000) described in the referenced guidance document.

The site has remained an industrial site the entire time since the Consent Decree was signed. The facility is connected to the City of Soda Springs public water supply. City water or bottled water is used for all domestic purposes. The facility has not prepared a document that details the water use requirements or established any easements or other Proprietary Controls that are attached to the chain of title to restrict land use in the future. This has not been completed because it was not anticipated that the property would be out of the control of Kerr-McGee or its successors and the property would remain an industrial facility for the foreseeable future. Consistent with Paragraph 9 of the Remedial Design/Remedial Action Consent Decree for the Site, the MST will work with the USEPA and the Idaho Department of Environmental Quality (IDEQ) to prepare

restrictive covenants for the industrial facility portion of the site that are compliant with the Uniform Environmental Covenant Act (UECA), which has been adopted by the State of Idaho as state law. While the consent decree required that use limitations or restrictions be in the form of recorded easements, with EPA approval, UECA-compliant restrictive covenants will be developed in lieu of such easements.

Although physical barriers to limit access to the site are not considered institutional controls by the guidance document, Tronox installed and maintained several barriers to access by the general public. As indicated above, access to the facility is limited to individuals that are involved with environmental actions, site maintenance, or approved vendors. These individuals must pass through a card key operated gate to gain access to the facility. Access to the on-site landfill and calcine cap is further restricted because both facilities are surrounded by a security fence and the gates are locked. Only authorized individuals have access to the keys that open the gates. These controls appear to be adequate to protect the general public.

While owned by Tronox, it was the facility's policy to allow State or Federal agencies, or their contractors, access to the facility to conduct specific tasks. The facility had a documented policy describing the actions to be taken if State or Federal agency personnel arrive at the facility for an unannounced visit. As the current owner of the facility, the MST will allow State and Federal agencies, and their contractors, whatever site access may be required. Since the facility is no longer operational, site visits should be coordinated with the MST so that personnel are available to provide the required access.

In 1996 Tronox (Kerr-McGee Chemical at the time) negotiated an easement with another land owner. This easement was attached to the chain of title by recording it with the Caribou County Clerk. This easement is considered a Proprietary Control by the guidance document. The easement contains an affirmative easement that allow access to the property by Tronox or its contractors and State or Federal agencies or its contractors and a negative easement because it restricts the development of ground

water beneath the property until the concentration of the ground water beneath the property becomes smaller than the risk-based concentrations. This land was purchased by Tronox in 2004 and the easement is still attached to the chain of title. This control appears to be adequate and meets the requirements of the guidance.

The risk assessment that was completed for the site included a potential future residential scenario. This future resident was located near the southern border of the site. In order to address the potential risk of a future resident in this area, the Consent Decree required that institutional controls be established to prevent the exposure to contaminated ground water. It was the understanding of Tronox that the Consent Decree only required institutional controls be established for the property immediately south of and adjacent to the site. Even though Tronox did not think that additional controls were required by the Consent Decree, in the past Tronox contacted the City of Soda Springs to determine what controls were in place to prevent the development of ground water for beneficial uses within the City limits. The City stated that it required building permits and hooking up to the City water supply if any development were to occur. This control was interpreted by Tronox to meet the Governmental Controls requirement found in the reference guidance document. This control does not appear to be adequate because any land owner can obtain a drilling permit for a domestic well from the Idaho Department of Water Resources without going through the City of Soda Springs.

Another factor that should be considered is the COC concentrations at Finch Spring and Big Spring. The vanadium concentration in both of these springs is smaller than the risk-based concentration and the molybdenum concentration at these springs fell beneath the risk-based concentration. Analysis presented in this document suggests that molybdenum was below the RBC at Finch Spring in 2009. Institutional controls in this area (to the south of the site on uncontrolled property) may not be required once the water quality in these springs falls and remains below the risk-based concentrations.

5.0 GROUND and SURFACE WATER QUALITY TREND EVALUATION

5.1 General

In order to evaluate the continued effects and performance of the LSE to ground and surface water impacts, existing semiannual data were reviewed as stated in the work plan. The purpose of the trend evaluation is to assess the likelihood of the remedy achieving cleanup goals within a specifiable timeframe, as stated in the Addendum I work plan. To achieve this end, ground and surface water COC data (specifically molybdenum and vanadium) were evaluated following cessation of uncontrolled waste stream discharges (October 1997) to estimate the relative change in ground water COC concentrations that resulted from LSE. The calcine was not capped until approximately 4 years after LSE, so effects of the infiltration and ponding in the calcine affected some of the early time COC concentration data for some of the wells, including wells KM-2, KM-3 and KM-4. Methods used to evaluate the data include the Mann-Kendall analysis (presented in Appendix B), graphical interpretation of the normalized data (monitor well network evaluation report) and regression analyses that are discussed in this section with the regression curves, regression equations and coefficients presented in Appendix C.

Existing data collected as part of the monitoring program were evaluated using regression analysis, and using the Mann-Kendall statistic (Appendix B) to evaluate the same data sets. Two data sets were evaluated as part of this task. The first data set included vanadium and molybdenum data from November 1997 to the most recent validated data (May 2008), the period following the implementation of the remedial actions. This truncation was prepared to focus the evaluation on the trends following the implementation of the remedial actions. The second set of data includes vanadium and molybdenum data results from a shorter period of time (May 2004 through May 2008). These data were evaluated in conjunction with the November 1997 through May 2008 data set to assess whether the more recent data set demonstrate trends that are notably different from the overall LSE time period. These evaluations were done for

most interior monitor wells, for each point of compliance monitor well, and for Finch Spring and Big Spring. The purpose of this evaluation was to estimate when cleanup performance standards can reasonably be expected to be met, one of the questions posed by the Addendum I SOW.

5.2 Regression Analysis

An analysis using the November 1997 through May 2008 and the May 2004 through May 2008 data sets provide an estimate when these concentrations may potentially fall below their respective RBC for molybdenum and vanadium. Plots are presented in Appendix C.

With the exception of well KM-8, organics samples are no longer obtained in the on-site or the off-site wells. Organics samples were routinely obtained prior to the installation of the pumping systems in each well in 1997. Organics samples were last obtained from the on-site wells in 2002. Results from the 2002 sampling event indicated mostly non-detects for TPH or concentrations that were less than the RBC of 0.73 mg/l in on-site wells. Ground water TBP concentrations were also less than the RBC in 2002 in the on-site wells. The off-site wells were not sampled after 1997 because the concentrations of organic COC were less than the RBC. Off-site ground water concentrations of TPH in 1996 were reported at the detection limit. Off-site ground water TBP concentrations increased through May 1994, and then decreased to less than the RBC in October 1995. TBP concentrations in well KM-16 was not detected after May 1993. With the exception of well KM-8, none of the wells were sampled after 2002. Therefore, only well KM-8 has been analyzed for organic concentration trends with time.

Arsenic was detected during the RI in the limestone settling ponds at a concentration of 190 ug/l with much smaller concentrations in the MAP (14.7 ug/l) and scrubber pond (8 ug/l). Arsenic, frequently found to be less than detection in most wells after 1999 is not evaluated. There is no clear trend for arsenic in well KM-8, or in the wells (KM-2, KM-3

and KM-4) surrounding the covered scrubber pond where arsenic concentrations are close to the RBC. Well KM-8 demonstrates the largest ground water concentration; therefore, prediction of the time for arsenic concentrations in ground water to fall below the RBC is uncertain.

Manganese is evaluated for wells KM-8 and well KM-3. Well KM-3 demonstrates increasing manganese concentrations in ground water with time. The remaining wells demonstrate that manganese concentrations in the ground water are currently at or less than the RBC and are therefore not included in the evaluation.

Projected concentration decay trends are estimated where possible, using a regression trend curve fitted to the real-time monitoring data from ground water where the COC currently exceed the risk-based concentrations of vanadium and molybdenum. These two COC were selected because most of the risk in ground water is driven by the occurrence of these metals. The time period for data used to evaluate the projected COC trends included the period from November 1997 (the first round of ground water collected from the monitoring points following LSE) through the May 2008 round.

Data analyzed to predict future trends include ground water results obtained from wells KM-2, KM-3, KM-5, KM-6, KM-8, KM-9, KM-12 and KM-13 that are located on the vanadium plant site; and off-site wells KM-15, KM-16, KM-17 and KM-18 that are located south of the site and Finch and Big Spring molybdenum trends. Vanadium and molybdenum data from well Monsanto well TW-33 located immediately west of the Tronox site are also analyzed and presented. Manganese concentrations from well TW-33 are less than detection and molybdenum is less than the RBC. Results of the regression analysis are presented in Appendix C. Results of the predictions based on the 1997 to 2008 data are summarized in Table 5-1. Predictions for COC based on the 2004 to 2008 data are summarized in Table 5-2.

Most of the wells, both on and off the industrial site and the springs demonstrate decreasing concentrations with respect to molybdenum and vanadium based on the

data from the 10-year LSE evaluated period. However, as the result of increasing concentration trends between 2004 and 2006 in ground water downgradient of the former scrubber and S-X ponds, the estimated time to reach the RBC cannot be reliably predicted. The wells that appear somewhat uncertain to reach the RBC following LSE include wells KM-2, KM-3 and KM-4 that surround the former scrubber pond, and wells KM-6, KM-8, KM-15 and KM-16 that are south and downgradient of the covered S-X pond basin and the site. Well KM-5 located near the former MAP ponds has achieved molybdenum cleanup levels, but the period to achieve the vanadium RBC will be substantially greater.

Analysis of trends for Monsanto well TW-33 indicates that concentrations peaked for vanadium in 1992 and molybdenum peaked in 1993. Concentrations of both metals in the aquifer show a steady decline since that time. Based on TW-33 vanadium trends between 1997 and the present, well TW-33 will fall below the RBC within the same estimated time range indicated for well KM-13 on the west side of the Tronox property. Molybdenum is less than the RBC in well TW-33 and concentrations are continuing to decline.

Analysis of 2004 to 2008 vanadium data from this group of wells shown in Table 5-2 indicates that the time to reach the RBC could be substantially longer than the estimated times from the 10-year data set. Conversely, estimated trends based on the most recent four years of data for a few wells suggest that the rate of COC decrease is occurring more quickly when compared with the full 10-year LSE period (November 1997 to 2008). With respect to Monsanto well TW-33, little difference is noted in the evaluated results when comparing the two data sets. For the Tronox wells, the 2004 to 2008 data set, for the most part, show decreasing trends in COC at a rate that is slower than immediately following LSE. However, the results from the regression analysis of the 2004 to 2008 data should not be relied upon for prediction of time to reach the RBC in ground water. These data implicate COC mass loading to the aquifer in the absence of pond sources during this time period.

COC concentration trends with time and projected trends for these wells are presented in Figures C-28 through C-52 in Appendix C. Projected trends are based on the post-LSE monitoring period data. The projected period into the future varies between wells in order to demonstrate the approximate time when the COC fall below the RBC.

5.2.1 Analytical Method

Existing ground water data were evaluated using a statistical forecast function for exponential decay. A forecast calculates or predicts a future value by using existing values. The predicted value is a y-value (future concentration of a COC in ground water) for a given future date. The known values are ground water data from the wells. A forecast statistically predicts future values based on a regression function of a range of known data or known x- and y-arrays. Regression analysis estimates the relationship between variables, so that a given variable can be predicted from one or more other variables.

Data curves for the ground water concentrations shown in Appendix C were generated using an exponential function that describes decay of a substance and calculates the least squares fit through points by using the equation:

$$y = ce^{-kt}$$

where:

e is the base of the natural logarithm;

c is a constant at y_0 (initial concentration) at t = 0, and;

$^{-kt}$ is a constant for the predicted time, with the minus sign representing decay of concentration with time.

A trend line and the equation for that trend line are generated for the data set based on known x-values for the best-fit curve. The y intercept for the regression trendline is set

at zero. This is appropriate, based on the observed absence of manganese, molybdenum and vanadium concentrations in background ground water quality data.

5.2.2 Results of Trendline Analysis

Results of the trendline analysis are presented on Figures C-28 through C-50 in Appendix C. It is possible that future ground water concentration trends may differ from results generated using the two data sets.

The minimum range of each graph has been set at the respective RBC. Analysis of the forecast trends suggests the following from the November 1997 to May 2008 data set:

- Monitor wells that appear somewhat uncertain to reach the RBC following LSE include wells KM-2, KM-3 and KM-4 that surround the former scrubber pond, and wells KM-6, KM-8, KM-15 and KM-16 that are south and downgradient of the covered S-X pond basin and the site.

- Wells KM-5 and KM-9 were reduced to the RBC for molybdenum in 2003 as predicted by use of these trendlines. However, a spike in molybdenum in the ground water between 2003 and 2007 affected both wells. Both well KM-5 and KM-9 results in May 2008 indicate that the molybdenum concentrations are below the RBC.

- Molybdenum concentrations will continue to decline in most wells in response to LSE and reclamation. However, wells downgradient of the former S-X and scrubber pond will have molybdenum concentrations exceeding the RBC well beyond 2015.

- On-site wells and several off-site wells are forecast to exceed the vanadium RBC for a period of twenty years or greater following remedial actions completed in 1997. Based on current trends, wells KM-9 and KM-13 are the first wells expected to fall below the vanadium RBC. Monitor wells located downgradient of the former S-X and scrubber pond will have vanadium concentrations exceeding the RBC far beyond 2020 based on current trends.

- Manganese is estimated to potentially exceed the RBC for more than 40 years following LSE in well KM-8, in part as the result of a rising manganese trend since 2004. Well KM-3 will exceed the manganese RBC for an uncertain period because a decreasing trend cannot be predicted from the data. The rising manganese trend in well KM-3 is not occurring in other wells monitoring the covered scrubber pond area.

5.3 MAROS Evaluation

The purpose of completing the MAROS evaluation (presented in Appendix B) was to assess the adequacy of the Tronox monitoring network in characterizing the migration of COC. To prepare for the evaluation the existing monitoring program was documented, the ground water modeling for the RI was critically reviewed, and the CSM was updated to reflect current understanding of site hydrogeologic conditions and transport processes. This preliminary evaluation was used to define and justify hydrogeologic input parameters and physical site parameters used in the program. The details and dynamics of the complex hydrogeologic system and contaminant transport processes had to be simplified to accommodate the two- and three-dimensional statistical and analytical calculations. The two main COCs at the site, molybdenum and vanadium, were used to represent contaminant trends in the evaluation. The MAROS program provided the following:

- Plume analysis;
- Spatial moment analysis;
- MAROS preliminary evaluation;
- Optimization for sampling location and frequency, and;
- MAROS data sufficiency analysis of cleanup by individual well and site.

Results from the plume analysis and spatial moment analysis presented in Appendix B indicate that both molybdenum and vanadium plumes have decreased since LSE was performed in 1997. Concentrations in most wells show a decreasing trend with few exceptions. Recent data, within the past five years, reflect a slower rate of change, with some wells reaching a flat slope showing no trend or even a slightly increasing trend. Both the plume and spatial moment analysis illustrate that molybdenum and vanadium have different reactions and migration patterns in the subsurface. Spatial and temporal variations can be attributed to natural variability inherent in any complex subsurface system. Physical changes in plant operations and movement of solid sources to

different site locations have likely resulted in some small changes in trends in the data. However, the statistical evaluation shows a high degree of confidence in the overall trend designations.

The MAROS preliminary evaluation of the monitoring program (presented in Appendix B-1) suggests that the decreasing trends in molybdenum and vanadium could indicate a decrease in sampling duration and frequency is justified. The optimization of sampling location and frequency concluded that all sampling locations are valid but sampling frequency can possibly be reduced in many wells. The reduction in frequency to annual and biennial in some wells and an increase to quarterly in others (KM-4 and KM-8) was based on individual COCs and is not practical to implement. However, sensitive wells were identified that require attentive data evaluation. The MAROS data sufficiency analysis of cleanup by well and site confirmed that cleanup has not been attained and may take several years to achieve.

As an addendum to the MAROS analysis, the Delaucy analysis with the Well Sufficiency Analysis – New Locations module was run to identify possible locations for new wells. Results of these evaluations are presented in Appendix B-2. The module was run for molybdenum and vanadium and was run with and without KM-17 because of the uncertainty of its representativeness. Excel figures of the model results are provided. Results indicated no additional well locations were needed within the well network.

6.0 CONCLUSIONS

The second Five Year Review for the Kerr-McGee Superfund Site was completed in September 2007. The Five Year Review found that the remedies were constructed in accordance with the requirements of the ROD. However, a protectiveness determination of the remedy was not made because levels of COC in ground water and surface water remain above cleanup goals. EPA concluded that COC concentration trends, after initially decreasing in ground water following LSE implementation in late 1997 became relatively flat-trending since the late 1990s and linger above risk-based cleanup goals identified in the ROD. EPA noted that in some cases, trends for certain COC at specific monitoring wells were increasing over the past several years. Ground and surface water data in October 2008 indicate that ground water clean-up goals had been met for arsenic in all but two wells (KM-2, KM-8), clean-up goals had been met for tributyl phosphate in all but one well (KM-8), clean-up goals had been met for manganese in all but two wells (KM-3 and KM-8), and clean-up goals had been met for TPH in all wells except one well (KM-8). Vanadium and molybdenum remain dispersed in the ground water aquifer beyond the property boundaries in 2008.

As a result of all of the ground water cleanup goals having not been achieved within a 10-year period since the implementation of the LSE remedial action (4 years prior to calcine capping), and concentration trends for some COCs are flat or upwards at some wells, additional assessment of the remedy in meeting the cleanup goals was required by EPA. EPA notified Tronox on April 9, 2008 by transmitting Addendum 1 to the Statement of Work, requiring Tronox to evaluate the likelihood of the remedy achieving cleanup goals within a specifiable timeframe and evaluate the adequacy of the current ground water monitoring network for understanding offsite migration of COC. The monitor well network evaluation report was initially submitted to EPA on August 1, 2008 and is not included in this report.

During 2008, Tronox evaluated the remedial actions performed in 1997 and 2001. Tasks performed as part of this evaluation were detailed in the Addendum I Work Plan

for the Kerr-McGee Chemical Superfund Site, dated January 14, 2009, amended February 4, 2009. Conclusions drawn from completion of the tasks detailed in the work plan are presented below.

6.1 S-X Pond

The S-X pond basin was drained, had sediments removed, and was covered with native soil as part of the original remedy in 1997. The remedy did not require removal of the underlying soils. The inspection conducted as part of this work in 2008 revealed that there are areas within the boundaries of the former pond that contain water after snowmelt. This water could infiltrate through the vadose zone into the ground water beneath the S-X pond. One sink hole was observed during the inspection. This sink hole could be another location where storm water could infiltrate through the vadose zone. Results of the review of the ground water model performed for the RI/FS suggest that the S-X pond had infiltration turned off (no infiltration) following completion of the remedy in forward model runs.

The S-X pond contributed significant mass of COC during plant operations based on RI data. The vadose zone beneath the former S-X pond was not investigated as part of the original remedial investigation (RI). The magnitude of any impacts resulting from storm water infiltrating through the vadose zone cannot be quantified because there are no supporting data from the vadose zone in the S-X basin. Well KM-8 ground water concentration trend results indicate arsenic, manganese, molybdenum, vanadium, TBP, and TPH, all found in the former S-X pond, are present in KM-8 ground water at levels well above the RBC. Trend analysis indicates that the ground water cleanup cannot be predicted based on current trends. Sampling of well KM-8 near the former S-X pond indicates that the ground water continues to have an odor comparable with the former S-X pond. Surface water infiltration through this pond basin has a potential to generate leachate within the vadose zone and to contribute to ground water COC concentrations, based on inspection and data analysis.

6.2 Scrubber Pond

The 1997 remedy of the former scrubber pond basin required removal of the liquids and sediments and covering the scrubber pond basin with native soil. The inspection conducted as part of this investigation in 2008 indicated areas on the cover that could hold storm water that could infiltrate through the vadose zone into the ground water beneath the scrubber pond. Results of the review of the ground water model suggest that the scrubber pond had infiltration turned off following completion of the remedy in forward model runs.

As with the S-X pond, the vadose zone beneath the scrubber pond was not investigated as part of the original RI and the remedy did not require removal of the underlying soils. The magnitude of any impacts resulting of any storm water infiltrating through the vadose zone cannot be quantified because there is no data from the vadose zone in this area. Results of HELP modeling from the CAP design document indicate that the cap could shed about 100,000 cubic feet of water onto this cover.

Wells KM-2 and KM-3 ground water concentration results indicate, molybdenum, and vanadium found in the former S-X circuit when this was diverted to the scrubber pond, are present in ground water at levels well above the RBC. Arsenic is near the MCL. Manganese is above the RBC and continues to slowly increase in concentration in well KM-3 ground water. Trend analysis indicates that the ground water clean up to below the RBC cannot be predicted based on current trends in these wells. Sampling of well KM-3 near the former scrubber pond indicates that the ground water samples continue to have an odor comparable with the former scrubber pond. Surface water infiltration through the scrubber pond basin has a probability to generate leachate within the vadose zone and to contribute to ground water COC concentrations, based on 2008 inspection and data analysis presented in Chapter 5 and in Appendix B. Additionally, results from the lysimeters at the historic scrubber/boiler blowdown pond show that soils below the scrubber solids have smaller adsorption capacity relative to soils beneath calcine.

6.3 Limestone Settling Pond Area

The unlined limestone settling ponds were covered with native soil when they were replaced with the lined ponds in 1988. The remedy did not require the treatment or closure of these ponds. The lined ponds were removed in 2003 after the vanadium plant ceased operation. The 2008 inspection of the area discovered is the presence of intermittent water running onto the area from an unknown source. This water creates a small pond and contains wetland vegetation above the west calcine and the old unlined settling ponds. A drainage ditch has been excavated from ponded water in this area to the northwest and discharges directly onto the west calcine impoundment area.

During the RI the vadose zone in the limestone settling ponds area was investigated with lysimeter completions and sampling of soil pore water in the calcine and underlying soils. Soils adsorb metals generated in the vadose zone within the calcine, but none of the covered settling pond solids have been defined in terms of areal extent or depth, nor have these sources been sampled. Therefore, the level of potential impacts resulting from an on-going source of surface water infiltrating through the vadose zone in the settling pond area cannot be quantified because there are no current monitoring data from the vadose zone in this area. The closest well (KM-6) indicates concentrations of molybdenum and vanadium exceeding the RBC, seasonal fluctuations in the COC, with longer term increasing trends correlating with increased annual moisture.

6.4 On-Site Landfill

The inspection of the on-site landfill and review of the construction records indicate that the landfill was constructed as designed. There are no data gaps associated with the construction and operation of the on-site landfill. The landfill will require weed control to ensure that the tap rooted plants do not encroach on the cover.

6.5 Calcine Cap

Limited ground water data are available immediately downgradient of the calcine cap. Well KM-4 indicates a significant mass of COC are contained in the ground near the southwest corner of the cap facility. Some of this elevated COC in well KM-4 may result from the former scrubber pond influence, although the calcine also contained a couple of ponds that were nearly full in 1998. The calcine was not covered until late 2002, therefore it is assumed that mass loading from the calcine to ground water continued through 2002.

The inspection of the calcine cap and review of the construction records indicate that the calcine cap was constructed as designed. Based on this review, no data gaps were identified with the construction and operation of the calcine cap. The cap will require weed control to ensure that the tap rooted plants do not encroach on the cover.

6.6 MAP Ponds

The former MAP ponds were filled and covered with native soil after the MAP was excavated. The vanadium production and MAP process was changed to make these ponds obsolete. These ponds were removed from service in 1993. The inspection of the former MAP ponds showed that there is a low lying area within the former pond boundaries and evidence of storm water run-on along the north and south sides of the former pond from the current process areas. Ponded storm water potentially infiltrates the vadose zone into the ground water beneath the former pond.

As with the S-X and scrubber pond areas, the vadose zone in the MAP area was not investigated during the RI. The magnitude of impacts resulting of any storm water infiltrating through the vadose zone cannot be quantified because there are no data from the vadose zone in this area. The MAP product was sold for fertilizer, therefore, it is possible that very little to no MAP product remains beneath the soil cover. However, well, KM-5 monitors ground water affected by this pond area, as shown during the RI.

Vanadium ground water concentrations in well KM-5 are relatively flat, whereas molybdenum is at or below the RBC.

6.7 Former Vanadium Plant

The vanadium plant ceased operation in 2000 and was demolished in 2002. Following demolition of the plant, the footprint was covered with limestone fines. The inspection of this area showed that there are foundations from the former plant that are not covered and there are low lying areas that could accumulate storm water. Storm water could infiltrate through the vadose zone beneath the former plant from these low lying areas or along the soil concrete contact where the foundations are exposed.

The current cover permeability is unknown. The limestone cover for the most part provides drainage, it is likely that infiltration is occurring through the cover. The vadose zone beneath the plant area was not investigated during the original RI. The magnitude of impacts resulting from rainfall or snowmelt infiltration through the vadose zone or the plant foundation cannot be quantified because there are no data from the vadose zone in this area. It appears that little soil exists in the vicinity of the former plant and that the foundation of the former plant is near the bedrock elevation. Ground water in the vicinity of the plant is not monitored, so the impact, if any from the former plant to ground water is not known. If an impact from the former plant site to ground water is occurring, the impact potential from the calcine impoundment located immediately upgradient of the plant could potentially mask this contribution.

6.8 West Calcine

Calcine from the early operation of the facility (1963 through 1972) was impounded on the west side of the facility and covered with native soil ranging in thickness from about 6 inches to 5 feet. Lysimeter results indicate that the calcine generates vanadium that is adsorbed by soils below the calcine where these soils exist. During 2008 inspection of the west calcine, a source of surface water was discovered that saturates a portion of

this calcine. The cover of the west calcine is thin. Calcine is exposed in a few locations between the settling ponds and the S-X pond cover. Most of the cover is vegetated and there is evidence of animal burrowing in a number of areas. The calcine is monitored by shallow wells KM-6, KM-7, KM-8, KM-9, KM-12 and KM-13. Infiltration through the west calcine potentially results in some impacts to ground water. However, these effects may be masked by the presence of impacted soils in the vadose zone beneath the former S-X pond that overlies the calcine.

6.9 Former Scrubber/Boiler Blowdown Pond

Lysimeter data obtained during the RI indicated that the leachate through the former scrubber/boiler blowdown pond potentially impacts ground water. Well KM-5 is downgradient of this former scrubber/boiler blowdown pond area, based on site gradient contours. Vanadium ground water concentration trend in well KM-5 is relatively flat after 2004, whereas molybdenum is at or below the RBC in this well. Vanadium concentrations are seasonal in this well with the larger concentrations occurring in the spring. Based on the results of well KM-5, this former pond source cannot be ruled out as a contributor to ground water impact.

6.10 Ground Water Quality Trends

Based on a review of water quality trends with water levels, the MAROS analysis presented in Appendix B, regression analysis of ground and surface water quality data from 1997 through May 2008, recent water quality trends between 2004 and 2008 and predictions of future concentrations, the following conclusions are drawn.

- Vanadium and molybdenum continue to exceed the RBC at most of the on-site wells. The largest continued impacts to ground water noted on the site occur immediately downgradient of the former scrubber and S-X pond basins.
- Results from the plume analysis and spatial moment analysis using the MAROS program indicate that both molybdenum and vanadium plumes have decreased since LSE was performed in 1997. Concentrations in most wells show a decreasing

trend with few exceptions. Recent data, (data evaluated since 2004) reflect a slower rate of change, with some wells reaching a flat slope showing no trend or even a slightly increasing trend. Both the plume and spatial moment analysis illustrate that molybdenum and vanadium have different reactions and migration patterns in the subsurface.

- Predicted ground water concentrations for molybdenum and vanadium in the wells monitoring the former S-X (well KM-8) and scrubber ponds (wells KM-2, KM-3 and KM-4) indicate these COC could exceed the vanadium RBC for sixty or more years following LSE. Well KM-8 has no predictable trend. Ground water data obtained from 2004 to 2008 indicate increasing trends for these wells. This period of time is longer than RI/FS modeling estimates for LSE. Ground water results since 2004 suggest that the soils beneath these pond basins are leaching COC to ground water, or that the natural attenuating properties of ground water system can no longer reduce the level of COC in ground water beneath these pond basins.

- In most cases, predicted clean up times are longer for vanadium based on data obtained from 2004 to 2008 when compared with estimated clean up times using the full data set since LSE (1997).

- Increasing COC concentrations since 2004 are noted in wells KM-6 and KM-16 that coincide with rising water levels and increased annual moisture in the aquifer following years of drought.

- Seasonal concentration trends are noted most well locations. These seasonal effects are less discernable for vanadium in a number of wells between October 2001 and in October 2008.

- A decreased pH in the ground water between 1999 and 2001 may have caused increased metals concentrations in some POC wells during that period. The pH is now near-neutral across the site and at off-site locations, with the exception of the area around the former S-X pond.

- Finch and Big Spring exceed the RBC for molybdenum only. Both locations continue to indicate decreasing trends that are now close to the RBC. Trend analysis suggest that Finch Spring may fall below the RBC in 2009

- Vanadium concentrations in Finch Spring remain elevated but are less than the RBC, and vanadium is less than the reporting limit in Big Spring.

6.11 Institutional Controls

The Consent Decree required that institutional controls (ICs) be placed on the industrial site and the private property to the south of the site. The Consent Decree required that these institutional controls must be protective of human health and the environment. The Consent Decree required controls that will not allow the consumption of ground water except for the treating and monitoring of ground water contamination and no use or activity will disturb any remedial actions that have been taken.

Additional information governing the use of institutional controls is contained in the Record of Decision (ROD) and the Statement of Work (SOW) which is appended to the Consent Decree. The ROD calls for institutional controls to be established for on- and off-site areas where ground water concentrations exceed RBCs. The SOW calls for the development of an institutional controls implementation plan. Molybdenum and vanadium meet the RBC at all surface water locations sampled by Tronox based on 2009 data. The COC molybdenum and vanadium RBC is not, or may not be met:

- In ground water at off-site properties owned by Monsanto to the west and southwest of the site;
- In ground water at off-site properties owned by the City of Soda Springs (Soda Springs Industrial Park) southwest of the site, and;
- In ground water at off-site properties owned by private land owners between the Soda Springs Industrial Park and Big Spring.

There are currently no institutional controls in place for the City of Soda Springs Industrial Park or for areas between the Soda Springs Industrial Park and Big Spring because home owners have been required to utilize city water in these areas. The MST is reviewing property ownership and well information for this area. Information obtained from this search will be shared with the USEPA and IDEQ to develop an approach for implementation of off-property institutional controls This search will also include an evaluation of any data available for ground water withdrawals or aquifer data from the

Salt Lake formation. The purpose of this evaluation is to assess whether the assumption that the Salt Lake formation is a boundary to vertical flow within the aquifer is valid.

In 1996 Tronox (Kerr-McGee Chemical at the time) negotiated an easement with land owner Larry Hopkins. This easement was attached to the chain of title by recording it with the Caribou County Clerk. This easement is considered a Proprietary Control by the guidance document. The easement discusses the site, the ROD, the remedial actions, and provides for an establishment of Institutional Controls (deed restrictions, limited access, well. restrictions and/or well-head protection) in affected off-site areas to prevent ingestion of ground water for as long as the ground water exceeds the performance standards. Covenant and restrictions that apply to the use of the property include "Ground water underlying the property shall not be extracted, consumed, exposed or utilized in any way, except for the limited purpose of treating and monitoring ground water contamination levels in accordance with plans approved by the Grantee."

The respective property and easement are outlined on Figure 6-1. The purpose of the easement was to limit exposures to site-related contaminants until RBCs are achieved. During January 2004, KMC LLC purchased all 212.6 acres of property from Larry Hopkins. This property is located immediately to the south of the plant site and east of Highway 34. All of this acquired property was under the control of Tronox and will be subject to proprietary controls that will be established for the plant site property.

The site has remained an industrial site the entire time since the Consent Decree was signed. The facility is connected to the City of Soda Springs public water supply and uses this water or bottled water for all domestic purposes. The facility has not prepared a document that details the water use requirements or established any easements or other Proprietary Controls that are attached to the chain of title to restrict land use in the future. This was not completed by Kerr-McGee/Tronox because it was not anticipated that the property would be out of the control of Kerr-McGee/Tronox and the property would remain an industrial facility for the foreseeable future. The consent decree calls

for the establishment of "a right, running with the land for the full duration of the applicable easement period, to enforce the land use restrictions required by this Consent Decree." An easement, or other acceptable form of control such as a covenant under UECA, for the Soda Springs site will be developed by the MST and recorded with the county that satisfies the requirements of the Consent Decree. The proposed controls that will be established and recorded for the Soda Springs site will be restrictive covenants on the ground water under the premises so that ground water will not be used as a potable water supply (any water used for human or domestic consumption, including but not limited to, water used for drinking, bathing, swimming, washing dishes or preparing foods or irrigating vegetable or fruits intended for human consumption) and that the future use and redevelopment of the site will not include residential use or for purposes of a childcare facility or educational use. The restrictive covenants will be binding on the current property owner (the MST) future property owners, grantees, successors, assigns, transferees and any other owner, occupant, lessee, possessor or user of the premises or the holder of any portion thereof or interest therein, shall apply in perpetuity against the premises (or until cleanup standards established for the site have been met) and shall not be released, revised, modified, altered or amended in any manner without written approval the then property owner, the USEPA, and/or the IDEQ.

Additionally, the State of Idaho does not recognize city ordinances as established controls. The State will require a Uniform Environmental Covenant Act control for the site, pursuant to the Uniform Environmental Covenants Act, Idaho Code §§ 55-3001 through 3015. The environmental covenant for the site will identify and enforce protective provisions, covenants, restrictions, and activity limitations for future use on the Soda Springs site.

City of Soda Springs property located to the south and to the west of the site is shown on Figure 6-1. With the exception of Finch Spring, other surface waters on the property owned by the City are not believed to exceed the RBC based on previous sampling efforts. This property south of the industrial park is used for residential and recreational purposes and may overlie ground water exceeding the RBC for

molybdenum. The extent of vanadium in the ground water to the south of the Evergreen facility and within the City Industrial Park is not monitored. Ground water on City property south of the Industrial Park is not monitored. Institutional controls for ground water consumption beyond property previously controlled by Tronox or the City of Soda Springs has not been considered since this ground water is not consumed. The City of Soda Springs requires building permits and hooking up to the city water supply if any development were to occur. Tronox interpreted this requirement to meet the Governmental Controls requirements. This control does not appear to be adequate because any landowner can obtain a drilling permit for a domestic well from the Idaho Department of Water Resources.

The vanadium concentration in Finch Spring and Big Spring is smaller than the risk-based concentration and the molybdenum concentration at these springs is falling to near the risk-based concentration. Analysis presented in this document suggests that molybdenum fell below the RBC at Finch Spring in 2009. Institutional controls in this area (to the south of the site on uncontrolled property) should not be a concern because the COC in these springs fell below and remains below the risk-based levels.

The MST is working with the USEPA and the IDEQ to develop an institutional controls approach including:

- The identification of all areas where RBCs are currently not being met in ground- and surface waters, (as outlined in this report and the Monitor Well Network Evaluation Report (GET, 2010));
- The identification of any current uses of those waters;
- The identification of potential uses of those waters; and
- The identification of areas needing controls to protect against exposures to site-related contaminants until RBCs are achieved.

Once areas have been identified, the MST will work with the USEPA and the IDEQ to develop a plan of how institutional controls will be established for these areas. The plan will provide details of implementation, monitoring, and reporting.

7.0 RECOMMENDATIONS

7.1 General

Based on the results of this remedy evaluation the MST proposes the following actions:

1. Assess areas which were not investigated during the RI that indicate potential impacts from the vadose zone to the ground water, including the S-X and scrubber pond areas where the largest ground water COC concentrations on site are identified, and other sites including the limestone settling ponds, MAP ponds and west calcine;

2. Install one shallow well on the site to assess impacts from the vanadium plant and install one shallow well to the south of the calcine cap and east or southeast of well KM-17 to assess the ground water characteristics in this area and identify potential off-site flow paths;

3. Assess the possible placement of a deep monitoring well downgradient of the industrial site;

4. Identify, characterize, and terminate the source of surface water that is currently infiltrating the Limestone Settling Pond area;

5. Sample high ground water where encountered in alluvium, such as within the scrubber pond basin;

6. Locate and assess the nature and extent and the potential impacts from process materials from the uninvestigated unlined Limestone Setting Ponds;

7. Develop a site-wide O&M Plan to develop a plan that promotes a reduction of infiltration onto pond basin areas that were identified during the 2008 inspection; and

8. Work with the USEPA and IDEQ on the preparation and implementation of required institutional controls.

Since the site inspection performed for the remedy evaluation in 2008, a number of corrective actions were completed at the landfill and calcine cap. The tap-rooted plants were addressed by spraying the landfill and calcine caps in the summers of 2009, 2010 and 2011, which was conveyed in the monthly reports to EPA. The landfill and calcine caps were also monitored in 2010 and 2011 for animal burrowing. No new animal burrowing was noted in 2010 or 2011 for these areas. The limestone settling pond area

that had standing water in 2008 has been dry for the past three years since the 2008 site inspection for the remedy evaluation report.

A work plan will be developed to address work to be conducted subsequent to the completion of the review of this report. Prior to conducting the characterization actions stated above, the MST will address measures that are intended to reduce the amount of infiltration through the S-X and scrubber pond basins including the assessment of run-on controls, providing additional site cover, performing site grading or locating and installing additional snow fence to reduce the potential volume of standing water and infiltration in these areas.

7.2 Recommendations For Site Facility

The following recommendations for investigation are arranged by site facility and are based on a review of the remedy and identification of potential data gaps in the remedy. The recommended investigation work described in this section will be conducted as specified in an EPA-approved work plan (or plans). The MST will develop the work plan(s), which will be reviewed by EPA and IDEQ, and approved by EPA, prior to conducting the investigation work. If other unknown or potentially significant source areas are identified, the MST will notify the EPA and will work with the EPA and IDEQ to evaluate the potential source for further study.

Covered S-X Pond – Potential impacts from the vadose zone to the ground water require assessment in this former pond basin because this basin was not investigated during the RI. The remedy evaluation identified this area as a likely uncontrolled source to ground water COC, and evidence of standing water suggests the occurrence of run-on to the S-X pond basin. Therefore, efforts to reduce the amount of standing water and run-on to the site should include the excavation of about 1000 feet of graded drainage ditch to the east of the S-X pond basin to intercept and re-direct rainfall and snowmelt runoff to the plant access road to the north and to the dirt road to the south of the S-X basin. Snow contributes about 40 percent of the total annual precipitation to the

site, and large snowdrifts are noted to occur on an annual basis in the area of the S-X pond. Therefore, approximately 1500 to 3000 feet (one or two rows depending on fence height) of snow fence should be placed to the south-southeast of the S-X pond basin to reduce the amount of snow on the S-X pond basin soil cover. This will also reduce the amount of snowdrift to the former limestone settling pond area and reduce the amount of snowdrift onto the west calcine area.

The site is adequately monitored by ground water wells. Therefore, the types of studies required to investigate the covered S-X pond site would include soil borings and geologic logging to characterize subsurface conditions, analyses of the selected samples retrieved from these borings, the installation of lysimeters and collection of soil pore water that would be representative of leachate potential. Limits of the S-X pond investigation would be within the previously identified basin and below high water boundaries of the former pond. Some of this investigated area will overprint on the calcine limits beneath this former pond area. Results of the investigation would be interpreted and assessed for potential for contribution to ground water, and assessed for the identification of remedial technologies to address the soils in the former pond.

Covered Scrubber Pond – Potential impacts from the vadose zone to the ground water require assessment in this former pond basin that was not investigated during the RI. The site is adequately monitored by ground water wells to the west. However, based on gradient analysis between wells KM-2 and KM-3, a southerly flow component cannot be ruled out entirely. The remedy evaluation identified this area as a probable contributor to ground water COC, and evidence of standing water suggests the occurrence of run-on to the cover from the plant area and from the calcine cap. Therefore, efforts to reduce the amount of standing water to the site should include improving the grades in the ditches to the infiltration basin locate to the south of the pond basin. During the winter months, significant snow accumulation is noted to occur in the scrubber pond basin due to the topographical depression formed by the facility. Snowfall contributes about 40 percent of the total annual precipitation to the site, therefore to reduce the potential run-on to the site from snowmelt, approximately 1300 to 2600 feet (one or two rows

depending on fence height) of snow fence should be placed to the south-southeast of the calcine cap and the scrubber pond basin to reduce the amount of snow onto the soil cover. This will also help to reduce the amount of snow that will drift and accumulate on the calcine cap and in the plant area west of the cap.

The types of studies required to investigate the covered scrubber pond would include soil borings and geologic logging to characterize subsurface conditions, analyses of the selected samples retrieved from these borings and in-situ testing, such as the installation of lysimeters and collection of soil pore water that would be representative of leachate potential from soils impacted by scrubber pond waters. If soil borings intercept the shallow aquifer in this area, water quality can be assessed in the alluvial aquifer, if present. Limits of the investigation of the former scrubber pond would be south of the calcine cap fence within the previously identified high water boundaries. Results of the investigation in the scrubber pond would be interpreted and assessed for potential contribution to ground water, and assessed for the identification of remedial technologies.

Vanadium Plant – The vanadium plant is a potential source of COC to ground water based on field inspection. However, this impact cannot be assessed because there are no historic ground water data to show that an impact to ground water exists, or to demonstrate that no impact exists. An evaluation of the vadose zone is not practical because the plant rests predominantly on bedrock. Therefore, a monitor well immediately west of the S-X processing part of the former plant appears to be the single alternative to addressing possible impacts. A snow fence should be placed to the south of the plant site to reduce the snowdrift onto the site. The snow fences proposed for the scrubber pond basin will reduce snow drift into this area.

Former Limestone Settling Ponds – The source of surface water that is currently infiltrating the limestone settling pond area should be identified, characterized and terminated. Since the time of the site inspection in 2008, this source has dried and has not reoccurred since 2008, leaving the cattail area dry for the past three-year period.

However, it is recommended that the source of this former water source be identified and terminated. This will require locating underground infrastructure or piping to permanently abandon the source of constant surface water overlying potentially uncontained sources. Potential impacts from the vadose zone to the ground water require assessment in this area because sediments from the covered ponds were not located in the field, characterized, or otherwise investigated during the RI. The site does not appear to have been included in RI/FS forward modeling since no characterization of the site was completed.

The site is adequately monitored by ground water wells KM-6 and KM-7. Therefore, the types of studies required to investigate this site would include soil borings and geologic logging to characterize subsurface conditions, analyses of the selected samples retrieved from these borings and the installation of lysimeters and collection of soil pore water that would be representative of leachate potential from one or more locations within and below source material. Limits of the investigation would be within the fenced area currently surrounding the covered ponds. Results should be interpreted and assessed for potential contribution to ground water, and assessed for the identification of remedial technologies, should significant contributions to ground water be implicated from the investigations.

MAP Ponds – The MAP product was reported to have been removed from these ponds prior to closure. Several soil borings should be placed in this area to characterize subsurface conditions and to confirm that MAP product is not remaining. Well KM-5 was affected by the MAP ponds as shown in the RI, but the recent flattening vanadium concentrations and seasonal changes in well KM-5 may result from on-going affects from the boiler blowdown/scrubber pond, or another source to the east of well KM-5, including the former vanadium plant facility.

Boiler Blowdown Scrubber Pond - Data from lysimeters L-4 and L-5 were input into the ground water model that was completed for the RI/FS. Well KM-5 is downgradient/lateral gradient from the boiler blowdown/scrubber pond. The recent

flattening of the vanadium concentration and seasonal changes in well KM-5 may result from on-going affects from the boiler blowdown/scrubber pond infiltration, or from another source to the east of well KM-5, including the former vanadium plant facility and the calcine. The types of studies required to investigate the boiler blowdown/scrubber pond includes a number soil borings located within the pond basin and in areas to the west and south of the covered pond to characterize subsurface conditions, logging, analyses of selected samples retrieved from these borings and installation of lysimeters and collection of soil pore water that would be representative of leachate potential. Results would be interpreted and assessed for potential contribution to ground water, and assessed for the identification of remedial technologies.

West Calcine - Soil pore-water data obtained from lysimeters L-1 and L-2 were input into the ground water model that was completed for the RI/FS to represent COC concentrations available from this solid source. The site is adequately monitored by ground water wells to the west and south of this source. Well KM-7 is completed in bedrock directly beneath this site. Seasonal changes in well KM-7 vanadium concentration may result from infiltration through the west calcine in the spring, affected by leaching from the on-going surface water source on the limestone settling ponds, or may result from another source to the east of well KM-7, including the former vanadium plant facility or the scrubber pond. Potential impacts from the S-X pond basin and limestone settling ponds occur within the west calcine limits. Therefore, the patterns of COC noted in the ground water in wells KM-6, KM-7, KM-8, KM-9, KM-12 and KM-13 result from the combined effects of these sources.

Consequently, to supplement the vadose investigations of the limestone settling ponds and the S-X pond basin, a number of soil borings should be drilled in areas of the west calcine to characterize subsurface conditions and to confirm the assumptions of calcine on soil to support RI conclusions. In particular, areas where calcine rests directly on or near bedrock should be identified. A lysimeter should be installed at the bedrock interface. Collection of soil pore water within the calcine would allow for assessment that would be representative of leachate characteristics. Results would be interpreted

and assessed for potential contribution to ground water, and assessed for the identification of remedial technologies.

7.3 Recommendations for Additional Wells

The siting and installation of the wells described below will be specified in an approved work plan. The MST will develop the work plan, which will be reviewed by EPA and IDEQ, and approved by EPA, prior to siting and installing any new wells. The following well locations are recommended, based on an evaluation of the monitoring well network and the current remedy. Proposed well locations and rationale for placement include:

- A shallow well sited immediately west of the S-X processing portion of the former vanadium plant to address potential impacts to ground water;
- A new shallow well southeast of KM-17 to assess gradients and potential off-site pathways; and
- A fully-penetrating deep well sited at a location downgradient of the former Tronox facility within a defined area of most heavily impacted shallow ground water.

The proposed well sited west of the S-X processing circuit of the former vanadium plant will assess potential contributions from the former plant process facility and provide additional data to assess concentrations and trends for wells downgradient (wells KM-5, KM-6, KM-7) from the partially covered plant foundation footprint.

The proposed well that would be sited south of the covered scrubber pond and calcine cap and south to southeast of off-site well KM-17 would be utilized to evaluate water levels, aquifer properties, water quality concentrations and address the extent of COC in ground water that currently exceeds the RBC. Data obtained from this well would be used in conjunction with the other off-site wells KM-15, KM-16 and KM-17 to gain a comprehensive understanding of off-site flow paths to the south of the most heavily impacted ground water areas.

The current understanding of the shallow and deeper wells on the industrial site is that little difference exists between piezometric heads, and that the concentrations of COC decrease vertically in the aquifer near the source areas. The intermediate depth wells KM-10, KM-11, KM-12 and deep well KM-19 have smaller concentrations than their respective nearby shallow wells. However, off-site wells KM-15 (shallow-depth) and KM-18 (intermediate-depth) located southwest of the site and to the west of the Finch Spring fault show vertically downward gradients between the two wells with similar concentrations of COC in both wells exceeding the RBC. The downward gradient is assumed to be induced by the fully-penetrating Monsanto production wells, where a vertically downward gradient is inferred within the capture zone (Golder, 2007).

Data from wells KM-15 and KM-18 indicate their piezometric heads are influenced by drawdown induced by the Monsanto production wells. Water quality data at off-site wells KM-15 and KM-18 indicate that COC are mixing vertically and currently exceed the RBC in the shallow and intermediate depth basalt aquifer at this location based on water level observations and water quality trends. The degree to which this mixed ground water is captured by the Monsanto production wells is unknown. Some of the mixed deeper ground water may follow regional ground water flow gradients, assumed to be to the south from this area. No deeper well data is available to the south of Monsanto well TW-11 on the southeast corner of the Monsanto site. Therefore, in order to assess deep water quality and potential pathways and exposures off of the former Tronox site, a deep well should be sited on the City of Soda Springs property, preferably downgradient of the Monsanto well capture zone. Ideally, a deep well would accompany a shallow well to assess vertical gradients and be sited within the most contaminated shallow ground water. This location would ideally be placed no further south than the Evergreen facility.

7.4 O&M Plan and Corrective Actions

It is recommended that a consolidated and revised O&M plan that describes the work to be done be prepared, reviewed and approved prior to implementation. The consolidated

and revised O&M plan would be submitted to USEPA for approval before being implemented, as required by Paragraph 11.f. of the Remedial Design/Remedial Action Consent Decree for the Site. The O&M plan should be developed and implemented to address the short-term issues identified during the remedy evaluation inspection, and long-term maintenance of the current site remedies as a whole. The consolidated O&M plan would address and update the landfill or calcine cap O&M plans at this time. The plan should outline the steps that will continue to be taken to eradicate the deep tap-rooted plants inside the fenced areas of the on-site landfill and calcine cap, and address filling in holes caused by animal burrowing or digging. The plan should also address areas of cover erosion and fence maintenance.

In order to address the potential problems that were identified during the 2008 field inspection, it is recommended that the consolidated O&M plan be revised to a site-wide O&M plan. This plan would be prepared following the approval of the final remedy evaluation report. The revised site-wide O&M plan should be updated to address site grading, runoff, establishment and maintenance of vegetation, or cover maintenance for the scrubber ponds, limestone settling ponds, west calcine, map ponds, plant and areas surrounding areas and establishment and maintenance of snow fences to reduce snow drifting on the site. The work addressed by this plan should address grading at the various sites as required to remove the low-lying areas, erosion rills and other physical problems that were identified during the site inspection. The work in this plan would include reseeding the disturbed areas and areas indicating a lack of vegetation. This plan would also contain the activities that will be taken to determine the depth of any existing burrows, the steps taken to fill in the animal burrows and any eradication of the animals making these burrows. Following the completion of the data evaluation of the proposed investigations, the consolidated and revised O&M plan should be updated as necessary to reflect any required changes to the remedy that result from the findings of the investigations.

8.0 REFERENCES

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TABLE 1-1
CHRONOLOGY OF PROCESS CHANGES

Event	Date(s)	Comments
S-X stream diverted from the S-X pond to the scrubber pond	1992 through 1993	Flow may have been diverted between ponds during this time period.
MAP ponds taken out of service; third roaster taken off-line in April	1993	Ponds reclaimed. Effects of remediation apparent in well KM-5.
S-X pond receiving discharge from S-X circuit	1994	S-X circuit discharge diverted to S-X pond for last time.
S-X stream diverted from the S-X pond to the scrubber pond	Late 1994 to mid 1995	S-X pond contained residual process water during 1995
S-X stream diverted to newly-constructed lined ponds	Mid 1995	Precipitation continued to fill the S-X pond basin and infiltrate. Pond contained significant volume of precipitation during 1996-1997 winter.
Scrubber pond taken out of service	April 1997	Scrubber pond pumped to the calcine pond. Some scrubber stream sent to calcine ponds. Residual liquid in pond and meteoric water drained out during stabilization of the pond sediments. All baghouses on-line in October.
Discontinue sluicing calcine	April – October 1997	Calcine dewatered, and residual water recycled in process. Dewatered calcine stockpiled north of the calcine impoundment.
Fertilizer Plant Operational	July 1998 to May 2000	Calcine removed from active calcine Impoundment, processed to fertilizer. Reject fertilizer placed in calcine impoundment.
Discontinue Vanadium Processing – Vanadium Plant Idle	January 1999 to present	Discontinue stockpiling of calcine, discontinue all vanadium process streams to lined ponds, discontinue the recycle of roaster reject.
Cap Active Calcine Impoundment	May 2001 through August 2001	Calcine was capped using multi-component cover to eliminate meteoric infiltration through calcine tailing. Substantial amount of dust control/construction water used.
Dismantle Vanadium Plant	November 2001 through May 2002	Materials removed to approved facility, surface footprint cleaned in preparation for surface regrade. Footprint regraded with limestone fines in April/May 2003
Dismantle Fertilizer Plant	November 2002 through June 2003	Materials removed to approved facility, surface footprint cleaned in preparation for surface regrade.
Reclaim Stormwater Runoff Ponds	September through October 2003	Solids and liquids removed to 10-acre pond, site regraded and reclaimed.
Reclaim 5-Acre Ponds	September through October 2004	Solids and liquids removed to 10-acre pond, east pond site regraded and reclaimed.
Regrade Scrubber Pond Cover	November 2005	Fill and regrade south of calcine cap

Note: Changes in the discharge locations of both the S-X and scrubber streams affected concentrations in both on-site and off-site wells and Finch Spring during operation.

TABLE 2-1
MONITOR WELL CONSTRUCTION AND WELL TESTING RESULTS

Well Designation	Completed Date	Northing*	Easting*	Elevation Top of PVC Feet msl	Elevation Concrete Pad Feet)	Top of Screen	Bottom of Screen	Hydraulic Conductivity (ft/day)	Lithology Unit Monitored	Screened Interval
Tronox Wells										
KM-1	10/07/91	373073.394	659740.078	6029.72	6027.50	45.9	55.9	204	I4	clay, tuff
KM-2	09/21/91	371777.028	660379.196	6025.11	6023.00	47.2	57.2	266	Qb5	basalt, clay
KM-3	10/11/91	371745.657	659825.555	6014.28	6012.20	39.1	49.1	91	I4	clay, tuff
KM-4	10/02/91	372033.826	659695.190	6023.44	6021.90	43.7	53.7	153	I4	cinders, tuff
KM-5	10/01/91	372710.706	658856.602	6002.72	6001.50	38	48	37	Qb5	vesicular basalt
KM-6	09/24/91	371736.929	658601.626	5988.13	5986.00	34.7	44.7	340	Qb5	vesicular basalt
KM-7	09/26/91	372113.189	658578.407	6001.63	5999.90	46.2	56.2	na	Qb5/I4	vesicular basalt and cinders
KM-8	10/21/91	371771.964	658144.161	5976.75	5974.40	34.6	44.6	9.4	Qb5	basalt, clay
KM-9	09/29/91	371770.477	657836.280	5973.56	5971.50	47.5	57.5	48	Qb5	vesicular basalt
KM-10	10/12/91	373073.856	659761.715	6029.43	6027.90	100	120	na	Qb3	basalt
KM-11	10/29/91	371745.582	659847.119	6013.63	6012.10	80	100	96	Qb3	basalt
KM-12	10/29/91	371778.391	658119.553	5976.07	5973.90	134.1	154.1	34	Qb3	basalt
KM-13	10/07/91	372185.749	658042.505	5977.65	5975.60	46.4	56.4	17	Qb5	basalt
KM-15	09/24/92	370332.04	657491.89	5958.10	5956.20	45.2	55.2	105	Qb5a/I5	cinders, basalt
KM-16	09/18/92	371058.74	658151.12	5998.97	5997.20	63.3	73.3	97	Qb5	basalt
KM-17	09/25/92	371100.35	659365.30	6001.11	5999.60	38.2	48.2	2.3	Qb4/I3	basalt, silt
KM-18	10/03/92	370336.14	657468.67	5958.25	5956.80	152.6	172.6	8.2	Qb3	basalt
KM-19	10/15/92	371788.11	658085.74	5975.17	5973.80	193.6	213.6	15	Qb2/I1	fractured basalt, clay
Evergreen Wells										
EV-1	09/05/03	4725177	452418	5951		26	36	na		Gravel, hard basalt
EV-2	09/08/03	4725074	452491	5943		25	35	na		Gravel, broken basalt
EV-3	09/06/03	4724950	452411	5938		26	36	na		Cinders, basalt, hard basalt
EV-4	?	4725070	452378	5945		?	?	na		Unknown
Monsanto Wells										
TW-12	09/14/84	369017.37	656681.35	5939.23	5937.63	89.5	99.5	100	UBZ (I4)	Loose basalt and cinders
TW-33	12/10/84	372526.92	657699.47	5975.68	5974.03	69	74	na	UBZ	Weathered basalt and cinders
TW-38	02/13/85	370446.4	656523.94	5972.91	5970.94	90	102	na	UBZ (Qb5/I5)	Cinders, fresh basalt
TW-56	1992 ?	367979.1	656276.06	5910.2		95	105	na	UBZ (Qb3)	Basalt
Lewis Well	08/15/74	4724126.4	451791.3	5864.35		85	105	100	NA	Creviced basalt, hard basalt

kmcwellsaquifer calcs

*** All coordinates in State Plane Coords except Evergreen and Lewis Wells that are in UTM**

TABLE 2-2
MAXIMUM CONCENTRATIONS OF COC AND MOST CURRENT CONCENTRATIONS IN TRONOX WELLS AND OFF-SITE SPRINGS

Well Designation	Arsenic Concentrations		Manganese Concentrations		Molybdenum Concentrations		Total Petroleum Hydrocarbons Concentrations		Tributyl Phosphate Concentrations		Vanadium Concentrations	
	PROPOSED RBC = 10 ug/l		RBC = 180 ug/l		RBC = 180 ug/l		RBC = 0.73 mg/l		RBC = 180 ug/l		RBC = 260 ug/l	
	Largest (ug/l)	Most Current (ug/l)	Largest (ug/l)	Most Current (ug/l)	Largest (ug/l)	Most Current (ug/l)	Largest (mg/l)	Most Current (mg/l)	Largest (ug/l)	Most Current (ug/l)	Largest (ug/l)	Most Current (ug/l)
KM-2*	53	13	444	31	11800	1000	2.0	NA	7	NA	15500	4700
KM-3*	27	12	1680	570	44900	6500	1.8	NA	1400	NA	13200	3300
KM-4	63	11	1160	100	15300	2200	NA	NA	NA	NA	23300	6900
KM-5*	12.2	2.6	399	7.2	1460	160	NA	NA	3	NA	15800	1100
KM-6	6.5	5.3	291	180	2140	1200	2.0	NA	110	NA	6630	3900
KM-7	6.9	4.2	197	79	593	390	2.0	NA	NA	NA	3410	2100
KM-8*	170	97	8770	4900	165000	47000	9.5	2.2	4442	830	29000	16000
KM-9*	5	2.1	113	6.7	1740	150	NA	NA	ND	NA	3590	430
KM-11*	2	0.35	157	17	5600	290	0.42	NA	112	NA	492	11
KM-12*	23	1.5	177	26	9290	430	0.39	NA	13	NA	5580	600
KM-13*	4	1.5	131	8.6	6790	230	0.18	NA	12	NA	6420	460
KM-15	5.6	2.0	543	55	6950	380	0.15	NA	484	NA	3840	860
KM-16	7.3	3.5	364	99	2300	700	1.9	NA	180	NA	4250	2100
KM-17	1.5	ND	84	2.1	987	380	1.2	NA	170	NA	493	15
KM-18	3.7	1.6	332	42	6340	360	1.3	NA	410	NA	2990	650
KM-19*	2	0.76	32.3	2.5	258	20	1.1	NA	4	NA	558	120
Big Spring	1.1	0.77	1.8	ND	508	200	NA	NA	NA	NA	13.6	3.7
Finch Spring	2	0.7	4.4	ND	663	190	0.22	NA	ND	NA	91.7	64
Upper Ledger	3.7	0.29	2.6	ND	22.4	ND	NA	NA	NA	NA	5.1	ND
Lower Ledger	4.2	0.32	1.5	ND	54.1	ND	NA	NA	NA	NA	14.9	ND

Footnotes:
* = Point of Compliance Well
NA = Not Available – not sampled during May 2007
ND = Not Detected (less than IDL)
Shaded cells indicate exceedence of RBC

TABLE 5-1
PROJECTED COC TRENDS
BASED ON NOVEMBER 1997 THROUGH MAY 2008 DATA

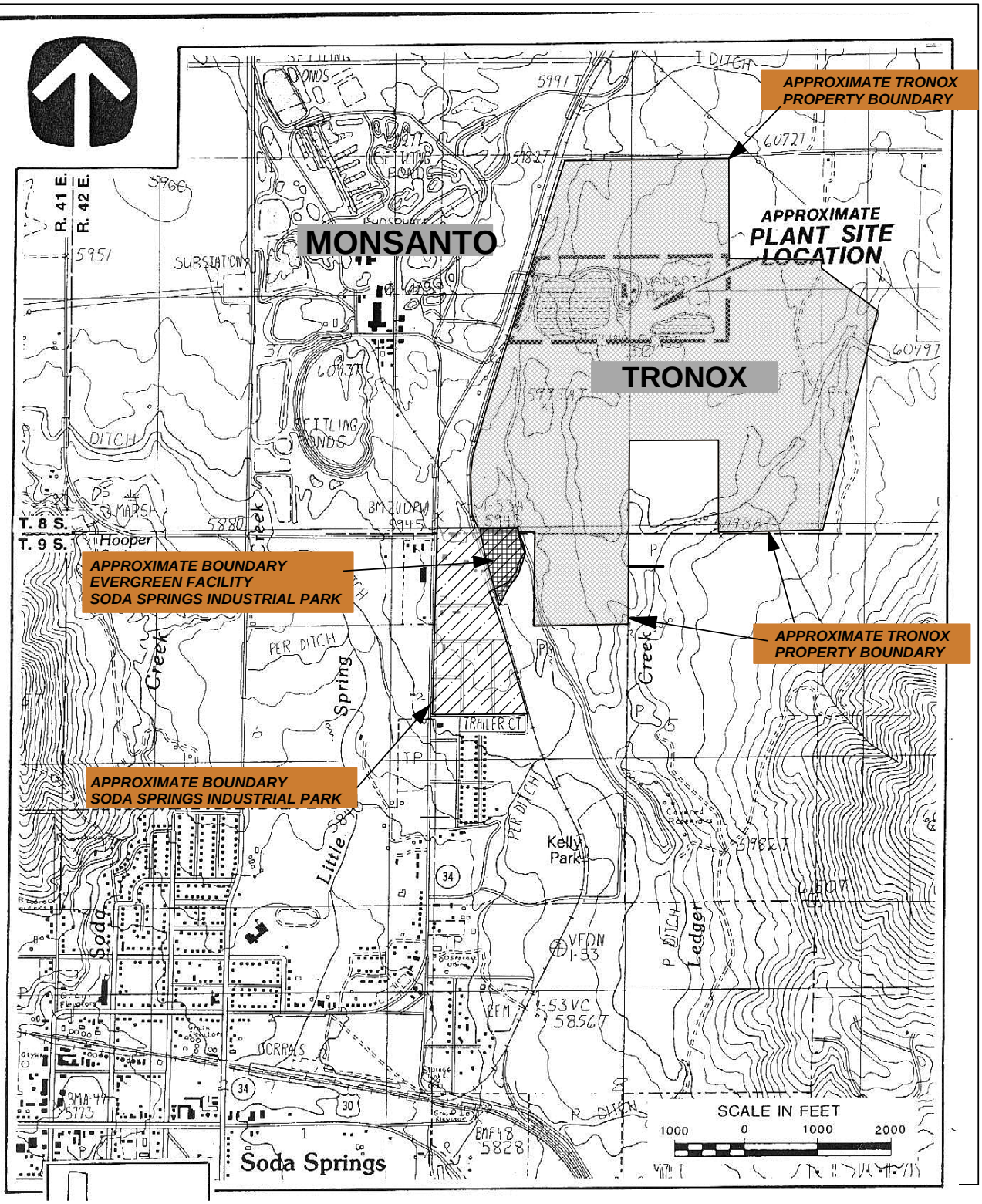
	MANGANESE				MOLYBDENUM				VANADIUM			
Monitor Well	**May 2008 Conc. (ug/l)**	**Projected Year Below RBC**	**Regression Equation**	**Regression Coefficient**	**May 2008 Conc. (ug/l)**	**Projected Year Below RBC**	**Regression Equation**	**Regression Coefficient**	**May 2008 Conc. (ug/l)**	**Projected Year Below RBC**	**Regression Equation**	**Regression Coefficient**
KM-2	31	Below RBC			1000	2019	y = 2E+09e-$^{0.0111x}$	R2 = 0.6533	4700	2037	y = 5E+07e-0.0072x	R2 = 0.7631
KM-3*	570	Increasing			6500	2030	y = 4E+08e-0.0087x	R2 = 0.4901	3300	2072	y = 90480e-0.0028x	R2 = 0.1199
KM-4	100	Below RBC			2200	NE			6900	NE		
KM-5*	7.2	Below RBC			160	Below RBC			1100	2026	y = 3E+06e-0.0061x	R2 = 0.7269
KM-6	180	At RBC			1200	2034	y = 2E+06e-0.0057x	R2 = 0.4174	3900	2087	y = 142495e-0.0028x	R2 = 0.2847
KM-7	79	Below RBC			390	NE			2100	NE		
KM-8*	4900	2042	y = 4E+06e-0.0057x	R2 = 0.2565	47000	2042	y = 4E+09e-0.0092x	R2 = 0.7271	16000	Increasing	y = 11.643e0.0059x	R2 = 0.2756
KM-9*	6.7	Below RBC			150	Below RBC			430	2012	y = 2E+06e-0.0067x	R2 = 0.9413
KM-11*	17	Below RBC			290	NE			11	Below		
KM-12*	26	Below RBC			430	2017	y = 1E+07e-0.0078x	R2 = 0.9108	600	2022	y = 477960e-0.0002x	R2 = 0.9349
KM-13*	8.6	Below RBC			230	2008	y = 7E+09e-0.0134x	R2 = 0.877	460	2017	y = 272600e-0.0049x	R2 = 0.8757
KM-15	55	Below RBC			380	2014	y = 646759e-0.0053x	R2 = 0.7734	860	2026	y = 551878e-0.0002x	R2 = 0.8659
KM-16	99	Below RBC			700	2022	y = 1E+07e-0.0076x	R2 = 0.6957	2100	2046	y = 743769e-0.0045x	R2 = 0.7361
KM-17	2.1	Below RBC			380	2031	y = 23755e-0.0031x	R2 = 0.2874	15	Below		
KM-18	42	Below RBC			360	2013	y = 4E+07e-0.009x	R2 = 0.8054	650	2022	y = 646759e-0.0053x	R2 = 0.911
KM-19*	2.5	Below RBC			20	Below RBC			120	Below		
Finch		Below RBC			190	2009	y = 2E+07e-0.0089x	R2 = 0.9435	64	Below		
Big Spring		Below RBC			200	2009	y = 555186e-0.0061x	R2 = 0.9251	3.7	Below		

SHADED CELL INDICATES CURRENT EXCEEDENCE OF RBC

TABLE 5-2
PROJECTED COC TRENDS BASED ON MAY 2004 THROUGH MAY 2008 DATA

	MOLYBDENUM				VANADIUM			
Monitor Well	**May 2008 Conc. (ug/l)**	**Projected Year Below RBC**	**Regression Equation**	**Regression Coefficient**	**May 2008 Conc. (ug/l)**	**Projected Year Below RBC**	**Regression Equation**	**Regression Coefficient**
KM-2	1000	2025	y = 3E+07e-0.0078x	R2 = 0.5015	4700	Increasing Trend	y = 1334.6e0.001x	R2 = 0.0239
KM-3*	6500	2075	y = 1E+06e-0.0042x	R2 = 0.6095	3300	2040	y = 3E+06e-0.0054x	R2 = 0.0687
KM-4	2200	NE			6900	NE		
KM-5*	160	Below RBC			1100	2082	y = 10166e-0.0017x	R2 = 0.034
KM-6	1200	Increasing Trend	y = 205.34e0.0015x	R2 = 0.0206	3900	Increasing Trend	y = 23.833e0.004x	R2 = 0.1022
KM-7	390	NE			2100	NE		
KM-8*	47000	Increasing Trend	y = 1151.4e0.0027x	R2 = 0.0311	16000	2042	y = 1E+09e-0.0085x	R2 = 0.3468
KM-9*	150	Below RBC			430	2017	y = 114508e-0.0043x	R2 = 0.5276
KM-11*	290	NE			11	Below RBC		
KM-12*	430	2015	y = 4E+08e-0.0105x	R2 = 0.9602	600	2019	y = 2E+06e-0.0002x	R2 = 0.9796
KM-13*	230	2009	y = 2E+10e-0.014x	R2 = 0.7951	460	2027	y = 16560e-0.0027x	R2 = 0.5342
KM-15	380	2026	y = 60562e-0.0001x	R2 = 0.2171	860	2069	y = 7086.3e-5E-05x	R2 = 0.1543
KM-16	700	2096	y = 4874.5e-0.0014x	R2 = 0.0204	2100	Increasing Trend	y = 2690.9e-9E-05x	R2 = 0.0002
KM-17	380	2014	y = 3E+07e-0.0086x	R2 = 0.7687	15	Below RBC		
KM-18	360	2021	y = 298096e-0.0051x	R2 = 0.328	650	2035	y = 30253e-0.0029x	R2 = 0.5077
KM-19*	20	Below RBC			120	Below RBC		
Finch Spring	190	2009	y = 794176e-0.0064x	R2 = 0.8517	64	Below RBC		
Big Spring	200	2009	y = 1E+06e-0.007x	R2 = 0.8344	3.7	Below RBC		

SHADED CELL INDICATES EXCEEDENCE OF RBC



REFERENCE: U.S.G.S. QUADRANGLE SODA SPRINGS, IDAHO PROVISIONAL EDITION 1982.

APPROXIMATE TRUST PROPERTY BOUNDARY LOCATION MAP

FIGURE 1-1

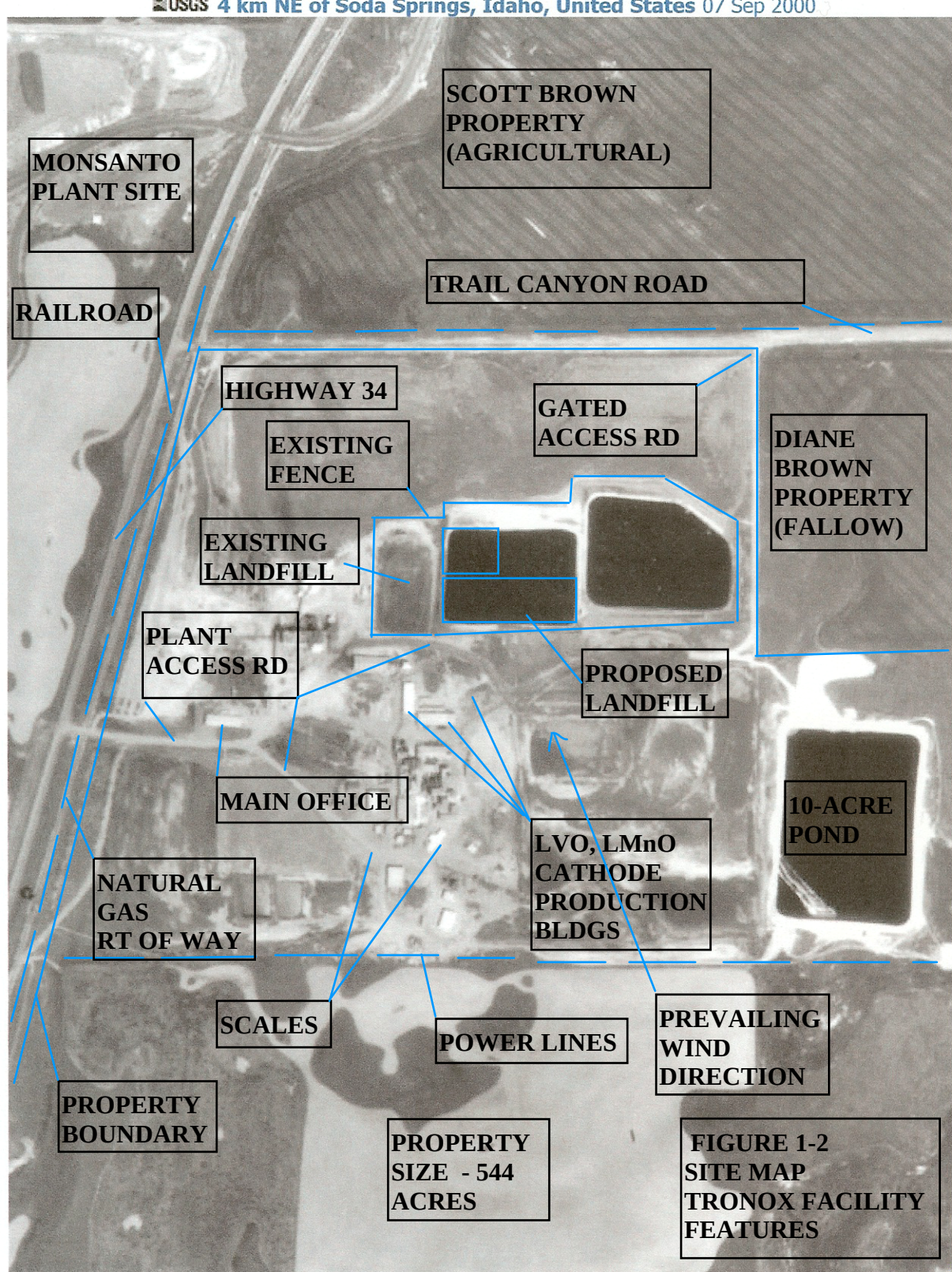


FIGURE 1-2
SITE MAP
TRONOX FACILITY FEATURES

WELL KM-18
WELL KM-15

REFERENCE: USGS TERRASERVER
DATE OF PHOTOGRAPHY SEPTEMBER 7, 2000

NORTH

0 200 400

MAP SCALE

SODA SPRINGS, IDAHO

TITLE

MONITOR WELLS, HISTORIC POND AND IMPOUNDMENT FEATURES

SIZE	CAGE CODE	DWG NO	REV
B			

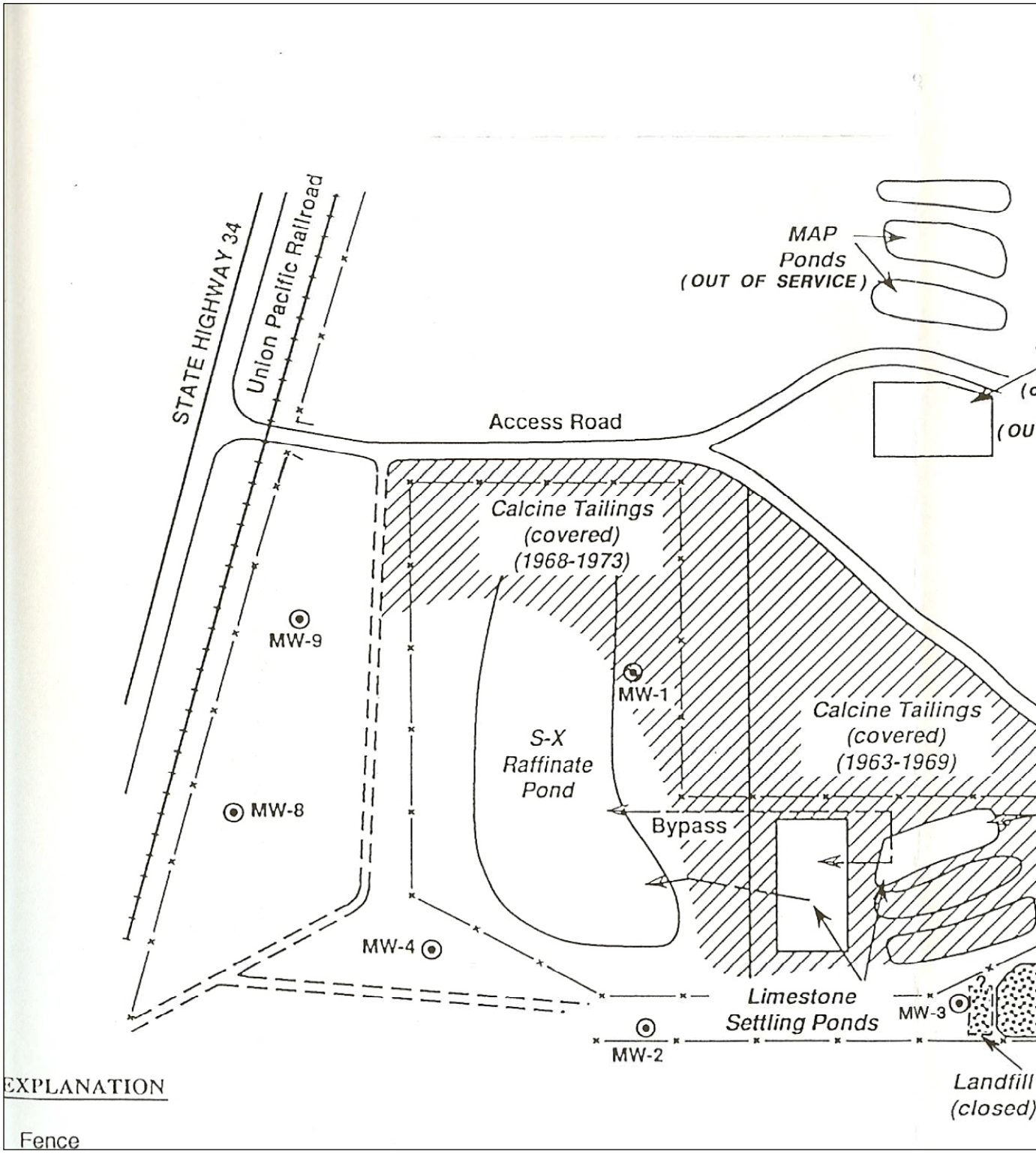
SCALE

SHEET

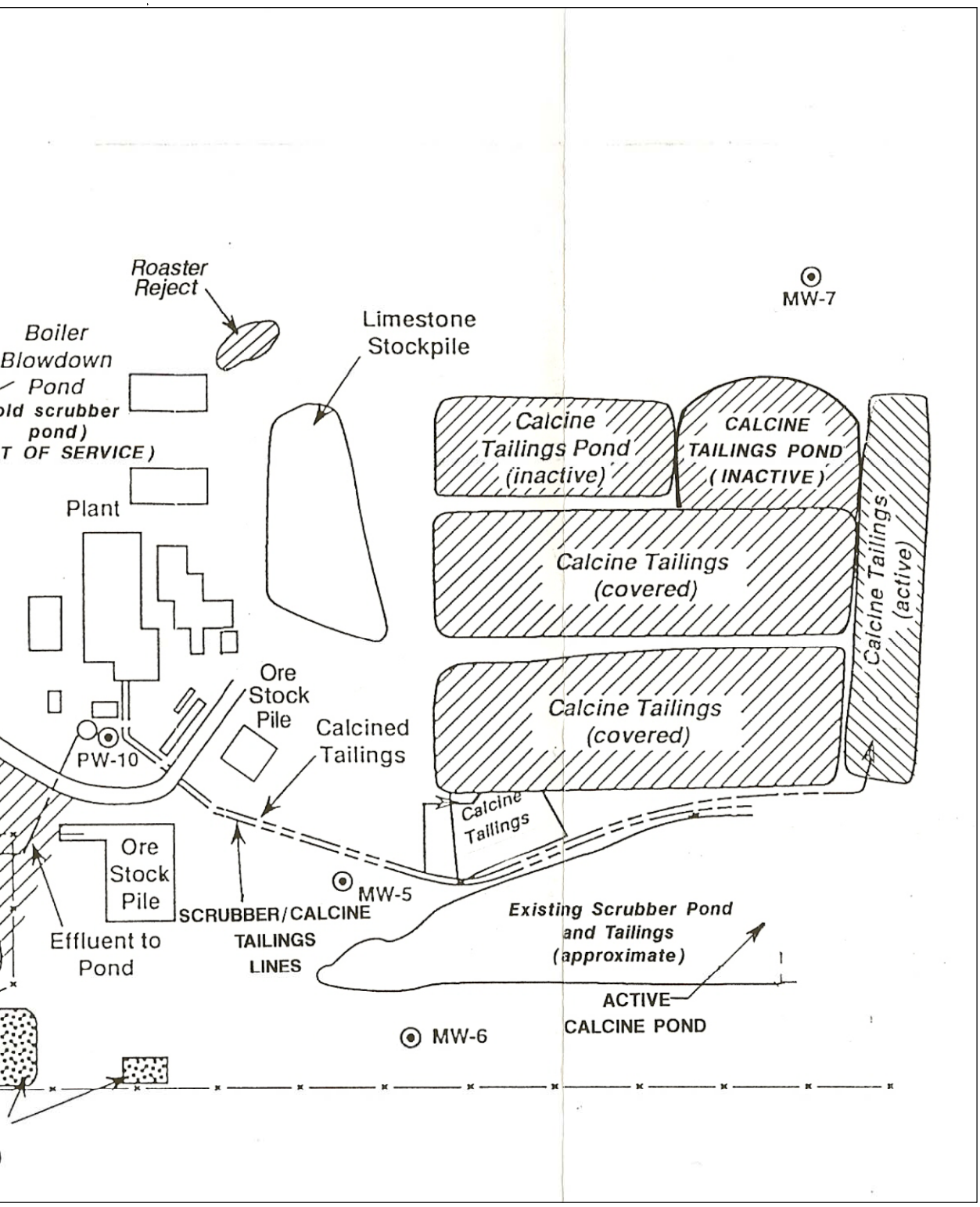
FIGURE 1-3

4/15/08

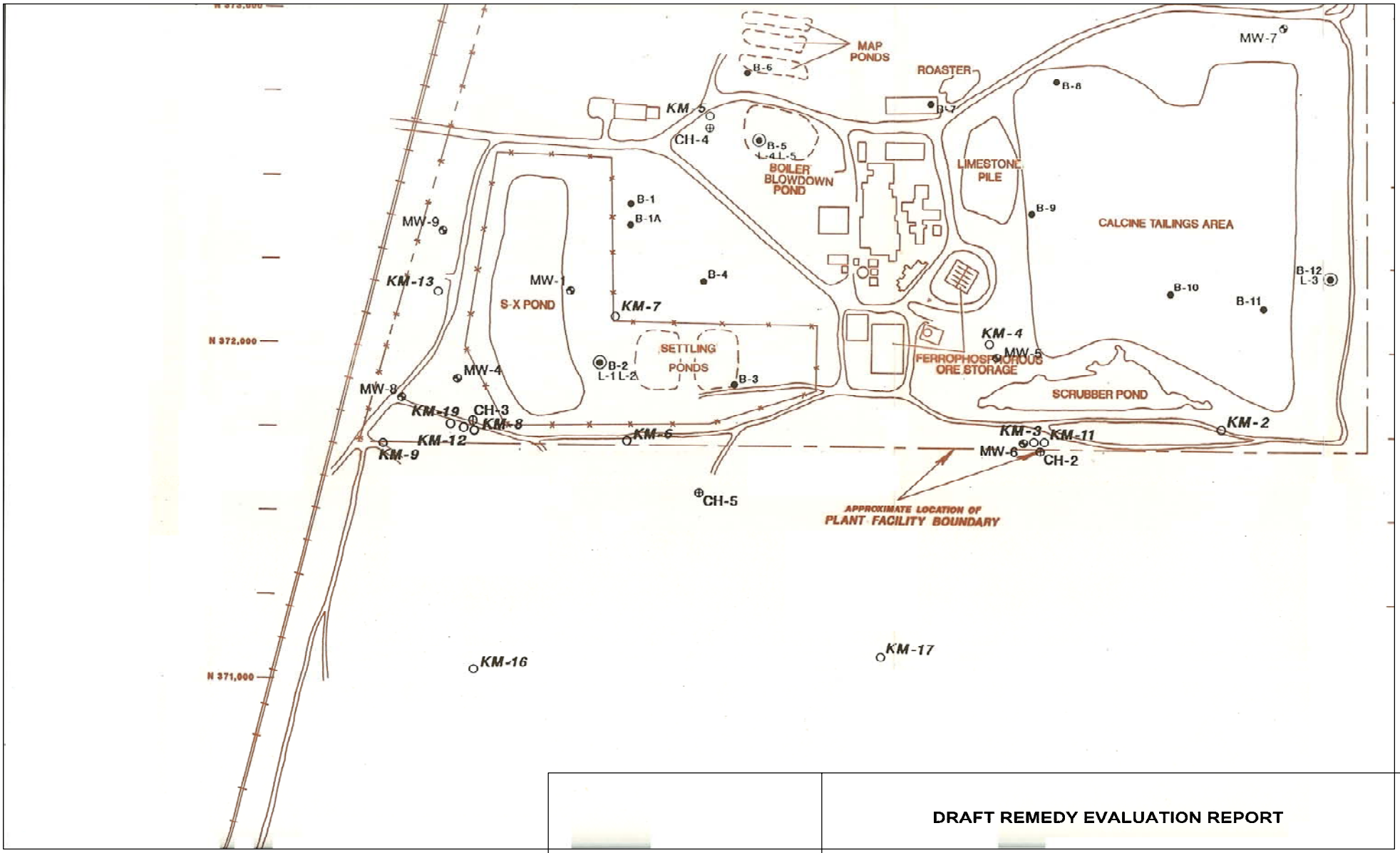
DRAWN BY J.S. BROWN, P.G.



REFERENCE: DAMES & MOORE, 1995



	TRONOX SODA SPRINGS IDAHO DRAFT REMEDY EVALUATION REPORT			
	TITLE HISTORIC SOLID SOURCES AND IMPOUNDMENTS			
4/14/08	SIZE B	CAGE CODE	DWG NO	REV
DRAWN BY J.S. BROWN, P.G.	SCALE		SHEET FIGURE 1-4	



REMEDIAL INVESTIGATION REPORT, DAMES & MOORE, 1995

DRAFT REMEDY EVALUATION REPORT

TITLE

REMEDIAL INVESTIGATION COREHOLE, BORING, LYSIMETER AND MONITOR WELL LOCATIONS

SIZE	CAGE CODE	DWG NO	REV
A			1

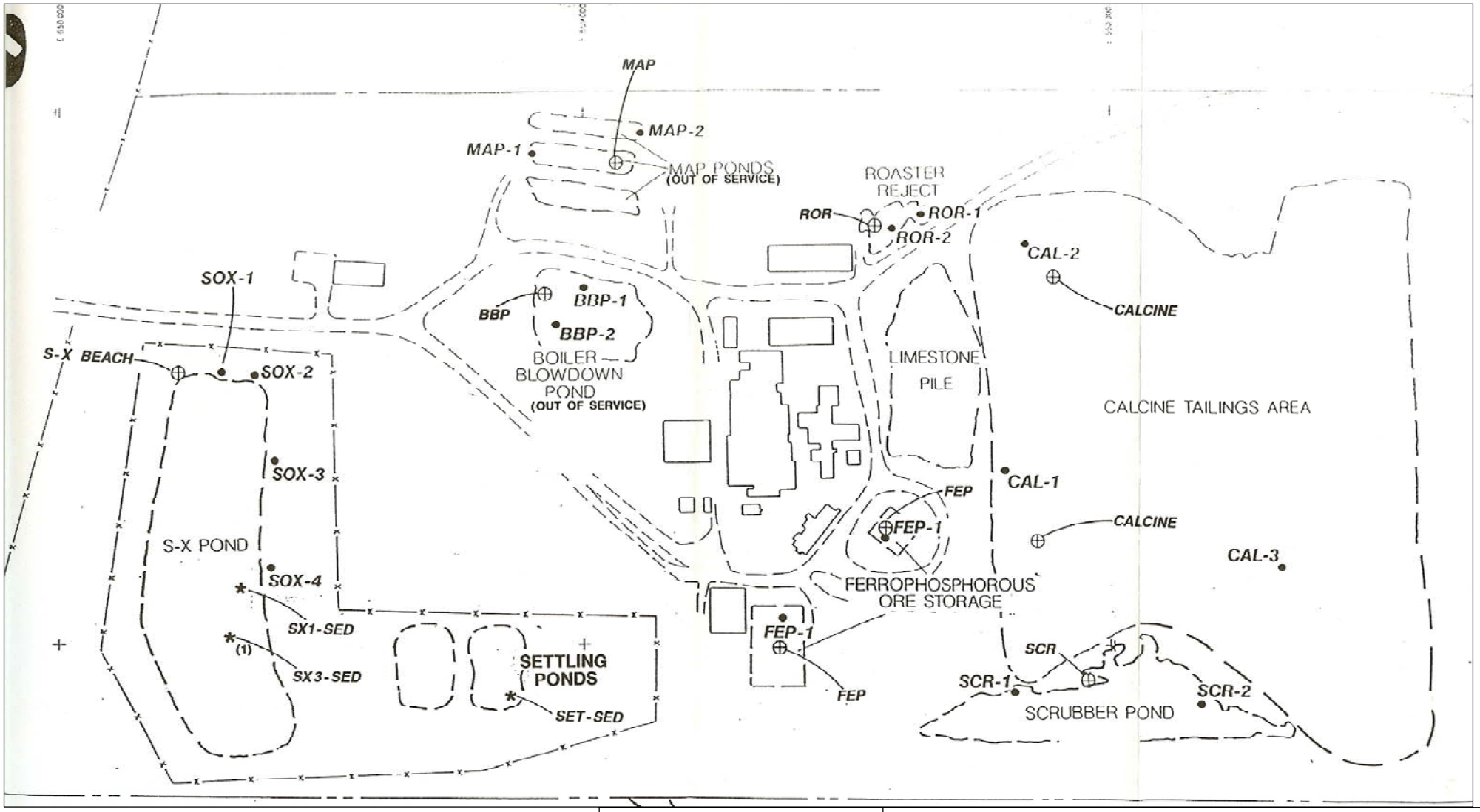
DRAWN BY J.S.BROWN P.G.

DATE: 2/14/09

SCALE

SHEET

FIGURE 1-5



REMEDIAL INVESTIGATION REPORT, DAMES & MOORE, 1995

DRAFT REMEDY EVALUATION REPORT

TITLE

LOCATION OF SOLID SOURCE AND SEDIMENT SAMPLES

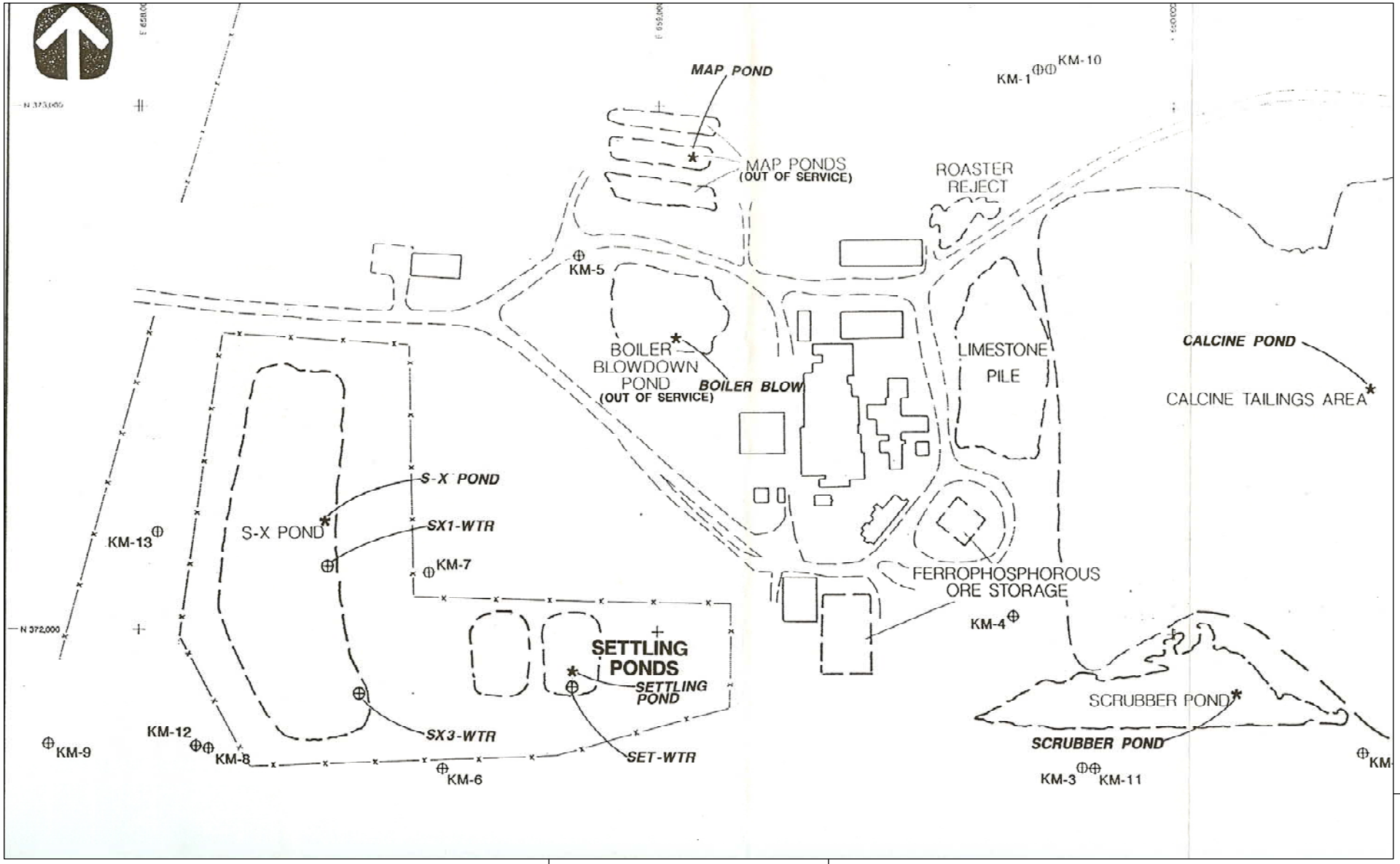
SIZE	CAGE CODE	DWG NO	REV
A			1

DRAWN BY J.S.BROWN P.G.

DATE: 2/14/09

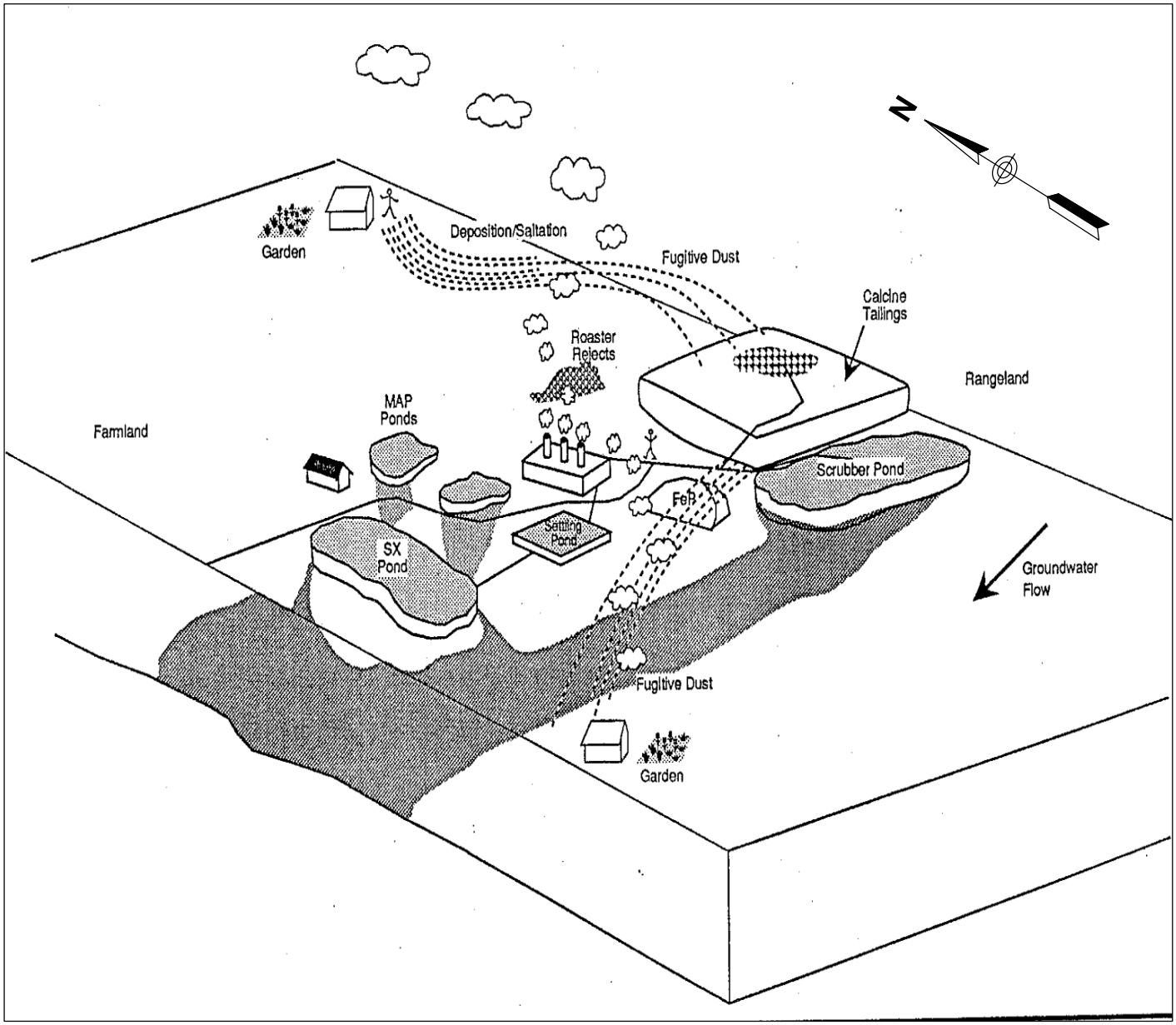
SCALE

SHEET **FIGURE 1-6**



REMEDIAL INVESTIGATION REPORT, DAMES & MOORE, 1995

DRAWN BY J.S.BROWN P.G.	TITLE: **LOCATION OF SURFACE IMPOUNDMENT AND WATER SAMPLE LOCATIONS**		
	SIZE: A	CAGE CODE	DWG NO	REV: 1
DATE: 2/14/09	SCALE		SHEET	**FIGURE 1-7**



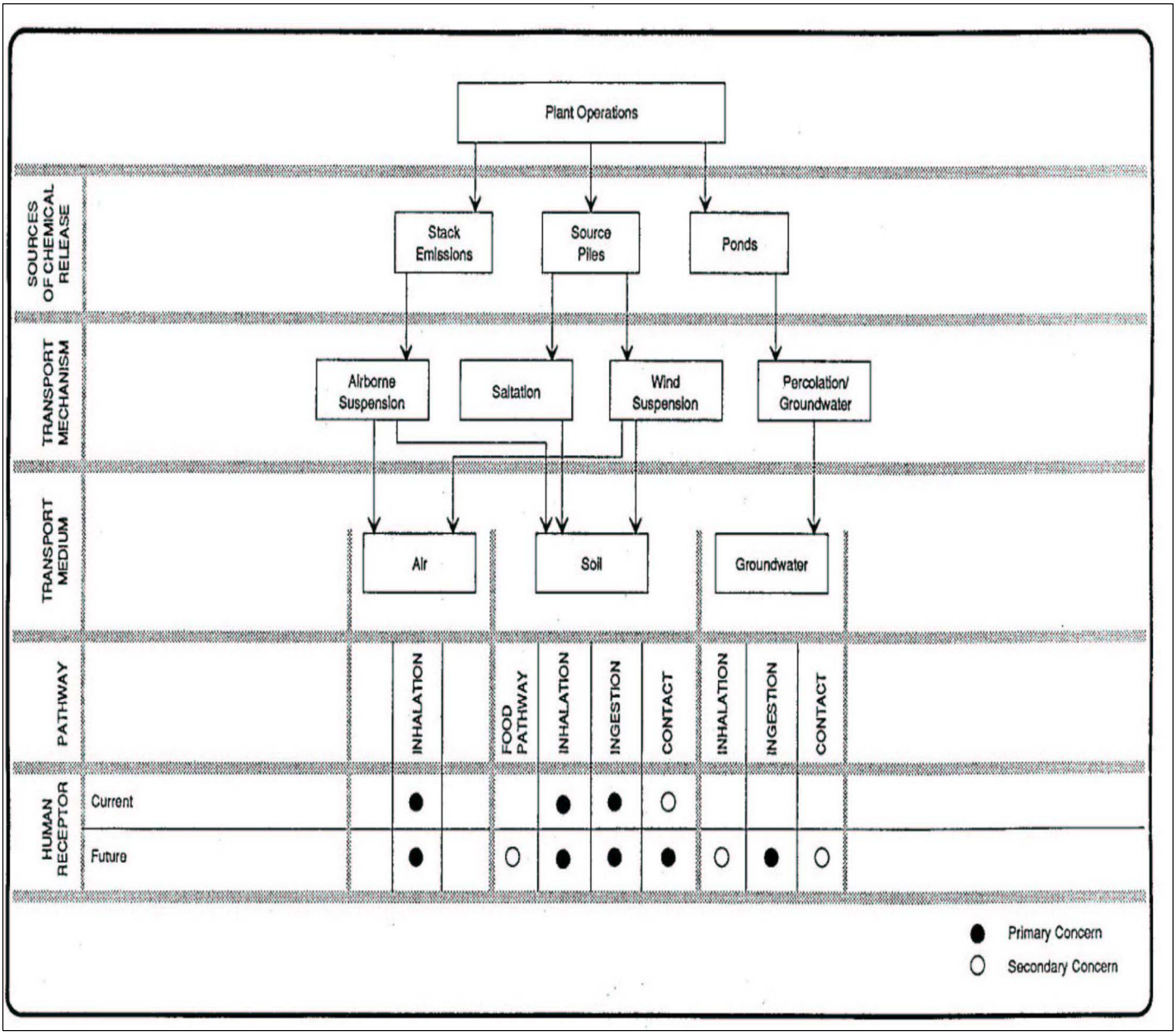
REFERENCE:SAIC/EPA, OCTOBER 1993

REMEDY EVALUATION REPORT

RISK ASSESSMENT CONCEPTUAL SITE MODEL

TRONOX
SODA SPRINGS, IDAHO

FIGURE 1-8



REFERENCE:SAIC/EPA, OCTOBER 1993

REMEDY EVALUATION REPORT

RISK ASSESSMENT ENVIRONMENTAL PATHWAY MODEL

TRONOX
SODA SPRINGS, IDAHO

FIGURE 1-9

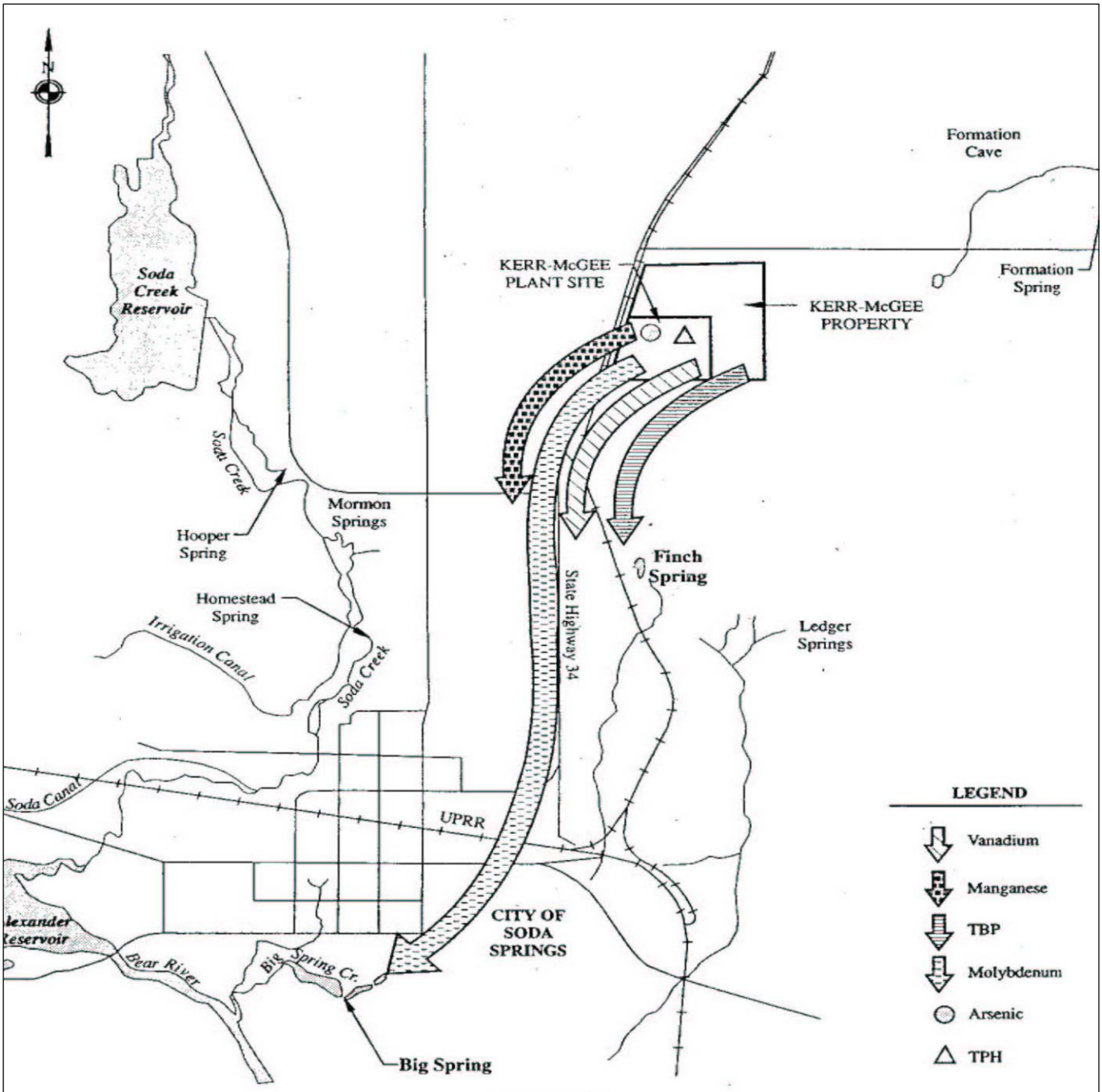


FIGURE 9
APPROXIMATE DIRECTION OF GROUNDWATER FLOW AND EXTENT OF GROUNDWATER CONTAMINATION AT LEVELS OF CONCERN FROM KERR-McGEE

REFERENCE:SAIC/EPA, 1996

REMEDY EVALUATION REPORT

CONCEPTUAL SITE MODEL GROUND WATER PATHWAY RECORD OF DECISION 1996

TRONOX
SODA SPRINGS, IDAHO

FIGURE 1-10

2008-12-18

Figure 2
Hydrogeologic Setting
Conceptual Model
Tronox Facility
Soda Springs, Idaho

Lori Robison and Associates, L.L.C.

Qal - Alluvium

Qb - Basalt Flow Sequences

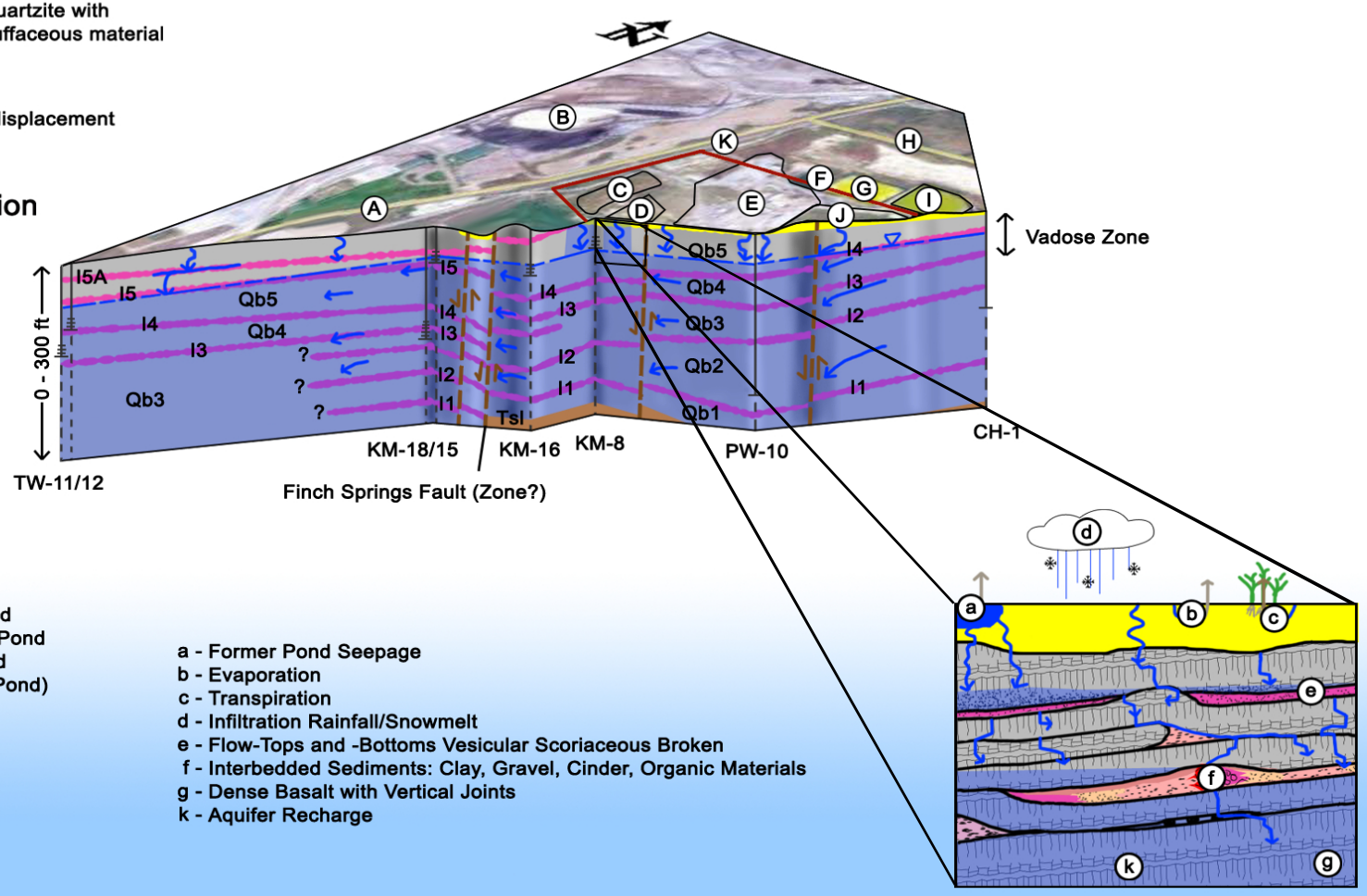
Qi - Basalt Interflow Sequences

Tsl - Salt Lake Formation
Conglomerate, sandstone, quartzite with interbedded limestone and tuffaceous material

Fault Location
Arrows indicate direction of displacement

Water Level Elevation

Water Flow Path



A - Highway 34
B - Monsanto
C - Former S-X Pond
D - Former Settling Ponds
E - Plant
F - Present Landfill Area
G - Reclaimed West 5-acre Pond
H - Reclaimed Calcine Tailings Pond
I - Reclaimed East 5-acre Pond
J - (North of Former Scrubber Pond)
K - Plant Site Boundary

a - Former Pond Seepage
b - Evaporation
c - Transpiration
d - Infiltration Rainfall/Snowmelt
e - Flow-Tops and -Bottoms Vesicular Scoriaceous Broken
f - Interbedded Sediments: Clay, Gravel, Cinder, Organic Materials
g - Dense Basalt with Vertical Joints
k - Aquifer Recharge

Figure not to scale
Basemap: Google Earth 2007

Note: Corehole/well depths are shown with approximate screen intervals where known

FIGURE 1-11

2008-12-18

Figure 3
COC Transport Proceses Conceptual Model
Tronox Facility
Soda Springs, Idaho

Lori Robison and Associates, L.L.C.

Qal - Alluvium

Qb - Basalt Flow Sequences

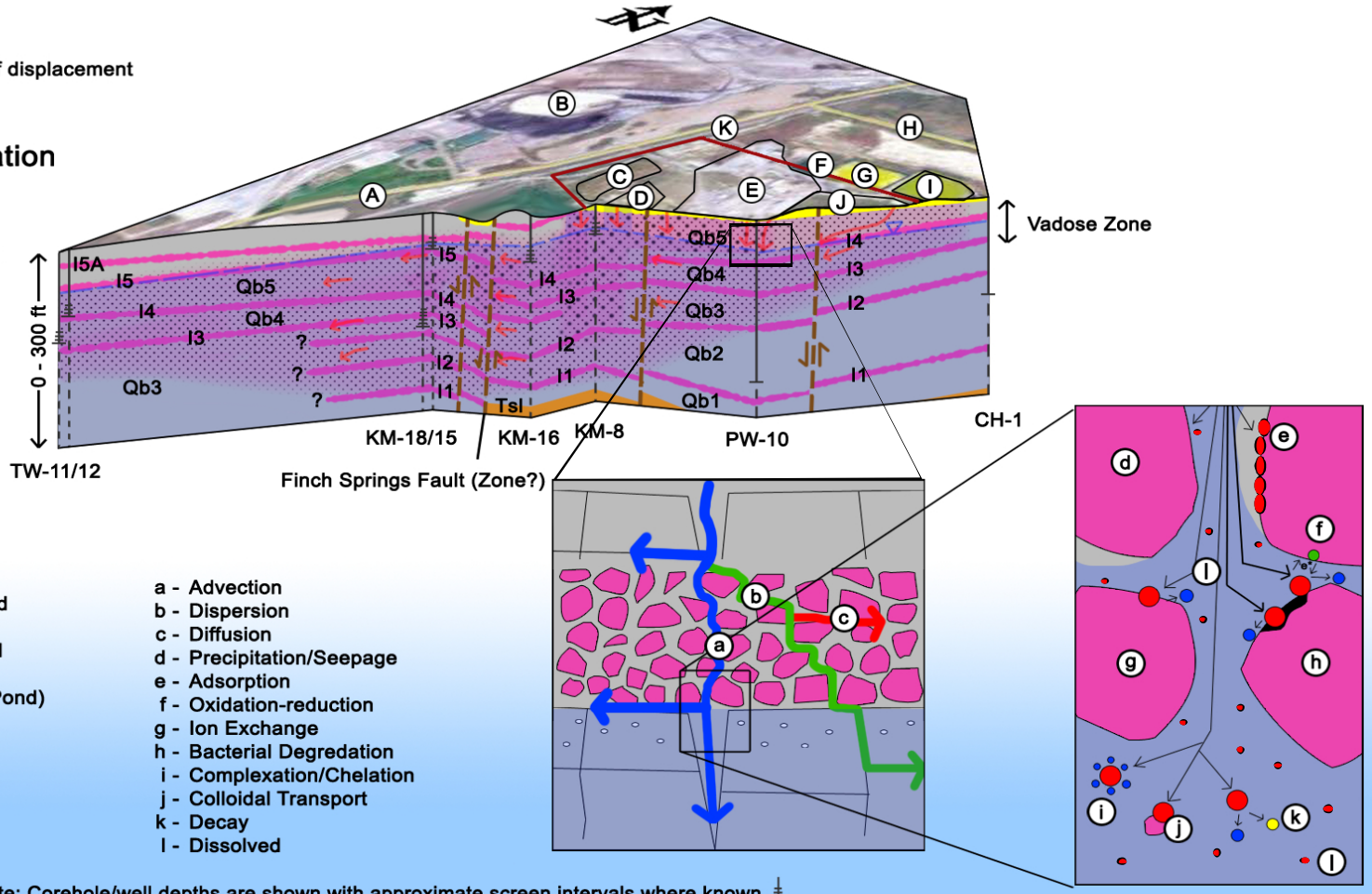
Qi - Basalt Interflow Sequences

Tsl - Salt Lake Formation
Conglomerate, sandstone, quartzite with interbedded limestone and tuffaceous material

Fault Location
Arrows indicate direction of displacement

Water Level Elevation

Contaminant Path



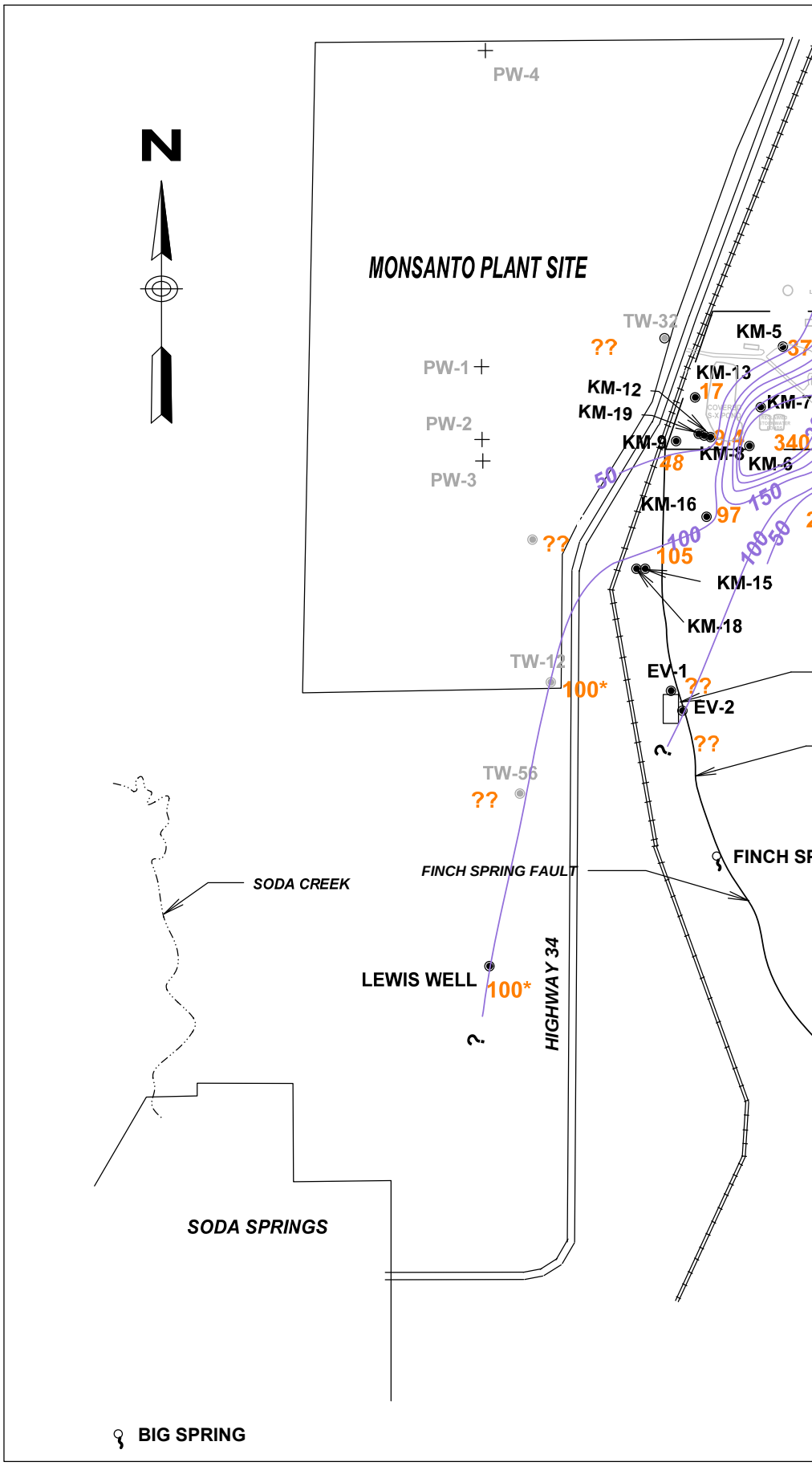
A - Highway 34
B - Monsanto
C - Former S-X Pond
D - Former Settling Ponds
E - Plant
F - Present Landfill Area
G - Reclaimed West 5-acre Pond
H - Trail Canyon Road
I - Reclaimed East 5-acre Pond
J - Capped Calcine Tailings (North of Former Scrubber Pond)
K - Plant Site Boundary

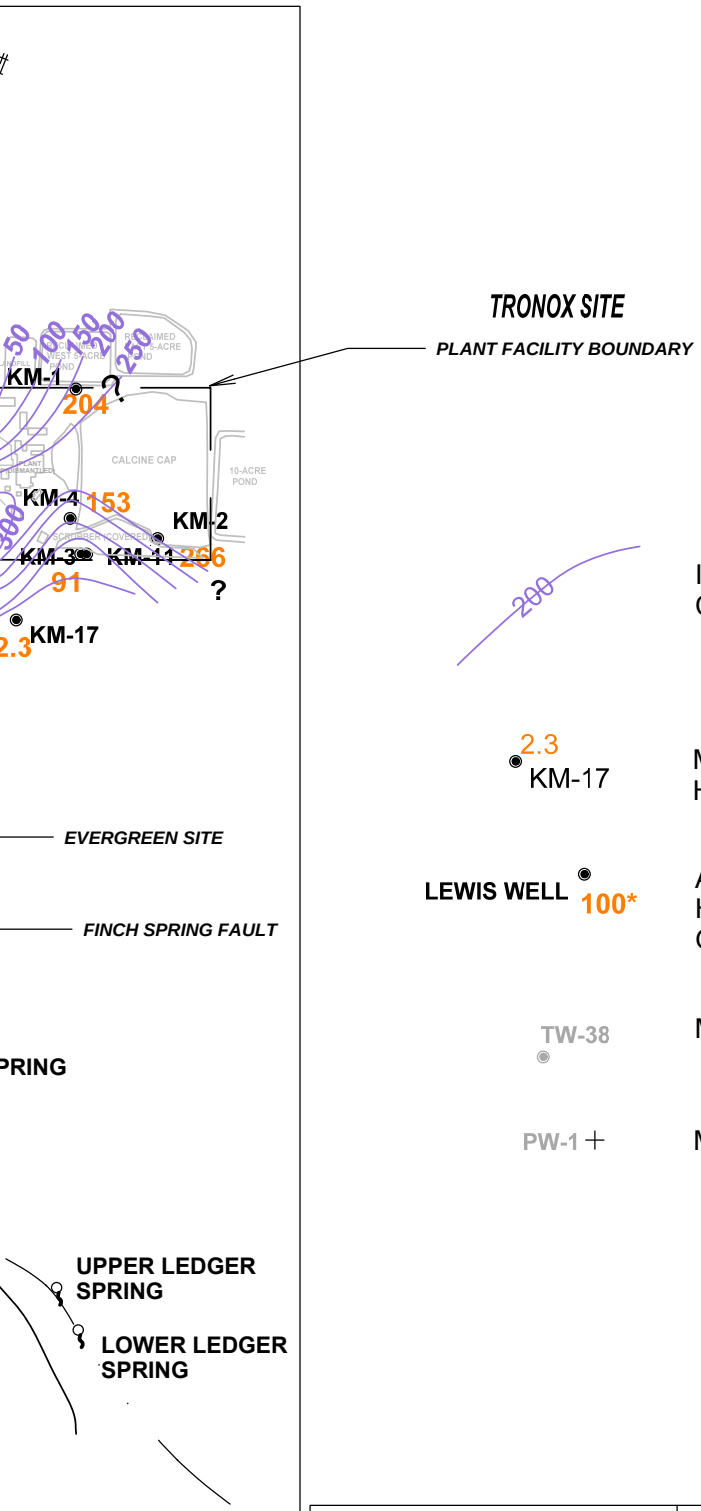
a - Advection
b - Dispersion
c - Diffusion
d - Precipitation/Seepage
e - Adsorption
f - Oxidation-reduction
g - Ion Exchange
h - Bacterial Degredation
i - Complexation/Chelation
j - Colloidal Transport
k - Decay
l - Dissolved

Figure not to scale
Basemap: Google Earth 2007

Note: Corehole/well depths are shown with approximate screen intervals where known

FIGURE 1-12


N
MONSANTO PLANT SITE
PW-4
PW-1
PW-2
PW-3
TW-32
??
KM-5
37
KM-13
17
KM-12
KM-19
KM-7
KM-9
9.4
KM-8
340
KM-6
48
50
KM-16
97
150
100
50
??
105
KM-15
KM-18
TW-12
100*
EV-1
??
EV-2
??
TW-56
??
FINCH SPRING FAULT
FINCH SP
SODA CREEK
LEWIS WELL
100*
HIGHWAY 34
SODA SPRINGS
BIG SPRING



KEY

200 — INFERRED CONTOUR AND HYDRAULIC CONDUCTIVITY ISOPLETH

2.3 KM-17 — MONITOR WELL LOCATION AND ESTIMATED HYDRAULIC CONDUCTIVITY IN FEET/DAY

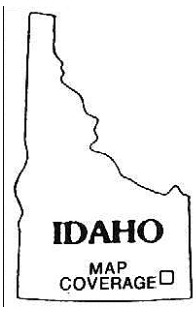
LEWIS WELL 100* — ASTERISK INDICATES MONITOR WELL ESTIMATED HYDRAULIC CONDUCTIVITY IN FEET/DAY AS PER GOLDER, JULY 3, 2008, TABLE 11

TW-38 — MONSANTO MONITOR WELL LOCATION

PW-1 — MONSANTO PRODUCTION WELL LOCATION

SCALE IN FEET

0 750 1500 3000



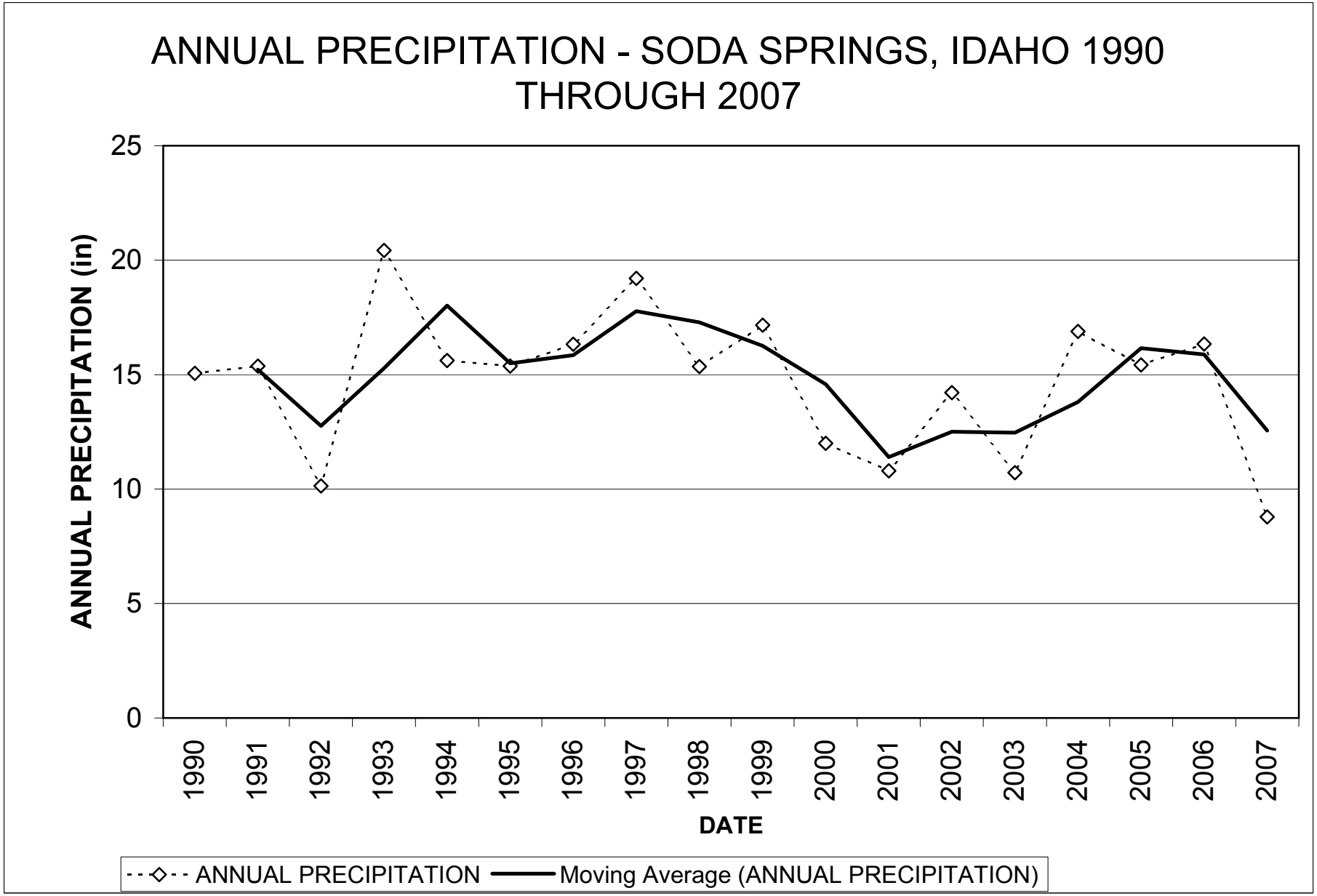
GROUND WATER MONITORING NETWORK EVALUATION

TITLE

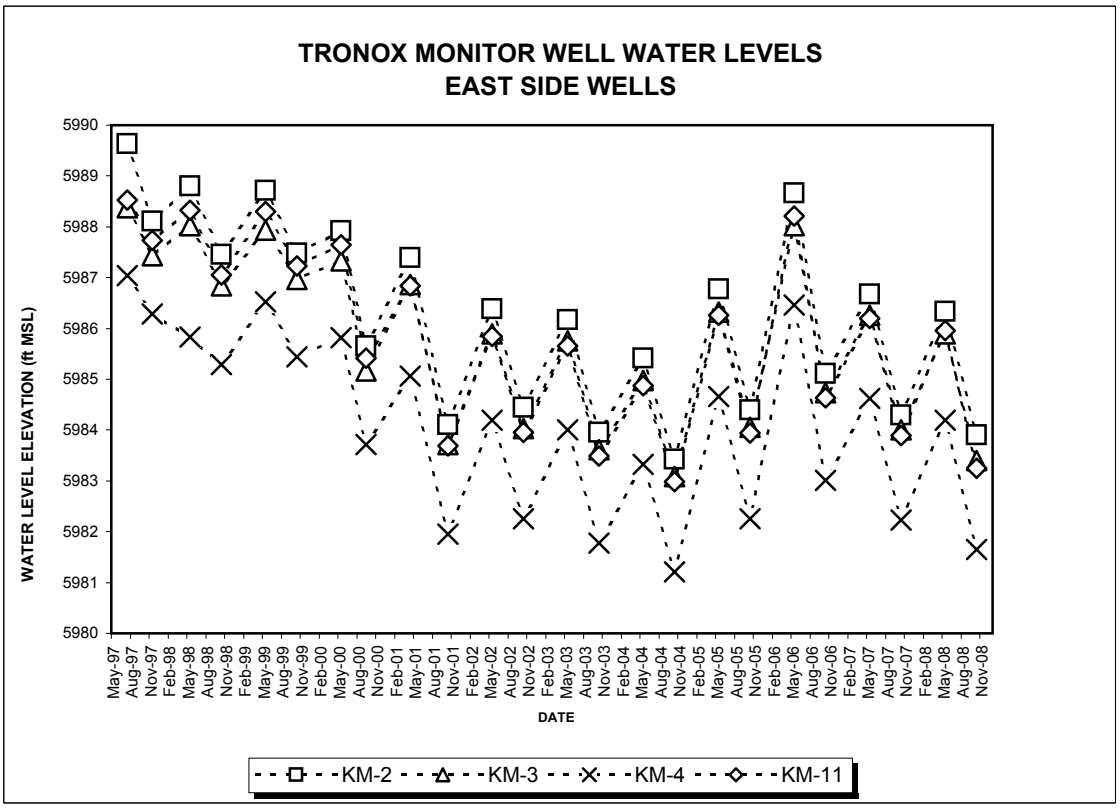
DISTRIBUTION OF SHALLOW AQUIFER HYDRAULIC CONDUCTIVIY

SIZE	CAGE CODE	DWG NO	REV
B		WATERSAMPLELOCATIONS.TCW	0

SCALE	SHEET
AS SHOWN	FIGURE 2-1


ANNUAL PRECIPITATION - SODA SPRINGS, IDAHO 1990 THROUGH 2007
ANNUAL PRECIPITATION (in)
25
20
15
10
5
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
DATE
ANNUAL PRECIPITATION
Moving Average (ANNUAL PRECIPITATION)

WATER LEVELS VERSUS TIME
TRONOX ON-SITE WELLS
FOLLOWING LSE AND POND RECLAMATION



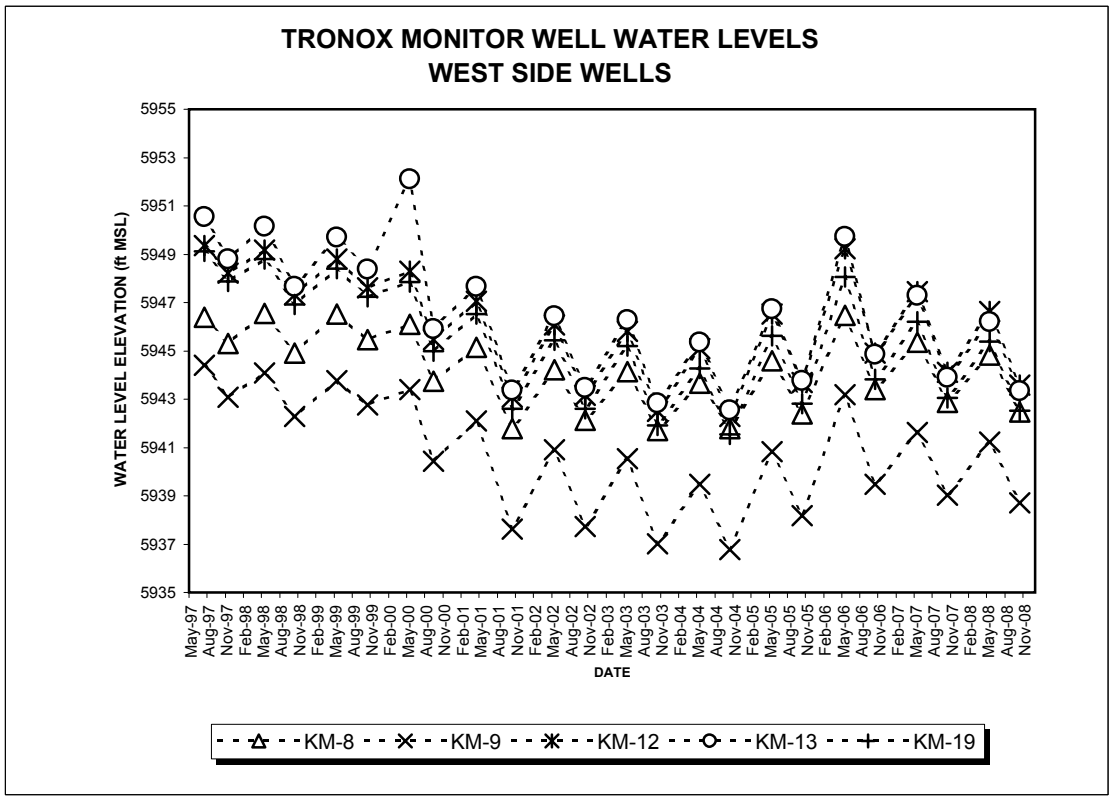
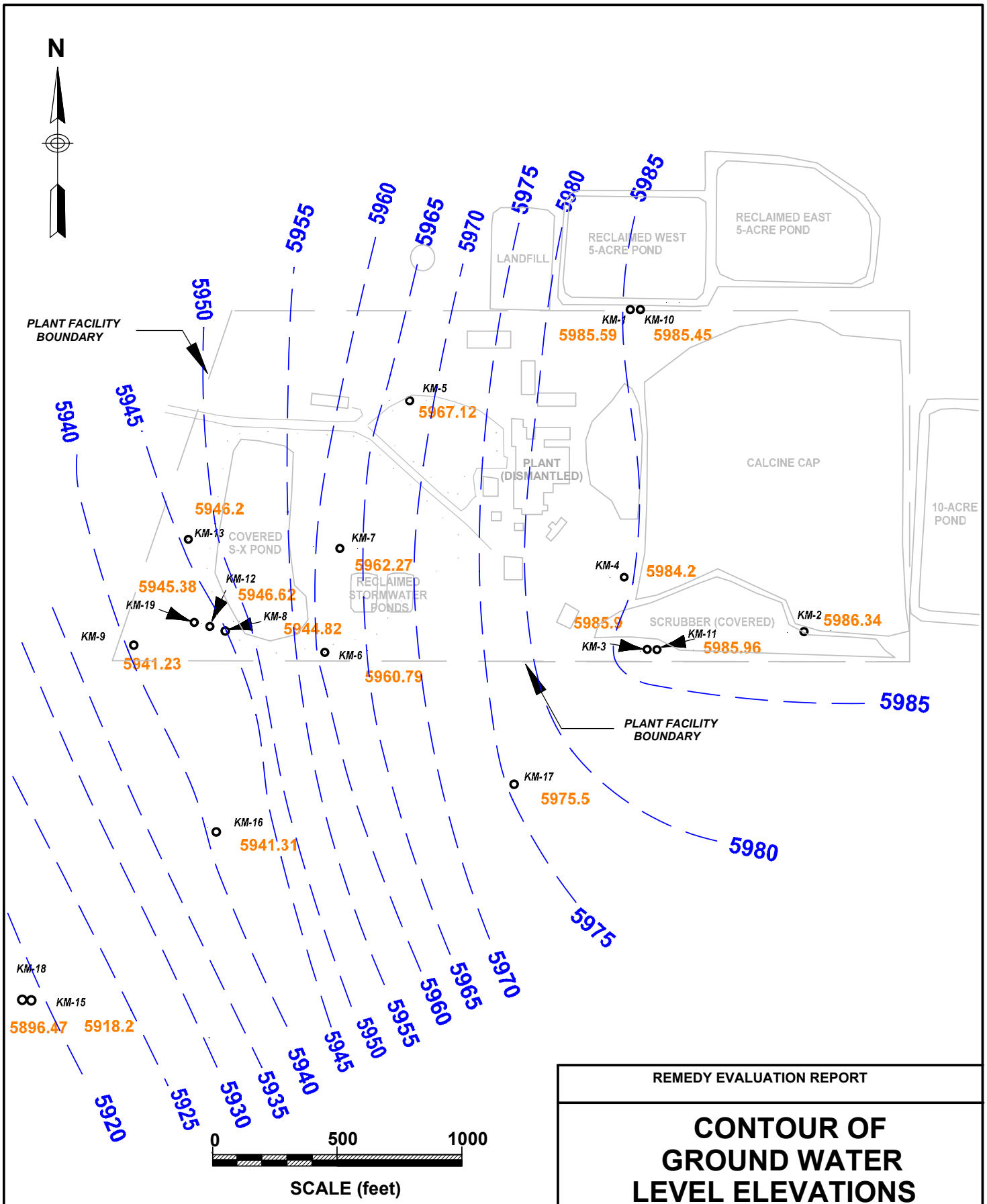


FIGURE 2-3



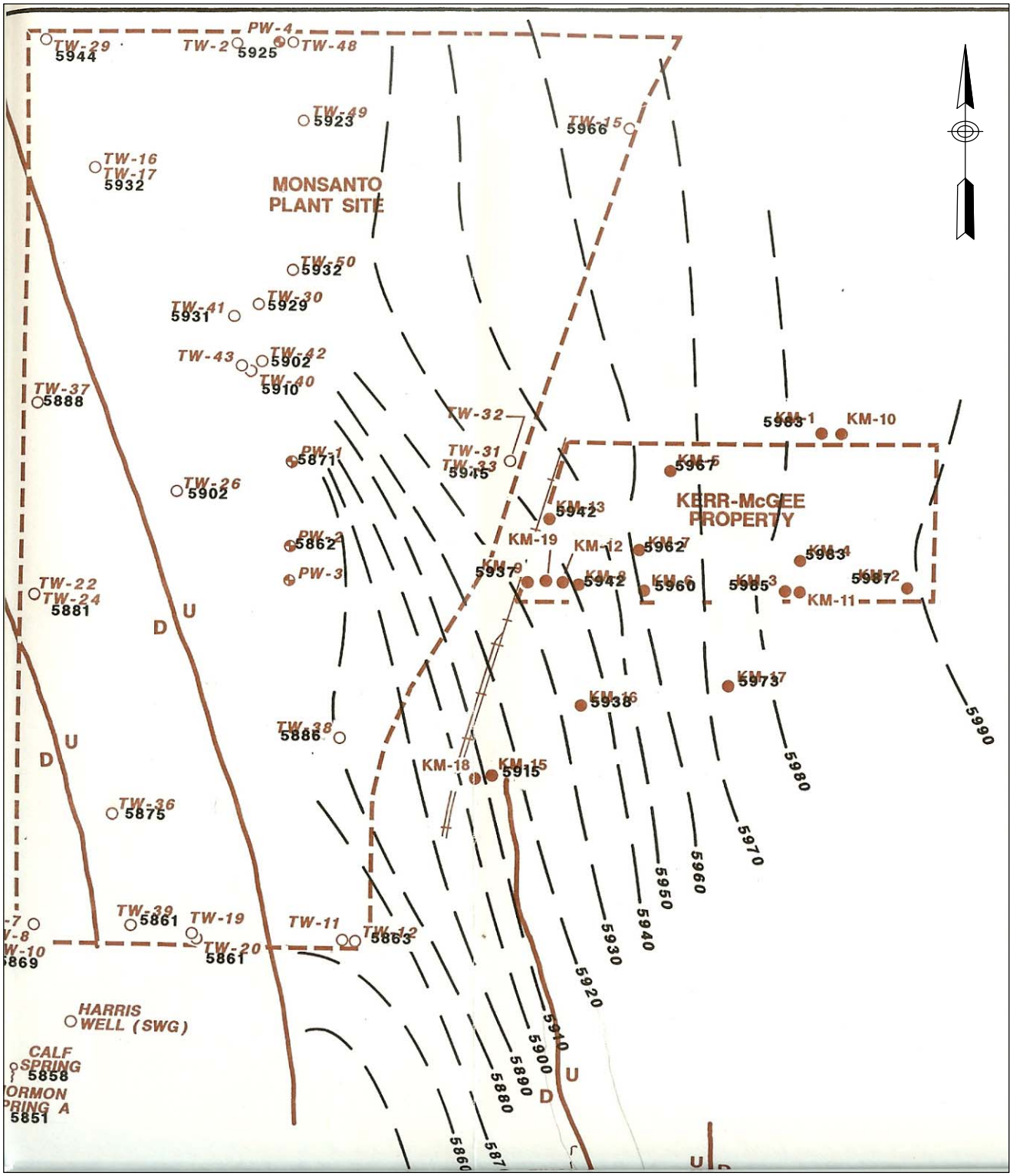
NOTE: CONTOURS BASED ON GROUND WATER LEVELS IN SHALLOW WELLS

REMEDY EVALUATION REPORT

CONTOUR OF GROUND WATER LEVEL ELEVATIONS MAY 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE X-2 2-4



0 500 1000

SCALE (feet)

NOTE: CONTOURS BASED ON GROUND WATER LEVELS IN SHALLOW WELLS

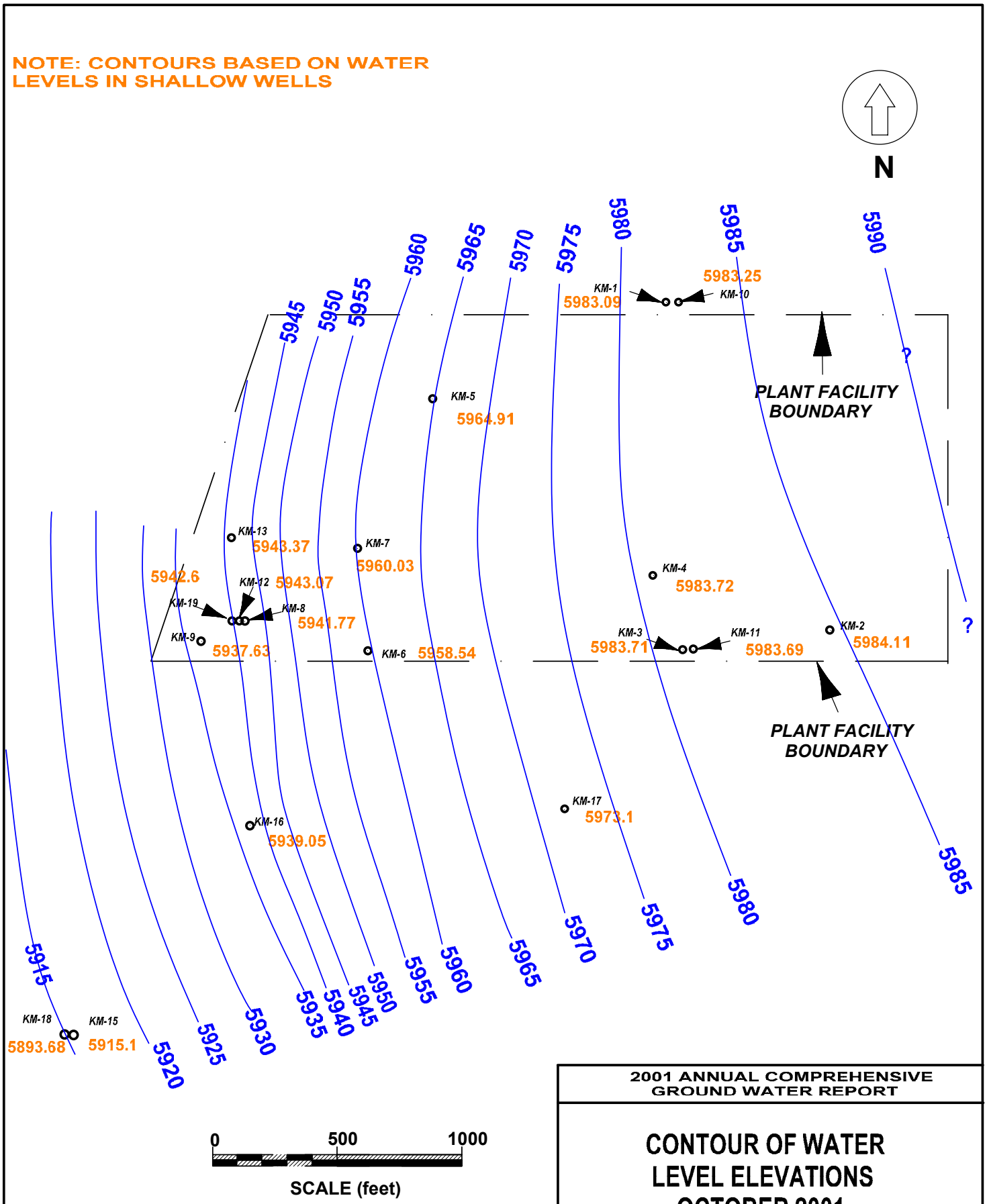
REFERENCE:DAMES & MOORE, 1995 RI REPORT

REMEDY EVALUATION REPORT

CONTOUR OF GROUND WATER LEVEL ELEVATIONS NOVEMBER 1992

TRONOX
SODA SPRINGS, IDAHO

FIGURE 2-5

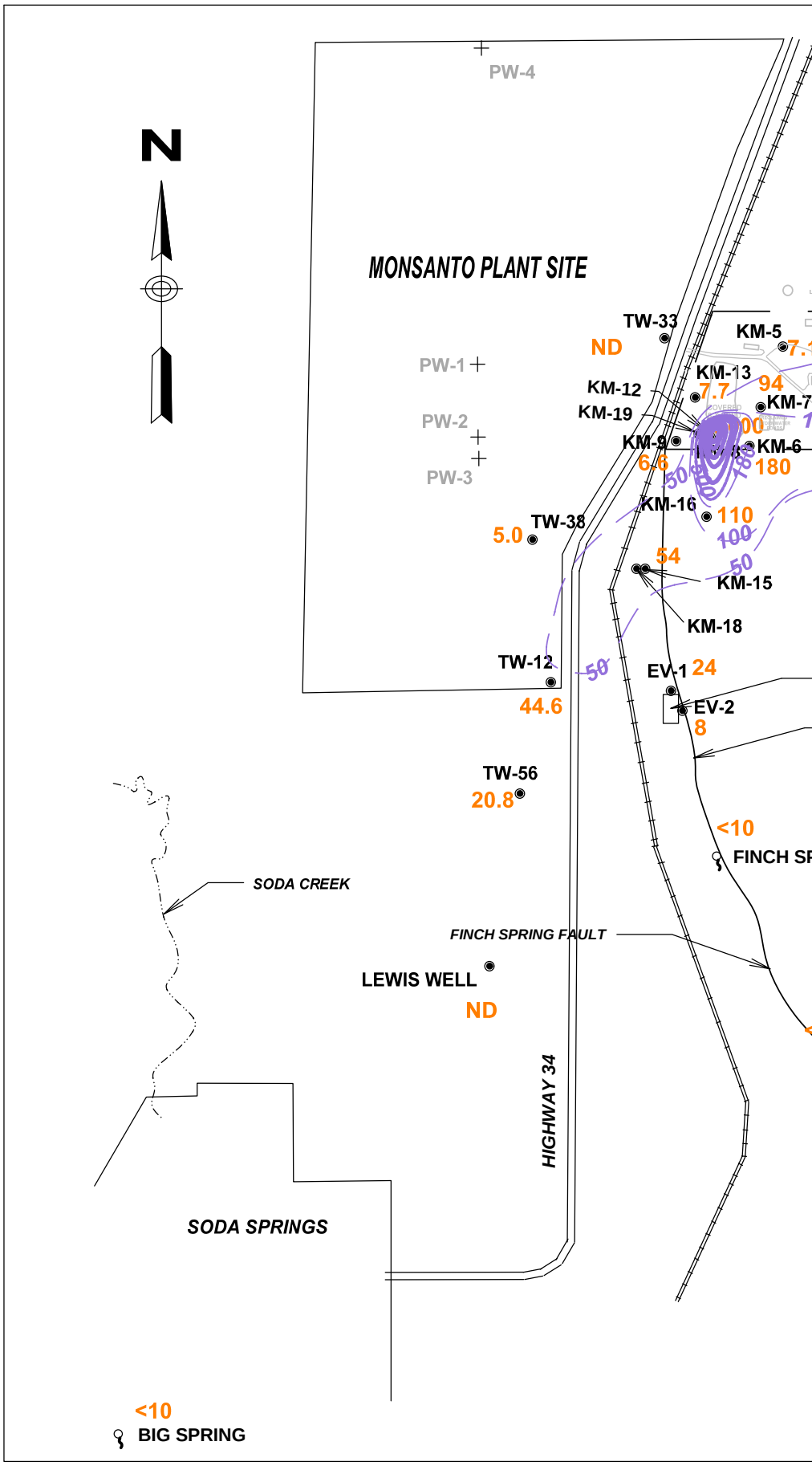


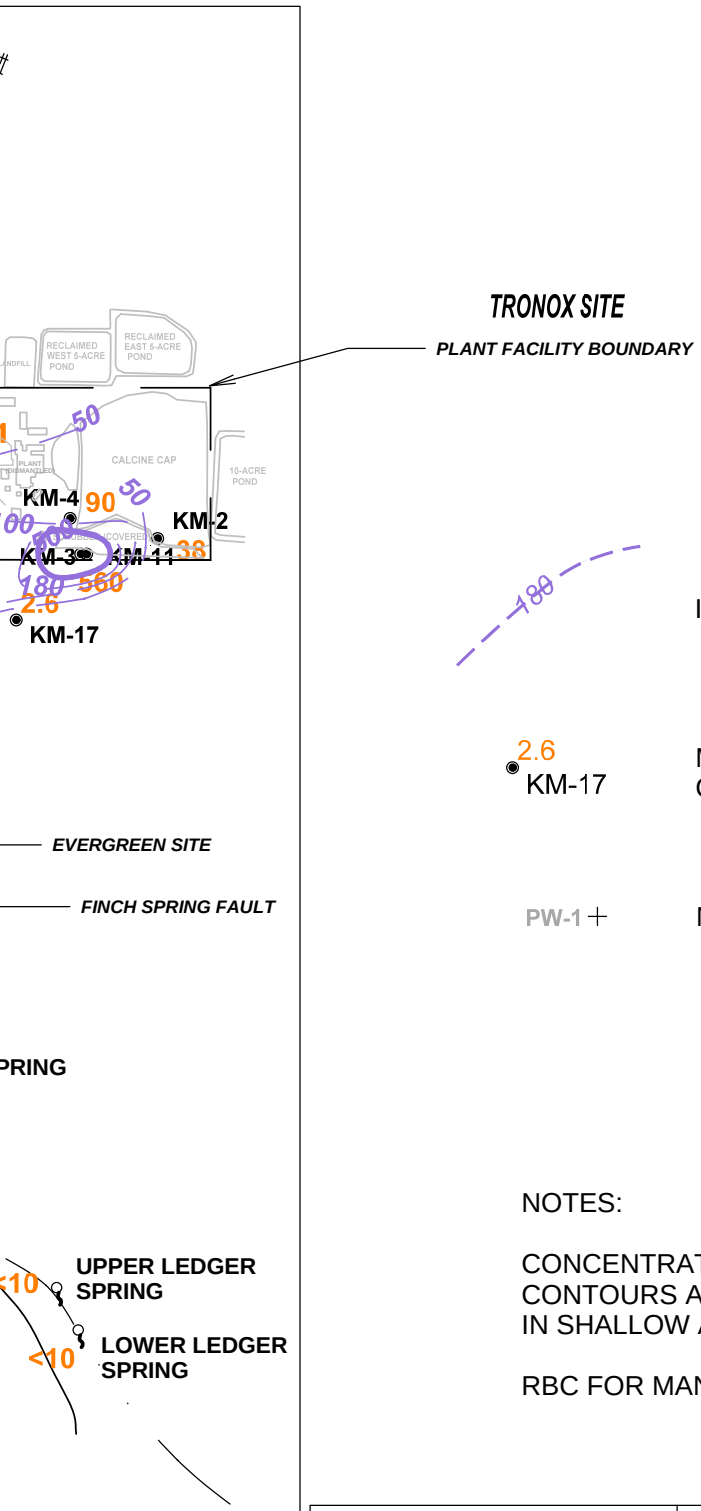
2001 ANNUAL COMPREHENSIVE GROUND WATER REPORT

CONTOUR OF WATER LEVEL ELEVATIONS OCTOBER 2001

KERR-McGEE CHEMICAL LLC
SODA SPRINGS, IDAHO

FIGURE 12-6


N
MONSANTO PLANT SITE
PW-4
PW-1
PW-2
PW-3
TW-33
ND
KM-5
KM-13
7.7
94
KM-12
KM-19
KM-9
6.6
KM-6
180
KM-16
110
TW-38
5.0
54
KM-15
KM-18
TW-12
44.6
EV-1
24
EV-2
8
TW-56
20.8
<10
FINCH SP
SODA CREEK
FINCH SPRING FAULT
LEWIS WELL
ND
HIGHWAY 34
SODA SPRINGS
<10
BIG SPRING



KEY

INFERRED CONTOUR AND CONCENTRATION

2.6
KM-17 — MONITOR WELL LOCATION AND CONCENTRATION IN UG/L

PW-1 + — MONSANTO PRODUCTION WELL LOCATION

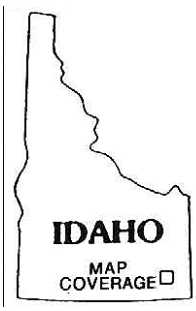
SCALE IN FEET

0 750 1500 3000

NOTES:

CONCENTRATIONS ARE IN UG/L
CONTOURS ARE BASED ON CONCENTRATIONS IN SHALLOW AQUIFER.

RBC FOR MANGANESE IS 180 UG/L



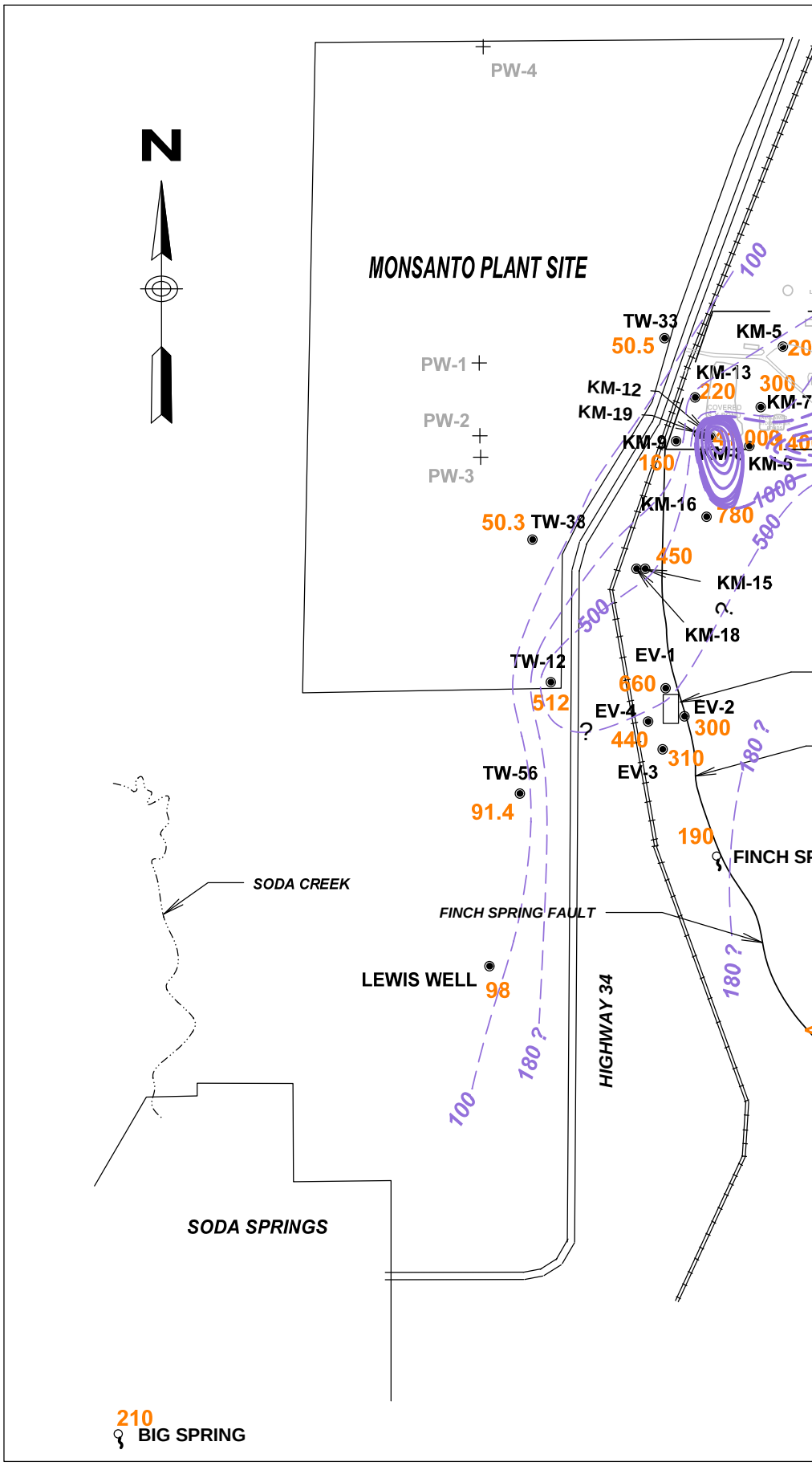
REMEDY EVALUATION REPORT

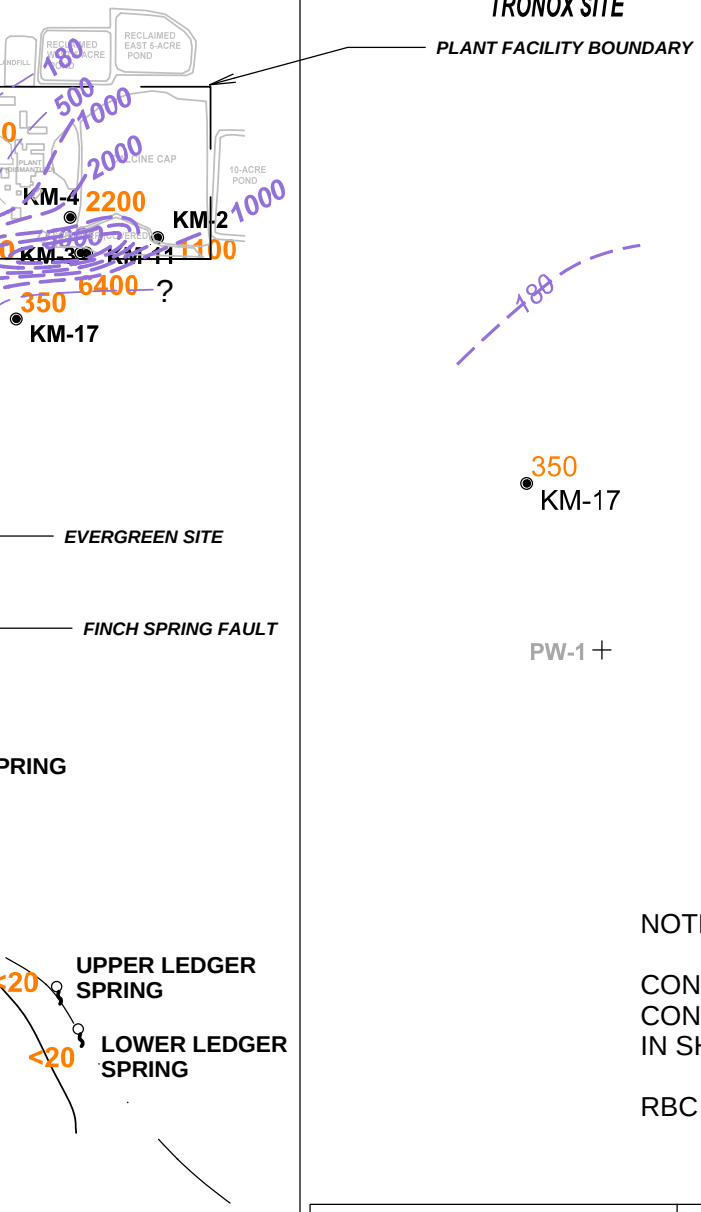
TITLE

GROUND AND SURFACE WATER MANGANESE CONCENTRATIONS MAY 2007

SIZE	CAGE CODE	DWG NO	REV
B		WATERSAMPLELOCATIONS.TCW	0

SCALE	SHEET
AS SHOWN	FIGURE 2-7


N
MONSANTO PLANT SITE
PW-4
PW-1
PW-2
PW-3
TW-33
50.5
KM-5
20
KM-13
300
KM-12
220
KM-19
KM-7
KM-9
160
KM-6
KM-16
780
50.3
TW-38
450
KM-15
KM-18
EV-1
660
TW-12
512
EV-4
EV-2
300
440
310
EV-3
TW-56
91.4
190
FINCH SP
SODA CREEK
FINCH SPRING FAULT
LEWIS WELL
98
HIGHWAY 34
SODA SPRINGS
210
BIG SPRING
100
500
1000
180 ?



KEY

180 — INFERRED CONTOUR AND CONCENTRATION

350 KM-17 — MONITOR WELL LOCATION AND CONCENTRATION IN UG/L

PW-1 + — MONSANTO PRODUCTION WELL LOCATION

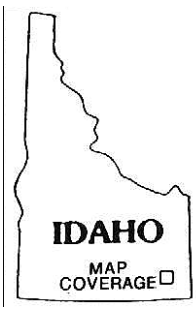
SCALE IN FEET

0 750 1500 3000

NOTES:

CONCENTRATIONS ARE IN UG/L
CONTOURS ARE BASED ON CONCENTRATIONS IN SHALLOW AQUIFER.

RBC FOR MOLYBDENUM IS 180 UG/L



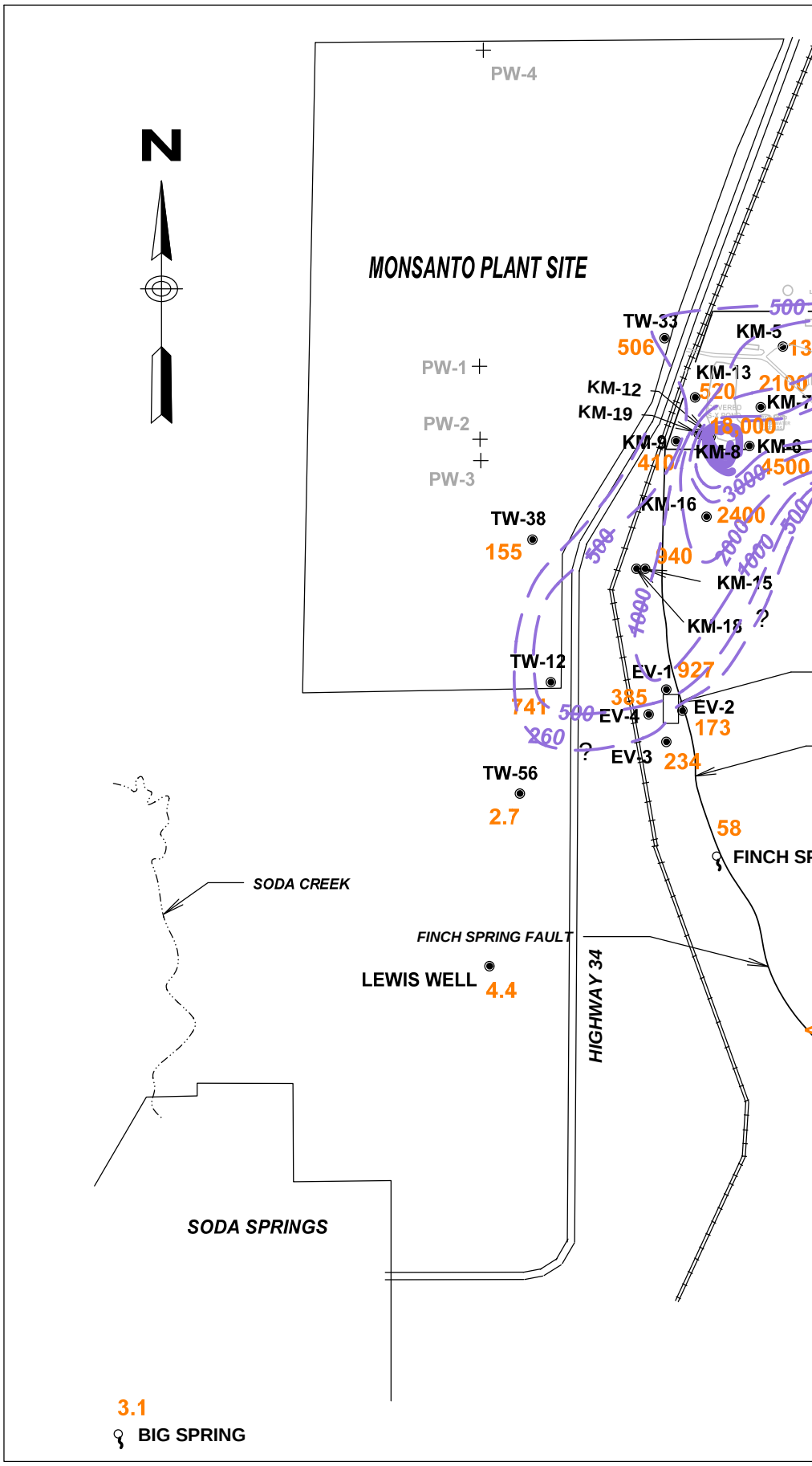
REMEDY EVALUATION REPORT

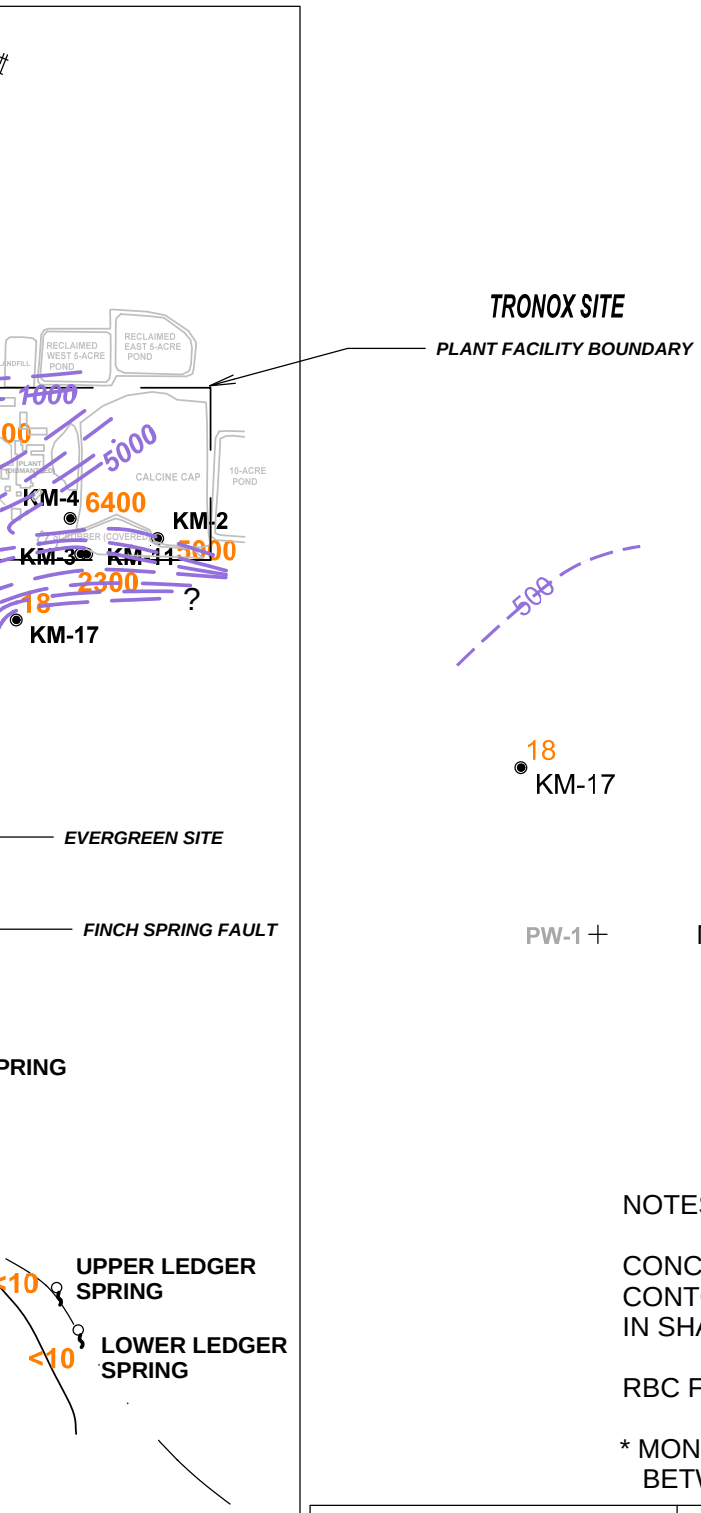
TITLE

GROUND AND SURFACE WATER MOLYBDENUM CONCENTRATIONS MAY 2007

SIZE	CAGE CODE	DWG NO	REV
B		WATERSAMPLELOCATIONS.TCW	0

SCALE	SHEET
AS SHOWN	FIGURE 2-8


N
MONSANTO PLANT SITE
PW-4
PW-1
PW-2
PW-3
TW-33
506
KM-5
KM-13
520
KM-12
KM-19
KM-9
410
KM-8
KM-6
4500
KM-16
2400
TW-38
155
940
KM-15
KM-18
?
TW-12
741
EV-1
927
385
EV-2
173
EV-4
EV-3
234
TW-56
2.7
58
FINCH SP
SODA CREEK
FINCH SPRING FAULT
LEWIS WELL
4.4
HIGHWAY 34
SODA SPRINGS
3.1
BIG SPRING
500
1000
2000
3000
4000
260



KEY

500 — INFERRED CONTOUR AND CONCENTRATION

18 KM-17 — MONITOR WELL LOCATION AND CONCENTRATION IN UG/L

PW-1 + — MONSANTO PRODUCTION WELL LOCATION

SCALE IN FEET

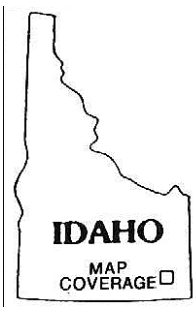
0 750 1500 3000

NOTES:

CONCENTRATIONS ARE IN UG/L
CONTOURS ARE BASED ON CONCENTRATIONS IN SHALLOW AQUIFER.

RBC FOR VANADIUM IS 260 UG/L

* MONSANTO DATA OBTAINED BY GOLDER BETWEEN JUNE 19 AND JUNE 27, 2007



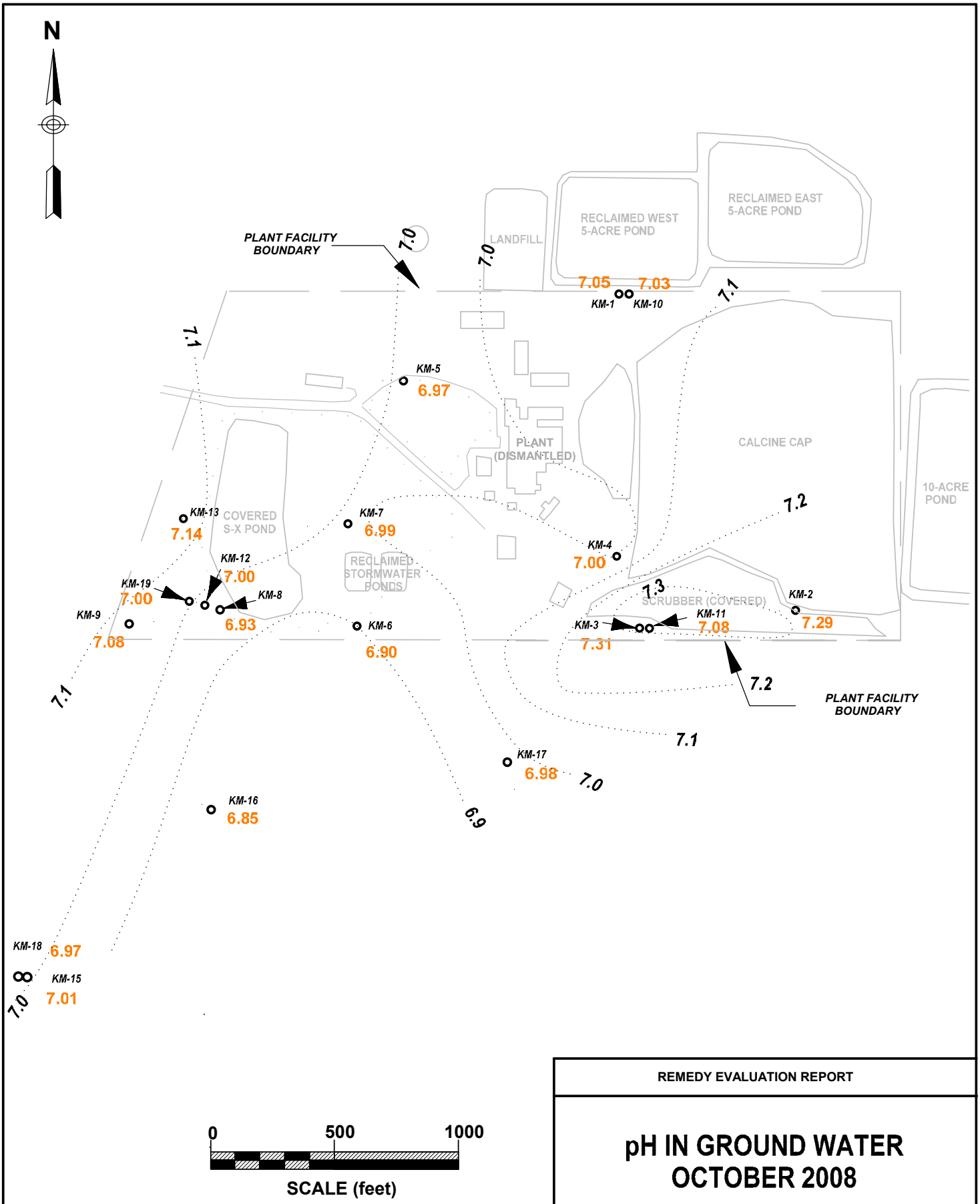
REMEDY EVALUATION REPORT

TITLE

GROUND AND SURFACE WATER VANADIUM CONCENTRATIONS MAY 2007*

SIZE	CAGE CODE	DWG NO	REV
B		WATERSAMPLELOCATIONS.TCW	0

SCALE	SHEET
AS SHOWN	FIGURE 2-9



0 500 1000

SCALE (feet)

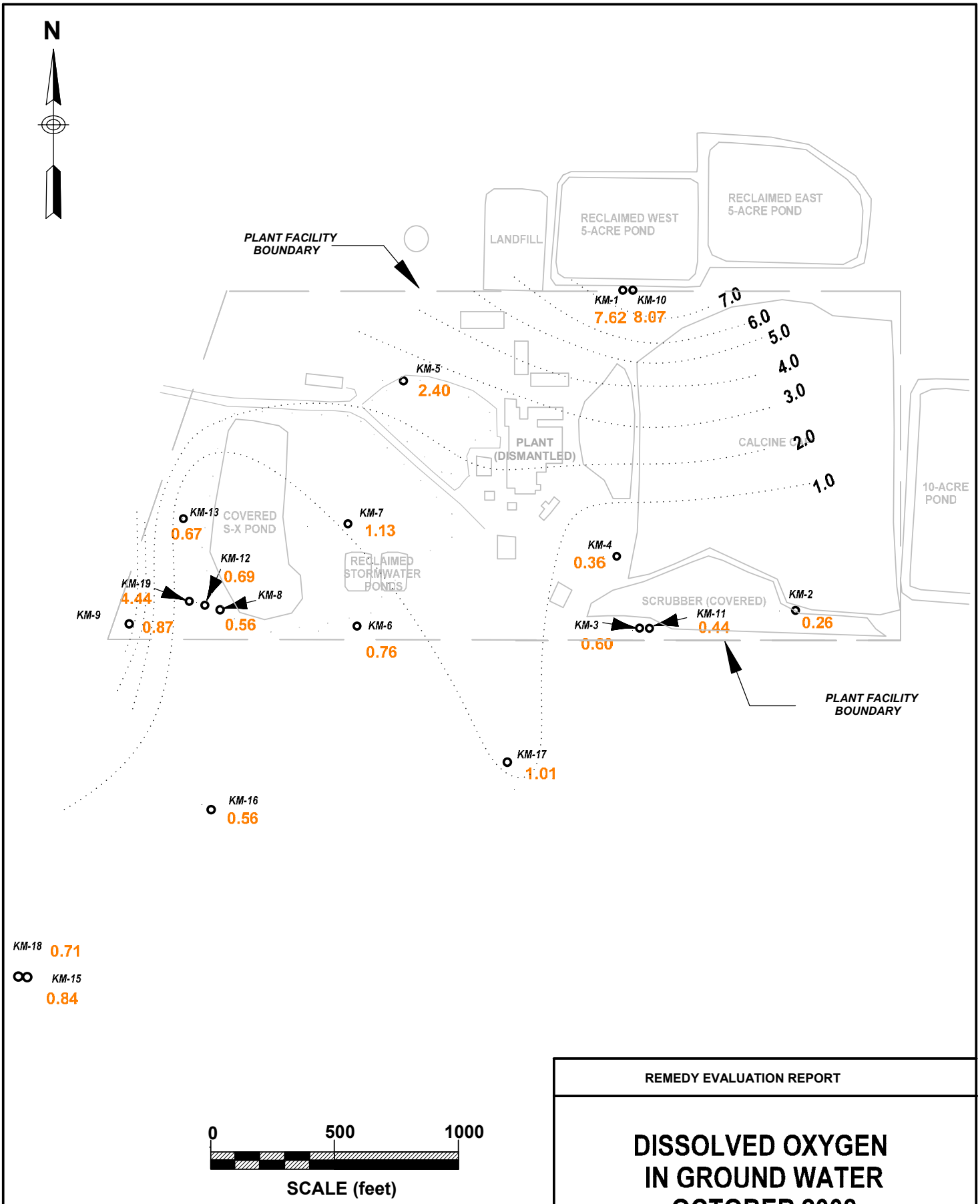
NOTE: CONCENTRATIONS ARE IN pH units.
CONCENTRATIONS BASED ON OBSERVED CONCENTRATIONS IN SHALLOW AQUIFER.

REMEDY EVALUATION REPORT

pH IN GROUND WATER OCTOBER 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE 2-10



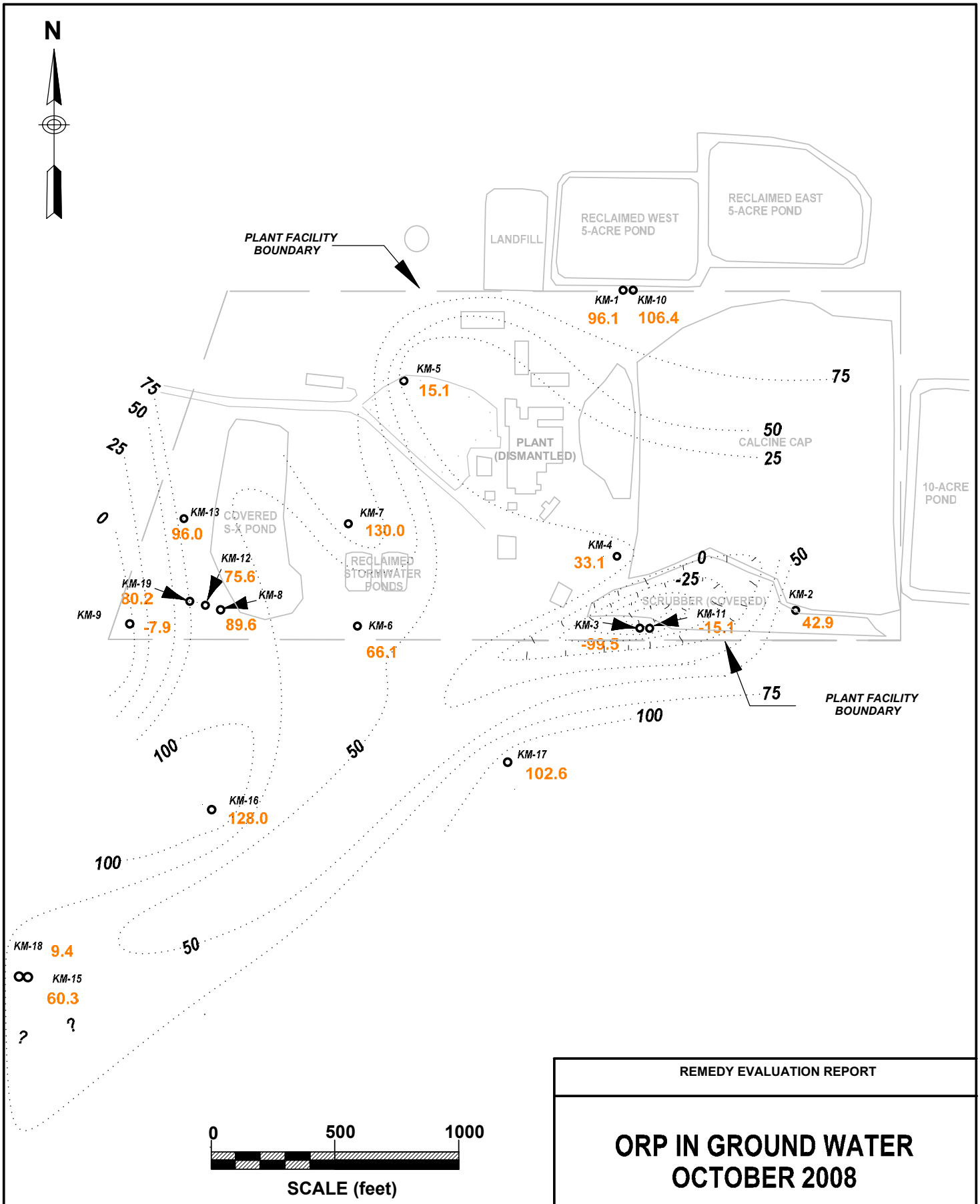
NOTE: CONCENTRATIONS ARE IN DO (MG/L).
CONCENTRATIONS BASED ON OBSERVED CONCENTRATIONS IN SHALLOW AQUIFER.

REMEDY EVALUATION REPORT

DISSOLVED OXYGEN IN GROUND WATER OCTOBER 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE 4-12-11



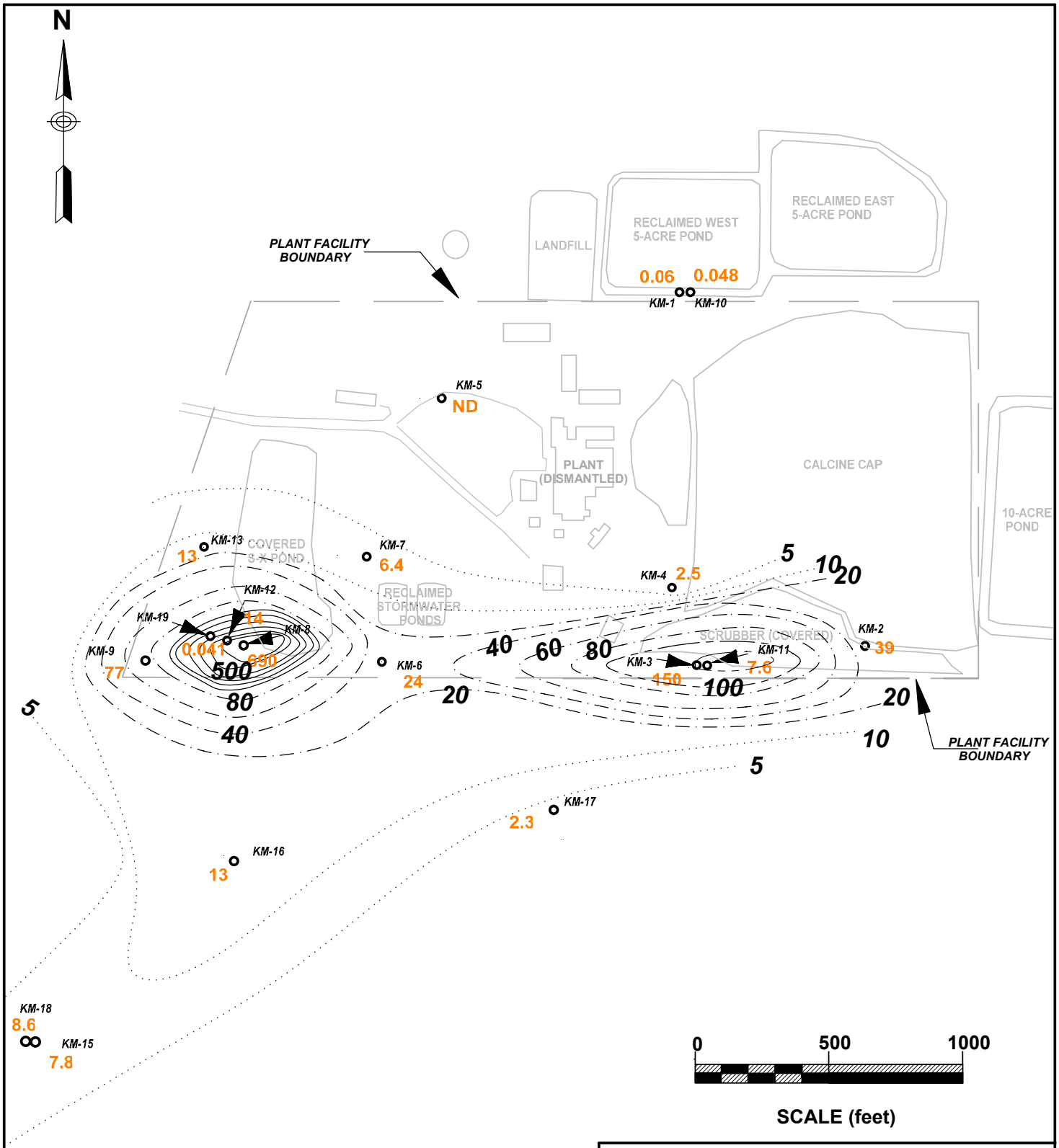
NOTE: CONCENTRATIONS ARE IN mV
CONCENTRATIONS BASED ON OBSERVED POTENTIALS
IN SHALLOW AQUIFER.

REMEDY EVALUATION REPORT

ORP IN GROUND WATER OCTOBER 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE ~~4-1~~ 2-12



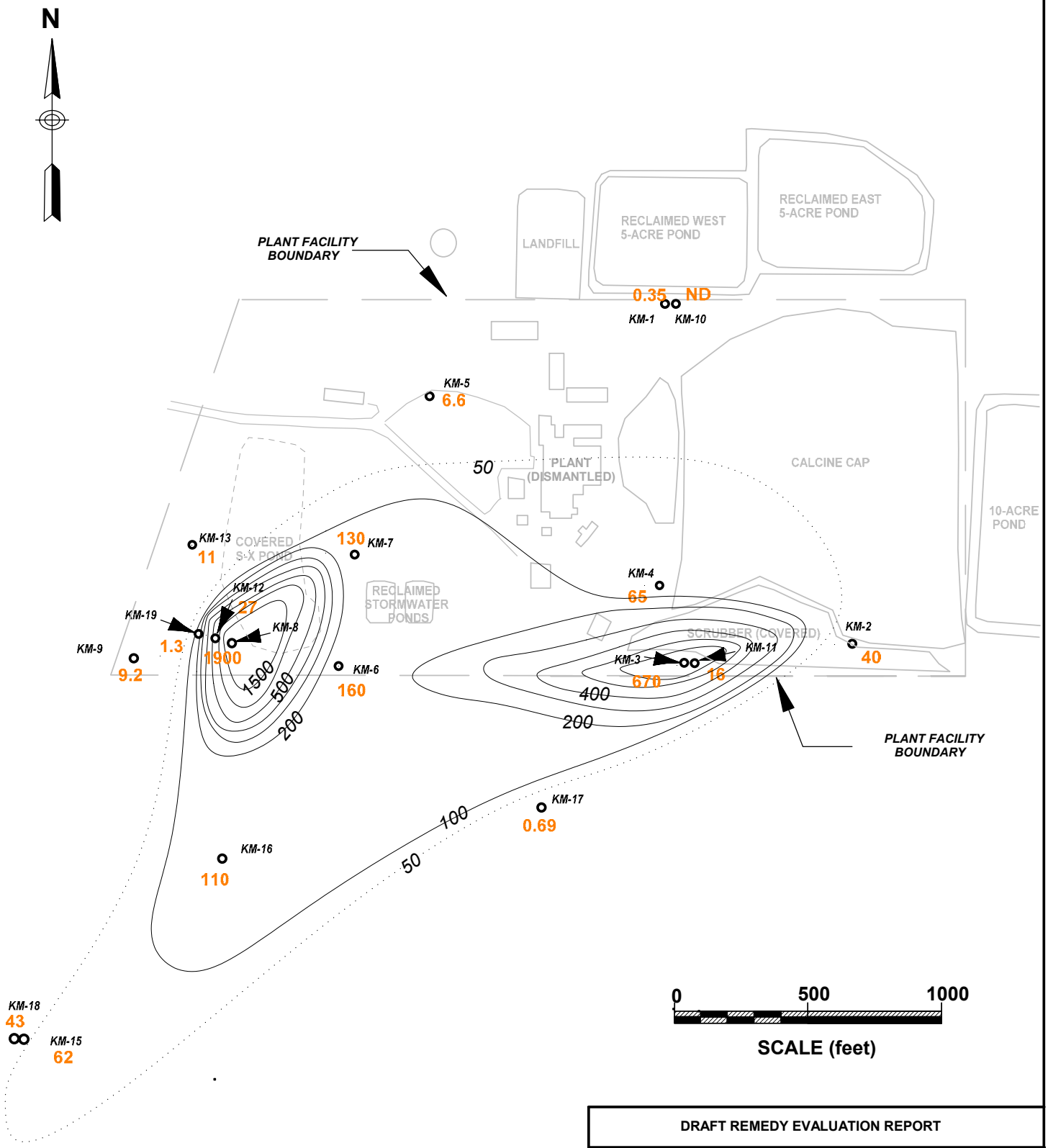
NOTE: CONCENTRATIONS ARE IN MG/L.
CONCENTRATIONS BASED ON OBSERVED CONCENTRATIONS IN SHALLOW AQUIFER.

DRAFT REMEDY EVALUATION REPORT

CONCENTRATIONS OF AMMONIUM IN GROUND WATER OCTOBER 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE 4.5 2-13



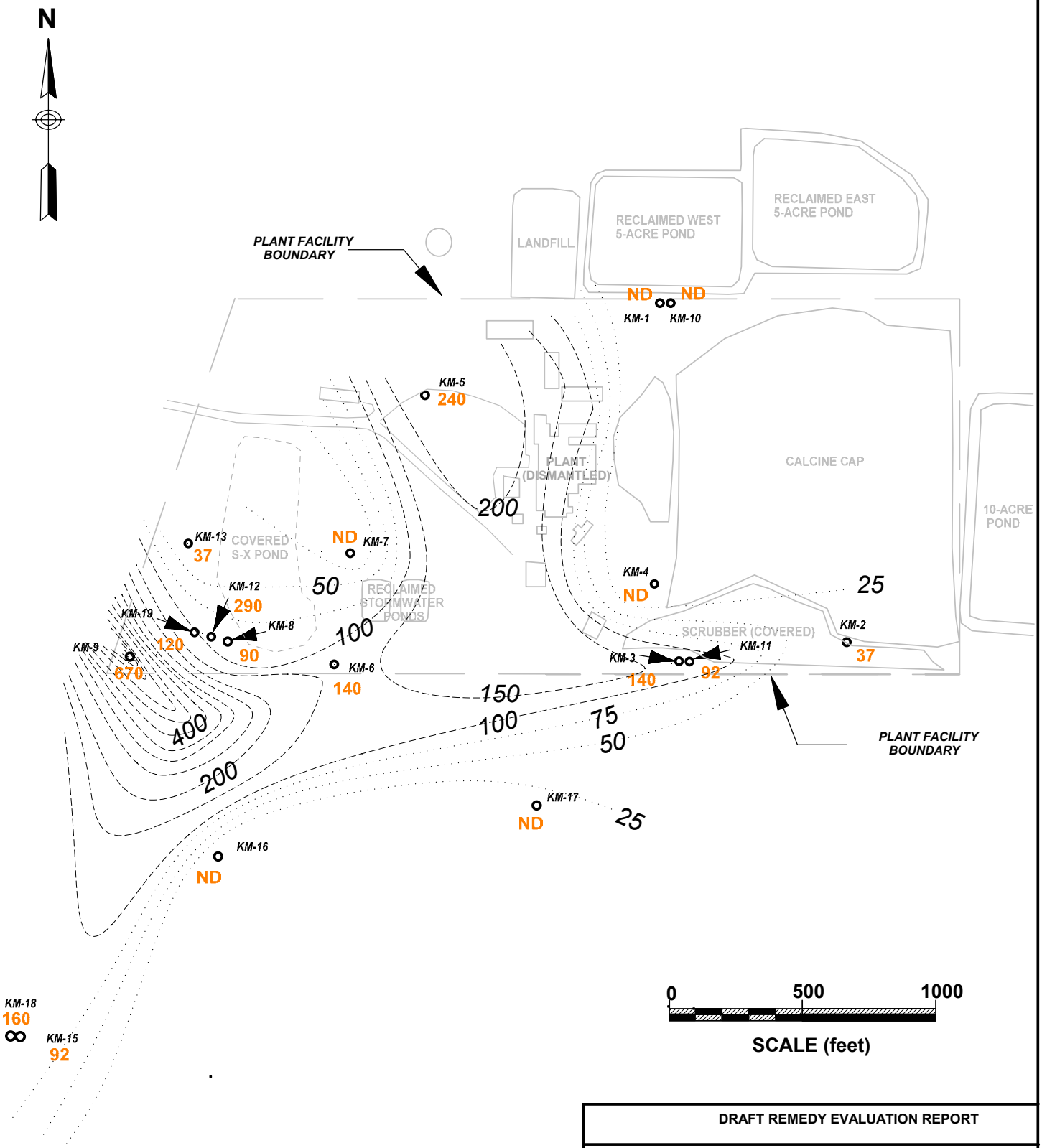
NOTE: CONCENTRATIONS ARE IN ug/l.
CONTOURS BASED ON CONCENTRATIONS IN SHALLOW AQUIFER.

DRAFT REMEDY EVALUATION REPORT

CONCENTRATIONS OF DISSOLVED MANGANESE IN GROUND WATER OCTOBER 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE 2-14



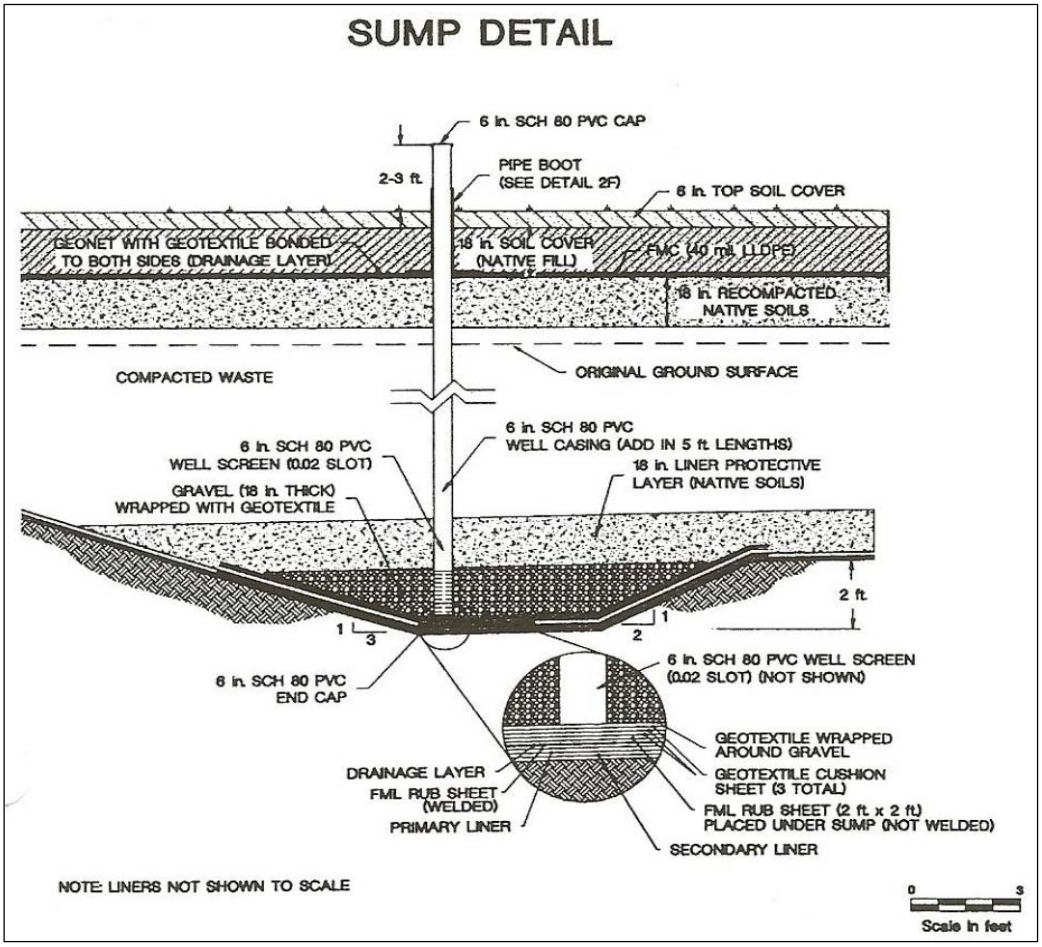
NOTE: CONCENTRATIONS ARE IN ug/l.
CONTOURS BASED ON CONCENTRATIONS
IN SHALLOW AQUIFER.

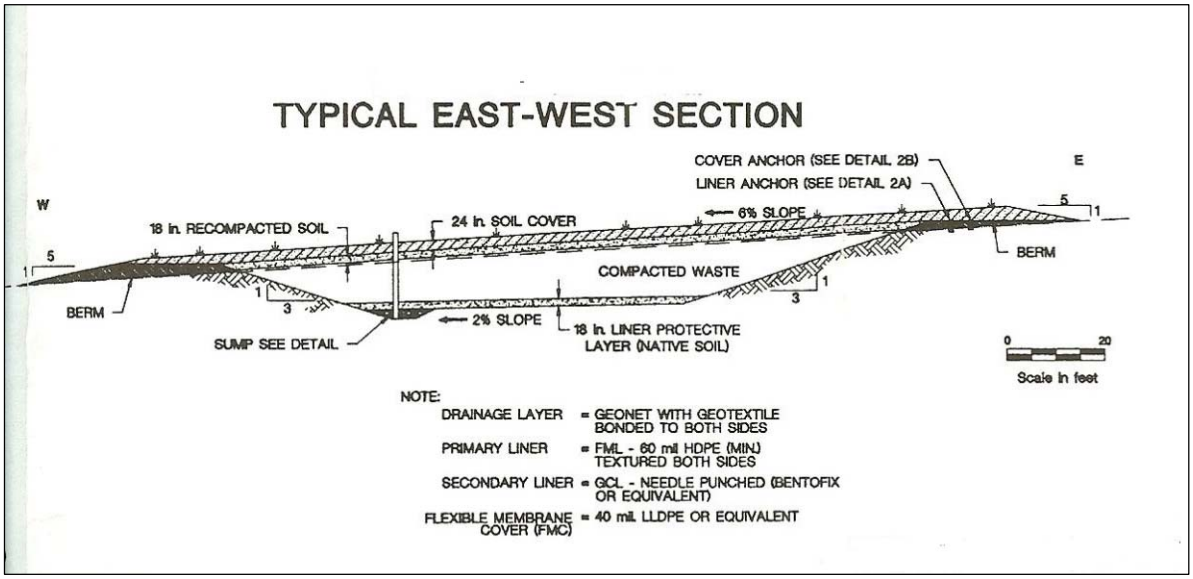
DRAFT REMEDY EVALUATION REPORT

CONCENTRATIONS OF DISSOLVED IRON IN GROUND WATER OCTOBER 2008

TRONOX
SODA SPRINGS, IDAHO

FIGURE 2-15



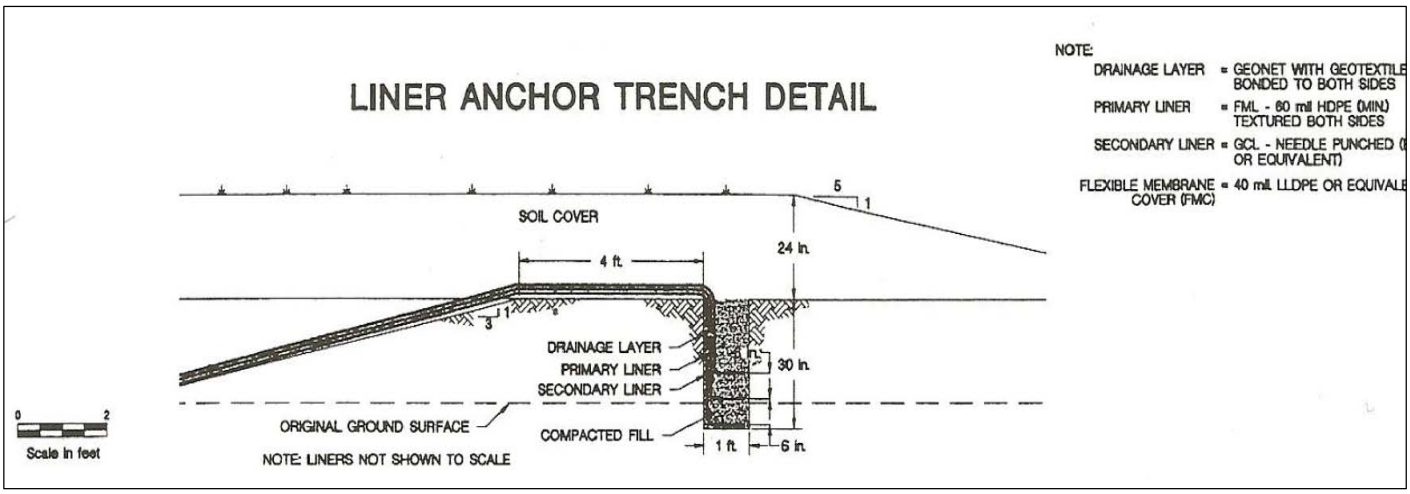


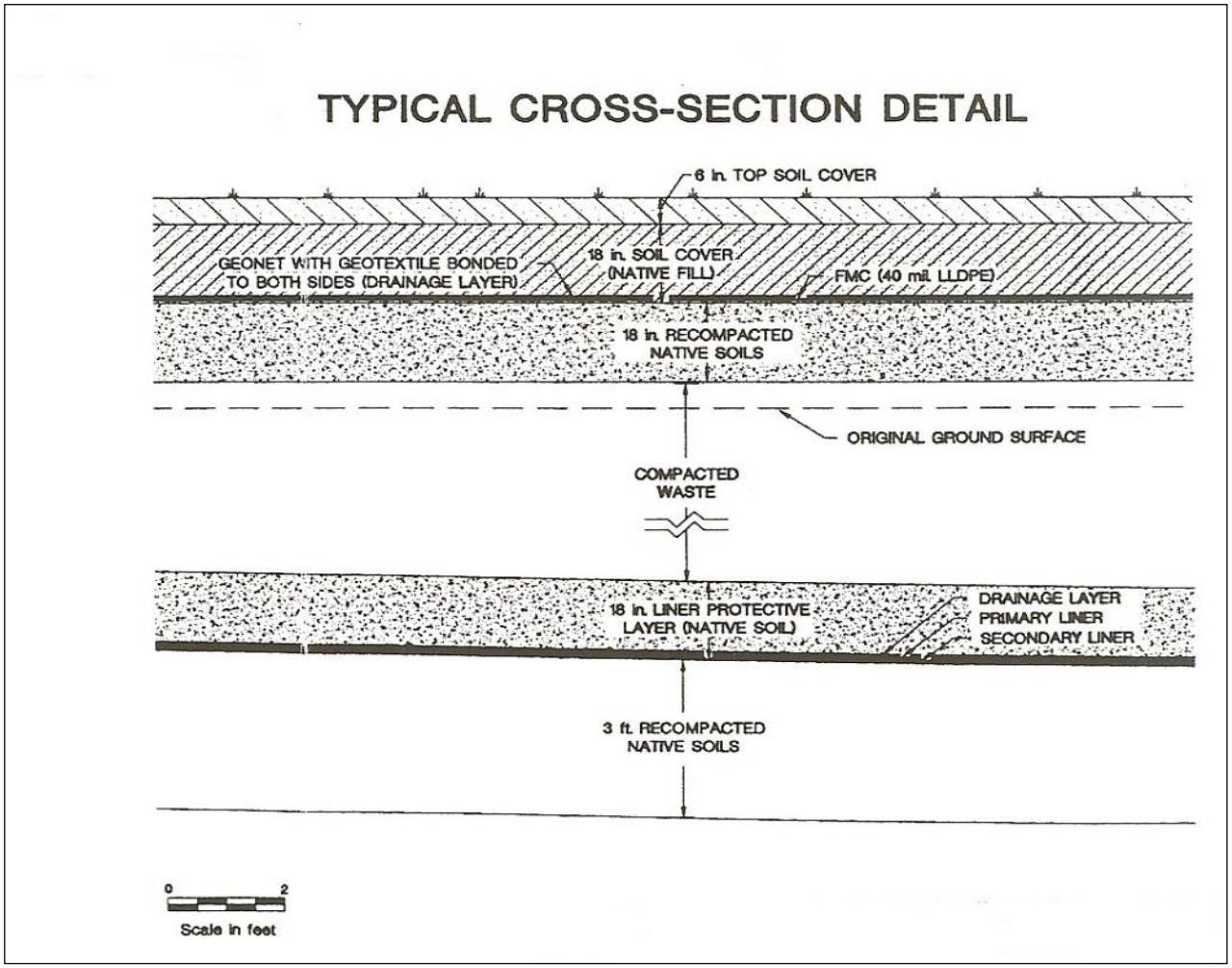
REMEDY EVALUATION REPORT

TRONOX LANDFILL CONSTRUCTION DETAILS

FIGURE 3-1

REFERENCE: DRAFT REMEDY EVALUATION REPORT
KERR-McGEE CHEMICAL LLC SODA SPRINGS, IDAHO
FACILITY REVISION I NOVEMBER 4, 1998



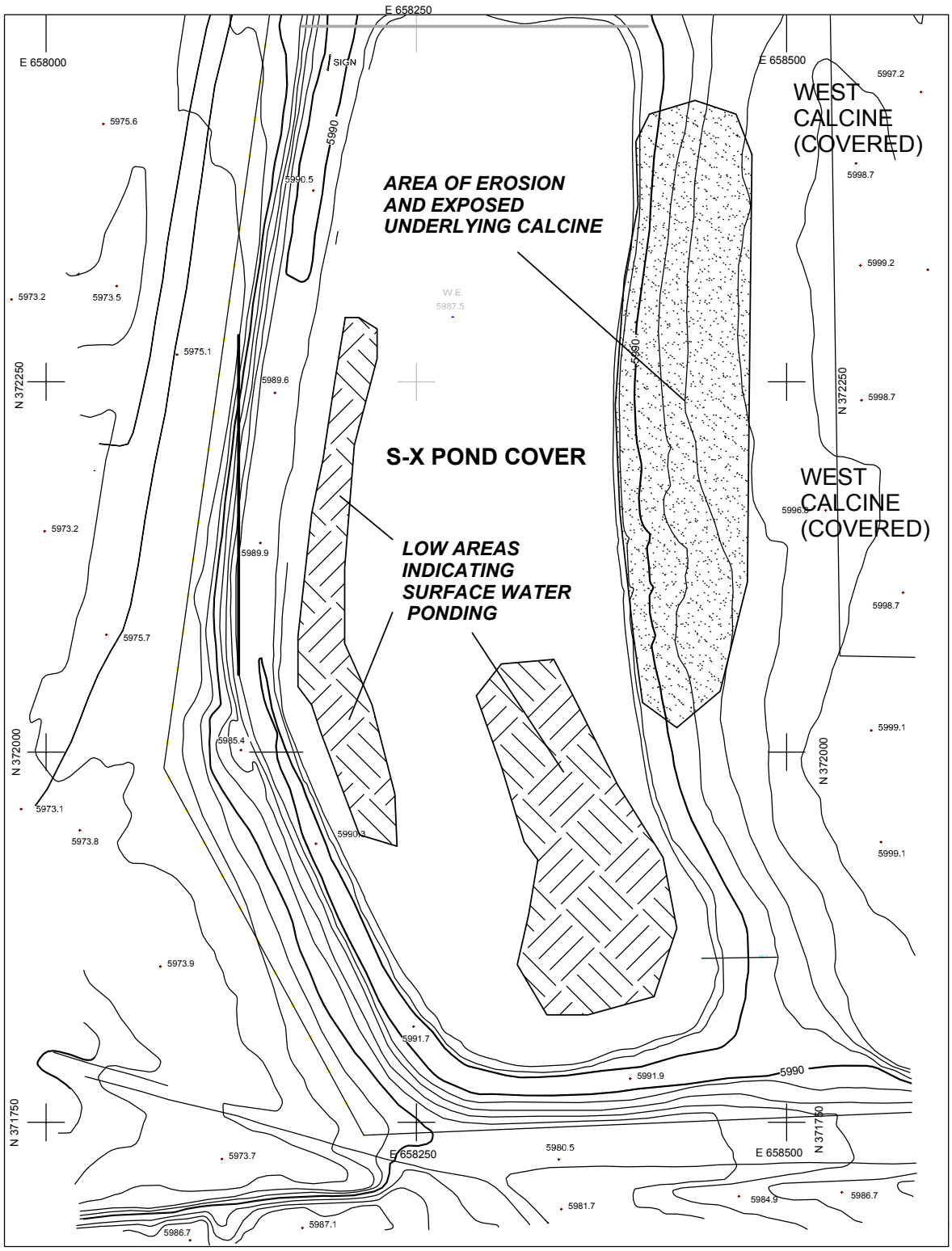


REMEDY EVALUATION REPORT

TRONOX LANDFILL CONSTRUCTION DETAILS

REFERENCE: DRAFT REMEDY EVALUATION REPORT
KERR-McGEE CHEMICAL LLC SODA SPRINGS, IDAHO
FACILITY REVISION I NOVEMBER 4, 1998

FIGURE 3-2



NORTH

50 25 0 50 100 150

SCALE 1"=50'

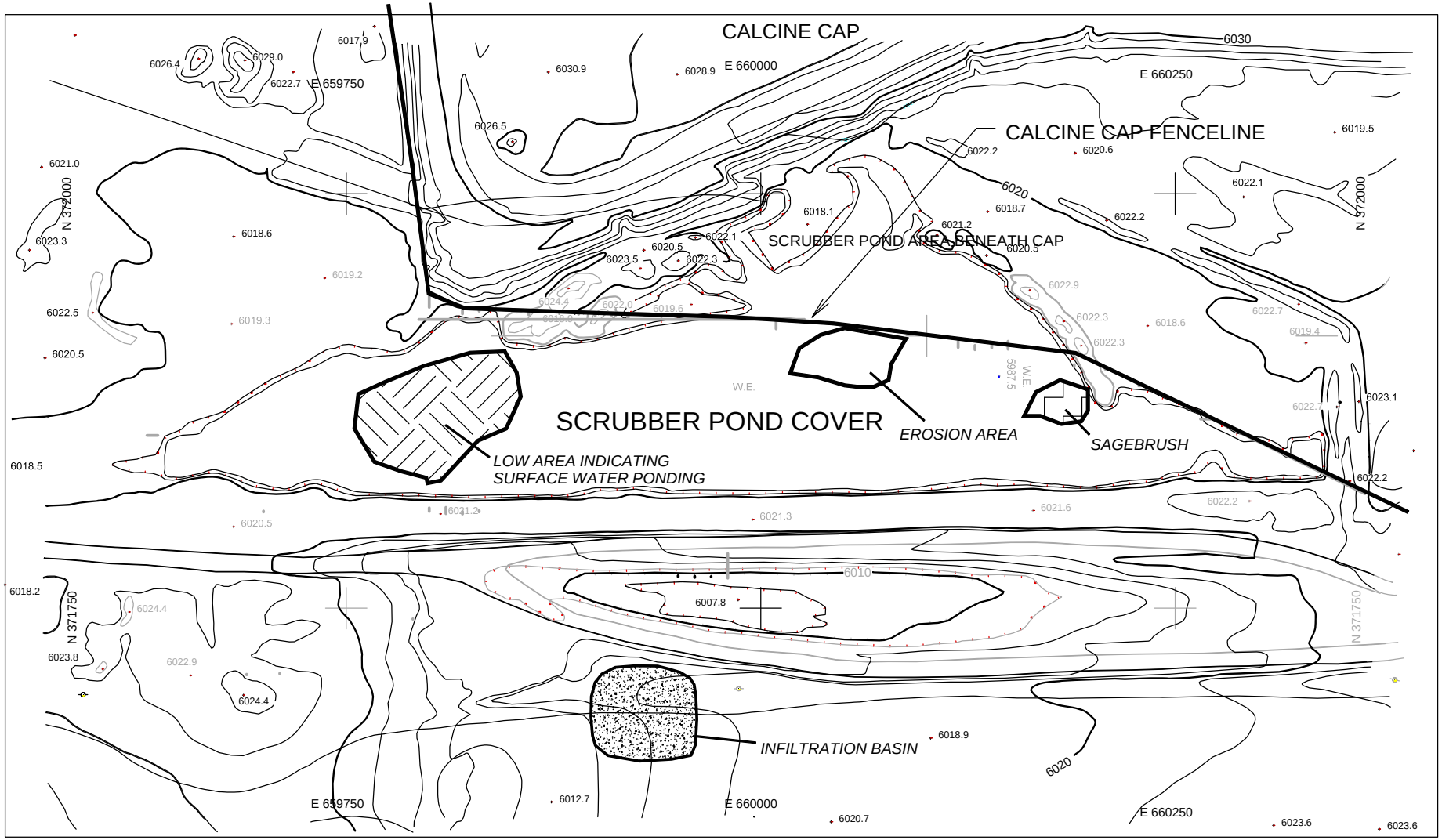
CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

GEMT LLC SODA SPRINGS, IDAHO
REMEDY EVALUATION REPORT

S-X POND COVER INSPECTION RESULTS

FIGURE 4-1



SCALE as shown

50 25 0 50 100 150

CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

DRAWN BY J.S.BROWN P.G.

DATE:3/12/10

DRAFT REMEDY EVALUATION REPORT

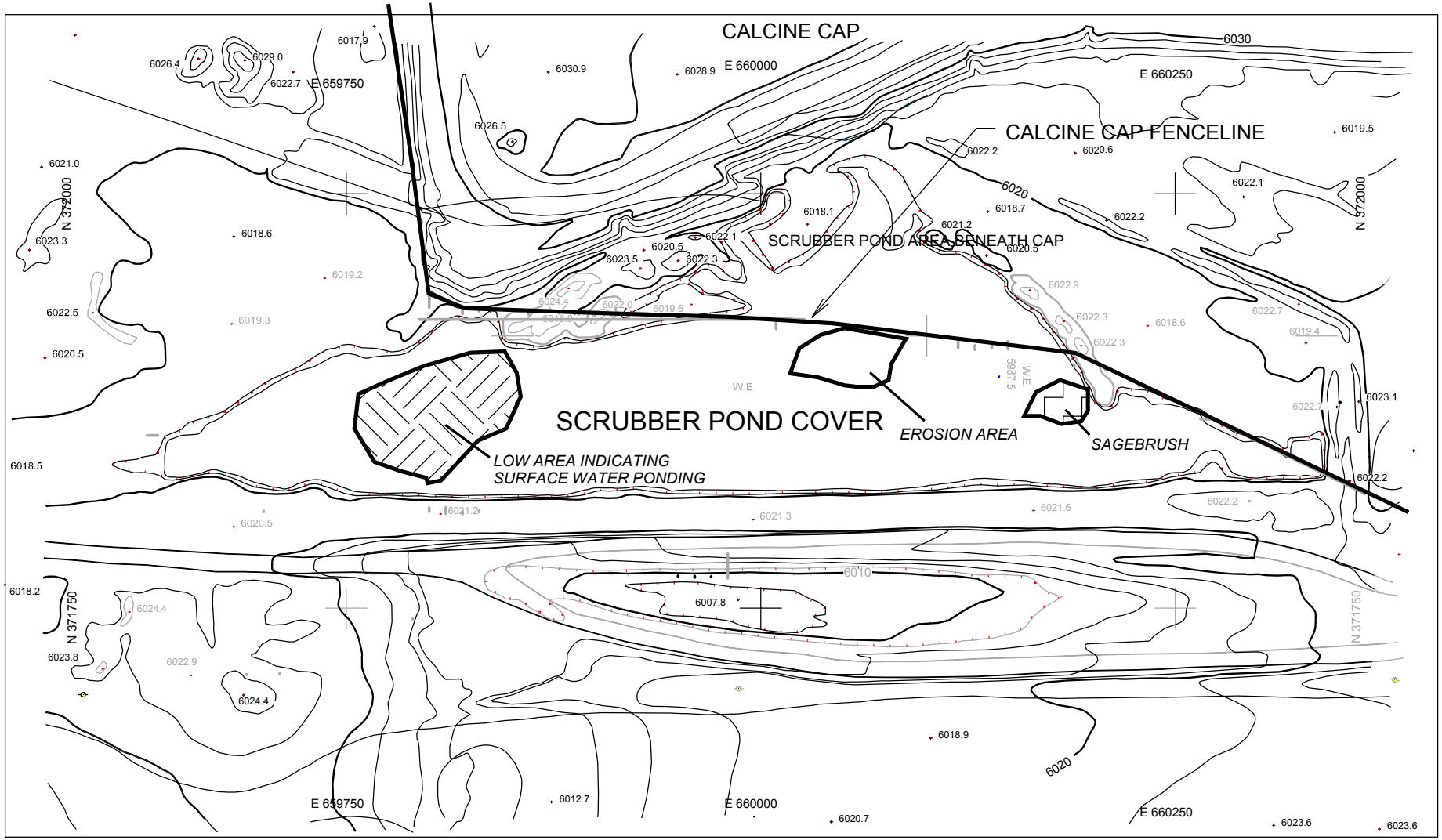
TITLE

SCRUBBER POND COVER INSPECTION RESULTS

SIZE	CAGE CODE	DWG NO	REV
A			1

SCALE

SHEET **FIGURE 4-2**



50 25 0 50 100 150

SCALE as shown

CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

DRAFT REMEDY EVALUATION REPORT

TITLE

SCRUBBER POND COVER INSPECTION RESULTS

SIZE	CAGE CODE	DWG NO	REV
A			1

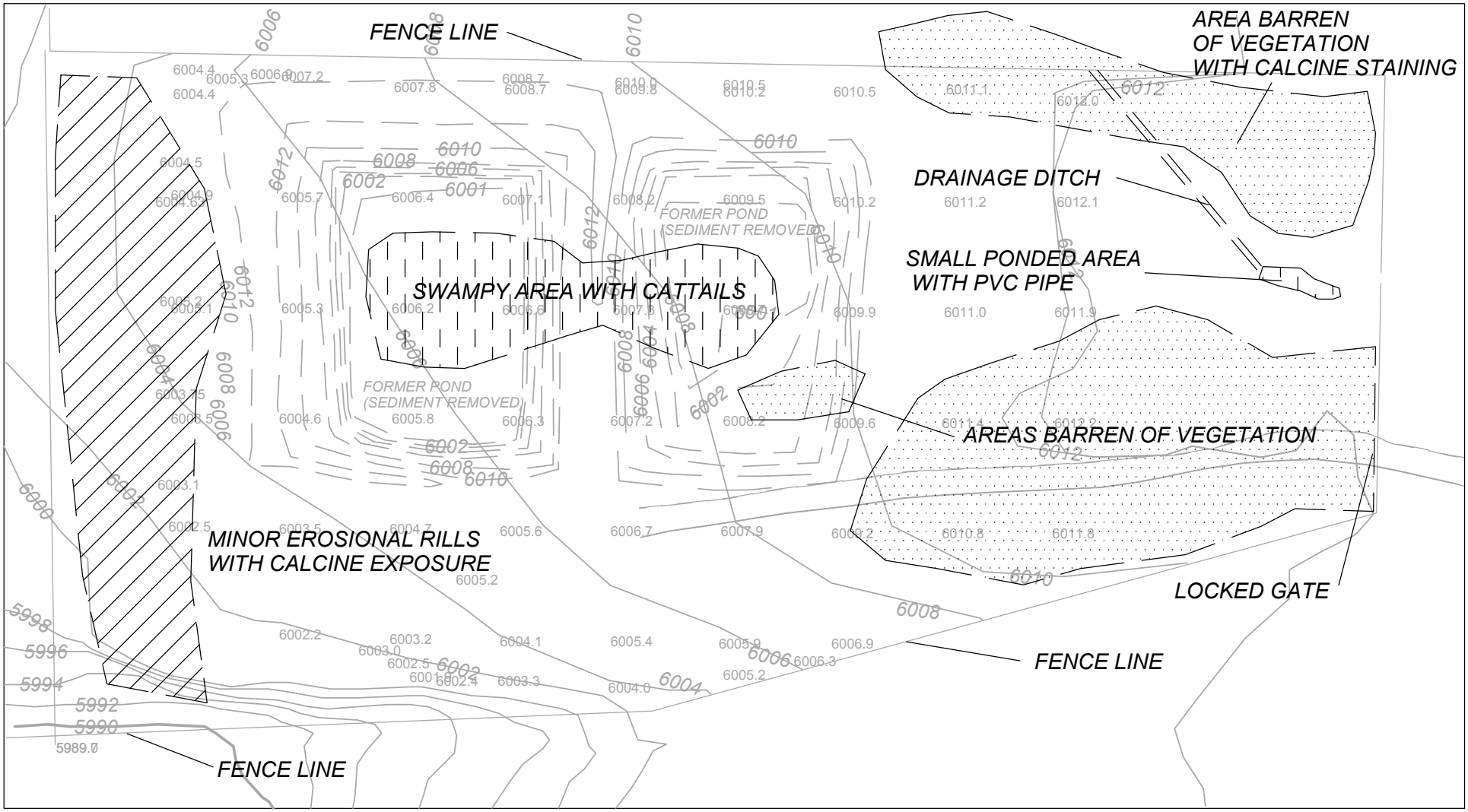
DRAWN BY J.S.BROWN P.G.

DATE: 2/14/09

SCALE

SHEET

FIGURE 4-2



50 25 0 50 100 150

REMEDIAL INVESTIGATION REPORT, DAMES & MOORE, 1995

DRAFT REMEDY EVALUATION REPORT

TITLE

LIMESTONE SETTLING PONDS INSPECTION RESULTS

SIZE	CAGE CODE	DWG NO	REV
A			1

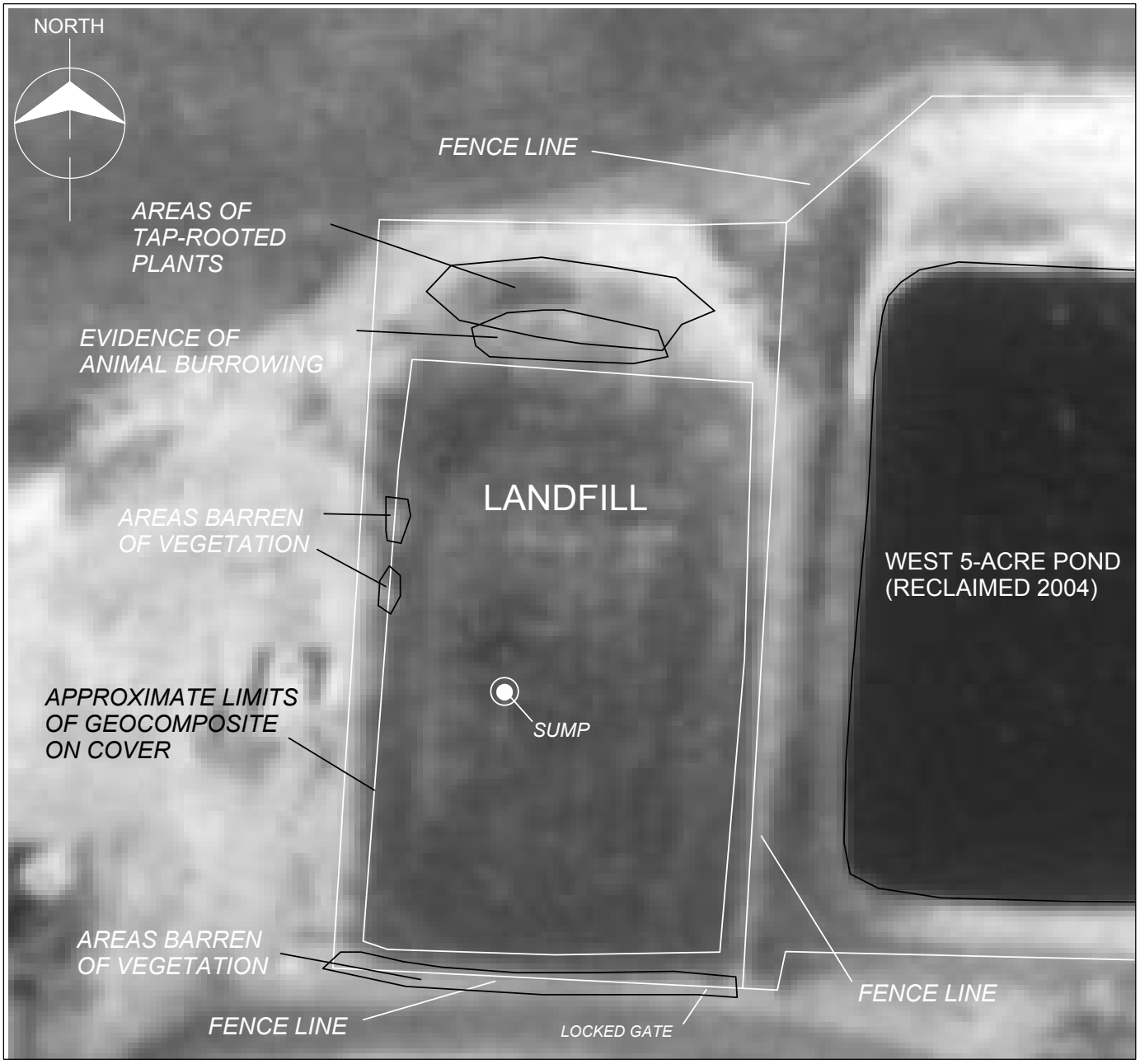
DRAWN BY J.S.BROWN P.G.

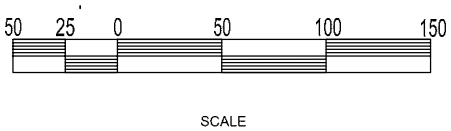
DATE: 2/16/09

SCALE

SHEET

FIGURE 4-3



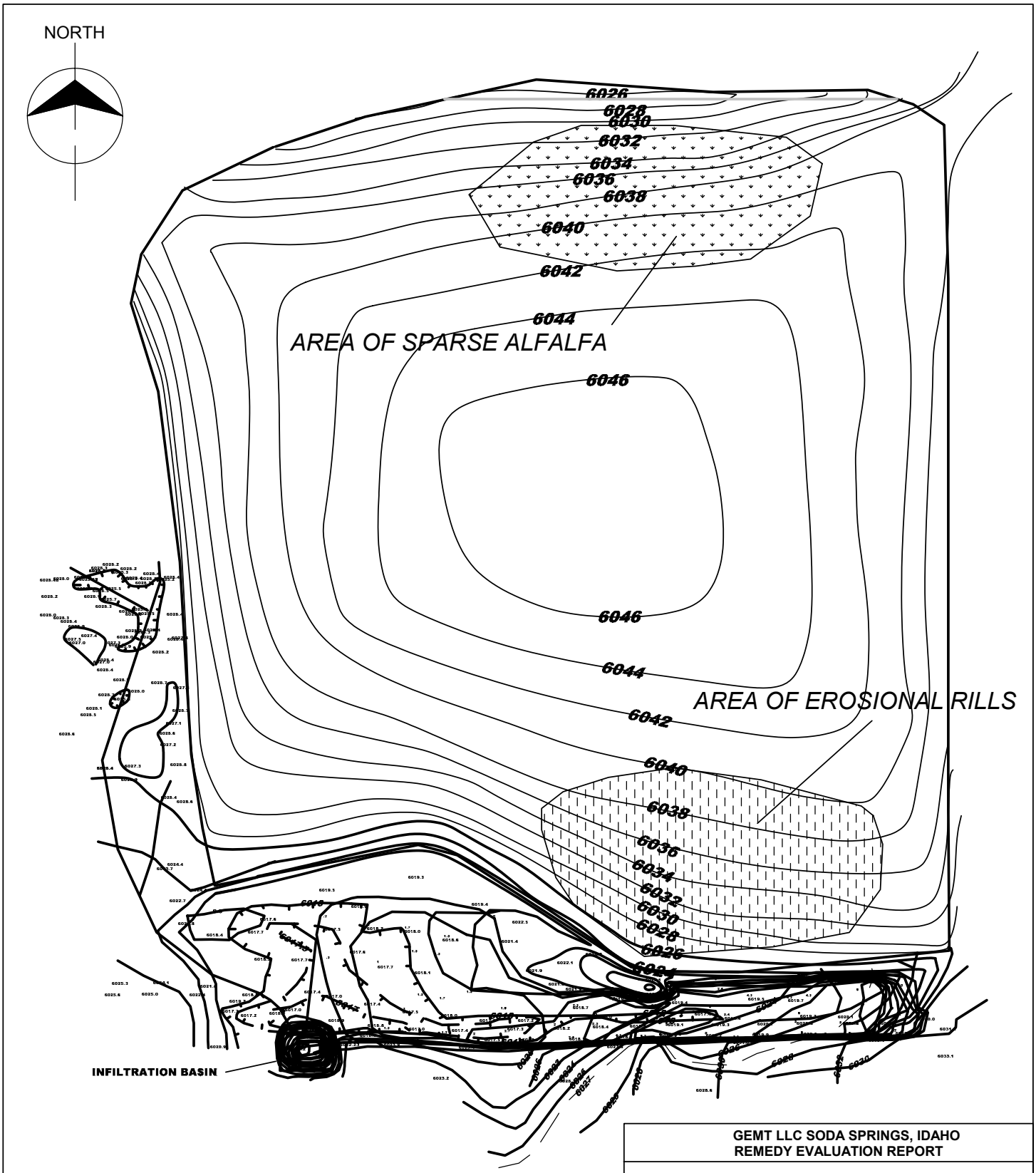


DATE OF PHOTOGRAPHY SEPTEMBER 7, 2000

REMEDY EVALUATION REPORT

ON-SITE LANDFILL INSPECTION RESULTS

FIGURE 4-4



GEMT LLC SODA SPRINGS, IDAHO
REMEDY EVALUATION REPORT

CALCINE CAP INSPECTION RESULTS

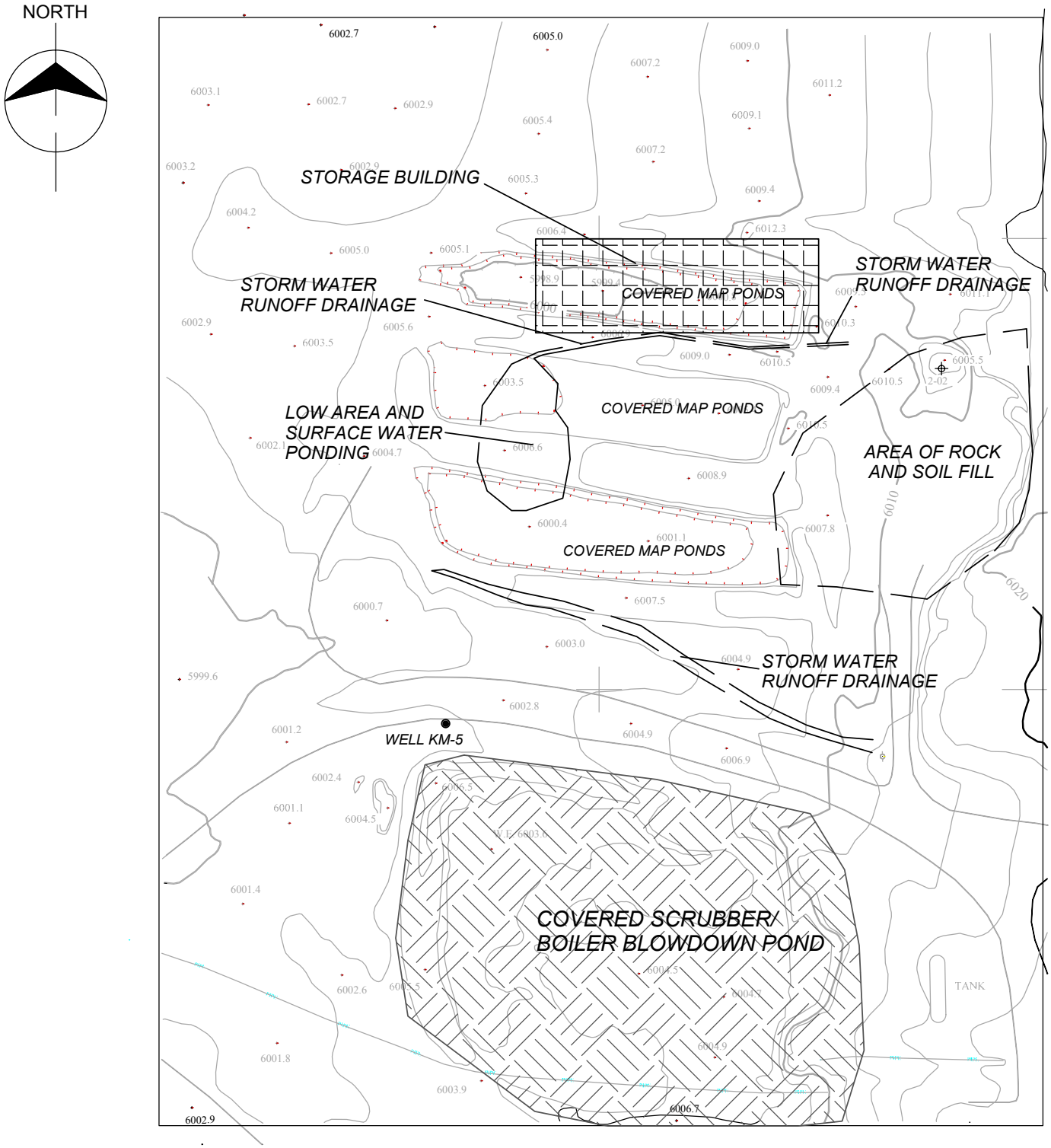
50 25 0 50 100 150

SCALE

CONTOUR INTERVAL 2'

DATE OF PHOTOGRAPHY OCTOBER 10,1991

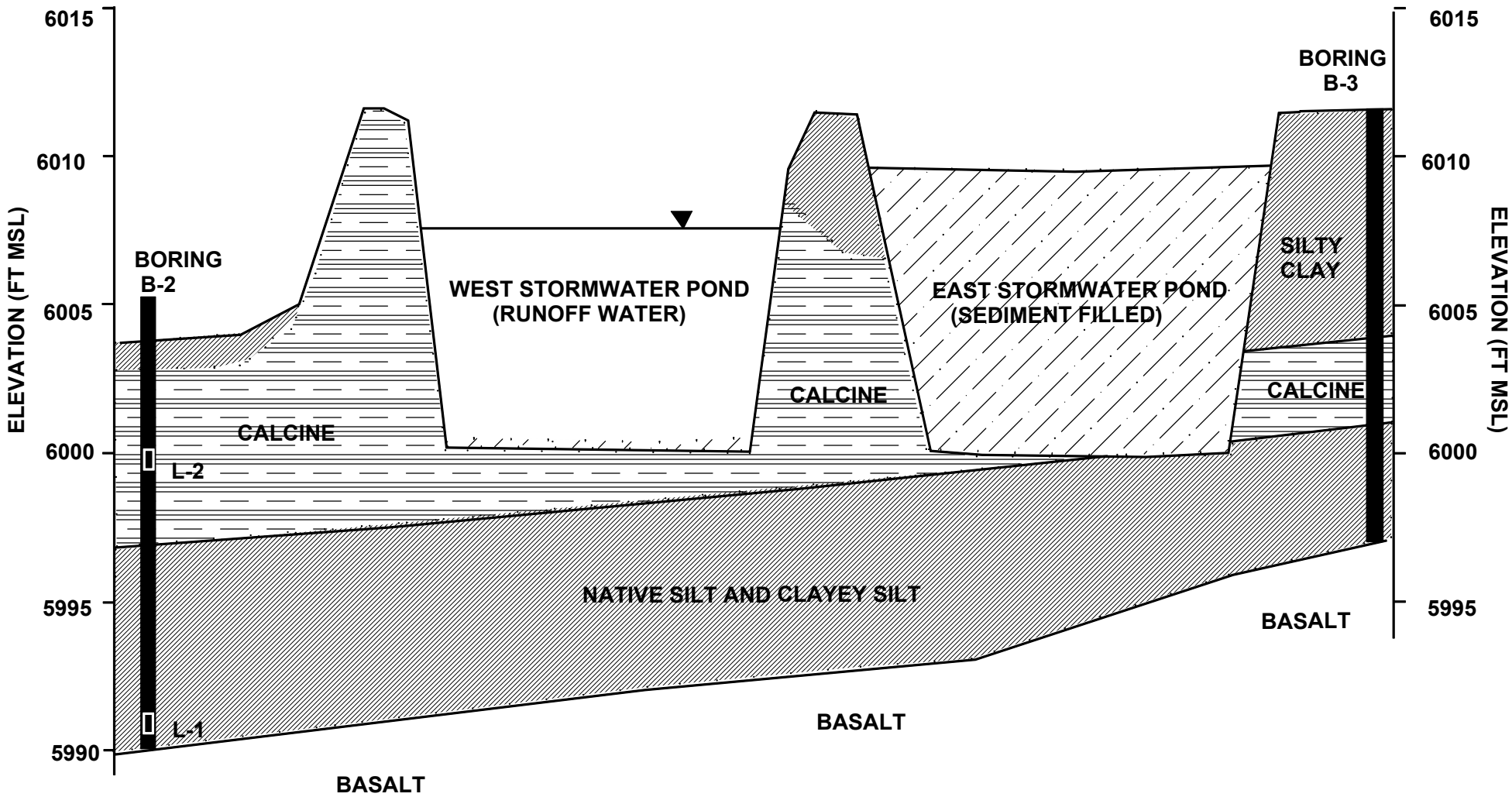
FIGURE 4-5



GEMT LLC SODA SPRINGS, IDAHO
REMEDY EVALUATION REPORT

MAP PONDS INSPECTION RESULTS

FIGURE 4-6



NOTE: VERTICAL EXAGGERATION 8:1

DRAFT REMEDY EVALUATION REPORT

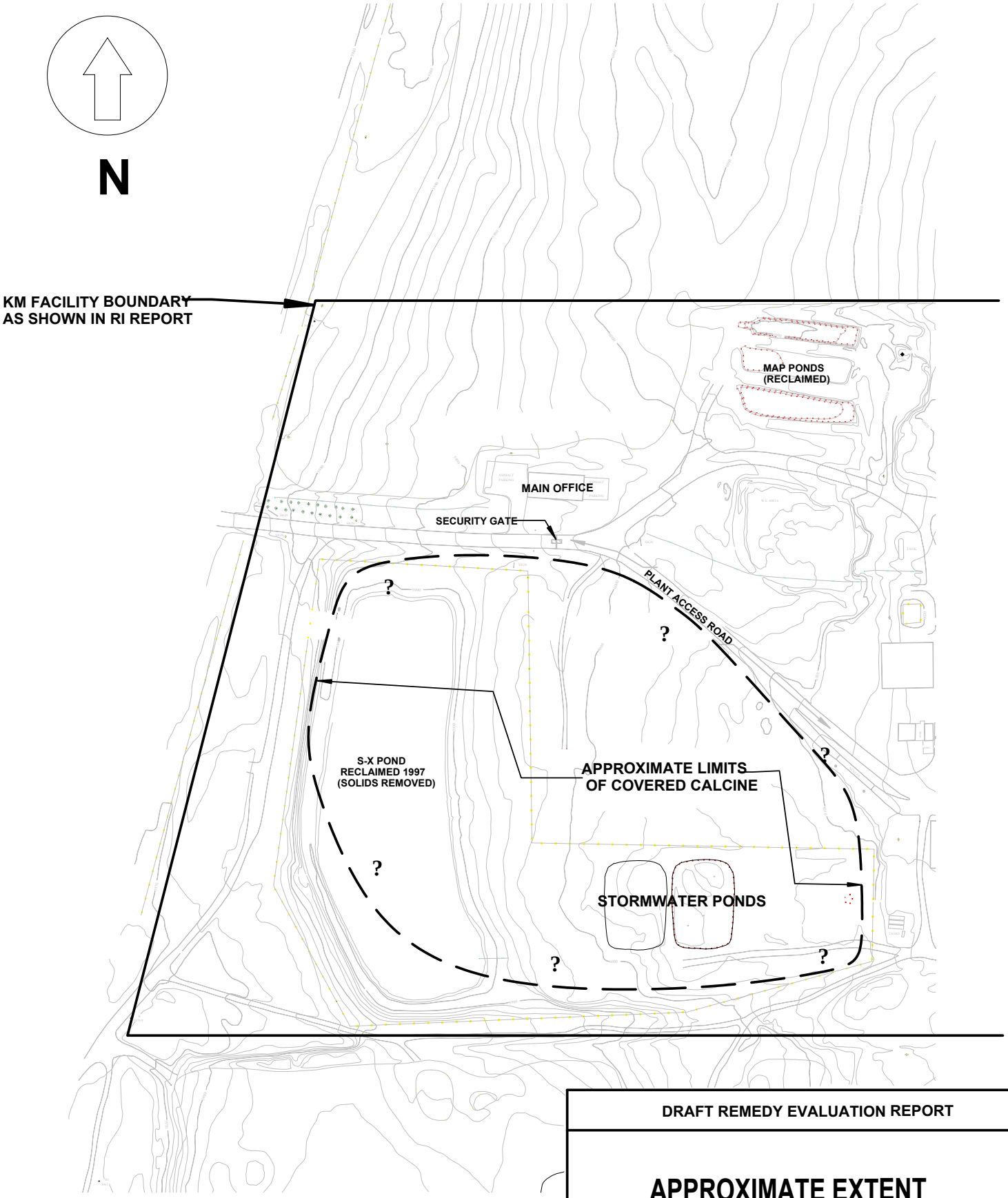
TITLE

CROSS SECTION OF STORM WATER PONDS LOOKING NORTH

SIZE	CAGE CODE	DWG NO	REV
A			0

SCALE | DRAWN BY J.S.BROWN | SHEET **FIGURE 4-7**

DATE: 2/14/09



DRAFT REMEDY EVALUATION REPORT

APPROXIMATE EXTENT OF COVERED CALCINE

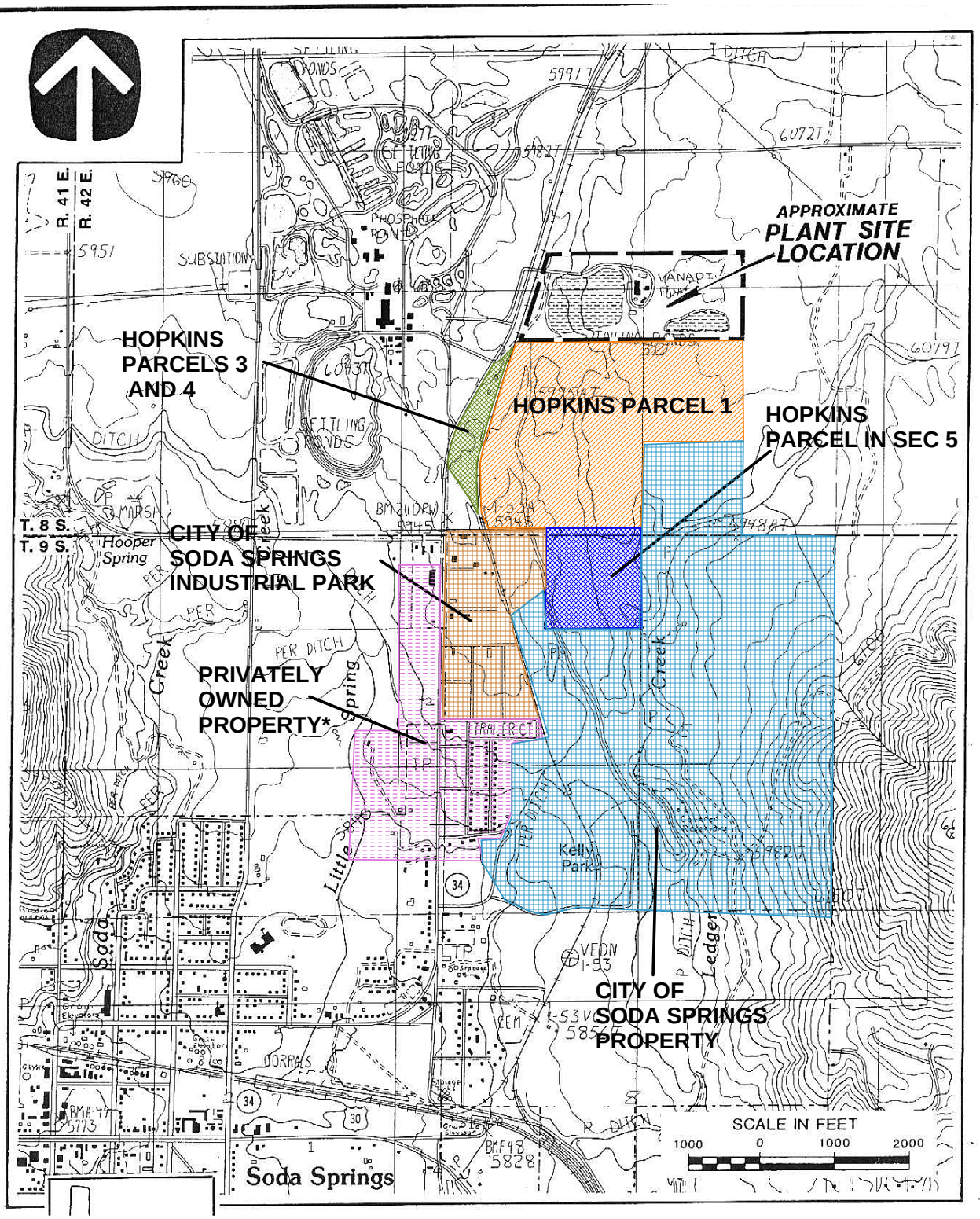
DATE OF PHOTOGRAPHY OCTOBER 10,1991

50 25 0 50 100 150

SCALE (feet)

Tronox
SODA SPRINGS, IDAHO

FIGURE 4-8



REMEDY EVALUATION REPORT

HOPKINS PROPERTY PARCEL AND CITY OF SODA SPRINGS PROPERTIES LOCATION MAP

REFERENCE: U.S.G.S. QUADRANGLE SODA SPRINGS, IDAHO PROVISIONAL EDITION 1982.

* CITY AND PRIVATE PROPERTY BOUNDARY BASED ON CARIBOU COUNTY COURTHOUSE RECORDS OCTOBER 2011

FIGURE 6-1