KAISER MEAD NPL
ADDITIONAL SITE INVESTIGATIONS
PROJECT REPORT

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June 2011

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1.0 INTRODUCTION

Hydrometrics has completed the evaluation of issues outlined in our November 2010 proposal (Hydrometrics, 2010a) to the Mead Custodial Trust related to groundwater contamination at the Kaiser Mead site. The objective of the additional site investigation is to provide an improved understanding of the physical conditions at the site and potentially provide insight as to why cyanide and fluoride levels in groundwater continue to be elevated. This project report provides results of the tasks outlined in the November 2010 proposed scope of work. The scope of work included:

- Expanded groundwater analysis, both in terms of number of wells sampled and analytes;
- Geochemical modeling, using results from the expanded analysis to determine if the cyanide (CN) and fluoride (F) contamination is potentially interacting with groundwater;
- Evaluation of contaminant sources, collection of soil samples from borings advanced within the groundwater plumes to verify the distribution of a potential secondary contaminant source within the aquifer;
- Hydrogeologic evaluation, to verify groundwater movement assumptions utilized in the cleanup model for the site;
- Source evaluation, develop a water balance of the site to provide an indication of the magnitude of the contaminant source and mobilizing water flow required to impact area monitoring wells;

- Sludge bed focused investigation, utilize existing wells to determine if the uncapped sludge bed is impacting area groundwater; and
- Well elevation verification, resurvey of key well heads to confirm well completion data reference a common vertical datum.

In February 2011 we presented a status report of the project that reported on progress on expanded groundwater analysis, geochemical modeling, and source evaluation. The status report is included as Appendix A. The following sections report on the outcome of all tasks.

2.0 EXPANDED GROUNDWATER ANALYSIS

The expanded groundwater analysis task spanned two consecutive quarterly monitoring events, coinciding with the ongoing monitoring program for the site. Five wells (KM-3, KM-4, KM-5, KMCP-4B, KMCP-5B) in the existing groundwater monitoring program were subject to an expanded analytical suite during the fourth quarter 2010. For the first quarter 2011 monitoring event the number of wells undergoing the expanded analyses was increased to include the remaining six program wells and eight additional wells. The expanded analyses included common ions and metals. The wells included in the expanded analysis are shown on Figure 2-1 and the analytical suite is shown on Table 2-1. The laboratory data packages are included as Appendix B to this report. The purpose of the expanded analysis is to provide data that can be used in a geochemical model to evaluate chemical constituents in the groundwater.

The expanded analysis from the first round indicated the following:

- The upgradient background well KM-3 and weakly impacted well KMCP-5B are Ca-Mg-bicarbonate waters;
- The main plume and downgradient well (KM-5 and KMCP-4B) are Na-F-bicarbonate waters; and
- The low to moderately impacted well KM-4 is intermediary between the other waters.

The data is consistent with a conceptual model in which high CN/F water from the source area (KM-5) mixes with upgradient and background water (KM-3 and perhaps KMCP-5B) to produce water with intermediate characteristics and CN/F concentrations (wells KM-4 and KMCP-4B).

The second round of analyses supported our understanding from the first round and the addition of redox-sensitive chemical parameters provided insight to the behavior of cyanide under site groundwater conditions. In general all redox measurements in Kaiser Mead groundwater point to the same correlation with cyanide concentrations.

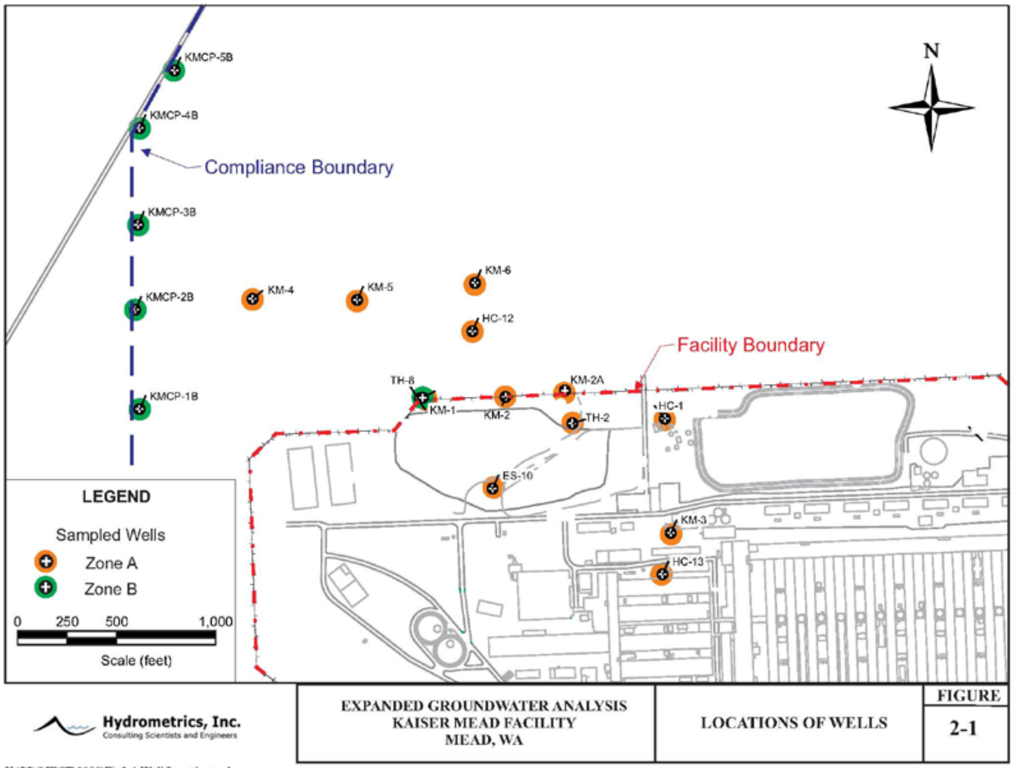
In areas of high cyanide concentration:

- pH is high (>9.5) indicating alkaline conditions;
- pe (a parameter for indicating intensity of redox conditions) is lower, indicating more reducing conditions; and
- Dissolved oxygen concentration is very low or absent (not measurable).

In areas of low cyanide concentration:

- pH is slightly alkaline (8 to 8.5);
- pe is higher, indicating more oxidizing conditions; and
- Dissolved oxygen is present at low to moderate levels.

FIGURE 2-1. EXPANDED ANALYSIS WELLS



K:\PROJECT\9088\Fig2-1 Well Locations.cdr

TABLE 2-1. EXPANDED ANALYTE SUITE

ANALYTES	ROUND ANALYZED	REPORTING LIMIT (ug/L unless specified)
Field Parameters		
pH	1,2	
Temperature	1,2	
Static Water Level	1,2	
ORP (Redox; Eh or pe)	2	
Dissolved Oxygen	2	
Major Minerals		
Calcium	1,2	1000
Magnesium	1,2	1000
Sodium	1,2	1000
Potassium	1,2	1000
Hardness as CaCO3	1,2	Calculated
Total Alkalinity as CaCO3	1,2	1000
Carbonate	1,2	1000
Bicarbonate	1,2	1000
Hydroxide	1,2	1000
Chloride	1,2	1000

Fluoride	1,2	100
Sulfate	1,2	1000
Sulfide	2	40
pH	2	0.1 standard pH units
Total Dissolved Solids	1,2	10 mg/L
Specific Conductivity	1,2	1 umho/cm
Silica (dissolved)	1,2	100
Nitrogen Compounds		
Nitrate plus Nitrite as "N"	2	10
Total Ammonia as N	2	50
Cyanide Forms		
Total Cyanide (manual distillation)	1,2	5
WAD Cyanide	1,2	5
Free Cyanide	1,2	200
Dissolved Metals		
Aluminum	1	8
Barium	1	0.2
Cobalt	1,2	6
Copper	1,2	1
Iron	1,2	50
Manganese	1,2	5
Nickel	1	10
Zinc	1	10

3.0 GEOCHEMICAL MODELING

The initial effort in understanding the geochemistry of the cyanide and fluoride contaminant plumes at the site focused on the general groundwater chemistry and fluoride as was reported in the February status report. The findings in the status report concluded the geochemical modeling and calculated mineral saturation indices support the observed chemical attenuation of fluoride:

1. SPL leachate contains very high concentrations of fluoride and is saturated with respect to the mineral fluorite. Any addition of dissolved calcium to the contaminant source water would result in precipitation of fluorite and the removal of fluoride from the water. This could occur in the unsaturated (vadose) zone and in the groundwater.
2. In the unsaturated zone, calcium could be released from soil either through dissolution of calcite or exchange reactions with sodium to form fluorite precipitates. In groundwater, mixing of the contaminant source with groundwater containing calcium (such as background groundwater) would also result in fluorite precipitation and fluoride attenuation.
3. Unimpacted water with low fluoride concentrations, such as infiltrating rain, leaking water pipes, background groundwater, etc. that contacts soils with precipitated fluorite will likely dissolve fluorite and acquire elevated fluoride concentrations.
4. In the groundwater system, for instance as observed between wells KM-5 and KMCP-4B, the contaminated groundwater is observed to be mixed with background groundwater containing moderate calcium concentrations. The resultant mixed water is oversaturated with fluorite, fluorite precipitates, and groundwater fluoride concentrations are reduced (i.e., fluoride is attenuated).
5. It is possible; perhaps likely, that actual fluoride behavior consists of both fluoride dissolution in some areas of the transport pathway and fluoride precipitation in other areas.

3.1 SECOND ROUND RESULTS AND DISCUSSION

Following receipt of the second round of expanded groundwater analysis our focus centered on evaluation of groundwater redox conditions to better understand cyanide behavior. The results of the measured and calculated redox parameter, pe, are presented in Table 3-1.

TABLE 3-1. SUMMARY OF MEASURED pe VALUES

Well	Field Measured	Calculated from NH4/NO3	Calculated from S/SO4	Dissolved Oxygen (mg/L)	pH
ES-10	6.87	NC	-5.02	0.75	8.27
HC-1	6.10	4.90	NC	0.79	8.17
HC-12	4.98	2.78	-6.66	0.51	9.8
HC-13	7.16	NC	-4.89	0.9	8.18
KM-1	5.77	3.05	-6.41	0.51	9.66
KM-2	7.13	2.74	-6.70	0.31	9.84
KM-2A	6.83	2.79	-6.60	0.42	9.74
KM-3	6.55	NC	-4.75	2.28	8.03
KM-4	8.59	4.65	-5.09	0	8.36
KM-5	6.58	2.63	-6.77	0.41	9.94
KM-6	6.13	2.91	-6.48	0.4	9.67
KMCP-1B	6.39	NC	-4.88	4.22	8.15
KMCP-2B	6.57	NC	-4.87	2.7	8.13
KMCP-3B	7.46	3.24	-6.38	0.43	9.56
KMCP-4B	8.06	4.48	-5.20	0.82	8.54
KMCP-5B	8.03	NC	-4.80	0.43	8.07
TH-2	3.15	3.58	-5.73	0.46	8.92
TH-8	6.61	3.05	-6.45	0.3	9.69

NM – pe not measured; NC – pe cannot be calculated because one or more parameters was not detected.

A task memorandum was prepared to document our findings and conclusions and it is included as Appendix C. Using redox-sensitive chemical parameters (ammonia/nitrate; sulfide/sulfate; dissolved oxygen) detected by analysis and by direct measurement of ORP with field meter we determined that groundwater conditions plotted on a standard stability diagram do not initially suggest conditions are conducive to the precipitation of iron-cyanides (Figure 3-1). However, conditions at Kaiser Mead differ significantly from the laboratory conditions reflected in the diagram and there is reason to believe slight modifications in assumed iron-cyanide precipitation boundaries are warranted that would provide a closer fit to site conditions, indicating that iron cyanide precipitates and redox conditions control groundwater cyanide concentrations to some extent at Kaiser Mead. This conclusion is based on the following observations:

1. Many studies have shown that iron cyanide precipitates and redox conditions control cyanide behavior and movement at aluminum smelters and other industrial sites (see Dzombak et al., 2006).
2. With the minor shift in stability line described above, the groundwater data indicates equilibrium with iron cyanide precipitates. This suggests that cyanide concentrations are controlled by precipitation and/or dissolution of iron cyanide precipitates.

What the groundwater data cannot tell us is exactly where the iron cyanide precipitates are located, and whether it is dissolution or precipitation or both that control cyanide concentrations. This uncertainty arises because although the data indicate that groundwater is in approximate equilibrium with iron cyanide precipitates, it cannot tell us exactly how the water came to be in equilibrium. An under-saturated groundwater could dissolve iron cyanide precipitates to come into equilibrium or an over-saturated groundwater could precipitate iron cyanide precipitates to come into equilibrium. Moreover, it is possible that groundwater is dissolving iron cyanide precipitates in one area (for instance where pH is high, such as in source areas) and precipitating iron cyanide in another area (for instance where pH is lower).

Because we do not know how and where groundwater came to be in equilibrium with iron cyanide precipitates, the suspected presence of iron cyanide precipitates alone does not identify the reason or reasons that cyanide concentrations continue to be high in Kaiser Mead groundwater. However, it is clear that the presence of iron cyanide precipitates should be accounted for in any conceptual or numeric model of groundwater contamination and cyanide fate and transport on the site.

3.2 IDENTIFICATION OF CYANIDE SOURCES

In the previous paragraphs we conclude that sources of cyanide subject to mobilization through groundwater are likely contributing to continued groundwater contamination at the site. This source may be in the form of secondary precipitation (iron-cyanide precipitates) of an original source or an original source that has not been adequately isolated. If the latter is occurring, it may be possible that previous assessments of potential sources are incorrect.

Laboratory analyses for total cyanide in soils can yield incorrect measurements unless care is taken to account for the presence of iron cyanide precipitates and to adjust the extraction methods accordingly. As shown in Figure 3-1, iron cyanide precipitates are stable and have low solubility under acidic conditions. Thus, if soil samples containing iron cyanide precipitates are extracted or directly analyzed under acidic conditions, as is common in the EPA Method 9012, poor recovery of the cyanide will occur and the analysis will underestimate the actual amount of cyanide present. Figure 3-2 shows the effect of extraction pH on cyanide recovery as reported by Ghosh et al. (2004). In many of the soils analyzed, the effect of using an acidic extraction resulted in underestimating actual cyanide concentrations by factors of 10 to 1,000. Acidic extractions generally yielded soil cyanide concentrations of 10 ppm or less, whereas actual total cyanide concentrations ranged from 100 to over 10,000 ppm.

FIGURE 3-1. IRON-CYANIDE STABILITY DIAGRAM WITH CYANIDE CONCENTRATION CONTOURS AND MARCH 2011 GROUNDWATER REDOX MEASUREMENTS

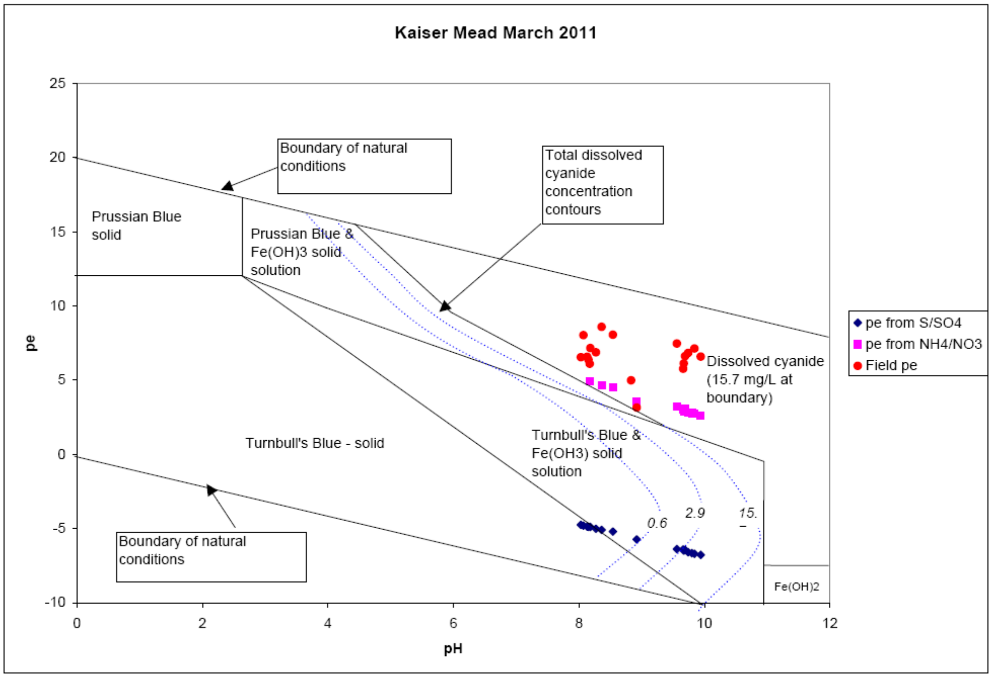
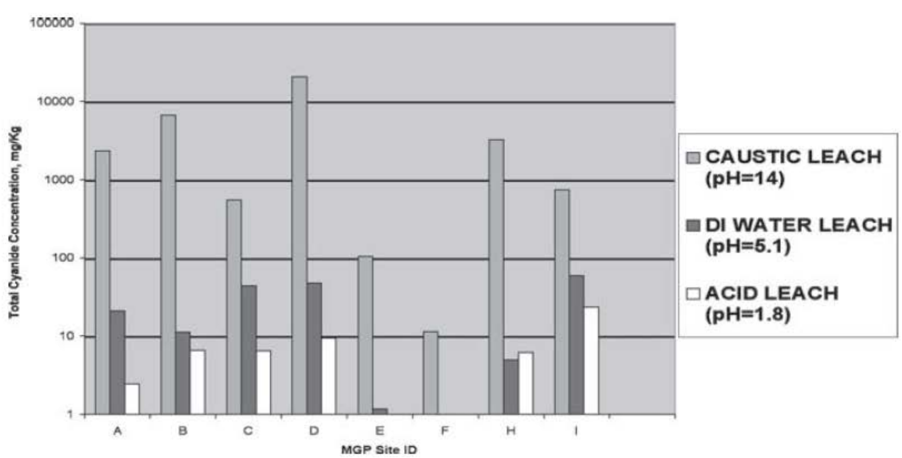


FIGURE 3-2. EFFECT OF EXTRACTION pH ON CYANIDE RECOVERY IN SOILS (FROM GHOSH et al., 2004)



Total cyanide concentration in MGP site soils (backcalculated based on three different leaching conditions).

ENVIRON ENG SCI, VOL. 21, NO. 6, 2004

In order to properly characterize cyanide concentrations in soil, it is first necessary to test and verify the effects of extraction pH on cyanide recoveries. It is not possible to verify the methods that were used in earlier analyses at Kaiser Mead, however, it is suspected that extractions were done under acidic or neutral pH conditions and thus may greatly underestimate actual cyanide concentrations.

If the previous soil cyanide analyses at Kaiser Mead underestimate cyanide concentrations, then it is possible that cyanide-rich soils and sediment remain on the site in areas that are exposed to leaching by rainfall and/or groundwater. The drilling logs and cyanide analyses described in Hart Crowser were used to identify areas of surface and subsurface contamination. If these analyses are biased low, then significant subsurface cyanide contamination may exist in the unsaturated and saturated zone soils. The soil analyses conducted by MFG in 2000 (MFG, 2000) were used to identify surficial materials for incorporation into the SPL pile. If these analyses provided unreliable data, then cyanide-contaminated soils may remain on the site outside of the SPL repository or the asphalt cap. In particular, the MFG soil samples indicated that Area 2, Tharp Lake, and the sludge pond did not contain soils with elevated cyanide concentrations and as a result these areas were not capped to the same extent as the SPL pile, even though: 1) Tharp Lake was identified as the primary cyanide source in the Hart Crowser report and 2) cessation of use of Tharp Lake resulted in the greatest improvement in cyanide concentrations on the site.

3.3 DATA GAPS

In order to gain additional data to test the relationship between iron-cyanide precipitates, cyanide concentrations in groundwater, and redox conditions the following data gaps would need to be addressed:

1. Continued monitoring of redox parameters in groundwater samples (field measurements and ammonia/nitrate analyses);
2. Collect shallow soil samples in suspected or potential source areas (Tharp Lake/Area 2, area north of SPL pile, sludge pond);
3. Evaluate the effects of various soil extraction methods on soil total cyanide measurements; and

4. Collect and analyze vadose zone/deep sediment/aquifer soil samples in areas of high cyanide and fluoride groundwater concentrations.

4.0 HYDROGEOLOGIC EVALUATION

In the 2010 Kaiser Mead Groundwater Review, Hydrometrics identified the lack of aquifer testing as a data gap in assessing the model developed for selection of the remedy at Kaiser Mead (Hydrometrics, 2010b). Consistent with the proposed scope of work, Hydrometrics evaluated the existing wells available for testing, either pump tests or slug tests, and concluded that only two wells were suitable for pump tests (TH-5 and TH-8) and that their location and construction would not yield the data that we were seeking. Pump tests are the ideal method for testing an aquifer's hydraulic conductivity if the well construction allows the pumping rates sufficient to stress the aquifer. The next best alternative would be to perform slug tests on other existing wells that met our criteria for testing. Hydrometrics conducted slug tests in April 2011 to more clearly define contaminant transport conditions on the site. A brief task report was prepared to document the results and it is included as Appendix D.

4.1 TEST RESULTS AND DISCUSSION

Over a two day period in April 2011, pneumatic slug tests were conducted on seven wells. Ten wells (representing completion in the three identified aquifers, A, B, C) were originally proposed for testing, but three of the wells were damaged or were obstructed and could not be tested. Table 4-1 presents the results of the testing.

TABLE 4-1. AQUIFER TEST HYDRAULIC CONDUCTIVITY RESULTS

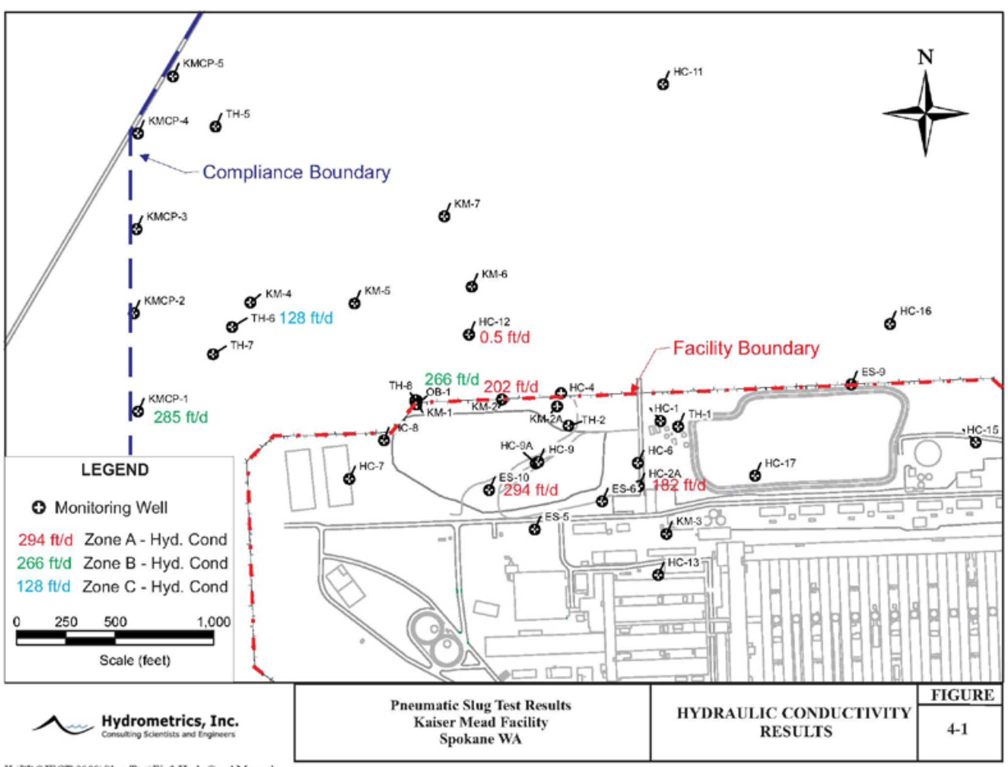
Well	Aquifer	Analyses Method	Hydraulic Conductivity (ft/day)	
			Range	Average
ES-10	Zone A	Bouwer-Rice (1976)	289-298	294
HC-2A	Zone A	Springer-Gelhar (1991)	168 – 195	182
HC-12	Zone A	Bouwer-Rice (1976)	0.5	0.5
KM-2	Zone A	Springer-Gelhar (1991)	201-202	202
KMCP-1B	Zone B	Butler (1998)	283-287	285
OB-1	Zone B	Butler (1998)	261-271	266
TH-6C	Zone C	Butler (1998)	125-131	128

Wells TH-7A, TH-6B and TH-6C were not tested due to obstruction or air leakage.

The analyses method is the method used to determine hydraulic conductivity (K) based on the response of the well to the slug test.

The slug test results show K values ranging from 124 to 298 ft/day with only one lower permeability well (HC-12) showing a K of 0.5 ft/day. Figure 4-1 shows the wells tested and resulting average conductivity. The K values suggest most of the wells are completed in relatively well-sorted medium to coarse grained sand. The K value for Well HC-12 is characteristic of fine sand, however, the well screen in this well is only 2 feet long and could easily be impacted by sedimentation in the well, so it is difficult to interpret the significance of the lower K results at this site. Slug tests are only reflective of the area immediately surrounding the well and cannot be assumed to represent large areas. In addition, most of the wells tested are south of the highest concentrations of cyanide and fluoride. The other wells exhibiting high contaminant concentrations have well screens straddling the static water level and therefore are not suitable for pneumatic slug tests.

FIGURE 4-1. HYDRAULIC CONDUCTIVITY RESULTS



K:\PROJECT\9088\Slug Test\Fig3 Hydr Cond Map.cdr

The results do narrow the previously inferred hydraulic conductivity range and are more consistent with established ranges for glacial outwash sediments, which underlie the Kaiser Mead site. The K values measured from the slug tests do not resolve the disparity between the cleanup model predictions and the concentrations observed in the wells. At these measured K values a noticeable reduction in the contaminants should be occurring if there was no attenuation and the source was completely removed or isolated.

4.2 DATA GAPS

If a more detailed assessment of corrective measures is required then additional testing may still be warranted in Zone A in the central plume area and in Zone B near the compliance line, since there are no test data in these areas. Installing 6- to 8-inch diameter wells in these areas and conducting pumping tests at higher discharge rates than previously conducted on the site would provide definitive results.

5.0 SOURCE EVALUATION

The possibility of additional unknown contaminant sources has been a focus of site investigation activities for over 20 years. The inability to precisely define the source(s) of ongoing cyanide and fluoride contribution to the contaminant plume and the fact that a predicted decline in contaminant concentrations has not occurred leaves open the possibility that a contaminant source not previously identified or addressed may exist. This evaluation of additional sources has focused on identifying water balance components that may provide an indication of sources.

Previous site evaluations (Hart Crowser, 1988; CH2M Hill, 1988) concluded that cyanide and fluoride mobilization by infiltration through the SPL pile cap and groundwater recharge were unlikely due to climatic and site conditions. This focused attention on areas where stormwater was concentrated or where there was no soil or vegetative cover. Following initial capping of the SPL pile (1979), backfill and abandonment of Tharp Lake (1981) and paving of Areas 2 and 4 in 1986 and 1987, it was thought that decreasing trends in contaminant concentrations in groundwater indicated that levels of CN and F would decrease to acceptable levels without additional remediation. Additionally, water supply and sewer (storm water and sanitary) pipes in the plant site were checked, lined and replaced to remove the possibility that pipeline leakage would flush contaminants to the groundwater.

Average annual precipitation from 121 years of record at Spokane airport is 16.1 inches. Average pan evaporation at the Spokane airport site is approximately 48 inches (April through September). Approximately half of Spokane's precipitation falls from November through February when evapotranspiration is low. The USGS (USGS, 2007) evaluated potential groundwater recharge in the Rathdrum/Spokane aquifer area using a variety of methods. For the Spokane airport site, these various methods yielded recharge rates of less than 1% to about 11% of annual precipitation and up to 40% of monthly precipitation.

Although there is no reliable method to quantify recharge in the vicinity or the Kaiser site, the conclusion that recharge is zero is not likely correct. Recharge in areas where precipitation or stormwater collects or runs off of paved areas is likely, at least following some snowmelt or large precipitation events. The primary area that may still provide an opportunity for infiltration of surface water through waste materials that could provide recharge to groundwater is the sludge pond. Further evaluation of materials underlying the sludge pond and of wells in the vicinity of the sludge pond may be warranted.

Another way of looking at the potential for infiltration and recharge to continue to contribute contaminants to the groundwater system is to estimate the quantity and concentration of recharge necessary to create the concentrations observed in monitoring wells. The groundwater flux in the contaminant plume of the A/B aquifer is calculated to be about 155 gpm based on a width of 700 feet (at wells KMCP 3B and KMCP-4B), a thickness of 20 feet and a hydraulic conductivity of 1800 gpd/ft^2 (Hart Crowser, 1988). These values would result in daily loads of CN of about 70 lbs/d and of F of about 37 lbs/d.

If the above values for daily contaminant loads are correct, the required amount of recharge and the required contaminant concentrations to produce those loads can be estimated (Table 5-1). As shown in the table, the levels of both CN and F that would be required for the high end of potential recharge quantities (10% of annual precipitation) would be higher than any levels measured on site unless the recharge area approached 100 acres. This exercise indicates that the rates of recharge and the contaminant concentrations required to produce the estimated contaminant loads do not appear to be realistic.

TABLE 5-1. ESTIMATED CONCENTRATION OF CN AND F IN GROUNDWATER RECHARGE REQUIRED TO PRODUCE CALCULATED CONTAMINANT LOADS AT COMPLIANCE BOUNDARY

Recharge Area (acres)	Recharge Rate (gpm)	CN Load (lbs/d)	F Load (lbs/d)	Required [CN] to create daily load (mg/L)	Required [F] to create daily load (mg/L)
1	0.08	71	37	71515	37639
10	0.8	71	37	7151	3764
100	8	71	37	715	376

Therefore, either infiltration/recharge through the types of materials known to be on site are not the primary source of groundwater contaminant loads or the estimated groundwater contaminant loads are not correct. Without additional aquifer hydraulic characteristics (long term aquifer pumping tests), it does not seem that additional examination of the site water balance would be productive. While it is still possible that a primary contaminant source may be producing the contaminant load through recharge, additional source evaluation should be delayed until additional information is available.

5.1 DATA GAPS

Data that would be helpful in reducing the unknowns regarding the nature of potential sources include contaminant concentrations of waste material that was not consolidated under either the engineered cap in the SPL Pile or under the asphalt cap. This includes the following areas:

- Tharp Lake; and
- The southwest corner of the sludge bed.

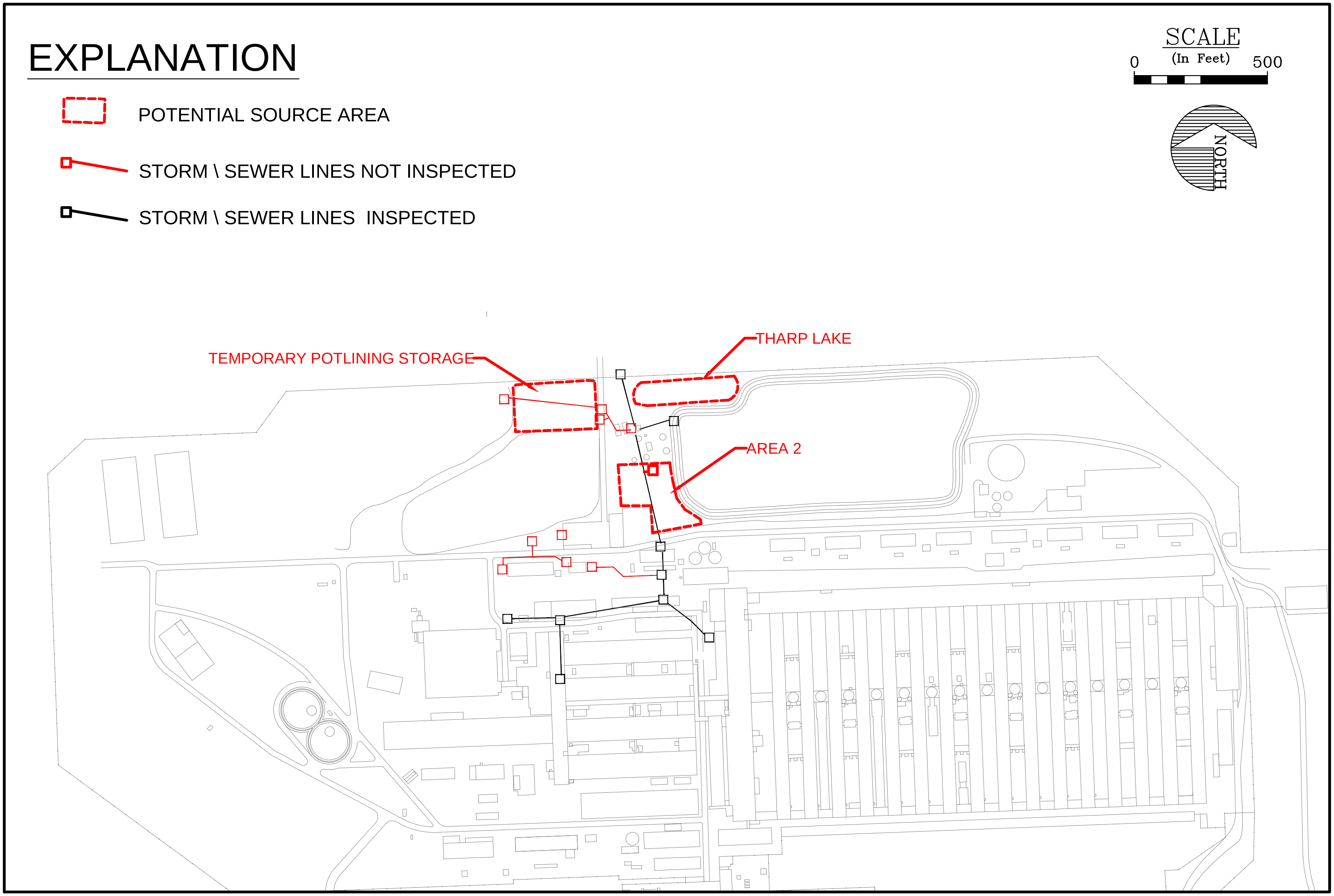
These areas could be investigated with a track-mounted excavator capable of accessing waste material down to approximately 15 feet. In order to determine if soils at greater depth in the area have been contaminated through leaching and precipitation, then a drill rig would have to be employed.

Potential source areas that are under the asphalt cap include Area 2 and the area formerly used to store spent potliner material (between the SPL Pile and the north fence). Investigating these areas would require a drill rig to minimize damage to the asphalt cap.

A third group of potential sources includes storm water sewer lines within the shallow aquitard area that were not included as part of the Scope of Work sanitary and storm sewer line inspection task that was completed in 2006. Included in this group is a storm sewer line (approximately 700 feet long, diameter unknown) on the south side of the SPL Pile, a storm sewer line (approximately 560 feet long, diameter ranging from 24 inch to 36 inch) on the north side of the SPL Pile that routes surface drainage from the SPL Pile to the main storm drain leaving the site, and a new catch basin in Area 2 that collects storm water and drains to a 30-inch storm drain. An inspection of these storm water features would eliminate them from the list of potential sources.

The potential sources discussed above are shown on Figure 5-1.

FIGURE 5-1. POTENTIAL SOURCE AREAS



SOURCE EVALUATION
KAISER MEAD FACILITY
MEAD, WA

POTENTIAL SOURCE AREAS
KAISER MEAD FACILITY
MEAD, WA

FIGURE 5-1

Hydrometrics, Inc.
Consulting Scientists and Engineers

UPDATE TIME: 4:14PM
JOHLAMSO\062211\F:\DATA\KAISER\

FIGURE 5-1.dwg

6.0 REMAINING TASKS

Three tasks identified in the November 2010 proposal remain incomplete; Evaluation of Contaminant Sources, Sludge Bed Focused Investigation, and Well Elevation Verification. A brief discussion of the status of each task is presented in the following paragraphs.

6.1 EVALUATION OF CONTAMINANT SOURCES

This task entailed advancing soil borings down through the vadose zone to the A zone and B zone aquifers, one each. Soil samples would be collected from the borings at regular intervals and analyzed for cyanide and fluoride. The completion of the task would be dependent on identification of likely source locations from the additional analysis/geochemical model tasks. Unfortunately the results from this effort were not definitive enough to point to a probable location for encountering deposition sites. Therefore we elected to defer this task until additional information provides further insight to probable source locations. Other developments may provide an opportunity to pursue this task, such as a desire to perform the pump tests discussed in Section 4.0 Hydrogeologic Evaluation. In such a case the desired soil samples could be collected as the test wells are being drilled.

6.2 FOCUSED SLUDGE BED INVESTIGATION

This task was proposed to utilize existing wells to determine if the dry sludge bed could potentially be impacting area groundwater. During the first quarter groundwater monitoring event we accessed two wells on or near the sludge bed. Unfortunately the well completed within the sludge bed (HC-17) was damaged (obstruction) and we could not extract a sample and the well directly west of the sludge bed (ES-8, completed in Area 2) was also blocked due to a deep obstruction (at 145 feet). A third well located near the northwest corner of the sludge bed, TH-1, was obstructed by existing equipment and could not be accessed. Therefore no determination could be made regarding potential impacts from the sludge bed. Should the data gaps suggested in Section 3.3 (collection of shallow samples from the sludge bed) be pursued then this information will provide key data that will allow us to assess this feature as a potential source. At the same time we would attempt to remove the equipment from TH-1 and collect a sample thereby providing additional data for our evaluation of potential impacts from the sludge bed.

6.3 WELL ELEVATION VERIFICATION

This task was proposed to resolve potential inconsistencies in the well construction database by physically surveying the well heads of key wells that have been used in development of site geologic cross sections. As wells were installed over a period of almost 30 years, there is some evidence that the same vertical datum was not used as the wells were surveyed and so minor elevation inconsistencies may exist. These minor inconsistencies have a slight impact to the geologic cross sections developed for the site but are not considered critical at this time. As such, this task has not been pursued.

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APPENDIX A

KAISER MEAD NPL-ADDITIONAL SITE INVESTIGATIONS-HYDROMETRICS' STATUS REPORT

KAISER MEAD NPL
ADDITIONAL SITE INVESTIGATIONS
HYDROMETRICS' STATUS REPORT

Prepared for:

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February 2011

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KAISER MEAD NPL
ADDITIONAL SITE INVESTIGATIONS
HYDROMETRICS' STATUS REPORT

1.0 INTRODUCTION

Hydrometrics has initiated the additional evaluation of issues related to groundwater contamination at the Kaiser Mead site. A number of tasks were outlined in a November 2010 proposal, cost estimate and schedule. The objective of these tasks is to provide an improved understanding of the physical conditions at the site and potentially provide insight as to why cyanide and fluoride levels in groundwater continue to be elevated. This brief status report provides initial results of the first three tasks outlined in the 2010 work plan. These are: 1) expanded chemical analysis of select wells during the 4th quarter 2010 monitoring event; 2) geochemical modeling; and 3) evaluation of potential additional contaminant sources.

Expanded monitoring has provided useful information on groundwater chemistry that indicates that attenuation of both fluoride and cyanide appear to be occurring between the plant site and the compliance wells. Chemical data indicates that significant dilution of groundwater also occurs in the contaminant plume.

Review of chemical and water balance data indicate the importance of an accurate estimate of groundwater flow quantity to quantify contaminant loads and continue the evaluation of possible contaminant sources.

Recommendations for ongoing work include:

1. Addition of eight existing wells to the 1st quarter monitoring event.
2. Suspend completion of the source evaluation task until the hydraulic characteristics of the aquifer in the contaminant plume are better defined by conducting aquifer tests as detailed in the approved 2010 proposal.

2.0 EXPANDED GROUNDWATER ANALYSIS

Five wells (KM-3, KM-4, KM-5, KMCP-4B, and KMCP-5B) in the existing groundwater monitoring program were subject to an expanded analytical suite during the fourth quarter 2010 monitoring event. The expanded analyses from the November 17, 2010 sampling included common ions and metals. The laboratory data packaged is included as Appendix A to this report. The purpose of the expanded analysis is to provide data that can be used in a geochemical model to evaluate chemical constituents in the groundwater.

The initial expanded analysis has been useful in the initial geochemical modeling steps. Additional groundwater chemistry data will be required to fully develop the geochemical model. Additional groundwater analyses are planned to coincide with the 1st quarter 2011 monitoring program.

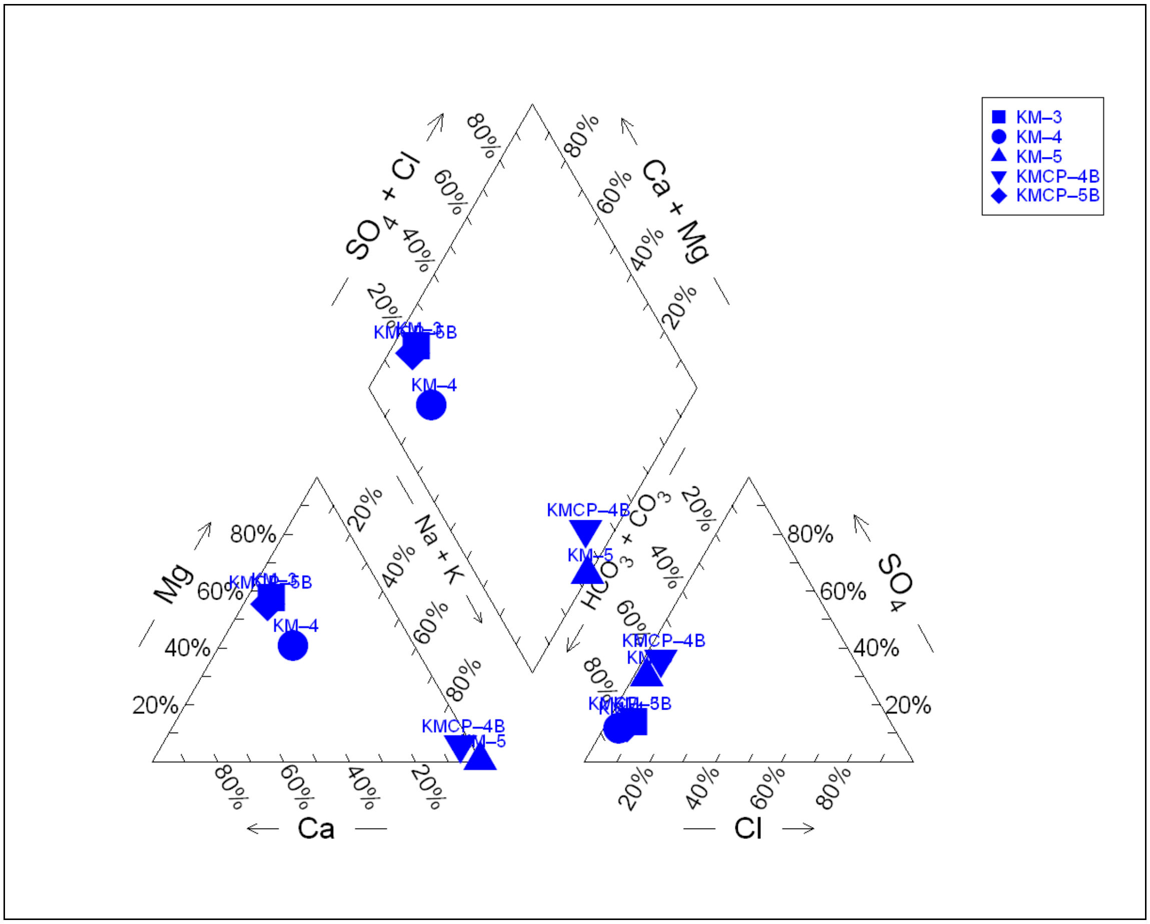
In the November 2010 event, five of the eleven wells sampled (KM-3, KM-5, KMCP-4B, KM-4 and KMCP-5) were selected for expanded monitoring parameters. These wells were selected to approximately bound and define the contaminant plume and groundwater transport flow path from upgradient (KM-3) to the center of the plume (KM-5) to downgradient compliance monitoring location (KMCP-4B). Two additional wells were selected on the periphery of the main plume to the south (KM-4 with moderate CN and F concentrations) and north (KMCP-5B with low, near background CN and F concentrations).

Common ion characteristics of groundwater are shown by the Piper (ternary) diagram (Figure 2-1). Data indicate three general types of water that correspond with relation to the CN/F plume:

- The upgradient background well KM-3 and weakly impacted well KM-5B are Ca-Mg-bicarbonate waters.
- The main plume and downgradient well (KM-5 and KMCP-4) are Na-F-bicarbonate waters.
- The low to moderately impacted well KM-4 is intermediary between the other waters.

The data is consistent with a conceptual model in which high CN/F water from the source area (KM-5) mixes with upgradient and background water (KM-3 and perhaps KMCP-5B) to produce water with intermediate characteristics and CN/F concentrations (wells KM-4 and KMCP-4B).

FIGURE 2-1. COMMON ION CHARACTERISTICS OF GROUNDWATER



2.1 ONGOING MONITORING

The current monitoring program focuses on analysis of total and WAD cyanide and total fluoride in the compliance wells and a few additional wells near the SPL pile. In order to develop a comprehensive geochemical model of the Kaiser Mead system, additional water chemical data will be required. The limited evaluation (five wells) of expanded analytical parameters in fourth quarter 2010 suggests that information about chemicals other than cyanide and fluoride are very important in determining cyanide and fluoride behavior in the groundwater system and thus the evaluation of whether compliance limits may be met in the future. The expanded data suggest that evaluation of changes in cyanide and fluoride concentrations may be interpreted by means of a mixing/dilution and attenuation model by comparison to conservative tracer elements and by geochemical modeling of the stability of cyanide and fluoride minerals. However, additional data on the expanded parameters is needed to verify that this approach is sound.

To better understand cyanide behavior it is recommended that characterization of groundwater redox conditions be included as part of groundwater monitoring. Characterization should include field measurements of Eh or ORP and laboratory analysis of redox pairs (nitrate and ammonia) from which Eh may be calculated.

One difficulty in interpreting the groundwater data is that there is very little temporally continuous data that covers the entire monitoring period of 1980 to 2010. It is recommended that select historically monitored wells be included in future monitoring efforts. In addition to conducting the expanded analysis on the wells in the ongoing monitoring program, sampling of eight additional wells (shown in Table 2-1) in the 1st quarter 2011 monitoring event is proposed. The expanded analytical schedule is shown in Table 2-2.

TABLE 2-1. PROPOSED ADDITION TO GROUNDWATER MONITORING

Well	Unit	Location	Rationale
ES-10	A	Between SPL pile and rubble pile & midway between KM-3 and KM-5 to better define flowpath.	Characterize flowpath, evaluate SPL vs rubble pile source – ES-10 shows apparent improvement between 2000 ad 2005/2009 and may be evidence that SPL source control is working. Monitoring of wells ES-10, TH-2, and HC-9 between SPL and rubble pile may confirm this.
TH-2	A	Between SPL pile and rubble pile & midway between KM-3 and KM-5 to better define flowpath.	Characterize flowpath, evaluate SPL vs rubble pile source.
HC-9	SAQ	Between SPL pile and rubble pile & midway between KM-3 and KM-5 to better define flowpath.	Characterize flowpath, evaluate SPL vs rubble pile source; evaluate source area conditions.
TH-3A or -8	A	Adjacent KM-1	Provide correlation with KM-1 to allow extrapolation of historic data.
HC-1	A	Upgradient by sludge pond	Document upgradient water quality to support use of chloride as tracer and basis for mixing evaluation.
HC-13	A	Upgradient south of KM-3	Document upgradient water quality to support use of chloride as tracer and basis for mixing evaluation.
HC-12	A	Center of plume	Evaluate conditions in center of plume – highest concentrations on site.
KM-2A		Plume adjacent to rubble pile	Better define suspected source area conditions.

TABLE 2-2. ANALYTICAL SCHEDULE

ANALYTES	Proposed Reporting Limit (ug/L unless specified)
Field Parameters	
pH	
Temperature	
Static Water Level	
ORP (Redox; Eh or pe)	
Dissolved Oxygen	
Major Minerals	
Calcium	1000
Magnesium	1000
Sodium	1000
Potassium	1000
Hardness as CaCO3	Calculated
Sodium Adsorption Ratio	Calculated
Total Alkalinity as CaCO3	1000
Carbonate	1000
Bicarbonate	1000
Hydroxide	1000
Chloride	1000
Fluoride	100
Sulfate	1000
Sulfide	40
pH	0.1 standard pH units
Total Dissolved Solids	10 mg/L
Specific Conductivity	1 umho/cm
Silica (dissolved)	100
Nitrogen Compounds	
Nitrate plus Nitrite as "N"	10
Total Ammonia as N	50
Cyanide Forms	
Total Cyanide (manual distillation)	5
WAD Cyanide	5
Free Cyanide	200
Dissolved Metals	
Cobalt	
Copper	1
Iron	50
Ferrous Iron	100
Ferric Iron	Calculate by difference
Manganese	5

3.0 GEOCHEMICAL MODELING

Initial steps in understanding the geochemistry of the cyanide and fluoride contaminant plumes has focused on the general groundwater chemistry and fluoride.

The expanded analysis of groundwater parameters appears to be very helpful in beginning to understand the complex conditions on the Kaiser Mead site. The additional parameters provide the information to evaluate several key factors in contaminant fate and transport:

1. Data on conservative chemical tracers (e.g., sodium and chloride) provides information on source and groundwater flow directions and provides a means to identify and quantify the amount of natural chemical attenuation in groundwater.
2. Data on parameters that may react with CN and F (e.g., calcium and iron) allows geochemical modeling and evaluation of likely natural attenuation mechanisms.

3.1 DILUTION AND ATTENUATION

Cyanide and fluoride concentrations are observed to decrease an order of magnitude or more between the source area and the compliance monitoring wells. This decrease in concentration could be caused by: 1) mixing and dispersion in groundwater; 2) chemical reactions in groundwater that remove cyanide and fluoride (i.e., chemical attenuation); or 3) some combination of the mixing/dispersion and chemical attenuation.

Assuming that chloride is conservative (not attenuated in the groundwater system), a comparison of source area groundwater (represented by well KM-5) to a point downgradient in the plume at the compliance monitoring well KMCP-4B, can provide an indication of the amount of dilution in the groundwater flowpath. Current chloride concentration in KM-5 (54 mg/L) is significantly higher than the background well KM-3 (16 mg/L) indicating that the current CN and F source is also high in chloride relative to background groundwater. At the compliance point (KMCP-4B) chloride has dropped to 26 mg/L.

Assuming that chloride is a conservative tracer, then the decline in chloride concentration only occurs by dilution and we can calculate: 1) the amount of dilution and the mixing ratios of KM-5 and background groundwater at the compliance point and 2) the amount of attenuation of cyanide and fluoride. Under this mixing scenario, groundwater at KMCP-4B consists of 26 percent source area groundwater (KM-5) and 74 percent background groundwater, a 3 to 1 dilution of source area groundwater.

A comparison of CN and F to chloride concentrations in groundwater downgradient of the source area well KM-5 provides a method to determine if mixing alone could be responsible for the observed decreases in cyanide and fluoride concentrations at the compliance well KMCP-4B. At KM-5 cyanide concentration in November 2010 was 127 mg/L compared to 19.1 mg/L in KMCP-4B. Assuming a mix of three parts background groundwater and one part source area groundwater, KMCP-4B would be predicted to contain 33 mg/L cyanide. However, if the assumption that chloride is truly conservative, then the difference between predicted and observed cyanide concentration (14 mg/L or about 40 percent) is attributable to chemical attenuation of cyanide in the groundwater system. Similarly, assuming a mix of three parts background groundwater and one part source area groundwater, KMCP-4B is predicted to contain 18.4 mg/L fluoride but actually contains 13.8 mg/L fluoride (November 2010 data). Thus the calculated fluoride attenuation is 4.6 mg/L or approximately 25 percent.

Quantifying the affects of dilution and attenuation are important in creating a realistic conceptual model of the groundwater system.

3.2 FLUORIDE ATTENUATION MECHANISMS

As noted above, fluoride appears to be attenuated during groundwater transport and there is a good inverse relationship between groundwater calcium and fluoride concentrations. The inverse relationship is typical of the “common ion effect” wherein a chemical reaction such as fluorite mineral equilibrium:

$$Ca_2+ + 2F^- \leftrightarrow CaF_2$$

Geochemical equilibrium modeling was performed to evaluate whether dissolved calcium concentrations and the formation or dissolution of the mineral fluorite (CaF_2) could control fluoride concentrations. Groundwater calcium and fluoride concentrations and calcite and fluorite saturation indices in the November 2010 sample analyses are shown in Table 3-1 below. Positive saturation indices (>0.00) indicate that the groundwater is saturated or over-saturated with the mineral phase while negative saturation indices indicate groundwater that is unsaturated with respect to the mineral phase.

TABLE 3-1.   NOVEMBER 2010 GROUNDWATER CONCENTRATIONS AND MINERAL SATURATION INDICES

		Mineral Saturation Index (log Q/K)		Groundwater Concentration (mg/L)			
Location	**Well**	**Calcite ($CaCO_3$)**	**Fluorite (CaF_2)**	**Calcium**	**Fluoride**	**Total Cyanide**	**pH**
Upgradient	**KM-3**	0.281	-2.878	50.9	<0.1	<0.01	7.54
Center of Plume	**KM-5**	0.573	0.547	1.16	70.5	127	9.5
Downgradient Center of Plume - Compliance	**KMCP-4B**	0.528	0.665	11.7	13.8	19.1	8.3
Cross-gradient Edge of Center of Plume	**KM-4**	1.151	0.418	146	3.21	2.7	7.74
Cross-gradient Downgradient Edge of Plume	**KMCP-5B**	0.224	-2.386	33.9	0.197	0.0445	7.79

Upgradient background groundwater (KM-3) is saturated with the common mineral calcite ($CaCO_3$) and has moderate calcium concentration. Because fluoride concentration is low, background groundwater is unsaturated with the mineral fluorite. In source area groundwater (KM-5), fluoride concentrations are much higher, calcium concentration is much lower, and groundwater is saturated with both calcite and fluorite. Downgradient of the F source area, calcium concentrations steadily rise and fluoride concentrations decline while groundwater remains saturated with both calcite and fluorite. Calculations also indicate that the 1978 SPL leachate water Hart Crowser (1988) was also saturated with both calcite and fluorite.

The geochemical modeling and calculated mineral saturation indices support the observed chemical attenuation of fluoride:

1. SPL leachate contains very high concentrations of fluorite and is saturated with respect to the mineral fluorite. Any addition of dissolved calcium to the contaminant source water would result in precipitation of fluorite and the removal of fluoride from the water. This could occur in the unsaturated (vadose) zone and in the groundwater.
2. In the unsaturated zone, calcium could be released from soil either through dissolution of calcite or exchange reactions with sodium to form fluorite precipitates. In groundwater, mixing of the contaminant source with groundwater containing calcium (such as background groundwater) would also result in fluorite precipitation and fluoride attenuation.
3. Unimpacted water with low fluoride concentrations, such as infiltrating rain, leaking water pipes, background groundwater, etc. that contacts soils with precipitated fluorite will likely dissolve fluorite and acquire elevated fluoride concentrations.
4. In the groundwater system, for instance as observed between wells KM-5 and KMCP-4B, the contaminated groundwater is observed to be mixed with background groundwater containing moderate calcium concentrations. The resultant mixed water is oversaturated with fluorite, fluorite precipitates, and groundwater fluoride concentrations are reduced (i.e., fluoride is attenuated).

5. It is possible, perhaps likely, that actual fluoride behavior consists of both fluoride dissolution in some areas of the transport pathway and fluoride precipitation in other areas.

3.3 CYANIDE ATTENUATION MECHANISMS

Cyanide chemistry is significantly more complex than fluoride. Literature reports conclude that the primary dissolved species of cyanide in aluminum smelting waste and associated groundwater are iron cyanide aqueous complexes, $Fe(CN)_6^{-3}$ or $Fe(CN)_6^{-4}$. Similarly, Robinson and Noble (1979) and Hart Crowser (1988) estimate that 90 to 99 percent of cyanide present in groundwater at the Kaiser Mead site is in the form of iron cyanide complexes. Thus, the mobility and fate of cyanide at Kaiser Mead primarily depends on the behavior of iron cyanide complexes.

The solubility and mobility of iron cyanide complexes in groundwater are principally controlled by: 1) equilibrium with a variety of solid iron cyanide phases such as Prussian Blue, Turnbull's Blue and solid solutions or mixed solid phases of these phases with each other and with ferric hydroxide ($Fe(OH)_3$); and 2) adsorption of the cyanide complexes by iron hydroxides/oxides and clays in aquifer sediments. The stability and solubility of the solid iron cyanide phases is dependent on pH and redox (i.e., Eh, pE, and ORP) conditions. Under high pH conditions such as are present in SPL, the iron cyanide complexes are highly soluble, as evidenced by the high cyanide concentrations in SPL leachate. Under neutral to acid pH conditions and/or reducing (i.e., anoxic) conditions, the solid phases become stable and cyanide solubility and concentrations are limited.

Site data are consistent with a model where cyanide is attenuated in groundwater and perhaps the vadose zone by decrease in pH and precipitation of iron cyanide solid phases. However, to date, there has been no comprehensive characterization of redox conditions in the groundwater and thus it is not possible at this time to fully consider solid phase stability and the control that redox conditions may exert.

If cyanide is attenuated by precipitation of iron cyanide complexes, then it would be expected that sediments encountered in wells and borings on the site would be enriched in cyanide. However, a review of data of monitoring well and boring logs in the Hart Crowser (1988) report indicates that some sediment are enriched in cyanide but in general sediments at depth have relatively low cyanide concentrations. It is likely that the cyanide-in-soil data in the Hart Crowser report (collected by Robinson and Noble (1979) and reported by Hart Crowser) is incorrect based on the following:

1. The nature of cyanide in general, and in particular cyanide solids make quantification difficult. In particular, it is not possible to analyze cyanide solid compounds directly. Instead, the solids must first be dissolved or leached and the resulting water analyzed. Typically this is done by leaching or dissolving the solids with acids or water. Unfortunately, acids destroy free cyanide while solid iron cyanide complexes are insoluble in acidic conditions. For smelter soils in particular, it is necessary to perform multiple leaches at high pH (alkaline) conditions in order to solubilize the iron cyanide complexes. Thus, a "typical" analysis of solids for cyanide can grossly underestimate cyanide levels unless the analysts are well practiced in cyanide analyses and have documented that the leaching procedure is effective for the solids of interest.
2. The cyanide analyses were conducted by the in-house Kaiser lab and the results are labeled as "qualitative" in the well/boring logs. It is likely that the analysts were competent and therefore they recognized that there were problems in quantification of cyanide levels.

4.0 SOURCE EVALUATION

The possibility of additional unknown contaminant sources has been a focus of site investigation activities for over 20 years. The inability to precisely define the source(s) of ongoing cyanide and fluoride contribution to the contaminant plume and the fact that a predicted decline in contaminant concentrations has not occurred leaves open the possibility that a contaminant source not previously identified or addressed may exist. This evaluation of additional sources has focused on identifying water balance components that may provide an indication of sources.

Previous site evaluations (Hart Crowser, 1988; CH2M Hill, 1988) concluded that cyanide and fluoride mobilization by infiltration through the SPL pile cap and groundwater recharge were unlikely due to climatic and site conditions. This focused attention on areas where stormwater was concentrated or where there was no soil or vegetative cover. Following initial capping of the SPL pile (1979), backfill and abandonment of Tharp Lake (1981) and paving of Areas 2 and 4 in 1986 and 1987, it was thought that decreasing trends in contaminant concentrations in groundwater indicated that levels of CN and F would decrease to acceptable levels without additional remediation. Additionally, water supply and sewer (storm water and sanitary) pipes in the plant site were checked, lined and replaced to remove the possibility that pipeline leakage would flush contaminants to the groundwater.

Average annual precipitation from 121 years of record at Spokane airport is 16.1 inches. Average pan evaporation at the Spokane airport site is approximately 48 inches (April through September). Approximately half of Spokane’s precipitation falls from November through February when evapotranspiration is low. The USGS (2007) evaluated potential groundwater recharge in the Rathdrum/Spokane aquifer area using a variety of methods. For the Spokane airport site, these various methods yielded recharge rates of less than 1% to about 11% of annual precipitation and up to 40% of monthly precipitation.

Although there is no reliable method to quantify recharge in the vicinity or the Kaiser site, the conclusion that recharge is zero is not likely correct. Recharge in areas where precipitation or stormwater collects or runs off of paved areas is likely, at least following some snowmelt or large precipitation events. The primary area that may still provide an opportunity for infiltration of surface water through waste materials that could provide recharge to groundwater is the sludge pond. Further evaluation of materials underlying the sludge pond and of wells in the vicinity of the sludge pond may be warranted.

Another way of looking at the potential for infiltration and recharge to continue to contribute contaminants to the groundwater system is to estimate the quantity and concentration of recharge necessary to create the concentrations observed in monitoring wells. The groundwater flux in the contaminant plume of the A/B aquifer is calculated to be about 155 gpm based on a width of 700 feet (at wells KMCP 3B and KMCP-4B) , a thickness of 20 feet and a hydraulic conductivity of 1800 gpd/ft^2 (Hart Crowser, 1988). Although this hydraulic conductivity and flow rate seem high, these values would result in daily loads of CN of about 70 lbs/d and of F of about 37 lbs/d.

If the above values for daily contaminant loads are correct, the required amount of recharge and the required contaminant concentrations to produce those loads can be estimated (Table 4-1). As shown in the table, the levels of both CN and F that would be required for the high end of potential recharge quantities ((10% of annual precipitation) would be higher than any levels measured on site unless the recharge area approached 100 acres. This exercise indicates that the rates of recharge and the contaminant concentrations required to produce the estimated contaminant loads do not appear to be realistic.

TABLE 4-1. ESTIMATED CONCENTRATION OF CN AND F IN GROUNDWATER RECHARGE REQUIRED TO PRODUCE CALCULATED CONTAMINANT LOADS AT COMPLIANCE BOUNDARY

Recharge Area (acres)	Recharge Rate (gpm)	CN Load (lbs/d)	F Load (lbs/d)	Required [CN] to create daily load (mg/L)	Required [F] to create daily load (mg/L)
1	0.08	71	37	71515	37639
10	0.8	71	37	7151	3764
100	8	71	37	715	376

Therefore, either infiltration/recharge through the types of materials known to be on site are not the primary source of groundwater contaminant loads or the estimated groundwater contaminant loads are not correct. Without additional aquifer hydraulic characteristics (aquifer tests) it does not seem that additional examination of the site water balance would be productive. While it is still possible that a primary contaminant source may be producing the contaminant load through recharge, additional source evaluation should be delayed until information is available.

5.0 REFERENCES

CH2MHill, 1988. Engineering Assessment Report, A Contaminant Release Control Feasibility Assessment. December 1988.

Hart Crowser, 1988. Site Characterization Analysis, KACC – Mead Plant, Spokane County, Washington. J-948-05. December 1988.

Robinson and Noble, 1979. Status Report of Aquifer Contamination at Kaiser Aluminum and Chemical Corporation, Mead Works. May 1, 1979.

USGS, 2007. U.S. Geological Survey Scientific Investigations Report 2007-5038. James R. Bartolino. Assessment of Areal Recharge to the Spokane Valley-Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho.

APPENDIX A

EXPANDED ANALYSIS LABORATORY DATA PACKAGE

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W0K0474**
Coeur d Alene, ID 83815	Reported: 16-Dec-10 12:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
KM-1	W0K0474-01	Ground Water	17-Nov-10 09:20	JF	18-Nov-2010
KM-2	W0K0474-02	Ground Water	17-Nov-10 10:00	JF	18-Nov-2010
KM-3	W0K0474-03	Ground Water	16-Nov-10 12:00	JF	18-Nov-2010
KM-4	W0K0474-04	Ground Water	16-Nov-10 11:15	JF	18-Nov-2010
KM-5	W0K0474-05	Ground Water	17-Nov-10 11:30	JF	18-Nov-2010
KM-6	W0K0474-06	Ground Water	17-Nov-10 10:35	JF	18-Nov-2010
KMCP-1B	W0K0474-07	Ground Water	16-Nov-10 12:35	JF	18-Nov-2010
KMCP-2B	W0K0474-08	Ground Water	16-Nov-10 13:05	JF	18-Nov-2010
KMCP-3B	W0K0474-09	Ground Water	16-Nov-10 09:00	JF	18-Nov-2010
KMCP-4B	W0K0474-10	Ground Water	16-Nov-10 09:45	JF	18-Nov-2010
KMCP-5B	W0K0474-11	Ground Water	16-Nov-10 10:20	JF	18-Nov-2010
W-195	W0K0474-12	Ground Water	17-Nov-10 14:15	JF	18-Nov-2010
W-2326	W0K0474-13	Ground Water	17-Nov-10 13:45	JF	18-Nov-2010
W-24	W0K0474-14	Ground Water	17-Nov-10 13:30	JF	18-Nov-2010

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

Case Narrative

12/16/10 DKG - Sample KM-2 reanalyzed for CN WAD, sample KM-6 reanalyzed for CN Total and CN WAD per client request. Each was reanalyzed in duplicate. Report includes original and reanalysis results.

12/10/10 (jk) - C/A balance for samples 4 and 5 due to precipitate in samples

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-1**
SVL Sample ID: **W0K0474-01 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 09:20
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	54.7	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:10	D2
SM 4500-CN-I	**Cyanide (WAD)**	0.220	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:01	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	95.0	mg/L	5.00	1.70	50	W047435	FEH	11/23/10 22:37	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-2**
SVL Sample ID: **W0K0474-02 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 10:00
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	88.4	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:12	D2
SM 4500-CN-I	**Cyanide (WAD)**	0.214	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:03	
SM 4500-CN-I	**Cyanide (WAD)**	0.248	mg/L	0.0100	0.0019		W051099	CFF	12/15/10 13:15	H6
SM 4500-CN-I	**Cyanide (WAD)**	0.345	mg/L	0.0100	0.0019		W051099	CFF	12/15/10 13:17	H6
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	39.5	mg/L	2.50	0.850	25	W047435	FEH	11/23/10 22:47	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-3**
SVL Sample ID: **W0K0474-03 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 12:00
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	50.9	mg/L	0.040	0.008		W048038	AS	12/02/10 16:54	
EPA 200.7	**Magnesium**	50.7	mg/L	0.060	0.012		W048038	AS	12/02/10 16:54	
EPA 200.7	**Potassium**	4.81	mg/L	0.50	0.04		W048038	AS	12/02/10 16:54	
EPA 200.7	**Sodium**	9.34	mg/L	0.50	0.05		W048038	AS	12/02/10 16:54	
SM 2340B	**Hardness (as CaCO3)**	336	mg/L	0.347	0.069		N/A		12/02/10 16:54	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:00	
EPA 200.7	**Barium**	0.0569	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:01	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:01	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W048090	AS	12/05/10 12:00	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:00	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:01	
EPA 200.7	**Silica (SiO2)**	12.2	mg/L	0.17	0.09		W048090	AS	12/05/10 12:00	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:01	
EPA 200.8	Copper	< 0.00100	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:27	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	618	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	Cyanide (total)	< 0.0100	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:12	
SM 2320B/2310B	**Bicarbonate**	268	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2320B/2310B	**Total Alkalinity**	268	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2540 C	**Total Diss. Solids**	300	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @20.0°C**	8.00	pH Units				W048016	DKS	11/22/10 10:34	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	16.2	mg/L	2.00	0.440	10	W047435	FEH	11/22/10 19:58	D2
EPA 300.0	Fluoride	< 0.100	mg/L	0.100	0.034		W047435	FEH	11/22/10 19:31	
EPA 300.0	**Sulfate as SO4**	37.4	mg/L	0.30	0.05		W047435	FEH	11/22/10 19:31	
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 12:41	

Cation/Anion Balance and TDS Ratios

Cation Sum: 7.25 meq/L Anion Sum: 6.59 meq/L C/A Balance: 4.72 % Calculated TDS: 330 TDS/cTDS: 0.91 TDS/eC: 0.49

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-4**
SVL Sample ID: **W0K0474-04 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 11:15
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	146	mg/L	0.040	0.008		W048038	AS	12/02/10 17:00	
EPA 200.7	**Magnesium**	97.7	mg/L	0.060	0.012		W048038	AS	12/02/10 17:00	
EPA 200.7	**Potassium**	16.6	mg/L	0.50	0.04		W048038	AS	12/02/10 17:00	
EPA 200.7	**Sodium**	91.5	mg/L	0.50	0.05		W048038	AS	12/02/10 17:00	
SM 2340B	**Hardness (as CaCO3)**	767	mg/L	0.347	0.069		N/A		12/02/10 17:00	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:17	
EPA 200.7	**Barium**	0.125	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:18	
EPA 200.7	**Cobalt**	0.0064	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:18	
EPA 200.7	**Iron**	2.06	mg/L	0.060	0.027		W048090	AS	12/05/10 12:17	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:17	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:18	
EPA 200.7	**Silica (SiO2)**	10.6	mg/L	0.17	0.09		W048090	AS	12/05/10 12:17	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:18	
EPA 200.8	**Copper**	0.00150	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:28	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	859	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	2.70	mg/L	0.100	0.0160	10	W049128	CFF	12/01/10 12:14	D2,H6
SM 2320B/2310B	**Bicarbonate**	560	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2320B/2310B	**Total Alkalinity**	560	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2540 C	**Total Diss. Solids**	428	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @19.0°C**	8.22	pH Units				W048016	DKS	11/22/10 10:41	
SM 4500-CN-I	**Cyanide (WAD)**	0.0627	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:24	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	18.5	mg/L	5.00	1.10	25	W047435	FEH	11/22/10 20:52	D2
EPA 300.0	**Fluoride**	3.21	mg/L	0.100	0.034		W047435	FEH	11/22/10 20:43	
EPA 300.0	**Sulfate as SO4**	60.8	mg/L	7.50	1.32	25	W047435	FEH	11/22/10 20:52	D2
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 12:55	

Cation/Anion Balance and TDS Ratios

Cation Sum: 19.8 meq/L | Anion Sum: 13.1 meq/L | C/A Balance: 20.22 % | Calculated TDS: 770 | TDS/cTDS: 0.56 | TDS/eC: 0.50

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-5**
SVL Sample ID: **W0K0474-05 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 11:30
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	1.16	mg/L	0.040	0.008		W048038	AS	12/02/10 17:06	
EPA 200.7	**Magnesium**	3.50	mg/L	0.060	0.012		W048038	AS	12/02/10 17:06	
EPA 200.7	**Potassium**	12.9	mg/L	0.50	0.04		W048038	AS	12/02/10 17:06	
EPA 200.7	**Sodium**	2330	mg/L	2.50	0.48	10	W048038	AS	12/02/10 18:00	D2
SM 2340B	**Hardness (as CaCO3)**	17.3	mg/L	0.347	0.069		N/A		12/02/10 17:06	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:23	
EPA 200.7	**Barium**	0.0191	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:25	
EPA 200.7	**Cobalt**	0.128	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:25	
EPA 200.7	**Iron**	40.3	mg/L	0.060	0.027		W048090	AS	12/05/10 12:23	
EPA 200.7	**Manganese**	0.0047	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:23	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:24	
EPA 200.7	**Silica (SiO2)**	8.70	mg/L	0.17	0.09		W048090	AS	12/05/10 12:23	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:25	
EPA 200.8	**Copper**	0.0373	mg/L	0.00100	0.00014	2	W048004	DG	12/10/10 15:02	D5
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	7840	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	127	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:16	D2
SM 2320B/2310B	**Bicarbonate**	1430	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2320B/2310B	**Carbonate**	2280	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2320B/2310B	**Total Alkalinity**	3710	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2540 C	**Total Diss. Solids**	5460	mg/L	100			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @22.0°C**	9.90	pH Units				W048016	DKS	11/30/10 13:38	
SM 4500-CN-I	**Cyanide (WAD)**	0.261	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:05	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049153	CFF	12/01/10 12:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	54.1	mg/L	5.00	1.10	25	W047435	FEH	11/22/10 21:01	D2
EPA 300.0	**Fluoride**	70.5	mg/L	2.50	0.850	25	W047435	FEH	11/22/10 21:01	D2
EPA 300.0	**Sulfate as SO4**	506	mg/L	7.50	1.32	25	W047435	FEH	11/22/10 21:01	D2
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 13:09	

Cation/Anion Balance and TDS Ratios

Cation Sum: 103 meq/L Anion Sum: 89.9 meq/L C/A Balance: 7.02 % Calculated TDS: 5204 TDS/cTDS: 1.05 TDS/eC: 0.70

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-6**
SVL Sample ID: **W0K0474-06 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 10:35
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	174	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:24	D2
EPA 335.4	**Cyanide (total)**	156	mg/L	5.00	0.800	500	W051078	CFF	12/15/10 12:47	D2,H6
EPA 335.4	**Cyanide (total)**	170	mg/L	5.00	0.800	500	W051078	CFF	12/15/10 12:49	D2,H6
SM 4500-CN-I	**Cyanide (WAD)**	0.435	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:07	
SM 4500-CN-I	**Cyanide (WAD)**	0.616	mg/L	0.0200	0.0038	2	W051099	CFF	12/15/10 13:46	D2,H6
SM 4500-CN-I	**Cyanide (WAD)**	0.451	mg/L	0.0100	0.0019		W051099	CFF	12/15/10 13:21	H6
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	75.8	mg/L	5.00	1.70	50	W047435	FEH	11/23/10 22:57	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-1B**
SVL Sample ID: **W0K0474-07 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 12:35
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.158	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:16	
SM 4500-CN-I	**Cyanide (WAD)**	0.0136	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:26	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.561	mg/L	0.100	0.034		W047435	FEH	11/22/10 21:19	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-2B**
SVL Sample ID: **W0K0474-08 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 13:05
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.133	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:18	
SM 4500-CN-I	**Cyanide (WAD)**	0.0143	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:28	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.436	mg/L	0.100	0.034		W047435	FEH	11/22/10 21:55	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-3B**
SVL Sample ID: **W0K0474-09 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 09:00
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	58.6	mg/L	2.00	0.320	200	W049128	CFF	12/01/10 12:26	D2,H6
SM 4500-CN-I	**Cyanide (WAD)**	0.444	mg/L	0.100	0.0190	10	W049018	CFF	11/29/10 13:36	D2
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	26.5	mg/L	2.50	0.850	25	W047435	FEH	11/23/10 23:07	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-4B**
SVL Sample ID: **W0K0474-10 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 09:45
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	11.7	mg/L	0.040	0.008		W048038	AS	12/02/10 17:12	
EPA 200.7	**Magnesium**	12.0	mg/L	0.060	0.012		W048038	AS	12/02/10 17:12	
EPA 200.7	**Potassium**	4.10	mg/L	0.50	0.04		W048038	AS	12/02/10 17:12	
EPA 200.7	**Sodium**	364	mg/L	0.50	0.05		W048038	AS	12/02/10 17:12	
SM 2340B	**Hardness (as CaCO3)**	78.8	mg/L	0.347	0.069		N/A		12/02/10 17:12	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:35	
EPA 200.7	**Barium**	0.0304	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:37	
EPA 200.7	**Cobalt**	0.0301	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:37	
EPA 200.7	**Iron**	6.97	mg/L	0.060	0.027		W048090	AS	12/05/10 12:35	
EPA 200.7	**Manganese**	0.0127	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:35	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:37	
EPA 200.7	**Silica (SiO2)**	7.83	mg/L	0.17	0.09		W048090	AS	12/05/10 12:35	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:37	
EPA 200.8	**Copper**	0.00615	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:57	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	1600	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	19.1	mg/L	0.500	0.0800	50	W049128	CFF	12/01/10 12:28	D2,H6
SM 2320B/2310B	**Bicarbonate**	479	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2320B/2310B	**Carbonate**	18.1	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2320B/2310B	**Total Alkalinity**	497	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2540 C	**Total Diss. Solids**	952	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @18.0°C**	8.50	pH Units				W048016	DKS	11/22/10 11:42	
SM 4500-CN-I	**Cyanide (WAD)**	0.374	mg/L	0.0200	0.0038	2	W049018	CFF	11/29/10 13:38	D2
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	26.4	mg/L	1.00	0.220	5	W047435	FEH	11/22/10 22:13	D2
EPA 300.0	**Fluoride**	13.8	mg/L	0.500	0.170	5	W047435	FEH	11/22/10 22:13	D2
EPA 300.0	**Sulfate as SO4**	228	mg/L	1.50	0.26	5	W047435	FEH	11/22/10 22:13	D2
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 13:23	

Cation/Anion Balance and TDS Ratios

Cation Sum: 17.8 meq/L Anion Sum: 16.1 meq/L C/A Balance: 4.76 % Calculated TDS: 958 TDS/cTDS: 0.99 TDS/eC: 0.60

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-5B**
SVL Sample ID: **W0K0474-11 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 10:20
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	33.9	mg/L	0.040	0.008		W048038	AS	12/02/10 17:18	
EPA 200.7	**Magnesium**	30.5	mg/L	0.060	0.012		W048038	AS	12/02/10 17:18	
EPA 200.7	**Potassium**	3.75	mg/L	0.50	0.04		W048038	AS	12/02/10 17:18	
EPA 200.7	**Sodium**	5.65	mg/L	0.50	0.05		W048038	AS	12/02/10 17:18	
SM 2340B	**Hardness (as CaCO3)**	211	mg/L	0.347	0.069		N/A		12/02/10 17:18	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:41	
EPA 200.7	**Barium**	0.0867	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:42	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:43	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W048090	AS	12/05/10 12:41	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:41	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:43	
EPA 200.7	**Silica (SiO2)**	10.6	mg/L	0.17	0.09		W048090	AS	12/05/10 12:41	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:43	
EPA 200.8	**Copper**	0.00106	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:58	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	399	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	0.0445	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:24	
SM 2320B/2310B	**Bicarbonate**	174	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2320B/2310B	**Total Alkalinity**	174	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2540 C	**Total Diss. Solids**	204	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @18.0°C**	8.06	pH Units				W048016	DKS	11/22/10 11:53	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:40	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	8.61	mg/L	0.200	0.044		W047435	FEH	11/22/10 22:31	
EPA 300.0	**Fluoride**	0.197	mg/L	0.100	0.034		W047435	FEH	11/22/10 22:31	
EPA 300.0	**Sulfate as SO4**	21.5	mg/L	0.30	0.05		W047435	FEH	11/22/10 22:31	
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/03/10 16:03	

Cation/Anion Balance and TDS Ratios

Cation Sum: 4.55 meq/L Anion Sum: 4.18 meq/L C/A Balance: 4.25 % Calculated TDS: 209 TDS/cTDS: 0.98 TDS/eC: 0.51

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **W-195**
SVL Sample ID: **W0K0474-12 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 14:15
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	1.85	mg/L	0.100	0.0160	10	W049128	CFF	12/01/10 12:30	D2
SM 4500-CN-I	**Cyanide (WAD)**	0.0629	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 14:16	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	1.02	mg/L	0.100	0.034		W047435	FEH	11/22/10 22:50	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **W-2326**
SVL Sample ID: **W0K0474-13 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 13:45
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.248	mg/L	0.0100	0.0016		W049128	CFF	12/01/10 12:32	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 14:24	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.200	mg/L	0.100	0.034		W047435	FEH	11/22/10 22:59	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **W-24**
SVL Sample ID: **W0K0474-14 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 13:30
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	Cyanide (total)	< 0.0100	mg/L	0.0100	0.0016		W049128	CFF	12/01/10 12:34	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 14:26	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.172	mg/L	0.100	0.034		W047435	FEH	11/22/10 23:08	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W0K0474**
Coeur d Alene, ID 83815	Reported: 16-Dec-10 12:06

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)								
EPA 200.7	Calcium	mg/L	<0.040	0.008	0.040	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	<0.060	0.012	0.060	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	<0.50	0.04	0.50	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	<0.50	0.05	0.50	W048038	02-Dec-10	
Metals (Dissolved)								
EPA 200.7	Aluminum	mg/L	<0.080	0.017	0.080	W048090	05-Dec-10	
EPA 200.7	Barium	mg/L	<0.0020	0.0005	0.0020	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	<0.0060	0.0009	0.0060	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	<0.060	0.027	0.060	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	<0.0040	0.0017	0.0040	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	<0.010	0.003	0.010	W048090	05-Dec-10	
EPA 200.7	Silica (SiO2)	mg/L	<0.17	0.09	0.17	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	<0.0100	0.0019	0.0100	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	<0.00100	0.000072	0.00100	W048004	10-Dec-10	
Classical Chemistry Parameters								
EPA 120.1	Specific conductance	µmhos/cm	<1.00		1.00	W048015	22-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W049017	29-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W049128	01-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W051078	15-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W049018	29-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W049132	01-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W051099	15-Dec-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	0.009	0.100	W049083	30-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	0.009	0.100	W049153	01-Dec-10	
Anions by Ion Chromatography								
EPA 300.0	Fluoride	mg/L	<0.100	0.034	0.100	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	<0.20	0.008	0.20	W049149	02-Dec-10	
EPA 300.0	Chloride	mg/L	<0.200	0.044	0.200	W047435	22-Nov-10	
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.05	0.30	W047435	22-Nov-10	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Calcium	mg/L	20.0	20.0	100	85 - 115	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	20.8	20.0	104	85 - 115	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	20.3	20.0	102	85 - 115	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	20.1	19.0	106	85 - 115	W048038	02-Dec-10	
Metals (Dissolved)									
EPA 200.7	Aluminum	mg/L	1.11	1.00	111	85 - 115	W048090	05-Dec-10	
EPA 200.7	Barium	mg/L	1.11	1.00	111	85 - 115	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	1.08	1.00	108	85 - 115	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	10.6	10.0	106	85 - 115	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	1.09	1.00	109	85 - 115	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	1.04	1.00	104	85 - 115	W048090	05-Dec-10	
EPA 200.7	Silica (SiO2)	mg/L	10.9	10.7	102	85 - 115	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	1.09	1.00	109	85 - 115	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	0.0264	0.0250	106	85 - 115	W048004	10-Dec-10	

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Classical Chemistry Parameters									
EPA 120.1	Specific conductance	µmhos/cm	440	445	99.0	90 - 110	W048015	22-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	0.152	0.150	102	90 - 110	W049128	01-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	0.152	0.150	101	90 - 110	W051078	15-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	0.153	0.150	102	90 - 110	W049017	29-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.153	0.150	102	90 - 110	W049132	01-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.148	0.150	98.5	90 - 110	W051099	15-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.151	0.150	101	90 - 110	W049018	29-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	1.07	1.00	107	85 - 115	W049153	01-Dec-10	
SW-846 9213	Cyanide (free)	mg/L	1.03	1.00	103	85 - 115	W049083	30-Nov-10	
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	1.96	2.00	98.0	90 - 110	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	4.60	5.00	92.1	90 - 110	W049149	02-Dec-10	
EPA 300.0	Chloride	mg/L	2.93	3.00	97.7	90 - 110	W047435	22-Nov-10	
EPA 300.0	Sulfate as SO4	mg/L	9.73	10.0	97.3	90 - 110	W047435	22-Nov-10	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Calcium	mg/L	85.6	86.1	0.5	20	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	7.20	7.29	1.3	20	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	5.46	5.54	1.4	20	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	22.5	22.7	1.1	20	W048038	02-Dec-10	
Metals (Dissolved)									
EPA 200.7	Aluminum	mg/L	<0.080	<0.080	UDL	20	W048090	05-Dec-10	R2
EPA 200.7	Barium	mg/L	0.0574	0.0569	0.9	20	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	<0.0060	<0.0060	UDL	20	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	<0.060	<0.060	UDL	20	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	<0.0040	<0.0040	UDL	20	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	<0.010	<0.010	UDL	20	W048090	05-Dec-10	R2
EPA 200.7	Silica (SiO2)	mg/L	12.2	12.2	0.6	20	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	<0.0100	<0.0100	<RL	20	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	0.00106	0.00106	0.1	20	W048004	10-Dec-10	
Classical Chemistry Parameters									
EPA 120.1	Specific conductance	µmhos/cm	745	742	0.4	20	W048015	22-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	4.08	3.75	8.4	20	W051078	15-Dec-10	D2
EPA 335.4	Cyanide (total)	mg/L	<0.0100	<0.0100	UDL	20	W049017	29-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	<0.0100	UDL	20	W049128	01-Dec-10	
SM 2320B/2310B	Total Alkalinity	mg/L	356	355	0.1	20	W048016	22-Nov-10	
SM 2320B/2310B	Bicarbonate	mg/L	356	355	0.1	20	W048016	22-Nov-10	
SM 2320B/2310B	Carbonate	mg/L	<1.0	<1.0	UDL	20	W048016	22-Nov-10	
SM 2320B/2310B	Hydroxide	mg/L	<1.0	<1.0	UDL	20	W048016	22-Nov-10	
SM 2540 C	Total Diss. Solids	mg/L	592	619	4.5	5	W048012	22-Nov-10	
SM 4500 H B	pH	pH Units	7.90	7.96	0.8	20	W048016	22-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.219	0.220	0.7	20	W049132	01-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.254	0.248	2.6	20	W051099	15-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	<0.0100	UDL	20	W049018	29-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	<RL	20	W049083	30-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	UDL	20	W049153	01-Dec-10	

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Quality Control - DUPLICATE Data (Continued)

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	<0.100	<0.100	<RL	20	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	<0.20	<0.20	UDL	200	W049149	03-Dec-10	
EPA 300.0	Chloride	mg/L	16.4	16.2	1.1	20	W047435	22-Nov-10	D2
EPA 300.0	Sulfate as SO4	mg/L	37.2	37.4	0.7	20	W047435	22-Nov-10	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	Calcium	mg/L	105	86.1	20.0	93.8	70 - 130	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	27.1	7.29	20.0	99.2	70 - 130	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	25.7	5.54	20.0	101	70 - 130	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	42.4	22.7	19.0	104	70 - 130	W048038	02-Dec-10	
Metals (Dissolved)										
EPA 200.7	Aluminum	mg/L	1.08	<0.080	1.00	108	70 - 130	W048090	05-Dec-10	
EPA 200.7	Barium	mg/L	1.15	0.0569	1.00	109	70 - 130	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	1.02	<0.0060	1.00	102	70 - 130	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	10.0	<0.060	10.0	100	70 - 130	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	1.04	<0.0040	1.00	104	70 - 130	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	0.983	<0.010	1.00	98.3	70 - 130	W048090	05-Dec-10	
EPA 200.7	Silica (SiO2)	mg/L	22.7	12.2	10.7	98.3	70 - 130	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	1.04	<0.0100	1.00	104	70 - 130	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	0.0279	0.00106	0.0250	107	70 - 130	W048004	10-Dec-10	
Classical Chemistry Parameters										
EPA 335.4	Cyanide (total)	mg/L	0.107	<0.0100	0.100	107	90 - 110	W049128	01-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	58.2	54.7	0.100	R > 4S	90 - 110	W049128	01-Dec-10	D2,M3
EPA 335.4	Cyanide (total)	mg/L	4.10	3.75	0.100	R > 4S	90 - 110	W051078	15-Dec-10	D2,M3
EPA 335.4	Cyanide (total)	mg/L	0.102	<0.0100	0.100	102	90 - 110	W049017	29-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	0.106	<0.0100	0.100	102	90 - 110	W049017	29-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.0675	<0.0100	0.100	67.5	75 - 125	W049132	01-Dec-10	M2
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.290	0.220	0.100	69.6	75 - 125	W049132	01-Dec-10	M2
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.383	0.248	0.100	135	75 - 125	W051099	15-Dec-10	M1
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.101	<0.0100	0.100	101	75 - 125	W049018	29-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	1.00	N/A	85 - 115	W049153	01-Dec-10	M2
SW-846 9213	Cyanide (free)	mg/L	1.29	<0.100	1.00	125	85 - 115	W049083	30-Nov-10	M1
Anions by Ion Chromatography										
EPA 300.0	Fluoride	mg/L	1.99	<0.100	2.00	96.4	90 - 110	W047435	22-Nov-10	
EPA 300.0	Fluoride	mg/L	2.09	0.197	2.00	94.4	90 - 110	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	3.46	<0.20	3.00	115	90 - 110	W049149	03-Dec-10	M1
EPA 300.0	Thiocyanate	mg/L	3.37	<0.20	3.00	112	90 - 110	W049149	03-Dec-10	M1
EPA 300.0	Chloride	mg/L	19.3	16.2	3.00	105	90 - 110	W047435	22-Nov-10	D2
EPA 300.0	Chloride	mg/L	11.0	8.61	3.00	80.7	90 - 110	W047435	22-Nov-10	M2
EPA 300.0	Sulfate as SO4	mg/L	47.2	37.4	10.0	97.2	90 - 110	W047435	22-Nov-10	
EPA 300.0	Sulfate as SO4	mg/L	31.6	21.5	10.0	100	90 - 110	W047435	22-Nov-10	

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W0K0474**
Coeur d Alene, ID 83815	Reported: 16-Dec-10 12:06

Notes and Definitions

D2	Sample required dilution due to high concentration of target analyte.
D5	Sample required dilution to meet internal standard recovery limits.
H6	Initial analysis was within holding time. Reanalysis was run past holding time.
M1	Matrix spike recovery was high, but the LCS recovery was acceptable.
M2	Matrix spike recovery was low, but the LCS recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
R2	RPD exceeded the laboratory acceptance limit.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

APPENDIX B

EXPANDED ANALYSIS LABORATORY DATA PACKAGES

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W0K0474**
Coeur d Alene, ID 83815	Reported: 16-Dec-10 12:06

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
KM-1	W0K0474-01	Ground Water	17-Nov-10 09:20	JF	18-Nov-2010
KM-2	W0K0474-02	Ground Water	17-Nov-10 10:00	JF	18-Nov-2010
KM-3	W0K0474-03	Ground Water	16-Nov-10 12:00	JF	18-Nov-2010
KM-4	W0K0474-04	Ground Water	16-Nov-10 11:15	JF	18-Nov-2010
KM-5	W0K0474-05	Ground Water	17-Nov-10 11:30	JF	18-Nov-2010
KM-6	W0K0474-06	Ground Water	17-Nov-10 10:35	JF	18-Nov-2010
KMCP-1B	W0K0474-07	Ground Water	16-Nov-10 12:35	JF	18-Nov-2010
KMCP-2B	W0K0474-08	Ground Water	16-Nov-10 13:05	JF	18-Nov-2010
KMCP-3B	W0K0474-09	Ground Water	16-Nov-10 09:00	JF	18-Nov-2010
KMCP-4B	W0K0474-10	Ground Water	16-Nov-10 09:45	JF	18-Nov-2010
KMCP-5B	W0K0474-11	Ground Water	16-Nov-10 10:20	JF	18-Nov-2010
W-195	W0K0474-12	Ground Water	17-Nov-10 14:15	JF	18-Nov-2010
W-2326	W0K0474-13	Ground Water	17-Nov-10 13:45	JF	18-Nov-2010
W-24	W0K0474-14	Ground Water	17-Nov-10 13:30	JF	18-Nov-2010

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

Case Narrative

12/16/10 DKG - Sample KM-2 reanalyzed for CN WAD, sample KM-6 reanalyzed for CN Total and CN WAD per client request. Each was reanalyzed in duplicate. Report includes original and reanalysis results.

12/10/10 (jk) - C/A balance for samples 4 and 5 due to precipitate in samples

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-1**
SVL Sample ID: **W0K0474-01 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 09:20
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	54.7	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:10	D2
SM 4500-CN-I	**Cyanide (WAD)**	0.220	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:01	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	95.0	mg/L	5.00	1.70	50	W047435	FEH	11/23/10 22:37	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-2**
SVL Sample ID: **W0K0474-02 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 10:00
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	88.4	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:12	D2
SM 4500-CN-I	**Cyanide (WAD)**	0.214	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:03	
SM 4500-CN-I	**Cyanide (WAD)**	0.248	mg/L	0.0100	0.0019		W051099	CFF	12/15/10 13:15	H6
SM 4500-CN-I	**Cyanide (WAD)**	0.345	mg/L	0.0100	0.0019		W051099	CFF	12/15/10 13:17	H6
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	39.5	mg/L	2.50	0.850	25	W047435	FEH	11/23/10 22:47	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-3**
SVL Sample ID: **W0K0474-03 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 12:00
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	50.9	mg/L	0.040	0.008		W048038	AS	12/02/10 16:54	
EPA 200.7	**Magnesium**	50.7	mg/L	0.060	0.012		W048038	AS	12/02/10 16:54	
EPA 200.7	**Potassium**	4.81	mg/L	0.50	0.04		W048038	AS	12/02/10 16:54	
EPA 200.7	**Sodium**	9.34	mg/L	0.50	0.05		W048038	AS	12/02/10 16:54	
SM 2340B	**Hardness (as CaCO3)**	336	mg/L	0.347	0.069		N/A		12/02/10 16:54	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:00	
EPA 200.7	**Barium**	0.0569	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:01	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:01	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W048090	AS	12/05/10 12:00	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:00	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:01	
EPA 200.7	**Silica (SiO2)**	12.2	mg/L	0.17	0.09		W048090	AS	12/05/10 12:00	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:01	
EPA 200.8	Copper	< 0.00100	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:27	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	618	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	Cyanide (total)	< 0.0100	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:12	
SM 2320B/2310B	**Bicarbonate**	268	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2320B/2310B	**Total Alkalinity**	268	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:34	
SM 2540 C	**Total Diss. Solids**	300	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @20.0°C**	8.00	pH Units				W048016	DKS	11/22/10 10:34	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	16.2	mg/L	2.00	0.440	10	W047435	FEH	11/22/10 19:58	D2
EPA 300.0	Fluoride	< 0.100	mg/L	0.100	0.034		W047435	FEH	11/22/10 19:31	
EPA 300.0	**Sulfate as SO4**	37.4	mg/L	0.30	0.05		W047435	FEH	11/22/10 19:31	
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 12:41	

Cation/Anion Balance and TDS Ratios

Cation Sum: 7.25 meq/L | Anion Sum: 6.59 meq/L | C/A Balance: 4.72 % | Calculated TDS: 330 | TDS/cTDS: 0.91 | TDS/eC: 0.49

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-4**
SVL Sample ID: **W0K0474-04 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 11:15
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	146	mg/L	0.040	0.008		W048038	AS	12/02/10 17:00	
EPA 200.7	**Magnesium**	97.7	mg/L	0.060	0.012		W048038	AS	12/02/10 17:00	
EPA 200.7	**Potassium**	16.6	mg/L	0.50	0.04		W048038	AS	12/02/10 17:00	
EPA 200.7	**Sodium**	91.5	mg/L	0.50	0.05		W048038	AS	12/02/10 17:00	
SM 2340B	**Hardness (as CaCO3)**	767	mg/L	0.347	0.069		N/A		12/02/10 17:00	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:17	
EPA 200.7	**Barium**	0.125	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:18	
EPA 200.7	**Cobalt**	0.0064	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:18	
EPA 200.7	**Iron**	2.06	mg/L	0.060	0.027		W048090	AS	12/05/10 12:17	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:17	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:18	
EPA 200.7	**Silica (SiO2)**	10.6	mg/L	0.17	0.09		W048090	AS	12/05/10 12:17	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:18	
EPA 200.8	**Copper**	0.00150	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:28	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	859	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	2.70	mg/L	0.100	0.0160	10	W049128	CFF	12/01/10 12:14	D2,H6
SM 2320B/2310B	**Bicarbonate**	560	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2320B/2310B	**Total Alkalinity**	560	mg/L	1.0	0.5		W048016	DKS	11/22/10 10:41	
SM 2540 C	**Total Diss. Solids**	428	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @19.0°C**	8.22	pH Units				W048016	DKS	11/22/10 10:41	
SM 4500-CN-I	**Cyanide (WAD)**	0.0627	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:24	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	18.5	mg/L	5.00	1.10	25	W047435	FEH	11/22/10 20:52	D2
EPA 300.0	**Fluoride**	3.21	mg/L	0.100	0.034		W047435	FEH	11/22/10 20:43	
EPA 300.0	**Sulfate as SO4**	60.8	mg/L	7.50	1.32	25	W047435	FEH	11/22/10 20:52	D2
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 12:55	

Cation/Anion Balance and TDS Ratios

Cation Sum: 19.8 meq/L Anion Sum: 13.1 meq/L C/A Balance: 20.22 % Calculated TDS: 770 TDS/cTDS: 0.56 TDS/eC: 0.50

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-5**
SVL Sample ID: **W0K0474-05 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 11:30
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	1.16	mg/L	0.040	0.008		W048038	AS	12/02/10 17:06	
EPA 200.7	**Magnesium**	3.50	mg/L	0.060	0.012		W048038	AS	12/02/10 17:06	
EPA 200.7	**Potassium**	12.9	mg/L	0.50	0.04		W048038	AS	12/02/10 17:06	
EPA 200.7	**Sodium**	2330	mg/L	2.50	0.48	10	W048038	AS	12/02/10 18:00	D2
SM 2340B	**Hardness (as CaCO3)**	17.3	mg/L	0.347	0.069		N/A		12/02/10 17:06	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:23	
EPA 200.7	**Barium**	0.0191	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:25	
EPA 200.7	**Cobalt**	0.128	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:25	
EPA 200.7	**Iron**	40.3	mg/L	0.060	0.027		W048090	AS	12/05/10 12:23	
EPA 200.7	**Manganese**	0.0047	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:23	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:24	
EPA 200.7	**Silica (SiO2)**	8.70	mg/L	0.17	0.09		W048090	AS	12/05/10 12:23	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:25	
EPA 200.8	**Copper**	0.0373	mg/L	0.00100	0.00014	2	W048004	DG	12/10/10 15:02	D5
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	7840	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	127	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:16	D2
SM 2320B/2310B	**Bicarbonate**	1430	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2320B/2310B	**Carbonate**	2280	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2320B/2310B	**Total Alkalinity**	3710	mg/L	1.0	0.5		W048016	DKS	11/30/10 13:38	
SM 2540 C	**Total Diss. Solids**	5460	mg/L	100			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @22.0°C**	9.90	pH Units				W048016	DKS	11/30/10 13:38	
SM 4500-CN-I	**Cyanide (WAD)**	0.261	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:05	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049153	CFF	12/01/10 12:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	54.1	mg/L	5.00	1.10	25	W047435	FEH	11/22/10 21:01	D2
EPA 300.0	**Fluoride**	70.5	mg/L	2.50	0.850	25	W047435	FEH	11/22/10 21:01	D2
EPA 300.0	**Sulfate as SO4**	506	mg/L	7.50	1.32	25	W047435	FEH	11/22/10 21:01	D2
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 13:09	

Cation/Anion Balance and TDS Ratios

Cation Sum: 103 meq/L | Anion Sum: 89.9 meq/L | C/A Balance: 7.02 % | Calculated TDS: 5204 | TDS/cTDS: 1.05 | TDS/eC: 0.70

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KM-6**
SVL Sample ID: **W0K0474-06 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 10:35
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	174	mg/L	5.00	0.800	500	W049128	CFF	12/01/10 12:24	D2
EPA 335.4	**Cyanide (total)**	156	mg/L	5.00	0.800	500	W051078	CFF	12/15/10 12:47	D2,H6
EPA 335.4	**Cyanide (total)**	170	mg/L	5.00	0.800	500	W051078	CFF	12/15/10 12:49	D2,H6
SM 4500-CN-I	**Cyanide (WAD)**	0.435	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 15:07	
SM 4500-CN-I	**Cyanide (WAD)**	0.616	mg/L	0.0200	0.0038	2	W051099	CFF	12/15/10 13:46	D2,H6
SM 4500-CN-I	**Cyanide (WAD)**	0.451	mg/L	0.0100	0.0019		W051099	CFF	12/15/10 13:21	H6
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	75.8	mg/L	5.00	1.70	50	W047435	FEH	11/23/10 22:57	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-1B**
SVL Sample ID: **W0K0474-07 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 12:35
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.158	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:16	
SM 4500-CN-I	**Cyanide (WAD)**	0.0136	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:26	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.561	mg/L	0.100	0.034		W047435	FEH	11/22/10 21:19	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W0K0474**
Coeur d Alene, ID 83815	Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-2B**
SVL Sample ID: **W0K0474-08 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 13:05
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.133	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:18	
SM 4500-CN-I	**Cyanide (WAD)**	0.0143	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:28	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.436	mg/L	0.100	0.034		W047435	FEH	11/22/10 21:55	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-3B**
SVL Sample ID: **W0K0474-09 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 09:00
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	58.6	mg/L	2.00	0.320	200	W049128	CFF	12/01/10 12:26	D2,H6
SM 4500-CN-I	**Cyanide (WAD)**	0.444	mg/L	0.100	0.0190	10	W049018	CFF	11/29/10 13:36	D2
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	26.5	mg/L	2.50	0.850	25	W047435	FEH	11/23/10 23:07	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-4B**
SVL Sample ID: **W0K0474-10 (Ground Water)**

Sampled: 16-Nov-10 09:45
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	11.7	mg/L	0.040	0.008		W048038	AS	12/02/10 17:12	
EPA 200.7	**Magnesium**	12.0	mg/L	0.060	0.012		W048038	AS	12/02/10 17:12	
EPA 200.7	**Potassium**	4.10	mg/L	0.50	0.04		W048038	AS	12/02/10 17:12	
EPA 200.7	**Sodium**	364	mg/L	0.50	0.05		W048038	AS	12/02/10 17:12	
SM 2340B	**Hardness (as CaCO3)**	78.8	mg/L	0.347	0.069		N/A		12/02/10 17:12	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:35	
EPA 200.7	**Barium**	0.0304	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:37	
EPA 200.7	**Cobalt**	0.0301	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:37	
EPA 200.7	**Iron**	6.97	mg/L	0.060	0.027		W048090	AS	12/05/10 12:35	
EPA 200.7	**Manganese**	0.0127	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:35	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:37	
EPA 200.7	**Silica (SiO2)**	7.83	mg/L	0.17	0.09		W048090	AS	12/05/10 12:35	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:37	
EPA 200.8	**Copper**	0.00615	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:57	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	1600	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	19.1	mg/L	0.500	0.0800	50	W049128	CFF	12/01/10 12:28	D2,H6
SM 2320B/2310B	**Bicarbonate**	479	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2320B/2310B	**Carbonate**	18.1	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2320B/2310B	**Total Alkalinity**	497	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:42	
SM 2540 C	**Total Diss. Solids**	952	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @18.0°C**	8.50	pH Units				W048016	DKS	11/22/10 11:42	
SM 4500-CN-I	**Cyanide (WAD)**	0.374	mg/L	0.0200	0.0038	2	W049018	CFF	11/29/10 13:38	D2
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	26.4	mg/L	1.00	0.220	5	W047435	FEH	11/22/10 22:13	D2
EPA 300.0	**Fluoride**	13.8	mg/L	0.500	0.170	5	W047435	FEH	11/22/10 22:13	D2
EPA 300.0	**Sulfate as SO4**	228	mg/L	1.50	0.26	5	W047435	FEH	11/22/10 22:13	D2
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/02/10 13:23	

Cation/Anion Balance and TDS Ratios

Cation Sum: 17.8 meq/L   Anion Sum: 16.1 meq/L   C/A Balance: 4.76 %   Calculated TDS: 958   TDS/cTDS: 0.99   TDS/eC: 0.60

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **KMCP-5B**
SVL Sample ID: **W0K0474-11 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 16-Nov-10 10:20
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	33.9	mg/L	0.040	0.008		W048038	AS	12/02/10 17:18	
EPA 200.7	**Magnesium**	30.5	mg/L	0.060	0.012		W048038	AS	12/02/10 17:18	
EPA 200.7	**Potassium**	3.75	mg/L	0.50	0.04		W048038	AS	12/02/10 17:18	
EPA 200.7	**Sodium**	5.65	mg/L	0.50	0.05		W048038	AS	12/02/10 17:18	
SM 2340B	**Hardness (as CaCO3)**	211	mg/L	0.347	0.069		N/A		12/02/10 17:18	
Metals (Dissolved)										
EPA 200.7	Aluminum	< 0.080	mg/L	0.080	0.017		W048090	AS	12/05/10 12:41	
EPA 200.7	**Barium**	0.0867	mg/L	0.0020	0.0005		W048090	AS	12/05/10 12:42	
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W048090	AS	12/05/10 12:43	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W048090	AS	12/05/10 12:41	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W048090	AS	12/05/10 12:41	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.003		W048090	AS	12/05/10 12:43	
EPA 200.7	**Silica (SiO2)**	10.6	mg/L	0.17	0.09		W048090	AS	12/05/10 12:41	
EPA 200.7	Zinc	< 0.0100	mg/L	0.0100	0.0019		W048090	AS	12/05/10 12:43	
EPA 200.8	**Copper**	0.00106	mg/L	0.00100	0.000072		W048004	DG	12/10/10 14:58	
Classical Chemistry Parameters										
EPA 120.1	**Specific conductance**	399	µmhos/cm	1.00			W048015	AAS	11/22/10 12:15	
EPA 335.4	**Cyanide (total)**	0.0445	mg/L	0.0100	0.0016		W049017	CFF	11/29/10 14:24	
SM 2320B/2310B	**Bicarbonate**	174	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2320B/2310B	**Total Alkalinity**	174	mg/L	1.0	0.5		W048016	DKS	11/22/10 11:53	
SM 2540 C	**Total Diss. Solids**	204	mg/L	40			W048012	JMS,	11/22/10 12:50	
SM 4500 H B	**pH @18.0°C**	8.06	pH Units				W048016	DKS	11/22/10 11:53	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049018	CFF	11/29/10 13:40	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W049083	CFF	11/30/10 10:00	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	8.61	mg/L	0.200	0.044		W047435	FEH	11/22/10 22:31	
EPA 300.0	**Fluoride**	0.197	mg/L	0.100	0.034		W047435	FEH	11/22/10 22:31	
EPA 300.0	**Sulfate as SO4**	21.5	mg/L	0.30	0.05		W047435	FEH	11/22/10 22:31	
EPA 300.0	Thiocyanate	< 0.20	mg/L	0.20	0.008		W049149	FEH	12/03/10 16:03	

Cation/Anion Balance and TDS Ratios

Cation Sum: 4.55 meq/L | Anion Sum: 4.18 meq/L | C/A Balance: 4.25 % | Calculated TDS: 209 | TDS/cTDS: 0.98 | TDS/eC: 0.51

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **W-195**
SVL Sample ID: **W0K0474-12 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 14:15
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	1.85	mg/L	0.100	0.0160	10	W049128	CFF	12/01/10 12:30	D2
SM 4500-CN-I	**Cyanide (WAD)**	0.0629	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 14:16	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	1.02	mg/L	0.100	0.034		W047435	FEH	11/22/10 22:50	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **W-2326**
SVL Sample ID: **W0K0474-13 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 13:45
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.248	mg/L	0.0100	0.0016		W049128	CFF	12/01/10 12:32	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 14:24	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.200	mg/L	0.100	0.034		W047435	FEH	11/22/10 22:59	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Client Sample ID: **W-24**
SVL Sample ID: **W0K0474-14 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 17-Nov-10 13:30
Received: 18-Nov-10
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Classical Chemistry Parameters										
EPA 335.4	Cyanide (total)	< 0.0100	mg/L	0.0100	0.0016		W049128	CFF	12/01/10 12:34	
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W049132	CFF	12/01/10 14:26	
Anions by Ion Chromatography										
EPA 300.0	**Fluoride**	0.172	mg/L	0.100	0.034		W047435	FEH	11/22/10 23:08	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)								
EPA 200.7	Calcium	mg/L	<0.040	0.008	0.040	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	<0.060	0.012	0.060	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	<0.50	0.04	0.50	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	<0.50	0.05	0.50	W048038	02-Dec-10	
Metals (Dissolved)								
EPA 200.7	Aluminum	mg/L	<0.080	0.017	0.080	W048090	05-Dec-10	
EPA 200.7	Barium	mg/L	<0.0020	0.0005	0.0020	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	<0.0060	0.0009	0.0060	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	<0.060	0.027	0.060	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	<0.0040	0.0017	0.0040	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	<0.010	0.003	0.010	W048090	05-Dec-10	
EPA 200.7	Silica (SiO2)	mg/L	<0.17	0.09	0.17	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	<0.0100	0.0019	0.0100	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	<0.00100	0.000072	0.00100	W048004	10-Dec-10	
Classical Chemistry Parameters								
EPA 120.1	Specific conductance	µmhos/cm	<1.00		1.00	W048015	22-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W049017	29-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W049128	01-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W051078	15-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W049018	29-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W049132	01-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W051099	15-Dec-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	0.009	0.100	W049083	30-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	0.009	0.100	W049153	01-Dec-10	
Anions by Ion Chromatography								
EPA 300.0	Fluoride	mg/L	<0.100	0.034	0.100	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	<0.20	0.008	0.20	W049149	02-Dec-10	
EPA 300.0	Chloride	mg/L	<0.200	0.044	0.200	W047435	22-Nov-10	
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.05	0.30	W047435	22-Nov-10	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Calcium	mg/L	20.0	20.0	100	85 - 115	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	20.8	20.0	104	85 - 115	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	20.3	20.0	102	85 - 115	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	20.1	19.0	106	85 - 115	W048038	02-Dec-10	
Metals (Dissolved)									
EPA 200.7	Aluminum	mg/L	1.11	1.00	111	85 - 115	W048090	05-Dec-10	
EPA 200.7	Barium	mg/L	1.11	1.00	111	85 - 115	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	1.08	1.00	108	85 - 115	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	10.6	10.0	106	85 - 115	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	1.09	1.00	109	85 - 115	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	1.04	1.00	104	85 - 115	W048090	05-Dec-10	
EPA 200.7	Silica (SiO2)	mg/L	10.9	10.7	102	85 - 115	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	1.09	1.00	109	85 - 115	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	0.0264	0.0250	106	85 - 115	W048004	10-Dec-10	

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Classical Chemistry Parameters									
EPA 120.1	Specific conductance	µmhos/cm	440	445	99.0	90 - 110	W048015	22-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	0.152	0.150	102	90 - 110	W049128	01-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	0.152	0.150	101	90 - 110	W051078	15-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	0.153	0.150	102	90 - 110	W049017	29-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.153	0.150	102	90 - 110	W049132	01-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.148	0.150	98.5	90 - 110	W051099	15-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.151	0.150	101	90 - 110	W049018	29-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	1.07	1.00	107	85 - 115	W049153	01-Dec-10	
SW-846 9213	Cyanide (free)	mg/L	1.03	1.00	103	85 - 115	W049083	30-Nov-10	
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	1.96	2.00	98.0	90 - 110	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	4.60	5.00	92.1	90 - 110	W049149	02-Dec-10	
EPA 300.0	Chloride	mg/L	2.93	3.00	97.7	90 - 110	W047435	22-Nov-10	
EPA 300.0	Sulfate as SO4	mg/L	9.73	10.0	97.3	90 - 110	W047435	22-Nov-10	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Calcium	mg/L	85.6	86.1	0.5	20	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	7.20	7.29	1.3	20	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	5.46	5.54	1.4	20	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	22.5	22.7	1.1	20	W048038	02-Dec-10	
Metals (Dissolved)									
EPA 200.7	Aluminum	mg/L	<0.080	<0.080	UDL	20	W048090	05-Dec-10	R2
EPA 200.7	Barium	mg/L	0.0574	0.0569	0.9	20	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	<0.0060	<0.0060	UDL	20	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	<0.060	<0.060	UDL	20	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	<0.0040	<0.0040	UDL	20	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	<0.010	<0.010	UDL	20	W048090	05-Dec-10	R2
EPA 200.7	Silica (SiO2)	mg/L	12.2	12.2	0.6	20	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	<0.0100	<0.0100	<RL	20	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	0.00106	0.00106	0.1	20	W048004	10-Dec-10	
Classical Chemistry Parameters									
EPA 120.1	Specific conductance	µmhos/cm	745	742	0.4	20	W048015	22-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	4.08	3.75	8.4	20	W051078	15-Dec-10	D2
EPA 335.4	Cyanide (total)	mg/L	<0.0100	<0.0100	UDL	20	W049017	29-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	<0.0100	<0.0100	UDL	20	W049128	01-Dec-10	
SM 2320B/2310B	Total Alkalinity	mg/L	356	355	0.1	20	W048016	22-Nov-10	
SM 2320B/2310B	Bicarbonate	mg/L	356	355	0.1	20	W048016	22-Nov-10	
SM 2320B/2310B	Carbonate	mg/L	<1.0	<1.0	UDL	20	W048016	22-Nov-10	
SM 2320B/2310B	Hydroxide	mg/L	<1.0	<1.0	UDL	20	W048016	22-Nov-10	
SM 2540 C	Total Diss. Solids	mg/L	592	619	4.5	5	W048012	22-Nov-10	
SM 4500 H B	pH	pH Units	7.90	7.96	0.8	20	W048016	22-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.219	0.220	0.7	20	W049132	01-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.254	0.248	2.6	20	W051099	15-Dec-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	<0.0100	UDL	20	W049018	29-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	<RL	20	W049083	30-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	UDL	20	W049153	01-Dec-10	

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W0K0474**
Reported: 16-Dec-10 12:06

Quality Control - DUPLICATE Data (Continued)

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	<0.100	<0.100	<RL	20	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	<0.20	<0.20	UDL	200	W049149	03-Dec-10	
EPA 300.0	Chloride	mg/L	16.4	16.2	1.1	20	W047435	22-Nov-10	D2
EPA 300.0	Sulfate as SO4	mg/L	37.2	37.4	0.7	20	W047435	22-Nov-10	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	Calcium	mg/L	105	86.1	20.0	93.8	70 - 130	W048038	02-Dec-10	
EPA 200.7	Magnesium	mg/L	27.1	7.29	20.0	99.2	70 - 130	W048038	02-Dec-10	
EPA 200.7	Potassium	mg/L	25.7	5.54	20.0	101	70 - 130	W048038	02-Dec-10	
EPA 200.7	Sodium	mg/L	42.4	22.7	19.0	104	70 - 130	W048038	02-Dec-10	
Metals (Dissolved)										
EPA 200.7	Aluminum	mg/L	1.08	<0.080	1.00	108	70 - 130	W048090	05-Dec-10	
EPA 200.7	Barium	mg/L	1.15	0.0569	1.00	109	70 - 130	W048090	05-Dec-10	
EPA 200.7	Cobalt	mg/L	1.02	<0.0060	1.00	102	70 - 130	W048090	05-Dec-10	
EPA 200.7	Iron	mg/L	10.0	<0.060	10.0	100	70 - 130	W048090	05-Dec-10	
EPA 200.7	Manganese	mg/L	1.04	<0.0040	1.00	104	70 - 130	W048090	05-Dec-10	
EPA 200.7	Nickel	mg/L	0.983	<0.010	1.00	98.3	70 - 130	W048090	05-Dec-10	
EPA 200.7	Silica (SiO2)	mg/L	22.7	12.2	10.7	98.3	70 - 130	W048090	05-Dec-10	
EPA 200.7	Zinc	mg/L	1.04	<0.0100	1.00	104	70 - 130	W048090	05-Dec-10	
EPA 200.8	Copper	mg/L	0.0279	0.00106	0.0250	107	70 - 130	W048004	10-Dec-10	
Classical Chemistry Parameters										
EPA 335.4	Cyanide (total)	mg/L	0.107	<0.0100	0.100	107	90 - 110	W049128	01-Dec-10	
EPA 335.4	Cyanide (total)	mg/L	58.2	54.7	0.100	R > 4S	90 - 110	W049128	01-Dec-10	D2,M3
EPA 335.4	Cyanide (total)	mg/L	4.10	3.75	0.100	R > 4S	90 - 110	W051078	15-Dec-10	D2,M3
EPA 335.4	Cyanide (total)	mg/L	0.102	<0.0100	0.100	102	90 - 110	W049017	29-Nov-10	
EPA 335.4	Cyanide (total)	mg/L	0.106	<0.0100	0.100	102	90 - 110	W049017	29-Nov-10	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.0675	<0.0100	0.100	67.5	75 - 125	W049132	01-Dec-10	M2
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.290	0.220	0.100	69.6	75 - 125	W049132	01-Dec-10	M2
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.383	0.248	0.100	135	75 - 125	W051099	15-Dec-10	M1
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.101	<0.0100	0.100	101	75 - 125	W049018	29-Nov-10	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	1.00	N/A	85 - 115	W049153	01-Dec-10	M2
SW-846 9213	Cyanide (free)	mg/L	1.29	<0.100	1.00	125	85 - 115	W049083	30-Nov-10	M1
Anions by Ion Chromatography										
EPA 300.0	Fluoride	mg/L	1.99	<0.100	2.00	96.4	90 - 110	W047435	22-Nov-10	
EPA 300.0	Fluoride	mg/L	2.09	0.197	2.00	94.4	90 - 110	W047435	22-Nov-10	
EPA 300.0	Thiocyanate	mg/L	3.46	<0.20	3.00	115	90 - 110	W049149	03-Dec-10	M1
EPA 300.0	Thiocyanate	mg/L	3.37	<0.20	3.00	112	90 - 110	W049149	03-Dec-10	M1
EPA 300.0	Chloride	mg/L	19.3	16.2	3.00	105	90 - 110	W047435	22-Nov-10	D2
EPA 300.0	Chloride	mg/L	11.0	8.61	3.00	80.7	90 - 110	W047435	22-Nov-10	M2
EPA 300.0	Sulfate as SO4	mg/L	47.2	37.4	10.0	97.2	90 - 110	W047435	22-Nov-10	
EPA 300.0	Sulfate as SO4	mg/L	31.6	21.5	10.0	100	90 - 110	W047435	22-Nov-10	

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W0K0474**
Coeur d Alene, ID 83815	Reported: 16-Dec-10 12:06

Notes and Definitions

D2	Sample required dilution due to high concentration of target analyte.
D5	Sample required dilution to meet internal standard recovery limits.
H6	Initial analysis was within holding time. Reanalysis was run past holding time.
M1	Matrix spike recovery was high, but the LCS recovery was acceptable.
M2	Matrix spike recovery was low, but the LCS recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
R2	RPD exceeded the laboratory acceptance limit.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

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Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W1C0444**
Coeur d Alene, ID 83815	Reported: 15-Apr-11 09:08

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
KMCP-1B	W1C0444-01	Ground Water	21-Mar-11 13:15	JF	24-Mar-2011
KMCP-2B	W1C0444-02	Ground Water	22-Mar-11 08:31	JF	24-Mar-2011
KMCP-3B	W1C0444-03	Ground Water	22-Mar-11 15:05	JF	24-Mar-2011
KMCP-4B	W1C0444-04	Ground Water	22-Mar-11 09:25	JF	24-Mar-2011
KMCP-5B	W1C0444-05	Ground Water	22-Mar-11 10:10	JF	24-Mar-2011
KM-1	W1C0444-06	Ground Water	22-Mar-11 13:20	JF	24-Mar-2011
KM-2	W1C0444-07	Ground Water	22-Mar-11 14:05	JF	24-Mar-2011
KM-3	W1C0444-08	Ground Water	21-Mar-11 13:15	JF	24-Mar-2011
KM-4	W1C0444-09	Ground Water	22-Mar-11 11:00	JF	24-Mar-2011
KM-5	W1C0444-10	Ground Water	22-Mar-11 11:55	JF	24-Mar-2011
KM-6	W1C0444-11	Ground Water	22-Mar-11 12:35	JF	24-Mar-2011
ES-10	W1C0444-12	Ground Water	23-Mar-11 12:40	JF	24-Mar-2011
TH-2	W1C0444-13	Ground Water	23-Mar-11 13:35	JF	24-Mar-2011
TH-8	W1C0444-14	Ground Water	23-Mar-11 10:45	JF	24-Mar-2011
HC-1	W1C0444-15	Ground Water	23-Mar-11 15:25	JF	24-Mar-2011
HC-13	W1C0444-16	Ground Water	23-Mar-11 16:20	JF	24-Mar-2011
HC-12	W1C0444-17	Ground Water	23-Mar-11 11:35	JF	24-Mar-2011
KM-2A	W1C0444-18	Ground Water	23-Mar-11 09:55	JF	24-Mar-2011

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

Case Narrative

04/14/2011 DKG - Sample W1C0444-04 was reanalyzed for 353.2 nitrate+nitrite on 04/13/2011 using unpreserved sample, per client request. The sample was originally analyzed using sample from the sulfuric preserved bottle, which appears to have been preserved with nitric acid.

Sample W1C0444-05 was reanalyzed for WAD CN, per client request. Reanalysis results, in duplicate, confirm original results.

Sample W1C0444-03 was reanalyzed for F, per client request. Reanalysis results, in duplicate, confirm original results.

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KMCP-1B**
SVL Sample ID: **W1C0444-01 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 21-Mar-11 13:15
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	29.4	mg/L	0.040	0.008		W114046	DG	04/08/11 14:45	
EPA 200.7	**Magnesium**	30.9	mg/L	0.060	0.012		W114046	DG	04/08/11 14:45	
EPA 200.7	**Potassium**	4.12	mg/L	0.50	0.04		W114046	DG	04/08/11 14:45	
EPA 200.7	**Sodium**	20.9	mg/L	0.50	0.05		W114046	DG	04/08/11 14:45	
SM 2340B	**Hardness (as CaCO3)**	201	mg/L	0.173	0.053		N/A		04/08/11 14:45	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 11:42	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 11:41	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W114041	DG	04/08/11 11:40	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 11:40	
EPA 200.7	**Silica (SiO2)**	11.1	mg/L	0.17	0.09		W114041	DG	04/08/11 11:40	
Metals Scan by ICP										
ASA 9	**SAR**	0.91					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.127	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 14:58	
EPA 350.1	Ammonia as N	< 0.030	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:02	
EPA 353.2	**Nitrate/Nitrite as N**	3.75	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:34	D2
SM 2320B/2310B	**Bicarbonate**	186	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:46	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:46	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:46	
SM 2320B/2310B	**Total Alkalinity**	186	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:46	
SM 2510 B	**Specific conductance**	486	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	255	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @22.0°C**	8.15	pH Units				W114131	DKS	03/30/11 14:46	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.0247	mg/L	0.0100	0.0019		W115020	CFF	04/04/11 13:19	
SM 4500-S-F	**Sulfide**	1.8	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115058	CFF	04/04/11 16:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	23.9	mg/L	1.00	0.22	5	W113166	FEH	03/31/11 14:45	D2
EPA 300.0	**Fluoride**	0.60	mg/L	0.10	0.03		W113166	FEH	03/31/11 14:36	
EPA 300.0	**Sulfate as SO4**	31.9	mg/L	0.30	0.05		W113166	FEH	04/05/11 14:28	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KMCP-2B**
SVL Sample ID: **W1C0444-02 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 22-Mar-11 08:31
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	27.8	mg/L	0.040	0.008		W114046	DG	04/08/11 14:50	
EPA 200.7	**Magnesium**	24.5	mg/L	0.060	0.012		W114046	DG	04/08/11 14:51	
EPA 200.7	**Potassium**	3.45	mg/L	0.50	0.04		W114046	DG	04/08/11 14:50	
EPA 200.7	**Sodium**	9.83	mg/L	0.50	0.05		W114046	DG	04/08/11 14:50	
SM 2340B	**Hardness (as CaCO3)**	170	mg/L	0.223	0.051		N/A		04/08/11 14:51	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 11:59	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 11:58	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W114041	DG	04/08/11 11:57	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 11:57	
EPA 200.7	**Silica (SiO2)**	10.9	mg/L	0.17	0.09		W114041	DG	04/08/11 11:57	
Metals Scan by ICP										
ASA 9	**SAR**	0.46					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	Cyanide (total)	< 0.0100	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 15:00	
EPA 350.1	Ammonia as N	< 0.030	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:03	
EPA 353.2	**Nitrate/Nitrite as N**	3.57	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:37	D2
SM 2320B/2310B	**Bicarbonate**	157	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:52	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:52	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:52	
SM 2320B/2310B	**Total Alkalinity**	157	mg/L	1.0	0.5		W114131	DKS	03/30/11 14:52	
SM 2510 B	**Specific conductance**	352	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	233	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @22.0°C**	8.13	pH Units				W114131	DKS	03/30/11 14:52	H5
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W115022	CFF	04/05/11 12:36	
SM 4500-S-F	**Sulfide**	1.5	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	10.6	mg/L	0.20	0.04		W113166	FEH	03/31/11 21:44	
EPA 300.0	**Fluoride**	0.25	mg/L	0.10	0.03		W113166	FEH	03/31/11 21:44	
EPA 300.0	**Sulfate as SO4**	22.4	mg/L	0.30	0.05		W113166	FEH	04/05/11 14:55	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KMCP-3B**
SVL Sample ID: **W1C0444-03 (Ground Water)**

Sampled: 22-Mar-11 15:05
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	2.45	mg/L	0.040	0.008		W114046	DG	04/08/11 15:07	
EPA 200.7	**Magnesium**	9.91	mg/L	0.060	0.012		W114046	DG	04/08/11 15:07	
EPA 200.7	**Potassium**	4.84	mg/L	0.50	0.04		W114046	DG	04/08/11 15:07	
EPA 200.7	**Sodium**	787	mg/L	5.00	0.97	20	W114046	DG	04/08/11 15:13	D2
SM 2340B	**Hardness (as CaCO3)**	46.9	mg/L	0.173	0.053		N/A		04/08/11 15:07	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.0701	mg/L	0.0060	0.0009		W114041	DG	04/08/11 12:41	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 12:40	
EPA 200.7	**Iron**	22.2	mg/L	0.060	0.027		W114041	DG	04/08/11 12:39	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 12:39	
EPA 200.7	**Silica (SiO2)**	7.12	mg/L	0.17	0.09		W114041	DG	04/08/11 12:39	
Metals Scan by ICP										
ASA 9	**SAR**	70.7					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	64.8	mg/L	2.00	0.320	200	W115030	CFF	04/04/11 15:24	D2
EPA 350.1	**Ammonia as N**	0.358	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:05	
EPA 353.2	**Nitrate/Nitrite as N**	36.6	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:38	D2
SM 2320B/2310B	**Bicarbonate**	818	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:38	
SM 2320B/2310B	**Carbonate**	458	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:38	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:38	
SM 2320B/2310B	**Total Alkalinity**	1280	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:38	
SM 2510 B	**Specific conductance**	3340	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	2250	mg/L	40			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	9.56	pH Units				W114131	DKS	04/04/11 14:38	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.927	mg/L	0.100	0.0190	10	W115022	CFF	04/05/11 12:41	D2
SM 4500-S-F	**Sulfide**	2.3	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	39.0	mg/L	1.00	0.22	5	W113166	FEH	03/31/11 15:47	D2
EPA 300.0	**Fluoride**	32.0	mg/L	0.50	0.17	5	W113166	FEH	03/31/11 15:47	D2
EPA 300.0	**Fluoride**	30.2	mg/L	1.00	0.34	10	W113166	FEH	04/13/11 13:34	D2,N4
EPA 300.0	**Fluoride**	30.9	mg/L	1.00	0.34	10	W113166	FEH	04/13/11 13:44	D2,N4
EPA 300.0	**Sulfate as SO4**	267	mg/L	15.0	2.65	50	W113166	FEH	04/05/11 15:21	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern (signature)

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KMCP-4B**
SVL Sample ID: **W1C0444-04 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 22-Mar-11 09:25
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	10.3	mg/L	0.040	0.008		W114046	DG	04/08/11 15:19	
EPA 200.7	**Magnesium**	10.8	mg/L	0.060	0.012		W114046	DG	04/08/11 15:19	
EPA 200.7	**Potassium**	4.02	mg/L	0.50	0.04		W114046	DG	04/08/11 15:19	
EPA 200.7	**Sodium**	340	mg/L	0.50	0.05		W114046	DG	04/08/11 15:19	
SM 2340B	**Hardness (as CaCO3)**	70.3	mg/L	0.350	0.070		N/A		04/08/11 15:19	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.0249	mg/L	0.0060	0.0009		W114041	DG	04/08/11 12:47	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 12:46	
EPA 200.7	**Iron**	6.79	mg/L	0.060	0.027		W114041	DG	04/08/11 12:45	
EPA 200.7	**Manganese**	0.0101	mg/L	0.0040	0.0017		W114041	DG	04/08/11 12:45	
EPA 200.7	**Silica (SiO2)**	8.49	mg/L	0.17	0.09		W114041	DG	04/08/11 12:45	
Metals Scan by ICP										
ASA 9	**SAR**	25.0					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	19.0	mg/L	0.500	0.0800	50	W115030	CFF	04/04/11 15:22	D2
EPA 350.1	**Ammonia as N**	0.141	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:06	
EPA 353.2	**Nitrate/Nitrite as N**	19.3	mg/L	0.500	0.150	10	W116153	TJK	04/13/11 16:43	D2,H3,Q13
SM 2320B/2310B	**Bicarbonate**	516	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:18	
SM 2320B/2310B	**Carbonate**	22.2	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:18	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:18	
SM 2320B/2310B	**Total Alkalinity**	538	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:18	
SM 2510 B	**Specific conductance**	1630	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	1070	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	8.54	pH Units				W114131	DKS	03/30/11 15:18	H5
SM 4500-CN-I	**Cyanide (WAD)**	1.25	mg/L	0.100	0.0190	10	W115022	CFF	04/05/11 12:43	D2
SM 4500-S-F	**Sulfide**	1.2	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	27.6	mg/L	1.00	0.22	5	W113166	FEH	03/31/11 16:05	D2
EPA 300.0	**Fluoride**	15.4	mg/L	0.50	0.17	5	W113166	FEH	03/31/11 16:05	D2
EPA 300.0	**Sulfate as SO4**	219	mg/L	3.00	0.53	10	W113166	FEH	04/05/11 15:30	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

SVL ANALYTICAL

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KMCP-5B**
SVL Sample ID: **W1C0444-05 (Ground Water)**

Sampled: 22-Mar-11 10:10
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	26.7	mg/L	0.040	0.008		W114046	DG	04/08/11 15:24	
EPA 200.7	**Magnesium**	24.5	mg/L	0.060	0.012		W114046	DG	04/08/11 15:24	
EPA 200.7	**Potassium**	3.22	mg/L	0.50	0.04		W114046	DG	04/08/11 15:24	
EPA 200.7	**Sodium**	4.44	mg/L	0.50	0.05		W114046	DG	04/08/11 15:24	
SM 2340B	**Hardness (as CaCO3)**	168	mg/L	0.350	0.070		N/A		04/08/11 15:24	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 12:16	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 12:15	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W114041	DG	04/08/11 12:14	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 12:14	
EPA 200.7	**Silica (SiO2)**	11.1	mg/L	0.17	0.09		W114041	DG	04/08/11 12:14	
Metals Scan by ICP										
ASA 9	**SAR**	0.21					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.0996	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 15:02	
EPA 350.1	Ammonia as N	< 0.030	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:07	
EPA 353.2	**Nitrate/Nitrite as N**	2.29	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:43	D2
SM 2320B/2310B	**Bicarbonate**	158	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:30	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:30	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:30	
SM 2320B/2310B	**Total Alkalinity**	158	mg/L	1.0	0.5		W114131	DKS	03/30/11 15:30	
SM 2510 B	**Specific conductance**	355	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	201	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	8.07	pH Units				W114131	DKS	03/30/11 15:30	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.0393	mg/L	0.0100	0.0019		W115022	CFF	04/05/11 12:45	
SM 4500-CN-I	**Cyanide (WAD)**	0.0370	mg/L	0.0100	0.0019		W116208	CFF	04/14/11 15:25	H6,N4
SM 4500-CN-I	**Cyanide (WAD)**	0.0370	mg/L	0.0100	0.0019		W116208	CFF	04/14/11 15:27	H6,N4
SM 4500-S-F	**Sulfide**	1.5	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	7.66	mg/L	0.20	0.04		W113166	FEH	03/31/11 16:23	
EPA 300.0	**Fluoride**	0.14	mg/L	0.10	0.03		W113166	FEH	03/31/11 16:23	
EPA 300.0	**Sulfate as SO4**	22.1	mg/L	0.30	0.05		W113166	FEH	04/05/11 15:39	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern

John Kern
Laboratory Director

SVL holds the following certifications: **AZ**:0538, **CA**:2080, **CO**:ID00019, **FL**(**NELAC**):E87993, **ID**:ID00019 & ID00965 (Microbiology), **NV**:ID000192007A, **WA**:1268, **WY**:ID00019

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KM-1**
SVL Sample ID: **W1C0444-06 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 22-Mar-11 13:20
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	0.489	mg/L	0.040	0.008		W114046	AS	04/10/11 10:38	
EPA 200.7	**Magnesium**	3.50	mg/L	0.060	0.012		W114046	AS	04/10/11 10:38	
EPA 200.7	**Potassium**	13.6	mg/L	0.50	0.04		W114046	AS	04/10/11 10:38	
EPA 200.7	**Sodium**	2570	mg/L	5.00	0.97	20	W114046	AS	04/10/11 10:44	D2
SM 2340B	**Hardness (as CaCO3)**	15.6	mg/L	0.350	0.070		N/A		04/10/11 10:38	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.0629	mg/L	0.0060	0.0009		W114041	DG	04/08/11 12:52	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 12:52	
EPA 200.7	**Iron**	18.3	mg/L	0.060	0.027		W114041	DG	04/08/11 12:51	
EPA 200.7	**Manganese**	0.0108	mg/L	0.0040	0.0017		W114041	DG	04/08/11 12:51	
EPA 200.7	**Silica (SiO2)**	10.5	mg/L	0.17	0.09		W114041	DG	04/08/11 12:51	
Metals Scan by ICP										
ASA 9	**SAR**	400					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	64.3	mg/L	2.00	0.320	200	W115030	CFF	04/04/11 15:26	D2
EPA 350.1	**Ammonia as N**	3.99	mg/L	0.150	0.065	5	W115125	TJK	04/07/11 16:11	D2
EPA 353.2	**Nitrate/Nitrite as N**	120	mg/L	5.00	1.50	100	W115154	TJK	04/07/11 17:45	D2
SM 2320B/2310B	**Bicarbonate**	1950	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:47	
SM 2320B/2310B	**Carbonate**	1710	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:47	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:47	
SM 2320B/2310B	**Total Alkalinity**	3670	mg/L	1.0	0.5		W114131	DKS	04/04/11 14:47	
SM 2510 B	**Specific conductance**	9630	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	7230	mg/L	100			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	9.66	pH Units				W114131	DKS	04/04/11 14:47	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.280	mg/L	0.0500	0.0095	5	W115022	CFF	04/05/11 12:47	D2
SM 4500-S-F	**Sulfide**	1.8	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	74.8	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 16:41	D2
EPA 300.0	**Fluoride**	108	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 16:41	D2
EPA 300.0	**Sulfate as SO4**	1340	mg/L	15.0	2.65	50	W113166	FEH	04/05/11 15:48	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KM-2**
SVL Sample ID: **W1C0444-07 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 22-Mar-11 14:05
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	0.634	mg/L	0.040	0.008		W114046	AS	04/10/11 10:50	
EPA 200.7	**Magnesium**	1.85	mg/L	0.060	0.012		W114046	AS	04/10/11 10:50	
EPA 200.7	**Potassium**	9.88	mg/L	0.50	0.04		W114046	AS	04/10/11 10:50	
EPA 200.7	**Sodium**	1410	mg/L	5.00	0.97	20	W114046	AS	04/10/11 10:55	D2
SM 2340B	**Hardness (as CaCO3)**	9.18	mg/L	0.350	0.070		N/A		04/10/11 10:50	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.0910	mg/L	0.0060	0.0009		W114041	DG	04/08/11 12:58	
EPA 200.7	**Copper**	0.017	mg/L	0.010	0.005		W114041	DG	04/08/11 12:58	
EPA 200.7	**Iron**	30.7	mg/L	0.060	0.027		W114041	DG	04/08/11 12:57	
EPA 200.7	**Manganese**	0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 12:57	
EPA 200.7	**Silica (SiO2)**	10.8	mg/L	0.17	0.09		W114041	DG	04/08/11 12:57	
Metals Scan by ICP										
ASA 9	**SAR**	286					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	93.5	mg/L	2.00	0.320	200	W115030	CFF	04/04/11 15:28	D2
EPA 350.1	**Ammonia as N**	20.5	mg/L	0.600	0.260	20	W115125	TJK	04/07/11 16:15	D2
EPA 353.2	**Nitrate/Nitrite as N**	85.4	mg/L	5.00	1.50	100	W115154	TJK	04/07/11 17:46	D2
SM 2320B/2310B	**Bicarbonate**	1050	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:05	
SM 2320B/2310B	**Carbonate**	1350	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:05	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:05	
SM 2320B/2310B	**Total Alkalinity**	2400	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:05	
SM 2510 B	**Specific conductance**	5580	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	3740	mg/L	40			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	9.84	pH Units				W114131	DKS	04/04/11 15:05	H5
SM 4500-CN-I	**Cyanide (WAD)**	2.64	mg/L	0.200	0.0380	20	W115022	CFF	04/05/11 13:32	D2
SM 4500-S-F	**Sulfide**	2.5	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	**Cyanide (free)**	2.34	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	36.7	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 16:58	D2
EPA 300.0	**Fluoride**	47.2	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 16:58	D2
EPA 300.0	**Sulfate as SO4**	301	mg/L	7.50	1.32	25	W113166	FEH	04/05/11 15:57	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W1C0444**
Coeur d Alene, ID 83815	Reported: 15-Apr-11 09:08

Client Sample ID: **KM-3**
SVL Sample ID: **W1C0444-08 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 21-Mar-11 13:15
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	55.5	mg/L	0.040	0.008		W114046	AS	04/10/11 11:01	
EPA 200.7	**Magnesium**	54.1	mg/L	0.060	0.012		W114046	AS	04/10/11 11:01	
EPA 200.7	**Potassium**	5.00	mg/L	0.50	0.04		W114046	AS	04/10/11 11:01	
EPA 200.7	**Sodium**	10.0	mg/L	0.50	0.05		W114046	AS	04/10/11 11:01	
SM 2340B	**Hardness (as CaCO3)**	361	mg/L	0.173	0.053		N/A		04/10/11 11:01	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 13:04	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 13:04	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W114041	DG	04/08/11 13:03	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 13:03	
EPA 200.7	**Silica (SiO2)**	12.6	mg/L	0.17	0.09		W114041	DG	04/08/11 13:03	
Metals Scan by ICP										
ASA 9	**SAR**	0.32					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	Cyanide (total)	< 0.0100	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 15:04	
EPA 350.1	Ammonia as N	< 0.030	mg/L	0.030	0.013		W115125	TJK	04/07/11 16:08	
EPA 353.2	**Nitrate/Nitrite as N**	6.17	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:47	D2
SM 2320B/2310B	**Bicarbonate**	297	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:40	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:40	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:40	
SM 2320B/2310B	**Total Alkalinity**	297	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:40	
SM 2510 B	**Specific conductance**	713	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	394	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	8.03	pH Units				W114131	DKS	03/30/11 16:40	H5
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W115020	CFF	04/04/11 13:21	
SM 4500-S-F	**Sulfide**	2.4	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115058	CFF	04/04/11 16:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	20.1	mg/L	2.00	0.44	10	W113166	FEH	03/31/11 17:43	D2
EPA 300.0	**Fluoride**	0.13	mg/L	0.10	0.03		W113166	FEH	03/31/11 17:34	
EPA 300.0	**Sulfate as SO4**	49.7	mg/L	1.50	0.26	5	W113166	FEH	04/05/11 16:06	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KM-4**
SVL Sample ID: **W1C0444-09 (Ground Water)**

Sampled: 22-Mar-11 11:00
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	68.5	mg/L	0.040	0.008		W114046	AS	04/10/11 11:07	
EPA 200.7	**Magnesium**	66.6	mg/L	0.060	0.012		W114046	AS	04/10/11 11:07	
EPA 200.7	**Potassium**	12.1	mg/L	0.50	0.04		W114046	AS	04/10/11 11:07	
EPA 200.7	**Sodium**	141	mg/L	0.50	0.05		W114046	AS	04/10/11 11:07	
SM 2340B	**Hardness (as CaCO3)**	445	mg/L	0.173	0.053		N/A		04/10/11 11:07	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 13:10	
EPA 200.7	**Copper**	0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 13:09	
EPA 200.7	**Iron**	0.330	mg/L	0.060	0.027		W114041	DG	04/08/11 13:08	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 13:08	
EPA 200.7	**Silica (SiO2)**	11.1	mg/L	0.17	0.09		W114041	DG	04/08/11 13:08	
Metals Scan by ICP										
ASA 9	**SAR**	4.11					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	1.25	mg/L	0.100	0.0160	10	W115030	CFF	04/04/11 15:20	D2
EPA 350.1	**Ammonia as N**	0.086	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:18	
EPA 353.2	**Nitrate/Nitrite as N**	3.90	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:48	D2
SM 2320B/2310B	**Bicarbonate**	426	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:52	
SM 2320B/2310B	**Carbonate**	7.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:52	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:52	
SM 2320B/2310B	**Total Alkalinity**	433	mg/L	1.0	0.5		W114131	DKS	03/30/11 16:52	
SM 2510 B	**Specific conductance**	9970	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	576	mg/L	40			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	8.36	pH Units				W114131	DKS	03/30/11 16:52	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.110	mg/L	0.0100	0.0019		W115022	CFF	04/05/11 12:51	
SM 4500-S-F	**Sulfide**	2.0	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	21.5	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 18:01	D2
EPA 300.0	**Fluoride**	5.94	mg/L	0.10	0.03		W113166	FEH	03/31/11 17:52	
EPA 300.0	**Sulfate as SO4**	82.5	mg/L	3.00	0.53	10	W113166	FEH	04/05/11 16:15	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KM-5**
SVL Sample ID: **W1C0444-10 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 22-Mar-11 11:55
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	1.16	mg/L	0.040	0.008		W114046	AS	04/10/11 11:13	
EPA 200.7	**Magnesium**	4.25	mg/L	0.060	0.012		W114046	AS	04/10/11 11:13	
EPA 200.7	**Potassium**	11.8	mg/L	0.50	0.04		W114046	AS	04/10/11 11:13	
EPA 200.7	**Sodium**	1970	mg/L	5.00	0.97	20	W114046	AS	04/10/11 11:19	D2
SM 2340B	**Hardness (as CaCO3)**	20.4	mg/L	0.173	0.053		N/A		04/10/11 11:13	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.118	mg/L	0.0060	0.0009		W114041	DG	04/08/11 13:16	
EPA 200.7	**Copper**	0.018	mg/L	0.010	0.005		W114041	DG	04/08/11 13:16	
EPA 200.7	**Iron**	38.4	mg/L	0.060	0.027		W114041	DG	04/08/11 13:14	
EPA 200.7	**Manganese**	0.0058	mg/L	0.0040	0.0017		W114041	DG	04/08/11 13:14	
EPA 200.7	**Silica (SiO2)**	10.3	mg/L	0.17	0.09		W114041	DG	04/08/11 13:14	
Metals Scan by ICP										
ASA 9	**SAR**	268					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	120	mg/L	5.00	0.800	500	W115030	CFF	04/04/11 15:44	D2,Q12
EPA 350.1	**Ammonia as N**	15.6	mg/L	0.300	0.130	10	W115125	TJK	04/07/11 16:12	D2
EPA 353.2	**Nitrate/Nitrite as N**	84.8	mg/L	5.00	1.50	100	W115154	TJK	04/07/11 17:49	D2
SM 2320B/2310B	**Bicarbonate**	1300	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:18	
SM 2320B/2310B	**Carbonate**	2090	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:18	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:18	
SM 2320B/2310B	**Total Alkalinity**	3390	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:18	
SM 2510 B	**Specific conductance**	7700	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	5290	mg/L	100			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	9.94	pH Units				W114131	DKS	04/04/11 15:18	H5
SM 4500-CN-I	**Cyanide (WAD)**	2.44	mg/L	0.200	0.0380	20	W115022	CFF	04/05/11 13:36	D2
SM 4500-S-F	**Sulfide**	1.9	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	55.9	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 18:10	D2
EPA 300.0	**Fluoride**	73.8	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 18:10	D2
EPA 300.0	**Sulfate as SO4**	575	mg/L	7.50	1.32	25	W113166	FEH	04/05/11 16:24	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **KM-6**
SVL Sample ID: **W1C0444-11 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 22-Mar-11 12:35
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	2.62	mg/L	0.040	0.008		W114046	AS	04/10/11 11:24	
EPA 200.7	**Magnesium**	10.0	mg/L	0.060	0.012		W114046	AS	04/10/11 11:24	
EPA 200.7	**Potassium**	11.3	mg/L	0.50	0.04		W114046	AS	04/10/11 11:24	
EPA 200.7	**Sodium**	1820	mg/L	5.00	0.97	20	W114046	AS	04/10/11 11:30	D2
SM 2340B	**Hardness (as CaCO3)**	47.8	mg/L	0.223	0.051		N/A		04/10/11 11:24	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.225	mg/L	0.0060	0.0009		W114041	DG	04/08/11 13:22	
EPA 200.7	**Copper**	0.025	mg/L	0.010	0.005		W114041	DG	04/08/11 13:22	
EPA 200.7	**Iron**	68.3	mg/L	0.060	0.027		W114041	DG	04/08/11 13:20	
EPA 200.7	**Manganese**	0.0134	mg/L	0.0040	0.0017		W114041	DG	04/08/11 13:21	
EPA 200.7	**Silica (SiO2)**	15.8	mg/L	0.17	0.09		W114041	DG	04/08/11 13:21	
Metals Scan by ICP										
ASA 9	**SAR**	162					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	192	mg/L	5.00	0.800	500	W115030	CFF	04/04/11 15:46	D2
EPA 350.1	**Ammonia as N**	32.8	mg/L	2.25	0.975	75	W115125	TJK	04/07/11 16:16	D2
EPA 353.2	**Nitrate/Nitrite as N**	98.1	mg/L	5.00	1.50	100	W115154	TJK	04/07/11 17:50	D2
SM 2320B/2310B	**Bicarbonate**	1690	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:36	
SM 2320B/2310B	**Carbonate**	1490	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:36	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:36	
SM 2320B/2310B	**Total Alkalinity**	3180	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:36	
SM 2510 B	**Specific conductance**	7460	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	5150	mg/L	100			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	9.67	pH Units				W114131	DKS	04/04/11 15:36	H5
SM 4500-CN-I	**Cyanide (WAD)**	1.19	mg/L	0.100	0.0190	10	W115022	CFF	04/05/11 13:01	D2
SM 4500-S-F	**Sulfide**	2.1	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	**Cyanide (free)**	1.08	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	31.0	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 18:28	D2
EPA 300.0	**Fluoride**	79.7	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 18:28	D2
EPA 300.0	**Sulfate as SO4**	457	mg/L	7.50	1.32	25	W113166	FEH	04/05/11 16:33	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **ES-10**
SVL Sample ID: **W1C0444-12 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 12:40
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	51.0	mg/L	0.040	0.008		W114046	AS	04/10/11 12:02	
EPA 200.7	**Magnesium**	56.4	mg/L	0.060	0.012		W114046	AS	04/10/11 12:02	
EPA 200.7	**Potassium**	6.24	mg/L	0.50	0.04		W114046	AS	04/10/11 12:02	
EPA 200.7	**Sodium**	24.9	mg/L	0.50	0.05		W114046	AS	04/10/11 12:02	
SM 2340B	**Hardness (as CaCO3)**	359	mg/L	0.350	0.070		N/A		04/10/11 12:02	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 14:18	
EPA 200.7	**Copper**	0.013	mg/L	0.010	0.005		W114041	DG	04/08/11 14:18	
EPA 200.7	**Iron**	0.161	mg/L	0.060	0.027		W114041	DG	04/08/11 14:17	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:17	
EPA 200.7	**Silica (SiO2)**	13.1	mg/L	0.17	0.09		W114041	DG	04/08/11 14:17	
Metals Scan by ICP										
ASA 9	**SAR**	0.81					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.455	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 15:06	
EPA 350.1	Ammonia as N	< 0.030	mg/L	0.030	0.013		W115125	TJK	04/07/11 16:10	
EPA 353.2	**Nitrate/Nitrite as N**	6.75	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:52	D2
SM 2320B/2310B	**Bicarbonate**	338	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:10	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:10	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:10	
SM 2320B/2310B	**Total Alkalinity**	338	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:10	
SM 2510 B	**Specific conductance**	750	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	442	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	8.27	pH Units				W114131	DKS	03/30/11 18:10	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.172	mg/L	0.0100	0.0019		W115023	CFF	04/05/11 11:39	
SM 4500-S-F	**Sulfide**	2.7	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	**Cyanide (free)**	0.162	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	15.9	mg/L	2.00	0.44	10	W113166	FEH	03/31/11 18:54	D2
EPA 300.0	**Fluoride**	1.27	mg/L	0.10	0.03		W113166	FEH	03/31/11 18:45	
EPA 300.0	**Sulfate as SO4**	61.0	mg/L	1.50	0.26	5	W113166	FEH	04/05/11 17:09	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W1C0444**
Coeur d Alene, ID 83815	Reported: 15-Apr-11 09:08

Client Sample ID: **TH-2**
SVL Sample ID: **W1C0444-13 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 13:35
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	4.01	mg/L	0.040	0.008		W114046	AS	04/10/11 12:13	
EPA 200.7	**Magnesium**	5.11	mg/L	0.060	0.012		W114046	AS	04/10/11 12:13	
EPA 200.7	**Potassium**	7.43	mg/L	0.50	0.04		W114046	AS	04/10/11 12:13	
EPA 200.7	**Sodium**	279	mg/L	0.50	0.05		W114046	AS	04/10/11 12:13	
SM 2340B	**Hardness (as CaCO3)**	31.1	mg/L	0.223	0.051		N/A		04/10/11 12:13	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.0108	mg/L	0.0060	0.0009		W114041	DG	04/08/11 14:30	
EPA 200.7	**Copper**	0.010	mg/L	0.010	0.005		W114041	DG	04/08/11 14:30	
EPA 200.7	**Iron**	0.089	mg/L	0.060	0.027		W114041	DG	04/08/11 14:29	
EPA 200.7	**Manganese**	0.0201	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:29	
EPA 200.7	**Silica (SiO2)**	2.50	mg/L	0.17	0.09		W114041	DG	04/08/11 14:29	
Metals Scan by ICP										
ASA 9	**SAR**	30.8					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.374	mg/L	0.0200	0.0032	2	W115030	CFF	04/04/11 15:08	
EPA 350.1	**Ammonia as N**	6.96	mg/L	0.300	0.130	10	W115125	TJK	04/07/11 16:14	D2
EPA 353.2	**Nitrate/Nitrite as N**	0.324	mg/L	0.050	0.015		W115154	TJK	04/07/11 17:58	
SM 2320B/2310B	**Bicarbonate**	526	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:18	
SM 2320B/2310B	**Carbonate**	65.1	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:18	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:18	
SM 2320B/2310B	**Total Alkalinity**	592	mg/L	1.0	0.5		W114131	DKS	03/30/11 18:18	
SM 2510 B	**Specific conductance**	1260	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	733	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	8.92	pH Units				W114131	DKS	03/30/11 18:18	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.0279	mg/L	0.0100	0.0019		W115023	CFF	04/05/11 11:41	
SM 4500-S-F	**Sulfide**	1.8	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	16.0	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 19:30	D2
EPA 300.0	**Fluoride**	19.4	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 19:30	D2
EPA 300.0	**Sulfate as SO4**	45.5	mg/L	1.50	0.26	5	W113166	FEH	04/06/11 12:08	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern

John Kern
Laboratory Director

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **TH-8**
SVL Sample ID: **W1C0444-14 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 10:45
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	0.615	mg/L	0.040	0.008		W114046	AS	04/10/11 12:18	
EPA 200.7	**Magnesium**	4.49	mg/L	0.060	0.012		W114046	AS	04/10/11 12:18	
EPA 200.7	**Potassium**	12.2	mg/L	0.50	0.04		W114046	AS	04/10/11 12:18	
EPA 200.7	**Sodium**	2140	mg/L	5.00	0.97	20	W114046	AS	04/10/11 12:24	D2
SM 2340B	**Hardness (as CaCO3)**	20.0	mg/L	0.223	0.051		N/A		04/10/11 12:18	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.0592	mg/L	0.0060	0.0009		W114041	DG	04/08/11 14:36	
EPA 200.7	**Copper**	0.023	mg/L	0.010	0.005		W114041	DG	04/08/11 14:36	
EPA 200.7	**Iron**	18.5	mg/L	0.060	0.027		W114041	DG	04/08/11 14:35	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:35	
EPA 200.7	**Silica (SiO2)**	11.0	mg/L	0.17	0.09		W114041	DG	04/08/11 14:35	
Metals Scan by ICP										
ASA 9	**SAR**	294					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	61.9	mg/L	2.00	0.320	200	W115030	CFF	04/04/11 15:30	D2
EPA 350.1	**Ammonia as N**	2.00	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:25	
EPA 353.2	**Nitrate/Nitrite as N**	123	mg/L	5.00	1.50	100	W115154	TJK	04/07/11 17:59	D2
SM 2320B/2310B	**Bicarbonate**	1670	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:53	
SM 2320B/2310B	**Carbonate**	1460	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:53	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:53	
SM 2320B/2310B	**Total Alkalinity**	3130	mg/L	1.0	0.5		W114131	DKS	04/04/11 15:53	
SM 2510 B	**Specific conductance**	8550	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	6330	mg/L	100			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	9.69	pH Units				W114131	DKS	04/04/11 15:53	H5
SM 4500-CN-I	**Cyanide (WAD)**	3.56	mg/L	0.200	0.0380	20	W115023	CFF	04/05/11 12:12	D2
SM 4500-S-F	**Sulfide**	1.8	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	**Cyanide (free)**	2.15	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	60.8	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 19:39	D2
EPA 300.0	**Fluoride**	88.0	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 19:39	D2
EPA 300.0	**Sulfate as SO4**	1100	mg/L	15.0	2.65	50	W113166	FEH	04/06/11 12:17	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	**Project Name: Kaiser**
2736 White Pines Drive	Work Order: **W1C0444**
Coeur d Alene, ID 83815	Reported: 15-Apr-11 09:08

Client Sample ID: **HC-1**
SVL Sample ID: **W1C0444-15 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 15:25
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	70.7	mg/L	0.040	0.008		W114046	AS	04/10/11 12:29	
EPA 200.7	**Magnesium**	45.6	mg/L	0.060	0.012		W114046	AS	04/10/11 12:30	
EPA 200.7	**Potassium**	6.22	mg/L	0.50	0.04		W114046	AS	04/10/11 12:30	
EPA 200.7	**Sodium**	49.4	mg/L	0.50	0.05		W114046	AS	04/10/11 12:29	
SM 2340B	**Hardness (as CaCO3)**	364	mg/L	0.223	0.051		N/A		04/10/11 12:30	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 14:42	
EPA 200.7	**Copper**	0.059	mg/L	0.010	0.005		W114041	DG	04/08/11 14:42	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W114041	DG	04/08/11 14:41	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:41	
EPA 200.7	**Silica (SiO2)**	10.4	mg/L	0.17	0.09		W114041	DG	04/08/11 14:41	
Metals Scan by ICP										
ASA 9	**SAR**	1.59					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.236	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 15:51	
EPA 350.1	**Ammonia as N**	0.081	mg/L	0.030	0.013		W115125	TJK	04/07/11 14:26	
EPA 353.2	**Nitrate/Nitrite as N**	4.90	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 18:00	D2
SM 2320B/2310B	**Bicarbonate**	254	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:06	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:06	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:06	
SM 2320B/2310B	**Total Alkalinity**	254	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:06	
SM 2510 B	**Specific conductance**	821	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	544	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	8.17	pH Units				W114131	DKS	03/30/11 19:06	H5
SM 4500-CN-I	**Cyanide (WAD)**	0.0213	mg/L	0.0100	0.0019		W115023	CFF	04/05/11 11:45	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	18.4	mg/L	2.00	0.44	10	W113166	FEH	03/31/11 20:06	D2
EPA 300.0	**Fluoride**	2.04	mg/L	0.10	0.03		W113166	FEH	03/31/11 19:57	
EPA 300.0	**Sulfate as SO4**	190	mg/L	3.00	0.53	10	W113166	FEH	04/06/11 12:26	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 | Kellogg ID 83837-0929 | (208) 784-1258 | Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **HC-13**
SVL Sample ID: **W1C0444-16 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 16:20
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	50.0	mg/L	0.040	0.008		W114046	AS	04/10/11 12:35	
EPA 200.7	**Magnesium**	47.3	mg/L	0.060	0.012		W114046	AS	04/10/11 12:35	
EPA 200.7	**Potassium**	4.93	mg/L	0.50	0.04		W114046	AS	04/10/11 12:35	
EPA 200.7	**Sodium**	14.0	mg/L	0.50	0.05		W114046	AS	04/10/11 12:35	
SM 2340B	**Hardness (as CaCO3)**	319	mg/L	0.223	0.051		N/A		04/10/11 12:35	
Metals (Dissolved)										
EPA 200.7	Cobalt	< 0.0060	mg/L	0.0060	0.0009		W114041	DG	04/08/11 14:48	
EPA 200.7	**Copper**	0.016	mg/L	0.010	0.005		W114041	DG	04/08/11 14:48	
EPA 200.7	Iron	< 0.060	mg/L	0.060	0.027		W114041	DG	04/08/11 14:47	
EPA 200.7	Manganese	< 0.0040	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:47	
EPA 200.7	**Silica (SiO2)**	12.0	mg/L	0.17	0.09		W114041	DG	04/08/11 14:47	
Metals Scan by ICP										
ASA 9	**SAR**	0.48					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	0.0277	mg/L	0.0100	0.0016		W115030	CFF	04/04/11 15:53	
EPA 350.1	Ammonia as N	< 0.030	mg/L	0.030	0.013		W115125	TJK	04/07/11 16:26	
EPA 353.2	**Nitrate/Nitrite as N**	5.76	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:29	D2
SM 2320B/2310B	**Bicarbonate**	266	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:16	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:16	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:16	
SM 2320B/2310B	**Total Alkalinity**	266	mg/L	1.0	0.5		W114131	DKS	03/30/11 19:16	
SM 2510 B	**Specific conductance**	655	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	371	mg/L	10			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @21.0°C**	8.18	pH Units				W114131	DKS	03/30/11 19:16	H5
SM 4500-CN-I	Cyanide (WAD)	< 0.0100	mg/L	0.0100	0.0019		W115023	CFF	04/05/11 11:47	
SM 4500-S-F	**Sulfide**	1.6	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	Cyanide (free)	< 0.100	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	16.3	mg/L	2.00	0.44	10	W113166	FEH	03/31/11 20:23	D2
EPA 300.0	**Fluoride**	0.26	mg/L	0.10	0.03		W113166	FEH	03/31/11 20:15	
EPA 300.0	**Sulfate as SO4**	54.7	mg/L	1.50	0.26	5	W113166	FEH	04/06/11 12:35	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Client Sample ID: **HC-12**
SVL Sample ID: **W1C0444-17 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 11:35
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	19.0	mg/L	0.040	0.008		W114046	AS	04/10/11 12:41	
EPA 200.7	**Magnesium**	2.97	mg/L	0.060	0.012		W114046	AS	04/10/11 12:42	
EPA 200.7	**Potassium**	12.4	mg/L	0.50	0.04		W114046	AS	04/10/11 12:41	
EPA 200.7	**Sodium**	1050	mg/L	5.00	0.97	20	W114046	AS	04/10/11 12:47	D2
SM 2340B	**Hardness (as CaCO3)**	59.6	mg/L	0.173	0.053		N/A		04/10/11 12:42	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.188	mg/L	0.0060	0.0009		W114041	DG	04/08/11 14:54	
EPA 200.7	**Copper**	0.033	mg/L	0.010	0.005		W114041	DG	04/08/11 14:54	
EPA 200.7	**Iron**	53.8	mg/L	0.060	0.027		W114041	DG	04/08/11 14:52	
EPA 200.7	**Manganese**	0.0112	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:53	
EPA 200.7	**Silica (SiO2)**	13.5	mg/L	0.17	0.09		W114041	DG	04/08/11 14:53	
Metals Scan by ICP										
ASA 9	**SAR**	83.6					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	161	mg/L	5.00	0.800	500	W115030	CFF	04/04/11 15:32	D2
EPA 350.1	**Ammonia as N**	39.2	mg/L	6.00	2.60	200	W115125	TJK	04/07/11 16:23	D2
EPA 353.2	**Nitrate/Nitrite as N**	41.5	mg/L	0.500	0.150	10	W115154	TJK	04/07/11 17:30	D2
SM 2320B/2310B	**Bicarbonate**	827	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:10	
SM 2320B/2310B	**Carbonate**	1100	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:10	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:10	
SM 2320B/2310B	**Total Alkalinity**	1920	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:10	
SM 2510 B	**Specific conductance**	4420	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	2810	mg/L	40			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	9.80	pH Units				W114131	DKS	04/04/11 16:10	H5
SM 4500-CN-I	**Cyanide (WAD)**	1.55	mg/L	0.100	0.0190	10	W115023	CFF	04/05/11 12:14	D2
SM 4500-S-F	**Sulfide**	2.2	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	**Cyanide (free)**	1.40	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	23.0	mg/L	2.00	0.44	10	W113166	FEH	03/31/11 21:08	D2
EPA 300.0	**Fluoride**	45.3	mg/L	1.00	0.34	10	W113166	FEH	03/31/11 21:08	D2
EPA 300.0	**Sulfate as SO4**	233	mg/L	3.00	0.53	10	W113166	FEH	04/06/11 12:52	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

One Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

Hydrometrics Inc. - CDA	Project Name: Kaiser
2736 White Pines Drive	Work Order: **W1C0444**
Coeur d Alene, ID 83815	Reported: 15-Apr-11 09:08

Client Sample ID: **KM-2A**
SVL Sample ID: **W1C0444-18 (Ground Water)**

Sample Report Page 1 of 1

Sampled: 23-Mar-11 09:55
Received: 24-Mar-11
Sampled By: JF

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)										
EPA 200.7	**Calcium**	1.31	mg/L	0.040	0.008		W114046	AS	04/10/11 13:09	
EPA 200.7	**Magnesium**	5.47	mg/L	0.060	0.012		W114046	AS	04/10/11 13:10	
EPA 200.7	**Potassium**	11.3	mg/L	0.50	0.04		W114046	AS	04/10/11 13:09	
EPA 200.7	**Sodium**	1540	mg/L	5.00	0.97	20	W114046	AS	04/10/11 13:15	D2
SM 2340B	**Hardness (as CaCO3)**	25.8	mg/L	0.173	0.053		N/A		04/10/11 13:10	
Metals (Dissolved)										
EPA 200.7	**Cobalt**	0.161	mg/L	0.0060	0.0009		W114041	DG	04/08/11 15:00	
EPA 200.7	**Copper**	0.017	mg/L	0.010	0.005		W114041	DG	04/08/11 15:00	
EPA 200.7	**Iron**	52.5	mg/L	0.060	0.027		W114041	DG	04/08/11 14:59	
EPA 200.7	**Manganese**	0.0060	mg/L	0.0040	0.0017		W114041	DG	04/08/11 14:59	
EPA 200.7	**Silica (SiO2)**	10.8	mg/L	0.17	0.09		W114041	DG	04/08/11 14:59	
Metals Scan by ICP										
ASA 9	**SAR**	187					W116064	DJS	04/11/11 21:01	
Classical Chemistry Parameters										
EPA 335.4	**Cyanide (total)**	160	mg/L	5.00	0.800	500	W115030	CFF	04/04/11 15:34	D2
EPA 350.1	**Ammonia as N**	68.7	mg/L	6.00	2.60	200	W115125	TJK	04/07/11 16:24	D2
EPA 353.2	**Nitrate/Nitrite as N**	89.9	mg/L	5.00	1.50	100	W115154	TJK	04/07/11 18:01	D2
SM 2320B/2310B	**Bicarbonate**	1280	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:21	
SM 2320B/2310B	**Carbonate**	1530	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:21	
SM 2320B/2310B	Hydroxide	< 1.0	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:21	
SM 2320B/2310B	**Total Alkalinity**	2810	mg/L	1.0	0.5		W114131	DKS	04/04/11 16:21	
SM 2510 B	**Specific conductance**	6410	µmhos/cm	1.00			W114017	AGF	03/28/11 16:00	
SM 2540 C	**Total Diss. Solids**	4430	mg/L	100			W114010	JMS	03/28/11 10:46	
SM 4500 H B	**pH @20.0°C**	9.74	pH Units				W114131	DKS	04/04/11 16:21	H5
SM 4500-CN-I	**Cyanide (WAD)**	1.91	mg/L	0.100	0.0190	10	W115023	CFF	04/05/11 12:16	D2
SM 4500-S-F	**Sulfide**	3.0	mg/L	1.0	0.4		W113215	DKG	03/26/11 12:22	
SW-846 9213	**Cyanide (free)**	1.23	mg/L	0.100	0.009		W115099	cff	04/05/11 15:30	
Anions by Ion Chromatography										
EPA 300.0	**Chloride**	28.5	mg/L	5.00	1.10	25	W113166	FEH	03/31/11 21:26	D2
EPA 300.0	**Fluoride**	54.6	mg/L	2.50	0.85	25	W113166	FEH	03/31/11 21:26	D2
EPA 300.0	**Sulfate as SO4**	339	mg/L	7.50	1.32	25	W113166	FEH	04/06/11 13:01	D2

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)								
EPA 200.7	Calcium	mg/L	<0.040	0.008	0.040	W114046	08-Apr-11	
EPA 200.7	Magnesium	mg/L	<0.060	0.012	0.060	W114046	08-Apr-11	
EPA 200.7	Potassium	mg/L	<0.50	0.04	0.50	W114046	08-Apr-11	
EPA 200.7	Sodium	mg/L	<0.50	0.05	0.50	W114046	08-Apr-11	
Metals (Dissolved)								
EPA 200.7	Cobalt	mg/L	<0.0060	0.0009	0.0060	W114041	08-Apr-11	
EPA 200.7	Copper	mg/L	<0.010	0.005	0.010	W114041	08-Apr-11	
EPA 200.7	Iron	mg/L	<0.060	0.027	0.060	W114041	08-Apr-11	
EPA 200.7	Manganese	mg/L	<0.0040	0.0017	0.0040	W114041	08-Apr-11	
EPA 200.7	Silica (SiO2)	mg/L	<0.17	0.09	0.17	W114041	08-Apr-11	
Metals Scan by ICP								
ASA 9	SAR		0.04			W116064	11-Apr-11	
Classical Chemistry Parameters								
EPA 335.4	Cyanide (total)	mg/L	<0.0100	0.0016	0.0100	W115030	04-Apr-11	
EPA 350.1	Ammonia as N	mg/L	<0.030	0.013	0.030	W115125	07-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	<0.050	0.015	0.050	W115154	07-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	<0.050	0.015	0.050	W116153	13-Apr-11	
SM 2510 B	Specific conductance	µmhos/cm	<1.00		1.00	W114017	28-Mar-11	
SM 2540 C	Total Diss. Solids	mg/L	<10		10	W114010	28-Mar-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W115020	04-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W115022	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W115023	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	0.0019	0.0100	W116208	14-Apr-11	
SM 4500-S-F	Sulfide	mg/L	<1.0	0.4	1.0	W113215	26-Mar-11	
SW-846 9213	Cyanide (free)	mg/L	<0.100	0.009	0.100	W115058	04-Apr-11	
SW-846 9213	Cyanide (free)	mg/L	<0.100	0.009	0.100	W115099	05-Apr-11	
Anions by Ion Chromatography								
EPA 300.0	Fluoride	mg/L	<0.10	0.03	0.10	W113166	31-Mar-11	
EPA 300.0	Chloride	mg/L	<0.20	0.04	0.20	W113166	31-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.05	0.30	W113166	05-Apr-11	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Calcium	mg/L	18.6	20.0	93.2	85 - 115	W114046	08-Apr-11	
EPA 200.7	Magnesium	mg/L	19.2	20.0	95.8	85 - 115	W114046	08-Apr-11	
EPA 200.7	Potassium	mg/L	19.2	20.0	96.1	85 - 115	W114046	08-Apr-11	
EPA 200.7	Sodium	mg/L	17.5	19.0	91.9	85 - 115	W114046	08-Apr-11	
Metals (Dissolved)									
EPA 200.7	Cobalt	mg/L	0.908	1.00	90.8	85 - 115	W114041	08-Apr-11	
EPA 200.7	Copper	mg/L	0.934	1.00	93.4	85 - 115	W114041	08-Apr-11	
EPA 200.7	Iron	mg/L	8.91	10.0	89.1	85 - 115	W114041	08-Apr-11	
EPA 200.7	Manganese	mg/L	0.878	1.00	87.8	85 - 115	W114041	08-Apr-11	
EPA 200.7	Silica (SiO2)	mg/L	9.48	10.7	88.6	85 - 115	W114041	08-Apr-11	
Classical Chemistry Parameters									
EPA 335.4	Cyanide (total)	mg/L	0.162	0.150	108	90 - 110	W115030	04-Apr-11	
EPA 350.1	Ammonia as N	mg/L	0.733	0.750	97.7	90 - 110	W115125	07-Apr-11	

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Classical Chemistry Parameters (Continued)									
EPA 353.2	Nitrate/Nitrite as N	mg/L	2.06	2.00	103	90 - 110	W115154	07-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	2.06	2.00	103	90 - 110	W116153	13-Apr-11	
SM 2510 B	Specific conductance	µmhos/cm	442	445	99.3	90 - 110	W114017	28-Mar-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.153	0.150	102	90 - 110	W115020	04-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.157	0.150	105	90 - 110	W115023	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.162	0.150	108	90 - 110	W115022	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.148	0.150	98.7	90 - 110	W116208	14-Apr-11	
SM 4500-S-F	Sulfide	mg/L	5.3	9.74	54.6	50 - 100	W113215	26-Mar-11	
SW-846 9213	Cyanide (free)	mg/L	1.01	1.00	101	85 - 115	W115058	04-Apr-11	
SW-846 9213	Cyanide (free)	mg/L	1.03	1.00	103	85 - 115	W115099	05-Apr-11	
Anions by Ion Chromatography									
EPA 300.0	Fluoride	mg/L	2.15	2.00	107	90 - 110	W113166	31-Mar-11	
EPA 300.0	Chloride	mg/L	3.16	3.00	105	90 - 110	W113166	31-Mar-11	
EPA 300.0	Sulfate as SO4	mg/L	10.7	10.0	107	90 - 110	W113166	05-Apr-11	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Metals (Total Recoverable--reportable as Total per 40 CFR 136)									
EPA 200.7	Calcium	mg/L	27.2	27.8	2.0	20	W114046	08-Apr-11	
EPA 200.7	Magnesium	mg/L	23.7	24.5	2.9	20	W114046	08-Apr-11	
EPA 200.7	Potassium	mg/L	3.38	3.45	2.1	20	W114046	08-Apr-11	
EPA 200.7	Sodium	mg/L	9.65	9.83	1.9	20	W114046	08-Apr-11	
Metals (Dissolved)									
EPA 200.7	Cobalt	mg/L	<0.0060	<0.0060	UDL	20	W114041	08-Apr-11	
EPA 200.7	Copper	mg/L	<0.010	<0.010	UDL	20	W114041	08-Apr-11	
EPA 200.7	Iron	mg/L	<0.060	<0.060	UDL	20	W114041	08-Apr-11	
EPA 200.7	Manganese	mg/L	<0.0040	<0.0040	UDL	20	W114041	08-Apr-11	
EPA 200.7	Silica (SiO2)	mg/L	10.8	11.1	3.1	20	W114041	08-Apr-11	
Metals Scan by ICP									
ASA 9	SAR		0.46	0.46	0.6	20	W116064	11-Apr-11	
Classical Chemistry Parameters									
EPA 335.4	Cyanide (total)	mg/L	0.126	0.127	0.7	20	W115030	04-Apr-11	
EPA 350.1	Ammonia as N	mg/L	<0.030	<0.030	UDL	20	W115125	07-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	0.353	0.349	1.2	20	W116153	13-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	3.58	3.75	4.6	20	W115154	07-Apr-11	D2
SM 2320B/2310B	Total Alkalinity	mg/L	185	186	0.2	20	W114131	30-Mar-11	
SM 2320B/2310B	Total Alkalinity	mg/L	3370	3390	0.6	20	W114131	04-Apr-11	
SM 2320B/2310B	Bicarbonate	mg/L	1270	1300	1.8	20	W114131	04-Apr-11	
SM 2320B/2310B	Bicarbonate	mg/L	185	186	0.2	20	W114131	30-Mar-11	
SM 2320B/2310B	Carbonate	mg/L	2100	2090	0.1	20	W114131	04-Apr-11	
SM 2320B/2310B	Carbonate	mg/L	<1.0	<1.0	UDL	20	W114131	30-Mar-11	
SM 2320B/2310B	Hydroxide	mg/L	<1.0	<1.0	UDL	20	W114131	04-Apr-11	
SM 2320B/2310B	Hydroxide	mg/L	<1.0	<1.0	UDL	20	W114131	30-Mar-11	
SM 2510 B	Specific conductance	µmhos/cm	354	352	0.4	20	W114017	28-Mar-11	
SM 2510 B	Specific conductance	µmhos/cm	461	486	5.3	20	W114017	28-Mar-11	
SM 2540 C	Total Diss. Solids	mg/L	211	201	4.9	5	W114010	28-Mar-11	
SM 2540 C	Total Diss. Solids	mg/L	271	255	6.1	5	W114010	28-Mar-11	R1
SM 4500 H B	pH	pH Units	8.07	8.15	1.0	20	W114131	30-Mar-11	
SM 4500 H B	pH	pH Units	9.94	9.94	0.0	20	W114131	04-Apr-11	

Quality Control - DUPLICATE Data (Continued)

Classical Chemistry Parameters (Continued)

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	<0.0100	<RL	20	W115022	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.0128	0.0114	11.1	20	W115023	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.0380	0.0370	2.7	20	W116208	14-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	<0.0100	<0.0100	UDL	20	W115020	04-Apr-11	
SM 4500-S-F	Sulfide	mg/L	2.1	2.1	0.0	20	W113215	26-Mar-11	
SM 4500-S-F	Sulfide	mg/L	2.3	1.8	27.5	20	W113215	26-Mar-11	R2
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	<RL	20	W115058	04-Apr-11	
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	UDL	20	W115099	05-Apr-11	

Anions by Ion Chromatography

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
EPA 300.0	Fluoride	mg/L	0.61	0.60	0.8	20	W113166	31-Mar-11	
EPA 300.0	Chloride	mg/L	23.6	23.9	1.3	20	W113166	31-Mar-11	D2
EPA 300.0	Sulfate as SO4	mg/L	32.0	31.9	0.1	20	W113166	05-Apr-11	

Quality Control - MATRIX SPIKE Data

Metals (Total Recoverable--reportable as Total per 40 CFR 136)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
EPA 200.7	Calcium	mg/L	46.1	27.8	20.0	91.8	70 - 130	W114046	08-Apr-11	
EPA 200.7	Calcium	mg/L	69.7	51.0	20.0	93.4	70 - 130	W114046	10-Apr-11	
EPA 200.7	Magnesium	mg/L	43.2	24.5	20.0	94.0	70 - 130	W114046	08-Apr-11	
EPA 200.7	Magnesium	mg/L	74.5	56.4	20.0	90.7	70 - 130	W114046	10-Apr-11	
EPA 200.7	Potassium	mg/L	22.8	3.45	20.0	96.8	70 - 130	W114046	08-Apr-11	
EPA 200.7	Potassium	mg/L	26.2	6.24	20.0	99.7	70 - 130	W114046	10-Apr-11	
EPA 200.7	Sodium	mg/L	27.4	9.83	19.0	92.2	70 - 130	W114046	08-Apr-11	
EPA 200.7	Sodium	mg/L	42.7	24.9	19.0	93.7	70 - 130	W114046	10-Apr-11	

Metals (Dissolved)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
EPA 200.7	Cobalt	mg/L	0.943	<0.0060	1.00	94.3	70 - 130	W114041	08-Apr-11	
EPA 200.7	Cobalt	mg/L	0.893	<0.0060	1.00	89.3	70 - 130	W114041	08-Apr-11	
EPA 200.7	Copper	mg/L	0.959	<0.010	1.00	95.9	70 - 130	W114041	08-Apr-11	
EPA 200.7	Copper	mg/L	0.960	0.013	1.00	94.7	70 - 130	W114041	08-Apr-11	
EPA 200.7	Iron	mg/L	10.1	<0.060	10.0	101	70 - 130	W114041	08-Apr-11	
EPA 200.7	Iron	mg/L	9.57	0.161	10.0	94.1	70 - 130	W114041	08-Apr-11	
EPA 200.7	Manganese	mg/L	0.979	<0.0040	1.00	97.9	70 - 130	W114041	08-Apr-11	
EPA 200.7	Manganese	mg/L	0.919	<0.0040	1.00	91.9	70 - 130	W114041	08-Apr-11	
EPA 200.7	Silica (SiO2)	mg/L	21.3	11.1	10.7	95.4	70 - 130	W114041	08-Apr-11	
EPA 200.7	Silica (SiO2)	mg/L	22.5	13.1	10.7	88.5	70 - 130	W114041	08-Apr-11	

Classical Chemistry Parameters

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
EPA 335.4	Cyanide (total)	mg/L	0.229	0.127	0.100	102	90 - 110	W115030	04-Apr-11	
EPA 335.4	Cyanide (total)	mg/L	0.103	<0.0100	0.100	95.9	90 - 110	W115030	04-Apr-11	
EPA 350.1	Ammonia as N	mg/L	0.482	<0.030	0.500	96.5	90 - 110	W115125	07-Apr-11	
EPA 350.1	Ammonia as N	mg/L	0.486	<0.030	0.500	97.2	90 - 110	W115125	07-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	4.66	3.75	1.00	91.0	90 - 110	W115154	07-Apr-11	D2
EPA 353.2	Nitrate/Nitrite as N	mg/L	95.3	98.1	1.00	R > 4S	90 - 110	W115154	07-Apr-11	D2,M3
EPA 353.2	Nitrate/Nitrite as N	mg/L	2.07	0.988	1.00	108	90 - 110	W116153	13-Apr-11	
EPA 353.2	Nitrate/Nitrite as N	mg/L	1.46	0.349	1.00	111	90 - 110	W116153	13-Apr-11	M1
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.0951	0.0124	0.100	82.6	75 - 125	W115020	04-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.104	<0.0100	0.100	104	75 - 125	W115020	04-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.117	0.0114	0.100	105	75 - 125	W115023	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.110	<0.0100	0.100	110	75 - 125	W115023	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.116	<0.0100	0.100	113	75 - 125	W115022	05-Apr-11	
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.115	<0.0100	0.100	115	75 - 125	W115022	05-Apr-11	

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Hydrometrics Inc. - CDA
2736 White Pines Drive
Coeur d Alene, ID 83815

Project Name: Kaiser
Work Order: **W1C0444**
Reported: 15-Apr-11 09:08

Quality Control - MATRIX SPIKE Data (Continued)

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Classical Chemistry Parameters (Continued)										
SM 4500-CN-I	Cyanide (WAD)	mg/L	0.137	0.0370	0.100	100	75 - 125	W116208	14-Apr-11	
SW-846 9213	Cyanide (free)	mg/L	0.746	<0.100	1.00	70.4	85 - 115	W115058	04-Apr-11	M2
SW-846 9213	Cyanide (free)	mg/L	<0.100	<0.100	1.00	N/A	85 - 115	W115099	05-Apr-11	M2
Anions by Ion Chromatography										
EPA 300.0	Fluoride	mg/L	2.78	0.60	2.00	109	90 - 110	W113166	31-Mar-11	
EPA 300.0	Fluoride	mg/L	2.39	0.26	2.00	107	90 - 110	W113166	31-Mar-11	
EPA 300.0	Chloride	mg/L	27.3	23.9	3.00	R > 4S	90 - 110	W113166	31-Mar-11	D2,M3
EPA 300.0	Chloride	mg/L	19.0	16.3	3.00	90.7	90 - 110	W113166	31-Mar-11	D2
EPA 300.0	Sulfate as SO4	mg/L	43.8	31.9	10.0	119	90 - 110	W113166	05-Apr-11	M1
EPA 300.0	Sulfate as SO4	mg/L	64.8	54.7	10.0	101	90 - 110	W113166	06-Apr-11	D2

Notes and Definitions

D2	Sample required dilution due to high concentration of target analyte.
H3	Sample was received and analyzed past holding time.
H5	This test is specified to be performed in the field within 15 minutes of sampling; sample was received and analyzed past the regulatory holding time.
H6	Initial analysis was within holding time. Reanalysis was run past holding time.
M1	Matrix spike recovery was high, but the LCS recovery was acceptable.
M2	Matrix spike recovery was low, but the LCS recovery was acceptable.
M3	The spike recovery value is unusable since the analyte concentration in the sample is disproportionate to spike level. The LCS was acceptable.
N4	After re-analysis original results are confirmed.
Q12	Sample was received and analyzed with pH <12.
Q13	Sample was received and analyzed with pH>2.
R1	RPD exceeded the method acceptance limit.
R2	RPD exceeded the laboratory acceptance limit.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

APPENDIX C

MEMORANDUM - KAISER MEAD - EVALUATION OF MARCH 2011 EXPANDED GROUNDWATER MONITORING DATA

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MEMORANDUM

DATE: June 23, 2011

TO: Antonio Chavez

FROM: Scott Mason

RE: Kaiser Mead - Evaluation of March 2011 Expanded Groundwater Monitoring Data

Expanded groundwater monitoring of eight wells was recommended in November 2010 and was implemented for five wells in the November 2010 monitoring event and eight additional wells in the March 2011 monitoring event (Table 1). Routine monitoring has focused on cyanide and fluoride concentrations in groundwater. The purpose of the expanded monitoring is to pursue an enhanced understanding of site conditions impacting the generation and movement of groundwater contamination (cyanide and fluoride).

For the November 2010 event, five wells along an assumed flowpath (from upgradient/background wells, to source area wells, to compliance wells) were selected for expanded monitoring. An evaluation of the November 2010 data is described in the February 2011 Hydrometrics Status Report and is summarized as follows:

1. Both cyanide and fluoride appear to be attenuated in groundwater between the plant site and the compliance wells. Fluoride concentrations appear to be controlled by dissolved calcium concentrations and the solubility of the mineral fluorite (CaF_2). Cyanide concentrations may be controlled by solubility of iron cyanide precipitates.
2. Significant dilution of cyanide and fluoride also occurs in the contaminant plume.

The November 2010 expanded monitoring data suggested that information about chemical parameters other than cyanide and fluoride are important in understanding cyanide and fluoride behavior. Therefore, continued monitoring for expanded chemical parameters at additional wells was recommended in the Status Report and implemented during the March 2011 monitoring event. Particular goals of the March 2011 monitoring were:

1. Characterize groundwater redox conditions to better understand cyanide behavior;
2. Monitor select historic wells to better document temporal variations; and
3. Better define spatial variations and conditions on site.

This memo summarizes observations regarding these three goals.

TABLE 1. RECOMMENDED ADDITIONAL WELLS FOR MARCH 2011

Well	Unit	Location	Rationale	Sampled March 2011?
ES-10	A	Between SPL pile and rubble pile and midway between KM-3 and KM-5 to better define flowpath	Characterize flowpath, evaluate SPL vs rubble pile source – ES-10 shows apparent improvement between 2000 ad 2005/2009 and may be evidence that SPL source control is working. Monitoring of wells ES-10, TH-2, and HC-9 between SPL and rubble pile may confirm this.	Yes
TH-2	A	Between SPL pile and rubble pile and midway between KM-3 and KM-5 to better define flowpath	Characterize flowpath, evaluate SPL vs rubble pile source	Yes
HC-9	SAQ	Between SPL pile and rubble pile and midway between KM-3 and KM-5 to better define flowpath	Characterize flowpath, evaluate SPL vs rubble pile source; evaluate source area conditions	No
TH-3A or –8	A	Adjacent KM-1	Provide correlation with KM-1 to allow extrapolation of historic data	Yes, TH-8
HC-1	A	Upgradient by sludge pond	Document upgradient water quality to support use of chloride as tracer and basis for mixing evaluation	Yes
HC-13	A	Upgradient south of KM-3	Document upgradient water quality to support use of chloride as tracer and basis for mixing evaluation	Yes
HC-12	A	Center of plume	Evaluate conditions in center of plume – highest concentrations on site	Yes
KM-2A		Plume adjacent to rubble pile	Better define suspected source area conditions	Yes

Groundwater Redox Conditions and Cyanide Behavior

Groundwater redox conditions (pe or Eh) were evaluated by analysis of redox-sensitive chemical parameters (ammonia/nitrate, sulfide/sulfate, dissolved oxygen) and by direct measurement with field meter and ORP probe. Results of the redox evaluation are summarized in Figure 1. Unfortunately redox conditions in water are difficult to assess or define as very few waters are actually in complete redox equilibrium where all redox pairs demonstrate equilibria with the same redox condition or pe/Eh value. Lindberg and Runnels (1984) recommend evaluating all of the redox couples within a solution to determine if the system is in redox equilibrium and using a weight-of-evidence approach to select the most representative pe. As shown in Figure 1, the redox (pe) indicators in site groundwater cover a broad range of values as follows:

1. Field measurements with an ORP probe indicate pe ranging from approximately 3 to 9; indicating generally oxidizing conditions;
2. Field dissolved oxygen (DO) measurements of predominantly 0.3 to 1 mg/L, indicate low levels of oxygen, typical of most groundwater (Drever, 1982) and generally indicative of mildly oxidizing to mildly reducing conditions;
3. Ammonia concentrations and pe calculated from the ammonia-nitrate redox couple indicate pe ranging from 2.6 to 4.9; indicating oxidizing to mildly reducing conditions; and
4. Sulfide concentrations and pe calculated from the sulfide-sulfate redox couple indicating pe ranging from –6.8 to –4.7; indicating fairly strongly reducing conditions.

Overall, the field ORP and DO measurements and pe calculated from the ammonia-nitrate redox pair are in general agreement suggesting mildly oxidizing to mildly reducing conditions. The weight of evidence seems to indicate that the overall system redox condition is mildly oxidizing to mildly reducing. Even though the absolute values of pe differ amongst the redox measures, all redox measures in KM groundwater point to the same correlation with cyanide concentrations. In areas of high cyanide concentration:

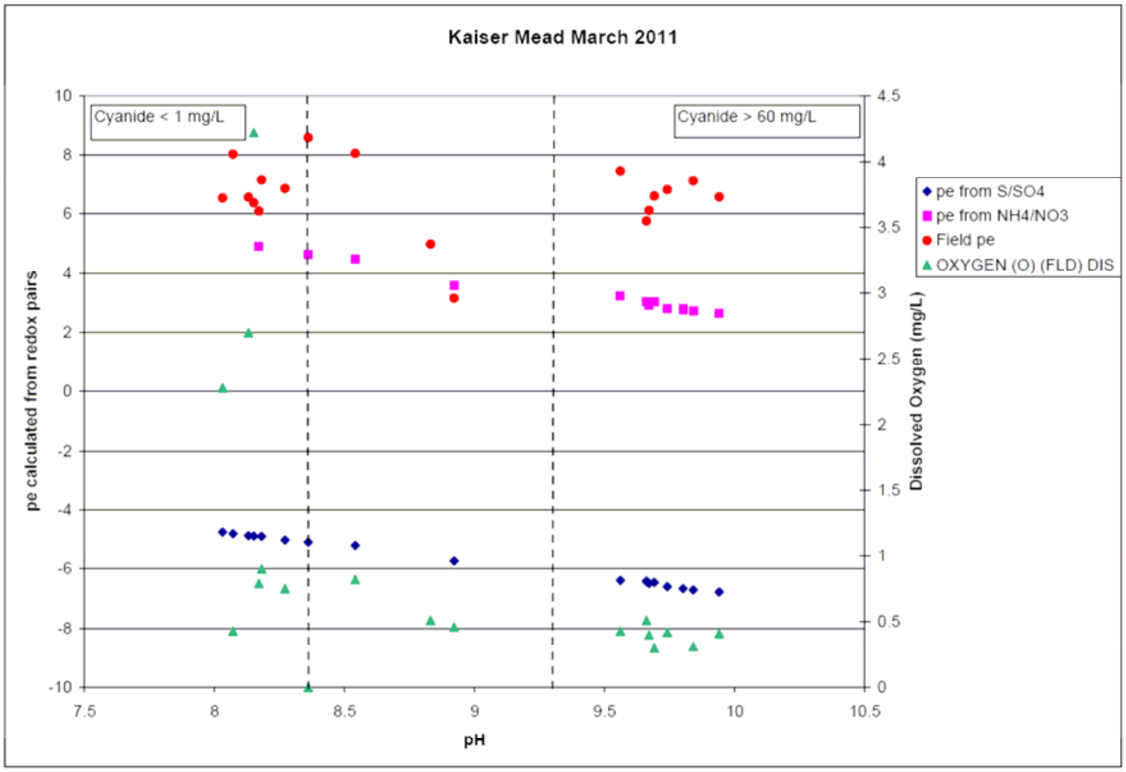
1. pH is high (> 9.5) indicating alkaline conditions;
2. pe is lower, indicating more reducing conditions; and
3. Dissolved oxygen concentration is very low or absent (not measurable).

Conversely, in areas of low cyanide concentrations:

1. pH is slightly alkaline (8 to 8.5);
2. pe is higher, indicating more oxidizing conditions; and
3. Dissolved oxygen is present at low to moderate levels.

Although it is possible that these correlations are the result of redox control of cyanide solubility or mobility, it is difficult to prove this relationship, as there are alternative explanations that yield the same correlations. For instance, uncontaminated groundwater in the area is more oxidized, has higher dissolved oxygen, and lower pH. Thus, a combination of groundwater dilution and cyanide attenuation/degradation would yield similar trends.

FIGURE 1. GROUNDWATER REDOX CONDITIONS



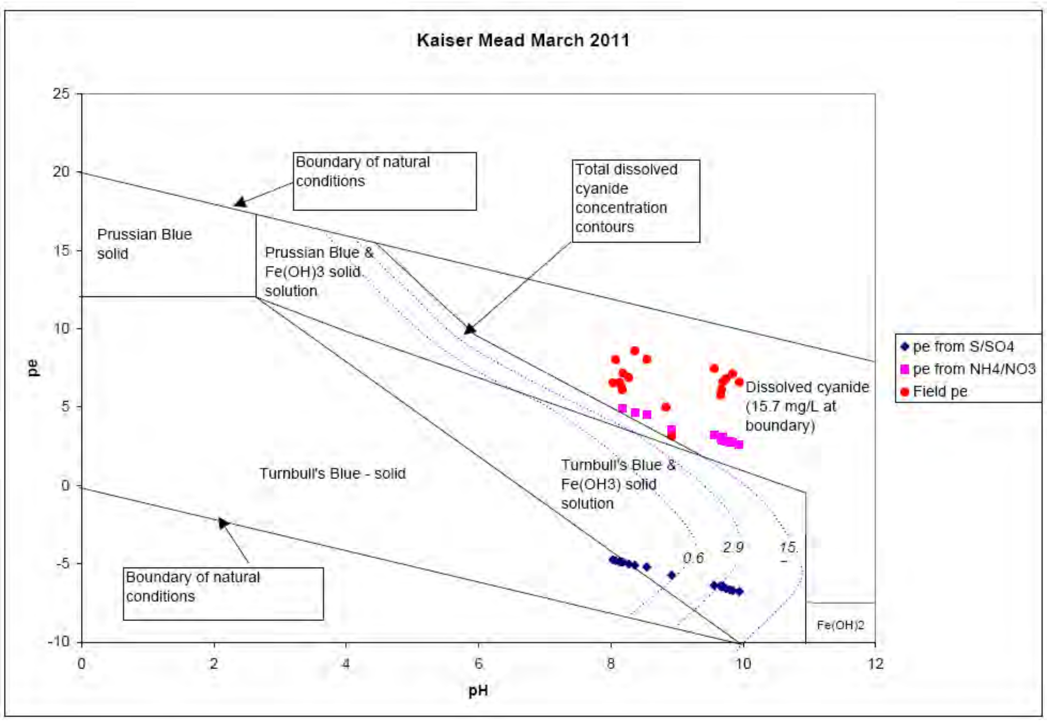
One of the goals of the redox evaluation was to determine if solid iron-cyanide precipitates could exert some control on dissolved cyanide concentrations. Figure 2 shows the measured and calculated pe values plotted on an iron-cyanide precipitate stability diagram. The stability diagram (after Ghosh et al., 1999) shows the pe-pH conditions where the solid iron-cyanide mineral precipitates (Prussian Blue, Turnbull's Blue, and iron hydroxides) and the total dissolved cyanide concentrations (blue dashed contours) that are in equilibrium with the solids. The stability diagram indicates that cyanide is soluble and fully dissolved (i.e., solid precipitates are not stable) under oxidizing to mildly reducing conditions and neutral to alkaline pH (e.g., pH > about 6). Moreover, in the presence of iron-cyanide precipitates, dissolved total cyanide concentrations are predicted to not exceed about 16 mg/L. In considering this diagram, it is important to remember the uncertainty inherent in the diagram:

1. The diagram is constructed based on laboratory solubility measurements and thermodynamic data.
2. The solids tested in the laboratory (generally reagent grade materials and synthesized solid solutions) may differ from those found in nature and moreover, additional forms of iron cyanides and iron cyanide/iron hydroxide solid solutions are known to exist but are not represented in the diagram.
3. The authors (Ghosh et al., 1999) note in a later paper (Ghosh et al., 2004) that the diagram seems to work well in predicting cyanide concentrations at many sites (primarily manufactured gas plants), but not all sites. In particular, they note that

groundwater not in contact with cyanide source materials or iron-cyanide precipitates would not be expected to be controlled by the relationships in the diagram.

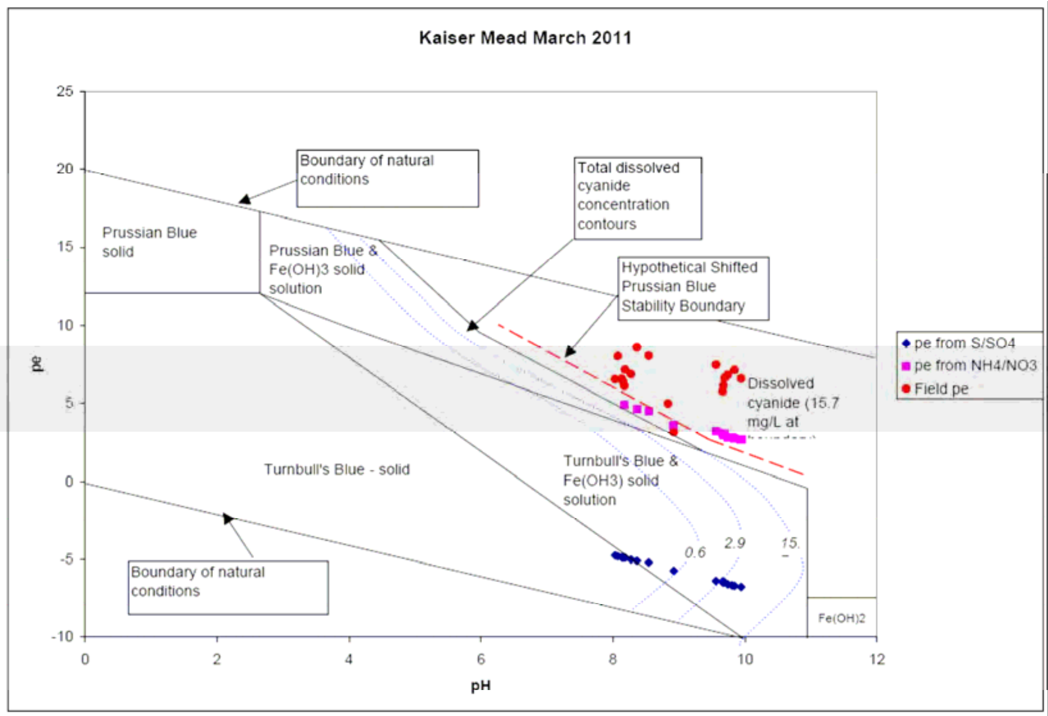
4. The diagram represents equilibrium conditions which may not be attained if the rates of reaction between the solid and aqueous phases are slow. Dzombak et al. (2006) note that iron cyanide precipitates are often found in soil solid phases even at high pH conditions where the diagram suggests that they should not exist. This is attributed to the very slow dissolution rate of iron-cyanide solids in the dark.

FIGURE 2. IRON – CYANIDE STABILITY DIAGRAM WITH CYANIDE CONCENTRATION CONTOURS AND MARCH 2011 GROUNDWATER REDOX MEASUREMENTS



Groundwater redox measurements in site groundwater in March 2011 are also plotted on the stability diagram (Figure 2). A narrow or exact comparison of field pe measurements and the ammonia-nitrate calculated pe values suggests that site groundwater conditions are such (mildly oxidizing to mildly reducing and pH >8) that iron-cyanide precipitates would not be expected to form or persist and thus cyanide concentrations would not be limited by the solubility of iron-cyanide precipitates. However, given the diagram uncertainties described above and the observed correlation between cyanide and redox conditions, a somewhat more lenient comparison may be warranted. As shown in Figure 3, a slight modification of the stability diagram (shifting of the Prussian Blue/Fe(OH)3 boundary to the right as indicated by the dashed red line) is all that is needed to reconcile the diagram with the Kaiser Mead groundwater data. That is, if the Prussian Blue/Fe(OH)3 boundary is shifted to the right, then the diagram and the measured groundwater redox values roughly predict the observed cyanide concentrations. This shift is considered to be reasonable because it is equivalent to increasing the total dissolved cyanide concentration in solution. As noted above, the diagram predicts a maximum dissolved cyanide concentration of 15.7 mg/L but groundwater at the Kaiser Mead site is known to contain up to 200 mg/L total cyanide.

FIGURE 3. IRON – CYANIDE STABILITY DIAGRAM WITH MODIFIED BOUNDARY

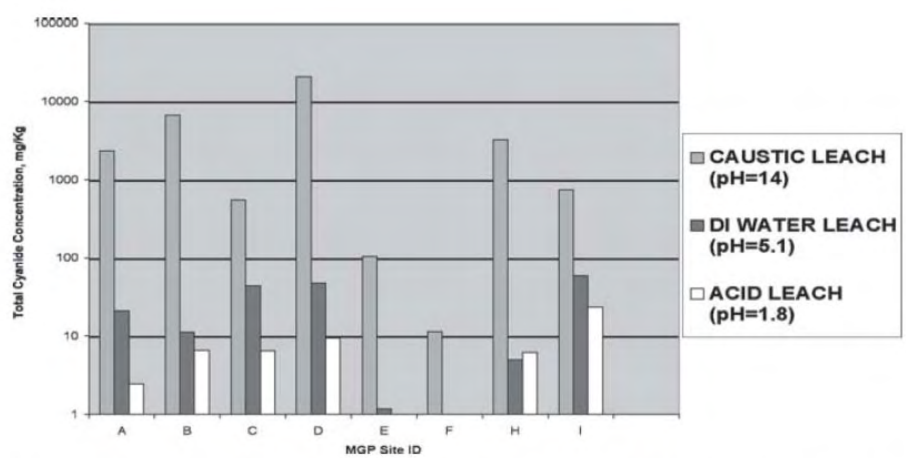


Presence of Iron-Cyanide Precipitates

It would seem to reason that if iron-cyanide precipitates occurred in source area soils or in aquifer or vadose zone sediments that the precipitates would be readily apparent in soil laboratory analyses or even visibly in the soils/sediments. At many sites, particularly manufactured gas plants, iron cyanide minerals are visually apparent by their brilliant blue colors. However, detection of the iron cyanide precipitates can be difficult. First, contrary to what their names imply, Prussian Blue and Turnbull's Blue are not always blue. The color of the precipitates is related to the ratio of ferrous to ferric iron in the minerals with the blue color occurring in very high or low ferrous to ferric ratios (Ghosh et al., 2004). At intermediate ratios, Prussian Blue and other ferric ferricyanide precipitates are actually brown to green, colors that are common in soils and sediment and so may go unnoticed.

Laboratory analyses for total cyanide in soils can yield incorrect measurements unless care is taken to account for the presence of iron cyanide precipitates and to adjust the extraction methods accordingly. As shown in Figure 2, iron cyanide precipitates are stable and have low solubility under acidic conditions. Thus, if soil samples containing iron cyanide precipitates are extracted or directly analyzed under acidic conditions, as is common in the EPA Method 9012, poor recovery of the cyanide will occur and the analysis will underestimate the actual amount of cyanide present. Figure 4 shows the effect of extraction pH on cyanide recovery as reported by Ghosh et al. (2004). In many of the soils analyzed, the effect of using an acidic extraction resulted in underestimating actual cyanide concentrations by factors of 10 to 1,000. Acidic extractions generally yielded soil cyanide concentrations of 10 ppm or less, whereas actual total cyanide concentrations ranged from 100 to over 10,000 ppm.

FIGURE 4. EFFECT OF EXTRACTION PH ON CYANIDE RECOVERY IN SOILS (FROM GHOSH ET AL., 2004).



Total cyanide concentration in MGP site soils (backcalculated based on three different leaching conditions).

ENVIRON ENG SCI, VOL. 21, NO. 6, 2004

In order to properly characterize cyanide concentrations in soil, it is first necessary to test and verify the effects of extraction pH on cyanide recoveries. It is not possible to verify the methods that were used in earlier analyses at Kaiser Mead, however, it is suspected that extractions were done under acidic or neutral pH conditions and thus may greatly underestimate actual cyanide concentrations. These suspicions are based on the following observations:

1. Soil cyanide analyses reported in the Hart Crowser (1988) Site Characterization analysis report state (pg. 4) that the Kaiser Mead laboratory analyzed soil samples that were collected as part of the drilling program. In the drilling logs, the soil cyanide measurements are listed as "qualitative." The reason that the soil analyses are considered to be qualitative is not known, however, it seems unlikely that the KM lab would have done alkaline extractions.
2. The soil analyses for cyanide described in the MFG (2000) SPL Remediation Soil Design Report reports the soil cyanide analytical method to be EPA Method 335.4, which is a method for analysis of cyanide in water wherein the water is acidified to cause cyanide gas to evolve. When questioned, the analytical lab (SVL) could not explain why a water method was listed for soil. Although speculative, it seems likely that the lab either a) performed a water extraction on the soil and then analyzed the water, or b) analyzed the soil directly by acid addition.

3. SVL lab reports that their current method of analyzing soils is EPA Method 9012 wherein the soil is directly analyzed by adding acid to the soil and analyzing the evolved gas.

If the previous soil cyanide analyses at Kaiser Mead underestimate cyanide concentrations, then it is possible that cyanide-rich soils and sediment remain on the site in areas that are exposed to leaching by rainfall and/or groundwater. The drilling logs and cyanide analyses described in Hart Crowser were used to identify areas of surface and subsurface contamination. If these analyses are biased low, then significant subsurface cyanide contamination may exist in the unsaturated and saturated zone soils. The soil analyses conducted by MFG in 2000 were used to identify surficial materials for incorporation into the SPL pile. If these analyses provided unreliable date, then cyanide-contaminated soils may remain on the site outside of the SPL repository. In particular, the MFG soil samples indicated that Area 2, Tharp Lake, and the sludge pond did not contain soils with elevated cyanide concentrations and as a result these areas were not capped to the same extent as the SPL pile, even though 1) Tharp Lake was identified as the primary cyanide source in the Hart Crowser report and 2) cessation of use of Tharp Lake resulted in the greatest improvement in cyanide concentrations on the site.

Conclusions and Data Gaps Regarding Redox and Cyanide Behavior

Although the redox data is somewhat variable and there is uncertainty associated with the relationship between iron-cyanide precipitates, cyanide concentrations, and redox conditions, the overall weight of evidence suggests that redox conditions and iron cyanide precipitates in source area soils and subsurface sediments is a factor in cyanide migration on the site. To further evaluate these relationships, the following data gaps would need to be addressed:

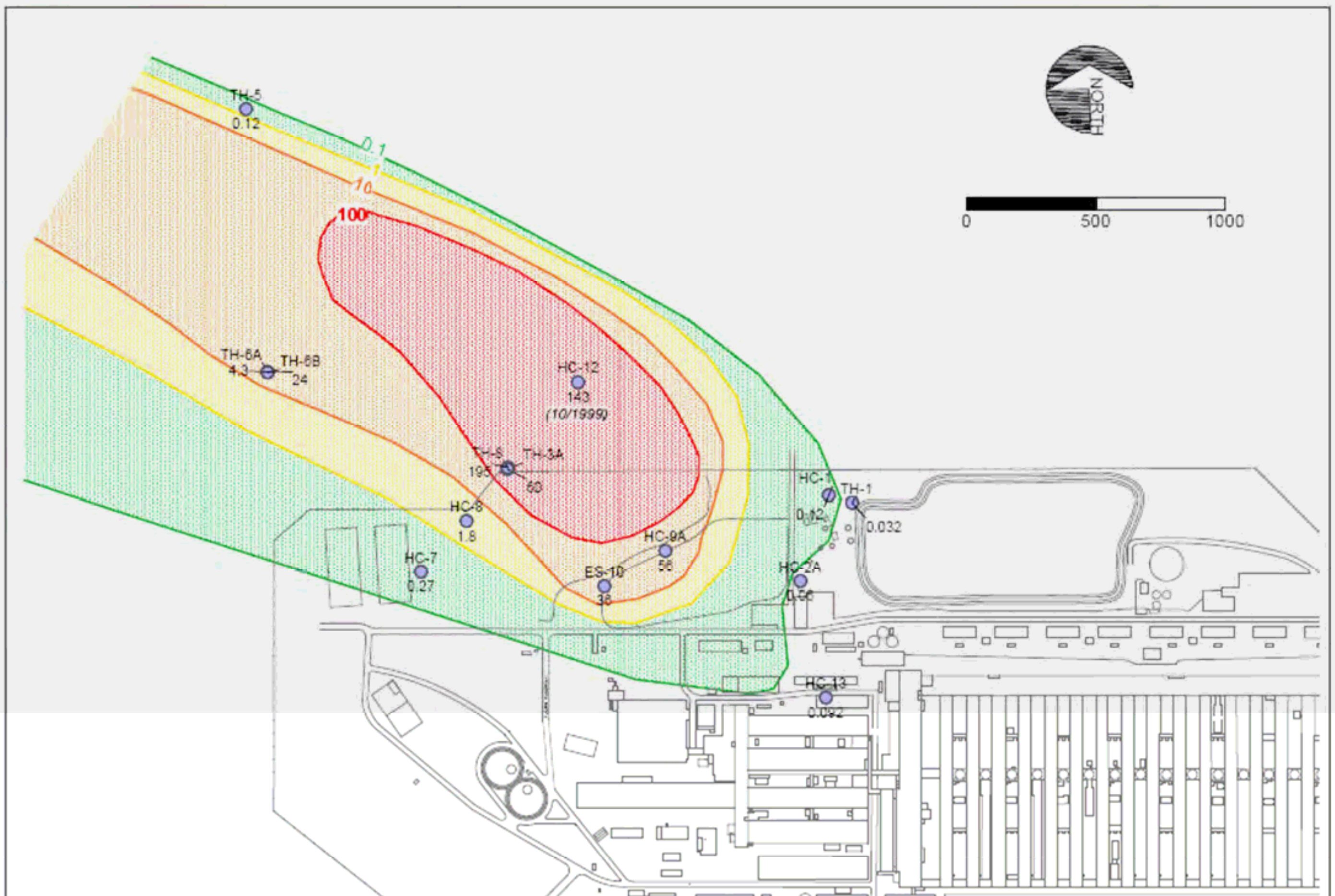
1. Continued monitoring of redox parameters in groundwater samples;
2. Collect additional shallow soil samples in suspected or potential source areas (Tharp Lake/Area 2, area north of SPL pile, sludge pond);
3. Evaluate effect of various soil extraction methods on soil total cyanide measurements; and
4. Collect and analyzed additional vadose zone/deep sediment/aquifer soil samples in areas of high cyanide and fluoride groundwater concentrations.

Temporal Variations in Historic Wells

As described in Table 1, wells ES-10, TH-2, TH-8, and HC-12 were sampled in order to evaluate long-term trends in cyanide and fluoride concentrations in wells that have not been routinely sampled in recent years. ES-10 and TH-2 are located in the footprint of the SPL repository approximately between the SPL and rubble material. TH-8 is located adjacent to well KM-1 at the northwest corner of the SPL repository and likely has the longest overall water quality record on the site. HC-12 is located further downgradient from the SPL repository in the center of the cyanide/fluoride plume.

Cyanide concentrations measured in 2000, 2009 and March 2011 are shown in Figures 5, 6, and 7. Fluoride concentrations measured in 2000, 2009 and March 2011 are shown in

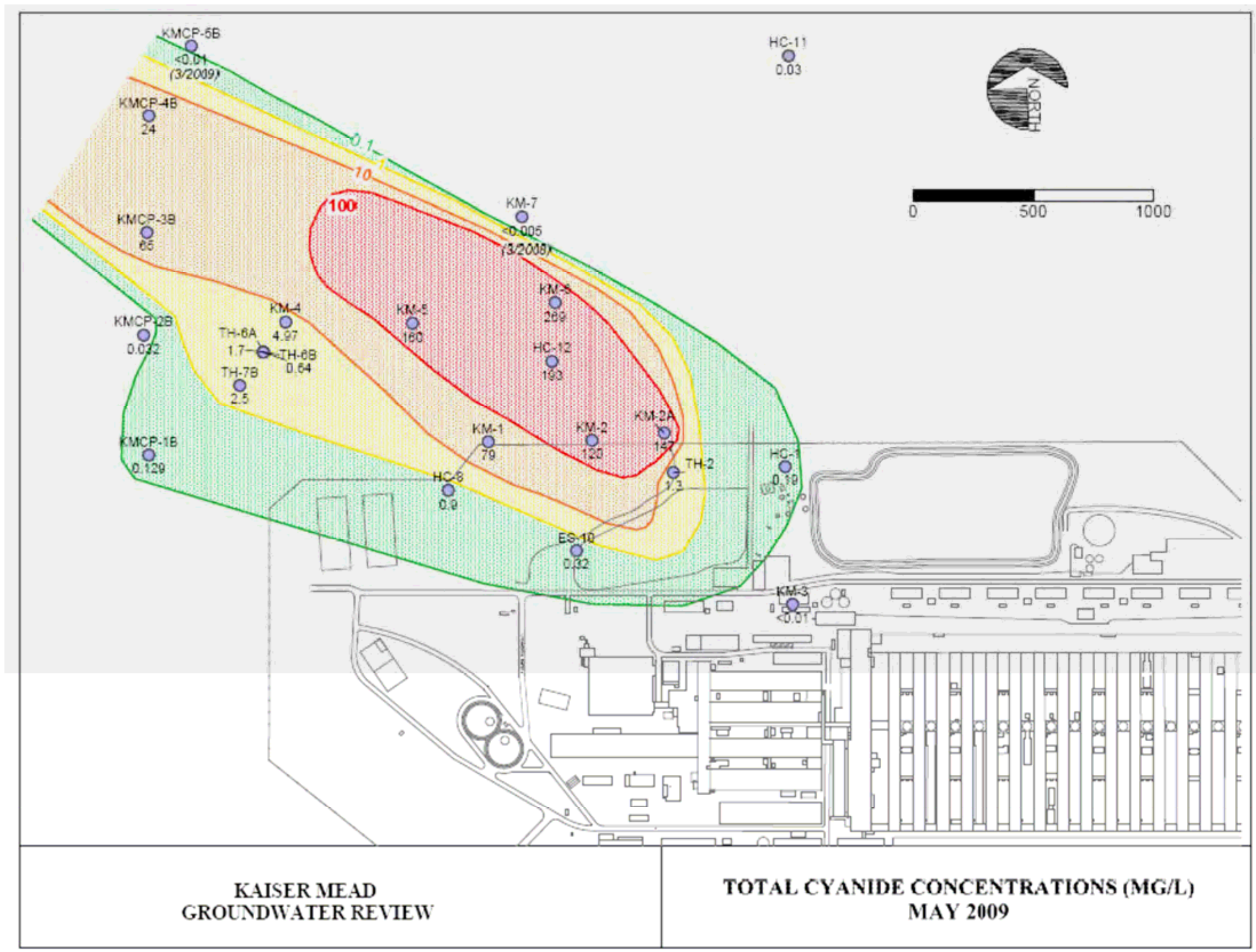
FIGURE 5. TOTAL CYANIDE CONCENTRATIONS (MG/L), MAY 2000



KAISER MEAD GROUNDWATER REVIEW	TOTAL CYANIDE CONCENTRATIONS (MG/L) MAY 2000

k:/project/9088/bill/TCN Map 2000.srf

FIGURE 6. TOTAL CYANIDE CONCENTRATIONS (MG/L), MAY 2009



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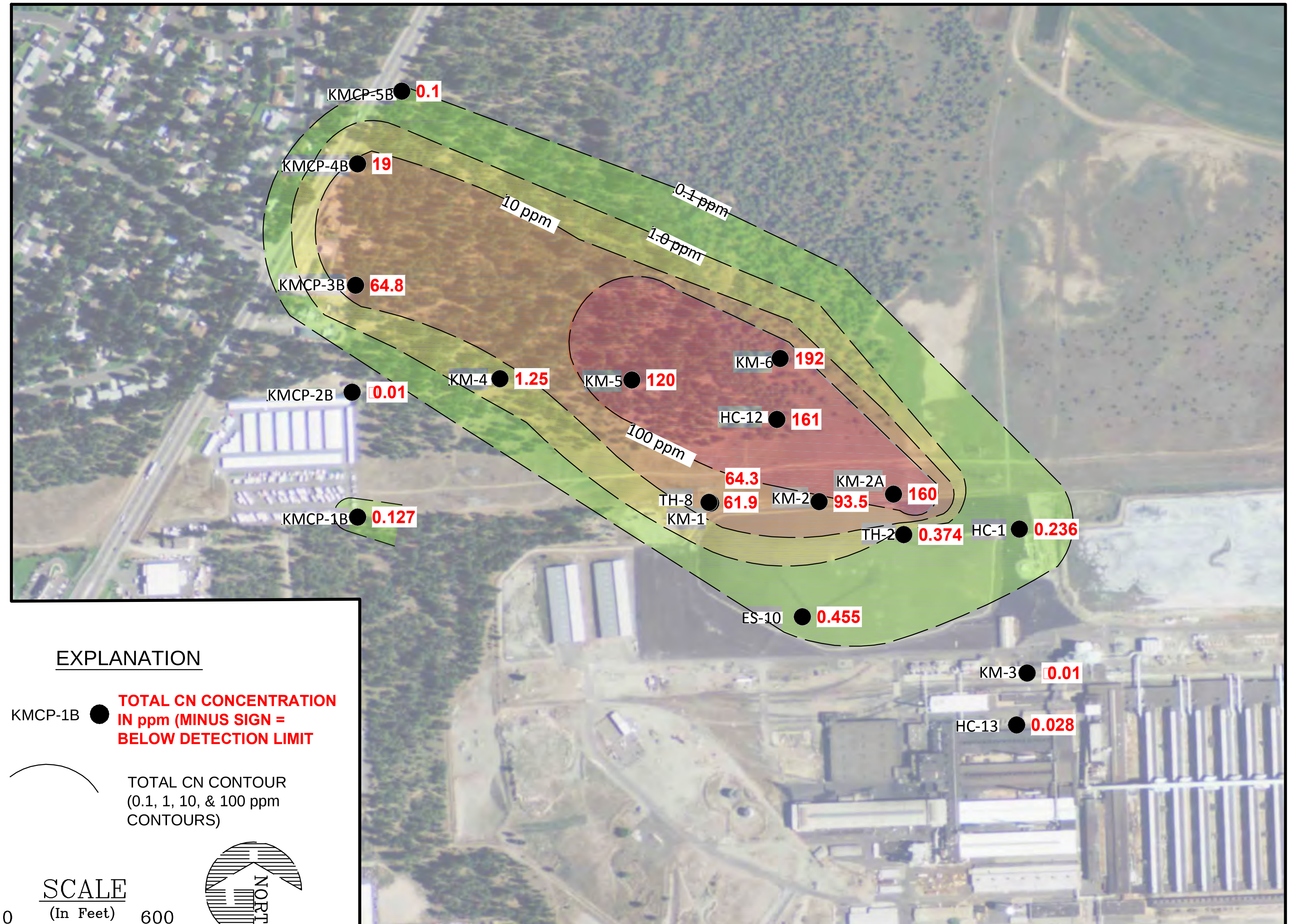

EXPLANATION

KMCP-1B ● TOTAL CN CONCENTRATION IN ppm (MINUS SIGN = BELOW DETECTION LIMIT

TOTAL CN CONTOUR (0.1, 1, 10, & 100 ppm CONTOURS)

SCALE (In Feet) 0 600

NORTH

SOURCE EVALUATION KAISER MEAD FACILITY MEAD, WA	TOTAL CN CONCENTRATION MARCH 2011 KAISER MEAD	FIGURE 7

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Figures 8, 9, and 10. In groundwater underlying the area of the remediated SPL and rubble pile (wells ES-10 and TH-2), a significant improvement in water quality is observed as summarized in the following Table 2. These trends suggest that the latest remediation actions in 2000-2005 have reduced cyanide and fluoride concentrations either by reducing the precipitation leaching of SPL/rubble material through the improved SPL cap or by reducing the leaching of subsurface materials through reduction in water losses from pipelines.

TABLE 2. CONCENTRATION TRENDS IN WELLS ES-10 AND TH-2

	ES-10			TH-2	
	2000	**2009**	**2011**	**2009**	**2011**
Total cyanide	36	0.32	0.455	1.3	0.374
Fluoride	11	1.7	1.27	58	19.4

Groundwater to the north (downgradient) of the SPL repository and in the center of the contaminant plume (wells TH-8 and HC-1) exhibits variable trends (Figures 11 and 12). In TH-8, cyanide concentrations decreased approximately by a factor of approximately 4 during 2000 through 2005 and remain lower in 2011. These cyanide improvements were accompanied by a lesser degree of improvement in fluoride concentrations. These observations appear consistent with the changes noted in SPL/rubble pile wells ES-10 and TH-2 and may also suggest a reduction in contaminant leaching due to remedial actions during 2000-2005.

Near the center of the contaminant plume in well HC-12, cyanide and fluoride concentrations are somewhat variable but overall have increased fairly steadily from the early 1980s to peak concentrations in 2009. Between 2009 and 2011, concentrations appear to have decreased by approximately 25 percent. However, the recent decrease is similar in magnitude to previously observed variations and as a result it is not possible to determine if the long-term trend in HC-12 is upward or downward.

Conclusions and Data Gaps Regarding Historic Wells

Monitoring of wells with long-term water quality records appears to be important in interpreting overall site trends and the effectiveness of previous remedial actions. Therefore, continued monitoring of these additional wells would be needed to further evaluate water quality trends.

FIGURE 8. FLUORIDE CONCENTRATIONS (MG/L), MAY 2000

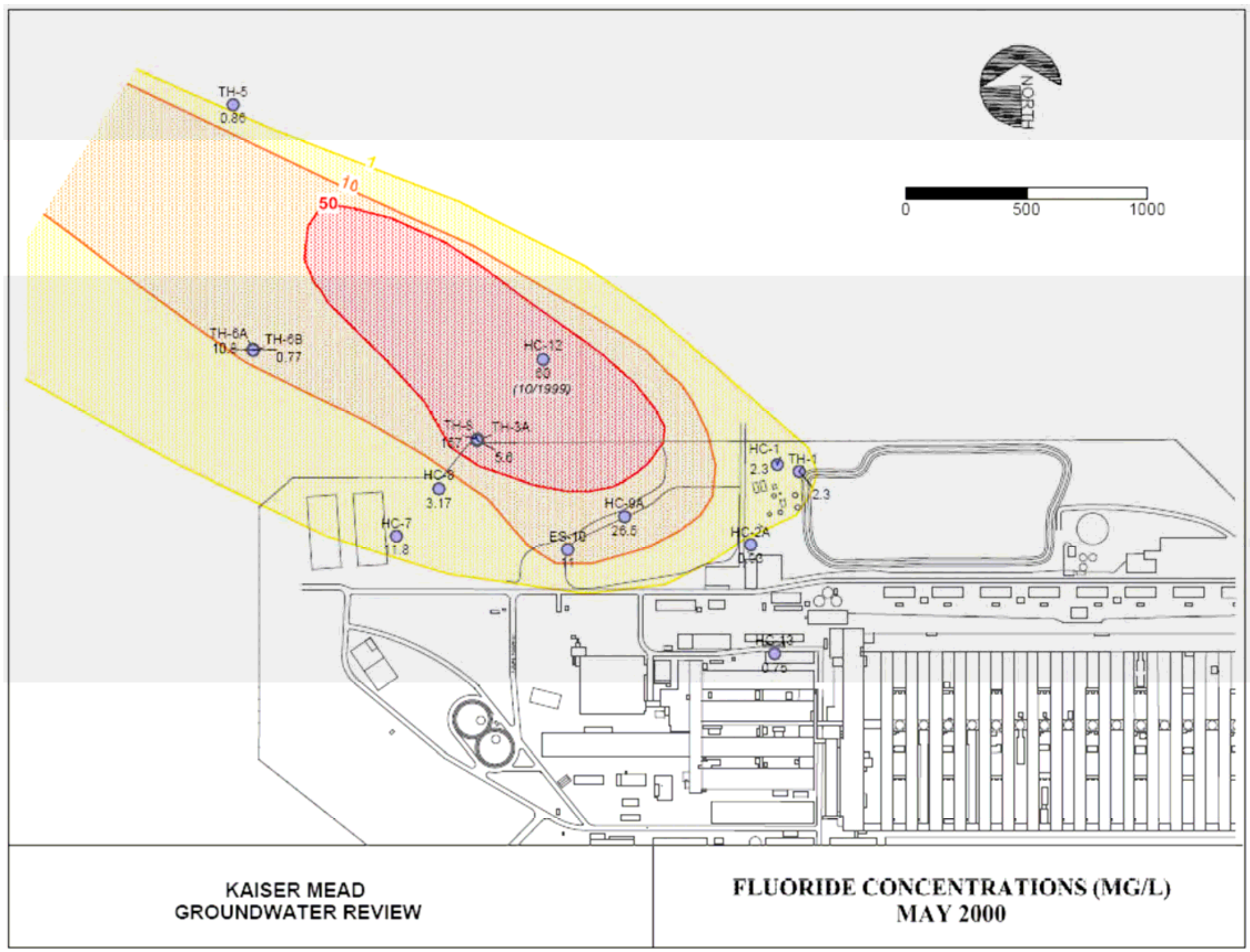
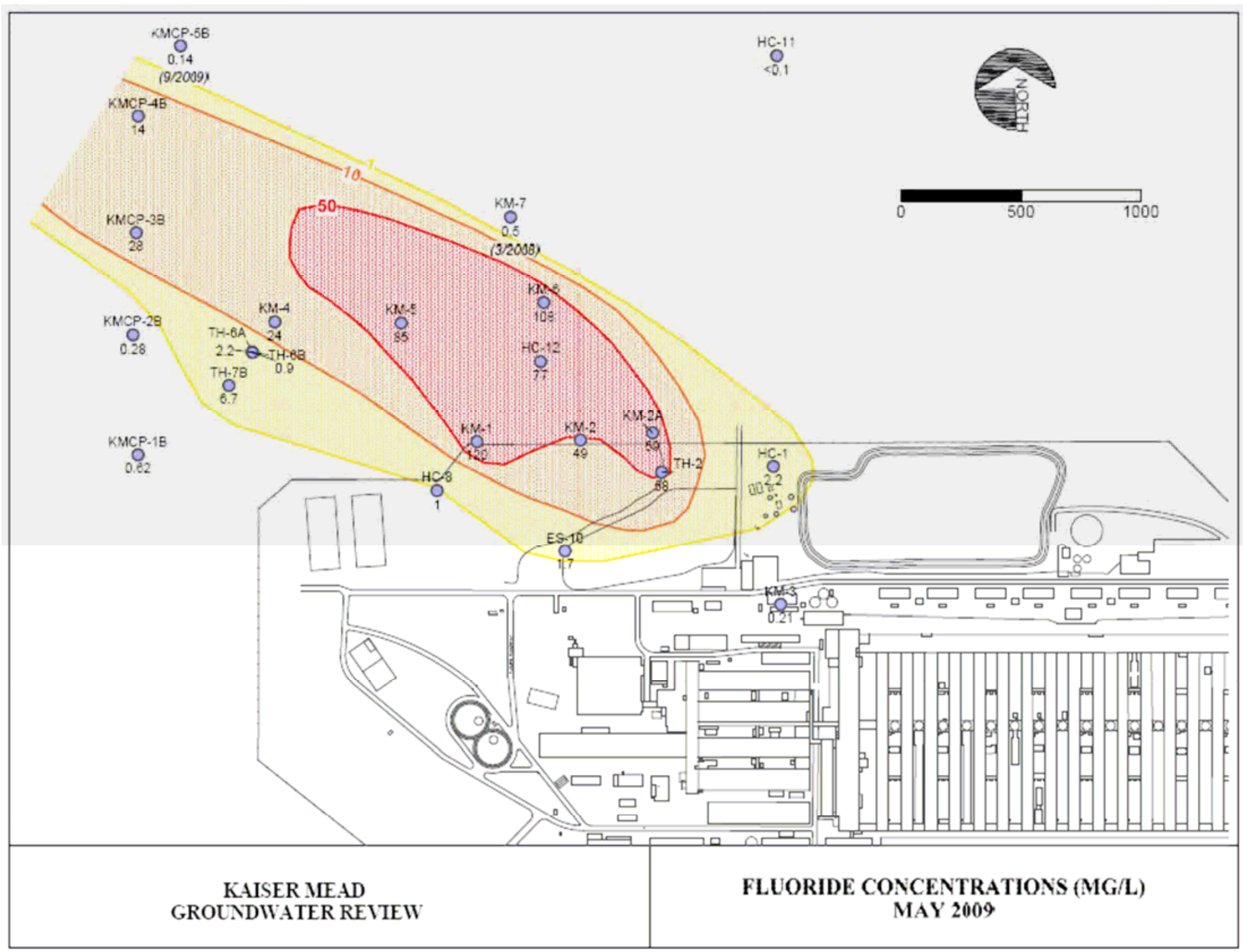
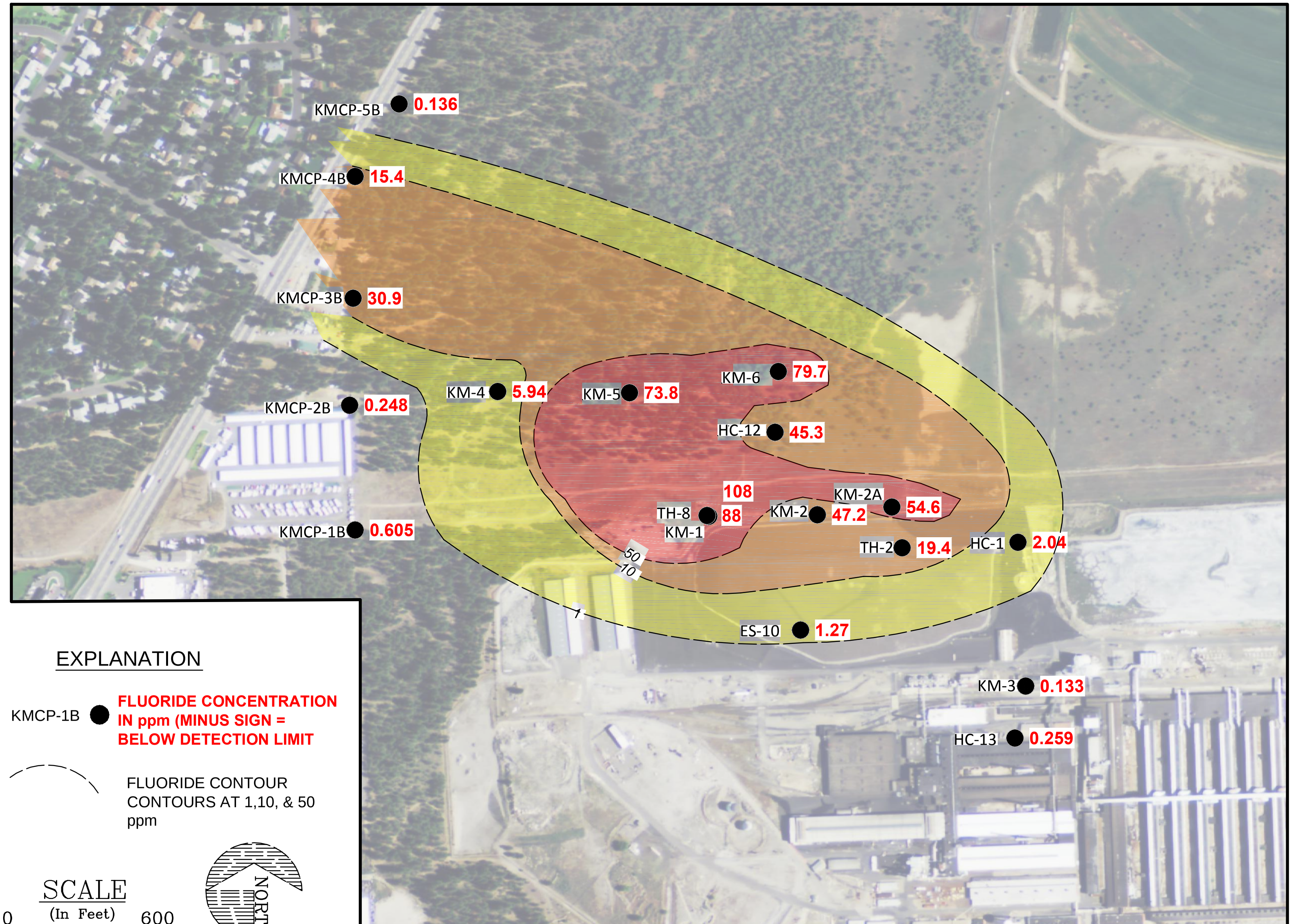


FIGURE 9. FLUORIDE CONCENTRATIONS (MG/L), MAY 2009





EXPLANATION

KMCP-1B ● FLUORIDE CONCENTRATION IN ppm (MINUS SIGN = BELOW DETECTION LIMIT

FLUORIDE CONTOUR CONTOURS AT 1,10, & 50 ppm

SCALE (In Feet) 0 600

NORTH

SOURCE EVALUATION
KAISER MEAD FACILITY
MEAD, WA

FLUORIDE CONCENTRATION
MARCH 2011
KAISER MEAD

FIGURE 10

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FL CONTOUR.dwg

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FIGURE 11. KAISER MEAD CYANIDE

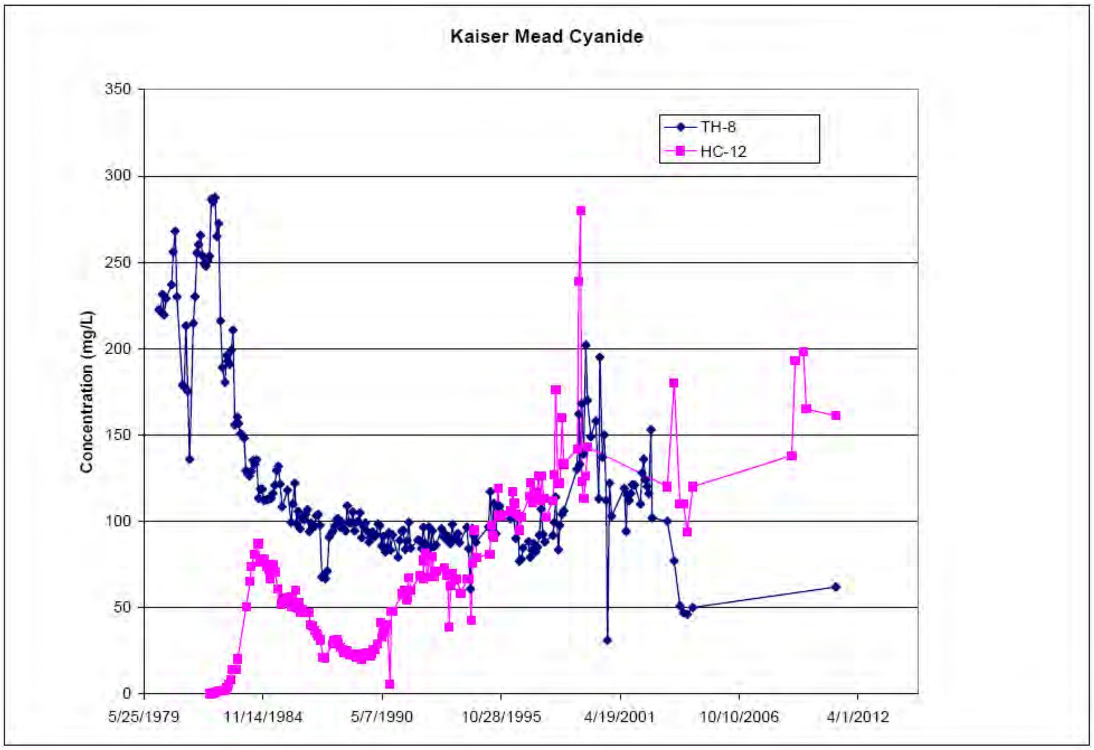
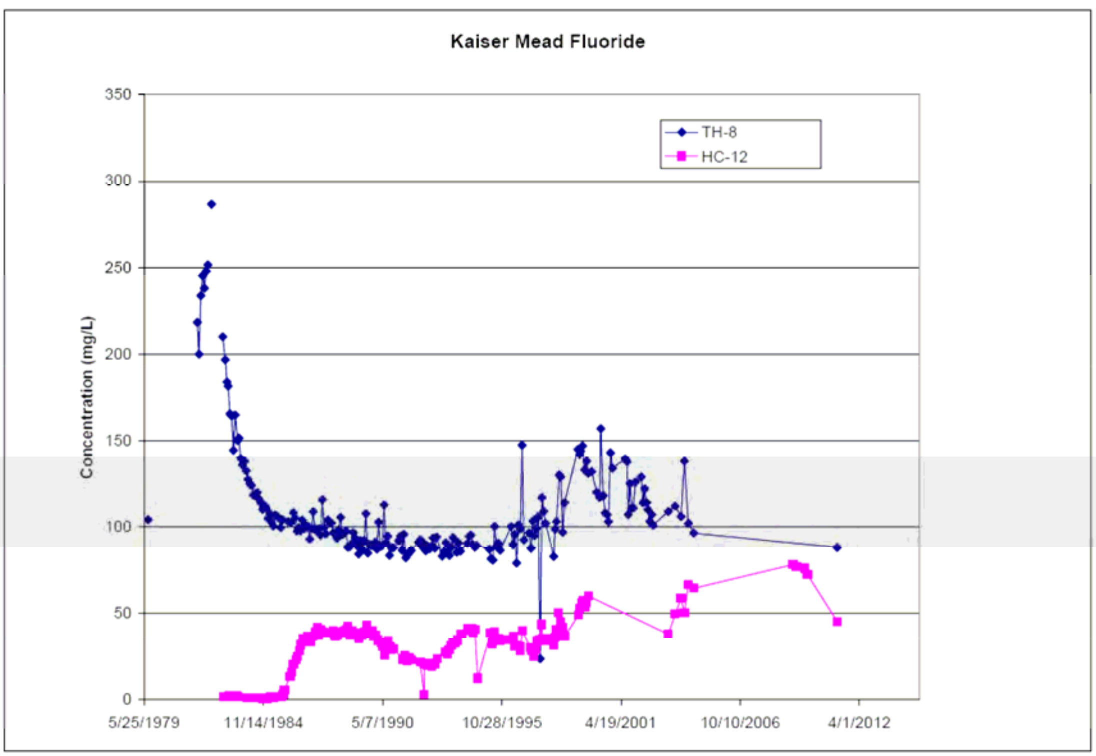


FIGURE 12. KAISER MEAD FLUORIDE



Spatial Variations in Chemical Concentrations in Groundwater

As shown on Figures 7 and 10 above, areas of highest cyanide and fluoride concentrations continue to be located north (downgradient) of the SPL repository and the contaminant plume continues to occupy a fairly narrow strip as it moves northwest toward compliance wells 3B and 4B.

Site-wide WAD cyanide concentrations are shown on Figure 13. One notable observation concerning WAD cyanide is the general lack of dilution/attenuation of WAD cyanide in contrast to what is observed for total cyanide. Total cyanide concentrations decrease by a factor of roughly 3 to 10 between high concentration wells (KM-6 and HC-12) and downgradient compliance wells 3B and 4B. In contrast, WAD cyanide concentrations are little changed during groundwater transport, remaining approximately 1 mg/L in the compliance wells and in the most highly contaminated wells.

Observations regarding site-wide variations in other chemical parameters are presented in the following Figures and discussion. Other chemical parameters confirm that:

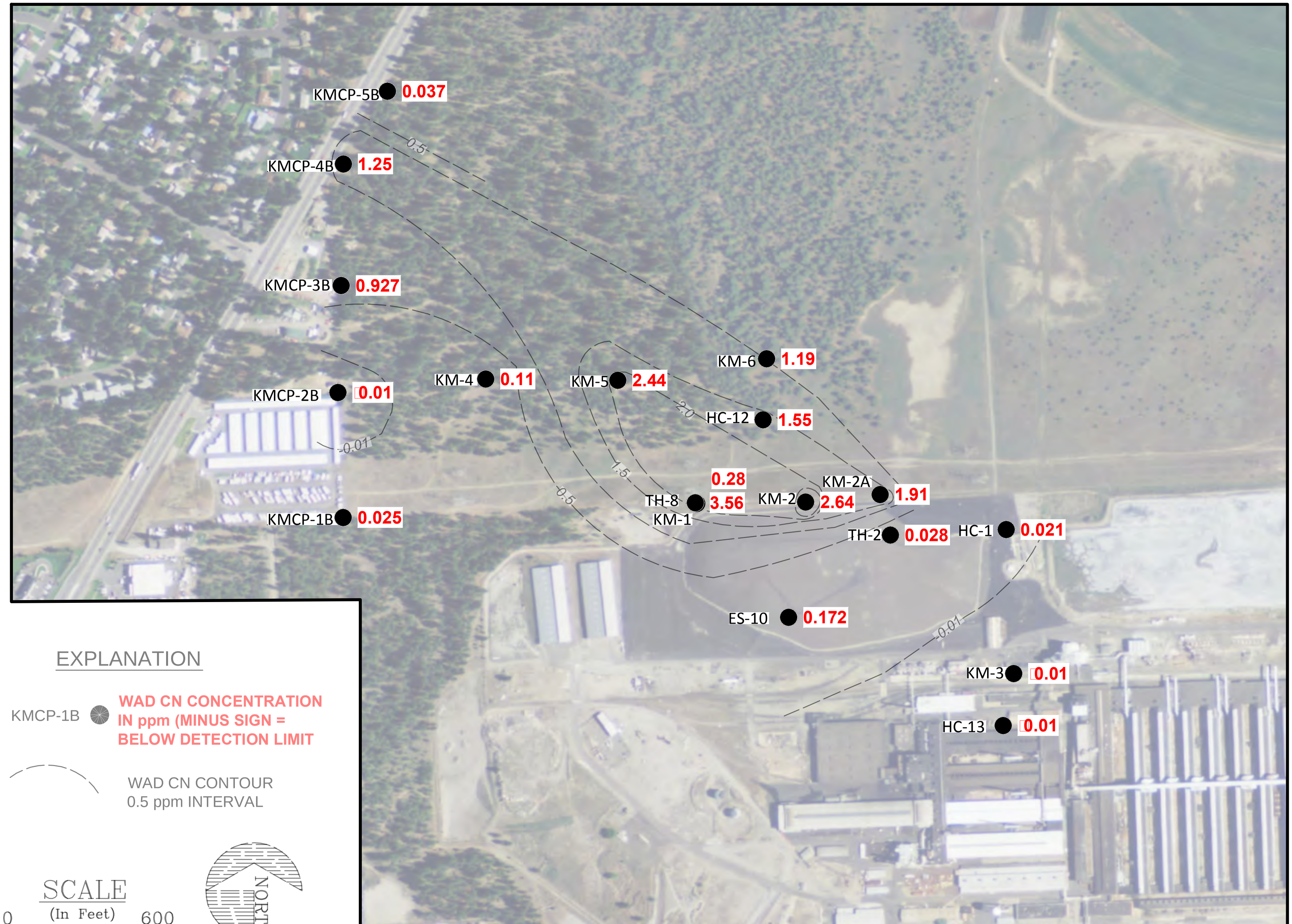
1. The area of highest effects from contaminant sources is located to the north of the SPL repository; and
2. The contaminant source is similar to spent pot liner leachate, with characteristics of:

    a. High cyanide;
    b. High sodium and fluoride (likely from cryolite);
    c. High pH and alkalinity;
    d. Low calcium; and
    e. High chloride and sulfate.

Site-wide sodium concentrations in groundwater are presented in Figure 14. Upgradient and background concentrations on the site range from 10 to 20 mg/L whereas sodium concentrations in the areas of highest cyanide and fluoride concentration range from approximately 1,400 to 2,600 mg/L.

Site-wide pH and alkalinity concentrations in groundwater are presented in Figures 15 and 16. Upgradient and background concentrations on the site range from pH of 8 to 8.3 and alkalinity of 150 to 350 mg/L. In contrast, pH is greater than 9 with alkalinity greater than 2,000 mg/L in the areas of highest cyanide and fluoride concentration.

Site-wide calcium concentrations in groundwater are presented in Figure 17. Upgradient and background concentrations on the site range from 25 to 55 mg/L whereas calcium concentrations in the areas of highest cyanide and fluoride concentration are generally less than 2 mg/L. As discussed in the February 2011 Status Report, the decrease in calcium concentrations in areas of high dissolved fluoride is likely due to precipitation of the mineral fluorite (CaF_2) upon mixing of calcium-bearing upgradient groundwater with the contaminant plume.



EXPLANATION

KMCP-1B — WAD CN CONCENTRATION IN ppm (MINUS SIGN = BELOW DETECTION LIMIT

WAD CN CONTOUR 0.5 ppm INTERVAL

SCALE (In Feet) 0 600

SOURCE EVALUATION KAISER MEAD FACILITY MEAD, WA	WAD CN CONCENTRATION MARCH 2011 KAISER MEAD	FIGURE 13

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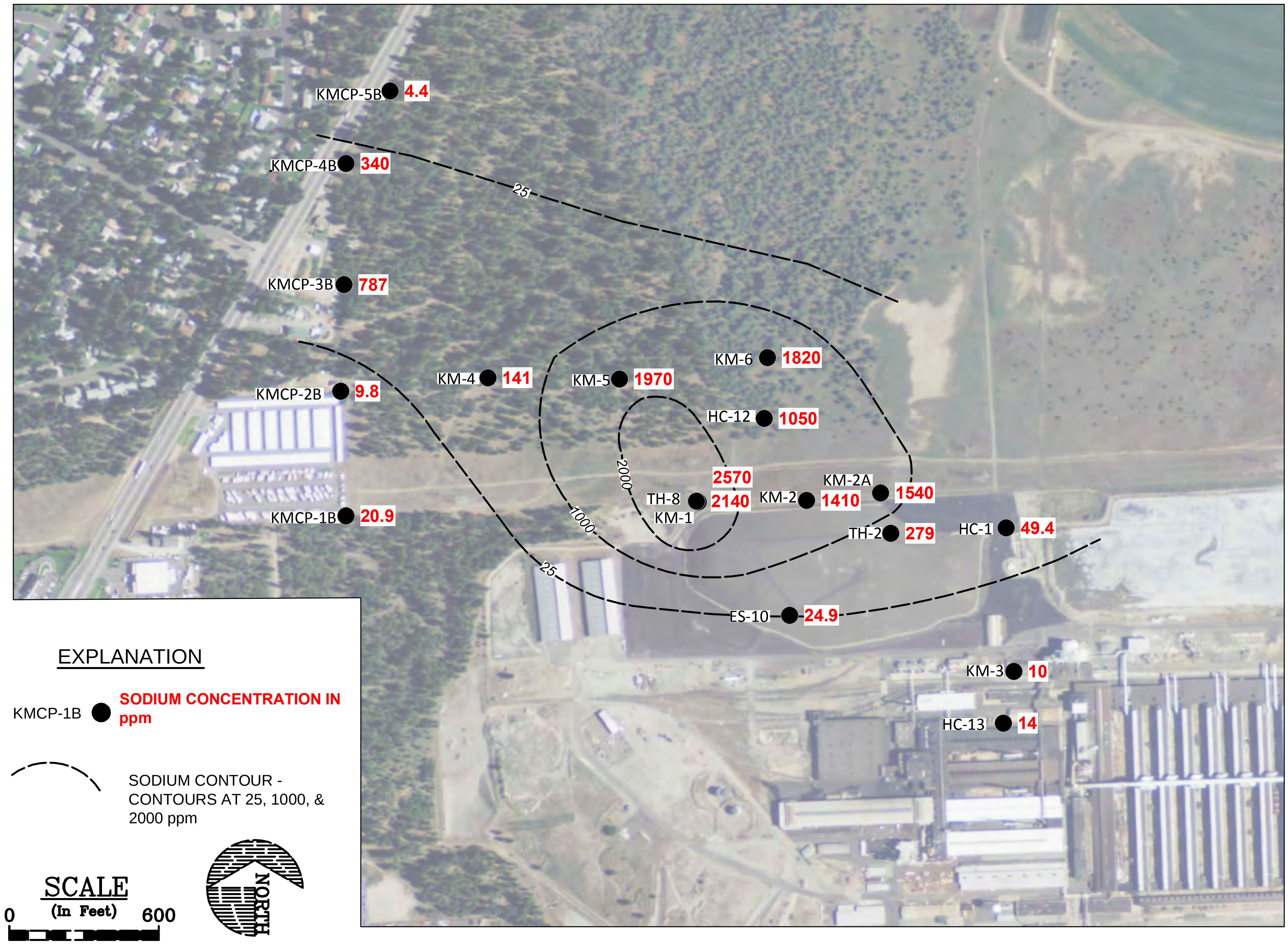

SOURCE EVALUATION
KAISER FACILITY
MEAD, WA

SODIUM CONCENTRATION
MARCH 2011
KAISER MEAD

FIGURE
14

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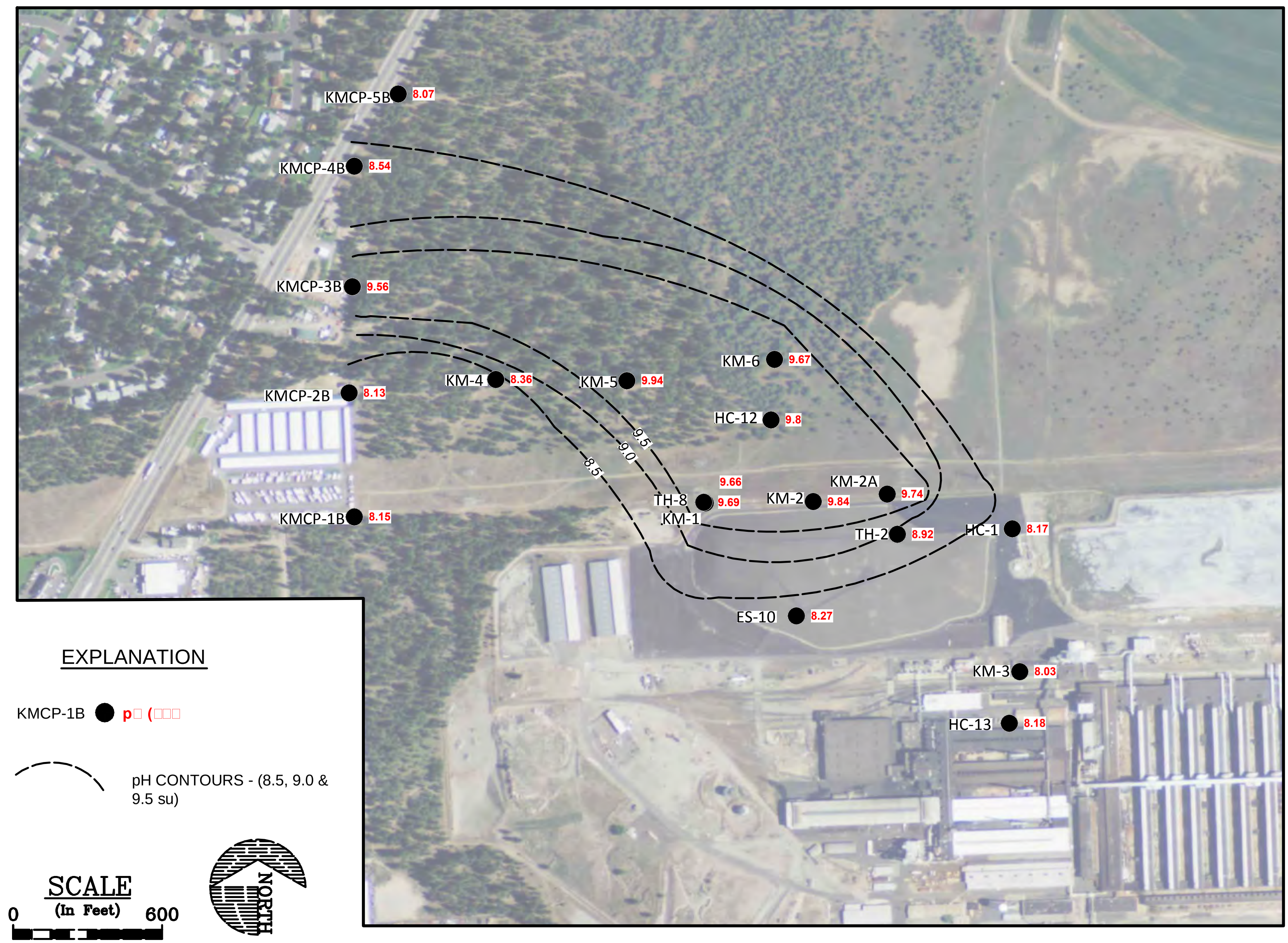

SOURCE EVALUATION
KAISER FACILITY
MEAD, WA

pH
MARCH 2011
KAISER MEAD

FIGURE
15

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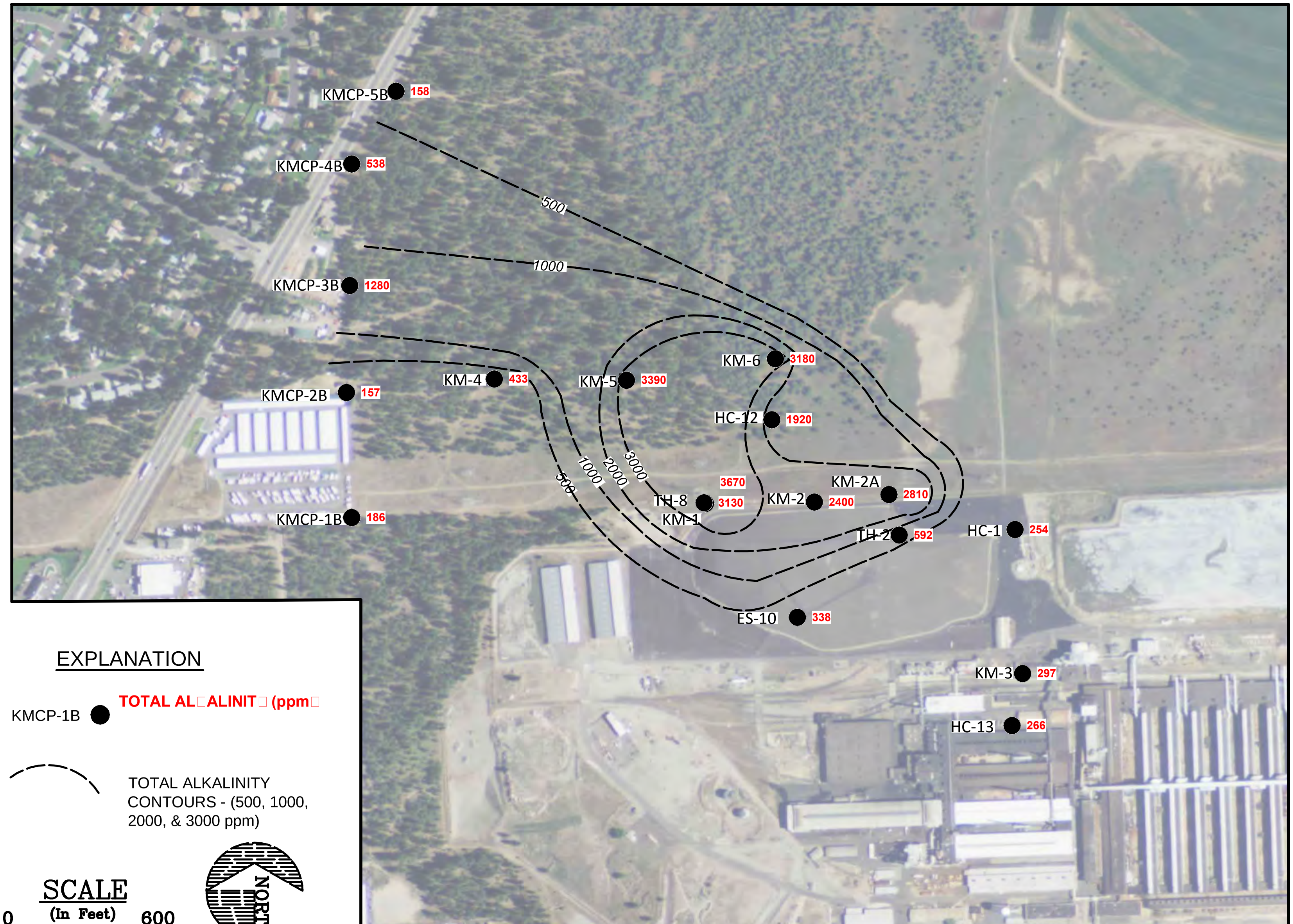

EXPLANATION

KMCP-1B ● TOTAL AL□ALINIT□ (ppm□

TOTAL ALKALINITY CONTOURS - (500, 1000, 2000, & 3000 ppm)

NORTH

SCALE (In Feet) 0 600

SOURCE EVALUATION
KAISER FACILITY
MEAD, WA

TOTAL ALKALINITY
MARCH 2011
KAISER MEAD

FIGURE 16

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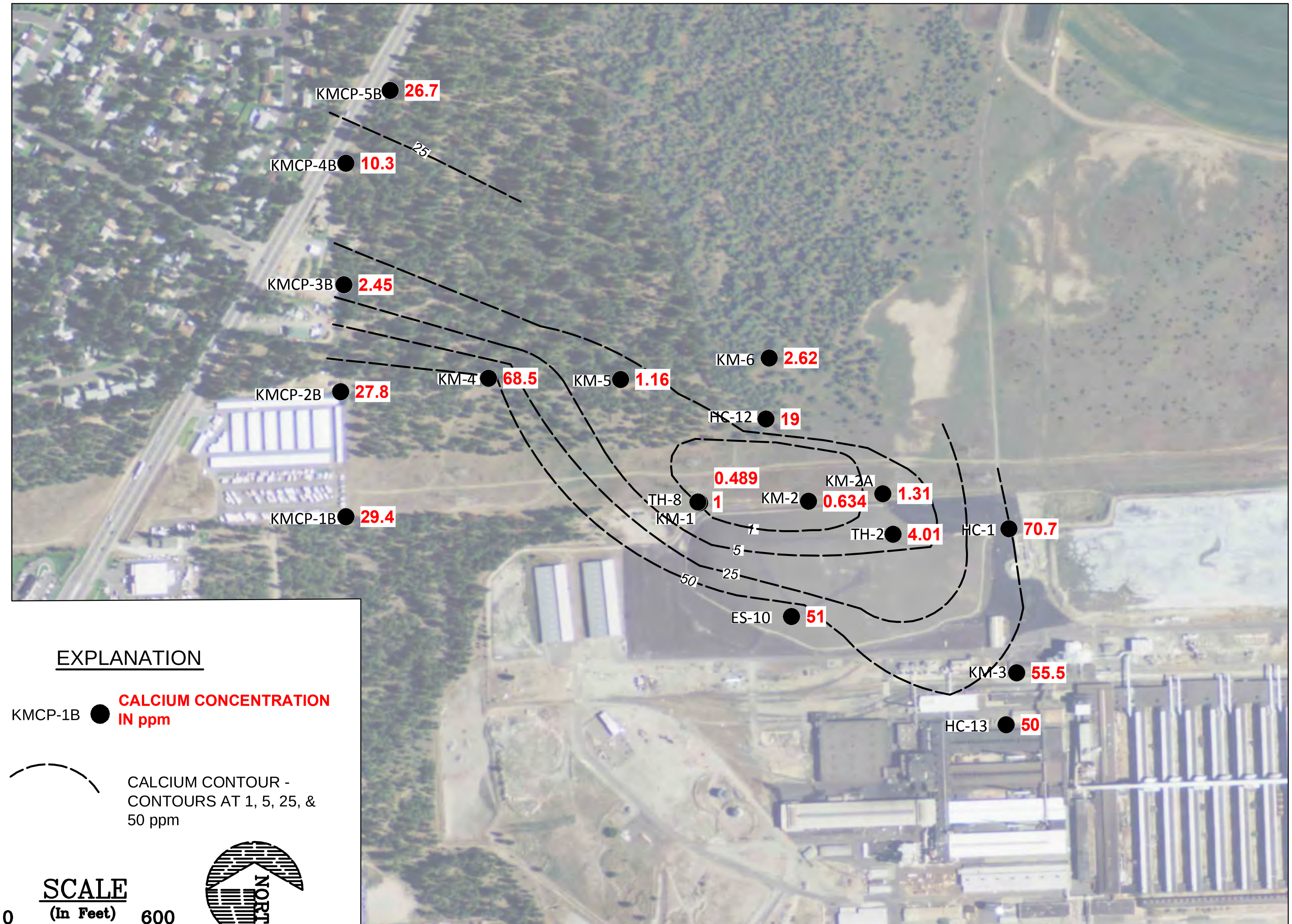
Consulting Scientists and Engineers



EXPLANATION

KMCP-1B ● CALCIUM CONCENTRATION IN ppm

CALCIUM CONTOUR - CONTOURS AT 1, 5, 25, & 50 ppm

SCALE (In Feet) 0 600

NORTH

SOURCE EVALUATION
KAISER FACILITY
MEAD, WA

CALCIUM CONCENTRATION
MARCH 2011
KAISER MEAD

FIGURE 17

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Site-wide chloride and sulfate concentrations in groundwater are presented in Figures 18 and 19. Upgradient and background chloride concentrations on the site range from <10 to 20 mg/L, whereas chloride concentrations in the areas of highest cyanide and fluoride concentration range from approximately 40 to 80 mg/L. Upgradient and background sulfate concentrations on the site range from 20 to 50 mg/L, whereas sulfate concentrations in the areas of highest cyanide and fluoride concentration range from approximately 200 to >1,300 mg/L.

References

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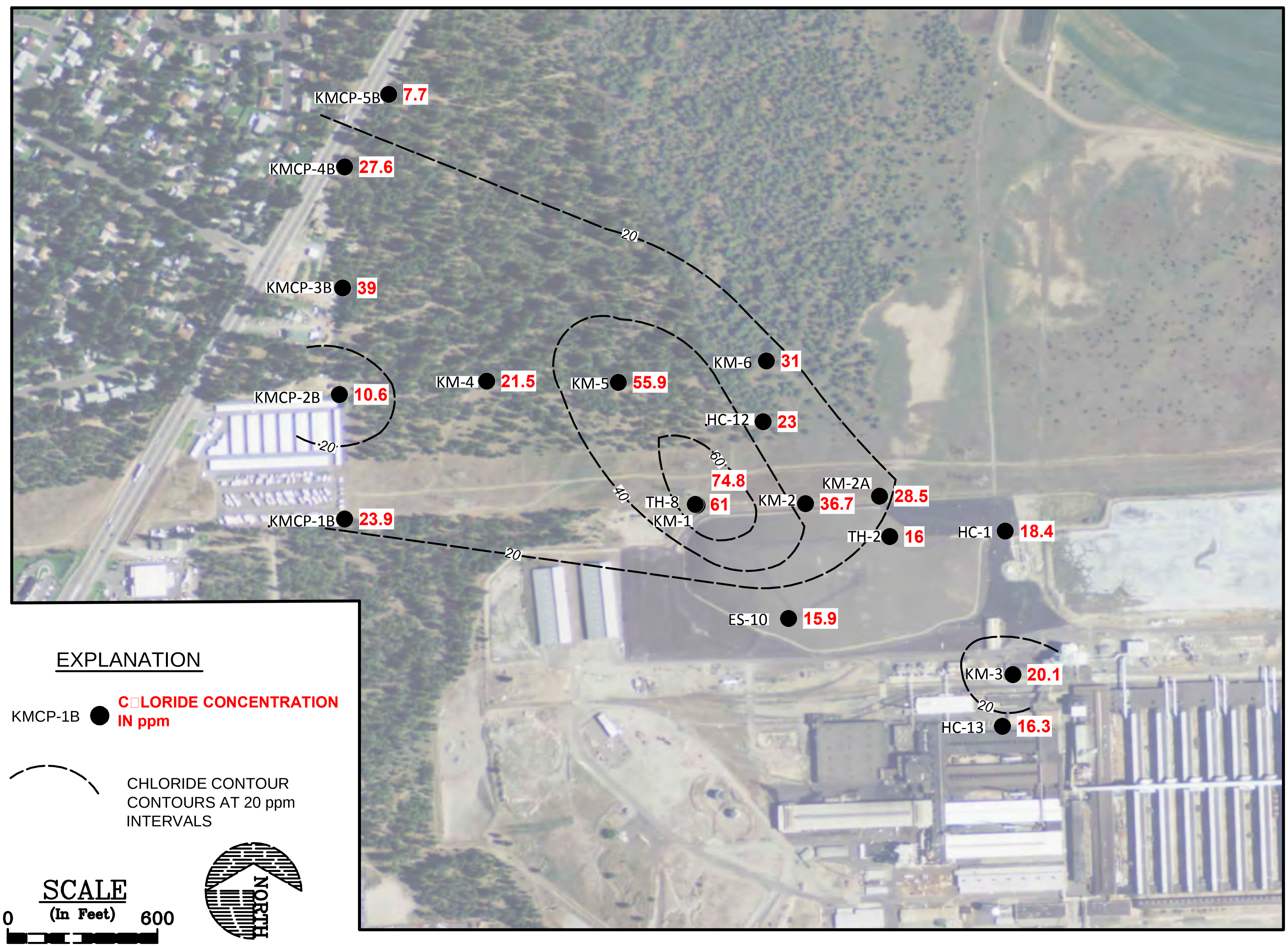

SOURCE EVALUATION
KAISER FACILITY
MEAD, WA

CHLORIDE CONCENTRATION
MARCH 2011
KAISER MEAD

FIGURE
18

UPDATE TIME: 4:53PM
JOHLAMSO\062211\F:\DATA\KAISER\
CHLORIDE_SM.dwg

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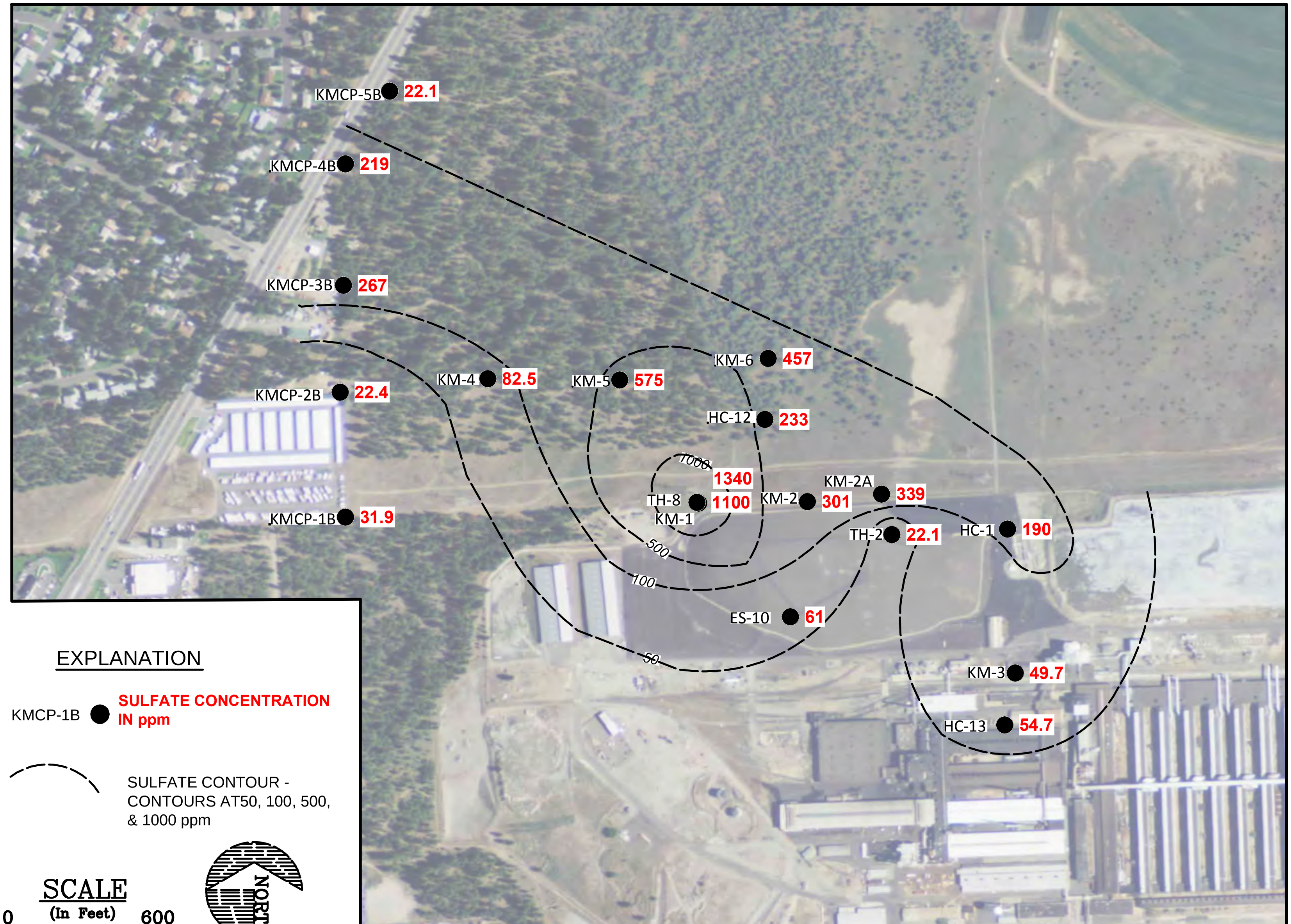

EXPLANATION

KMCP-1B ● **SULFATE CONCENTRATION IN ppm**

SULFATE CONTOUR - CONTOURS AT50, 100, 500, & 1000 ppm

SCALE (In Feet) 0 600

NORTH

SOURCE EVALUATION
KAISER FACILITY
MEAD, WA

SULFATE CONCENTRATION
MARCH 2011
KAISER MEAD

FIGURE 19

UPDATE TIME: 5:01PM
JOHLAMSO\062211\F:\DATA\KAISER\ SULFATE_SM.dwg

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APPENDIX D

PNEUMATIC SLUG TEST RESULTS FOR THE KAISER MEAD FACILITY

PNEUMATIC SLUG TEST RESULTS FOR THE KAISER MEAD FACILITY SPOKANE, WASHINGTON

Prepared for:

Mead Custodial Trust
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Prepared by:

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Helena, MT 59601

June 2011

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PNEUMATIC SLUG TEST RESULTS FOR
THE KAISER MEAD FACILITY
SPOKANE, WASHINGTON

1.0 INTRODUCTION

Aquifer test data for the Kaiser Mead site are very limited and additional testing is needed to more clearly define contaminant transport conditions on the site and assess the effectiveness of remedial options. Hydrometrics conducted a series of pneumatic slug tests on selected monitoring wells on April 27 and April 28, 2011 to provide additional information on the hydrologic characteristics of groundwater system at the site. The tests showed hydraulic conductivites ranging from 0.5 ft/day to 297 ft/day. This report describes the test methodology, slug test results and the corresponding aquifer characteristics determined from the testing.

1.1 BACKGROUND

A mixed glacial outwash package of fine to coarse sands with minor gravel, and thin intervening layers of silt and clay underlie the Kaiser Mead site. In the lower portion of this sequence the sediments become coarser-grained and contain gravel, cobbles and boulders. The glacial outwash sequence is approximately 285 feet thick in the vicinity of the site and underlain by a regional aquitard.

Previous investigators have divided the aquifer stratigraphy into three zones for purposes of defining contaminant transport at the site. The uppermost zone, Zone A, is composed of fine to coarse and/or medium to coarse sand. Zone A is approximately 10 to 20 feet thick and underlain by a silt and clay layer that is laterally discontinuous to the west. Zone B consists of fine sand, fine to medium sand, and/or medium to coarse sand, sometimes silty or with silt layers (MFG, 2000). The thickness of Zone B reported in boring logs ranges from 6 to 20 feet and is underlain by a silt/clay layer. Zone C consists of fine to medium sands or fine to coarse sands with some gravel. Sediments in the lower half of Zone C are cleaner and coarser-grained containing coarse sand and fine to coarse gravel with boulders. Zone C is up to 100 feet thick, however, the monitoring wells on the site typically only penetrate 10 to 25 feet into Zone C.

Two short-term pumping tests were previously conducted on Zone A wells (ES-9 and ES-10) by Hart Crowser (1989). Separate 3-hour and 24-hour pumping tests were also conducted on another Zone A well (KM-1) by McCulley, Frick and Gilman, resulting in hydraulic conductivity (K) estimates ranging from approximately 250 to 650 ft/day (MFG, 2000). The upper range is high for the mixed sand units described in the well logs; typical values for well sorted sand/glacial outwash range from 3 to 300 ft/day (Fetter, 2001). High estimates may sometimes result when pumping rates are too low (Hart Crower -12 gpm; MFG 16 to 28 gpm) to adequately stress the aquifer, resulting in low drawdown and artificially high K estimates.

No testing has been conducted to quantify the aquifer characteristics in either Zone B or Zone C in the areas where remedial measures have been implemented to address elevated cyanide and fluoride in groundwater. Drawdown measurements have been taken at an upgradient production well completed in the lower portion of the Zone C with reported specific capacity values corresponding to a K range of 250 to 1,250 ft/day (MFG, 2000). This hydraulic conductivity range likely overestimates the permeability of the upper portion of Zone C where compliance wells are completed. Zone B and Zone C appear to have similar grain size characteristics to Zone A in plant site monitoring wells and therefore may have similar hydrologic characteristics.

2.0 PNEUMATIC SLUG TESTING

Hydrometrics conducted slug tests on selected Zone A, Zone B and Zone C wells to further assess the representative range of hydraulic conductivities that are present in these units. Conventional slug tests were not feasible at this site due to the well depths, the small diameter of most of the wells and the high permeabilities, which require minimal “test noise” to produce meaningful results. These limitations were overcome with pneumatic slug tests, which use air pressure rather than a downhole instrument to produce water level changes. Pneumatic slug tests, however, can only be conducted on wells where water levels are above the top of the well screen.

Well construction and water level data were reviewed to identify existing wells with suitable well construction and water level depths.

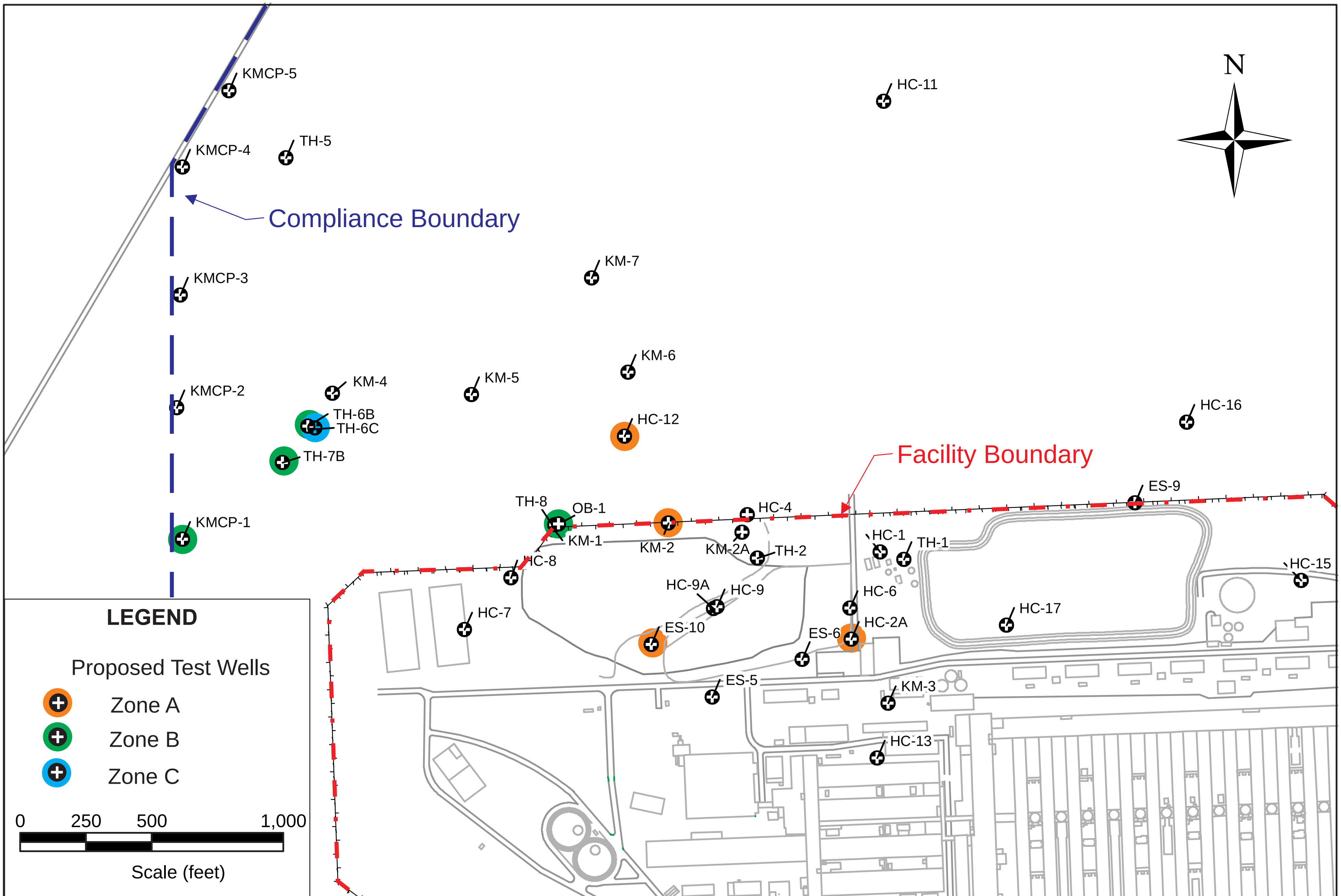
The following wells were identified as potentially suitable for testing and are highlighted in Figure 1:

Zone A wells: HC-2A, HC-12, ES-10, TH-7A, KM-2;
Zone B wells: TH-6B, TH-7B, OB-1, KMCP-1B; and
Zone C well: TH-6C.

2.1 SLUG TEST METHODOLOGY

A pneumatic slug test uses air pressure to depress the water in a well and then instantaneously releases the air at which time the water level recovers at a rate that is equivalent to the hydraulic conductivity of the aquifer. The recovery of the water level is monitored to determine the hydraulic conductivity of the aquifer in the vicinity of the well. Below is a summary of the procedures used to conduct pneumatic slug testing at the Kaiser Mead Facility.

1. The static water level was measured and compared to the screened interval to determine the amount of water above the well screen.



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Pneumatic Slug Test Results
Kaiser Mead Facility
Spokane WA

LOCATIONS OF WELLS IDENTIFIED AS SUITABLE FOR PNEUMATIC SLUG TESTING

FIGURE 1

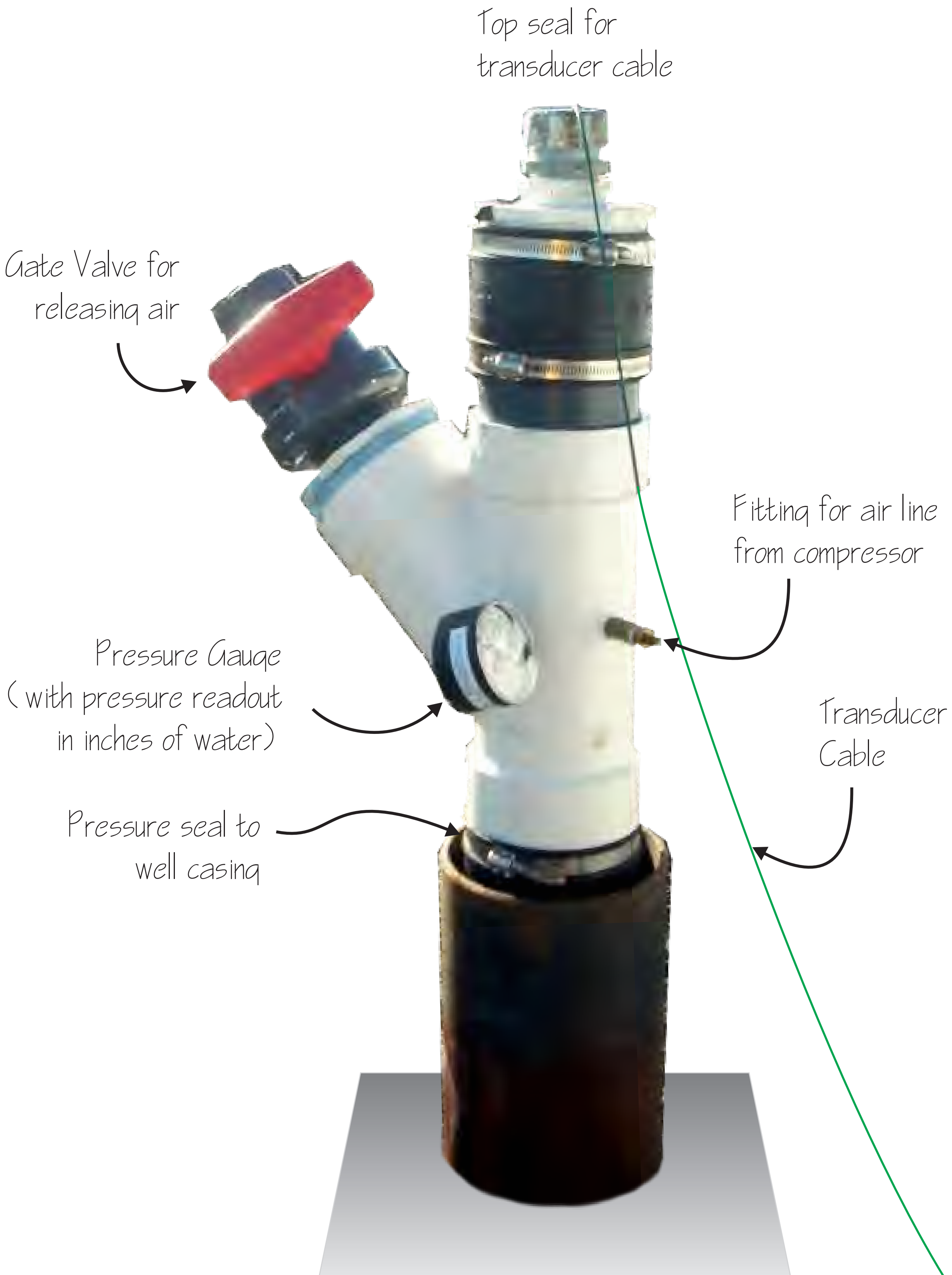
K:\PROJECT\9088\Slug Test\Fig1 Test Wells.cdr

2. A pneumatic slug test apparatus (Figure 2) was used to seal the well and control the pressure in the well throughout the test.
3. The well was instrumented with a pressure transducer set at a depth below the proposed water level displacement; the transducer cable was sealed with a rubber gasket where it passed through the pneumatic slug test apparatus.
4. The transducer was set to record water levels at a 0.5 second interval prior to pressurizing the well.
5. The well was then pressurized using a compressor, which forced the water level downward in the well.
6. The pressure applied to the well was monitored using a pressure gauge that displayed the pressure placed on the wellhead in inches of water.
7. The water level was allowed to stabilize at an elevation above the top of the well screen so that the injected air would not escape from the well via the screen.
8. Once the pressure applied to the well and the transducer readings were stable, the air was then released from the well through a 4-inch diameter gate valve resulting in an instantaneous change in pressure in the well.
9. The water level recovery was recorded with a Solinst-Levelogger pressure transducer.

Multiple tests were typically conducted at each well to ensure reproducible results. The water level was allowed to fully recover prior to conducting the next test.

2.2 SLUG TEST RESULTS

Slug tests were successfully conducted on all but two of the wells identified for testing. Well TH-7B would not hold air pressure and likely has a leak in one of the casing joints that prevents pneumatic testing. Well TH-6B had an obstruction in the casing at a depth of about 30 feet that we believe is sample tubing from an old bladder pump, and may also have a bailer down the hole, that prevented us from setting a transducer in the well for testing. The remaining wells were all successfully tested. Drawdown graphs for each test are shown in Attachment 1.



Pneumatic Slug Test Results for Kaiser Med Facility	**PNEUMATIC SLUG TEST APPARATUS**	**FIGURE** **2**

K:/project/9088/Slug Apparatus.cdr

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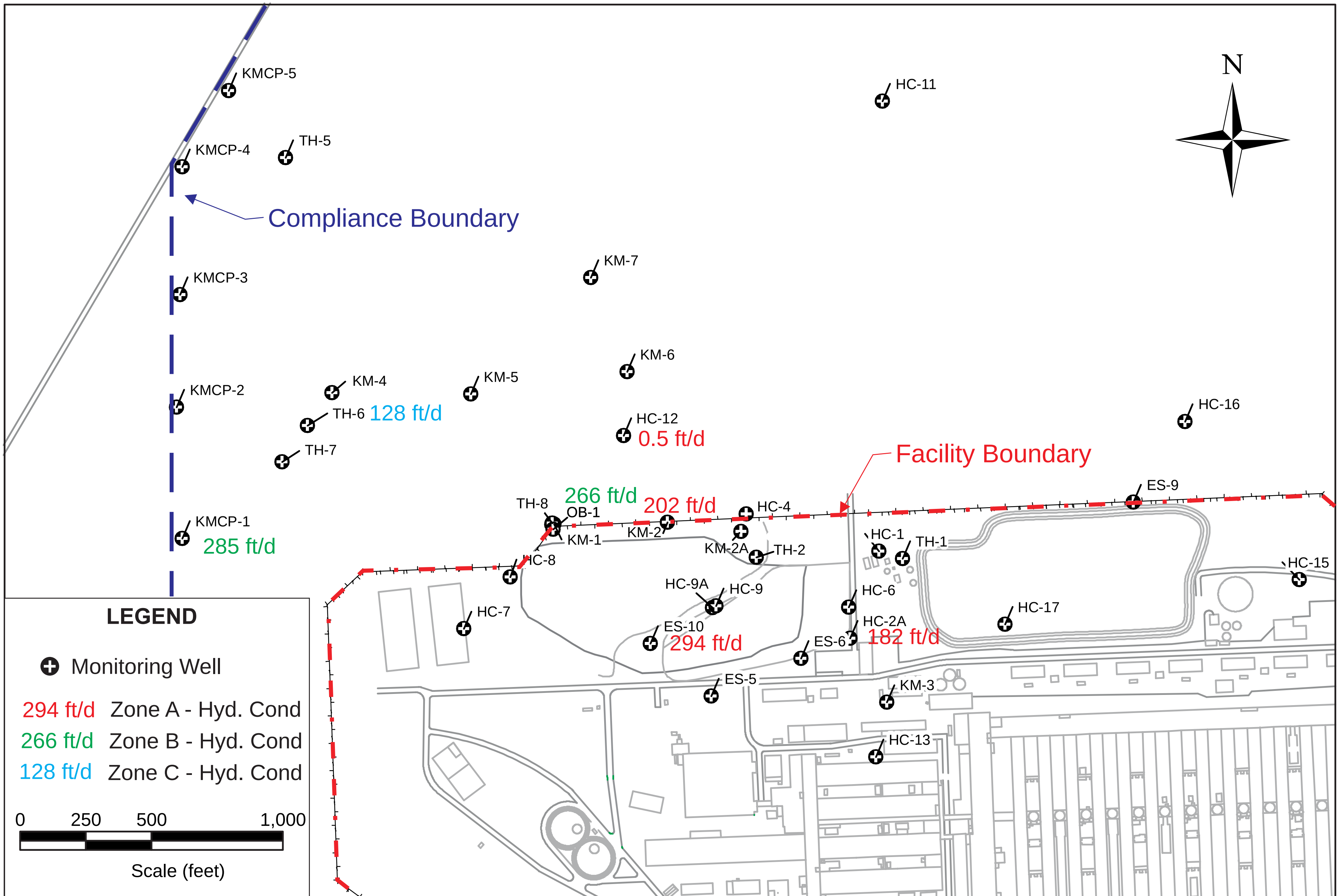
Slug test drawdown data were analyzed using AQTESOLV (v4.50) to calculate aquifer hydraulic conductivity values based on the Bouwer and Rice Method (1976) for damped water level responses. Under damped responses were calculated using the Springer and Gelhar Method (1991) method for wells completed in the unconfined Zone A-aquifer or the Butler (1998) method for wells completed in the confined Zone B and Zone C aquifers. The lowest K value (0.5 ft/day) was at monitoring well HC-12 in the Zone A aquifer, while other Zone A wells ranged from 182 to 294 ft/day. The two Zone B wells tested yielded average K values of 202 and 285 ft/day, while the one Zone C well tested had an average K of 128 feet/day. The curve matching results for the slug tests are shown on the drawdown graphs in Attachment 1 and resultant hydraulic conductivity values are summarized in Table 1. The average values for each test site are shown on a site map on Figure 3.

TABLE 1. AQUIFER TEST HYDRAULIC CONDUCTIVITY RESULTS

Site	Aquifer	Analyses Method	Hydraulic Conductivity (ft/day)	
			Range	Average
ES-10	Zone A	Bouwer-Rice (1976)	289-298	294
HC-2A	Zone A	Springer-Gelhar (1991)	168 – 195	182
HC-12	Zone A	Bouwer-Rice (1976)	0.5	0.5
KM-2	Zone A	Springer-Gelhar (1991)	201-202	202
KMCP-1B	Zone B	Butler (1998)	283-287	285
OB-1	Zone B	Butler (1998)	261-271	266
TH-6C	Zone C	Butler (1998)	125-131	128



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Pneumatic Slug Test Results
Kaiser Mead Facility
Spokane WA

HYDRAULIC CONDUCTIVITY RESULTS

FIGURE

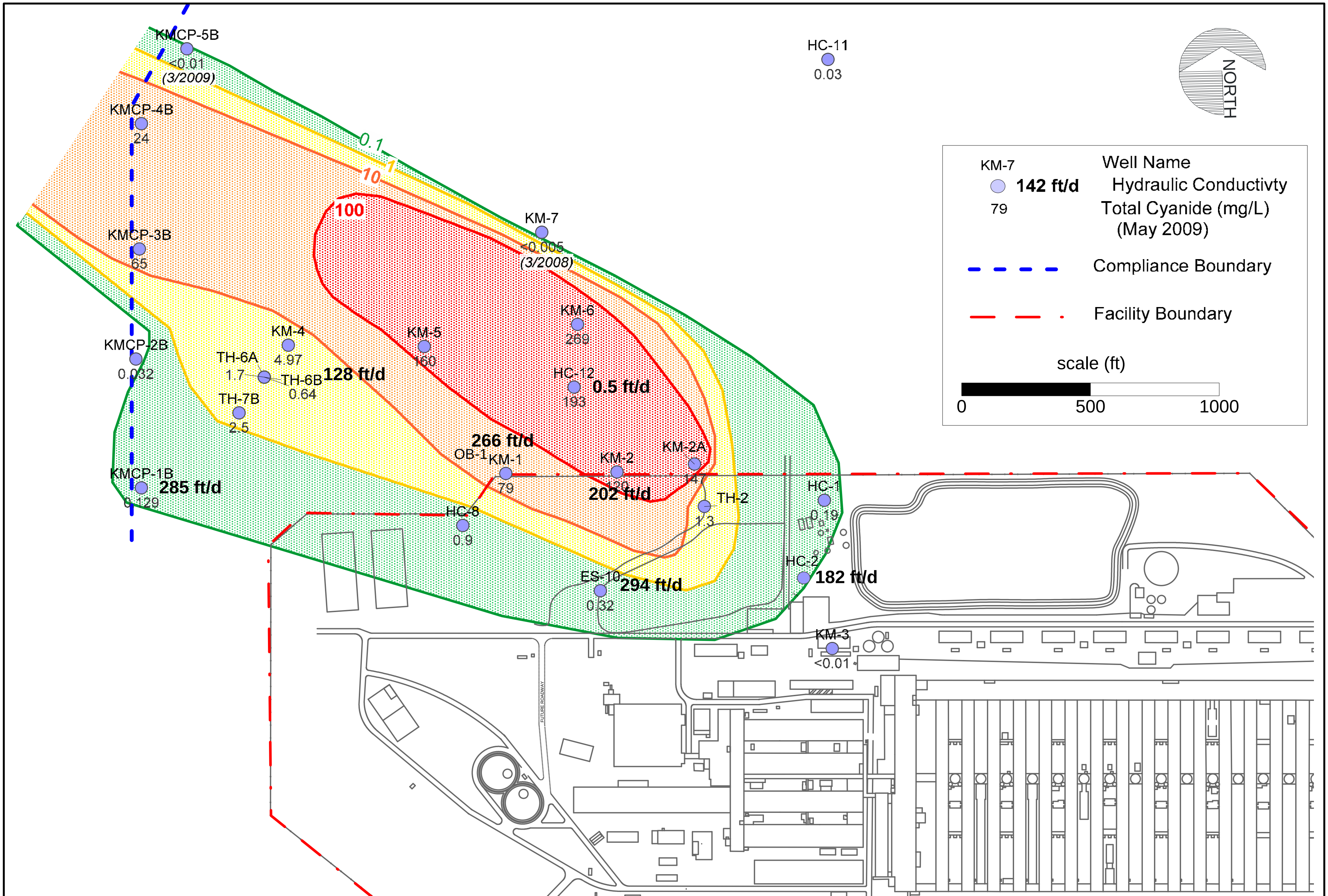
3

K:\PROJECT\9088\Slug Test\Fig3 Hydr Cond Map.cdr

3.0 DISCUSSION OF FINDINGS AND RECOMMENDATIONS

The slug test results show K values ranging from 124 to 298 ft/day with only one lower permeability well (HC-12) showing a K of 0.5 ft/day. The K values suggest most of the wells are completed in relatively well-sorted medium to coarse-grained sand. The K value for Well HC-12 is characteristic of fine sand, however, the well screen in this well is only 2 feet long and could easily be impacted by sedimentation in the well, so it is difficult to interpret the significance of the lower K results at this site. It is nevertheless interesting to note that well HC-12 with the lowest K is one of the wells with the highest total cyanide concentrations (Figure 4). There is not sufficient information, however to establish whether there is a real relationship between hydraulic conductivity and cyanide concentrations on the site. Slug tests are only reflective of the area immediately surrounding the well and cannot be assumed to represent large areas. In addition, most of the wells tested are south of the highest concentrations of cyanide and fluoride. The results do narrow the previously inferred hydraulic conductivity range and are more consistent with established ranges for glacial outwash sediments.

Additional testing may still be warranted in Zone A in the central plume area and in Zone B near the compliance point, since there are no test data in these areas and any further evaluation of corrective measures will focus on areas where there is little or no test data. It may be possible to modify the pneumatic slug test apparatus to apply a vacuum to the well, which would allow us to test several additional Zone B wells that currently have insufficient water over the screens for pressure testing. More definitive results would ultimately require conducting pumping tests. If a more detailed assessment of corrective measures is required we recommend installing two 6-to 8-inch diameter wells in the areas described above and conducting additional pumping tests at higher discharge rates than previous tests. If these wells were installed using rotosonic drilling methods, detailed soils data could be collected to correlate with pumping test results while providing soils geochemistry data in the plume area.



PNEUMATIC SLUG TEST RESULTS FOR THE KAISER MEAD FACILITY	**HYDRAULIC CONDUCTIVITY TEST LOCATIONS AND RESULTS RELATIVE TO CYANIDE PLUME**	**FIGURE** 4

k:/project/9088/slug test/Fig4 K vs Cn.srf

4.0 REFERENCES

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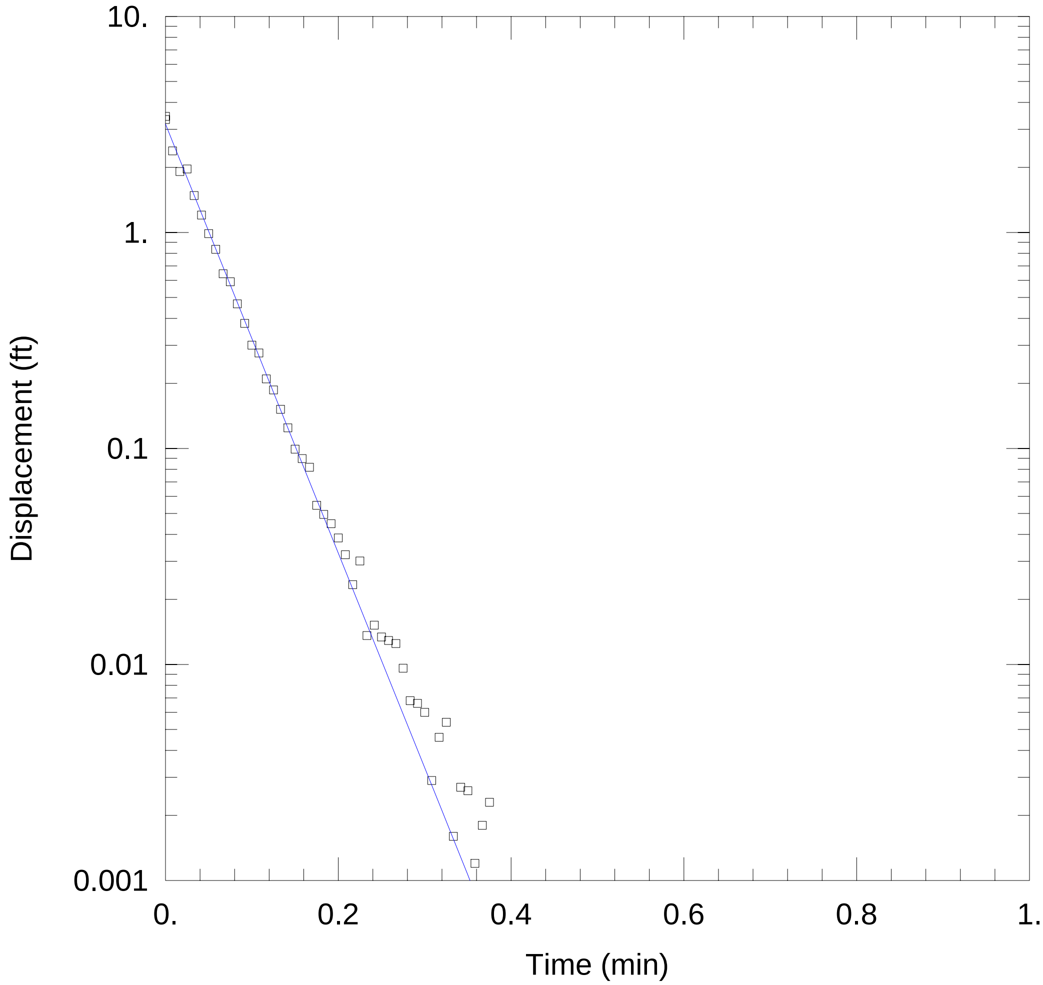
ATTACHMENT 1

DRAWDOWN GRAPHS



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\ES-10-1.aqt
Date: 06/22/11 Time: 13:57:36

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

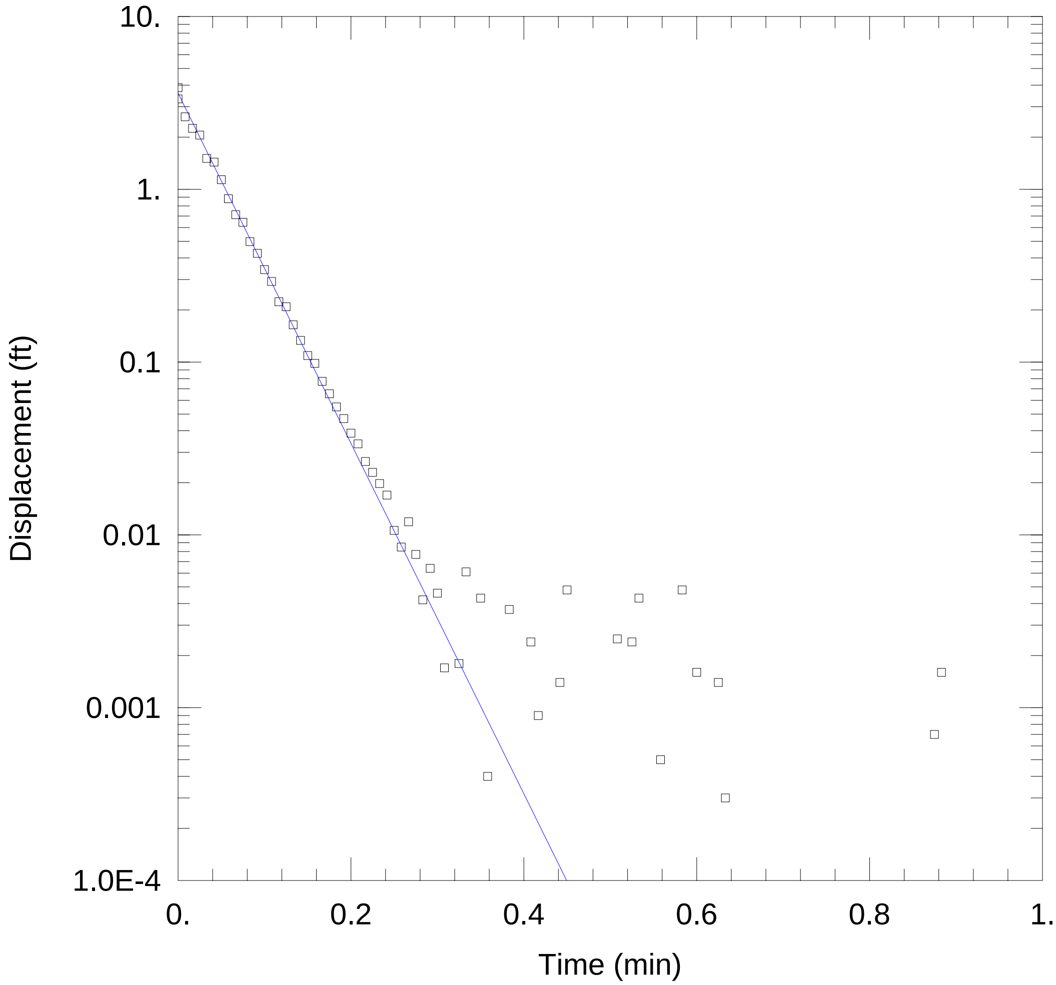
WELL DATA (ES-10)

Initial Displacement: 3.33 ft Static Water Column Height: 12. ft
Total Well Penetration Depth: 13. ft Screen Length: 5. ft
Casing Radius: 0.167 ft Well Radius: 0.167 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 288.6 ft/day y0 = 3.173 ft



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AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

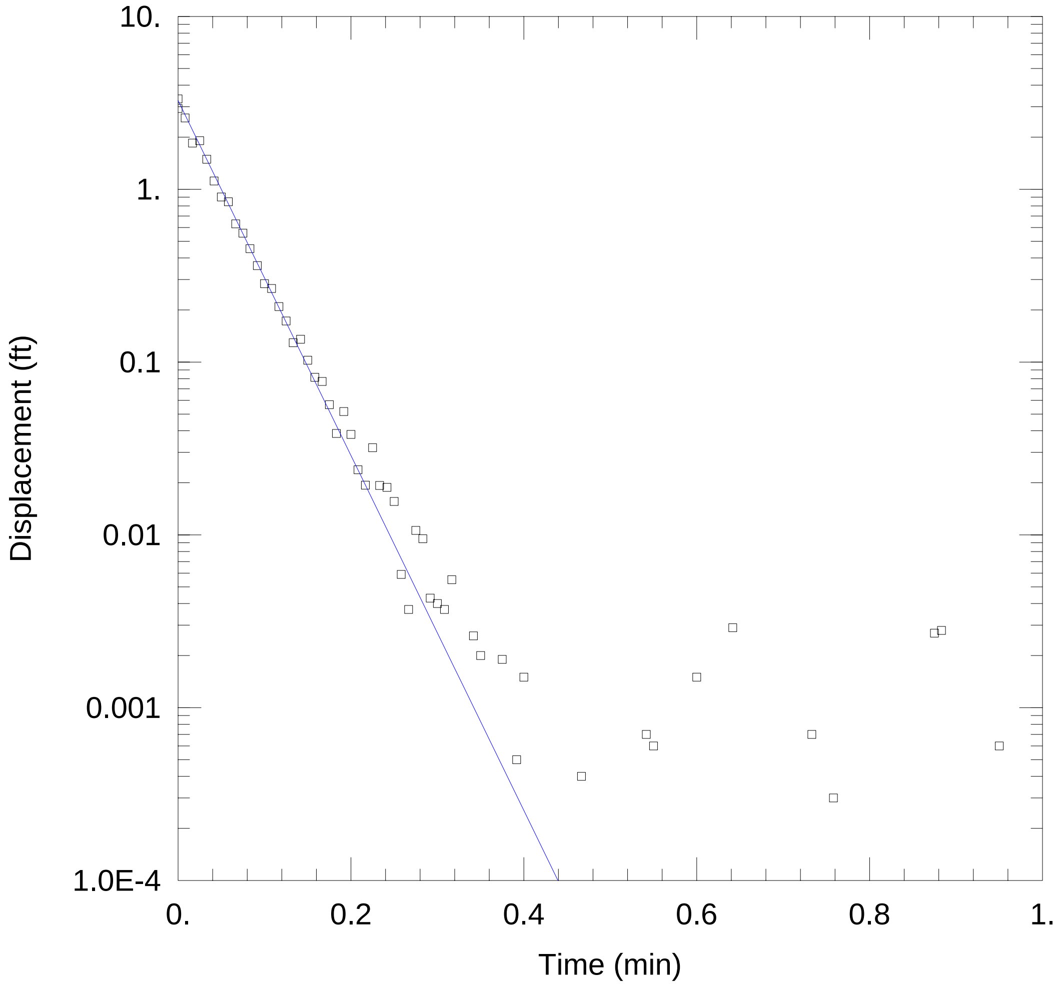
WELL DATA (ES-10)

Initial Displacement: 3.33 ft Static Water Column Height: 12. ft
Total Well Penetration Depth: 13. ft Screen Length: 5. ft
Casing Radius: 0.167 ft Well Radius: 0.167 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 294.4 ft/day y0 = 3.596 ft



WELL TEST ANALYSIS

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Date: 06/22/11 Time: 13:57:11

AQUIFER DATA

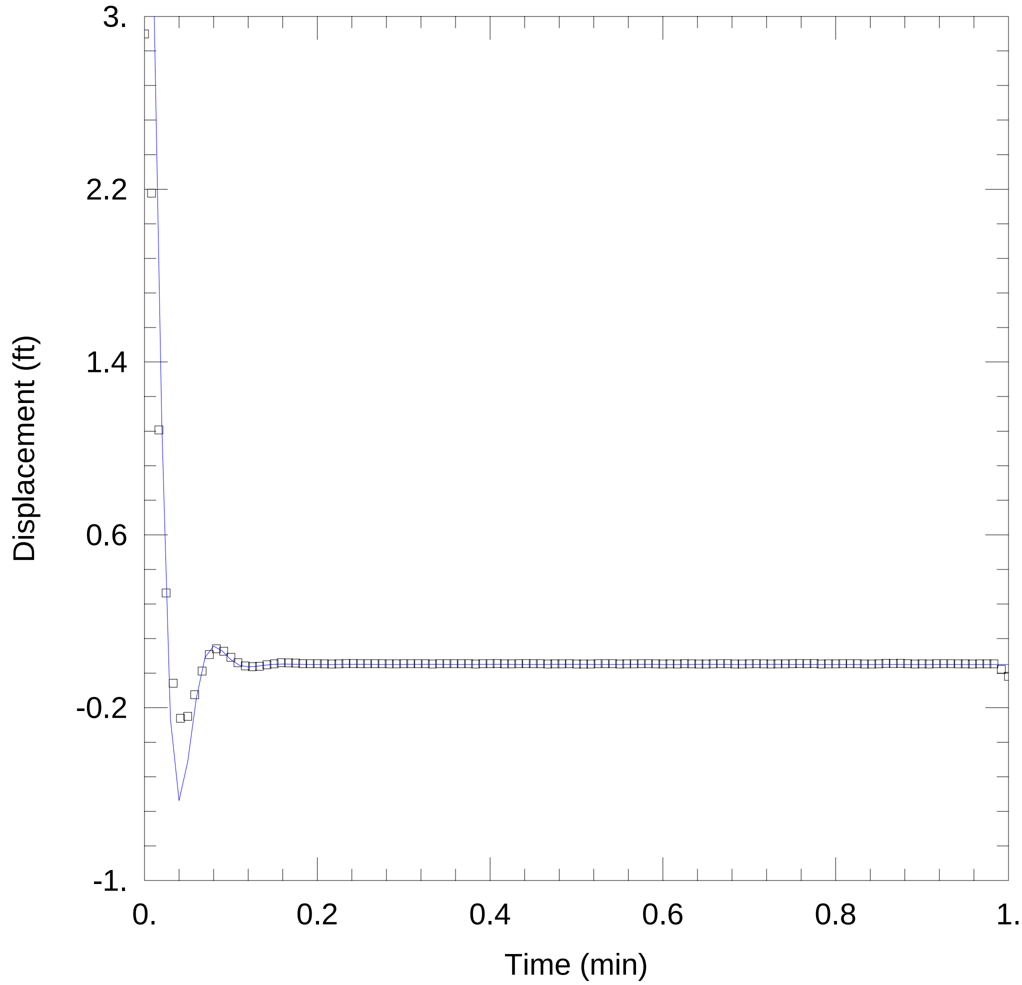
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (ES-10)

Initial Displacement: 3.33 ft Static Water Column Height: 12. ft
Total Well Penetration Depth: 13. ft Screen Length: 5. ft
Casing Radius: 0.167 ft Well Radius: 0.167 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 298.4 ft/day y0 = 3.259 ft



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\HC-2A-1.aqt
Date: 06/22/11 Time: 13:56:51

AQUIFER DATA

Saturated Thickness: 11.94 ft Anisotropy Ratio (Kz/Kr): 1.

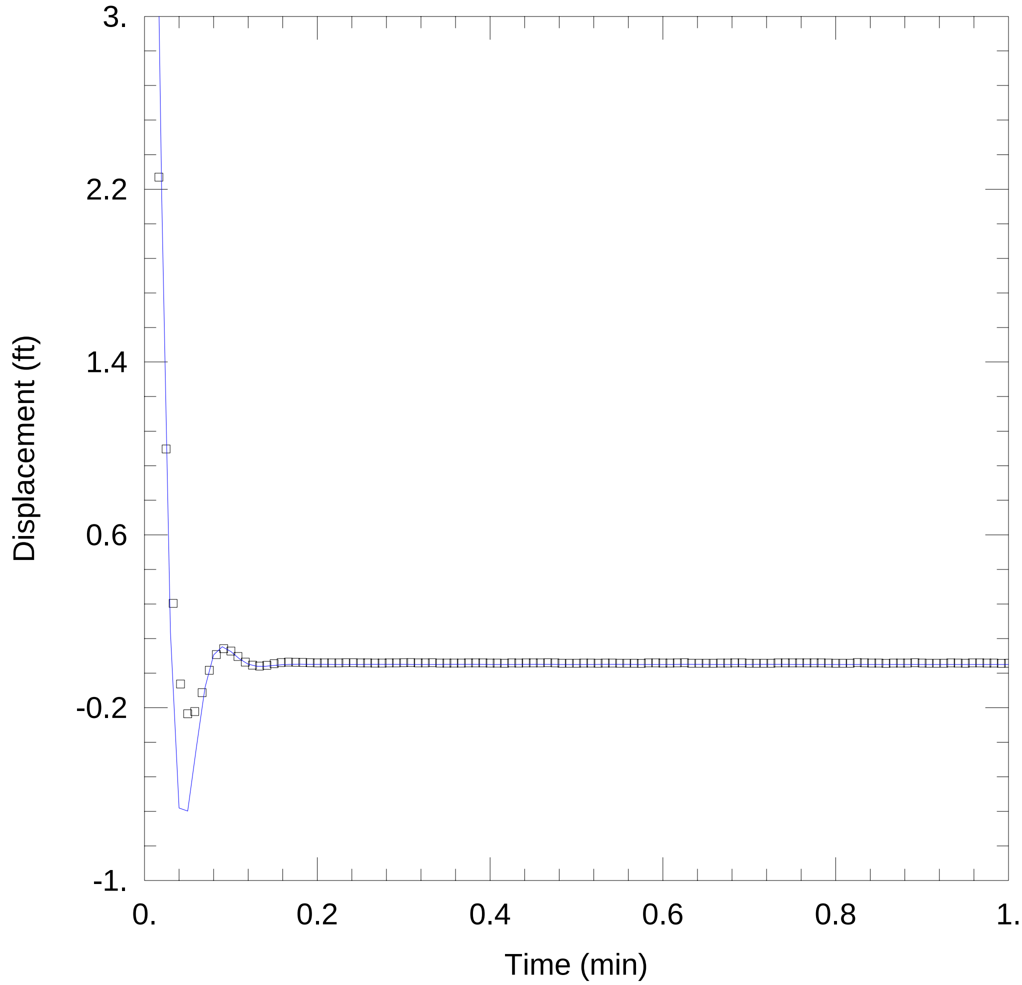
WELL DATA (HC-2A)

Initial Displacement: 4.67 ft
Total Well Penetration Depth: 11.94 ft
Casing Radius: 0.063 ft
Static Water Column Height: 11.94 ft
Screen Length: 5. ft
Well Radius: 0.063 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Springer-Gelhar

K = 194.6 ft/day Le = 13.51 ft



WELL TEST ANALYSIS

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Date: 06/22/11 Time: 13:55:59

AQUIFER DATA

Saturated Thickness: 11.94 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (HC-2A)

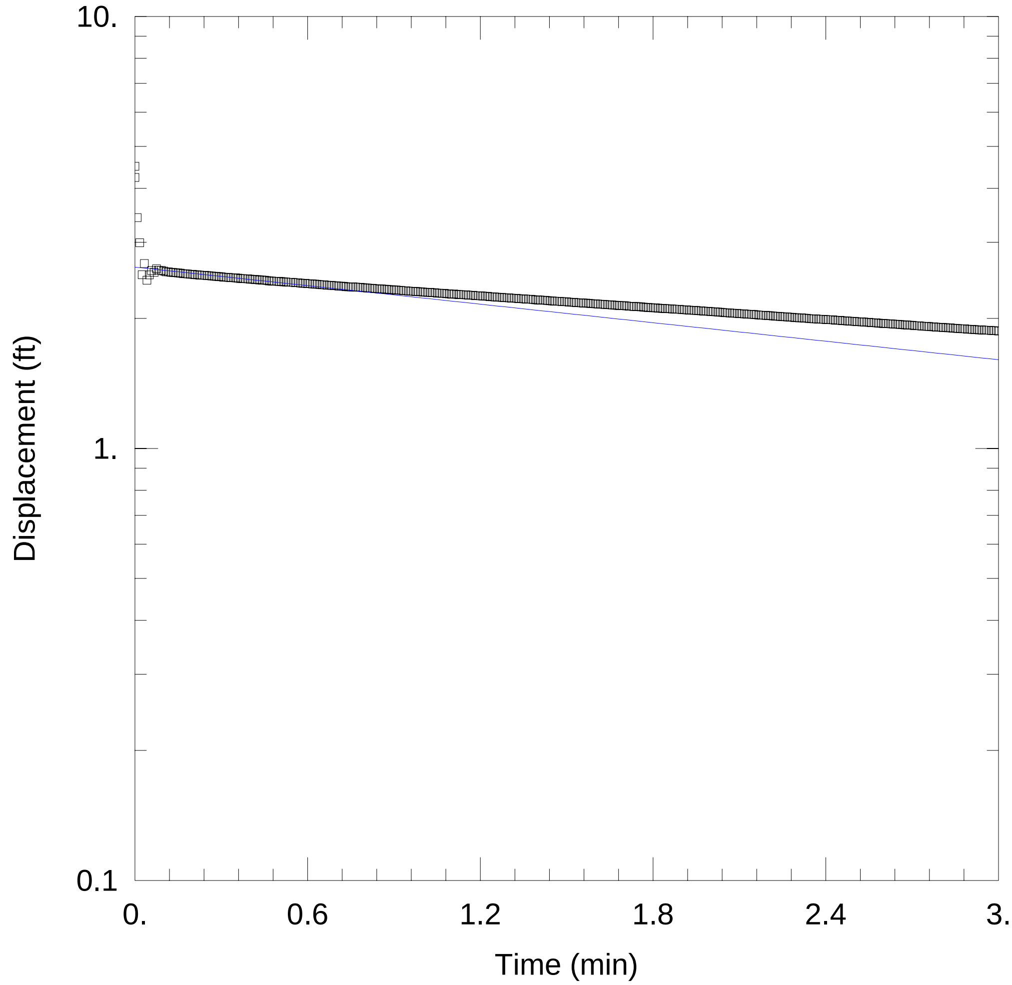
Initial Displacement: 6.67 ft
Total Well Penetration Depth: 11.94 ft
Casing Radius: 0.063 ft

Static Water Column Height: 11.94 ft
Screen Length: 5. ft
Well Radius: 0.063 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 168.1 ft/day
Le = 15.84 ft



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AQUIFER DATA

Saturated Thickness: 14. ft Anisotropy Ratio (Kz/Kr): 1.

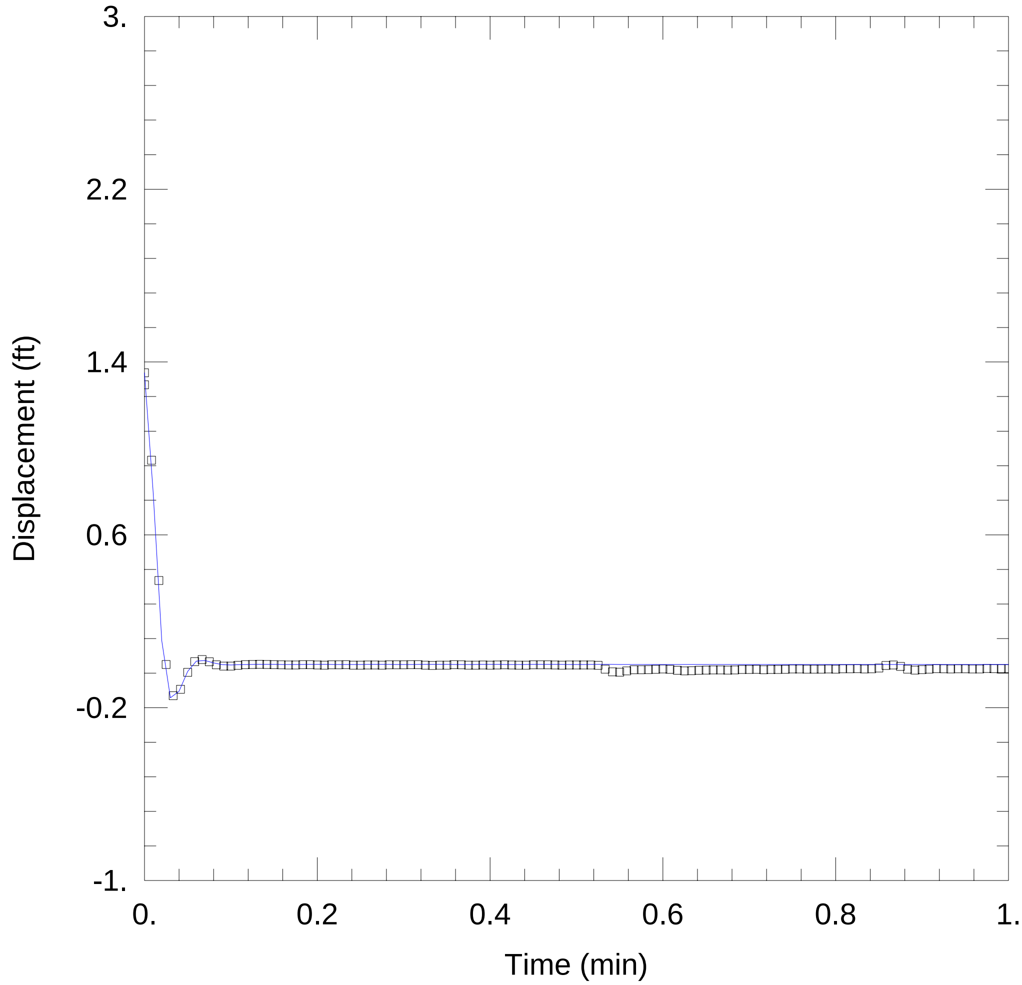
WELL DATA (HC-12)

Initial Displacement: 4.5 ft Static Water Column Height: 14. ft
Total Well Penetration Depth: 11. ft Screen Length: 3. ft
Casing Radius: 0.063 ft Well Radius: 0.063 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.497 ft/day y0 = 2.628 ft



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\KM-2-1.aqt
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AQUIFER DATA

Saturated Thickness: 14. ft Anisotropy Ratio (Kz/Kr): 1.

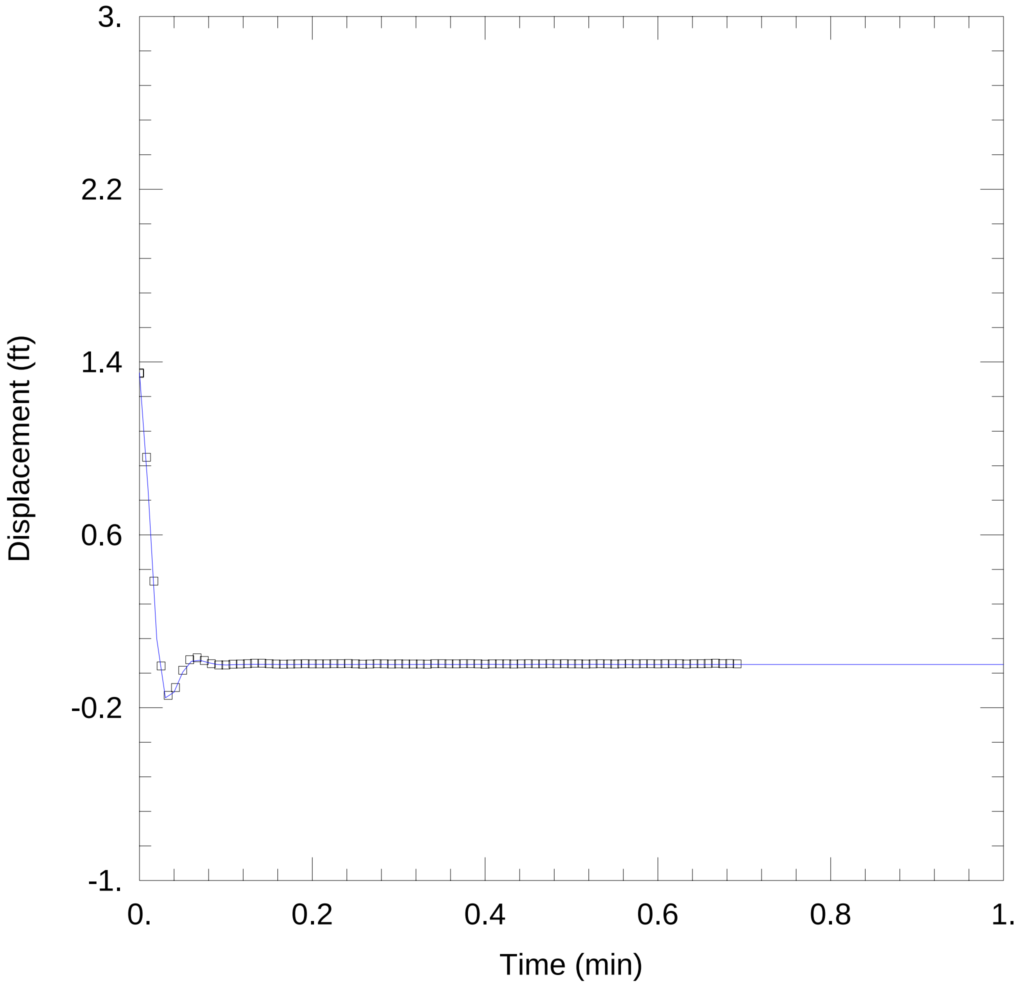
WELL DATA (KM-2)

Initial Displacement: 1.35 ft
Total Well Penetration Depth: 14. ft
Casing Radius: 0.083 ft
Static Water Column Height: 14. ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 202.4 ft/day
Le = 8.709 ft



WELL TEST ANALYSIS

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AQUIFER DATA

Saturated Thickness: 14. ft Anisotropy Ratio (Kz/Kr): 1.

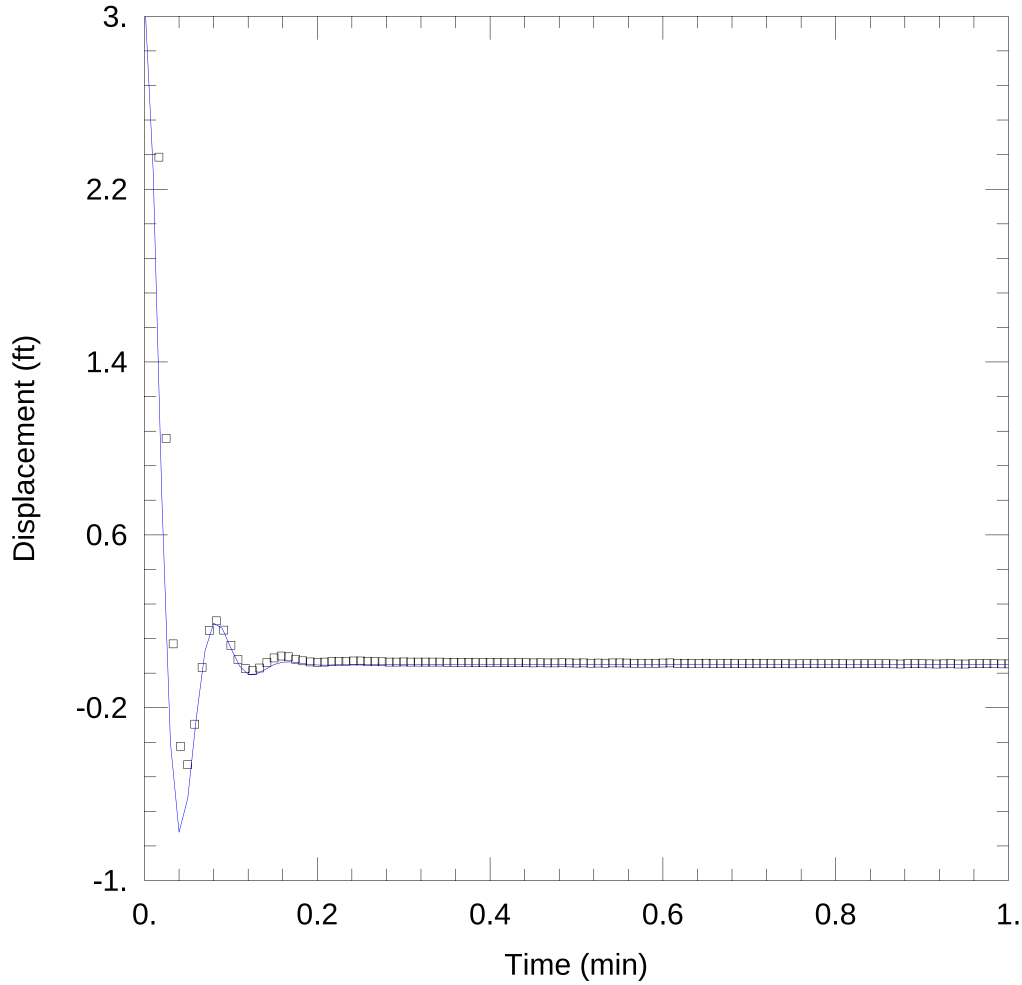
WELL DATA (KM-2)

Initial Displacement: 1.35 ft Static Water Column Height: 14. ft
Total Well Penetration Depth: 14. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Springer-Gelhar

K = 201.2 ft/day Le = 8.889 ft



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\KMCP-1B-1.aqt
Date: 06/22/11 Time: 13:54:52

AQUIFER DATA

Saturated Thickness: 18. ft Anisotropy Ratio (Kz/Kr): 1.

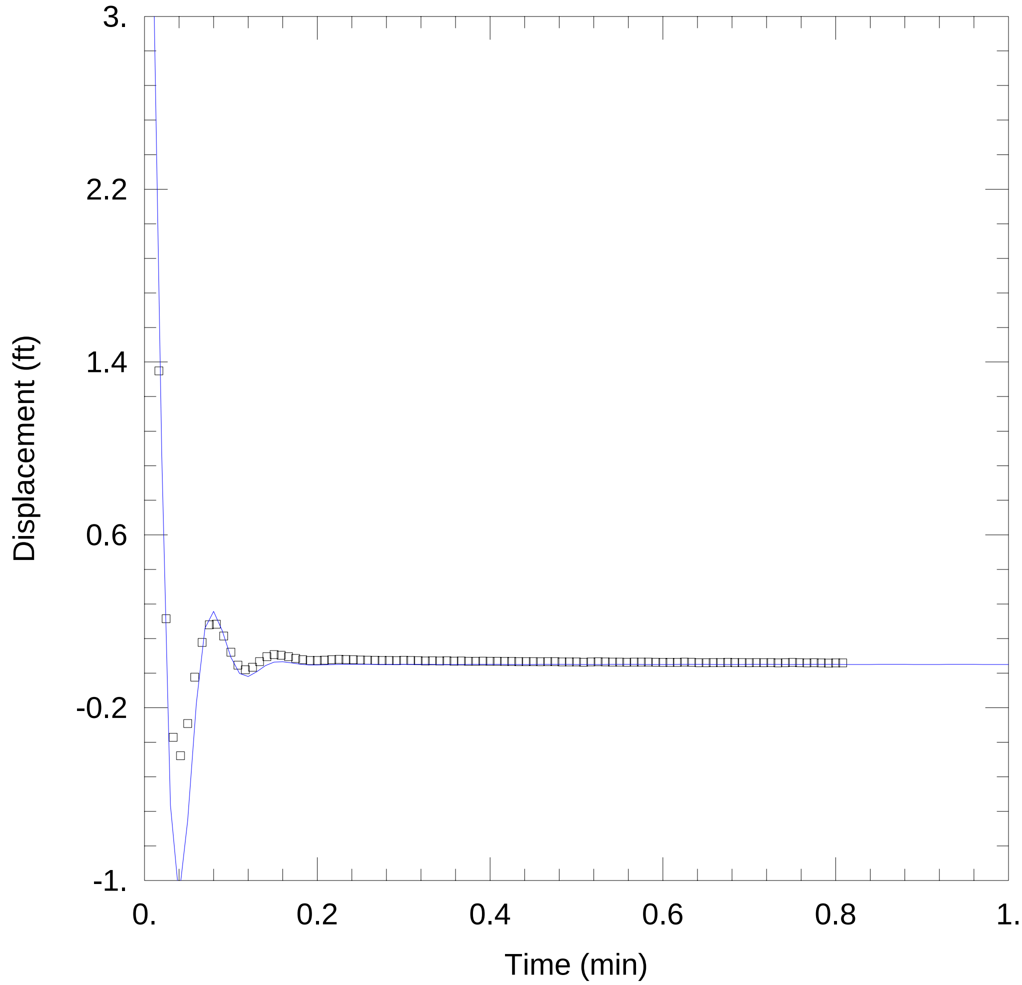
WELL DATA (KMCP-1B)

Initial Displacement: 3.11 ft Static Water Column Height: 18. ft
Total Well Penetration Depth: 18. ft Screen Length: 10. ft
Casing Radius: 0.083 ft Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 283.4 ft/day Le = 16.83 ft



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\KMCP-1B-2.aqt
Date: 06/22/11 Time: 13:54:13

AQUIFER DATA

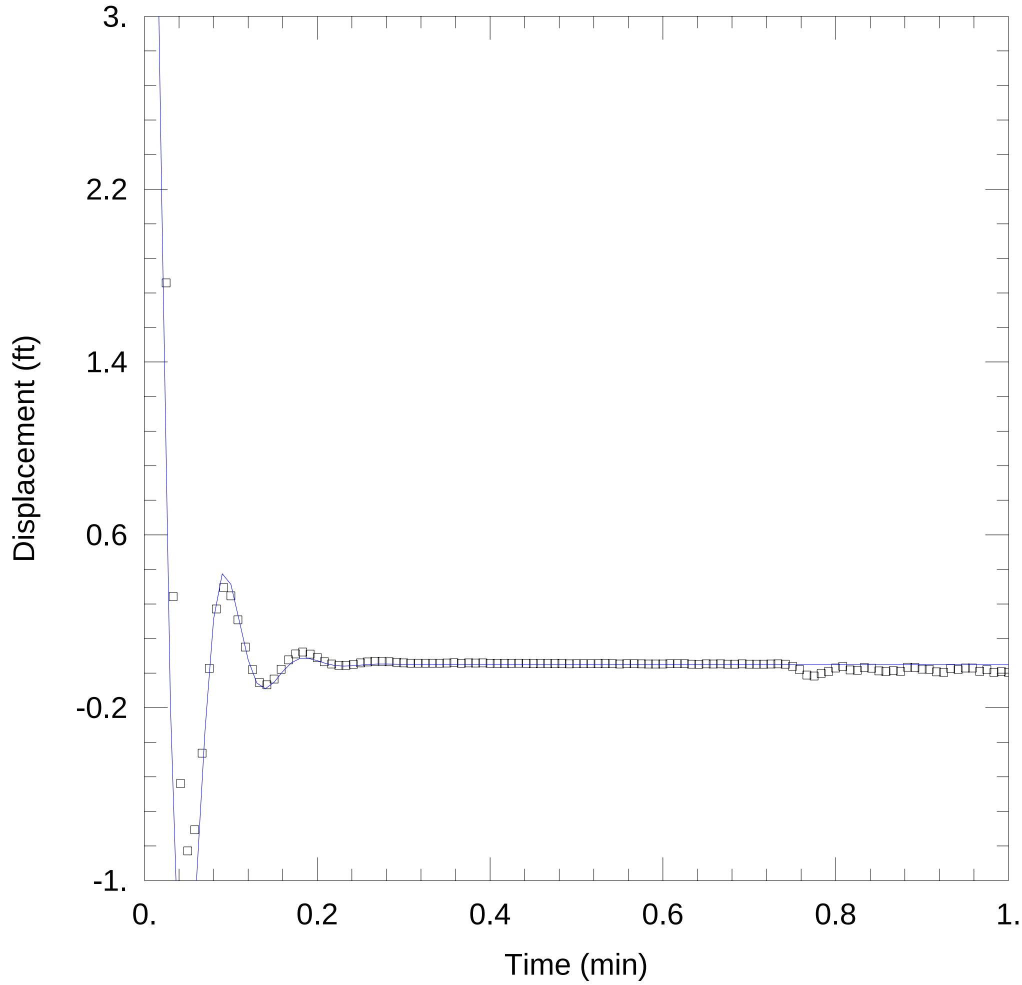
Saturated Thickness: 18. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (KMCP-1B)

Initial Displacement: 4.7 ft
Total Well Penetration Depth: 18. ft
Casing Radius: 0.083 ft
Static Water Column Height: 18. ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler
K = 287.1 ft/day
Le = 14.77 ft



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\OB-1-1.aqt
Date: 06/22/11 Time: 13:58:06

AQUIFER DATA

Saturated Thickness: 23. ft Anisotropy Ratio (Kz/Kr): 1.

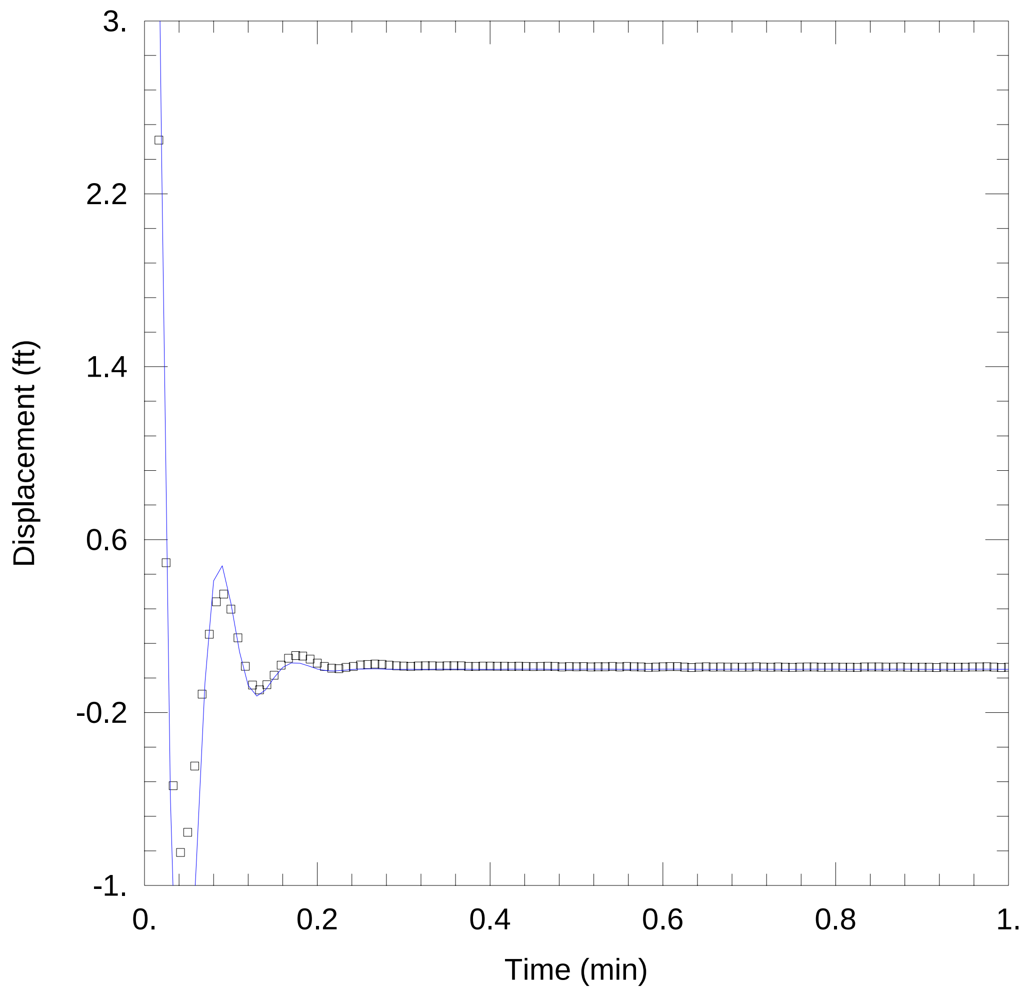
WELL DATA (OB-1)

Initial Displacement: 6.1 ft
Total Well Penetration Depth: 23. ft
Casing Radius: 0.083 ft
Static Water Column Height: 23. ft
Screen Length: 10. ft
Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Butler

K = 260.9 ft/day
Le = 21.28 ft



WELL TEST ANALYSIS

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Date: 06/22/11 | Time: 13:57:56

AQUIFER DATA

Saturated Thickness: 23. ft | Anisotropy Ratio (Kz/Kr): 1.

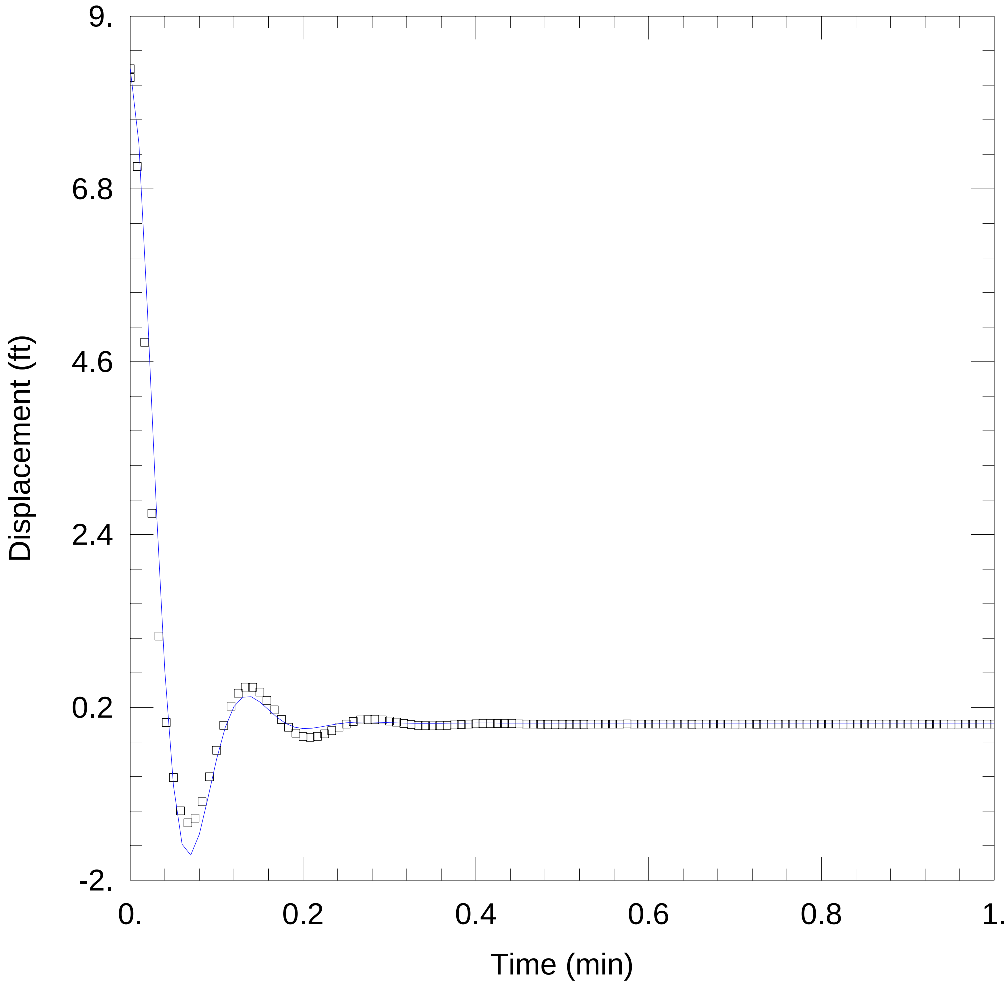
WELL DATA (OB-1)

Initial Displacement: 7.8 ft | Static Water Column Height: 23. ft
Total Well Penetration Depth: 23. ft | Screen Length: 10. ft
Casing Radius: 0.083 ft | Well Radius: 0.083 ft

SOLUTION

Aquifer Model: Confined | Solution Method: Butler

K = 270.6 ft/day | Le = 18.58 ft



WELL TEST ANALYSIS

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AQUIFER DATA

Saturated Thickness: 50. ft Anisotropy Ratio (Kz/Kr): 1.

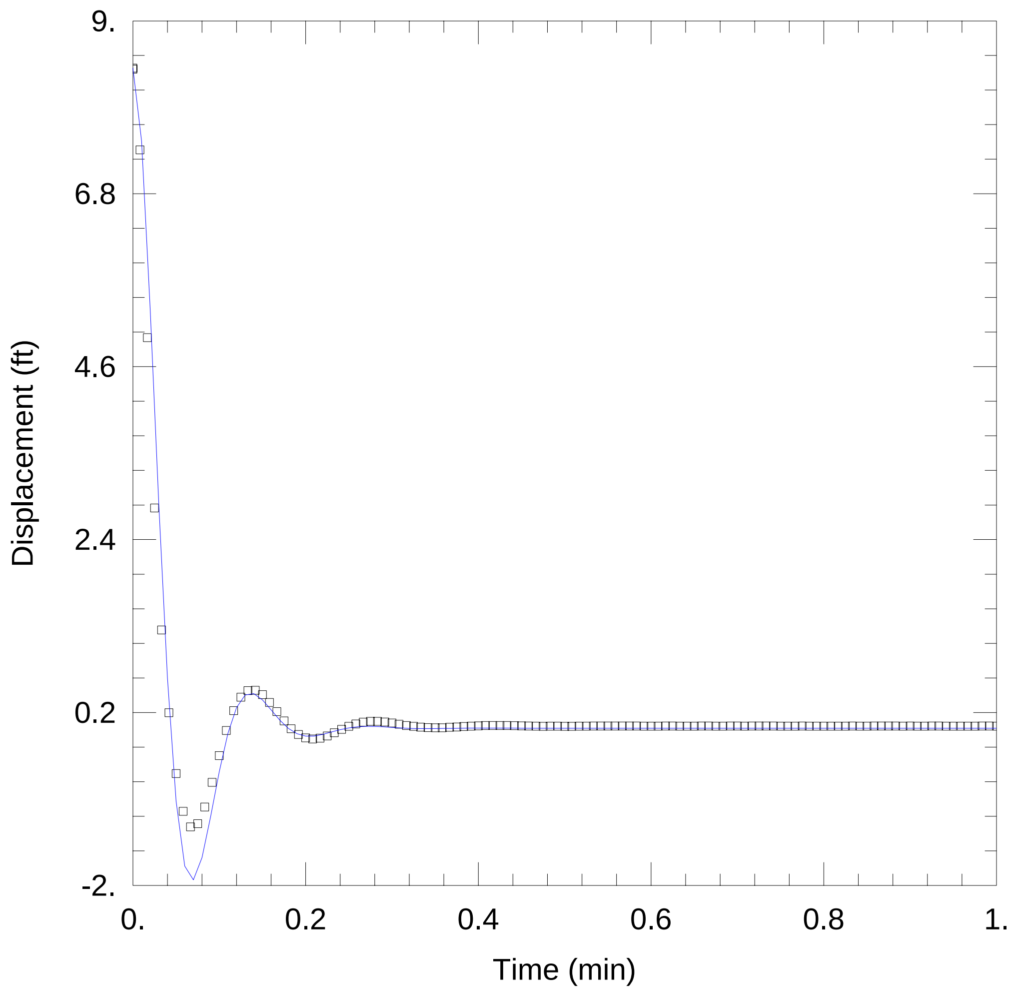
WELL DATA (TH-6C)

Initial Displacement: 8.33 ft Static Water Column Height: 50. ft
Total Well Penetration Depth: 50. ft Screen Length: 5. ft
Casing Radius: 0.052 ft Well Radius: 0.052 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 124.5 ft/day Le = 42.79 ft



WELL TEST ANALYSIS

Data Set: K:\project\9088\slug test\TH-6C-2.aqt
Date: 06/22/11 Time: 13:57:47

AQUIFER DATA

Saturated Thickness: 50. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (TH-6C)

Initial Displacement: 8.4 ft Static Water Column Height: 50. ft
Total Well Penetration Depth: 50. ft Screen Length: 5. ft
Casing Radius: 0.052 ft Well Radius: 0.052 ft

SOLUTION

Aquifer Model: Confined Solution Method: Butler

K = 130.6 ft/day Le = 44.73 ft