

Evaluation of Cr(IV) Analytical Results from Field and Fixed Laboratory Methods for the 100-KR4 Pump and Treat Systems

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788



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Evaluation of Cr(IV) Analytical Results from Field and Fixed Laboratory Methods for the 100-KR4 Pump and Treat Systems

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Terms

ERMA	Environmental Risk Management Archive
HEIS	Hanford Environmental Information System
HWIS	Hanford Well Information System
OU	Operable Unit
P&T	Pump and Treat
RPD	Relative Percent Difference

1 Purpose

The purpose of this environmental calculation is to evaluate historical hexavalent chromium (Cr(VI)) data associated with the 100-KR-4 Groundwater Operable Unit (OU) to determine the data quality associated with field analytical methods in support of the 100-K pump and treat (P&T) system operations. The analytical results reported by field methods are compared against the analytical results reported by fixed laboratories, using the precision criteria established in the *Sampling and Analysis Plan for the 100-K Decision Unit Remedial Investigation/Feasibility Study* (DOE/RL-2009-41, Rev. 0) as the basis to determine the data quality of the field results relative to the fixed laboratory results.

The precision of the field analytical results relative to the laboratory analytical results is determined by calculating the relative percent difference (RPD) between analytical results for replicate samples analyzed by both field and laboratory methods. For comparison, RPDs are also calculated for replicate sample results reported by two independent fixed laboratories. The RPDs are evaluated against an acceptable precision criteria range of $\pm 20\%$ as established in DOE/RL-2009-41.

The precision of temporally coincidental replicate (same date and time) sample results reported by field and laboratory methods compared favorably with the precision of temporally coincidental replicate sample results reported by two independent fixed laboratories. For the three 100-K P&T systems, the percentage of RPDs exceeding the acceptable precision criteria ranged from 0 to 30 percent for temporally coincidental replicate sample results reported by field and laboratory methods. In comparison, the percentage of RPDs exceeding the precision criteria ranged from 11 to 32% for temporally coincidental replicate sample results reported by independent laboratories.

The linear correlation between field and laboratory method replicate results and between independent laboratory replicate results was measured by calculating the R-squared coefficient. The R-squared coefficients ranged from 0.5107 to 0.9993 for temporally coincidental replicate samples. Further review of the datasets associated with lower R-squared coefficients identified outliers with data qualifiers. Recalculation without the outliers resulted in a coefficient range of 0.9688 to 0.9993.

Summaries of the results of this environmental calculation are presented in Table 1 and Table 2. Additional discussion is provided in Section 7 (Results and Conclusions).

2 Background

Analysis of Cr(VI) in the 100-KR-4 Groundwater OU is routinely performed in the field as a part of the P&T systems' operation and maintenance activities. The fixed laboratory analyses are performed on a less-routine basis in support of the on-going remedial investigation/feasibility study activities.

Field analyses are performed in accordance with the technical procedure, "Chromium Analysis of Water Samples at Pump-and-Treat Facilities (GRP-FS-04-G-001, Revision 3). Fixed laboratory analyses are performed using EPA Method 7196 as required by the *Sampling and Analysis Plan for the 100-K Decision Unit Remedial Investigation/Feasibility Study* (DOE/RL-2009-41, Rev. 0).

Both of these methods are colorimetric methods. The field method procedure specifies using the following spectrophotometers at a wavelength of 540 nm: DR/4000V, DR/2010 or DR 2800. EPA Method 7196 requires either a spectrophotometer, for use at 540 nm, providing a light path of 1 cm or longer, or a filter photometer, providing a light path of 1 cm or longer and equipped with a greenish-yellow filter having maximum transmittance near 540 nm.

3 Methodology

The following provides the steps and associated calculation approach, including the equation, for this environmental calculation.

1. Extract the Cr(VI) data associated with the 100-KR-4 OU P&T extraction wells from the Hanford Environmental Information System (HEIS).
2. Select data to be used in the comparison.
3. Inspect data to identify any data quality issues that might have been identified during analysis, data review, and data validation.
4. Prepare time series plots (time versus concentration) for each well.
5. Prepare scatter (X-Y) charts plotting field versus fixed laboratory Cr(VI) results by system. Scatter charts are provided that 1) summarize temporally coincidental results (time-day-laboratory) by well location and 2) summarize same-day coincidental results (day-laboratory) by well location.
6. Calculate the relative percent difference (RPD) between field and fixed laboratory results for temporally coincidental results and same-day coincidental results by well location (see formula below).
7. Calculate the RPD for field replicates by well location (see formula below).
8. Calculate the RPD for intralaboratory (same laboratory) fixed laboratory replicates by well location (see formula below).
9. Calculate the RPD for interlaboratory (different laboratory) fixed laboratory replicates by well location (see formula below).

$$RPD = \frac{|x_1 - x_2|}{[(x_1 + x_2)/2]} \times 100\%$$

4 Assumptions and Inputs

The following provides the relevant assumptions and inputs necessary to perform the calculation, including a brief explanation of the basis for each and the methodology step it is supporting.

The following inputs and assumptions support Methodology Step 1:

- The initial dataset represents all Cr(VI) data available for each well from 1/1/1964 to 1/29/2013.
- The wells considered for this environmental calculation include the extraction wells for the KR4, KW, and KX P&T systems.

The following assumptions were made in support of Methodology Step 2:

1. Filtered and unfiltered data are considered equivalent for the Cr(VI) data evaluation.

2. Well construction dates were tabulated. If a sample was collected prior to the well construction date, the associated record was removed from the dataset. Drilling and well construction dates were obtained from the HWIS database.
3. Interval-specific data were not considered for the data evaluation. Records associated with samples collected at multiple intervals on the same day from the same well were removed from the dataset.

5 Software Applications

Software used for this analysis includes HEIS, HWIS, and Microsoft Excel®¹. HEIS is a central repository for storing and maintaining access to environmental data collected for the Hanford Site. HWIS is a central repository for storing and maintaining access to well data collected for the Hanford Site. Microsoft Excel® is used to present the groundwater data and other information in spreadsheets.

6 Calculation

The following documents the calculation steps as listed in Section 3 (Methodology). Summaries of the results of the calculation are presented in Table 1 and Table 2.

1. **Extract the Cr(VI) data associated with the 100-KR-4 OU P&T extraction wells from the Hanford Environmental Information System (HEIS).** The dataset was downloaded from the Hanford Virtual Library on January 29, 2013, using the Environmental Data Module. The following criteria were used for the query:
 - Media: Groundwater
 - Date Range: 1/1/1964 to 1/29/2013
 - Constituent(s): Hexavalent Chromium (CAS #18450-29-9).
 - All additional database fields were selected.
 - A “Location+Constituent” extraction was used.
 - The specific locations (see Table 3) were manually loaded into the “Select Locations.”
 - Three separate extractions were performed for each of the 100-KR-4 Groundwater OU P&T systems. The data was extracted into three files (usr4508ext19023.zip, usr4508ext19024.zip, and usr4508ext19025.zip).
 - The following steps were used to compile the data into an Excel file:
 - a. The files downloaded from the Hanford Virtual Library were unzipped.
 - b. A blank excel file was created named “100K_CrVI_GWforSelectWells_29Jan2013.xlsx.”
 - c. The .csv files (usr4508ext19023.csv, usr4508ext19024.csv, and usr4508ext19025.csv) were each opened and the contents of each file were moved into a worksheet in the

¹ Excel is a trademark of Microsoft Corporation, Redmond, Washington.

“100K_CrVI_GWforSelectWells_29Jan2013.xlsx” file using the copy/move function.

2. **Select data to be used in the comparison.** Table 4 summarizes the well construction dates and the earliest sample date reported for each well included in the evaluation. Records for samples dates that precede the well construction date were deleted from the dataset.

Interval depths and sample dates were also evaluated. If multiple samples were collected at different depths at the same well on the same day, these records were removed from the dataset.

The effective date for the procedure documenting the field analytical method for Cr(VI) is 2/3/2006. Records for sample dates that precede this date were removed from the dataset.

Table 5 summarizes the number of records retrieved, the number of records removed, and the number of records retained. Worksheets containing the records removed and the final dataset used for evaluation are referenced by filename in Appendix A.

3. **Inspect data to identify any data quality issues that might have been identified during data review and validation.** The laboratory, review and validation qualifiers were summarized and reviewed for the data associated with each P&T system. Based on a review of these qualifiers, all data were retained for further evaluation (i.e., no data had been rejected during validation). A summary of the data qualifiers reported is provided by system in Tables 6, 7, and 8. These data qualifiers are reconsidered as needed during the data quality evaluation (Section 7).
4. **Prepare time series plots (time versus concentration) for each well.** A time series plot using a scatter (X-Y) chart is presented for each well considered. The Cr(VI) concentrations (as reported by each laboratory) are plotted against the respective sample date and time. The plots are referenced by filename in the Appendix A and are presented in Figures A.1 through A.34.
5. **Prepare scatter (X-Y) charts plotting field versus fixed Cr(VI) results by system.** The scatter plots for field versus fixed Cr(VI) results are presented in Figures 1 through 6 (Figures 1 through 3 for temporally coincidental samples and Figures 4 through 6 for same date samples).
6. **Calculate the relative percent difference (RPD) between field and fixed laboratory results for temporally coincidental results and same-day results by well location.** The RPD between field and fixed laboratory results for temporally coincidental samples are presented in Tables 9, 10, and 11. The RPD between field and fixed laboratory results for same-day samples are presented in Tables 12, 13, and 14.
7. **Calculate the RPD for field laboratory replicates by well location.** The RPD between field laboratory replicates (both samples analyzed using a field method) are presented in Tables 15, 16, and 17.
8. **Calculate the RPD for intralaboratory (same laboratory) fixed laboratory replicates by well location.** The RPD between fixed laboratory replicates analyzed by the same laboratory are presented in Tables 18, 19, and 20.
9. **Calculate the RPD for interlaboratory (different laboratory) fixed laboratory replicates by well location.** The RPD between fixed laboratory replicates (split samples between two independent fixed laboratories) are presented in Tables 21, 22, and 23.

7 Results/Conclusions

The RPDs calculated performing the steps in Section 6 were evaluated on the basis of the precision criterion established in the *Sampling and Analysis Plan for the 100-K Decision Unit Remedial Investigation/Feasibility Study* (DOE/RL-2009-41, Rev. 0). This criterion establishes a precision requirement of $\pm 20\%$ for replicate sample analyses.

The RPDs evaluated include those calculated for temporally coincidental (date and time) replicates analyzed by field and fixed laboratory methods (Tables 9 through 11), date-only coincidental replicates analyzed by field and fixed laboratory methods (Tables 12 through 14), and temporally coincidental (date and time) replicates analyzed by the fixed laboratory method but performed by independent laboratories (interlaboratory) (Tables 21 through 23).

Field versus Fixed and Interlaboratory Fixed RPD Summary. For each set of replicates (temporally coincidental field versus fixed, date-only coincidental field versus fixed, and temporally coincidental interlaboratory fixed versus fixed), the RPDs were filtered to determine the number of results where the RPD exceeded the precision requirement of $\pm 20\%$. The percentage of replicate results with an RPD greater than $\pm 20\%$ was then calculated. These replicates with RPDs exceeding the precision requirement were further evaluated to see if any of the results were laboratory-, review- or validation-qualified. The percentage of replicates with an RPD greater than $\pm 20\%$ and without any qualifier flags noted was also calculated for each set of replicates. This information is summarized in Table 1. The RPDs of the field versus fixed laboratory replicates compare favorably with the RPDs of the fixed versus fixed replicates.

The total (qualified and unqualified data) percentage of RPDs greater than $\pm 20\%$ for temporally coincidental field versus fixed replicates ranged between 0 and 30% for the three P&T systems as compared to a range of 11 to 32% for fixed versus fixed replicates. The percentage of unqualified RPDs greater than $\pm 20\%$ for temporally coincidental field versus fixed replicates ranged between 0 and 15% for the three P&T systems as compared to a range of 0 to 11% for fixed versus fixed replicates.

The total (qualified and unqualified data) percentage of RPDs greater than $\pm 20\%$ for date-only coincidental field versus fixed replicates ranged between 10 and 43% for the three P&T systems. The percentage of unqualified RPDs greater than $\pm 20\%$ for date-only coincidental field versus fixed replicates ranged between 10 and 13% for the three P&T systems.

Intralaboratory Field and Intralaboratory Fixed RPD Summary. A review of the RPD for temporally coincidental replicates reported by a field laboratory (Tables 15, 16, and 17) does indicate that the precision requirement of $\pm 20\%$ was not met for two replicate pairs for the KR4 system (22% of the replicates—nine replicate pairs total), two replicate pairs for the KW system (33% of the replicates—six replicate pairs total), and one replicate pair for the KX system (25% of the replicates—four replicate pairs total). All RPDs for temporally coincidental replicate results reported by a single fixed laboratory (Tables 19, 20, and 21) were within the precision requirement of $\pm 20\%$ with the exception of six sets of replicates that were represented by filtered and unfiltered samples. It is noted that filtered and unfiltered samples are regarded as equivalent for the purposes of this environmental calculation—see assumptions in Section 4. One of these five sets had samples that were also flagged with a “Q” review qualifier, which indicates that the associated quality control sample is out of limits.

Linear Correlation Summary. The linear correlation R-squared values are summarized in Table 2 (see Figures 1 through 3 for temporally coincidental replicates and Figures 4 through 6 for same-date replicates).

The R-squared correlation coefficient indicates that the sets of field versus fixed replicates and the fixed versus fixed replicates are generally linearly correlated. The correlation coefficient is 0.5107 for the KW fixed versus fixed replicates and is 0.8957 for the KX field versus fixed temporally coincidental replicates, which are lower than the correlation coefficients for the other replicate sets, which range from 0.9688 to 0.9993. Further evaluation of these two replicate datasets identified replicate pairs, for which both results were flagged with data qualifiers.

The KW fixed versus fixed dataset had a replicate pair (2/7/2008 11:30 at well 199-K-137) with both results qualified (the TARL result of 561 µg/L was review qualified with a “Y” flag and the WSCF result of 2590 µg/L was lab qualified with a “D” flag). Recalculation of the linear regression without this replicate pair results in a correlation coefficient of 0.9977 for the remaining replicates. Figure 7 presents a scatter plot with and without this replicate pair.

The KX field versus fixed temporally coincidental dataset had a replicate pair (6/29/2007 11:42 at well 199-K-141) with both results qualified (the field result of 262 µg/L was review qualified with a “G” flag and the STLR result of 186 µg/L was review qualified with a “Y” flag). Recalculation of the linear regression without this pair results in a correlation coefficient of 0.9770. Figure 8 presents a scatter plot with and without these replicate pairs.

8 References

DOE/RL-2009-41, 2009, *Sampling and Analysis Plan for the 100-K Decision Unit Remedial Investigation/Feasibility Study*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

EPA Method 7196A, Chromium, Hexavalent (Colorimetric)

GRP-FS-04-G-001, 2006, *Chromium Analysis of Water Samples at Pump and Treat Facilities*, Rev. 0, Change 0.

GRP-FS-04-G-001, 2013, *Chromium Analysis of Water Samples at Pump and Treat Facilities*, Rev. 3, Change 0.

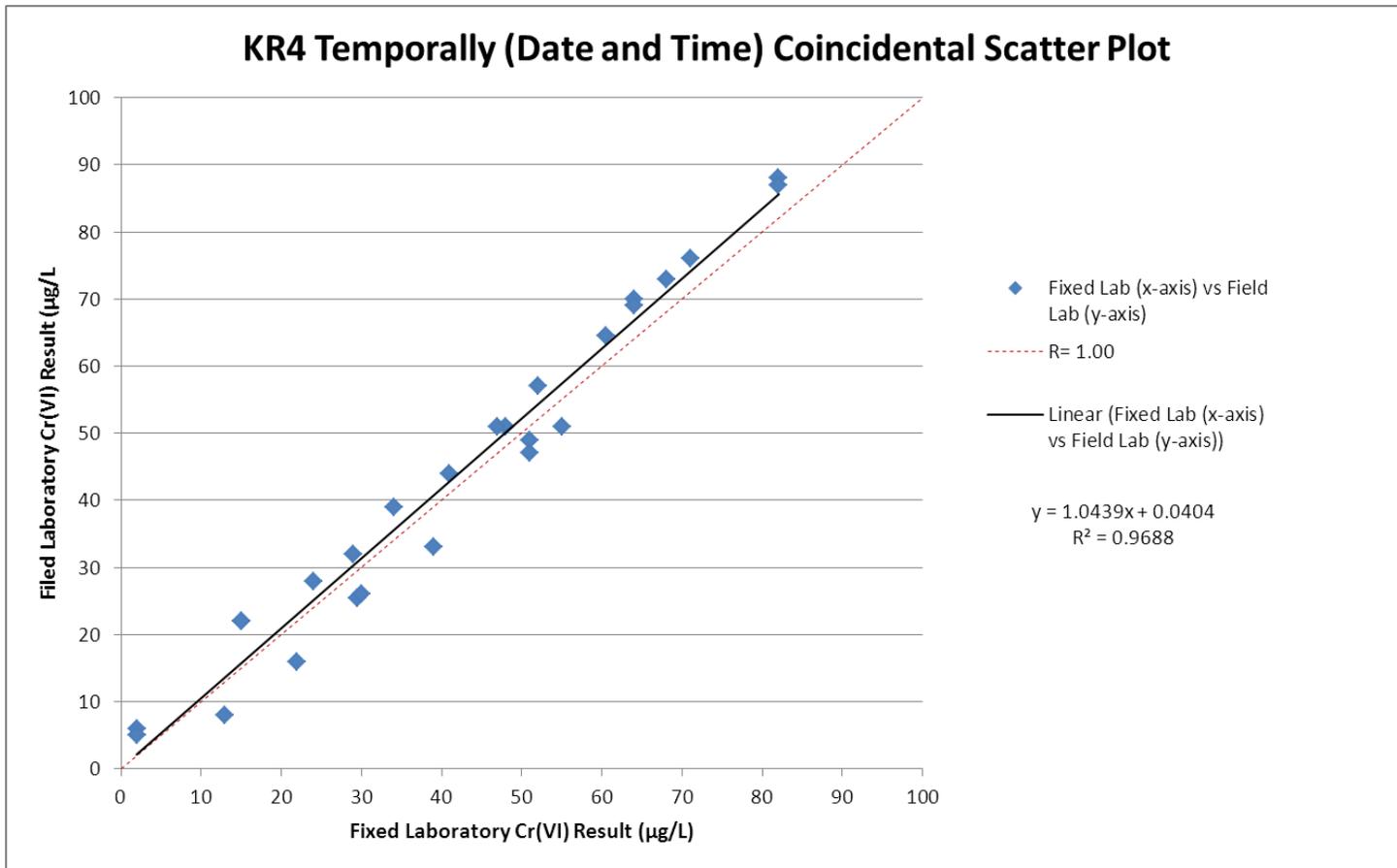


Figure 1. KR4 Temporally (Date and Time) Coincidental Results

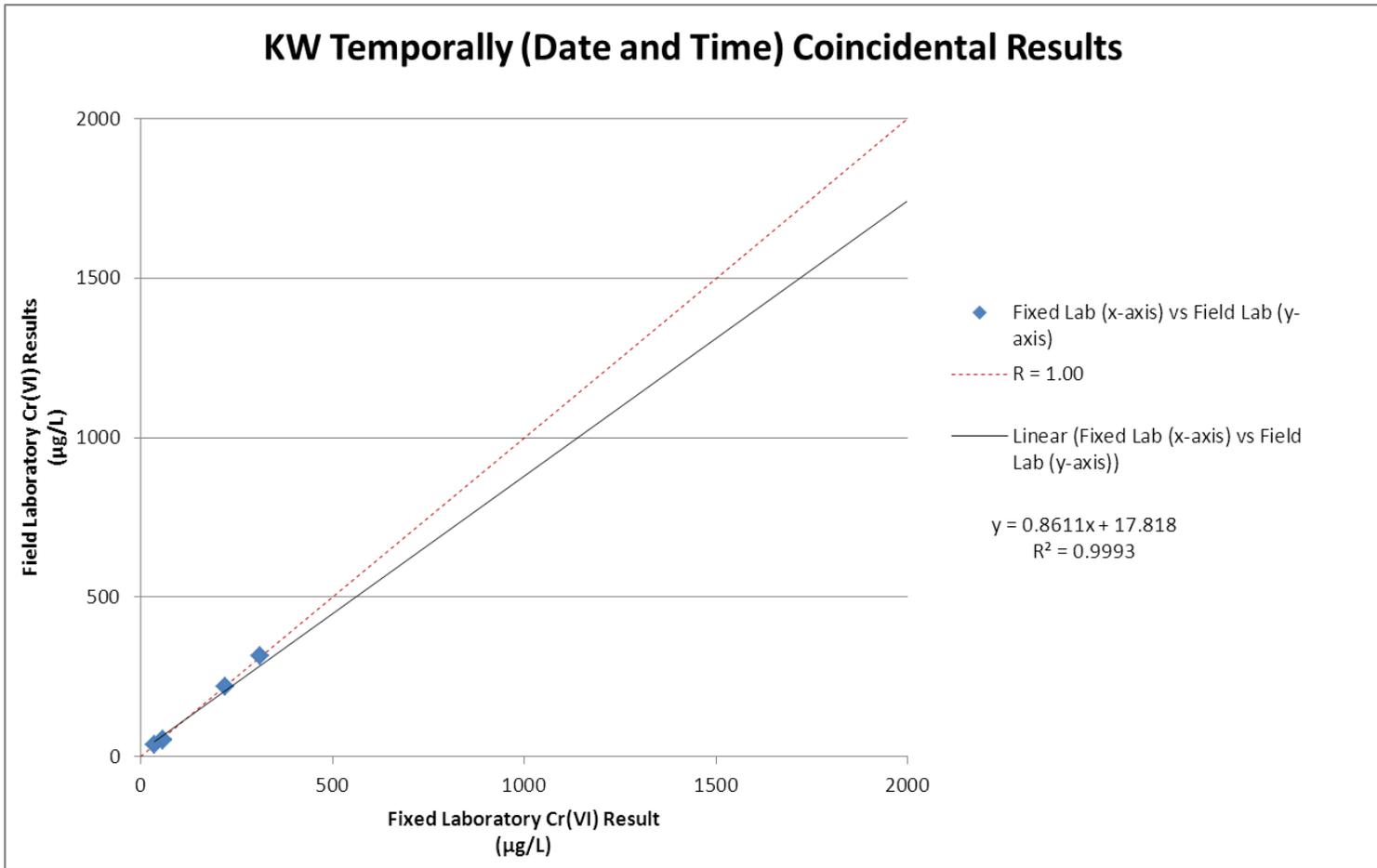


Figure 2. KW Temporally (Date and Time) Coincidental Results

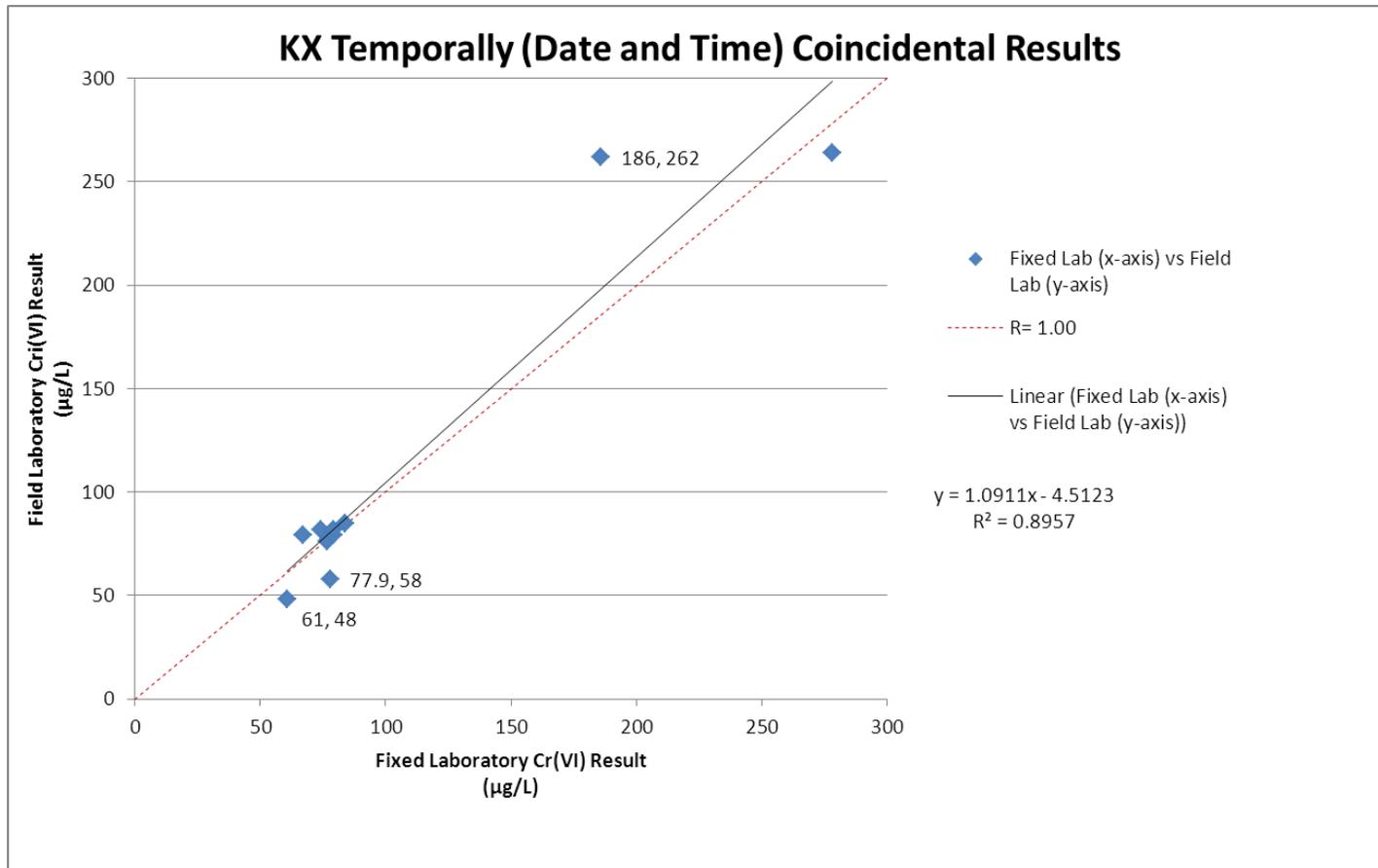


Figure 3. KX Temporally (Date and Time) Coincidental Results

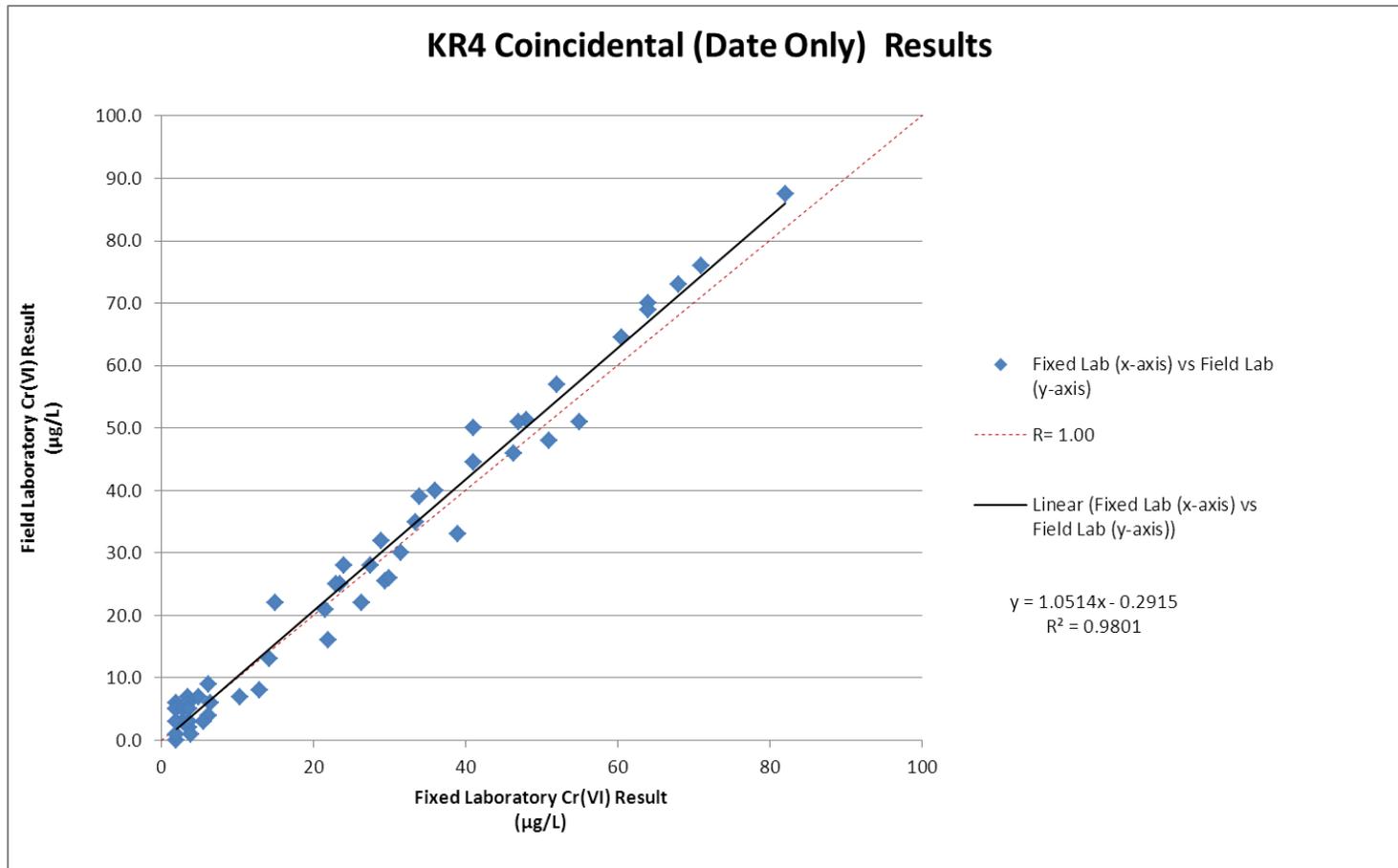


Figure 4. KR4 Coincidental (Date Only) Results

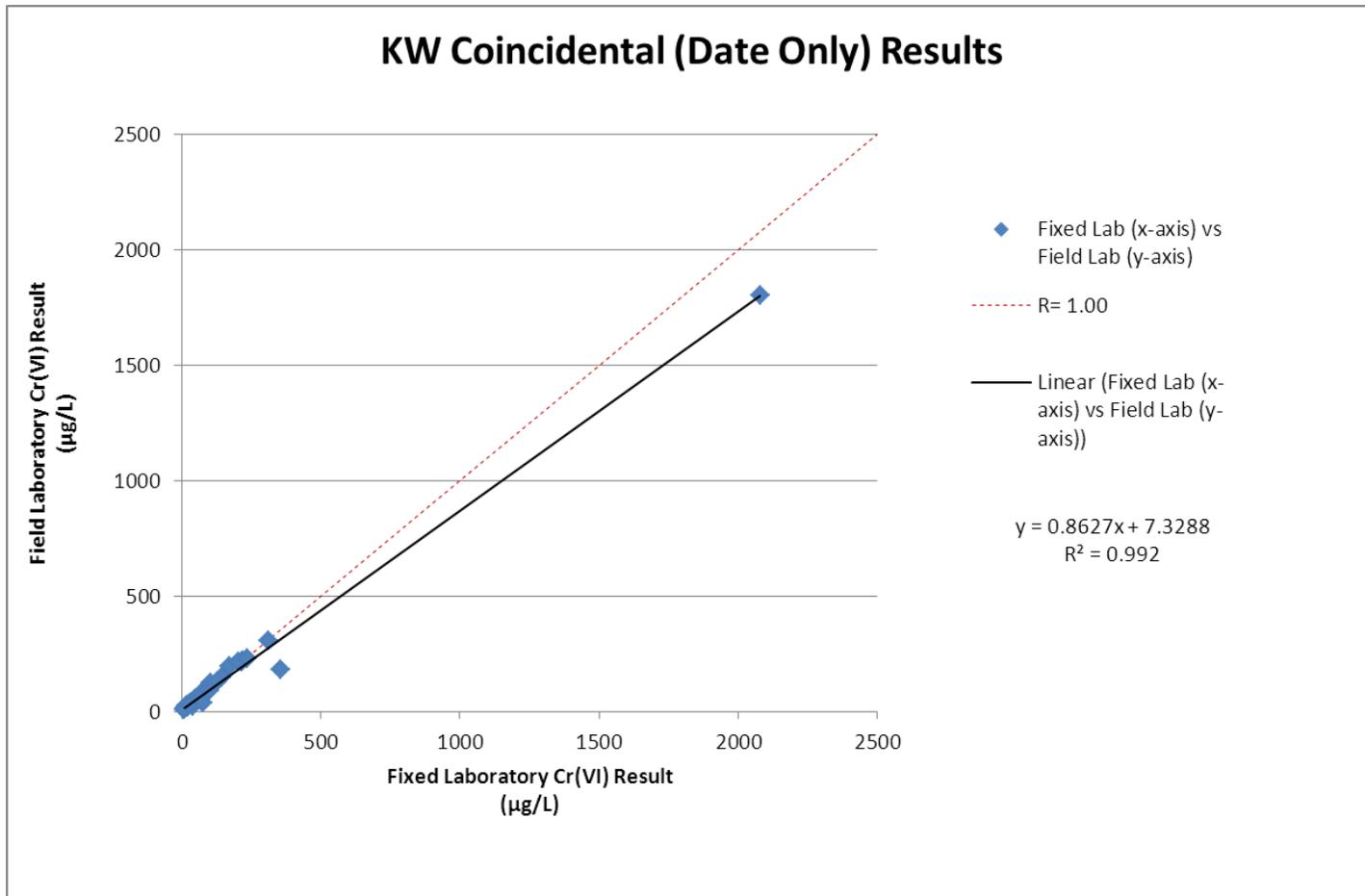


Figure 5. KW Coincidental (Date Only) Results

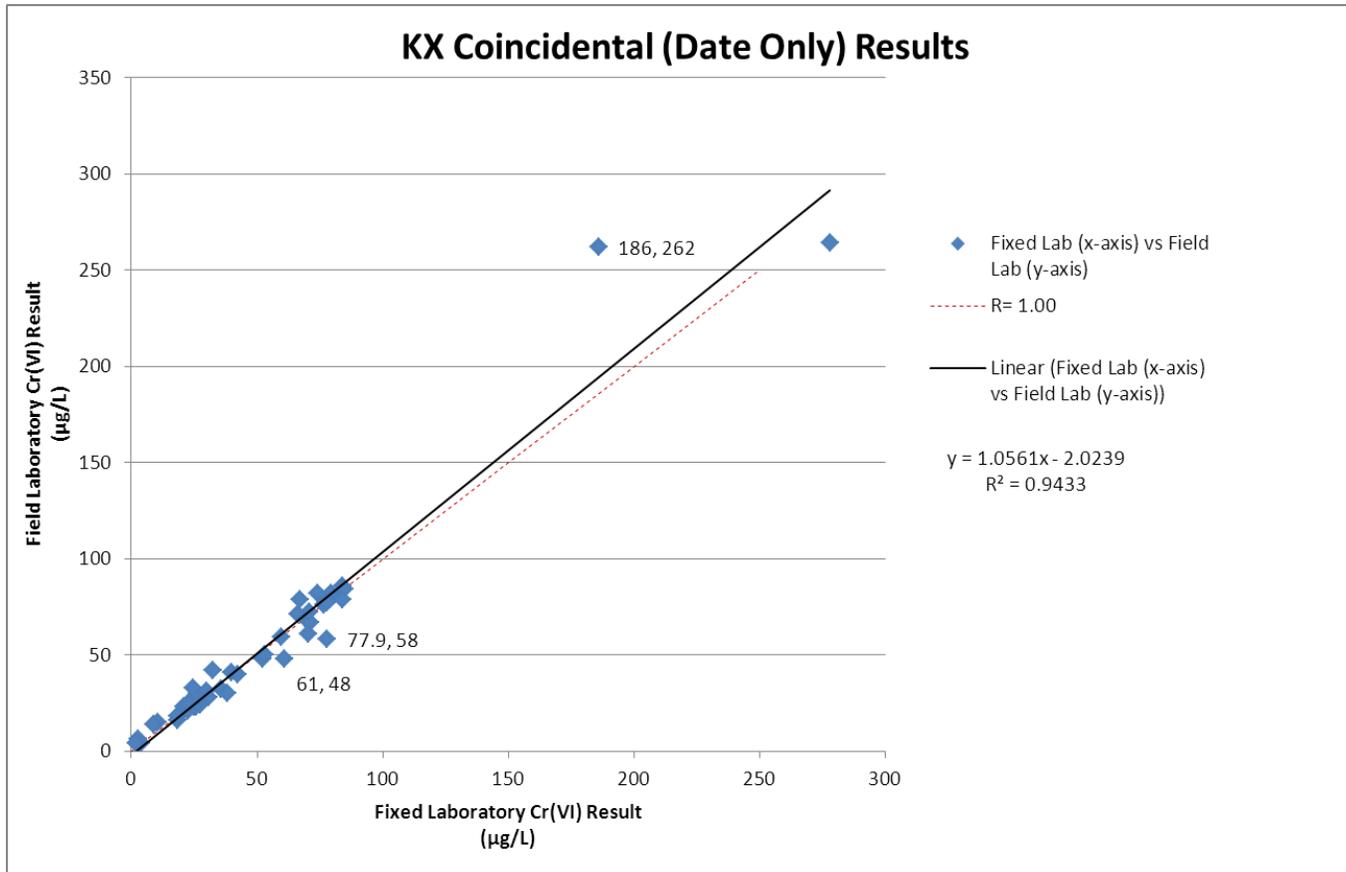


Figure 6. KX Coincidental (Date only) Results

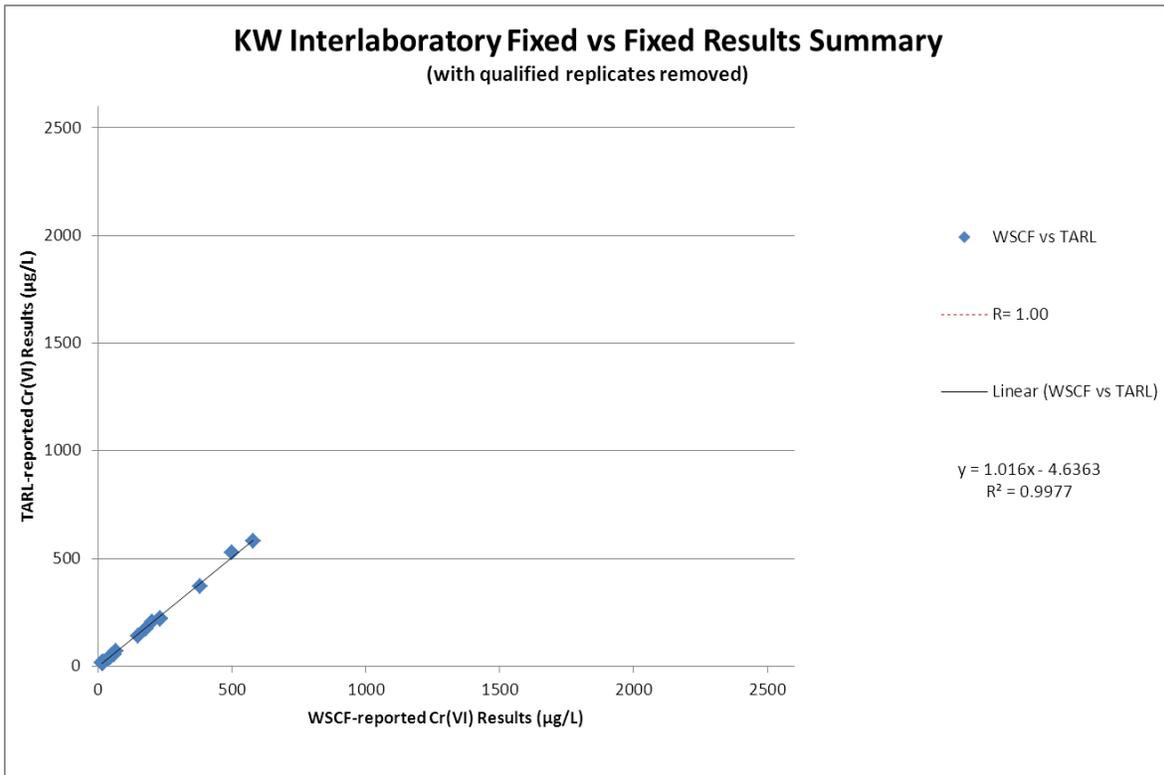
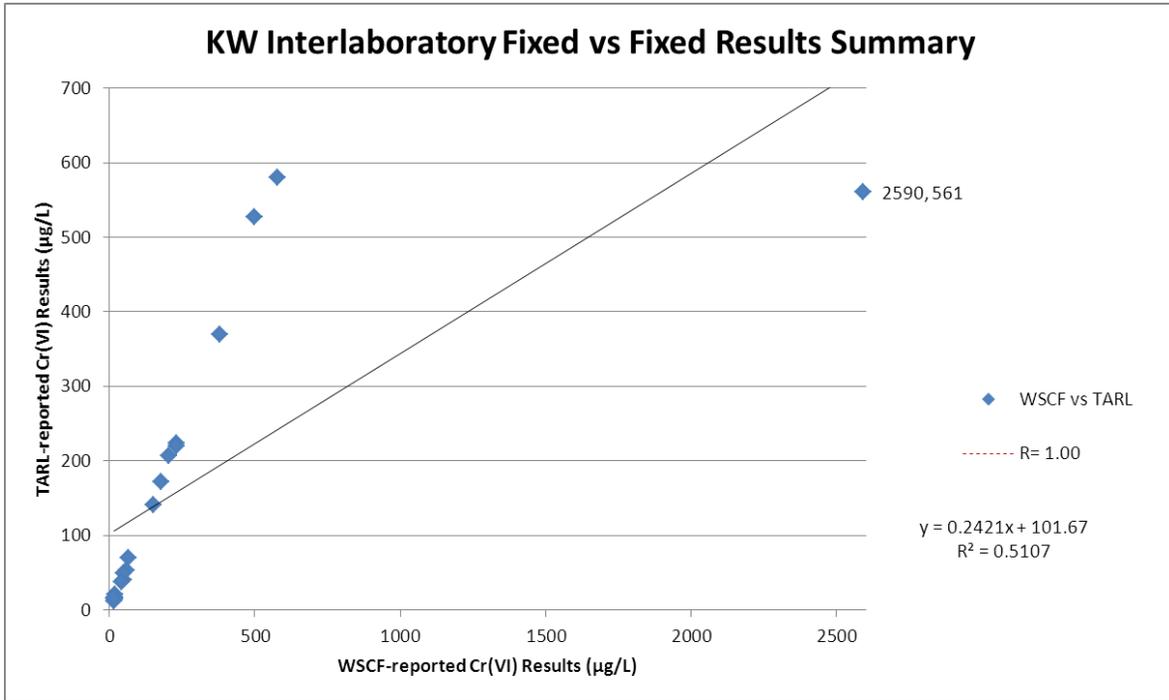


Figure 7. KW Interlaboratory Fixed vs Fixed Results (with and without Qualified Replicates)

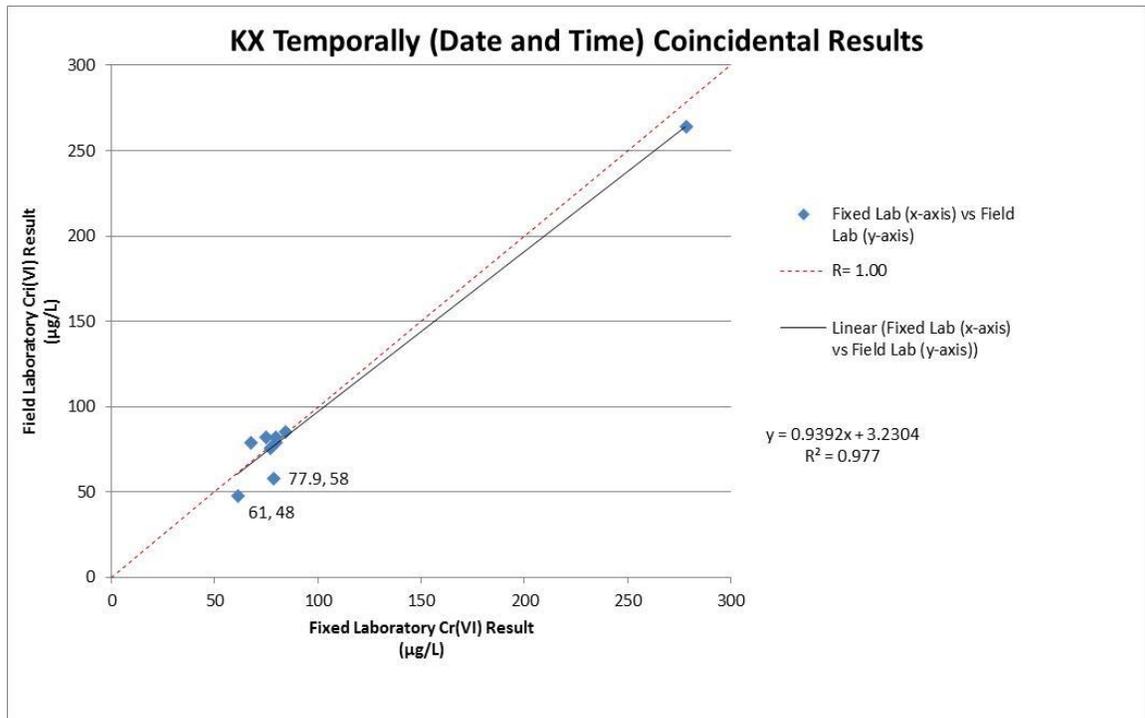
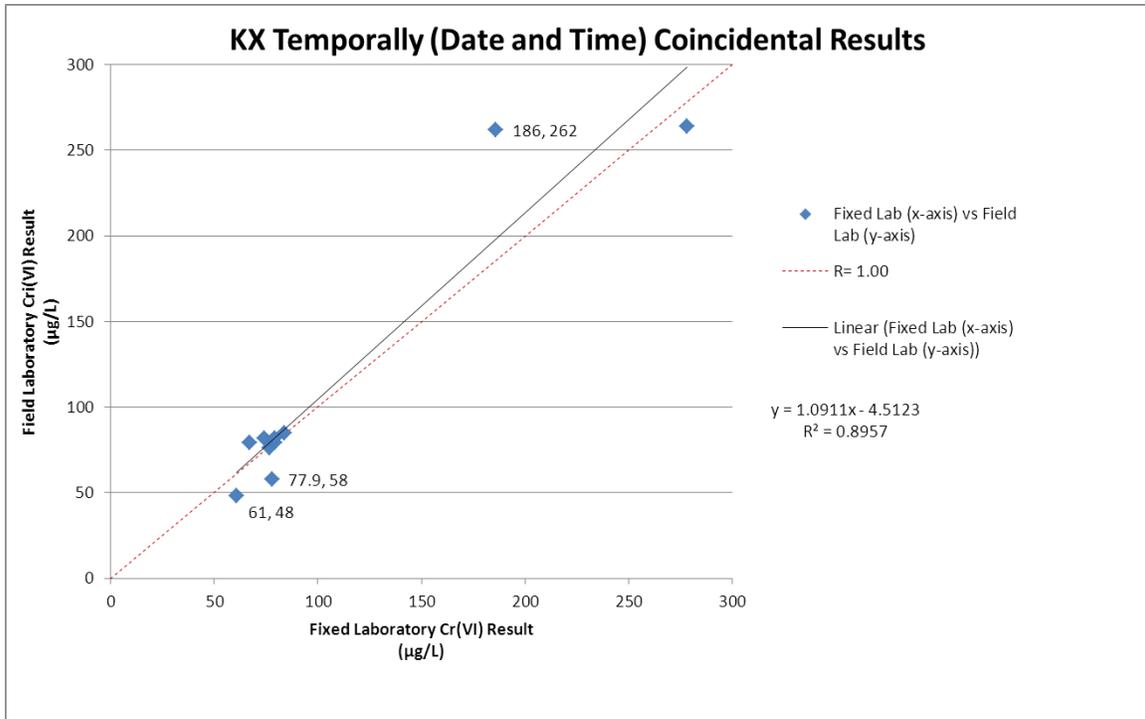


Figure 8. KX Temporally (Date and Time) Coincidental Field vs Fixed Results (with and without Qualified Replicates)

Table 1. Summary of Linear Correlations and Relative Percent Differences for Field and Fixed Laboratory Cr(VI) Results 100-KR-4 Groundwater Operable Unit Pump and Treat Systems

System	Field vs Fixed (Temporally Coincidental)			Field vs Fixed (Same Date Coincidental)			Fixed vs Fixed (Interlaboratory) (Temporally Coincidental)		
	Total Number of Replicate Pairs	% of Replicate Pairs RPD > 20% (total)	% of Replicate Pairs RPD > 20% (unqualified)	Total Number of Replicate Pairs	% of Replicate Pairs RPD > 20% (total)	% of Replicate Pairs RPD > 20% (unqualified)	Total Number of Replicate Pairs	% of Replicate Pairs RPD > 20% (total)	% of Replicate Pairs RPD > 20% (unqualified)
KR4	26	23%	15%	54	43%	13%	19	32%	11%
KW	6	0%	0%	42	10%	10%	20	15%	10%
KX	10	30%	10%	49	20%	12%	9	11%	0%

Table 2. Summary of Linear Correlations and Relative Percent Differences for Field and Fixed Laboratory Cr(VI) Results 100-KR-4 Groundwater Operable Unit Pump and Treat Systems

System	Field vs Fixed (Temporally Coincidental)		Field vs Fixed (Same Date Coincidental)		Fixed vs Fixed (Interlaboratory) (Temporally Coincidental)	
	Total Number of Replicate Pairs	Linear Correlation (R-squared)	Total Number of Replicate Pairs	Linear Correlation (R-squared)	Total Number of Replicate Pairs	Linear Correlation (R-squared)
KR4	26	0.9688	113	0.9801	19	0.9892
KW	6	0.9993	42	0.9920	20	0.5107
KX	10	0.8957	49	0.9433	9	0.9993

Table 3. 100-KR-4 OU Pump and Treat System Extraction Wells

KR4 System				
199-K-113A	199-K-115A	199-K-120A	199-K-129	199-K-145
199-K-114A	199-K-116A	199-K-127	199-K-144	199-K-162
KW System				
199-K-132	199-K-138	199-K-140	199-K-166	199-K-173
199-K-137	199-K-139	199-K-165	199-K-168	--
KX System				
199-K-130	199-K-146	199-K-152	199-K-161	199-K-178
199-K-131	199-K-147	199-K-153	199-K-163	199-K-182
199-K-141	199-K-148	199-K-154	199-K-171	--

Table 4. Summary of Well Construction Dates and Earliest Reported Sample Dates for the 100-KR-4 OU Extraction Wells

Well Name	Construction Date	Earliest Reported Sample Date	Earliest Reported Sample Date < Well Construction Date
KR4 System			
199-K-113A	9/24/1996	11/12/1996	No
199-K-114A	9/30/1996	2/26/1997	No
199-K-115A	10/4/1996	9/12/1997	No
199-K-116A	10/16/1996	11/20/1996	No
199-K-120A	10/4/1996	11/26/1996	No
199-K-127 ^a	2/1/2002	5/14/2002	No
199-K-129	2/14/2003	8/4/2003	No
199-K-144	3/13/2008	4/7/2008	No
199-K-145	4/11/2008	4/15/2008	No
199-K-162	2/22/2008	4/4/2008	No
KW System			
199-K-132	10/1/2004	1/17/2006	No
199-K-137	9/22/2006	9/15/2006	Yes
199-K-138	9/13/2006	10/12/2006	No
199-K-139	9/14/2006	10/31/2006	No
199-K-140	9/21/2006	10/31/2006	No
199-K-165	9/8/2008	8/28/2008	Yes
199-K-166	9/23/2008	9/11/2008	Yes

Table 4. Summary of Well Construction Dates and Earliest Reported Sample Dates for the 100-KR-4 OU Extraction Wells

Well Name	Construction Date	Earliest Reported Sample Date	Earliest Reported Sample Date < Well Construction Date
199-K-168	8/25/2008	8/7/2008	Yes
199-K-173	9/26/2008	9/20/2008	Yes
KX System			
199-K-130	2/14/2003	3/26/2003	No
199-K-131	9/29/2004	10/20/2004	No
199-K-141	1/3/2007	6/29/2007	No
199-K-146	12/17/2007	1/4/2008	No
199-K-147	11/13/2007	11/15/2007	No
199-K-148	11/7/2007	11/14/2007	No
199-K-152	1/8/2008	2/1/2008	No
199-K-153	11/30/2007	1/3/2008	No
199-K-154	11/14/2007	11/20/2007	No
199-K-161	12/5/2007	1/4/2008	No
199-K-163	11/6/2007	11/16/2007	No
199-K-171	8/14/2008	8/18/2008	No
199-K-178	10/7/2009	9/15/2009	Yes
199-K-182	12/28/2009	12/28/2009	No

a. For well 199-K-27, the construction date was obtained from the finish date documented in the well construction summary report (0544244).

Table 5. Summary of Data Selection and Reduction

Pump and Treat System	Number of Records Retrieved	Number of Records Removed	Number of Records Retained
KR4	1805	631	1174
KW	1651	100	1551
KX	1402	67	1335

Table 6. KR4 System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
FIELD		
U	3	Analyzed for but not detected above limiting criteria.
MOBILE: None Reported		
TARL		
U	4	Analyzed for but not detected above limiting criteria.
WSCF		
B	2	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
N	1	Spike and/or spike duplicate sample recovery is outside control limits.
U	3	Analyzed for but not detected above limiting criteria.
X	1	The result-specific translation of this qualifier code is provided in the hardcopy data report and/or case narrative.
Review Qualifier	Number of Review Qualifiers Reported	Review Qualifier Definition
FIELD		
F	1	The result is undergoing further review
MOBILE: None Reported		
TARL		
H	2	Laboratory holding time exceeded before the sample was analyzed.
WSCF		
Y	4	Result suspect. Review - insufficient evidence to show result valid or invalid.
Validation Qualifier		
No validation qualifiers were associated with the Cr(VI) results as reported for the KR4 Pump and Treat System.		

Table 7. KW System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
222-S: None Reported		
FIELD: None Reported		
MOBILE: None Reported		
STLRL: None Reported		
TARL		
D	1	Analyte was reported at a secondary dilution factor, typically DF>1 (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference)
U	1	Analyzed for but not detected above limiting criteria.
WSCF		
B	1	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
D	27	Analyte was reported at a secondary dilution factor, typically DF>1 (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference).
DN	2	Analyte was reported at a secondary dilution factor, typically DF>1 (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference); Spike and/or spike duplicate sample recovery is outside control limits.
N	13	Spike and/or spike duplicate sample recovery is outside control limits.
Review Qualifier	Number of Review Qualifiers Reported	Review Qualifier Definition
222-S		
G	4	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
FIELD		
G	6	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
Y	2	Result suspect. Review - insufficient evidence to show result valid or invalid.
MOBILE		
G	5	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
STLRL: None Reported		
TARL		

Table 7. KW System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
A	1	Not defined in HEIS dictionary
H	6	Laboratory holding time exceeded before the sample was analyzed.
Y	1	Result suspect. Review - insufficient evidence to show result valid or invalid.
WSCF		
G	4	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
H	2	Laboratory holding time exceeded before the sample was analyzed.
Y	1	Result suspect. Review - insufficient evidence to show result valid or invalid.
Validation Qualifier	Number of Validation Qualifiers Reported	Validation Qualifier Definition
222-S: None Reported		
FIELD: None Reported		
MOBILE: None Reported		
STLRL: None Reported		
TARL		
J	1	Estimated value: The associated result value may not reflect quantitation/detection levels (if assigned with an associated "U" qualifier) or actual concentrations with the precision/accuracy typically associated with results by this methodology. Result precision/accuracy may have been impacted due to minor quality control deficiency/s or sample matrix interferences identified during data validation.
WSCF: None Reported		

Table 8. KX System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
FIELD		
U	5	Analyzed for but not detected above limiting criteria.
MOBILE: None Reported		
STLRL: None Reported		
TARL		
U	2	Analyzed for but not detected above limiting criteria.
WSCF		
B	1	The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
D	3	Analyte was reported at a secondary dilution factor, typically DF>1 (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference)
N	1	Spike and/or spike duplicate sample recovery is outside control limits.
U	2	Analyzed for but not detected above limiting criteria.
Review Qualifier	Number of Review Qualifiers Reported	Review Qualifier Definition
FIELD		
F	2	The result is undergoing further review
G	3	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
Y	3	Result suspect. Review - insufficient evidence to show result valid or invalid.
MOBILE		
G	1	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
STLRL		
H	1	Laboratory holding time exceeded before the sample was analyzed.
Y	1	Result suspect. Review - insufficient evidence to show result valid or invalid.
STLSL: None Reported		
TARL		
A	1	Not defined in HEIS dictionary

Table 8. KX System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
Q	2	Associated quality control sample is out of limits.
WSCF		
F	2	The result is undergoing further review
H	2	Laboratory holding time exceeded before the sample was analyzed.
Validation Qualifier		
No validation qualifiers were associated with the Cr(VI) results as reported for the KX Pump and Treat System.		

Table 9. KR4 System Field versus Fixed Laboratory Temporally (Date and Time) Coincidental Results Comparison

Sample Date and Time	Reporting Laboratory Cr(VI) Results (µg/L)*							Field versus Fixed Summary			
	FIELD	QTESRL	RFWLVL	RLNP	STLRL	TARL	WSCF	Field Cr(VI) Results (µg/L)	Fixed Cr(VI) Results (µg/L)	Relative Percent Difference	Additional Notes
199-K-113A											
2/21/2006 10:20	51						48	51	48	6%	
5/24/2006 8:05	22						15	22	15	38%	Nothing noted
5/24/2006 8:10	22						15	22	15	38%	Nothing noted
11/21/2006 9:15	70						64	70	64	9%	
5/22/2007 10:56	8						13	8	13	48%	Nothing noted
199-K-114A											
5/24/2006 8:20	6						2	6	2	100%	WSCF result lab qualified with "U" flag (MDL)
8/14/2006 9:47	44						41	44	41	7%	
11/21/2006 9:30	73						68	73	68	7%	
5/22/2007 11:03	5						2	5	2	86%	Both lab qualified with "U" flag (MDLs)
199-K-115A											
11/21/2006 9:35	88						82	88	82	7%	
11/21/2006 9:40	87						82	87	82	6%	
5/22/2007 11:10	33						39	33	39	17%	
199-K-116A											
5/24/2006 9:15	39						34	39	34	14%	
11/21/2006 10:20	76						71	76	71	7%	
2/6/2007 8:55	64.5						60.5	64.5	60.5	6%	
5/22/2007 9:42	25.5						29.5	25.5	29.5	15%	

Table 9. KR4 System Field versus Fixed Laboratory Temporally (Date and Time) Coincidental Results Comparison

Sample Date and Time	Reporting Laboratory Cr(VI) Results (µg/L)*							Field versus Fixed Summary			
	FIELD	QTESRL	RFWLVL	RLNP	STLRL	TARL	WSCF	Field Cr(VI) Results (µg/L)	Fixed Cr(VI) Results (µg/L)	Relative Percent Difference	Additional Notes
199-K-120A											
5/24/2006 7:40	69						64	69	64	8%	
11/21/2006 8:15	57						52	57	52	9%	
5/22/2007 10:28	51						55	51	55	8%	
8/13/2007 12:00	49						51	49	51	4%	
8/13/2007 12:05	47						51	47	51	8%	
199-K-127											
5/24/2006 7:30	32						29	32	29	10%	
11/21/2006 8:30	28						24	28	24	15%	
5/22/2007 10:33	16						22	16	22	32%	Nothing noted
199-K-129											
11/21/2006 9:00	51						47	51	47	8%	
5/22/2007 11:16	26						30	26	30	14%	

*Replicates by laboratory are averaged if applicable

Table 10. KW System Field versus Fixed Laboratory Temporally (Date and Time) Coincidental Results Comparison

Sample Date and Time	Reporting Laboratory Cr(VI) Results (µg/L)*						Field versus Fixed Summary			
	FIELD	MOBILE	222-S	STLRL	TARL	WSCF	Field Cr(VI) Results (µg/L)	Fixed Cr(VI) Results (µg/L)	Relative Percent Difference	Additional Notes
199-K-137										
10/24/06 11:40	1804			2080			1804	2080	14%	
199-K-138										
8/30/07 8:45	52					56	52	56	7%	
8/30/07 8:50	53					56	53	56	6%	
199-K-139										
1/30/07 8:50		315				311	315	311	1%	
5/24/07 8:37	221					220	221	220	0%	
199-K-140										
5/24/07 8:30	36					34	36	34	6%	

*Replicates by laboratory are averaged if applicable

Table 11. KX System Field versus Fixed Laboratory Temporally (Date and Time) Coincidental Results Comparison

Sample Date and Time	Reporting Laboratory Cr(VI) Results (µg/L)						Field versus Fixed Summary			
	FIELD	MOBILE	STLRL	STLSL	TARL	WSCF	Field Laboratory Result	Fixed Laboratory Result	Relative Percent Difference	Additional Notes
199-K-130										
3/7/2006 11:14	85					84	85	84	1%	
8/1/2007 9:00	76					76.6	76	76.6	1%	
199-K-131										
3/7/2006 12:13		79	67				79	67	16%	
9/18/2006 9:35		48	61				48	61	24%	Nothing noted
11/16/2006 11:40		82				74.3	82	74.3	10%	
2/14/2007 8:52		58				77.9	58	77.9	29%	WSCF result lab qualified with "D" flag (dilution factor of 4.65)
6/4/2007 12:05		79				79.2	79	79.2	0%	
6/13/2007 10:44		82				79.3	82	79.3	3%	
199-K-141										
6/29/2007 11:42		262	186				262	186	34%	Field result review qualified with "G" flag; STLRL result review qualified with "Y" flag
8/14/2007 10:10	264					278	264	278	5%	

*Replicates by laboratory are averaged if applicable

Table 12. KR4 System Field versus Fixed Laboratory Coincidental (Date Only) Results Comparison

Sample Date	Field Cr(VI) Results (µg/L)*				Fixed Cr(VI) Results (µg/L)*				Field versus Fixed Summary	
	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Relative Percent Difference	Additional Notes
199-K-113A										
2/21/2006	3	51	52	51.3	1	48	48	48	7%	
5/24/2006	2	22	22	22	2	15	15	15	38%	Nothing Noted
11/21/2006	1	70	70	70	1	64	64	64	9%	
5/22/2007	1	8	8	8	1	13	13	13	48%	Nothing Noted
7/26/2010	1	3	3	3	4	2	3.7	2.85	5%	
1/31/2011	1	0	0	0	2	2	2	2	200%	All results lab qualified with "U" flag (MDLs)
11/15/2011	1	3	3	3	1	3.7	3.7	3.7	21%	TARL result lab qualified with "U" flag (MDL) and review qualified with "H" flag
6/12/2012	1	3	3	3	1	2	2	2	40%	WSCF Result lab qualified with "U" flag (MDL)
199-K-114A										
5/24/2006	1	6	6	6	1	2	2	2	100%	WSCF Result lab qualified with "U" flag (MDL)
8/14/2006	2	44	45	44.5	1	41	41	41	8%	
11/21/2006	1	73	73	73	1	68	68	68	7%	
5/22/2007	1	5	5	5	1	2	2	2	86%	Both results lab qualified with "U" flag (MDLs)
1/31/2011	1	1	1	1	2	2	2	2	67%	WSCF results lab qualified with "U" flag (MDLs)
11/15/2011	1	2	2	2	1	3.7	3.7	3.7	60%	TARL result lab qualified with "U" flag (MDL) and review qualified with "H" flag
6/12/2012	1	5	5	5	1	2	2	2	86%	WSCF Result lab qualified with "U" flag (MDL)
199-K-115A										
5/24/2006	1	50	50	50	1	41	41	41	20%	
11/21/2006	2	87	88	87.5	2	82	82	82	6%	
5/22/2007	1	33	33	33	1	39	39	39	17%	
1/31/2011	1	13	13	13	2	13.9	14.5	14.2	9%	
6/12/2012	1	4	4	4	1	6.3	6.3	6.3	45%	Nothing Noted
199-K-116A										
5/24/2006	1	39	39	39	1	34	34	34	14%	
11/21/2006	1	76	76	76	1	71	71	71	7%	
2/6/2007	2	64	65	64.5	2	60	61	60.5	6%	
5/22/2007	2	25	26	25.5	2	29	30	29.5	15%	
1/31/2011	1	7	7	7	2	10.3	10.5	10.4	39%	Nothing Noted
6/12/2012	1	9	9	9	1	6.3	6.3	6.3	35%	Nothing Noted
199-K-120A										
5/24/2006	1	69	69	69	1	64	64	64	8%	
11/21/2006	1	57	57	57	1	52	52	52	9%	
5/22/2007	1	51	51	51	1	55	55	55	8%	

Table 12. KR4 System Field versus Fixed Laboratory Coincidental (Date Only) Results Comparison

Sample Date	Field Cr(VI) Results (µg/L)*				Fixed Cr(VI) Results (µg/L)*				Field versus Fixed Summary	
	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Relative Percent Difference	Additional Notes
8/13/2007	2	47	49	48	2	51	51	51	6%	
7/26/2010	1	7	7	7	2	4.8	5	4.9	35%	One WSCF result lab qualified with "B" flag
1/31/2011	1	3	3	3	2	5.1	6	5.55	60%	Nothing Noted
11/15/2011	1	6	6	6	1	3.7	3.7	3.7	47%	TARL result lab qualified with "U" flag (MDL)
6/12/2012	1	7	7	7	1	3.6	3.6	3.6	64%	WSCF Result lab qualified with "B" flag
199-K-127										
5/24/2006	1	32	32	32	1	29	29	29	10%	
11/21/2006	1	28	28	28	1	24	24	24	15%	
5/22/2007	1	16	16	16	1	22	22	22	32%	Nothing Noted
7/26/2010	1	5	5	5	4	2	3.7	2.85	55%	All fixed results (2 WSCF 2 TARL) lab qualified with "U" flag
1/31/2011	1	1	1	1	2	3.8	4.1	3.95	119%	WSCF results lab qualified with "U" flag (MDLs)
11/15/2011	1	3	3	3	1	3.7	3.7	3.7	21%	TARL result lab qualified with "U" flag (MDL)
6/12/2012	1	6	6	6	1	3.6	3.6	3.6	50%	WSCF Result lab qualified with "B" flag
199-K-129										
5/24/2006	1	40	40	40	1	36	36	36	11%	
11/21/2006	1	51	51	51	1	47	47	47	8%	
5/22/2007	1	26	26	26	1	30	30	30	14%	
199-K-144										
1/31/2011	1	21	21	21	2	21.6	21.6	21.6	3%	
5/9/2011	1	28	28	28	2	26	29	27.5	2%	
11/1/2011	1	25	25	25	2	23	24	23.5	6%	
6/12/2012	1	30	30	30	2	30	33	31.5	5%	
199-K-145										
1/31/2011	1	46	46	46	2	45.9	46.7	46.3	1%	
5/9/2011	1	35	35	35	2	33	34	33.5	4%	
11/1/2011	1	25	25	25	1	23	23	23	8%	
6/12/2012	1	22	22	22	1	26.3	26.3	26.3	18%	
199-K-162										
11/1/2011	1	5	5	5	1	3.7	3.7	3.7	30%	TARL result lab qualified with "U" flag (MDL)
6/12/2012	1	6	6	6	2	5	8	6.5	8%	

Table 13. KW System Field versus Fixed Laboratory Coincidental (Date Only) Results Comparison

Sample Date	Field Cr(VI) Results (µg/L)*				Fixed Cr(VI) Results (µg/L)*				Field versus Fixed Summary	
	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Relative Percent Difference	Additional Notes
199-K-132										
11/29/2007	1	85	85	85	1	76	76	76	11%	
2/7/2008	1	71	71	71	2	67	70	68.5	4%	
10/28/2008	1	39	39	39	2	42.2	43.2	42.7	9%	
10/20/2009	1	28	28	28	4	27.3	28.6	27.95	0.2%	
8/24/2010	1	23	23	23	4	20.4	20.5	20.425	12%	
11/22/2010	1	21	21	21	2	16.3	16.8	16.55	24%	Nothing noted
5/31/2012	1	20	20	20	1	20	20	20	0%	
199-K-137										
10/24/2006	1	1804	1804	1804	1	2080	2080	2080	14%	
10/20/2009	1	217	217	217	2	216	218	217	0%	
8/24/2010	1	125	125	125	2	104	104	104	18%	
9/27/2011	1	49	49	49	1	47	47	47	4%	
5/31/2012	1	39	39	39	1	36	36	36	8%	
199-K-138										
8/30/2007	2	52	53	52.5	2	56	56	56	6%	
11/29/2007	1	56	56	56	2	50	75	62.5	11%	
2/7/2008	1	53	53	53	2	49	49	49	8%	
10/28/2008	1	40	40	40	1	41	41	41	2%	
10/20/2009	1	34	34	34	2	36.8	37.4	37.1	9%	
8/24/2010	1	24	24	24	2	21.1	21.1	21.1	13%	
11/22/2010	1	25	25	25	2	20.6	20.8	20.7	19%	
5/31/2012	1	14	14	14	1	13.1	13.1	13.1	7%	
199-K-139										
1/30/2007	2	301	315	308	1	311	311	311	1%	
5/24/2007	1	221	221	221	1	220	220	220	0.5%	
11/29/2007	1	197	197	197	1	174	174	174	12%	
2/7/2008	1	216	216	216	4	202	209	205.5	5%	
8/24/2010	1	24	24	24	2	38.3	38.8	38.55	47%	Nothing noted
5/31/2012	1	14	14	14	1	12.4	12.4	12.4	12%	

Table 13. KW System Field versus Fixed Laboratory Coincidental (Date Only) Results Comparison

Sample Date	Field Cr(VI) Results (µg/L)*				Fixed Cr(VI) Results (µg/L)*				Field versus Fixed Summary	
	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Relative Percent Difference	Additional Notes
199-K-140										
5/24/2007	1	36	36	36	1	34	34	34	6%	
11/29/2007	1	20	20	20	1	19	19	19	5%	
2/7/2008	1	22	22	22	2	17	19	18	20%	
10/28/2008	1	15	15	15	2	11	16.2	13.6	10%	
10/20/2009	1	13	13	13	2	13.6	13.7	13.65	5%	
199-K-165										
10/20/2009	1	230	230	230	2	234	234	234	2%	
8/24/2010	1	183	183	183	2	353	356	354.5	64%	Nothing noted
9/27/2011	1	149	149	149	2	141	151	146	2%	
5/31/2012	1	91	91	91	1	99.5	99.5	99.5	9%	
199-K-166										
10/20/2009	1	56	56	56	2	51.8	56.2	54	4%	
8/24/2010	1	62	62	62	2	65.6	66.1	65.85	6%	
11/22/2010	1	33	33	33	2	30	30.5	30.25	9%	
6/20/2012	1	9	9	9	2	9.1	9.3	9.2	2%	
199-K-168										
10/20/2009	1	130	130	130	2	126	127	126.5	3%	
8/24/2010	1	39	39	39	2	74.4	75.1	74.75	63%	Nothing noted
6/20/2012	1	28	28	28	1	30	30	30	7%	

Table 14. KX System Field versus Fixed Laboratory Coincidental (Date Only) Results Comparison

Sample Date	Field Cr(VI) Results (µg/L)*				Fixed Cr(VI) Results (µg/L)*				Field versus Fixed Summary	
	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Relative Percent Difference	Additional Notes
199-K-130										
3/7/2006	2	85	86	85.5	1	84	84	84	2%	
8/1/2007	1	76	76	76	1	76.6	76.6	76.6	1%	
4/21/2011	1	42	42	42	2	30	34.9	32.5	26%	Nothing noted
11/1/2011	1	25	25	25	1	24	24	24	4%	
6/26/2012	1	16	16	16	1	18.4	18.4	18.4	14%	
199-K-131										
3/7/2006	1	79	79	79	1	67	67	67	16%	
9/18/2006	1	48	48	48	1	61	61	61	24%	Nothing noted
11/16/2006	1	82	82	82	1	74.3	74.3	74.3	10%	
2/14/2007	1	58	58	58	1	77.9	77.9	77.9	29%	WSCF result lab qualified with "D" flag (dilution factor of 4.65)
6/4/2007	1	79	79	79	1	79.2	79.2	79.2	0.3%	
6/13/2007	1	82	82	82	1	79.3	79.3	79.3	3%	
4/21/2011	1	30	30	30	2	25.8	26.3	26.1	14%	
5/31/2012	1	15	15	15	1	10.4	10.4	10.4	36%	Nothing noted
199-K-141										
6/29/2007	1	262	262	262	1	186	186	186	34%	Field result review qualified with "G" flag; STLRL result review qualified with "Y" flag
8/14/2007	1	264	264	264	1	278	278	278	5%	
7/26/2010	1	32	32	32	2	35.7	35.8	35.8	11%	
5/14/2012	1	24	24	24	1	27.3	27.3	27.3	13%	
6/20/2012	1	23	23	23	1	26	26	26	12%	
199-K-146										
11/1/2011	1	14	14	14	1	9	9	9	43%	Nothing noted
5/31/2012	1	6	6	6	1	2.6	2.6	2.6	79%	WSCF result lab qualified with "B" flag
199-K-147										
5/31/2012	1	18	18	18	1	18.6	18.6	18.6	3%	
199-K-148										
4/21/2011	1	33	33	33	2	24.7	24.7	24.7	29%	Nothing noted
11/1/2011	1	25	25	25	1	23	23	23	8%	
5/31/2012	1	18	18	18	1	18.2	18.2	18.2	1%	

Table 14. KX System Field versus Fixed Laboratory Coincidental (Date Only) Results Comparison

Sample Date	Field Cr(VI) Results (µg/L)*				Fixed Cr(VI) Results (µg/L)*				Field versus Fixed Summary	
	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Number of Results Reported	Minimum Concentration	Maximum Concentration	Average Concentration	Relative Percent Difference	Additional Notes
199-K-152										
4/21/2011	1	69	69	69	2	69.1	69.6	69.4	1%	
5/31/2012	1	67	67	67	1	71.2	71.2	71.2	6%	
199-K-153										
7/26/2010	1	28	28	28	2	29.7	30.9	30.3	8%	
11/22/2010	1	31	31	31	2	29.9	30.2	30.1	3%	
11/1/2011	1	23	23	23	1	21	21	21	9%	
5/31/2012	1	23	23	23	1	25.5	25.5	25.5	10%	
199-K-154										
11/22/2010	1	84	84	84	2	84.7	85.2	85.0	1%	
4/21/2011	1	77	77	77	2	77.6	77.8	77.7	1%	
11/1/2011	1	72	72	72	1	71	71	71	1%	
5/31/2012	1	61	61	61	1	70.2	70.2	70.2	14%	
199-K-161										
5/9/2011	1	4	4	4	2	2	6	4	0%	
5/31/2012	1	4	4	4	1	2	2	2	67%	WSCF result lab qualified with "U" flag (MDL)
199-K-163										
11/22/2010	1	48	48	48	2	52.2	52.5	52.4	9%	
4/21/2011	2	22	38	30	2	38	38.6	38.3	24%	Nothing noted
11/1/2011	1	41	41	41	1	40	40	40	2%	
5/31/2012	1	28	28	28	1	30.6	30.6	30.6	9%	
199-K-171										
4/1/2010	1	71	71	71	4	63	68.9	66.1	7%	
11/22/2010	1	50	50	50	2	52.8	53	52.9	6%	
5/31/2012	1	40	40	40	1	42.4	42.4	42.4	6%	
199-K-178										
4/1/2010	1	79	79	79	4	78	89.1	84.2	6%	
4/6/2010	1	59	59	59	4	55	64.2	59.8	1%	
7/26/2010	1	23	23	23	4	24.6	25.6	25.1	9%	
8/23/2010	1	24	24	24	2	23.2	24.5	23.9	1%	
5/14/2012	1	21	21	21	1	22.6	22.6	22.6	7%	
6/20/2012	1	24	24	24	1	22.5	22.5	22.5	6%	

Table 15. KR4 System Field Laboratory Replicate Cr(VI)Results Comparison

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
199-K-114A						
11/4/2008 8:30	2	81	86	83.5	6%	
11/1/2009 11:00	2	56	56	56	0%	
199-K-116A						
2/6/2007 8:55	2	64	65	64.5	2%	
5/22/2007 9:42	2	25	26	25.5	4%	
12/1/2008 8:00	2	54	55	54.5	2%	
3/2/2009 11:45	2	41	51	46	22%	both unfiltered; replicate Lab QC type
7/6/2009 11:15	2	31	33	32	6%	
199-K-127						
5/4/2010 8:20	2	6	6	6	0%	
199-K-162						
5/11/2010 9:30	2	16	25	20.5	44%	both unfiltered; no designation of Lab QC type

Table 16. KW System Field Laboratory Replicate Cr(VI) Results Comparison

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
199-K-138						
1/9/2007 10:33	2	73	74	73.5	1.4%	
199-K-139						
10/31/2006 11:17	2	292	295	293.5	1%	
4/27/2007 12:30	2	239	242	240.5	1%	
199-K-140						
7/25/2007 11:40	2	15	15	15	0	
199-K-168						
6/28/2010 8:30	2	11	67	39	144%	Nothing noted
3/5/2012 9:45	2	31	43	37	32%	Nothing noted

Table 17. KX System Field Laboratory Replicate Cr(VI) Results Comparison

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
199-K-130						
10/16/2006 12:04	2	93	94	93.5	1%	
199-K-131						
4/3/2006 10:11	2	81	82	81.5	1%	
12/21/2006 12:45	2	82	83	82.5	1%	
199-K-163						
4/21/2011 10:50	2	22	38	30	53%	Nothing noted

Table 18. KR4 System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
TARL						
199-K-113A						
7/26/2010 10:47	2	3.7	3.7	3.7	0%	
199-K-127						
7/26/2010 9:36	2	3.7	3.7	3.7	0%	
199-K-144						
5/21/2009 12:58	4	6	11	8	63%	Four samples (two filtered [6 and 6 ug/L--0% RPD]; two unfiltered [9 and 11 ug/L--10% RPD])
5/9/2011 11:40	2	26	29	27.5	11%	
11/1/2011 12:25	2	23	24	23.5	4%	
199-K-145						
5/9/2011 11:55	2	33	34	33.5	3%	
199-K-162						
2/17/2011 11:05	2	3.7	3.7	3.7	0%	
WSCF						
199-K-113A						
10/21/2009 8:20	2	58	58	58	0.0%	
7/26/2010 10:47	2	2	2	2	0.0%	
1/31/2011 12:38	2	2	2	2	0.0%	
4/21/2011 8:25	2	2	2	2	0.0%	
199-K-114A						
10/21/2009 9:00	2	62.6	62.9	62.8	0.5%	

Table 18. KR4 System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
6/16/2010 13:55	2	2	2	2	0.0%	
1/31/2011 12:21	2	2	2	2	0.0%	
4/21/2011 9:38	2	2	2	2	0.0%	
199-K-115A						
10/21/2009 9:20	2	84.3	84.4	84.4	0.1%	
6/16/2010 13:55	2	3	3.3	3.15	9.5%	
1/31/2011 12:03	2	13.9	14.5	14.2	4.2%	
4/21/2011 8:46	2	8.5	8.6	8.55	1.2%	
199-K-116A						
2/6/2007 8:55	2	60	61	60.5	1.7%	
5/22/2007 9:42	2	29	30	29.5	3.4%	
10/21/2009 11:10	2	25.3	25.5	25.4	0.8%	
6/16/2010 12:38	2	6.1	6.6	6.35	7.9%	
1/31/2011 11:26	2	10.3	10.5	10.4	1.9%	
4/21/2011 10:50	2	7.1	7.3	7.2	2.8%	
199-K-120A						
4/1/2010 10:55	2	4.2	4.4	4.3	4.7%	
7/26/2010 9:00	2	4.8	5	4.9	4.1%	
1/31/2011 9:53	2	5.1	6	5.55	16.2%	
4/21/2011 10:20	2	2.7	2.9	2.8	7.1%	
199-K-127						
3/21/2008 11:30	2	13	13	13	0.0%	

Table 18. KR4 System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
4/1/2010 10:22	2	3.9	3.9	3.9	0.0%	
7/26/2010 9:36	2	2	2	2	0.0%	
1/31/2011 9:30	2	3.8	4.1	3.95	7.6%	
4/21/2011 10:02	2	2	2	2	0.0%	
199-K-129						
10/21/2009 9:37	2	45.2	45.4	45.3	0.4%	
6/16/2010 13:13	2	14.6	15.1	14.9	3.4%	
199-K-144						
4/1/2010 11:21	2	25.5	25.6	25.6	0.4%	
6/16/2010 12:40	2	56.2	56.7	56.5	0.9%	
1/31/2011 10:52	2	21.6	21.6	21.6	0.0%	
10/25/2012 11:56	2	26.8	26.9	26.9	0.4%	
199-K-145						
2/18/2010 11:12	2	73.7	74.2	74.0	0.7%	
6/16/2010 12:57	2	28.3	28.7	28.5	1.4%	
1/31/2011 10:12	2	45.9	46.7	46.3	1.7%	
199-K-162						
4/1/2010 12:05	2	16.4	16.6	16.5	1.2%	
7/26/2010 11:56	2	9.7	9.9	9.8	2.0%	
2/17/2011 11:05	2	2	2.2	2.1	9.5%	
4/21/2011 10:30	2	2	2	2	0.0%	

Table 19. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
222-S						
199-K-173						
3/10/2010 9:29	4	960	974	966.5	1%	Four samples
TARL						
199-K-132						
5/21/2009 10:26	4	31	34	32.25	9%	Four samples
2/3/2010 9:05	2	19	20	19.5	5%	
2/17/2011 8:25	2	14	15	14.5	7%	
10/31/2011 9:25	2	7	8	7.5	13%	
199-K-137						
5/21/2009 9:24	2	535	808	671.5	41%	Filtered (808) vs unfiltered (535)
6/19/2009 12:41	2	578	581	579.5	1%	
2/18/2010 8:55	2	223	224	223.5	0.4%	
5/4/2011 8:25	2	53	54	53.5	1.9%	
6/22/2011 9:30	2	40	41	40.5	2.5%	
199-K-138						
5/21/2009 9:45	2	32	32	32	0.0%	
2/3/2010 9:26	2	24	25	24.5	4.1%	
199-K-139						
2/7/2008 10:16	2	205	209	207	1.9%	
9/24/2009 11:56	4	100	107	103.5	6.8%	Four samples
2/4/2010 10:46	2	108	113	110.5	4.5%	

Table 19. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
199-K-140						
5/21/2009 10:59	2	11	12	11.5	8.7%	
2/3/2010 9:39	2	4	5	4.5	22.2%	Filtered (5) vs unfiltered (4)
199-K-165						
5/21/2009 9:06	4	261	270	264.75	3.4%	Four samples
9/23/2009 9:14	2	218	221	219.5	1.4%	
2/3/2010 10:05	2	329	337	333	2.4%	
5/4/2011 7:48	2	169	174	171.5	2.9%	
11/2/2011 12:15	2	141	144	142.5	2.1%	
199-K-166						
4/1/2010 8:13	2	33	33	33	0.0%	
5/4/2011 8:57	2	16	16	16	0.0%	
199-K-168						
2/3/2010 9:51	2	95	95	95	0.0%	
WSCF						
199-K-132						
10/28/2008 10:10	2	42.2	43.2	42.7	2%	
10/20/2009 9:23	4	27.3	28.6	27.95	5%	Four samples
6/15/2010 10:35	4	21.1	22.3	21.725	6%	Four samples
8/24/2010 13:59	4	20.4	20.5	20.425	0.5%	Four samples
11/22/2010 10:15	2	16.3	16.8	16.55	3%	
2/17/2011 8:25	2	20.2	20.5	20.35	1%	

Table 19. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
6/22/2011 11:10	4	23.4	24.7	24.175	5%	Four samples
199-K-137						
7/11/2008 8:33	2	1430	1440	1435	1%	
9/8/2008 10:34	2	1370	1430	1400	4%	
11/9/2008 12:41	2	1240	1250	1245	1%	
1/26/2009 12:53	2	902	908	905	1%	
6/19/2009 12:41	2	575	583	579	1%	
9/23/2009 8:53	2	285	287	286	1%	
10/20/2009 14:30	2	216	218	217	1%	
2/18/2010 8:55	2	232	232	232	0%	
6/15/2010 9:34	2	145	145	145	0%	
8/24/2010 12:33	2	104	104	104	0%	
1/4/2011 11:10	2	93	94.1	93.55	1%	
5/4/2011 8:25	2	59	59.4	59.2	1%	
6/22/2011 9:30	2	47.8	48.2	48	1%	
7/19/2011 9:17	2	41.6	42.3	41.95	2%	
10/25/12 12:30	2	31.5	31.7	31.6	1%	
199-K-138						
10/20/2009 10:30	2	36.8	37.4	37.1	2%	
6/15/2010 9:55	2	20.8	21.3	21.05	2%	
8/24/2010 13:46	2	21.1	21.1	21.1	0%	
11/22/2010 9:35	2	20.6	20.8	20.7	1%	

Table 19. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
2/17/2011 8:45	2	16	16.1	16.05	1%	
5/4/2011 10:20	2	14.7	14.9	14.8	1%	
199-K-139						
2/7/2008 10:16	2	202	206	204	2%	
11/10/2009 11:37	2	112	117	114.5	4%	
6/15/2010 10:09	2	59.4	59.4	59.4	0%	
8/24/2010 13:34	2	38.3	38.8	38.55	1%	
1/4/2011 12:05	2	19.7	19.9	19.8	1%	
2/17/2011 8:56	2	19.1	19.5	19.3	2%	
5/4/2011 10:36	2	15.9	16.1	16	1%	
199-K-140						
7/11/2008 12:07	2	17.4	18.6	18	7%	
10/20/2009 11:04	2	13.6	13.7	13.65	1%	
5/4/2011 11:16	2	8.2	9	8.6	9%	
199-K-165						
8/28/2008 9:35	2	2810	2850	2830	1%	
6/19/2009 13:02	2	176	177	176.5	1%	
9/23/2009 9:14	2	231	231	231	0%	
10/20/2009 13:40	2	234	234	234	0%	
6/15/2010 8:36	2	285	292	288.5	2%	
8/24/2010 12:46	2	353	356	354.5	1%	
1/4/2011 9:30	4	245	249	246.75	2%	Four samples

Table 19. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
5/4/2011 7:48	2	177	179	178	1%	
6/22/2011 10:22	4	122	128	124.25	5%	Four samples
199-K-166						
6/5/2009 8:08	2	8.7	8.7	8.7	0%	
8/26/2009 11:20	2	36.7	37.5	37.1	2%	
10/20/2009 12:42	2	51.8	56.2	54	8%	
4/1/2010 8:15	2	36.2	36.8	36.5	2%	
6/15/2010 8:55	2	14.7	14.7	14.7	0%	
8/24/2010 12:58	2	65.6	66.1	65.85	1%	
11/22/2010 10:50	2	30	30.5	30.25	2%	
2/17/2011 9:22	2	9.8	9.8	9.8	0%	
5/4/2011 8:57	2	15.7	15.9	15.8	1%	
6/20/12 10:28	2	9.1	9.3	9.2	2%	
199-K-168						
11/10/2008 13:54	2	240	242	241	1%	
7/29/2009 9:49	2	135	135	135	0%	
8/12/2009 12:38	2	130	131	130.5	1%	
10/20/2009 11:49	2	126	127	126.5	1%	
6/15/2010 9:12	2	79.5	79.5	79.5	0%	
8/24/2010 13:10	2	74.4	75.1	74.75	1%	
1/4/2011 10:20	4	48	52.4	50.8	9%	Four samples
2/17/2011 9:09	2	48.8	49.4	49.1	1%	

Table 19. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
5/4/2011 9:57	4	42.7	43.4	43.05	2%	Four samples
5/17/12 8:32	2	31.3	31.5	31.4	1%	
10/25/12 13:55	2	34.9	35.1	35	1%	
199-K-173						
6/5/2009 7:48	2	32.4	34	33.2	5%	
8/12/2009 10:26	2	53.2	55	54.1	3%	
10/21/2009 12:32	2	104	104	104	0%	
4/22/2010 9:40	2	914	920	917	1%	
5/6/2010 8:35	2	581	641	611	10%	
5/14/2010 8:31	2	602	616	609	2%	
5/20/2010 14:22	2	652	659	655.5	1%	
6/6/2010 9:38	2	523	528	525.5	1%	
6/11/2010 11:48	2	296	304	300	3%	
6/23/2010 12:51	2	213	217	215	2%	
7/1/2010 12:13	2	310	312	311	1%	
7/15/2010 9:41	2	516	519	517.5	1%	
7/22/2010 9:30	2	633	634	633.5	0.2%	
7/29/2010 8:55	2	746	756	751	1%	
8/12/2010 13:51	2	966	968	967	0.2%	
1/13/2011 13:26	2	649	659	654	2%	
5/19/2011 12:40	4	246	253	249.25	3%	Four samples
6/8/2011 12:47	2	377	483	430	25%	Filtered (377) vs unfiltered (483)

Table 20. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
TARL						
199-K-131						
10/20/2009 10:10	2	56	58	57	4%	
199-K-141						
5/9/2011 9:35	4	25	33	30.75	26%	Four samples (two filtered 25 and 33 ug/L--RPD = 26%, both review qualified with "Q" flag; two unfiltered 32 and 33 ug/L--RPD = 3%)
199-K-146						
5/21/2009 11:43	2	47	50	48.5	6%	
5/9/2011 10:50	2	12	13	12.5	8%	
199-K-147						
5/21/2009 10:32	2	46	46	46	0%	
199-K-148						
5/21/2009 10:55	4	81	83	82.25	2%	Four samples
199-K-152						
5/9/2011 10:39	2	72	73.3	72.65	2%	
199-K-161						
5/21/2009 10:07	2	58	60	59	3%	
10/21/2009 10:35	2	81	82	81.5	1%	
5/9/2011 10:24	2	2	6	4	100%	One sample filtered (2 ug/L lab qualified with "U"); one sample unfiltered (6 ug/L)

Table 20. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
199-K-171						
4/1/2010 9:32	2	63	64	63.5	2%	
5/9/2011 8:40	2	49	49	49	0%	
199-K-178						
4/1/2010 9:01	2	78	83	80.5	6%	
4/6/2010 11:20	2	55	59	57	7%	
11/17/2010 8:51	2	21	22	21.5	5%	
5/9/2011 9:00	2	25	26	25.5	4%	
199-K-182						
8/13/2010 8:47	2	74	74	74	0%	
WSCF						
199-K-130						
10/5/2007 11:23	2	78.4	81.0	79.7	3%	
6/5/2009 10:05	4	56.5	57.0	56.7	1%	Four Samples
10/20/2009 9:00	4	49.4	51.8	50.8	5%	Four Samples
6/16/2010 9:07	2	43.3	45.5	44.4	5%	
11/22/2010 10:00	2	37.5	39.9	38.7	6%	
4/21/2011 9:36	2	30.0	34.9	32.5	15%	
199-K-131						
12/11/2007 12:48	2	84.2	84.2	84.2	0%	
7/29/2009 8:47	2	70.7	71.0	70.9	0.4%	
10/20/2009 10:10	2	60.0	62.1	61.1	3%	

Table 20. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
6/16/2010 9:34	2	40.8	42.5	41.7	4%	
1/5/2011 9:10	2	33.1	34.4	33.8	4%	
4/21/2011 9:03	2	25.8	26.3	26.1	2%	
199-K-141						
1/7/2010 10:30	4	45.6	47.6	46.7	4%	Four Samples
7/26/2010 13:07	2	35.7	35.8	35.8	0.3%	
1/5/2011 13:50	2	31.2	36.5	33.9	16%	
2/17/2011 10:20	4	31.0	34.0	32.6	9%	Four Samples
9/27/2011 12:45	2	25.9	26.0	26.0	0.4%	
199-K-146						
10/20/2009 10:35	2	44.8	45.5	45.2	2%	
6/16/2010 10:05	2	19.8	20.3	20.1	2%	
1/4/2011 12:50	2	20.5	21.0	20.8	2%	
199-K-147						
10/20/2009 8:45	2	34.6	37.9	36.3	9%	
6/16/2010 8:52	2	33.4	33.4	33.4	0%	
11/22/2010 10:32	2	31.5	31.6	31.6	0.3%	
4/21/2011 9:52	2	27.6	27.8	27.7	1%	
199-K-148						
10/20/2009 9:30	2	83.7	86.9	85.3	4%	
6/16/2010 9:21	2	59.3	61.7	60.5	4%	
11/22/2010 11:13	2	52.6	52.9	52.8	1%	

Table 20. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
4/21/2011 9:17	2	24.7	24.7	24.7	0%	
199-K-152						
8/19/2009 10:39	2	67.6	68.2	67.9	1%	
10/22/2009 10:37	2	69.9	70.4	70.2	1%	
3/8/2010 12:14	2	59.5	60.8	60.2	2%	
6/22/2010 14:40	4	62.1	62.4	62.2	0.5%	Four Samples
9/21/2010 10:06	2	59.4	59.9	59.7	1%	
1/9/2011 10:16	2	60.8	61.0	60.9	0.3%	
4/21/2011 8:40	2	69.1	69.6	69.4	1%	
9/15/2011 9:15	2	71.3	72.5	71.9	2%	
199-K-153						
7/26/2010 13:40	2	29.7	30.9	30.3	4%	
8/12/2010 8:52	2	29.8	30.4	30.1	2%	
11/22/2010 10:58	2	29.9	30.2	30.1	1%	
4/21/2011 11:30	2	20.5	20.8	20.7	1%	
199-K-154						
6/5/2009 9:20	2	104	105	105	1%	
8/26/2009 8:45	2	100	101	101	1%	
1/7/2010 11:15	2	95.7	95.7	95.7	0%	
6/16/2010 11:54	2	85.0	88.9	87.0	4%	
11/22/2010 10:35	2	84.7	85.2	85.0	1%	
4/21/2011 11:03	2	77.6	77.8	77.7	0.3%	

Table 20. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
199-K-161						
10/21/2009 10:35	2	89.5	89.8	89.7	0.3%	
6/16/2010 8:30	2	8.6	8.6	8.6	0%	
11/22/2010 9:20	2	14.1	14.5	14.3	3%	
199-K-163						
6/5/2009 9:00	4	108	108	108	0%	Four Samples
8/26/2009 9:02	2	106	107	107	1%	
1/7/2010 11:48	2	80.0	80.5	80.3	1%	
6/16/2010 12:11	2	61.7	61.8	61.8	0.2%	
11/22/2010 10:11	2	52.2	52.5	52.4	1%	
4/21/2011 11:15	2	38.0	38.6	38.3	2%	
199-K-171						
6/30/2009 10:04	4	54.7	55.5	55.1	1%	Four Samples
4/1/2010 9:32	2	68.4	68.9	68.7	1%	
6/16/2010 11:36	2	60.1	60.7	60.4	1%	
11/22/2010 9:37	2	52.8	53.0	52.9	0.4%	
199-K-178						
10/8/2009 10:00	2	105	106	106	1%	
11/5/2009 11:57	2	117	118	118	1%	
4/1/2010 9:01	2	86.7	89.1	87.9	3%	
4/6/2010 11:20	2	61.1	64.2	62.7	5%	
6/16/2010 11:16	2	27.7	28.2	28.0	2%	

Table 20. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Intralaboratory)

Sample Date and Time	Number of Results Reported	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Average Concentration (µg/L)	Relative Percent Difference	Additional Notes
7/26/2010 12:35	4	24.6	25.6	25.1	4%	Four Samples
8/23/2010 12:15	2	23.2	24.5	23.9	5%	
11/17/2010 8:51	2	23.8	25.7	24.8	8%	
199-K-182						
12/28/2009 15:10	2	73.9	75.4	74.7	2%	
6/6/2010 11:23	2	80.9	80.9	80.9	0%	
6/22/2010 12:02	2	81.3	81.5	81.4	0.2%	
8/13/2010 8:47	2	78.6	79.5	79.1	1%	
9/20/2010 10:39	2	80.1	80.5	80.3	0.5%	
1/9/2011 9:36	2	79.8	81.1	80.5	2%	

Table 21. KR4 System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Relative Percent Difference	Additional Notes
199-K-113A						
11/26/2007 14:40	1	71	1	69	3%	
3/21/2008 12:30	1	65	1	68	5%	
7/26/2010 10:47	2	3.7	2	2	60%	TARL (filtered and unfiltered both 3.7 ug/L) and WSCF (filtered and unfiltered both 2 ug/L)--all "U" qualified (MDLs reported)
199-K-114A						
11/26/2007 14:47	1	27	1	34	23%	Nothing noted
3/21/2008 12:20	1	37	1	39	5%	
199-K-115A						
11/26/2007 14:34	1	82	1	86	5%	
3/21/2008 12:15	1	78	1	85	9%	
199-K-116A						
11/26/2007 13:20	1	61	1	62	2%	
3/21/2008 10:55	1	54	1	59	9%	
199-K-120A						
11/26/2007 14:13	1	38	1	42	10%	
3/21/2008 11:43	1	42	1	46	9%	
199-K-127						
11/26/2007 14:00	1	10	1	13	26%	Nothing noted
3/21/2008 11:30	1	13	2	13	0%	

Table 21. KR4 System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Relative Percent Difference	Additional Notes
7/26/2010 9:36	2	3.7	2	2	60%	TARL (filtered and unfiltered both 3.7 ug/L) and WSCF (filtered and unfiltered both 2 ug/L)--all "U" qualified (MDLs reported)
199-K-129						
11/26/2007 13:00	1	42	1	49.8	17%	
3/21/2008 12:40	1	44	1	46	4%	
199-K-144						
6/12/2012 11:00	1	30	1	33	10%	
199-K-162						
2/17/2011 11:05	2	3.7	2	2.1	55%	TARL (filtered and unfiltered both 3.7 ug/L--both "U" qualified) and WSCF (filtered 2.2 ug/L "B" qualified and unfiltered 2 ug/L "U" qualified) (MDLs reported for "U" qualified)
6/12/2012 9:27	1	8	1	5	46%	Both unfiltered; TARL "U" qualified

*Replicates by laboratory are averaged if applicable

Table 22. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Relative Percent Difference	Additional Notes
199-K-132						
2/7/08 10:07	1	70	1	67	4%	
2/17/11 8:25	2	14.5	2	20.35	34%	Nothing noted
10/25/12 10:15	1	15	1	14.6	3%	
199-K-137						
2/7/08 11:30	1	561	1	2590	129%	TARL review qualified with a "Y" flag; WSCF result lab qualified with a "D" flag and reported an 18.6 dilution factor
6/19/09 12:41	2	579.5	2	579	0%	
2/18/10 8:55	2	223.5	2	232	4%	
5/4/11 8:25	2	53.5	2	59.2	10%	
6/22/11 9:30	2	40.5	2	48	17%	
199-K-138						
2/7/08 10:13	1	49	1	49	0%	
199-K-139						
2/7/08 10:16	2	207	2	204	1%	
199-K-140						
1/22/08 14:07	1	21	1	19.9	5%	
2/7/08 10:24	1	17	1	19	11%	
10/28/08 12:10	1	11	1	16.2	38%	Nothing noted
199-K-165						
9/23/09 9:14	2	219.5	2	231	5%	
5/4/11 7:48	2	171.5	2	178	4%	

Table 22. KW System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Relative Percent Difference	Additional Notes
9/27/11 9:45	1	141	1	151	7%	
199-K-166						
5/4/11 8:57	2	16	2	15.8	1%	
199-K-168						
1/24/12 11:25	1	38	1	42.2	10%	
199-K-173						
9/20/11 9:37	1	527	1	499	5%	
3/14/12 11:35	1	369	1	381	3%	

*Replicates by laboratory are averaged if applicable

Table 23. KX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	Relative Percent Difference	Additional Notes
199-K-131						
10/20/2009 10:10	2	57	2	61.05	7%	
199-K-141						
1/26/2009 10:24	1	420	1	459	9%	
12/5/2012 9:05	1	12	1	2	143%	WSCF result lab qualified with "U" flag; MDL for WSCF is 2 ug/L and MDL for TARL is 8 ug/L
199-K-161						
10/21/2009 10:35	2	81.5	2	89.65	10%	
199-K-171						
4/1/2010 9:32	2	63.5	2	68.65	8%	
199-K-178						
4/1/2010 9:01	2	80.5	2	87.9	9%	
4/6/2010 11:20	2	57	2	62.65	9%	
11/17/2010 8:51	2	21.5	2	24.75	14%	
199-K-182						
8/13/2010 8:47	2	74	2	79.05	7%	

*Replicates by laboratory are averaged if applicable

Appendix A

Data Files

Worksheets containing the records removed and the final dataset used for evaluation are provided in the Excel® file named “ECF-100KR4-13-0002_ Appendix A Dataset and Deleted Records.xlsx” under this EFC number in the Environmental Risk Management Archive (ERMA).

Scatter plot figures are located in the Excel® file named “ECF-100KR4-13-0002_ Appendix A Scatter Plot.xlsx” under this EFC number in the ERMA.