ECF-100HR3-13-0003
Revision 1

Evaluation of Cr(IV) Analytical Results from Field and Fixed Laboratory Methods for the 100-HR3 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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AH Aly / Manager Risk & Modeling **Risk/Modeling Integration Manager:** (Name /Position)		Signature	10/6/15 Date

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Terms

ERMA	Environmental Risk Management Archive
HWIS	Hanford Well Information System
HEIS	Hanford Environmental 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-HR-3 Groundwater Operable Unit (OU) to determine the data quality associated with field analytical methods in support of the 100-D/H pump and treat (P&T) system operations. The analytical results reported by field methods are compared against the analytical results reported by fixed laboratories. The precision criteria established in the *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study* (DOE/RL-2009-40, Rev. 0) is used for 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 ±20% as established in DOE/RL-2009-40.

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 100-HR-3 P&T systems, the percentages of RPDs exceeding the acceptable precision criteria were 23 percent (DX) and 39 percent (HX) for temporally coincidental replicate sample results reported by field and laboratory methods. In comparison, the percentages of RPDs exceeding the precision criteria were 17 percent (DX) and 80 percent (HX) for temporally coincidental replicate sample results reported by independent laboratories. It is noted that the percentage of RPDs exceeding the criteria range is significantly higher for the HX replicate sample results reported by independent laboratories. Addition details regarding this dataset are provided in Section 7 (Results and Conclusions).

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 0.6496 to 0.9947 for temporally coincidental replicate samples. Further review of the dataset associated with the R-squared coefficient of 0.6496 (HX field versus fixed) identified an outlier with a data qualifier. Recalculation of the linear regression without the outlier resulted in a correlation coefficient of 0.8477, which indicates a strong positive correlation but is still somewhat lower than the other datasets (0.9740 to 0.9947). Figure 6 presents a scatter plot with and without the outlier. A significant number of HX field versus fixed replicate pairs indicate a higher field method measurement when compared to the fixed laboratory result (13 of 23 replicate pairs). This might be attributed to a turbidity correction factor that is applied in the laboratory but not in the field.

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-HR-3 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 2, Change 5). Fixed laboratory analyses are performed using EPA Method 7196 as required by the *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study* (DOE/RL-2009-40, 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-HR-3 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 by well location and same-day coincidental results by well location (see formula below).
7. Calculate the RPD for field laboratory 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 2/8/2013.
- The wells considered for this environmental calculation include the extraction wells for the DX and the HX P&T systems.

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

1. Filtered and unfiltered data is considered equivalent for the Cr(VI) data evaluation.
2. Well construction dates were tabulated. If a sample was collect 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 was 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-HR-3 OU P&T extraction wells from the Hanford Environmental Information System (HEIS).** The dataset was downloaded from the Hanford Virtual Library on February 8, 2013, using the Environmental Data Module. The following criteria were used for the query:
    - Media: Groundwater
    - Date Range: 1/1/1964 to 2/8/2013
    - 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.”
    - Two separate extractions were performed for each of the 100-HR-3 Groundwater OU P&T systems (DX and HX). The data was extracted into two files (usr4388ext19054.zip [HX] and usr4388ext19055.zip [DX]).

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

- The following steps were used to compile the data into an Excel® file:
    a. The files downloaded from the Hanford Virtual Library were upzipped.
    b. Two blank Excel® files were created named "100DX_CrVI_GWforSelectWells_08Feb2013.xlsx." and "100HX_CrVI_GWforSelectWells_08Feb2013.xlsx."
    c. The .csv files (usr4388ext19054.zip and usr4388ext19055.zip) were opened and the contents of each file were moved into a worksheet in the respective Excel® file using the copy/move function.

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

   Additionally, results associated with the laboratory code "PNL1" and laboratory method "CR6_HACH_M" were removed from the dataset for DX and HX systems. Results associated with the laboratory code "PNL-K1" and laboratory method "UNKNOWN_METALS" were removed from the dataset for the HX system. These results are not considered results reported by 100-HR-3 P&T system operations or results reported by a fixed laboratory.

   An initial evaluation of the data identified a laboratory-related data quality issue with results associated with a sample date of 7/22/2012. All results with a sample date of 7/22/2012 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 was 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 and 7. 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 or field method) are plotted against the respective sample date and time. The plots are referenced by filename in Appendix A and are presented in Figures A.1 through A.72.

5. **Prepare scatter (X-Y) charts plotting field versus fixed** laboratory **Cr(VI) results by system.** The scatter plots for field versus fixed Cr(VI) results are presented in Figures 1 through 4 (Figures 1 and 2 for temporally coincidental samples and Figures 3 and 4 for same date samples).

6. **Calculate the RPD between field and fixed laboratory results for temporally coincidental results and same-day results**. The RPD between field and fixed laboratory results for temporally

coincidental samples are presented in Tables 8 and 9. The RPD between field and fixed laboratory results for same-day samples are presented in Tables 10 and 11.

7. **Calculate the RPD for field laboratory replicates**. The RPD between field laboratory replicates (both samples analyzed using a field method) are presented in Tables 12 and 13.

8. **Calculate the RPD for intralaboratory (same laboratory) fixed laboratory replicates**. The RPD between fixed laboratory replicates analyzed by the same laboratory are presented in Tables 14 and 15.

9. **Calculate the RPD for interlaboratory (different laboratory) fixed laboratory replicates**. The RPD between fixed laboratory replicates (split samples between two independent fixed laboratories) are presented in Tables 16 and 17.

7 Results/Conclusions

The RPDs calculated performing the steps in Section 6 were evaluated on the basis of the precision criteria established in the *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study* (DOE/RL-2009-40, Rev. 0). This criteron establishes a precision requirement of ±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 8 and 9), date-only coincidental replicates analyzed by field and fixed laboratory methods (Tables 10 and 11), and temporally coincidental (date and time) replicates analyzed by the fixed laboratory method but performed by independent laboratories (interlaboratory) (Tables 12 and 13).

Field versus Fixed Laboratory 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 ±20%. The percentage of replicate results with an RPD greater than ±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 ±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±20% for temporally coincidental field versus fixed replicates ranged between 23 and 39% for the two P&T systems as compared to a range of 17 to 80% for fixed versus fixed replicates. The fixed versus fixed replicate pairs for the HX system had RPDs that were consistently greater than ±20% (eight of ten replicate pairs or 80%). The eight replicate pairs with RPDs greater than ±20% were associated with the laboratory codes of WSCF and TARL and two sample dates: 11/27/2007 and 2/6/2008. The reported Cr(VI) concentrations ranged between 10 and 31 µg/L, with the WSCF results higher than the TARL results. Four replicate samples with a sample date of 11/27/2007 were analyzed at WSCF and were all laboratory-qualified with an “N” flag, which indicated that the spike and/or spike duplicate sample recovery is outside of control limits. One replicate sample with a sample date of 2/6/2008 was analyzed at WSCF and was review-qualified with a “Y” flag. The remaining sample results were not qualified. A review of the scatter

plots for the applicable wells (Figures A-64 through A-67) does not identify any of the results as significant outliers at these locations.

The percentage of unqualified RPDs greater than ±20 percent for temporally coincidental field versus fixed replicates ranged between 12 and 28 percent for the two P&T systems as compared to a range of 4 to 30 percent for fixed versus fixed replicates.

The total (qualified and unqualified data) percentage of RPDs greater than ±20% for date-only coincidental field versus fixed replicates ranged between 33 and 52% for the two P&T systems. The percentage of unqualified RPDs greater than ±20% for date-only coincidental field versus fixed replicates ranged between 19 and 24% for the two P&T systems. The field method results are generally somewhat higher than the fixed laboratory results, especially for the lower concentration ranges. This may be a result of a turbidity correction factor that is applied in the fixed laboratories but not in the field.

Intralaboratory Field and Intralaboratory Fixed RPD Summary. A review of the RPD for temporally coincidental replicates reported by a field laboratory (Tables 12 and 13) does indicate that the precision requirement of ±20% was not met for two replicate pairs for the DX system (6% of the replicates—33 replicate pairs total) and three replicate pairs for the HX system (33% of the replicates—nine replicate pairs total. All RPDs for temporally coincidental replicate results reported by a single fixed laboratory (Tables 16 and 17) were within the precision requirement of ±20% with the exception of two sets of replicates, one of which was represented by filtered and unfiltered samples. The other replicate pair is flagged with either a lab or review qualifier. It is noted that filtered and unfiltered samples are regarded as equivalent for the purposes of this environmental calculation—see assumptions in Section 4.

Linear Correlation Summary. The linear correlation R-squared values are summarized in Table 2 (see Figures 1 and 2 for temporally coincidental replicates and Figures 3 and 4 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 0.4900 for the DX date-only coincidental field versus fixed replicates and is 0.6496 for the HX field versus fixed temporally coincidental replicates, which are lower than the correlation coefficients for the other replicate sets, which range from 0.9442 to 0.9947.

The DX date-only coincidental field versus fixed dataset had a replicate pair (4/29/2012 at well 199-D4-104) with the WSCF result (695 µg/L) lab-qualified with a "D" flag. An RDR has been filed for further review of this result since it is about an order of magnitude lower than other results reported at this well location. A replicate pair (11/14/2006 at well 199-D8-72) had the field result review qualified with a "Z" flag as well. Recalculation of the linear regression without these replicate pairs results in a correlation coefficient of 0.9990 for the remaining replicates. Figure 5 presents a scatter plot with and without these replicate pairs.

The HX field versus fixed temporally coincidental dataset had a replicate pair (11/14/2006 12:40 at well 199-H4-15A) with the field result review-qualified and noted that the analytical ampules were defective. Recalculation of the linear regression without this pair results in a correlation coefficient of 0.8477, which is still somewhat lower. A significant number of result pairs indicate a higher field method measurement when compared to the fixed laboratory result (13 of 23 replicate pairs), which is consistent with the lack of a correction for turbidity in the field method. Figure 6 presents a scatter plot with and without these replicate pairs.

8 References

DOE/RL-2009-40, 2009, *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units 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.

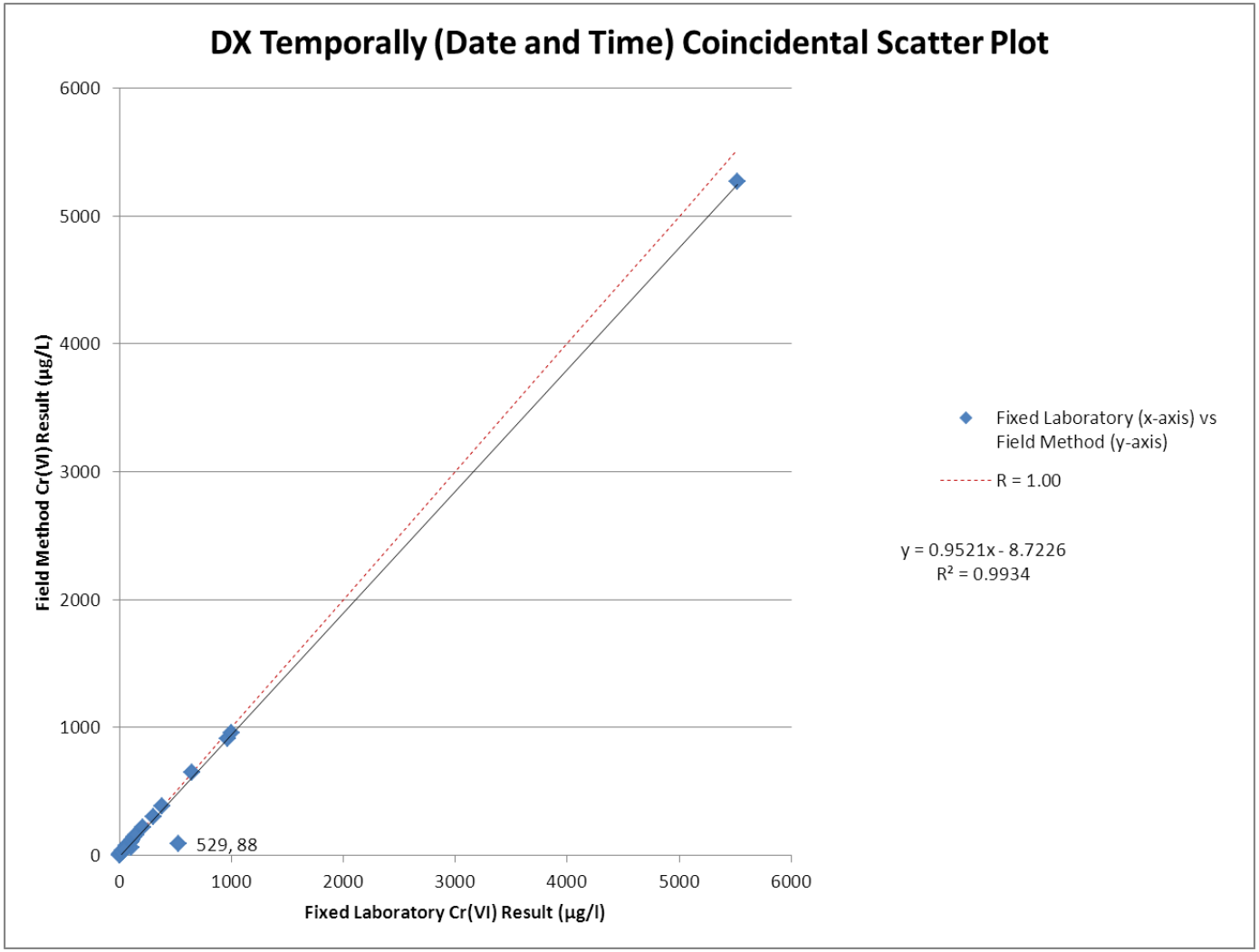


Figure 1. DX Temporally (Date and Time) Coincidental Scatter Plot

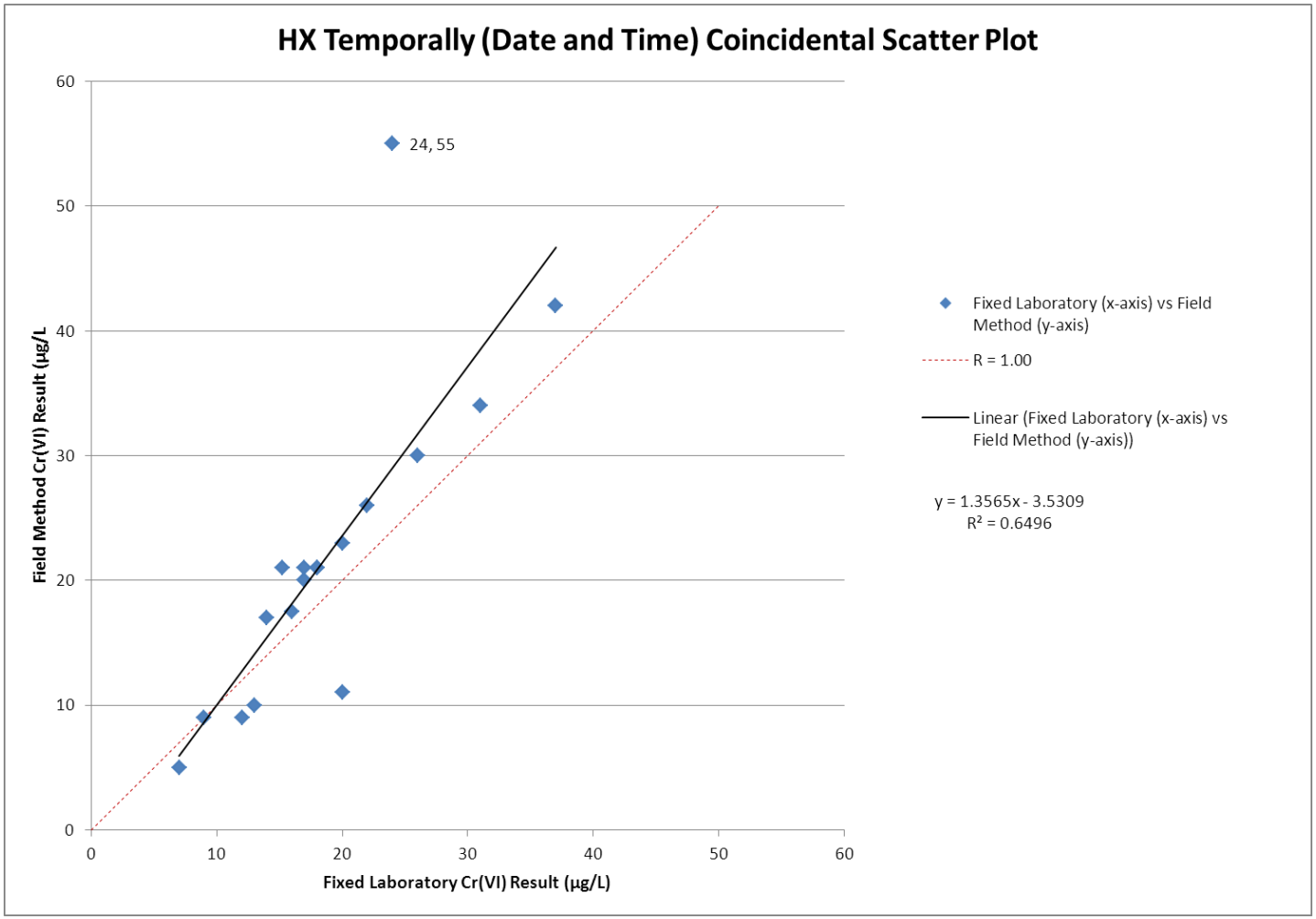


Figure 2. HX Temporally (Date and Time) Coincidental Scatter Plot

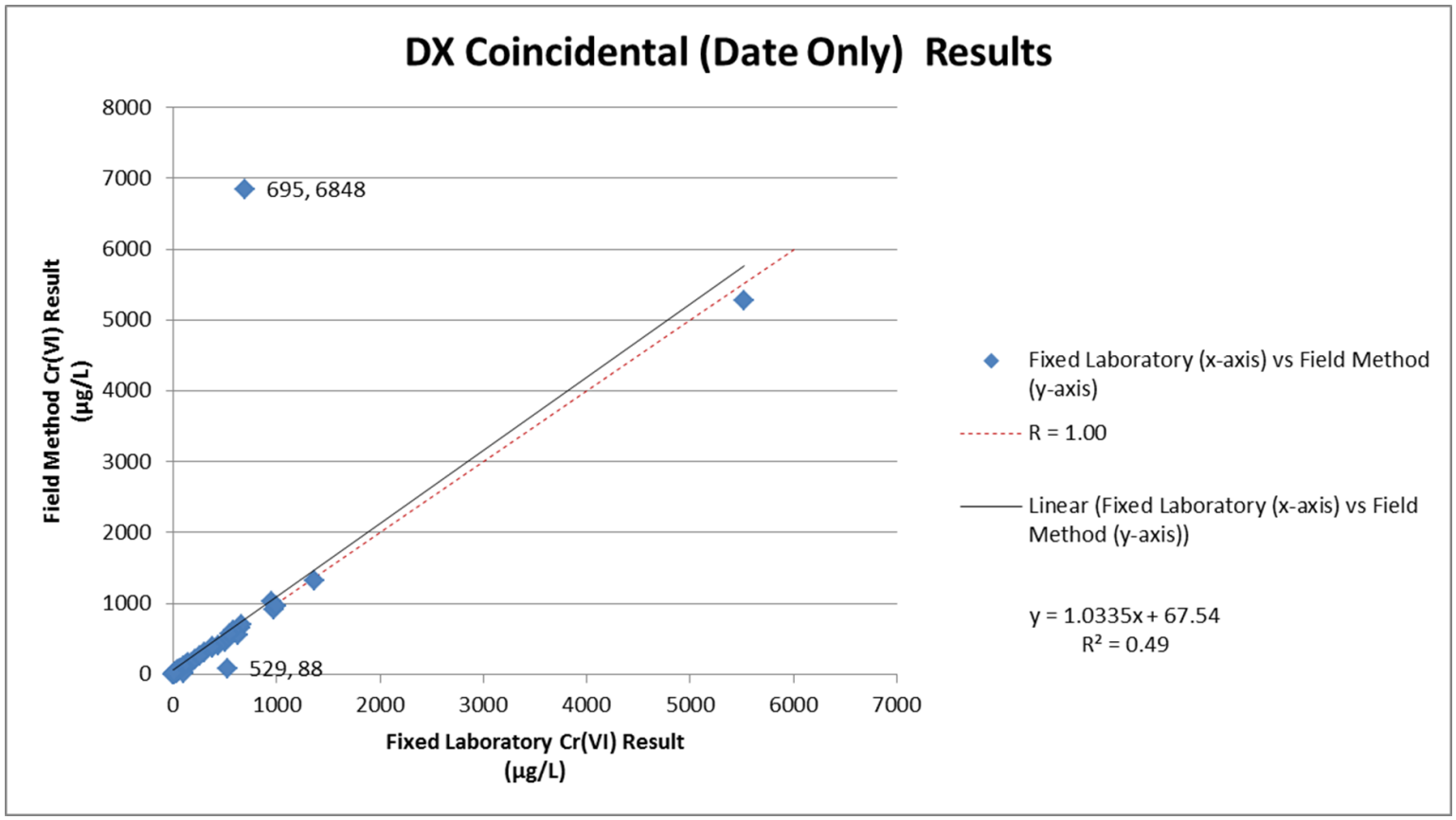


Figure 3. DX Coincidental (Date Only) Results

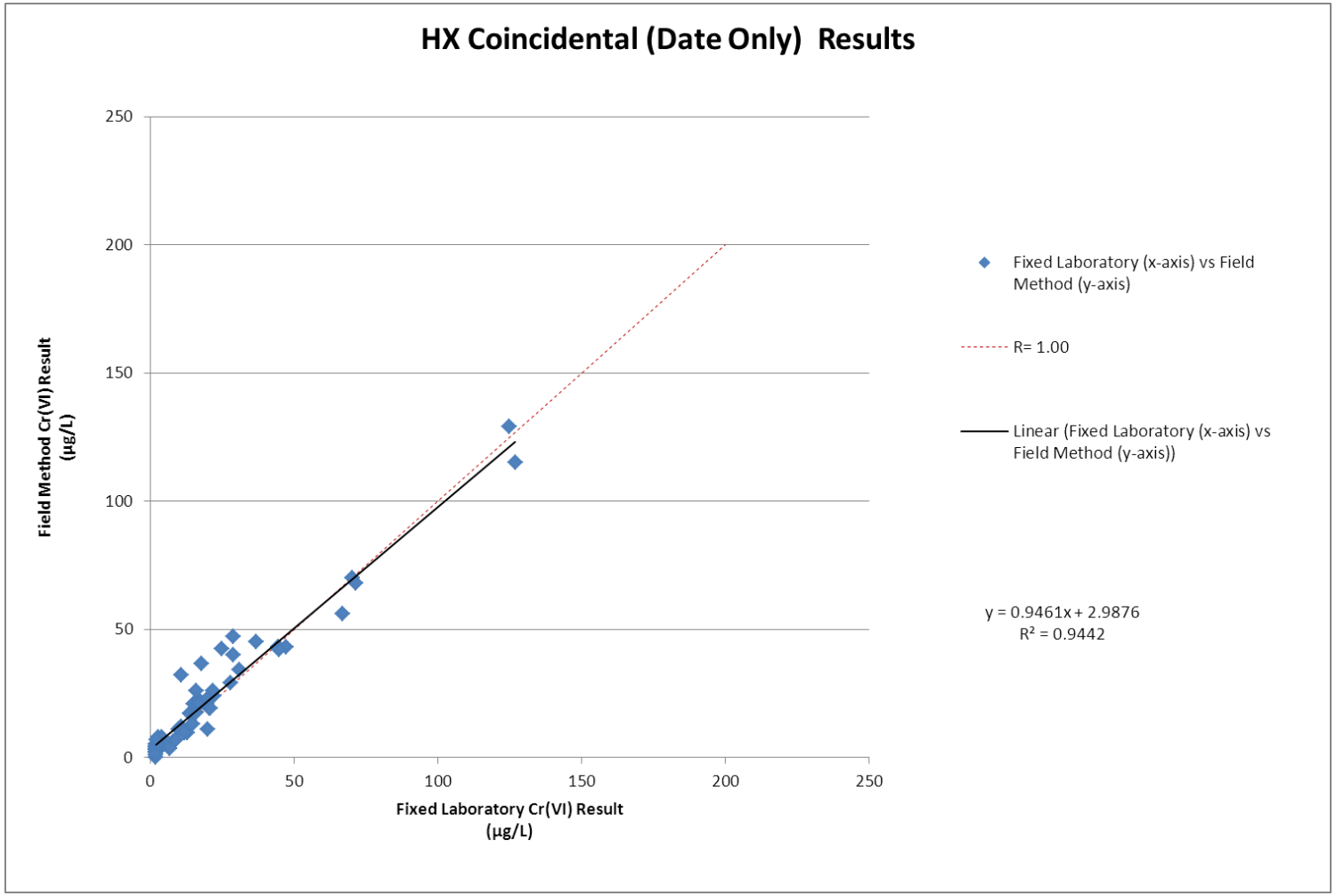
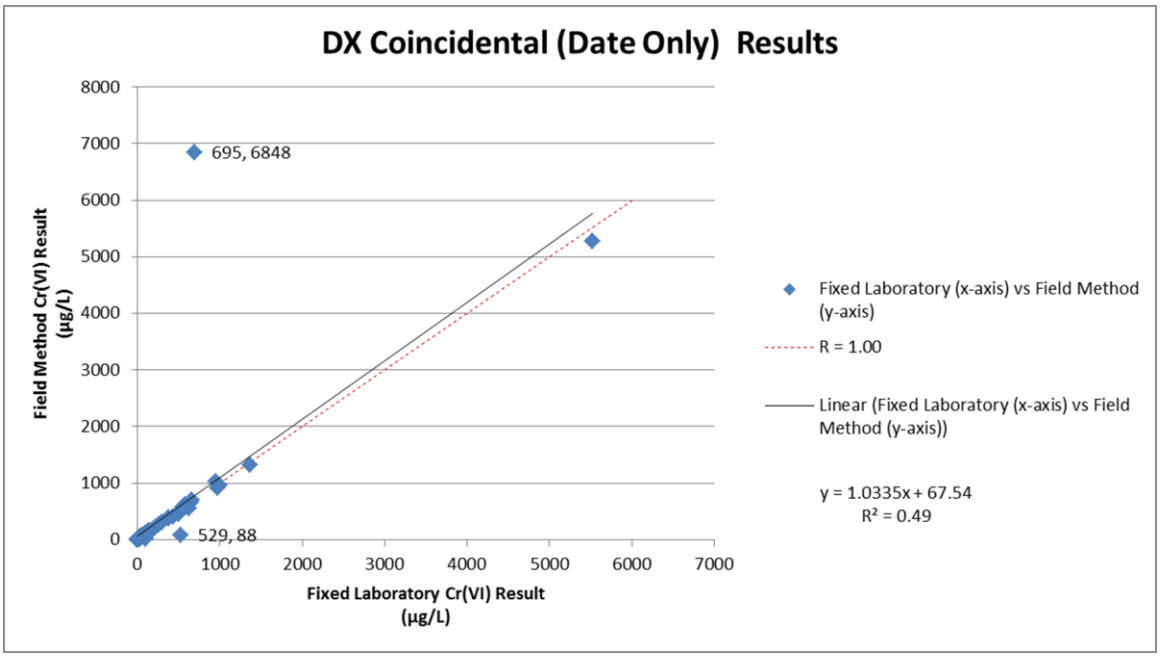


Figure 4. HX Coincidental (Date Only) Results



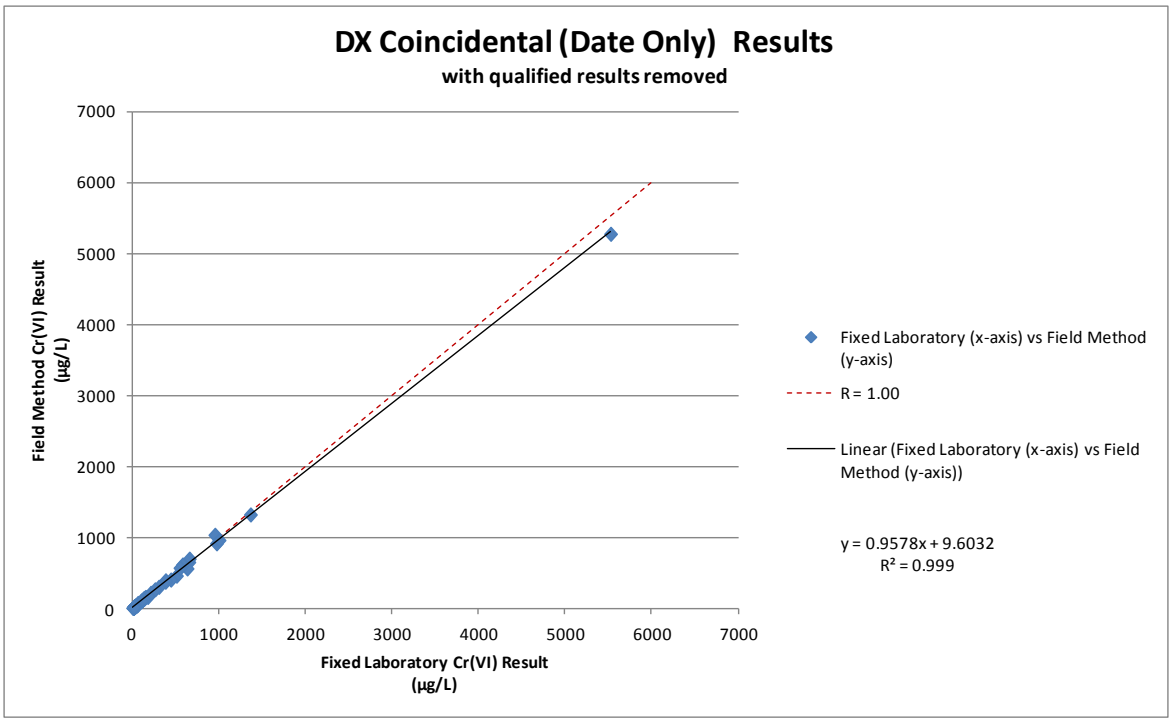
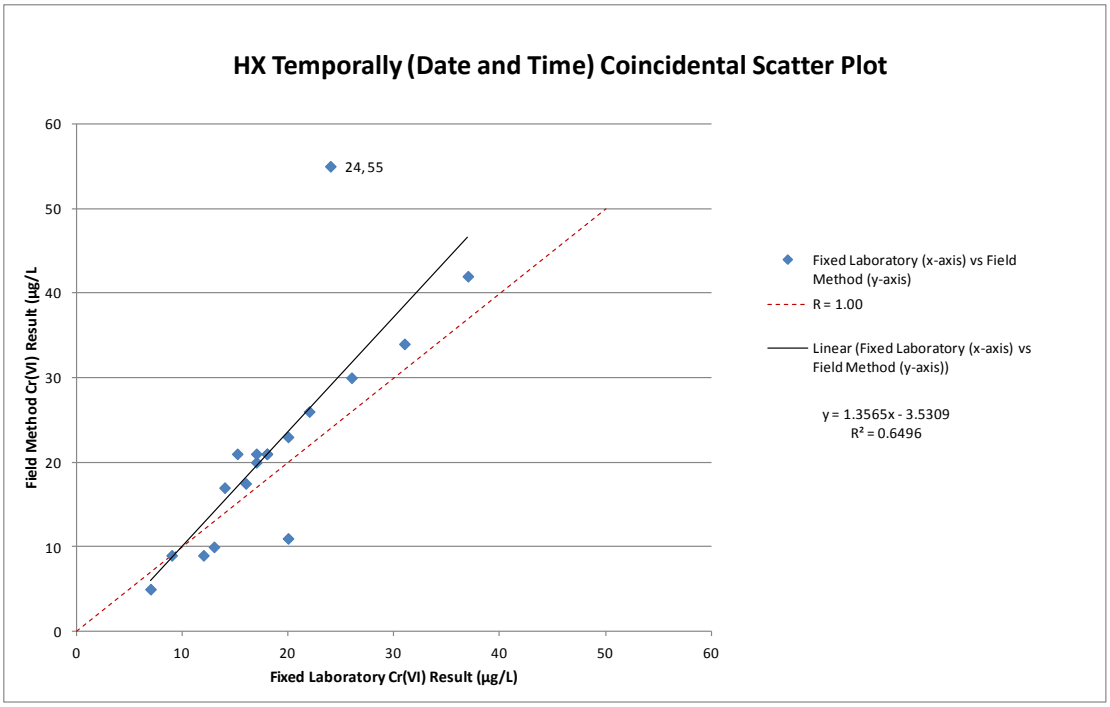


Figure 5. DX Same Day (Date Only) Coincidental Field vs Fixed Results (with and without Qualified Replicates)



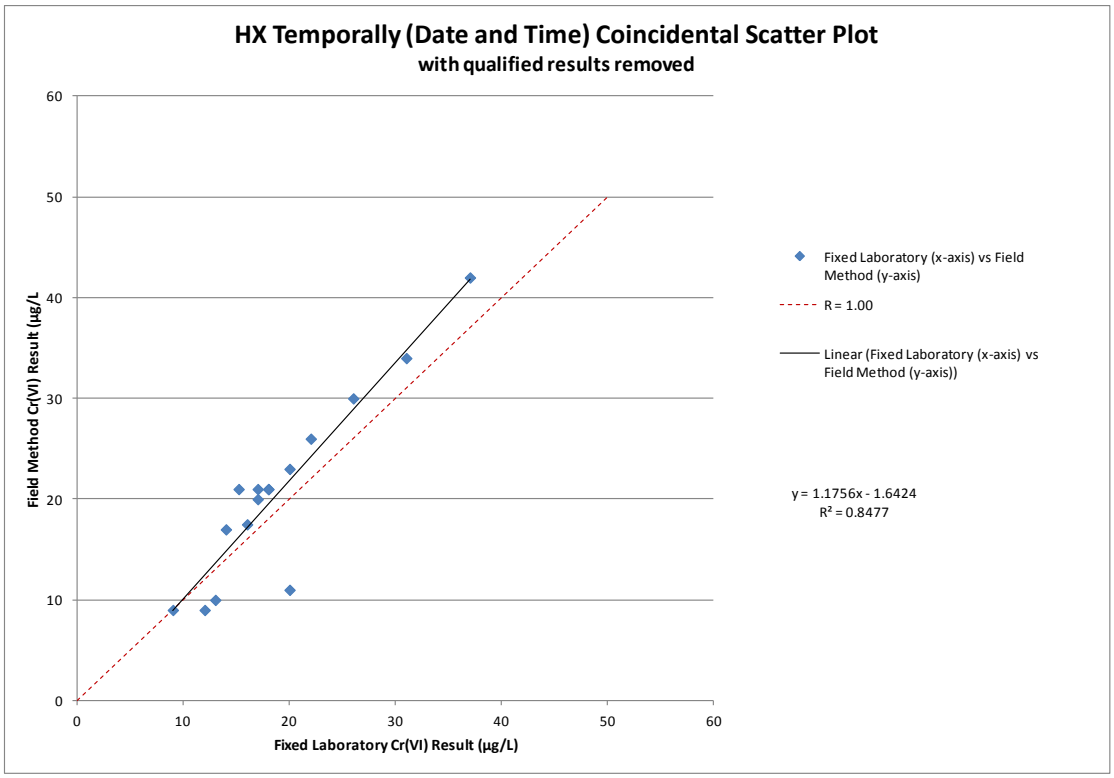


Figure 6. HX Temporally (Date and Time) Coincidental Field vs Fixed Results (with and without Qualified Replicates)

Table 1. Summary of Linear Correlations and Relative Percent Differences for Field and Fixed Laboratory Cr(VI) Results 100-HR-3 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)
DX	26	23%	12%	72	33%	19%	23	17%	4%
HX	18	39%	28%	59	52%	24%	10	80%	30%

Table 2. Summary of Linear Correlations and Relative Percent Differences for Field and Fixed Laboratory Cr(VI) Results 100-HR-3 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)
DX	26	0.9934	72	0.4900	23	0.9947
HX	18	0.6496	59	0.9442	10	0.974

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

DX System				
199-D4-101	199-D4-98	199-D5-32	199-D8-68	199-D8-95
199-D4-38	199-D4-99	199-D5-39	199-D8-69	199-D8-96
199-D4-39	199-D5-101	199-D5-92	199-D8-72	199-D8-97
199-D4-83	199-D5-104	199-D7-3	199-D8-73	199-D8-98
199-D4-84	199-D5-127	199-D7-6	199-D8-88	199-H1-5
199-D4-85	199-D5-130	199-D8-53	199-D8-89	199-H4-80
199-D4-95	199-D5-131	199-D8-54A	199-D8-90	199-H4-81
199-D4-96	199-D5-20	199-D8-6	199-D8-91	199-H4-82
199-D4-97				
HX System				
199-H1-1	199-H1-34	199-H1-4	199-H3-2C	199-H4-64
199-H1-2	199-H1-35	199-H1-40	199-H3-4	199-H4-69
199-H1-25	199-H1-36	199-H1-42	199-H4-12C	199-H4-70
199-H1-27	199-H1-37	199-H1-43	199-H4-15A	199-H4-75
199-H1-3	199-H1-38	199-H1-45	199-H4-4	199-H4-76
199-H1-32	199-H1-39	199-H1-6	199-H4-63	199-H4-77
199-H1-33				

Table 4. Summary of Well Construction Dates and Earliest Reported Sample Dates for the 100-HR-3 OU Extraction Wells

Well Name	Construction Date	Earliest Reported Sample Date	Earliest Reported Sample Date Precedes Well Construction Date
DX System			
199-D4-101	3/3/2010	3/3/2010	Yes
199-D4-38	3/29/2000	3/9/2000	Yes
199-D4-39	3/29/2000	3/6/2000	Yes
199-D4-83	2/20/2001	8/29/2001	No
199-D4-84	3/22/2001	8/28/2001	No
199-D4-85	4/27/2001	8/28/2001	No
199-D4-95	11/19/2009	11/20/2009	No
199-D4-96	10/22/2009	10/28/2009	No
199-D4-97	10/27/2009	11/3/2009	No
199-D4-98	12/3/2009	12/4/2009	No
199-D4-99	11/19/2009	11/24/2009	No
199-D5-101	3/12/2010	3/12/2010	Yes
199-D5-104	4/2/2007	3/15/2007	Yes
199-D5-127	3/4/2010	3/5/2010	No
199-D5-130	3/23/2010	3/23/2010	Yes
199-D5-131	4/27/2010	4/27/2010	Yes
199-D5-20[a]	2/24/1992	3/19/1997	No
199-D5-32	11/10/2003	9/14/2000	Yes
199-D5-39	4/29/1999	7/7/1999	No
199-D5-92	7/21/2004	10/21/2004	No
199-D7-3	4/21/2010	4/21/2010	Yes
199-D7-6	6/14/2010	6/14/2010	Yes
199-D8-53	2/7/1992	5/13/1994	No
199-D8-54A[b]	2/10/1992	10/25/1996	No
199-D8-6	12/19/1991	12/5/2007	No
199-D8-68	8/5/1996	10/15/1996	No
199-D8-69	8/20/1996	10/14/1996	No
199-D8-72	4/2/2002	6/17/2002	No
199-D8-73	7/30/2004	10/21/2004	No

Table 4. Summary of Well Construction Dates and Earliest Reported Sample Dates for the 100-HR-3 OU Extraction Wells

Well Name	Construction Date	Earliest Reported Sample Date	Earliest Reported Sample Date Precedes Well Construction Date
199-D8-88	7/27/2004	11/17/2004	No
199-D8-89	10/29/2009	11/3/2009	No
199-D8-90	1/28/2010	1/28/2010	Yes
199-D8-91	1/26/2010	1/26/2010	Yes
199-D8-95	4/29/2010	4/29/2010	Yes
199-D8-96	4/27/2010	4/27/2010	Yes
199-D8-97	4/26/2010	4/26/2010	Yes
199-D8-98	4/23/2010	4/23/2010	Yes
199-H1-5	6/21/2010	6/21/2010	Yes
199-H4-80	6/22/2010	6/22/2010	Yes
199-H4-81	6/24/2010	6/24/2010	Yes
199-H4-82	6/23/2010	6/23/2010	Yes
HX System			
199-H1-1	9/14/2010	9/12/2011	No
199-H1-2	9/14/2010	9/12/2011	No
199-H1-25	5/26/2010	5/26/2010	Yes
199-H1-27	5/25/2010	5/25/2010	Yes
199-H1-3	9/13/2010	9/19/2011	No
199-H1-32	5/21/2010	5/21/2010	Yes
199-H1-33	5/26/2010	5/27/2010	No
199-H1-34	5/25/2010	5/25/2010	Yes
199-H1-35	5/24/2010	5/20/2010	Yes
199-H1-36	5/19/2010	5/19/2010	Yes
199-H1-37	5/14/2010	5/14/2010	Yes
199-H1-38	5/20/2010	9/12/2011	No
199-H1-39	5/17/2010	5/12/2010	Yes
199-H1-4	9/10/2010	9/19/2011	No
199-H1-40	5/18/2010	5/18/2010	Yes
199-H1-42	10/2/2009	10/2/2009	Yes
199-H1-43	10/6/2009	10/2/2009	Yes

Table 4. Summary of Well Construction Dates and Earliest Reported Sample Dates for the 100-HR-3 OU Extraction Wells

Well Name	Construction Date	Earliest Reported Sample Date	Earliest Reported Sample Date Precedes Well Construction Date
199-H1-45	9/27/2009	9/28/2009	No
199-H1-6	9/13/2010	9/12/2011	No
199-H3-2C	12/15/1986	11/22/2005	No
199-H1-37	5/14/2010	5/14/2010	Yes
199-H3-4	7/15/1996	10/25/1996	No
199-H4-12C	10/3/1986	10/22/1996	No
199-H4-15A	11/11/1986	10/24/1996	No
199-H4-4	6/10/1983	12/13/1983	No
199-H4-63	7/26/1996	10/16/1996	No
199-H4-64	7/31/1996	10/16/1996	No
199-H4-69	9/14/2009	9/21/2009	No
199-H4-70	9/11/2009	9/21/2009	No
199-H4-75	9/30/2010	9/12/2011	No
199-H4-76	6/28/2010	9/12/2011	No
199-H4-77	9/29/2010	9/12/2011	No

Notes:

a. For well 199-D5-20, the construction date was obtained from the finish date documented in the well construction summary report (E011086).

b. For well 199-D8-54A, the construction date was obtained from the finish date documented in the well construction summary report (E011126).

Table 5. Summary of Data Selection and Reduction

Pump and Treat System	Number of Records Retrieved	Number of Records Removed	Number of Records Retained
DX	4568	1858	2710
HX	1983	652	1331

Table 6. DX System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
222-S: None Reported		
FIELD		
U	7	Analyzed for but not detected above limiting criteria.
MOBILE		
U	2	Analyzed for but not detected above limiting criteria.
STLRL: None Reported		
TARL		
D	6	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	2	Analyzed for but not detected above limiting criteria.
WSCF		
B	12	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	86	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	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); Spike and/or spike duplicate sample recovery is outside control limits.

Table 6. DX System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
N	7	Spike and/or spike duplicate sample recovery is outside control limits.
U	14	Analyzed for but not detected above limiting criteria.
UDN	2	Analyzed for but not detected above limiting criteria.; 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.
Review Qualifier	**Number of Review Qualifiers Reported**	**Review Qualifier Definition**
222-S: None Reported		
FIELD		
F	5	The result is undergoing further review
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.
Z	2	Miscellaneous circumstances exist. Additional information may be found in the result_comment field for this record and/or in the samp_comment field of the parent sample record.
MOBILE		
Y	1	Result suspect. Review - insufficient evidence to show result valid or invalid.

Table 6. DX System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
STLRL		
H	1	Laboratory holding time exceeded before the sample was analyzed.
TARL		
Y	1	Result suspect. Review - insufficient evidence to show result valid or invalid.
WSCF		
A	1	Not defined in HEIS dictionary
G	1	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
GH	2	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information; Laboratory holding time exceeded before the sample was analyzed.
H	7	Laboratory holding time exceeded before the sample was analyzed.
R	2	Do not use. Further review indicates the result is not valid.
Y	9	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 DX Pump and Treat System.		

Table 7. HX System Data Qualifier Summary

Laboratory Qualifier	Number of Laboratory Qualifiers Reported	Laboratory Qualifier Definition
FIELD		
U	15	Analyzed for but not detected above limiting criteria.
MOBILE: None Reported		
TARL: None Reported		
WSCF		
B	36	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).
BN	6	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); Spike and/or spike duplicate sample recovery is outside control limits.
N	11	Spike and/or spike duplicate sample recovery is outside control limits.
U	43	Analyzed for but not detected above limiting criteria.
UN	9	Analyzed for but not detected above limiting criteria; Spike and/or spike duplicate sample recovery is outside control limits.
Review Qualifier	**Number of Review Qualifiers Reported**	**Review Qualifier Definition**
FIELD		
G	1	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
ZY	1	Miscellaneous circumstances exist. Additional information may be found in the result_comment field for this record and/or in the samp_comment field of the parent sample record.; Result suspect. Review - insufficient evidence to show result valid or invalid.
MOBILE: None Reported		
TARL		
A	1	Not defined in HEIS dictionary
WSCF		
Y	3	Result suspect. Review - insufficient evidence to show result valid or invalid.

Table 7. HX System Data Qualifier Summary

Validation Qualifier	Number of Validation Qualifiers Reported	Validation Qualifier Definition
FIELD: None Reported		
MOBILE: 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. DX System Field versus Fixed Laboratory Temporally (Date and Time) Coincidental Cr(VI) 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-D4-39										
11/14/06 11:34		651				649	651	649	0%	
199-D4-83										
8/10/07 11:38	23					27.6	23	27.6	18%	
199-D5-104										
8/9/07 12:18	5270					5520	5270	5520	5%	
199-D5-39										
3/8/06 10:57		914		968			914	968	6%	
7/10/06 11:12		960		998			960	998	4%	
199-D8-53										
5/23/06 12:00	17					14	17	14	19%	
11/14/06 13:00	100					97	100	97	3%	
5/8/07 10:55	8					10	8	10	22%	Nothing Noted
199-D8-54A										
11/9/06 11:53		108		105			108	105	3%	
11/9/06 11:53		108				102	108	102	6%	
11/14/06 13:10	65					101	65	101	43%	Field result review qualified with a "Z" flag (sample comment: "SAMPLE TURNED A YELLOWISH BROWN. IT WAS LATER DISCOVERED THAT SOME OF THE ANALYTICAL AMPULES WERE DEFECTIVE, AND THESE RESUOLTS ARE LIKELY LOW.")
5/8/07 11:10	11					13	11	13	17%	
199-D8-68										
5/23/06 12:15	9					5	9	5	57%	Nothing Noted
11/14/06 13:15	123					116	123	116	6%	
5/8/07 11:15	5					5	5	5	0%	
199-D8-69										
3/7/06 10:25		41		26			41	26	45%	STLRL result review qualified with an "H" flag
4/5/06 9:42		75		61			75	61	21%	Nothing Noted
3/27/07 9:05		25				20.9	25	20.9	18%	
199-D8-72										
5/23/06 12:20	302					301	302	301	0%	
11/14/06 13:20	88					529	88	529	143%	WSCF result lab qualified with "D" flag; field result review qualified with "Z" flag and sample commented “Sample turned a yellowish brown. It was later discovered that some of the analytical ampules were defective and these results are likely low.”
5/8/07 11:20	385					379	385	379	2%	
199-D8-73										
7/11/06 10:21		141		128			141	128	10%	
8/8/06 10:25		159		148			159	148	7%	
1/8/07 11:13		217				208	217	208	4%	
199-D8-88										
8/15/07 9:08	45					52.1	45	52.1	15%	
9/11/07 12:29		44				45.9	44	45.9	4%	

*Replicates by laboratory are averaged if applicable

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

Sample Date and Time	Reporting Laboratory Cr(VI) Results (µg/L)						Field versus Fixed Summary	
	FIELD	MOBILE	TARL	WSCF	Field Cr(VI) Results (µg/L)	Fixed Cr(VI) Results (µg/L)	Relative Percent Difference	Additional Notes
199-H3-4								
11/8/06 12:43		21		15.2	21	15.2	32%	Nothing Noted
199-H4-15A								
2/13/06 11:10	42			37	42	37	13%	
5/23/06 9:45	21			18	21	18	15%	
11/14/06 12:30	30			26	30	26	14%	
11/14/06 12:40	55			24	55	24	78%	Field result review qualified with "ZY" flag; sample comment: "Sample turned a yellowish brown. It was later discovered that some of the analytical ampules were defective and these results are likely low./See RDR 070125FIELD-R3674"
5/8/07 10:15	10			13	10	13	26%	Nothing Noted
199-H4-4								
2/13/06 10:40	21			18	21	18	15%	
5/23/06 9:00	17			14	17	14	19%	
11/14/06 9:25	26			22	26	22	17%	
5/8/07 9:50	5			7	5	7	33%	Field sample lab qualified with "U" flag (MDL reported)
199-H4-63								
2/13/06 11:15	20			17	20	17	16%	
11/14/06 10:40	11			20	11	20	58%	Nothing Noted
2/13/07 8:18	17.5			16	17.5	16	9%	
5/8/07 10:20	9			9	9	9	0%	
199-H4-64								
2/13/06 10:20	34			31	34	31	9%	
5/23/06 8:25	21			17	21	17	21%	Nothing Noted
11/14/06 8:50	23			20	23	20	14%	
5/8/07 8:20	9			12	9	12	29%	Nothing Noted

*Replicates by laboratory are averaged if applicable

Table 10. DX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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-D4-101										
4/29/2012	1	69	69	69	1	60.1	60.1	60.1	14%	
199-D4-38										
4/29/2012	1	6	6	6	1	2	2	2	100%	WSCF sample lab qualified with "U" flag (MDL reported)
199-D4-39										
11/14/2006	1	651	651	651	1	649	649	649	0%	
4/29/2012	1	15	15	15	1	11.2	11.2	11.2	29%	Nothing Noted
199-D4-83										
8/10/2007	1	23	23	23	1	27.6	27.6	27.6	18%	
199-D4-84										
4/27/2006	1	57	57	57	1	38	38	38	40%	Nothing Noted except field sample filtered (57 ug/L); STLRL sample filtered (38 ug/L)
4/29/2012	1	21	21	21	1	13.1	13.1	13.1	46%	Nothing Noted
199-D4-85										
4/29/2012	1	12	12	12	1	6.7	6.7	6.7	57%	Nothing Noted
199-D4-95										
2/15/2011	1	160	160	160	2	169	176	172.5	8%	
4/29/2012	1	33	33	33	1	29.1	29.1	29.1	13%	
199-D4-96										
2/15/2011	1	459	459	459	2	503	508	505.5	10%	
4/29/2012	1	137	137	137	1	131	131	131	4%	
199-D4-97										
2/15/2011	1	404	404	404	2	438	441	439.5	8%	
4/29/2012	1	61	61	61	1	55.8	55.8	55.8	9%	
199-D4-98										
2/15/2011	1	35	35	35	2	38.9	41.4	40.15	14%	
4/29/2012	1	5	5	5	2	2	2	2	86%	WSCF results lab qualified with "U" flag (MDL reported)
199-D4-99										
2/15/2011	1	8	8	8	2	7.8	9.4	8.6	7%	
4/29/2012	1	7	7	7	1	3.3	3.3	3.3	72%	WSCF result lab qualified with "B" flag
199-D5-101										
4/29/2012	1	137	137	137	1	130	130	130	5%	
199-D5-104										
8/9/2007	1	5270	5270	5270	1	5520	5520	5520	5%	
4/29/2012	1	6848	6848	6848	1	695	695	695	163%	WSCF result lab qualified with "D" flag

Table 10. DX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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-D5-130										
4/29/2012	1	149	149	149	1	140	140	140	6%	
199-D5-131										
4/29/2012	1	1034	1034	1034	1	949	949	949	9%	
199-D5-20										
4/29/2012	1	36	36	36	1	28.7	28.7	28.7	23%	Nothing Noted
199-D5-32										
2/15/2011	1	16	16	16	2	5.1	5.8	5.45	98%	Field sample unfiltered (16 ug/L);WSCF sample filtered (5.8 ug/L) and unfiltered (5.1 ug/L); WSCF Samples lab qualified with “N” flag
4/29/2012	1	374	374	374	1	377	377	377	1%	
199-D5-39										
3/8/2006	1	914	914	914	1	968	968	968	6%	
7/10/2006	1	960	960	960	1	998	998	998	4%	
4/29/2012	1	1320	1320	1320	1	1360	1360	1360	3%	
199-D5-92										
4/29/2012	1	13	13	13	1	9.9	9.9	9.9	27%	Nothing Noted
199-D7-3										
4/29/2012	1	39	39	39	1	35.3	35.3	35.3	10%	
199-D7-6										
4/29/2012	1	21	21	21	1	14.9	14.9	14.9	34%	Nothing Noted
199-D8-53										
5/23/2006	1	17	17	17	1	14	14	14	19%	
11/14/2006	1	100	100	100	1	97	97	97	3%	
5/8/2007	3	8	15	10	2	10	10	10	3%	
199-D8-54A										
5/23/2006	1	22	22	22	1	19	19	19	15%	
11/9/2006	1	108	108	108	2	102	105	103.5	4%	
11/14/2006	1	65	65	65	1	101	101	101	43%	Field result review qualified with a "Z" flag (sample comment: "SAMPLE TURNED A YELLOWISH BROWN. IT WAS LATER DISCOVERED THAT SOME OF THE ANALYTICAL AMPULES WERE DEFECTIVE, AND THESE RESUOLTS ARE LIKELY LOW.")
5/8/2007	2	7	11	9	1	13	13	13	36%	Nothing Noted
8/9/2007	2	43	44	43.5	2	46	47	46.5	7%	

Table 10. DX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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
12/4/2007	1	112	112	112	1	106	106	106	6%	
199-D8-68										
5/23/2006	1	9	9	9	1	5	5	5	57%	Nothing Noted
11/14/2006	1	123	123	123	1	116	116	116	6%	
5/8/2007	2	5	21	13	1	5	5	5	89%	One field result lab qualified with "U" (MDL of 5 ug/L reported);
2/3/2011	1	12	12	12	2	8.3	8.5	8.4	35%	Nothing noted except: field sample unfiltered (12 ug/L);WSCF sample filtered (8.3 ug/L) and unfiltered (8.5 ug/L)
199-D8-69										
3/7/2006	1	41	41	41	1	26	26	26	45%	STLRL result review qualified with an "H" flag
4/5/2006	1	75	75	75	1	61	61	61	21%	Nothing Noted
3/27/2007	1	25	25	25	1	20.9	20.9	20.9	18%	
5/21/2007	1	5	5	5	1	4.1	4.1	4.1	20%	
4/29/2012	1	13	13	13	2	9.1	198	103.55	155%	Nothing noted--see scatter plot
199-D8-72										
5/23/2006	1	302	302	302	1	301	301	301	0%	
11/14/2006	1	88	88	88	1	529	529	529	143%	WSCF result lab qualified with "D" flag; field result review qualified with "Z" flag and sample commented “Sample turned a yellowish brown. It was later discovered that some of the analytical ampules were defective and these results are likely low.”
5/8/2007	2	385	401	393	1	379	379	379	4%	
12/4/2007	1	698	698	698	1	654	654	654	7%	
2/3/2011	1	561	561	561	2	624	633	628.5	11%	
199-D8-73										
7/11/2006	1	141	141	141	1	128	128	128	10%	
8/8/2006	1	159	159	159	1	148	148	148	7%	
1/8/2007	1	217	217	217	1	208	208	208	4%	
4/29/2012	1	72	72	72	1	67	67	67	7%	
199-D8-88										
8/15/2007	1	45	45	45	1	52.1	52.1	52.1	15%	
9/11/2007	1	44	44	44	1	45.9	45.9	45.9	4%	
4/29/2012	1	105	105	105	1	97.8	97.8	97.8	7%	
199-D8-90										
4/29/2012	1	34	34	34	1	30.6	30.6	30.6	11%	

Table 10. DX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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-D8-91										
4/29/2012	1	25	25	25	1	20.5	20.5	20.5	20%	
199-D8-95										
4/29/2012	1	266	266	266	1	257	257	257	3%	
199-D8-96										
4/29/2012	1	616	616	616	1	576	576	576	7%	
199-D8-97										
4/29/2012	1	570	570	570	1	546	546	546	4%	
199-D8-98										
4/29/2012	1	29	29	29	1	24.3	24.3	24.3	18%	
199-H1-5										
4/29/2012	1	20	20	20	1	14.9	14.9	14.9	29%	Nothing Noted
199-H4-80										
4/29/2012	1	27	27	27	1	22.8	22.8	22.8	17%	
199-H4-81										
4/29/2012	1	29	29	29	1	23.6	23.6	23.6	21%	Nothing Noted
199-H4-82										
4/29/2012	1	15	15	15	1	12.1	12.1	12.1	21%	Nothing Noted

Table 11. HX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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-H1-1										
4/29/2012	1	29	29	29	1	27.9	27.9	27.9	4%	
199-H1-2										
4/29/2012	1	43	43	43	1	44.7	44.7	44.7	4%	
199-H1-2										
4/29/2012	1	43	43	43	1	44.7	44.7	44.7	4%	
199-H1-25										
4/29/2012	1	2	2	2	1	2	2	2	0%	
199-H1-27										
4/29/2012	1	4	4	4	1	2	2	2	67%	WSCF result is lab qualified with "U" flag (MDL reported)
199-H1-32										
4/29/2012	1	4	4	4	1	4.1	4.1	4.1	2%	
199-H1-33										
4/29/2012	1	6	6	6	1	8	8	8	29%	Nothing Noted
199-H1-34										
4/29/2012	1	5	5	5	1	2	2	2	86%	WSCF result is lab qualified with "U" flag (MDL reported)
199-H1-35										
4/29/2012	1	2	2	2	1	2	2	2	0%	
199-H1-36										
4/29/2012	1	43	43	43	1	47.3	47.3	47.3	10%	
199-H1-37										
4/29/2012	1	3	3	3	1	2	2	2	40%	WSCF result is lab qualified with "U" flag (MDL reported)
199-H1-38										
4/29/2012	1	4	4	4	1	2	2	2	67%	WSCF result is lab qualified with "U" flag (MDL reported)
199-H1-39										
4/29/2012	1	3	3	3	1	2	2	2	40%	WSCF result is lab qualified with "U" flag (MDL reported)
199-H1-4										
4/29/2012	1	42	42	42	1	45	45	45	7%	
199-H1-40										
4/29/2012	1	3	3	3	1	2	2	2	40%	WSCF result is lab qualified with "U" flag (MDL reported)

Table 11. HX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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-H1-42										
4/29/2012	1	21	21	21	2	19.8	20	19.9	5%	
199-H1-45										
4/29/2012	1	5	5	5	1	3.4	3.4	3.4	38%	WSCF result is lab qualified with "B" flag
199-H1-6										
4/29/2012	1	24	24	24	1	22.1	22.1	22.1	8%	
199-H3-2C										
4/29/2012	1	56	56	56	2	66.2	67.6	66.9	18%	
199-H3-4										
11/8/2006	1	21	21	21	1	15.2	15.2	15.2	32%	Nothing Noted
4/29/2012	1	19	19	19	1	20.7	20.7	20.7	9%	
199-H4-12C										
4/29/2012	1	115	115	115	1	127	127	127	10%	
11/1/2012	1	129	129	129	1	125	125	125	3%	
199-H4-15A										
2/13/2006	2	42	48	45	1	37	37	37	20%	
2/28/2006	1	47	47	47	1	29	29	29	47%	Nothing Noted
5/23/2006	1	21	21	21	2	17	18	17.5	18%	
6/6/2006	1	12	12	12	1	11	11	11	9%	
8/15/2006	1	19	19	19	1	21	21	21	10%	
11/14/2006	2	30	55	42.5	2	24	26	25	52%	Field result (55 ug/L) is review qualified with "ZY" flag; sample comment: "Sample turned a yellowish brown. It was later discovered that some of the analytical ampules were defective and these results are likely low./See RDR 070125FIELD-R3674"
5/8/2007	2	9	10	9.5	1	13	13	13	31%	Nothing Noted
4/29/2012	1	8	8	8	1	2.9	2.9	2.9	94%	WSCF result is lab qualified with "B" flag
199-H4-4										
2/13/2006	2	21	52	36.5	1	18	18	18	68%	Nothing Noted
2/28/2006	1	32	32	32	1	11	11	11	98%	Nothing Noted
5/23/2006	1	17	17	17	2	14	14	14	19%	
6/6/2006	1	5	5	5	1	5	5	5	0%	

Table 11. HX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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
11/14/2006	1	26	26	26	1	22	22	22	17%	
5/8/2007	2	2	5	3.5	1	7	7	7	67%	Field result (5 ug/L) lab qualified with "U" flag (MDL reported)
6/2/2008	1	8	8	8	1	4.2	4.2	4.2	62%	WSCF result is lab qualified with "B" flag
4/29/2012	1	3	3	3	1	2	2	2	40%	WSCF result is lab qualified with "U" flag (MDL reported)
11/1/2012	1	13	13	13	1	14.8	14.8	14.8	13%	
199-H4-63										
2/13/2006	2	20	25	22.5	1	17	17	17	28%	Nothing Noted
2/28/2006	1	26	26	26	1	16	16	16	48%	Nothing Noted
5/23/2006	1	17	17	17	2	14	14	14	19%	
6/6/2006	1	11	11	11	1	10	10	10	10%	
11/14/2006	1	11	11	11	1	20	20	20	58%	Nothing Noted
2/13/2007	2	17	18	17.5	2	16	16	16	9%	
5/8/2007	2	5	9	7	1	9	9	9	25%	Nothing Noted
4/29/2012	1	5	5	5	1	2.9	2.9	2.9	53%	WSCF result is lab qualified with "B" flag
199-H4-64										
2/13/2006	2	33	35	34	1	31	31	31	9%	
2/28/2006	1	40	40	40	1	29	29	29	32%	Nothing Noted
5/23/2006	1	21	21	21	2	17	17	17	21%	Nothing Noted
6/6/2006	1	7	7	7	1	9	9	9	25%	Nothing Noted
11/14/2006	1	23	23	23	1	20	20	20	14%	
5/8/2007	2	9	10	9.5	1	12	12	12	23%	Nothing Noted
4/29/2012	1	0	0	0	1	2	2	2	200%	Both field and fixed results are lab qualified with "U" flag (fixed reports MDL; field reports "0")
199-H4-69										
4/29/2012	1	7	7	7	1	2.2	2.2	2.2	104%	WSCF result is lab qualified with "B" flag
199-H4-70										
4/29/2012	1	1	1	1	1	2	2	2	67%	WSCF result is lab qualified with "U" flag (MDL reported)
199-H4-75										
4/29/2012	1	70	70	70	1	70.2	70.2	70.2	0%	
199-H4-77										

Table 11. HX System Field versus Fixed Laboratory Coincidental (Date Only) Cr(VI) Results Comparison

Sample Date	Field Cr(VI) Concentration (µg/L)				Fixed Cr(VI) Concentration (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
4/29/2012	1	68	68	68	1	71.7	71.7	71.7	5%	

Table 12. DX System Field Laboratory Replicate Cr(VI)Results Comparison

Sample Date and Time	FIELD Cr(VI) Results (µg/L)				MOBILE Cr(VI) Results (µg/L)				Field vs Field 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-D4-38										
5/21/07 10:36					2	125	128	126.5	2%	
199-D4-83										
2/21/07 9:27					2	18	20	19	11%	
199-D4-95										
5/10/11 8:30	2	11	90	50.5					156%	11 ug/L result review qualified with "F" flag
199-D5-101										
2/15/11 8:30	2	213	382	297.5					57%	Nothing noted
199-D5-20										
11/27/06 12:59					2	424	425	424.5	0.2%	
199-D5-39										
2/8/06 8:29					2	912	918	915	1%	
9/7/06 9:06					2	1506	1514	1510	1%	
10/11/06 11:43					2	1768	1786	1777	1%	
2/13/07 9:58					2	1390	1396	1393	0.4%	
10/11/10 8:12	2	2365	2365	2365					0%	
199-D8-53										
5/8/07 10:55	2	8	8	8					0%	
6/30/08 8:00	2	6	7	6.5					15%	
199-D8-54A										
8/9/07 13:00	2	43	44	43.5					2%	
8/4/08 7:30	2	44	44	44					0%	
199-D8-69										
5/8/06 10:53	2	9	9	9					0%	
6/6/06 10:11	2	7	7	7					0%	
7/10/06 10:21					2	9	10	9.5	11%	
1/8/07 10:40					2	62	62	62	0%	
9/11/07 12:56					2	16	17	16.5	6%	
199-D8-72										
10/5/09 13:00	2	949	950	949.5					0.1%	
2/1/10 8:36	2	1030	1033	1031.5					0.3%	
5/3/10 10:00	2	1051	1057	1054					1%	
6/2/10 8:50	2	1052	1052	1052					0%	
199-D8-73										

Table 12. DX System Field Laboratory Replicate Cr(VI)Results Comparison

Sample Date and Time	FIELD Cr(VI) Results (µg/L)				MOBILE Cr(VI) Results (µg/L)				Field vs Field 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
3/7/06 11:22					2	171	172	171.5	1%	
9/7/06 12:01					2	152	153	152.5	1%	
2/13/07 11:05					2	208	208	208	0%	
4/12/07 11:36					2	202	203	202.5	0.5%	
6/13/07 12:36					2	167	168	167.5	1%	
7/19/07 11:49					2	159	160	159.5	1%	
199-D8-88										
2/6/06 12:22					2	86	88	87	2%	
4/5/06 11:16					2	69	69	69	0%	
6/4/07 10:16					2	52	53	52.5	2%	
199-H4-80										
3/8/12 9:00	2	26	28	27					7%	

Table 13. HX 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-H1-42						
3/5/12 10:00	2	15	39	27	89%	Nothing Noted
199-H3-2C						
1/5/11 10:05	2	56	57	56.5	2%	
199-H4-15A						
9/5/06 7:30	2	12	17	14.5	34%	Nothing Noted
3/2/10 14:00	2	19	20	19.5	5%	
199-H4-63						
2/13/07 8:18	2	17	18	17.5	6%	
199-H4-64						
2/13/06 10:20	2	33	35	34	6%	
8/4/09 9:35	2	22	22	22	0%	
4/5/10 9:30	2	15	15	15	0%	
199-H4-76						
11/1/11 8:10	2	41	73	57	56%	Nothing Noted

Table 14. DX 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-D5-104						
3/11/10 8:45	2	5750	5850	5800	2%	
TARL						
199-D4-38						
2/9/09 10:27	2	156	157	156.5	1%	
199-D4-39						
11/3/09 8:58	2	778	779	778.5	0%	
199-D4-84						
10/8/09 9:51	2	62	62	62	0%	
199-D5-104						
10/8/09 8:57	2	3480	3530	3505	1%	
199-D5-131						
1/23/13 10:09	2	455	464	459.5	2%	
199-D8-69						
8/12/09 11:35	2	18	19	18.5	5%	
199-D8-72						
2/6/08 11:10	2	690	692	691	0%	
WSCF						
199-D4-101						
2/3/11 9:54	2	474	475	474.5	0%	
199-D4-38						
10/30/07 12:44	2	166	167	166.5	1%	
5/7/09 11:23	2	108	110	109	2%	
8/10/09 12:48	2	106	117	111.5	10%	

Table 14. DX 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
12/1/09 10:18	2	254	265	259.5	4%	
3/1/10 11:16	2	113	116	114.5	3%	
8/9/12 10:55	2	2	2	2	0%	
199-D4-39						
5/7/09 9:21	2	703	703	703	0%	
8/12/09 11:58	2	515	518	516.5	1%	
11/3/09 8:58	2	772	783	777.5	1%	
3/1/10 11:44	4	798	800	799	0%	Four Samples
6/15/10 7:52	2	2950	2960	2955	0%	
199-D4-83						
5/13/09 13:56	2	74.4	74.4	74.4	0%	
8/10/09 11:21	2	46.3	49.4	47.85	6%	
11/9/09 9:45	2	94.5	95.8	95.15	1%	
3/1/10 12:14	2	108	109	108.5	1%	
5/30/12 10:06	2	2	2	2	0%	
199-D4-84						
5/7/09 12:28	4	43.8	47.7	46.25	8%	Four Samples
8/10/09 11:05	4	51.6	53.9	52.975	4%	Four Samples
10/8/09 9:51	2	60.4	63.3	61.85	5%	
3/24/10 9:13	2	69	69.8	69.4	1%	
6/3/10 13:38	4	67.5	68.6	68.05	2%	Four Samples
199-D4-85						
5/7/09 13:25	2	10.6	10.7	10.65	1%	
8/13/09 9:32	2	9.3	9.6	9.45	3%	
11/9/09 12:23	4	6.1	6.1	6.1	0%	Four Samples
199-D4-95						

Table 14. DX 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
2/15/11 10:00	2	169	176	172.5	4%	
3/15/11 8:24	2	137	140	138.5	2%	
199-D4-96						
2/15/11 10:18	2	503	508	505.5	1%	
3/15/11 8:32	2	10.2	10.5	10.35	3%	
199-D4-97						
11/3/09 9:25	2	410	411	410.5	0%	
2/15/11 10:33	2	438	441	439.5	1%	
3/22/11 8:15	2	289	290	289.5	0%	
199-D4-98						
2/15/11 10:43	2	38.9	41.4	40.15	6%	
3/22/11 8:30	2	68	68.9	68.45	1%	
4/29/12 9:22	2	2	2	2	0%	
199-D4-99						
2/15/11 10:56	2	7.8	9.4	8.6	19%	
3/22/11 8:41	2	6.3	6.4	6.35	2%	
199-D5-101						
3/22/11 9:00	2	156	158	157	1%	
199-D5-104						
11/23/08 12:05	2	2	2	2	0%	
3/9/09 12:00	2	5000	5000	5000	0%	
4/13/09 10:23	2	4030	4050	4040	0.5%	
5/6/09 10:30	2	4460	4580	4520	3%	
6/19/09 8:54	2	2190	2240	2215	2%	
7/21/09 12:05	2	3660	3670	3665	0.3%	
8/11/09 9:12	2	3140	3150	3145	0.3%	

Table 14. DX 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
9/14/09 12:44	2	164	165	164.5	0.6%	
10/8/09 8:57	2	4100	4160	4130	1%	
12/1/09 8:13	2	4520	4550	4535	0.7%	
2/11/10 13:42	2	5320	5360	5340	0.7%	
4/14/10 10:06	2	8840	8910	8875	0.8%	
5/14/10 13:08	2	7140	7210	7175	1%	
199-D5-127						
3/5/10 12:12	2	785	787	786	0.3%	
3/22/11 9:20	2	310	312	311	1%	
8/9/12 12:42	2	47.6	51.2	49.4	7%	
199-D5-130						
2/3/11 10:35	2	236	236	236	0%	
3/22/11 10:20	2	215	217	216	1%	
199-D5-131						
2/3/11 10:20	2	1550	1790	1670	14%	
3/22/11 9:25	2	1610	1610	1610	0%	
199-D5-20						
11/14/07 11:46	2	259	262	260.5	1%	
2/3/11 8:50	2	83.4	83.4	83.4	0%	
10/28/12 8:18	2	25	25	25	0%	
199-D5-32						
5/22/08 13:15	2	127	132	129.5	4%	
8/24/08 8:45	2	133	134	133.5	1%	
2/3/11 9:29	2	6.9	7.1	7	3%	
2/15/11 9:30	2	5.1	5.8	5.45	13%	
5/30/12 10:51	2	325	334	329.5	3%	

Table 14. DX 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-D5-39						
11/20/08 10:14	2	2000	2070	2035	3%	
1/30/11 11:01	2	5540	5710	5625	3%	
2/3/11 9:03	2	5790	5860	5825	1%	
199-D5-92						
11/4/09 10:41	2	66.8	68.1	67.45	2%	
2/3/11 8:25	2	29.6	29.6	29.6	0%	
199-D7-3						
3/22/11 9:15	2	76.2	76.9	76.55	1%	
3/22/11 9:56	2	76.1	76.7	76.4	0.8%	
199-D7-6						
3/22/11 10:00	2	26.5	26.5	26.5	0%	
3/22/11 10:21	2	25.5	25.9	25.7	2%	
199-D8-53						
5/8/07 10:55	2	10	10	10	0%	
199-D8-54A						
5/20/10 9:16	2	67.6	67.6	67.6	0%	
2/23/11 9:41	2	16	16.4	16.2	2%	
199-D8-6						
5/22/08 13:00	2	239	242	240.5	1%	
5/14/09 12:00	2	201	206	203.5	2%	
8/12/09 10:16	4	256	259	257.5	1%	Four Samples
11/9/09 13:30	2	137	137	137	0%	
2/3/11 8:57	2	268	271	269.5	1%	
2/17/11 7:53	2	256	259	257.5	1%	

Table 14. DX 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-D8-68						
5/20/10 9:45	2	40	40	40	0%	
2/3/11 10:05	2	8.3	8.5	8.4	2%	
3/15/11 9:38	2	2	2	2	0%	
199-D8-69						
3/4/08 12:13	2	51.8	51.8	51.8	0%	
11/20/08 13:05	2	47.3	48.6	47.95	3%	
5/13/09 9:47	4	28.5	29.2	28.8	2%	Four Samples
8/12/09 11:35	2	22.1	22.5	22.3	2%	
12/1/09 11:10	2	58.2	58.2	58.2	0%	
3/4/10 14:12	2	63.6	64.5	64.05	1%	
2/3/11 10:53	2	5.7	6.2	5.95	8%	
2/17/11 10:20	2	3.6	4.1	3.85	13%	
199-D8-72						
2/6/08 11:10	2	178	798	488	127%	798 ug/L results lab qualified with "D" flag; 178 ug/L result review qualified with "Y flag; see TARL result for same well and date/time
5/20/10 10:08	2	1110	1110	1110	0%	
2/3/11 10:21	2	624	633	628.5	1%	
3/15/11 9:20	2	236	237	236.5	0%	
199-D8-73						
5/13/09 11:49	2	226	226	226	0%	
11/4/09 8:23	2	248	250	249	1%	
2/3/11 9:30	2	256	260	258	2%	
2/17/11 8:00	2	205	205	205	0%	

Table 14. DX 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-D8-88						
12/4/07 12:56	2	76.7	76.7	76.7	0%	
5/13/09 12:19	4	112	115	114	3%	Four Samples
8/12/09 9:19	2	82.8	84.1	83.45	2%	
10/8/09 11:54	2	166	167	166.5	1%	
3/24/10 12:04	4	215	217	216	1%	Four Samples
6/3/10 11:47	2	177	177	177	0%	
3/15/11 8:00	2	269	271	270	1%	
199-D8-89						
2/17/11 8:22	4	120	121	120.25	1%	Four Samples
3/22/11 10:52	2	95.2	96.8	96	2%	
199-D8-90						
2/17/11 10:10	2	40.9	41.1	41	0%	
3/22/11 8:10	2	26.4	26.9	26.65	2%	
199-D8-91						
2/17/11 9:25	2	36.6	38	37.3	4%	
3/22/11 8:30	2	34.2	34.4	34.3	1%	
199-D8-95						
2/17/11 9:09	2	784	807	795.5	3%	
3/22/11 9:00	2	473	480	476.5	1%	
2/2/12 9:24	2	304	304	304	0%	
2/27/12 10:30	2	314	318	316	1%	
199-D8-96						
2/3/11 11:34	2	1440	1450	1445	1%	
3/22/11 9:50	2	1170	1170	1170	0%	
8/9/12 9:42	2	405	408	406.5	1%	

Table 14. DX 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-D8-97						
3/22/11 8:43	2	566	569	567.5	1%	
199-D8-98						
2/3/11 11:17	2	142	142	142	0%	
3/22/11 9:38	2	98.7	98.7	98.7	0%	

Table 15. HX 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-H3-4						
10/11/09 9:32	2	52	52	52	0%	
WSCF						
199-H1-37						
10/28/12 9:26	2	9.4	9.6	9.5	2%	
199-H1-42						
4/29/12 9:26	2	19.8	20	19.9	1%	
199-H1-43						
3/31/10 11:06	2	91.7	91.8	91.75	0.1%	
199-H3-2C						
9/16/09 15:07	2	13.1	13.2	13.15	1%	
9/21/09 15:00	2	10.7	10.9	10.8	2%	
9/30/09 10:00	2	30.4	30.5	30.45	0.3%	
10/13/09 8:15	2	34.7	34.9	34.8	1%	
10/20/09 10:25	2	33	33.1	33.05	0.3%	
10/23/09 6:50	2	33.3	33.7	33.5	1%	
10/23/09 7:15	2	111	112	111.5	1%	
1/24/11 11:20	2	61.6	62.1	61.85	1%	
4/29/12 11:03	2	66.2	67.6	66.9	2%	
11/26/12 11:10	2	63.4	64	63.7	1%	
199-H3-4						
6/2/08 12:42	2	29	29	29	0%	
5/28/09 12:00	2	50.7	51.2	50.95	1%	
10/11/09 9:32	2	50.4	51.7	51.05	3%	
3/21/10 10:17	2	58.9	61.7	60.3	5%	

Table 15. HX 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
5/13/10 13:37	2	60.6	61.1	60.85	1%	
12/30/10 10:21	2	62.7	64.9	63.8	3%	
1/18/11 11:58	2	62.1	62.6	62.35	1%	
4/20/11 11:21	2	53.1	53.4	53.25	1%	
199-H4-12C						
6/4/09 13:20	2	82.4	84.3	83.35	2%	
9/21/09 15:00	2	93.3	93.3	93.3	0%	
9/30/09 10:00	2	91	91.1	91.05	0.1%	
10/6/09 10:45	2	98.8	99.6	99.2	1%	
10/13/09 8:15	2	106	107	106.5	1%	
10/20/09 10:55	2	110	110	110	0%	
11/19/09 10:00	2	120	121	120.5	1%	
8/16/10 9:36	2	124	126	125	2%	
12/16/10 9:32	2	139	140	139.5	1%	
199-H4-15A						
1/11/10 12:53	2	14.8	15.3	15.05	3%	
2/23/11 10:57	2	9.6	10.1	9.85	5%	
5/24/12 9:41	2	2	2	2	0%	
199-H4-4						
11/19/09 11:32	2	13.3	13.3	13.3	0%	
2/23/11 10:28	2	3.5	3.6	3.55	3%	
199-H4-63						
2/13/07 8:18	2	16	16	16	0%	

Table 15. HX 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
9/24/09 9:53	2	2	13.2	7.6	147%	One sample filtered (13.2 ug/L); one sample unfiltered (2 ug/L) and lab qualified with "U" flag (MDL reported)
11/5/09 11:45	2	17.9	18.1	18	1%	
11/19/09 12:10	4	14	14.9	14.4	6%	Four samples
1/11/10 13:10	2	17.3	17.3	17.3	0%	

Table 16. DX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	STLRL		TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	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-D4-38								
11/19/08 11:05			1	195	1	201	3%	
199-D4-39								
11/3/09 8:58			2	778.5	2	777.5	0%	
199-D4-84								
10/8/09 9:51			2	62	2	61.85	0%	
199-D5-104								
10/6/08 9:40			1	4560	1	5440	18%	
4/13/09 10:23			1	3410	2	4040	17%	
10/8/09 8:57			2	3505	2	4130	16%	
199-D8-53								
11/27/07 13:30			1	79	1	87	10%	
2/6/08 10:45			1	67	1	76	13%	
199-D8-54A								
11/9/06 11:53	1	105			1	102	3%	
2/6/08 10:55			1	118	1	131	10%	
199-D8-6								
12/5/07 13:46			1	359	1	200	57%	TARL result is review qualified with "Y" flag; WSCF result is review qualified with "G" flag
3/4/08 10:52			1	195	1	190	3%	
8/13/08 9:36			1	189	1	172	9%	

Table 16. DX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	STLRL		TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	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-D8-68								
11/27/07 13:40			1	133	1	136	2%	
11/27/07 13:45			1	129	1	135	5%	
2/6/08 11:00			1	65	1	349	137%	WSCF result is lab qualified with "D" flag and review qualified with "Y" flag
199-D8-69								
8/13/08 8:21			1	11	1	15.8	36%	Nothing Noted
8/12/09 11:35			2	18.5	2	22.3	19%	
199-D8-72								
11/27/07 13:55			1	611	1	639	4%	
2/6/08 11:10			2	691	2	488	34%	One WSCF result (798 ug/L) lab qualified with "D" flag and one WSCF results (178 ug/L) review qualified with "Y" flag
199-D8-73								
3/7/08 9:23			1	199	1	189	5%	
199-D8-88								
6/3/08 12:40			1	58	1	64.5	11%	
2/24/09 10:22			1	105	1	107	2%	

Table 16. DX System Fixed Laboratory Replicate Cr(VI) Results Comparison (Interlaboratory)

Sample Date and Time	STLRL		TARL		WSCF		Interlaboratory Summary	
	Number of Results Reported	Reported Cr(VI) Concentration* (µg/L)	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

*Replicates by laboratory are averaged if applicable

Table 17. HX 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-H3-4						
10/11/09 9:32	2	52	2	51.05	2%	Four samples
199-H4-12C						
11/10/08 10:22	1	84	1	86.6	3%	
199-H4-15A						
11/27/07 11:30	1	22	1	28	24%	WSCF result is lab qualified with "N" flag
2/6/08 10:20	1	15	1	22	38%	Nothing Noted
199-H4-4						
11/27/07 11:50	1	14	1	19	30%	WSCF result is lab qualified with "N" flag
2/6/08 9:50	1	10	1	16	46%	Nothing Noted
199-H4-63						
11/27/07 11:20	1	10	1	18	57%	WSCF result is lab qualified with "N" flag
2/6/08 10:30	1	10	1	16	46%	Nothing Noted
199-H4-64						
11/27/07 12:35	1	16	1	22	32%	WSCF result is lab qualified with "N" flag
2/6/08 9:35	1	15	1	31	70%	WSCF result is review qualified with "Y" flag

*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-100HR3-13-0003_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® files named "ECF-100HR3-13-0003_Appendix A DX Scatter Plots.xlsx" and "ECF-100HR3-13-0003_Appendix A HX Scatter Plots.xlsx" under this EFC number in the ERMA.