Tier II Data Validation Report Summary

Client: Chevron Environmental Management Company (EMC) Cincinnati	Laboratory: Lancaster Laboratories, Inc.
Project Name: Barrier Wall Monitoring Network Sampling	Sample Matrix: Groundwater
Project Number: 500-017-012	Sample Start Date: December 17, 2009
Date Validated: February 8, 2010	Sample End Date: December 17, 2009
Parameters Included: Volatile Organic Compounds (VOC) by Solid Waste-846 (SW-846) Method 8260B; Carbon Dioxide by SW-846 Method 8000B; Methane by SW-846 Modified Method 8015B; Total and Dissolved Metals by SW-846 Method 6010B; Ferric Iron by SW-846 Modified Method 6010B; Chloride and Sulfate by Environmental Protection Agency (EPA) Method 300.0; Kjeldahl Nitrogen by EPA Method 351.2; Nitrate Nitrogen and Nitrite Nitrogen by EPA Method 353.2; Total Carbon (TC), Total Inorganic Carbon (TIC), and Total Organic Carbon (TOC) by EPA Method 415.1; Alkalinity by Standard Method 20th Edition (SM20) 2320B; Ferrous Iron by Modified Method SM20 3500 Fe B; Sulfide by Method SM20 4500 S2 D; and Ammonia Nitrogen by Modified Method SM20 4500NH3 B/C	
Laboratory Project ID: 1175899	
Data Validator: Tim Gunn, CHMM	

DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services group on the analytical data report package generated by Lancaster Laboratories evaluating samples from the Chevron EMC site located in Cincinnati, Ohio.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values of samples from laboratory duplicate pairs. Laboratory accuracy was established by reviewing the demonstrated percent recoveries of matrix spike (MS) and matrix spike duplicate (MSD) samples, and of laboratory control samples (LCS) and laboratory control sample duplicates (LCSD) to verify that none of the data were biased. Additionally, field accuracy was established by collecting trip blank samples to monitor for possible ambient or cross contamination during sampling. Method compliance was established by reviewing holding times, detection limits, surrogate recoveries, method blanks, and the LCS and LCSD percent recoveries against method specific requirements. Completeness was evaluated by determining the overall ratio of the number of samples planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody, laboratory analytical methods, and any other necessary documents associated with this analytical data set.

Data were evaluated in general accordance with validation criteria set forth in the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review, document number USEPA-540-R-08-01, June 2008 with additional reference to USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, document number EPA 540/R-99-008 of October 1999 and the USEPA CLP National Functional Guidelines for Inorganic Data Review, document number EPA 540R-04-004, October 2004. Review of duplicates is conducted in accordance with USEPA Region 1 Laboratory Data Validation Function Guidelines for Evaluation of Organic Analysis, December 1996.

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SAMPLE NUMBERS TABLE

Client Sample ID	Laboratory Sample Number
BMW-3I, 121709	5868546
BMW-3I, 121709 Filtered	5868547
BMW-3D, 121709	5868548
BMW-3D, 121709 Filtered	5868549
MW-137S, 121709	5868550
MW-137S, 121709 Filtered	5868551
BMW-3S, 121709	5868552
BMW-3S, 121709 Filtered	5868553
Trip Blank, 121709	5868554

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The samples were analyzed for client-specified analytes. Chain-of-custody (COC) completeness is included in Section #3. The laboratory data were reviewed to evaluate compliance with the required methods and the quality of the reported data. A leading check mark (✓) indicates that the referenced data were deemed acceptable. A preceding crossed circle (⊗) signifies problems with the referenced data that may have warranted attaching qualifiers to the data.

- ✓ Data Completeness
- ✓ COC Documentation
- ⊗ Holding Times and Preservation
- ✓ Laboratory Blanks
- ✓ System Monitoring Compounds (i.e. Surrogates)
- ✓ Laboratory Control Samples/Laboratory Control Sample Duplicates (LCS/LCSD)
- ⊗ Matrix Spike/Matrix Spike Duplicates (MS/MSD)
- ✓ Laboratory Duplicates
- ✓ Trip Blank

OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Section #2.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data which are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R, the data may be used for site evaluation, with the reasons for qualification being given consideration when interpreting sample concentrations. Data points which are assigned an R qualifier should not be used for any site evaluation purposes. Data were qualified with J data flags by the laboratory if the result was greater than or equal to the method detection limit (MDL) but less than the limit of quantitation (LOQ). Laboratory J flags were preserved in the data and included in the Data Qualification Summary table at the end of this report.

Data qualifiers used during this validation included:

J – Estimated concentration

Data Completeness

The analyses appeared to be performed as requested on the chain-of-custody records. The associated samples were received by the laboratory and appeared to be analyzed properly. No data points were rejected. The data completeness measure for this data package is 100% and is acceptable.

VALIDATION CRITERIA CHECKLIST	
1. Was the report free of any non-conformances related to the analytical data identified by the laboratory?	Yes
Comments: The laboratory did not note any non-conformances related to the analytical data.	
2. Were data qualification flags or any other notes used by the laboratory? If yes, define.	Yes
Comments: The laboratory noted that the samples were filtered in the field for dissolved metals. The laboratory used the following data qualification flags with this data set. J – Estimated value (1) The result for one or both determinations was less than five times the limit of quantitation (LOQ). (2) The unspiked result was more than four times the spike added. *- Outside of specification	
3. Were sample COC forms complete?	Yes
Comments: The COC form was complete from the field to the laboratory. Custody was maintained as evidenced by proper signatures, dates, and times of receipt.	
4. Were detection limits in accordance with the QAPP, permit, or method?	Yes
Comments: The detection limits were found to be acceptable. Dilutions up to 20 times were applied to samples for chloride, sulfate, and TC analyses. The final usability of the data with respect to dilutions will be determined by the project manager.	
5. Were the requested analytical methods in compliance with the QAPP, permit, or COC?	Yes
Comments: The requested analytical methods were in compliance with the COC and the attached analyte list, Analytical Requests for Groundwater.	
6. Were samples received in good condition within method specified requirements?	Yes
Comments: The samples were received in good condition and within or below the recommended temperature range of 4°C +/- 2°C at 0.5-1.3° C. No samples were reported frozen or broken, and therefore no further action was required regarding sample temperatures. The custody seals were present and intact.	
7. Were samples analyzed within method specified or technical holding times?	No
Comments: The samples were extracted or analyzed within method specified holding times with the following exception. **The ferrous iron analysis was performed past the immediate recommended analysis time. The modified Method SM20 3500 Fe B states that holding time is 24 hours but the procedure can also be used in the laboratory if it is understood that normal sample exposure to air during shipment may result in precipitation of iron. As a result, the data were accepted with qualification of J for detections.**	
8. Were reported units appropriate for the associated sample matrix/matrices and method(s) of analyses?	Yes
Comments: Sample results were reported in µg/L or mg/L, which are appropriate units for the requested analyses and the water matrix.	
9. Do the laboratory reports include all constituents requested to be reported?	Yes
Comments: The laboratory report included the requested constituents.	
10. Was there indication from the laboratory that the initial or continuing calibration verification results were within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set; however, these data are assumed to be acceptable as the laboratory did not note that any calibration verification results were outside acceptable limits.	

VALIDATION CRITERIA CHECKLIST	
11. Was the total number of method blank samples prepared equal to at least 5% of the total number of samples, or analyzed as required by the method?	Yes
Comments: The total number of method blanks prepared was greater than 5% of the total number of samples.	
12. Were method blank samples free of analyte contamination?	No
Comments: There were no detections of target analytes in the method blank samples with the following exceptions. In metals batch 093571848001, iron was detected at a concentration of 0.0575 mg/L. Additionally, total carbon in batch 09365049501A was detected at a concentration of 0.56 mg/L. No qualification was necessary since the sample detections or reporting limits were greater than or equal to 10 times the method blank detections.	
13. Was the total number of matrix spike samples prepared equal to at least 5% of the total number of samples, or analyzed as required by the method?	Yes
Comments: The total number of matrix spike samples prepared was greater than 5% of the total number of samples with the following exception. Matrix spike samples were not prepared for ammonia as nitrogen batch 09357022101A. The associated data were validated using other QC data including the LCS and duplicate. Matrix spikes were prepared for VOCs batch Y093621AA from sample MW-137S, 121709, methane batch 093560006A from sample BMW-3I, 121709, nitrite nitrogen batch 09352105101B from sample BMW-3S, 121709, and nitrate nitrogen batch 10006106101B from sample MW-137S, 121709. Matrix spikes were also prepared for Kjeldahl nitrogen batch 09354108101B from sample BMW-3D, 121709, total organic carbon batch 09364049502B from sample BMW-3I, 121709 and ferrous iron batch 0935834401A from sample MW-137S, 121709. The MS/MSD pair for carbon dioxide analyses and batch 093550001A was prepared from sample MW-136I of data set 1175433. The total carbon MS/MSD pair was prepared for batch 09365049501A was prepared from sample MW-137D of data set 1176482. The remaining matrix spikes were prepared from samples not associated with this sampling event.	
14. Were MS/MSD percent recoveries and MS/MSD RPD values within data validation or laboratory quality control (QC) limits?	No
Comments: Project specific MS/MSD samples were within laboratory-specified limits or were not applicable since the un-spiked result was more than four times the spike added with the following exceptions. **In methane batch 093560006A, the MS percent recovery was below the limits of 35-157% at 17%. As a result of possible low bias, detections in the associated samples were qualified as J.** For analyses including MS/MSD sample pairs prepared from samples not associated with this client's data, some MS/MSD recoveries were found to exceed laboratory control limits. The MS and MSD spike recoveries for these non-project samples were considered but data were not qualified since matrix similarity to project samples could not be guaranteed.	
15. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples, or analyzed as required by the method?	Yes
Comments: Laboratory control samples were prepared on at least a 5% basis for the total number of samples.	
16. Were LCS/LCSD percent recoveries and LCS/LCSD RPD values within laboratory QC limits?	Yes
Comments: The LCS/LCSD percent recoveries and LCS/LCSD RPD values were within laboratory QC limits.	
17. Were surrogate recoveries within laboratory control limits?	Yes
Comments: Surrogate recoveries were within laboratory control limits.	
18. Was the number of equipment, trip, or field blanks collected equal to at least 10% of the total number of samples, or as required by the project guidelines, QAPP, SAP, or permit?	Yes
Comments: There was one trip blank (Trip Blank, 121709) collected with the samples of this data set, which is greater than 10% the total number of samples.	
19. Were the trip blank, field blank, and/or equipment blank samples free of analyte contamination?	Yes
Comments: There were no detections of the requested analytes in the sample Trip Blank, 121709.	

VALIDATION CRITERIA CHECKLIST	
20. Were the field duplicates collected equal to at least 10% of the total number of samples, or as required by the project guidelines, QAPP, SAP, or permit?	No
Comments: Field duplicates were not collected with this data set.	
21. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?	N/A
Comments: The field duplicate RPD values were within acceptable limits.	
22. Were laboratory duplicate RPD values within laboratory-specified limits?	Yes

Comments: Laboratory duplicates were prepared for inorganic analyses including metals, nitrite nitrogen, total organic carbon, Kjeldahl nitrogen, chloride/sulfate, nitrate nitrogen, total carbon, ferrous iron, ammonia nitrogen, sulfide, and alkalinity. Laboratory duplicates were prepared for nitrite nitrogen batch 09352105101B from sample BMW-3S, 121709, and nitrate nitrogen batch 10006106101B from sample MW-137S, 121709. Laboratory duplicates were also prepared for Kjeldahl nitrogen batch 09354108101B from sample BMW-3D, 121709, total organic carbon batch 09364049502B from sample BMW-3I, 121709 and ferrous iron batch 0935834401A from sample MW-137S, 121709. The total carbon laboratory duplicate pair was prepared for batch 09365049501A was prepared from sample MW-137D of data set 1176482. The remaining laboratory duplicates were prepared from samples not associated with this sampling event.

The project specific laboratory duplicate RPD values were within the data validation QC limits or were qualified by the laboratory with (1) indicating that the result for one or both determinations was less than five times the LOQ with the following exception.

The laboratory duplicate RPD value for total organic carbon batch 09364049502B was 6% where the acceptable maximum is 4% and was prepared from a sample associated with this data set. The laboratory also qualified the RPD result with (1) indicating that the result for one or both determinations was less than five times the LOQ. As a result RPD values outside of laboratory control limits were not qualified as results were less than five times the LOQ.

The laboratory reported that several duplicate values were not applicable due to results that were less than five times the limit of quantitation. Laboratory duplicate RPDs for non-project samples were considered but data were not qualified since matrix similarity to project samples could not be guaranteed.

DATA QUALIFICATION SUMMARY

Analyte	Field Sample ID	Lab Sample ID	Result	Units	Reviewer Qualifier	Reviewer Qualifier Reason
Arsenic, Dissolved	MW-137S,121709 Filtered	5868551	0.0096	mg/L	J	Flagged by the Lab: Result between MDL and RL.
CO2 by Headspace	BMW-3D,121709	5868548	7500	ug/L	J	Flagged by the Lab: Result between MDL and RL.
CO2 by Headspace	BMW-3I,121709	5868546	7200	ug/L	J	Flagged by the Lab: Result between MDL and RL.
CO2 by Headspace	BMW-3S,121709	5868552	7400	ug/L	J	Flagged by the Lab: Result between MDL and RL.
Iron, Ferric	BMW-3I,121709	5868546	0.084	mg/L	J	Flagged by the Lab: Result between MDL and RL.
Iron, Ferrous	BMW-3D,121709	5868548	0.048	mg/L	J	Sample was extracted outside of the acceptable holding time.
Iron, Ferrous	BMW-3I,121709	5868546	0.11	mg/L	J	Sample was extracted outside of the acceptable holding time.
Iron, Ferrous	BMW-3S,121709	5868552	0.28	mg/L	J	Sample was extracted outside of the acceptable holding time.
Iron, Ferrous	MW-137S,121709	5868550	1.7	mg/L	J	Sample was extracted outside of the acceptable holding time.
Iron, Total	BMW-3D,121709	5868548	0.0652	mg/L	J	Flagged by the Lab: Result between MDL and RL.
Iron, Total	BMW-3I,121709	5868546	0.198	mg/L	J	Flagged by the Lab: Result between MDL and RL.
Methane	BMW-3D,121709	5868548	26	ug/L	J	The MS and/or MSD recovery(ies) were below the acceptable limits indicating possible matrix interference.
Methane	BMW-3I,121709	5868546	120	ug/L	J	The MS and/or MSD recovery(ies) were below the acceptable limits indicating possible matrix interference.
Methane	BMW-3S,121709	5868552	86	ug/L	J	The MS and/or MSD recovery(ies) were below the acceptable limits indicating possible matrix interference.
Methane	MW-137S,121709	5868550	44	ug/L	J	The MS and/or MSD recovery(ies) were below the acceptable limits indicating possible matrix interference.
Nitrogen, Nitrite	BMW-3S,121709	5868552	0.043	mg/L	J	Flagged by the Lab: Result between MDL and RL.