Appendix L

Phase II
RI Data Validation
Summaries and Checklists

MEMORANDUM

To:
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From:
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Golden, Colorado

Date:
November 30, 2010 (revised December 9, 2010)

Subject:
Heglar Kronquist Landfill - Quality Control Evaluation – September/October 2010 Groundwater Sampling Events

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The purpose of this memorandum is to provide a summary evaluation of data quality associated with groundwater sampling conducted at the Heglar/Kronquist landfill during September and October 2010. The review was conducted by a third party Data Validator, Mr. William Huskie, of Nankoweep Environmental Consulting. The review process included evaluation of both field and laboratory quality assurance and quality control (QA/QC) sample results reported. Evaluation criteria for the QA/QC review were based on SW-846 method requirements, EPA data validation guidance, the Final Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP) prepared for the project (ARCADIS 2009), and professional judgment of the third party Data Validator.

Groundwater samples were submitted for analysis to Columbia Analytical Services (CAS) Laboratory located in Kelso, Washington.

A discussion of data quality, in terms of precision, accuracy, completeness, and overall data quality, is presented for the groundwater samples in the following pages.

Groundwater Sampling

Groundwater samples were collected on September 29, September 30, and October 1, 2010, in association with the landfill investigation. Samples were collected from established groundwater monitoring wells. Analytical results for the water samples were provided in three separate CAS laboratory reports (one report for each day of sampling).

Analyses for combinations of the following parameters were requested.

• Chloride, Fluoride, and Sulfate	EPA Method 300.0
• Dissolved Ammonia as (N)	EPA Method 350.1
• Nitrite as (N)	EPA Method 353.2
• Nitrate+Nitrite as (N)	EPA Method 353.2
• Nitrate as (N)	EPA Method 353.3
• Alkalinity forms	SM 2320B
• Total Dissolved Solids	SM 2540C
• Dissolved Metals	EPA Method 200.7 (Aluminum, Calcium, Iron, Magnesium, Manganese, Potassium, and Sodium)
• Dissolved Metals	EPA Method 200.8 (Arsenic)
• Aroclors/PCBs	EPA Method 8082
• VOCs	EPA Method 624

An evaluation of the groundwater data quality is summarized in the following table and comments.

VALIDATION CHECKLIST SUMMARY - GROUNDWATER SAMPLING

REQUIREMENTS	REPORTED / EVALUATED NO	REPORTED / EVALUATED YES	PERFORMANCE ACCEPTABLE* NO	PERFORMANCE ACCEPTABLE* YES	DATA QUALIFIED - COMMENTS
VARIOUS EPA AND STANDARD METHODS					
1. Holding times / Preservation		X		X	
2. Detection limits / Dilutions		X		X	
3. Blanks					
A. Method/Prep Blanks		X	X		Yes
B. Equipment/Field/Trip Blanks		X	X		Yes
4. Initial and Continuing Calibration %R		X		X	
5. Matrix Spike (MS) %R		X		X	
6. MS Duplicate (MSD) %R and RPD		X		X	
7. LCS and LCSD %R and RPD		X		X	
8. Field/Lab Duplicate Comparison (RPD)		X	X		Yes
9. Surrogate Recoveries		X		X	
10. Serial Dilutions		X	X		Yes
11. ICP Interference Check Sample		X	X		Yes
12. Results Quantitation		X		X	Yes – J values

%R - percent recovery RPD - relative percent difference LCS – Laboratory Control Sample

* Performance is flagged as not acceptable, if some of the resulting data are qualified. This is not an indication that the laboratory work was unacceptable. Full explanation is provided below with the comments for each quality control element.

COMMENTS: Performance was acceptable, with the following exceptions and/or notes:

1) The groundwater samples were received by CAS at acceptable temperatures and under proper chain-of-custody documentation. The water sample analyses were performed within applicable holding times for all analyses required.

2) Several of the inorganic constituent analyses were performed at dilutions to bring analyte concentrations into appropriate linear range. The maximum dilution was required for chloride, at 100 times. Reporting limits are determined to be acceptable.

3) Results from one or more method blanks were provided in support of each of the requested analyses. Several inorganic constituents were detected in the method blanks. Total alkalinity was detected in some method blanks at concentrations an order of magnitude lower than in the associated samples, and no action was taken. Nitrate+nitrite was detected in method blanks associated with several of the analyses at concentrations of 0.024 mg/L and 0.029 mg/L. Nitrate+nitrite was detected in the associated samples at concentrations more than 5 times greater than the method blank detections, and no bias to the sample results is indicated. Nitrite was detected in one method blank at a concentration of 0.01 mg/L. No action was required, as nitrite was not detected in the associated sample.

Dissolved iron and dissolved sodium were detected in the Method 200.7 method blanks at concentrations of 6.2 ug/L, and 70 ug/L, respectively. Dissolved iron was detected in several samples at concentrations within five times those of the method blank. Qualifiers are discussed below.

Results from three equipment blanks (one for each day of sampling) were provided. Numerous target constituents were detected in the equipment blanks, as follows:

Equipment Blank Date	Detections
September 29, 2010	Nitrate+nitrite = 0.051 mg/L
September 29, 2010	**TDS = 451 mg/L ****
September 29, 2010	Iron = 5.3 ug/L
September 29, 2010	Sodium = 46 ug/L
September 30, 2010	Nitrate+nitrite = 0.045 mg/L
September 30, 2010	TDS = 31 mg/L
September 30, 2010	Magnesium = 6.1 ug/L
September 30, 2010	Sodium = 152 ug/L
October 1, 2010	Nitrate+nitrite = 0.043 mg/L
October 1, 2010	TDS = 32 mg/L
October 1, 2010	Calcium = 10.8 ug/L
October 1, 2010	Iron = 3.6 ug/L
October 1, 2010	Magnesium = 2.6 ug/L
October 1, 2010	Sodium = 564 ug/L
October 1, 2010	Methylene chloride = 1.1 ug/L
October 1, 2010	Benzene = 0.31 ug/L
October 1, 2010	Toluene = 1.2 ug/L
October 1, 2010	Aroclor 1260 = 0.0014 ug/L

** Results for TDS in the equipment blank were investigated. The sample was re-analyzed (out of holding times), and the equipment blank was found to be non-detect. TDS results from the initial equipment blank analysis were determined to be the result of an operator error, and were not further considered.

Results from calibration blanks were also provided in support of the dissolved metals analyses. Several dissolved metals were detected in the calibration blanks, including the metals detected in the method blanks, with the addition of sodium and potassium. **Several target constituents were detected in groundwater samples at concentrations within 5 times those of the various associated blanks discussed above. Results for these inorganic and organic analytes were qualified as "U/non-detect at the concentrations reported", due to potential blank contamination bias, as follows:**

Sample	Constituent	Results	Units	Qualifier
MW-5	Iron	15.1	ug/L	U
MW-3	Iron	10.4	ug/L	U
MW-1	Iron	24.2	ug/L	U
MW-2	Iron	30.4	ug/L	U
MW-4	Iron	4.5	ug/L	U
MW-3	Methylene Chloride	0.15	ug/L	U
MW-3	Toluene	0.22	ug/L	U

4) Results from initial and continuing calibration analyses were reviewed for all metals and inorganic constituents. Calibration data was reviewed at a cursory level for the organic analyses (VOCs and PCBs). Calibration data was determined to be acceptable. No data qualification was required based on the calibration review**.**

5-6) The laboratory provided results from project specific Matrix Spike (MS) and Matrix Spike Duplicate (MSD) analyses and from batch specific MS and MSD analyses. Precision and accuracy, as demonstrated by these analyses were acceptable.

7) The laboratory provided results from LCS and/or LCSD analyses in support of the each method requested. Precision and accuracy, as demonstrated by these analyses is acceptable.

8) Field duplicate samples were not submitted with the groundwater samples during the sampling event.

The laboratory provided results from project and batch specific laboratory duplicate analyses for most analytes. Laboratory duplicate precision was acceptable for all analytes, with RPDs less that 25 percent, or with results in agreement within a reporting limit increment, with the following exception. Laboratory duplicate precision for dissolved iron was poor in a duplicate performed on sample MW-6 (RPD = 26.3 percent). Due to the poor precision, the dissolved iron result for this sample was qualified as J/Estimated.

9) Results from surrogate spikes were reported in support of the VOC and PCB analyses performed on sample MW-3. Accuracy, as demonstrated by the surrogate recoveries was determined to be acceptable.

10) Results from serial dilution analyses were provided in support of the metals analyses. The percent differences between the initial and diluted analyses exceeded the upper control limit of 10 percent for potassium. Due to the poor serial dilution precision, results for potassium were qualified as J/Estimated in the following associated samples.

MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6

11) Results of ICP interference check sample analyses were provided in support of the metals analyses. Recoveries for magnesium were low in the check samples at 61 percent. Due to the low check sample recoveries, magnesium results were qualified as J/Estimated for the following samples.

MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6

12) No anomalies were noted with respect to the analytical reporting, with the following considerations. Results for aluminum (samples MW-2 and MW-6) and arsenic (sample MW-4) were reported at concentrations between the method detection limit (MDL) and the project reporting limit (RL). **These data were flagged by the laboratory with a "J" flag. Due to limited accuracy in this portion of the calibration range, the results for these analytes were qualified as J/Estimated.**

Some general chemistry parameters were detected at concentrations between the MDL and RL. These included fluoride (samples MW-1, MW-2, MW-3, MW-4, and MW-6) and nitrite (sample MW-2). **Due to limited accuracy in this portion of the calibration range, the results for these analytes were qualified as J/Estimated.**

Summary

Data quality for the groundwater samples collected during September and October 2010 was evaluated based on SW-846 method requirements, EPA data validation guidance, the Final Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP) prepared for the project (ARCADIS 2009), and professional judgment of the third party Data Validator.

Data quality was determined to be acceptable, with the following considerations.

Dissolved magnesium and potassium results were qualified as J/Estimated due to generally small control limit excursions in the serial dilution or interference check sample analyses. Magnesium data may be biased slightly low, and precision of potassium results, as demonstrated by serial dilution analysis, just exceeds control limits. These exclusions are not significant with respect to the overall site evaluation.

Some target constituents were detected at low concentrations between the laboratory method detection limits (MDL) and standard reporting limits (RL). These data were flagged by the laboratory as “J” values, and were validated as estimated concentrations, due to limited accuracy in this portion of the calibration range.

Dissolved iron was detected in some samples at concentrations within 5 times those detected in associated blanks. These detections were qualified due to potential blank contamination bias, and may be false positives. These iron results are qualified as U/non-detect at the concentrations reported.

All VOC detections for groundwater sample MW-3 were all qualified as U/non-detect at the concentrations reported due to associated equipment blank detections. There is no indication that VOCs detected in the groundwater sample are present as anything other than false positives.