APPENDIX G

Data Usability

Data Usability
Boeing Auburn Facility
Auburn, Washington

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Prepared for

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LIST OF ABBREVIATIONS AND ACRONYMS

DQI ..... data quality indicator
EPA ..... U.S. Environmental Protection Agency
LAI ..... Landau Associates, Inc.
LCS ..... laboratory control sample
LCSD ..... laboratory control sample duplicate
LOQ ..... limit of quantitation
MQO ..... measurement quality objective
MS ..... matrix spike
MSD ..... matrix spike duplicate
QA ..... quality assurance
QAPP ..... quality assurance project plan
QC ..... quality control
RI ..... remedial investigation
SL ..... screening level
VOC ..... volatile organic compound

DATA USABILITY

The section discusses usability of the laboratory analytical data reported for the remedial investigation (RI) conducted since 2003. The purpose of evaluating data usability is to determine any limitations on data use in drawing conclusions about the nature and extent of contamination at the Site.

Intended Data Use

The intended use of the laboratory analytical data is to evaluate concentrations of potentially hazardous substances in relationship to applicable screening levels and cleanup levels with the intent of determining areas and media requiring cleanup, evaluating cleanup options, and identifying a preferred cleanup action alternative during the feasibility study process.

Data Validation and Verification Methodology

Groundwater, surface water, and soil samples were analyzed by Eurofins Lancaster Laboratories and Analytical Resources, Inc. Air samples were analyzed by Eurofins Air Toxics, Inc., Test America Irvine, Air Technology Laboratories, Inc., Envirosystems, Inc., H&P Mobile Geochemistry, Inc., and Pace Analytical Services, Inc. Analytical suites by environmental sample matrix are included in Section 3.0 tables.

To ensure laboratory analytical data achieved the measurement quality objectives (MQOs), RI data underwent a U.S. Environmental Protection Agency (EPA) Level IIa equivalent validation. This validation followed the guidelines in the appropriate sections of the EPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (EPA 1999, 2004) as well as the project Quality Assurance Project Plan (QAPP; LAI 2015). The Level IIa equivalent data validation performed by Landau Associates, Inc. (LAI) included evaluations of the following:

- Chain-of-custody records
- Holding times
- Laboratory method blanks
- Surrogate recoveries
- Laboratory Matrix Spike/Matrix Spike Duplicate (MS/MSD)
- Blank spikes/Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)
- Laboratory duplicates
- Corrective action records
- Completeness
- Overall assessment of data quality.

Quality Assurance Objectives

Quality assurance (QA) objectives consist of MQOs. MQOs specify how robust the data must be in order to fulfill the project objectives; they are the acceptance thresholds for data quality indicators (DQIs). DQIs are precision, accuracy, representativeness, comparability, completeness, sensitivity. The table below lists DQIs evaluated by LAI as part of data validation and verification, their relevant laboratory or field quality control (QC) parameter, and the frequency of the QC parameter.

QC Parameter	Frequency/Number [1]	Data Quality Indicator
Preservation	Every environmental sample.	Representativeness Accuracy Completeness
Headspace	Every vial that contains an aqueous matrix that is to be analyzed for volatile organic compounds (VOCs).	Representativeness Accuracy Completeness
Holding Time	Every environmental sample scheduled for analysis that has a method-recommended holding time.	Representativeness Accuracy Completeness
Trip Blank	One per cooler containing environmental samples to be analyzed for VOCS.	Representativeness Accuracy Completeness
Field Duplicate [2]	One in twenty environmental samples.	Representativeness Precision
Laboratory Duplicate [3]	One per analytical batch.	Representativeness Precision
Method Blank	One per analytical batch.	Representativeness Accuracy Completeness Sensitivity
Surrogate	All environmental and laboratory samples analyzed by analytical methods for organic compounds.	Accuracy Completeness
LCS/LCSD	One per analytical batch.	Precision Accuracy Completeness Comparability Completeness
MS/MSD	One per analytical batch.	Accuracy Representativeness Precision

QC Parameter	Frequency/Number [1]	Data Quality Indicator
Dilution Factors	As needed based on concentration in environmental samples and instrument calibration.	Accuracy Comparability Completeness

1. Batch is equivalent to 20 or fewer samples prepared and analyzed together with comment QC samples.
2. Field duplicates are only collected for groundwater samples.
3. LSCD, MSD, and laboratory duplicates may not be included in every batch, but every batch shall contain at least one QC parameter that serves as a DQI for precision.

Findings

DQIs as they relate to the usability of the laboratory analytical data reported for the RI are discussed below. Overall, the dataset satisfies completeness and quality objectives and data can be used for their intended purposes with confidence.

Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Precision was evaluated by calculation of relative percent difference calculations for MS/MSDs, LCS/LCSD, laboratory duplicate samples, and field duplicate samples. MQOs were achieved for precision and data usability was not adversely affected by any qualifications to data based on QC parameters for this DQI.

Accuracy

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Analytical accuracy may be assessed by analyzing “spiked” samples with known standards (surrogates, LCS, and/or MS) and measuring the percent recovery. Accuracy measurements on spiked samples were carried out at a minimum frequency of 1 per laboratory analysis group or 1 in 20 samples per matrix analyzed. MQOs were achieved for accuracy and data usability was not adversely affected by any qualifications to data based on QC parameters for this DQI.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic of a population. Representativeness can be evaluated using replicate samples, representative sampling locations, and blanks. MQOs were achieved for representativeness and data usability was not adversely affected by any qualifications to data based on QC parameters for this DQI.

Comparability

Comparability expresses the confidence with which one data set can be evaluated in relation to another data set. For this project, comparability of data was established through the use of standard analytical methodologies with analytical limits of quantitation (LOQ) that met screening level criteria to the extent practicable, standard reporting formats, and common traceable calibration and reference materials. Methods used for analysis of groundwater, surface water, pore water, soil, air samples complied with the requirements in the project QAPP (LAI 2015).

Completeness

Completeness is a measure of the proportion of data obtained from a task sampling plan that is determined to be valid. It is calculated as the number of valid data points divided by the total number of data points requested. The QA objective for completeness during this project was 95 percent. Completeness was routinely determined and compared to this control criterion during the course of implementation of the RI program. Based on the data validation and data quality assessments, the analytical data set completeness was calculated as 99.81 percent. Of the 268,829 data records collected, 517 of the data records were rejected.

Sensitivity

Sensitivity is the ability to discern the difference between very small amounts of a substance. For the purposes of this project, sensitivity refers to the capability of a method or instrument to detect a given analyte at a given concentration and reliably quantitate the analyte at that concentration. Analytical methods are reported down the laboratory LOQ, which is defined as the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. For several Site constituents of concern (vinyl chloride and tetrachloroethene), the LOQ exceeded the screening level. As appropriate, those constituents were analyzed by both Methods SW-846 8260 SCAN and Selected Ion Monitoring to achieve and LOQ less than the applicable screening level.

REFERENCES

EPA. 2004. National Functional Guidelines for Inorganic Data Review. EPA 540-R-04-004. U.S. Environmental Protection Agency. October.

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