CHPRC-04245
Revision 0

Data Quality Objectives Form for the Groundwater Monitoring Plan for the Integrated Disposal Facility, DOE/RL-2019-29

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

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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APPROVED
By Julia Raymer at 10:51 am, Feb 20, 2020

Release Approval Date

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Rev 0, Chg. 0	**PRC-PRO-SMP-53095** **Data Quality Objectives Information Summary**	
Published Date: 09/2019		**Effective Date:** 09/2019

Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

NOTE: In cases where the requested information is not applicable, state that, and explain why it is not applicable so that it is clear that a required field has not been forgotten.

Project Summary

Project Name:	Groundwater Monitoring Plan for the Integrated Disposal Facility, DOE/RL-2019-29	Date:	12-Jun-19
Name of Person Completing Record:	C.W. Miller/SSPA	Position:	Consultant
Name of Responsible Manager:	W.R. Faught/PRC		

Project Background:

This data quality objectives (DQO) is intended to identify the final status groundwater monitoring requirements in accordance with WAC 173-303-645(9), "Dangerous Waste Regulations," "Releases from Regulated Units," for detection monitoring of the Integrated Disposal Facility (IDF), located on the Hanford Site in the 200 East Area. Information about the facility is primarily obtained from the engineering evaluation report (SGW-62007, *Engineering Evaluation Report for the Integrated Disposal Facility Groundwater Monitoring*).

Planning Type:

(If systematic planning is not required, state the reason)

This will be an external planning exercise. External planning is used for projects where decisions require collaboration with an integrated team of subject matter experts, regulatory agency (Washington State Department of Ecology), and decision-makers (U.S. Department of Energy) to prepare the DQO Information Summary (Form A-6006-889) and resulting data collection plan. The data collection plan will be produced as a final status groundwater monitoring plan that includes both a quality assurance project plan and a field sampling plan.

Organization, Schedule, and Goal

(State the problem, requirements, schedule, PSQs, and outcomes)

State the Problem

(Describe the reason/need for data collection and project goals/objectives)

Groundwater monitoring is needed to meet requirements of a detection monitoring program under WAC 173-303-645(9) for IDF. This will support pre-operational monitoring and the cold start of the facility through a permit modification to IDF.

Principal Study Questions *(What questions are data needed to answer?)*	**PSQ 1**	Have releases from IDF affected underlying groundwater?	**PSQ 6**	-NA-
	PSQ 2	-NA-	**PSQ 7**	-NA-
	PSQ 3	-NA-	**PSQ 8**	-NA-
	PSQ 4	-NA-	**PSQ 9**	-NA-
	PSQ 5	-NA-	**PSQ 10**	-NA-

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Define alternative outcomes or actions that can occur upon answering PSQs.	**AA 1A**	Groundwater monitoring results indicate that IDF has not affected underlying groundwater and monitoring continues. Continue routine sampling and analysis and data evaluation.	**AA 6A**	-NA-
	AA 1B	Groundwater monitoring results indicate that IDF has affected underlying groundwater and response actions are appropriate. Initiate appropriate response(s).	**AA 6B**	-NA-
	AA 2A	-NA-	**AA 7A**	-NA-
	AA 2B	-NA-	**AA 7B**	-NA-
	AA 3A	-NA-	**AA 8A**	-NA-
	AA 3B	-NA-	**AA 8B**	-NA-
	AA 4A	-NA-	**AA 9A**	-NA-
	AA 4B	-NA-	**AA 9B**	-NA-
	AA 5A	-NA-	**AA 10A**	-NA-
	AA 5B	-NA-	**AA 10B**	-NA-

Identify the decision statements or estimation statements needed to address the PSQs.	1. PSQ1. Determine the most appropriate approach to perform quantitative evaluation of routine detection monitoring results to identify the presence of site-specific dangerous waste constituent(s) from IDF in groundwater and decide whether to continue monitoring (i.e., no release), or initiate appropriate action (i.e., release identified).
	2. -NA-
	3. -NA-
	4. -NA-
	5. -NA-
	6. -NA-
	7. -NA-
	8. -NA-
	9. -NA-
	10. -NA-

Data Needs

(Define the spatial and temporal boundaries of the study)

Define what constitutes a sampling unit:

A sampling unit consists of the upgradient (background) wells and downgradient (point of compliance) wells associated with IDF.

What is the smallest unit upon which decisions or estimates will be made?

The smallest decision unit is a single valid contaminant measurement from a downgradient (point of compliance) well, in comparison to its baseline condition (intra-well evaluation) or to its upgradient comparison value (inter-well evaluation).

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Characterization Data Collection Planning Record

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Data Needs Summary

(Information inputs to answer PSQs: target population, characteristics of interest, spatial and temporal limits, scale of inference)

PSQ	Data Need	Media of Interest	Location	Sampling Method	Action Level	Frequency	Practical Constraints	Analytical Method	Potential Source of Data
See Data Needs Summary in Attachment A (Table A-1)									

Performance or Acceptance Criteria

(Determine the quality of data needed and analytical approach)

Specify the population parameter *(e.g., mean, median, or percentile)*, appropriate for making decisions or estimates:

The population parameter that will be used for decision making is the upper prediction limit (UPL). Data collected during the pre-operational (baseline/background) monitoring at IDF will be used to calculate a UPL for each site-specific groundwater monitoring constituent where a sufficient number of detections in the sample data are available at each upgradient (background) and downgradient (point of compliance) well. This is intended to be representative of baseline/background conditions during a time when no waste has been placed in the facility/not enough time has elapsed for migration of contamination to groundwater. For IDF, an intra-well comparison method is considered the preferred methodology during the routine phase of detection monitoring; however, both intra-well and inter-well comparison approach will be performed and evaluated.

An intra-well comparison method will be used during the routine monitoring phase of detection monitoring because of the long travel time in groundwater from an upgradient (background) well to a downgradient (point of compliance) well. This means that the concentrations measured for a site-specific monitoring constituent in a well will only be compared to the UPL in that well. When a concentration of a site-specific monitoring constituent exceeds the intra-well UPL at a point of compliance well, this will be considered indicative of a statistically-significant increase in the constituent concentration and will initiate further assessment.

An inter-well comparison method, in which a sample results of site-specific monitoring constituents at downgradient wells will be compared to the corresponding upgradient UPL, will also be used at IDF.

The intra-well and inter-well comparison methods will be evaluated after the first 2 years of samples are collected, afterwhich, one of the methods will be selected for further detection monitoring evaluation.

For constituents where a UPL cannot be established, the double quantitation rule will be used in routine detection monitoring to indicate a release impacting groundwater at IDF.

Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

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Decision Problem	Provide a decision rule related to the Action Level identified above that includes a clear "if…then…else" statement: All data-based decisions assume the use of valid and confirmed measurements. The decision rules related to the action level are as follows: a. If a site-specific monitoring constituent is present in groundwater in the baseline/background dataset, then include that constituent in the baseline/background UPL determination, else exclude it. b. If a measurement result fails to meet data quality criteria during the data usability assessment, then reject the value, exclude it from further analysis and implement reanalysis and/or resampling if needed, else use valid data for the data evaluation. c. If a groundwater monitoring result from a downgradient (point of compliance) well exceeds the applicable metric (i.e., the point of compliance well-specific UPL for intra-well testing or the upgradient UPL for inter-well testing), then initiate the appropriate response action (including an assessment to evaluate the result in the context of other potential contributing sources), else continue routine monitoring.
	What are the consequences of making an incorrect decision and what is the tolerance for an incorrect decision? a. If an exceedance is identified when, in fact, none exists, then effort and cost will be incurred to implement response actions that are unnecessary. b. If an actual exceedance is not identified when it in fact exists, then conditions at the facility may continue to affect groundwater unabated. c. No quantitative tolerance for incorrect decision-making is established or this activity.
Estimation Problem	Develop the specification of the estimator by combining the true value of the selected population parameter with the scale of estimation and other boundaries: The estimator selected for this decision is the UPL for site-specific groundwater monitoring constituents in both upgradient (background) and downgradient (point of compliance) monitoring locations, as appropriate for intra-well and inter-well testing.
	What are the acceptable limits on uncertainty? Acceptable limits on uncertainty are not established for this monitoring activity.

Plan for Obtaining the Data
(Specify the general plan of obtaining the needed data and explain where and how the information in this Planning Record will be formalized in a data collection plan)

Essential elements of the data collection plan include:

a. **Identify the selected upgradient and downgradient groundwater monitoring locations**

A combination of existing and newly-installed groundwater monitoring wells will be used for final status groundwater monitoring of IDF. The monitoring well network consists of two upgradient (background) wells (299-E24-24 and new well 299-E17-57) and five downgradient (point of compliance) wells (existing wells 299-E17-22, 299-E24-18, and 299-E24-21, and new wells 299-E17-56 and 299-E24-164) as shown in Figure 1. The well network is presented in Table 1.

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Plan for Obtaining the Data

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Essential elements of the data collection plan include:

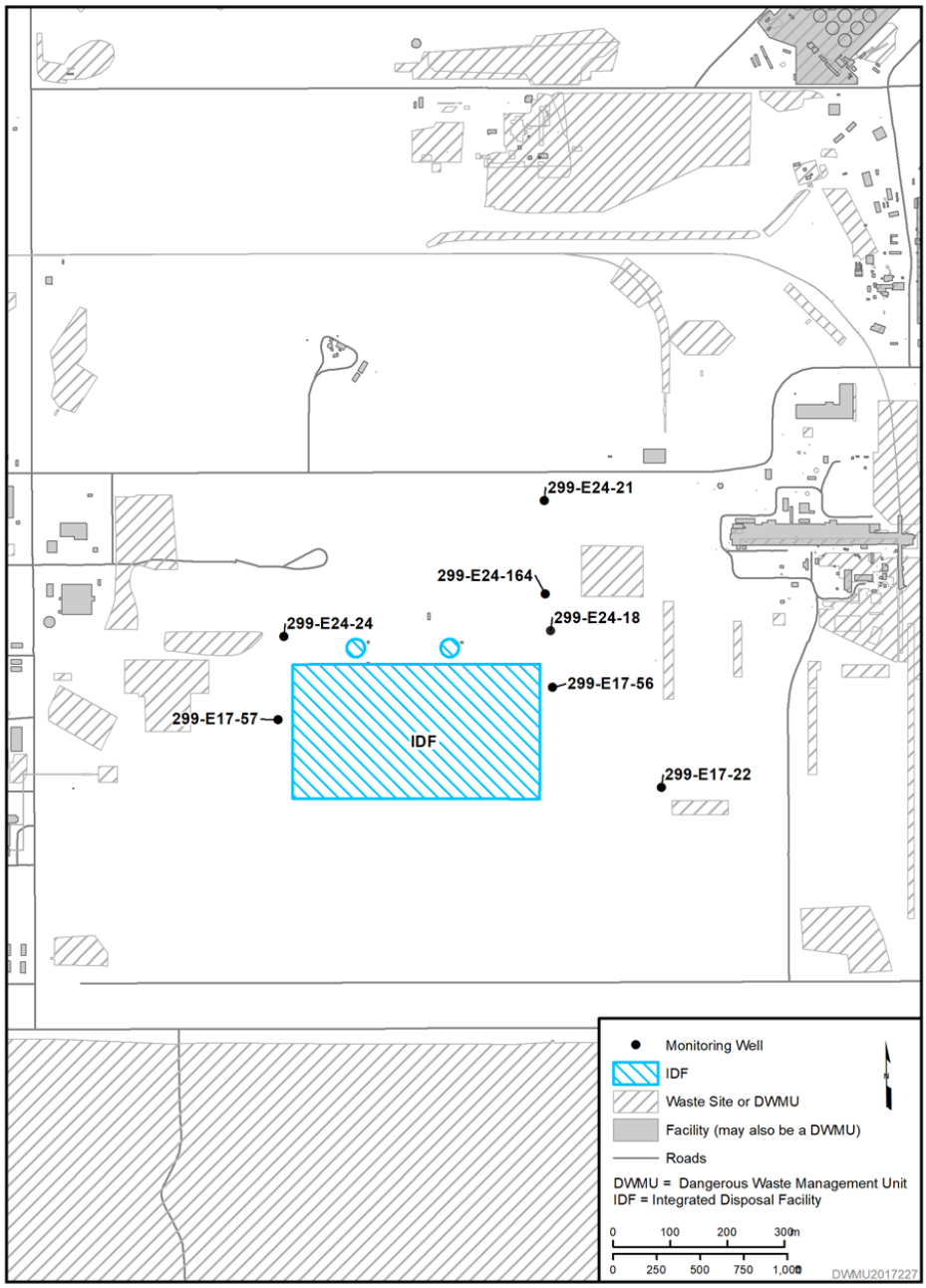

Figure 1. Proposed Final Status Groundwater Monitoring Well Network for IDF

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Essential elements of the data collection plan include:

Table 1. IDF Monitoring Well Network

Well Name	Purpose
299-E24-24	Upgradient
299-E17-57 (Proposed new well)	Upgradient
299-E17-22	Downgradient
299-E17-56 (Proposed new well)	Downgradient
299-E24-21	Downgradient
299-E24-18	Downgradient
299-E24-164 (Proposed new well)	Downgradient

Groundwater samples will be collected from wells using submersible electric pumps and a low-flow purge and sample technique that minimizes disturbance and mixing of the water column within the well(s). Submersible pump intakes will be placed no more than 5 feet below the water table elevation to collect representative groundwater samples.

b. **Identify the site-specific constituents for groundwater monitoring, based on baseline/background conditions and the characteristics of dangerous wastes planned for future disposal**

IDF is constructed, but is not yet in service (i.e., it has not received any waste disposal). IDF is intended to receive radioactive mixed waste of two general types: 1) mixed waste generated by future operation of the Waste Treatment Plant, and 2) mixed waste from multiple sources at Hanford Site comparable to the waste received at Low-Level Burial Grounds (LLBG) Trenches 31 and 34, following closure of those units. LLBG Trenches 31 and 34 are expected to be in operation until 2035. At this time, only the dangerous wastes that will be generated by the Waste Treatment Plant are included in the constituent screening.

Constituents were screened in the following manner:

1. The list of potential constituents was limited to the output of the Waste Treatment Plant and process wastes, this list was from the current IDF Part A (minus the additional constituents from LLBG Trenches 31 and 34, which will be part of the revised Part A submitted with the permit modification).
2. Unit concentrations in water (C_w) were calculated for each contaminant using three-phase partitioning (WAC 173-340-747, “Model Toxics Control Act—Cleanup,” “Deriving Soil Concentrations for Groundwater Protection”).
3. Since the facility is pre-operational a unit mass of 1 was assumed for each constituent so that the constituents could be ranked.
4. Constituents were selected that had a C_w greater than or equal to 0.15 µg/L (organics), or 0.001 µg/L (metals).

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Essential elements of the data collection plan include:

5. Professional judgment was used to eliminate constituents that by knowledge of chemistry and the environment would not make it to groundwater.

c. **Determine groundwater baseline/background conditions/constituent concentrations**

Baseline groundwater conditions, including concentrations of routine monitoring constituents, will be determined by calculating the estimator parameter UPL. The UPL will be calculated using a set of 8 sample results for each well collected during the pre-operational (baseline/background) period (samples collected quarterly for the first 2 years of monitoring) at IDF. The resulting baseline/background data set will be used to calculate the UPL estimator parameter for each selected site-specific groundwater monitoring constituent at each upgradient (background) well and downgradient (point of compliance) well.

When non-naturally occurring constituents are detected in the baseline/background dataset this is indicative of pre-existing contamination in groundwater. Site-specific monitoring constituents that appear to have pre-existing contamination will be considered for removal from detection monitoring as they may not provide a good indication of potential releases from the facility.

In addition, samples for a modified list of the constituents in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*, will be collected from each well for the first year of sampling. The sampling results from the Appendix 5 constituents will be used for information only and no statistical evaluation will be performed.

d. **Determine appropriate monitoring frequency**

Following establishment of UPLs for each monitoring location, routine detection monitoring samples will be collected on a semi-annual basis (i.e., two times per year).

e. **Select appropriate analytical methods and associated performance requirements**

Groundwater sample analytical methods will be specified from those methods currently in use by Hanford-contracted laboratories. Multiple methods are anticipated at this time to include:

- Method 8260, analysis of the volatile organic compounds by gas chromatography/mass spectroscopy
- Method 8270, analysis of the semivolatile organic compounds by gas chromatography/mass spectroscopy
- Method 6010, analysis of metals by inductively coupled plasma – optical emission spectroscopy
- Method 6020, analysis of metals by inductively coupled plasma – mass spectroscopy
- Other analytical methods that are appropriate for selected site-specific monitoring constituents.

Analytical method performance specifications and associated performance metrics will be specified for each method and/or site-specific constituent, as appropriate. Laboratory method detection limits (MDLs) and practical quantitation limits (PQLs) will be selected from laboratory statement of work specifications and reviewed to ensure that they meet the requirements of the final status monitoring plan (e.g., PQLs must be less than the UPLs).

Analytical performance requirements, and associated data review corrective actions, will be specified for the following parameters, at a minimum:

- Precision
- Accuracy

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Characterization Data Collection Planning Record

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Essential elements of the data collection plan include:

- Representativeness
- Completeness
- Comparability
- Bias
- Sensitivity

f. **Determine presence/absence, and relative concentrations of constituents in groundwater**

Through sampling and analysis of groundwater from selected monitoring locations (upgradient and downgradient), the presence/absence of site-specific constituents (i.e., presence above, or below, the MDL) will be determined. Constituents detected in samples at quantified concentrations greater than the method PQL will be compared to the established UPLs for that monitoring location. Measurement of a site-specific constituent in a downgradient compliance point location at a concentration greater than the UPL for that constituent at that location will initiate further assessment, to include evaluation of potential contributors of that constituent.

g. **Incorporate the results of leachate monitoring**

Samples of leachate will be routinely collected from the leachate collection system of IDF and analyzed for site-specific monitoring constituents. The leachate sampling and analysis results will be evaluated routinely for impacts to final status groundwater monitoring results because the leachate effectively represents the contaminated liquid that could eventually affect groundwater in the event of a liner failure in the facility. To account for the potential presence of site-specific monitoring constituents, as well as to evaluate the potential need to change the site-specific groundwater monitoring constituent list, the leachate sampling and analysis results will be assembled and inspected for the presence/absence and relative concentrations of site-specific constituents. These data will be collected by IDF operations and used to support final status groundwater monitoring as indirect data. The operational sampling and analysis suite for leachate will be evaluated to ensure that required site-specific monitoring constituents are to be determined in those samples.

h. Define data usability rules

Only measurement data determined to be valid and usable will be used for assessment of detection or compliance. If a valid measurement value for a site-specific constituent in a monitoring location exceeds the UPL for that location, then an exceedance is identified and appropriate response action is initiated.

See Attachment A (Table A-2).

Appendix A – Systematic Planning Record

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Essential elements of the data collection plan include:

References:

Ecology Publication 97-407, 2014, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*, Hazardous Waste and Toxics Reduction Program, Washington State Department of Ecology, Olympia, Washington. Available at: https://fortress.wa.gov/ecy/publications/publications/97407.pdf.

SGW-62007, 2019, *Engineering Evaluation Report for the Integrated Disposal Facility Groundwater Monitoring*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-01220.

WAC 173-303-645, "Dangerous Waste Regulations," "Releases from Regulated Units," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-645.

WAC 173-340-747, "Model Toxics Control Act—Cleanup," "Deriving Soil Concentrations for Groundwater Protection," *Washington Administrative Code*, Olympia, Washington. Available at: https://apps.leg.wa.gov/WAC/default.aspx?cite=173-340-747.

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Attachment A

Integrated Disposal Facility Final Status Groundwater Monitoring Data Quality Objectives - Supporting Information

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Table A-1. Data Needs Summary

PSQ	Data Need	Media of Interest	Location	Sampling Method	Action Level	Frequency	Practical Constraints	Analytical Method	Potential Source of Data
PSQ 1	Pre-Operational Phase: Baseline groundwater concentrations to establish UPLs for comparison to routine monitoring results after the pre-operational monitoring phase where baseline/background data are collected.	Groundwater	Representative groundwater samples from monitoring network wells. Samples collected from within 5 feet below water table, or at level of highest concentration if vertical distribution of contaminants is indicated.	Pump sample using low-flow purge method at new wells being drilled: 299-E17-56, 299-E24-164, and 299-E17-57. Pump sample in existing wells 299-E17-22, 299-E24-18, 299-E24-21, and 299-E24-24 using dedicated electric submersible pumps or positive displacement pumps.	Not defined – the calculated UPL will become the action level for the routine monitoring phase.	Eight samples will be collected in the first two years to establish baseline a UPL to use for comparison during routine monitoring. (The first two years (pre-operational monitoring) will have quarterly monitoring)	No practical constraints to sample collection and analysis identified.	Appropriate method for each constituent of interest with target PQLs that are less than action levels.	Sampling and analysis results from this monitoring plan.
PSQ 1	Routine Monitoring Phase: Measured concentrations of site-specific constituents at representative groundwater monitoring locations that are upgradient (background) and downgradient (point of compliance) of the unit.	Groundwater	Representative samples from the detection monitoring well network defined in the RCRA permit. Samples collected from within 5 feet below water table, or at level of highest concentration if vertical distribution of contaminants is indicated.	Pump sample using low-flow purge method at new wells being drilled: 299-E17-56, 299-E24-164, and 299-E17-57. Pump sample in existing wells 299-E17-22, 299-E24-18, 299-E24-21, and 299-E24-24 using dedicated electric submersible pumps or positive displacement pumps.	Concentrations of constituents in point of compliance wells that exceed the comparison value in background/baseline (upgradient) wells.	After first two years, samples for routine detection monitoring will be semi-annual (WAC 173-303-645 (8)(g)(ii)).	No practical constraints to sample collection and analysis identified.	Appropriate method for each constituent of interest with target PQLs that are less than action levels.	Sampling and analysis results from this monitoring plan.
PSQ 1	IDF LCS sampling and analysis results. Measured concentrations of site-specific constituents is samples of landfill leachate collected periodically from the IDF LCS.	Landfill leachate.	Samples of leachate collected periodically during landfill operations from the IDF LCS.	Grab sample(s) of leachate collected during leachate pumping.	No action level defined.	Periodically based on IDF landfill operational requirements.	No constraints identified.	Appropriate method for each constituent of interest with target PQLs that are less than monitoring well UPLs.	Secondary data to be generated by sampling and analysis conducted by IDF operations.

References:

Ecology Publication 97-407, 2014, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*, Hazardous Waste and Toxics Reduction Program, Washington State Department of Ecology, Olympia, Washington. Available at: https://fortress.wa.gov/ecy/publications/publications/97407.pdf.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq. Available at: https://elr.info/sites/default/files/docs/statutes/full/rcra.pdf.

WAC 173-303-645, "Dangerous Waste Regulations," "Releases from Regulated Units," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

IDF = Integrated Disposal Facility
LCS = leachate collection system
PQL = practical quantitation limit
PSQ = principal study question
RCRA = *Resource Conservation and Recovery Act of 1976*
UPL = upper prediction limit

Table A-2. Data Quality Indicators

Data Quality Indicator (QC Element)	Definition	Determination Methodologies	Possible Corrective Actions
Precision (field duplicates, laboratory sample duplicates, and matrix spike duplicates)	Precision measures the agreement among a set of replicate measurements. Field precision is assessed through the collection and analysis of field duplicates. Analytical precision is estimated by duplicate/replicate analyses, usually on laboratory control samples, spiked samples, and/or field samples. The most commonly used estimates of precision are the relative standard deviation and, when only two samples are available, the relative percent difference.	Use the same analytical instrument to make repeated analyses on the same sample. Use the same method to make repeated measurements of the same sample within a single laboratory. Acquire replicate field samples for information on sample acquisition, handling, shipping, storage, preparation, and analytical processes and measurements.	If duplicate data do not meet objective: Evaluate apparent cause (e.g., sample heterogeneity). Request reanalysis or remeasurement. Qualify the data before use.
Accuracy (laboratory control samples, matrix spikes, and surrogates)	Accuracy is the closeness of a measured result to an accepted reference value. Accuracy is usually measured as a percent recovery. QC analyses used to measure accuracy include standard recoveries, laboratory control samples, spiked samples, and surrogates.	Analyze a reference material or reanalyze a sample to which a material of known concentration or amount of pollutant has been added (a spiked sample).	If recovery does not meet objective: Qualify the data before use. • Request reanalysis or remeasurement. • Determine if follow-up evaluation is needed. • Evaluate instrumentation and re-calibrate, if necessary
Representativeness (field duplicates)	Sample representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. It is dependent on the proper design of the sampling program and will be satisfied by ensuring that the approved plans were followed during sampling and analysis.	Evaluate whether measurements are made and physical samples collected in such a manner that the resulting data appropriately reflect the environment or condition being measured or studied.	If results are not representative of the system sampled: • Identify the reason for results not being representative. • Flag for further review. • Review data for usability. • If data are usable, qualify the data for limited use and define the portion of the system that the data represent. • If data are not usable, flag as appropriate. • Redefine sampling and measurement requirements and protocols. • Resample and reanalyze, as appropriate.
Comparability (Use of standard methods, field duplicate, field splits, laboratory control samples, matrix spikes, and matrix spike duplicates)	Comparability expresses the degree of confidence with which one data set can be compared to another. It is dependent upon the proper design of the sampling and analytical program and will be satisfied by ensuring that the approved plans are followed and that proper sampling and analysis techniques are applied.	Use identical or similar sample collection and handling methods, sample preparation and analytical methods, holding times, and quality assurance protocols.	If data are not comparable to other data sets: • Identify appropriate changes to data collection and/or analysis methods. • Identify quantifiable bias, if applicable. • Qualify the data as appropriate. • Resample and/or reanalyze if needed. • Revise sampling/analysis protocols to ensure future comparability.
Completeness (no QC element; addressed in data usability assessment)	Completeness is a measure of the amount of valid data collected compared to the amount of data planned. Measurements are considered to be valid if they are unqualified or qualified as estimated data during validation. Field completeness is a measure of the number of samples collected versus the number of samples planned. Laboratory completeness is a measure of the number of valid measurements compared to the total number of measurements planned.	Compare the number of valid measurements completed (samples collected or samples analyzed) with those established by the project's quality criteria (data quality objectives or performance/acceptance criteria).	If data set does not meet the completeness objective: • Identify appropriate changes to data collection and/or analysis methods. • Identify quantifiable bias, if applicable. • Resample and/or reanalyze if needed. • Revise sampling/analysis protocols to ensure future completeness.

Table A-2. Data Quality Indicators

Data Quality Indicator (QC Element)	Definition	Determination Methodologies	Possible Corrective Actions
Bias (equipment blanks, field transfer blanks, full trip blanks, laboratory control samples, matrix spikes, and method blanks)	Bias is the systematic or persistent distortion of a measurement process that causes error in one direction (e.g., the sample measurement is consistently lower than the sample's true value). Bias can be introduced during sampling, analysis, and data evaluation. Analytical bias refers to deviation in one direction (i.e., high, low, or unknown) of the measured value from a known spiked amount.	Sampling bias may be revealed by analysis of replicate samples. Analytical bias may be assessed by comparing a measured value in a sample of known concentration to an accepted reference value or by determining the recovery of a known amount of contaminant spiked into a sample (matrix spike).	For sampling bias: • Properly select and use sampling tools. • Institute correct sampling and subsampling processes to limit preferential selection or loss of sample media. • Use sample handling processes, including proper sample preservation, that limit the loss or gain of constituents to the sample media. • Analytical data that are known to be affected by either sampling or analytical bias are flagged to indicate possible bias. • Laboratories that are known to generate biased data for a specific analyte are asked to correct their methods to remove the bias as practicable. Otherwise, samples are sent to other laboratories for analysis.
Sensitivity (method detection limit, practical quantitation limit, and relative percent difference)	Sensitivity is an instrument's or method's minimum concentration that can be reliably measured (i.e., instrument detection limit or limit of quantitation).	Determine the minimum concentration or attribute to be measured by an instrument (instrument detection limit) or by a laboratory (limit of quantitation). The lower limit of quantitation* is the lowest level that can be routinely quantified and reported by a laboratory.	If detection limits do not meet objective: • Request reanalysis or remeasurement using methods or analytical conditions that will meet required detection or limit of quantitation. • Qualify/reject the data before use.

Based on SW-846, 2019, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update VI*, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: https://www.epa.gov/hazardous-waste-test-methods-sw-846.

*For purposes of this groundwater monitoring plan, the lower limit of quantitation is interchangeable with the practical quantitation limit.

QC = quality control

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