

NONRADIOACTIVE DANGEROUS WASTE LANDFILL DATA SCREENING FOR RCRA ASSESSMENT FIRST DETERMINATION REPORT

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**

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Date Published
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APPROVED
By Janis D. Aardal at 10:40 am, May 07, 2019

Release Approval

Date

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ENVIRONMENTAL CALCULATION COVER PAGE

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NONRADIOACTIVE DANGEROUS WASTE LANDFILL DATA SCREENING FOR RCRA
ASSESSMENT FIRST DETERMINATION REPORT

DATE:
May 07, 2019



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ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

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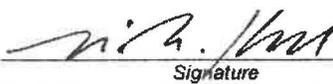
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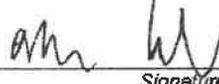
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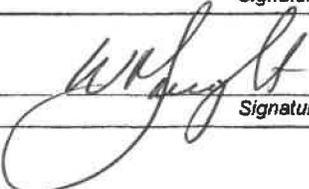
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ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

SECTION 5 - Applicable if Calculation is a Risk Assessment or Uses an Environmental Model

Prior to Initiating Modeling:

Required training for modelers completed:

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Integration Lead:

N/A _____ *Print First and Last Name* _____ *Signature* _____ *Date*

Calculation Approved:

Risk/Modeling Integration Manager:

N/A _____ *Print First and Last Name* _____ *Signature* _____ *Date*

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Terms

BTV	background threshold value
ECF	electronic calculation file
Ecology	Washington State Department of Ecology
EDA	Environmental Dashboard Application
HEIS	Hanford Environmental Information System
MDL	method detection limit
NRDWL	Nonradioactive Dangerous Waste Landfill
PQL	practical quantitation limit
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
SVOC	semi-volatile organic compound
TIC	tentatively identified compound
VOC	volatile organic compound

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1 Purpose

The purpose of this environmental calculation file (ECF) is to explain the steps involved in the screening of groundwater monitoring data for further evaluation of dangerous waste impacts to groundwater from the nonradioactive dangerous waste landfill (NRDWL). This screening resulted in the selection of six constituents which will be used for further evaluation of whether NRDWL is the original source impacting groundwater (DOE/RL-2019-22, *Groundwater Quality Assessment Report for the NRDWL*).

2 Background

NRDWL (Figure 1 and 2) entered into the groundwater quality assessment program in 2016 because of an exceedance of the specific conductance critical mean in downgradient well 699-25-34B. An assessment groundwater monitoring plan was subsequently drafted, based on requirements for interim status facilities, as defined by the *Resource Conservation and Recovery Act of 1976* (RCRA). Regulations for the NRDWL assessment monitoring plan are defined by the Washington State Department of Ecology (Ecology) in the *Washington Administrative Code*, and the Code of Federal Regulations (WAC 173-303-400, “Dangerous Waste Regulations,” “Interim Status Facility Standards,” 40 CFR 265, “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities,” Subpart F, “Ground-Water Monitoring”). Under assessment monitoring plan DOE/RL-2017-19, *Groundwater Quality Assessment Plan for the Nonradioactive Dangerous Waste Landfill, Hanford Site*, the NRDWL monitoring well network was sampled on a quarterly basis between April of 2017 and April of 2018. The groundwater sampling constituent list and frequency requirements are outlined in DOE/RL-2017-19. Five quarterly assessment groundwater sampling events were completed for the NRDWL first determination. The objective of the first determination is to determine if any dangerous waste constituents from the facility have entered the groundwater.

3 Methodology

This section describes the screening process for dangerous waste constituents detected in the NRDWL monitoring well network that require further evaluation of their possible impact to groundwater (Figure 3). Dangerous waste constituents defined in Table 3-1 of DOE/RL-2017-19 were acquired for the period from April 1, 2017, to April 30, 2018 by querying the Hanford Environmental Information System (HEIS) database for all of the wells in the NRDWL network (Figure 2). Initial screening is based on eliminating data with associated laboratory or review qualifiers that indicate non-detection or quality control issues (Table 1).

All remaining inorganic data after the laboratory and review qualifier screening were compared to the sitewide background threshold values at the 95th percentile (DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*).

All organic data remaining after the laboratory and review qualifier screening were screened for consecutive “J” qualifiers. These data are retained because they indicate the presence of low-level organic compound contamination that may be of interest to the site owner/operator. Specifically the “J” qualifier indicates that an analytical value is higher than the method detection limit (MDL) but lower than the practical quantitation limit (PQL). The laboratory PQLs are either established at the value of the lowest calibration standard obtained by a laboratory for the applicable analytical method or they are based on the MDL multiplied by a factor (usually 3 to 5 times) as determined by a laboratory. MDLs are determined in accordance with the most current version of 40 CFR 136, “Guidelines Establishing Test Procedures for the Analysis of Pollutants,” Appendix B, “Definition and Procedure for the Determination of the Method Detection Limit.” The MDL and PQL values published by the laboratories are based on ideal samples and

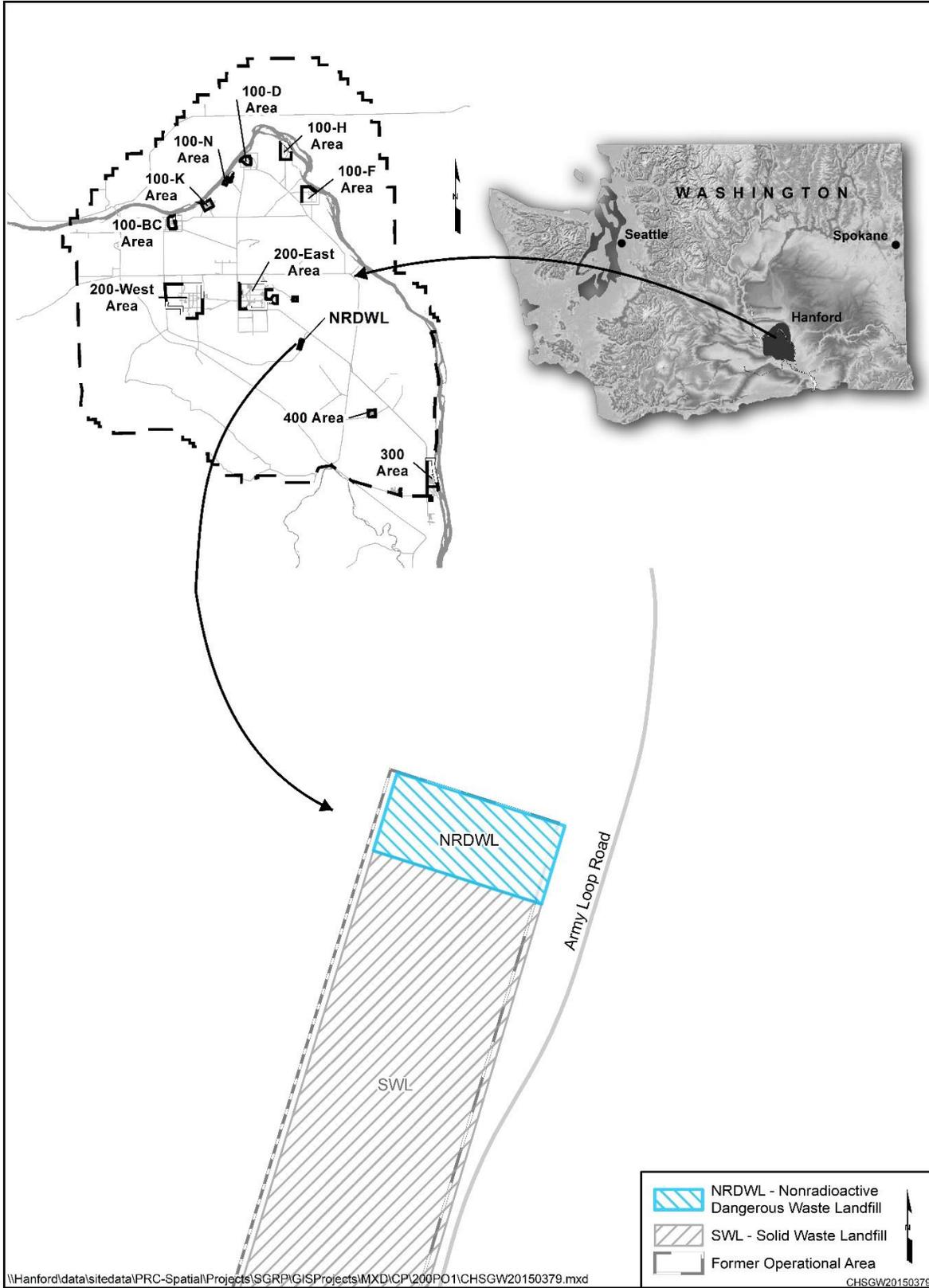


Figure 1. NRDWL Site Location Map

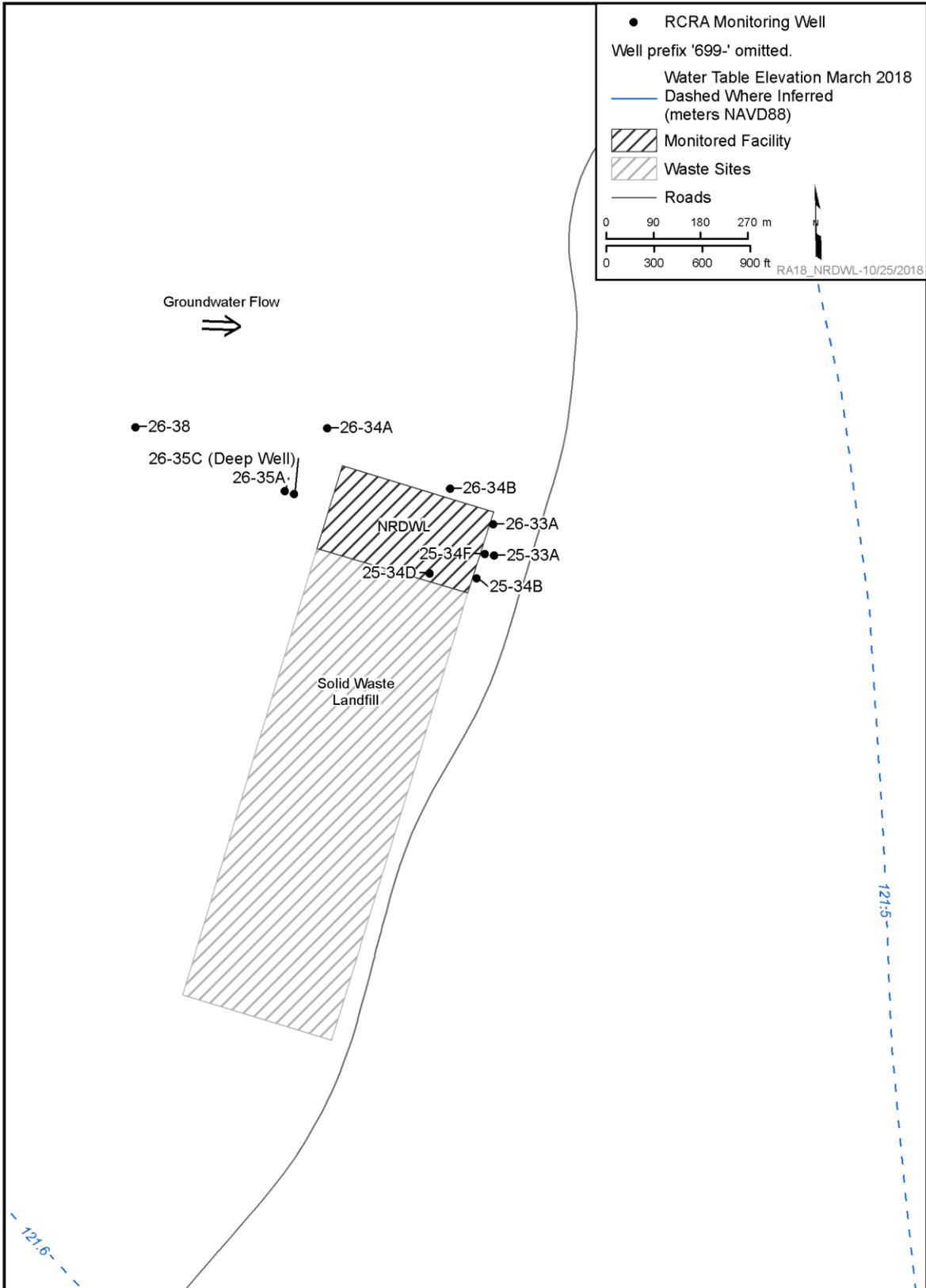


Figure 2. NRDWL Monitoring Well Network

Table 1. Hanford Environmental Information System Data Qualifiers

Qualifier	Translation
Laboratory Qualifier	A INORGANICS and WETCHEM - Valid for TIC only: The TIC is a suspected alcohol-condensation product.
	B INORGANICS and WETCHEM - The analyte was detected at a value less than the contract RDL, but greater than or equal to the IDL/MIDL (as appropriate). ORGANICS - The analyte was detected in both the sample and the associated QC blank, and the blank concentration was > than the PQL but <= 5% of the sample concentration.
	C INORGANICS/WETCHEM: The analyte was detected in both the sample and the associated QC blank, and the blank concentration was > than the PQL but <= 10% of the sample concentration. ORGANICS (PESTICIDE only) - The identification of a pesticide confirmed by GC/MS.
	D All - 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). Required for organics/wetchem if the sample was diluted.
	E INORGANICS - Reported value is estimated because of interference. See comment on cover page, hardcopy case narrative, or specific inorganic hardcopy datasheet. ORGANICS - Concentration exceeds the calibration range of the GC/MS.
	J ORGANICS - Estimated value; (1) constituent detected at a level less than the RDL or PQL and greater than or equal to the MDL, (2) estimated concentration for TICs.
	N ALL (except GC/MS based analysis) - Spike and/or spike duplicate sample recovery is outside control limits. ORGANICS (GC/MS only) - Presumptive evidence of compound based on mass spectral library search.
	O ALL - The associated laboratory control sample recovery is outside control limits
	P ORGANICS (PCB only) - Aroclor target analyte with greater than 25% difference between column analyses.
	Q ORGANICS (Dioxins & PCB-congeners only) - Estimated maximum concentration. Used if one of the qualitative identification criteria is not met (e.g., Cl isotopic ratios outside theoretical range.)
	S INORGANICS - Reported value determined by MSA.
	T Organics (GC/MS only) - Spike and/or spike duplicate sample recovery is outside control limits.
	U ALL - Analyzed for but not detected above limiting criteria. Limiting criteria may be any of the following: value reported < 0; value reported < counting error, value reported < total analytical error; value reported <= contract MDL/IDL/MDA/PQL.
	W INORGANICS - Post-digestion spike recovery for GFAA out of control limit. Sample absorbency <50% of spike absorbency.
X ALL - The result-specific translation of this qualifier code is provided in the hardcopy data report and/or case narrative, and/or case narrative. Additional result-specific translation information may also be found in the RESULT_COMMENT field for this record.	

Table 1. Hanford Environmental Information System Data Qualifiers

Qualifier		Translation
	Y	Same as X if more than one flag is required.
	Z	ALL - The result-specific translation of this qualifier code is provided in the hardcopy data report and/or case narrative.
	Y	Same as X and Y if more than two flags are required.
Review Qualifier	A	Chain of custody issues associated with sample.
	F	Result is undergoing further review.
	G	Record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
	H	Laboratory holding time was exceeded before the sample was analyzed.
	P	Potential problem. Collection/analysis circumstances makes value questionable.
	Q	Associated quality control sample is out of limits.
	R	Do not use. Further review indicates the result is not valid.
	Y	Result suspect. Review - insufficient evidence to show result valid or invalid.
	Z	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.

Laboratory Qualifier Source: CP-15383, *Common Requirements of the Format for Electronic Analytical Data (FEAD)*.

Review Qualifier Source: HNF-38155, *HEIS Sample, Result, and Sampling Site Data Dictionary*.

- DF = dilution factor
- GC/MS = gas chromatograph/mass spectrometer
- GFAA = Graphite Furnace Atomic Absorption
- HEIS = Hanford Environmental Information System
- IDL = instrument detection limit
- MDA = minimum detectable activity
- MDL = method detection limit
- MIDL = method instrument detection limit
- MSA = Method of Standard Additions
- PCB = Polychlorinated biphenyl
- PQL = practical quantitation limit
- QC = quality control
- RDL = required detection limit
- TIC = tentatively identified compounds

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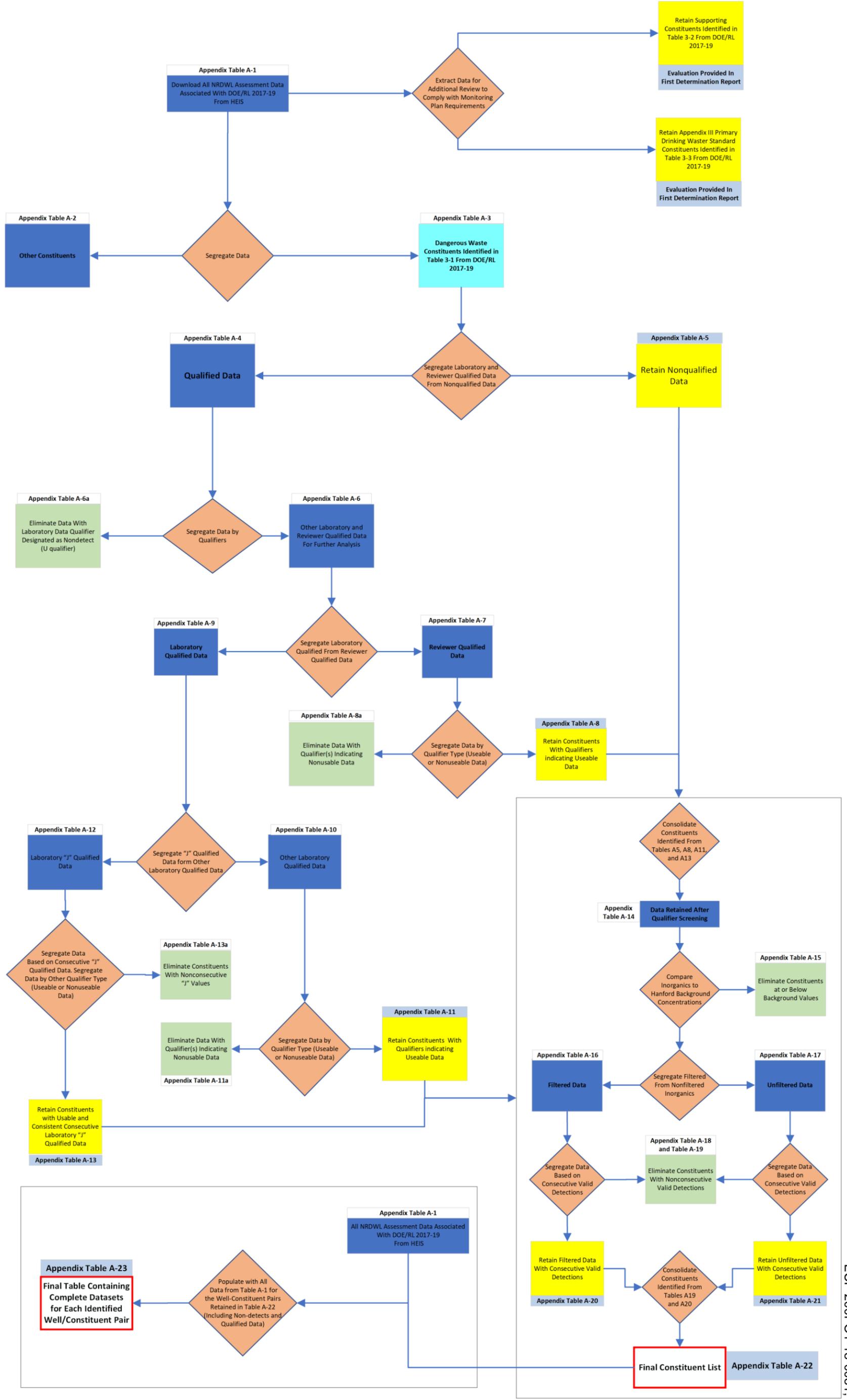


Figure 3. Data Screening Process Flow Diagram

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sample volumes and do not take into account issues (i.e., dilutions or reduced sample sizes) resulting from difficult matrices.

3.1 Laboratory and Review Qualifier Screening

1. Access HEIS using the Environmental Dashboard Application (EDA) to download all groundwater monitoring data from April, 1 of 2017 to April, 30 of 2018 for wells 699-25-33A, 699-25-34B, 699-25-34D, 699-25-34F, 699-26-33A, 699-26-34A, 699-26-34B, 699-26-35A, 699-26-35C, and 699-26-38 (Figure 3).
 - a. Export the data into an Excel spreadsheet. Load exported data into an Access database.
 - b. Extract all results categorized as supporting constituents in Table 3-2 of DOE/RL-2017-19 and export to an Excel spreadsheet (Appendix A, “NRDWL_sprtrng_cnstntns.xlsx”).
 - c. Extract all results sampled for 40 CFR 265 “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” Appendix III, “EPA Interim Primary Drinking Water Standards” that are listed in Table 3-3 of DOE/RL-2017-19 and Export to an Excel spreadsheet (Appendix A, “NRDWL_appndx_3_cnstntns.xlsx”). Appendix III parameter sampling for four quarters is required for wells newly added to the network. For NRDWL, wells 699-25-34F, 699-26-33A and 699-26-38 were sampled for Appendix III.
2. Screen the data not excluded for designated dangerous waste status by comparing constituents with those listed in Table 3-1 of DOE/RL-2017-19. Exclude all data for constituents not listed as dangerous waste in Table 3-1. Retain all constituents listed as dangerous waste for further evaluation (Figure 3).
3. Screen and exclude all data with laboratory qualifiers “A,” “E,” “N,” “O,” “P,” “Q,” “T,” “U” and “W.” Also, screen and exclude organic constituent data associated with “B” qualifiers and inorganic constituent data with “C” qualifiers (Figure 3).
 - a. Retain all organic constituents associated with “J” qualifiers and save in a separate file.
4. Screen and determine adequacy of data associated with laboratory qualifiers “X,” “Y,” and “Z.” For example, if the laboratory hardcopy indicates sample quality control issues (e.g. hold-time exceedance or sample contamination) then exclude the data point (Figure 3).
5. Screen and exclude all data points associated with review qualifiers “F,” “H,” “P,” “Q,” “R” or “Y” (Figure 3).

3.2 Background Threshold Value

1. Screen all remaining inorganic data retained in step 5 in Section 3.1 against sitewide background threshold values (BTV) at the 95th percentile (Table 2, DOE/RL-96-61). Retain those values that exceed the background threshold values (Figure 3).

3.3 Consecutive Valid Detections Screening

1. Screen all previously retained data for consecutive, valid detections. Retain all well constituent datasets with two or more consecutive valid dangerous waste detections. These data will be further evaluated in DOE/RL-2019-22 Sections 4.1 and 4.3 (Figure 3).
2. Screen all organic constituent data for consistent consecutive “J” qualifiers (Figure 3).

Table 2. Hanford Site-wide 95th Percentile Background Values for NRDWL Dangerous Waste Constituents

Analyte	Filtered	units	95 CI
Antimony	Y	µg/L	69.8
Arsenic	Y	µg/L	11.8
Barium	Y	µg/L	149
Beryllium	Y	µg/L	3.38
Cadmium	Y	µg/L	1.29
Chromium	Y	µg/L	3.17
Cobalt	Y	µg/L	1.29
Copper	Y	µg/L	1.04
Cyanide	N	µg/L	9.52
Lead	Y	µg/L	1.3
Mercury	Y	µg/L	0.006
Nickel	Y	µg/L	1.98
Selenium	Y	µg/L	20.7
Silver	Y	µg/L	5.98
Sulfide	Y	µg/L	2.35
Thallium	Y	µg/L	1.87
Tin	Y	µg/L	23.6
Vanadium	Y	µg/L	19.3
Zinc	Y	µg/L	48.9

Source: DOE/RL 96 61, 1997, Hanford Site Background: Part 3, Groundwater Background, Rev. 0

- Retrieve all of the data for constituent/well pairs retained in Section 3.3, steps 1 and 2 from the initial dataset obtained in Section 3.1, step 1. It is necessary to include all assessment data for the retained constituent/well pairs for further evaluation (DOE/RL-2019-22) (Figure 3).
- Export final dataset (along with intermediate datasets derived in 3.1 through 3.3) from Access database to individual Excel spreadsheets (Appendix A, "Table A-23.xlsx") (Figure 3).

4 Assumptions and Inputs

Non-detected sample data results (data with a "U" qualifier) are assumed to not be present and were not further evaluated. Sample data results that could have been affected by sample or lab contamination (semi-volatile organic compound (SVOC), and volatile organic compound (VOC) sample data flagged by the laboratory with a "B" qualifier or inorganic constituent data flagged by the laboratory with a "C" qualifier) were not evaluated. Data were considered valid for organic constituents if datasets containing

both detections and non-detects contained consecutive detections. Consecutive “J” qualifiers suggests that the organic constituent is detectable in groundwater at very low concentrations.

DOE/RL-2017-19 specifies that tentatively identified compounds (TIC) results also be evaluated. The VOC 2-propanol was identified as a TIC in well 699-25-33A in the January 2018 sampling event and in wells 699-26-35C and 699-26-38 in the April 2018 sampling event. The April 2018 samples were both flagged with the “T” qualifier indicating a quality control issue (Table 1). Being that 2-propanol is common in hand sanitizers and household cleaners and because of its isolated occurrence of detection, isopropyl alcohol is not considered a groundwater contaminant attributable to NRDWL. Methylene chloride was identified as a TIC in the January 2018 sampling event at well 699-26-35A. The sample was associated with the “Q” review qualifier indicating a quality control issue. Because of the review qualifier, the methylene chloride TIC at 699-26-35A in January 2018 is not considered a groundwater contaminant attributable to NRDWL.

5 Software Applications

Microsoft Excel[®] and Microsoft Access[®] software are approved and appropriate applications for this effort and were used to perform sorting operations.

6 Calculation

Data were accessed through HEIS using the EDA, and processed by Excel and Access using conditional statements in accordance with the assumptions, inputs, and methodology presented in Section 3. Results are summarized in Section 7.

7 Results

Results of the screening process described in Section 3 and outlined in the process flow diagram in Figure 3 are presented in tables listed in Appendix A. Of the 17,814 Assessment sample results retrieved from HEIS, 14,320 were results representing 248 unique dangerous waste constituents. After qualifier, BTV and consecutive detection screening of the retained dangerous wastes constituent results, the following inorganic dangerous waste constituents were retained for further analysis:

- Chromium at wells 699-25-33A, 699-25-34B, 699-25-34F, 699-26-33A, 699-26-34A, 699-26-34B, 699-26-35A, 699-26-35C, and 699-26-38
- Nickel at wells 699-25-34D and 699-25-34F

Organic constituents present at low concentrations as indicated by consistent consecutive “J” qualifiers were retained for further evaluation even though those constituents are not considered dangerous wastes attributable to NRDWL. Further evaluation of organics present at low-level concentrations was deemed necessary for estimating possible future changes in concentrations and to determine their suitability as site-specific monitoring constituents. NRDWL organics carried forward for further evaluation included:

- Chloroform at wells 699-25-34B, 699-25-34F, 699-26-35A, and 699-26-35C
- Tetrachloroethene at wells 699-25-34B, 699-25-34D, 699-25-34F, 699-26-33A, 699-26-34A, and 699-26-35A
- Trichloroethene at wells 699-25-34B, 699-25-34D, and 699-25-34F

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- Trichloromonofluoromethane at well 699-25-34B and 699-26-35A

The process for further evaluation of dangerous waste constituent detections is described in DOE/RL-2019-22. Based on the results provided in this ECF, a First Determination Report DOE/RL-2019-22 was prepared. A summary of the entire data evaluation process, results, and conclusions is provided in DOE/RL-2019-22.

8 References

- 40 CFR 136, “Guidelines Establishing Test Procedures for the Analysis of Pollutants,” Appendix B, “Definition and Procedure for the Determination of the Method Detection Limit,” *Code of Federal Regulations*. Available at: <https://www.ecfr.gov/cgi-bin/text-idx?SID=bf278f3fc951721dd2894e3fc8163cfe&mc=true&node=pt40.25.136&rgn=div5>.
- 40 CFR 265, “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities,” *Code of Federal Regulations*. Available at: <http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol25/xml/CFR-2010-title40-vol25-part265.xml>.
- Subpart F, “Ground-Water Monitoring”
- Appendix III, “EPA Interim Primary Drinking Water Standards”
- CP-15383, 2007, *Common Requirements of the Format for Electronic Analytical Data (FEAD)*, Rev. 8, Fluor Hanford, Inc., Richland, Washington.
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- DOE/RL-2017-19, 2017, *Groundwater Quality Assessment Plan for the Nonradioactive Dangerous Waste Landfill, Hanford Site*, Rev. 0, Department of Energy, Richland Operations Office, Richland, Washington. Available at: <https://pdw.hanford.gov/arpir/pdf.cfm?accession=0072142H>.
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- HNF-38155, 2013, *HEIS Sample, Result, and Sampling Site Data Dictionary*, Rev. 1, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: <https://pdw.hanford.gov/arpir/pdf.cfm?accession=0082589H>.
- 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, “Dangerous Waste Regulations,” *Washington Administrative Code*, Olympia, Washington. Available at: <http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303>.
- 303-400, “Interim Status Facility Standards.”

Appendix A

Nonradioactive Dangerous Waste Landfill Assessment Sampling Data and Data Screening Results

Results of the steps of the data screening process described in Section 3 are listed in the spreadsheets in the table below. The spreadsheet “table_explanation_NRDWL.xlsx” explains each of the spreadsheets. Figure 3 of this document outlines the process followed for which spreadsheet was derived.

Microsoft Excel Spreadsheet
table_explanation_NRDWL.xlsx
Table A-1.xlsx
Table A-2.xlsx
Table A-3.xlsx
Table A-4.xlsx
Table A-5.xlsx
Table A-6.xlsx
Table A-6a.xlsx
Table A-9.xlsx
Table A-7.xlsx
Table A-8.xlsx
Table A-8a.xlsx
Table A-10.xlsx
Table A-11.xlsx
Table A-11a.xlsx
Table A-12.xlsx
Table A-13.xlsx
Table A-13a.xlsx

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Microsoft Excel Spreadsheet
Table A-14.xlsx
Table A-15.xlsx
Table A-16.xlsx
Table A-17.xlsx
Table A-18.xlsx
Table A-19.xlsx
Table A-20.xlsx
Table A-21.xlsx
Table A-22.xlsx
Table A-23.xlsx
NRDWL_sprtnng_cnstntns.xlsx
NRDWL_apndx_3_cnstntns.xlsx