STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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August 17, 2020 20-NWP-132

Brian T. Vance, Manager
Richland Operations Office
United States Department of Energy
PO Box 550, MSIN: H5-30
Richland, Washington 99352

Re: Tank Waste Closure Performance Standards and Criteria for Use in Closure Plans for Unit Groups that Handle Tank Waste or its Components in Support of the *Hanford Facility Resource Conservation and Recovery Act Permit*, Dangerous Waste Portion, Revision 9, for the Treatment, Storage, and Disposal of Dangerous Waste (Site-wide Permit, Rev. 9)

References: See page 5

Dear Brian T. Vance:

The United States Department of Energy (USDOE), USDOE Contractors, and the Department of Ecology (Ecology) worked together to develop a Tank Waste Closure Performance Standards (TW CPS) Table for tank waste constituents present in soil. The TW CPS Table was completed in support of the Site-wide Permit, Rev. 9 Closure Plan Conceptual Agreement Package (CAP) deficiency review.

This letter transmits the following to USDOE and its contractors:

- The final agreed to version of the TW CPS Table (Enclosure 1).
- The TW CPS Table Attachment, which explains the acronyms and databases used in the TW CPS Table (Enclosure 2).
- Ecology's preferred path forward for use of the TW CPS Table is to develop closure performance standards for Tank Waste Unit Group closure plans. The Tank Waste Unit Groups include:
    - Single-Shell Tank System (SSTs)
    - Double-Shell Tank System & 204-AR (DSTs)
    - 242-A Evaporator
    - Liquid Effluent Retention Facility/ Effluent Treatment Facility (LERF/ETF)
    - 222-S Dangerous & Mixed Waste Treatment Storage and Disposal Unit (TSD)

The process to create the TW CPS Table involved review of the regulatory requirements for closure, review of existing data on tank waste constituents, and review of potential pathways for contaminants to reach the environment and the toxicological data related to those contaminants.

Regulatory Basis

The closure performance standard requirements codified in Washington Administrative Code (WAC) 173-303-610(2) were reviewed when preparing the initial table for review. The WAC specifies the clean closure performance standards for soils, groundwater, surface water, and air are to be the cleanup levels using unrestricted use requirements and exposure assumptions, according to Model Toxics Control Act (MTCA), WAC 173-340-740. Primarily, these will be numeric cleanup levels calculated according to MTCA Method B, WAC 173-340-700 through WAC 173-340-760, excluding WAC 173-340-745.

The regulations in WAC 173-340-700(5)(b), seventh paragraph, first sentence states, "For soil contamination, the potential impact of hazardous substances on terrestrial ecological receptors must be evaluated under WAC 173-340-7490 through 173-340-7494." MTCA also states, at WAC 173-340-740(3)(b)(iii)(A) *Groundwater Protection*, "Concentrations that will not cause contamination of groundwater at levels which exceed ground water cleanup levels established under WAC 173-340-720 as determined using the methods described in WAC 173-340-747." This means that the selected soil cleanup levels must take into consideration the ecological and groundwater protection pathways. Site specific conditions will dictate which contaminants and risk pathways to evaluate at each site. Generally, the lowest value from the closure performance standard table is used as the cleanup level unless it can be demonstrated that some criteria are not relevant at the Unit Group site.

Initial TW CPS Table Development and Data Review

Analytical data on tank waste constituents were reviewed to create the initial table of constituents for consideration. The Primary and Secondary waste constituents identified on the TW CPS Table are taken from data in RPP-23403, Rev. 6 (Reference 1). The data and constituents, exposure pathway calculations, and references listed in the TW CPS Table were reviewed by representatives of USDOE, USDOE contractors, and Ecology. The TW CPS Table went through multiple reviews in a series of workshops held for over a year and a half, until all comments provided by USDOE, Washington River Protection Solutions, CH2M Hill Plateau Remediation Company, and Mission Support Alliance (the Permittees) were addressed. The Review Comment Record for these reviews is included as Enclosure 3.

The closure performance standard chosen, according to the regulations, is based on evaluation of the contaminant exposure pathway(s) and toxicological data, and is usually the lowest identified value provided. The TW CPS Table also provides footnote explanations and references used in evaluating the choice of closure performance standards, at the end of the table. The TW CPS Table Attachment provides explanations of table acronyms and links to reference databases where applicable.

Use of the TW CPS Table

Ecology has determined that the preferred path forward for use of the TW CPS Table is as follows for each of the Unit Groups listed below:

<u>SSTs and DSTs</u>

- Use the entire CPS Table, as is, in the Unit Group closure plans until a Data Quality Objective (DQO) review is performed.
- Perform the DQO review within five years of starting closure of the first SST or DST.
- Perform the DQO review in accordance with EPA/240/B-06/001 (Reference 2).

In the period between now and when closure actually begins, USDOE will continue to characterize the wastes being managed in the tanks for dangerous wastes as listed in WAC 173-303-9905.

Ecology has the option to approve a reduction in the scope of the analyses. Ecology would need sampling and laboratory analysis that reflect the waste being managed during the ongoing operations, including the chemicals listed in WAC 173-303-9905. Ecology would use this data to support our decision to approve or disapprove of the reduced scope of closure analysis (e.g. use of indicator constituents).

USDOE could use that data at the time of the DQO review to provide justification for reducing the closure performance standard list in used in the closure plans.

<u>242-A Evaporator</u>

- Use the entire TW CPS Table, as is, in the Unit Group closure plan until a DQO review is performed.
- Perform the DQO review within five years of starting closure of this Unit Group.
- Performed the DQO review in accordance with EPA/240/B-06/001 (Reference 2).

In the period between now and when closure actually begins, USDOE will continue to characterize the wastes being managed at the 242-A Evaporator for dangerous wastes as listed in WAC 173-303-9905.

Ecology has the option to approve a reduction in the scope of the analyses. Ecology would need sampling and laboratory analysis that reflect the waste being managed during the ongoing operations, including the chemicals listed in WAC 173-303-9905. Ecology would use this data to support our decision to approve or disapprove of the reduced scope of closure analysis (e.g. use of indicator constituents).

USDOE could use that data at the time of the DQO review to provide justification for reducing the closure performance standard list in used in the closure plans.

<u>Other units that handle tank waste or related components – LERF/ETF and 222-S Dangerous and Mixed Waste TSD</u>

The LERF/ETF processes tank waste condensates from the 242-A Evaporator and the AZ-301 condensate collection tank. Waste Treatment and Immobilization Plant (WTP) waste returns are derived from tank wastes that can contain many chemicals listed in the TW CPS Table. The entire TW CPS table will apply to LERF/ETF until the DQO review is completed.

The 222-S Dangerous & Mixed Waste TSD receives waste from the analysis of tank waste samples. The entire TW CPS table will apply to the 222-S Dangerous & Mixed Waste TSD until the DQO review is completed.

If the Permittee proposes something less than the entire TW CPS table for each Dangerous Waste Management Unit (DWMU)/Unit Group, then full and complete sample analyses for the dangerous waste constituents in each DWMU must be performed to support the closure performance standards used in the closure plan. This analytical work would be done as part of and to support the DQO review.

- Evaluate the known waste streams from each DWMU within each Unit Group to identify what constituents from the TW CPS Table need to be addressed in the Unit Group/DWMU closure plans. To do this, perform a DQO review for each DWMU.
- The DQO review will be performed in accordance with EPA/240/B-06/001 (Reference 2).
- The DQO review can be separate from or included in the closure plan(s).
- The final list of constituents and exposure pathways identified through the DQO review is used to create the closure performance standard table used in the closure plans.

In summary, the following tools are used by Ecology and the Permittees to address deficiencies in the Site-wide Permit, Rev. 9 closure plans for each DWMU.

- The TW CPS Table,
- Characterization data from tank waste analyses and the wastes handles in each Unit Group/DWMU,
- The DQO reviews for Unit Groups/DWMUs, and
- The Closure Plan Conceptual Agreement Package.

The systematic process outlined in this letter for each respective Unit Group enables the Permittees and Ecology to define the list of closure performance standards needed to complete the closure plans.

If you have any questions, please contact Debra Alexander, Rev. 8C Permit Coordinator, at debra.alexander@ecy.wa.gov or (509) 372-7896.

Sincerely,

Stephanie Schleif Digitally signed by Schleif, Stephanie (ECY)

Stephanie Schleif
Deputy Program Manager
Nuclear Waste Program

da/ag
Enclosures (3)

cc: See page 5

References:

1. Document RPP-23403, Rev. 6, dated May 23, 2016, *Single-Shell Tank component Closure Data Quality Objectives*
2. Document EPA/240/B-06/001, dated February 2006, *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA QA/G-4)

cc w/enc, electronic:

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Mign Walmsley, Ecology
Christopher Wend, Ecology
Jerry Yokel, Ecology
NWP RIM Coordinators, Ecology
Hanford Administrative Record
Hanford Facility Operating Record
Environmental Portal
CHPRC Correspondence Control
MSA Correspondence Control
USDOE-ORP Correspondence Control
USDOE-RL Correspondence Control
WRPS Correspondence Control

Review Comment Record	Washington State Department of Ecology Nuclear Waste Program	Date: 06-11-2019 through 11-14-2019 Page 1 of 8

Document Title(s)/Number(s):

Ecology Table of Tank Waste/Tank System Closure Performance Standards

Document Manager	Telephone Number	Project Manager	Telephone Number	Facility Site ID	Cleanup Site ID
Donna Morgans, CHPRC/EPSP/Risk & Modeling Integration Debra Alexander, WA State Dept. of Ecology	509-373-3963 509-372-7896	WRPS 2505 Garlick, Richland WA 3100 Port of Benton Boulevard, Richland, WA		Tank Waste Systems	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
1	Method A Columns in Table	Except arsenic and lead, Method A Values are intended for simple sites	Delete all Method A values except arsenic and lead.	MTCA	Agree		C	
2	Row 15	Mercury - Method 7470 is for water samples; this table applies to solid medium	Delete reference to Method 7470	Editorial	Agree, deleted		C	
3	Row 70	Row 82; Incorrect spelling	Delete 1,1,2,2 from prefix of chemical name; this should be tetrachloroethylene	Editorial	Agree, corrected		C	
4	Row 74	Row 85. incorrect spelling	Delete 1,1,2- from prefix of chemical name; this should be trichloroethylene	Editorial	Agree, corrected		C	
5	All rows with empty cells	Put dashes in empty cells to indicate there is no value	Add dashes to empty cells	Global editorial	Agree, corrected		C	
6	Row 3	Arsenic GWP value of 2.92 mg/kg represents adjusted MCL of 5 µg/L, this concentration is < Hanford background of 7.85 µg/L.	Recommend changing Arsenic GWP to 4.58 mg/kg to represent groundwater background.	WAC 173-340-700(6)(d)	Disagree; Propose use of the CLARC value of 2.92 mg/kg rather than a site-specific GW background. The performance standard of 20 mg/kg is also not the site-specific background of 6.5 mg/kg. Change on table in red text 10/21/19 See spreadsheet foot-note a.	Accept with modification. Recommended arsenic GWP value is based on Statewide background value. Add footnote to indicate that the 90th percentile Hanford Site-specific arsenic value is 7.95 µg/L. If this value were used the GWP value would be 4.58 mg/kg. Accepted – 10/28/19	C	
7	Row 20	Oral RfD for thallium has been withdrawn.	Delete Method B Noncancer direct value. Change GWP value from 0.228 mg/kg to 0.72 mg/kg; based on MCLG of 0.5 µg/L.	Toxicity value withdrawn	Disagree; CLARC uses the PPRTV value. Please maintain. See Ecology notes on the spreadsheet for this contaminant and many others (including contaminants not included on this RCR). Add information to footnote. Ecology discuss internally and get back to DOE. Footnote s added. See changes on table in red 10/21/19 No change. The state (via CLARC) made the decision to use this value from PPRTV. At meeting on 10-28-19, all parties agreed to add the following to the first reference in the Tank Waste CPS table: "PPRTV Appendix values are considered screening levels because of the uncertainty associated with the toxicity values." The sentence was added to the table.	Accept with Modification. Revise footnote for thallium to read "The closure performance standards listed for thallium are considered screening levels because of the uncertainty associated with its toxicity value. A risk-management decision is required for its use as a final performance standard." Accepted – 10/28/19 (see explanation at left)	C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
8	Row 31	Incorrect oral RfD for phosphorous used; represents white phosphorous (explosive)	Delete noncancer direct contact value for phosphorous	Toxicity value incorrect	Disagree; The RfD for CAS 7723-14-0 is 2E-05 mg/kg/day. The original value is ok for this form of P. See Ecology notes on spreadsheet. Check on CAS # and Analytical method listed on table. Value in red corresponds to value for CAS 7723-14-0. Phosphate is separate (row 67) CAS 14265-44-2. See changes on table in red. 10/21/19 No change. Method 6010 measures CAS 7723-14-0.	Not accept. Delete value of 1.6 mg/kg for Method B noncancer direct contact. The CAS # listed in row 31 represents white phosphorus, this is not the form of phosphorus reported by Method 6010. Jerry Y found Method 7580, which is specific to CAS 7723-14-0. Method was added in the analytical method column on row #31.	C	
9	Row 114	oral RfD withdrawn for n-Hexane.	Delete direct contact and GWP closure standards.	Toxicity value withdrawn	Agree, Still need to make changes on table. See changes on table in red.	Accept.	C	
10	Row 54	Fluoride, replace current GWP value with 1.44E+03 mg/kg	HLC = 0 (unitless); Kd 150 L/kg BAES, Cw 480 µg/L from CLARC	Reproducibility	Disagree; See Ecology notes on spreadsheet. Resolved if CAS number is changed – non-volatile form. Notes in Reviewer notes column were deleted. Values correspond to CAS 16984-48-8. 10/21/19 Value is being changed to correspond with Ecology's original GWP value of 2.88E03 mg/kg.	Not accept. Fluoride is evaluated in the form of soluble fluoride. Cw = 960 µg/L from CLARC, GWP = 2,884 mg/kg. Accepted 10/28/19	C	
11	Row 61	Cyanide - revise Method B noncancer value for inhalation.	Replace value of 19.2 mg/kg with 2.67E07 mg/kg	Reproducibility	~~Disagree; Use vapor value instead of particulate value for inhalation. See Ecology notes on spreadsheet.~~Agree after discussion in meeting. Make suggested change on table. Values and notes revised in red. 10/21/19 No change. Discussion needed. VF = 5.2E4 m3/kg (EPA/RSL).	Agree. GWP Inhalation noncancer = ~~2.26 mg/kg~~. 21.9 mg.kg Kd=9.9 L/kg (RSL/SSL), Di = ~~0.168~~0.211 cm2/sec (EPA/RSL), Dw = ~~1.68E-05~~ 2.5E-05 cm2/sec HLC = ~~5.44E-03~~ 4.2E-03 (EPA/RSL), VF=~~6.19~~ 5.99 m3/kg (EPA/RSL), Cair noncancer=3.66E-1 µg/m3 Changes made in this color text above	C	
12	Row 74	TCE - revise Method B cancer value for inhalation	Replace value of 1.05 mg/kg with 0.639 mg/kg	Reproducibility	Agree; Make suggested change on table. Changes were previously made on table.		C	
13	Row 81	Oral reference dose withdrawn for 4-methyl-2-pentanone	Delete Method B noncancer direct contact and GWP values.	Updated toxicity value	~~Disagree; See CLARC for toxicity information and Ecology notes on spreadsheet.~~ Agree after discussion in meeting. Make suggested change on table Changes shown in red on table.	Agree,	C	
14	Row 77	Vinyl chloride- revise Method B cancer value for inhalation	Replace value of 0.531 mg/kg with 0.265 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
15	Row 72	1,1,2-Trichloro-1,2,2-trifluoroethane - revise Method B noncancer value for inhalation	Replace value of 1.77E+04 mg/kg with 2.99E+03 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
16	Row 79	2-nitropropane- revise Method B cancer value for inhalation	Replace value of 1.21E-02 mg/kg with 9.29E-03 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
17	Row 79	2-nitropropane- revise Method B non cancer value for inhalation	Replace value of 120 mg/kg with 91.7 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
18	Row 89	Oral slope factor published for ethylbenzene	Include Method B cancer direct contact value of 90.9 mg/kg and revise GWP value from 6.05 mg/kg to 0.344 mg/kg	Updated toxicity value	Agree; Make suggested change on table Changes were previously made on table.		C	
19	Row 92	Methanol - revise Method B non cancer value for inhalation	Replace value of 5.83E+04 mg/kg with 2.91E+05 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
20	Row 104	1,3-butadiene - cancer potency factor and oral reference dose values have been updated	Revise noncancer direct contact value from 0.294 mg/kg to 1.67 mg/kg and revise GWP value from 1.29E-04 mg/kg to 7.29E-04 mg/kg	Updated toxicity values	Agree; Make suggested change on table Changes were previously made on table. Also, see Notes column. What is the source of the oral RfD? 10/21/19 Value of 160 mg/kg is deleted.	Correction. Delete direct contact value of 160 mg/kg. oral reference dose is not published for this analyte. Accepted 10/28/19	C	
21	Row 97	Xylenes (mixed isomers) revise noncancer inhalation value	Replace value of 104 mg/kg with 115 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
22	Row 108	Acrylonitrile - revise cancer and noncancer direct contact values	Replace noncancer value of 3.2E+02 mg/kg with 3.2E+03 mg/kg and replace cancer value of 8.10E-02 mg/kg with 1.85 mg/kg	see CLARC	Agree; Make suggested change on table Changes were previously made on table.		C	
23	Row 115	Cyclohexane - revise noncancer inhalation value	Replace noncancer inhalation value of 2.6E+03 mg/kg with 2.00E+11 mg/kg.	Reproducibility	Disagree; Use vapor value for inhalation and revise CPS. See Ecology notes on spreadsheet. See revisions in red on table.	Agree	C	
24	Row 119	1,4-dioxane- revise cancer and noncancer inhalation values	Replace cancer value of 13.6 mg/kg with 21 mg/kg and replace noncancer value of 5.76E+04 mg/kg with 576 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
25	Row 145	Ethylene oxide - revise cancer and noncancer inhalation values	Replace cancer value of 1.73E-01 mg/kg with 5.31E-03 mg/kg and replace noncancer value of 83.4 mg/kg with 87.3 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
26	Row 150	1,2-dichloropropane - revise cancer inhalation value	Replace cancer value of 0.63 mg/kg with 0.17 mg/kg.	Reproducibility	Disagree; See Ecology notes on spreadsheet. Check if the number change was due to changes in CLARC table or toxicity factor changes. Update as necessary. See revisions on table in red.	Agree.	C	
27	Row 160	o-cresol - revise noncancer inhalation value	Replace noncancer value of 5.20E+04 mg/kg with 3.11E+04 mg/kg	Reproducibility	Agree; Make suggested change on table Changes were previously made on table.		C	
28	Row 161	p-cresol - revise noncancer inhalation value	Replace noncancer value of 5.59E+04 mg/kg with 4.84E+04 mg/kg	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	
29	Row 182	p-chloronitrobenzene - oral reference dose and oral cancer potency factors have been updated; revise all closure standards	Revise noncancer direct contact value of 80 mg/kg with 16.7 mg/kg; revise cancer direct contact value of 159 mg/kg with 56 mg/kg; replace GWP value of 7.77E-02 mg/kg with 8.21E-03 mg/kg.	Updated toxicity values	Disagree; The cancer and noncancer direct contact numbers need to be swapped. See Ecology notes on spreadsheet. Discussion at meeting, make the change suggested on the table. See revisions on table in red.	Agree,	C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
30	Row 186	Hexachlorobenzene - revise inhalation cancer value	Revise cancer inhalation value of 3.67E-01 mg/kg with 3.96E+05 mg/kg.	Reproducibility	Disagree; See Ecology notes on spreadsheet. Discussion at meeting – look at all calculations for this chemical See revisions on table in red. 10/21/19 Accept GWP changes. Table has been changed. Discussion needed about VF for inhalation (we find 6.8E04 m3/kg, EPA/RSL).	Accept~~Disagree~~ GWP. Cw MCL C adj=5.5E-1 µg/L (CLARC), Kd = 80 (CLARC), HLC 0.054 (CLARC) retain value of 0.877 mg/kg. ~~Disagree~~Check of inhalation. H unitless=.~~054~~5.41 E-02 (CLARC), Koc=8E+04 L/kg (CLARC), Kd=80 cm3/kg CLARC, Di = 0.029 cm2/sec, Da = 7.9E-06 cm2/sec, VF=~~1.27E+05 m3/kg~~Not calculated/CLARC does not identify analyte as volatile (1 inhalation correction value), Cair cancer=5.4E-3 µg/m3 (CLARC), Cs inhalation dust ~~vapors~~ cancer=3.96E+05~~6.9E-1~~ mg/kg Note: GWP becomes most protective value Changes made in this color text above	C	
31	Row 187	n,n-diphenylamine - oral reference dose updated	Revise noncancer direct contact value of 2.00E+03 mg/kg with 8.00E+03 mg/kg; revise GWP value of 8.24 mg/kg with 32.8 mg/kg.	Updated toxicity values	Agree; Make suggested change on table See revisions on table in red.		C	
32	Row 193	Benzo(a)pyrene - oral cancer potency factor and inhalation unit risk factor updated	Revise cancer direct contact value of 0.19 mg/kg with 1 mg/kg; revise cancer inhalation value of 1.66E+05 mg/kg with 3.04E+05 mg/kg.	Updated toxicity values	Disagree; See new values in CLARC and Ecology notes on spreadsheet. Discussion at meeting – evaluate changes from CLARC table See revisions on table in red.	Agree	C	
33	Row 194	Dibenzo(a,h)anthracene - oral cancer potency factor and inhalation unit risk factor updated	Revise cancer direct contact value of 0.19 mg/kg with 1 mg/kg;revise GWP value of 4.29E-01 mg/kg with 3.13 mg/kg; revise cancer inhalation value of 1.66E+05 mg/kg with 3.04E+05 mg/kg.	Updated toxicity values	Disagree; See Ecology notes on spreadsheet. Discussion at meeting – reevaluate See revisions on table in red.	Accept	C	
34	Row 202	1,1'-Bipehnyl - reference concentration value withdrawn	Delete noncancer inhalation value	Toxicity value withdrawn	Disagree; Use PPRTV screening toxicity information. See Ecology notes on spreadsheet. Discussion at meeting – like thallium issue, add similar language to table. See revisions on table in red. Footnote t added. 10/21/19 Footnote t modified to add 'inhalation' prior to RfD. The state (via CLARC) made the decision to use this value from PPRTV.	Accept with Modification. Revise footnote for 1,1-biphenyl to read "The closure performance standards listed for 1,1-biphenyl are considered screening levels because of the uncertainty associated with its toxicity value. A risk-management decision is required for its use as a final performance standard." Accepted 10/28/19 - See comment #7 for agreed to changes.	C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
35	Row 212	1,1-dimethylhydrazine - oral reference dose and inhalation reference concentration values withdrawn.	Delete all closure standards for this analyte.	Toxicity values withdrawn	Disagree; See revised CLARC and toxicity information. See Ecology notes on spreadsheet. Discussion at meeting – leave as is, if not withdrawn. See revisions on table in red. 10/21/19 Footnote u added. The state (via CLARC) made the decision to use this value from PPRTV.	Accept with Modification. Revise footnote for 1,1-dimethylhydrazine to read "The closure performance standards listed for 1,1-dimethylhydrazine are considered screening levels because of the uncertainty associated with its toxicity value. A risk-management decision is required for its use as a final performance standard." Accepted 10/28/19 - See comment #7 for agreed to changes.	C	
36	Row 213	Methylhydrazine - inhalation unit risk factor and inhalation reference concentration values are withdrawn.	Delete cancer and noncancer inhalation values.	Toxicity values withdrawn	Disagree; See revised CLARC and toxicity information. See Ecology notes on spreadsheet. Discussion at meeting – leave as is, if not withdrawn. See revisions on table in red.	Accept	C	
37	Row 215	n-nitrosodi-n-butylamine - revise cancer inhalation value	Replace cancer inhalation value of 0.15 mg/kg with 1.82E-01 mg/kg.	Reproducibility	Agree; Make suggested change on table Changes previously made on the table.		C	
38	**Not on table** **Now Rows 216, 217, and 218**	DDD, DDE, and DDT are not identified as primary or secondary compounds and should be removed from the list; note indicates these were common pesticides at Hanford.	DDD, DDE, DDT are applied on the Hanford site to prevent the spread of contamination and comply with environmental, safety, health, and quality principals.	Biological controls	Discussion at meeting – added back in, so decisions are made at Unit Group workshop level. 10/21/19 Method A value deleted. CLARC values added for direct contact noncancer. Inhalation cancer values inserted from Morgans (2018), except DDE [note that DDE value in Response is not the same as the Morgans (2018) value.] Ecology gets 54.6 mg/kg for DDE inhalation. See notes column on the spreadsheet.	Not accept. Delete Method A value for DDT. Direct contact noncancer standards are missing for DDD, DDE, and DDT. Add Method B cancer inhalation values for DDD (2.6E+06 mg/kg), DDE (29.7 mg/kg) and DDT (1.9E+06 mg/kg) Inhalation check for DDE H unitless=8.61E-04 (CLARC), Koc=8.64E+04 L/kg (CLARC), Kd=86.4 cm3/g (CLARC), Di = 0.023 cm2/sec (EPA/RSL), Da = 5.86E-06 cm2/sec (EPA/RSL) VF=not calculated/CLARC does not identify analyte as volatile (1 inhalation correction value), Cair cancer=2.6E-2 µg/m3, Cs inhalation dust cancer=1.88E+06 mg/kg Changes made in this color text above	C	
39	Row 219	Total PCBs - revise cancer inhalation value.	Replace the cancer inhalation value of 2.34 mg/kg with 3.20E+05 mg/kg.	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	
40	Row 221	Aroclor 1221 - revise cancer inhalation value.	Replace the cancer inhalation value of 0.19 mg/kg with 4.12E-01 mg/kg	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	
41	Row 222	Aroclor 1232 - revise cancer inhalation value.	Replace the cancer inhalation value of 0.19 mg/kg with 2.26E-01 mg/kg	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
42	Row 223	Aroclor 1242 - revise cancer inhalation value.	Replace the cancer inhalation value of 3.20E+05 mg/kg with 1.19 mg/kg	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	
43	Row 224	Aroclor 1248 - revise cancer inhalation value.	Replace the cancer inhalation value of 3.20E+05 mg/kg with 1.26 mg/kg	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	
44	Row 226	Aroclor 1260 - revise GWP value.	Replace GWP of 3.10E-01 mg/kg with 0.72 mg/kg. HLC (unitless) 0.014 PHYSPROP, Koc = 8.22E+05, Kd = 822 CLARC, Cw = 0.0438 µg/L.	Reproducibility	Agree; Make suggested change on table See revisions on table in red.		C	
45	**Not on table** **Now Row 227**	2,3,7,8-TCDD TEQ (12 dioxin-like PCBs) is not a primary or secondary compound in RPP-23403 Rev 6, Single-Shell Tank Component Closure Data Quality Objectives	Delete 2,3,7,8 TCDD TEQ from the table.	Not included in RPP-23403 Rev. 6	~~Disagree;~~ Add back this chemical, because these dioxin-like PCB congeners are present in Aroclors (which, in turn, are ""primary"" compounds). WAC 173-340-747 value (Cs gw protect) based on Henry's of 2.0E-03 PHYSPROP database; Koc=2.5E5 mL/g EPI database, giving Kd=2.5E02 mL/g. Cw 6.73E-06 µg/L (CLARC, Adjusted MCL) Air CUL cancer=6.58E-08 µg/m3 (CLARC), Air CUL noncancer=1.83E-05 µg/m3 (CLARC), VF=2E+06 m3/kg (EPA/RSL). Agree, after discussion in meeting. Make suggested change on table See revisions on table in red. 10/21/19 There should be no strike-through on text above. Also, footnote v was added with info from notes column. [Note: Strike-through on above text (black font) was removed per preceding comment.]	Not accept. Footnote is not included at the end of the table. Footnote is there; Accepted 10/28/19	C	
46	Multiple rows	Analytical method column; methods not provided for all compounds	Recommend identifying the analytical method when planning documents are prepared (sampling and analysis plans).	Incomplete	Disagree; Ecology does not agree; we are adding in a starting point for analytical methods for all listed chemicals. A previous version of this table had many of cells filled in, so we started with them. Methods were added for chemicals that didn't initially have one listed. Once the unit-specific workshops begin, these methods can be changed as needed to address project-specific QA/QC needs. After permit issuance and before the beginning of closure, changes can be made through permit modification.		C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
47	Multiple rows	Allowable PQL column; values not provided for all compounds	Recommend identifying the highest allowable PQL when planning documents are prepared (sampling and analysis plans).	Incomplete	Agree; Ecology agrees we do not need to address PQLs in this table. However, it will need to be addressed during the preparation of the Closure Plan for each DWMU and be part of the Closure Plan SAP. The PQL is necessary information for making the final determination of Closure Performance Standards.		C	
48	Multiple rows	Some of the compounds in this table currently have no value; however closure standards are available for at least one exposure pathway.	Attached table contains green highlighted cells that report values for compounds that were not originally blank.	Add missing data that is available	See Ecology notes on the spreadsheet for specific notes about the added values.		C	
49	Multiple rows	Soil cleanup level and basis for soil cleanup level	These columns will need to be revised based on updated values. Footnote columns to indicate the soil cleanup level presented is based on all exposure pathways being complete. If any of the exposure pathways are incomplete, then the selection process will need to be revised.	Exposure pathways issue	Disagree; This comment is not clear. All of the pathways on the table are currently complete to the depths given in WAC 173-340-740.		C	
50	Table headers	Recommend the use of the term "Closure Performance Standard" instead of Soil Cleanup Level	Revise term.	To be consistent with the terminology in WAC 173-303-610	Agree; The pathway chosen as the value to be met for cleanup, should be identified as the Closure Performance Standard.		C	
51	Table footnotes	All footnotes will need to be revised once concurrence on closure performance standard values has been attained.	Update footnotes.	Revise to reflect changes made	Agree; When we finalize this table, we will revise footnotes as necessary.		C	
52	Row 14	Comment in Table instead of RCR			Please provide calculations for gw protection value (for manganese). 10/21/19 CLARC has Cw 750 µg/L, giving GWP 9.8E02 mg/kg	Cw = 384 µg/L; Kd = 65 mL/g; HLC = 0 Fix GWP value – Beth R.- Done	C	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Ecology Response	Permittee Response	Open/ Close	Reviewer Initials
53	Row 15	Change made to Table without comment in RCR			CAS is for elemental Hg, soil dir cont Cs is OK (but for HgCl2), inhalation noncancer Cs for Hg vapor=4.8 mg/kg, Cair noncancer=1.37E-1 µg/m3, VF for elemental Hg=3.5E4 m3/kg 10/21/19 Row added at the end for mercuric chloride. Moved up into table into correct location; made row number 15A to not mix up any other original row numbers.	Not accept. Add another row to specifically identify elemental mercury and its associated inhalation value. Retain all values for mercuric chloride Mercuric chloride row added at end of table; Deb A. moved it up after the elemental Mercury row (#15). Mercuric chloride became row #15A to not mess up the other row numbers. Accepted 10/28/19 Beth R. is checking on the values listed in row #15; checking to make sure they are for elemental mercury. – Done 11-14-19 - check all numbers for both elemental mercury and mercuric chloride and make sure both have analytical methods - Done	C	
54	Row 21	Change made to Table without comment in RCR			Revised footnote "i" (RfD=2E-4 mg/kg/d, Region 10/USEPA/OSRTI memo Dec 2016) Cs soil dir contact=1.6E1 mg/kg Cw=9.8 µg/L (Hanford gw background), Kd=0.3 L/kg (PNNL-13895), Cs gw protect=9.8E-2 mg/kg	Accept	C	

ACRONYM and REFERENCE DATABASE List for the Tank Waste CPS Table

Acronym	Definition
MTCA Equation Terms	
Air CUL	Air "cleanup level"
Cair	Air concentration in mg/kg
CPF	Carcinogenic potency factor as specified in WAC 173-340-708 in kg-day/mg
Cs	Soil concentration in mg/kg
Cw	Groundwater cleanup level established under WAC 173-340-720 in µg/l
Inh	Inhalation correction factor (see WAC 173-340-708)
Kd, Kf, Koc, Kfoc	Soil absorption coefficient; measures mobility of a substance in soil
Rfd	Reference dose as defined by WAC 173-340-708 in mg/kg-day
Others	
ECF-Hanford	"Environmental Calculation" document header for Hanford Site
EPA/RSL SSL	EPA Regional Screening levels, residential soils Soil Screening Levels (c or ca for "cancer", n or NC for "non-cancer")
EPI PHYSPROP	Estimation Programs Interface Suite – EPA Physical Properties database (part of EPAs EPI Suite - see above)
GWP	Groundwater Protection
HEAST	Health Effects Assessment Summary Tables
IRIS	Integrated Risk Information System IRIS Glossary
IUR	Inhalation Unit Risk
MCL	Maximum Contaminant Level; standards set by EPA
MTCA	Model Toxics Control Act
NCEA	National Center for Environmental Assessment
PPRTV	Professional Peer Reviewed Toxicity Values
RAIS	Risk Assessment Information System
UCF	Unit Conversion Factor
US EPA/OSRTI	United States Environmental Protection Agency / Office of Superfund Remediation and Technology Innovation
VF	Volatilization Factor

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
	Inorganics - Metals																	
1	Aluminum Al	7429-90-5	P	6010 (ICP/AES) 6020 (ICP/MS)	--	8.00E+04	--	4.80E+05	5.00E+01	--	--	--	1.67E+08	1.18E+04	1.18E+04	Soil background	Soil background is larger than the ecological indicator (plants). Background reference is DOE/RL-92-24, Rev 4.	GW protect Cs is OK, Cw=1.6E4 µg/L, Kd=1.5E3 L/kg (RSL/Baes), Cs=4.8E5 mg/kg
2	Antimony	7440-36-0	P	6010 (ICP/AES) 6020 (ICP/MS)	--	3.20E+01	--	5.42E+00	5.00E+00	--	--	--	--	1.30E-01	5.00E+00	Ecological plants	Soil background from ECF-HANFORD-11-0038.	
3	Arsenic As[a]	7440-38-2	P	6010 (ICP/AES) 6020 (ICP/MS)	2.00E+01	2.40E+01	6.67E-01		1.00E+01	6.00E+01	1.32E+02	4.24E+04	5.00E+05	6.47E+00	2.00E+01	Method A	See footnote a. Note that Eco Indicator concentrations are based on As+5.	See footnote "a".
4	Barium Ba	7440-39-3	P	6010 (ICP/AES) 6020 (ICP/MS)	--	1.60E+04	--	1.65E+03	5.00E+02	--	1.02E+02	--	1.67E+07	1.32E+02	1.32E+02	Soil background	Soil background is larger than the ecological indicator (wildlife). Background reference is DOE/RL-92-24, Rev 4.	
5	Beryllium Be	7440-41-7	P	6010 (ICP/AES) 6020 (ICP/MS)	--	1.60E+02	--	6.32E+01	1.00E+01	--	--	7.60E+04	6.67E+05	1.51E+00	1.00E+01	Ecological plants		
6	Cadmium Cd	7440-43-9	P	6010 (ICP/AES) 6020 (ICP/MS)	--	8.00E+01	--	6.90E-01	4.00E+00	2.00E+01	1.40E+01	1.00E+05	3.33E+05	5.63E-01	6.90E-01	Groundwater protection	Soil background from ECF-HANFORD-11-0038.	Change dust inhalation Cs [cancer], Cair cancer=1.39E-3 µg/m3, Cs=1.0E5 mg/kg
7	Chromium (Total) Cr	7440-47-3	P	6010 (ICP/AES) 6020 (ICP/MS)	--	--	--	--	4.20E+01	4.20E+01	6.70E+01	--	--	1.85E+01	4.20E+01	Ecological plants and soil biota		
8	Chromium (III) Cr+3	16065-83-1	N/A	6010 (ICP/AES)	--	1.20E+05	--	4.80E+05	--	--	--	--	--	--	1.20E+05	Method B Direct Contact		
9	Chromium (VI) Cr+6[b]	18540-29-9	N/A	7196 (Colorimetric)	--	2.40E+02	--	0.19[b]	--	--	--	2.17E+03	3.33E+06	--	1.90E-01	Groundwater protection	See footnote b. The PQL is larger than the soil concentration protective of groundwater value.	See footnote "b".
10	Cobalt Co[c]	7440-48-4	P	6010 (ICP/AES) 6020 (ICP/MS)	--	2.40E+01	--	4.34E+00	2.00E+01	--	--	2.03E+04	2.00E+05	1.57E+01	1.57E+01	Soil background	See footnote c.	Dust inhalation Cs is OK, RfC=6E-6 mg/m3 (PPRTV), IUR=9E-3 [µg/m3]-1 (PPRTV). See footnote "c".
11	Copper Cu	7440-50-8	P	6010 (ICP/AES) 6020 (ICP/MS)	--	3.20E+03	--	2.84E+02	1.00E+02	5.00E+01	2.17E+02	--	--	2.20E+01	5.00E+01	Ecological soil biota		
12	Iron Fe	7439-89-6	P	6010 (ICP/AES) 6020 (ICP/MS)	--	5.60E+04	--	5.64E+03	--	--	--	--	--	3.26E+04	5.64E+03	Groundwater protection		CPS= 3.26E4 mg/kg (background) GW protect Cs is OK, Cw=1.12E4 µg/L, Kd=2.5E1 L/kg (RSL/Baes)
13	Lead Pb	7439-92-1	P	6010 (ICP/AES) 6020 (ICP/MS)	2.50E+02	--	--	3.00E+03	5.00E+01	5.00E+02	1.18E+02	--	--	1.02E+01	5.00E+01	Ecological plants		
14	Manganese Mn	7439-96-5	P	6010 (ICP/AES) 6020 (ICP/MS)	--	1.12E+04	--	9.80E+02	1.10E+03	--	1.50E+03	--	1.67E+06	5.12E+02	1.10E+03	Ecological plants		Change GW protect Cs, Cw=2.24E3 µg/L, Kd=6.5E1 L/kg (RSL/Baes), Cs=2.92E3 mg/kg Please provide calculations for GW protection value. Value revised based on CLARC. Oral RfD=0.0467 mg/kg/day (see value in CLARC and CLARC notes).
15	Mercury Hg	7439-97-6	P	7471 (CVAA)	--	--	--	2.09E+00	3.00E-01	1.00E-01	5.50E+00	--	4.80E+00	1.31E-02	1.00E-01	Ecological - soil biota	The PQL is greater than the soil concentration protective of soil biota. Soil background from ECF-HANFORD-11-0038.	CAS is for elemental Hg, soil dir cont Cs is OK (but for HgCl2), inhalation noncancer Cs for Hg vapor=4.8 mg/kg, Cair noncancer=1.37E-1 µg/m3, VF for elemental Hg=3.5E4 m3/kg. Eco values are for all inorganic mercury.
15A	Mercuric Chloride	7487-94-7	N/A	7471B		2.40E+01		2.09E+00	3.00E-01	1.00E-01	5.50E+00				1.00E-01	Ecological soil biota		All Eco values are for inorganic mercury. HgCl - if matrix is high in chlorides you still use Method 7471B, just add more permanganate.
16	Nickel Ni	7440-02-0	P	6010 (ICP/AES) 6020 (ICP/MS)	--	1.60E+03	--	1.30E+02	3.00E+01	2.00E+02	9.80E+02	7.01E+05	3.00E+06	1.91E+01	3.00E+01	Ecological plants		
17	Selenium Se	7782-49-2	P	6010 (ICP/AES) 6020 (ICP/MS)	--	4.00E+02	--	5.20E+00	1.00E+00	7.00E+01	3.00E-01	--	6.67E+08	7.80E-01	7.80E-01	Soil background	Soil background from ECF-HANFORD-11-0038.	
18	Silver Ag	7440-22-4	P	6010 (ICP/AES) 6020 (ICP/MS)	--	4.00E+02	--	1.36E+01	2.00E+00	--	--	--	--	1.67E-01	2.00E+00	Ecological plants	Soil background from ECF-HANFORD-11-0038.	
19	Strontium Sr[f]	7440-24-6	P	6010 (ICP/AES) 6020 (ICP/MS)	--	4.80E+04	--	6.73E+03	--	--	--	--	--	5.67E+01	6.73E+03	Groundwater protection	See footnote f.	See footnote "f".
20	Thallium Tl[q]	7440-28-0	P	6010 (ICP/AES) 6020 (ICP/MS)	--	8.00E-01	--	2.28E-01	1.00E+00	--	--	--	--	1.85E-01	2.28E-01	Groundwater protection	Soil background from ECF-HANFORD-11-0038.	Soil dir cont Cs=8E-1 mg/kg (CLARC uses PPRTV Appendix values, RfD=1E-5 mg/kg/d) GW protect Cs=2.28E-1 mg/kg CPS=2.28E-1 mg/kg See footnote "q".
21	Uranium U[g]	7440-61-1	P	6010 (ICP/AES) 6020 (ICP/MS)	--	1.60E+01	--	3.20E-02	5.00E+00	--	--	--	1.33E+06	3.21E+00	3.21E+00	Soil background	See footnote i.	Revised footnote "g" (RfD=2E-4 mg/kg/d, Region 10/USEPA/OSRTI memo Dec 2016) Cs soil dir contact=1.6E1 mg/kg Cw=3.2 µg/L (MTCA Method B), Kd=0.3 L/kg (PNNL-13895), Cs GW protect=3.2E-02 mg/kg

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
22	Vanadium V	7440-62-2	P	6010 (ICP/AES) 6020 (ICP/MS)	--	4.00E+02	--	1.60E+03	2.00E+00	--	--	--	3.33E+06	8.51E+01	8.51E+01	Soil background	Background and PQL are greater than clean up level for plants. Background reference is DOE/RL-92-24, Rev 4.	
23	Zinc Zn	7440-66-6	P	6010 (ICP/AES) 6020 (ICP/MS)	--	2.40E+04	--	5.97E+03	8.60E+01	2.00E+02	3.60E+02	--	--	6.78E+01	8.60E+01	Ecological plants		
24	Boron B[h]	7440-42-8	S	6010 (ICP/AES) 6020 (ICP/MS)	--	1.60E+04	--	2.05E+02	5.00E-01	--	--	--	6.67E+08	3.62E+00	3.62E+00	Soil background	See footnote h.	See footnote "h".
25	Bismuth Bi	7440-69-9	S	6010 (ICP/AES) 6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
26	Calcium Ca	7440-70-2	S	6010 (ICP/AES)	--	--	--	--	--	--	--	--	--	1.72E+04	--	--		
27	Lithium Li	7439-93-2	S	6010 (ICP/AES) 6020 (ICP/MS)	--	1.60E+02	--	1.92E+02	3.50E+01	--	--	--	--	3.35E+01	3.50E+01	Ecological plants		oral RfD=2E-3 mg/kg/d (PPRTV), Kd=3E2 L/kg (RSL/Baes)
28	Molybdenum Mo[i]	7439-98-7	S	6010 (ICP/AES) 6020 (ICP/MS)	--	4.00E+02	--	3.23E+01	2.00E+00	--	7.00E+00	--	--	4.70E-01	2.00E+00	Ecological plants	See footnote i.	See footnote "i".
29	Magnesium Mg	7439-95-4	S	6010 (ICP/AES) 6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	7.06E+03	--	--		
30	Sodium Na	7440-23-5	S	6010 (ICP/AES) 6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	6.90E+02	--	--		
31	Phosphorous P, elemental	7723-14-0	S	7580	--	1.60E+00	--	--	--	--	--	--	--	--	1.60E+00	Method B, direct contact		Soil dir contact Cs=1.6 mg/kg (RfD=2E-5 mg/kg/d, CLARC/IRIS), CPS=1.6 mg/kg
32	Potassium K	7440-09-7	S	6010 (ICP/AES) 6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	`		
33	Rhodium Rh	7440-16-6	S	6020	--	--	--	--	--	--	--	--	--	--	--	--		
34	Sulfur S	7704-34-9	S	6010 (ICP/AES)	--	--	--	--	--	--	--	--	--	--	--	--		
35	Silicon Si	7440-21-3	S	6010 (ICP/AES)	--	--	--	--	--	--	--	--	--	4.40E+01				
36	Tin Sn[j]	7440-31-5	S	6010 (ICP/AES) 6020 (ICP/MS)	--	4.80E+04	--	4.80E+04	5.00E+01	--	--	--	--	--	5.00E+01	Ecological plants	See footnote j.	See footnote "j".
37	Tantalum Ta	7440-25-7	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
38	Tungsten W	7440-33-7	S	6020	--	6.40E+01	--	3.85E+01	--	--	--	--	--	--	3.85E+01	Groundwater Protection		oral RfD=8E-4 mg/kg/d (PPRTV), Kd=1.5E2 L/kg (RSL/Baes), Cw=1.28E1 µg/L
39	Yttrium Y	7440-65-5	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
40	Zirconium Zr	7440-67-7	S	6010 (ICP/AES)	--	--	--	--	--	--	--	--	--	3.98E+01	--	--		
41	Cerium Ce	7440-45-1	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
42	Europium Eu	7440-53-1	S	6020	--	--	--	--	--	--	--	--	--	--	--	--		
43	Lanthanum La	7439-91-0	S	6020 (ICP/MS)	--	4.00E+00	--	--	--	--	--	--	--	--	4.00E+00	Direct contact		RfD=5E-5 mg/kg/d (PPRTV), CPS= 4 mg/kg (Method B dir cont)
44	Niobium Nb	7440-03-1	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
45	Neodymium Nd	7440-00-8	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
46	Palladium Pd	7440-05-3	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
47	Praseodymium Pr	7440-10-0	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
48	Rubidium Rb	7440-17-7	S	6020	--	--	--	--	--	--	--	--	--	--	--	--		
49	Ruthenium Ru	7440-18-8	S	6020	--	--	--	--	--	--	--	--	--	--	--	--		
50	Samarium Sm	7440-19-9	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
51	Tellurium Te	13494-80-9	S	6020	--	--	--	--	--	--	--	--	--	--	--	--		
52	Thorium Th	7440-29-1	S	6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	--	--	--		
53	Titanium Ti	7440-32-6	S	6010 (ICP/AES) 6020 (ICP/MS)	--	--	--	--	--	--	--	--	--	2.57E+03	--	--		
	Inorganics - Nonmetals																	
54	Fluoride F-[k]	16984-48-8	P	9056 (IC)	--	4.80E+03	--	2.88E+03	2.00E+02	--	--	--	4.34E+08	2.81E+00	2.00E+02	Ecological plants	See footnote k.	Oral RfD=6E-2 mg/kg/d (IRIS), INH=1, Cw=960 µg/L, Kd=1.5E2 L/kg (RSL/Baes), GW protect Cs=2.88E3 mg/kg See footnote "k".
55	Nitrite NO2- -N[l]	14797-65-0	P	9056 (IC)	--	8.00E+03	--	4.00E+00	--	--	--	--	--	--	4.00E+00	Groundwater protection	See footnote l.	See footnote "l".
56	Nitrate NO3- -N[l]	14797-55-8	P	9056 (IC)	--	1.28E+05	--	4.00E+01	--	--	--	--	--	5.20E+01	5.20E+01	Soil background	See footnote l.	See footnote "l".
57	Acetate C2H3O2-	71-50-1	P	9056 (IC)	--	--	--	--	--	--	--	--	--	--	--	--		
58	Formate CHO2- (formic acid)	71-47-6	P	9056 (IC)	--	7.20E+04	--	2.89E+01	--	--	--	--	--	--	2.89E+01	Groundwater protection	WAC 173-340-747 value based on Henry's 6.8E-06 (unitless) PHYSPROP database; Koc 1 L/kg, giving Kd 1E-03 L/kg (EPI database for formic acid). Cw 7.2E03 µg/L (formic acid) from CLARC.	
59	Glycolate C2H3O3-	666-14-8	P	9056 (IC)	--	--	--	--	--	--	--	--	--	--	--	--		
60	Oxalate C2O4-2	338-70-5	P	9056 (IC)	--	--	--	--	--	--	--	--	--	--	--	--		
61	Cyanide CN-[m]	57-12-5	P	9014 (Spectrophotometric)	--	4.80E+01	--	9.70E-01	--	--	--	--	2.19E+01	--	9.70E-01	Groundwater protection	See footnote m.	Kd=9.9 L/kg (RSL/SSL), Cw= 4.8 µg/L (hydrogen cyanide) VF=5.3E4 m3/kg (EPA/RSL), Cair noncancer=3.66E-1 µg/m3, Cs inhalation vapors noncancer=1.9E1 mg/kg See footnote "m".

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
62	Ferrocyanide Fe(CN)6-4	13601-19-9	P	Est. from total cyanide	--	--	--	--	--	--	--	--	--	--	--	--		
63	Ammonium NH4+	14798-03-9	P	EPA 300.7 (IC)	--	--	--	--	--	--	--	--	--	--	--	--		This chemical should have been ammonia (CAS 7664-41-7). There is a Cair (4.57E1 µg/m3), but no VF available, so an inhalation vapors Cs was not calculated for ammonia.
64	pH	---	P	9045	--	--	--	--	--	--	--	--	--	--	--	--		
65	Bromide Br-	24959-67-9	S	9056 (IC)	--	--	--	--	1.00E+01	--	--	--	--	--	1.00E+01	Ecological plants		
66	Chloride Cl-	16887-00-6	S	9056 (IC)	--	--	--	--	--	--	--	--	--	1.00E+02	--	--		
67	Phosphate PO4-3	14265-44-2	S	9056 (IC)	--	--	--	--	--	--	--	--	--	7.90E-01	--	--		
68	Sulfate SO4-2	14808-79-8	S	9056 (IC)	--	--	--	--	--	--	--	--	--	2.37E+02	--	--		
	Organics - VOCs																	
69	1,1,1-Trichloroethane	71-55-6	P	8260	--	1.60E+05	--	1.58E+00	--	--	--	--	3.65E+03	--	1.58E+00	Groundwater protection		
70	Tetrachloroethylene (PCE)	127-18-4	P	8260/5035	--	4.80E+02	4.76E+02	5.30E-02	--	--	--	1.97E+01	3.75E+01	--	5.30E-02	Groundwater protection		
71	1,1,2,2-Tetrachloroethane	79-34-5	P	8260	--	1.60E+03	5.00E+00	1.23E-03	--	--	--	3.90E-01	--	--	1.23E-03	Groundwater protection		
72	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	P	8260 (GC/MS)	--	2.40E+06	--	1.09E+04	--	--	--	--	2.99E+03	--	2.99E+03	Inhalation	WAC 173-340-747 value is based on RAIS-ORNL values. Henry's 2.15E01 (unitless); Koc 1.97E02 L/kg; Kd 1.97E-01, Air CUL=1.37E04 µg/m3, VF=1.29E03 m3/kg (EPA/RSL)	
73	1,1,2-Trichloroethane	79-00-5	P	8260	--	3.20E+02	1.75E+01	2.78E-02	--	--	--	7.49E-01	4.38E-01	--	2.78E-02	Groundwater protection		
74	Trichloroethylene	79-01-6	P	8260/5035	--	4.00E+01	1.20E+01	2.64E-02	--	--	--	6.39E-01	1.58E+00	--	2.64E-02	Groundwater protection		
75	1,1-Dichloroethylene	75-35-4	P	8260	--	4.00E+03	--	5.01E-02	--	--	--	--	1.02E+02	--	5.01E-02	Groundwater Protection		
76	1,2-Dichloroethane	107-06-2	P	8260/5035	--	4.80E+02	1.10E+01	2.32E-02	--	--	--	3.51E-01	1.20E+01	--	2.32E-02	Groundwater Protection		
77	Chloroethene (vinyl chloride)[p]	75-01-4	P	8260/5035	--	2.40E+02	6.70E-01	1.83E-03	--	--	--	2.65E-01	4.27E+01	--	1.83E-03	Groundwater Protection	PQL is greater than soil concentration protective of groundwater.[w]	See footnote "p".
78	2-Butanone (MEK)	78-93-3	P	8260/5035	--	4.80E+04	--	1.96E+01	--	--	--	--	2.84E+04	--	1.96E+01	Groundwater protection	WAC 173-340-747 is based on RAIS-ORNL values: Henry's of 2.33E-03 (unitless); Koc 4.51 L/kg giving Kd 4.51E-03 L/kg.	
79	2-Nitropropane	79-46-9	P	8260	--	--	--	--	--	--	--	9.29E-03	9.17E+01	--	9.29E-03	Inhalation	Air CUL cancer=9.26E-04 µg/m3, VF=1.31E04 m3/kg (EPA/RSL)	
80	2-Propanone (acetone)	67-64-1	P	8260/5035	--	7.20E+04	--	2.89E+01	--	--	--	--	1.94E+05	--	2.89E+01	Groundwater protection		
81	4-Methyl-2-pentanone (MIBK)	108-10-1	P	8260/5035	--	6.40E+03	--	2.73E+00	--	--	--	--	1.31E+04	--	2.73E+00	Groundwater protection	WAC 173-340-747 value is based on RAIS/ORNL: Henry's 5.6E-03 (unitless); Koc 1.3E01 L/kg giving Kd 1.3E-02 L/kg, Cw 640 µg/L from CLARC	Soil direct cont Cs=6.4E3 mg/kg (CLARC) Soil to protect GW Cs=2.73 mg/kg, H unitless= 5.6E-3 (RSL); Koc 1.3E1 L/kg (RSL), giving Kd 1.3E-2 L/kg, Cw=640 µg/L (CLARC) CPS=2.73 mg/kg (GW protect)
82	Benzene	71-43-2	P	8260/5035	--	3.20E+02	1.82E+01	2.82E-02	--	--	--	5.71E-01	2.44E+01	--	2.82E-02	Groundwater protection		
83	Carbon disulfide	75-15-0	P	8260/5035	--	8.00E+03	--	5.65E+00	--	--	--	--	3.05E+02	--	5.65E+00	Groundwater protection		
84	Carbon tetrachloride	56-23-5	P	8260/5035	--	3.20E+02	1.43E+01	4.60E-02	--	--	--	6.12E-01	6.72E+01	--	4.60E-02	Groundwater protection		
85	Chlorobenzene	108-90-7	P	8260/5035	--	1.60E+03	--	8.74E-01	--	4.00E+01	--	--	7.28E+01	--	8.74E-01	Groundwater protection		
86	Chloroform	67-66-3	P	8260/5035	--	8.00E+02	3.23E+01	7.50E-02	--	--	--	2.42E-01	9.98E+01	--	7.50E-02	Groundwater protection		
87	Dichloromethane (methylene chloride)	75-09-2	P	8260/5035	--	4.80E+02	5.00E+02	2.18E-02	--	--	--	5.28E+02	5.80E+02	--	2.18E-02	Groundwater protection		
88	Ethyl Acetate	141-78-6	P	8260	--	7.20E+04	--	2.97E+01	--	--	--	--	2.76E+02	--	2.97E+01	Groundwater protection	WAC 173-340-747 value is based on RAIS/ORNL: Henry's of 5.48E-03 (unitless); Koc 5.58 mL/g giving Kd 5.58E-03 mL/g. Cw 7.2E03 µg/L from CLARC.	

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
89	Ethylbenzene	100-41-4	P	8260/5035	--	8.00E+03	9.09E+01	3.44E-01	--	--	--	2.28E+00	1.04E+03	--	3.44E-01	Groundwater protection		Oral CPF=1.1E-2 [mg/kg-d]-1 (ORNL/RAIS/CalEPA), H unitless=3.2E-1 (EPA/RSL/physprop), Koc=2.04E2 L/kg (CLARC) so Kd=2E-1 L/kg, Cw=40 µg/L (MCL)
90	Diethyl ether (ethyl ether)	60-29-7	P	8260	--	1.60E+04	--	6.85E+00	--	--	--	--	--	--	6.85E+00	Groundwater protection	WAC 173-340-747 value is based on RAIS/ORNL: Henry's 5.03E-02;. Koc 9.7 mL/g giving Kd 9.7E-03 mL/g. Cw=1.6E03 µg/L from CLARC.	
91	Isobutanol (isobutyl alcohol)	78-83-1	P	8260	--	2.40E+04	--	9.70E+00	--	--	--	--	--	--	9.70E+00	Groundwater protection	WAC 173-340-747 value is based on RAIS-ORNL values: Henry's 4.0E-04 (unitless); Koc 2.92 L/kg giving Kd 2.92E-03 L/kg. Cw 2.4E03 µg/L from CLARC.	
92	Methanol	67-56-1	P	8260	--	1.60E+05	--	6.43E+01	--	--	--	--	2.91E+05	--	6.43E+01	Groundwater protection	WAC 173-340-747 value is based on RAIS/ORNL: Henry's 1.86E-04 (unitless); Koc 1.0 mL/g giving Kd 1E-03 mL/g. Cw 1.6E04 µg/L from CLARC.	
93	n-Butyl alcohol (1-butanol, n-butanol)	71-36-3	P	8260	--	8.00E+03	--	3.31E+00	--	--	--	--	--	--	3.31E+00	Groundwater protection		
94	Toluene	108-88-3	P	8260/5035	--	6.40E+03	--	4.65E+00	2.00E+02	--	--	--	4.77E+03	--	4.65E+00	Groundwater protection		
95	Trans-1,3-dichloropropene	10061-02-6	P	8260/5035	--	2.40E+03	1.00E+01	2.54E-03	--	--	--	7.70E-01	1.10E+01	--	2.54E-03	Groundwater protection	This trans chemical appears to also have CAS 542-75-6. Values from CLARC.	Toxicity factors in IRIS and CLARC (and hence derived CULs) are for CAS 542-75-6.
96	Trichlorofluoromethane	75-69-4	P	8260/5035	--	2.40E+04	--	2.84E+01	--	--	--	--	3.34E+02	--	2.84E+01	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 4.0 (unitless) PHYSPROP database; Koc 4.4E01 mL/g EPI database, giving Kd 4.4E-2 mL/g. Cw 2.40E03 µg/L from CLARC.	
97	Xylenes (mixed isomers of o-, m-, and p-)	1330-20-7	P	8260/5035	--	1.60E+04	--	1.46E+01	--	--	--	--	1.15E+02	--	1.46E+01	Groundwater protection		
98	o-Xylene	95-47-6	P	8260/5035	--	1.60E+04	--	1.47E+01	--	--	--	--	1.31E+02	--	1.47E+01	Groundwater protection		
99	m-Xylene	108-38-3	P	8260/5035	--	1.60E+04	--	1.35E+01	--	--	--	--	1.06E+02	--	1.35E+01	Groundwater protection		
100	p-Xylene	106-42-3	P	8260/5035	--	1.60E+04	--	1.72E+01	--	--	--	--	1.04E+02	--	1.72E+01	Groundwater protection		
101	cis-1,3-Dichloropropene	10061-01-5	S	8260	--	2.40E+03	1.00E+01	2.54E-03	--	--	--	7.70E-01	1.10E+01	--	2.54E-03	Groundwater protection		Toxicity factors in IRIS and CLARC (and hence derived CULs) are for CAS 542-75-6.
102	Ethylene dibromide (1,2-dibromoethane)	106-93-4	S	8260/5035	--	7.20E+02	5.00E-01	1.18E-04	--	--	--	2.90E-02	2.80E+01	--	1.18E-04	Groundwater protection	WAC 173-340-747 value is based on: Henry's 2.7E-02(unitless) PHYSPROP database; Koc 6.6E01 mL/g CLARC, giving Kd 6.6E-02mL/g. Cw 2.19E-02 µg/L from CLARC.	
103	Butane	106-97-8	S	Gas - keep?	--	--	--	--	--	--	--	--	--	--				
104	1,3-Butadiene	106-99-0	S	8260	--	---	1.67E+00	7.29E-04	--	--	--	7.21E-02	7.92E-01	--	7.29E-04	Groundwater protection	WAC 173-340-747 value is based on: Henry's 3E00(unitless) EPI database; Koc 4E01 mL/g EPI, giving Kd 4E-02mL/g. Cw 1.29E-02 µg/L from CLARC. VF=8.66E02 m3/kg (EPA/RSL), MTCA Air CUL cancer=8.33E-02 µg/m3, MTCA Air CUL noncancer=9.14E-01 µg/m3.	oral CPF=0.6 mg/kg/d (CalEPA), H unitless=3 (EPA/RSL/EPI), Koc=4E1 L/kg (EPA/RSL/EPI), Kd=4E-2 L/kg, INH=2, Cw=0.073 µg/L Cair cancer=8.33E-2 µg/m3, Cair noncancer=9.14E-1 µg/m3, VF=8.7E2 m3/kg (EPA/RSL). What is source of oral RfD?
105	Acrolein (propenal)	107-02-8	S	8260, 8015	--	4.00E+01	--	1.61E-02	--	--	--	--	6.90E-02	--	1.61E-02	Groundwater protection	WAC 173-340-747 value is based on: Henry's 5E-03(unitless) PHYSPROP database; Koc 1E00 mL/g EPI, giving Kd 1E-03mL/g. Cw 4E00 µg/L from CLARC.	
106	3-Chloropropene (allyl chloride)	107-05-1	S	8260	--	--	4.76E+01	1.16E-02	--	--	--	5.40E-01	5.90E-01	--	1.16E-02	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 4.5E-01(unitless) EPI database; Koc 4E01 mL/g EPI, giving Kd 4E-02mL/g. Cw 2.08 µg/L from CLARC.	
107	Propionitrile (ethyl cyanide)	107-12-0	S	8260	--	--	--	--	--	--	--	--	--	--				

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
108	Acrylonitrile	107-13-1	S	8260, 8015	--	3.20E+03	1.85E+00	3.39E-04	--	--	--	2.70E-01	6.70E+00	--	3.39E-04	Groundwater protection	WAC 173-340-747 value is based on: Henry's 5.6E-03(unitless) PHYSPROP database; Koc 8.5E00mL/g EPI, giving Kd 8.5E-03mL/g. Cw 8.0E-02 µg/L from CLARC.	
109	2-Pentanone	107-87-9	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
110	Methylcyclohexane	108-87-2	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
111	n-Pentane	109-66-0	S	Gas - keep?	--	--	--	--	--	--	--	--	--	--	--	--		
~~112~~	~~5-Methyl-2-hexanone~~	~~110-12-3~~	~~S~~	~~8260~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~3.93E+02~~	~~--~~	~~3.93E+02~~	~~Inhalation~~		~~What is source of inhalation value?~~ **See footnote "v".**
113	2-Heptanone	110-43-0	S	GC EPA 18 bag sampling	--	--	--	--	--	--	--	--	--	--	--	--		
114	n-Hexane	110-54-3	S	Liquid - 8260	--	4.80E+03	--	9.62E+01	--	--	--	--	3.24E+02	--	9.62E+01	Groundwater protection		Cs direct contact noncancer=4.8E3 mg/kg (CLARC/HEAST), Cs GW protect=9.62E1 mg/kg (CLARC), CPS=9.62E1 mg/kg (GW protection)
115	Cyclohexane	110-82-7	S	8260	--	--	--	--	--	--	--	--	2.70E+03	--	2.70E+03	Inhalation		Cair noncancer=2.7E03 µg/m3 (CLARC), VF=1E3 m3/kg (EPA/RSL), Cs inhalation vapors=2.7E03 mg/kg, CPS=2.7E03 mg/kg (inhalation vapors); CLARC has an air CUL so considered volatile; INH factor is only for partitioning from water.
116	n-Octane	111-65-9	S	Gas - keep?	--	--	--	--	--	--	--	--	--	--	--	--		
117	4-Heptanone	123-19-3	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
118	Acetic acid, n-butyl ester (n-butyl acetate)	123-86-4	S	HPLC	--	--	--	--	--	--	--	--	--	--	--	--		
119	1,4-Dioxane	123-91-1	S	8260	--	2.40E+03	1.00E+01	1.77E-03	--	--	--	2.10E+01	5.76E+02	--	1.77E-03	Groundwater protection	WAC 173-340-747 value is based on: Henry's 2E-04(unitless) PHYSPROP database; Koc 2.6E00mL/g EPI, giving Kd 2.6E-03mL/g. Cw 4.38E-01 µg/L from CLARC.	Cair noncancer=1.37E1 µg/m3, Cair cancer=5E-1 µg/m3,
120	n-Heptane	142-82-5	S	8260	--	2.40E+01	--	3.60E-01	--	--	--	--	1.77E+02	--	3.60E-01	Groundwater protection		RfC=4E-1 mg/m3 (PPRTV), inh RfD=1.1E-1 mg/kg/d, Cair noncancer=1.76E2 µg/m3, VF=9E2 m3/kg (EPA/RSL) oral RfD=3E-4 mg/kg/d (PPRTV Appendix), Cs dir cont noncancer=2.4E1 mg/kg Cw=2.4 µg/L, INH=2 (CLARC), H unitless=8.2E1 (EPA/RSL), Koc=2.4E2 L/kg (EPA/RSL/EPI), Kd=2.4E-1 L/kg, Cs GW protect=3.6E-1 mg/kg CPS=3.6E-1 mg/kg (GW protection)
121	Cyclopentane	287-92-3	S	Gas - keep?	--	--	--	--	--	--	--	--	--	--	--	--		
122	Ethyl alcohol	64-17-5	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
123	2-Propyl alcohol	67-63-0	S	8260, 8015	--	1.60E+05	--	6.45E+01	--	--	--	--	2.75E+03	--	6.45E+01	Groundwater protection		Isopropanol, oral RfD=2 mg/kg/d (PPRTV), RfC=0.2 mg/m3 (PPRTV), inh RfD=5.7E-2 mg/kg/d Cs dir cont noncancer=1.6E5 mg/kg Cw=1.6E4 µg/L, INH=2 (CLARC, based on VP=44 mm Hg), H unitless=3.3E-4 (EPA/RSL/Physprop), Koc=1.5 L/kg (EPA/RSL/EPI), Kd=1.5E-3 L/kg VF=2.8E4 m3/kg (EPA/RSL), Cair noncancer=9.1E1 µg/m3 (MTCA equation 750-1) CPS=6.4E1 mg/kg (GW protection)
124	n-propyl alcohol (1-propanol)	71-23-8	S	8015, 8260	--	--	--	--	--	--	--	--	--	--	--	--		
125	Bromomethane	74-83-9	S	8260/5035	--	1.12E+02	--	5.18E-02	--	--	--	--	3.20E+00	--	5.18E-02	Groundwater protection		
126	Chloroethane (ethyl chloride)	75-00-3	S	8260/5035	--	--	--	--	--	--	--	--	5.40E+03	--	5.40E+03	Inhalation		
127	Acetonitrile	75-05-8	S	8260, 8015	--	--	--	--	--	--	--	--	3.61E+02	--	3.61E+02	Inhalation		
128	1,1 Dichloroethane	75-34-3	S	8260	--	1.60E+04	1.75E+02	4.19E-02	--	--	--	2.80E+00	--	--	4.19E-02	Groundwater protection		
129	Dichlorofluromethane	75-43-4	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
130	Chlorodifluoromethane	75-45-6	S	8260	--	--	--	--	--	--	--	--	2.07E+04	--	2.07E+04	Inhalation		Cair noncancer=2.29E4 µg/m3, VF=9.4E2 m3/kg (EPA/RSL)
131	3-Methyl-2-butanone	563-80-4	S	8015, 8260	--	--	--	--	--	--	--	--	--	--	--	--		
132	Hexafluoroacetone	684-16-2	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
133	2-Butenaldehyde (2-butenal)	4170-30-3	S	8260	--	8.00E+01	5.30E-01	9.30E-05	--	--	--	--	--	--	9.30E-05	Groundwater protection		Also named crotonaldehyde, oral RfD=1E-3 mg/kg/d (CLARC/PPRTV), oral CPF=1.9 [mg/kg/d]-1 (CLARC/HEAST), Cs dir cont noncancer=8E1 mg/kg (CLARC), Cs dir cont cancer=5.3E-1 mg/kg (CLARC), Cw cancer=2.3E-2 µg/L (CLARC), H=4.37E-4 (CLARC), Koc=1.79 L/kg (RAIS/EPI), Kd=1.79E-3 L/kg, Cs GW protect=9.3E-5 mg/kg, CPS=9.3E-5 mg/kg (GW protection)
134	Methyl isocyanate	624-83-9	S	HPLC (Poison) ?	--	--	--	--	--	--	--	--	1.48E+00	--	1.48E+00	Inhalation		RfC=1E-3 mg/m3 (CalEPA), inh RfD=2.86E-4 mg/kg/d, Cair noncancer=4.6E-1 µg/m3 (MTCA equation 750-1)

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	WAC 173-340-740 Human Health - Direct Contact with Soil A: Method A Table 740-1 mg/kg	B: Method B Non-cancer mg/kg	C: Method B Cancer mg/kg	WAC 173-340-747 Soil Protective of Groundwater D: Groundwater Protection mg/kg	WAC 173-340-7493 Ecological Indicator Table 749-3 E: Plants mg/kg	F: Soil Biota mg/kg	G: Wildlife mg/kg	WAC 173-340-750 Human Health - Inhalation of Dust and Vapors[n] H: Method B Cancer mg/kg	I: Method B Noncancer mg/kg	J: Hanford Background[o] 90th Percentile mg/kg	L: Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer Notes: General comment-designate inhalation Cs values as vapor or dust; General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway; Reviewer's Notes
135	n-Propionaldehyde	123-38-6	S	Gas - keep?	--	--	--	--	--	--	--	--	3.59E+01	--	3.59E+01	Inhalation		RfC=8E-3 mg/m3 (IRIS), inh RfD=2.29E-3 mg/kg/d, Cair noncancer=3.66 µg/m3 (MTCA equation 750-1), VF=8.9E3 m3/kg (EPA/RSL), Cs inhalation vapors noncancer=3.3E1 mg/kg
136	3-Heptanone	106-35-4	S	GC EPA 18 bag sampling	--	--	--	--	--	--	--	--	--	--	--	--		
137	Chloromethane	74-87-3	S	8260/5035	--	--	--	--	--	--	--	--	4.60E+01	--	4.60E+01	Inhalation		
138	n-Nonane	111-84-2	S	Gas - keep?	--	2.40E+01	--	6.30E-01	--	--	--	--	1.00E+01	--	6.30E-01	Groundwater protection		oral RfD=3E-4 mg/kg/d (PPRTV Appendix), RfC=2E-2 mg/m3 (PPRTV), inh RfD=5.7E-3 mg/kg/d Cs dir cont noncancer=2.4E1 mg/kg Cw=2.4 µg/L, INH=2 (CLARC, based on VP=4.4 mm Hg), H unitless=1.4E2 (EPA/RSL/Physprop), Koc=8.0E2 L/kg (EPA/RSL/EPI), Kd=8.0E-1 L/kg, Cs GW protect=6.3E-1 mg/kg Cair noncancer=9.1 µg/m3 (MTCA equation 750-1), CPS=6.3E-1 mg/kg (GW protection)
139	Styrene	100-42-5	S	8260	--	1.60E+04	--	2.24E+00	3.00E+02	--	--	--	2.90E+03	--	2.24E+00	Groundwater protection		
140	Tetrahydrofuran	109-99-9	S	8260	--	7.20E+04	--	3.00E+01	--	--	--	--	1.01E+04	--	3.00E+01	Groundwater protection		oral RfD=9E-1 mg/kg/d (IRIS) Cs dir cont noncancer=7.2E4 mg/kg Cw=7.2E3 µg/L, INH=2 (CLARC, based on VP=143 mm Hg), H unitless=2.9E-3 (EPA/RSL/Physprop), Koc=1.1E1 L/kg (EPA/RSL/EPI), Kd=1.1E-2 L/kg, Cs GW protect=3.0E1 mg/kg CPS=3.0E1 mg/kg (GW protection)
141	Cyclohexene	110-83-8	S	Unstable ?	--	4.00E+02	--	4.06E-01	--	--	--	--	6.90E+02	--	4.06E-01	Groundwater protection		oral RfD=5E-3 mg/kg/d (PPRTV), RfC=1 mg/m3 (PPRTV Appendix), inh RfD=2.9E-1 mg/kg/d Cw=4E1 µg/L, INH=2 (CLARC, based on VP=89 mm Hg), H unitless=1.9 (EPA/RSL/Physprop), Koc=1.5E2 L/kg (EPA/RSL/EPI), Kd=1.5E-1 L/kg VF=1.5E3 m3/kg (EPA/RSL), Cair noncancer=4.6E2 µg/m3 (MTCA equation 750-1), Cs inhalation vapors noncancer=6.9E2 mg/kg CPS=4.1E-1 mg/kg (GW protection)
142	2-Methyl-2-propenenitrile (methylacrylonitrile)	126-98-7	S	8260	--	8.00E+00	--	3.42E-03	--	--	--	--	8.40E+01	--	3.42E-03	Groundwater protection	WAC 173-340-747 value is based on: Henry's 1E-02(unitless) EPI database; Koc 1.3E01 mL/g EPI database, giving Kd 1.3E-02mL/g. Cw 8E-01 µg/L from CLARC.	
143	2-Hexanone	591-78-6	S	8260	--	4.00E+02	--	1.72E-01	--	--	--	--	1.60E+02	--	1.72E-01	Groundwater protection		oral RfD=5E-3 mg/kg/d (IRIS) Cw=4E1 µg/L, INH=2 (CLARC, based on VP=12 mm Hg), H unitless=3.8E-3 (EPA/RSL/EPI), Koc=1.5E1 L/kg (EPA/RSL/EPI), Kd=1.5E-2 L/kg
144	Triethylamine	121-44-8	S	Unstable ?	--	---	--	--	--	--	--	--	5.10E+01	--	5.10E+01	Inhalation		VF=1.6E4 m3/kg (EPA/RSL), Cair noncancer=3.2 µg/m3 (CLARC), Cs inhalation vapors noncancer=5.1E1 mg/kg CPS=5.1E1 mg/kg (inhalation)
145	Oxirane (ethylene oxide)	75-21-8	S	8260	--	--	3.23E+00	5.75E-04	--	--	--	5.31E-03	8.73E+01	--	5.75E-04	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 6.1E-03(unitless) PHYSPROP database; Koc 3.2E00 mL/g EPI database, giving Kd 3.2E-03mL/g. Cw 1.41E-01 µg/L from CLARC. MTCA Air CUL noncancer=1.37E01 µg/m3, MTCA Air CUL cancer=2.84E-02 µg/m3, VF=6.09E3 m3/kg	Cw=1.4E-1 µg/L, H unitless=6.1E-3 (EPA/RSL/PHYSPROP), Koc=3.2 L/kg (EPA/RSL/EPI), Kd=3.2E-3 L/kg VF=6.1E3 m3/kg, Cair cancer vapors=8.3E-4 µg/m3, Cair noncancer vapors=1.4E1 µg/m3
146	2-Methyl-2-propanol	75-65-0	S	8015 ?	--	--	--	--	--	--	--	--	--	--	--	--		
147	Dichlorodifluoromethane	75-71-8	S	8260/5035	--	1.60E+04	--	4.60E+01	--	--	--	--	4.20E+01	--	4.20E+01	Inhalation	WAC 173-340-747 value is based on: Henry's 1.4E01(unitless) PHYSPROP database; Koc 4.4E01 mL/g EPI database, giving Kd 4.4E-02 mL/g. Cw 1.6E03 µg/L from CLARC.	H unitless=1.4E1 (EPA/RSL/PHYSPROP), Koc 4.4E01 L/kg (EPA/RSL/EPI), Kd 4.4E-02 mL/g, Cw 1.6E3 µg/L (CLARC)
148	1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	S	8260	--	--	--	--	--	--	--	--	--	--	--	--		
149	Heptachlor	76-44-8	S	8081	--	4.00E+01	2.22E-01	3.78E-02	--	--	4.00E-01	1.40E+05	--	--	3.78E-02	Groundwater protection		
150	1,2-Dichloropropane	78-87-5	S	8260/5035	--	3.20E+03	2.78E+01	2.57E-02	--	7.00E+02	--	1.70E+00	4.60E+00	--	2.57E-02	Groundwater protection		Cs dir cont noncancer=3.2E3 mg/kg (CLARC) Cair cancer=6.8E-1 µg/m3 (CLARC), VF=2.51E03 m3/kg (Morgans, 2018), Cs inhalation cancer vapors=1.7 mg/kg

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
151	1-Methylpropyl alcohol	78-92-2	S	8015 ?	--	1.60E+05	--	6.49E+01	--	--	--	--	4.21E+05	--	6.49E+01	Groundwater protection		sec-butyl alcohol, oral RfD=2 mg/kg/d (PPRTV), RfC=3E1 (PPRTV), inh RfD=8.86 mg/kg/d INH=2 (VP=12.5 mmHg), Cw=1.6E4 µg/L (MTCA equation 720-1), H unitless=3.7E-4 (EPA/RSL/PHYSPROP), Koc=2.9 L/kg (EPA/RSL/EPI), Kd=2.9E-3 L/kg VF=2.9E4 m3/L, Cair noncancer=1.4E4 µg/m3 CPS=6.49 mg/kg (GW protection)
152	3-Pentanone	96-22-0	S	GC 8015	--	--	--	--	--	--	--	--	--	--	--	--		
	Organics - SVOCs																	
153	1,2,4-Trichlorobenzene	120-82-1	P	8270/3540-3546	--	8.00E+02	3.45E+01	5.63E-01	--	2.00E+01	--	1.40E+01	--	--	5.63E-01	Groundwater protection		
154	2,4-Dinitrotoluene	121-14-2	P	8270/3540-3546	--	1.60E+02	3.23E+00	1.67E-03	--	--	--	2.05E+06	--	--	1.67E-03	Groundwater protection	The PQL is greater than the soil concentration protective of groundwater.[w]	
155	2,4,5-Trichlorophenol	95-95-4	P	8270/3540-3546	--	8.00E+03	--	2.88E+01	4.00E+00	9.00E+00	--	--	--	--	4.00E+00	Ecological plants		
156	2,4,6-Trichlorophenol	88-06-2	P	8270/3540-3546	--	8.00E+01	9.09E+01	4.62E-02	--	1.00E+01	--	9.50E+01	--	--	4.62E-02	Groundwater protection		
157	2,6-Bis (tert-butyl)-4-methylphenol (BHT)	128-37-0	P	8270 ?	--	2.40E+04	2.78E+02	3.65E+00	--	--	--	--	--	--	3.65E+00	Groundwater protection		butylated hydroxytoluene (BHT), oral RfD=3E-1 (PPRTV), oral CPF=3.6E-3 [mg/kg/d]-1 (PPRTV) Cw cancer= 1.2E1 µg/L, INH=2 (VP=1E-2 mm Hg), H unitless=1.7E-4 (EPA/RSL/PHYSPROP), Koc=1.5E4 L/kg (EPA/RSL/EPI), Kd=1.5E1 L/kg, Cs GW protect=3.65 mg/kg CPS=3.65 mg/kg (GW protection)
158	2-Chlorophenol	95-57-8	P	8270/3540-3546	--	4.00E+02	--	4.72E-01	--	--	--	--	3.10E+04	--	4.72E-01	Groundwater protection		Cair noncancer=2.7E2 µg/m3 (CLARC), VF=1.13E5 m3/kg (Morgans, 2018), Csair inhalation noncancer =3.1E04 mg/kg
159	2-Ethoxyethanol	110-80-5	P	8015	--	7.20E+03	--	2.89E+00	--	--	--	--	9.88E+03	--	2.89E+00	Groundwater protection	WAC 173-340-747 value is based on: Henry's 1.9E-05(unitless) PHYSPROP database; Koc 1E00 mL/g EPI database, giving Kd 1E-03 mL/g. Cw 7.2E02 µg/L from CLARC.	cellosolve, Cw=7.2E2 µg/L (CLARC), H unitless=1.9E-5 (EPA/RSL/PHYSPROP), Koc=1.0 L/kg (EPA,RSL/EPI)
160	o-Cresol (2-methylphenol)	95-48-7	P	8270	--	4.00E+03	--	2.33E+00	--	--	--	--	3.11E+04	--	2.33E+00	Groundwater protection		
161	p-Cresol (4-methylphenol)	106-44-5	P	8270	--	8.00E+03	--	4.66E+00	--	--	--	--	4.84E+04	--	4.66E+00	Groundwater protection	WAC 173-340-747 value is based on: Henry's 4.1E-05(unitless) PHYSPROP database; Koc 3E02 mL/g EPI database, giving Kd 3E-01 mL/g. Cw 8E02 µg/L from CLARC.	oral RfD=5E-02 mg/kg/day (IRIS); Cw=8E2 µg/L (CLARC), H unitless=4.1E-5 (EPA/RSL/PHYSPROP), Koc=9.12E01 L/kg (CLARC o-cresol), Kd=9.12E-02 L/kg (CLARC o-cresol); Cs GW protect=4.66 mg/kg; CPS =4.66 mg/kg GW protection
162	Acenaphthene	83-32-9	P	8270	--	4.80E+03	--	9.79E+01	2.00E+01	--	--	--	--	--	2.00E+01	Ecological plants		
163	Butyl benzyl phthalate	85-68-7	P	8270, 8061	--	1.60E+04	5.26E+02	1.28E+01	--	--	--	--	--	--	1.28E+01	Groundwater protection		
164	Cresylic acid (cresol, mixed isomers)	1319-77-3	P	8270 ?	--	8.00E+03	--	4.66E+00	--	--	--	--	2.00E+10	--	4.66E+00	Groundwater protection		oral RfD=1E-1 mg/kg/d (ATSDR), RfC=6E-1 mg/m3 (CalEPA), inh RfD=1.7E-1 mg/kg/d; Cair noncancer=2.7E2 µg/m3 (MTCA Eq 750-1), C inhalation noncancer is for dust; H unitless=2.5E-5 (EPA/RSL/PHYSPROP), Koc=9.12E01 L/kg (CLARC o-cresol), Kd=9.12E-02 L/kg, INH=2 (VP=0.17 mm Hg), Cw=8E2 µg/L (MTCA equation 720-1), Cs GW protect=4.66 mg/kg; CPS=4.66 mg/kg (GW protection)
165	Cyclohexanone	108-94-1	P	8260	--	4.00E+05	--	1.74E+02	--	--	--	--	1.14E+04	--	1.74E+02	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 3.7E-04(unitless) PHYSPROP database; Koc 1.7E01 mL/g EPI database, giving Kd 1.7E-02 mL/g. Cw 4E04 µg/L from CLARC.	
166	Di-n-butyl phthalate	84-74-2	P	8270, 8061	--	8.00E+03	--	5.65E+01	2.00E+02	--	--	--	--	--	5.65E+01	Groundwater protection		
167	Di-n-octyl phthalate	117-84-0	P	8270, 8061	--	8.00E+02	--	2.66E+05	--	--	--	--	--	--	8.00E+02	Method B Direct Contact		
168	N-nitroso-di-n-propylamine	621-64-7	P	8070	--	--	1.43E-01	5.60E-05	--	--	--	9.12E+04	--	--	5.60E-05	Groundwater protection		
169	Fluoranthene	83-32-9	P	8270/3540-3546	--	3.20E+03	--	6.31E+02	--	--	--	--	--	--	6.31E+02	Groundwater protection		
170	Hexachlorobutadiene	87-68-3	P	8270/3540-3546 8260/5035	--	8.00E+01	1.28E+01	6.05E-01	--	--	--	4.96E+00	--	--	6.05E-01	Groundwater Protection		

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
171	Hexachloroethane	67-72-1	P	8270/3540-3546	--	5.60E+01	2.50E+01	4.36E-02	--	--	--	2.47E+00	1.49E+02	--	4.36E-02	Groundwater protection	The PQL is greater than the soil concentration protective of groundwater.[w]	
172	m-Cresol (3-methylphenol)	108-39-4	P	8270/3510,3580	--	4.00E+03	--	2.33E+00	--	--	--	--	5.10E+04	--	2.33E+00	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 3.5E-05(unitless) PHYSPROP database; Koc 3E02 mL/g EPI database, giving Kd 3E-01 mL/g. Cw 4E02 µg/L from CLARC	Cair noncancer=2.7E2 µg/m3 (CLARC), VF=1.86E5 m3/kg (Morgans,2018); oral RfD=5E-02 mg/kg/day (IRIS); H unitless = 3.5E-05 (EPA/RSL/PHYSPROP); Koc=9.12E01 L/kg (CLARC o-cresol), Kd=9.12E-02 L/kg, INH=2 (CLARC); Cw=4E02 µg/L (CLARC); Cs GW protect = 2.33 mg/kg ; CPS = 2.33 mg/kg (GW protection)
173	Naphthalene	91-20-3	P	8270/3540-3546 8260/5035	--	1.60E+03	--	4.46E+00	--	--	--	1.40E+00	2.50E+01	--	1.40E+00	Inhalation		
174	Nitrobenzene	98-95-3	P	8270/3540-3546	--	1.60E+02	--	1.02E-01	--	4.00E+01	--	1.99E+00	1.31E+02	--	1.02E-01	Groundwater protection	The PQL is greater than the soil concentration protective of groundwater.[w]	
175	n-Nitrosomorpholine	59-89-2	P	8270/3580	--	--	1.49E-01	2.90E-05	--	--	--	9.60E+04	--	--	2.90E-05	Groundwater protection		
176	o-Dichlorobenzene (1,2-dichlorobenzene)	95-50-1	P	8270/3540-3546	--	7.20E+03	--	7.03E+00	--	--	--	--	5.46E+02	--	7.03E+00	Groundwater protection		
177	o-Nitrophenol	88-75-5	P	8270/3540-3546	--	--	--	--	--	--	--	--	--	--	--	--		
178	p-Chloro-m-cresol (4-chloro-3-methylphenol)	59-50-7	P	8270/3540-3546	--	8.00E+03	--	2.21E+01	--	--	--	--	--	--	2.21E+01	Groundwater protection		oral RfD=1E-1 mg/kg/d (ATSDR) Cw= 1.6E3 µg/L (MTCA Equation 720-1), INH=1 (CLARC), H unitless=1E-4 (EPA/RSL/EPI), Koc=4.9E2 L/kg (EPA/RSL/EPI),
179	Pyrene	129-00-0	P	8270/3540-3546	--	2.40E+03	--	6.55E+02	--	--	--	--	--	--	6.55E+02	Groundwater protection		
180	Pyridine	110-86-1	P	8270/3540-3546	--	8.00E+01	--	4.35E-02	--	--	--	--	--	--	4.35E-02	Groundwater protection	PQL is greater than soil concentration protective of groundwater.[w] WAC 173-340-747 value based on Henry's 4.5E-04 (unitless) PHYSPROP database; Koc 7.2E01 mL/g EPI database, giving Kd 7.2E-02 mL/g. Cw 8 µg/L from CLARC.	
181	Tributyl phosphate	126-73-8	P	8270/3540-3546	--	8.00E+02	1.11E+02	5.05E-01	--	--	--	--	--	--	5.05E-01	Groundwater Protection	WAC 173-340-747 value based on Henry's 5.8E-05(unitless) EPI database; Koc 2.4E03 mL/g EPI database, giving Kd 2.4E00 mL/g; RfD 1E-02 mg/kg/day, slope factor 9E-03 (mg/kg/day)-1 PPRTV database.	
182	p-Chloronitrobenzene	100-00-5	S	8270 ?	--	5.60E+01	1.70E+01	8.21E-03	--	--	--	--	1.05E+02	--	8.21E-03	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 2E-04(unitless) PHYSPROP database; Koc 3.6E02 mL/g EPI database, giving Kd 3.6E-01 mL/g. Cw 6.94E00 µg/L from CLARC.	Cs direct contact now in CLARC: 5.6E01 mg/kg noncancer, 1.7E01 mg/kg cancer Cw cancer=7.3E-1 µg/L (CLARC), INH=2 (VP=2.2E-2 mm Hg, HSDB), H unitless=2E-4 (EPA/RSL/PHYSPROP), Koc=3.6E2 L/kg (EPA/RSL/EPI), Kd=3.6E-1 L/kg
183	p-Dinitrobenzene	100-25-4	S	8270/3510,3580	--	8.00E+00	--	1.76E-02	--	--	--	--	--	--	1.76E-02	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 3.4E-06(unitless) PHYSPROP database; Koc 3.5E02 mL/g EPI database, giving Kd 3.5E-01 mL/g. Cw 1.6E00 µg/L from CLARC.	
184	1,4-Dichlorobenzene	106-46-7	S	8270/3540-3546 8260/5035	--	5.60E+03	1.85E+02	1.24E+00	--	2.00E+01	--	1.48E+00	2.38E+03	--	1.24E+00	Groundwater Protection		
185	Phenol	108-95-2	S	8270/3540-3546	--	2.40E+04	--	1.10E+01	7.00E+01	3.00E+01	--	--	1.15E+04	--	1.10E+01	Groundwater Protection		
186	Hexachlorobenzene	118-74-1	S	8270/3540-3546	--	6.40E+01	6.25E-01	8.77E-01	--	--	1.70E+01	3.70E-01	--	--	8.77E-01	Groundwater Protection	MTCA Air CUL cancer=5.4E-3 µg/m3, VF=6.8E4 m3/kg (EPA/RSL) [Wrong units in previous version]	oral CPF=1.6 [mg/kg/d]-1 (CLARC), oral RfD=8E-4 mg/kg/d (CLARC) Cw cancer=5.5E-1 µg/L based on adjusted MCL = 1 µg/kg (CLARC), Cw noncancer=1.3E1 µg/L (CLARC), H unitless=0.054 (CLARC); Kd = 80 L/kg (CLARC). VF=6.8E4 m3/kg (EPA/RSL), Cair cancer=5.4E-3 µg/m3 (CLARC), Cs inhalation vapors cancer=3.7E-1 mg/kg CPS=3.7E-01 (Inhalation)

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	WAC 173-340-740 Human Health - Direct Contact with Soil A: Method A Table 740-1 mg/kg	B: Method B Non-cancer mg/kg	C: Method B Cancer mg/kg	WAC 173-340-747 Soil Protective of Groundwater D: Groundwater Protection mg/kg	WAC 173-340-7493 Ecological Indicator Table 749-3 E: Plants mg/kg	F: Soil Biota mg/kg	G: Wildlife mg/kg	WAC 173-340-750 Human Health - Inhalation of Dust and Vapors[n] H: Method B Cancer mg/kg	I: Method B Noncancer mg/kg	Hanford Background[o] J: 90th Percentile mg/kg	L: Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer Notes: General comment-designate inhalation Cs values as vapor or dust; General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway — Reviewer's Notes
187	N,N-Diphenylamine	122-39-4	S	8270	--	2.00E+03	--	8.20E+00	--	--	--	--	--	--	8.20E+00	Groundwater protection	WAC 173-340-747 value is based on: Henry's 1.1E-04(unitless) EPI database; Koc 8.3E02 mL/g EPI database, giving Kd 8.3E-01 mL/g. Cw 4.0E02 µg/L from CLARC.	Cs dir contact noncancer=2.0E3 mg/kg (CLARC) Cw noncancer=4.0E2 µg/L (CLARC), H unitless=1.1E-4 (EPA/RSL/EPI), Koc=8.3E2 L/kg (EPA/RSL/EPI), Kd=8.3E-1 L/kg, Cs GW protect=8.2 mg/kg CPS=8.2 mg/kg (GW protection)
188	Pentachloronaphthalene	1321-64-8	S	8270 ?	--	--	--	--	--	--	--	--	--	--	--	--		
189	Hexachloronaphtahlene	1335-87-1	S	8270 ?	--	--	--	--	--	--	--	--	--	--	--	--		
190	Tetrachloronaphthalene	1335-88-2	S	8270 ?	--	--	--	--	--	--	--	--	--	--	--	--		
191	Octachloronaphthalene	2234-13-1	S	---	--	--	--	--	--	--	--	--	--	--	--	--		
192	Isodrin	465-73-6	S	8081	--	--	--	--	--	--	--	--	--	--	--	--		
193	Benzo[a]pyrene	50-32-8	S	8270/3540-3546	--	2.40E+01	1.90E-01	3.90E+00	--	--	1.20E+01	8.00E+04	6.67E+04	--	1.90E-01	Method B Direct Contact	PAH/TEQ based on revised IRIS slope factor. Ecology guidance in progress.	Cs direct cont cancer=0.19 mg/kg (CLARC-see CLARC notes on ELE/ADAF) Cair cancer=1.1E-3 µg/m3 (CLARC-see CLARC notes on ELE), Cs inhalation cancer dust=8E4 mg/kg Cair noncancer=9.1E-4 µg/m3 (CLARC) CPS=0.19 mg/kg (Method B direct contact/ELE)
194	Dibenzo[a,h]anthracene	53-70-3	S	8270/3540-3546	--	--	1.90E+00	8.20E+00	--	--	--	8.00E+05	--	--	1.90E+00	Groundwater protection	PAH/TEQ based on revised IRIS slope factor. Ecology guidance in progress.	Cs direct cont cancer=1.9 mg/kg (CLARC-see CLARC notes on TEF/ELE) Cw=0.23 µg/L (CLARC-TEF/ELE), INH=1 (CLARC), H unitless=6E-7 (CLARC), Kd=1.79E3 L/kg (CLARC), Cs GW protect=8.2 mg/kg Cair cancer=1.1E-2 µg/m3 (CLARC-see CLARC notes on TEF/ELE), Cs inhalation cancer dust=8E5 mg/kg CPS=1.9 mg/kg (Method B direct contact/TEF/ELE)
195	1,3-Dichlorobenzene	541-73-1	S	8270/3540-3546 8260/5035	--	--	--	--	--	--	--	--	--	--	--	--		
196	3-Methyl-2-butanone	563-80-4	S	8015	--	--	--	--	--	--	--	--	--	--	--	--		
197	N-Nitroso-N,N-dimethylamine	62-75-9	S	8270/3540-3546	--	6.40E-01	1.96E-02	3.83E-06	--	--	--	1.20E-02	1.20E+00	--	3.83E-06	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 7.4E-05(unitless) PHYSPROPdatabase; Koc 2.31E01 mL/g EPI database, giving Kd 2.31E-02 mL/g. Cw 8.58E-04 µg/L from CLARC.	
198	Hexafluoroacetone	684-16-2	S	8015	--	--	--	--	--	--	--	--	--	--	--	--		
199	Pentachloronitrobenzene (PCNB)	82-68-8	S	8270	--	2.40E+02	3.85E+00	4.18E-02	--	--	--	--	--	--	4.18E-02	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 1.8E-03(unitless) EPI database; Koc 6E03 mL/g EPI database, giving Kd 6E00 mL/g. Cw 3.37E-01 µg/L from CLARC.	
200	Pentachlorophenol	87-86-5	S	8270/3540-3546	--	4.00E+02	2.50E+00	1.58E-02	3.00E+00	6.00E+00	4.50E+00	3.58E+07	--	--	1.58E-02	Groundwater protection	The PQL is greater than the soil concentration protective of groundwater.[w]	Cair cancer=4.9E-1 µg/m3 (CLARC), Cs inhalation cancer value is for dust
201	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	88-85-7	S	8270/3510,3580	--	8.00E+01	--	1.50E+00	--	--	--	--	--	--	1.50E+00	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 1.9E-05(unitless) EPI database; Koc 4.3E03 mL/g EPI database, giving Kd 4.3E00 mL/g. Cw 1.67E01 µg/L from CLARC.	
202	1,1'-Biphenyl[r]	92-52-4	S	8270	--	4.00E+04	1.25E+02	5.84E-01	6.00E+01	--	--	--	9.50E+00	--	5.84E-01	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 1.3E-02(unitless) PHYSPROP database; Koc 5.1E03 mL/g EPI database, giving Kd 5.14E00 mL/g. Cw 5.47E00 µg/L from CLARC, MTCA Air CUL noncancer=1.83E-01 µg/m3, VF=1.14E05 m3/kg (EPA/RSL)	Cair noncancer = 1.8E-01 µg/m3 (CLARC), Cs noncancer dust = 1.31E07 mg/kg VF=5.27E4 m3/kg (Morgans, 2018), Cs noncancer vapor =9.5 mg/kg See footnote "r".
203	Acetophenone	98-86-2	S	8270	--	8.00E+03	--	4.03E+00	--	--	--	--	--	--	4.03E+00	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 4.3E-4 (unitless) PHYSPROP database; Koc 5.2E1 mL/g EPI database, giving Kd 5.2E-02 mL/g. Cw 8E02 µg/L from CLARC.	
204	Toxaphene	8001-35-2	S	8080	--	--	9.09E-01	1.53E+00	--	--	--	5.70E+05	--	--	9.09E-01	Method B Direct Contact		
205	Nitric acid, propyl ester (n-propyl nitrate)	627-13-4	S	**(no method found)**	--	--	--	--	--	--	--	--	--	--	--	--		
206	Aldrin	309-00-2	S	8080	--	2.40E+00	5.88E-02	2.52E-03	--	--	1.00E-01	1.20E-01	--	--	2.52E-03	Groundwater Protection		

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
207	alpha-BHC (alpha hexachlorocyclohexane)	319-84-6	S	8121	--	6.40E+02	1.59E-01	5.45E-04	--	--	6.00E+00	1.01E+05	--	--	5.45E-04	Groundwater Protection		
208	beta-BHC (beta hexachlorocyclohexane)	319-85-7	S	8121	--	---	5.56E-01	2.27E-03	--	--	6.00E+00	3.44E+05	--	--	2.27E-03	Groundwater Protection		
209	gamma-BHC (Lindane)	58-89-9	S	8121	--	2.40E+01	9.09E-01	6.21E-03	--	--	6.00E+00	5.88E+05	--	--	6.21E-03	Groundwater Protection		
210	Dieldrin	60-57-1	S	8270, 8080	--	4.00E+00	6.25E-02	2.82E-03	--	--	7.00E-02	3.97E+04	--	--	2.82E-03	Groundwater Protection		
211	Endrin	72-20-8	S	8270, 8080	--	2.40E+01	--	4.40E-01	--	--	2.00E-01	--	--	--	2.00E-01	Ecological wildlife		
212	1,1-Dimethylhydrazine[s]	57-14-7	S	8315	---	8.00E+00	--	3.39E-03	--	--	--	--	2.55E-02	--	3.39E-03	Groundwater protection	WAC 173-340-747 value based on Henry's of 5.3E-04 (unitless) PHYSPROP database; Koc 1.2E1 mL/g EPI database, giving Kd 1.2E-2 mL/g. Cw 0.80 µg/L from CLARC. MTCA Air CUL noncancer=9.14E-04 µg/m3, VF=2.77E04 m3/kg (EPA/RSL)	Cs direct contact = 8 mg/kg (CLARC); Cw = 0.8 mg/kg (CLARC), Koc=1.2E1 L/kg (EPA/RSL/EPI), Kd = 1.2E-02 L/kg, Henry's = 5.3E-04 unitless (EPA/RSL/PHYSPROP), Cs GW protect= 3.39E-03 mg/kg; Cair noncancer =9.1E-04 µg/m3 (CLARC), VF = 2.8E04 m3/kg (EPA/RSL), Cs inhalation vapor = 2.55E-02 mg/kg; CPS = 3.39E-03 mg/kg (GW protect) See footnote "s".
213	Methylhydrazine	60-34-4	S	8315	--	8.00E+01	--	3.41E-02	--	--	--	1.25E-01	--	--	3.41E-02	Groundwater Protection	WAC 173-340-747 value based on : Henry's of 1.2E-04 PHYSPROP database; Koc 1.3E1 mL/g EPI database, giving Kd 1.3E-2 mL/g. Cw 8.0 µg/L from CLARC. MTCA Air CUL noncancer=9.14E-03 µg/m3, MTCA Air CUL cancer=2.50E-03 µg/m3, VF=5.04E04 m3/kg (EPA/RSL)	
214	n-Nitrosomethylethylamine	10595-95-6	S	8070	--	--	4.55E-02	1.93E-05	--	--	--	2.89E+04	--	--	1.93E-05	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 5.9E-05(unitless) PHYSPROP database; Koc 4.3E01 mL/g EPI database, giving Kd 4.3E-02 mL/g. Cw 3.98E-03 µg/L from CLARC.	
215	n-Nitrosodi-n-butylamine	924-16-3	S	8070	--	--	1.85E-01	1.80E-04	--	--	--	1.82E-01	--	--	1.80E-04	Groundwater Protection	WAC 173-340-747 value is based on: Henry's 5.4E-04(unitless) PHYSPROP database; Koc 9.1E02 mL/g EPI database, giving Kd 9.1E-01 mL/g. Cw 8.1E-03 µg/L from CLARC.	Cair cancer=1.6E-3 µg/m3 (CLARC), VF=1.17E5 m3/kg (Morgans, 2018)
216	DDD	72-54-8	N/A	8081B		2.40E+00	4.17E+00	3.35E-01			7.50E-01	2.60E+06			3.35E-01	Groundwater protection		These were common pesticides at Hanford
217	DDE	72-55-9	N/A	8081B		2.40E+01	2.94E+00	4.46E-01			7.50E-01	5.46E+01			4.46E-01	Groundwater protection		VF = 2.1E06 m3/kg (EPA/RSL); Cair cancer = 0.026 µg/m3 giving Cs = 54.6 mg/kg
218	DDT	50-29-3	N/A	8081B		4.00E+01	2.94E+00	3.49E+00			7.50E-01	1.90E+06			7.50E-01	Wildlife		These were common pesticides at Hanford
	Organics - PCBs																	
219	Polychlorinated biphenyls (PCBs)	1336-36-3	P	8082	--	--	5.00E-01	2.72E+00	40[d]	--	0.65[d]	2.33E+00	--	--	5.00E-01	Method B Direct Contact	WAC 173-340-747 value is based on: Henry's of 1.7E-02(unitless) PHYSPROP database for high risk PCBs; Koc 7.8E04 mL/g EPI database for high risk PCBs, giving Kd 7.8E01 mL/g. Cw 4.4E-01 µg/L from CLARC (Adjusted MCL). Inhalation: MTCA B Air CUL 4.39E-03 µg/m3, VF 5.32E05 m3/kg.	Cw=4.4E-1 µg/L (adj MCL at 1E-5 risk), H unitless=1.7E-2 (PHYSPROP), Koc=3.09E5 L/kg (CLARC), Kd=3.09E2 L/kg, Cs GW protect=2.72 mg/kg; Cair cancer=4.4E-3 µg/m3 (CLARC), Cs inhalation cancer dust=3.2E5 mg/kg; VF=5.3E5 m3/kg (EPA/RSL), Cs inhalation cancer vapors=2.33 mg/kg See footnote "d".
220	Aroclor 1016	12674-11-2	P	8082	--	5.60E+00	1.43E+01	2.36E+00	40[d]	--	0.65[d]	9.20E+01	--	--	0.65[f]	Ecological wildlife	WAC 173-340-747 value is based on: Henry's of 8.2E-03(unitless) PHYSPROP database; Koc 4.8E04 mL/g EPI database, giving Kd 4.8E05 mL/g. Cw 1.12 µg/L from CLARC.	Cw=1.1 µg/L (noncancer, CLARC), H unitless=8.2E-3 (EPI), Koc=1.07E5 L/kg (CLARC), Kd=1.07E2 L/kg, Cs GW protect=2.36 mg/kg VF=7.1E5 m3/kg (EPA/RSL), Cair cancer=1.3E-1 µg/m3 (CLARC), Cs inhalation cancer vapor=9.2E1 mg/kg, Cs inhalation cancer dust=9.5E6 mg/kg See footnote "d".
221	Aroclor 1221	11104-28-2	P	8082	--	--	5.00E-01	7.57E-03	40[d]	--	0.65[d]	4.12E-01	--	--	7.57E-03	Groundwater protection		Cw=4.4E-2 µg/L (cancer, MTCA Eq 720-2), H unitless=9.3E-3 (PHYSPROP), Koc=8.4E3 L/kg (EPI), Kd=8.4 L/kg, Cs GW protect=7.57E-3 mg/kg IUR=5.7E-4 [µg/m3]-1 (RAIS), CPFi=2 [mg/kg/d]-1, Cair cancer=4.4E-3 µg/m3 (MTCA Equation 750-2), VF=9.4E4 m3/kg (Morgans) CPS=7.57E-3 mg/kg (GW protect) See footnote "d".

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes
222	Aroclor 1232	11141-16-5	P	8082	--	--	5.00E-01	7.57E-03	40[d]	--	0.65[d]	2.26E-01	--	--	7.57E-03	Groundwater protection		Cw=4.4E-2 µg/L (cancer, MTCA Eq 720-2), H unitless=3.0E-2 (EPI), Koc=8.4E3 L/kg (EPI), Kd=8.4 L/kg, Cs GW protect=7.57E-3 mg/kg; IUR=5.7E-4 [µg/m3]-1 (RAIS), CPFi=2 [mg/kg/d]-1, Cair cancer=4.4E-3 µg/m3 (MTCA Equation 750-2), VF=5.16E4 m3/kg (Morgans); CPS=7.57E-3 mg/kg (GW protect) See footnote "d".
223	Aroclor 1242	53469-21-9	P	8082	--	--	5.00E-01	6.88E-02	40[d]	--	0.65[d]	1.19E+00	--	--	6.88E-02	Groundwater protection		Cw=4.4E-2 µg/L (cancer, MTCA Eq 720-2), H unitless=1.4E-2 (PHYSPROP), Koc=7.8E4 L/kg (EPI), Kd=7.8E1 L/kg, Cs GW protect=6.88E-2 mg/kg IUR=5.7E-4 [µg/m3]-1 (RAIS), CPFi=2 [mg/kg/d]-1, Cair cancer=4.4E-3 µg/m3 (MTCA Equation 750-2), VF=2.71E5 m3/kg (Morgans) CPS=6.88E-2 mg/kg (GW protect)
224	Aroclor 1248	12672-29-6	P	8082	--	--	5.00E-01	6.97E-02	40[d]	--	0.65[d]	1.26E+00	--	--	6.97E-02	Groundwater protection		Cw=4.4E-2 µg/L (cancer, MTCA Eq 720-2), H unitless=1.8E-2 (PHYSPROP), Koc=7.7E4 L/kg (EPI), Kd=7.7E1 L/kg, Cs GW protect=6.79E-2 mg/kg IUR=5.7E-4 [µg/m3]-1 (RAIS), CPFi=2 [mg/kg/d]-1, Cair cancer=4.4E-3 µg/m3 (MTCA Equation 750-2), VF=2.87E5 m3/kg (Morgans) Cs inhalation cancer vapors=1.3 mg/kg, Cs inhalation cancer dust=3.2E5 mg/kg CPS=6.79E-2 mg/kg (GW protect) See footnote "d".
225	Aroclor 1254	11097-69-1	P	8082	--	1.60E+00	5.00E-01	1.15E-01	4.00E+01	--	6.50E-01	3.70E+00	--	--	1.15E-01	Groundwater protection	WAC 173-340-747 value is based on: Henry's of 1.2E-02(unitless) PHYSPROP database; Koc 1.3E05 mL/g EPI database, giving Kd 1.3E02 mL/g. Cw 4.4E-02 µg/L from CLARC.	Cw=4.4E-2 µg/L (cancer, CLARC), H unitless=1.2E-2 (PHYSPROP), Koc=1.3E5 L/kg (EPI), Kd=1.3E2 L/kg, Cs GW protect=1.15E-1 mg/kg Cair cancer=4.4E-3 µg/m3 (CLARC), Cs inhalation cancer dust=3.2E5 mg/kg VF=8.4E5 m3/kg (EPA/RSL), Cs inhalation cancer vapors=3.7 mg/kg
226	Aroclor 1260	11096-82-5	P	8082	--	--	5.00E-01	7.20E-01	40[d]	--	0.65[d]	5.70E+00	--	--	5.00E-01	Method B Direct Contact	WAC 173-340-747 value is based on: Henry's of 1.4E-02(unitless) PHYSPROP database; Koc 3.5E05 mL/g EPI database, giving Kd 3.5E02 mL/g. Cw 4.38E-02 µg/L from CLARC.	Cw=4.4E-2 µg/L (cancer, CLARC), H unitless=1.4E-2 (PHYSPROP), Koc=8.22E5 L/kg (CLARC), Kd=8.22E2 L/kg, Cair cancer=4.4E-3 µg/m3 (CLARC), Cs inhalation cancer dust=3.2E5 mg/kg VF=1.3E6 m3/kg (EPA/RSL), Cs inhalation cancer vapors=5.7 mg/kg See footnote "d".
227	2,3,7,8-TCDD TEQ[t] (12 dioxin-like PCBs)	1746-01-6	N/A	1668[u]	---	9.30E-05	1.30E-05	3.37E-05	---	---	2.00E-06	1.30E-04	3.70E-02	---	2.00E-06	Ecological wildlife	WAC 173-340-747 value based on Henry's of 2.0E-03 PHYSPROP database; Koc=2.5E5 mL/g EPI database, giving Kd=2.5E02 mL/g. Cw 6.73E-06 µg/L (CLARC, Adjusted MCL), Air CUL cancer=6.58E-08 µg/m3 (CLARC), Air CUL noncancer=1.83E-05 µg/m3 (CLARC), VF=1.96E+06 m3/kg (EPA/RSL)	Added back this chemical, because these dioxin-like PCB congeners are present in Aroclors (which, in turn, are "primary" compounds). WAC 173-340-747 value (Cs GW protect) based on Henry's of 2.0E-03 PHYSPROP database; Koc=2.5E5 mL/g EPI database, giving Kd=2.5E02 mL/g. Cw 6.73E-06 µg/L (CLARC, Adjusted MCL) Air CUL cancer=6.58E-08 µg/m3 (CLARC), Air CUL noncancer=1.83E-05 µg/m3 (CLARC), VF=2E+06 m3/kg (EPA/RSL) See footnote "t". See footnote "u" for basis for analytical method.

General Notes:

Primary and Secondary compounds are based on RPP-23403 Rev 6, Single-Shell Tank Component Closure Data Quality Objectives

Unless otherwise noted, human health values are from MTCA (WAC 173-340) Cleanup Levels and Risk Calculations (CLARC) database (https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx) or calculated using methods provided in WAC 173-340.

For human health risk assessment, cleanup levels for individual hazardous substances established under Method B shall be adjusted downward to take into account exposure to multiple hazardous substances.
This adjustment needs to be made if, without this adjustment, the hazard index would exceed one or the total excess cancer risk would exceed one in one hundred thousand (WAC 173-340-708(5)(a)).

Footnotes

a. Arsenic - The Hanford Site closure performance standard is 20 mg/kg based on a memo, Dave Bradley to Jane Hedges, "Issues associated with establishing soil cleanup levels for arsenic," dated 6/11/2013. Arsenic GWP values are calculated with the state-wide background Cw=5 µg/L, giving Cs=2.92 mg/kg. No other GWP values are calculated using groundwater background values. This exception involves using only the state-
b. Chromium(VI) - Groundwater protection value is based on a Kd of 0 mL/g (PNNL-13895) in Equation 747-1.
c. Cobalt - Reference dose (3E-04 mg/kg/day) from PPRTV, giving Cw of 4.8 µg/L. Kd (45 L/kg) from Baes et al., 1984.
d. PCBs - based on Aroclor-1254.
e. Closure Performance Standard - Soil cleanup level and Basis - This is the value if all pathways are considered; a different value and basis might be used if one or more pathways are not considered.
f. Strontium - Kd (35 L/kg) from Baes et al (1984). Soil background from PNNL-18577.
g. Uranium - Kd (0.3 L/kg) based on PNNL-13895, Table 16, lower 10th percentile of values, excluding acid process waste-treated samples. Cw based on MCL of 30 µg/L. Cw 3.2 µg/L (MTCA Method B)9.8 µg/L, background. Revised RfD of 2E-04 mg/kg/day (Region 10, USEPA/OSRTI memo Dec 2016). For U background, convert from U-
h. Boron (and borates) - Kd (3.0 L/kg) from Baes et al., 1984. Background from PNNL-18577.
i. Molybdenum - Kd (20 L/kg) from Baes et al., 1984.
j. Tin - Kd (250 L/kg) from Baes et al., 1984. Reference dose (0.6 mg/kg/day) from HEAST database.
k. Fluoride - Kd =150 L/kg (Baes et al, 1984), giving Cw of 960 µg/L.
l. Nitrate-N and nitrite-N soil concentrations to protect groundwater are based on MCLs of 10 mg/L and 1 mg/L, respectively, and Kd of 0 L/kg based on PNNL-13895.

Analytical Methods - these are methods that can be used; there may be others not listed.

Ecology requested methods be kept in the table. THESE METHODS ARE STARTING POINTS ONLY; the DQO Process determines the final analytical method per QA/QC requirements. Some chemicals are gases; need to decide if they apply to your unit.

					WAC 173-340-740			WAC 173-340-747	WAC 173-340-7493			WAC 173-340-750						Reviewer Notes
					Human Health - Direct Contact with Soil			Soil Protective of Groundwater	Ecological Indicator Table 749-3			Human Health - Inhalation of Dust and Vapors[n]		Hanford Background[o]				General comment-designate inhalation Cs values as vapor or dust
					A	B	C	D	E	F	G	H	I	J	L			General comment - Values given as Cs values in the notes in this column should replace table values for the specified pathway
Row No.	Chemical Name	CAS No.	Primary or Secondary Compound	Analytical Method	Method A Table 740-1 mg/kg	Method B Non-cancer mg/kg	Method B Cancer mg/kg	Groundwater Protection mg/kg	Plants mg/kg	Soil Biota mg/kg	Wildlife mg/kg	Method B Cancer mg/kg	Method B Noncancer mg/kg	90th Percentile mg/kg	Closure Performance Standard[e] mg/kg	Basis for Standard	Notes (initial)	Reviewer's Notes

m. Cyanide - Kd (9.9 L/kg) from USEPA SSL database. Cw of 9.6 µg/L from CLARC.
n. Values from ECF-HANFORD-11-0033, Rev. 1 (and Rev. 2), Calculation of Inhalation Pathway Preliminary Remediation Goals Using Standard Method B Air Cleanup Levels for the 100 Areas and 300 Area Remedial Investigation/Feasibility Study Reports. However, where MTCA Air CULs and VF are provided in Notes column, inhalation CULs were calculated: (Soil CUL=[Air CUL][VF][UCF]).
o. Background values from DOE/RL-92-24, Rev. 4, unless otherwise noted.
p. Chloroethene - See guidance for vinyl chloride at https://fortress.wa.gov/ecy/clarc/FocusSheets/VinylChloride.pdf
q. Thallium - CLARC uses PPRTV Appendix values, oral RfD=1E-5 mg/kg/d
r. 1,1-Biphenyl - CLARC uses PPRTV Appendix values, inhalation RfD = 1.14E-04 mg/kg/day
s. 1,1-Dimethylhydrazine - CLARC uses PPRTV Appendix values, oral RfD = 1E-04 mg/kg/day, inhalation RfD = 5.71E-7 mg/kg/day
t. WAC 173-340-747 value (Cs GW protect) based on Henry's of 2.0E-03 PHYSPROP database; Koc=2.5E5 mL/g EPI database, giving Kd=2.5E02 mL/g. Cw 6.73E-06 µg/L (CLARC, Adjusted MCL)
u. Analytical method from Ecology Implementation Memorandum #12, July 22, 2015, When to Use EPA Method 1668 for PCB Congener Analyses.
v. 5-Methyl-2-hexanone. There is no toxicological information available for this chemical. Therefore, no cleanup values can be calculated. It is being deleted from the list, but has been left in place, to keep the list row numbers intact. **Do not use for developing closure standards.**
w. The initial notes were added when the table was first developed. Some of them mention PQL issues. PQL values were removed from this table, as they are are affected by the laboratory methods in use at the time of closure and will be added when closure plans are revised prior to the beginning of closure.

References:

Baes, CF, RD Sharp, AL Sjoreen, RW Shor, 1984. ORNL-5786. A review and analysis of parameters for assessing transport of environmentally released radionuclides through agriculture.
DOE/RL-92-24, Rev 4: Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes, January 2001.
DOE/RL-96-12, Hanford site background: Part 2, Soil background for radioactive analytes.
ECF-HANFORD-11-0038, Rev 0: Soil Background for Interim Use at the Hanford Site, CH2MHill Plateau Remediation Company, February 2012.
Estimation Programs Interface (EPI) database developed by USEPA's Office of Pollution Prevention and Toxics, and Syracuse Research Corp.; cited in USEPA's Regional Soil Screening Levels (SSL) tables.
Physical Properties Database (PHYSPROP) developed by Syracuse Research Corp.; cited in USEPA's Regional Soil Screening Levels (SSL) tables.
PPRTV - PPRTV Appendix values are considered screening levels because of the uncertainty associated with the toxicity values.
PNNL-13895, Cantrell, KJ, RJ Serne, GV Last, 2003, Hanford contaminant distribution user's guide.
PNNL-18577, A review of metal concentrations measured in surface soil samples collected on and around the Hanford Site. BG Fritz, July 2009.
RAIS database: Risk Assessment Information Systems database, Oak Ridge National Laboratory, February 2016.
EPA/RSL=EPA Regional Screening Levels, Residential Soil