

# Identification of Site-Specific Monitoring Constituents for Waste Management Area B-BX-BY

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy  
under Contract DE-AC06-08RL14788

**CH2MHILL**  
Plateau Remediation Company

**P.O. Box 1600  
Richland, Washington 99352**

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**APPROVED**

*By Julia Raymer at 1:24 pm, Jun 17, 2019*

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Release Approval

Date

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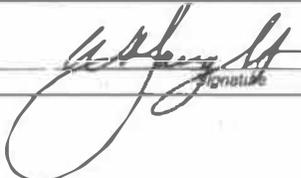
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## Terms

CAS	Chemical Abstracts Service
HEIS	Hanford Environmental Information System
$K_d$	distribution coefficient
$K_{oc}$	organic carbon-water partition coefficient
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
SST	single-shell tank
WMA	waste management area

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## 1 Purpose

This environmental calculation file evaluates the waste constituents associated with Waste Management Area (WMA) B-BX-BY and constituents that were detected in groundwater during interim status monitoring to identify proposed groundwater monitoring constituents.

## 2 Background

WMA B-BX-BY is one of the inactive single-shell tank (SST) farms in the SST System unit group that will be modified into the future Revision 9 of WA7890008967, *Hanford Facility Dangerous Waste Permit (Site-Wide Permit)* as a final status dangerous waste management unit. Site-specific monitoring constituents are required to support final status groundwater monitoring under WAC 173-303-645, “Dangerous Waste Regulations,” “Releases from Regulated Units.”

## 3 Methodology

The dangerous wastes identified in WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste* (Revision 8c) (hereinafter referred to as the Hanford Facility RCRA Permit) Part A Permit Application for the SST System and the groundwater sample results collected for WMA B-BX-BY during interim status monitoring were evaluated to identify potential monitoring constituents for the WMA.

The use of the Part A Permit Application information and groundwater sample data are discussed in the following sections.

### 3.1 Hanford Facility RCRA Permit Part A Application Dangerous Wastes

The Hanford Facility RCRA Permit Part A application for the SST System identifies the dangerous wastes associated with the unit group, which includes the WMA B-BX-BY SSTs. The wastes are identified by waste code in Section 2.3 of SGW-60587, *Engineering Evaluation Report For Single Shell Tank Waste Management Area B-BX-BY Groundwater Monitoring*. A list of specified dangerous wastes and corresponding Chemical Abstracts Service (CAS) numbers was compiled using the waste codes and represents the Part A Permit Application dangerous waste dataset (Table 1).

The dangerous wastes were screened to identify mobile constituents by comparing literature reference values for constituent distribution coefficients ( $K_{ds}$ ) to a Hanford Site-derived  $K_d$  value of 0.8 mL/g that was developed and applied to hexavalent chromium (a known mobile constituent in Hanford Site vadose soils) (Section 6.1 in ECF-Hanford-11-0165, *Evaluation of Hexavalent Chromium Leach Test Data Conducted on Vadose Zone Sediment Samples from the 100 Area*). Constituents with a  $K_d \leq 0.8$  mL/g were identified as mobile constituents and further evaluated as potential monitoring constituents (Table 1). If a reference  $K_d$  value was not available for a constituent, the constituent was conservatively retained for further evaluation. If a reference soil organic carbon-water partition coefficient ( $K_{OC}$ ) value was available for a constituent, a  $K_d$  value was derived using the following relationship:

$$K_{OC} = (100 \times K_d) \div (\% OM)$$

where % OM is the assumed soil organic carbon content of 0.1 weight percent.

Solving this equation for  $K_d$ :

$$K_d = (K_{OC} \times \% OM) \div 100$$

**Table 1. Dangerous Wastes Identified on the Single-Shell Tank System Part A Permit Application and Mobility Evaluation**

Dangerous Waste Code	Constituent	CAS Number	K <sub>d</sub> (mL/g)*	K <sub>d</sub> reference	Is K <sub>d</sub> ≤0.8 mL/g? (Yes/No/N/A)	Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)
D004	Arsenic	7440-38-2	29	Ecology, 2015	No	No
D005	Barium	7440-39-3	41	Ecology, 2015	No	No
D006	Cadmium	7440-43-9	6.7	Ecology, 2015	No	No
D007	Chromium	7440-47-3	1000	Ecology, 2015	No	No
D008	Lead	7439-92-1	10000	Ecology, 2015	No	No
D009	Mercury	7439-97-6	52	Ecology, 2015	No	No
D010	Selenium	7782-49-2	5	Ecology, 2015	No	No
D011	Silver	7440-22-4	8.3	Ecology, 2015	No	No
D018	Benzene	71-43-2	0.062	Ecology, 2015	Yes	Yes
D019	Carbon tetrachloride	56-23-5	0.152	Ecology, 2015	Yes	Yes
D022	Chloroform	67-66-3	0.053	Ecology, 2015	Yes	Yes
D028	1,2-Dichloroethane	107-06-2	0.038	Ecology, 2015	Yes	Yes
D029	1,1-Dichloroethylene	75-35-4	0.065	Ecology, 2015	Yes	Yes
D030	2,4-Dinitrotoluene	121-14-2	0.0955	Ecology, 2015	Yes	Yes
D033	Hexachlorobutadiene	87-68-3	53.7	Ecology, 2015	No	No
D034	Hexachloroethane	67-72-1	1.78	Ecology, 2015	No	No
D035	Methyl ethyl ketone	78-93-3	0.0045	ECF-HANFORD-12-0023	Yes	Yes
D036	Nitrobenzene	98-95-3	0.119	Ecology, 2015	Yes	Yes
D038	Pyridine	110-86-1	Not available	N/A	N/A	Evaluate
D039	Tetrachloroethylene	127-18-4	0.265	Ecology, 2015	Yes	Yes
D040	Trichloroethylene	79-01-6	0.094	Ecology, 2015	Yes	Yes
D041	2,4,5-Trichlorophenol	95-95-4	1.597	Ecology, 2015	No	No
D043	Vinyl chloride	75-01-4	0.0186	Ecology, 2015	Yes	Yes

**Table 1. Dangerous Wastes Identified on the Single-Shell Tank System Part A Permit Application and Mobility Evaluation**

Dangerous Waste Code	Constituent	CAS Number	K <sub>d</sub> (mL/g)*	K <sub>d</sub> reference	Is K <sub>d</sub> ≤0.8 mL/g? (Yes/No/N/A)	Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)
F001	1,1,1-Trichloroethane	71-55-6	0.135	Ecology, 2015	Yes	Yes
F001	Methylene chloride	75-09-2	0.01	Ecology, 2015	Yes	Yes
F001	Carbon tetrachloride	56-23-5	0.152	Ecology, 2015	Yes	Yes
F001	Tetrachloroethylene	127-18-4	0.265	Ecology, 2015	Yes	Yes
F001	Trichloroethylene	79-01-6	0.094	Ecology, 2015	Yes	Yes
F002	1,1,1-Trichloroethane	71-55-6	0.135	Ecology, 2015	Yes	Yes
F002	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	Not available	N/A	N/A	Evaluate
F002	1,1,2-Trichloroethane	79-00-5	0.075	Ecology, 2015	Yes	Yes
F002	Chlorobenzene	108-90-7	0.224	Ecology, 2015	Yes	Yes
F002	Methylene chloride	75-09-2	0.01	Ecology, 2015	Yes	Yes
F002	Ortho-dichlorobenzene	95-50-1	0.379	Ecology, 2015	Yes	Yes
F002	Trichlorofluoromethane	75-69-4	0.044	ECF- HANFORD-12-0023	Yes	Yes
F002	Tetrachloroethylene	127-18-4	0.265	Ecology, 2015	Yes	Yes
F002	Trichloroethylene	79-01-6	0.094	Ecology, 2015	Yes	Yes
F003	Acetone	67-64-1	0.0006	Ecology, 2015	Yes	Yes
F003	Cyclohexanone	108-94-1	Not available	N/A	N/A	Evaluate
F003	Ethyl acetate	141-78-6	0.0056	ECF-HANFORD-12-0023	Yes	Yes
F003	Ethyl benzene	100-41-4	0.204	Ecology, 2015	Yes	Yes
F003	Ethyl ether	60-29-7	0.0097	ECF-HANFORD-12-0023	Yes	Yes
F003	Methyl isobutyl ketone	108-10-1	0.013	ECF-HANFORD-12-0023	Yes	Yes
F003	Methanol	67-56-1	0.0010	ECF-HANFORD-12-0023	Yes	Yes
F003	N-Butyl alcohol	71-36-3	0.00692	Ecology, 2015	Yes	Yes
F003	Xylene	1330-20-7	0.233	Ecology, 2015	Yes	Yes

**Table 1. Dangerous Wastes Identified on the Single-Shell Tank System Part A Permit Application and Mobility Evaluation**

Dangerous Waste Code	Constituent	CAS Number	K <sub>d</sub> (mL/g)*	K <sub>d</sub> reference	Is K <sub>d</sub> ≤ 0.8 mL/g? (Yes/No/N/A)	Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)
F004	Cresols	1319-77-3	N/A	N/A	N/A	Evaluate
F004	Cresylic acid	93-51-6	N/A	N/A	N/A	Evaluate
F004	Nitrobenzene	98-95-3	0.119	Ecology, 2015	Yes	Yes
F005	2-Ethoxyethanol	110-80-5	Not available	N/A	N/A	Evaluate
F005	2-Nitropropane	79-46-9	Not available	N/A	N/A	Evaluate
F005	Benzene	71-43-2	0.062	Ecology, 2015	Yes	Yes
F005	Carbon disulfide	75-15-0	0.0457	Ecology, 2015	Yes	Yes
F005	Isobutanol	78-83-1	Not available	N/A	N/A	Evaluate
F005	Methyl ethyl ketone	78-93-3	0.0045	ECF-HANFORD-12-0023	Yes	Yes
F005	Pyridine	110-86-1	Not available	N/A	N/A	Evaluate
F005	Toluene	108-88-3	0.14	Ecology, 2015	Yes	Yes

Source: WA7890008967, Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste, Revision 8c.

References: ECF-HANFORD-12-0023, Groundwater and Surface Water Cleanup Levels and Distribution Coefficients for Nonradiological and Radiological Analytes in the 100 Areas and 300 Area.

Ecology, 2015, Cleanup Levels and Risk Calculations (CLARC) database.

Notes: The specific dangerous wastes associated with “F”-code wastes were obtained from WAC 173-303-9904, “Dangerous Waste Regulations,” “Dangerous Waste Sources List.”

This table identifies specific dangerous wastes identified from the waste codes included in the SST System Part A Application. Characteristic wastes (D001, D002, and D003) and state-only wastes (WP01, WP02, WT01, and WT02) (waste codes assigned based on waste designation) are included in the SST System Part A Application but are not identified in this table.

\*For organic constituents, the K<sub>d</sub> is calculated from the K<sub>oc</sub> value. The K<sub>d</sub> calculations assume a value of 0.001 g/g for the soil fraction of organic carbon.

CAS = Chemical Abstracts Service

K<sub>d</sub> = distribution coefficient

K<sub>oc</sub> = organic carbon-water partition coefficient

N/A = not applicable

SST = single-shell tank

## 3.2 Interim Status Groundwater Monitoring Results

Appendix A of SGW-60587 includes a summary of the interim status groundwater monitoring history at WMA B-BX-BY through 2016, including the changes to the well network and monitoring constituents. Groundwater sample results collected under interim status monitoring plans are presented for each well. The sample data through December 31, 2016 were retrieved from the Hanford Environmental Information System (HEIS) database and presented in separate Microsoft® Excel® workbooks in Appendix A of SGW-60587.

The nonradiological sample data for each well (excluding wells used for information purposes only) were evaluated to determine the maximum measurement result for each detected chemical constituent. Sample data that were qualified with either “U” or an “R” qualifier were not considered in the evaluation.<sup>1</sup> Field parameters (e.g., dissolved oxygen, pH, specific conductance, temperature, and turbidity), alkalinity measurements, and nonanalyte-specific measures (e.g., total organic carbon and total organic halides) were not considered in the evaluation. The maximum result for each detected chemical was compared to the Hanford Site 90<sup>th</sup> percentile groundwater background values, as appropriate (Table ES-1 in DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*) (Table 2). Chemicals detected above background values and chemicals without background values were retained for evaluation as potential monitoring constituents.

## 3.3 Final Monitoring Constituent Evaluation

The constituents retained as potential monitoring constituents in Sections 3.1 and 3.2 were compiled. A final evaluation identified potential monitoring constituents to be included as proposed monitoring constituents to detect and monitor wastes from WMA B-BX-BY that impact groundwater.

The initial step of this evaluation identified those potential monitoring constituents which are also listed in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*. Monitoring for the dangerous wastes identified in Appendix 5 of Ecology Publication No. 97-407 is already prescribed for WMA B-BX-BY (Section 9.4 in SGW-60587). Therefore, the potential monitoring constituents that are also listed in Appendix 5 of Ecology Publication No. 97-407 were identified as proposed monitoring constituents.

The remaining potential monitoring constituents were evaluated in two groups:

- The first group comprised the potential monitoring constituents identified from the SST System Part A Permit Application (Section 3.1) that are not identified in Appendix 5 of Ecology Publication No. 97-407. Each of these constituents is a dangerous waste.
- The second group comprised the potential monitoring constituents identified from evaluation of the interim status groundwater results (Section 3.2) that were not identified in Appendix 5 of Ecology Publication No. 97-407 and were not identified from the Part A Permit Application.

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<sup>1</sup> Data flagged with a “U” qualifier are analyzed for but not detected. Data flagged with an “R” qualifier are determined during formal data reviews as not valid for any use.

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Table 2. WMA B-BX-BY Interim Status Groundwater Maximum Results and Comparison to Hanford Site Background

Well	Constituent	Sample Date	Sample Result (µg/L)	Filtered (Yes/No)	Lab Qualifier	Review Qualifier	Validation Qualifier	Hanford Site Background Comparison			
								Background Value Available? (Yes/No)	90th Percentile (µg/L)*	Filtered (Yes/No/N/A)	Maximum Value Above Background? (Yes/No)
299-E33-343	(2S)-Propane-1,2-diol	27-Sep-2009	37	N	--	--	--	No	N/A	N/A	Yes
299-E33-33	1,1,1-Trichloroethane	5-Nov-1993	0.12	N	L	--	--	No	N/A	N/A	Yes
299-E33-342	1,2-Benzenedicarboxylic acid, diheptyl ester	12-Nov-2009	4.6	N	--	--	--	No	N/A	N/A	Yes
299-E33-31	2,4-D(2,4-Dichlorophenoxyacetic acid)	2-Mar-1993	0.05	N	--	--	--	No	N/A	N/A	Yes
299-E33-32	2,4-D(2,4-Dichlorophenoxyacetic acid)	2-Mar-1993	0.05	N	--	--	--	No	N/A	N/A	Yes
299-E33-33	2,4-D(2,4-Dichlorophenoxyacetic acid)	1-Mar-1993	0.05	N	--	F	--	No	N/A	N/A	Yes
299-E33-41	2,4-D(2,4-Dichlorophenoxyacetic acid)	2-Mar-1993	0.05	N	--	--	--	No	N/A	N/A	Yes
299-E33-42	2,4-D(2,4-Dichlorophenoxyacetic acid)	2-Mar-1993	0.05	N	--	--	--	No	N/A	N/A	Yes
299-E33-43	2,4-D(2,4-Dichlorophenoxyacetic acid)	2-Mar-1993	0.05	N	--	--	--	No	N/A	N/A	Yes
299-E33-42	2-Chlorophenol	7-Feb-1996	1.8	N	L	--	--	No	N/A	N/A	Yes
299-E33-343	3-Hydroxy-3-methyl-2-butanone	27-Sep-2009	10	N	--	--	--	No	N/A	N/A	Yes
299-E33-33	4,4'-DDT (Dichlorodiphenyltrichloroethane)	19-May-1992	0.1	N	B	--	--	No	N/A	N/A	Yes
299-E33-33	4,6-Dinitro-2-methylphenol	5-Nov-1997	2.3	N	BJ	Q	--	No	N/A	N/A	Yes
299-E33-18	4-Methyl-2-pentanone	10-Apr-1991	200	N	--	--	--	No	N/A	N/A	Yes
299-E33-36	Acetone	16-Dec-1992	76	N	B	Q	--	No	N/A	N/A	Yes
299-E33-32	Acetophenone	12-Feb-2013	1.7	N	--	--	--	No	N/A	N/A	Yes
299-E33-344	Aluminum	22-May-2009	675	N	--	--	--	Yes	7.11	Yes	Yes
299-E33-20	Ammonia	15-May-2014	1280	N	--	--	--	Yes	113	Yes	Yes
299-E33-344	Ammonium ion	12-Nov-2009	773	N	D	--	--	No	N/A	N/A	Yes
299-E33-341	Amylene hydrate	16-Sep-2009	85	N	--	--	--	No	N/A	N/A	Yes
299-E33-15	Antimony	1-May-2012	237	N	--	Y	--	Yes	55.1	Yes	Yes
299-E33-16	Arsenic	1-Aug-2011	104	Y	D	--	--	Yes	7.85	Yes	Yes
299-E33-47	Barium	1-May-2013	328	Y	--	--	--	Yes	105	Yes	Yes
299-E33-41	Beryllium	11-Feb-2002	2.5	Y	B	--	--	Yes	2.29	Yes	Yes
299-E33-44	Bis(2-ethylhexyl) phthalate	5-Feb-2013	9.6	N	--	--	--	No	N/A	N/A	Yes
299-E33-41	Boron	23-Nov-2015	93	Y	BDC	--	--	Yes	36	Yes	Yes
299-E33-31	Bromide	15-Sep-2008	1440	N	D	H	--	Yes	124	No	Yes
299-E33-339	Butane, 2-methoxy-2-methyl-	5-Feb-2013	11	N	--	--	--	No	N/A	N/A	Yes
299-E33-44	Butylbenzylphthalate	5-Feb-2013	2.8	N	--	--	--	No	N/A	N/A	Yes
299-E33-39	Cadmium	28-Oct-1991	16.7	Y	--	--	--	Yes	0.916	Yes	Yes
299-E33-31	Calcium	14-Nov-2008	390000	N	--	Y	--	Yes	52644	No	Yes
299-E33-342	Carbon tetrachloride	27-Sep-2009	5.9	N	--	--	--	No	N/A	N/A	Yes
299-E33-4	Chloride	9-May-2005	523,000	Y	D	GQ	--	Yes	15630	No	Yes

Table 2. WMA B-BX-BY Interim Status Groundwater Maximum Results and Comparison to Hanford Site Background

Well	Constituent	Sample Date	Sample Result (µg/L)	Filtered (Yes/No)	Lab Qualifier	Review Qualifier	Validation Qualifier	Hanford Site Background Comparison			
								Background Value Available? (Yes/No)	90th Percentile (µg/L)*	Filtered (Yes/No/N/A)	Maximum Value Above Background? (Yes/No)
299-E33-343	Chloroform	27-Sep-2009	1.5	N	J	--	--	No	N/A	N/A	Yes
299-E33-36	Chloroform	6-Mar-1992	1.5	N	BJ	--	--	No	N/A	N/A	Yes
299-E33-36	Chromium	5-Jun-1992	440	N	--	--	--	Yes	2.4	Yes	Yes
299-E33-337	Cobalt	14-Jul-2011	69	N	--	--	--	Yes	0.916	Yes	Yes
299-E33-337	Copper	29-Mar-2011	166	N	--	G	--	Yes	0.81	Yes	Yes
299-E33-7	Cyanide	13-Nov-2008	1730	N	D	--	--	Yes	8.41	No	Yes
299-E33-342	Cyclotetrasiloxane, Octamethyl	12-Nov-2009	20	N	--	--	--	No	N/A	N/A	Yes
299-E33-342	Decamethylcyclopentasiloxane	12-Nov-2009	4.5	N	--	--	--	No	N/A	N/A	Yes
299-E33-42	Dieldrin	21-Sep-1993	0.025	N	L	--	--	No	N/A	N/A	Yes
299-E33-343	Diisobutyl phthalate	12-Nov-2009	7.3	N	--	--	--	No	N/A	N/A	Yes
299-E33-32	Di-n-butylphthalate	13-Mar-1991	1	N	J	--	--	No	N/A	N/A	Yes
299-E33-44	Di-n-octylphthalate	5-Feb-2013	5.5	N	--	--	--	No	N/A	N/A	Yes
299-E33-344	Fluoride	19-Dec-2010	97,200	N	D	--	--	Yes	1047	No	Yes
299-E33-344	Hexavalent chromium	19-Dec-2010	381	N	--	--	--	No	N/A	N/A	Yes
299-E33-18	Iron	9-Jul-1991	5240	N	JN	--	--	Yes	570	Yes	Yes
299-E33-39	Lead	28-Oct-1991	20.6	N	JNS	--	--	Yes	0.917	Yes	Yes
299-E33-31	Magnesium	14-Nov-08	106000	N	--	Y	--	Yes	24,816	Yes	Yes
299-E33-47	Magnesium	1-May-2013	106000	N	--	--	--	Yes	24,816	Yes	Yes
299-E33-337	Manganese	14-Jul-2011	632	N	--	--	--	Yes	38.5	Yes	Yes
299-E33-7	Mercury	7-Nov-2006	4.3	Y	--	--	--	Yes	0.003	Yes	Yes
299-E33-342	Methyl 2-hydroxyisobutyrate	27-Sep-2009	8.6	N	--	--	--	No	N/A	N/A	Yes
299-E33-33	Methylene chloride	1-Mar-1993	2.2	N	--	--	--	No	N/A	N/A	Yes
299-E33-36	Methylene chloride	11-Mar-1993	2.2	N	B	--	--	No	N/A	N/A	Yes
299-E33-44	Molybdenum	27-Jul-2011	12.5	Y	D	--	--	Yes	3.21	Yes	Yes
299-E33-337	Nickel	14-Jul-2011	4070	N	--	--	--	Yes	1.56	Yes	Yes
299-E33-4	Nitrate	9-May-2005	1890000	Y	CDN	Q	--	Yes	26,871	No	Yes
299-E33-342	Nitrite	22-Dec-2009	14400	N	D	G	--	Yes	93.7	No	Yes
299-E33-334	n-Nitrosodi-n-propylamine	13-Aug-2013	3.5	N	--	--	--	No	N/A	N/A	Yes
299-E33-38	n-Nitrosodiphenylamine	11-Mar-1991	1	N	J	--	--	No	N/A	N/A	Yes
299-E33-36	Pentachlorophenol	5-Nov-1997	2.3	N	J	--	--	No	N/A	N/A	Yes
299-E33-43	Perchlorate anion	21-Sep-1993	500	N	--	Q	--	No	N/A	N/A	Yes
299-E33-341	Phenol	26-Jun-2009	1.1	N	J	--	--	No	N/A	N/A	Yes
299-E33-16	Phosphate	13-Nov-2007	1720	N	BD	--	--	Yes	162	Yes	Yes

**Table 2. WMA B-BX-BY Interim Status Groundwater Maximum Results and Comparison to Hanford Site Background**

Well	Constituent	Sample Date	Sample Result (µg/L)	Filtered (Yes/No)	Lab Qualifier	Review Qualifier	Validation Qualifier	Hanford Site Background Comparison			
								Background Value Available? (Yes/No)	90th Percentile (µg/L)*	Filtered (Yes/No/N/A)	Maximum Value Above Background? (Yes/No)
299-E33-341	Phosphine oxide, triphenyl-	23-Feb-2010	25	N	--	--	--	No	N/A	N/A	Yes
299-E33-24	Potassium	4-Apr-1991	51100	N	--	--	--	Yes	9,122	No	Yes
299-E33-344	Pyrrolidin-2-one	12-Nov-2009	6.4	N	--	--	--	No	N/A	N/A	Yes
299-E33-47	Selenium	6-Nov-2016	23	Y	C	--	--	Yes	10.5	Yes	Yes
299-E33-39	Silicon	20-Oct-1994	20000	N	--	--	--	Yes	33,949	Yes	No
299-E33-39	Silicon	20-Oct-1994	20000	Y	--	--	--	Yes	33,949	Yes	No
299-E33-42	Silver	3-May-11	158	N	--	Y	--	Yes	5.28	Yes	Yes
299-E33-344	Sodium	26-Jun-2009	807000	N	DN	--	--	Yes	26,998	No	Yes
299-E33-7	Strontium	10-Aug-2008	2310	N	--	Y	--	Yes	323	Yes	Yes
299-E33-31	Sulfate	27-Nov-2000	1100000	N	D	Y	--	Yes	47,014	No	Yes
299-E33-18	Sulfide	5-Feb-2013	800	N	B	Q	--	Yes	2.19	Yes	Yes
299-E33-32	Thallium	23-Nov-15	1.5	Y	BC	--	--	Yes	1.67	Yes	No
299-E33-31	Thorium	2-Feb-16	0.899	N	B	--	--	Yes	0.5	Yes	Yes
299-E33-33	Tin	6-Feb-1996	110	Y	B	--	--	Yes	21.6	Yes	Yes
299-E33-32	Vanadium	14-Sep-93	122	Y	--	--	--	Yes	11.5	Yes	Yes
299-E33-20	Zinc	31-Jan-2012	986	N	--	--	--	Yes	21.8	Yes	Yes

\* The 90<sup>th</sup> percentile background values for groundwater were obtained from DOE/RL-96-61, *Hanford Site Background: Part 3, Groundwater Background*, Table ES-1.

Qualifiers:

B = INORGANICS and WETCHEM - The analyte was detected at a value less than the contract required detection limit, but greater than or equal to the instrument detection limit/method detection limit (as appropriate).

B = ORGANICS - The analyte was detected in both the associated QC blank and in the sample.

C = INORGANICS/WETCHEM: The analyte was detected in both the sample and the associated QC blank, and the sample concentration was <= 5X the blank concentration.

D = All - Analyte was identified in an analysis at a secondary dilution factor, typically dilution factor > 1 (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference). Required for organics/wetchem if the sample was diluted.

F = Review Qualifier: the result is undergoing further review.

G = Review Qualifier: record has been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.

H = Review Qualifier: laboratory holding time exceeded before the sample was analyzed.

J = Lab Qualifier: ORGANICS - estimated value; (1) constituent detected at a level less than the required detection limit or practical quantitation limit and greater than or equal to the method detection limit, (2) estimated concentration for tentatively identified compounds. Note - For Hanford Environmental Information System data generated prior to December 1, 2002, laboratories may have applied a "J" qualifier to non-organic results. When applied, application was based primarily on criteria comparable to statement (1) above. Prior to January, 1998, validation qualifiers (including "J") were recorded in the LAB\_QUALIFIER field without identification as validation qualifiers.

L = Lab Qualifier: method detection limit <= value < contract required quantitation limit [RETIRED].

N = Lab Qualifier: ALL (except GC/MS based analysis) - Spike and/or spike duplicate sample recovery is outside control limits. ORGANICS (GC/MS only) - Presumptive evidence of compound based on mass spectral library search.

Q = Review Qualifier: associated quality control sample is out of limits.

S = Lab Qualifier: INORGANICS - Reported value determined by the Method of Standard Additions (MSA).

Y = Lab Qualifier: same as X if more than one flag is required. In the process of being retired.

Y = Review Qualifier: Result suspect. Review- insufficient evidence to show result valid or invalid.

N/A = not applicable

QC = quality control

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The remaining potential monitoring constituents from the first group (Part A Permit Application) were evaluated for availability of analysis. Any constituent that is not routinely analyzed by commercial laboratories was removed from consideration. The potential monitoring constituents in the first group that were not excluded due to unavailability of analysis were identified as proposed monitoring constituents.

The potential monitoring constituents in the second group (interim status groundwater results) that were not already identified as proposed monitoring constituents through the preceding evaluation of the Part A constituents were evaluated as follows:

- Constituents were evaluated to determine if any were dangerous wastes. Any constituent identified as a dangerous waste was identified as a proposed monitoring constituent
- Any remaining constituents were evaluated individually for one or more of the following:
  - Identification of related chemicals (e.g., parent compounds and isomers) that were already identified as proposed monitoring constituents (evaluated on a case-by-case basis).
  - Identification of any potential monitoring constituent that is not routinely analyzed by commercial laboratories. Any potential monitoring constituent that is not routinely analyzed by commercial laboratories was removed from consideration as a proposed monitoring constituent.
  - Comparison of the maximum groundwater concentration of the potential monitoring constituent to the federal or state action level (evaluated on a case-by-case basis).
  - Determination if a potential monitoring constituent was identified as present in the waste discharge profile for the WMA B-BX-BY SSTs that have leaked (Table 2-2 in SGW-60587) (evaluated on a case-by-case basis).

#### **4 Assumptions and Inputs**

The primary inputs to this calculation were the SST System Part A Permit Application and the HEIS analytical data associated with WMA B-BX-BY interim status groundwater monitoring. The SST System Part A Permit Application is assumed to be descriptive and representative of the known and suspected contents of the WMA B-BX-BY SSTs. It is assumed that the HEIS data are accurate and valid measurements of contaminant conditions in groundwater associated with WMA B-BX-BY.

Nondetected sample data (data with a “U” qualifier) in the interim status groundwater monitoring dataset were not further evaluated.

#### **5 Software Applications**

Microsoft Excel software is an approved and appropriate application for this calculation and was used to perform sorting of data.

#### **6 Calculation**

The evaluations detailed in this calculation are summarized in the identified tables. Appendix A of SGW-60587 provides the data for interim status groundwater monitoring.

#### **7 Results and Conclusions**

Based on the evaluations of waste constituents associated with WMA B-BX-BY from the SST System Part A Permit Application and constituents that were detected in groundwater during interim status

monitoring (detailed in Chapter 3), proposed groundwater monitoring constituents for WMA B-BX-BY were identified.

## 7.1 Results from Evaluation of Dangerous Wastes from the SST System Part A Application

Forty-six distinct dangerous wastes were identified from the Hanford Facility RCRA Permit Part A Application for the SST System unit group, which includes the WMA B-BX-BY SSTs (Table 1). Further screening for constituent mobility identified 27 mobile constituents with a  $K_d \leq 0.8$  that were retained for further evaluation as potential monitoring constituents (Table 1 and Table 3). Eight constituents did not have associated  $K_d$  values and, therefore, were not evaluated for mobility (Table 1). However, these eight constituents were conservatively retained for further evaluation as potential monitoring constituents (Table 3).

**Table 3. Mobile Dangerous Waste Identified in the Single-Shell Tank System Unit Group Retained as Potential Monitoring Constituents**

Dangerous Waste Code	Waste Constituent	CAS Number
D018	Benzene	71-43-2
D019	Carbon tetrachloride	56-23-5
D022	Chloroform	67-66-3
D028	1,2-Dichloroethane	107-06-2
D029	1,1-Dichloroethylene	75-35-4
D030	2,4-Dinitrotoluene	121-14-2
D035	Methyl ethyl ketone	78-93-3
D036	Nitrobenzene	98-95-3
D038	Pyridine*	110-86-1
D039	Tetrachloroethylene	127-18-4
D040	Trichloroethylene	79-01-6
D043	Vinyl chloride	75-01-4
F001	1,1,1-Trichloroethane	71-55-6
F001	Carbon tetrachloride	56-23-5
F001	Methylene chloride	75-09-2
F001	Tetrachloroethylene	127-18-4
F001	Trichloroethylene	79-01-6
F002	1,1,1-Trichloroethane	71-55-6
F002	1,1,2-Trichloro-1,2,2-trifluoroethane*	76-13-1
F002	1,1,2-Trichloroethane	79-00-5
F002	Chlorobenzene	108-90-7
F002	Methylene chloride	75-09-2
F002	Ortho-dichlorobenzene	95-50-1

**Table 3. Mobile Dangerous Waste Identified in the Single-Shell Tank System Unit Group Retained as Potential Monitoring Constituents**

Dangerous Waste Code	Waste Constituent	CAS Number
F002	Tetrachloroethylene	127-18-4
F002	Trichloroethylene	79-01-6
F002	Trichlorofluoromethane	75-69-4
F003	Acetone	67-64-1
F003	Cyclohexanone*	108-94-1
F003	Ethyl acetate	141-78-6
F003	Ethyl benzene	100-41-4
F003	Ethyl ether	60-29-7
F003	Methanol	67-56-1
F003	Methyl isobutyl ketone	108-10-1
F003	N-Butyl alcohol	71-36-3
F003	Xylene	1330-20-7
F004	Cresols*	1319-77-3
F004	Cresylic acid*	93-51-6
F004	Nitrobenzene	98-95-3
F005	2-Ethoxyethanol*	110-80-5
F005	2-Nitropropane*	79-46-9
F005	Carbon disulfide	75-15-0
F005	Isobutanol*	78-83-1
F005	Toluene	108-88-3

\*No established distribution coefficient is available for constituent; therefore, mobility was not evaluated.

CAS = Chemical Abstracts Service

## 7.2 Results from Evaluation of Groundwater Data Collected under Interim Status Monitoring Plans

The maximum result for each detected chemical in the WMA B-BX-BY interim status groundwater monitoring dataset was compiled and compared to the Hanford Site 90<sup>th</sup> percentile groundwater background values (Table 2). Constituents that were detected above background values and non-naturally occurring constituents that do not have background values (N = 71) were retained as potential monitoring constituents (Table 4).

**Table 4. Constituents Detected Above Background Concentrations in the WMA B-BX-BY Interim Status Groundwater Dataset**

CAS Number	Constituent
4254-15-3	(2S)-Propane-1,2-diol
71-55-6	1,1,1-Trichloroethane
3648-21-3	1,2-Benzenedicarboxylic acid, diheptyl ester
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)
95-57-8	2-Chlorophenol
115-22-0	3-Hydroxy-3-methyl-2-butanone
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)
534-52-1	4,6-Dinitro-2-methylphenol
108-10-1	4-Methyl-2-pentanone
67-64-1	Acetone
98-86-2	Acetophenone
7429-90-5	Aluminum
7664-41-7	Ammonia
14798-03-9	Ammonium ion
75-85-4	Amylene hydrate
7440-36-0	Antimony
7440-38-2	Arsenic
7440-39-3	Barium
7440-41-7	Beryllium
117-81-7	Bis(2-ethylhexyl) phthalate
7440-42-8	Boron
24959-67-9	Bromide
994-05-8	Butane, 2-methoxy-2-methyl-
85-68-7	Butylbenzylphthalate
7440-43-9	Cadmium
7440-70-2	Calcium
56-23-5	Carbon tetrachloride
16887-00-6	Chloride
67-66-3	Chloroform
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
57-12-5	Cyanide

**Table 4. Constituents Detected Above Background Concentrations in the WMA B-BX-BY Interim Status Groundwater Dataset**

CAS Number	Constituent
556-67-2	Cyclotetrasiloxane, octamethyl
541-02-6	Decamethylcyclopentasiloxane
60-57-1	Dieldrin
84-69-5	Diisobutyl phthalate
84-74-2	Di-n-butylphthalate
117-84-0	Di-n-octylphthalate
16984-48-8	Fluoride
18540-29-9	Hexavalent chromium
7439-89-6	Iron
7439-92-1	Lead
7439-95-4	Magnesium
7439-96-5	Manganese
7439-97-6	Mercury
2110-78-3	Methyl 2-hydroxyisobutyrate
75-09-2	Methylene chloride
7439-98-7	Molybdenum
7440-02-0	Nickel
14797-55-8	Nitrate
14797-65-0	Nitrite
621-64-7	n-Nitrosodi-n-propylamine
86-30-6	n-Nitrosodiphenylamine
87-86-5	Pentachlorophenol
14797-73-0	Perchlorate anion
108-95-2	Phenol
14265-44-2	Phosphate
791-28-6	Phosphine oxide, triphenyl-
7440-09-7	Potassium
616-45-5	Pyrrolidin-2-one
7782-49-2	Selenium
7440-22-4	Silver
7440-23-5	Sodium
7440-24-6	Strontium
14808-79-8	Sulfate
18496-25-8	Sulfide

**Table 4. Constituents Detected Above Background Concentrations in the WMA B-BX-BY Interim Status Groundwater Dataset**

CAS Number	Constituent
7440-29-1	Thorium
7440-31-5	Tin
7440-62-2	Vanadium
7440-66-6	Zinc

CAS = Chemical Abstracts Service

### 7.3 Results from Final Monitoring Constituent Evaluation

One hundred distinct constituents were identified as potential monitoring constituents from the evaluations detailed in Sections 7.1 and 7.2. These constituents were identified by CAS number and are compiled in Table 5.

As described in Section 3.3, potential monitoring constituents that are also listed in Appendix 5 of Ecology Publication No. 97-407 were identified (Table 5). Monitoring for the dangerous wastes listed in Appendix 5 of Ecology Publication No. 97-407 has already been prescribed for WMA B-BX-BY. Therefore, the 58 potential monitoring constituents that are also included in Appendix 5 of Ecology Publication No. 97-407 were identified as proposed monitoring constituents.

The remaining potential monitoring constituents (N = 42) were evaluated in two groups (Table 5 provides details of the evaluation outcomes for these constituents):

- The first group comprised the potential monitoring constituents identified from the SST System Part A Permit Application (Section 3.1) that are not included in Appendix 5 of Ecology Publication No. 97-407. Each of these constituents is a dangerous waste.
- The second group comprised the potential monitoring constituents identified from the evaluation of the interim status groundwater results (Section 3.2) that are not included in Appendix 5 of Ecology Publication No. 97-407 and were not identified from the Part A Permit Application.

The remaining potential monitoring constituents in the first group (N = 9) were evaluated for availability of analysis (Table 5). Two of the potential monitoring constituents are not routinely analyzed by commercial laboratories and were removed as potential monitoring constituents. Each of the remaining potential monitoring constituents from the first group (N = 7) were identified as proposed monitoring constituents (Table 5).

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
100-41-4	Ethyl benzene	Yes (SST System Part A)	Yes	Yes
107-06-2	1,2-Dichloroethane	Yes (SST System Part A)	Yes	Yes
108-10-1	4-Methyl-2-pentanone	Yes (Interim Status Detection)	Yes	Yes
108-10-1	Methyl isobutyl ketone	Yes (SST System Part A)	Yes	Yes
108-88-3	Toluene	Yes (SST System Part A)	Yes	Yes
108-90-7	Chlorobenzene	Yes (SST System Part A)	Yes	Yes
108-94-1	Cyclohexanone	Evaluate (SST System Part A)	No	Yes - dangerous waste in SST System Part A
108-95-2	Phenol	Yes (Interim Status Detection)	Yes	Yes
110-80-5	2-Ethoxyethanol	Evaluate (SST System Part A)	No	No - not routinely analyzed by commercial laboratories
110-86-1	Pyridine	Evaluate (SST System Part A)	Yes	Yes
115-22-0	3-Hydroxy-3-methyl-2-butanone	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
117-81-7	Bis(2-ethylhexyl) phthalate	Yes (Interim Status Detection)	Yes	Yes
117-84-0	Di-n-octylphthalate	Yes (Interim Status Detection)	Yes	Yes
121-14-2	2,4-Dinitrotoluene	Yes (SST System Part A)	Yes	Yes
127-18-4	Tetrachloroethene	Yes (SST System Part A)	Yes	Yes
1319-77-3	Cresols	Evaluate (SST System Part A)	Yes (as isomers) <sup>d</sup>	Yes
1330-20-7	Xylene	Yes (SST System Part A)	Yes	Yes
141-78-6	Ethyl acetate	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A
14265-44-2	Phosphate	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
14797-55-8	Nitrate	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked
14797-65-0	Nitrite	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked
14797-73-0	Perchlorate anion	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
14798-03-9	Ammonium ion	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
14808-79-8	Sulfate	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked
16887-00-6	Chloride	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
16984-48-8	Fluoride	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked
18496-25-8	Sulfide	Yes (Interim Status Detection)	Yes	Yes
18540-29-9	Hexavalent chromium	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
2110-78-3	Methyl 2-hydroxyisobutyrate	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
24959-67-9	Bromide	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
3648-21-3	1,2-Benzenedicarboxylic acid, diheptyl ester	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
4254-15-3	(2S)-Propane-1,2-diol	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	Yes (Interim Status Detection)	Yes	Yes
534-52-1	4,6-Dinitro-2-methylphenol	Yes (Interim Status Detection)	Yes	Yes
541-02-6	Decamethylcyclopentasiloxane	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
556-67-2	Cyclotetrasiloxane, Octamethyl	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
56-23-5	Carbon tetrachloride	Yes (Interim Status Detection)	Yes	Yes
56-23-5	Carbon tetrachloride	Yes (SST System Part A)	Yes	Yes
57-12-5	Cyanide	Yes (Interim Status Detection)	Yes	Yes

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
60-29-7	Ethyl ether	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A
60-57-1	Dieldrin	Yes (Interim Status Detection)	Yes	Yes
616-45-5	Pyrrolidin-2-one	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
621-64-7	n-Nitrosodi-n-propylamine	Yes (Interim Status Detection)	Yes	Yes
67-56-1	Methanol	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A
67-64-1	Acetone	Yes (Interim Status Detection)	Yes	Yes
67-64-1	Acetone	Yes (SST System Part A)	Yes	Yes
67-66-3	Chloroform	Yes (Interim Status Detection)	Yes	Yes
67-66-3	Chloroform	Yes (SST System Part A)	Yes	Yes
71-36-3	n-Butyl alcohol	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A
71-43-2	Benzene	Yes (SST System Part A)	Yes	Yes
71-55-6	1,1,1-Trichloroethane	Yes (Interim Status Detection)	Yes	Yes
71-55-6	1,1,1-Trichloroethane	Yes (SST System Part A)	Yes	Yes
7429-90-5	Aluminum	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
7439-89-6	Iron	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked
7439-92-1	Lead	Yes (Interim Status Detection)	Yes	Yes
7439-95-4	Magnesium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
7439-96-5	Manganese	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 <sup>e</sup> as present in WMA B-BX-BY SSTs that have leaked
7439-97-6	Mercury	Yes (Interim Status Detection)	Yes	Yes
7439-98-7	Molybdenum	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste; maximum result less than action level
7440-02-0	Nickel	Yes (Interim Status Detection)	Yes	Yes
7440-09-7	Potassium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
7440-22-4	Silver	Yes (Interim Status Detection)	Yes	Yes
7440-23-5	Sodium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
7440-24-6	Strontium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste; maximum result less than action level
7440-29-1	Thorium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
7440-31-5	Tin	Yes (Interim Status Detection)	Yes	Yes
7440-36-0	Antimony	Yes (Interim Status Detection)	Yes	Yes
7440-38-2	Arsenic	Yes (Interim Status Detection)	Yes	Yes
7440-39-3	Barium	Yes (Interim Status Detection)	Yes	Yes
7440-41-7	Beryllium	Yes (Interim Status Detection)	Yes	Yes
7440-42-8	Boron	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste; maximum result less than action level
7440-43-9	Cadmium	Yes (Interim Status Detection)	Yes	Yes
7440-47-3	Chromium	Yes (Interim Status Detection)	Yes	Yes
7440-48-4	Cobalt	Yes (Interim Status Detection)	Yes	Yes
7440-50-8	Copper	Yes (Interim Status Detection)	Yes	Yes
7440-62-2	Vanadium	Yes (Interim Status Detection)	Yes	Yes
7440-66-6	Zinc	Yes (Interim Status Detection)	Yes	Yes
7440-70-2	Calcium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
75-01-4	Vinyl chloride	Yes (SST System Part A)	Yes	Yes
75-09-2	Methylene chloride	Yes (Interim Status Detection)	Yes	Yes

**Table 5. Evaluation of Potential Monitoring Constituents**

<b>CAS Number</b>	<b>Potential Monitoring Constituent</b>	<b>Retained for Evaluation as Monitoring Constituent (Source)<sup>a</sup></b>	<b>Is Constituent Identified in Appendix 5? (Yes/No)<sup>b</sup></b>	<b>Identified as Proposed Monitoring Constituent?<sup>c</sup> (Yes/No)</b>
75-09-2	Methylene chloride	Yes (SST System Part A)	Yes	Yes
75-15-0	Carbon disulfide	Yes (SST System Part A)	Yes	Yes
75-35-4	1,1-Dichloroethylene	Yes (SST System Part A)	Yes	Yes
75-69-4	Trichlorofluoromethane	Yes (SST System Part A)	Yes	Yes
75-85-4	Amylene Hydrate	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	Evaluate (SST System Part A)	No	Yes - dangerous waste in SST System Part A
7664-41-7	Ammonia	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
7782-49-2	Selenium	Yes (Interim Status Detection)	Yes	Yes
78-83-1	Isobutanol	Evaluate (SST System Part A)	Yes	Yes
78-93-3	Methyl ethyl ketone	Yes (SST System Part A)	Yes	Yes
79-00-5	1,1,2-Trichloroethane	Yes (SST System Part A)	Yes	Yes
79-01-6	Trichloroethylene	Yes (SST System Part A)	Yes	Yes
791-28-6	Phosphine oxide, triphenyl-	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
79-46-9	2-Nitropropane	Evaluate (SST System Part A)	No	Yes - dangerous waste in SST System Part A
84-69-5	Diisobutyl Phthalate	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories
84-74-2	Di-n-butylphthalate	Yes (Interim Status Detection)	Yes	Yes
85-68-7	Butylbenzylphthalate	Yes (Interim Status Detection)	Yes	Yes
86-30-6	n-Nitrosodiphenylamine	Yes (Interim Status Detection)	Yes	Yes
87-86-5	Pentachlorophenol	Yes (Interim Status Detection)	Yes	Yes

**Table 5. Evaluation of Potential Monitoring Constituents**

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source) <sup>a</sup>	Is Constituent Identified in Appendix 5? (Yes/No) <sup>b</sup>	Identified as Proposed Monitoring Constituent? <sup>c</sup> (Yes/No)
93-51-6	Cresylic acid	Evaluate (SST System Part A)	No	No - related compound included; not routinely analyzed by commercial laboratories <sup>f</sup>
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	Yes (Interim Status Detection)	Yes	Yes
95-50-1	Ortho-dichlorobenzene	Yes (SST System Part A)	Yes	Yes
95-57-8	2-Chlorophenol	Yes (Interim Status Detection)	Yes	Yes
98-86-2	Acetophenone	Yes (Interim Status Detection)	Yes	Yes
98-95-3	Nitrobenzene	Yes (SST System Part A)	Yes	Yes
994-05-8	Butane, 2-methoxy-2-methyl-	Yes (Interim Status Detection)	No	No - not routinely analyzed by commercial laboratories <sup>g</sup>

a. This column presents constituents that were identified as potential monitoring constituents from the evaluations detailed in Sections 7.1 and 7.2. "Source" identifies the specific dataset evaluation from which the constituent was identified as a potential monitoring constituent. "Yes" indicates that the constituent has a  $K_d$  less than or equal to that of hexavalent chromium. "Evaluate" indicates that no  $K_d$  was available for comparison.

b. This column identifies potential monitoring constituents that are also dangerous wastes identified in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*. The potential monitoring constituents that are also identified in Appendix 5 of Ecology Publication No. 97-407 are identified as proposed monitoring constituents.

c. Rationale is provided for only those constituents that are not identified in Appendix 5 of Ecology Publication No. 97-407.

d. The isomers of cresol (m-, p-, and o- cresol) are identified in Appendix 5 of Ecology Publication No. 97-407.

e. Table 2-2 in SGW-60587, *Engineering Evaluation Report For Single Shell Tank Waste Management Area B-BX-BY Groundwater Monitoring*, provides the nonradiological waste discharge profiles for the WMA B-BX-BY SSTs that have leaked.

f. Cresylic acid is a mixture of compounds and is characterized by the analysis of m-, o-, and p-cresol (cresols) and 2,6-di-t-butyl-4-methylphenol (CAS number 128-37-0). Cresols is included as a proposed monitoring constituent. 2,6-Di-t-butyl-4-methylphenol is not routinely analyzed by commercial laboratories.

g. Butane, 2-methoxy-2-methyl- (CAS number 994-05-8) was reported as a tentatively identified compound in a single sample result within the WMA B-BX-BY interim status dataset. One commercial laboratory is able to analyze this compound with advance notice and planning. However, there is no alternate laboratory available in the event that the laboratory encounters unexpected issues and is unable to perform the analysis. Therefore, this chemical is not included as a proposed monitoring constituent.

CAS = Chemical Abstracts Service

$K_d$  = distribution coefficient

SST = single-shell tank

WMA = waste management area

The remaining potential monitoring constituents in the second group (N = 33) were evaluated as follows:

- Constituents that are also dangerous wastes were identified as proposed monitoring constituents.
- The remaining nondangerous constituents detected in groundwater were evaluated individually for one or more of the following:
  - Identification of related chemicals (e.g., parent compounds and isomers) that were already identified as proposed monitoring constituents
  - Identification of potential monitoring constituents that are not routinely analyzed by commercial laboratories
  - Comparison of the maximum groundwater concentration of the potential monitoring constituent to the federal or state action level (Table 6)
  - Determination if a potential monitoring constituent was identified as present in the waste discharge profile for the WMA B-BX-BY SSTs that have leaked (Table 2-2 in SGW-60587)

Of the remaining 33 potential monitoring constituents, 2 are dangerous wastes and were included as proposed monitoring constituents (Table 5). None of the remaining potential monitoring constituents were already identified for monitoring by related chemicals. Eleven of the remaining constituents are not routinely analyzed by commercial laboratories and were removed from consideration as a potential monitoring constituent.

A comparison of the maximum concentration to the action level showed that 8 of the remaining 20 nondangerous constituents exceeded the action level during the interim status monitoring period and were identified as proposed monitoring constituents (Table 5). Table 6 presents this comparison and identifies the sample date and well from which the sample originated. Each of the eight constituents that exceeded the action level during the interim status monitoring period were identified in the waste discharge profile for the WMA B-BX-BY SSTs that have leaked (Table 2-2 in SGW-60587). The remaining 12 constituents were removed from consideration as potential monitoring constituents.

In summary, 75 constituents were identified as proposed monitoring constituents to detect and monitor any groundwater impacts from dangerous waste releases at WMA B-BX-BY. Eight of the 75 constituents are nondangerous constituents that were quantified in groundwater above the applicable action level and were identified in the waste discharge profile for the WMA B-BX-BY SSTs that have leaked.

**Table 6. Comparison of Maximum Interim Status Groundwater Monitoring Results of Nondangerous Waste Constituents to Action Levels**

CAS Number	Constituent	Maximum Concentration (µg/L)	Well with Maximum Concentration	Sample Date of Maximum	Action Level (µg/L)	Action Level Basis	Maximum Concentration Exceeds Action Level? (Yes/No/N/A)
7429-90-5	Aluminum	675	299-E33-344	22-May-2009	50	40 CFR 143.3	Yes
14798-03-9	Ammonium ion	773	299-E33-344	12-Nov-2009	Not available	N/A	N/A
7440-42-8	Boron	93	299-E33-41	23-Nov-2015	3200	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
24959-67-9	Bromide	1440	299-E33-31	1-Jun-2011	Not available	N/A	N/A
7440-70-2	Calcium	390000	299-E33-31	8-Dec-2015	Not available	N/A	N/A
16887-00-6	Chloride	523,000	299-E33-4	16-Feb-2010	250000	40 CFR 143.3	Yes
16984-48-8	Fluoride	97,200	299-E33-344	19-Dec-2010	640	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
7439-89-6	Iron	5240	299-E33-18	9-Jul-1991	11200	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
7439-95-4	Magnesium	106000	299-E33-31	14-Nov-08	Not available	N/A	N/A
7439-95-4	Magnesium	106000	299-E33-47	1-May-2013	Not available	N/A	N/A
7439-96-5	Manganese	632	299-E33-337	14-Jul-2011	50	40 CFR 143.3	Yes
7439-98-7	Molybdenum	12.5	299-E33-44	27-Jul-2011	80	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
14797-55-8	Nitrate	1890000	299-E33-4	9-May-2005	45000	40 CFR 141.62	Yes
14797-65-0	Nitrite	14400	299-E33-342	22-Dec-2009	1000	40 CFR 141.62	Yes
14797-73-0	Perchlorate anion	500	299-E33-43	21-Sep-1993	Not available	N/A	N/A
14265-44-2	Phosphate	1720	299-E33-16	13-Nov-2007	Not available	N/A	N/A
7440-09-7	Potassium	51100	299-E33-24	4-Apr-1991	Not available	N/A	N/A
7440-23-5	Sodium	807000	299-E33-344	26-Jun-2009	Not available	N/A	N/A
7440-24-6	Strontium	2310	299-E33-7	10-Aug-2008	9600	WAC 173-340-720(4)(b)(iii)(A) and (B)	No

**Table 6. Comparison of Maximum Interim Status Groundwater Monitoring Results of Nondangerous Waste Constituents to Action Levels**

CAS Number	Constituent	Maximum Concentration (µg/L)	Well with Maximum Concentration	Sample Date of Maximum	Action Level (µg/L)	Action Level Basis	Maximum Concentration Exceeds Action Level? (Yes/No/N/A)
14808-79-8	Sulfate	1100000	299-E33-31	27-Nov-2000	250000	40 CFR 143.3	Yes
7440-29-1	Thorium	0.899	299-E33-31	2-Feb-2016	Not available	N/A	N/A

References: 40 CFR 141.62, "National Primary Drinking Water Regulations," "Maximum Contaminant Levels for Inorganic Contaminants"

40 CFR 143.3, "National Secondary Drinking Water Regulations," "Secondary Maximum Contaminant Levels"

WAC 173-340-720, "Model Toxics Control Act—Cleanup," "Groundwater Cleanup Standards"

N/A = not applicable

## 7.4 Conclusions

Based on the evaluation of the dangerous wastes identified from the SST System Part A Permit Application and groundwater data collected for WMA B-BX-BY under interim status monitoring plans, 75 waste constituents are identified as proposed monitoring constituents to detect and monitor any groundwater impacts from dangerous waste releases at WMA B-BX-BY (Table 7). Eight of the 75 are nondangerous waste constituents that were quantified in groundwater above the applicable action level and were identified in the waste discharge profile for the WMA B-BX-BY SSTs that have leaked.

**Table 7. Proposed Groundwater Monitoring Constituents for WMA B-BX-BY**

Waste Constituent	CAS Number
<b>Dangerous Waste Constituents</b>	
1,1-Dichloroethylene	75-35-4
1,1,1-Trichloroethane	71-55-6
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1
1,1,2-Trichloroethane	79-00-5
1,2-Dichloroethane	107-06-2
2,4-D(2,4-Dichlorophenoxyacetic acid)	94-75-7
2,4-Dinitrotoluene	121-14-2
2-Chlorophenol	95-57-8
2-Nitropropane	79-46-9
4,4'-DDT (Dichlorodiphenyltrichloroethane)	50-29-3
4,6-Dinitro-2-methylphenol	534-52-1
Acetone (2-Propanone)	67-64-1
Acetophenone	98-86-2
Ammonia	7664-41-7
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Benzene	71-43-2
Beryllium	7440-41-7
Bis(2-ethylhexyl) phthalate	117-81-7
Butylbenzylphthalate	85-68-7
Cadmium	7440-43-9
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroform	67-66-3

**Table 7. Proposed Groundwater Monitoring Constituents for WMA B-BX-BY**

<b>Waste Constituent</b>	<b>CAS Number</b>
Chromium	7440-47-3
Cobalt	7440-48-4
Copper	7440-50-8
Cresols	1319-77-3
Cyanide	57-12-5
Cyclohexanone	108-94-1
Dieldrin	60-57-1
Di-n-butylphthalate	84-74-2
Di-n-octylphthalate	117-84-0
Ethyl acetate	141-78-6
Ethyl benzene	100-41-4
Ethyl ether	60-29-7
Hexavalent chromium	18540-29-9
Isobutanol (Isobutyl alcohol)	78-83-1
Lead	7439-92-1
Mercury	7439-97-6
Methanol	67-56-1
Methyl ethyl ketone (2-Butanone)	78-93-3
Methyl isobutyl ketone (4-Methyl-2-pentanone)	108-10-1
Methylene chloride	75-09-2
n-Butyl alcohol (1-Butanol)	71-36-3
Nickel	7440-02-0
Nitrobenzene	98-95-3
n-Nitrosodi-n-propylamine	621-64-7
n-Nitrosodiphenylamine	86-30-6
o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1
Pentachlorophenol	87-86-5
Phenol	108-95-2
Pyridine	110-86-1
Selenium	7782-49-2
Silver	7440-22-4
Sulfide	18496-25-8
Tetrachloroethene	127-18-4
Tin	7440-31-5

**Table 7. Proposed Groundwater Monitoring Constituents for WMA B-BX-BY**

Waste Constituent	CAS Number
Toluene	108-88-3
Trichloroethylene	79-01-6
Trichlorofluoromethane	75-69-4
Vanadium	7440-62-2
Vinyl chloride (Chloroethene)	75-01-4
Xylenes (total)	1330-20-7
Zinc	7440-66-6
Nondangerous Waste Constituents	
Aluminum	7429-90-5
Chloride	16887-00-6
Fluoride	16984-48-8
Iron	7439-89-6
Manganese	7439-96-5
Nitrate	14797-55-8
Nitrite	14797-65-0
Sulfate	14808-79-8

CAS = Chemical Abstracts Service

## 8 References

- 40 CFR 141.62, "National Primary Drinking Water Regulations," "Maximum Contaminant Levels for Inorganic Contaminants," *Code of Federal Regulations*. Available at: [https://www.ecfr.gov/cgi-bin/text-idx?SID=f9e1d56f98beea0a22531c076ec27ab6&mc=true&tpl=/ecfrbrowse/Title40/40cfr141main\\_02.tpl](https://www.ecfr.gov/cgi-bin/text-idx?SID=f9e1d56f98beea0a22531c076ec27ab6&mc=true&tpl=/ecfrbrowse/Title40/40cfr141main_02.tpl).
- 40 CFR 143.3, "National Secondary Drinking Water Regulations," "Secondary Maximum Contaminant Levels," *Code of Federal Regulations*. Available at: [https://www.ecfr.gov/cgi-bin/text-idx?SID=4e32f1ae13171430ec577ff46796c27f&mc=true&node=pt40.25.143&rgn=div5#se40.25.143\\_13](https://www.ecfr.gov/cgi-bin/text-idx?SID=4e32f1ae13171430ec577ff46796c27f&mc=true&node=pt40.25.143&rgn=div5#se40.25.143_13).
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- WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Revision 8c, as amended, Washington State Department of Ecology. Available at: <https://fortress.wa.gov/ecy/nwp/permitting/hdwp/rev/8c/index.html>.
- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington. Available at: <http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303>.
- 173-303-645, "Releases from Regulated Units."
- 173-303-9904, "Dangerous Waste Sources List."

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## **Appendix A**

### **Supplemental Identification of Site-Specific Monitoring Constituents for Waste Management Area B-BX-BY**

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<b>ENVIRONMENTAL CALCULATION COVER PAGE</b>	
<b>SECTION 1 - Completed by the Responsible Manager</b>	
<b>Project:</b> RCRA Interim to Final Closure Plans	<b>RELEASE / ISSUE</b>
<b>Date:</b> 03/14/2019	
<b>Calculation Title and Description:</b> Identification of Site-Specific Monitoring Constituents for Waste Management Area B-BX-BY  Appendix A is a supplemental evaluation of the WMA B-BX-BY data included in the environmental calculation file.	
<b>Qualifications Summary</b>	
<b>Preparer(s):</b>	
<b>Name:</b> Donna Morgans	
<b>Degree, Major, Institution, Year:</b> MS, Environmental Toxicology, Oregon State University, 2003 BS, Microbiology, Oregon State University, 1986	
<b>Professional Licenses:</b>	
<b>Brief Narrative of Experience:</b> Donna Morgans' professional experience has focused on assessing the potential for adverse human health effects associated with exposure to radiological and nonradiological contaminants in air, soil, water, and animal and plant tissues. In support of restoration efforts to address contamination in a variety of environmental media, she has managed and performed complex risk assessment and data compilation efforts to address a host of federal, state, and local regulations that include Comprehensive Environmental Response, Compensation, and Liability Act lifecycle decisions. Donna is also proficient in the application of aspects related to CERCLA including the development and review of work plans, remedial investigations, feasibility studies, and proposed plans. She has applied this knowledge to a variety of environmental projects and programs for private industry clients and federal government agencies. She has experience in developing risk assessment products and incorporating the appropriate federal and state regulatory requirements on projects throughout the US. Donna also has experience in the statistical evaluation of analytical data to determine population distributions using ProUCL and modeling the effects from exposure to radiological contaminants in soil using RESRAD.	

<b>ENVIRONMENTAL CALCULATION COVER PAGE (Continued)</b>	
<b>Checker(s):</b>	
<b>Name:</b> Sara Lindberg	
<b>Degree, Major, Institution, Year:</b> BS, Chemistry, Whitman College, 1986	
<b>Professional Licenses:</b>	
<b>Brief Narrative of Experience:</b>	Sara Lindberg's professional environmental consulting experience encompasses environmental chemistry, software development, and environmental science. Her efforts have focused primarily in hazardous waste regulatory work and environmental documentation, including environmental data analysis in support of the Comprehensive Environmental Response, Compensation, and Liability Act remedial investigation/feasibility study process, Resource Conservation and Recovery Act permitting of hazardous waste treatment, storage, and disposal facilities at federal facilities, and analytical chemistry. She has prepared compliance plans, permit applications, and sampling and analysis plans, as well as systems for verifying and validating environmental analytical data to ensure completeness and accuracy. Sara spent two years as a member of a software development team responsible for a database management tool for the preparation and maintenance of metadata. She is a proficient code developer in HTML, ASP, and XML and has experience working in the US EPA code, ProUCL.

<b>ENVIRONMENTAL CALCULATION COVER PAGE (Continued)</b>			
<b>Senior Reviewer(s):</b>			
Name: Mahmudur Rahman			
Degree, Major, Institution, Year: PhD, Environmental Science, Oklahoma State University, 2000 MS, Environmental Science, Oklahoma state University, 1997 BS, Mechanical Engineering, Bangladesh University of Engineering and Technology, 1992			
<b>Professional Licenses:</b>			
<p><b>Brief Narrative of Experience:</b> Mahmudur Rahman's professional experience has focused on managing numerous soil and groundwater remedial action program projects. His project work has encompassed performing both radiological and chemical baseline human health risk assessments and screening level ecological risk assessments, data review and validation, statistical data analysis and database management, evaluating site characterization results, deriving cleanup criteria for radiological and chemical contaminants, and determining media-specific background concentrations. Mahmudur's experience also includes estimating environmental cost analysis, conducting air quality analyses, and developing remedial action planning documents including federally approved quality assurance plans, baseline risk assessment work plans, remedial investigation and feasibility study plans, and remedial action work plans. In addition to his planning documentation expertise, Mahmudur's experience also includes development of reports that document remedial action project results including ISO 9001 and NQA-01 approved documents, engineering evaluation and cost analysis, decommissioning plans, five-year reviews, record of decision documents, annual monitoring reports for groundwater, surface water and sediment monitoring reports for storm water and treated wastewater, final status survey plans, post-remedial action reports, and site closeout reports consistent with EPA and NRC requirements along with other regulatory programs.</p>			
<b>SECTION 2 - Completed by Preparer</b>			
Calculation Number: ECF-200BP5-17-0229			Revision Number: 0
Revision History			
Revision No.	Description	Date	Affected Pages
0	Initial Issue		
<b>SECTION 3 - Completed by the Responsible Manager</b>			
<b>Document Control:</b>			
Is the document intended to be controlled within the Document Management Control System (DMCS)? <input checked="" type="radio"/> Yes <input type="radio"/> No			
Does document contain scientific and technical information intended for public use? <input checked="" type="radio"/> Yes <input type="radio"/> No			
Does document contain controlled-use information? <input type="radio"/> Yes <input checked="" type="radio"/> No			
<b>SECTION 4 - Document Review and Approval</b>			
<b>Preparer(s):</b>			
Donna Morgans <small>Print First and Last Name</small>	Sr Risk Specialist <small>Position</small>	 <small>Signature</small>	4/2/19 <small>Date</small>

<b>ENVIRONMENTAL CALCULATION COVER PAGE (Continued)</b>			
<b>Checker(s):</b>			
<u>Sara Lindberg</u> <small>Print First and Last Name</small>	<u>Risk Specialist</u> <small>Position</small>	 <small>Signature</small>	<u>4/3/2019</u> <small>Date</small>
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<b>SECTION 5 - Applicable if Calculation is a Risk Assessment or Uses an Environmental Model</b>			
<b>Prior to Initiating Modeling:</b>			
Required training for modelers completed:			
Integration Lead:			
_____	_____	_____	_____
<small>Print First and Last Name</small>	<small>Signature</small>	<small>Signature</small>	<small>Date</small>
Safety Software Approved:			
Integration Lead:			
_____	_____	_____	_____
<small>Print First and Last Name</small>	<small>Signature</small>	<small>Signature</small>	<small>Date</small>
<b>Calculation Approved:</b>			
Risk/Modeling Integration Manager:			
<u>WE NICHOLS, ACTING for AH AZY</u> <small>Print First and Last Name</small>	 <small>Signature</small>	<u>3 APR 2019</u> <small>Date</small>	

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## A1 Purpose

This appendix provides additional information and analyses that could be used to further refine the specific monitoring constituents for Waste Management Area (WMA) B-BX-BY.

## A2 Background

The methodology used in ECF-200BP5-17-0229, *Identification of Site-Specific Monitoring Constituents for Waste Management Area B-BX-BY* to identify the proposed monitoring constituents includes the following steps:

1. Constituents identified as dangerous wastes in the Single-Shell Tank Part A Permit (WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*) were screened depending on their mobility through the vadose zone soil. Mobile constituents were identified by comparing chemical-specific distribution coefficients ( $K_{ds}$ ) to a Hanford Site-derived  $K_d$  value of 0.8 mL/g that was developed and applied to hexavalent chromium (a known mobile constituent in Hanford Site vadose soils) (Section 6.1 in ECF-Hanford-11-0165, *Evaluation of Hexavalent Chromium Leach Test Data Conducted on Vadose Zone Sediment Samples from the 100 Area*). Constituents with a  $K_d \leq 0.8$  mL/g were identified as mobile constituents and further evaluated as potential monitoring constituents (Table A-1).
2. Appendix A of SGW-60587, *Engineering Evaluation Report For Single Shell Tank Waste Management Area B-BX-BY Groundwater Monitoring*, includes a summary of the interim status groundwater monitoring history at WMA B-BX-BY through 2016, including the changes to the well network and monitoring constituents. Groundwater sample results collected under interim status monitoring plans are presented for each well.
3. Maximum concentrations for any constituent detected within the WMA B-BX-BY well network is compiled. These concentrations were compared to the Hanford Site 90th percentile background concentration when available. When the maximum detected concentration exceeded the respective background concentration or a background concentration was not available, the detected constituent was maintained for further evaluation as a potential monitoring constituent (Table A-2).
4. Constituents identified in Steps 1 and 2 were compared to constituents that are listed in Appendix 5 of Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*. If the constituents identified in Steps 1 and 2 are also included in Appendix 5 of Ecology Publication No. 97-407 they were identified as proposed monitoring constituents.
5. The final step to identify proposed monitoring constituents was to review interim status groundwater detections that were not already identified as proposed monitoring constituents through the preceding evaluation of the Part A constituents.
6. Any remaining constituents were evaluated individually for one or more of the following:
  - Identification of related chemicals (e.g., parent compounds and isomers) that were already identified as proposed monitoring constituents (evaluated on a case-by-case basis).
  - Identification of any potential monitoring constituent that is not routinely analyzed by commercial laboratories. Any potential monitoring constituent that is not routinely analyzed by commercial laboratories was removed from consideration as a proposed monitoring constituent.

- Comparison of the maximum groundwater concentration of the potential monitoring constituent to the federal or state action level (evaluated on a case-by-case basis).
- Determination if a potential monitoring constituent was identified as present in the waste discharge profile for the WMA B-BX-BY SSTs that have leaked (Table 2-2 in SGW-60587) (evaluated on a case-by-case basis).

**Table A-1. Wells, Sample Date Range, and Class of Constituents Evaluated in ECF-200BP5-17-0229**

Well Name	Sample Date Range	Class of Constituents Analyzed
299-E28-8	4/16/1998 – 8/1/2012	Inorganic nonmetals and metals
299-E28-26	2/5/2000 – 12/4/2001	SVOCs, inorganic nonmetals, metals
299-E28-27	2/5/2000 – 12/4/2001	Phenols, inorganic nonmetals, metals
299-E28-28	2/3/2000 – 12/4/2001	Phenols, inorganic nonmetals, metals
299-E32-2	2/3/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E32-3	2/4/2000 – 6/6/2001	Phenols, inorganic nonmetals, metals
299-E32-4	1/20/2000- 12/4/2001	Phenols, inorganic nonmetals, metals
299-E32-5	2/4/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E32-6	2/3/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E32-7	2/3/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E32-8	2/4/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E32-9	2/4/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E32-10	2/4/2000 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E33-1A	2/1/2005 – 11/4/2005	Inorganic nonmetals and metals
299-E33-2	2/1/2005 – 12/1/2005	Inorganic nonmetals and metals
299-E33-3	2/1/2005 – 11/15/2005	Inorganic nonmetals and metals
299-E33-4	2/4/2005 – 5/9/2005	Inorganic nonmetals and metals
299-E33-5	2/26/1990 – 5/5/1999	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, metals
299-E33-7	6/4/1998 – 8/16/2012	Inorganic nonmetals and metals
299-E33-8	2/26/1990 – 5/5/1999	phenol, inorganic nonmetals, herbicides, pesticides, metals
299-E33-9	4/12/2000 – 6/6/2012	Inorganic nonmetals and metals
299-E33-10	11/12/2002-5/5/2003	Inorganic nonmetals and metals
299-E33-13	4/15/1997 – 12/14/2000	Inorganic nonmetals and metals
299-E33-15	11/20/1997 – 5/1/2012	Inorganic nonmetals and metals
299-E33-16	8/27/1997 – 8/1/2012	Inorganic nonmetals and metals
299-E33-17	2/3/1998 – 8/29/2012	Inorganic nonmetals and metals

**Table A-1. Wells, Sample Date Range, and Class of Constituents Evaluated in ECF-200BP5-17-0229**

<b>Well Name</b>	<b>Sample Date Range</b>	<b>Class of Constituents Analyzed</b>
299-E33-18	4/10/1991 – 5/1/2013	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, PCB aroclors, metals
299-E33-20	4/13/2000 - 11/4/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-21	2/27/1990 – 5/7/2012	phenol, inorganic nonmetals, herbicides, pesticides, metals
299-E33-24	4/4/1991 – 1/23/1992	VOCs, SVOCs, inorganic nonmetals, pesticides, PCB aroclors, metals
299-E33-26	3/2/2000 – 9/12/2012	Inorganic nonmetals and metals
299-E33-28	6/3/1999 – 6/2/2005	Phenols, inorganic nonmetals, metals
299-E33-29	6/3/1999 – 12/15/2003	Phenols, inorganic nonmetals, metals,
299-E33-30	2/4/2000 – 12/6/2001	Phenols, inorganic nonmetals, metals
299-E33-31	2/27/1990 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, PCB aroclors, metals
299-E33-32	2/22/1990 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, PCB aroclors, metals
299-E33-33	2/22/1990 – 11/11/2002	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, PCB aroclors, metals
299-E33-34	2/16/2000 – 12/6/2001	Phenols, inorganic nonmetals, metals
299-E33-35	6/8/1999 – 12/5/2001	Phenols, inorganic nonmetals, metals
299-E33-36	7/30/1991 – 11/11/2002	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, PCB aroclors, metals, 2,3,7,8-TCDD
299-E33-38	3/11/1991 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-39	3/11/1991 – 8/1/2012	VOCs, SVOCs, inorganic nonmetals, metals
299-E33-41	7/25/1991 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, metals
299-E33-42	3/24/1992 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, herbicides, pesticides, metals
299-E33-43	3/24/1992 – 8/16/2012	Phenols, inorganic nonmetals, herbicides, pesticides, metals
299-E33-44	1/5/1999 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-47	11/30/2004 – 11/6/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-48	11/30/2004 – 11/6/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-49	11/30/2004 – 11/7/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals

**Table A-1. Wells, Sample Date Range, and Class of Constituents Evaluated in ECF-200BP5-17-0229**

Well Name	Sample Date Range	Class of Constituents Analyzed
299-E33-205	9/25/2009 – 9/23/2010	VOCs, SVOCs, inorganic nonmetals, metals
299-E33-334	1/5/2000 – 11/4/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-335	2/10/2000 – 11/7/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-337	8/22/2001 – 11/7/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-338	9/4/2001 – 11/6/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-339	8/21/2001 – 11/7/2016	VOCs, SVOCs, inorganic nonmetals, pesticides, metals
299-E33-341	1/5/2009 – 12/21/2010	VOCs, SVOCs, inorganic nonmetals, metals
299-E33-342	1/5/2009 – 12/21/2010	VOCs, SVOCs, inorganic nonmetals, metals
299-E33-343	1/5/2009 – 12/19/2010	VOCs, SVOCs, inorganic nonmetals, metals
299-E33-344	5/22/2009 – 12/19/2010	VOCs, SVOCs, inorganic nonmetals, metals
699-49-55A	3/2/2000 – 11/20/2000	Inorganic nonmetals and metals
699-49-57A	2/22/2000 – 11/20/2000	Inorganic nonmetals and metals
699-50-53A	7/28/2000	Inorganic nonmetals

Note: Metals results include filtered and unfiltered samples.

- PCB = polychlorinated biphenyl
- SVOC = semivolatile organic compounds
- VOC = volatile organic compounds

### **A3 Uncertainties Identified in Methodology for Final Evaluation of Proposed Monitoring Constituents**

The following additional steps could be performed to further reduce the list of constituents to be monitored. The steps could be implemented to address uncertainties associated with the methodology and provides additional considerations that would supplement the assessment results in the main text of this environmental calculation file.

#### **A3.1 Data Processing and Reduction**

The following additional steps could be applied in the data reduction and process:

1. Use routine sampling results in the evaluation. However, one sample represents characterization, and the characterization results could be eliminated from further consideration.
2. Further evaluate nondetect data to identify constituents that have not been detected over the duration of the sampling period.

3. Reduce parent and field duplicate sample results into a single set of results at a location and time of collection.
4. Identify laboratory contaminants. Sample results assigned a “B” laboratory qualifier for organics or a “C” qualifier for metals are typically laboratory contaminants and were identified, and could be removed as proposed monitoring constituents. The definition of the “B” laboratory qualifier is “The analyte was detected in both the associated QC blank and in the sample.” The definition of the “C” laboratory qualifier is “The analyte was detected in both the sample and the associated QC blank, and the sample concentration was  $\leq 5X$  the blank concentration.”
5. Do not include samples collected for informational purposes only. As a result, the well-specific sampling timeframe was shorter for some wells (see Appendix A of SGW-60587). Sample results from monitoring performed between 1989 and 2016 were included in the evaluation. The actual sampling period, however, varied from well to well depending on the status of the well within the monitoring network. Although the purpose of this evaluation was to consider anything detected for proposed monitoring, several constituents were detected sporadically in the 1990s and results were not reproducible over time.
6. Include filtered and unfiltered metals results in the initial evaluation. Only unfiltered results would be considered when future groundwater samples are compared to groundwater protection standards.

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Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
100-41-4	Ethyl benzene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
107-06-2	1,2-Dichloroethane	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
108-10-1	4-Methyl-2-pentanone	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. One detect in 1991; not associated with a plume or a trend. Well 299-E33-18 (1 detect of 4 samples)
108-88-3	Toluene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
108-90-7	Chlorobenzene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
108-94-1	Cyclohexanone	Evaluate (SST System Part A)	No	Yes. Dangerous waste in SST System Part A	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
108-95-2	Phenol	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single detect in one well; not associated with a plume or a trend. Well 299-E33-341 (1 detect of 8 samples) J flag
110-80-5	2-Ethoxyethanol	Evaluate (SST System Part A)	No	No. Not routinely analyzed by commercial laboratories	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
110-86-1	Pyridine	Evaluate (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
115-22-0	3-Hydroxy-3-methyl-2-butanone	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. Not in Part A or Appendix 5. Single detection at well 299-E33-343; is a tentatively identified compound and a toxicity value is not available.
117-81-7	Bis(2-ethylhexyl) phthalate	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Sporadic detections at 11 wells; not associated with a plume or a trend. Well 299-E33-18 (1 detect of 5 samples) J flag Well 299-E33-32 (1 detect of 8 samples) J flag Well 299-E33-334 (1 detect of 7 samples) Well 299-E33-335 (1 detect of 7 samples) Well 299-E33-341 (1 detect of 8 samples) J flag Well 299-E33-342 (3 detects of 6 samples) all J flags Well 299-E33-343 (1 detect of 6 samples) J flag Well 299-E33-344 (3 detects of 6 samples) 1 J flag Well 299-E33-38 (2 detects of 9 samples) both J flags Well 299-E33-39 (1 detect of 1 sample) J flag Well 299-E33-44 (2 detects of 11 samples) Well 299-E33-49 (1 detect of 7 samples)
117-84-0	Di-n-octylphthalate	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Sporadic detections at 4 wells; not associated with a plume or a trend. Well 299-E33-42 (1 detects of 6 samples) Well 299-E33-44 (2 detects of 11 samples) 1 J flag Well 299-E33-47 (1 detect of 8 samples) Well 299-E33-337 (1 detect of 8 samples)
121-14-2	2,4-Dinitrotoluene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
127-18-4	Tetrachloroethene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
1319-77-3	Cresols	Evaluate (SST System Part A)	Yes (as isomers) <sup>d</sup>	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
1330-20-7	Xylene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
141-78-6	Ethyl acetate	Yes (SST System Part A)	No	Yes. Dangerous waste in SST System Part A	Yes. Is a dangerous waste in SST System Part A. Not analyzed in groundwater between 1990 and 2016.
14265-44-2	Phosphate	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Not in Part A or Appendix 5. Five interim status detections and a toxicity value is not available.

Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
14797-55-8	Nitrate	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	Yes. Interim status detections of nitrate > MCL but not included in Part A or Appendix 5. Nitrate is include in the waste discharge profile for WMA B-BX-BY SSTs.
14797-65-0	Nitrite	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	Yes. Interim status detections of nitrite > MCL but not included in Part A or Appendix 5.
14797-73-0	Perchlorate anion	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Single detection at 299-E33-42 (1 detect of 7 samples) and a toxicity value is not available.
14798-03-9	Ammonium ion	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Interim status detections but a toxicity value is not available.
14808-79-8	Sulfate	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	Yes. Interim status detections. Sulfate is include in the waste discharge profile for WMA B-BX-BY SSTs. Interim status detections are greater than secondary MCL of 250,000 µg/L.
16887-00-6	Chloride	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	Yes. Interim status detections. Chloride is include in the waste discharge profile for WMA B-BX-BY SSTs. Chloride concentrations are greater than secondary MCL.
16984-48-8	Fluoride	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	No. Not identified in Appendix 5. Concentrations greater than background but sporadic detections above the risk-based concentration of 960 µg/L. Well 299-E33-4 (1 detect of 2 samples > RBC) Well 299-E33-31 (2 detects of 123 samples > RBC) Well 299-E33-38 (2 detects of 104 samples > RBC) Well 299-E33-39 (2 detects of 79 samples > RBC) Well 299-E33-41 (1 detect of 124 samples > RBC) Well 299-E33-44 (1 detect of 89 samples > RBC) Well 299-E33-344 (7 detects of 7 samples >RBC)
18496-25-8	Sulfide	Yes (Interim Status Detection)	Yes	Yes	Yes. Included in Appendix 5. A toxicity value is not available.
18540-29-9	Hexavalent chromium	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value, dangerous waste	Yes. Identified as a dangerous waste based on chromium. Interim status detects greater than risk based concentration above 48 µg/L.
2110-78-3	Methyl 2-hydroxyisobutyrate	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-342; is a tentatively identified compound and a toxicity value is not available.
24959-67-9	Bromide	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Not in Part A or Appendix 5. Interim status detections at 9 wells, a toxicity value is not available.
3648-21-3	1,2-Benzenedicarboxylic acid, diheptyl ester	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-342; is a tentatively identified compound and a toxicity value is not available.
4254-15-3	(2S)-Propane-1,2-diol	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-343; is a tentatively identified compound and a toxicity value is not available.

Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. One interim status detection flagged with a "B" laboratory qualifier indicating its presence is from laboratory contamination. Well 299-E33-33 (1 detect of 9 samples) B flag
534-52-1	4,6-Dinitro-2-methylphenol	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Two interim status detections flagged with a "B" laboratory qualifier indicating its presence is from laboratory contamination. Well 299-E33-33 (1 detect of 21 samples) BJ flag Well 299-E33-36 (1 detect of 22 samples) BJ flag
541-02-6	Decamethylcyclopentasiloxane	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-342; is a tentatively identified compound and a toxicity value is not available.
556-67-2	Cyclotetrasiloxane, Octamethyl	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-342; is a tentatively identified compound and a toxicity value is not available.
56-23-5	Carbon tetrachloride	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Sporadic detections at 3 wells; not associated with a plume or a trend. Well 299-E33-342 (1 detect of 6 samples) Well 299-E33-343 (1 detect of 6 samples) J flag Well 299-E33-344 (2 detects of 6 samples) both J flags
57-12-5	Cyanide	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Interim status detections > MCL of 200 µg/L.
60-29-7	Ethyl ether	Yes (SST System Part A)	No	Yes. Dangerous waste in SST System Part A	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
60-57-1	Dieldrin	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. One sporadic detect; not associated with a plume or a trend. Well 299-E33-42 (1 detect of 9 samples) L flag
616-45-5	Pyrrolidin-2-one	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-344; is a tentatively identified compound and a toxicity value is not available.
621-64-7	n-Nitrosodi-n-propylamine	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Sporadic detections at two wells; not associated with a plume or a trend. Well 299-E33-334 (1 of 7 samples) Well 299-E33-42 (1 of 6 samples)
67-56-1	Methanol	Yes (SST System Part A)	No	Yes. Dangerous waste in SST System Part A	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
67-64-1	Acetone	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. One sporadic detect flagged with a "B" laboratory qualifier indicating its presence is from laboratory contamination. Well 299-E33-36 (1 detect of 9 samples) B flag
67-66-3	Chloroform	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Sporadic detections at 5 wells; not associated with a plume or a trend. Well 299-E33-33 (1 detect of 6 samples) L flag Well 299-E33-342 (1 detects of 6 samples) J flag Well 299-E33-343 (1 detects of 6 samples) J flag Well 299-E33-344 (1 detects of 6 samples) J flag Well 299-E33-36 (3 detects of 12 samples) 2 B flags/1 L flag
71-36-3	n-Butyl alcohol	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A	Yes. Part A. Not detected in groundwater between 1990 and 2016.
71-43-2	Benzene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
71-55-6	1,1,1-Trichloroethane	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Sporadic detections at 2 wells; not associated with a plume or a trend. Well 299-E33-33 (1 detect of 6 samples) L flag Well 299-E33-36 (1 detects of 12 samples) L flag

Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
7429-90-5	Aluminum	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	No. Not a dangerous waste and not identified in Appendix 5. Aluminum concentrations > background but less than risk-based concentration of 16,000 µg/L. Aluminum is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7439-89-6	Iron	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	No. Not a Dangerous Waste and not identified in Appendix 5. Iron concentrations > background but less than risk-based concentration of 11,200 µg/L. Iron is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7439-92-1	Lead	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Lead concentrations > background and 2 detections above MCL in 1991. Not associated with a plume or a trend. Lead is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127). Well 299-E33-39 (1 detect of 22 samples > MCL) Well 299-E33-5 (1 of 17 samples > MCL)
7439-95-4	Magnesium	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Magnesium is an interim status detection and a toxicity value is not available.
7439-96-5	Manganese	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value; not a dangerous waste; maximum result greater than action level; identified in Table 2-2 in the 200-BP-5 RI report (DOE/RL-2009-127) as present in WMA B-BX-BY SSTs that have leaked	No. Not a Dangerous Waste and not identified in Appendix 5. Manganese concentrations > background and 3 detections above risk-based concentration of 384 µg/L. Not associated with a plume or a trend. Manganese is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127). Well 299-E33-337 (2 detects of 106 samples > RBC) Well 299-E33-4 (1 detect of 2 samples > RBC)
7439-97-6	Mercury	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Mercury concentrations are less than its risk-based concentration of 4.8 µg/L. Mercury is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7439-98-7	Molybdenum	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste; maximum result less than action level	No. Not a dangerous waste and not identified in Appendix 5. Molybdenum concentrations > background but less than risk-based concentration of 80 µg/L. Molybdenum is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-02-0	Nickel	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Nickel concentrations above MCL at 5 wells. Nickel is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-09-7	Potassium	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Potassium is an interim status detection and a toxicity value is not available.
7440-22-4	Silver	Yes (Interim Status Detection)	Yes	Yes	Yes. Included in Part A and Appendix 5. Silver concentrations > background single sporadic detect above risk-based concentration of 80 µg/L. Not associated with a plume or a trend. Silver is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127). Well 299-E33-42 (1 detect of 150 samples > RBC)
7440-23-5	Sodium	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Sodium is an interim status detection and a toxicity value is not available.
7440-24-6	Strontium	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste; maximum result less than action level	No. Not a dangerous waste and not identified in Appendix 5. Strontium concentrations > background but less than risk-based concentration of 9,600 µg/L. strontium is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-29-1	Thorium	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Thorium is an interim status detection and a toxicity value not available.
7440-31-5	Tin	Yes (Interim Status Detection)	Yes	Yes	Yes. Not a dangerous waste but identified in Appendix 5. Tin concentrations > background but less than risk-based concentration of 9,600 µg/L. Tin is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).

Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
7440-36-0	Antimony	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Antimony is not identified as COC in 200-BP-5 RI. Antimony analyzed by Method 6010 have been shown to be false positives. Antimony analyzed by Method 200.8 and Method 6020 are < background and < MCL of 6 µg/L (includes 258 samples).
7440-38-2	Arsenic	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Arsenic concentrations > background and > MCL of 10 µg/L. Note that arsenic is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-39-3	Barium	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Barium concentrations > background but less than MCL of 2,000 µg/L. Tin is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-41-7	Beryllium	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Beryllium concentrations > background but less than risk-based concentration of 32 µg/L. Note that beryllium is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-42-8	Boron	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste; maximum result less than action level	No. Not a dangerous waste and not identified in Appendix 5. Boron concentrations > background but less than risk-based concentration of 3,200 µg/L. boron is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-43-9	Cadmium	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Cadmium concentrations > background and three detects above the MCL of 5 µg/L. Note that cadmium is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-47-3	Chromium	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Chromium concentrations > background and above MCL of 100 µg/L. Note that chromium is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-48-4	Cobalt	Yes (Interim Status Detection)	Yes	Yes	Yes. Not a dangerous waste but identified in Appendix 5. Cobalt concentrations > background with sporadic detections above the risk-based concentration of 4.8 µg/L that are not associated with a plume or a trend. Numerous cobalt results reported by Method 6010 have method detection limits greater than the risk-based concentration. Note that cobalt is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-50-8	Copper	Yes (Interim Status Detection)	Yes	Yes	Yes. Not a dangerous waste but identified in Appendix 5. Copper concentrations > background but less than risk-based concentration of 640 µg/L. Note that copper is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-62-2	Vanadium	Yes (Interim Status Detection)	Yes	Yes	Yes – not a dangerous waste but identified in Appendix 5. Vanadium concentrations > background with sporadic detections above the risk-based concentration of 80 µg/L that are not associated with a plume or a trend. Note that vanadium is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-66-6	Zinc	Yes (Interim Status Detection)	Yes	Yes	Yes. Not a dangerous waste but identified in Appendix 5. Zinc concentrations > background but less than risk-based concentration of 4,800 µg/L. Note that zinc is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
7440-70-2	Calcium	Yes (Interim Status Detection)	No	No. Detected in groundwater above background value; not a dangerous waste, no action level for screening	No. Calcium is an interim status detection and a toxicity value is not available.
75-01-4	Vinyl chloride	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
75-09-2	Methylene chloride	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Two interim status detections flagged with a “B” laboratory qualifier indicating its presence is from laboratory contamination. Well 299-E33-33 (2 detects of 6 samples) 1 BL flag Well 299-E33-36 (1 detect of 12 samples) BJ flag
75-15-0	Carbon disulfide	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
75-35-4	1,1-Dichloroethylene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
75-69-4	Trichlorofluoromethane	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
75-85-4	Amylene Hydrate	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. Single interim status detects at Well 299-E33-205 and Well 299-E33-341; not associated with a plume or a trend.

Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	Evaluate (SST System Part A)	No	Yes. Dangerous waste in SST System Part A	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
7664-41-7	Ammonia	Yes (Interim Status Detection)	No	Yes. Detected in groundwater above background value, dangerous waste	No. Interim status detections. Single sporadic detections 8 wells; a toxicity value is not available.
7782-49-2	Selenium	Yes (Interim Status Detection)	Yes	Yes	Yes. Part A and identified in Appendix 5. Selenium concentrations > background but less than MCL of 50 µg/L. Note that selenium is not identified as a COC in the 200-BP-5 RI report (DOE/RL-2009-127).
78-83-1	Isobutanol	Evaluate (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
78-93-3	Methyl ethyl ketone	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Single sporadic detection at one well; not associated with a plume or a trend. Well 299-E33-5 (1 detect of 1 sample)
79-00-5	1,1,2-Trichloroethane	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
79-01-6	Trichloroethylene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
791-28-6	Phosphine oxide, triphenyl-	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-341 and is a tentatively identified compound.
79-46-9	2-Nitropropane	Evaluate (SST System Part A)	No	Yes. Dangerous waste in SST System Part A	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
84-69-5	Diisobutyl Phthalate	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. One interim status detection at Well 299-E33-343; is a tentatively identified compound and a toxicity value is not available.
84-74-2	Di-n-butylphthalate	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detection at 1 well; not associated with a plume or a trend. Well 299-E33-32 (1 detect of 8 samples) J flag
85-68-7	Butylbenzylphthalate	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detections at 2 wells; not associated with a plume or a trend. Well 299-E33-44 (1 detect of 11 samples) Well 299-E33-334 (1 detect of 7 samples)
86-30-6	n-Nitrosodiphenylamine	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detection at 1 well; not associated with a plume or a trend. Well 299-E33-38 (1 detect of 2 samples) J flag
87-86-5	Pentachlorophenol	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detection at 1 well; not associated with a plume or a trend. Well 299-E33-36 (1 detect of 22 samples) J flag
93-51-6	Cresylic acid	Evaluate (SST System Part A)	No	No. Related compound included; not routinely analyzed by commercial laboratories	Yes. Part A. Not analyzed in groundwater between 1990 and 2016.
94-75-7	2,4-D(2,4-Dichlorophenoxyacetic acid)	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detections at 5 wells during 1993; not associated with a plume or a trend. Well 299-E33-31 (1 detect of 9 samples) Well 299-E33-32 (1 detect of 9 samples) Well 299-E33-33 (1 detect of 9 samples) Well 299-E33-41 (1 detect of 9 samples) Well 299-E33-42 (1 detect of 7 samples) Well 299-E33-43 (1 detect of 7 samples)
95-50-1	Ortho-dichlorobenzene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
95-57-8	2-Chlorophenol	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detection at 1 well; not associated with a plume or a trend. Well 299-E33-42 (1 detect of 17 samples)

Table A-2. Additional Evaluation of Proposed Monitoring Constituents for WMA B-BX-BY SSTs

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)	Is Constituent Identified in Appendix 5 of Ecology Publication No. 97-407 ? (Yes/No)	Identified as Proposed Monitoring Constituent? (Yes/No)	Recommend as Proposed Monitoring Constituent Based on Further Review
98-86-2	Acetophenone	Yes (Interim Status Detection)	Yes	Yes	Yes. Identified in Appendix 5. Single sporadic detection at 1 well; not associated with a plume or a trend. Well 299-E33-32 (1 detect of 7 samples)
98-95-3	Nitrobenzene	Yes (SST System Part A)	Yes	Yes	Yes. Part A and identified in Appendix 5. Not detected in groundwater between 1990 and 2016.
994-05-8	Butane, 2-methoxy-2-methyl-	Yes (Interim Status Detection)	No	No. Not routinely analyzed by commercial laboratories	No. Single interim status detection at well 299-E33-339; is a tentatively identified compound and a toxicity value is not available.

References: DOE/RL-2009-127, 2018, *Remedial Investigation Report 200-BP-5 Groundwater Operable Unit*.

Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*.

COC = contaminant of concern

EPA = U.S. Environmental Protection Agency

MCL = maximum contaminant level

OU = operable unit

RI = remedial investigation

SST = single-shell tank

WMA = waste management area

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### A3.2 Evaluation of Mobile Constituents

Site-specific or Central Plateau-specific  $K_d$  values could be applied. The evaluation of mobile constituents proposed that constituents with a  $K_d < 0.8$  mL/g were identified as mobile constituents and further evaluated as potential monitoring constituents (Table 1). However, the use of this  $K_d$  is based on a leaching study performed for vadose zone materials in the 100 Areas of the Hanford Site. Soil properties for vadose zone materials in the Central Plateau are different than what was observed in the River Corridor. As a result, it is recommended that future evaluations consider Central Plateau-specific information to determine mobility of contaminants through vadose zone material at WMA B-BX-BY.

This screening step using a  $K_d$  of  $<0.8$  mL/g did not result in the elimination of constituents for proposed monitoring.

### A3.3 Constituents Recommended for Proposed Monitoring

All constituents identified for proposed monitoring (listed in Table 5) were individually reviewed to confirm their inclusion for proposed monitoring and included in Table A-2. Constituents were proposed for monitoring because they are either dangerous or listed wastes. Constituents that are not dangerous or listed wastes and were detected during interim status monitoring were compared to the Appendix 5 list.

Potential data quality issues such as laboratory contamination or sporadic detections that could not be associated with a plume or a trend are described in Table A-2. Additionally, constituents that are associated with the SST Part A permit were evaluated to determine their prevalence within the WMA B-BX-BY monitoring network. Contaminants that were not detected or were not analyzed between 1990 and 2016 are identified.

## A4 Results

A total of 100 constituents were evaluated for proposed for monitoring including metals, inorganic metals, volatile organic compounds, semivolatile organic compounds, and pesticides. Constituents were proposed because they are on the SST Part A list or are identified on the Appendix 5 list in Ecology Publication No. 97-407 and have interim status detections. Constituents were categorized by the findings of the review and are summarized in Table A-3.

**Table A-3. Summary of Constituents Proposed for Monitoring at WMA B-BX-BY SSTs**

<b>Constituents Proposed for Monitoring Because They Are on the SST Part A list</b>	
Constituents proposed for monitoring because they are commonly detected and may be associated with a potential release from WMA B-BX-BY	Lead, mercury, arsenic, silver, cadmium, chromium, selenium, hexavalent chromium, cyanide
Constituents proposed for monitoring that have not been detected in groundwater between 1990 and 2016	Ethyl benzene, 1,2-dichloroethane, toluene, chlorobenzene, pyridine, 2,4-dinitrotoluene, tetrachloroethene, cresols including isomers, carbon disulfide, xylenes, benzene, 1,1,1-trichloroethane, trichlorofluoromethane, isobutanol, 1,1,2-trichloroethane, trichloroethene, 1,2-dichlorobenzene, nitrobenzene, vinyl chloride, 1,1-dichloroethene, n-butyl alcohol
Constituents proposed for monitoring that have not been analyzed in groundwater between 1990 and 2016	Ethyl acetate, ethyl ether, methanol, 1,1,2-trichloro-1,2,2-trifluoroethane, 2-nitropropane, cyclohexanone, cresylic acid, 2-ethoxyethanol

**Table A-3. Summary of Constituents Proposed for Monitoring at WMA B-BX-BY SSTs**

Constituents proposed for monitoring that are associated with single sporadic detections between 1990 and 2016 and are not associated with a plume or show a trend	Methyl isobutyl ketone, carbon tetrachloride, dieldrin, acetone, chloroform, methyl ethyl ketone
Constituents proposed for monitoring that are associated with laboratory contamination between 1990 and 2016 and are not associated with a plume or show a trend	Methylene chloride
<b>Constituents Identified in Appendix 5 of Ecology Publication No. 97-407</b>	
Constituents proposed for monitoring because they have an interim status groundwater detections	Nickel, barium, beryllium, tin, antimony, cobalt, copper, vanadium, and zinc
Constituents proposed for monitoring that are associated with sporadic detections between 1990 and 2016 and are not associated with a plume or show a trend	Phenol, di-n-butylphthalate, butylbenzylphthalate, Nitrosodi-n-propylamine n-Nitrosodiphenylamine pentachlorophenol, 2,4-D(2,4-Dichlorophenoxyacetic acid), 2-chlorophenol, acetophenone
Constituents proposed for monitoring that are associated with laboratory contamination between 1990 and 2016 and are not associated with a plume or show a trend	Bis(2-ethylhexyl) phthalate, di-n-octylphthalate, 4,4'-DDT, 4,6-Dinitro-2-methylphenol
Toxicity value not available	Sulfide
<b>Constituents Identified as Present in the Waste Discharge Profile for the WMA B-BX-BY SSTs</b>	
Present in waste discharge profile for the WMA B-BX-BY SSTs	Nitrate, sulfate, chloride
<b>Constituents with Interim Status Detection but Are Not Included in SST Part A Permit and Are Not Identified in Appendix 5 of Ecology Publication No. 97-407</b>	
Interim status detection	Nitrite, aluminum, iron, manganese, molybdenum, strontium, boron
Toxicity value not available	Phosphate, perchlorate anion, ammonia, ammonium, ion, methyl 2-hydroxyisobutyrate, bromide, 1,2-Benzenedicarboxylic acid, diheptyl ester, (2S)-Propane-1,2-diol, decamethylcyclopentasiloxane, cyclotetrasiloxane, octamethyl, pyrrolidin-2-one, magnesium, potassium, sodium, thorium, calcium, butane, 2-methoxy-2-methyl-
Tentatively identified compound	3-Hydroxy-3-methyl-2-butanone, Phosphine oxide, triphenyl-
Interim status detection with single sporadic detections between 1990 and 2016 and are not associated with a plume or show a trend	Fluoride, amylene hydrate, diisobutyl phthalate,

References: Ecology Publication No. 97-407, *Chemical Test Methods For Designating Dangerous Waste WAC 173-303-090 & -100*. WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*.

SST = single-shell tank

WMA = waste management area

## A5 Conclusions and Recommendations

A total of 100 constituents were considered for proposed monitoring at WMA B-BX-BY; however, only 18 were frequently detected and included on the SST Part A list or identified in Appendix 5 and have interim status detections without data quality issues. These constituents include the following:

- Lead
- Mercury
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Selenium
- Nickel
- Silver
- Tin
- Antimony
- Cobalt
- Copper
- Cyanide
- Vanadium
- Zinc
- Hexavalent chromium

Nitrate, chloride, and sulfate are identified for monitoring because they are included in the waste discharge profile for WMA B-BX-BY SSTs.

Monitoring of the remaining constituents that are on the Part A permit or are listed in Appendix 5 could be further evaluated based on their absence of detection, absence of analysis, sporadic detections, or presence of laboratory contamination.

Proposed monitoring is not recommended for any of the constituents based solely on interim status detections. When the constituents are not associated with a release or associated with a sporadic detection, or, are tentatively identified compounds, or do not have published toxicity values, they may not part of the proposed monitoring

Irrespective of the constituents that are selected for short-term or long-term monitoring, a data usability assessment is recommended for all monitoring programs to determine whether the sample results are the right type and of sufficient quality and quantity to support a basis to reduce the number of constituents that require monitoring in the future.

## A6 References

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