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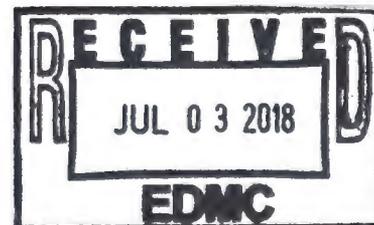
Identification of Site-Specific Monitoring Constituents for Waste Management Area TX-TY

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



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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
PQL	practical quantitation limit
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) TX-TY and constituents that were detected in groundwater during interim status monitoring to identify proposed groundwater monitoring constituents.

2 Background

WMA TX-TY is one of the inactive single-shell tank (SST) farms in the SST System unit group which 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)* (hereafter referred to as the Hanford Facility RCRA Permit) Part A Permit Application for the SST System and the groundwater sample results collected for WMA TX-TY 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 subsections.

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 TX-TY SSTs. The wastes are identified by waste code in Section 2.3 in SGW-60576, Internal Draft, *Engineering Evaluation Report For Single Shell Tank Waste Management Area TX-TY 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 data set (Table 1).

The dangerous wastes were screened to identify mobile constituents by comparing literature reference values for constituent distribution coefficient (K_d) 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 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:

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

where:

% OM = assumed soil organic carbon content of 0.1 weight percent

Solving this equation for K_d :

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

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 _d (mL/g)*	K _d reference	Is K _d ≤ 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, Rev. 3	Yes	Yes
D036	Nitrobenzene	98-95-3	0.119	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 _d (mL/g)*	K _d reference	Is K _d ≤ 0.8 mL/g? (Yes/No/N/A)	Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)
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
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, Rev. 3	Yes	Yes

ECF-2002P1-17-0204, REV. 0

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 _d (mL/g)*	K _d reference	Is K _d ≤ 0.8 mL/g? (Yes/No/N/A)	Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)
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, Rev. 3	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, Rev. 3	Yes	Yes
F003	Methyl isobutyl ketone	108-10-1	0.013	ECF-HANFORD-12-0023, Rev. 3	Yes	Yes
F003	Methanol	67-56-1	0.0010	ECF-HANFORD-12-0023, Rev. 3	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
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

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 _d (mL/g)*	K _d reference	Is K _d ≤ 0.8 mL/g? (Yes/No/N/A)	Retain as Potential Monitoring Constituent? (Yes/No/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, Rev. 3	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.

Notes:

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

ECF-HANFORD-12-0023, Rev. 3, Groundwater and Surface Water Cleanup Levels and Distribution Coefficients for Nonradiological and Radiological Analytes in the 100 Areas and 300 Area.

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_d is calculated from the K_{oc} value. The K_d calculations assume a value of 0.001 g/g for the soil fraction of organic carbon.

CAS = Chemical Abstracts Service

K_d = distribution coefficient

N/A = not applicable

3.2 Interim Status Groundwater Monitoring Results

Appendix A of SGW-60576 includes a summary of the interim status groundwater monitoring history at WMA TX-TY 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 are presented in separate Microsoft® Excel® workbooks in SGW-60576, Appendix A.

The non-radiological 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.¹ Field parameters (e.g., dissolved oxygen, pH, specific conductance, temperature, turbidity, etc.), alkalinity measurements, and non analyte-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 90th 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.

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¹ 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.

Table 2. WMA TX-TY 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-W15-40	1,1-Dichloroethene	17-Nov-2005	0.19	N	J			No	N/A	N/A	Yes
299-W10-20	1,4-Dichlorobenzene	10-Mar-1998	11	N	JD			No	N/A	N/A	Yes
299-W14-14	1,4-Dioxane	16-Aug-2005	32	N	J			No	N/A	N/A	Yes
299-W14-11	1-Butanol	8-Nov-2016	4700	N				No	N/A	N/A	Yes
299-W10-18	2,4-Dimethylphenol	20-Apr-1992	47	N				No	N/A	N/A	Yes
299-W10-20	2,4-Dinitrophenol	10-Mar-1998	1.1	N	J			No	N/A	N/A	Yes
299-W14-11	2-Butanol	8-Nov-2016	1000	N	J			No	N/A	N/A	Yes
299-W15-44	2-Butanone	26-Apr-2007	690	N		Y		No	N/A	N/A	Yes
299-W15-765	2-Propanol	10-Nov-2016	110	N				No	N/A	N/A	Yes
299-W10-20	Acetone	10-Mar-1998	76	N	BJD			No	N/A	N/A	Yes
299-W14-19	Acetonitrile	7-Jun-2011	12	N				No	N/A	N/A	Yes
299-W15-22	Aluminum	3/17/1994	4500	N				Yes	7.11	Yes	Yes
299-W10-27	Ammonia	19-May-2014	120	N		Q		Yes	113	Yes	Yes
299-W15-19	Ammonium ion	15-Jan-1990	551	N				No	N/A	N/A	Yes
299-W15-763	Antimony	4/11/2012	107	N	B			Yes	55.1	Yes	Yes
299-W10-17	Arsenic	3/8/1993	13	Y				Yes	7.85	Yes	Yes
299-W10-17	Arsenic	9/28/1993	13	Y				Yes	7.85	Yes	Yes
299-W10-27	Barium	11/14/2011	224	N				Yes	105	Yes	Yes
299-W15-44	Benzene	17-May-2007	6.8	N				No	N/A	N/A	Yes
299-W14-5	Beryllium	2/7/2002	1.9	Y	B	Q		Yes	2.29	Yes	No
299-W14-15	Beryllium	2/7/2002	1.9	Y	B	Q		Yes	2.29	Yes	No
299-W14-16	Beryllium	2/7/2002	1.9	Y	B	Q		Yes	2.29	Yes	No
299-W14-17	Beryllium	2/7/2002	1.9	Y	B	Q		Yes	2.29	Yes	No
299-W14-14	Bis(2-ethylhexyl) phthalate	25-Apr-2011	6.5	N	J			No	N/A	N/A	Yes
299-W10-26	Boron	5/19/2014	44.9	N	B			Yes	36	Yes	Yes
299-W14-13	Bromide	25-Feb-2010	718	N	B	HQ		Yes	124	No	Yes
299-W15-763	Bromodichloromethane	25-Apr-2011	0.34	N	J			No	N/A	N/A	Yes

Table 2. WMA TX-TY 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-W10-18	Cadmium	2/18/1998	45.7	Y		Y		Yes	0.916	Yes	Yes
299-W14-16	Calcium	11/10/2016	192000	N				Yes	52644	No	Yes
299-W10-21	Carbon disulfide	9-Sep-1996	270	N	XD			No	N/A	N/A	Yes
299-W15-44	Carbon tetrachloride	8-Nov-2007	4900	N		YQ		No	N/A	N/A	Yes
299-W15-44	Carbon tetrachloride	6-Sep-2007	4900	N	E	Y		No	N/A	N/A	Yes
299-W14-13	Chloride	9-Oct-2002	204000	N	CD			Yes	15630	No	Yes
299-W10-21	Chloroform	8-Sep-1997	200	N	D	Y		No	N/A	N/A	Yes
299-W14-12	Chromium	9/28/1993	1700	N				Yes	2.4	Yes	Yes
299-W14-13	Chromium	8/12/2005	769	Y				Yes	2.4	Yes	Yes
299-W15-44	cis-1,2-Dichloroethylene	17-Nov-2005	0.37	N	J			No	N/A	N/A	Yes
299-W14-16	Cobalt	11/10/2016	93.8	N				Yes	0.916	Yes	Yes
299-W15-763	Copper	12/6/2007	73.4	Y		Q		Yes	0.81	Yes	Yes
299-W14-18	Cyanide	25-Aug-2011	179	N				Yes	8.41	No	Yes
299-W14-11	Diethylphthalate	22-Apr-2011	34	N				No	N/A	N/A	Yes
299-W14-12	Ethylbenzene	16-Dec-1993	0.056	N	L			No	N/A	N/A	Yes
299-W14-12	Fluoride	28-Sep-1993	5300	N		F		Yes	1047	No	Yes
299-W14-13	Hexavalent Chromium	8/2/2006	782	Y				No	N/A	N/A	Yes
299-W10-18	Hydrazine	23-Jun-1993	20	N	L			No	N/A	N/A	Yes
299-W15-22	Iron	3/17/1994	18000	N	B			Yes	570	Yes	Yes
299-W10-18	Lead	3/8/1993	13	N				Yes	0.917	Yes	Yes
299-W14-14	Lithium	8/4/2004	9.7	Y	B			Yes	11,321	No	No
299-W14-12	Magnesium	9/28/1993	69000	N				Yes	24,816	Yes	Yes
299-W14-16	Manganese	11/10/2016	3540	N	D			Yes	38.5	Yes	Yes
299-W10-26	Mercury	2/8/2012	0.373	N	BD			Yes	0.003	Yes	Yes
299-W10-20	Methylene chloride	11-Mar-1997	220	N	D			No	N/A	N/A	Yes
299-W10-27	Molybdenum	10/30/2015	15.8	Y				Yes	3.21	Yes	Yes
299-W14-16	Nickel	11/10/2016	5340	N	D			Yes	1.56	Yes	Yes

Table 2. WMA TX-TY 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-W14-11	Nitrate	15-Apr-2005	3630000	N				Yes	26,871	No	Yes
299-W14-2	Nitrite	24-Aug-2000	5,910	N	D	H		Yes	93.7	No	Yes
299-W10-17	Perchlorate anion	28-Sep-1993	400	N	L	Q		No	N/A	N/A	Yes
299-W10-18	Perchlorate anion	28-Sep-1993	400	N	L	Q		No	N/A	N/A	Yes
299-W14-12	Perchlorate anion	28-Sep-1993	400	N	L	Q		No	N/A	N/A	Yes
299-W10-17	Phenol	22-Jan-1992	1	N		Y		No	N/A	N/A	Yes
299-W10-17	Phenol	22-Jan-1992	1	N		Y		No	N/A	N/A	Yes
299-W10-26	Phosphate	19-May-2014	230	N	BNC			Yes	162	No	Yes
299-W14-14	Phosphorus	4-Aug-2004	38.5	N	B	H		No	N/A	N/A	Yes
299-W10-27	Potassium	5/9/2007	12300	Y				Yes	9,122	No	Yes
299-W10-26	Selenium	4/26/2011	10	N	D			Yes	10.5	Yes	No
299-W10-26	Silicon	11/6/2012	23100	N				Yes	33,949	Yes	No
299-W15-44	Silver	8/5/2004	85	Y		Y		Yes	5.28	Yes	Yes
299-W10-27	Sodium	11/14/2011	201000	N	D			Yes	26,998	No	Yes
299-W14-13	Strontium	1/22/2009	774	N		Y		Yes	323	Yes	Yes
299-W14-13	Sulfate	9-Oct-2002	263000	N	D			Yes	47,014	No	Yes
299-W10-27	Sulfide	5-Feb-2015	5300	N	B			Yes	2.19	Yes	Yes
299-W15-40	Tetrachloroethene	22-Jan-2009	4.2	N	J			No	N/A	N/A	Yes
299-W15-40	Tetrachloroethene	17-Nov-2005	4.2	N				No	N/A	N/A	Yes
299-W15-44	Tetrahydrofuran	26-Apr-2007	800	N		Y		No	N/A	N/A	Yes
299-W10-26	Thallium	5/4/2012	42.5	N	B			Yes	1.67	Yes	Yes
299-W14-11	Thorium	5/6/2016	2.04	N	C			Yes	0.5	Yes	Yes
299-W10-17	Tin	8/7/1995	66	Y	BL			Yes	21.6	Yes	Yes
299-W10-21	Toluene	9-Sep-1996	21	N	BDJ			No	N/A	N/A	Yes
299-W10-21	Toluene	9-Sep-1996	21	N	BDJ			No	N/A	N/A	Yes
299-W15-44	Trichloroethene	5-Jan-2005	27	N				No	N/A	N/A	Yes
299-W10-26	Vanadium	5/9/2000	88.8	Y		Y		Yes	11.5	Yes	Yes

Table 2. WMA TX-TY 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-W14-12	Xylenes (total)	16-Dec-1993	0.24	N	L			No	N/A	N/A	Yes
299-W14-18	Zinc	8/24/2010	19100	Y		Y		Yes	21.8	Yes	Yes

* The 90th 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.

E = Lab Qualifier: INORGANICS - Reported value is estimated because of interference. See comment on cover page, hardcopy case narrative, or specific inorganic hardcopy data sheet. ORGANICS - Concentration exceeds the calibration range of the GC/MS.

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

J = Laboratory 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 nonorganic 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.

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

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

N = Lab Qualifier: ALL (except GC/MS based analysis) - Spike sample recovery is outside control limits.

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

X = Lab Qualifier: ALL - The result-specific translation of this qualifier code is provided in the hardcopy data report and/or case narrative. Additional result-specific translation information may also be found in the RESULT_COMMENT field for this record.

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

N/A = not applicable

QC = quality control

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 TX-TY 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 TX-TY (Section 9.4 in SGW-60576). 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 consisted of 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 consisted of 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.

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 WMA TX-TY SSTs during leak events (Table 2-1 in SGW-60576) (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 TX-TY 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 TX-TY SSTs. It is assumed that the HEIS data are accurate and valid measurements of contaminant conditions in groundwater associated with WMA TX-TY.

Nondetected sample data (data with a "U" qualifier) in the interim status groundwater monitoring data set are assumed to be not present and 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 and basic summary calculations.

6 Calculation

The evaluations detailed in this calculation are summarized in the identified tables. Appendix A of SGW-60576 provides the data for interim status groundwater monitoring.

7 Results and Conclusions

Based on the evaluations of waste constituents associated with WMA TX-TY 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 TX-TY 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 TX-TY 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 SST 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

Table 3. Mobile Dangerous Waste Identified in the SST System Unit Group Retained as Potential Monitoring Constituents

Dangerous Waste Code	Waste Constituent	CAS Number
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
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

Table 3. Mobile Dangerous Waste Identified in the SST System Unit Group Retained as Potential Monitoring Constituents

Dangerous Waste Code	Waste Constituent	CAS Number
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 TX-TY interim status groundwater monitoring data set was compiled and compared to the Hanford Site 90th 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 = 68) were retained as potential monitoring constituents (Table 4).

Table 4. Constituents Detected above Background Concentrations in the WMA TX-TY Interim Status Groundwater Data Set

CAS Number	Constituent
100-41-4	Ethylbenzene
105-67-9	2,4-Dimethylphenol
106-46-7	1,4-Dichlorobenzene
108-88-3	Toluene
108-95-2	Phenol
109-99-9	Tetrahydrofuran
117-81-7	Bis(2-ethylhexyl) phthalate

Table 4. Constituents Detected above Background Concentrations in the WMA TX-TY Interim Status Groundwater Data Set

CAS Number	Constituent
123-91-1	1,4-Dioxane
127-18-4	Tetrachloroethene
1330-20-7	Xylene (total)
14265-44-2	Phosphate
14797-55-8	Nitrate
14797-65-0	Nitrite
14797-73-0	Perchlorate anion
14798-03-9	Ammonium ion
14808-79-8	Sulfate
156-59-2	cis-1,2-Dichloroethylene
16887-00-6	Chloride
16984-48-8	Fluoride
18496-25-8	Sulfide
18540-29-9	Hexavalent Chromium
24959-67-9	Bromide
302-01-2	Hydrazine
51-28-5	2,4-Dinitrophenol
56-23-5	Carbon tetrachloride
57-12-5	Cyanide
67-63-0	2-Propanol (isopropyl alcohol)
67-64-1	Acetone
67-66-3	Chloroform
71-36-3	1-Butanol
71-43-2	Benzene
7429-90-5	Aluminum
7439-89-6	Iron
7439-92-1	Lead
7439-95-4	Magnesium
7439-96-5	Manganese

Table 4. Constituents Detected above Background Concentrations in the WMA TX-TY Interim Status Groundwater Data Set

CAS Number	Constituent
7439-97-6	Mercury
7439-98-7	Molybdenum
7440-02-0	Nickel
7440-09-7	Potassium
7440-22-4	Silver
7440-23-5	Sodium
7440-24-6	Strontium
7440-28-0	Thallium
7440-29-1	Thorium
7440-31-5	Tin
7440-36-0	Antimony
7440-38-2	Arsenic
7440-39-3	Barium
7440-42-8	Boron
7440-43-9	Cadmium
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
7440-62-2	Vanadium
7440-66-6	Zinc
7440-70-2	Calcium
75-05-8	Acetonitrile
75-09-2	Methylene chloride
75-15-0	Carbon disulfide
75-27-4	Bromodichloromethane
75-35-4	1,1-Dichloroethene
7664-41-7	Ammonia
7723-14-0	Phosphorus
78-92-2	2-Butanol

Table 4. Constituents Detected above Background Concentrations in the WMA TX-TY Interim Status Groundwater Data Set

CAS Number	Constituent
78-93-3	2-Butanone
79-01-6	Trichloroethene
84-66-2	Diethylphthalate

CAS = Chemical Abstracts Service

7.3 Results from Final Monitoring Constituent Evaluation

Eighty-nine distinct constituents were retained 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.

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source) ^a	Is Constituent Identified in Appendix 5? (Yes/No) ^b	Identified as Proposed Monitoring Constituent? ^c (Yes/No)
100-41-4	Ethyl benzene	Yes (SST System Part A)	Yes	Yes
100-41-4	Ethylbenzene	Yes (Interim Status Detection)	Yes	Yes
105-67-9	2,4-Dimethylphenol	Yes (Interim Status Detection)	Yes	Yes
106-46-7	1,4-Dichlorobenzene	Yes (Interim Status Detection)	Yes	Yes
107-06-2	1,2-Dichloroethane	Yes (SST System Part A)	Yes	Yes
108-10-1	Methyl isobutyl ketone	Yes (SST System Part A)	Yes	Yes
108-88-3	Toluene	Yes (Interim Status Detection)	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
109-99-9	Tetrahydrofuran	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
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
117-81-7	Bis(2-ethylhexyl) phthalate	Yes (Interim Status Detection)	Yes	Yes
121-14-2	2,4-Dinitrotoluene	Yes (SST System Part A)	Yes	Yes
123-91-1	1,4-Dioxane	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source) ^a	Is Constituent Identified in Appendix 5? (Yes/No) ^b	Identified as Proposed Monitoring Constituent? ^c (Yes/No)
127-18-4	Tetrachloroethene	Yes (Interim Status Detection)	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) ^d	Yes
1330-20-7	Xylene	Yes (SST System Part A)	Yes	Yes
1330-20-7	Xylene (total)	Yes (Interim Status Detection)	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
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 2-1 ^e as present in WMA TX-TY SSTs during leaks
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 2-1 ^e as present in WMA TX-TY SSTs during leaks
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

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)^a	Is Constituent Identified in Appendix 5? (Yes/No)^b	Identified as Proposed Monitoring Constituent?^c (Yes/No)
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 2-1 ^e as present in WMA TX-TY SSTs during leaks
156-59-2	cis-1,2-Dichloroethylene	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
16887-00-6	Chloride	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste; maximum result less than action level
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 2-1 ^e as present in WMA TX-TY SSTs during leaks
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
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

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)^a	Is Constituent Identified in Appendix 5? (Yes/No)^b	Identified as Proposed Monitoring Constituent?^c (Yes/No)
302-01-2	Hydrazine	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
51-28-5	2,4-Dinitrophenol	Yes (Interim Status Detection)	Yes	Yes
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
60-29-7	Ethyl ether	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A
67-56-1	Methanol	Yes (SST System Part A)	No	Yes - dangerous waste in SST System Part A
67-63-0	2-Propanol (isopropyl alcohol)	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
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	1-Butanol	Yes (Interim Status Detection)	No	Yes - dangerous waste in SST System Part A
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 (Interim Status Detection)	Yes	Yes
71-43-2	Benzene	Yes (SST System Part A)	Yes	Yes

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)^a	Is Constituent Identified in Appendix 5? (Yes/No)^b	Identified as Proposed Monitoring Constituent?^c (Yes/No)
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 2-1 ^e as present in WMA TX-TY SSTs during leaks
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 2-1 ^e as present in WMA TX-TY SSTs during leaks
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, identified in Table 2-1 as present in WMA TX-TY SSTs during leaks; maximum concentration greater than action level
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

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source)^a	Is Constituent Identified in Appendix 5? (Yes/No)^b	Identified as Proposed Monitoring Constituent?^c (Yes/No)
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
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
7440-28-0	Thallium	Yes (Interim Status Detection)	Yes	Yes
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
7440-42-8	Boron	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste; maximum result less than action level

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source) ^a	Is Constituent Identified in Appendix 5? (Yes/No) ^b	Identified as Proposed Monitoring Constituent? ^c (Yes/No)
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
75-05-8	Acetonitrile	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
75-09-2	Methylene chloride	Yes (Interim Status Detection)	Yes	Yes
75-09-2	Methylene chloride	Yes (SST System Part A)	Yes	Yes
75-15-0	Carbon disulfide	Yes (Interim Status Detection)	Yes	Yes
75-15-0	Carbon disulfide	Yes (SST System Part A)	Yes	Yes
75-27-4	Bromodichloromethane	Yes (Interim Status Detection)	Yes	Yes
75-35-4	1,1-Dichloroethene	Yes (Interim Status Detection)	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

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source) ^a	Is Constituent Identified in Appendix 5? (Yes/No) ^b	Identified as Proposed Monitoring Constituent? ^c (Yes/No)
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
7723-14-0	Phosphorus	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; not a dangerous waste; maximum concentration greater than action level
78-83-1	Isobutanol	Evaluate (SST System Part A)	Yes	Yes
78-92-2	2-Butanol	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
78-93-3	2-Butanone	Yes (Interim Status Detection)	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	Trichloroethene	Yes (Interim Status Detection)	Yes	Yes
79-01-6	Trichloroethylene	Yes (SST System Part A)	Yes	Yes
79-46-9	2-Nitropropane	Evaluate (SST System Part A)	No	Yes - dangerous waste in SST System Part A
84-66-2	Diethylphthalate	Yes (Interim Status Detection)	Yes	Yes
93-51-6	Cresylic acid	Evaluate (SST System Part A)	No	No - related compound included; not routinely analyzed by commercial laboratories ^f
95-50-1	Ortho-dichlorobenzene	Yes (SST System Part A)	Yes	Yes

Table 5. Evaluation of Potential Monitoring Constituents

CAS Number	Potential Monitoring Constituent	Retained for Evaluation as Monitoring Constituent (Source) ^a	Is Constituent Identified in Appendix 5? (Yes/No) ^b	Identified as Proposed Monitoring Constituent? ^c (Yes/No)
98-95-3	Nitrobenzene	Yes (SST System Part A)	Yes	Yes

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 data set 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 2-1 in SGW-60576, *Engineering Evaluation Report For Single Shell Tank Waste Management Area TX-TY Groundwater Monitoring*, provides the nonradiological waste profiles for the WMA TX-TY SSTs during leak events.

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.

CAS = Chemical Abstracts Service

K_d = distribution coefficient

SST = single-shell tank

WMA = waste management area

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 TX-TY. Therefore, the 50 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 = 39) were evaluated in two groups (Table 5 provides details of the evaluation outcomes for these constituents):

- The first group consisted of 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 consisted of 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).

The remaining potential monitoring constituents in the second group (N = 30) 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 WMA TX-TY SSTs during leak events (Table 2-1 in SGW-60576)

Of the remaining 30 potential monitoring constituents, 9 are dangerous wastes and were included as proposed monitoring constituents. None of the remaining potential monitoring constituents were already identified for monitoring by related chemicals or not routinely analyzed by commercial laboratories.

A comparison of the maximum concentration to the action level showed that 8 of the remaining 21 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 the well that was sampled. Seven of the 8 constituents that exceeded the action level during the interim status monitoring period were identified in the waste profile for the WMA TX-TY SSTs during leak events (Table 2-1 in SGW-60576). The remaining 13 constituents were removed from consideration as potential monitoring constituents.

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)
109-99-9	Tetrahydrofuran	800	299-W15-44	26-Apr-2007	Not available	N/A	N/A
123-91-1	1,4-Dioxane	32	299-W14-14	16-Aug-2005	0.4376	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
14265-44-2	Phosphate	230	299-W10-26	19-May-2014	Not available	N/A	N/A
14797-55-8	Nitrate	3630000	299-W14-11	15-Apr-2005	45000	40 CFR 141.62	Yes
14797-65-0	Nitrite	5,910	299-W14-2	24-Aug-2000	1000	40 CFR 141.62	Yes
14797-73-0	Perchlorate anion	400	299-W10-17	28-Sep-1993	Not available	N/A	N/A
14797-73-0	Perchlorate anion	400	299-W10-18	28-Sep-1993	Not available	N/A	N/A
14797-73-0	Perchlorate anion	400	299-W14-12	28-Sep-1993	Not available	N/A	N/A
14798-03-9	Ammonium ion	551	299-W15-19	15-Jan-1990	Not available	N/A	N/A
14808-79-8	Sulfate	263000	299-W14-13	9-Oct-2002	250000	40 CFR 143.3	Yes
156-59-2	cis-1,2-Dichloroethylene	0.37	299-W15-44	17-Nov-2005	16	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
16887-00-6	Chloride	204000	299-W14-13	9-Oct-2002	250000	40 CFR 143.3	No
16984-48-8	Fluoride	5300	299-W14-12	28-Sep-1993	640	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes

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)
18540-29-9	Hexavalent Chromium	782	299-W14-13	8/2/2006	48	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
24959-67-9	Bromide	718	299-W14-13	25-Feb-2010	Not available	N/A	N/A
302-01-2	Hydrazine	20	299-W10-18	23-Jun-1993	0.0146	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
67-63-0	2-Propanol (isopropyl alcohol)	110	299-W15-765	10-Nov-2016	Not available	N/A	N/A
7429-90-5	Aluminum	4500	299-W15-22	3/17/1994	50	40 CFR 143.3	Yes
7439-89-6	Iron	18000	299-W15-22	3/17/1994	300	40 CFR 143.3	Yes
7439-95-4	Magnesium	69000	299-W14-12	9/28/1993	Not available	N/A	N/A
7439-96-5	Manganese	3540	299-W14-16	11/10/2016	50	40 CFR 143.3	Yes
7439-98-7	Molybdenum	15.8	299-W10-27	10/30/2015	80	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
7440-09-7	Potassium	12300	299-W10-27	5/9/2007	Not available	N/A	N/A
7440-23-5	Sodium	201000	299-W10-27	11/14/2011	Not available	N/A	N/A
7440-24-6	Strontium	774	299-W14-13	1/22/2009	9600	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
7440-29-1	Thorium	2.04	299-W14-11	5/6/2016	Not available	N/A	N/A

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)
7440-42-8	Boron	44.9	299-W10-26	5/19/2014	3200	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
7440-70-2	Calcium	192000	299-W14-16	11/10/2016	Not available	N/A	N/A
75-05-8	Acetonitrile	12	299-W14-19	7-Jun-2011	Not available	N/A	N/A
7664-41-7	Ammonia	120	299-W10-27	19-May-2014	Not available	N/A	N/A
7723-14-0	Phosphorus	38.5	299-W14-14	4-Aug-2004	0.16	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
78-92-2	2-Butanol	1000	299-W14-11	8-Nov-2016	Not available	N/A	N/A

Notes:

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

In summary, 74 constituents were identified as proposed monitoring constituents to detect and monitor any groundwater impacts from dangerous waste releases at WMA TX-TY. Eight of the 74 constituents are nondangerous constituents that were quantified in groundwater above the applicable action level. Seven of these eight constituents were also identified in the waste profile for the WMA TX-TY SSTs during leak events.

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 TX-TY under interim status monitoring plans, 74 waste constituents are identified as proposed monitoring constituents to detect and monitor any groundwater impacts from dangerous waste releases at WMA TX-TY (Table 7). Eight of the 74 are nondangerous waste constituents that were quantified in groundwater above the applicable action level. Seven of these 8 were identified in the waste profile for the WMA TX-TY SSTs during leak events.

Table 7. Proposed Groundwater Monitoring Constituents for WMA TX-TY

Waste Constituent	CAS Number
Dangerous Waste Constituents	
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
1,1-Dichloroethene	75-35-4
1,2-Dichloroethane	107-06-2
1,4-Dichlorobenzene	106-46-7
1,4-Dioxane	123-91-1
1-Butanol	71-36-3
2,4-Dimethylphenol	105-67-9
2,4-Dinitrophenol	51-28-5
2,4-Dinitrotoluene	121-14-2
2-Butanol	78-92-2
2-Butanone	78-93-3
2-Nitropropane	79-46-9
2-Propanol (isopropyl alcohol)	67-63-0
Acetone	67-64-1
Acetonitrile	75-05-8
Ammonia	7664-41-7

Table 7. Proposed Groundwater Monitoring Constituents for WMA TX-TY

Waste Constituent	CAS Number
Antimony	7440-36-0
Arsenic	7440-38-2
Barium	7440-39-3
Benzene	71-43-2
Bis(2-ethylhexyl) phthalate	117-81-7
Bromodichloromethane	75-27-4
Cadmium	7440-43-9
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroform	67-66-3
Chromium	7440-47-3
cis-1,2-Dichloroethylene	156-59-2
Cobalt	7440-48-4
Copper	7440-50-8
Cresols	1319-77-3
Cyanide	57-12-5
Cyclohexanone	108-94-1
Diethylphthalate	84-66-2
Ethyl acetate	141-78-6
Ethyl benzene	100-41-4
Ethyl ether	60-29-7
Hexavalent Chromium	18540-29-9
Hydrazine	302-01-2
Isobutanol	78-83-1
Lead	7439-92-1
Mercury	7439-97-6

Table 7. Proposed Groundwater Monitoring Constituents for WMA TX-TY

Waste Constituent	CAS Number
Methanol	67-56-1
Methyl isobutyl ketone	108-10-1
Methylene chloride	75-09-2
Nickel	7440-02-0
Nitrobenzene	98-95-3
Ortho-dichlorobenzene	95-50-1
Phenol	108-95-2
Pyridine	110-86-1
Silver	7440-22-4
Sulfide	18496-25-8
Tetrachloroethene	127-18-4
Tetrahydrofuran	109-99-9
Thallium	7440-28-0
Tin	7440-31-5
Toluene	108-88-3
Trichloroethene	79-01-6
Trichlorofluoromethane	75-69-4
Vanadium	7440-62-2
Vinyl chloride	75-01-4
Xylene	1330-20-7
Zinc	7440-66-6
Nondangerous Waste Constituents	
Aluminum	7429-90-5
Fluoride	16984-48-8
Iron	7439-89-6
Manganese	7439-96-5
Nitrate	14797-55-8

Table 7. Proposed Groundwater Monitoring Constituents for WMA TX-TY

Waste Constituent	CAS Number
Nitrite	14797-65-0
Phosphorus	7723-14-0
Sulfate	14808-79-8

CAS = Chemical Abstracts Service

8 References

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