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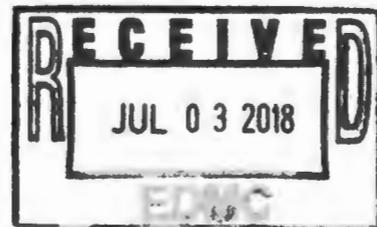
# Identification of Site-Specific Monitoring Constituents for Waste Management Area T

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



P.O. Box 1600  
Richland, Washington 99352



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**APPROVED**  
By Mary P. Curry at 1:58 pm, Apr 30, 2018

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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

## 1 Purpose

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

## 2 Background

WMA T 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) (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 T 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 T SSTs. The wastes are identified by waste code in Section 2.3 of SGW-60575, Regulator Review Draft, *Engineering Evaluation Report For Single Shell Tank Waste Management Area T 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 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 = 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**

<b>Dangerous Waste Code</b>	<b>Constituent</b>	<b>CAS Number</b>	<b>K<sub>d</sub> (mL/g)*</b>	<b>K<sub>d</sub> Reference</b>	<b>Is K<sub>d</sub> ≤ 0.8 mL/g? (Yes/No/N/A)</b>	<b>Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)</b>
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 <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)
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
F002	Tetrachloroethylene	127-18-4	0.265	Ecology, 2015	Yes	Yes

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

<b>Dangerous Waste Code</b>	<b>Constituent</b>	<b>CAS Number</b>	<b>K<sub>d</sub> (mL/g)*</b>	<b>K<sub>d</sub> Reference</b>	<b>Is K<sub>d</sub> ≤ 0.8 mL/g? (Yes/No/N/A)</b>	<b>Retain as Potential Monitoring Constituent? (Yes/No/Evaluate)</b>
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
F005	2-Nitropropane	79-46-9	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 <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)
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.

References:

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."

Note: 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

N/A = not applicable

## 3.2 Interim Status Groundwater Monitoring Results

Appendix A of SGW-60575 includes a summary of the interim status groundwater monitoring history at WMA T 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 SGW-60575, Appendix A.

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, 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 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 T 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 T (Section 9.4 in SGW-60575). 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.

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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.

Table 2. WMA T 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-W11-47	1,1-Dichloroethene	16-Aug-2007	0.23	N	J			No	N/A	N/A	Yes
299-W11-47	1,2,4-Trichlorobenzene	28-Apr-2011	1.1	N	J			No	N/A	N/A	Yes
299-W11-47	1,2-Dichlorobenzene	28-Apr-2011	2.5	N	J			No	N/A	N/A	Yes
299-W11-40	1,2-Dichloroethene (Total)	26-Apr-2011	0.3	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-W11-28	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid) Silvex	9/21/1994	0.036	N	L	P		No	N/A	N/A	Yes
299-W11-28	2,4-Dichlorophenol	6-Jul-1994	1.7	N	L	P		No	N/A	N/A	Yes
299-W11-45	2-Butanone	4-Oct-2005	13	N				No	N/A	N/A	Yes
299-W11-28	4,4'-DDT (Dichlorodiphenyltrichloroethane)	7/6/1994	0.002	N	L	PY		No	N/A	N/A	Yes
299-W10-24	4-Methyl-2-pentanone	8-Aug-2008	4.4	N	J			No	N/A	N/A	Yes
299-W10-15	Acetone	10-Nov-1992	80	N	B	Q		No	N/A	N/A	Yes
299-W11-28	Aldrin	5/27/1992	0.05	N	B	P		No	N/A	N/A	Yes
299-W11-28	Aluminum	7/6/1994	3600	N	B	PQ		Yes	7.11	Yes	Yes
299-W11-41	Ammonia	20-May-2014	71.1	N		A		Yes	113	Yes	No
299-W11-28	Ammonium ion	27-May-1992	300	N		P		No	N/A	N/A	Yes
299-W10-4	Antimony	5/1/2012	293	N		Y		Yes	55.1	Yes	Yes
299-W10-8	Arsenic	3/16/1990	101	N		Y		Yes	7.85	Yes	Yes
299-W10-8	Barium	3/16/1990	732	N		Y		Yes	105	Yes	Yes
299-W10-15	Benzene	10-Nov-1992	1.3	N	BJ			No	N/A	N/A	Yes
299-W10-4	Beryllium	2/4/2002	1.5	Y	B			Yes	2.29	Yes	No
299-W10-23	Beryllium	22-Feb-1999	1.5	Y	B	Q		Yes	2.29	Yes	No
299-W11-47	Bis(2-ethylhexyl) phthalate	28-Apr-2011	2.2	N	JB			No	N/A	N/A	Yes
299-W10-24	Bismuth	4-Nov-2005	27.1	N	B			No	N/A	N/A	Yes
299-W10-8	Boron	3/16/1990	86	N		Y		Yes	36	Yes	Yes
299-W10-16	Bromide	8-May-1997	1010	N	D			Yes	124	No	Yes
299-W11-46	Bromodichloromethane	17-Nov-2011	0.11	N	J			No	N/A	N/A	Yes
299-W11-27	Cadmium	8/13/1998	127	Y		Y		Yes	0.916	Yes	Yes
299-W10-4	Calcium	11/5/2012	824000	N	D			Yes	52644	No	Yes
299-W10-21	Carbon disulfide	9-Sep-1996	270	N	XD			No	N/A	N/A	Yes

Table 2. WMA T 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-W10-23	Carbon tetrachloride	9-Feb-2010	5900	N		QY		No	N/A	N/A	Yes
299-W11-7	Chloride	10-May-1999	99,500	N	D			Yes	15630	No	Yes
299-W10-21	Chloroform	8-Sep-1997	200	N	D	Y		No	N/A	N/A	Yes
299-W10-8	Chromium	3/16/1990	6180	N		Y		Yes	2.4	Yes	Yes
299-W11-45	Cobalt	10/25/2007	27.5	Y	C			Yes	0.916	Yes	Yes
299-W10-15	Copper	8-Aug-1995	130	Y		F		Yes	0.81	Yes	Yes
299-W11-41	Cyanide	23-Aug-2011	44.9	N				Yes	8.41	No	Yes
299-W10-16	Ethylbenzene	21-Sep-1994	0.17	N	L			No	N/A	N/A	Yes
299-W10-8	Fluoride	7-Feb-2005	10500	N	D	Y		Yes	1047	No	Yes
299-W10-28	Hexavalent Chromium	27-Oct-2004	323	Y				No	N/A	N/A	Yes
299-W10-8	Iron	3/16/1990	328000	N		Y		Yes	570	Yes	Yes
299-W10-8	Lead	3/16/1990	340	N				Yes	0.917	Yes	Yes
299-W10-23	Lithium	4-Aug-2004	12.7	Y	B			Yes	11,321	No	No
299-W10-4	Magnesium	11/5/2012	266000	N	D			Yes	24,816	Yes	Yes
299-W10-8	Manganese	3/16/1990	2320	N		Y		Yes	38.5	Yes	Yes
299-W11-41	Mercury	6/23/2011	0.129	Y	B			Yes	0.003	Yes	Yes
299-W10-20	Methylene chloride	11-Mar-1997	220	N	D			No	N/A	N/A	Yes
299-W11-47	Molybdenum	11/1/2015	7.58	N				Yes	3.21	Yes	Yes
299-W10-15	Nickel	8-Aug-1995	500	Y		F		Yes	1.56	Yes	Yes
299-W10-4	Nitrate	27-Oct-2004	7610000	N	D	QY		Yes	26,871	No	Yes
299-W11-24	Nitrite	3-Jan-2000	36100	N	D			Yes	93.7	No	Yes
299-W11-27	Perchlorate anion	28-Sep-1993	400	N	L	Q		No	N/A	N/A	Yes
299-W11-47	Phosphate	13-Nov-2012	5640	N	D			Yes	162	No	Yes
299-W10-4	Potassium	8/29/2007	32200	Y	BDN			Yes	9,122	No	Yes
299-W11-41	Selenium	6/23/2011	6.91	N	D			Yes	10.5	Yes	No
299-W10-8	Silicon	3/16/1990	83100	N		Y		Yes	33,949	Yes	Yes
299-W11-45	Silver	10/25/2007	24.4	Y	C	Y		Yes	5.28	Yes	Yes
299-W10-4	Sodium	5/16/2006	608000	Y	DN			Yes	26,998	No	Yes
299-W10-4	Strontium	11/5/2012	5560	N	D	Q		Yes	323	Yes	Yes
299-W11-27	Sulfate	6-Feb-1997	326000	N	D			Yes	47,014	No	Yes
299-W10-4	Sulfide	12-Jul-2011	600	N	BC			Yes	2.19	Yes	Yes
299-W11-46	Sulfide	21-Jun-2011	600	N	BC			Yes	2.19	Yes	Yes

**Table 2. WMA T 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-W11-7	Tetrachloroethene	26-Aug-2005	4.6	N	N	Y		No	N/A	N/A	Yes
299-W6-2	Thallium	3/7/1996	4.2	Y	L			Yes	1.67	Yes	Yes
299-W10-16	Tin	7-Aug-1995	100	Y	B			Yes	21.6	Yes	Yes
299-W10-8	Titanium	3/16/1990	169	N		Y		Yes	30	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-W10-4	Trichloroethene	2-Jan-1991	23	N				No	N/A	N/A	Yes
299-W10-8	Vanadium	3/16/1990	1140	N		Y		Yes	11.5	Yes	Yes
299-W10-15	Xylenes (total)	21-Sep-1994	0.05	N	L			No	N/A	N/A	Yes
299-W10-22	Zinc	16-Dec-2010	15100	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:**

A = Review Qualifier: Administrative Technical Issue. An issue was identified with the chain of custody or other administrative documents during the administrative technical verification process that may potentially affect the data quality/defensibility

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.

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 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.

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.

P = Review Qualifier: P = Review Qualifier: Potential problem. Collection/analysis circumstances makes value questionable.

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

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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 WMA T SSTs during leak events (Table 2-1 in SGW-60575) (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 T 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 T SSTs. It is assumed that the HEIS data are accurate and valid measurements of contaminant conditions in groundwater associated with WMA T.

Nondetected sample data (data with a “U” qualifier) in the interim status groundwater monitoring data set 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-60575 provides the data for interim status groundwater monitoring.

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

Based on the evaluations of waste constituents associated with WMA T 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 T 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 T 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
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

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

Dangerous Waste Code	Waste Constituent	CAS Number
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
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 T interim status groundwater monitoring data set 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 (N = 64) and non-naturally-occurring constituents that do not have background values were retained as potential monitoring constituents (Table 4).

**Table 4. Constituents Detected Above Background Concentrations in the WMA T Interim Status Groundwater Data Set**

CAS Number	Constituent
75-35-4	1,1-Dichloroethene
120-82-1	1,2,4-Trichlorobenzene
95-50-1	1,2-Dichlorobenzene
540-59-0	1,2-Dichloroethene (Total)
106-46-7	1,4-Dichlorobenzene
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid) Silvex
120-83-2	2,4-Dichlorophenol
78-93-3	2-Butanone
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)
108-10-1	4-Methyl-2-pentanone
67-64-1	Acetone
309-00-2	Aldrin
7429-90-5	Aluminum
14798-03-9	Ammonium ion
7440-36-0	Antimony
7440-38-2	Arsenic
7440-39-3	Barium
71-43-2	Benzene
117-81-7	Bis(2-ethylhexyl) phthalate
7440-69-9	Bismuth
7440-42-8	Boron
24959-67-9	Bromide
75-27-4	Bromodichloromethane
7440-43-9	Cadmium
7440-70-2	Calcium
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
16887-00-6	Chloride
67-66-3	Chloroform

**Table 4. Constituents Detected Above Background Concentrations in the WMA T Interim Status Groundwater Data Set**

CAS Number	Constituent
7440-47-3	Chromium
7440-48-4	Cobalt
7440-50-8	Copper
57-12-5	Cyanide
100-41-4	Ethylbenzene
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
75-09-2	Methylene chloride
7439-98-7	Molybdenum
7440-02-0	Nickel
14797-55-8	Nitrate
14797-65-0	Nitrite
14797-73-0	Perchlorate anion
14265-44-2	Phosphate
7440-09-7	Potassium
7440-21-3	Silicon
7440-22-4	Silver
7440-23-5	Sodium
7440-24-6	Strontium
14808-79-8	Sulfate
18496-25-8	Sulfide
127-18-4	Tetrachloroethene
7440-28-0	Thallium
7440-31-5	Tin

**Table 4. Constituents Detected Above Background Concentrations in the WMA T Interim Status Groundwater Data Set**

CAS Number	Constituent
7440-32-6	Titanium
108-88-3	Toluene
79-01-6	Trichloroethene
7440-62-2	Vanadium
1330-20-7	Xylene (total)
7440-66-6	Zinc

CAS = Chemical Abstracts Service

### 7.3 Results from Final Monitoring Constituent Evaluation

Eighty-four 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.

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 T. Therefore, the 51 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 = 33) 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).

**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
100-41-4	Ethylbenzene	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	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 (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
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
120-82-1	1,2,4-Trichlorobenzene	Yes (Interim Status Detection)	Yes	Yes
121-14-2	2,4-Dinitrotoluene	Yes (SST System Part A)	Yes	Yes
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 <sup>d</sup>	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

**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)
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 <sup>c</sup> as present in WMA T 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 <sup>c</sup> as present in WMA T 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
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 <sup>c</sup> as present in WMA T SSTs during leaks
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

**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)
16984-48-8	Fluoride	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value; maximum result greater than action level; identified in Table 2-1 <sup>e</sup> as present in WMA T 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
309-00-2	Aldrin	Yes (Interim Status Detection)	Yes	Yes
50-29-3	4,4'-DDT (Dichlorodiphenyltrichloroethane)	Yes (Interim Status Detection)	Yes	Yes
51-28-5	2,4-Dinitrophenol	Yes (Interim Status Detection)	Yes	Yes
540-59-0	1,2-Dichloroethene (Total)	Yes (Interim Status Detection)	No	Yes - detected in groundwater above background value, dangerous waste
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
67-64-1	Acetone	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>
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 (Interim Status Detection)	Yes	Yes
71-43-2	Benzene	Yes (SST System Part A)	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 2-1 <sup>e</sup> as present in WMA T 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 <sup>e</sup> as present in WMA T 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

**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>
7439-96-5	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 2-1 <sup>e</sup> as present in WMA T SSTs during leaks
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
7440-21-3	Silicon	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
7440-31-5	Tin	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>
7440-32-6	Titanium	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
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
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
7440-69-9	Bismuth	Yes (Interim Status Detection)	No	No - detected in groundwater above background value; not a dangerous waste, no action level for screening
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
75-09-2	Methylene chloride	Yes (SST System Part A)	Yes	Yes
75-15-0	Carbon disulfide	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)
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
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
78-83-1	Isobutanol	Evaluate (SST System Part A)	Yes	Yes
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
93-72-1	2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid) Silvex	Yes (Interim Status Detection)	Yes	Yes
95-50-1	1,2-Dichlorobenzene	Yes (Interim Status Detection)	Yes	Yes
95-50-1	Ortho-dichlorobenzene	Yes (SST System Part A)	Yes	Yes
93-51-6	Cresylic acid	Evaluate (SST System Part A)	No	No - related compound included; not routinely analyzed by commercial laboratories <sup>f</sup>
98-95-3	Nitrobenzene	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) <sup>a</sup>	Is Constituent Identified in Appendix 5? (Yes/No) <sup>b</sup>	Identified as Proposed Monitoring Constituent? <sup>c</sup> (Yes/No)
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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-60575, *Engineering Evaluation Report For Single Shell Tank Waste Management Area T Groundwater Monitoring*, provides the nonradiological waste profiles for the WMA T 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

The remaining potential monitoring constituents in the second group (N = 24) 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 T SSTs during leak events (Table 2-1 in SGW-60575)

Of the remaining 24 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 or not routinely analyzed by commercial laboratories.

A comparison of the maximum concentration to the action level showed that 7 of the remaining 22 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 seven constituents that exceeded the action level during the interim status monitoring period were identified in the waste profile for the WMA T SSTs during leak events (Table 2-1 in SGW-60575). The remaining 15 constituents were removed from consideration as potential monitoring constituents.

In summary, 66 constituents were identified as proposed monitoring constituents to detect and monitor any groundwater impacts from dangerous waste releases at WMA T. Seven of the 66 constituents are nondangerous constituents that were quantified in groundwater above the applicable action level and were identified in the waste profile for the WMA T 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 T under interim status monitoring plans, 66 waste constituents are identified as proposed monitoring constituents to detect and monitor any groundwater impacts from dangerous waste releases at WMA T (Table 7). Seven of the 66 are nondangerous waste constituents that were quantified in groundwater above the applicable action level and were identified in the waste profile for the WMA T SSTs during leak events.

**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	3,600	299-W11-28	7/6/1994	50	40 CFR 143.3	Yes
14798-03-9	Ammonium ion	300	299-W11-28	27-May-1992	Not available	N/A	N/A
7440-69-9	Bismuth	27.1	299-W10-24	11/4/2005	Not available	N/A	N/A
7440-42-8	Boron	86	299-W10-8	3/16/1990	3,200	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
24959-67-9	Bromide	1,010	299-W10-16	5/8/1997	Not available	N/A	N/A
7440-70-2	Calcium	824,000	299-W10-4	11/5/2012	Not available	N/A	N/A
16887-00-6	Chloride	99,500	299-W11-7	10-May-1999	250,000	40 CFR 143.3	No
16984-48-8	Fluoride	10,500	299-W10-8	7-Feb-2005	640	WAC 173-340-720(4)(b)(iii)(A) and (B)	Yes
7439-89-6	Iron	328,000	299-W10-8	3/16/1990	300	40 CFR 143.3	Yes
7439-95-4	Magnesium	266,000	299-W10-4	11/5/2012	Not available	N/A	N/A
7439-96-5	Manganese	2,320	299-W10-8	3/16/1990	50	40 CFR 143.3	Yes
7439-98-7	Molybdenum	7.58	299-W11-47	11/1/2015	80	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
14797-55-8	Nitrate	7,610,000	299-W10-4	27-Oct-2004	45,000	40 CFR 141.62	Yes
14797-65-0	Nitrite	36,100	299-W11-24	3-Jan-2000	1,000	40 CFR 141.62	Yes
14797-73-0	Perchlorate anion	400	299-W11-27	28-Sep-1993	Not available	N/A	N/A
14265-44-2	Phosphate	5,640	299-W11-47	13-Nov-2012	Not available	N/A	N/A
7440-09-7	Potassium	32,200	299-W10-4	29-Aug-2007	Not available	N/A	N/A
7440-21-3	Silicon	83,100	299-W10-8	3/16/1990	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)
7440-23-5	Sodium	608,000	299-W10-4	5/16/2006	Not available	N/A	No
7440-24-6	Strontium	5,560	299-W10-4	11/5/2012	9,600	WAC 173-340-720(4)(b)(iii)(A) and (B)	No
14808-79-8	Sulfate	326,000	299-W11-27	6-Feb-1997	250,000	40 CFR 143.3	Yes
7440-32-6	Titanium	169	299-W10-8	3/16/1990	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

Table 7. Proposed Groundwater Monitoring Constituents for WMA T

Waste Constituent	CAS Number
<b>Dangerous Waste Constituents</b>	
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-Dichloroethylene	75-35-4
1,2,4-Trichlorobenzene	120-82-1
1,2-Dichloroethane	107-06-2
1,2-Dichloroethene (Total)	540-59-0
1,4-Dichlorobenzene	106-46-7
2,4,5-TP(2-(2,4,5-Trichlorophenoxy)propionic acid) Silvex	93-72-1
2,4-Dinitrophenol	51-28-5
2,4-Dinitrotoluene	121-14-2
2-Nitropropane	79-46-9
4,4'-DDT (Dichlorodiphenyltrichloroethane)	50-29-3
Acetone	67-64-1
Aldrin	309-00-2
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

Table 7. Proposed Groundwater Monitoring Constituents for WMA T

Waste Constituent	CAS Number
Cobalt	7440-48-4
Copper	7440-50-8
Cyanide	57-12-5
Cyclohexanone	108-94-1
Ethyl acetate	141-78-6
Ethyl ether	60-29-7
Ethylbenzene	100-41-4
Hexavalent Chromium	18540-29-9
Isobutanol	78-83-1
Lead	7439-92-1
Mercury	7439-97-6
Methanol	67-56-1
Methyl ethyl ketone	78-93-3
Methyl isobutyl ketone	108-10-1
Methylene chloride	75-09-2
N-butyl alcohol	71-36-3
Nickel	7440-02-0
Nitrobenzene	98-95-3
Ortho-dichlorobenzene	95-50-1
Pyridine	110-86-1
Silver	7440-22-4
Sulfide	18496-25-8
Tetrachloroethene	127-18-4
Thallium	7440-28-0
Tin	7440-31-5
Toluene	108-88-3
Trichloroethylene	79-01-6
Trichlorofluoromethane	75-69-4
Vanadium	7440-62-2

Table 7. Proposed Groundwater Monitoring Constituents for WMA T

Waste Constituent	CAS Number
Vinyl chloride	75-01-4
Xylene (total)	1330-20-7
Zinc	7440-66-6
<b>Nondangerous Waste Constituents</b>	
Aluminum	7429-90-5
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

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