

1
2
3
4

APPENDIX D
ANALYTICAL METHODS

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

9.8.3 Analytical Methods

The analytical methods and the target minimum reportable quantity (MRQ) ranges are indicated in Table 9-3 through Table 9-8.

Table 9-3. Methods and Target MRQ Range for Semivolatiles

CAS#	Compound	Analysis	Analytical Method ^(a)	Supernate Target MRQ Range (mg/L)	Sludge Target MRQ Range (mg/kg)
100-00-5	p-Nitrochlorobenzene	SVOA	8270C	0.25-5.00	1.50-5.00
100-25-4	1,4-Dinitrobenzene ^(d)	SVOA	8270C	0.25-25.00	1.50-5.00
106-46-7	1,4-Dichlorobenzene ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	0.50-5.00
108-95-2	Phenol	SVOA	8270C	0.25-20.00	1.50-5.00
110-86-1	Pyridine ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	1.50-5.00
120-82-1	1,2,4-Trichlorobenzene ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	0.50-5.00
120-83-2	2,4-Dichlorophenol ^{(c), (d)}	SVOA	8270C	---	---
122-39-4	N,N-Diphenylamine	SVOA	8270C	0.25-5.00	1.50-5.00
126-73-8	Tributyl phosphate	SVOA	8270C	0.25-5.00	1.50-5.00
128-37-0	2,6-Bis(tert-butyl)-4-methylphenol	SVOA	8270C	0.25-15.00	1.50-5.00
50-32-8	Benzo(a)pyrene	SVOA	8270C	0.25-5.00 ^(e)	1.50-5.00 ^(e)
53-70-3	Dibenz[a,h]anthracene	SVOA	8270C	0.25-5.00 ^(e)	1.50-5.00 ^(e)
541-73-1	1,3-Dichlorobenzene ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	0.50-5.00
59-50-7	4-Chloro-3-methylphenol ^{(c), (d)}	SVOA	8270C	---	---
627-13-4	Nitric acid, propyl ester ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	2.00-5.00
62-75-9	N-Nitroso-N,N-dimethylamine ^(d)	SVOA	8270C	0.25-6.00	1.50-5.00
67-72-1	Hexachloroethane ^{(b), (c), (d)}	SVOA/VOA	8270C & 8260B	---	---
82-68-8	Pentachloronitrobenzene (PCNB)	SVOA	8270C	0.25-5.00	1.50-5.00
87-68-3	Hexachlorobutadiene ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	0.50-5.00
87-86-5	Pentachlorophenol ^(d)	SVOA	8270C	0.25-35.00	1.50-5.00
88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	SVOA	8270C	0.25-6.00	1.50-5.00
92-52-4	1,1'-Biphenyl	SVOA	8270C	0.25-5.00	1.50-5.00
95-50-1	1,2-Dichlorobenzene ^(b)	SVOA/VOA	8270C or 8260B	0.25-1.00	0.50-5.00
98-86-2	Acetophenone	SVOA	8270C	0.25-5.00	1.50-5.00
98-95-3	Nitrobenzene	SVOA	8270C	0.25-5.00	1.50-5.00

^(a) Prep methods include SW-846 Methods 3520C and 3510C for the supernate and Methods 3540C and 3550B for the sludge. The Performance Based Measurement System should be applied as appropriate for these methods, adjusting for minor modifications required to safely handle high-level waste samples.

^(b) These analytes can be determined using either the semivolatile or the volatile method. Hexachloroethane is usually included for analysis with both the semivolatile and volatile method.

^(c) Hexachloroethane, 2,4-dichlorophenol, 4-chloro-3-methylphenol are not RDQO analytes, however, they are included in the list since they are currently COCs. (—) There has been no method demonstration work performed on these analytes.

^(d) These analytes were identified in Table 9-2. They will be required during the analysis of regulatory compliance samples.

^(e) For all analytes, EQLs ≤ target MRQ provided, except for benzo(a)pyrene and dibenz[a,h]anthracene where MDLs ≤ target MRQs.

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

Table 9-4. Methods and Target MRQ Range for Volatiles

CAS#	Compound	Analysis	Analytical Method ^(a)	Supernate Target MRQ Range (mg/L)	Sludge Target MRQ Range (mg/kg)
100-41-4	Ethyl benzene	VOA	8260B	0.10-1.00	0.25-1.00
100-42-5	Styrene	VOA	8260B	0.10-1.00	0.25-1.00
10061-01-5	cis-1,3-Dichloropropene	VOA	8260B	0.10-1.00	0.25-1.00
10061-02-6	trans-1,3-Dichloropropene	VOA	8260B	0.10-1.00	0.25-1.00
106-35-4	3-Heptanone	VOA	8260B	0.10-1.00	0.25-8.50
106-42-3	p-Xylene & m-Xylene	VOA	8260B	0.10-1.00	0.25-1.00
106-93-4	Ethylene dibromide ^(d)	VOA	8260B	0.10-1.00	0.25-1.00
106-97-8	Butane	VOA	8260B	0.10-1.00	0.25-1.00
106-99-0	1,3-Butadiene	VOA	8260B	0.10-1.00	0.25-1.00
107-02-8	Acrolein	VOA	8260B	0.10-1.00	0.25-1.00
107-05-1	3-Chloropropene	VOA	8260B	0.10-1.00	0.25-1.00
107-06-2	1,2-Dichloroethane	VOA	8260B	0.10-1.00	0.25-1.00
107-12-0	Propionitrile	VOA	8260B	0.10-1.00	0.25-2.00
107-13-1	Acrylonitrile	VOA	8260B	0.10-2.00	0.25-1.00
107-87-9	2-Pentanone	VOA	8260B	0.10-5.00	0.25-1.00
108-10-1	4-Methyl-2-pentanone	VOA	8260B	0.10-1.00	0.25-1.00
108-38-3	m-Xylene (see 106-42-3)	VOA	8260B	0.10-1.00	0.25-1.00
108-87-2	Methylcyclohexane	VOA	8260B	0.10-1.00	0.25-1.00
108-88-3	Toluene	VOA	8260B	0.10-1.00	0.25-1.00
108-90-7	Chlorobenzene	VOA	8260B	0.10-1.00	0.25-1.00
108-94-1	Cyclohexanone	VOA	8260B	0.10-1.00	0.25-1.00
109-66-0	n-Pentane	VOA	8260B	0.10-1.00	0.25-1.00
109-99-9	Tetrahydrofuran	VOA	8260B	0.10-1.00	0.25-1.00
110-12-3	5-Methyl-2-hexanone	VOA	8260B	0.10-1.00	0.25-1.00
110-43-0	2-Heptanone	VOA	8260B	0.10-1.00	0.25-1.00
110-54-3	n-Hexane	VOA	8260B	0.10-1.00	0.25-1.00
110-82-7	Cyclohexane	VOA	8260B	0.10-1.00	0.25-1.00
110-83-8	Cyclohexene	VOA	8260B	0.10-1.00	0.25-1.00
111-65-9	n-Octane	VOA	8260B	0.10-1.00	0.25-1.00
111-84-2	n-Nonane	VOA	8260B	0.10-1.00	0.25-1.00
123-19-3	4-Heptanone	VOA	8260B	0.10-1.00	0.25-1.00
123-38-6	n-Propionaldehyde	VOA	8260B	0.10-1.00	0.25-8.50
123-86-4	Acetic acid n-butyl ester	VOA	8260B	0.10-1.00	0.25-1.00
123-91-1	1,4-Dioxane	VOA	8260B	0.10-1.00	0.25-5.00
126-98-7	2-Methyl-2-propenenitrile	VOA	8260B	0.10-1.00	0.25-1.00
127-18-4	1,1,2,2-Tetrachloroethene	VOA	8260B	0.10-1.00	0.25-1.00
141-78-6	Acetic acid ethyl ester	VOA	8260B	0.10-1.00	0.25-1.00
142-82-5	n-Heptane	VOA	8260B	0.10-1.00	0.25-2.00
287-92-3	Cyclopentane	VOA	8260B	0.10-1.00	0.25-1.00
4170-30-3	2-Butenaldehyde (2-Butenal)	VOA	8260B	0.10-1.00	0.25-1.00
56-23-5	Carbon tetrachloride	VOA	8260B	0.10-1.00	0.25-1.00
563-80-4	3-Methyl-2-butanone	VOA	8260B	0.10-1.00	0.25-1.00

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

Table 9-4. Methods and Target MRQ Range for Volatiles

CAS#	Compound	Analysis	Analytical Method ^(a)	Supernate Target MRQ Range (mg/L)	Sludge Target MRQ Range (mg/kg)
591-78-6	2-Hexanone	VOA	8260B	0.10-1.00	0.25-1.00
64-17-5	Ethyl alcohol	VOA	8260B	0.10-1.00	0.50-5.00
67-56-1	Methyl alcohol	VOA	8260B	0.10-1.00	0.50-5.00
67-63-0	2-Propyl alcohol (Isopropanol)	VOA	8260B	0.10-1.00	0.25-5.00
67-64-1	2-Propanone (Acetone)	VOA	8260B	0.10-2.00	0.25-5.00
67-66-3	Chloroform ^(d)	VOA	8260B	0.10-1.00	0.25-1.00
67-72-1	Hexachloroethane ^{(b), (c), (d)}	VOA/SVOA	8260B & 8270C	---	--
71-23-8	n-Propyl alcohol (1-propanol)	VOA	8260B	0.10-1.00	0.50-5.00
71-36-3	n-Butyl alcohol	VOA	8260B	0.25-1.00	0.50-5.00
71-43-2	Benzene	VOA	8260B	0.10-1.00	0.25-1.00
71-55-6	1,1,1-Trichloroethane	VOA	8260B	0.10-1.00	0.25-1.00
74-83-9	Bromomethane	VOA	8260B	0.10-1.00	0.25-1.00
74-87-3	Chloromethane	VOA	8260B	0.10-1.00	0.25-1.00
75-00-3	Chloroethane	VOA	8260B	0.10-1.00	0.25-1.00
75-01-4	1-Chloroethene	VOA	8260B	0.10-1.00	0.25-1.00
75-05-8	Acetonitrile	VOA	8260B	0.10-1.00	0.25-8.50
75-09-2	Dichloromethane (methylene chloride)	VOA	8260B	0.10-1.00	0.25-1.00
75-15-0	Carbon disulfide	VOA	8260B	0.10-1.00	0.25-1.00
75-21-8	Oxirane	VOA	8260B	0.10-1.00	0.25-5.00
75-34-3	1,1-Dichloroethane	VOA	8260B	0.10-1.00	0.25-1.00
75-35-4	1,1-Dichloroethene	VOA	8260B	0.10-1.00	0.25-1.00
75-43-4	Dichlorofluoromethane	VOA	8260B	0.10-1.00	0.25-1.00
75-45-6	Chlorodifluoromethane	VOA	8260B	0.10-1.00	0.25-1.00
75-65-0	2-Methyl-2-propanol	VOA	8260B	0.10-1.00	0.25-5.00
75-69-4	Trichlorofluoromethane	VOA	8260B	0.10-1.00	0.25-1.00
75-71-8	Dichlorodifluoromethane	VOA	8260B	0.10-1.00	0.25-1.00
76-13-1	1,2,2-Trichloro-1,1,2-trifluoroethane	VOA	8260B	0.10-1.00	0.25-1.00
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	VOA	8260B	0.10-1.00	0.25-1.00
78-87-5	1,2-Dichloropropane	VOA	8260B	0.10-1.00	0.25-1.00
78-92-2	1-Methylpropyl alcohol (2-butanol)	VOA	8260B	0.25-1.00	0.50-5.00
78-93-3	2-Butanone	VOA	8260B	0.10-1.00	0.25-5.00
79-00-5	1,1,2-Trichloroethane	VOA	8260B	0.10-1.00	0.25-1.00
79-01-6	1,1,2-Trichloroethylene	VOA	8260B	0.10-1.00	0.25-1.00
79-34-5	1,1,2,2-Tetrachloroethane	VOA	8260B	0.10-1.00	0.25-1.00
95-47-6	o-Xylene	VOA	8260B	0.10-1.00	0.25-1.00
96-22-0	3-Pentanone	VOA	8260B	0.10-1.00	0.25-1.00

^(a) Prep methods include SW-846 Methods 5021 and 5030B for the supernate and Methods 5021, 5035, and 5030B for the sludge. The Performance Based Measurement System should be applied as appropriate to these methods, adjusting for minor modifications required to safely handle high-level waste samples.

^(b) Hexachloroethane is not a RDQO analyte, however, it is included in the list since it is currently a constituent of concern. (---) There has been no method demonstration work performed on this analyte.

^(c) Hexachloroethane is usually included for analysis with both the semivolatle and volatile method.

^(d) These analytes were identified in Table 9-2. They will be required during the analysis of regulatory compliance samples.

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

Table 9-5. Methods and Target MRQ Range for PCBs

CAS#	Compound ^(b)	Analysis	Analytical Method ^(a)	Supernate Target MRQ Range (mg/L)	Sludge Target MRQ Range (mg/kg)
11096-82-5	Aroclor-1260	PCB	8082	0.025-0.05	0.10-0.25
11097-69-5	Aroclor-1254	PCB	8082	0.025-0.05	0.10-0.25
11104-28-2	Aroclor-1221	PCB	8082	0.025-0.05	0.10-0.25
11141-16-5	Aroclor-1232	PCB	8082	0.025-0.05	0.10-0.25
12672-29-6	Aroclor-1248	PCB	8082	0.025-0.05	0.10-0.25
12674-11-2	Aroclor-1016	PCB	8082	0.025-0.05	0.10-0.25
53469-21-9	Aroclor-1242	PCB	8082	0.025-0.05	0.10-0.25

^(a) Prep methods include SW-846 Methods 3540C and 3510C for supernate and Methods 3540C and 3550B for sludge. The Performance Based Measurement System should be applied as appropriate to these methods, adjusting for minor modifications required to safely handle high-level waste samples.

^(b) These analytes were identified in Table 9-2. They will be required during the analysis of regulatory compliance samples.

Table 9-6. Methods and Target MRQ Range for Pesticides

CAS#	Compound	Analysis	Analytical Method ^(a)	Supernate Target MRQ Range (mg/L)	Sludge Target MRQ Range (mg/kg)
118-74-1	Hexachlorobenzene ^(b)	Pesticides	8081A	0.05-0.07	0.01-0.07
2234-13-1	Octachloronaphthalene	Pesticides	8081A	0.05-0.07	---
1321-64-8	Pentachloronaphthalene ^(c)	Pesticides	8081A	0.05-2.00	---
1335-87-1	Hexachloronaphthalene ^(c)	Pesticides	8081A	---	---
1335-88-2	Tetrachloronaphthalene ^(c)	Pesticides	8081A	0.05-2.00	0.05-0.07
309-00-2	Aldrin	Pesticides	8081A	0.025-0.05	0.05-0.07
319-84-6	alpha-BHC	Pesticides	8081A	0.025-0.05	0.05-0.07
319-85-7	beta-BHC	Pesticides	8081A	0.025-0.05	0.05-0.07
465-73-6	Isodrin	Pesticides	8081A	0.05-0.5	0.01-0.07
58-89-9	Gamma-BHC (Lindane)	Pesticides	8081A	0.025-0.05	0.05-0.07
60-57-1	Dieldrin	Pesticides	8081A	0.05-0.07	0.01-0.07
72-20-8	Endrin	Pesticides	8081A	0.05-0.07	0.01-0.07
76-44-8	Heptachlor ^(b)	Pesticides	8081A	0.025-0.05	0.05-0.07
8001-35-2	Toxaphene	Pesticides	8081A	0.05-0.07	0.10-0.50

^(a) Prep methods include SW-846 Methods 3540C and 3510C for supernate and Methods 3540C and 3550B for sludge. The Performance Based Measurement System should be applied as appropriate to these methods, adjusting for minor modifications required to safely handle high-level waste samples.

^(b) These analytes were identified in Table 9-2. They will be required during the analysis of regulatory compliance samples.

^(c) Halowax 1014 (CAS#: 12616-36-3) contains the congener mixtures of penta-, hexa-, and tetra-polychlorinated naphthalenes. The analysis of these compounds is dependent on standards availability. The method demonstration was performed on supernate simulant and waste using Halowax 1013 (CAS#: 12616-35-2), which contains the congener mixtures of penta-, tetra-, and tri-polychlorinated naphthalenes. (---) Reporting limits have not been established for this analyte.

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

Table 9-7. Methods and Target MRQ Range for Organic Acids

CAS#	Compound	Analysis	Analytical Method ^(a)	Supernatant Target MRQ Range (mg/L) ¹	Sludge Target MRQ Range (mg/kg) ⁽²⁾
144-62-7	Oxalic acid	Organic Acid	9056 (IC)	4000-5500	2000-3500
64-18-6	Formic acid	Organic Acid	9056 (IC)	6500-8000	2000-3500
64-19-7	Acetic acid	Organic Acid	9056 (IC)	6500-8000	2000-3500
79-10-7	2-Propenoic acid	Organic Acid	9056 (IC)	6500-8000	5000-6500

^(a) The preparation for these samples in supernatant is included in SW-846 Method 9056 and for the sludge were included in EPA Method 300.0 and ASTM Method D3987-85. The Performance Based Measurement System should be applied as appropriate to these methods, adjusting for minor modifications required to safely handle high-level waste samples.

^(b) These reporting limits are greater than 1000, however, they are still within limits that support data needs for these analytes.

IC- Ion Chromatography

Table 9-8. Methods and Target MRQ Range for Inorganics and Metals

CAS#	Compound	Analytical Method ^(a)	Target MRQ Range (mg/L)	Target MRQ Range (mg/kg)
7440-22-4	Ag ^(d)	6010B or (7761)	2.0-7.5 or (0.8-2.0)	25.0-80.0
7429-90-5	Al	6010B	20.0-45.0	70.0-600
7440-38-2	As ^(d)	6010B or (7060A)	10.0-15.0 or (0.6-2.0)	175-250 or (6.0-10.0)
7440-39-3	Ba ^(d)	6010B	0.55-1.75	6.00-25.0
7440-41-7	Be ^(d)	6010B	0.05-0.25	1.50-5.00
7440-43-9	Cd ^(d)	6010B	1.75-2.50	10.0-25.0
7440-48-4	Co	6010B	2.50-5.00	9.00-35.0
7440-47-3	Cr ^(d)	6010B	0.75-8.50	25.0-110
7440-50-8	Cu ^(d)	6010B	2.00-8.50	40.0-75.0
7439-89-6	Fe	6010B	2.00-20.0	100-200
7439-93-2	Li	6010B	1.50-10.0	35.0-150
7439-95-4	Mg	6010B	9.50-30.0	150-400
7439-96-5	Mn	6010B	0.55-1.75	1.00-15.0
7439-98-7	Mo	6010B	3.00-15.0	40.0-150
7440-23-5	Na	6010B	60.0-250	600-750
7440-02-0	Ni ^(d)	6010B	6.50-15.0	45.0-100
7723-14-0	P	6010B	15.0-80.0	200-250
7439-92-1	Pb ^(d)	6010B	15.0-45.0	100-450
7440-16-6	Rh (ICP-MS) ^(b)	6020	15.0-20.0	0.25-10.00
7704-34-9	S	6010B	50.0-75.0	150-300
7440-36-0	Sb ^(d)	6010B	15.0-20.0	210-250
7782-49-2	Se ^(d)	6010B or (7740)	20.0-30.0 or (2.5-5.0)	175-400 or (26-50)
7440-31-5	Sn	6010B	60.0-100	250-2500 ^(c)
7440-25-7	Ta (ICP-MS) ^(b)	6020	0.25-5.00	8.50-15.0
7440-28-0	Tl ^(d)	6010B	5.50-15.0	175-200
7440-61-1	U	6010B	250-525	1800-3200 ^(e)
7440-62-2	V ^(d)	6010B	2.50-5.00	25.0-50.0
7440-33-70	W	6010B	7.00-125	125-1100 ^(c)
7440-65-5	Y	6010B	1.00-6.00	7.00-100
7440-66-6	Zn ^(d)	6010B	3.50-5.50	15.0-100
7440-67-7	Zr	6010B	2.50-125	15.0-550
7439-97-6	Hg ^(d)	7470A or (7471A)	0.025-1.00	(0.10-3.50)
57-12-5	CN	9010B/9014 or 9012A	2.50-10.00	0.50-3.50

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

Table 9-8. Methods and Target MRQ Range for Inorganics and Metals

CAS#	Compound	Analytical Method ^(a)	Target MRQ Range (ug/L)	Target MRQ Range (mg/kg)
7664-41-7	NH3	SM-4500-NH3-F or EPA Method 350.3	0.08-15.0	0.75-3.50
---	pH ^(d)	Std Method	---	---
16984-48-8	Fluoride	9056 ^(e)	150-500	2.50-25.0
16887-00-6	Chloride	9056 ^(e)	100-500	2.50-25.0
14797-65-0	Nitrite	9056 ^(e)	2600-10000 ^(c)	2.50-50.0
24959-67-9	Bromide	9056 ^(e)	150-500	2.50-25.0
14797-55-8	Nitrate	9056 ^(e)	2600-10000 ^(c)	2.50-50.0
14265-44-2	Phosphate	9056 ^(e)	150-500	2.50-50.0
14808-79-8	Sulfate	9056 ^(e)	150-500	25.0-50.0

^(a) Prep methods include SW-846 Methods 3010A, 3005A, and 3015 for the supernate and Methods 3050B and 3015 for the sludge. Fusion was also used in the methods demonstration for metals preparation. The Performance Based Measurement System should be applied as appropriate to these methods, adjusting for minor modifications required to safely handle high-level waste samples.

^(b) Although the ICP-AES methodology (6010B) can be applied to the determination of rhodium and tantalum, the ICP-MS technique (6020) has been demonstrated to achieve reporting limits that better support data needs.

^(c) These reporting limits are greater than 1000, however, they are still within limits that support data needs for these analytes.

^(d) These analytes were identified in Table 9-2. They will be required during the analysis of regulatory compliance samples.

^(e) Prep methods for the inorganic anions were SW-846 Method 9056 for the supernate and EPA Method 300.0 and ASTM Method D3987-85 for the sludge.

() - Target MRQ ranges given in parentheses correspond to the methods given in parentheses.

9.8.4 Analytical Method Guidelines

Per the guidelines established using the PBMS and safe handling procedures required to address ALARA concepts, sample sizes may be reduced from those recommended in SW-846. The adjustments to the samples sizes applied to the SW-846 methods and the appropriate scaling of reagents is not considered a modification or a deviation from SW-846. The sample size reduction is typical for the analysis of radioactive samples to ensure safety. The selection of acids, solvents, and surrogates may also be adjusted to address matrix interferences and are within the PBMS guidelines. Minor modifications to SW-846 methods are discussed in Table 9-9 and Table 9-10.

Table 9-9. SW-846 Guidelines and Handling Hanford Tank Waste

SW-846 Methods Guidelines	Procedures for Performing Analysis on Hanford Tank Waste
SW-846 provides recommendations for sample sizes applied to each method.	Sample size reduction, the associated scaling of reagents, and the selection of container sizes applied during sample preparation are not considered deviations from SW-846. This is required to ensure safe handling of the radioactive samples and minimize waste generation.
In some methods, SW-846 describes specific containers or vessels for application of the method and means for transferring materials (for example, pouring).	In cases where the container type may impact ability to safely handle a radioactive sample or where the sample matrix may be affected by the container material, a different container type may be specified for safe handling in laboratory procedures. Procedures may require minor adjustments for safety (for example, using a syringe to transfer the sample rather than pouring the sample). These are considered minor modifications.
SW-846 provides recommended wavelengths for ICP-AES and alternate isotopes for ICP-MS	Adjustments to wavelengths for ICP-AES and selection of alternate isotopes for ICP-MS are not considered deviations from SW-846. This is required to address complex matrix interferences and improve analytical accuracy.

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

Table 9-10. Summary of Method Modifications

Analytes	Determinative	Preparation	Modifications ^(a)
SVOA	8270C	3520C, 3510C, 3540C, 3550B	If matrix interferences affect the recoveries of the SW-846 recommended surrogates, additional surrogates may be added to the method surrogate list for the 8270C analysis. If necessary, this should be included in the TSAPs.
VOA	8260B	5021, 5030B, 5021, 5035, 5030B	Minor ^(a)
PCB	8082	3540C, 3510C, 3550B	Minor ^(a)
Pesticides	8081A	3540C, 3510C, 3550B	Minor ^(a)
Organic Acids and Inorganic Anions	9056 (IC)	9056	Organic acid salts are not included in the SW-846 9056 method; however, the IC technique and column selection can be adjusted to determine these analytes and to reduce interferences from the anions and acid salts present in the tank waste.
		EPA Method 300.0 (EPA, 1989)	EPA Method 300.0 is not an SW-846 method.
		ASTM D3987-85 (1999) Shake extraction of solid waste with water	ASTM D3987-85 is not an SW-846 method. An ultrasonic bath rather than shaker may be applied to the preparation of solids if this facilitates proper extraction.
Metals	6010B (ICP-AES) 6020 (ICP-MS)	3010A, 3005A, 3015, 3050B, 3015 (Note: acid digestion methods generally preferred over fusion)	Heat source alternatives (for example, heating block) and solvent selection may be adjusted based on matrix interferences and safe sample handling practices. See Table 9-9.
Silver Arsenic Selenium	7761 (AA) 7060A (AA) 7740 (AA)	ASTM D4503-86 (1998) Dissolution of solid waste by fusion	Not an SW-846 method. The modified ASTM method uses KOH, which supports a broader analyte list, rather than lithium metaborate. ASTM methods are recognized by EPA as equivalent standards.
Mercury	7470A 7471A	NA	Minor ^(a)
Cyanide - CN	9010B/9014 9012A	NA	Selection of distillation apparatus may be adjusted to safely perform distillation.
Ammonia - NH ₃	SM-4500-NH ₃ -F	NA	SM-4500-NH ₃ -F (Standard Method, 1992) is not an SW-846 method, but is considered equivalent by EPA.
	EPA Method 350.3	NA	EPA Method 350.3 (EPA, 1989) is not an SW-846 method.
pH	Standard Method	NA	Application of laboratory standard pH measurement techniques are considered equivalent by EPA and can be applied to this determination.

NA - not applicable. The preparation procedure for these analytes is included in the determinative method.
AA- atomic absorption spectrometry

^(a) - The Performance Based Measurement System should be applied as appropriate to these methods, adjusting for minor modifications required to safely handle high-level waste samples. See also the discussion in Table 9-9.

24590-WTP-RPT-MGT-04-001, Rev 0
 Regulatory Data Quality Objectives Optimization Report

9.8.5 Analytical Quality Control Parameters

The QC parameters in Table 9-11 have been provided with input from a performance assessment of method evaluation and demonstration activities. These performance criteria apply for the analytes and methods described in Table 9-3 through Table 9-8.

Table 9-11. Quality Control Parameters for SW-846 Methods

Analytes	Method	QC Acceptance Criteria			
		LCS % Recovery	Spike % Recovery	MSD/Dup RPD	Replicate % RSD
Metals	ICP-AES-6010B	80-120 %	75-125 %	< 20 %	< 20 %
Metals	ICP-MS-6020	80-120 %	75-125 %	< 20 %	< 20 %
Metals	AA-7060A; AA-7740 or equiv	80-120 %	75-125 %	≤ 20 %	≤ 20 %
Hg	CVAA-7470A; 7471A	80-120 %	75-125 %	≤ 20 %	≤ 20 %
Organic Acids and Anions	IC-9056	80-120 %	75-125 %	≤ 20 %	≤ 20 %
pH	pH (Std Method)	± 0.1 pH units	NA	NA	NA
SVOA	8270C	70-130 %	50-150 % ^(a)	< 30 %	< 30 %
VOA	8260B	70-130 %	50-150 %	< 30 %	< 30 %
PCBs	8082	70-130 %	50-150 % ^(a)	< 30 %	< 30 %
Pesticides	8081A	70-130 %	50-150 % ^(a)	< 30 %	< 30 %

^(a) Control chart limits should be identified for these analyses as applied to the recoveries associated with the high-level waste matrices as appropriate. The SW-846 Method 8270C acknowledges poor recoveries of phenols and other semivolatiles and recommends expanding the recovery limits to approximately D-175 % for many of these analytes. (D- applies to any result detected above zero at the instrument).

24590-WTP-RPT-MGT-04-001, Rev 0
Regulatory Data Quality Objectives Optimization Report

10 References

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