This document was too large to scan as a single document. It has been divided into smaller sections.

Section 9 of 14

Document Information			
Document #	0602648		
Title	DRAFT WTP DANGEROUS WASTE PERMIT		
Date	10/04/2006		
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CALCULATION SHEET

BY: E. Berrios
DATE: 03/13/03

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 61

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-7 LVP01 Calculation**												
2			Total feed			Representatives			LVP01	Unabated LAW VV			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	1.66E-06		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	1.16E+01	g/sec	1.89E-07	6.13E+07	9.83E-06		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	2.60E-08	4.17E+09	4.06E-08		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	4.18E-01	g/sec	1.28E-09	3.27E+08	7.49E-07		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	3.33E-06		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	1.40E-06	2.99E+08	1.06E-06		
10	Se	78.9	4.70E+01	1.96E+02		F-	3.65E+00	g/sec	8.77E-08	4.16E+07	4.70E-06		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	1.04E-08	2.09E+08	9.33E-09		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	7.69E-07		
13	Tl	204.3	1.57E+01	1.70E+02		F-	3.65E+00	g/sec	8.77E-08	4.16E+07	4.08E-06		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	4.18E-10	1.39E+08	3.80E-05		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	4.18E-01	g/sec	1.28E-09	3.27E+08	3.69E-08		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	6.14E-06		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	5.66E-05	1.95E+09	3.09E-08		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	3.65E+00	g/sec	8.77E-08	4.16E+07	4.02E-07		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	1.30E+00	g/sec	1.61E-08	8.08E+07	6.43E-07		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	2.84E-07	3.25E+11	3.70E-11		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	2.84E-07	3.25E+11	3.85E-08		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	3.95E-11		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	2.00E-07		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	4.13E-08		
26	229Th	229	3.91E+07	2.53E-02		232Th	5.54E-05	Ci/d	3.87E-11	1.43E+06	1.77E-08		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	4.39E-07		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	7.18E-10	6.83E+07	7.61E-09		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	7.55E-09	3.13E+10	1.76E-13		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	2.61E-08	3.70E+10	4.08E-12		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	1.67E-07	3.57E+08	2.43E-08		
32	79Se	79	7.42E+08	4.82E-01		F-	3.65E+00	g/sec	8.77E-08	4.16E+07	1.16E-08		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	5.66E-05	1.95E+09	7.27E-05		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	1.42E-06		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	1.92E+00	g/sec	1.31E-07	1.47E+07	1.28E-06		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	6.99E-11	4.60E+11	1.34E-12		

CALCULATION SHEET

BY: E. Berrios
DATE: 03/13/03

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 62

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-8 HMP06 Calculation**												
2			Total feed			Representatives			HMP06	Unabated HLW OFFGAS			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	4.19E-04		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	9.95E+00	2.21E+02	1.43E-02		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	5.39E-01	2.02E+02	4.42E-03		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	6.81E-01	1.17E+02	1.10E-02		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	8.39E-04		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	3.54E+00	1.19E+02	1.40E-02		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	2.61E+01	2.66E+01	3.87E-02		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	8.34E-03	2.61E+02	3.92E-05		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	1.94E-04		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	2.61E+01	2.66E+01	3.36E-02		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	1.87E-04	3.11E+02	8.93E-02		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	6.81E-01	1.17E+02	5.43E-04		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	1.55E-03		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	1.09E+03	1.02E+02	3.12E-03		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	2.61E+01	2.66E+01	6.29E-01		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	1.32E+01	1.87E+01	2.79E+00		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	3.19E+03	2.90E+01	4.15E-01		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	3.19E+03	2.90E+01	4.32E+02		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	1.89E-06		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	9.56E-03		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	1.98E-03		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	4.32E-05	2.44E+02	1.04E-04		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	2.10E-02		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	6.64E-05	7.38E+02	7.04E-04		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	1.19E+00	1.99E+02	2.76E-05		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	4.85E+00	1.99E+02	7.58E-04		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	5.86E-01	1.02E+02	8.50E-02		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	2.61E+01	2.66E+01	1.81E-02		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	1.09E+03	1.02E+02	1.40E+03		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	6.80E-02		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	1.19E+00	3.07E+02	6.12E-02		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	1.62E-01	1.99E+02	3.11E-03		

BY: E. Berrios
DATE: 03/13/03

CALCULATION SHEET

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 63

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-9 HOP10 Calculation**												
2			Total feed			Representatives			HOP10	Unabated HLW VV			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	5.70E-09		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	4.77E-06	4.61E+08	6.87E-09		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	6.69E-06	1.63E+07	5.49E-08		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	7.62E-06	1.04E+07	1.24E-07		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	1.14E-08		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	3.96E-05	1.06E+07	1.57E-07		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	3.82E-04	1.81E+06	5.68E-07		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	1.03E-07	2.11E+07	4.86E-10		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	2.64E-09		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	3.82E-04	1.81E+06	4.92E-07		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	2.31E-09	2.51E+07	1.11E-06		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	7.62E-06	1.04E+07	6.09E-09		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	2.11E-08		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	1.22E-02	9.07E+06	3.50E-08		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	3.82E-04	1.81E+06	9.21E-06		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	1.34E-04	1.84E+06	2.82E-05		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	3.31E-02	2.80E+06	4.30E-06		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	3.31E-02	2.80E+06	4.48E-03		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	2.57E-11		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	1.30E-07		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	2.69E-08		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	5.36E-10	1.97E+07	1.29E-09		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	2.86E-07		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	8.24E-10	5.95E+07	8.74E-09		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	1.47E-05	1.61E+07	3.42E-10		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	6.02E-05	1.61E+07	9.39E-09		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	6.49E-06	9.22E+06	9.41E-07		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	3.82E-04	1.81E+06	2.66E-07		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	1.22E-02	9.07E+06	1.56E-02		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	9.24E-07		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	1.62E-05	2.26E+07	8.33E-07		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	2.00E-06	1.61E+07	3.86E-08		

BY: E. Berrios
DATE: 03/13/03

CALCULATION SHEET

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 64

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-10 PJV32 Calculation**												
2			Total feed			Representatives			PJV32	Unabated HLW RFD/PJM			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	1.31E-11		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	3.98E-08	5.54E+10	5.73E-11		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	1.15E-08	9.48E+09	9.41E-11		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	7.67E-09	1.04E+10	1.24E-10		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	2.62E-11		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	3.98E-08	1.05E+10	1.58E-10		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	6.32E-08	1.10E+10	9.37E-11		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	1.77E-10	1.23E+10	8.33E-13		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	6.05E-12		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	6.32E-08	1.10E+10	8.13E-11		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	3.96E-12	1.46E+10	1.90E-09		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	7.67E-09	1.04E+10	6.12E-12		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	4.83E-11		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	1.22E-05	9.05E+09	3.51E-11		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	6.32E-08	1.10E+10	1.52E-09		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	3.03E-08	8.15E+09	6.37E-09		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	1.36E-05	6.80E+09	1.77E-09		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	1.36E-05	6.80E+09	1.84E-06		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	5.91E-14		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	2.99E-10		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	6.18E-11		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	9.18E-13	1.15E+10	2.21E-12		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	6.57E-10		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	1.41E-12	3.48E+10	1.50E-11		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	2.52E-08	9.39E+09	5.86E-13		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	1.03E-07	9.39E+09	1.61E-11		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	5.95E-09	1.01E+10	8.62E-10		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	6.32E-08	1.10E+10	4.39E-11		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	1.22E-05	9.05E+09	1.57E-05		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	2.12E-09		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	3.71E-08	9.83E+09	1.91E-09		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	3.43E-09	9.38E+09	6.60E-11		

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-11 PVP12 Calculation**												
2			Total feed			Representatives			PVP12	Abated PT- VV			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	5.63E-15		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	2.05E-10	1.07E+13	2.96E-13		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	4.21E-12	2.58E+13	3.46E-14		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	2.69E-12	2.95E+13	4.37E-14		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	1.13E-14		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	1.45E-11	2.89E+13	5.76E-14		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	5.02E-11	1.38E+13	7.45E-14		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	8.32E-14	2.62E+13	3.91E-16		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	2.60E-15		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	5.02E-11	1.38E+13	6.46E-14		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	3.83E-15	1.51E+13	1.83E-12		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	2.69E-12	2.95E+13	2.15E-15		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	2.08E-14		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	3.06E-09	3.61E+13	8.78E-15		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	5.02E-11	1.38E+13	1.21E-12		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	1.35E-11	1.83E+13	2.85E-12		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	4.51E-09	2.05E+13	5.86E-13		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	4.51E-09	2.05E+13	6.10E-10		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	2.54E-17		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	1.28E-13		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	2.66E-14		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	5.29E-16	1.99E+13	1.27E-15		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	2.82E-13		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	4.67E-15	1.05E+13	4.95E-14		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	6.24E-12	3.79E+13	1.45E-16		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	2.55E-11	3.79E+13	3.98E-15		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	2.02E-12	2.96E+13	2.93E-13		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	5.02E-11	1.38E+13	3.49E-14		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	3.06E-09	3.61E+13	3.93E-09		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	9.12E-13		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	1.60E-11	2.29E+13	8.22E-13		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	1.22E-12	2.64E+13	2.34E-14		

CALCULATION SHEET

BY: E. Berrios
DATE: 03/13/03

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 66

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-12 PJV11 Calculation**												
2			Total feed			Representatives			PJV11	Abated PT- PJM/RFD			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	7.93E-12		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	1.97E-07	1.12E+10	2.83E-10		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	6.60E-09	1.65E+10	5.42E-11		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	5.24E-09	1.51E+10	8.50E-11		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	1.59E-11		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	2.79E-08	1.50E+10	1.11E-10		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	6.82E-08	1.02E+10	1.01E-10		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	1.50E-10	1.45E+10	7.06E-13		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	3.66E-12		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	6.82E-08	1.02E+10	8.79E-11		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	4.24E-12	1.37E+10	2.03E-09		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	5.24E-09	1.51E+10	4.19E-12		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	2.93E-11		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	6.80E-06	1.62E+10	1.95E-11		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	6.82E-08	1.02E+10	1.64E-09		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	2.06E-08	1.20E+10	4.34E-09		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	7.58E-06	1.22E+10	9.86E-10		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	7.58E-06	1.22E+10	1.03E-06		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	3.58E-14		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	1.81E-10		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	3.74E-11		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	7.05E-13	1.50E+10	1.69E-12		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	3.98E-10		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	4.23E-12	1.16E+10	4.49E-11		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	1.43E-08	1.66E+10	3.32E-13		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	5.84E-08	1.66E+10	9.12E-12		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	3.93E-09	1.52E+10	5.70E-10		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	6.82E-08	1.02E+10	4.74E-11		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	6.80E-06	1.62E+10	8.74E-06		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	1.28E-09		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	2.25E-08	1.62E+10	1.16E-09		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	1.94E-09	1.66E+10	3.74E-11		

CALCULATION SHEET

BY: E. Berrios
DATE: 03/13/03

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 67

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-13 LVP26 Calculation**												
2			Total feed			Representatives			LVP26	Abated LAW OFFGAS			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	4.82E-11		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	1.80E-10	1.23E+13	2.58E-13		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	5.07E-10	2.14E+11	4.16E-12		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	7.74E-09	1.03E+10	1.26E-10		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	9.64E-11		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	8.56E-08	4.90E+09	3.40E-10		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	2.06E-06	3.37E+08	3.05E-09		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	3.26E-11	6.69E+10	1.53E-13		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	2.23E-11		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	2.06E-06	3.37E+08	2.65E-09		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	1.30E-12	4.45E+10	6.24E-10		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	7.74E-09	1.03E+10	6.18E-12		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	1.78E-10		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	3.52E-07	3.13E+11	1.01E-12		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	2.06E-06	3.37E+08	4.96E-08		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	5.52E-07	4.47E+08	1.16E-07		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	3.22E-08	2.88E+12	4.19E-12		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	3.22E-08	2.88E+12	4.36E-09		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	2.17E-13		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	1.10E-09		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	2.27E-10		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	1.21E-13	8.73E+10	2.90E-13		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	2.42E-09		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	2.24E-12	2.19E+10	2.38E-11		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	2.36E-11	1.00E+13	5.49E-16		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	8.16E-11	1.19E+13	1.27E-14		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	3.96E-09	1.51E+10	5.74E-10		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	2.06E-06	3.37E+08	1.43E-09		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	3.52E-07	3.13E+11	4.52E-07		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	7.81E-09		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	1.37E-07	2.67E+09	7.03E-09		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	2.18E-13	1.47E+14	4.20E-15		

BY: E. Berrios
DATE: 03/13/03

CALCULATION SHEET

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 68

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-14 HOP33 Calculation**												
2			Total feed			Representatives			HOP33	Abated HLW OFFGAS			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	7.80E-14		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	2.65E-13	8.31E+15	3.82E-16		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	4.22E-10	2.58E+11	3.46E-12		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	4.37E-10	1.82E+11	7.08E-12		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	1.56E-13		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	4.35E-09	9.65E+10	1.72E-11		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	4.85E-12	1.43E+14	7.21E-15		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	1.16E-12	1.87E+12	5.47E-15		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	3.60E-14		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	4.85E-12	1.43E+14	6.25E-15		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	2.61E-14	2.23E+12	1.25E-11		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	4.37E-10	1.82E+11	3.49E-13		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	2.88E-13		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	1.52E-07	7.28E+11	4.36E-13		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	4.85E-12	1.43E+14	1.17E-13		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	4.70E-09	5.25E+10	9.91E-10		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	2.22E-06	4.17E+10	2.88E-10		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	2.22E-06	4.17E+10	3.00E-07		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	3.52E-16		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	1.78E-12		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	3.68E-13		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	6.04E-15	1.75E+12	1.45E-14		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	3.91E-12		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	9.27E-15	5.29E+12	9.83E-14		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	1.66E-10	1.43E+12	3.85E-15		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	6.77E-10	1.43E+12	1.06E-13		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	2.76E-10	2.17E+11	4.01E-11		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	4.85E-12	1.43E+14	3.37E-15		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	1.52E-07	7.28E+11	1.95E-07		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	1.26E-11		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	2.21E-10	1.65E+12	1.14E-11		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	2.26E-11	1.43E+12	4.34E-13		

CALCULATION SHEET

BY: E. Berrios
DATE: 03/13/03

PROJECT: WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00003
SHEET REV: A
SHEET NO.: 69

SUBJECT: Integrated Baseline Emissions Report Non-SSFM Represented Constituents Emissions Rate Estimation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Table B-15 PJV34 Calculation**												
2			Total feed			Representatives			PJV34	Abated HLW PJM			
3	Non-Rep Const	MW	mol/hr	lb/d			Feed Rate		Rate	PF	Non-Rep Const (g/sec)		
4	Be	9.0	5.15E+01	2.45E+01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	6.55E-17		
5	CN	26.0	4.39E+02	6.03E+02		PO4-3	2.20E+03	lb/d	1.99E-13	1.11E+16	2.86E-16		
6	Co	58.9	5.45E+01	1.70E+02		60Co	1.09E+02	Ci/d	5.73E-14	1.90E+15	4.70E-16		
7	Mo	95.9	4.83E+01	2.45E+02		Bi+3	7.94E+01	lb/d	3.83E-14	2.07E+15	6.21E-16		
8	Rh	102.9	9.02E+00	4.90E+01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	1.31E-16		
9	Sb	121.7	4.92E+01	3.16E+02		125Sb	4.19E+02	Ci/d	1.99E-13	2.11E+15	7.89E-16		
10	Se	78.9	4.70E+01	1.96E+02		F-	6.93E+02	lb/d	3.16E-13	2.20E+15	4.69E-16		
11	Sn	118.7	3.11E-01	1.95E+00		126Sn	2.18E+00	Ci/d	8.85E-16	2.46E+15	4.16E-18		
12	Ta	180.9	1.18E+00	1.13E+01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	3.03E-17		
13	Tl	204.3	1.57E+01	1.70E+02		F-	6.93E+02	lb/d	3.16E-13	2.20E+15	4.07E-16		
14	U	238.0	4.20E+02	5.27E+03		234U	5.80E-02	Ci/d	1.98E-17	2.93E+15	9.48E-15		
15	V	50.9	4.48E+00	1.21E+01		Bi+3	7.94E+01	lb/d	3.83E-14	2.07E+15	3.06E-17		
16	W	183.8	9.31E+00	9.03E+01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	2.42E-16		
17	Y	88.9	1.28E+01	6.03E+01		90Sr	1.10E+05	Ci/d	6.10E-11	1.81E+15	1.75E-16		
18			Bq/hr	Ci/d									
19	106Ru	106	2.57E+10	1.67E+01		F-	6.93E+02	lb/d	3.16E-13	2.20E+15	7.61E-15		
20	113mCd	113	8.01E+10	5.20E+01		Cd+2	2.47E+02	lb/d	1.51E-13	1.63E+15	3.19E-14		
21	134Cs	134	1.86E+10	1.20E+01		137Cs	9.26E+04	Ci/d	6.81E-11	1.36E+15	8.86E-15		
22	137mBa	137	1.93E+13	1.25E+04		137Cs	9.26E+04	Ci/d	6.81E-11	1.36E+15	9.22E-12		
23	226Ra	226	8.96E+05	5.81E-04		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	2.95E-19		
24	227Ac	227	4.53E+09	2.94E+00		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	1.49E-15		
25	228Ra	228	9.37E+08	6.08E-01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	3.09E-16		
26	229Th	229	3.91E+07	2.53E-02		232Th	1.05E-02	Ci/d	4.59E-18	2.30E+15	1.10E-17		
27	231Pa	231	9.96E+09	6.46E+00		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	3.28E-15		
28	232U	232	8.01E+08	5.20E-01		233U	4.90E-02	Ci/d	7.05E-18	6.95E+15	7.48E-17		
29	242Pu	242	8.48E+06	5.50E-03		241Pu	2.36E+02	Ci/d	1.26E-13	1.88E+15	2.93E-18		
30	243Am	243	2.33E+08	1.51E-01		241Am	9.67E+02	Ci/d	5.15E-13	1.88E+15	8.04E-17		
31	59Ni	59	1.34E+10	8.68E+00		63Ni	5.99E+01	Ci/d	2.97E-14	2.01E+15	4.31E-15		
32	79Se	79	7.42E+08	4.82E-01		F-	6.93E+02	lb/d	3.16E-13	2.20E+15	2.19E-16		
33	90Y	90	2.19E+14	1.42E+05		90Sr	1.10E+05	Ci/d	6.10E-11	1.81E+15	7.84E-11		
34	93Zr	93	3.22E+10	2.09E+01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	1.06E-14		
35	93mNb	93	2.90E+10	1.88E+01		Zr+4	3.65E+02	lb/d	1.86E-13	1.97E+15	9.56E-15		
36	242Cm	242	9.55E+08	6.19E-01		243Cm	3.22E+01	Ci/d	1.72E-14	1.88E+15	3.30E-16		

D

Appendix D
Calculation: Updated Emissions Run Feed Vector

24590-WTP-M4C-FRP-00001, Rev 0A

ISSUED BY
RPP-WTP PDC
KLD 12-26-02
INIT DATE

Calculation Cover Sheet

RIVER PROTECTION PROJECT-WASTE TREATMENT PLANT		JOB NO.:	24590
CALC NO.	24590-WTP-M4C-FRP-00001	GROUP	Process Operations
SUBJECT	Updated Emissions Run Feed Vector		

CALCULATION STATUS DESIGNATION: ☒ PRELIMINARY ☐ COMMITTED ☐ CONFIRMED ☐ SUPERSEDED ☐ VOIDED

COMPUTER PROGRAM/TYPE	N/A	QAS	SCP	PROGRAM NAME	VERSION/RELEASE NO.
	☒	☐ YES ☐ NO	☐ YES ☐ NO		

Notes/Comments

This calculation is a complete re-write of Revision 0 therefore no revision bars are used.

Calculations were performed on a Personal Computer using the software Excel 97 SR-2.

NO.	REASON FOR REVISION	TOTAL NO OF SHEETS	LAST SHEET NO.	BY	CHECKED	APPROVED/ ACCEPTED	DATE
0A	Update the feed vector	137	137	E. Berrios	T. Lix/J. Tadlock	O. Block	12-18-02
0	Initial Issue	43	43	E. Berrios	J. Reynolds	O. Block	04/01/02

RECORD OF REVISIONS

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1 Objective

The objective of this calculation is to update the Steady State Flowsheet Model (ACM) feed vector for the updated revision of the *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant* (Cook 2001).

2 Inputs

2.1 Design Inputs

Rev. 1 of the Emissions Report (Cook 2001) recommended that the highest concentration of the constituents be used in the feed vector in order to obtain a bounding emissions estimate for the Waste Treatment Plant (WTP). The feed vector used was based on several sources which included the Tank Farm Contractor Utilization Plan (TFCOUP), the Best Basis Inventory (BBI), and the Aspen model. It was decided by the Emissions Feed Vector Task team that only one source of information should be used to determine the feed vector. It was agreed that this source is the BBI data (CCN# 044663). It was also decided that tanks to be evaluated to derive the feed vector are those scheduled to be processed during Phase I as stated in the System Plan Run 1C document (Allen 2002). The tanks in scope are:

LAW
- AP-101 supernate
- AZ-101 supernate
- AZ-102 supernate
- AN-102 supernate
- AN-104 dissolved solids (salt cake) and supernate
- AN-107 supernate

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 3

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

- AN-105 dissolved solids (salt cake) and supernate
- SY-101 supernate
- AN-103 dissolved solids (salt cake) and supernate
- AW-101 dissolved solids (salt cake) and supernate
- AP-104 supernate

HLW
- AZ-101 solids
- AZ-102 solids
- AY-102 solids
- C-106 solids
- AY-101 solids
- C-104 solids
- SY-102 solids
- C-107 solids
- AW-104 solids (sludge portion only)

Inventory from each tank is located in the BBI website http://twins.pnl.gov:8001/data/datamenu.htm. The inventory is located under the subject area called Best Basis Inventory

Part of this calculation requires comparing BBI results to contract maximums. For the LAW feed, the following Statement of Work (SOW) maximums, based on the *WTP Statement of Work* (DE-AC27-01RV14136) Specification 7, Tables TS-7.1 and TS-7.2, were used:

LAW Contract Maximums

Chemical Analyte	mol/mol Na
Al	2.5E-01
Ba	1.0E-04
Ca	4.0E-02
Cd	4.0E-03
Cl	8.9E-02
Cr	2.0E-02
F	2.0E-01
Fe	1.0E-02
Hg	1.4E-05
K	1.8E-01
La	8.3E-05
Ni	3.0E-03
NO_2	3.8E-01
NO_3	8.0E-01
Pb	6.8E-04
PO_4	1.3E-01
SO_4	7.0E-02
TIC as CO_3	3.0E-01
TOC as oxalate	5.0E-01
U	1.2E-03
Radionuclide	**Bq/mol Na**

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 4

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Chemical Analyte	mol/mol Na
TRU*	4.8E+05
^{137}Cs	2.0E+10
^{90}Sr	8.0E+08
^{99}Tc	7.1E+06
^{60}Co	3.7E+05
^{154}Eu	4.3E+06

* TRU is defined as alpha-emitting radionuclides with an atomic number greater than 92 with half-life greater than 10 years.

For the HLW feed, the SOW maximums are based on grams per 100 grams of non-volatile waste oxides. SOW maximums are available for various non-volatile elements, volatile components, and radionuclides. The HLW SOW maximums, per the *WTP Statement of Work* (DE-AC27-01RV14136) Specification 8, Tables TS-8.1, TS-8.2, TS-8.3, and TS-8.4 are:

HLW Non-Volatile Elements SOW Maximums

Non-Volatile Element	Maximum (grams / 100 grams waste oxides)	Non-Volatile Element	Maximum (grams / 100 grams waste oxides)
As	0.16	Zn	0.42
B	1.3	Ag	0.55
Be	0.065	Al	14
Ce	0.81	Ba	4.5
Co	0.45	Bi	2.8
Cs	0.58	Ca	7.1
Cu	0.48	Cd	4.5
Hg	0.1	Cr	0.68
La	2.6	F	3.5
Li	0.14	Fe	29
Mn	6.5	K	1.3
Mo	0.65	Mg	2.1
Nd	1.7	Na	19
Pr	0.35	Th	5.0
Pu	0.054	Ni	2.4
Rb	0.19	P	1.7
Sb	0.84	Pb	1.1
Se	0.52	Pd	0.13
Sr	0.52	Rh	0.13
Ta	0.03	Ru	0.35
Tc	0.26	S	0.65
Te	0.13	Si	19
Tl	0.45	Ti	1.3
V	0.032	U	14
W	0.24	Zr	15
Y	0.16		

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 5

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

HLW Volatile Components SOW Maximums

Volatile Components	Maximum (grams / 100 grams waste oxides)
Cl	0.33
CO_3^{-2}	30
NO_2	36
NO_3	(total NO_2/NO_3) as NO_3
TOC	11
CN	1.6
NH_3	1.6

HLW Radionuclides SOW Maximums

Radionuclide	Maximum (Ci/100 grams waste oxide)	Radionuclide	Maximum (Ci/100 grams waste oxide)	Radionuclide	Maximum (Ci/100 grams waste oxide)
3H	6.5E-05	129I	2.9E-07	237Np	7.4E-05
14C	6.5E-06	137Cs	1.5E+00	238Pu	3.5E-04
60Co	1.0E-02	152Eu	4.8E-04	239Pu	3.1E-03
90Sr	1.0E+01	154Eu	5.2E-02	241Pu	2.2E-02
99Tc	1.5E-02	155Eu	2.9E-02	241Am	9.0E-02
125Sb	3.2E-02	233U	9.0E-07	243+244Cm	3.0E-03
126Sn	1.5E-04	235U	2.5E-07		

For the purposes of charge balancing the feed vector, the following element charges were used. Only the elements tracked on the Steady State Flowsheet Model were charged balanced. Charges are based on the CRC Handbook 71st Edition (CRC 1991).

Component Charges

Component	Charge	Component	Charge	Component	Charge
Ag	1	NO_2	-1	137Cs	1
Al	3	NO_3	-1	14C	4
As	5	OH	-1	151Sm	3
B	3	Oxalate	-2	152Eu	3
Ba	2	Pb	2	154Eu	3
Be	2	Pd	2	155Eu	3
Bi	3	PO_4	-3	232Th	4
Ca	2	Rb	1	233U	6
Cd	2	Rh	3	234U	6
Ce	3	Ru	4	235U	6
Cl	-1	Sb	3	236U	6
CN	-1	Se	4	237Np	4
CO_3	-2	Ta	5	238Pu	4
Co	3	Si	4	238U	6
Cr	3	SO_4	-2	239Pu	4
Cu	2	Sr	2	240Pu	4
F	-1	Te	4	241Pu	4
Fe	3	Th	4	241Am	3
Hg	2	Ti	4	243Cm	3

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 6

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Component	Charge	Component	Charge	Component	Charge
K	1	Tl	5	244Cm	3
La	3	V	3	3H	1
Li	1	W	6	60Co	3
Mg	2	Y	3	63Ni	2
Mn	4	Zn	2	90Sr	2
Mo	6	Zr	4	99Tc	7
Na	1	125Sb	3		
Nd	3	126Sn	2		
Ni	2	129I	-1		

For the radionuclides, the activity per mole ratios used during charge balancing were based on the *Tank by Tank Feed Composition for Steady State Mass Balance* calculation (Capps 2002). Only the ratios for the radionuclides used during the charge balance process were used. The activity per mole ratios are:

Radionuclide	Ci/kmol	Radionuclide	Ci/kmol
125Sb	1.30E+08	237Np	1.67E+02
126Sn	1.43E+03	238Pu	4.08E+06
129I	2.28E+01	238U	8.00E-02
137Cs	1.19E+07	239Pu	1.48E+04
14C	6.26E+04	240Pu	5.45E+04
151Sm	3.97E+06	241Am	8.26E+05
152Eu	2.64E+07	241Pu	2.48E+07
154Eu	4.16E+07	243Cm	1.23E+07
155Eu	7.53E+07	244Cm	2.62E+07
232Th	2.55E-02	3H	2.90E+07
233U	2.25E+03	60Co	6.78E+07
234U	1.45E+03	63Ni	3.57E+06
235U	5.08E-01	90Sr	1.24E+07
236U	1.52E+01	99Tc	1.68E+03

Molecular weights of components were based on the CRC Handbook 71st Edition (CRC 1991). These are:

Analyte	MW g/mol	Analyte	MW g/mol
Ag	107.8	NO2	46.0
Al	26.9	NO3	62.0
As	74.9	OH	17.0
B	10.8	Oxalate	88.0
Ba	137.3	Pb	207.2
Be	9.0	Pd	105.4
Bi	208.9	PO4	94.9
Ca	40.0	Pr	140.9
Cd	112.4	Rb	85.5
Ce	140.1	Rh	102.9
Cl	35.4	Ru	101.1
CN	26.0	Sb	121.7

Analyte	MW g/mol	Analyte	MW g/mol
Co	58.9	Se	78.9
Cr	51.9	Si	28.1
Cu	63.5	SO4	96.1
F	18.9	Sr	87.6
Fe	55.8	Ta	180.9
Hg	200.6	Te	127.6
K	39.1	Th	232.0
La	138.9	Ti	47.9
Li	6.9	TIC as CO3	60.0
Mg	24.3	Tl	204.4
Mn	54.9	U(total)	238.0
Mo	95.9	V	50.9
Na	22.9	W	183.9
Nd	144.2	Y	88.9
NH3	17	Zn	65.4
Ni	58.7	Zr	91.2

2.2 Criteria

The following criteria were used in this calculation to develop the emissions feed vector:

- Constituents feed quantity selected is the highest value from all the tanks evaluated.
- SOW maximums shall be selected for all constituents that the SOW indicated has a maximum. Otherwise the BBI information is used.
- The LAW transuranics are defined as: ^{237}Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{241}Pu, ^{242}Cm, ^{242}Pu, ^{243}Am, ^{243}Cm, and ^{244}Cm, per the contract specifications.
- For the HLW feed contract maximum calculations, the non-volatile compounds are all those in the feed except Cl, CN, F, NH_3, NO_2, NO_3, OH, oxalate, PO_4, SO_4, and CO_3.

3 Background

The previous emissions profiles for the Waste Treatment Plant (WTP) have been based on a feed vector generated from various sources. For the profile generated in the *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant* (Cook 2001), the feed vector was based on data from the Best Basis Inventory, data from the ACM model, and the TFCOUP Rev. 2.

In March 2002, an update to the emissions profile was generated and can be found in the *Integrated Emissions Baseline Report Update* (Berrios 2002). The feed vector for this profile was based on a comparison between what was used in the *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant* (Cook 2001) and data from the TFCOUP Rev. 3a. The highest constituent concentration between the two sources was selected as the preferred feed quantity.

In May 2002, an Emissions Task Team was developed to resolve issues pertaining to the basis of the WTP emissions profiles. This team was comprised of personnel from Process Engineering, Process Technology, Environmental Safety and Health, and Research and Technology. One of the issues that required evaluation was the feed vector (CCN# 034316). The required action for the team was to arrive to a commonly agreed feed vector

for inorganic constituents that would be representative of the WTP feed yet be adequately conservative for emissions estimates. The Emissions Task Team decided to maintain a single data source for developing the emissions feed vector. This source is the BBI. Thus, the emissions feed vector requires to be updated. This calculation arrives at the new feed vector to be used for future emissions profiles.

It should be noted that the BBI data was only retrieved for the tanks being processed during the Phase I of the WTP. If at any point, the tanks to be processed through Phase I changes, this calculation will require to be updated.

4 Applicable Codes and Standards

No codes and standards were used in this calculation.

5 Methodology

The following methodology was used in this calculation.

5.1 LAW

- Data for the LAW tanks was obtained from the Best Basis Inventory on the web site http://twins.pnl.gov:8001/twins.htm. This data was downloaded on September 2002 and can be found in Appendix C sorted by tanks. Units of this data are:
  - Chemical Analytes: kg
  - Radionuclides: Ci
- For inventories that included supernatant and salt cake, both numbers were added together to get a total constituent inventory.
- Chemical analyte weight was converted to moles by multiplying by 1000 grams/kg and dividing by the molecular weight of the analyte in grams/mol. The maximum concentration in moles per constituents was then selected, except for Na. Reason being that the low sodium moles will give the highest concentration when based on mol/mol of Na.
- Radionuclides maximum activity in Ci was selected per constituent.
- Statement of Work maximums were used for constituents that had one specified. Otherwise, the maximum BBI data was used.
- Once the new feed quantities were selected, they were charge balanced. For this process, only the constituents tracked on the Steady State Flowsheet Model were charge balanced. If the final overall charge was positive, then the amount of negative charges was adjusted to counteract the positive balance. If the final overall charge was negative, then the positive charges were adjusted to counteract the negative balance.
- After the charges were balanced, the final feed vector was converted to the units used by the Steady State Flowsheet Model. Chemical analytes were converted to a ratio of mol/mol Na and the radionuclides were converted to a ratio of Bq/mol Na.

5.2 HLW

- Data for the HLW tanks was obtained from the Best Basis Inventory on the web site http://twins.pnl.gov:8001/twins.htm. This data was downloaded on September 2002 and can be found in Appendix D sorted by tanks. Units for this data are:
  - Chemical Analyte: kg
  - Radionuclides: Ci

- For analytes that have several data points, these were added together to obtain a total inventory for the analyte.
- Chemical analyte weight was converted to moles by multiplying by 1000 grams/kg and dividing by the molecular weight of the analyte in grams/mol. The maximum concentration in moles per constituents was then selected, except for Na. Reason being that the low sodium moles will give the highest concentration when based on mols/mol of Na.
- Radionuclides maximum activity in Ci was selected per constituent.
- Statement of Work maximums were used for constituents that had one specified. Otherwise, the maximum BBI data was used. In order to determine to the SOW maximum, the amount of total non-volatile oxides had to be calculated. Once this number was obtained, the feed quantity required, per the SOW maximum, was calculated.
- Once the new feed quantities were selected, they were charge balanced. For this process, only the constituents tracked on the Steady State Flowsheet Model were charged balanced. If the final overall charge was positive, then the amount of negative charges adjusted to counteract the positive balance. If the final overall charge was negative, then the positive charges were adjusted to counteract the negative balance.
- After the charges were balanced, the final feed vector was converted to the units used by the Steady State Flowsheet Model. Chemical analytes were converted to a ratio of mol/mol Na and the radionuclides were converted to a ratio of Bq/mol Na.

6 Assumptions

- For compounds with multiple valance states, the most common valance state (or state that is most appropriate for high level waste) has been assumed.
- Only WTP Phase I tanks will be processed with the new WTP 2+2 configuration. If at a later time, the feed sequence for WTP changes and new tanks are added to the scope of the project, then this calculation will be revised to include the inventories of the new added tanks.

7 Calculations

These calculations were performed with a Microsoft Excel® 97 spreadsheet on a Compaq PC workstation. A detail calculation of each step is presented in this section for at least one constituent. The rest of the calculations are presented in the spreadsheets found in Appendix A for LAW and Appendix B for HLW.

7.1 LAW

7.1.1 Data Collection

The spreadsheet for the LAW portion of the calculation can be located in Appendix A. Table A-1 shows the raw data from the BBI for the chemical analytes in kilograms. This data was then converted to moles by multiplying by 1000 g/kg and dividing by the constituent's molecular weight in g/mole. Silver is used as an example:

Ag: 20.9 kg * 1000 g / kg * 1 mole / 107.9 g = 194 mole Ag

Table A-2 shows the data in moles for all chemical analytes. The highest feed quantity for each constituent was then selected except for Na. The reason being is that the lowest Na concentration would give the highest constituent concentration based on moles per moles of Na (mol/mol Na). The last column on Table A-2 shows the selected feed in units of mol.

For the radionuclides, the raw data from BBI is presented in Table A-3. The maximum activity, in Ci, per constituent was selected and is shown in the last column of the table.

7.1.2 Comparison with SOW Maximum

The selected chemical analytes and radionuclide feed quantities were then compared to the SOW maximums. For constituents with SOW maximum, this amount was selected for their feed concentration. BBI calculated feed quantity was used for all other constituents without SOW maximum. For chemical analytes, SOW maximums are given in terms of mol/mol Na, therefore data was converted to these units to do the comparison. The chemical analytes amount in moles was divided by the moles of Na to obtain mol/mol Na. For example,

Ag
mol: 9.04E+02 moles
Na: 7.48E+06 moles
Concentration = 9.04E+02 / 7.48E+06 = 1.21E-04 mol/mol Na

The amount in mol/mol Na was then compared to the SOW maximum. Examples for aliminum and calcium are shown below.

Al
mol: 8.07E+06 mol
Concentration = 8.07E+06 mol Al / 7.48E+06 mol Na = 1.08 mol/mol Na
SOW maximum = 0.25 mol/mol Na
Concentration selected = SOW maximum = 0.25 mol/mol Na

Ca
mol: 5.09E+04 mol
Concentration = 5.09E+04 mol Ca / 7.48E+06 mol Na = 6.8E-03 mol/mol Na
SOW maximum = 4.0E-02 mol/mol Na
Concentration selected = SOW maximum = 4.0E-02 mol/mol Na

For constituents without SOW maximums, the BBI feed quantity was used. Table A-4 shows the calculation for all the constituents. The final selected amounts were then converted back to moles by multiplying by the total Na moles (7.48E+06 moles) to facilitate the feed charge balancing.

For the radionuclides, the SOW maximum is given in terms of Bq/mol Na, therefore data was converted to these units for comparison. The Ci amount was converted to Bq by multiplying by 3.7E+10 Bq/Ci and then dividing by the moles of Na (7.48E+06 moles) to get the units of Bq/mol Na. Constituents without SOW maximums were kept at the BBI feed quantity value. For example,

^{106}Ru: 3.05E-04 Ci * 3.7E+10 Bq/Ci * 1 / 7.48E+06 moles Na = 1.5 Bq/mol Na

The calculated amount in Bq/mol Na was then compared to the SOW maximum. If the SOW maximum was lower than the calculated number, then the SOW maximum was selected. For constituents without SOW maximum, the calculated value was selected. Examples are shown below.

^{137}Cs: 5.65E+06 Ci * 3.7E+10 Bq/Ci * 1 / 7.48E+06 moles Na = 2.8E+10 Bq/mol Na
SOW maximum = 2.0E+10 Bq/mol Na
Concentration selected = SOW maximum = 2.0E+10 Bq/mol Na

Table A-5 shows the calculation for all the radionuclides. The selected amounts were then converted to Ci to facilitate in the feed charge balancing. Conversion to Ci was done by multiplying the Bq/mol Na by 1 Ci / 3.7E+10 Bq and then by the moles of Na (7.48E+06 moles). For example,

^{106}Ru: 1.51 Bq/mol Na * 1 Ci / 3.7E+10 Bq * 7.48E+06 mol Na = 3.05E-04 Ci

For the transuranics, the SOW maximum is given as a whole amount of 4.80E+05 Bq/mol Na. The LAW transuranics are defined as ^{237}Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{241}Pu, ^{242}Cm, ^{242}Pu, ^{243}Am, ^{243}Cm, and ^{244}Cm. The sum of all these in Bq/mol Na were added together to determine the overall concentration (Table A-5 shows the amounts of the radionuclides in Bq/mol Na). The summation is:
^{237}Np = 2.75E+04 Bq/mol Na
^{238}Pu = 7.27E+04 Bq/mol Na
^{239}Pu = 8.61E+05 Bq/mol Na
^{240}Pu = 1.52E+05 Bq/mol Na
^{241}Am = 1.22E+07 Bq/mol Na
^{241}Pu = 3.58E+06 Bq/mol Na
^{242}Cm = 3.08E+04 Bq/mol Na
^{242}Pu = 1.91E+01 Bq/mol Na
^{243}Am = 5.00E+02 Bq/mol Na
^{243}Cm = 2.56E+03 Bq/mol Na
^{244}Cm = 1.78E+04 Bq/mol Na
Total = 1.70E+07 Bq/mol Na
The total amount is higher than the SOW maximum, therefore the SOW maximum will be used as the feed quantity. To calculate the feed quantity based on the SOW maximum, the total concentration was divided equally between all the transuranics. This was done by dividing the feed quantity by the total feed quantity and then multiplying by the SOW maximum.
^{237}Np = 2.75E+04 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 7.78E+02 Bq/mol Na
^{238}Pu = 7.27E+04 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 2.06E+03 Bq/mol Na
^{239}Pu = 8.61E+05 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 2.44E+04 Bq/mol Na
^{240}Pu = 1.52E+05 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 4.31E+03 Bq/mol Na
^{241}Am = 1.22E+07 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 3.46E+05 Bq/mol Na
^{241}Pu = 3.58E+06 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 1.01E+05 Bq/mol Na
^{242}Cm = 3.08E+04 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 8.72E+02 Bq/mol Na
^{242}Pu = 1.91E+01 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 5.42E-01 Bq/mol Na
^{243}Am = 5.00E+02 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 1.41E+01 Bq/mol Na
^{243}Cm = 2.56E+03 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 7.25E+01 Bq/mol Na
^{244}Cm = 1.78E+04 Bq/mol Na / 1.7E+07 Bq/mol Na * 4.80E+05 Bq/mol Na = 5.04E+02 Bq/mol Na
To verify the calculation, the new concentrations were added together to make sure they matched the SOW maximum. Total sum is 4.80E+05 Bq/mol Na which is the same as the SOW maximum.

7.1.3 Feed Charge Balance

Once the final feed quantities were determined, the feed was charge balanced. Only the constituents that are tracked on the Steady State Flowsheet Model were charge balanced.

For the chemical analytes, the feed quantity in moles was multiplied by the charge to get the total constituent's charge. For example,

Ag
9.04E+02 moles * 1 = 9.04E+02 moles

After all the charges were calculated they were added together. Table A-6 shows the charge balance calculation for the chemical analytes. Constituents that have a charge of zero (0) are not tracked in the Steady State Flowsheet Model. Total charge for chemical analytes is -27,791,598.

For the radionuclides, the Ci amount was converted to mol by multiplying by the activity per mole ratio. The activity per mole ratio used are the ones presented in Section 2.0. For example,

^{125}Sb
Feed quantity: 4.02E+03 Ci
Activity per mole = 1.30E+08 Ci/kmol
Amount in moles = 4.02E+03 Ci * 1 kmol / 1.30E+08 Ci * 1000 mol / kmol = 3.09E-02 mol

The amount of the radionuclide in moles was then multiplied by the charge to get the total charge for the constituent.

^{125}Sb
Total charge = 3.09E-02 mol * 3 = 9.28E-02

The same calculation was performed for all the radionuclides tracked in the Steady State Flowsheet Model. This calculation can be found in Table A-7. After all the charges were calculated, they were added together to get the total charge. The total charge for all radionuclides is 92,071.

The total charges for radionuclides and chemical analytes were then added together to obtain the overall charge of the feed:

-32,652,468 (chemical analytes charge) + 92,120 (radionuclides charge) = -32,560,348

Being highly negative, the amount of Na was then adjusted to counteract the positive charge. In order to add this much Na, all the positive charges were also readjusted to keep the concentrations selected. To do this, all the positive charges were added together (both chemical and radionuclide). This total positive charge is 16,824,502. The new mole amount needed per constituent was calculated by multiplying the original moles charge by the new amount of positive mole charges needed divided by the total positive mole charges. For example,

Ag
Original mole charges = 904
New mole charges = 904 * 32,652,468 / 16,824,502 = 1.75E+03 new positive mole charges of Ag

This value was then converted back to actual moles by dividing by the charge of the analyte.

Ag = 1.75E+03 / +1 = 1.75E+03 moles of Ag needed
Based on this new ratio, the new moles of Na are:
7.48E+06 moles Na * 32,652,468 / 16,824,502 = 1.45E+07 / +1 = 1.45E+07 new moles of Na

The new mol/mol Na concentration are then based on this new Na amount. Therefore for Ag:

Ag: 1.75E+03 / 1.45E+07 = 1.21E-04 mol/mol Na

This concentration is equivalent to the one previously calculated before the charge balance thereby confirming that the ratio was applied correctly. Table A-8 shows the new ratio adjustment process for the chemical analytes. Table A-9 shows the adjustment for the radionuclides.

The chemical analyte feed vector for LAW for emissions purposes is shown in Table A-10. Table A-11 shows the finalized radionuclide feed vector for LAW.

7.2 HLW

7.2.1 Data Collection

The spreadsheet for the HLW portion of the calculation can be located in Appendix B. Table B-1 shows the raw data from the BBI for the chemical analytes in kilograms. This data was then converted to moles by multiplying by 1000 g/kg and dividing by the molecular weight in g/mole. Silver is used as an example:

Ag: 117 kg * 1000 g / kg * 1 mole / 107.9 g = 1,080 mole Ag

Table B-2 shows the data in moles for all chemical analytes. The highest amount for each constituent was then selected except for Na. The reason being is that the lowest Na concentration would give the highest constituent concentration based on moles per moles of Na (mol/mol Na). The last column on Table B-2 shows the selected feed.

For the radionuclides, the raw data from BBI is presented in Table B-3. The maximum activity, in Ci, per each constituent was selected and is shown in the last column of the table.

7.2.2 Comparison with SOW Maximums

The selected chemical analytes and radionuclide feeds were then compared to the SOW maximums. For constituents with SOW maximum, this amount was selected for their feed concentration. For constituents without a SOW maximum, the selected feed was used. To determine the SOW maximum, first the amount of non-volatile oxides had to be calculated. Non-volatile compounds include all components except Cl, CN, F, NH_3, NO_2, NO_3, OH, oxalate, PO_4, SO_4, and CO_3. Table B-4 shows the calculation of the total oxides mass.

Silver is used as an example to demonstrate the calculation process. First, the amount of each constituent per mole was converted to grams by multiplying by the molecular weight.

Ag: 9.82E+03 moles * 107.87 g / mol = 1.06E+06 grams

The charge per each constituent was then obtained as shown in Section 2.0. In order to calculate the amount of oxygen needed to form the oxides, the constituent charge was divided by the charge of oxygen.

Ag (O needed)
charge = 1
Oxygen needed = 1/2 = 0.5

The mass of oxygen associated with each constituent in the oxide form is then the number of oxygens ratio times the moles of the constituent times the molecular weight of oxygen (16 g/mole).

Ag (Mass of oxygen)
9.82E+03 moles Ag * 0.5 moles O / moles Ag * 16 g O / mole O = 7.86E+04 g O

This process was then repeated for all the constituents. Once all the numbers were calculated, the total amount of oxides in grams was calculated by adding all the constituents' weights together with the oxygen weight.

Total mass of constituents: 4.36E+08 grams
Total mass of oxygen: 2.0E+08 grams
Total mass of oxides: 4.36E+08 grams + 2.0E+08 grams = 6.36E+08 grams

The SOW maximum feed was then calculated by multiplying the constituents SOW maximum ratio by the total mass of oxides and dividing by 100. SOW maximum ratios used are those presented in Section 2.0.

Ag:
Total mass oxides = 6.36E+08 grams
SOW maximum ratio = 0.55 / 100 g of oxides
SOW maximum feed quantity = 6.36E+08 * 0.55/100 = 3.50E+06 grams

The calculated SOW maximum feed quantity was then compared to the selected feed quantity. If the selected feed quantity was higher than the SOW maximum, then the SOW maximum was used. For constituents without a SOW maximum, the selected feed quantity was selected as the emissions feed.

Ag:
SOW maximum feed quantity = 3.50E+06 grams
Actual feed quantity = 1.06E+06 grams
Feed quantity selected = SOW maximuml = 3.50E+06 grams

An example where SOW maximum feed quantity was selected is Chromium.

Cr:
SOW maximum feed quantity = 4.32E+06 grams
Actual feed quantity = 1.34E+07 grams
Feed quantity selected = SOW maximum = 4.32E+06 grams

Table B-5 shows the rest of the comparisons and the selected feed in grams for HLW chemical analytes.

For the radionuclides a similar approach was used. The SOW maximum Ci feed was calculated by multiplying the total oxide mass by the SOW maximum ratio and dividing by 100. ^{125}Sb is usd as an example:

^{125}Sb
SOW maximum ratio: 3.20E-02 Ci / 100 grams of oxides
Total oxide mass: 6.36E+08 grams
SOW maximum feed quantity = 6.36E+08 * 3.20E-02 / 100 = 2.03E+05 Ci

This SOW maximum feed quantity was then compared to the selected feed quantity.

^{125}Sb
SOW maximum feed quantity = 2.03E+05 Ci
Actual feed quantity = 6.18E+03 Ci

Selected feed quantity = 2.03E+05 Ci

Table B-6 shows the rest of the calculation for the remaining radionuclides.

7.2.3 Feed Charge Balance

Once the final feed quantities were determined, the feed was charge balanced. Only the constituents that are tracked on the Steady State Flowsheet Model were charge balanced for the purposes of this calculation.

For the chemical analytes, the feed quantity in moles was multiplied by the charge to get the total constituent's charge. For example,

Ag
3.24E+04 moles * 1 = 3.24E+04 moles

After all the charges were calculated they were added together. Table B-7 shows the charge balance calculation for the chemical analytes. Constituents that have a charge of zero (0) are not tracked in the Steady State Flowsheet Model.

For the radionuclides, the Ci amount was converted to mol by multiplying by the activity per mole ratio. The activity per mole ratio used are the ones presented in Section 2.0. For example,

^{125}Sb
Feed quantity: 2.03E+05 Ci
Activity per mole = 1.30E+08 Ci/kmol
Amount in moles = 2.03E+05 Ci * 1 kmol / 1.30E+08 Ci * 1000 mol / kmol = 1.56 mol

The amount of the radionuclide in moles was then multiplied by the charge to get the total charge for the constituent.

^{125}Sb
Total charge = 1.56 mol * 3 = 4.69 mol

The same calculation was performed for all the radionuclides tracked in the Steady State Flowsheet Model. This calculation can be found in Table B-8. After all the charges were calculated, they were added together to get the total charge.

The total charges for radionuclides and chemical analytes were then added together to obtain the overall charge of the feed:

29,810,608 (chemical analytes charge) + 2,108,359 (radionuclides charge) = 31,918,968 mol charges

Being highly positive, the amount of OH is then adjusted to counteract the positive charge. The added amount of OH is 31,918,968 moles.

The final chemical analytes feed vector, in moles, is then converted to mol/mol Na by diving all the constituents by the total moles of sodium (5.25E+06 moles). The chemical analyte feed vector for HLW for emissions purposes is found in Table B-9.

The final radionuclide feed vector, in curies, is then converted to Bq per mol of Na by multiplying the Ci amount by 3.7E+10 and then dividing by the sodium moles (5.25E+06 moles). For example,

^{106}Ru
Feed quantity = 621 Ci
Mol Na = 5.25E+06 moles
Conversion to Bq/mol Na = 621 Ci * 3.7E+10 Bq/Ci * 1/ 5.25E+06 mol Na = 4.37E+06 Bq/mol Na

The final radionuclide feed vector is presented in Table B-10.

8 Results and Conclusions

The HLW and LAW feed vectors for the WTP emissions profiles have been developed in this calculation by using the BBI data as the main basis. Calculated feed quantities were compared to the SOW maximums. If the SOW maximum was higher than the calculated number, then the SOW maximum was used. If the actual calculated number was higher than SOW maximum, then the SOW maximum was used. Otherwise the calculated number was selected as the constituent's feed quantity. The tables below show the final feed vector for LAW and HLW respectively. This feed vector will be incorporated in the Steady State Flowsheet Model to support future emissions profiles.

LAW Chemical Analytes Emissions Feed Vector

Analyte	mol/mol Na	Analyte	mol/mol Na
Ag	1.21E-04	NO2	1.96E-01
Al	2.50E-01	NO3	4.12E-01
As	6.11E-04	OH	1.55E+00
B	6.46E-03	Oxalate	2.58E-01
Ba	1.00E-04	Pb	6.80E-04
Be	1.21E-04	Pd	8.04E-06
Bi	2.02E-04	PO4	6.70E-02
Ca	4.00E-02	Pr	3.49E-07
Cd	4.00E-03	Rb	1.35E-05
Ce	3.02E-04	Rh	5.54E-05
Cl	4.59E-02	Ru	6.13E-05
CN	2.89E-04	Sb	1.07E-04
Co	1.67E-04	Se	2.04E-04
Cr	2.00E-02	Si	1.68E-02
Cu	2.21E-04	SO4	3.61E-02
F	1.03E-01	Sr	4.82E-05
Fe	1.00E-02	Ta	2.95E-05
Hg	1.40E-05	Te	3.85E-07
K	1.80E-01	Th	2.15E-05
La	8.30E-05	Ti	9.66E-05
Li	3.95E-03	TIC as CO3	1.55E-01
Mg	1.78E-03	Tl	2.13E-04
Mn	4.87E-03	U(total)	6.18E-04
Mo	2.67E-04	V	2.14E-04
Na	1.00E+00	W	2.01E-04

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 17

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	mol/mol Na	Analyte	mol/mol Na
Nd	1.69E-04	Y	2.02E-05
NH3	1.02E-02	Zn	4.05E-04
Ni	3.00E-03	Zr	3.59E-04

LAW Radionuclide Emissions Feed Vector

Analyte	Bq/mol Na	Analyte	Bq/mol Na
106Ru	7.78E-01	236U	6.93E+02
113mCd	8.26E+05	237Np	7.78E+02
125Sb	1.99E+07	238Pu	2.06E+03
126Sn	1.49E+05	238U	4.45E+03
129I	2.88E+03	239Pu	2.44E+04
134Cs	3.70E+07	240Pu	4.31E+03
137Cs	2.00E+10	241Am	3.46E+05
137mBa	1.36E+10	241Pu	1.01E+05
14C	2.64E+05	242Cm	4.49E+02
151Sm	2.47E+08	242Pu	2.79E-01
152Eu	1.30E+06	243Am	7.29E+00
154Eu	4.30E+06	243Cm	7.25E+01
155Eu	7.42E+06	244Cm	5.04E+02
226Ra	1.19E+00	3H	3.53E+06
227Ac	1.32E+01	59Ni	1.29E+04
228Ra	2.31E+03	60Co	3.70E+05
229Th	5.43E+01	63Ni	2.37E+06
231Pa	3.85E+01	79Se	1.13E+04
232Th	5.54E+02	90Sr	8.00E+08
232U	1.30E+03	90Y	7.70E+08
233U	1.03E+04	93mNb	1.52E+05
234U	5.99E+03	93Zr	1.92E+05
235U	2.31E+02	99Tc	7.10E+06

HLW Chemical Analytes Emissions Feed Vector

Analyte	mol	mol/mol Na	Analyte	mol	mol/mol Na
Ag	3.24E+04	6.17E-03	NO2	7.96E+05	1.51E-01
Al	3.30E+06	6.28E-01	NO3	3.69E+06	7.03E-01
As	1.36E+04	2.59E-03	OH	4.54E+07	8.64E+00
B	7.65E+05	1.46E-01	Oxalate	7.95E+05	1.51E-01
Ba	2.08E+05	3.97E-02	Pb	3.38E+04	6.43E-03
Be	4.59E+04	8.74E-03	Pd	7.77E+03	1.48E-03
Bi	8.52E+04	1.62E-02	PO4	6.19E+05	1.18E-01
Ca	1.13E+06	2.14E-01	Pr	1.58E+04	3.01E-03
Cd	2.55E+05	4.85E-02	Rb	1.41E+04	2.69E-03
Ce	3.68E+04	7.00E-03	Rh	8.03E+03	1.53E-03
Cl	5.91E+04	1.13E-02	Ru	2.20E+04	4.19E-03
CN	3.91E+05	7.45E-02	Sb	4.38E+04	8.35E-03
Co	4.86E+04	9.25E-03	Se	4.18E+04	7.97E-03
Cr	8.31E+04	1.58E-02	Si	4.30E+06	8.19E-01

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 18

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	mol	mol/mol Na	Analyte	mol	mol/mol Na
Cu	4.81E+04	9.15E-03	SO4	8.77E+04	1.67E-02
F	1.17E+06	2.23E-01	Sr	3.77E+04	7.19E-03
Fe	3.30E+06	6.29E-01	Ta	1.05E+03	2.01E-04
Hg	3.17E+03	6.03E-04	Te	6.48E+03	1.23E-03
K	2.11E+05	4.02E-02	Th	1.37E+05	2.61E-02
La	1.19E+05	2.27E-02	Ti	1.73E+05	3.29E-02
Li	1.29E+05	2.46E-02	TIC as CO3	3.18E+06	6.05E-01
Mg	5.49E+05	1.05E-01	Tl	1.40E+04	2.67E-03
Mn	7.53E+05	1.43E-01	U(total)	3.74E+05	7.12E-02
Mo	4.31E+04	8.20E-03	V	4.00E+03	7.61E-04
Na	5.25E+06	1.00E+00	W	8.30E+03	1.58E-03
Nd	7.50E+04	1.43E-02	Y	1.14E+04	2.18E-03
NH3	5.98E+05	1.14E-01	Zn	4.08E+04	7.77E-03
Ni	2.60E+05	4.95E-02	Zr	1.05E+06	1.99E-01

HLW Radionuclide Emissions Feed Vector

Analyte	Ci	Bq/mol Na	Analyte	Ci	Bq/mol Na
106Ru	6.21E+02	4.37E+06	236U	6.48E-01	4.57E+03
113mCd	1.93E+03	1.36E+07	237Np	4.70E+02	3.31E+06
125Sb	2.03E+05	1.43E+09	238Pu	2.23E+03	1.57E+07
126Sn	9.54E+02	6.72E+06	238U	1.17E+01	8.24E+04
129I	1.84E+00	1.30E+04	239Pu	1.97E+04	1.39E+08
134Cs	4.47E+02	3.15E+06	240Pu	1.08E+03	7.61E+06
137Cs	9.54E+06	6.72E+10	241Am	5.72E+05	4.03E+09
137mBa	4.66E+05	3.28E+09	241Pu	1.40E+05	9.85E+08
14C	4.13E+01	2.91E+05	242Cm	2.30E+01	1.62E+05
151Sm	6.36E+05	4.48E+09	242Pu	2.05E-01	1.44E+03
152Eu	3.05E+03	2.15E+07	243Am	5.61E+00	3.95E+04
154Eu	3.31E+05	2.33E+09	243Cm	1.91E+04	1.34E+08
155Eu	1.84E+05	1.30E+09	244Cm	1.91E+04	1.34E+08
226Ra	2.16E-02	1.52E+02	3H	4.13E+02	2.91E+06
227Ac	1.09E+02	7.68E+05	59Ni	3.22E+02	2.27E+06
228Ra	2.25E+01	1.59E+05	60Co	6.36E+04	4.48E+08
229Th	9.41E-01	6.63E+03	63Ni	3.01E+04	2.12E+08
231Pa	2.40E+02	1.69E+06	79Se	1.79E+01	1.26E+05
232Th	4.99E+00	3.52E+04	90Sr	6.36E+07	4.48E+11
232U	1.93E+01	1.36E+05	90Y	5.27E+06	3.71E+10
233U	5.72E+00	4.03E+04	93mNb	6.98E+02	4.92E+06
234U	2.08E+01	1.47E+05	93Zr	7.75E+02	5.46E+06
235U	1.59E+00	1.12E+04	99Tc	9.54E+04	6.72E+08

9 References

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10 Attachments

There are no attachments for this calculation

Appendix A LAW Calculations

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 21

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-1 LAW Chemical Analytes Feed Quantities in Kg

Analyte	Unit	Tank										
		AN-102	AN-103	AN-104	AN-105	AN-107	AP-101	AP-104	AW-101	AZ-101	AZ-102	SY-101
Ag	kg	2.09E+01	8.30E+01	7.86E+01	9.75E+01	6.13E+00	2.66E+00	1.05E+01	6.23E+01	2.43E+01	1.25E+01	7.85E+01
Al	kg	4.80E+04	2.18E+05	1.38E+05	1.60E+05	9.07E+02	2.93E+04	6.11E+04	1.25E+05	2.58E+04	1.26E+03	3.52E+04
As	kg	0.00E+00	3.16E+02	2.51E+02	2.27E+02	1.55E+02	5.31E+00	7.26E+00	3.42E+02	2.52E+01	1.29E+01	1.58E+02
B	kg	0.00E+00	5.22E+02	5.17E+02	4.40E+02	9.13E+01	6.75E+01	1.73E+02	4.90E+02	6.10E+01	1.36E+01	1.44E+02
Ba	kg	1.05E+02	1.58E+02	1.18E+02	1.14E+02	1.93E+01	1.39E+00	2.52E-01	1.38E+01	2.53E-01	1.57E-01	7.90E+01
Be	kg	1.06E+01	1.58E+01	1.45E+01	1.14E+01	3.06E+00	5.57E+00	5.10E-01	7.47E+00	9.57E-01	7.43E-02	7.90E+00
Bi	kg	1.69E+02	3.16E+02	2.34E+02	2.27E+02	2.76E+01	1.05E+01	1.05E+02	4.78E+01	0.00E+00	1.56E+00	5.78E+01
Ca	kg	1.60E+03	5.27E+02	7.17E+02	1.96E+03	2.04E+03	3.25E+01	2.36E+02	7.87E+02	1.21E+02	3.41E+01	2.68E+02
Cd	kg	2.08E+02	3.53E+01	3.35E+01	3.95E+01	2.29E+02	8.43E+00	5.24E+00	2.25E+01	6.75E+00	1.70E+00	7.90E+00
Ce	kg	0.00E+00	3.16E+02	2.34E+02	2.27E+02	1.87E+02	3.15E-01	2.46E-01	6.24E+01	1.92E-01	7.61E-02	1.58E+02
Cl	kg	1.17E+04	2.82E+04	2.86E+04	3.72E+04	7.85E+03	8.35E+03	2.44E+04	2.80E+04	4.56E+02	2.36E+02	1.87E+04
CN	kg	0.00E+00	2.84E+01	0.00E+00	0.00E+00	1.60E+01	2.40E+01	1.09E+02	0.00E+00	0.00E+00	2.44E+01	0.00E+00
Co	kg	0.00E+00	1.43E+02	4.69E+01	4.55E+01	1.38E+01	1.48E+00	2.89E+00	2.34E+01	1.92E-01	7.43E-02	3.15E+01
Cr	kg	8.64E+02	2.52E+03	4.99E+03	7.34E+03	5.90E+02	6.03E+02	1.98E+03	1.22E+03	2.18E+03	2.27E+03	3.57E+02
Cu	kg	8.31E+01	3.18E+01	3.37E+01	3.26E+01	1.05E+02	6.75E+00	1.06E+01	3.19E+01	1.21E+01	3.41E+00	2.56E+01
F	kg	2.18E+03	3.53E+03	2.39E+03	6.14E+03	2.48E+04	1.22E+04	5.13E+02	1.01E+04	5.28E+03	3.51E+03	1.62E+02
Fe	kg	1.43E+02	2.15E+02	3.80E+02	4.03E+02	5.81E+03	1.05E+01	5.24E+01	8.25E+02	6.76E+01	1.70E+01	7.90E+01
Hg	kg	0.00E+00	4.66E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.59E-02	2.03E-01	6.30E-03
K	kg	7.77E+03	4.81E+04	2.40E+04	2.52E+04	6.53E+03	1.32E+05	8.39E+03	1.68E+05	1.44E+04	9.86E+03	7.04E+03
La	kg	5.93E+00	8.72E+01	1.18E+02	6.22E+01	1.22E+02	5.48E+00	4.17E-01	1.62E+01	0.00E+00	1.17E-02	5.27E+00
Li	kg	2.09E+01	2.04E+02	6.95E+01	6.45E+01	9.19E+00	1.43E+00	8.39E-02	1.47E+01	1.68E+00	4.93E-01	1.58E+01
Mg	kg	1.14E+02	3.24E+02	2.34E+02	2.27E+02	2.76E+01	1.05E+01	1.05E+02	1.79E+02	1.21E+02	3.41E+01	1.58E+02
Mn	kg	7.06E+01	3.24E+01	5.98E+01	7.24E+01	2.00E+03	0.00E+00	1.05E+01	6.36E+02	0.00E+00	3.41E+00	1.58E+01
Mo	kg	1.73E+02	3.31E+02	3.07E+02	3.72E+02	1.27E+02	6.11E+01	2.36E+02	2.64E+02	2.91E+02	1.67E+02	2.12E+02
Na	kg	7.94E+05	1.06E+06	1.07E+06	1.10E+06	7.28E+05	5.45E+05	5.52E+05	1.09E+06	3.35E+05	1.72E+05	4.28E+05
Nd	kg	2.09E+02	3.16E+02	2.34E+02	2.27E+02	3.53E+02	1.05E+01	1.05E+02	4.78E+01	1.21E+02	3.41E+01	1.58E+02
NH3	kg	0.00E+00	0.00E+00	4.69E+02	0.00E+00	1.56E+02	7.21E+00	0.00E+00	2.77E+01	0.00E+00	0.00E+00	2.52E+03
Ni	kg	1.38E+03	6.32E+01	1.92E+02	1.42E+02	1.93E+03	3.33E+01	1.69E+02	1.09E+02	0.00E+00	6.82E+00	2.46E+02
NO2	kg	2.91E+05	4.93E+05	4.09E+05	4.58E+05	1.99E+05	1.77E+05	3.03E+05	4.62E+05	2.19E+05	1.09E+05	2.31E+05
NO3	kg	7.28E+05	7.23E+05	6.86E+05	6.91E+05	6.87E+05	5.57E+05	4.77E+05	8.17E+05	2.15E+05	5.70E+04	3.70E+05
OH	kg	3.74E+04	2.61E+05	2.50E+05	2.05E+05	3.87E+04	1.74E+05	8.64E+04	3.82E+05	3.47E+04	6.45E+02	6.91E+04

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 22

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Unit	Tank										
		AN-102	AN-103	AN-104	AN-105	AN-107	AP-101	AP-104	AW-101	AZ-101	AZ-102	SY-101
Oxalate	kg	0.00E+00	1.53E+04	2.50E+04	2.19E+04	1.24E+05	7.59E+03	0.00E+00	2.59E+04	3.92E+03	1.20E+04	4.37E+00
Pb	kg	5.45E+02	4.60E+02	2.40E+02	2.63E+02	1.34E+03	6.32E+01	1.05E+02	7.37E+02	0.00E+00	3.41E+01	1.58E+02
Pd	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E+00	0.00E+00	0.00E+00
PO4	kg	1.79E+04	8.91E+03	1.73E+04	2.53E+04	5.34E+03	4.06E+03	1.92E+04	1.11E+04	4.03E+03	1.53E+03	1.19E+04
Pr	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.29E-02	7.13E-01	0.00E+00	1.92E-01	7.43E-02	0.00E+00
Rb	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	1.18E+01	0.00E+00	1.52E+01	1.13E+01	0.00E+00
Rh	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.27E+01	0.00E+00	2.28E+01	0.00E+00	6.82E+00	1.78E+01	0.00E+00
Ru	kg	0.00E+00	0.00E+00	9.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E+00	9.49E+00	0.00E+00
Sb	kg	0.00E+00	1.89E+02	1.41E+02	1.37E+02	1.02E+00	1.77E-01	1.12E-01	1.65E+02	1.92E-01	1.13E-01	9.48E+01
Se	kg	0.00E+00	2.18E+02	2.34E+02	2.27E+02	6.89E+01	9.70E+00	2.85E+01	1.20E+02	7.46E+01	2.22E+01	1.58E+02
Si	kg	7.24E+01	2.02E+03	3.54E+03	1.77E+03	0.00E+00	5.78E+02	1.94E+02	1.77E+03	1.77E+03	1.77E+03	2.16E+02
SO4	kg	5.46E+04	1.10E+04	4.10E+04	2.85E+04	3.09E+04	1.70E+04	1.40E+04	1.27E+04	4.54E+04	5.73E+04	1.17E+04
Sr	kg	7.25E+00	3.16E+01	2.34E+01	1.18E+01	9.19E+00	1.60E+00	1.05E+01	1.07E+01	1.21E+01	3.41E+00	1.58E+01
Ta	kg	0.00E+00	4.83E+01	0.00E+00	7.25E+01	7.75E+01	3.75E-01	1.44E-01	0.00E+00	1.92E-01	7.43E-02	0.00E+00
Te	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-01	0.00E+00	1.92E-01	8.23E-02	0.00E+00
Th	kg	0.00E+00	4.83E+01	0.00E+00	7.25E+01	0.00E+00	4.64E-02	1.06E+00	0.00E+00	1.82E-01	6.20E-02	0.00E+00
Ti	kg	2.09E+01	3.16E+01	2.34E+01	2.27E+01	1.55E+01	2.66E+00	1.05E+01	3.46E+01	1.21E+01	3.41E+00	1.58E+01
TIC as CO3	kg	2.65E+05	9.15E+04	1.97E+05	2.31E+05	2.08E+05	1.36E+05	7.10E+04	1.19E+05	1.03E+05	1.08E+05	9.02E+04
Tl	kg	0.00E+00	6.32E+02	4.69E+02	4.55E+02	3.98E-01	7.59E-02	2.10E-01	2.42E+02	1.92E-01	7.43E-02	3.15E+02
U(total)	kg	7.36E+01	1.40E+02	5.01E+02	2.71E+02	3.43E+02	2.33E+02	4.36E+01	2.70E+03	3.71E+00	3.91E+01	8.14E+00
V	kg	1.05E+02	1.58E+02	1.18E+02	1.14E+02	0.00E+00	3.15E+00	5.24E+01	2.34E+01	9.60E+00	3.70E+00	7.90E+01
W	kg	0.00E+00	5.37E+02	0.00E+00	0.00E+00	5.19E+02	1.21E+02	3.75E+02	0.00E+00	0.00E+00	1.87E+01	0.00E+00
Y	kg	0.00E+00	9.65E+00	0.00E+00	1.45E+01	2.60E+01	0.00E+00	1.05E+01	0.00E+00	0.00E+00	7.43E-02	0.00E+00
Zn	kg	2.09E+01	1.10E+02	8.82E+01	1.98E+02	6.99E+01	2.36E+01	1.05E+01	1.33E+02	1.21E+01	3.41E+00	1.64E+01
Zr	kg	3.28E+01	3.49E+01	6.31E+01	4.43E+01	2.45E+02	5.90E+00	1.05E+01	2.08E+02	1.35E+01	3.41E+00	1.58E+01

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 23

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-2 LAW Chemical Analytes Feed Quantities in moles

Analyte	MW g/mol	Unit	Tank											
			AN-102	AN-103	AN-104	AN-105	AN-107	AP-101	AP-104	AW-101	AZ-101	AZ-102	SY-101	Max Feed*
Ag	107.8	mol	1.94E+02	7.70E+02	7.29E+02	9.04E+02	5.69E+01	2.47E+01	9.74E+01	5.78E+02	2.25E+02	1.16E+02	7.28E+02	9.04E+02
Al	26.9	mol	1.78E+06	8.10E+06	5.13E+06	5.95E+06	3.37E+04	1.09E+06	2.27E+06	4.65E+06	9.59E+05	4.68E+04	1.31E+06	8.10E+06
As	74.9	mol	0.00E+00	4.22E+03	3.35E+03	3.03E+03	2.07E+03	7.09E+01	9.69E+01	4.57E+03	3.36E+02	1.72E+02	2.11E+03	4.57E+03
B	10.8	mol	0.00E+00	4.83E+04	4.79E+04	4.07E+04	8.45E+03	6.25E+03	1.60E+04	4.54E+04	5.65E+03	1.26E+03	1.33E+04	4.83E+04
Ba	137.3	mol	7.65E+02	1.15E+03	8.59E+02	8.30E+02	1.41E+02	1.01E+01	1.84E+00	1.01E+02	1.84E+00	1.14E+00	5.75E+02	1.15E+03
Be	9.0	mol	1.18E+03	1.76E+03	1.61E+03	1.27E+03	3.40E+02	6.19E+02	5.67E+01	8.30E+02	1.06E+02	8.26E+00	8.78E+02	1.76E+03
Bi	208.9	mol	8.09E+02	1.51E+03	1.12E+03	1.09E+03	1.32E+02	5.02E+01	5.02E+02	2.29E+02	0.00E+00	7.46E+00	2.77E+02	1.51E+03
Ca	40.0	mol	4.00E+04	1.31E+04	1.79E+04	4.89E+04	5.09E+04	8.10E+02	5.89E+03	1.96E+04	3.02E+03	8.50E+02	6.68E+03	5.09E+04
Cd	112.4	mol	1.85E+03	3.14E+02	2.98E+02	3.51E+02	2.04E+03	7.50E+01	4.66E+01	2.00E+02	6.01E+01	1.51E+01	7.03E+01	2.04E+03
Ce	140.1	mol	0.00E+00	2.26E+03	1.67E+03	1.62E+03	1.33E+03	2.25E+00	1.76E+00	4.45E+02	1.37E+00	5.43E-01	1.13E+03	2.26E+03
Cl	35.4	mol	3.31E+05	7.94E+05	8.06E+05	1.05E+06	2.21E+05	2.35E+05	6.87E+05	7.89E+05	1.28E+04	6.65E+03	5.27E+05	1.05E+06
CN	26.0	mol	0.00E+00	1.09E+03	0.00E+00	0.00E+00	6.15E+02	9.23E+02	4.19E+03	0.00E+00	0.00E+00	9.38E+02	0.00E+00	4.19E+03
Co	58.9	mol	0.00E+00	2.43E+03	7.96E+02	7.72E+02	2.34E+02	2.51E+01	4.91E+01	3.97E+02	3.26E+00	1.26E+00	5.35E+02	2.43E+03
Cr	51.9	mol	1.66E+04	4.85E+04	9.60E+04	1.41E+05	1.13E+04	1.16E+04	3.81E+04	2.35E+04	4.19E+04	4.37E+04	6.87E+03	1.41E+05
Cu	63.5	mol	1.31E+03	5.01E+02	5.31E+02	5.13E+02	1.65E+03	1.06E+02	1.67E+02	5.02E+02	1.91E+02	5.37E+01	4.03E+02	1.65E+03
F	18.9	mol	1.15E+05	1.86E+05	1.26E+05	3.23E+05	1.31E+06	6.42E+05	2.70E+04	5.32E+05	2.78E+05	1.85E+05	8.53E+03	1.31E+06
Fe	55.8	mol	2.56E+03	3.85E+03	6.81E+03	7.22E+03	1.04E+05	1.88E+02	9.39E+02	1.48E+04	1.21E+03	3.05E+02	1.42E+03	1.04E+05
Hg	200.6	mol	0.00E+00	2.32E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-01	1.01E+00	3.14E-02	2.32E+01
K	39.1	mol	1.99E+05	1.23E+06	6.14E+05	6.45E+05	1.67E+05	3.38E+06	2.15E+05	4.30E+06	3.68E+05	2.52E+05	1.80E+05	4.30E+06
La	138.9	mol	4.27E+01	6.28E+02	8.50E+02	4.48E+02	8.78E+02	3.95E+01	3.00E+00	1.17E+02	0.00E+00	8.42E-02	3.79E+01	8.78E+02
Li	6.9	mol	3.03E+03	2.96E+04	1.01E+04	9.35E+03	1.33E+03	2.07E+02	1.22E+01	2.13E+03	2.43E+02	7.14E+01	2.29E+03	2.96E+04
Mg	24.3	mol	4.69E+03	1.33E+04	9.63E+03	9.34E+03	1.14E+03	4.32E+02	4.32E+03	7.37E+03	4.98E+03	1.40E+03	6.50E+03	1.33E+04
Mn	54.9	mol	1.29E+03	5.90E+02	1.09E+03	1.32E+03	3.64E+04	0.00E+00	1.91E+02	1.16E+04	0.00E+00	6.21E+01	2.88E+02	3.64E+04
Mo	95.9	mol	1.80E+03	3.45E+03	3.20E+03	3.88E+03	1.32E+03	6.37E+02	2.46E+03	2.75E+03	3.03E+03	1.74E+03	2.21E+03	3.88E+03
Na	22.9	mol	3.47E+07	4.61E+07	4.65E+07	4.78E+07	3.17E+07	2.37E+07	2.40E+07	4.74E+07	1.46E+07	7.48E+06	1.86E+07	7.48E+06
Nd	144.2	mol	1.45E+03	2.19E+03	1.62E+03	1.57E+03	2.45E+03	7.28E+01	7.28E+02	3.31E+02	8.39E+02	2.36E+02	1.10E+03	2.45E+03
NH3	17	mol	0.00E+00	0.00E+00	2.76E+04	0.00E+00	9.18E+03	4.24E+02	0.00E+00	1.63E+03	0.00E+00	0.00E+00	1.48E+05	1.48E+05
Ni	58.7	mol	2.35E+04	1.08E+03	3.27E+03	2.42E+03	3.29E+04	5.67E+02	2.88E+03	1.86E+03	0.00E+00	1.16E+02	4.19E+03	3.29E+04
NO2	46.0	mol	6.33E+06	1.07E+07	8.89E+06	9.96E+06	4.33E+06	3.85E+06	6.59E+06	1.00E+07	4.76E+06	2.37E+06	5.02E+06	1.07E+07
NO3	62.0	mol	1.17E+07	1.17E+07	1.11E+07	1.11E+07	1.11E+07	8.98E+06	7.69E+06	1.32E+07	3.47E+06	9.19E+05	5.97E+06	1.32E+07
OH	17.0	mol	2.20E+06	1.54E+07	1.47E+07	1.21E+07	2.28E+06	1.02E+07	5.08E+06	2.25E+07	2.04E+06	3.79E+04	4.06E+06	2.25E+07
Oxalate	88.0	mol	0.00E+00	1.74E+05	2.84E+05	2.49E+05	1.41E+06	8.63E+04	0.00E+00	2.94E+05	4.45E+04	1.36E+05	4.97E+01	1.41E+06

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 24

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	MW g/mol	Unit	Tank											
			AN-102	AN-103	AN-104	AN-105	AN-107	AP-101	AP-104	AW-101	AZ-101	AZ-102	SY-101	Max Feed*
Pb	207.2	mol	2.63E+03	2.22E+03	1.16E+03	1.27E+03	6.47E+03	3.05E+02	5.07E+02	3.56E+03	0.00E+00	1.65E+02	7.63E+02	6.47E+03
Pd	105.4	mol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+01	0.00E+00	0.00E+00	6.02E+01
PO4	94.9	mol	1.89E+05	9.38E+04	1.82E+05	2.66E+05	5.62E+04	4.27E+04	2.02E+05	1.17E+05	4.24E+04	1.61E+04	1.25E+05	2.66E+05
Pr	140.9	mol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-01	5.06E+00	0.00E+00	1.36E+00	5.27E-01	0.00E+00	5.06E+00
Rb	85.5	mol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E+02	1.38E+02	0.00E+00	1.78E+02	1.32E+02	0.00E+00	1.95E+02
Rh	102.9	mol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.04E+02	0.00E+00	2.22E+02	0.00E+00	6.63E+01	1.73E+02	0.00E+00	8.04E+02
Ru	101.1	mol	0.00E+00	0.00E+00	8.90E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+01	9.39E+01	0.00E+00	8.90E+02
Sb	121.7	mol	0.00E+00	1.55E+03	1.16E+03	1.12E+03	8.37E+00	1.45E+00	9.20E-01	1.35E+03	1.58E+00	9.28E-01	7.78E+02	1.55E+03
Se	78.9	mol	0.00E+00	2.76E+03	2.96E+03	2.87E+03	8.72E+02	1.23E+02	3.61E+02	1.52E+03	9.44E+02	2.81E+02	2.00E+03	2.96E+03
Si	28.1	mol	2.58E+03	7.19E+04	1.26E+05	6.30E+04	0.00E+00	2.06E+04	6.90E+03	6.30E+04	6.30E+04	6.30E+04	7.69E+03	1.26E+05
SO4	96.1	mol	5.68E+05	1.14E+05	4.27E+05	2.97E+05	3.22E+05	1.77E+05	1.46E+05	1.32E+05	4.72E+05	5.96E+05	1.22E+05	5.96E+05
Sr	87.6	mol	8.28E+01	3.61E+02	2.67E+02	1.35E+02	1.05E+02	1.83E+01	1.20E+02	1.22E+02	1.38E+02	3.89E+01	1.80E+02	3.61E+02
Ta	180.9	mol	0.00E+00	2.67E+02	0.00E+00	4.01E+02	4.28E+02	2.07E+00	7.96E-01	0.00E+00	1.06E+00	4.11E-01	0.00E+00	4.28E+02
Te	127.6	mol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.59E+00	0.00E+00	1.50E+00	6.45E-01	0.00E+00	5.59E+00
Th	232.0	mol	0.00E+00	2.08E+02	0.00E+00	3.13E+02	0.00E+00	2.00E-01	4.57E+00	0.00E+00	7.84E-01	2.67E-01	0.00E+00	3.13E+02
Ti	47.9	mol	4.36E+02	6.60E+02	4.89E+02	4.74E+02	3.24E+02	5.55E+01	2.19E+02	7.22E+02	2.53E+02	7.12E+01	3.30E+02	7.22E+02
TIC as CO3	60.0	mol	4.42E+06	1.53E+06	3.28E+06	3.85E+06	3.47E+06	2.27E+06	1.18E+06	1.98E+06	1.72E+06	1.80E+06	1.50E+06	4.42E+06
Tl	204.4	mol	0.00E+00	3.09E+03	2.29E+03	2.23E+03	1.95E+00	3.71E-01	1.03E+00	1.18E+03	9.39E-01	3.64E-01	1.54E+03	3.09E+03
U(total)	238.0	mol	3.09E+02	5.88E+02	2.11E+03	1.14E+03	1.44E+03	9.79E+02	1.83E+02	1.13E+04	1.56E+01	1.64E+02	3.42E+01	1.13E+04
V	50.9	mol	2.06E+03	3.10E+03	2.32E+03	2.24E+03	0.00E+00	6.19E+01	1.03E+03	4.60E+02	1.89E+02	7.27E+01	1.55E+03	3 10E+03
W	183.9	mol	0.00E+00	2.92E+03	0.00E+00	0.00E+00	2.82E+03	6.58E+02	2.04E+03	0.00E+00	0.00E+00	1.02E+02	0.00E+00	2.92E+03
Y	88.9	mol	0.00E+00	1.09E+02	0.00E+00	1.63E+02	2.92E+02	0.00E+00	1.18E+02	0.00E+00	0.00E+00	8.36E-01	0.00E+00	2.92E+02
Zn	65.4	mol	3.20E+02	1.68E+03	1.35E+03	3.03E+03	1.07E+03	3.61E+02	1.61E+02	2.03E+03	1.85E+02	5.21E+01	2.51E+02	3.03E+03
Zr	91.2	mol	3.60E+02	3.83E+02	6.92E+02	4.86E+02	2.69E+03	6.47E+01	1.15E+02	2.28E+03	1.48E+02	3.74E+01	1.73E+02	2.69E+03

* Except for Na which is the minimum.

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 25

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-3 LAW Radionuclide Feed Quantities in Curies

Analyte	Unit	Tank											
		AN-102	AN-103	AN-104	AN-105	AN-107	AP-101	AP-104	AW-101	AZ-101	AZ-102	SY-101	Max
106Ru	Ci	1.73E-04	2.21E-04	2.00E-04	2.23E-04	8.35E-05	1.16E-04	7.59E-05	2.17E-04	3.05E-04	6.25E-05	6.61E-05	3.05E-04
113mCd	Ci	1.57E+02	2.00E+02	1.82E+02	2.02E+02	7.59E+01	1.05E+02	9.08E+01	1.98E+02	3.24E+02	6.32E+01	7.85E+01	3.24E+02
125Sb	Ci	8.65E+01	1.10E+02	9.98E+01	1.11E+02	4.17E+01	2.12E+02	4.23E+01	1.08E+02	4.02E+03	3.17E+03	3.69E+01	4.02E+03
126Sn	Ci	4.87E+00	1.81E+01	1.30E+01	6.27E+00	3.02E+01	3.57E+00	3.04E+00	6.10E+00	7.89E+00	1.80E+00	2.61E+00	3.02E+01
129I	Ci	4.60E-01	9.24E-01	7.13E-01	9.05E-01	3.71E-01	3.39E-01	5.82E-01	1.13E+00	2.69E-01	1.16E-01	4.36E-01	1.13E+00
134Cs	Ci	2.17E+00	1.31E+00	1.24E+00	1.38E+00	1.05E+00	1.57E+02	9.25E-01	1.35E+02	1.45E+04	2.38E+03	1.13E+00	1.45E+04
137Cs	Ci	1.46E+06	1.90E+06	1.99E+06	1.51E+06	1.07E+06	5.97E+05	8.94E+05	1.72E+06	5.65E+06	3.35E+06	6.79E+05	5.65E+06
137mBa	Ci	1.38E+06	1.80E+06	1.88E+06	1.43E+06	1.01E+06	5.65E+05	8.46E+05	1.63E+06	5.35E+06	3.17E+06	6.42E+05	5.35E+06
14C	Ci	2.49E+00	5.34E+01	4.68E+01	5.25E+01	1.26E+00	1.11E+00	2.66E+00	3.94E+01	6.19E+00	3.17E+00	2.99E+00	5.34E+01
151Sm	Ci	2.68E+04	3.41E+04	3.09E+04	3.45E+04	1.29E+04	1.79E+04	0.00E+00	3.36E+04	4.99E+04	9.94E+03	1.45E+04	4.99E+04
152Eu	Ci	8.09E+00	1.03E+01	9.34E+00	1.04E+01	3.90E+00	8.13E+00	4.17E+00	1.02E+01	2.63E+02	5.02E+01	3.67E+00	2.63E+02
154Eu	Ci	7.97E+02	7.87E+02	3.11E+02	2.53E+02	2.46E+03	7.97E+00	1.80E+02	2.48E+02	1.98E+02	2.01E+02	7.97E+01	2.46E+03
155Eu	Ci	4.08E+02	1.27E+02	2.93E+02	1.55E+02	1.50E+03	4.91E+00	6.24E+01	7.77E+02	2.57E+02	3.83E+02	2.47E+02	1.50E+03
226Ra	Ci	3.23E-04	4.12E-04	3.73E-04	4.17E-04	1.56E-04	2.16E-04	2.39E-04	4.06E-04	4.65E-04	9.52E-05	1.92E-04	4.65E-04
227Ac	Ci	3.30E-03	2.42E-03	2.19E-03	4.25E-03	1.59E-03	1.27E-03	1.16E-03	4.13E-03	5.18E-03	1.04E-03	2.00E-03	5.18E-03
228Ra	Ci	3.45E-01	9.05E-01	8.20E-01	5.02E-01	1.88E-01	4.75E-01	8.57E-02	4.58E-01	9.72E-08	1.32E-03	7.44E-02	9.05E-01
229Th	Ci	1.65E-02	2.10E-02	1.90E-02	2.13E-02	7.96E-03	1.10E-02	3.85E-03	2.07E-02	3.89E-06	6.37E-05	3.33E-03	2.13E-02
231Pa	Ci	8.90E-03	1.13E-02	1.03E-02	1.15E-02	4.29E-03	5.94E-03	6.21E-03	1.11E-02	1.51E-02	2.99E-03	5.30E-03	1.51E-02
232Th	Ci	7.88E-04	7.10E-02	6.25E-02	1.12E-01	4.18E-02	5.79E-02	1.16E-04	5.14E-02	1.57E-07	6.78E-06	1.51E-02	1.12E-01
232U	Ci	3.29E-02	4.10E-02	1.72E-01	1.16E-01	2.53E-01	6.21E-02	1.27E-02	5.08E-01	6.30E-05	8.01E-05	2.59E-03	5.08E-01
233U	Ci	1.35E-01	1.69E-01	7.04E-01	4.76E-01	1.04E+00	2.55E-01	5.23E-02	2.08E+00	2.57E-04	3.10E-04	1.06E-02	2.08E+00
234U	Ci	2.78E-02	5.95E-02	2.37E-01	1.08E-01	1.33E-01	8.64E-02	1.63E-02	1.21E+00	1.79E-03	2.15E-02	2.99E-03	1.21E+00
235U	Ci	1.11E-03	2.31E-03	8.12E-03	4.24E-03	5.15E-03	3.56E-03	6.63E-04	4.67E-02	6.80E-05	7.04E-04	1.21E-04	4.67E-02
236U	Ci	9.90E-04	3.47E-03	1.12E-02	4.90E-03	4.69E-03	3.02E-03	5.33E-04	1.40E-01	1.45E-04	1.65E-03	9.42E-05	1.40E-01
237Np	Ci	5.56E+00	6.11E-01	5.67E-01	6.13E-01	1.84E-01	2.29E-02	7.47E-01	5.23E-01	1.29E-01	3.58E-01	9.45E-02	5.56E+00
238Pu	Ci	5.43E-01	2.75E-01	3.79E-01	2.16E-01	5.27E+00	6.16E-02	2.38E-02	1.47E+01	1.71E-01	2.63E+00	4.36E-03	1.47E+01
238U	Ci	2.46E-02	4.66E-02	1.68E-01	9.03E-02	1.14E-01	7.80E-02	1.47E-02	9.00E-01	1.24E-03	1.31E-02	2.72E-03	9.00E-01
239Pu	Ci	1.77E+01	5.43E+00	8.62E+00	5.80E+00	1.74E+02	4.55E-01	7.31E-01	9.92E+01	1.48E+00	2.38E+01	1.56E-01	1.74E+02
240Pu	Ci	3.12E+00	1.13E+00	1.70E+00	1.09E+00	3.08E+01	7.67E-02	1.24E-01	2.73E+01	4.47E-01	7.04E+00	2.66E-02	3.08E+01
241Am	Ci	5.68E+02	1.99E+01	5.29E+01	2.08E+01	2.47E+03	7.11E-01	1.18E+01	1.05E+02	2.13E+00	1.24E+00	8.92E-01	2.47E+03
241Pu	Ci	2.94E+01	1.75E+01	2.38E+01	1.26E+01	2.85E+02	7.90E-01	1.04E+00	7.23E+02	1.32E+01	2.01E+02	2.23E-01	7.23E+02
242Cm	Ci	1.52E+00	3.83E-02	1.20E-01	4.62E-02	6.23E+00	1.63E-06	3.70E-02	1.56E-01	1.90E-03	1.06E-01	2.34E-03	6.23E+00

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 26

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Unit	Tank											
		AN-102	AN-103	AN-104	AN-105	AN-107	AP-101	AP-104	AW-101	AZ-101	AZ-102	SY-101	Max
242Pu	Ci	2.20E-04	1.15E-04	1.55E-04	8.78E-05	2.14E-03	6.96E-06	8.05E-06	3.87E-03	6.90E-05	1.06E-03	1.72E-06	3.87E-03
243Am	Ci	2.23E-02	1.33E-03	2.91E-03	9.10E-04	1.01E-01	3.55E-05	4.20E-04	7.21E-03	4.48E-04	1.62E-04	3.17E-05	1.01E-01
243Cm	Ci	1.27E-01	3.40E-03	1.02E-02	4.00E-03	5.18E-01	1.47E-04	1.49E-02	7.68E-02	2.78E-04	1.55E-02	1.89E-04	5.18E-01
244Cm	Ci	9.94E-01	4.21E-02	9.40E-02	3.40E-02	3.60E+00	3.19E-03	3.27E-01	1.79E+00	6.24E-03	2.05E-03	1.66E-03	3.60E+00
3H	Ci	2.26E+00	9.01E+00	2.47E+01	4.98E+00	2.43E+00	1.96E+01	2.78E+00	2.74E+01	5.48E+01	1.16E+02	7.14E+02	7.14E+02
59Ni	Ci	1.74E+00	5.05E+00	4.49E+00	5.03E+00	8.41E-01	1.16E+00	1.86E+00	4.26E+00	0.00E+00	3.66E-02	5.33E-01	5.05E+00
60Co	Ci	2.73E+02	4.12E+01	6.33E+01	5.52E+01	4.04E+02	1.26E+01	2.77E+01	6.71E+01	5.92E+01	5.85E+01	3.23E+01	4.04E+02
63Ni	Ci	1.64E+02	4.79E+02	4.26E+02	4.77E+02	7.93E+01	1.10E+02	1.79E+02	4.03E+02	0.00E+00	3.44E+00	4.98E+01	4.79E+02
79Se	Ci	2.14E+00	2.06E+00	2.54E+00	1.04E+00	2.58E+00	2.45E-01	3.16E+00	2.42E+00	4.44E+00	1.43E+00	6.83E-01	4.44E+00
90Sr	Ci	2.97E+05	7.40E+03	8.55E+04	3.10E+04	3.02E+05	3.62E+02	7.76E+03	8.93E+04	3.03E+03	7.00E+03	9.66E+03	3.02E+05
90Y	Ci	2.97E+05	7.40E+03	8.55E+04	3.10E+04	3.02E+05	3.62E+02	7.76E+03	8.93E+04	3.03E+03	7.00E+03	9.66E+03	3.02E+05
93mNb	Ci	3.19E+01	3.63E+01	3.29E+01	4.11E+01	1.54E+01	1.91E+01	1.55E+01	4.00E+01	5.95E+01	1.18E+01	4.16E+00	5.95E+01
93Zr	Ci	3.98E+01	5.06E+01	4.58E+01	5.12E+01	1.92E+01	2.66E+01	1.88E+01	4.98E+01	7.53E+01	1.49E+01	5.02E+00	7.53E+01
99Tc	Ci	4.95E+02	6.93E+02	7.87E+02	1.12E+03	2.60E+02	1.99E+02	7.09E+02	8.37E+02	1.17E+03	6.99E+02	6.43E+02	1.17E+03

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 27

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-4 LAW Chemical Analytes Comparison with SOW Maximums

Analyte	Feed mol	Feed mol/mol Na	Cont Max mol/mol Na	Selected mol/mol Na	Basis	Feed mol
Ag	9.04E+02	1.21E-04	N/A*	1.21E-04	Actual	9.04E+02
Al	8.10E+06	1.08E+00	2.50E-01	2.50E-01	SOWM	1.87E+06
As	4.57E+03	6.11E-04	N/A	6.11E-04	Actual	4.57E+03
B	4.83E+04	6.46E-03	N/A	6.46E-03	Actual	4.83E+04
Ba	1.15E+03	1.54E-04	1.00E-04	1.00E-04	SOWM	7.48E+02
Be	1.76E+03	2.35E-04	N/A	2.35E-04	Actual	1.76E+03
Bi	1.51E+03	2.02E-04	N/A	2.02E-04	Actual	1.51E+03
Ca	5.09E+04	6.80E-03	4.00E-02	4.00E-02	SOWM	2.99E+05
Cd	2.04E+03	2.72E-04	4.00E-03	4.00E-03	SOWM	2.99E+04
Ce	2.26E+03	3.02E-04	N/A	3.02E-04	Actual	2.26E+03
Cl	1.05E+06	1.40E-01	8.90E-02	8.90E-02	SOWM	6.66E+05
CN	4.19E+03	5.61E-04	N/A	5.61E-04	Actual	4.19E+03
Co	2.43E+03	3.25E-04	N/A	3.25E-04	Actual	2.43E+03
Cr	1.41E+05	1.89E-02	2.00E-02	2.00E-02	SOWM	1.50E+05
Cu	1.65E+03	2.21E-04	N/A	2.21E-04	Actual	1.65E+03
F	1.31E+06	1.75E-01	2.00E-01	2.00E-01	SOWM	1.50E+06
Fe	1.04E+05	1.39E-02	1.00E-02	1.00E-02	SOWM	7.48E+04
Hg	2.32E+01	3.11E-06	1.40E-05	1.40E-05	SOWM	1.05E+02
K	4.30E+06	5.75E-01	1.80E-01	1.80E-01	SOWM	1.35E+06
La	8.78E+02	1.17E-04	8.30E-05	8.30E-05	SOWM	6.21E+02
Li	2.96E+04	3.95E-03	N/A	3.95E-03	Actual	2.96E+04
Mg	1.33E+04	1.78E-03	N/A	1.78E-03	Actual	1.33E+04
Mn	3.64E+04	4.87E-03	N/A	4.87E-03	Actual	3.64E+04
Mo	3.88E+03	5.19E-04	N/A	5.19E-04	Actual	3.88E+03
Na	7.48E+06	1.00E+00	N/A	1.00E+00	Actual	7.48E+06
Nd	2.45E+03	3.27E-04	N/A	3.27E-04	Actual	2.45E+03
NH3	1.48E+05	1.98E-02	N/A	1.98E-02	Actual	1.48E+05
Ni	3.29E+04	4.40E-03	3.00E-03	3.00E-03	SOWM	2.24E+04
NO2	1.07E+07	1.43E+00	3.80E-01	3.80E-01	SOWM	2.84E+06
NO3	1.32E+07	1.76E+00	8.00E-01	8.00E-01	SOWM	5.98E+06
OH	2.25E+07	3.00E+00	N/A	3.00E+00	Actual	2.25E+07
Oxalate	1.41E+06	1.88E-01	5.00E-01	5.00E-01	SOWM	3.74E+06
Pb	6.47E+03	8.65E-04	6.80E-04	6.80E-04	SOWM	5.09E+03
Pd	6.02E+01	8.04E-06	N/A	8.04E-06	Actual	6.02E+01
PO4	2.66E+05	3.56E-02	1.30E-01	1.30E-01	SOWM	9.72E+05
Pr	5.06E+00	6.77E-07	N/A	6.77E-07	Actual	5.06E+00
Rb	1.95E+02	2.61E-05	N/A	2.61E-05	Actual	1.95E+02
Rh	8.04E+02	1.07E-04	N/A	1.07E-04	Actual	8.04E+02
Ru	8.90E+02	1.19E-04	N/A	1.19E-04	Actual	8.90E+02
Sb	1.55E+03	2.07E-04	N/A	2.07E-04	Actual	1.55E+03
Se	2.96E+03	3.96E-04	N/A	3.96E-04	Actual	2.96E+03
Si	1.26E+05	1.68E-02	N/A	1.68E-02	Actual	1.26E+05
SO4	5.96E+05	7.97E-02	7.00E-02	7.00E-02	SOWM	5.23E+05
Sr	3.61E+02	4.82E-05	N/A	4.82E-05	Actual	3.61E+02
Ta	4.28E+02	5.73E-05	N/A	5.73E-05	Actual	4.28E+02
Te	5.59E+00	7.47E-07	N/A	7.47E-07	Actual	5.59E+00
Th	3.13E+02	4.18E-05	N/A	4.18E-05	Actual	3.13E+02

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 28

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Feed mol	Feed mol/mol Na	Cont Max mol/mol Na	Selected mol/mol Na	Basis	Feed mol
Ti	7.22E+02	9.66E-05	N/A	9.66E-05	Actual	7.22E+02
TIC as CO3	4.42E+06	5.91E-01	3.00E-01	3.00E-01	SOWM	2.24E+06
Tl	3.09E+03	4.13E-04	N/A	4.13E-04	Actual	3.09E+03
U(total)	1.13E+04	1.52E-03	1.20E-03	1.20E-03	SOWM	8.97E+03
V	3.10E+03	4.15E-04	N/A	4.15E-04	Actual	3.10E+03
W	2.92E+03	3.90E-04	N/A	3.90E-04	Actual	2.92E+03
Y	2.92E+02	3.91E-05	N/A	3.91E-05	Actual	2.92E+02
Zn	3.03E+03	4.05E-04	N/A	4.05E-04	Actual	3.03E+03
Zr	2.69E+03	3.59E-04	N/A	3.59E-04	Actual	2.69E+03

N/A = none available
SOWM = statement of work maximum

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 29

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-5 LAW Radionuclide Comparison with SOW Maximums

Analyte	Ci	Ci/mol Na	Bq/mol Na	CM	Selected Bq/mol Na	Basis	Selected Ci/mol Na	Selected Ci
106Ru	3.05E-04	4.08E-11	1.51E+00	N/A	1.51E+00	Actual	4.08E-11	3.05E-04
113mCd	3.24E+02	4.33E-05	1.60E+06	N/A	1.60E+06	Actual	4.33E-05	3.24E+02
125Sb	4.02E+03	5.38E-04	1.99E+07	N/A	1.99E+07	Actual	5.38E-04	4.02E+03
126Sn	3.02E+01	4.04E-06	1.49E+05	N/A	1.49E+05	Actual	4.04E-06	3.02E+01
129I	1.13E+00	1.51E-07	5.59E+03	N/A	5.59E+03	Actual	1.51E-07	1.13E+00
134Cs	1.45E+04	1.94E-03	7.17E+07	N/A	7.17E+07	Actual	1.94E-03	1.45E+04
137Cs	5.65E+06	7.56E-01	2.80E+10	2.00E+10	2.00E+10	SOWM	5.41E-01	4.04E+06
137mBa	5.35E+06	7.15E-01	2.65E+10	N/A	2.65E+10	Actual	7.15E-01	5.35E+06
14C	5.34E+01	7.14E-06	2.64E+05	N/A	2.64E+05	Actual	7.14E-06	5.34E+01
151Sm	4.99E+04	6.67E-03	2.47E+08	N/A	2.47E+08	Actual	6.67E-03	4.99E+04
152Eu	2.63E+02	3.52E-05	1.30E+06	N/A	1.30E+06	Actual	3.52E-05	2.63E+02
154Eu	2.46E+03	3.29E-04	1.22E+07	4.30E+06	4.30E+06	SOWM	1.16E-04	8.69E+02
155Eu	1.50E+03	2.01E-04	7.42E+06	N/A	7.42E+06	Actual	2.01E-04	1.50E+03
226Ra	4.65E-04	6.22E-11	2.30E+00	N/A	2.30E+00	Actual	6.22E-11	4.65E-04
227Ac	5.18E-03	6.93E-10	2.56E+01	N/A	2.56E+01	Actual	6.93E-10	5.18E-03
228Ra	9.05E-01	1.21E-07	4.48E+03	N/A	4.48E+03	Actual	1.21E-07	9.05E-01
229Th	2.13E-02	2.85E-09	1.05E+02	N/A	1.05E+02	Actual	2.85E-09	2.13E-02
231Pa	1.51E-02	2.02E-09	7.47E+01	N/A	7.47E+01	Actual	2.02E-09	1.51E-02
232Th	1.12E-01	1.50E-08	5.54E+02	N/A	5.54E+02	Actual	1.50E-08	1.12E-01
232U	5.08E-01	6.79E-08	2.51E+03	N/A	2.51E+03	Actual	6.79E-08	5.08E-01
233U	2.08E+00	2.78E-07	1.03E+04	N/A	1.03E+04	Actual	2.78E-07	2.08E+00
234U	1.21E+00	1.62E-07	5.99E+03	N/A	5.99E+03	Actual	1.62E-07	1.21E+00
235U	4.67E-02	6.24E-09	2.31E+02	N/A	2.31E+02	Actual	6.24E-09	4.67E-02
236U	1.40E-01	1.87E-08	6.93E+02	N/A	6.93E+02	Actual	1.87E-08	1.40E-01
237Np	5.56E+00	7.43E-07	2.75E+04	7.78E+02	7.78E+02	SOWM	2.10E-08	1.57E-01
238Pu	1.47E+01	1.97E-06	7.27E+04	2.06E+03	2.06E+03	SOWM	5.56E-08	4.16E-01
238U	9.00E-01	1.20E-07	4.45E+03	N/A	4.45E+03	Actual	1.20E-07	9.00E-01
239Pu	1.74E+02	2.33E-05	8.61E+05	2.44E+04	2.44E+04	SOWM	6.58E-07	4.92E+00
240Pu	3.08E+01	4.12E-06	1.52E+05	4.31E+03	4.31E+03	SOWM	1.17E-07	8.72E-01
241Am	2.47E+03	3.30E-04	1.22E+07	3.46E+05	3.46E+05	SOWM	9.35E-06	6.99E+01
241Pu	7.23E+02	9.67E-05	3.58E+06	1.01E+05	1.01E+05	SOWM	2.74E-06	2.05E+01
242Cm	6.23E+00	8.33E-07	3.08E+04	8.72E+02	8.72E+02	SOWM	2.36E-08	1.76E-01
242Pu	3.87E-03	5.18E-10	1.91E+01	5.42E-01	5.42E-01	SOWM	1.46E-11	1.10E-04
243Am	1.01E-01	1.35E-08	5.00E+02	1.41E+01	1.41E+01	SOWM	3.82E-10	2.86E-03
243Cm	5.18E-01	6.93E-08	2.56E+03	7.25E+01	7.25E+01	SOWM	1.96E-09	1.47E-02
244Cm	3.60E+00	4.81E-07	1.78E+04	5.04E+02	5.04E+02	SOWM	1.36E-08	1.02E-01
3H	7.14E+02	9.55E-05	3.53E+06	N/A	3.53E+06	Actual	9.55E-05	7.14E+02
59Ni	5.05E+00	6.75E-07	2.50E+04	N/A	2.50E+04	Actual	6.75E-07	5.05E+00
60Co	4.04E+02	5.40E-05	2.00E+06	3.70E+05	3.70E+05	SOWM	1.00E-05	7.48E+01
63Ni	4.79E+02	6.41E-05	2.37E+06	N/A	2.37E+06	Actual	6.41E-05	4.79E+02
79Se	4.44E+00	5.94E-07	2.20E+04	N/A	2.20E+04	Actual	5.94E-07	4.44E+00
90Sr	3.02E+05	4.04E-02	1.49E+09	8.00E+08	8.00E+08	SOWM	2.16E-02	1.62E+05
90Y	3.02E+05	4.04E-02	1.49E+09	N/A	1.49E+09	Actual	4.04E-02	3.02E+05
93mNb	5.95E+01	7.96E-06	2.94E+05	N/A	2.94E+05	Actual	7.96E-06	5.95E+01
93Zr	7.53E+01	1.01E-05	3.73E+05	N/A	3.73E+05	Actual	1.01E-05	7.53E+01
99Tc	1.17E+03	1.56E-04	5.79E+06	7.10E+06	7.10E+06	SOWM	1.92E-04	1.44E+03

NA = none available
SOWM = Statement of Work maximum

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 30

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-6 LAW Chemical Analytes Feed Charge Balance

Analyte	Charge	mol	Total Charge
Ag	1	9.04E+02	9.04E+02
Al	3	1.87E+06	5.61E+06
As	5	4.57E+03	2.28E+04
B	3	4.83E+04	1.45E+05
Ba	2	7.48E+02	1.50E+03
Be	0	1.76E+03	0.00E+00
Bi	3	1.51E+03	4.54E+03
Ca	2	2.99E+05	5.98E+05
Cd	2	2.99E+04	5.98E+04
Ce	3	2.26E+03	6.77E+03
Cl	-1	6.66E+05	-6.66E+05
CN	0	4.19E+03	0.00E+00
Co	0	2.43E+03	0.00E+00
Cr	3	1.50E+05	4.49E+05
Cu	2	1.65E+03	3.31E+03
F	-1	1.50E+06	-1.50E+06
Fe	3	7.48E+04	2.24E+05
Hg	2	1.05E+02	2.09E+02
K	1	1.35E+06	1.35E+06
La	3	6.21E+02	1.86E+03
Li	1	2.96E+04	2.96E+04
Mg	2	1.33E+04	2.67E+04
Mn	4	3.64E+04	1.46E+05
Mo	0	3.88E+03	0.00E+00
Na	1	7.48E+06	7.48E+06
Nd	0	2.45E+03	0.00E+00
NH3	0	1.48E+05	0.00E+00
Ni	2	2.24E+04	4.49E+04
NO2	-1	2.84E+06	-2.84E+06
NO3	-1	5.98E+06	-5.98E+06
OH	-1	2.25E+07	-2.25E+07
Oxalate	-2	3.74E+06	-7.48E+06
Pb	2	5.09E+03	1.02E+04
Pd	2	6.02E+01	1.20E+02
PO4	-3	9.72E+05	-2.92E+06
Pr	0	5.06E+00	0.00E+00
Rb	0	1.95E+02	0.00E+00
Rh	0	8.04E+02	0.00E+00
Ru	0	8.90E+02	0.00E+00
Sb	0	1.55E+03	0.00E+00
Se	0	2.96E+03	0.00E+00
Si	4	1.26E+05	5.04E+05
SO4	-2	5.23E+05	-1.05E+06
Sr	2	3.61E+02	7.21E+02
Ta	0	4.28E+02	0.00E+00

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 31

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Charge	mol	Total Charge
Te	0	5.59E+00	0.00E+00
Th	0	3.13E+02	0.00E+00
Ti	4	7.22E+02	2.89E+03
TIC as CO3	-2	2.24E+06	-4.49E+06
Tl	0	3.09E+03	0.00E+00
U(total)	0	8.97E+03	0.00E+00
V	0	3.10E+03	0.00E+00
W	0	2.92E+03	0.00E+00
Y	0	2.92E+02	0.00E+00
Zn	2	3.03E+03	6.06E+03
Zr	4	2.69E+03	1.07E+04
Total charge			-32652326

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 32

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-7 LAW Radionuclide Feed Charge Balance

Analyte	Charge	Ci/kmol	Ci	mol	Total Charge
106Ru	0		3.05E-04		0.00E+00
113mCd	0		3.24E+02		0.00E+00
125Sb	3	1.30E+08	4.02E+03	3.09E-02	9.28E-02
126Sn	2	1.43E+03	3.02E+01	2.11E+01	4.22E+01
129I	-1	2.28E+01	1.13E+00	4.96E+01	-4.96E+01
134Cs	0		1.45E+04		0.00E+00
137Cs	1	1.19E+07	4.04E+06	3.40E+02	3.40E+02
137mBa	0		5.35E+06		0.00E+00
14C	4	6.26E+04	5.34E+01	8.53E-01	3.41E+00
151Sm	3	3.97E+06	4.99E+04	1.26E+01	3.77E+01
152Eu	3	2.64E+07	2.63E+02	9.96E-03	2.99E-02
154Eu	3	4.16E+07	8.69E+02	2.09E-02	6.27E-02
155Eu	3	7.53E+07	1.50E+03	1.99E-02	5.98E-02
226Ra	0		4.65E-04		0.00E+00
227Ac	0		5.18E-03		0.00E+00
228Ra	0		9.05E-01		0.00E+00
229Th	0		2.13E-02		0.00E+00
231Pa	0		1.51E-02		0.00E+00
232Th	4	2.55E-02	1.12E-01	4.39E+03	1.76E+04
232U	0		5.08E-01		0.00E+00
233U	6	2.25E+03	2.08E+00	9.24E-01	5.55E+00
234U	6	1.45E+03	1.21E+00	8.34E-01	5.01E+00
235U	6	5.08E-01	4.67E-02	9.19E+01	5.52E+02
236U	6	1.52E+01	1.40E-01	9.21E+00	5.53E+01
237Np	4	1.67E+02	1.57E-01	9.42E-01	3.77E+00
238Pu	4	4.08E+06	4.16E-01	1.02E-04	4.08E-04
238U	6	8.00E-02	9.00E-01	1.13E+04	6.75E+04
239Pu	4	1.48E+04	4.92E+00	3.33E-01	1.33E+00
240Pu	4	5.45E+04	8.72E-01	1.60E-02	6.40E-02
241Am	3	8.26E+05	6.99E+01	8.46E-02	2.54E-01
241Pu	4	2.48E+07	2.05E+01	8.25E-04	3.30E-03
242Cm	0		1.76E-01		0.00E+00
242Pu	0		1.10E-04		0.00E+00
243Am	0		2.86E-03		0.00E+00
243Cm	3	1.23E+07	1.47E-02	1.19E-06	3.58E-06
244Cm	3	2.62E+07	1.02E-01	3.89E-06	1.17E-05
3H	1	2.90E+07	7.14E+02	2.46E-02	2.46E-02
59Ni	0		5.05E+00		0.00E+00
60Co	3	6.78E+07	7.48E+01	1.10E-03	3.31E-03
63Ni	2	3.57E+06	4.79E+02	1.34E-01	2.68E-01
79Se	0		4.44E+00		0.00E+00
90Sr	2	1.24E+07	1.62E+05	1.30E+01	2.61E+01
90Y	0		3.02E+05		0.00E+00
93mNb	0		5.95E+01		0.00E+00
93Zr	0		7.53E+01		0.00E+00

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 33

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Charge	Ci/kmol	Ci	mol	Total Charge
99Tc	7	1.68E+03	1.44E+03	8.54E+02	5.98E+03
Total charge					92071

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 34

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-8 Adjustment of Chemical Analytes Positive Charges

Analyte	mol	Charge	Adjusted Total Charge	Adjusted moles	Final mol/mol Na
Ag	9.04E+02	1	1.76E+03	1.76E+03	1.21E-04
Al	5.61E+06	3	1.09E+07	3.63E+06	2.50E-01
As	2.28E+04	5	4.43E+04	8.86E+03	6.11E-04
B	1.45E+05	3	2.81E+05	9.38E+04	6.46E-03
Ba	1.50E+03	2	2.90E+03	1.45E+03	1.00E-04
Be	0.00E+00	0			
Bi	4.54E+03	3	8.80E+03	2.93E+03	2.02E-04
Ca	5.98E+05	2	1.16E+06	5.81E+05	4.00E-02
Cd	5.98E+04	2	1.16E+05	5.81E+04	4.00E-03
Ce	6.77E+03	3	1.31E+04	4.38E+03	3.02E-04
Cl	-6.66E+05	-1			
CN	0.00E+00	0			
Co	0.00E+00	0			
Cr	4.49E+05	3	8.71E+05	2.90E+05	2.00E-02
Cu	3.31E+03	2	6.42E+03	3.21E+03	2.21E-04
F	-1.50E+06	-1			
Fe	2.24E+05	3	4.35E+05	1.45E+05	1.00E-02
Hg	2.09E+02	2	4.06E+02	2.03E+02	1.40E-05
K	1.35E+06	1	2.61E+06	2.61E+06	1.80E-01
La	1.86E+03	3	3.61E+03	1.20E+03	8.30E-05
Li	2.96E+04	1	5.74E+04	5.74E+04	3.95E-03
Mg	2.67E+04	2	5.18E+04	2.59E+04	1.78E-03
Mn	1.46E+05	4	2.83E+05	7.07E+04	4.87E-03
Mo	0.00E+00	0			
Na	7.48E+06	1	1.45E+07	1.45E+07	1.00E+00
Nd	0.00E+00	0			
NH3	0.00E+00	0			
Ni	4.49E+04	2	8.71E+04	4.35E+04	3.00E-03
NO2	-2.84E+06	-1			
NO3	-5.98E+06	-1			
OH	-2.25E+07	-1			
Oxalate	-7.48E+06	-2			
Pb	1.02E+04	2	1.97E+04	9.87E+03	6.80E-04
Pd	1.20E+02	2	2.33E+02	1.17E+02	8.04E-06
PO4	-2.92E+06	-3			
Pr	0.00E+00	0			
Rb	0.00E+00	0			
Rh	0.00E+00	0			
Ru	0.00E+00	0			
Sb	0.00E+00	0			
Se	0.00E+00	0			
Si	5.04E+05	4	9.78E+05	2.44E+05	1.68E-02
SO4	-1.05E+06	-2			
Sr	7.21E+02	2	1.40E+03	7.00E+02	4.82E-05

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 35

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	mol	Charge	Adjusted Total Charge	Adjusted moles	Final mol/mol Na
Ta	0.00E+00	0			
Te	0.00E+00	0			
Th	0.00E+00	0			
Ti	2.89E+03	4	5.61E+03	1.40E+03	9.66E-05
TIC as CO3	-4.49E+06	-2			
Tl	0.00E+00	0			
U(total)	0.00E+00	0			
V	0.00E+00	0			
W	0.00E+00	0			
Y	0.00E+00	0			
Zn	6.06E+03	2	1.18E+04	5.88E+03	4.05E-04
Zr	1.07E+04	4	2.09E+04	5.21E+03	3.59E-04

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 36

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-9 Adjustment of Radionuclide Positive Charges

Analyte	mol	charge	Adjusted total charge	Adjusted Moles	Adjusted Ci	Bq/mol Na
106Ru	0.00E+00	0				
113mCd	0.00E+00	0				
125Sb	3.09E-02	3	1.80E-01	6.00E-02	7.80E+03	1.99E+07
126Sn	2.11E+01	2	8.20E+01	4.10E+01	5.86E+01	1.49E+05
129I	4.96E+01	-1				
134Cs	0.00E+00	0				
137Cs	3.40E+02	1	6.59E+02	6.59E+02	7.85E+06	2.00E+10
137mBa	0.00E+00	0				
14C	8.53E-01	4	6.62E+00	1.66E+00	1.04E+02	2.64E+05
151Sm	1.26E+01	3	7.32E+01	2.44E+01	9.68E+04	2.47E+08
152Eu	9.96E-03	3	5.80E-02	1.93E-02	5.10E+02	1.30E+06
154Eu	2.09E-02	3	1.22E-01	4.05E-02	1.69E+03	4.30E+06
155Eu	1.99E-02	3	1.16E-01	3.87E-02	2.91E+03	7.42E+06
226Ra	0.00E+00	0				
227Ac	0.00E+00	0				
228Ra	0.00E+00	0				
229Th	0.00E+00	0				
231Pa	0.00E+00	0				
232Th	4.39E+03	4	3.41E+04	8.52E+03	2.17E-01	5.54E+02
232U	0.00E+00	0				
233U	9.24E-01	6	1.08E+01	1.79E+00	4.04E+00	1.03E+04
234U	8.34E-01	6	9.72E+00	1.62E+00	2.35E+00	5.99E+03
235U	9.19E+01	6	1.07E+03	1.78E+02	9.06E-02	2.31E+02
236U	9.21E+00	6	1.07E+02	1.79E+01	2.72E-01	6.93E+02
237Np	9.42E-01	4	7.31E+00	1.83E+00	3.05E-01	7.78E+02
238Pu	1.02E-04	4	7.91E-04	1.98E-04	8.07E-01	2.06E+03
238U	1.13E+04	6	1.31E+05	2.18E+04	1.75E+00	4.45E+03
239Pu	3.33E-01	4	2.58E+00	6.46E-01	9.56E+00	2.44E+04
240Pu	1.60E-02	4	1.24E-01	3.10E-02	1.69E+00	4.31E+03
241Am	8.46E-02	3	4.93E-01	1.64E-01	1.36E+02	3.46E+05
241Pu	8.25E-04	4	6.40E-03	1.60E-03	3.97E+01	1.01E+05
242Cm	0.00E+00	0				
242Pu	0.00E+00	0				
243Am	0.00E+00	0				
243Cm	1.19E-06	3	6.94E-06	2.31E-06	2.84E-02	7.25E+01
244Cm	3.89E-06	3	2.26E-05	7.55E-06	1.98E-01	5.04E+02
3H	2.46E-02	1	4.78E-02	4.78E-02	1.39E+03	3.53E+06
59Ni	0.00E+00	0				
60Co	1.10E-03	3	6.42E-03	2.14E-03	1.45E+02	3.70E+05
63Ni	1.34E-01	2	5.21E-01	2.60E-01	9.30E+02	2.37E+06
79Se	0.00E+00	0				
90Sr	1.30E+01	2	5.06E+01	2.53E+01	3.14E+05	8.00E+08
90Y	0.00E+00	0				
93mNb	0.00E+00	0				

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 37

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

93Zr	0.00E+00	0				
99Tc	8.54E+02	7	1.16E+04	1.66E+03	2.79E+03	7.10E+06

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 38

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-10 LAW Chemical Analytes Emissions Feed Quantities

Analyte	mol/mol Na	Analyte	mol/mol Na
Ag	1.21E-04	NO2	1.96E-01
Al	2.50E-01	NO3	4.12E-01
As	6.11E-04	OH	1.55E+00
B	6.46E-03	Oxalate	2.58E-01
Ba	1.00E-04	Pb	6.80E-04
Be	1.21E-04	Pd	8.04E-06
Bi	2.02E-04	PO4	6.70E-02
Ca	4.00E-02	Pr	3.49E-07
Cd	4.00E-03	Rb	1.35E-05
Ce	3.02E-04	Rh	5.54E-05
Cl	4.59E-02	Ru	6.13E-05
CN	2.89E-04	Sb	1.07E-04
Co	1.67E-04	Se	2.04E-04
Cr	2.00E-02	Si	1.68E-02
Cu	2.21E-04	SO4	3.61E-02
F	1.03E-01	Sr	4.82E-05
Fe	1.00E-02	Ta	2.95E-05
Hg	1.40E-05	Te	3.85E-07
K	1.80E-01	Th	2.15E-05
La	8.30E-05	Ti	9.66E-05
Li	3.95E-03	TIC as CO3	1.55E-01
Mg	1.78E-03	Tl	2.13E-04
Mn	4.87E-03	U(total)	6.18E-04
Mo	2.67E-04	V	2.14E-04
Na	1.00E+00	W	2.01E-04
Nd	1.69E-04	Y	2.02E-05
NH3	1.02E-02	Zn	4.05E-04
Ni	3.00E-03	Zr	3.59E-04

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 39

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table A-11 LAW Radionuclide Emissions Feed Quantities

Analyte	Bq/mol Na	Analyte	Bq/mol Na
106Ru	7.78E-01	236U	6.93E+02
113mCd	8.26E+05	237Np	7.78E+02
125Sb	1.99E+07	238Pu	2.06E+03
126Sn	1.49E+05	238U	4.45E+03
129I	2.88E+03	239Pu	2.44E+04
134Cs	3.70E+07	240Pu	4.31E+03
137Cs	2.00E+10	241Am	3.46E+05
137mBa	1.36E+10	241Pu	1.01E+05
14C	2.64E+05	242Cm	4.49E+02
151Sm	2.47E+08	242Pu	2.79E-01
152Eu	1.30E+06	243Am	7.29E+00
154Eu	4.30E+06	243Cm	7.25E+01
155Eu	7.42E+06	244Cm	5.04E+02
226Ra	1.19E+00	3H	3.53E+06
227Ac	1.32E+01	59Ni	1.29E+04
228Ra	2.31E+03	60Co	3.70E+05
229Th	5.43E+01	63Ni	2.37E+06
231Pa	3.85E+01	79Se	1.13E+04
232Th	5.54E+02	90Sr	8.00E+08
232U	1.30E+03	90Y	7.70E+08
233U	1.03E+04	93mNb	1.52E+05
234U	5.99E+03	93Zr	1.92E+05
235U	2.31E+02	99Tc	7.10E+06

Appendix B HLW Calculations

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 41

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-1 HLW Chemical Analytes Feed Quantities in kg

Analyte	Unit	Tank								
		AY-101	AY-102	AZ-101	AZ-102	C-104	C-106	SY-102	AW-104	C-107
Ag	kg	1.17E+02	2.52E+01	4.88E+01	2.37E+02	1.06E+03	2.63E+01	2.98E+01	2.42E+01	2.94E+02
Al	kg	2.71E+04	3.87E+04	1.61E+04	1.99E+04	9.01E+04	1.83E+03	2.28E+04	3.59E+03	5.86E+04
As	kg	9.37E+00	2.09E+01	1.73E+01	8.60E+00	4.87E+01	8.79E-01	5.95E+00	1.50E+01	9.95E+00
B	kg	1.21E+02	3.52E+01	7.83E+01	1.52E+02	1.79E+03	8.98E+00	2.90E+01	8.06E+00	2.08E+02
Ba	kg	2.63E+02	6.84E+02	1.94E+02	0.00E+00	1.47E+02	1.52E+01	2.09E+01	8.27E+00	7.29E+02
Be	kg	2.17E+00	2.63E+00	2.75E+00	1.97E+00	3.81E+01	1.10E-01	2.04E+00	1.11E+00	1.56E+00
Bi	kg	2.13E+00	1.52E+02	1.97E+01	2.53E+01	4.80E+01	1.11E-01	2.80E+03	1.60E+00	1.04E+04
Ca	kg	1.19E+03	4.59E+03	0.00E+00	6.92E+02	2.98E+03	7.85E+01	1.07E+03	9.05E+02	1.24E+03
Cd	kg	6.18E+01	1.03E+02	1.88E+03	2.71E+03	1.03E+03	2.11E+00	1.20E+02	2.94E+01	9.52E+01
Ce	kg	2.96E+02	7.13E+02	2.30E+02	1.41E+02	7.09E+01	2.34E+01	3.91E+01	1.50E+01	7.79E+02
Cl	kg	1.65E+02	1.24E+02	2.92E+01	9.39E+01	7.99E+02	3.78E+00	1.60E+03	5.58E+02	8.70E+02
CN	kg	0.00E+00	0.00E+00	0.00E+00	5.64E+00	2.09E+01	3.53E-01	0.00E+00	0.00E+00	6.11E+00
Co	kg	1.56E+01	2.37E+01	1.23E+01	1.13E+01	9.74E+00	1.11E+00	7.91E+00	3.00E+00	2.65E+01
Cr	kg	1.20E+03	1.48E+03	1.64E+02	4.56E+02	1.46E+03	5.71E+01	1.34E+04	1.61E+02	9.30E+02
Cu	kg	9.75E+01	2.01E+02	6.37E+01	3.80E+01	1.34E+02	6.86E+00	1.85E+01	1.45E+01	2.28E+02
F	kg	9.48E+02	2.49E+02	1.41E+03	4.79E+02	3.46E+04	2.38E+00	5.92E+02	7.88E+02	6.39E+03
Fe	kg	3.57E+04	8.69E+04	2.21E+04	2.32E+04	2.76E+04	3.05E+03	7.61E+03	2.28E+03	1.03E+05
Hg	kg	1.20E+01	1.13E+02	5.58E-01	3.33E+00	8.29E+03	4.39E+00	5.82E+00	0.00E+00	6.70E+01
K	kg	2.93E+02	5.23E+02	9.56E+02	1.51E+03	1.33E+03	2.11E+01	7.63E+02	1.75E+03	4.47E+02
La	kg	1.23E+03	1.12E+03	9.85E+02	7.93E+02	4.87E+01	1.23E+01	4.82E+01	2.00E+01	2.70E+02
Li	kg	2.57E+00	4.34E+01	1.70E+02	1.65E+00	6.05E+00	1.33E+00	2.49E+01	3.11E+00	1.67E+02
Mg	kg	5.02E+02	1.74E+03	1.78E+02	1.78E+02	2.06E+02	2.02E+01	2.33E+02	2.00E+02	4.77E+02
Mn	kg	2.04E+03	1.15E+04	2.84E+02	5.08E+02	7.01E+03	7.59E+02	1.78E+03	7.87E+02	5.02E+03
Mo	kg	1.19E+01	9.17E+00	1.23E+01	2.02E+01	2.40E+01	3.85E-01	0.00E+00	1.29E+01	4.58E+01
Na	kg	4.78E+04	5.33E+04	2.63E+04	2.67E+04	1.78E+05	2.45E+03	7.46E+04	3.31E+04	9.52E+04
Nd	kg	7.41E+02	1.02E+03	5.99E+02	4.90E+02	1.07E+02	3.53E+01	6.83E+01	1.50E+01	6.33E+02
NH3	kg	3.62E+02	1.63E+03	0.00E+00	0.00E+00	2.25E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni	kg	1.33E+03	2.11E+03	1.37E+03	1.46E+03	2.63E+03	1.06E+02	2.27E+02	6.29E+01	3.09E+03
NO2	kg	1.35E+04	5.16E+01	1.10E+04	1.67E+04	3.66E+04	8.08E+01	2.31E+04	1.01E+04	3.53E+04
NO3	kg	1.14E+03	2.91E+01	1.03E+04	6.87E+03	1.96E+04	1.18E+01	4.26E+04	1.75E+04	4.78E+04
OH	kg	0.00E+00	0.00E+00	1.39E+03	2.02E+03	0.00E+00	0.00E+00	4.11E+03	1.27E+03	2.29E+05
Oxalate	kg	1.92E+04	1.77E+03	1.47E+03	1.49E+03	5.61E+03	6.92E+01	3.36E+04	6.14E+02	7.36E+02

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 42

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Unit	Tank								
		AY-101	AY-102	AZ-101	AZ-102	C-104	C-106	SY-102	AW-104	C-107
Pb	kg	9.56E+02	3.52E+03	8.57E+01	2.71E+02	8.36E+02	1.57E+02	5.53E+02	8.16E+01	1.01E+04
Pd	kg	0.00E+00	0.00E+00	3.74E-04	1.62E+01	0.00E+00	3.88E-01	0.00E+00	0.00E+00	0.00E+00
PO4	kg	3.45E+03	9.04E+03	1.06E+02	6.31E+02	3.21E+03	3.75E+02	6.46E+03	1.77E+02	5.88E+04
Pr	kg	0.00E+00	3.01E+02	1.28E+02	9.27E+01	7.00E+01	1.26E+01	0.00E+00	0.00E+00	2.08E+02
Rb	kg	5.93E-01	0.00E+00	3.74E+00	1.39E+00	2.67E+02	9.07E-02	2.41E+01	0.00E+00	8.43E-01
Rh	kg	6.85E+00	0.00E+00	4.70E+01	9.77E+00	1.44E+02	8.92E-01	0.00E+00	0.00E+00	4.36E+01
Ru	kg	0.00E+00	4.36E+02	3.79E+02	4.37E+01	0.00E+00	1.83E+01	0.00E+00	0.00E+00	9.51E+02
Sb	kg	1.18E+01	2.38E+00	2.15E+00	9.88E+00	5.71E+00	9.97E-02	1.81E+00	9.03E+00	2.41E+00
Se	kg	1.96E+01	5.02E-01	7.16E+00	2.79E+00	3.92E+01	2.11E-02	5.90E+00	1.13E+01	5.01E+00
Si	kg	4.31E+02	1.13E+02	4.47E+02	2.49E+03	1.02E+04	4.15E+01	9.40E+02	4.78E+02	1.87E+03
SO4	kg	3.04E+03	1.51E+03	7.59E+03	7.05E+03	3.42E+03	6.06E+01	1.94E+03	7.36E+02	8.43E+03
Sr	kg	6.68E+01	2.28E+02	9.17E+01	4.79E+01	8.75E+01	6.49E+00	3.84E+01	5.31E+00	2.57E+02
Ta	kg	0.00E+00	0.00E+00	2.15E+00	6.53E-01	1.75E+00	8.79E-02	2.49E+00	0.00E+00	8.47E-01
Te	kg	0.00E+00	9.48E+01	2.36E+01	1.54E+01	0.00E+00	3.98E+00	1.48E+00	0.00E+00	1.80E+02
Th	kg	0.00E+00	4.53E+02	7.78E+01	8.93E+01	5.10E+04	1.89E+01	3.29E+02	1.50E+01	6.61E+02
Ti	kg	3.52E+01	1.10E+02	9.62E+00	1.06E+01	9.80E+01	4.09E+00	1.20E+01	1.60E+01	1.24E+02
TIC as CO3	kg	8.09E+04	5.45E+04	7.50E+03	1.90E+04	4.84E+04	3.25E+03	1.14E+04	1.31E+04	1.14E+04
Tl	kg	5.61E-01	2.96E+00	2.15E+00	6.53E-01	9.74E+01	1.24E-01	4.60E-01	3.00E+01	5.43E+00
U(total)	kg	4.67E+02	2.35E+03	1.63E+03	3.50E+03	3.53E+04	4.11E+01	6.77E+02	6.91E+03	9.29E+03
V	kg	9.80E+00	2.98E+01	5.35E+00	8.32E+00	2.72E+01	1.37E+00	9.06E+00	7.53E+00	2.51E+01
W	kg	0.00E+00	0.00E+00	0.00E+00	4.84E+00	9.60E+02	0.00E+00	0.00E+00	0.00E+00	6.75E+02
Y	kg	0.00E+00	9.81E+01	0.00E+00	3.41E+01	2.82E+01	4.46E+00	1.13E+01	1.50E+00	9.48E+01
Zn	kg	5.33E+01	1.52E+02	2.56E+01	2.45E+01	6.08E+02	4.36E+00	9.85E+00	2.80E+01	1.77E+02
Zr	kg	6.93E+02	2.86E+01	7.85E+03	3.81E+03	6.49E+04	2.65E+00	7.51E+01	2.10E+03	7.39E+01

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 43

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-2 HLW Chemical Analytes Feed Quantities in moles

Analyte	MW g/mol	Unit	Tank									
			AY-101	AY-102	AZ-101	AZ-102	C-104	C-106	SY-102	AW-104	C-107	Max Conc *
Ag	107.8	mol	1.08E+03	2.34E+02	4.52E+02	2.20E+03	9.82E+03	2.44E+02	2.76E+02	2.24E+02	2.72E+03	9.82E+03
Al	26.9	mol	1.00E+06	1.43E+06	5.96E+05	7.37E+05	3.34E+06	6.78E+04	8.44E+05	1.33E+05	2.17E+06	3.34E+06
As	74.9	mol	1.25E+02	2.79E+02	2.31E+02	1.15E+02	6.50E+02	1.17E+01	7.94E+01	2.00E+02	1.33E+02	6.50E+02
B	10.8	mol	1.12E+04	3.26E+03	7.25E+03	1.41E+04	1.66E+05	8.31E+02	2.69E+03	7.46E+02	1.93E+04	1.66E+05
Ba	137.3	mol	1.92E+03	4.98E+03	1.41E+03	0.00E+00	1.07E+03	1.11E+02	1.52E+02	6.02E+01	5.31E+03	5.31E+03
Be	9.0	mol	2.41E+02	2.92E+02	3.06E+02	2.19E+02	4.23E+03	1.22E+01	2.27E+02	1.23E+02	1.73E+02	4.23E+03
Bi	208.9	mol	1.02E+01	7.27E+02	9.43E+01	1.21E+02	2.30E+02	5.31E-01	1.34E+04	7.66E+00	4.98E+04	4.98E+04
Ca	40.0	mol	2.97E+04	1.14E+05	0.00E+00	1.73E+04	7.43E+04	1.96E+03	2.67E+04	2.26E+04	3.09E+04	1.14E+05
Cd	112.4	mol	5.50E+02	9.16E+02	1.67E+04	2.41E+04	9.16E+03	1.88E+01	1.07E+03	2.62E+02	8.47E+02	2.41E+04
Ce	140.1	mol	2.11E+03	5.09E+03	1.64E+03	1.01E+03	5.06E+02	1.67E+02	2.79E+02	1.07E+02	5.56E+03	5.56E+03
Cl	35.4	mol	4.65E+03	3.49E+03	8.23E+02	2.65E+03	2.25E+04	1.06E+02	4.51E+04	1.57E+04	2.45E+04	4.51E+04
CN	26.0	mol	0.00E+00	0.00E+00	0.00E+00	2.17E+02	8.04E+02	1.36E+01	0.00E+00	0.00E+00	2.35E+02	8.04E+02
Co	58.9	mol	2.65E+02	4.02E+02	2.09E+02	1.92E+02	1.65E+02	1.88E+01	1.34E+02	5.09E+01	4.50E+02	4.50E+02
Cr	51.9	mol	2.31E+04	2.85E+04	3.15E+03	8.77E+03	2.81E+04	1.10E+03	2.58E+05	3.09E+03	1.79E+04	2.58E+05
Cu	63.5	mol	1.54E+03	3.17E+03	1.00E+03	5.98E+02	2.11E+03	1.08E+02	2.91E+02	2.28E+02	3.59E+03	3.59E+03
F	18.9	mol	4.99E+04	1.31E+04	7.42E+04	2.52E+04	1.82E+06	1.25E+02	3.12E+04	4.15E+04	3.36E+05	1.82E+06
Fe	55.8	mol	6.40E+05	1.56E+06	3.96E+05	4.16E+05	4.95E+05	5.47E+04	1.36E+05	4.09E+04	1.85E+06	1.85E+06
Hg	200.6	mol	5.98E+01	5.63E+02	2.78E+00	1.66E+01	4.13E+04	2.19E+01	2.90E+01	0.00E+00	3.34E+02	4.13E+04
K	39.1	mol	7.49E+03	1.34E+04	2.45E+04	3.86E+04	3.40E+04	5.40E+02	1.95E+04	4.47E+04	1.14E+04	4.47E+04
La	138.9	mol	8.86E+03	8.06E+03	7.09E+03	5.71E+03	3.51E+02	8.86E+01	3.47E+02	1.44E+02	1.94E+03	8.86E+03
Li	6.9	mol	3.72E+02	6.29E+03	2.46E+04	2.39E+02	8.77E+02	1.93E+02	3.61E+03	4.51E+02	2.42E+04	2.46E+04
Mg	24.3	mol	2.07E+04	7.16E+04	7.33E+03	7.33E+03	8.48E+03	8.31E+02	9.59E+03	8.22E+03	1.96E+04	7.16E+04
Mn	54.9	mol	3.72E+04	2.09E+05	5.17E+03	9.25E+03	1.28E+05	1.38E+04	3.24E+04	1.43E+04	9.14E+04	2.09E+05
Mo	95.9	mol	1.24E+02	9.56E+01	1.28E+02	2.11E+02	2.50E+02	4.01E+00	0.00E+00	1.35E+02	4.78E+02	4.78E+02
Na	22.9	mol	2.08E+06	2.32E+06	1.14E+06	1.16E+06	7.74E+06	1.07E+05	3.24E+06	1.44E+06	4.14E+06	1.07E+05
Nd	144.2	mol	5.14E+03	7.07E+03	4.15E+03	3.40E+03	7.42E+02	2.45E+02	4.74E+02	1.04E+02	4.39E+03	7.07E+03
NH3	17	mol	2.13E+04	9.59E+04	0.00E+00	0.00E+00	1.32E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E+04
Ni	58.7	mol	2.27E+04	3.59E+04	2.33E+04	2.49E+04	4.48E+04	1.81E+03	3.87E+03	1.07E+03	5.26E+04	5.26E+04
NO2	46.0	mol	2.93E+05	1.12E+03	2.39E+05	3.63E+05	7.96E+05	1.76E+03	5.02E+05	2.20E+05	7.67E+05	7.96E+05
NO3	62.0	mol	1.84E+04	4.69E+02	1.66E+05	1.11E+05	3.16E+05	1.90E+02	6.87E+05	2.81E+05	7.71E+05	7.71E+05
OH	17.0	mol	0.00E+00	0.00E+00	8.18E+04	1.19E+05	0.00E+00	0.00E+00	2.42E+05	7.47E+04	1.35E+07	1.35E+07

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 44

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	MW g/mol	Unit	Tank									
			AY-101	AY-102	AZ-101	AZ-102	C-104	C-106	SY-102	AW-104	C-107	Max Conc *
Oxalate	88.0	mol	2.18E+05	2.01E+04	1.67E+04	1.69E+04	6.38E+04	7.86E+02	3.82E+05	6.98E+03	8.36E+03	3.82E+05
Pb	207.2	mol	4.61E+03	1.70E+04	4.14E+02	1.31E+03	4.03E+03	7.58E+02	2.67E+03	3.94E+02	4.87E+04	4.87E+04
Pd	105.4	mol	0.00E+00	0.00E+00	3.52E-03	1.52E+02	0.00E+00	3.65E+00	0.00E+00	0.00E+00	0.00E+00	1.52E+02
PO4	94.9	mol	3.63E+04	9.52E+04	1.12E+03	6.64E+03	3.38E+04	3.95E+03	6.80E+04	1.86E+03	6.19E+05	6.19E+05
Pr	140.9	mol	0.00E+00	2.14E+03	9.08E+02	6.58E+02	4.97E+02	8.94E+01	0.00E+00	0.00E+00	1.48E+03	2.14E+03
Rb	85.5	mol	6.94E+00	0.00E+00	4.37E+01	1.63E+01	3.12E+03	1.06E+00	2.82E+02	0.00E+00	9.86E+00	3.12E+03
Rh	102.9	mol	6.66E+01	0.00E+00	4.57E+02	9.49E+01	1.40E+03	8.67E+00	0.00E+00	0.00E+00	4.24E+02	1.40E+03
Ru	101.1	mol	0.00E+00	4.31E+03	3.75E+03	4.32E+02	0.00E+00	1.81E+02	0.00E+00	0.00E+00	9.41E+03	9.41E+03
Sb	121.7	mol	9.69E+01	1.95E+01	1.77E+01	8.11E+01	4.69E+01	8.19E-01	1.49E+01	7.41E+01	1.98E+01	9.69E+01
Se	78.9	mol	2.48E+02	6.35E+00	9.06E+01	3.53E+01	4.96E+02	2.67E-01	7.47E+01	1.43E+02	6.34E+01	4.96E+02
Si	28.1	mol	1.53E+04	4.02E+03	1.59E+04	8.86E+04	3.63E+05	1.48E+03	3.35E+04	1.70E+04	6.65E+04	3.63E+05
SO4	96.1	mol	3.16E+04	1.57E+04	7.90E+04	7.34E+04	3.56E+04	6.31E+02	2.02E+04	7.66E+03	8.77E+04	8.77E+04
Sr	87.6	mol	7.63E+02	2.60E+03	1.05E+03	5.47E+02	9.99E+02	7.41E+01	4.38E+02	6.06E+01	2.93E+03	2.93E+03
Ta	180.9	mol	0.00E+00	0.00E+00	1.19E+01	3.61E+00	9.67E+00	4.86E-01	1.38E+01	0.00E+00	4.68E+00	1.38E+01
Te	127.6	mol	0.00E+00	7.43E+02	1.85E+02	1.21E+02	0.00E+00	3.12E+01	1.16E+01	0.00E+00	1.41E+03	1.41E+03
Th	232.0	mol	0.00E+00	1.95E+03	3.35E+02	3.85E+02	2.20E+05	8.15E+01	1.42E+03	6.48E+01	2.85E+03	2.20E+05
Ti	47.9	mol	7.35E+02	2.30E+03	2.01E+02	2.21E+02	2.05E+03	8.54E+01	2.51E+02	3.33E+02	2.59E+03	2.59E+03
TIC as CO3	60.0	mol	1.35E+06	9.08E+05	1.25E+05	3.17E+05	8.07E+05	5.42E+04	1.90E+05	2.19E+05	1.90E+05	1.35E+06
Tl	204.4	mol	2.74E+00	1.45E+01	1.05E+01	3.19E+00	4.77E+02	6.07E-01	2.25E+00	1.47E+02	2.66E+01	4.77E+02
U(total)	238.0	mol	1.96E+03	9.87E+03	6.85E+03	1.47E+04	1.48E+05	1.73E+02	2.84E+03	2.90E+04	3.90E+04	1.48E+05
V	50.9	mol	1.93E+02	5.85E+02	1.05E+02	1.63E+02	5.34E+02	2.69E+01	1.78E+02	1.48E+02	4.93E+02	5.85E+02
W	183.9	mol	0.00E+00	0.00E+00	0.00E+00	2.63E+01	5.22E+03	0.00E+00	0.00E+00	0.00E+00	3.67E+03	5.22E+03
Y	88.9	mol	0.00E+00	1.10E+03	0.00E+00	3.84E+02	3.17E+02	5.02E+01	1.27E+02	1.69E+01	1.07E+03	1.10E+03
Zn	65.4	mol	8.15E+02	2.32E+03	3.91E+02	3.75E+02	9.30E+03	6.67E+01	1.51E+02	4.28E+02	2.71E+03	9.30E+03
Zr	91.2	mol	7.60E+03	3.14E+02	8.61E+04	4.18E+04	7.12E+05	2.91E+01	8.23E+02	2.30E+04	8.10E+02	7.12E+05

* Except for Na which is the minimum concentration

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 45

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-3 HLW Radionuclide Feed Quantities in Curies

Analyte	Unit	Tank									
		AY-101	AY-102	AZ-101	AZ-102	C-104	C-106	SY-102	AW-104	C-107	MAX
106Ru	Ci	6.53E-02	7.54E-03	3.86E+02	6.21E+02	1.80E-04	5.77E-06	1.35E-05	1.65E-06	1.13E-02	6.21E+02
113mCd	Ci	1.75E+03	4.83E+00	1.93E+03	8.16E+02	1.93E+01	5.84E+00	1.60E+01	1.50E+00	1.19E+03	1.93E+03
125Sb	Ci	1.34E+01	1.55E+00	6.18E+03	4.93E+03	1.77E+02	4.01E-01	7.54E+00	8.23E-01	7.42E+00	6.18E+03
126Sn	Ci	2.80E+01	2.78E-01	2.31E+01	1.25E+01	1.72E+00	1.81E+00	5.31E-01	4.63E-02	6.37E+01	6.37E+01
129I	Ci	9.40E-02	8.43E-03	1.17E-01	1.40E+00	7.53E-01	8.28E-03	9.30E-02	2.89E-02	4.83E-02	1.40E+00
134Cs	Ci	8.07E-02	2.14E+02	2.81E+02	4.47E+02	4.49E-02	1.00E-02	1.03E-01	2.07E-02	4.90E-01	4.47E+02
137Cs	Ci	5.30E+04	1.61E+05	2.98E+05	4.92E+05	9.55E+04	1.14E+04	6.54E+04	1.33E+04	6.35E+04	4.92E+05
137mBa	Ci	5.02E+04	1.53E+05	2.82E+05	4.66E+05	9.03E+04	1.08E+04	6.19E+04	1.25E+04	6.01E+04	4.66E+05
14C	Ci	8.70E-01	1.74E-01	4.72E-01	4.80E-01	1.86E+00	8.28E-03	5.58E-01	1.27E+00	3.80E+00	3.80E+00
151Sm	Ci	4.29E+05	1.51E+03	1.60E+05	6.69E+04	9.39E+03	1.01E+04	2.94E+03	2.55E+02	6.36E+05	6.36E+05
152Eu	Ci	0.00E+00	6.13E+01	1.31E+02	5.23E+01	2.43E+00	2.85E+00	7.49E-01	7.70E-02	1.17E+02	1.31E+02
154Eu	Ci	4.69E+03	6.77E+03	1.35E+04	7.29E+03	1.10E+03	2.64E+02	1.91E+02	8.75E+00	1.60E+03	1.35E+04
155Eu	Ci	2.28E+03	5.53E+03	1.74E+04	1.30E+04	8.05E+02	1.82E+02	1.05E+02	2.41E+00	1.04E+03	1.74E+04
226Ra	Ci	1.02E-02	3.66E-03	2.32E-04	8.50E-05	6.27E-03	3.93E-04	3.92E-05	3.07E-06	2.16E-02	2.16E-02
227Ac	Ci	5.69E-02	1.29E-02	2.61E-03	7.40E-04	1.09E+02	2.21E-03	4.09E-04	3.14E-05	1.41E-01	1.09E+02
228Ra	Ci	4.11E-02	3.42E-02	3.11E-03	5.30E-03	2.25E+01	2.46E-05	3.02E-02	3.70E-03	4.85E-02	2.25E+01
229Th	Ci	6.53E-04	6.93E-06	1.94E-06	6.83E-07	9.41E-01	2.10E-05	6.77E-04	1.57E-04	2.43E-03	9.41E-01
231Pa	Ci	7.44E-02	3.90E-04	7.77E-03	1.77E-03	2.40E+02	2.82E-03	1.08E-03	8.46E-05	1.92E-01	2.40E+02
232Th	Ci	3.82E-02	6.02E-02	8.12E-03	9.83E-03	4.99E+00	2.53E-03	3.23E-02	8.24E-04	7.28E-02	4.99E+00
232U	Ci	9.37E-02	2.55E-04	2.77E-02	1.07E-02	1.93E+01	1.65E-04	1.04E-01	2.60E-03	5.45E-03	1.93E+01
233U	Ci	3.85E-01	3.72E-06	1.13E-01	4.17E-02	4.13E+02	6.81E-04	4.27E-01	7.83E-03	2.26E-02	4.13E+02
234U	Ci	1.71E-01	1.04E+00	7.86E-01	2.89E+00	2.08E+01	1.34E-02	2.38E-01	3.35E+00	5.63E-01	2.08E+01
235U	Ci	6.94E-03	4.01E-02	2.99E-02	6.88E-02	6.03E-01	5.73E-04	9.99E-03	1.27E-01	1.37E-01	6.03E-01
236U	Ci	5.87E-03	7.55E-02	6.37E-02	1.41E-01	6.48E-01	2.39E-04	5.78E-03	2.76E-01	8.92E-02	6.48E-01
237Np	Ci	1.59E-01	3.95E+00	1.34E+01	1.31E+01	4.40E+00	1.66E-01	7.44E-01	5.29E-02	8.07E-02	1.34E+01
238Pu	Ci	1.91E+02	5.26E+02	1.33E+02	1.79E+02	2.28E+02	3.48E+00	5.55E+02	5.14E+01	6.81E+01	5.55E+02
238U	Ci	1.56E-01	8.00E-01	5.44E-01	1.16E+00	1.17E+01	1.37E-02	2.26E-01	2.30E+00	3.10E+00	1.17E+01
239Pu	Ci	4.89E+02	1.64E+03	1.15E+03	1.54E+03	5.47E+03	7.52E+01	3.82E+03	4.40E+02	2.16E+03	5.47E+03
240Pu	Ci	1.48E+02	3.55E+02	3.46E+02	4.58E+02	1.08E+03	1.54E+01	8.61E+02	1.34E+02	3.93E+02	1.08E+03

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 46

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Unit	Tank									
		AY-101	AY-102	AZ-101	AZ-102	C-104	C-106	SY-102	AW-104	C-107	MAX
241Am	Ci	8.79E+03	7.62E+03	2.55E+04	1.88E+04	6.35E+03	2.25E+02	2.35E+04	5.28E+01	6.75E+03	2.55E+04
241Pu	Ci	2.69E+03	4.42E+03	1.02E+04	1.32E+04	1.48E+04	1.84E+02	3.27E+03	3.96E+03	3.73E+03	1.48E+04
242Cm	Ci	1.17E+01	1.40E+01	2.30E+01	6.52E+00	5.38E+00	3.42E-01	5.15E-02	9.84E-04	5.37E+00	2.30E+01
242Pu	Ci	2.67E-02	4.27E-02	5.35E-02	6.57E-02	9.48E-02	1.64E-03	2.05E-01	2.07E-02	2.74E-02	2.05E-01
243Am	Ci	8.83E-01	5.60E-01	5.40E+00	5.61E+00	3.12E-01	2.02E-03	3.96E-01	3.75E-05	3.47E-01	5.61E+00
243Cm	Ci	1.19E+00	1.27E+00	3.36E+00	8.39E-01	4.31E-01	2.74E-02	4.61E-01	1.35E-04	4.21E-01	3.36E+00
244Cm	Ci	4.08E+01	3.03E+01	7.53E+01	4.08E+01	1.50E+01	5.82E-01	1.10E+01	5.89E-04	1.56E+01	7.53E+01
3H	Ci	2.38E+00	7.31E+00	4.05E+00	1.22E+01	5.61E+01	1.45E-01	6.85E-01	7.81E+00	2.99E+01	5.61E+01
59Ni	Ci	1.58E+02	1.10E+02	2.68E+01	1.07E+01	4.58E+00	6.13E+00	2.58E-01	1.66E-02	3.22E+02	3.22E+02
60Co	Ci	4.36E+02	5.81E-01	1.09E+03	7.80E+02	2.72E+02	2.46E-01	8.13E+00	4.03E-01	2.47E+02	1.09E+03
63Ni	Ci	1.48E+04	1.04E+04	2.95E+03	1.19E+03	4.29E+02	5.71E+02	2.40E+01	1.56E+00	3.01E+04	3.01E+04
79Se	Ci	1.37E+01	4.39E-02	4.67E-01	3.51E-01	6.40E+00	2.77E-01	8.79E-02	7.66E-03	1.79E+01	1.79E+01
90Sr	Ci	1.38E+06	5.27E+06	4.94E+06	2.98E+06	4.84E+05	2.82E+05	6.73E+04	1.09E+03	2.24E+06	5.27E+06
90Y	Ci	1.38E+06	5.27E+06	4.94E+06	2.98E+06	4.84E+05	2.82E+05	6.73E+04	1.09E+03	2.24E+06	5.27E+06
93mNb	Ci	4.99E+02	1.70E+00	1.33E+02	5.25E+01	9.90E+00	1.08E+01	3.50E+00	3.04E-01	6.98E+02	6.98E+02
93Zr	Ci	6.09E+02	1.98E+00	2.35E+02	9.69E+01	1.16E+01	1.16E+01	4.31E+00	3.78E-01	7.75E+02	7.75E+02
99Tc	Ci	4.85E+01	1.39E+01	6.41E+01	8.99E+01	5.79E+01	1.03E+00	1.27E+02	1.49E+01	3.79E+01	1.27E+02

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 47

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-4 HLW Waste Oxide Mass Calculation

Analyte	Max Conc mol	MW g/mol	Mass g	Charge	# oxygens/mol oxide	Mass of O grams	Contract Max g/100 g w. ox	Feed Quantity g
Ag	9.82E+03	107.87	1.06E+06	1	0.5	7.86E+04	0.55	3.50E+06
Al	3.34E+06	27	9.01E+07	3	1.5	8.01E+07	14	8.90E+07
As	6.50E+02	74.92	4.87E+04	5	2.5	2.60E+04	0.16	1.02E+06
B	1.66E+05	10.81	1.79E+06	3	1.5	3.98E+06	1.3	8.26E+06
Ba	5.31E+03	137.3	7.29E+05	2	1	8.50E+04	4.5	2.86E+07
Be	4.23E+03	9	3.81E+04	2	1	6.77E+04	0.065	4.13E+05
Bi	4.98E+04	209	1.04E+07	3	1.5	1.19E+06	2.8	1.78E+07
Ca	1.14E+05	40.1	4.59E+06	2	1	1.83E+06	7.1	4.51E+07
Cd	2.41E+04	112.4	2.71E+06	2	1	3.86E+05	4.5	2.86E+07
Ce	5.56E+03	140.1	7.79E+05	3	1.5	1.33E+05	0.81	5.15E+06
Cl	4.51E+04	35.5	0.00E+00	-1	0	0.00E+00	0.33	2.10E+06
CN	8.04E+02	26	0.00E+00	-1	0	0.00E+00	1.6	1.02E+07
Co	4.50E+02	58.9	2.65E+04	3	1.5	1.08E+04	0.45	2.86E+06
Cr	2.58E+05	52	1.34E+07	3	1.5	6.18E+06	0.68	4.32E+06
Cu	3.59E+03	63.5	2.28E+05	2	1	5.74E+04	0.48	3.05E+06
F	1.82E+06	19	0.00E+00	-1	0	0.00E+00	3.5	2.23E+07
Fe	1.85E+06	55.8	1.03E+08	3	1.5	4.43E+07	29	1.84E+08
Hg	4.13E+04	200.6	8.29E+06	2	1	6.61E+05	0.1	6.36E+05
K	4.47E+04	39.1	1.75E+06	1	0.5	3.58E+05	1.3	8.26E+06
La	8.86E+03	138.9	1.23E+06	3	1.5	2.13E+05	2.6	1.65E+07
Li	2.46E+04	6.9	1.70E+05	1	0.5	1.97E+05	0.14	8.90E+05
Mg	7.16E+04	24.3	1.74E+06	2	1	1.15E+06	2.1	1.34E+07
Mn	2.09E+05	54.9	1.15E+07	4	2	6.70E+06	6.5	4.13E+07
Mo	4.78E+02	95.9	4.58E+04	6	3	2.29E+04	0.65	4.13E+06
Na	1.07E+05	23	2.45E+06	1	0.5	8.52E+05	19	1.21E+08
Nd	7.07E+03	144.2	1.02E+06	3	1.5	1.70E+05	1.7	1.08E+07
NH3	9.59E+04	17	0.00E+00	0	0	0.00E+00	1.6	1.02E+07
Ni	5.26E+04	58.7	3.09E+06	2	1	8.42E+05	2.4	1.53E+07
NO2	7.96E+05	46	0.00E+00	-1	0	0.00E+00	(no2/no3)	0.00E+00
NO3	7.71E+05	62	0.00E+00	-1	0	0.00E+00	36	2.29E+08
OH	1.35E+07	17	0.00E+00	-1	0	0.00E+00	N/A*	0.00E+00

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 48

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Max Conc mol	MW g/mol	Mass g	Charge	# oxygens/mol oxide	Mass of O grams	Contract Max g/100 g w. ox	Feed Quantity g
Oxalate	3.82E+05	88	0.00E+00	-2	0	0.00E+00	11	6.99E+07
Pb	4.87E+04	207.2	1.01E+07	2	1	7.80E+05	1.1	6.99E+06
Pd	1.52E+02	106.4	1.62E+04	2	1	2.44E+03	0.13	8.26E+05
PO4	6.19E+05	95	0.00E+00	-3	0	0.00E+00	N/A*	0.00E+00
Pr	2.14E+03	140.9	3.01E+05	4	2	6.84E+04	0.35	2.23E+06
Rb	3.12E+03	85.5	2.67E+05	1	0.5	2.50E+04	0.19	1.21E+06
Rh	1.40E+03	102.9	1.44E+05	3	1.5	3.36E+04	0.13	8.26E+05
Ru	9.41E+03	101.1	9.51E+05	4	2	3.01E+05	0.35	2.23E+06
Sb	9.69E+01	121.8	1.18E+04	3	1.5	2.33E+03	0.84	5.34E+06
Se	4.96E+02	79	3.92E+04	4	2	1.59E+04	0.52	3.31E+06
Si	3.63E+05	28.1	1.02E+07	4	2	1.16E+07	19	1.21E+08
SO4	8.77E+04	96.1	0.00E+00	-2	0	0.00E+00	N/A*	0.00E+00
Sr	2.93E+03	87.6	2.57E+05	2	1	4.69E+04	0.52	3.31E+06
Ta	1.38E+01	180.9	2.49E+03	5	2.5	5.51E+02	0.03	1.91E+05
Te	1.41E+03	127.6	1.80E+05	4	2	4.51E+04	0.13	8.26E+05
Th	2.20E+05	232	5.10E+07	4	2	7.03E+06	5	3.18E+07
Ti	2.59E+03	47.9	1.24E+05	4	2	8.28E+04	1.3	8.26E+06
TIC as CO3	1.35E+06	60	0.00E+00	-2	0	0.00E+00	30	1.91E+08
Tl	4.77E+02	204.4	9.74E+04	5	2.5	1.91E+04	0.45	2.86E+06
U(total)	1.48E+05	238	3.53E+07	6	3	7.12E+06	14	8.90E+07
V	5.85E+02	50.9	2.98E+04	3	1.5	1.41E+04	0.032	2.03E+05
W	5.22E+03	183.9	9.60E+05	6	3	2.51E+05	0.24	1.53E+06
Y	1.10E+03	88.9	9.81E+04	3	1.5	2.65E+04	0.16	1.02E+06
Zn	9.30E+03	65.4	6.08E+05	2	1	1.49E+05	0.42	2.67E+06
Zr	7.12E+05	91.2	6.49E+07	4	2	2.28E+07	15	9.54E+07

* N/A = not available

	4.36E+08 g mass		2.0E+08 g O
	4.36E+05 kg		2.0E+05 kg O
Total Mass	6.46E+05 kg	=	6.36E+08 g

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 49

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-5 Chemical Analytes Feed Quantity Comparison

Analyte	Actual (g)	SOW max (g)	Selected (g)	Source
Ag	1.06E+06	3.50E+06	3.50E+06	SOWM
Al	9.01E+07	8.90E+07	8.90E+07	SOWM
As	4.87E+04	1.02E+06	1.02E+06	SOWM
B	1.79E+06	8.26E+06	8.26E+06	SOWM
Ba	7.29E+05	2.86E+07	2.86E+07	SOWM
Be	3.81E+04	4.13E+05	4.13E+05	SOWM
Bi	1.04E+07	1.78E+07	1.78E+07	SOWM
Ca	4.59E+06	4.51E+07	4.51E+07	SOWM
Cd	2.71E+06	2.86E+07	2.86E+07	SOWM
Ce	7.79E+05	5.15E+06	5.15E+06	SOWM
Cl	1.60E+06	2.10E+06	2.10E+06	SOWM
CN	2.09E+04	1.02E+07	1.02E+07	SOWM
Co	2.65E+04	2.86E+06	2.86E+06	SOWM
Cr	1.34E+07	4.32E+06	4.32E+06	SOWM
Cu	2.28E+05	3.05E+06	3.05E+06	SOWM
F	3.46E+07	2.23E+07	2.23E+07	SOWM
Fe	1.03E+08	1.84E+08	1.84E+08	SOWM
Hg	8.29E+06	6.36E+05	6.36E+05	SOWM
K	1.75E+06	8.26E+06	8.26E+06	SOWM
La	1.23E+06	1.65E+07	1.65E+07	SOWM
Li	1.70E+05	8.90E+05	8.90E+05	SOWM
Mg	1.74E+06	1.34E+07	1.34E+07	SOWM
Mn	1.15E+07	4.13E+07	4.13E+07	SOWM
Mo	4.58E+04	4.13E+06	4.13E+06	SOWM
Na	2.45E+06	1.21E+08	1.21E+08	SOWM
Nd	1.02E+06	1.08E+07	1.08E+07	SOWM
NH3	1.63E+06	1.02E+07	1.02E+07	SOWM
Ni	3.09E+06	1.53E+07	1.53E+07	SOWM
NO2	3.66E+07		3.66E+07	Actual
NO3	4.78E+07	2.29E+08	2.29E+08	SOWM
OH	2.29E+08		2.29E+08	Actual
Oxalate	3.36E+07	6.99E+07	6.99E+07	SOWM
Pb	1.01E+07	6.99E+06	6.99E+06	SOWM
Pd	1.62E+04	8.26E+05	8.26E+05	SOWM
PO4	5.88E+07		5.88E+07	Actual
Pr	3.01E+05	2.23E+06	2.23E+06	SOWM
Rb	2.67E+05	1.21E+06	1.21E+06	SOWM
Rh	1.44E+05	8.26E+05	8.26E+05	SOWM
Ru	9.51E+05	2.23E+06	2.23E+06	SOWM
Sb	1.18E+04	5.34E+06	5.34E+06	SOWM
Se	3.92E+04	3.31E+06	3.31E+06	SOWM
Si	1.02E+07	1.21E+08	1.21E+08	SOWM
SO4	8.43E+06		8.43E+06	Actual
Sr	2.57E+05	3.31E+06	3.31E+06	SOWM
Ta	2.49E+03	1.91E+05	1.91E+05	SOWM
Te	1.80E+05	8.26E+05	8.26E+05	SOWM
Th	5.10E+07	3.18E+07	3.18E+07	SOWM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 50

BY: E. Berríos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	Actual (g)	SOW max (g)	Selected (g)	Source
Ti	1.24E+05	8.26E+06	8.26E+06	SOWM
TIC as CO3	8.09E+07	1.91E+08	1.91E+08	SOWM
Tl	9.74E+04	2.86E+06	2.86E+06	SOWM
U(total)	3.53E+07	8.90E+07	8.90E+07	SOWM
V	2.98E+04	2.03E+05	2.03E+05	SOWM
W	9.60E+05	1.53E+06	1.53E+06	SOWM
Y	9.81E+04	1.02E+06	1.02E+06	SOWM
Zn	6.08E+05	2.67E+06	2.67E+06	SOWM
Zr	6.49E+07	9.54E+07	9.54E+07	SOWM

SOWM = statement of work maximum

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 51

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-6 Radionuclides Feed Quantity Comparison

Analyte	Ci	SOW Max Ci/100 g w. ox	Feed Quantity Ci	Actual Feed Ci	Selected Ci	Source
106Ru	6.21E+02			6.21E+02	6.21E+02	Actual
113mCd	1.93E+03			1.93E+03	1.93E+03	Actual
125Sb	6.18E+03	3.20E-02	2.03E+05	6.18E+03	2.03E+05	SOWM
126Sn	6.37E+01	1.50E-04	9.54E+02	6.37E+01	9.54E+02	SOWM
129I	1.40E+00	2.90E-07	1.84E+00	1.40E+00	1.84E+00	SOWM
134Cs	4.47E+02			4.47E+02	4.47E+02	Actual
137Cs	4.92E+05	1.5	9.54E+06	4.92E+05	9.54E+06	SOWM
137mBa	4.66E+05			4.66E+05	4.66E+05	Actual
14C	3.80E+00	6.50E-06	4.13E+01	3.80E+00	4.13E+01	SOWM
151Sm	6.36E+05			6.36E+05	6.36E+05	Actual
152Eu	1.31E+02	4.80E-04	3.05E+03	1.31E+02	3.05E+03	SOWM
154Eu	1.35E+04	5.20E-02	3.31E+05	1.35E+04	3.31E+05	SOWM
155Eu	1.74E+04	2.90E-02	1.84E+05	1.74E+04	1.84E+05	SOWM
226Ra	2.16E-02			2.16E-02	2.16E-02	Actual
227Ac	1.09E+02			1.09E+02	1.09E+02	Actual
228Ra	2.25E+01			2.25E+01	2.25E+01	Actual
229Th	9.41E-01			9.41E-01	9.41E-01	Actual
231Pa	2.40E+02			2.40E+02	2.40E+02	Actual
232Th	4.99E+00			4.99E+00	4.99E+00	Actual
232U	1.93E+01			1.93E+01	1.93E+01	Actual
233U	4.13E+02	9.00E-07	5.72E+00	4.13E+02	5.72E+00	SOWM
234U	2.08E+01			2.08E+01	2.08E+01	Actual
235U	6.03E-01	2.50E-07	1.59E+00	6.03E-01	1.59E+00	SOWM
236U	6.48E-01			6.48E-01	6.48E-01	Actual
237Np	1.34E+01	7.40E-05	4.70E+02	1.34E+01	4.70E+02	SOWM
238Pu	5.55E+02	3.50E-04	2.23E+03	5.55E+02	2.23E+03	SOWM
238U	1.17E+01			1.17E+01	1.17E+01	Actual
239Pu	5.47E+03	3.10E-03	1.97E+04	5.47E+03	1.97E+04	SOWM
240Pu	1.08E+03			1.08E+03	1.08E+03	Actual
241Am	2.55E+04	9.00E-02	5.72E+05	2.55E+04	5.72E+05	SOWM
241Pu	1.48E+04	2.20E-02	1.40E+05	1.48E+04	1.40E+05	SOWM
242Cm	2.30E+01			2.30E+01	2.30E+01	Actual
242Pu	2.05E-01			2.05E-01	2.05E-01	Actual
243Am	5.61E+00			5.61E+00	5.61E+00	Actual
243Cm*	3.36E+00	3.00E-03	1.91E+04	3.36E+00	1.91E+04	SOWM
244Cm*	7.53E+01	3.00E-03	1.91E+04	7.53E+01	1.91E+04	SOWM
3H	5.61E+01	6.50E-05	4.13E+02	5.61E+01	4.13E+02	SOWM
59Ni	3.22E+02			3.22E+02	3.22E+02	Actual
60Co	1.09E+03	1.00E-02	6.36E+04	1.09E+03	6.36E+04	SOWM
63Ni	3.01E+04			3.01E+04	3.01E+04	Actual
79Se	1.79E+01			1.79E+01	1.79E+01	Actual
90Sr	5.27E+06	1.00E+01	6.36E+07	5.27E+06	6.36E+07	SOWM
90Y	5.27E+06			5.27E+06	5.27E+06	Actual
93mNb	6.98E+02			6.98E+02	6.98E+02	Actual
93Zr	7.75E+02			7.75E+02	7.75E+02	Actual
99Tc	1.27E+02	1.50E-02	9.54E+04	1.27E+02	9.54E+04	SOWM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 52

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-7 HLW Chemical Analytes Charge Balance

Analyte	mol	Charge	Total charge
Ag	3.24E+04	1	3.24E+04
Al	3.30E+06	3	9.89E+06
As	1.36E+04	5	6.79E+04
B	7.65E+05	3	2.29E+06
Ba	2.08E+05	2	4.17E+05
Be	4.59E+04	0	0.00E+00
Bi	8.52E+04	3	2.56E+05
Ca	1.13E+06	2	2.25E+06
Cd	2.55E+05	2	5.09E+05
Ce	3.68E+04	3	1.10E+05
Cl	5.91E+04	-1	-5.91E+04
CN	3.91E+05	0	0.00E+00
Co	4.86E+04	0	0.00E+00
Cr	8.31E+04	3	2.49E+05
Cu	4.81E+04	2	9.61E+04
F	1.17E+06	-1	-1.17E+06
Fe	3.30E+06	3	9.91E+06
Hg	3.17E+03	2	6.34E+03
K	2.11E+05	1	2.11E+05
La	1.19E+05	3	3.57E+05
Li	1.29E+05	1	1.29E+05
Mg	5.49E+05	2	1.10E+06
Mn	7.53E+05	4	3.01E+06
Mo	4.31E+04	0	0.00E+00
Na	5.25E+06	1	5.25E+06
Nd	7.50E+04	0	0.00E+00
NH3	5.98E+05	0	0.00E+00
Ni	2.60E+05	2	5.20E+05
NO2	7.96E+05	-1	-7.96E+05
NO3	3.69E+06	-1	-3.69E+06
OH	1.35E+07	-1	-1.35E+07
Oxalate	7.95E+05	-2	-1.59E+06
Pb	3.38E+04	2	6.75E+04
Pd	7.77E+03	2	1.55E+04
PO4	6.19E+05	-3	-1.86E+06
Pr	1.58E+04	0	0.00E+00
Rb	1.41E+04	0	0.00E+00
Rh	8.03E+03	0	0.00E+00
Ru	2.20E+04	0	0.00E+00
Sb	4.38E+04	0	0.00E+00
Se	4.18E+04	0	0.00E+00
Si	4.30E+06	4	1.72E+07
SO4	8.77E+04	-2	-1.75E+05
Sr	3.77E+04	2	7.55E+04
Ta	1.05E+03	0	0.00E+00
Te	6.48E+03	0	0.00E+00
Th	1.37E+05	0	0.00E+00
Ti	1.73E+05	4	6.90E+05

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 53

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Analyte	mol	Charge	Total charge
TIC as CO3	3.18E+06	-2	-6.36E+06
Tl	1.40E+04	0	0.00E+00
U(total)	3.74E+05	0	0.00E+00
V	4.00E+03	0	0.00E+00
W	8.30E+03	0	0.00E+00
Y	1.14E+04	0	0.00E+00
Zn	4.08E+04	2	8.17E+04
Zr	1.05E+06	4	4.18E+06
Total charge			29810608

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 54

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-8 HLW Radionuclides Charge Balance

Analyte	Ci	Charge	Ci/kmol	mol	Total Charge
106Ru	6.21E+02				
113mCd	1.93E+03				
125Sb	2.03E+05	3	1.30E+08	1.56E+00	4.69E+00
126Sn	9.54E-02	2	1.43E+03	6.67E+02	1.33E+03
129I	1.84E+00	-1	2.28E+01	8.09E+01	-8.09E+01
134Cs	4.47E-02				
137Cs	9.54E+06	1	1.19E+07	8.01E+02	8.01E+02
137mBa	4.66E+05				
14C	4.13E+01	4	6.26E+04	6.60E-01	2.64E+00
151Sm	6.36E+05	3	3.97E+06	1.60E+02	4.81E+02
152Eu	3.05E+03	3	2.64E+07	1.16E-01	3.47E-01
154Eu	3.31E+05	3	4.16E+07	7.95E+00	2.38E+01
155Eu	1.84E+05	3	7.53E+07	2.45E+00	7.35E+00
226Ra	2.16E-02				
227Ac	1.09E+02				
228Ra	2.25E+01				
229Th	9.41E-01				
231Pa	2.40E+02				
232Th	4.99E+00	4	2.55E-02	1.96E+05	7.83E+05
232U	1.93E+01				
233U	5.72E+00	6	2.25E+03	2.54E+00	1.53E+01
234U	2.08E+01	6	1.45E+03	1.43E+01	8.61E+01
235U	1.59E+00	6	5.08E-01	3.13E+03	1.88E+04
236U	6.48E-01	6	1.52E+01	4.26E+01	2.56E+02
237Np	4.70E+02	4	1.67E+02	2.82E+03	1.13E+04
238Pu	2.23E+03	4	4.08E+06	5.45E-01	2.18E+00
238U	1.17E+01	6	8.00E-02	1.46E+05	8.78E+05
239Pu	1.97E+04	4	1.48E+04	1.33E+03	5.33E+03
240Pu	1.08E+03	4	5.45E+04	1.98E+01	7.93E+01
241Am	5.72E+05	3	8.26E+05	6.93E+02	2.08E+03
241Pu	1.40E+05	4	2.48E+07	5.64E+00	2.26E+01
242Cm	2.30E+01				
242Pu	2.05E-01				
243Am	5.61E+00				
243Cm	1.91E+04	3	1.23E+07	1.55E+00	4.65E+00
244Cm	1.91E+04	3	2.62E+07	7.28E-01	2.18E+00
3H	4.13E+02	1	2.90E+07	1.42E-02	1.42E-02
59Ni	3.22E+02				
60Co	6.36E+04	3	6.78E+07	9.38E-01	2.81E+00
63Ni	3.01E+04	2	3.57E+06	8.43E+00	1.69E+01
79Se	1.79E+01				
90Sr	6.36E+07	2	1.24E+07	5.13E+03	1.03E+04
90Y	5.27E+06				
93mNb	6.98E+02				
93Zr	7.75E+02				
99Tc	9.54E+04	7	1.68E+03	5.68E+04	3.97E+05
Total overall charge for radionuclides					2108359

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 55

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-9 HLW Chemical Analytes Emissions Feed

Analyte	mol	mol/mol Na	Analyte	mol	mol/mol Na
Ag	3.24E+04	6.17E-03	NO2	7.96E+05	1.51E-01
Al	3.30E+06	6.28E-01	NO3	3.69E+06	7.03E-01
As	1.36E+04	2.59E-03	OH	4.54E+07	8.64E+00
B	7.65E+05	1.46E-01	Oxalate	7.95E+05	1.51E-01
Ba	2.08E+05	3.97E-02	Pb	3.38E+04	6.43E-03
Be	4.59E+04	8.74E-03	Pd	7.77E+03	1.48E-03
Bi	8.52E+04	1.62E-02	PO4	6.19E+05	1.18E-01
Ca	1.13E+06	2.14E-01	Pr	1.58E+04	3.01E-03
Cd	2.55E+05	4.85E-02	Rb	1.41E+04	2.69E-03
Ce	3.68E+04	7.00E-03	Rh	8.03E+03	1.53E-03
Cl	5.91E+04	1.13E-02	Ru	2.20E+04	4.19E-03
CN	3.91E+05	7.45E-02	Sb	4.38E+04	8.35E-03
Co	4.86E+04	9.25E-03	Se	4.18E+04	7.97E-03
Cr	8.31E+04	1.58E-02	Si	4.30E+06	8.19E-01
Cu	4.81E+04	9.15E-03	SO4	8.77E+04	1.67E-02
F	1.17E+06	2.23E-01	Sr	3.77E+04	7.19E-03
Fe	3.30E+06	6.29E-01	Ta	1.05E+03	2.01E-04
Hg	3.17E+03	6.03E-04	Te	6.48E+03	1.23E-03
K	2.11E+05	4.02E-02	Th	1.37E+05	2.61E-02
La	1.19E+05	2.27E-02	Ti	1.73E+05	3.29E-02
Li	1.29E+05	2.46E-02	TIC as CO3	3.18E+06	6.05E-01
Mg	5.49E+05	1.05E-01	Tl	1.40E+04	2.67E-03
Mn	7.53E+05	1.43E-01	U(total)	3.74E+05	7.12E-02
Mo	4.31E+04	8.20E-03	V	4.00E+03	7.61E-04
Na	5.25E+06	1.00E+00	W	8.30E+03	1.58E-03
Nd	7.50E+04	1.43E-02	Y	1.14E+04	2.18E-03
NH3	5.98E+05	1.14E-01	Zn	4.08E+04	7.77E-03
Ni	2.60E+05	4.95E-02	Zr	1.05E+06	1.99E-01

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 56

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Table B-10 HLW Radionuclide Emissions Feed

Analyte	Ci	Bq/mol Na	Analyte	Ci	Bq/mol Na
106Ru	6.21E+02	4.37E+06	236U	6.48E-01	4.57E+03
113mCd	1.93E+03	1.36E+07	237Np	4.70E+02	3.31E+06
125Sb	2.03E+05	1.43E+09	238Pu	2.23E+03	1.57E+07
126Sn	9.54E+02	6.72E+06	238U	1.17E+01	8.24E+04
129I	1.84E+00	1.30E+04	239Pu	1.97E+04	1.39E+08
134Cs	4.47E+02	3.15E+06	240Pu	1.08E+03	7.61E+06
137Cs	9.54E+06	6.72E+10	241Am	5.72E+05	4.03E+09
137mBa	4.66E+05	3.28E+09	241Pu	1.40E+05	9.85E+08
14C	4.13E+01	2.91E+05	242Cm	2.30E+01	1.62E+05
151Sm	6.36E+05	4.48E+09	242Pu	2.05E-01	1.44E+03
152Eu	3.05E+03	2.15E+07	243Am	5.61E+00	3.95E+04
154Eu	3.31E+05	2.33E+09	243Cm	1.91E+04	1.34E+08
155Eu	1.84E+05	1.30E+09	244Cm	1.91E+04	1.34E+08
226Ra	2.16E-02	1.52E+02	3H	4.13E+02	2.91E+06
227Ac	1.09E+02	7.68E+05	59Ni	3.22E+02	2.27E+06
228Ra	2.25E+01	1.59E+05	60Co	6.36E+04	4.48E+08
229Th	9.41E-01	6.63E+03	63Ni	3.01E+04	2.12E+08
231Pa	2.40E+02	1.69E+06	79Se	1.79E+01	1.26E+05
232Th	4.99E+00	3.52E+04	90Sr	6.36E+07	4.48E+11
232U	1.93E+01	1.36E+05	90Y	5.27E+06	3.71E+10
233U	5.72E+00	4.03E+04	93mNb	6.98E+02	4.92E+06
234U	2.08E+01	1.47E+05	93Zr	7.75E+02	5.46E+06
235U	1.59E+00	1.12E+04	99Tc	9.54E+04	6.72E+08

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 57

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Undated Emissions Run Feed Vector

Appendix C LAW BBI Data

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 58

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-102	106Ru	Supernatant	1.73E-04	Ci	TE	1.6	g/mL	3571	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-102	113mCd	Supernatant	1.57E+02	Ci	TE	1.6	g/mL	3571	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-102	125Sb	Supernatant	8.65E+01	Ci	TE	1.6	g/mL	3571	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-102	126Sn	Supernatant	4.87E+00	Ci	TE	1.6	g/mL	3571	kL	9.02E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	129I	Supernatant	4.60E-01	Ci	S	1.43	g/mL	3571	kL	9.09E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-102	134Cs	Supernatant	2.17E+00	Ci	TE	1.6	g/mL	3571	kL	4.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	137Cs	Supernatant	1.46E+06	Ci	S	1.46	g/mL	3571	kL	2.83E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-102	137mBa	Supernatant	1.38E+06	Ci	C		g/mL	3571	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-102	14C	Supernatant	2.49E+00	Ci	S	1.43	g/mL	3571	kL	4.92E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	151Sm	Supernatant	2.68E+04	Ci	TE	1.6	g/mL	3571	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-102	152Eu	Supernatant	8.09E+00	Ci	TE	1.6	g/mL	3571	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-102	154Eu	Supernatant	7.97E+02	Ci	S	1.43	g/mL	3571	kL	1.58E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-102	155Eu	Supernatant	4.08E+02	Ci	S	1.43	g/mL	3571	kL	8.08E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-102	226Ra	Supernatant	3.23E-04	Ci	TE	1.6	g/mL	3571	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-102	227Ac	Supernatant	3.30E-03	Ci	TE	1.6	g/mL	3571	kL	6.12E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-102	228Ra	Supernatant	3.45E-01	Ci	TE	1.6	g/mL	3571	kL	6.40E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-102	229Th	Supernatant	1.65E-02	Ci	TE	1.6	g/mL	3571	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-102	231Pa	Supernatant	8.90E-03	Ci	TE	1.6	g/mL	3571	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-102	232Th	Supernatant	7.88E-04	Ci	S	1.43	g/mL	3571	kL	1.56E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-102	232U	Supernatant	3.29E-02	Ci	C	1.46	g/mL	3571	kL	6.39E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-102	233U	Supernatant	1.35E-01	Ci	C	1.46	g/mL	3571	kL	2.62E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-102	234U	Supernatant	2.78E-02	Ci	C	1.46	g/mL	3571	kL	5.40E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-102	235U	Supernatant	1.11E-03	Ci	C	1.46	g/mL	3571	kL	2.15E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-102	236U	Supernatant	9.90E-04	Ci	C	1.46	g/mL	3571	kL	1.92E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-102	237Np	Supernatant	5.56E+00	Ci	TE	1.6	g/mL	3571	kL	1.03E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-102	238Pu	Supernatant	5.43E-01	Ci	C	1.41	g/mL	3571	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	238U	Supernatant	2.46E-02	Ci	C	1.46	g/mL	3571	kL	4.77E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-102	239Pu	Supernatant	1.77E+01	Ci	C	1.41	g/mL	3571	kL	3.51E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-102	240Pu	Supernatant	3.12E+00	Ci	C	1.41	g/mL	3571	kL	6.18E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	241Am	Supernatant	5.68E+02	Ci	S	1.43	g/mL	3571	kL	1.12E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-102	241Pu	Supernatant	2.94E+01	Ci	C	1.41	g/mL	3571	kL	5.81E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-102	242Cm	Supernatant	1.52E+00	Ci	C	1.43	g/mL	3571	kL	3.01E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	242Pu	Supernatant	2.20E-04	Ci	C	1.41	g/mL	3571	kL	4.35E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-102	243Am	Supernatant	2.23E-02	Ci	C	1.43	g/mL	3571	kL	4.40E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-102	243Cm	Supernatant	1.27E-01	Ci	C	1.43	g/mL	3571	kL	2.50E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-102	244Cm	Supernatant	9.94E-01	Ci	C	1.43	g/mL	3571	kL	1.97E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	3H	Supernatant	2.26E+00	Ci	S	1.43	g/mL	3571	kL	4.47E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	59Ni	Supernatant	1.74E+00	Ci	TE	1.6	g/mL	3571	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	60Co	Supernatant	2.73E+02	Ci	S	1.43	g/mL	3571	kL	5.39E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-102	63Ni	Supernatant	1.64E+02	Ci	TE	1.6	g/mL	3571	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-102	79Se	Supernatant	2.14E+00	Ci	S	1.43	g/mL	3571	kL	4.22E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-102	90Sr	Supernatant	2.97E+05	Ci	S	1.46	g/mL	3571	kL	5.75E+01	uCi/g	Jan 1 2001 12:00AM
241-AN-102	90Y	Supernatant	2.97E+05	Ci	C		g/mL	3571	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-102	93mNb	Supernatant	3.19E+01	Ci	TE	1.6	g/mL	3571	kL	5.92E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-102	93Zr	Supernatant	3.98E+01	Ci	TE	1.6	g/mL	3571	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-102	99Tc	Supernatant	4.95E+02	Ci	S	1.43	g/mL	3571	kL	9.79E-02	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 59

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-102	Ag	Supernatant	2.09E+01	kg	S	1.42	g/mL	3571	kL	4.23E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	Al	Supernatant	4.80E+04	kg	S	1.46	g/mL	3571	kL	9.20E+03	ug/g	Jan 1 2001 12:00AM
241-AN-102	Ba	Supernatant	1.05E+02	kg	S	1.42	g/mL	3571	kL	2.12E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Be	Supernatant	1.06E+01	kg	S	1.46	g/mL	3571	kL	2.05E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	Bi	Supernatant	1.69E+02	kg	TE	1.6	g/mL	3571	kL	3.13E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Ca	Supernatant	1.60E+03	kg	S	1.46	g/mL	3571	kL	3.08E+02	ug/g	Jan 1 2001 12:00AM
241-AN-102	Cd	Supernatant	2.08E+02	kg	S	1.46	g/mL	3571	kL	4.00E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Cl	Supernatant	1.17E+04	kg	S	1.46	g/mL	3571	kL	2.24E+03	ug/g	Jan 1 2001 12:00AM
241-AN-102	Cr	Supernatant	8.64E+02	kg	S	1.46	g/mL	3571	kL	1.66E+02	ug/g	Jan 1 2001 12:00AM
241-AN-102	Cu	Supernatant	8.31E+01	kg	S	1.46	g/mL	3571	kL	1.59E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	F	Supernatant	2.18E+03	kg	S	1.46	g/mL	3571	kL	4.18E+02	ug/g	Jan 1 2001 12:00AM
241-AN-102	Fe	Supernatant	1.43E+02	kg	S	1.46	g/mL	3571	kL	2.74E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	3571	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	K	Supernatant	7.77E+03	kg	S	1.46	g/mL	3571	kL	1.49E+03	ug/g	Jan 1 2001 12:00AM
241-AN-102	La	Supernatant	5.93E+00	kg	TE	1.6	g/mL	3571	kL	1.10E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	Li	Supernatant	2.09E+01	kg	S	1.42	g/mL	3571	kL	4.23E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	Mg	Supernatant	1.14E+02	kg	S	1.46	g/mL	3571	kL	2.18E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Mn	Supernatant	7.06E+01	kg	S	1.46	g/mL	3571	kL	1.35E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Mo	Supernatant	1.73E+02	kg	S	1.46	g/mL	3571	kL	3.32E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Na	Supernatant	7.94E+05	kg	S	1.46	g/mL	3571	kL	1.52E+05	ug/g	Jan 1 2001 12:00AM
241-AN-102	Nd	Supernatant	2.09E+02	kg	S	1.42	g/mL	3571	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Ni	Supernatant	1.38E+03	kg	S	1.46	g/mL	3571	kL	2.64E+02	ug/g	Jan 1 2001 12:00AM
241-AN-102	NO2	Supernatant	2.91E+05	kg	S	1.46	g/mL	3571	kL	5.59E+04	ug/g	Jan 1 2001 12:00AM
241-AN-102	NO3	Supernatant	7.28E+05	kg	S	1.46	g/mL	3571	kL	1.40E+05	ug/g	Jan 1 2001 12:00AM
241-AN-102	OH	Supernatant	3.74E+04	kg	S	1.46	g/mL	3571	kL	7.17E+03	ug/g	Jan 1 2001 12:00AM
241-AN-102	Pb	Supernatant	5.45E+02	kg	S	1.46	g/mL	3571	kL	1.04E+02	ug/g	Jan 1 2001 12:00AM
241-AN-102	PO4	Supernatant	1.79E+04	kg	S	1.46	g/mL	3571	kL	3.43E+03	ug/g	Jan 1 2001 12:00AM
241-AN-102	Si	Supernatant	7.24E+01	kg	S	1.41	g/mL	3571	kL	1.43E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	SO4	Supernatant	5.46E+04	kg	S	1.46	g/mL	3571	kL	1.05E+04	ug/g	Jan 1 2001 12:00AM
241-AN-102	Sr	Supernatant	7.25E+00	kg	C		g/mL	3571	kL		ug/g	Jan 1 2001 12:00AM
241-AN-102	Ti	Supernatant	2.09E+01	kg	S	1.42	g/mL	3571	kL	4.23E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	TIC as CO3	Supernatant	2.65E+05	kg	S	1.46	g/mL	3571	kL	5.08E+04	ug/g	Jan 1 2001 12:00AM
241-AN-102	UTOTAL	Supernatant	7.36E+01	kg	S	1.46	g/mL	3571	kL	1.43E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	V	Supernatant	1.05E+02	kg	S	1.42	g/mL	3571	kL	2.12E+01	ug/g	Jan 1 2001 12:00AM
241-AN-102	Zn	Supernatant	2.09E+01	kg	S	1.42	g/mL	3571	kL	4.23E+00	ug/g	Jan 1 2001 12:00AM
241-AN-102	Zr	Supernatant	3.28E+01	kg	S	1.46	g/mL	3571	kL	6.37E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	106Ru	Salt Cake	1.40E-04	Ci	TS	1.58	g/mL	1533	kL	4.97E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-103	106Ru	Supernatant	8.08E-05	Ci	TE	1.6	g/mL	1883	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-103	113mCd	Salt Cake	1.27E+02	Ci	TS	1.58	g/mL	1533	kL	4.52E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	113mCd	Supernatant	7.34E+01	Ci	TE	1.6	g/mL	1883	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	125Sb	Salt Cake	6.97E+01	Ci	TS	1.58	g/mL	1533	kL	2.48E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	125Sb	Supernatant	4.04E+01	Ci	TE	1.6	g/mL	1883	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	126Sn	Salt Cake	3.92E+00	Ci	TS	1.58	g/mL	1533	kL	1.40E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	126Sn	Supernatant	1.42E+01	Ci	S	1.49	g/mL	1883	kL	5.93E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	129I	Salt Cake	3.15E-01	Ci	TS	1.58	g/mL	1533	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	129I	Supernatant	6.09E-01	Ci	S	1.49	g/mL	1883	kL	2.54E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	134Cs	Salt Cake	3.04E-01	Ci	TS	1.58	g/mL	1533	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 60

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-103	134Cs	Supernatant	1.01E+00	Ci	TE	1.6	g/mL	1883	kL	4.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	137Cs	Salt Cake	6.79E+05	Ci	S	1.69	g/mL	1533	kL	2.24E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	137Cs	Supernatant	1.22E+06	Ci	S	1.49	g/mL	1883	kL	5.12E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	137mBa	Salt Cake	6.42E+05	Ci	C		g/mL	1533	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-103	137mBa	Supernatant	1.16E+06	Ci	C		g/mL	1883	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-103	14C	Salt Cake	5.28E+01	Ci	TS	1.58	g/mL	1533	kL	1.88E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	14C	Supernatant	5.57E-01	Ci	S	1.49	g/mL	1883	kL	2.33E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	151Sm	Salt Cake	2.16E+04	Ci	TS	1.58	g/mL	1533	kL	7.69E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-103	151Sm	Supernatant	1.25E+04	Ci	TE	1.6	g/mL	1883	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-103	152Eu	Salt Cake	6.53E+00	Ci	TS	1.58	g/mL	1533	kL	2.32E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	152Eu	Supernatant	3.77E+00	Ci	TE	1.6	g/mL	1883	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	154Eu	Salt Cake	1.61E+02	Ci	S	1.69	g/mL	1533	kL	5.30E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	154Eu	Supernatant	6.26E+01	Ci	S	1.49	g/mL	1883	kL	2.62E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	155Eu	Salt Cake	9.22E+01	Ci	E	1.69	g/mL	1533	kL	3.04E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	155Eu	Supernatant	3.48E+01	Ci	E	1.49	g/mL	1883	kL	1.45E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	226Ra	Salt Cake	2.61E-04	Ci	TS	1.58	g/mL	1533	kL	9.28E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-103	226Ra	Supernatant	1.51E-04	Ci	TE	1.6	g/mL	1883	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-103	227Ac	Salt Cake	1.53E-03	Ci	TS	1.58	g/mL	1533	kL	5.46E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	227Ac	Supernatant	8.87E-04	Ci	TE	1.6	g/mL	1883	kL	3.52E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	228Ra	Supernatant	3.32E-01	Ci	TE	1.6	g/mL	1883	kL	1.32E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	228Ra	Salt Cake	5.73E-01	Ci	TS	1.58	g/mL	1533	kL	2.04E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	229Th	Salt Cake	1.33E-02	Ci	TS	1.58	g/mL	1533	kL	4.74E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	229Th	Supernatant	7.70E-03	Ci	TE	1.6	g/mL	1883	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	231Pa	Salt Cake	7.16E-03	Ci	TS	1.58	g/mL	1533	kL	2.55E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	231Pa	Supernatant	4.15E-03	Ci	TE	1.6	g/mL	1883	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	232Th	Salt Cake	7.00E-02	Ci	TS	1.58	g/mL	1533	kL	2.49E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-103	232Th	Supernatant	9.69E-04	Ci	S	1.49	g/mL	1883	kL	4.05E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	232U	Salt Cake	4.01E-02	Ci	C	1.69	g/mL	1533	kL	6.02E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	232U	Supernatant	8.67E-04	Ci	E	1.49	g/mL	1883	kL	3.62E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	233U	Salt Cake	1.65E-01	Ci	C	1.69	g/mL	1533	kL	2.38E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	233U	Supernatant	3.55E-03	Ci	E	1.49	g/mL	1883	kL	1.48E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	234U	Salt Cake	5.82E-02	Ci	C	1.69	g/mL	1533	kL	8.42E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	234U	Supernatant	1.26E-03	Ci	E	1.49	g/mL	1883	kL	5.26E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	235U	Salt Cake	2.26E-03	Ci	C	1.69	g/mL	1533	kL	3.27E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-103	235U	Supernatant	4.88E-05	Ci	E	1.49	g/mL	1883	kL	2.04E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-103	236U	Salt Cake	3.40E-03	Ci	C	1.69	g/mL	1533	kL	4.92E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-103	236U	Supernatant	7.34E-05	Ci	E	1.49	g/mL	1883	kL	3.07E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-103	237Np	Salt Cake	5.76E-01	Ci	TS	1.58	g/mL	1533	kL	2.05E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	237Np	Supernatant	3.52E-02	Ci	S	1.49	g/mL	1883	kL	1.47E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-103	238Pu	Salt Cake	2.25E-01	Ci	C	1.69	g/mL	1533	kL	2.11E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	238Pu	Supernatant	5.03E-02	Ci	E	1.49	g/mL	1883	kL	2.10E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-103	238U	Salt Cake	4.56E-02	Ci	C	1.69	g/mL	1533	kL	6.59E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	238U	Supernatant	9.86E-04	Ci	E	1.49	g/mL	1883	kL	4.12E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	239Pu	Salt Cake	4.44E+00	Ci	C	1.69	g/mL	1533	kL	4.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	239Pu	Supernatant	9.93E-01	Ci	E	1.49	g/mL	1883	kL	4.15E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	240Pu	Salt Cake	9.24E-01	Ci	C	1.69	g/mL	1533	kL	8.44E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	240Pu	Supernatant	2.07E-01	Ci	E	1.49	g/mL	1883	kL	8.66E-05	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 61

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-103	241Am	Salt Cake	1.07E+01	Ci	E	1.69	g/mL	1533	kL	3.54E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	241Am	Supernatant	9.16E+00	Ci	E	1.49	g/mL	1883	kL	3.83E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	241Pu	Salt Cake	1.43E+01	Ci	E	1.69	g/mL	1533	kL	4.72E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	241Pu	Supernatant	3.20E+00	Ci	E	1.49	g/mL	1883	kL	1.34E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	242Cm	Salt Cake	2.06E-02	Ci	C	1.69	g/mL	1533	kL	1.06E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	242Cm	Supernatant	1.77E-02	Ci	E	1.49	g/mL	1883	kL	7.38E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	242Pu	Salt Cake	9.41E-05	Ci	C	1.69	g/mL	1533	kL	8.59E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	242Pu	Supernatant	2.10E-05	Ci	E	1.49	g/mL	1883	kL	8.79E-09	uCi/g	Jan 1 2001 12:00AM
241-AN-103	243Am	Salt Cake	7.16E-04	Ci	C	1.69	g/mL	1533	kL	3.61E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	243Am	Supernatant	6.15E-04	Ci	E	1.49	g/mL	1883	kL	2.57E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	243Cm	Salt Cake	1.83E-03	Ci	C	1.69	g/mL	1533	kL	1.01E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-103	243Cm	Supernatant	1.57E-03	Ci	E	1.49	g/mL	1883	kL	6.56E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-103	244Cm	Salt Cake	2.26E-02	Ci	C	1.69	g/mL	1533	kL	1.32E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	244Cm	Supernatant	1.94E-02	Ci	E	1.49	g/mL	1883	kL	8.12E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-103	3H	Salt Cake	6.97E+00	Ci	S	1.69	g/mL	1533	kL	2.30E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	3H	Supernatant	2.04E+00	Ci	S	1.49	g/mL	1883	kL	8.52E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	59Ni	Salt Cake	4.24E+00	Ci	TS	1.58	g/mL	1533	kL	1.51E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	59Ni	Supernatant	8.13E-01	Ci	TE	1.6	g/mL	1883	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	60Co	Salt Cake	2.30E+01	Ci	S	1.69	g/mL	1533	kL	7.59E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	60Co	Supernatant	1.82E+01	Ci	S	1.49	g/mL	1883	kL	7.58E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	63Ni	Salt Cake	4.02E+02	Ci	TS	1.58	g/mL	1533	kL	1.43E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-103	63Ni	Supernatant	7.67E+01	Ci	TE	1.6	g/mL	1883	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	79Se	Salt Cake	6.49E-01	Ci	TS	1.58	g/mL	1533	kL	2.31E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	79Se	Supernatant	1.41E+00	Ci	S	1.49	g/mL	1883	kL	5.88E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-103	90Sr	Salt Cake	7.37E+03	Ci	S	1.69	g/mL	1533	kL	2.43E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-103	90Sr	Supernatant	3.06E+01	Ci	S	1.49	g/mL	1883	kL	1.28E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	90Y	Salt Cake	7.37E+03	Ci	C		g/mL	1533	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-103	90Y	Supernatant	3.06E+01	Ci	C		g/mL	1883	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-103	93mNb	Salt Cake	2.30E+01	Ci	TS	1.58	g/mL	1533	kL	8.19E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	93mNb	Supernatant	1.33E+01	Ci	TE	1.6	g/mL	1883	kL	5.29E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	93Zr	Salt Cake	3.20E+01	Ci	TS	1.58	g/mL	1533	kL	1.14E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-103	93Zr	Supernatant	1.86E+01	Ci	TE	1.6	g/mL	1883	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-103	99Tc	Salt Cake	4.38E+02	Ci	S	1.69	g/mL	1533	kL	1.44E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-103	99Tc	Supernatant	2.55E+02	Ci	S	1.49	g/mL	1883	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-103	Ag	Salt Cake	4.60E+01	kg	S	1.69	g/mL	1533	kL	1.52E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ag	Supernatant	3.70E+01	kg	S	1.48	g/mL	1883	kL	1.33E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Al	Salt Cake	1.62E+05	kg	S	1.72	g/mL	1533	kL	6.13E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	Al	Supernatant	5.64E+04	kg	S	1.48	g/mL	1883	kL	2.03E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	As	Salt Cake	1.69E+02	kg	S	1.69	g/mL	1533	kL	5.57E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	As	Supernatant	1.47E+02	kg	S	1.48	g/mL	1883	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	B	Salt Cake	3.72E+02	kg	S	1.72	g/mL	1533	kL	1.41E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	B	Supernatant	1.50E+02	kg	S	1.48	g/mL	1883	kL	5.38E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ba	Supernatant	7.36E+01	kg	S	1.48	g/mL	1883	kL	2.64E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ba	Salt Cake	8.44E+01	kg	S	1.69	g/mL	1533	kL	2.79E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Be	Salt Cake	8.44E+00	kg	S	1.69	g/mL	1533	kL	2.79E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Be	Supernatant	7.35E+00	kg	S	1.48	g/mL	1883	kL	2.64E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Bi	Salt Cake	1.69E+02	kg	S	1.69	g/mL	1533	kL	5.57E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 62

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-103	Bi	Supernatant	1.47E+02	kg	S	1.48	g/mL	1883	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ca	Salt Cake	3.80E+02	kg	S	1.69	g/mL	1533	kL	1.25E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ca	Supernatant	1.47E+02	kg	S	1.48	g/mL	1883	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cd	Supernatant	9.89E+00	kg	S	1.48	g/mL	1883	kL	3.55E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cd	Salt Cake	2.54E+01	kg	S	1.72	g/mL	1533	kL	9.62E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ce	Supernatant	1.47E+02	kg	S	1.48	g/mL	1883	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ce	Salt Cake	1.69E+02	kg	S	1.69	g/mL	1533	kL	5.57E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cl	Salt Cake	1.03E+04	kg	S	1.72	g/mL	1533	kL	3.92E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cl	Supernatant	1.79E+04	kg	S	1.48	g/mL	1883	kL	6.43E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	CN	Supernatant	2.84E+01	kg	S	1.49	g/mL	1883	kL	1.19E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Co	Supernatant	1.93E+01	kg	S	1.49	g/mL	1883	kL	8.05E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Co	Salt Cake	1.24E+02	kg	S	1.72	g/mL	1533	kL	4.71E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cr	Supernatant	1.06E+03	kg	S	1.48	g/mL	1883	kL	3.79E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cr	Salt Cake	1.46E+03	kg	S	1.72	g/mL	1533	kL	5.53E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cu	Salt Cake	1.69E+01	kg	S	1.69	g/mL	1533	kL	5.57E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Cu	Supernatant	1.49E+01	kg	S	1.48	g/mL	1883	kL	5.36E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	F	Salt Cake	2.28E+03	kg	S	1.72	g/mL	1533	kL	8.65E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	F	Supernatant	1.25E+03	kg	S	1.48	g/mL	1883	kL	4.47E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Fe	Salt Cake	1.40E+02	kg	S	1.69	g/mL	1533	kL	4.61E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Fe	Supernatant	7.51E+01	kg	S	1.48	g/mL	1883	kL	2.69E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Hg	Salt Cake	4.66E+00	kg	E	1	g/mL	1533	kL	3.04E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	1883	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	K	Salt Cake	1.68E+04	kg	S	1.72	g/mL	1533	kL	6.38E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	K	Supernatant	3.13E+04	kg	S	1.48	g/mL	1883	kL	1.12E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	La	Salt Cake	8.44E+01	kg	S	1.69	g/mL	1533	kL	2.79E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	La	Supernatant	2.77E+00	kg	TE	1.6	g/mL	1883	kL	1.10E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Li	Supernatant	4.68E+01	kg	S	1.48	g/mL	1883	kL	1.68E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Li	Salt Cake	1.57E+02	kg	S	1.72	g/mL	1533	kL	5.96E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Mg	Supernatant	1.47E+02	kg	S	1.48	g/mL	1883	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Mg	Salt Cake	1.77E+02	kg	S	1.69	g/mL	1533	kL	5.85E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Mn	Salt Cake	1.77E+01	kg	S	1.69	g/mL	1533	kL	5.85E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Mn	Supernatant	1.47E+01	kg	S	1.48	g/mL	1883	kL	5.28E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Mo	Salt Cake	1.11E+02	kg	S	1.69	g/mL	1533	kL	3.66E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Mo	Supernatant	2.20E+02	kg	S	1.48	g/mL	1883	kL	7.89E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Na	Salt Cake	5.51E+05	kg	S	1.72	g/mL	1533	kL	2.09E+05	ug/g	Jan 1 2001 12:00AM
241-AN-103	Na	Supernatant	5.08E+05	kg	S	1.48	g/mL	1883	kL	1.82E+05	ug/g	Jan 1 2001 12:00AM
241-AN-103	Nd	Supernatant	1.47E+02	kg	S	1.48	g/mL	1883	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Nd	Salt Cake	1.69E+02	kg	S	1.69	g/mL	1533	kL	5.57E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ni	Salt Cake	3.38E+01	kg	S	1.69	g/mL	1533	kL	1.12E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ni	Supernatant	2.94E+01	kg	S	1.48	g/mL	1883	kL	1.06E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	NO2	Salt Cake	1.84E+05	kg	S	1.72	g/mL	1533	kL	7.00E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	NO2	Supernatant	3.09E+05	kg	S	1.48	g/mL	1883	kL	1.11E+05	ug/g	Jan 1 2001 12:00AM
241-AN-103	NO3	Salt Cake	4.08E+05	kg	S	1.72	g/mL	1533	kL	1.55E+05	ug/g	Jan 1 2001 12:00AM
241-AN-103	NO3	Supernatant	3.15E+05	kg	S	1.48	g/mL	1883	kL	1.13E+05	ug/g	Jan 1 2001 12:00AM
241-AN-103	OH	Salt Cake	1.03E+05	kg	S	1.69	g/mL	1533	kL	3.39E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	OH	Supernatant	1.58E+05	kg	S	1.49	g/mL	1883	kL	6.59E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	Oxalate	Supernatant	2.30E+00	kg	TE	1.6	g/mL	1883	kL	9.13E-01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 63

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-103	Oxalate	Salt Cake	1.53E+04	kg	S	1.72	g/mL	1533	kL	5.79E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	Pb	Salt Cake	1.69E+02	kg	S	1.69	g/mL	1533	kL	5.57E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Pb	Supernatant	2.91E+02	kg	S	1.48	g/mL	1883	kL	1.05E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	PO4	Salt Cake	5.74E+03	kg	S	1.72	g/mL	1533	kL	2.18E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	PO4	Supernatant	3.17E+03	kg	S	1.48	g/mL	1883	kL	1.14E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	Sb	Salt Cake	1.01E+02	kg	S	1.69	g/mL	1533	kL	3.34E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Sb	Supernatant	8.83E+01	kg	S	1.48	g/mL	1883	kL	3.17E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Se	Salt Cake	1.69E+02	kg	S	1.69	g/mL	1533	kL	5.57E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Se	Supernatant	1.49E+02	kg	S	1.48	g/mL	1883	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Si	Salt Cake	1.20E+03	kg	TS	1.58	g/mL	1533	kL	4.28E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Si	Supernatant	8.17E+02	kg	S	1.48	g/mL	1883	kL	2.93E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	SO4	Salt Cake	8.56E+03	kg	S	1.72	g/mL	1533	kL	3.25E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	SO4	Supernatant	2.41E+03	kg	S	1.48	g/mL	1883	kL	8.66E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Sr	Salt Cake	1.69E+01	kg	S	1.69	g/mL	1533	kL	5.57E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Sr	Supernatant	1.47E+01	kg	S	1.48	g/mL	1883	kL	5.28E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ta	Supernatant	4.83E+01	kg	S	1.49	g/mL	1883	kL	2.02E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Th	Supernatant	4.83E+01	kg	S	1.49	g/mL	1883	kL	2.02E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ti	Supernatant	1.47E+01	kg	S	1.48	g/mL	1883	kL	5.28E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Ti	Salt Cake	1.69E+01	kg	S	1.69	g/mL	1533	kL	5.57E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	TIC as CO3	Salt Cake	8.22E+04	kg	S	1.69	g/mL	1533	kL	2.71E+04	ug/g	Jan 1 2001 12:00AM
241-AN-103	TIC as CO3	Supernatant	9.28E+03	kg	S	1.49	g/mL	1883	kL	3.88E+03	ug/g	Jan 1 2001 12:00AM
241-AN-103	Tl	Supernatant	2.94E+02	kg	S	1.48	g/mL	1883	kL	1.05E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Tl	Salt Cake	3.38E+02	kg	S	1.69	g/mL	1533	kL	1.12E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	UTOTAL	Salt Cake	1.37E+02	kg	S	1.69	g/mL	1533	kL	4.51E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	UTOTAL	Supernatant	2.95E+00	kg	S	1.49	g/mL	1883	kL	1.23E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	V	Supernatant	7.36E+01	kg	S	1.48	g/mL	1883	kL	2.64E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	V	Salt Cake	8.44E+01	kg	S	1.69	g/mL	1533	kL	2.79E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	W	Supernatant	5.37E+02	kg	S	1.49	g/mL	1883	kL	2.24E+02	ug/g	Jan 1 2001 12:00AM
241-AN-103	Y	Supernatant	9.65E+00	kg	S	1.49	g/mL	1883	kL	4.03E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Zn	Salt Cake	8.66E+01	kg	S	1.72	g/mL	1533	kL	3.29E+01	ug/g	Jan 1 2001 12:00AM
241-AN-103	Zn	Supernatant	2.32E+01	kg	S	1.48	g/mL	1883	kL	8.31E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Zr	Salt Cake	1.69E+01	kg	S	1.69	g/mL	1533	kL	5.57E+00	ug/g	Jan 1 2001 12:00AM
241-AN-103	Zr	Supernatant	1.80E+01	kg	S	1.48	g/mL	1883	kL	6.46E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	106Ru	Salt Cake	1.22E-04	Ci	TS	1.58	g/mL	1736	kL	4.97E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-104	106Ru	Supernatant	7.76E-05	Ci	TE	1.6	g/mL	2083	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-104	113mCd	Salt Cake	1.11E+02	Ci	TS	1.58	g/mL	1736	kL	4.52E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	113mCd	Supernatant	7.05E+01	Ci	TE	1.6	g/mL	2083	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	125Sb	Salt Cake	6.10E+01	Ci	TS	1.58	g/mL	1736	kL	2.48E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	125Sb	Supernatant	3.88E+01	Ci	TE	1.6	g/mL	2083	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	126Sn	Salt Cake	3.43E+00	Ci	TS	1.58	g/mL	1736	kL	1.40E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	126Sn	Supernatant	9.59E+00	Ci	S	1.41	g/mL	2083	kL	3.23E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	129I	Salt Cake	2.75E-01	Ci	TS	1.58	g/mL	1736	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	129I	Supernatant	4.38E-01	Ci	S	1.41	g/mL	2083	kL	1.48E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	134Cs	Salt Cake	2.66E-01	Ci	TS	1.58	g/mL	1736	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	134Cs	Supernatant	9.73E-01	Ci	TE	1.6	g/mL	2083	kL	4.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	137Cs	Salt Cake	8.88E+05	Ci	S	1.57	g/mL	1736	kL	3.26E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	137Cs	Supernatant	1.10E+06	Ci	S	1.41	g/mL	2083	kL	3.70E+02	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 84

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-104	137mBa	Salt Cake	8.40E+05	Ci	C		g/mL	1736	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-104	137mBa	Supernatant	1.04E+06	Ci	C		g/mL	2083	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-104	14C	Salt Cake	4.62E+01	Ci	TS	1.58	g/mL	1736	kL	1.88E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	14C	Supernatant	6.33E-01	Ci	S	1.41	g/mL	2083	kL	2.13E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	151Sm	Salt Cake	1.89E+04	Ci	TS	1.58	g/mL	1736	kL	7.69E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-104	151Sm	Supernatant	1.20E+04	Ci	TE	1.6	g/mL	2083	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-104	152Eu	Salt Cake	5.71E+00	Ci	TS	1.58	g/mL	1736	kL	2.32E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	152Eu	Supernatant	3.63E+00	Ci	TE	1.6	g/mL	2083	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	154Eu	Salt Cake	1.89E+02	Ci	S	1.57	g/mL	1736	kL	6.94E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	154Eu	Supernatant	1.22E+02	Ci	S	1.41	g/mL	2083	kL	4.10E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	155Eu	Salt Cake	1.79E+02	Ci	TS	1.58	g/mL	1736	kL	7.29E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	155Eu	Supernatant	1.14E+02	Ci	TE	1.6	g/mL	2083	kL	4.70E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	226Ra	Salt Cake	2.28E-04	Ci	TS	1.58	g/mL	1736	kL	9.28E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-104	226Ra	Supernatant	1.45E-04	Ci	TE	1.6	g/mL	2083	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-104	227Ac	Salt Cake	1.34E-03	Ci	TS	1.58	g/mL	1736	kL	5.46E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-104	227Ac	Supernatant	8.52E-04	Ci	TE	1.6	g/mL	2083	kL	3.52E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-104	228Ra	Salt Cake	5.01E-01	Ci	TS	1.58	g/mL	1736	kL	2.04E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	228Ra	Supernatant	3.19E-01	Ci	TE	1.6	g/mL	2083	kL	1.32E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	229Th	Salt Cake	1.16E-02	Ci	TS	1.58	g/mL	1736	kL	4.74E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	229Th	Supernatant	7.39E-03	Ci	TE	1.6	g/mL	2083	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	231Pa	Salt Cake	6.27E-03	Ci	TS	1.58	g/mL	1736	kL	2.55E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	231Pa	Supernatant	3.99E-03	Ci	TE	1.6	g/mL	2083	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	232Th	Salt Cake	6.12E-02	Ci	TS	1.58	g/mL	1736	kL	2.49E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	232Th	Supernatant	1.32E-03	Ci	S	1.41	g/mL	2083	kL	4.44E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-104	232U	Salt Cake	1.69E-01	Ci	C	1.57	g/mL	1736	kL	5.22E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	232U	Supernatant	2.65E-03	Ci	C	1.41	g/mL	2083	kL	5.22E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	233U	Supernatant	1.09E-02	Ci	C	1.41	g/mL	2083	kL	2.06E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	233U	Salt Cake	6.93E-01	Ci	C	1.57	g/mL	1736	kL	2.06E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	234U	Salt Cake	2.05E-01	Ci	C	1.57	g/mL	1736	kL	6.09E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	234U	Supernatant	3.21E-03	Ci	C	1.41	g/mL	2083	kL	6.09E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	235U	Salt Cake	7.99E-03	Ci	C	1.57	g/mL	1736	kL	2.38E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	235U	Supernatant	1.25E-04	Ci	C	1.41	g/mL	2083	kL	2.38E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	236U	Salt Cake	1.10E-02	Ci	C	1.57	g/mL	1736	kL	3.27E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	236U	Supernatant	1.72E-04	Ci	C	1.41	g/mL	2083	kL	3.27E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	237Np	Salt Cake	5.04E-01	Ci	TS	1.58	g/mL	1736	kL	2.05E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	237Np	Supernatant	6.31E-02	Ci	S	1.41	g/mL	2083	kL	2.13E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	238Pu	Salt Cake	3.65E-01	Ci	C	1.57	g/mL	1736	kL	1.32E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	238Pu	Supernatant	1.35E-02	Ci	C	1.41	g/mL	2083	kL	1.32E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	238U	Salt Cake	1.65E-01	Ci	C	1.57	g/mL	1736	kL	4.89E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	238U	Supernatant	2.58E-03	Ci	C	1.41	g/mL	2083	kL	4.89E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	239Pu	Salt Cake	8.31E+00	Ci	C	1.57	g/mL	1736	kL	2.91E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	239Pu	Supernatant	3.08E-01	Ci	C	1.41	g/mL	2083	kL	2.91E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	240Pu	Supernatant	6.05E-02	Ci	C	1.41	g/mL	2083	kL	5.73E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	240Pu	Salt Cake	1.64E+00	Ci	C	1.57	g/mL	1736	kL	5.73E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	241Am	Salt Cake	5.22E+01	Ci	E	1.57	g/mL	1736	kL	1.91E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	241Am	Supernatant	7.31E-01	Ci	E	1.41	g/mL	2083	kL	2.47E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	241Pu	Salt Cake	2.29E+01	Ci	E	1.57	g/mL	1736	kL	8.42E-03	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-MKC-FRP-00001
SHEET REV: 0A
SHEET NO.: 65

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-104	241Pu	Supernatant	8.51E-01	Ci	E	1.41	g/mL	2083	kL	2.87E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	242Cm	Salt Cake	1.18E-01	Ci	C	1.57	g/mL	1736	kL	8.75E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	242Cm	Supernatant	1.64E-03	Ci	C	1.41	g/mL	2083	kL	8.75E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	242Pu	Salt Cake	1.49E-04	Ci	C	1.57	g/mL	1736	kL	5.20E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-104	242Pu	Supernatant	5.50E-06	Ci	C	1.41	g/mL	2083	kL	5.20E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-104	243Am	Salt Cake	2.87E-03	Ci	C	1.57	g/mL	1736	kL	2.10E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	243Am	Supernatant	4.01E-05	Ci	C	1.41	g/mL	2083	kL	2.10E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	243Cm	Supernatant	1.41E-04	Ci	C	1.41	g/mL	2083	kL	8.08E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	243Cm	Salt Cake	1.01E-02	Ci	C	1.57	g/mL	1736	kL	8.08E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-104	244Cm	Salt Cake	9.27E-02	Ci	C	1.57	g/mL	1736	kL	7.85E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	244Cm	Supernatant	1.29E-03	Ci	C	1.41	g/mL	2083	kL	7.85E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-104	3H	Salt Cake	2.21E+01	Ci	S	1.57	g/mL	1736	kL	8.11E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	3H	Supernatant	2.56E+00	Ci	S	1.41	g/mL	2083	kL	8.61E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	59Ni	Salt Cake	3.71E+00	Ci	TS	1.58	g/mL	1736	kL	1.51E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	59Ni	Supernatant	7.81E-01	Ci	TE	1.6	g/mL	2083	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	60Co	Salt Cake	4.27E+01	Ci	S	1.57	g/mL	1736	kL	1.57E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	60Co	Supernatant	2.06E+01	Ci	S	1.41	g/mL	2083	kL	6.94E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	63Ni	Salt Cake	3.52E+02	Ci	TS	1.58	g/mL	1736	kL	1.43E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-104	63Ni	Supernatant	7.36E+01	Ci	TE	1.6	g/mL	2083	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	79Se	Supernatant	1.97E+00	Ci	S	1.41	g/mL	2083	kL	6.65E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	79Se	Salt Cake	5.68E-01	Ci	TS	1.58	g/mL	1736	kL	2.31E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-104	90Sr	Salt Cake	8.53E+04	Ci	S	1.57	g/mL	1736	kL	3.13E+01	uCi/g	Jan 1 2001 12:00AM
241-AN-104	90Sr	Supernatant	1.83E+02	Ci	S	1.41	g/mL	2083	kL	6.19E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	90Y	Salt Cake	8.53E+04	Ci	C		g/mL	1736	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-104	90Y	Supernatant	1.83E+02	Ci	C		g/mL	2083	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-104	93mNb	Salt Cake	2.01E+01	Ci	TS	1.58	g/mL	1736	kL	8.19E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	93mNb	Supernatant	1.28E+01	Ci	TE	1.6	g/mL	2083	kL	5.29E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	93Zr	Salt Cake	2.80E+01	Ci	TS	1.58	g/mL	1736	kL	1.14E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-104	93Zr	Supernatant	1.78E+01	Ci	TE	1.6	g/mL	2083	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-104	99Tc	Salt Cake	3.68E+02	Ci	S	1.57	g/mL	1736	kL	1.35E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-104	99Tc	Supernatant	4.19E+02	Ci	S	1.41	g/mL	2083	kL	1.41E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-104	Ag	Salt Cake	4.14E+01	kg	S	1.59	g/mL	1736	kL	1.50E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ag	Supernatant	3.72E+01	kg	S	1.4	g/mL	2083	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Al	Salt Cake	5.69E+04	kg	S	1.59	g/mL	1736	kL	2.06E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	Al	Supernatant	8.12E+04	kg	S	1.4	g/mL	2083	kL	2.76E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	As	Salt Cake	1.08E+02	kg	S	1.57	g/mL	1736	kL	3.98E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	As	Supernatant	1.43E+02	kg	S	1.4	g/mL	2083	kL	4.85E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	B	Supernatant	1.36E+02	kg	S	1.4	g/mL	2083	kL	4.63E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	B	Salt Cake	3.81E+02	kg	S	1.59	g/mL	1736	kL	1.38E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ba	Supernatant	6.33E+01	kg	S	1.41	g/mL	2083	kL	2.13E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ba	Salt Cake	5.42E+01	kg	S	1.57	g/mL	1736	kL	1.99E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Be	Salt Cake	8.20E+00	kg	S	1.57	g/mL	1736	kL	3.01E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Be	Supernatant	6.31E+00	kg	S	1.41	g/mL	2083	kL	2.13E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Bi	Salt Cake	1.08E+02	kg	S	1.57	g/mL	1736	kL	3.98E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Bi	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ca	Salt Cake	5.91E+02	kg	S	1.59	g/mL	1736	kL	2.14E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ca	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 66

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-104	Cd	Salt Cake	2.72E+01	kg	S	1.59	g/mL	1736	kL	9.86E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cd	Supernatant	6.31E+00	kg	S	1.41	g/mL	2083	kL	2.13E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ce	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ce	Salt Cake	1.08E+02	kg	S	1.57	g/mL	1736	kL	3.98E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cl	Salt Cake	1.23E+04	kg	S	1.59	g/mL	1736	kL	4.46E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cl	Supernatant	1.63E+04	kg	S	1.4	g/mL	2083	kL	5.54E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Co	Supernatant	2.52E+01	kg	S	1.4	g/mL	2083	kL	8.57E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Co	Salt Cake	2.17E+01	kg	S	1.57	g/mL	1736	kL	7.96E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cr	Salt Cake	4.28E+03	kg	S	1.59	g/mL	1736	kL	1.55E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cr	Supernatant	7.07E+02	kg	S	1.4	g/mL	2083	kL	2.40E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cu	Supernatant	1.26E+01	kg	S	1.41	g/mL	2083	kL	4.26E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Cu	Salt Cake	2.11E+01	kg	S	1.59	g/mL	1736	kL	7.64E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	F	Salt Cake	2.22E+03	kg	S	1.59	g/mL	1736	kL	8.03E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	F	Supernatant	1.72E+02	kg	S	1.41	g/mL	2083	kL	5.81E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Fe	Salt Cake	3.17E+02	kg	S	1.59	g/mL	1736	kL	1.15E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Fe	Supernatant	6.33E+01	kg	S	1.41	g/mL	2083	kL	2.13E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Hg	Salt Cake	0.00E+00	kg	TS	1.58	g/mL	1736	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	2083	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	K	Salt Cake	9.88E+03	kg	S	1.59	g/mL	1736	kL	3.58E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	K	Supernatant	1.41E+04	kg	S	1.4	g/mL	2083	kL	4.78E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	La	Salt Cake	5.42E+01	kg	S	1.57	g/mL	1736	kL	1.99E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	La	Supernatant	6.33E+01	kg	S	1.41	g/mL	2083	kL	2.13E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Li	Supernatant	2.48E+01	kg	S	1.4	g/mL	2083	kL	8.43E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Li	Salt Cake	4.47E+01	kg	S	1.59	g/mL	1736	kL	1.62E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Mg	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Mg	Salt Cake	1.08E+02	kg	S	1.57	g/mL	1736	kL	3.98E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Mn	Salt Cake	4.72E+01	kg	S	1.59	g/mL	1736	kL	1.71E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Mn	Supernatant	1.26E+01	kg	S	1.41	g/mL	2083	kL	4.26E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Mo	Salt Cake	1.38E+02	kg	S	1.59	g/mL	1736	kL	5.00E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Mo	Supernatant	1.69E+02	kg	S	1.4	g/mL	2083	kL	5.74E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Na	Salt Cake	5.33E+05	kg	S	1.59	g/mL	1736	kL	1.93E+05	ug/g	Jan 1 2001 12:00AM
241-AN-104	Na	Supernatant	5.39E+05	kg	S	1.4	g/mL	2083	kL	1.83E+05	ug/g	Jan 1 2001 12:00AM
241-AN-104	Nd	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Nd	Salt Cake	1.08E+02	kg	S	1.57	g/mL	1736	kL	3.98E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	NH3	Supernatant	4.69E+02	kg	S	1.41	g/mL	2083	kL	1.58E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ni	Salt Cake	1.67E+02	kg	S	1.59	g/mL	1736	kL	6.04E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ni	Supernatant	2.52E+01	kg	S	1.41	g/mL	2083	kL	8.51E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	NO2	Salt Cake	1.75E+05	kg	S	1.59	g/mL	1736	kL	6.33E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	NO2	Supernatant	2.34E+05	kg	S	1.4	g/mL	2083	kL	7.93E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	NO3	Salt Cake	3.28E+05	kg	S	1.59	g/mL	1736	kL	1.19E+05	ug/g	Jan 1 2001 12:00AM
241-AN-104	NO3	Supernatant	3.58E+05	kg	S	1.4	g/mL	2083	kL	1.21E+05	ug/g	Jan 1 2001 12:00AM
241-AN-104	OH	Salt Cake	1.01E+05	kg	S	1.57	g/mL	1736	kL	3.72E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	OH	Supernatant	1.49E+05	kg	S	1.41	g/mL	2083	kL	5.03E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	Oxalate	Salt Cake	2.34E+04	kg	S	1.59	g/mL	1736	kL	8.47E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Oxalate	Supernatant	1.56E+03	kg	S	1.41	g/mL	2083	kL	5.27E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Pb	Salt Cake	1.14E+02	kg	S	1.57	g/mL	1736	kL	4.20E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Pb	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 67

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-104	PO4	Salt Cake	1.16E+04	kg	S	1.59	g/mL	1736	kL	4.20E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	PO4	Supernatant	5.69E+03	kg	S	1.4	g/mL	2083	kL	1.93E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Sb	Salt Cake	6.51E+01	kg	S	1.57	g/mL	1736	kL	2.39E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Sb	Supernatant	7.59E+01	kg	S	1.41	g/mL	2083	kL	2.56E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Se	Salt Cake	1.08E+02	kg	S	1.57	g/mL	1736	kL	3.98E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Se	Supernatant	1.26E+02	kg	S	1.41	g/mL	2083	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Si	Salt Cake	1.77E+03	kg	S	1.59	g/mL	1736	kL	6.41E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	Si	Supernatant	4.90E+02	kg	S	1.4	g/mL	2083	kL	1.66E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	SO4	Salt Cake	3.35E+04	kg	S	1.59	g/mL	1736	kL	1.21E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	SO4	Supernatant	7.45E+03	kg	S	1.4	g/mL	2083	kL	2.53E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Sr	Salt Cake	1.08E+01	kg	S	1.57	g/mL	1736	kL	3.98E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Sr	Supernatant	1.26E+01	kg	S	1.41	g/mL	2083	kL	4.26E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ti	Supernatant	1.26E+01	kg	S	1.41	g/mL	2083	kL	4.26E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	Ti	Salt Cake	1.08E+01	kg	S	1.57	g/mL	1736	kL	3.98E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	TIC as CO3	Salt Cake	1.74E+05	kg	S	1.57	g/mL	1736	kL	6.40E+04	ug/g	Jan 1 2001 12:00AM
241-AN-104	TIC as CO3	Supernatant	2.25E+04	kg	S	1.41	g/mL	2083	kL	7.59E+03	ug/g	Jan 1 2001 12:00AM
241-AN-104	Tl	Supernatant	2.52E+02	kg	S	1.41	g/mL	2083	kL	8.51E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Tl	Salt Cake	2.17E+02	kg	S	1.57	g/mL	1736	kL	7.95E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	UTOTAL	Salt Cake	4.93E+02	kg	S	1.57	g/mL	1736	kL	1.81E+02	ug/g	Jan 1 2001 12:00AM
241-AN-104	UTOTAL	Supernatant	7.74E+00	kg	S	1.41	g/mL	2083	kL	2.61E+00	ug/g	Jan 1 2001 12:00AM
241-AN-104	V	Supernatant	6.33E+01	kg	S	1.41	g/mL	2083	kL	2.13E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	V	Salt Cake	5.42E+01	kg	S	1.57	g/mL	1736	kL	1.99E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Zn	Supernatant	3.05E+01	kg	S	1.4	g/mL	2083	kL	1.04E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Zn	Salt Cake	5.77E+01	kg	S	1.59	g/mL	1736	kL	2.09E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Zr	Salt Cake	4.66E+01	kg	S	1.59	g/mL	1736	kL	1.69E+01	ug/g	Jan 1 2001 12:00AM
241-AN-104	Zr	Supernatant	1.65E+01	kg	S	1.4	g/mL	2083	kL	5.60E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	106Ru	Salt Cake	1.37E-04	Ci	TS	1.58	g/mL	1925	kL	4.97E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	106Ru	Supernatant	8.61E-05	Ci	TE	1.6	g/mL	2227	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	113mCd	Salt Cake	1.24E+02	Ci	TS	1.58	g/mL	1925	kL	4.52E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	113mCd	Supernatant	7.83E+01	Ci	TE	1.6	g/mL	2227	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	125Sb	Salt Cake	6.83E+01	Ci	TS	1.58	g/mL	1925	kL	2.48E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	125Sb	Supernatant	4.30E+01	Ci	TE	1.6	g/mL	2227	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	126Sn	Salt Cake	3.85E+00	Ci	TS	1.58	g/mL	1925	kL	1.40E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	126Sn	Supernatant	2.42E+00	Ci	TE	1.6	g/mL	2227	kL	9.02E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	129I	Salt Cake	3.09E-01	Ci	TS	1.58	g/mL	1925	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	129I	Supernatant	5.96E-01	Ci	S	1.42	g/mL	2227	kL	1.88E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	134Cs	Salt Cake	2.99E-01	Ci	TS	1.58	g/mL	1925	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	134Cs	Supernatant	1.08E+00	Ci	TE	1.6	g/mL	2227	kL	4.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	137Cs	Salt Cake	8.10E+05	Ci	S	1.57	g/mL	1925	kL	2.68E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	137Cs	Supernatant	6.98E+05	Ci	S	1.42	g/mL	2227	kL	2.21E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	137mBa	Salt Cake	7.66E+05	Ci	C		g/mL	1925	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-105	137mBa	Supernatant	6.61E+05	Ci	C		g/mL	2227	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-105	14C	Salt Cake	5.18E+01	Ci	TS	1.58	g/mL	1925	kL	1.88E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	14C	Supernatant	7.31E-01	Ci	S	1.42	g/mL	2227	kL	2.31E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	151Sm	Salt Cake	2.12E+04	Ci	TS	1.58	g/mL	1925	kL	7.69E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-105	151Sm	Supernatant	1.33E+04	Ci	TE	1.6	g/mL	2227	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-105	152Eu	Salt Cake	6.40E+00	Ci	TS	1.58	g/mL	1925	kL	2.32E-03	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 68

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-105	152Eu	Supernatant	4.03E+00	Ci	TE	1.6	g/mL	2227	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	154Eu	Salt Cake	1.94E+02	Ci	S	1.57	g/mL	1925	kL	6.43E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	154Eu	Supernatant	5.85E+01	Ci	S	1.42	g/mL	2227	kL	1.85E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	155Eu	Salt Cake	1.19E+02	Ci	E	1.57	g/mL	1925	kL	3.93E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	155Eu	Supernatant	3.58E+01	Ci	E	1.42	g/mL	2227	kL	1.13E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	226Ra	Salt Cake	2.56E-04	Ci	TS	1.58	g/mL	1925	kL	9.28E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	226Ra	Supernatant	1.61E-04	Ci	TE	1.6	g/mL	2227	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	227Ac	Salt Cake	2.61E-03	Ci	TS	1.58	g/mL	1925	kL	9.46E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-105	227Ac	Supernatant	1.64E-03	Ci	TE	1.6	g/mL	2227	kL	6.12E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-105	228Ra	Salt Cake	3.08E-01	Ci	TS	1.58	g/mL	1925	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	228Ra	Supernatant	1.94E-01	Ci	TE	1.6	g/mL	2227	kL	7.22E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	229Th	Salt Cake	1.31E-02	Ci	TS	1.58	g/mL	1925	kL	4.74E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	229Th	Supernatant	8.21E-03	Ci	TE	1.6	g/mL	2227	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	231Pa	Salt Cake	7.03E-03	Ci	TS	1.58	g/mL	1925	kL	2.55E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	231Pa	Supernatant	4.43E-03	Ci	TE	1.6	g/mL	2227	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	232Th	Salt Cake	6.86E-02	Ci	TS	1.58	g/mL	1925	kL	2.49E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	232Th	Supernatant	4.31E-02	Ci	TE	1.6	g/mL	2227	kL	1.61E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	232U	Salt Cake	1.13E-01	Ci	C	1.57	g/mL	1925	kL	3.73E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	232U	Supernatant	3.40E-03	Ci	C	1.42	g/mL	2227	kL	1.07E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	233U	Salt Cake	4.62E-01	Ci	C	1.57	g/mL	1925	kL	1.53E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	233U	Supernatant	1.39E-02	Ci	C	1.42	g/mL	2227	kL	4.41E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	234U	Salt Cake	1.05E-01	Ci	C	1.57	g/mL	1925	kL	3.47E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	234U	Supernatant	3.16E-03	Ci	C	1.42	g/mL	2227	kL	1.00E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	235U	Salt Cake	4.12E-03	Ci	C	1.57	g/mL	1925	kL	1.36E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	235U	Supernatant	1.24E-04	Ci	C	1.42	g/mL	2227	kL	3.93E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	236U	Salt Cake	4.76E-03	Ci	C	1.57	g/mL	1925	kL	1.57E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	236U	Supernatant	1.43E-04	Ci	C	1.42	g/mL	2227	kL	4.54E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	237Np	Salt Cake	5.65E-01	Ci	TS	1.58	g/mL	1925	kL	2.05E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	237Np	Supernatant	4.75E-02	Ci	S	1.42	g/mL	2227	kL	1.50E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	238Pu	Salt Cake	2.13E-01	Ci	C	1.57	g/mL	1925	kL	7.03E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	238Pu	Supernatant	2.50E-03	Ci	C	1.42	g/mL	2227	kL	7.89E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-105	238U	Salt Cake	8.77E-02	Ci	C	1.57	g/mL	1925	kL	2.90E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	238U	Supernatant	2.64E-03	Ci	C	1.42	g/mL	2227	kL	8.36E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-105	239Pu	Salt Cake	5.73E+00	Ci	C	1.57	g/mL	1925	kL	1.90E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	239Pu	Supernatant	6.73E-02	Ci	C	1.42	g/mL	2227	kL	2.13E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	240Pu	Salt Cake	1.08E+00	Ci	C	1.57	g/mL	1925	kL	3.58E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	240Pu	Supernatant	1.27E-02	Ci	C	1.42	g/mL	2227	kL	4.02E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	241Am	Salt Cake	2.07E+01	Ci	S	1.57	g/mL	1925	kL	6.86E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	241Am	Supernatant	8.33E-02	Ci	S	1.42	g/mL	2227	kL	2.63E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	241Pu	Salt Cake	1.25E+01	Ci	C	1.57	g/mL	1925	kL	4.13E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	241Pu	Supernatant	1.47E-01	Ci	C	1.42	g/mL	2227	kL	4.64E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	242Cm	Salt Cake	4.60E-02	Ci	C	1.57	g/mL	1925	kL	1.52E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	242Cm	Supernatant	1.83E-04	Ci	C	1.42	g/mL	2227	kL	5.79E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	242Pu	Salt Cake	8.68E-05	Ci	C	1.57	g/mL	1925	kL	2.87E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	242Pu	Supernatant	1.02E-06	Ci	C	1.42	g/mL	2227	kL	3.22E-10	uCi/g	Jan 1 2001 12:00AM
241-AN-105	243Am	Salt Cake	9.06E-04	Ci	C	1.57	g/mL	1925	kL	3.00E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-105	243Am	Supernatant	3.60E-06	Ci	C	1.42	g/mL	2227	kL	1.14E-09	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 69

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-105	243Cm	Salt Cake	3.98E-03	Ci	C	1.57	g/mL	1925	kL	1.32E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-105	243Cm	Supernatant	1.58E-05	Ci	C	1.42	g/mL	2227	kL	5.00E-09	uCi/g	Jan 1 2001 12:00AM
241-AN-105	244Cm	Salt Cake	3.39E-02	Ci	C	1.57	g/mL	1925	kL	1.12E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	244Cm	Supernatant	1.35E-04	Ci	C	1.42	g/mL	2227	kL	4.27E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-105	3H	Salt Cake	4.91E+00	Ci	S	1.57	g/mL	1925	kL	1.62E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	3H	Supernatant	6.87E-02	Ci	S	1.42	g/mL	2227	kL	2.17E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-105	59Ni	Salt Cake	4.16E+00	Ci	TS	1.58	g/mL	1925	kL	1.51E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	59Ni	Supernatant	8.67E-01	Ci	TE	1.6	g/mL	2227	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	60Co	Salt Cake	4.55E+01	Ci	TS	1.58	g/mL	1925	kL	1.65E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	60Co	Supernatant	9.65E+00	Ci	S	1.42	g/mL	2227	kL	3.05E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	63Ni	Salt Cake	3.95E+02	Ci	TS	1.58	g/mL	1925	kL	1.43E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-105	63Ni	Supernatant	8.18E+01	Ci	TE	1.6	g/mL	2227	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	79Se	Salt Cake	6.37E-01	Ci	TS	1.58	g/mL	1925	kL	2.31E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	79Se	Supernatant	4.01E-01	Ci	TE	1.6	g/mL	2227	kL	1.49E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-105	90Sr	Salt Cake	3.09E+04	Ci	S	1.57	g/mL	1925	kL	1.02E+01	uCi/g	Jan 1 2001 12:00AM
241-AN-105	90Sr	Supernatant	8.32E+01	Ci	S	1.42	g/mL	2227	kL	2.63E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	90Y	Salt Cake	3.09E+04	Ci	C		g/mL	1925	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-105	90Y	Supernatant	8.32E+01	Ci	C		g/mL	2227	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-105	93mNb	Salt Cake	2.52E+01	Ci	TS	1.58	g/mL	1925	kL	9.15E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	93mNb	Supernatant	1.59E+01	Ci	TE	1.6	g/mL	2227	kL	5.92E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	93Zr	Salt Cake	3.14E+01	Ci	TS	1.58	g/mL	1925	kL	1.14E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-105	93Zr	Supernatant	1.98E+01	Ci	TE	1.6	g/mL	2227	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-105	99Tc	Salt Cake	5.34E+02	Ci	S	1.57	g/mL	1925	kL	1.77E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-105	99Tc	Supernatant	5.88E+02	Ci	S	1.42	g/mL	2227	kL	1.86E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-105	Ag	Supernatant	3.96E+01	kg	S	1.42	g/mL	2227	kL	1.25E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ag	Salt Cake	5.79E+01	kg	S	1.57	g/mL	1925	kL	1.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Al	Supernatant	9.28E+04	kg	S	1.42	g/mL	2227	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	Al	Salt Cake	6.76E+04	kg	S	1.57	g/mL	1925	kL	2.24E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	As	Salt Cake	1.18E+02	kg	S	1.57	g/mL	1925	kL	3.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	As	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	B	Supernatant	1.66E+02	kg	S	1.42	g/mL	2227	kL	5.24E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	B	Salt Cake	2.74E+02	kg	S	1.57	g/mL	1925	kL	9.06E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ba	Supernatant	5.47E+01	kg	S	1.42	g/mL	2227	kL	1.73E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ba	Salt Cake	5.92E+01	kg	S	1.57	g/mL	1925	kL	1.96E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Be	Supernatant	5.44E+00	kg	S	1.42	g/mL	2227	kL	1.72E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Be	Salt Cake	5.92E+00	kg	S	1.57	g/mL	1925	kL	1.96E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Bi	Salt Cake	1.18E+02	kg	S	1.57	g/mL	1925	kL	3.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Bi	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ca	Salt Cake	1.85E+03	kg	S	1.57	g/mL	1925	kL	6.13E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ca	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cd	Supernatant	5.44E+00	kg	S	1.42	g/mL	2227	kL	1.72E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cd	Salt Cake	3.41E+01	kg	S	1.57	g/mL	1925	kL	1.13E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ce	Salt Cake	1.18E+02	kg	S	1.57	g/mL	1925	kL	3.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ce	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cl	Salt Cake	1.57E+04	kg	S	1.57	g/mL	1925	kL	5.19E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cl	Supernatant	2.15E+04	kg	S	1.42	g/mL	2227	kL	6.79E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	Co	Supernatant	2.18E+01	kg	S	1.42	g/mL	2227	kL	6.89E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 70

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-105	Co	Salt Cake	2.37E+01	kg	S	1.57	g/mL	1925	kL	7.84E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cr	Salt Cake	6.84E+03	kg	S	1.57	g/mL	1925	kL	2.26E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cr	Supernatant	5.00E+02	kg	S	1.42	g/mL	2227	kL	1.58E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cu	Supernatant	1.17E+01	kg	S	1.42	g/mL	2227	kL	3.70E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Cu	Salt Cake	2.09E+01	kg	S	1.57	g/mL	1925	kL	6.93E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	F	Salt Cake	5.45E+03	kg	S	1.57	g/mL	1925	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	F	Supernatant	6.91E+02	kg	S	1.42	g/mL	2227	kL	2.18E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Fe	Salt Cake	3.48E+02	kg	S	1.57	g/mL	1925	kL	1.15E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Fe	Supernatant	5.47E+01	kg	S	1.42	g/mL	2227	kL	1.73E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Hg	Salt Cake	0.00E+00	kg	TS	1.58	g/mL	1925	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	2227	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	K	Salt Cake	1.06E+04	kg	S	1.57	g/mL	1925	kL	3.49E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	K	Supernatant	1.46E+04	kg	S	1.42	g/mL	2227	kL	4.62E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	La	Salt Cake	5.92E+01	kg	S	1.57	g/mL	1925	kL	1.96E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	La	Supernatant	2.95E+00	kg	TE	1.6	g/mL	2227	kL	1.10E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Li	Salt Cake	5.12E+01	kg	S	1.57	g/mL	1925	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Li	Supernatant	1.33E+01	kg	S	1.42	g/mL	2227	kL	4.20E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Mg	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Mg	Salt Cake	1.18E+02	kg	S	1.57	g/mL	1925	kL	3.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Mn	Salt Cake	6.15E+01	kg	S	1.57	g/mL	1925	kL	2.03E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Mn	Supernatant	1.09E+01	kg	S	1.42	g/mL	2227	kL	3.45E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Mo	Supernatant	2.15E+02	kg	S	1.42	g/mL	2227	kL	6.81E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Mo	Salt Cake	1.57E+02	kg	S	1.57	g/mL	1925	kL	5.19E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Na	Salt Cake	5.52E+05	kg	S	1.57	g/mL	1925	kL	1.83E+05	ug/g	Jan 1 2001 12:00AM
241-AN-105	Na	Supernatant	5.50E+05	kg	S	1.42	g/mL	2227	kL	1.74E+05	ug/g	Jan 1 2001 12:00AM
241-AN-105	Nd	Salt Cake	1.18E+02	kg	S	1.57	g/mL	1925	kL	3.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Nd	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ni	Salt Cake	1.20E+02	kg	S	1.57	g/mL	1925	kL	3.97E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ni	Supernatant	2.20E+01	kg	S	1.42	g/mL	2227	kL	6.96E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	NO2	Salt Cake	1.94E+05	kg	S	1.57	g/mL	1925	kL	6.44E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	NO2	Supernatant	2.64E+05	kg	S	1.42	g/mL	2227	kL	8.36E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	NO3	Salt Cake	3.43E+05	kg	S	1.57	g/mL	1925	kL	1.13E+05	ug/g	Jan 1 2001 12:00AM
241-AN-105	NO3	Supernatant	3.48E+05	kg	S	1.42	g/mL	2227	kL	1.10E+05	ug/g	Jan 1 2001 12:00AM
241-AN-105	OH	Salt Cake	7.22E+04	kg	S	1.57	g/mL	1925	kL	2.39E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	OH	Supernatant	1.33E+05	kg	S	1.47	g/mL	2227	kL	4.06E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	Oxalate	Supernatant	1.09E+03	kg	S	1.42	g/mL	2227	kL	3.44E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Oxalate	Salt Cake	2.08E+04	kg	S	1.57	g/mL	1925	kL	6.88E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	Pb	Salt Cake	1.43E+02	kg	S	1.57	g/mL	1925	kL	4.72E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Pb	Supernatant	1.20E+02	kg	S	1.42	g/mL	2227	kL	3.79E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	PO4	Salt Cake	2.26E+04	kg	S	1.57	g/mL	1925	kL	7.48E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	PO4	Supernatant	2.73E+03	kg	S	1.42	g/mL	2227	kL	8.63E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Sb	Salt Cake	7.11E+01	kg	S	1.57	g/mL	1925	kL	2.35E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Sb	Supernatant	6.55E+01	kg	S	1.42	g/mL	2227	kL	2.07E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Se	Salt Cake	1.18E+02	kg	S	1.57	g/mL	1925	kL	3.92E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Se	Supernatant	1.09E+02	kg	S	1.42	g/mL	2227	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Si	Salt Cake	4.19E+02	kg	S	1.57	g/mL	1925	kL	1.39E+02	ug/g	Jan 1 2001 12:00AM
241-AN-105	Si	Supernatant	4.86E+02	kg	S	1.42	g/mL	2227	kL	1.54E+02	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-MIC-FRP-00001
SHEET REV: 0A
SHEET NO.: 71

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-105	SO4	Salt Cake	2.22E+04	kg	S	1.57	g/mL	1925	kL	7.34E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	SO4	Supernatant	6.26E+03	kg	S	1.42	g/mL	2227	kL	1.98E+03	ug/g	Jan 1 2001 12:00AM
241-AN-105	Sr	Salt Cake	1.18E+01	kg	S	1.57	g/mL	1925	kL	3.92E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Sr	Supernatant	2.03E-03	kg	C		g/mL	2227	kL		ug/g	Jan 1 2001 12:00AM
241-AN-105	Ta	Supernatant	7.25E+01	kg	S	1.42	g/mL	2227	kL	2.12E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Th	Supernatant	7.25E+01	kg	S	1.42	g/mL	2227	kL	2.12E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ti	Supernatant	1.09E+01	kg	S	1.42	g/mL	2227	kL	3.45E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Ti	Salt Cake	1.18E+01	kg	S	1.57	g/mL	1925	kL	3.92E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	TIC as CO3	Salt Cake	1.91E+05	kg	S	1.57	g/mL	1925	kL	6.33E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	TIC as CO3	Supernatant	3.97E+04	kg	S	1.42	g/mL	2227	kL	1.26E+04	ug/g	Jan 1 2001 12:00AM
241-AN-105	Tl	Salt Cake	2.37E+02	kg	S	1.57	g/mL	1925	kL	7.84E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Tl	Supernatant	2.18E+02	kg	S	1.42	g/mL	2227	kL	6.89E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	UTOTAL	Salt Cake	2.63E+02	kg	S	1.57	g/mL	1925	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	UTOTAL	Supernatant	7.93E+00	kg	S	1.42	g/mL	2227	kL	2.51E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	V	Salt Cake	5.92E+01	kg	S	1.57	g/mL	1925	kL	1.96E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	V	Supernatant	5.47E+01	kg	S	1.42	g/mL	2227	kL	1.73E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Y	Supernatant	1.45E+01	kg	S	1.42	g/mL	2227	kL	4.23E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Zn	Salt Cake	1.29E+02	kg	S	1.57	g/mL	1925	kL	4.27E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Zn	Supernatant	6.91E+01	kg	S	1.42	g/mL	2227	kL	2.18E+01	ug/g	Jan 1 2001 12:00AM
241-AN-105	Zr	Supernatant	1.12E+01	kg	S	1.42	g/mL	2227	kL	3.55E+00	ug/g	Jan 1 2001 12:00AM
241-AN-105	Zr	Salt Cake	3.31E+01	kg	S	1.57	g/mL	1925	kL	1.10E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	106Ru	Supernatant	8.35E-05	Ci	TE	1.6	g/mL	3195	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-107	113mCd	Supernatant	7.59E+01	Ci	TE	1.6	g/mL	3195	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	125Sb	Supernatant	4.17E+01	Ci	TE	1.6	g/mL	3195	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	126Sn	Supernatant	3.02E+01	Ci	S	1.37	g/mL	3195	kL	7.20E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-107	129I	Supernatant	3.71E-01	Ci	S	1.37	g/mL	3195	kL	8.83E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	134Cs	Supernatant	1.05E+00	Ci	TE	1.6	g/mL	3195	kL	4.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	137Cs	Supernatant	1.07E+06	Ci	S	1.37	g/mL	3195	kL	2.54E+02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	137mBa	Supernatant	1.01E+06	Ci	C		g/mL	3195	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-107	14C	Supernatant	1.26E+00	Ci	S	1.37	g/mL	3195	kL	3.01E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	151Sm	Supernatant	1.29E+04	Ci	TE	1.6	g/mL	3195	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AN-107	152Eu	Supernatant	3.90E+00	Ci	TE	1.6	g/mL	3195	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-107	154Eu	Supernatant	2.46E+03	Ci	S	1.37	g/mL	3195	kL	5.87E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-107	155Eu	Supernatant	1.50E+03	Ci	S	1.37	g/mL	3195	kL	3.57E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-107	226Ra	Supernatant	1.56E-04	Ci	TE	1.6	g/mL	3195	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AN-107	227Ac	Supernatant	1.59E-03	Ci	TE	1.6	g/mL	3195	kL	6.12E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-107	228Ra	Supernatant	1.88E-01	Ci	TE	1.6	g/mL	3195	kL	7.22E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	229Th	Supernatant	7.96E-03	Ci	TE	1.6	g/mL	3195	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-107	231Pa	Supernatant	4.29E-03	Ci	TE	1.6	g/mL	3195	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-107	232Th	Supernatant	4.18E-02	Ci	TE	1.6	g/mL	3195	kL	1.61E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	232U	Supernatant	2.53E-01	Ci	C	1.37	g/mL	3195	kL	6.03E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	233U	Supernatant	1.04E+00	Ci	C	1.37	g/mL	3195	kL	2.47E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	234U	Supernatant	1.33E-01	Ci	C	1.37	g/mL	3195	kL	3.16E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	235U	Supernatant	5.15E-03	Ci	C	1.37	g/mL	3195	kL	1.23E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-107	236U	Supernatant	4.69E-03	Ci	C	1.37	g/mL	3195	kL	1.12E-06	uCi/g	Jan 1 2001 12:00AM
241-AN-107	237Np	Supernatant	1.84E-01	Ci	S	1.42	g/mL	3195	kL	4.23E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	238Pu	Supernatant	5.27E+00	Ci	C	1.37	g/mL	3195	kL	1.24E-03	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 72

BY: E. Berdos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-107	238U	Supernatant	1.14E-01	Ci	C	1.37	g/mL	3195	kL	2.73E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	239Pu	Supernatant	1.74E+02	Ci	C	1.37	g/mL	3195	kL	4.11E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	240Pu	Supernatant	3.08E+01	Ci	C	1.37	g/mL	3195	kL	7.25E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-107	241Am	Supernatant	2.47E+03	Ci	S	1.37	g/mL	3195	kL	5.89E-01	uCi/g	Jan 1 2001 12:00AM
241-AN-107	241Pu	Supernatant	2.85E+02	Ci	C	1.37	g/mL	3195	kL	6.72E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	242Cm	Supernatant	6.23E+00	Ci	C	1.37	g/mL	3195	kL	1.48E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-107	242Pu	Supernatant	2.14E-03	Ci	C	1.37	g/mL	3195	kL	5.03E-07	uCi/g	Jan 1 2001 12:00AM
241-AN-107	243Am	Supernatant	1.01E-01	Ci	C	1.37	g/mL	3195	kL	2.40E-05	uCi/g	Jan 1 2001 12:00AM
241-AN-107	243Cm	Supernatant	5.18E-01	Ci	C	1.37	g/mL	3195	kL	1.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	244Cm	Supernatant	3.60E+00	Ci	C	1.37	g/mL	3195	kL	8.59E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	3H	Supernatant	2.43E+00	Ci	S	1.37	g/mL	3195	kL	5.80E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	59Ni	Supernatant	8.41E-01	Ci	TE	1.6	g/mL	3195	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	60Co	Supernatant	4.04E+02	Ci	S	1.37	g/mL	3195	kL	9.63E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	63Ni	Supernatant	7.93E+01	Ci	TE	1.6	g/mL	3195	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	79Se	Supernatant	2.58E+00	Ci	S	1.37	g/mL	3195	kL	6.15E-04	uCi/g	Jan 1 2001 12:00AM
241-AN-107	90Sr	Supernatant	3.02E+05	Ci	S	1.37	g/mL	3195	kL	7.20E+01	uCi/g	Jan 1 2001 12:00AM
241-AN-107	90Y	Supernatant	3.02E+05	Ci	C		g/mL	3195	kL		uCi/g	Jan 1 2001 12:00AM
241-AN-107	93mNb	Supernatant	1.54E+01	Ci	TE	1.6	g/mL	3195	kL	5.92E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-107	93Zr	Supernatant	1.92E+01	Ci	TE	1.6	g/mL	3195	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AN-107	99Tc	Supernatant	2.60E+02	Ci	S	1.37	g/mL	3195	kL	6.19E-02	uCi/g	Jan 1 2001 12:00AM
241-AN-107	Ag	Supernatant	6.13E+00	kg	S	1.42	g/mL	3195	kL	1.41E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Al	Supernatant	9.07E+02	kg	S	1.37	g/mL	3195	kL	2.18E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	As	Supernatant	1.55E+02	kg	S	1.37	g/mL	3195	kL	3.69E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	B	Supernatant	9.13E+01	kg	S	1.37	g/mL	3195	kL	2.20E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Ba	Supernatant	1.93E+01	kg	S	1.42	g/mL	3195	kL	4.44E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Be	Supernatant	3.06E+00	kg	S	1.42	g/mL	3195	kL	7.04E-01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Bi	Supernatant	2.76E+01	kg	S	1.42	g/mL	3195	kL	6.34E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Ca	Supernatant	2.04E+03	kg	S	1.37	g/mL	3195	kL	4.91E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	Cd	Supernatant	2.29E+02	kg	S	1.37	g/mL	3195	kL	5.50E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Ce	Supernatant	1.87E+02	kg	S	1.37	g/mL	3195	kL	4.50E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Cl	Supernatant	7.85E+03	kg	S	1.37	g/mL	3195	kL	1.89E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	CN	Supernatant	1.60E+01	kg	S	1.37	g/mL	3195	kL	3.85E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Co	Supernatant	1.38E+01	kg	S	1.42	g/mL	3195	kL	3.17E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Cr	Supernatant	5.90E+02	kg	S	1.37	g/mL	3195	kL	1.42E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	Cu	Supernatant	1.05E+02	kg	S	1.37	g/mL	3195	kL	2.52E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	F	Supernatant	2.48E+04	kg	S	1.37	g/mL	3195	kL	5.96E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	Fe	Supernatant	5.81E+03	kg	S	1.37	g/mL	3195	kL	1.40E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	3195	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	K	Supernatant	6.53E+03	kg	S	1.37	g/mL	3195	kL	1.57E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	La	Supernatant	1.22E+02	kg	S	1.37	g/mL	3195	kL	2.93E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Li	Supernatant	9.19E+00	kg	S	1.42	g/mL	3195	kL	2.11E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Mg	Supernatant	2.76E+01	kg	S	1.42	g/mL	3195	kL	6.34E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Mn	Supernatant	2.00E+03	kg	S	1.37	g/mL	3195	kL	4.81E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	Mo	Supernatant	1.27E+02	kg	S	1.37	g/mL	3195	kL	3.05E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Na	Supernatant	7.28E+05	kg	E	1.37	g/mL	3195	kL	1.66E+05	ug/g	Jan 1 2001 12:00AM
241-AN-107	Nd	Supernatant	3.53E+02	kg	S	1.37	g/mL	3195	kL	8.50E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	NH3	Supernatant	1.56E+02	kg	S	1.37	g/mL	3195	kL	3.71E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 73

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AN-107	Ni	Supernatant	1.93E+03	kg	S	1.37	g/mL	3195	kL	4.65E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	NO2	Supernatant	1.99E+05	kg	S	1.37	g/mL	3195	kL	4.79E+04	ug/g	Jan 1 2001 12:00AM
241-AN-107	NO3	Supernatant	6.87E+05	kg	S	1.37	g/mL	3195	kL	1.65E+05	ug/g	Jan 1 2001 12:00AM
241-AN-107	OH	Supernatant	3.87E+04	kg	E	1.37	g/mL	3195	kL	8.83E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	Pb	Supernatant	1.34E+03	kg	S	1.37	g/mL	3195	kL	3.23E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	PO4	Supernatant	5.34E+03	kg	S	1.37	g/mL	3195	kL	1.29E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	Rh	Supernatant	8.27E+01	kg	S	1.42	g/mL	3195	kL	1.90E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Sb	Supernatant	1.02E+00	kg	S	1.37	g/mL	3195	kL	2.44E-01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Se	Supernatant	6.89E+01	kg	S	1.42	g/mL	3195	kL	1.58E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Si	Supernatant	9.13E+01	kg	S	1.37	g/mL	3195	kL	2.20E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	SO4	Supernatant	3.09E+04	kg	S	1.37	g/mL	3195	kL	7.45E+03	ug/g	Jan 1 2001 12:00AM
241-AN-107	Sr	Supernatant	9.19E+00	kg	S	1.42	g/mL	3195	kL	2.11E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Ta	Supernatant	7.75E+01	kg	S	1.37	g/mL	3195	kL	1.85E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Ti	Supernatant	1.55E+01	kg	S	1.37	g/mL	3195	kL	3.69E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	TIC as CO3	Supernatant	2.08E+05	kg	S	1.37	g/mL	3195	kL	5.02E+04	ug/g	Jan 1 2001 12:00AM
241-AN-107	Tl	Supernatant	3.98E-01	kg	S	1.37	g/mL	3195	kL	9.49E-02	ug/g	Jan 1 2001 12:00AM
241-AN-107	TOC	Supernatant	1.24E+05	kg	S	1.37	g/mL	3195	kL	2.99E+04	ug/g	Jan 1 2001 12:00AM
241-AN-107	UTOTAL	Supernatant	3.43E+02	kg	S	1.37	g/mL	3195	kL	8.18E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	V	Supernatant	1.38E+01	kg	S	1.42	g/mL	3195	kL	3.17E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	W	Supernatant	5.19E+02	kg	S	1.37	g/mL	3195	kL	1.25E+02	ug/g	Jan 1 2001 12:00AM
241-AN-107	Y	Supernatant	2.60E+01	kg	S	1.42	g/mL	3195	kL	5.99E+00	ug/g	Jan 1 2001 12:00AM
241-AN-107	Zn	Supernatant	6.99E+01	kg	S	1.37	g/mL	3195	kL	1.68E+01	ug/g	Jan 1 2001 12:00AM
241-AN-107	Zr	Supernatant	2.45E+02	kg	S	1.37	g/mL	3195	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	106Ru	Supernatant	1.16E-04	Ci	TE	1.6	g/mL	4216	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-101	113mCd	Supernatant	1.05E+02	Ci	TE	1.6	g/mL	4216	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	125Sb	Supernatant	2.12E+02	Ci	S	1.31	g/mL	4216	kL	3.84E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	126Sn	Supernatant	3.57E+00	Ci	S	1.31	g/mL	4216	kL	6.47E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	129I	Supernatant	3.39E-01	Ci	S	1.31	g/mL	4216	kL	6.15E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	134Cs	Supernatant	1.57E+02	Ci	S	1.31	g/mL	4216	kL	2.85E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	137Cs	Supernatant	5.97E+05	Ci	S	1.31	g/mL	4216	kL	1.08E+02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	137mBa	Supernatant	5.65E+05	Ci	C		g/mL	4216	kL		uCi/g	Jan 1 2001 12:00AM
241-AP-101	14C	Supernatant	1.11E+00	Ci	S	1.31	g/mL	4216	kL	2.01E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	151Sm	Supernatant	1.79E+04	Ci	TE	1.6	g/mL	4216	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AP-101	152Eu	Supernatant	8.13E+00	Ci	S	1.31	g/mL	4216	kL	1.47E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-101	154Eu	Supernatant	7.97E+00	Ci	S	1.31	g/mL	4216	kL	1.44E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-101	155Eu	Supernatant	4.91E+00	Ci	E	1.31	g/mL	4216	kL	8.89E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	226Ra	Supernatant	2.16E-04	Ci	TE	1.6	g/mL	4216	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-101	227Ac	Supernatant	1.27E-03	Ci	TE	1.6	g/mL	4216	kL	3.52E-07	uCi/g	Jan 1 2001 12:00AM
241-AP-101	228Ra	Supernatant	4.75E-01	Ci	TE	1.6	g/mL	4216	kL	1.32E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	229Th	Supernatant	1.10E-02	Ci	TE	1.6	g/mL	4216	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-101	231Pa	Supernatant	5.94E-03	Ci	TE	1.6	g/mL	4216	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-101	232Th	Supernatant	5.79E-02	Ci	TE	1.6	g/mL	4216	kL	1.61E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	232U	Supernatant	6.21E-02	Ci	E	1.31	g/mL	4216	kL	1.12E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	233U	Supernatant	2.55E-01	Ci	E	1.31	g/mL	4216	kL	4.62E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	234U	Supernatant	8.64E-02	Ci	E	1.31	g/mL	4216	kL	1.56E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	235U	Supernatant	3.56E-03	Ci	E	1.31	g/mL	4216	kL	6.44E-07	uCi/g	Jan 1 2001 12:00AM
241-AP-101	236U	Supernatant	3.02E-03	Ci	E	1.31	g/mL	4216	kL	5.47E-07	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 74

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AP-101	237Np	Supernatant	2.29E-02	Ci	S	1.31	g/mL	4216	kL	4.15E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-101	238Pu	Supernatant	6.16E-02	Ci	S	1.31	g/mL	4216	kL	1.12E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	238U	Supernatant	7.80E-02	Ci	E	1.31	g/mL	4216	kL	1.41E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	239Pu	Supernatant	4.55E-01	Ci	E	1.31	g/mL	4216	kL	8.24E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	240Pu	Supernatant	7.67E-02	Ci	E	1.31	g/mL	4216	kL	1.39E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	241Am	Supernatant	7.11E-01	Ci	E	1.31	g/mL	4216	kL	1.29E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	241Pu	Supernatant	7.90E-01	Ci	E	1.31	g/mL	4216	kL	1.43E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	242Cm	Supernatant	1.63E-06	Ci	E	1.31	g/mL	4216	kL	2.95E-10	uCi/g	Jan 1 2001 12:00AM
241-AP-101	242Pu	Supernatant	6.96E-06	Ci	E	1.31	g/mL	4216	kL	1.26E-09	uCi/g	Jan 1 2001 12:00AM
241-AP-101	243Am	Supernatant	3.55E-05	Ci	E	1.31	g/mL	4216	kL	6.42E-09	uCi/g	Jan 1 2001 12:00AM
241-AP-101	243Cm	Supernatant	1.47E-04	Ci	E	1.31	g/mL	4216	kL	2.65E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-101	244Cm	Supernatant	3.19E-03	Ci	E	1.31	g/mL	4216	kL	5.77E-07	uCi/g	Jan 1 2001 12:00AM
241-AP-101	3H	Supernatant	1.96E+01	Ci	S	1.31	g/mL	4216	kL	3.54E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-101	59Ni	Supernatant	1.16E+00	Ci	TE	1.6	g/mL	4216	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-101	60Co	Supernatant	1.26E+01	Ci	S	1.31	g/mL	4216	kL	2.29E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-101	63Ni	Supernatant	1.10E+02	Ci	TE	1.6	g/mL	4216	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	79Se	Supernatant	2.45E-01	Ci	S	1.31	g/mL	4216	kL	4.44E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-101	90Sr	Supernatant	3.62E+02	Ci	S	1.31	g/mL	4216	kL	6.56E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	90Y	Supernatant	3.62E+02	Ci	C		g/mL	4216	kL		uCi/g	Jan 1 2001 12:00AM
241-AP-101	93mNb	Supernatant	1.91E+01	Ci	TE	1.6	g/mL	4216	kL	5.29E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-101	93Zr	Supernatant	2.66E+01	Ci	TE	1.6	g/mL	4216	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-101	99Tc	Supernatant	1.99E+02	Ci	S	1.31	g/mL	4216	kL	3.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-101	Ag	Supernatant	2.66E+00	kg	S	1.31	g/mL	4216	kL	4.81E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ag	Supernatant	2.66E+00	kg	S	1.31	g/mL	4216	kL	4.81E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Al	Supernatant	2.93E+04	kg	S	1.31	g/mL	4216	kL	5.30E+03	ug/g	Jan 1 2001 12:00AM
241-AP-101	As	Supernatant	5.31E+00	kg	S	1.31	g/mL	4216	kL	9.62E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	As	Supernatant	5.31E+00	kg	S	1.31	g/mL	4216	kL	9.62E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	B	Supernatant	6.75E+01	kg	S	1.31	g/mL	4216	kL	1.22E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	B	Supernatant	6.75E+01	kg	S	1.31	g/mL	4216	kL	1.22E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ba	Supernatant	1.39E+00	kg	S	1.31	g/mL	4216	kL	2.52E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ba	Supernatant	1.39E+00	kg	S	1.31	g/mL	4216	kL	2.52E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Be	Supernatant	5.57E+00	kg	S	1.31	g/mL	4216	kL	1.01E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Be	Supernatant	5.57E+00	kg	S	1.31	g/mL	4216	kL	1.01E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Bi	Supernatant	1.05E+01	kg	S	1.31	g/mL	4216	kL	1.91E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ca	Supernatant	3.25E+01	kg	S	1.31	g/mL	4216	kL	5.88E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Cd	Supernatant	8.43E+00	kg	S	1.31	g/mL	4216	kL	1.53E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Cd	Supernatant	8.43E+00	kg	S	1.31	g/mL	4216	kL	1.53E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ce	Supernatant	3.15E-01	kg	S	1.31	g/mL	4216	kL	5.70E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ce	Supernatant	3.15E-01	kg	S	1.31	g/mL	4216	kL	5.70E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Cl	Supernatant	8.35E+03	kg	S	1.31	g/mL	4216	kL	1.51E+03	ug/g	Jan 1 2001 12:00AM
241-AP-101	CN	Supernatant	2.40E+01	kg	S	1.31	g/mL	4216	kL	4.35E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	CN	Supernatant	2.40E+01	kg	S	1.31	g/mL	4216	kL	4.35E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Co	Supernatant	1.48E+00	kg	S	1.31	g/mL	4216	kL	2.69E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Co	Supernatant	1.48E+00	kg	S	1.31	g/mL	4216	kL	2.69E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Cr	Supernatant	6.03E+02	kg	S	1.31	g/mL	4216	kL	1.09E+02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Cu	Supernatant	6.75E+00	kg	S	1.31	g/mL	4216	kL	1.22E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Cu	Supernatant	6.75E+00	kg	S	1.31	g/mL	4216	kL	1.22E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 75

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AP-101	F	Supernatant	1.22E+04	kg	S	1.31	g/mL	4216	kL	2.21E+03	ug/g	Jan 1 2001 12:00AM
241-AP-101	Fe	Supernatant	1.05E+01	kg	S	1.31	g/mL	4216	kL	1.91E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	4216	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	K	Supernatant	1.32E+05	kg	S	1.31	g/mL	4216	kL	2.38E+04	ug/g	Jan 1 2001 12:00AM
241-AP-101	La	Supernatant	5.48E+00	kg	S	1.31	g/mL	4216	kL	9.92E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Li	Supernatant	1.43E+00	kg	S	1.31	g/mL	4216	kL	2.60E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Li	Supernatant	1.43E+00	kg	S	1.31	g/mL	4216	kL	2.60E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Mg	Supernatant	1.05E+01	kg	S	1.31	g/mL	4216	kL	1.91E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Mg	Supernatant	1.05E+01	kg	S	1.31	g/mL	4216	kL	1.91E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Mn	Supernatant	5.48E+00	kg	S	1.31	g/mL	4216	kL	9.92E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Mo	Supernatant	6.11E+01	kg	S	1.31	g/mL	4216	kL	1.11E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Mo	Supernatant	6.11E+01	kg	S	1.31	g/mL	4216	kL	1.11E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Na	Supernatant	5.45E+05	kg	S	1.31	g/mL	4216	kL	9.87E+04	ug/g	Jan 1 2001 12:00AM
241-AP-101	Nd	Supernatant	1.05E+01	kg	S	1.31	g/mL	4216	kL	1.91E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Nd	Supernatant	1.05E+01	kg	S	1.31	g/mL	4216	kL	1.91E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	NH3	Supernatant	7.21E+00	kg	S	1.31	g/mL	4216	kL	1.31E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	NH3	Supernatant	7.21E+00	kg	S	1.31	g/mL	4216	kL	1.31E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ni	Supernatant	3.33E+01	kg	S	1.31	g/mL	4216	kL	6.03E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	NO2	Supernatant	1.77E+05	kg	S	1.31	g/mL	4216	kL	3.20E+04	ug/g	Jan 1 2001 12:00AM
241-AP-101	NO3	Supernatant	5.57E+05	kg	S	1.31	g/mL	4216	kL	1.01E+05	ug/g	Jan 1 2001 12:00AM
241-AP-101	OH	Supernatant	1.74E+05	kg	S	1.31	g/mL	4216	kL	3.15E+04	ug/g	Jan 1 2001 12:00AM
241-AP-101	Oxalate	Supernatant	7.59E+03	kg	S	1.31	g/mL	4216	kL	1.37E+03	ug/g	Jan 1 2001 12:00AM
241-AP-101	Oxalate	Supernatant	7.59E+03	kg	S	1.31	g/mL	4216	kL	1.37E+03	ug/g	Jan 1 2001 12:00AM
241-AP-101	Pb	Supernatant	6.32E+01	kg	S	1.31	g/mL	4216	kL	1.15E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	PO4	Supernatant	4.06E+03	kg	S	1.31	g/mL	4216	kL	7.35E+02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Pr	Supernatant	7.29E-02	kg	S	1.31	g/mL	4216	kL	1.32E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Pr	Supernatant	7.29E-02	kg	S	1.31	g/mL	4216	kL	1.32E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Rb	Supernatant	1.67E+01	kg	S	1.31	g/mL	4216	kL	3.03E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Rb	Supernatant	1.67E+01	kg	S	1.31	g/mL	4216	kL	3.03E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Sb	Supernatant	1.77E-01	kg	S	1.31	g/mL	4216	kL	3.21E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Sb	Supernatant	1.77E-01	kg	S	1.31	g/mL	4216	kL	3.21E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Se	Supernatant	9.70E+00	kg	S	1.31	g/mL	4216	kL	1.76E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Se	Supernatant	9.70E+00	kg	S	1.31	g/mL	4216	kL	1.76E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Si	Supernatant	5.78E+02	kg	S	1.31	g/mL	4216	kL	1.05E+02	ug/g	Jan 1 2001 12:00AM
241-AP-101	SO4	Supernatant	1.70E+04	kg	S	1.31	g/mL	4216	kL	3.08E+03	ug/g	Jan 1 2001 12:00AM
241-AP-101	Sr	Supernatant	1.60E+00	kg	S	1.31	g/mL	4216	kL	2.90E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ta	Supernatant	3.75E-01	kg	S	1.31	g/mL	4216	kL	6.79E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ta	Supernatant	3.75E-01	kg	S	1.31	g/mL	4216	kL	6.79E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Th	Supernatant	4.64E-02	kg	S	1.31	g/mL	4216	kL	8.40E-03	ug/g	Jan 1 2001 12:00AM
241-AP-101	Th	Supernatant	4.64E-02	kg	S	1.31	g/mL	4216	kL	8.40E-03	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ti	Supernatant	2.66E+00	kg	S	1.31	g/mL	4216	kL	4.81E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Ti	Supernatant	2.66E+00	kg	S	1.31	g/mL	4216	kL	4.81E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	TIC as CO3	Supernatant	1.36E+05	kg	S	1.31	g/mL	4216	kL	2.47E+04	ug/g	Jan 1 2001 12:00AM
241-AP-101	Tl	Supernatant	7.59E-02	kg	S	1.31	g/mL	4216	kL	1.37E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	Tl	Supernatant	7.59E-02	kg	S	1.31	g/mL	4216	kL	1.37E-02	ug/g	Jan 1 2001 12:00AM
241-AP-101	UTOTAL	Supernatant	2.33E+02	kg	S	1.31	g/mL	4216	kL	4.22E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	V	Supernatant	3.15E+00	kg	S	1.31	g/mL	4216	kL	5.70E-01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 76

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AP-101	V	Supernatant	3.15E+00	kg	S	1.31	g/mL	4216	kL	5.70E-01	ug/g	Jan 1 2001 12:00AM
241-AP-101	W	Supernatant	1.21E+02	kg	S	1.31	g/mL	4216	kL	2.18E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	W	Supernatant	1.21E+02	kg	S	1.31	g/mL	4216	kL	2.18E+01	ug/g	Jan 1 2001 12:00AM
241-AP-101	Zn	Supernatant	2.36E+01	kg	S	1.31	g/mL	4216	kL	4.27E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Zn	Supernatant	2.36E+01	kg	S	1.31	g/mL	4216	kL	4.27E+00	ug/g	Jan 1 2001 12:00AM
241-AP-101	Zr	Supernatant	5.90E+00	kg	S	1.31	g/mL	4216	kL	1.07E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	106Ru	Supernatant	7.59E-05	Ci	E	1.25	g/mL	4195	kL	1.45E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-104	113mCd	Supernatant	9.08E+01	Ci	E	1.25	g/mL	4195	kL	1.73E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-104	125Sb	Supernatant	4.23E+01	Ci	E	1.25	g/mL	4195	kL	8.06E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-104	126Sn	Supernatant	3.04E+00	Ci	E	1.25	g/mL	4195	kL	5.79E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	129I	Supernatant	5.82E-01	Ci	S	1.28	g/mL	4195	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	134Cs	Supernatant	9.25E-01	Ci	E	1.25	g/mL	4195	kL	1.76E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	137Cs	Supernatant	8.94E+05	Ci	S	1.28	g/mL	4195	kL	1.66E+02	uCi/g	Jan 1 2001 12:00AM
241-AP-104	137mBa	Supernatant	8.46E+05	Ci	C		g/mL	4195	kL		uCi/g	Jan 1 2001 12:00AM
241-AP-104	14C	Supernatant	2.66E+00	Ci	S	1.28	g/mL	4195	kL	4.96E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	151Sm	Supernatant	1.68E+04	Ci	E	1.25	g/mL	4195	kL	3.20E+00	uCi/g	Jan 1 2001 12:00AM
241-AP-104	152Eu	Supernatant	4.17E+00	Ci	E	1.25	g/mL	4195	kL	7.95E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	154Eu	Supernatant	1.80E+02	Ci	E	1.25	g/mL	4195	kL	3.43E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-104	155Eu	Supernatant	6.24E+01	Ci	E	1.25	g/mL	4195	kL	1.19E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-104	226Ra	Supernatant	2.39E-04	Ci	E	1.25	g/mL	4195	kL	4.55E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-104	227Ac	Supernatant	1.16E-03	Ci	E	1.25	g/mL	4195	kL	2.21E-07	uCi/g	Jan 1 2001 12:00AM
241-AP-104	228Ra	Supernatant	8.57E-02	Ci	E	1.25	g/mL	4195	kL	1.63E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-104	229Th	Supernatant	3.85E-03	Ci	E	1.25	g/mL	4195	kL	7.35E-07	uCi/g	Jan 1 2001 12:00AM
241-AP-104	231Pa	Supernatant	6.21E-03	Ci	E	1.25	g/mL	4195	kL	1.18E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	232Th	Supernatant	1.16E-04	Ci	S	1.28	g/mL	4195	kL	2.16E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-104	232U	Supernatant	1.27E-02	Ci	E	1.28	g/mL	4195	kL	2.37E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	233U	Supernatant	5.23E-02	Ci	E	1.28	g/mL	4195	kL	9.74E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	234U	Supernatant	1.63E-02	Ci	E	1.28	g/mL	4195	kL	3.03E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	235U	Supernatant	6.63E-04	Ci	E	1.28	g/mL	4195	kL	1.23E-07	uCi/g	Jan 1 2001 12:00AM
241-AP-104	236U	Supernatant	5.33E-04	Ci	E	1.28	g/mL	4195	kL	9.92E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-104	237Np	Supernatant	7.47E-01	Ci	S	1.28	g/mL	4195	kL	1.39E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	238Pu	Supernatant	2.38E-02	Ci	E	1.28	g/mL	4195	kL	4.43E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	238U	Supernatant	1.47E-02	Ci	E	1.28	g/mL	4195	kL	2.74E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	239Pu	Supernatant	7.31E-01	Ci	E	1.28	g/mL	4195	kL	1.36E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	240Pu	Supernatant	1.24E-01	Ci	E	1.28	g/mL	4195	kL	2.31E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-104	241Am	Supernatant	1.18E+01	Ci	E	1.28	g/mL	4195	kL	2.19E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-104	241Pu	Supernatant	1.04E+00	Ci	E	1.28	g/mL	4195	kL	1.94E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	242Cm	Supernatant	3.70E-02	Ci	E	1.28	g/mL	4195	kL	6.89E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	242Pu	Supernatant	8.05E-06	Ci	E	1.28	g/mL	4195	kL	1.50E-09	uCi/g	Jan 1 2001 12:00AM
241-AP-104	243Am	Supernatant	4.20E-04	Ci	E	1.28	g/mL	4195	kL	7.81E-08	uCi/g	Jan 1 2001 12:00AM
241-AP-104	243Cm	Supernatant	1.49E-02	Ci	E	1.28	g/mL	4195	kL	2.78E-06	uCi/g	Jan 1 2001 12:00AM
241-AP-104	244Cm	Supernatant	3.27E-01	Ci	E	1.28	g/mL	4195	kL	6.09E-05	uCi/g	Jan 1 2001 12:00AM
241-AP-104	3H	Supernatant	2.78E+00	Ci	S	1.28	g/mL	4195	kL	5.18E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	59Ni	Supernatant	1.86E+00	Ci	E	1.25	g/mL	4195	kL	3.55E-04	uCi/g	Jan 1 2001 12:00AM
241-AP-104	60Co	Supernatant	2.77E+01	Ci	E	1.25	g/mL	4195	kL	5.29E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-104	63Ni	Supernatant	1.79E+02	Ci	E	1.25	g/mL	4195	kL	3.41E-02	uCi/g	Jan 1 2001 12:00AM
241-AP-104	79Se	Supernatant	3.16E+00	Ci	S	1.28	g/mL	4195	kL	5.88E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 77

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AP-104	90Sr	Supernatant	7.76E+03	Ci	S	1.28	g/mL	4195	kL	1.44E+00	uCi/g	Jan 1 2001 12:00AM
241-AP-104	90Y	Supernatant	7.76E+03	Ci	C		g/mL	4195	kL		uCi/g	Jan 1 2001 12:00AM
241-AP-104	93mNb	Supernatant	1.55E+01	Ci	E	1.25	g/mL	4195	kL	2.95E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-104	93Zr	Supernatant	1.88E+01	Ci	E	1.25	g/mL	4195	kL	3.58E-03	uCi/g	Jan 1 2001 12:00AM
241-AP-104	99Tc	Supernatant	7.09E+02	Ci	S	1.28	g/mL	4195	kL	1.32E-01	uCi/g	Jan 1 2001 12:00AM
241-AP-104	Ag	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Al	Supernatant	6.11E+04	kg	S	1.28	g/mL	4195	kL	1.14E+04	ug/g	Jan 1 2001 12:00AM
241-AP-104	As	Supernatant	7.26E+00	kg	S	1.28	g/mL	4195	kL	1.35E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	B	Supernatant	1.73E+02	kg	S	1.28	g/mL	4195	kL	3.22E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ba	Supernatant	2.52E-01	kg	S	1.28	g/mL	4195	kL	4.69E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Be	Supernatant	5.10E-01	kg	S	1.28	g/mL	4195	kL	9.51E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Bi	Supernatant	1.05E+02	kg	S	1.28	g/mL	4195	kL	1.95E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ca	Supernatant	2.36E+02	kg	S	1.28	g/mL	4195	kL	4.40E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Cd	Supernatant	5.24E+00	kg	S	1.28	g/mL	4195	kL	9.77E-01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ce	Supernatant	2.46E-01	kg	S	1.28	g/mL	4195	kL	4.57E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Cl	Supernatant	2.44E+04	kg	S	1.28	g/mL	4195	kL	4.54E+03	ug/g	Jan 1 2001 12:00AM
241-AP-104	CN	Supernatant	1.09E+02	kg	S	1.28	g/mL	4195	kL	2.04E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Co	Supernatant	2.89E+00	kg	S	1.28	g/mL	4195	kL	5.38E-01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Cr	Supernatant	1.98E+03	kg	S	1.28	g/mL	4195	kL	3.68E+02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Cu	Supernatant	1.06E+01	kg	S	1.28	g/mL	4195	kL	1.97E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	F	Supernatant	5.13E+02	kg	S	1.28	g/mL	4195	kL	9.55E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Fe	Supernatant	5.24E+01	kg	S	1.28	g/mL	4195	kL	9.77E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Hg	Supernatant	0.00E+00	kg	E	1	g/mL	4195	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	K	Supernatant	8.39E+03	kg	S	1.28	g/mL	4195	kL	1.56E+03	ug/g	Jan 1 2001 12:00AM
241-AP-104	La	Supernatant	4.17E-01	kg	S	1.28	g/mL	4195	kL	7.76E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Li	Supernatant	8.39E-02	kg	S	1.28	g/mL	4195	kL	1.56E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Mg	Supernatant	1.05E+02	kg	S	1.28	g/mL	4195	kL	1.95E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Mn	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Mo	Supernatant	2.36E+02	kg	S	1.28	g/mL	4195	kL	4.40E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Na	Supernatant	5.52E+05	kg	S	1.28	g/mL	4195	kL	1.03E+05	ug/g	Jan 1 2001 12:00AM
241-AP-104	Nd	Supernatant	1.05E+02	kg	S	1.28	g/mL	4195	kL	1.95E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ni	Supernatant	1.69E+02	kg	S	1.28	g/mL	4195	kL	3.14E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	NO2	Supernatant	3.03E+05	kg	S	1.28	g/mL	4195	kL	5.64E+04	ug/g	Jan 1 2001 12:00AM
241-AP-104	NO3	Supernatant	4.77E+05	kg	S	1.28	g/mL	4195	kL	8.89E+04	ug/g	Jan 1 2001 12:00AM
241-AP-104	OH	Supernatant	8.64E+04	kg	S	1.28	g/mL	4195	kL	1.61E+04	ug/g	Jan 1 2001 12:00AM
241-AP-104	Pb	Supernatant	1.05E+02	kg	S	1.28	g/mL	4195	kL	1.95E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	PO4	Supernatant	1.92E+04	kg	S	1.28	g/mL	4195	kL	3.58E+03	ug/g	Jan 1 2001 12:00AM
241-AP-104	Pr	Supernatant	7.13E-01	kg	S	1.28	g/mL	4195	kL	1.33E-01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Rb	Supernatant	1.18E+01	kg	S	1.28	g/mL	4195	kL	2.20E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Rh	Supernatant	2.28E+01	kg	S	1.28	g/mL	4195	kL	4.26E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ru	Supernatant	9.00E+01	kg	S	1.28	g/mL	4195	kL	1.68E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Sb	Supernatant	1.12E-01	kg	S	1.28	g/mL	4195	kL	2.08E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	Se	Supernatant	2.85E+01	kg	S	1.28	g/mL	4195	kL	5.31E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Si	Supernatant	1.94E+02	kg	S	1.28	g/mL	4195	kL	3.61E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	SO4	Supernatant	1.40E+04	kg	S	1.28	g/mL	4195	kL	2.60E+03	ug/g	Jan 1 2001 12:00AM
241-AP-104	Sr	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ta	Supernatant	1.44E-01	kg	S	1.28	g/mL	4195	kL	2.68E-02	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 78

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AP-104	Te	Supernatant	7.13E-01	kg	S	1.28	g/mL	4195	kL	1.33E-01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Th	Supernatant	1.06E+00	kg	S	1.28	g/mL	4195	kL	1.98E-01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Ti	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	TIC as CO3	Supernatant	7.10E+04	kg	S	1.28	g/mL	4195	kL	1.32E+04	ug/g	Jan 1 2001 12:00AM
241-AP-104	Tl	Supernatant	2.10E-01	kg	S	1.28	g/mL	4195	kL	3.91E-02	ug/g	Jan 1 2001 12:00AM
241-AP-104	UTOTAL	Supernatant	4.36E+01	kg	S	1.28	g/mL	4195	kL	8.13E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	V	Supernatant	5.24E+01	kg	S	1.28	g/mL	4195	kL	9.77E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	W	Supernatant	3.75E+02	kg	S	1.28	g/mL	4195	kL	6.98E+01	ug/g	Jan 1 2001 12:00AM
241-AP-104	Y	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Zn	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AP-104	Zr	Supernatant	1.05E+01	kg	S	1.28	g/mL	4195	kL	1.95E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	106Ru	Salt Cake	1.02E-04	Ci	TS	1.58	g/mL	1403	kL	4.97E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	106Ru	Supernatant	1.15E-04	Ci	TE	1.6	g/mL	2768	kL	3.21E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	113mCd	Salt Cake	9.27E+01	Ci	TS	1.58	g/mL	1403	kL	4.52E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	113mCd	Supernatant	1.05E+02	Ci	TE	1.6	g/mL	2768	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	125Sb	Salt Cake	5.09E+01	Ci	TS	1.58	g/mL	1403	kL	2.48E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	125Sb	Supernatant	5.75E+01	Ci	TE	1.6	g/mL	2768	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	126Sn	Salt Cake	2.87E+00	Ci	TS	1.58	g/mL	1403	kL	1.40E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	126Sn	Supernatant	3.23E+00	Ci	TE	1.6	g/mL	2768	kL	9.02E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	129I	Salt Cake	2.30E-01	Ci	TS	1.58	g/mL	1403	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	129I	Supernatant	9.02E-01	Ci	S	1.47	g/mL	2768	kL	2.22E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	134Cs	Salt Cake	2.22E-01	Ci	TS	1.58	g/mL	1403	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	134Cs	Supernatant	1.35E+02	Ci	S	1.48	g/mL	2768	kL	3.31E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	137Cs	Salt Cake	5.09E+05	Ci	S	1.59	g/mL	1403	kL	2.28E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	137Cs	Supernatant	1.21E+06	Ci	S	1.47	g/mL	2768	kL	2.98E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	137mBa	Salt Cake	4.81E+05	Ci	C		g/mL	1403	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	137mBa	Supernatant	1.15E+06	Ci	C		g/mL	2768	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	14C	Salt Cake	3.86E+01	Ci	TS	1.58	g/mL	1403	kL	1.88E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	14C	Supernatant	8.36E-01	Ci	S	1.47	g/mL	2768	kL	2.05E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	151Sm	Salt Cake	1.58E+04	Ci	TS	1.58	g/mL	1403	kL	7.69E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-101	151Sm	Supernatant	1.78E+04	Ci	TE	1.6	g/mL	2768	kL	4.97E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-101	152Eu	Salt Cake	4.77E+00	Ci	TS	1.58	g/mL	1403	kL	2.32E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	152Eu	Supernatant	5.38E+00	Ci	TE	1.6	g/mL	2768	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	154Eu	Salt Cake	1.65E+02	Ci	S	1.59	g/mL	1403	kL	7.40E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	154Eu	Supernatant	8.31E+01	Ci	S	1.47	g/mL	2768	kL	2.04E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	155Eu	Salt Cake	6.09E+02	Ci	S	1.59	g/mL	1403	kL	2.73E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-101	155Eu	Supernatant	1.68E+02	Ci	TE	1.6	g/mL	2768	kL	4.70E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	226Ra	Salt Cake	1.91E-04	Ci	TS	1.58	g/mL	1403	kL	9.28E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	226Ra	Supernatant	2.15E-04	Ci	TE	1.6	g/mL	2768	kL	5.99E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	227Ac	Salt Cake	1.94E-03	Ci	TS	1.58	g/mL	1403	kL	9.46E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-101	227Ac	Supernatant	2.19E-03	Ci	TE	1.6	g/mL	2768	kL	6.12E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-101	228Ra	Salt Cake	2.29E-01	Ci	TS	1.58	g/mL	1403	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	228Ra	Supernatant	2.29E-01	Ci	TE	1.6	g/mL	2768	kL	6.39E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	229Th	Salt Cake	9.72E-03	Ci	TS	1.58	g/mL	1403	kL	4.74E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	229Th	Supernatant	1.10E-02	Ci	TE	1.6	g/mL	2768	kL	3.06E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	231Pa	Salt Cake	5.23E-03	Ci	TS	1.58	g/mL	1403	kL	2.55E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	231Pa	Supernatant	5.91E-03	Ci	TE	1.6	g/mL	2768	kL	1.65E-06	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 79

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-101	232Th	Supernatant	2.52E-04	Ci	S	1.47	g/mL	2768	kL	6.18E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	232Th	Salt Cake	5.11E-02	Ci	TS	1.58	g/mL	1403	kL	2.49E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	232U	Salt Cake	5.06E-01	Ci	C	1.59	g/mL	1403	kL	2.27E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	232U	Supernatant	1.84E-03	Ci	C	1.48	g/mL	2768	kL	4.49E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-101	233U	Salt Cake	2.07E+00	Ci	C	1.59	g/mL	1403	kL	9.29E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	233U	Supernatant	7.54E-03	Ci	C	1.48	g/mL	2768	kL	1.84E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	234U	Salt Cake	1.21E+00	Ci	C	1.59	g/mL	1403	kL	5.42E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	234U	Supernatant	4.40E-03	Ci	C	1.48	g/mL	2768	kL	1.07E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	235U	Salt Cake	4.65E-02	Ci	C	1.59	g/mL	1403	kL	2.08E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	235U	Supernatant	1.69E-04	Ci	C	1.48	g/mL	2768	kL	4.13E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	236U	Salt Cake	1.40E-01	Ci	S	1.59	g/mL	1403	kL	6.29E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	236U	Supernatant	3.04E-04	Ci	C	1.48	g/mL	2768	kL	7.42E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	237Np	Salt Cake	4.21E-01	Ci	TS	1.58	g/mL	1403	kL	2.05E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	237Np	Supernatant	1.02E-01	Ci	S	1.47	g/mL	2768	kL	2.52E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	238Pu	Salt Cake	1.46E+01	Ci	S	1.59	g/mL	1403	kL	6.55E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	238Pu	Supernatant	1.35E-01	Ci	S	1.48	g/mL	2768	kL	3.30E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	238U	Salt Cake	8.97E-01	Ci	S	1.59	g/mL	1403	kL	4.02E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	238U	Supernatant	3.26E-03	Ci	C	1.48	g/mL	2768	kL	7.95E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-101	239Pu	Salt Cake	9.81E+01	Ci	C	1.59	g/mL	1403	kL	4.40E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	239Pu	Supernatant	1.12E+00	Ci	C	1.48	g/mL	2768	kL	2.72E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	240Pu	Salt Cake	2.70E+01	Ci	C	1.59	g/mL	1403	kL	1.21E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	240Pu	Supernatant	3.07E-01	Ci	C	1.48	g/mL	2768	kL	7.49E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	241Am	Salt Cake	1.03E+02	Ci	S	1.59	g/mL	1403	kL	4.63E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	241Am	Supernatant	1.85E+00	Ci	S	1.47	g/mL	2768	kL	4.56E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	241Pu	Salt Cake	7.15E+02	Ci	C	1.59	g/mL	1403	kL	3.20E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-101	241Pu	Supernatant	8.12E+00	Ci	C	1.48	g/mL	2768	kL	1.98E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	242Cm	Salt Cake	1.53E-01	Ci	C	1.59	g/mL	1403	kL	6.87E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-101	242Cm	Supernatant	2.78E-03	Ci	C	1.47	g/mL	2768	kL	6.83E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-101	242Pu	Supernatant	4.35E-05	Ci	C	1.48	g/mL	2768	kL	1.06E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	242Pu	Salt Cake	3.83E-03	Ci	C	1.59	g/mL	1403	kL	1.72E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	243Am	Salt Cake	7.08E-03	Ci	C	1.59	g/mL	1403	kL	3.17E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-101	243Am	Supernatant	1.28E-04	Ci	C	1.47	g/mL	2768	kL	3.15E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-101	243Cm	Salt Cake	7.58E-02	Ci	C		g/mL	1403	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	243Cm	Supernatant	1.01E-03	Ci	C		g/mL	2768	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	244Cm	Salt Cake	1.77E+00	Ci	C		g/mL	1403	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	244Cm	Supernatant	2.35E-02	Ci	C		g/mL	2768	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	3H	Salt Cake	1.74E+01	Ci	S	1.59	g/mL	1403	kL	7.80E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	3H	Supernatant	1.00E+01	Ci	S	1.47	g/mL	2768	kL	2.46E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	59Ni	Salt Cake	3.10E+00	Ci	TS	1.58	g/mL	1403	kL	1.51E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	59Ni	Supernatant	1.16E+00	Ci	TE	1.6	g/mL	2768	kL	3.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	60Co	Salt Cake	4.54E+01	Ci	S	1.59	g/mL	1403	kL	2.03E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	60Co	Supernatant	2.17E+01	Ci	S	1.48	g/mL	2768	kL	5.30E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	63Ni	Salt Cake	2.94E+02	Ci	TS	1.58	g/mL	1403	kL	1.43E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-101	63Ni	Supernatant	1.09E+02	Ci	TE	1.6	g/mL	2768	kL	3.05E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	79Se	Salt Cake	4.74E-01	Ci	TS	1.58	g/mL	1403	kL	2.31E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	79Se	Supernatant	1.95E+00	Ci	S	1.47	g/mL	2768	kL	4.79E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-101	90Sr	Salt Cake	8.82E+04	Ci	S	1.59	g/mL	1403	kL	3.95E+01	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 80

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-101	90Sr	Supernatant	1.11E+03	Ci	S	1.47	g/mL	2768	kL	2.73E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-101	90Y	Salt Cake	8.82E+04	Ci	C		g/mL	1403	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	90Y	Supernatant	1.11E+03	Ci	C		g/mL	2768	kL		uCi/g	Jan 1 2001 12:00AM
241-AW-101	93mNb	Salt Cake	1.88E+01	Ci	TS	1.58	g/mL	1403	kL	9.15E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	93mNb	Supernatant	2.12E+01	Ci	TE	1.6	g/mL	2768	kL	5.92E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	93Zr	Salt Cake	2.34E+01	Ci	TS	1.58	g/mL	1403	kL	1.14E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-101	93Zr	Supernatant	2.64E+01	Ci	TE	1.6	g/mL	2768	kL	7.37E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-101	99Tc	Salt Cake	3.50E+02	Ci	S	1.58	g/mL	1403	kL	1.58E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-101	99Tc	Supernatant	4.87E+02	Ci	S	1.47	g/mL	2768	kL	1.20E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-101	Ag	Supernatant	5.54E+00	kg	S	1.48	g/mL	2768	kL	1.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ag	Salt Cake	5.68E+01	kg	S	1.59	g/mL	1403	kL	2.55E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Al	Supernatant	9.11E+04	kg	S	1.47	g/mL	2768	kL	2.24E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	Al	Salt Cake	3.34E+04	kg	S	1.59	g/mL	1403	kL	1.50E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	As	Salt Cake	8.31E+01	kg	S	1.58	g/mL	1403	kL	3.75E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	As	Supernatant	2.59E+02	kg	S	1.47	g/mL	2768	kL	6.37E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	B	Salt Cake	2.44E+02	kg	S	1.59	g/mL	1403	kL	1.09E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	B	Supernatant	2.46E+02	kg	S	1.47	g/mL	2768	kL	6.05E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ba	Salt Cake	1.10E+01	kg	S	1.59	g/mL	1403	kL	4.95E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ba	Supernatant	2.77E+00	kg	S	1.48	g/mL	2768	kL	6.76E-01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Be	Supernatant	7.47E+00	kg	S	1.48	g/mL	2768	kL	1.82E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Be	Supernatant	7.47E+00	kg	S	1.48	g/mL	2768	kL	1.82E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Bi	Salt Cake	2.57E+01	kg	S	1.59	g/mL	1403	kL	1.15E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Bi	Supernatant	2.21E+01	kg	S	1.48	g/mL	2768	kL	5.41E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ca	Salt Cake	7.30E+02	kg	S	1.59	g/mL	1403	kL	3.27E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ca	Supernatant	5.67E+01	kg	S	1.48	g/mL	2768	kL	1.39E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cd	Salt Cake	1.67E+01	kg	S	1.59	g/mL	1403	kL	7.47E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cd	Supernatant	5.81E+00	kg	S	1.48	g/mL	2768	kL	1.42E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ce	Salt Cake	5.13E+01	kg	S	1.59	g/mL	1403	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ce	Supernatant	1.11E+01	kg	S	1.48	g/mL	2768	kL	2.70E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cl	Salt Cake	7.81E+03	kg	S	1.59	g/mL	1403	kL	3.50E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cl	Supernatant	2.02E+04	kg	S	1.47	g/mL	2768	kL	4.97E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	Co	Supernatant	1.11E+01	kg	S	1.48	g/mL	2768	kL	2.70E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Co	Salt Cake	1.23E+01	kg	S	1.59	g/mL	1403	kL	5.50E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cr	Salt Cake	8.76E+02	kg	S	1.59	g/mL	1403	kL	3.93E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cr	Supernatant	3.43E+02	kg	S	1.47	g/mL	2768	kL	8.44E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cu	Salt Cake	2.44E+01	kg	S	1.59	g/mL	1403	kL	1.09E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Cu	Supernatant	7.47E+00	kg	S	1.48	g/mL	2768	kL	1.82E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	F	Supernatant	2.66E+03	kg	S	1.47	g/mL	2768	kL	6.54E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	F	Salt Cake	7.47E+03	kg	S	1.59	g/mL	1403	kL	3.35E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	Fe	Salt Cake	8.04E+02	kg	S	1.59	g/mL	1403	kL	3.61E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Fe	Supernatant	2.08E+01	kg	S	1.48	g/mL	2768	kL	5.07E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Hg	Salt Cake	0.00E+00	kg	TS	1.58	g/mL	1403	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Hg	Supernatant	0.00E+00	kg	TE	1.6	g/mL	2768	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	K	Salt Cake	6.97E+04	kg	S	1.59	g/mL	1403	kL	3.12E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	K	Supernatant	9.83E+04	kg	S	1.47	g/mL	2768	kL	2.41E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	La	Salt Cake	1.23E+01	kg	S	1.59	g/mL	1403	kL	5.50E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	La	Supernatant	3.94E+00	kg	TE	1.6	g/mL	2768	kL	1.10E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 81

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-101	Li	Supernatant	6.92E+00	kg	S	1.48	g/mL	2768	kL	1.69E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Li	Salt Cake	7.81E+00	kg	S	1.59	g/mL	1403	kL	3.50E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Mg	Supernatant	2.21E+01	kg	S	1.48	g/mL	2768	kL	5.41E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Mg	Salt Cake	1.57E+02	kg	S	1.59	g/mL	1403	kL	7.06E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Mn	Salt Cake	6.25E+02	kg	S	1.59	g/mL	1403	kL	2.80E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Mn	Supernatant	1.11E+01	kg	S	1.48	g/mL	2768	kL	2.70E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Mo	Supernatant	1.88E+02	kg	S	1.47	g/mL	2768	kL	4.63E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Mo	Salt Cake	7.63E+01	kg	S	1.59	g/mL	1403	kL	3.42E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Na	Salt Cake	3.77E+05	kg	S	1.59	g/mL	1403	kL	1.69E+05	ug/g	Jan 1 2001 12:00AM
241-AW-101	Na	Supernatant	7.11E+05	kg	S	1.47	g/mL	2768	kL	1.75E+05	ug/g	Jan 1 2001 12:00AM
241-AW-101	Nd	Salt Cake	2.57E+01	kg	S	1.59	g/mL	1403	kL	1.15E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Nd	Supernatant	2.21E+01	kg	S	1.48	g/mL	2768	kL	5.41E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	NH3	Supernatant	2.77E+01	kg	S	1.47	g/mL	2768	kL	6.80E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ni	Salt Cake	9.18E+01	kg	S	1.59	g/mL	1403	kL	4.11E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ni	Supernatant	1.69E+01	kg	S	1.48	g/mL	2768	kL	4.12E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	NO2	Salt Cake	1.30E+05	kg	S	1.59	g/mL	1403	kL	5.84E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	NO2	Supernatant	3.32E+05	kg	S	1.47	g/mL	2768	kL	8.16E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	NO3	Salt Cake	3.46E+05	kg	S	1.59	g/mL	1403	kL	1.55E+05	ug/g	Jan 1 2001 12:00AM
241-AW-101	NO3	Supernatant	4.71E+05	kg	S	1.47	g/mL	2768	kL	1.16E+05	ug/g	Jan 1 2001 12:00AM
241-AW-101	OH	Salt Cake	1.17E+05	kg	S	1.59	g/mL	1403	kL	5.26E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	OH	Supernatant	2.65E+05	kg	S	1.47	g/mL	2768	kL	6.52E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	Oxalate	Salt Cake	2.59E+04	kg	S	1.58	g/mL	1403	kL	1.17E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	Pb	Salt Cake	5.34E+02	kg	S	1.59	g/mL	1403	kL	2.39E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Pb	Supernatant	2.03E+02	kg	S	1.48	g/mL	2768	kL	4.97E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	PO4	Salt Cake	9.26E+03	kg	S	1.59	g/mL	1403	kL	4.15E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	PO4	Supernatant	1.82E+03	kg	S	1.48	g/mL	2768	kL	4.45E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Sb	Supernatant	1.15E+02	kg	S	1.48	g/mL	2768	kL	2.80E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Sb	Salt Cake	4.99E+01	kg	S	1.58	g/mL	1403	kL	2.25E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Se	Supernatant	5.67E+01	kg	S	1.48	g/mL	2768	kL	1.39E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Se	Salt Cake	6.36E+01	kg	S	1.59	g/mL	1403	kL	2.85E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Si	Salt Cake	8.95E+02	kg	S	1.59	g/mL	1403	kL	4.01E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Si	Supernatant	4.98E+02	kg	S	1.47	g/mL	2768	kL	1.22E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	SO4	Salt Cake	9.17E+03	kg	S	1.59	g/mL	1403	kL	4.11E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	SO4	Supernatant	3.54E+03	kg	S	1.47	g/mL	2768	kL	8.69E+02	ug/g	Jan 1 2001 12:00AM
241-AW-101	Sr	Salt Cake	7.92E+00	kg	S	1.59	g/mL	1403	kL	3.55E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Sr	Supernatant	2.77E+00	kg	S	1.48	g/mL	2768	kL	6.76E-01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ti	Salt Cake	8.67E+00	kg	S	1.58	g/mL	1403	kL	3.91E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Ti	Supernatant	2.59E+01	kg	S	1.47	g/mL	2768	kL	6.37E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	TIC as CO3	Salt Cake	9.35E+04	kg	S	1.59	g/mL	1403	kL	4.19E+04	ug/g	Jan 1 2001 12:00AM
241-AW-101	TIC as CO3	Supernatant	2.55E+04	kg	S	1.47	g/mL	2768	kL	6.26E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	Tl	Supernatant	1.15E+02	kg	S	1.48	g/mL	2768	kL	2.80E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Tl	Salt Cake	1.27E+02	kg	S	1.59	g/mL	1403	kL	5.70E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	UTOTAL	Salt Cake	2.69E+03	kg	S	1.59	g/mL	1403	kL	1.20E+03	ug/g	Jan 1 2001 12:00AM
241-AW-101	UTOTAL	Supernatant	9.77E+00	kg	S	1.48	g/mL	2768	kL	2.39E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	V	Salt Cake	1.23E+01	kg	S	1.59	g/mL	1403	kL	5.50E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	V	Supernatant	1.11E+01	kg	S	1.48	g/mL	2768	kL	2.70E+00	ug/g	Jan 1 2001 12:00AM
241-AW-101	Zn	Supernatant	6.03E+01	kg	S	1.47	g/mL	2768	kL	1.48E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 82

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-101	Zn	Salt Cake	7.24E+01	kg	S	1.59	g/mL	1403	kL	3.25E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Zr	Salt Cake	1.68E+02	kg	S	1.59	g/mL	1403	kL	7.54E+01	ug/g	Jan 1 2001 12:00AM
241-AW-101	Zr	Supernatant	3.96E+01	kg	S	1.47	g/mL	2768	kL	9.73E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	106Ru	Supernatant	3.05E-04	Ci	TE	1.11	g/mL	3539	kL	3.66E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	113mCd	Supernatant	3.24E+02	Ci	TE	1.11	g/mL	3539	kL	3.88E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	125Sb	Supernatant	4.02E+03	Ci	S	1.24	g/mL	3539	kL	1.07E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	126Sn	Supernatant	7.89E+00	Ci	S	1.24	g/mL	3539	kL	2.11E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	129I	Supernatant	2.69E-01	Ci	S	1.24	g/mL	3539	kL	7.18E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	134Cs	Supernatant	1.45E+04	Ci	TE	1.11	g/mL	3539	kL	1.73E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	137Cs	Supernatant	5.65E+06	Ci	S	1.24	g/mL	3539	kL	1.51E+03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	137mBa	Supernatant	5.35E+06	Ci	C		g/mL	3539	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-101	14C	Supernatant	6.19E+00	Ci	S	1.24	g/mL	3539	kL	1.65E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	151Sm	Supernatant	4.99E+04	Ci	TE	1.11	g/mL	3539	kL	5.98E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	152Eu	Supernatant	2.63E+02	Ci	TE	1.11	g/mL	3539	kL	3.15E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	154Eu	Supernatant	1.98E+02	Ci	S	1.24	g/mL	3539	kL	5.28E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	155Eu	Supernatant	2.57E+02	Ci	E	1.24	g/mL	3539	kL	6.87E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	226Ra	Supernatant	4.65E-04	Ci	TE	1.11	g/mL	3539	kL	5.57E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	227Ac	Supernatant	5.18E-03	Ci	TE	1.11	g/mL	3539	kL	6.19E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	228Ra	Supernatant	9.72E-08	Ci	TE	1.11	g/mL	3539	kL	1.16E-11	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	229Th	Supernatant	3.89E-06	Ci	TE	1.11	g/mL	3539	kL	4.65E-10	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	231Pa	Supernatant	1.51E-02	Ci	TE	1.11	g/mL	3539	kL	1.80E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	232Th	Supernatant	1.57E-07	Ci	TE	1.11	g/mL	3539	kL	1.87E-11	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	232U	Supernatant	6.30E-05	Ci	C	1.24	g/mL	3539	kL	1.68E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	233U	Supernatant	2.57E-04	Ci	C	1.24	g/mL	3539	kL	6.86E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	234U	Supernatant	1.79E-03	Ci	C	1.24	g/mL	3539	kL	4.77E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	235U	Supernatant	6.80E-05	Ci	C	1.24	g/mL	3539	kL	1.82E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	236U	Supernatant	1.45E-04	Ci	C	1.24	g/mL	3539	kL	3.87E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	237Np	Supernatant	1.29E-01	Ci	S	1.24	g/mL	3539	kL	3.44E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	238Pu	Supernatant	1.71E-01	Ci	C	1.24	g/mL	3539	kL	4.58E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	238U	Supernatant	1.24E-03	Ci	C	1.24	g/mL	3539	kL	3.30E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	239Pu	Supernatant	1.48E+00	Ci	C	1.24	g/mL	3539	kL	3.96E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	240Pu	Supernatant	4.47E-01	Ci	C	1.24	g/mL	3539	kL	1.20E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	241Am	Supernatant	2.13E+00	Ci	S	1.24	g/mL	3539	kL	5.69E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	241Pu	Supernatant	1.32E+01	Ci	C	1.24	g/mL	3539	kL	3.52E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	242Cm	Supernatant	1.90E-03	Ci	C	1.24	g/mL	3539	kL	5.09E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	242Pu	Supernatant	6.90E-05	Ci	C	1.24	g/mL	3539	kL	1.84E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	243Am	Supernatant	4.48E-04	Ci	C	1.24	g/mL	3539	kL	1.20E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	243Cm	Supernatant	2.78E-04	Ci	C	1.24	g/mL	3539	kL	7.43E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	244Cm	Supernatant	6.24E-03	Ci	C	1.24	g/mL	3539	kL	1.67E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	3H	Supernatant	5.48E+01	Ci	S	1.24	g/mL	3539	kL	1.46E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	59Ni	Supernatant	0.00E+00	Ci	TE	1.11	g/mL	3539	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	60Co	Supernatant	5.92E+01	Ci	S	1.24	g/mL	3539	kL	1.58E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	63Ni	Supernatant	0.00E+00	Ci	TE	1.11	g/mL	3539	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	79Se	Supernatant	4.44E+00	Ci	S	1.24	g/mL	3539	kL	1.19E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	90Sr	Supernatant	3.03E+03	Ci	S	1.24	g/mL	3539	kL	8.10E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	90Y	Supernatant	3.03E+03	Ci	C		g/mL	3539	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-101	93mNb	Supernatant	5.95E+01	Ci	TE	1.11	g/mL	3539	kL	7.12E-03	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 83

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-101	93Zr	Supernatant	7.53E+01	Ci	TE	1.11	g/mL	3539	kL	9.01E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	99Tc	Supernatant	1.17E+03	Ci	S	1.24	g/mL	3539	kL	3.14E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	Ag	Supernatant	2.43E+01	kg	S	1.24	g/mL	3539	kL	6.50E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Al	Supernatant	2.58E+04	kg	S	1.24	g/mL	3539	kL	6.90E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	As	Supernatant	2.52E+01	kg	S	1.24	g/mL	3539	kL	6.73E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	B	Supernatant	6.10E+01	kg	S	1.24	g/mL	3539	kL	1.63E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ba	Supernatant	2.53E-01	kg	S	1.24	g/mL	3539	kL	6.77E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Be	Supernatant	9.57E-01	kg	S	1.24	g/mL	3539	kL	2.56E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Bi	Supernatant	0.00E+00	kg	TE	1.11	g/mL	3539	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ca	Supernatant	1.21E+02	kg	S	1.24	g/mL	3539	kL	3.23E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cd	Supernatant	6.75E+00	kg	S	1.24	g/mL	3539	kL	1.80E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ce	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cl	Supernatant	4.56E+02	kg	S	1.24	g/mL	3539	kL	1.22E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Co	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cr	Supernatant	2.18E+03	kg	S	1.24	g/mL	3539	kL	5.83E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cu	Supernatant	1.21E+01	kg	S	1.24	g/mL	3539	kL	3.23E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	F	Supernatant	5.28E+03	kg	S	1.24	g/mL	3539	kL	1.41E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Fe	Supernatant	6.76E+01	kg	S	1.24	g/mL	3539	kL	1.81E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Hg	Supernatant	4.59E-02	kg	S	1.24	g/mL	3539	kL	1.23E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	K	Supernatant	1.44E+04	kg	S	1.24	g/mL	3539	kL	3.84E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	La	Supernatant	0.00E+00	kg	TE	1.11	g/mL	3539	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Li	Supernatant	1.68E+00	kg	S	1.24	g/mL	3539	kL	4.48E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Mg	Supernatant	1.21E+02	kg	S	1.24	g/mL	3539	kL	3.23E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Mn	Supernatant	0.00E+00	kg	TE	1.11	g/mL	3539	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Mo	Supernatant	2.91E+02	kg	S	1.24	g/mL	3539	kL	7.78E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Na	Supernatant	3.35E+05	kg	S	1.24	g/mL	3539	kL	8.95E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Nd	Supernatant	1.21E+02	kg	S	1.24	g/mL	3539	kL	3.23E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ni	Supernatant	0.00E+00	kg	TE	1.11	g/mL	3539	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	NO2	Supernatant	2.19E+05	kg	S	1.24	g/mL	3539	kL	5.85E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	NO3	Supernatant	2.15E+05	kg	S	1.24	g/mL	3539	kL	5.74E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	OH	Supernatant	3.47E+04	kg	S	1.24	g/mL	3539	kL	9.27E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Oxalate	Supernatant	3.92E+03	kg	S	1.24	g/mL	3539	kL	1.05E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Pb	Supernatant	0.00E+00	kg	TE	1.11	g/mL	3539	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Pd	Supernatant	6.34E+00	kg	S	1.24	g/mL	3539	kL	1.69E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	PO4	Supernatant	4.03E+03	kg	S	1.24	g/mL	3539	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Pr	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Rb	Supernatant	1.52E+01	kg	S	1.24	g/mL	3539	kL	4.05E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Rh	Supernatant	6.82E+00	kg	S	1.24	g/mL	3539	kL	1.82E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ru	Supernatant	1.52E+00	kg	S	1.24	g/mL	3539	kL	4.07E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Sb	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Se	Supernatant	7.46E+01	kg	S	1.24	g/mL	3539	kL	1.99E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Si	Supernatant	2.22E+02	kg	S	1.24	g/mL	3539	kL	5.94E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	SO4	Supernatant	4.54E+04	kg	S	1.24	g/mL	3539	kL	1.21E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Sr	Supernatant	1.21E+01	kg	S	1.24	g/mL	3539	kL	3.23E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ta	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Te	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Th	Supernatant	1.82E-01	kg	S	1.24	g/mL	3539	kL	4.86E-02	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-MMC-FRP-00001
SHEET REV: 0A
SHEET NO.: 84

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-101	Ti	Supernatant	1.21E+01	kg	S	1.24	g/mL	3539	kL	3.23E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	TIC as CO3	Supernatant	1.03E+05	kg	S	1.24	g/mL	3539	kL	2.76E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Tl	Supernatant	1.92E-01	kg	S	1.24	g/mL	3539	kL	5.13E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	UTOTAL	Supernatant	3.71E+00	kg	S	1.24	g/mL	3539	kL	9.92E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	V	Supernatant	9.60E+00	kg	S	1.24	g/mL	3539	kL	2.56E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Zn	Supernatant	1.21E+01	kg	S	1.24	g/mL	3539	kL	3.23E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Zr	Supernatant	1.35E+01	kg	S	1.24	g/mL	3539	kL	3.60E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	106Ru	Supernatant	6.25E-05	Ci	M	1.05	g/mL	3369	kL	1.71E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	113mCd	Supernatant	6.32E+01	Ci	M	1.05	g/mL	3369	kL	1.73E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	125Sb	Supernatant	3.17E+03	Ci	S	1.14	g/mL	3369	kL	9.03E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	126Sn	Supernatant	1.80E+00	Ci	M	1.05	g/mL	3369	kL	4.91E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	129I	Supernatant	1.16E-01	Ci	S	1.14	g/mL	3369	kL	3.29E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	134Cs	Supernatant	2.38E+03	Ci	S	1.14	g/mL	3369	kL	6.78E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	137Cs	Supernatant	3.35E+06	Ci	S	1.14	g/mL	3369	kL	9.54E+02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	137mBa	Supernatant	3.17E+06	Ci	C		g/mL	3369	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-102	14C	Supernatant	3.17E+00	Ci	S	1.14	g/mL	3369	kL	9.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	151Sm	Supernatant	9.94E+03	Ci	M	1.05	g/mL	3369	kL	2.72E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	152Eu	Supernatant	5.02E+01	Ci	M	1.05	g/mL	3369	kL	1.37E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	154Eu	Supernatant	2.01E+02	Ci	S	1.14	g/mL	3369	kL	5.71E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	155Eu	Supernatant	3.83E+02	Ci	S	1.14	g/mL	3369	kL	1.09E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	226Ra	Supernatant	9.52E-05	Ci	M	1.05	g/mL	3369	kL	2.60E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	227Ac	Supernatant	1.04E-03	Ci	M	1.05	g/mL	3369	kL	2.85E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	228Ra	Supernatant	1.32E-03	Ci	M	1.05	g/mL	3369	kL	3.61E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	229Th	Supernatant	6.37E-05	Ci	M	1.05	g/mL	3369	kL	1.74E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	231Pa	Supernatant	2.99E-03	Ci	M	1.05	g/mL	3369	kL	8.17E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	232Th	Supernatant	6.78E-06	Ci	S	1.14	g/mL	3369	kL	1.93E-09	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	232U	Supernatant	8.01E-05	Ci	M	1.05	g/mL	3369	kL	2.19E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	233U	Supernatant	3.10E-04	Ci	M	1.05	g/mL	3369	kL	8.47E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	234U	Supernatant	2.15E-02	Ci	M	1.05	g/mL	3369	kL	5.87E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	235U	Supernatant	7.04E-04	Ci	S	1.14	g/mL	3369	kL	2.00E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	236U	Supernatant	1.65E-03	Ci	S	1.14	g/mL	3369	kL	4.70E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	237Np	Supernatant	3.58E-01	Ci	S	1.14	g/mL	3369	kL	1.02E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	238Pu	Supernatant	2.63E+00	Ci	C	1.14	g/mL	3369	kL	7.49E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	238U	Supernatant	1.31E-02	Ci	S	1.14	g/mL	3369	kL	3.73E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	239Pu	Supernatant	2.38E+01	Ci	C	1.14	g/mL	3369	kL	6.77E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	240Pu	Supernatant	7.04E+00	Ci	C	1.14	g/mL	3369	kL	2.00E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	241Am	Supernatant	1.24E+00	Ci	S	1.14	g/mL	3369	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	241Pu	Supernatant	2.01E+02	Ci	C	1.14	g/mL	3369	kL	5.71E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	242Cm	Supernatant	1.06E-01	Ci	C	1.14	g/mL	3369	kL	3.02E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	242Pu	Supernatant	1.06E-03	Ci	C	1.14	g/mL	3369	kL	3.02E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	243Am	Supernatant	1.62E-04	Ci	C	1.14	g/mL	3369	kL	4.61E-08	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	243Cm	Supernatant	1.55E-02	Ci	C	1.14	g/mL	3369	kL	4.42E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	244Cm	Supernatant	2.05E-03	Ci	C	1.14	g/mL	3369	kL	5.83E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	3H	Supernatant	1.16E+02	Ci	S	1.14	g/mL	3369	kL	3.29E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	59Ni	Supernatant	3.66E-02	Ci	M	1.05	g/mL	3369	kL	1.00E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	60Co	Supernatant	5.85E+01	Ci	S	1.14	g/mL	3369	kL	1.67E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	63Ni	Supernatant	3.44E+00	Ci	M	1.05	g/mL	3369	kL	9.40E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 85

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-102	79Se	Supernatant	1.43E+00	Ci	S	1.14	g/mL	3369	kL	4.07E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	90Sr	Supernatant	7.00E+03	Ci	S	1.14	g/mL	3369	kL	1.99E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	90Y	Supernatant	7.00E+03	Ci	C		g/mL	3369	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-102	93mNb	Supernatant	1.18E+01	Ci	M	1.05	g/mL	3369	kL	3.23E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	93Zr	Supernatant	1.49E+01	Ci	M	1.05	g/mL	3369	kL	4.08E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	99Tc	Supernatant	6.99E+02	Ci	S	1.14	g/mL	3369	kL	1.99E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	Ag	Supernatant	1.25E+01	kg	S	1.14	g/mL	3369	kL	3.57E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Al	Supernatant	1.26E+03	kg	S	1.14	g/mL	3369	kL	3.27E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	As	Supernatant	1.29E+01	kg	S	1.14	g/mL	3369	kL	3.66E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	B	Supernatant	1.36E+01	kg	S	1.14	g/mL	3369	kL	3.86E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ba	Supernatant	1.57E-01	kg	S	1.14	g/mL	3369	kL	4.46E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Be	Supernatant	7.43E-02	kg	S	1.14	g/mL	3369	kL	2.11E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Bi	Supernatant	1.56E+00	kg	M	1.05	g/mL	3369	kL	4.28E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ca	Supernatant	3.41E+01	kg	S	1.14	g/mL	3369	kL	8.86E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cd	Supernatant	1.70E+00	kg	S	1.14	g/mL	3369	kL	4.43E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ce	Supernatant	7.61E-02	kg	S	1.14	g/mL	3369	kL	2.17E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cl	Supernatant	2.36E+02	kg	S	1.14	g/mL	3369	kL	6.72E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	CN	Supernatant	2.44E+01	kg	S	1.14	g/mL	3369	kL	6.95E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Co	Supernatant	7.43E-02	kg	S	1.14	g/mL	3369	kL	2.11E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cr	Supernatant	2.27E+03	kg	S	1.14	g/mL	3369	kL	6.46E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cu	Supernatant	3.41E+00	kg	S	1.14	g/mL	3369	kL	8.86E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	F	Supernatant	3.51E+03	kg	S	1.14	g/mL	3369	kL	1.00E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Fe	Supernatant	1.70E+01	kg	S	1.14	g/mL	3369	kL	4.43E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Hg	Supernatant	2.03E-01	kg	S	1.14	g/mL	3369	kL	5.79E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	K	Supernatant	9.86E+03	kg	S	1.14	g/mL	3369	kL	2.81E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	La	Supernatant	1.17E-02	kg	M	1.05	g/mL	3369	kL	3.20E-03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Li	Supernatant	4.93E-01	kg	S	1.14	g/mL	3369	kL	1.40E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Mg	Supernatant	3.41E+01	kg	S	1.14	g/mL	3369	kL	8.86E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Mn	Supernatant	3.41E+00	kg	S	1.14	g/mL	3369	kL	8.86E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Mo	Supernatant	1.67E+02	kg	S	1.14	g/mL	3369	kL	4.75E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Na	Supernatant	1.72E+05	kg	S	1.14	g/mL	3369	kL	4.90E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Nd	Supernatant	3.41E+01	kg	S	1.14	g/mL	3369	kL	8.86E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ni	Supernatant	6.82E+00	kg	S	1.14	g/mL	3369	kL	1.77E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	NO2	Supernatant	1.09E+05	kg	S	1.14	g/mL	3369	kL	3.11E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	NO3	Supernatant	5.70E+04	kg	S	1.14	g/mL	3369	kL	1.62E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	OH	Supernatant	6.45E+02	kg	S	1.14	g/mL	3369	kL	1.68E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Oxalate	Sludge	1.49E+03	kg	S	1.41	g/mL	396	kL	2.66E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Oxalate	Supernatant	1.20E+04	kg	S	1.14	g/mL	3369	kL	3.40E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Pb	Supernatant	3.41E+01	kg	S	1.14	g/mL	3369	kL	8.86E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Pd	Supernatant	1.00E+01	kg	S	1.14	g/mL	3369	kL	2.85E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	PO4	Supernatant	1.53E+03	kg	S	1.14	g/mL	3369	kL	4.36E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Pr	Supernatant	7.43E-02	kg	S	1.14	g/mL	3369	kL	2.11E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Rb	Supernatant	1.13E+01	kg	S	1.14	g/mL	3369	kL	3.23E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Rh	Supernatant	1.78E+01	kg	S	1.14	g/mL	3369	kL	5.06E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ru	Supernatant	9.49E+00	kg	S	1.14	g/mL	3369	kL	2.70E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Sb	Supernatant	1.13E-01	kg	S	1.14	g/mL	3369	kL	3.23E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Se	Supernatant	2.22E+01	kg	S	1.14	g/mL	3369	kL	6.31E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 86

BY: E. Gerlos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-102	Si	Supernatant	8.14E+01	kg	S	1.14	g/mL	3369	kL	2.32E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	SO4	Supernatant	5.73E+04	kg	S	1.14	g/mL	3369	kL	1.63E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Sr	Supernatant	3.41E+00	kg	S	1.14	g/mL	3369	kL	8.86E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ta	Supernatant	7.43E-02	kg	S	1.14	g/mL	3369	kL	2.11E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Te	Supernatant	8.23E-02	kg	S	1.14	g/mL	3369	kL	2.34E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Th	Supernatant	6.20E-02	kg	S	1.14	g/mL	3369	kL	1.76E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ti	Supernatant	3.41E+00	kg	S	1.14	g/mL	3369	kL	8.86E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	TIC as CO3	Supernatant	1.08E+05	kg	S	1.14	g/mL	3369	kL	3.07E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Tl	Supernatant	7.43E-02	kg	S	1.14	g/mL	3369	kL	2.11E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	UTOTAL	Supernatant	3.91E+01	kg	S	1.14	g/mL	3369	kL	1.11E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	V	Supernatant	3.70E+00	kg	S	1.14	g/mL	3369	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	W	Supernatant	1.87E+01	kg	S	1.14	g/mL	3369	kL	5.32E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Y	Supernatant	7.43E-02	kg	S	1.14	g/mL	3369	kL	2.11E-02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Zn	Supernatant	3.41E+00	kg	S	1.14	g/mL	3369	kL	8.86E-01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Zr	Supernatant	3.41E+00	kg	S	1.14	g/mL	3369	kL	8.86E-01	ug/g	Jan 1 2001 12:00AM
241-SY-101	106Ru	Supernatant	6.61E-05	Ci	TE	1.83	g/mL	2626	kL	3.13E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-101	113mCd	Supernatant	7.85E+01	Ci	TE	1.83	g/mL	2626	kL	3.71E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-101	125Sb	Supernatant	3.69E+01	Ci	TE	1.83	g/mL	2626	kL	1.74E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-101	126Sn	Supernatant	2.61E+00	Ci	TE	1.83	g/mL	2626	kL	1.23E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-101	129I	Supernatant	4.36E-01	Ci	E	1.53	g/mL	2626	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-101	134Cs	Supernatant	1.13E+00	Ci	TE	1.83	g/mL	2626	kL	5.35E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-101	137Cs	Supernatant	6.79E+05	Ci	S	1.36	g/mL	2626	kL	1.90E+02	uCi/g	Jan 1 2001 12:00AM
241-SY-101	137mBa	Supernatant	6.42E+05	Ci	C		g/mL	2626	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-101	14C	Supernatant	2.99E+00	Ci	E	1.53	g/mL	2626	kL	7.44E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-101	151Sm	Supernatant	1.45E+04	Ci	TE	1.83	g/mL	2626	kL	6.83E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-101	152Eu	Supernatant	3.67E+00	Ci	TE	1.83	g/mL	2626	kL	1.74E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-101	154Eu	Supernatant	7.97E+01	Ci	S	1.36	g/mL	2626	kL	2.23E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-101	155Eu	Supernatant	2.47E+02	Ci	S	1.36	g/mL	2626	kL	6.91E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-101	226Ra	Supernatant	1.92E-04	Ci	TE	1.83	g/mL	2626	kL	9.10E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-101	227Ac	Supernatant	2.00E-03	Ci	TE	1.83	g/mL	2626	kL	9.47E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-101	228Ra	Supernatant	7.44E-02	Ci	TE	1.83	g/mL	2626	kL	3.52E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-101	229Th	Supernatant	3.33E-03	Ci	TE	1.83	g/mL	2626	kL	1.57E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-101	231Pa	Supernatant	5.30E-03	Ci	TE	1.83	g/mL	2626	kL	2.51E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-101	232Th	Supernatant	1.51E-02	Ci	TE	1.83	g/mL	2626	kL	7.16E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-101	232U	Supernatant	2.59E-03	Ci	C	1.36	g/mL	2626	kL	7.26E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-101	233U	Supernatant	1.06E-02	Ci	C	1.36	g/mL	2626	kL	2.98E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-101	234U	Supernatant	2.99E-03	Ci	C	1.36	g/mL	2626	kL	8.38E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-101	235U	Supernatant	1.21E-04	Ci	C	1.36	g/mL	2626	kL	3.39E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-101	236U	Supernatant	9.42E-05	Ci	C	1.36	g/mL	2626	kL	2.64E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-101	237Np	Supernatant	9.45E-02	Ci	E	1.53	g/mL	2626	kL	2.35E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-101	238Pu	Supernatant	4.36E-03	Ci	C	1.36	g/mL	2626	kL	1.22E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-101	238U	Supernatant	2.72E-03	Ci	C	1.36	g/mL	2626	kL	7.61E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-101	239Pu	Supernatant	1.56E-01	Ci	C	1.36	g/mL	2626	kL	4.38E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-101	240Pu	Supernatant	2.66E-02	Ci	C	1.36	g/mL	2626	kL	7.45E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-101	241Am	Supernatant	8.92E-01	Ci	S	1.36	g/mL	2626	kL	2.50E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-101	241Pu	Supernatant	2.23E-01	Ci	C	1.36	g/mL	2626	kL	6.25E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-101	242Cm	Supernatant	2.34E-03	Ci	C	1.36	g/mL	2626	kL	6.54E-07	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 87

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-SY-101	242Pu	Supernatant	1.72E-06	Ci	C	1.36	g/mL	2626	kL	4.82E-10	uCi/g	Jan 1 2001 12:00AM
241-SY-101	243Am	Supernatant	3.17E-05	Ci	C	1.36	g/mL	2626	kL	8.89E-09	uCi/g	Jan 1 2001 12:00AM
241-SY-101	243Cm	Supernatant	1.89E-04	Ci	C	1.36	g/mL	2626	kL	5.29E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-101	244Cm	Supernatant	1.66E-03	Ci	C	1.36	g/mL	2626	kL	4.64E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-101	3H	Supernatant	7.14E+02	Ci	TE	1.83	g/mL	2626	kL	3.38E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-101	59Ni	Supernatant	5.33E-01	Ci	TE	1.83	g/mL	2626	kL	2.52E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-101	60Co	Supernatant	3.23E+01	Ci	S	1.36	g/mL	2626	kL	9.05E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-101	63Ni	Supernatant	4.98E+01	Ci	TE	1.83	g/mL	2626	kL	2.35E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-101	79Se	Supernatant	6.83E-01	Ci	E	1.53	g/mL	2626	kL	1.70E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-101	90Sr	Supernatant	9.66E+03	Ci	S	1.36	g/mL	2626	kL	2.70E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-101	90Y	Supernatant	9.66E+03	Ci	C		g/mL	2626	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-101	93mNb	Supernatant	4.16E+00	Ci	E	1.53	g/mL	2626	kL	1.04E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-101	93Zr	Supernatant	5.02E+00	Ci	E	1.53	g/mL	2626	kL	1.25E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-101	99Tc	Supernatant	6.43E+02	Ci	S	1.36	g/mL	2626	kL	1.80E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-101	Ag	Supernatant	7.85E+01	kg	S	1.36	g/mL	2626	kL	2.20E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Al	Supernatant	3.52E+04	kg	S	1.36	g/mL	2626	kL	9.85E+03	ug/g	Jan 1 2001 12:00AM
241-SY-101	As	Supernatant	1.58E+02	kg	S	1.36	g/mL	2626	kL	4.42E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	B	Supernatant	1.44E+02	kg	S	1.36	g/mL	2626	kL	4.04E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Ba	Supernatant	7.90E+01	kg	S	1.36	g/mL	2626	kL	2.21E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Be	Supernatant	7.90E+00	kg	S	1.36	g/mL	2626	kL	2.21E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Bi	Supernatant	5.78E+01	kg	TE	1.83	g/mL	2626	kL	2.73E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Ca	Supernatant	2.68E+02	kg	S	1.36	g/mL	2626	kL	7.50E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Cd	Supernatant	7.90E+00	kg	S	1.36	g/mL	2626	kL	2.21E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Ce	Supernatant	1.58E+02	kg	S	1.36	g/mL	2626	kL	4.42E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Cl	Supernatant	1.87E+04	kg	S	1.36	g/mL	2626	kL	5.24E+03	ug/g	Jan 1 2001 12:00AM
241-SY-101	Co	Supernatant	3.15E+01	kg	S	1.36	g/mL	2626	kL	8.82E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Cr	Supernatant	3.57E+02	kg	S	1.36	g/mL	2626	kL	1.00E+02	ug/g	Jan 1 2001 12:00AM
241-SY-101	Cu	Supernatant	2.56E+01	kg	S	1.36	g/mL	2626	kL	7.16E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	F	Supernatant	1.62E+02	kg	S	1.36	g/mL	2626	kL	4.54E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Fe	Supernatant	7.90E+01	kg	S	1.36	g/mL	2626	kL	2.21E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Hg	Supernatant	6.30E-03	kg	S	1.36	g/mL	2626	kL	1.76E-03	ug/g	Jan 1 2001 12:00AM
241-SY-101	K	Supernatant	7.04E+03	kg	S	1.36	g/mL	2626	kL	1.97E+03	ug/g	Jan 1 2001 12:00AM
241-SY-101	La	Supernatant	5.27E+00	kg	TE	1.83	g/mL	2626	kL	2.49E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Li	Supernatant	1.58E+01	kg	S	1.36	g/mL	2626	kL	4.42E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Mg	Supernatant	1.58E+02	kg	S	1.36	g/mL	2626	kL	4.42E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Mn	Supernatant	1.58E+01	kg	S	1.36	g/mL	2626	kL	4.42E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Mo	Supernatant	2.12E+02	kg	S	1.36	g/mL	2626	kL	5.94E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Na	Supernatant	4.28E+05	kg	S	1.36	g/mL	2626	kL	1.20E+05	ug/g	Jan 1 2001 12:00AM
241-SY-101	Nd	Supernatant	1.58E+02	kg	S	1.36	g/mL	2626	kL	4.42E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	NH3	Supernatant	2.52E+03	kg	S	1.36	g/mL	2626	kL	7.07E+02	ug/g	Jan 1 2001 12:00AM
241-SY-101	Ni	Supernatant	2.46E+02	kg	S	1.36	g/mL	2626	kL	6.88E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	NO2	Supernatant	2.31E+05	kg	S	1.36	g/mL	2626	kL	6.46E+04	ug/g	Jan 1 2001 12:00AM
241-SY-101	NO3	Supernatant	3.70E+05	kg	S	1.36	g/mL	2626	kL	1.04E+05	ug/g	Jan 1 2001 12:00AM
241-SY-101	OH	Supernatant	6.91E+04	kg	S	1.36	g/mL	2626	kL	1.93E+04	ug/g	Jan 1 2001 12:00AM
241-SY-101	Oxalate	Supernatant	4.37E+00	kg	TE	1.83	g/mL	2626	kL	2.07E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Pb	Supernatant	1.58E+02	kg	S	1.36	g/mL	2626	kL	4.42E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	PO4	Supernatant	1.19E+04	kg	S	1.36	g/mL	2626	kL	3.33E+03	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 88

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-SY-101	Sb	Supernatant	9.48E+01	kg	S	1.36	g/mL	2626	kL	2.65E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Se	Supernatant	1.58E+02	kg	S	1.36	g/mL	2626	kL	4.42E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Si	Supernatant	2.16E+02	kg	S	1.36	g/mL	2626	kL	6.06E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	SO4	Supernatant	1.17E+04	kg	S	1.36	g/mL	2626	kL	3.26E+03	ug/g	Jan 1 2001 12:00AM
241-SY-101	Sr	Supernatant	1.58E+01	kg	S	1.36	g/mL	2626	kL	4.42E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Ti	Supernatant	1.58E+01	kg	S	1.36	g/mL	2626	kL	4.42E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	TIC as CO3	Supernatant	9.02E+04	kg	S	1.36	g/mL	2626	kL	2.53E+04	ug/g	Jan 1 2001 12:00AM
241-SY-101	Tl	Supernatant	3.15E+02	kg	S	1.36	g/mL	2626	kL	8.82E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	UTOTAL	Supernatant	8.14E+00	kg	S	1.36	g/mL	2626	kL	2.28E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	V	Supernatant	7.90E+01	kg	S	1.36	g/mL	2626	kL	2.21E+01	ug/g	Jan 1 2001 12:00AM
241-SY-101	Zn	Supernatant	1.64E+01	kg	S	1.36	g/mL	2626	kL	4.59E+00	ug/g	Jan 1 2001 12:00AM
241-SY-101	Zr	Supernatant	1.58E+01	kg	S	1.36	g/mL	2626	kL	4.42E+00	ug/g	Jan 1 2001 12:00AM

Appendix D HLW BBI Data

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 90

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Best Basis Inventory Data for HLW Phase I Tanks

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AY-101	106Ru	Sludge (Solids)	6.53E-02	Ci	M	1.39	g/mL	309	kL	7.64E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	113mCd	Sludge (Solids)	1.75E+03	Ci	M	1.39	g/mL	309	kL	2.04E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-101	125Sb	Sludge (Solids)	1.34E+01	Ci	M	1.39	g/mL	309	kL	1.57E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	126Sn	Sludge (Solids)	2.80E+01	Ci	S	1.59	g/mL	309	kL	5.70E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	129I	Sludge (Solids)	9.40E-02	Ci	M	1.39	g/mL	309	kL	1.10E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-101	137Cs	Sludge (Solids)	5.30E+04	Ci	S	1.59	g/mL	309	kL	1.08E+02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	137mBa	Sludge (Solids)	5.02E+04	Ci	C		g/mL	309	kL		uCi/g	Jan 1 2001 12:00AM
241-AY-101	14C	Sludge (Solids)	8.70E-01	Ci	S	1.59	g/mL	309	kL	1.77E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-101	151Sm	Sludge (Solids)	4.29E+05	Ci	M	1.39	g/mL	309	kL	5.02E+02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	154Eu	Sludge (Solids)	4.69E+03	Ci	S	1.59	g/mL	309	kL	9.55E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-101	155Eu	Sludge (Solids)	2.28E+03	Ci	S	1.59	g/mL	309	kL	4.63E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-101	226Ra	Sludge (Solids)	1.02E-02	Ci	M	1.39	g/mL	309	kL	1.20E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	227Ac	Sludge (Solids)	5.69E-02	Ci	M	1.39	g/mL	309	kL	6.65E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	228Ra	Sludge (Solids)	4.11E-02	Ci	M	1.39	g/mL	309	kL	4.81E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	229Th	Sludge (Solids)	6.53E-04	Ci	M	1.39	g/mL	309	kL	7.64E-07	uCi/g	Jan 1 2001 12:00AM
241-AY-101	231Pa	Sludge (Solids)	7.44E-02	Ci	M	1.39	g/mL	309	kL	8.71E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	232Th	Sludge (Solids)	3.82E-02	Ci	S	1.59	g/mL	309	kL	7.78E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	232U	Sludge (Solids)	9.37E-02	Ci	C	1.59	g/mL	309	kL	1.91E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-101	233U	Sludge (Solids)	3.85E-01	Ci	C	1.59	g/mL	309	kL	7.84E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-101	234U	Sludge (Solids)	1.71E-01	Ci	C	1.59	g/mL	309	kL	3.48E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-101	235U	Sludge (Solids)	6.94E-03	Ci	C	1.59	g/mL	309	kL	1.41E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	236U	Sludge (Solids)	5.87E-03	Ci	C	1.59	g/mL	309	kL	1.19E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	237Np	Sludge (Solids)	1.59E-01	Ci	M	1.39	g/mL	309	kL	1.86E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-101	238Pu	Sludge (Solids)	1.91E+02	Ci	S	1.59	g/mL	309	kL	3.89E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	238U	Sludge (Solids)	1.56E-01	Ci	C	1.59	g/mL	309	kL	3.17E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-101	239Pu	Sludge (Solids)	4.89E+02	Ci	C	1.59	g/mL	309	kL	9.95E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	240Pu	Sludge (Solids)	1.48E+02	Ci	C	1.59	g/mL	309	kL	3.00E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	241Am	Sludge (Solids)	8.79E+03	Ci	S	1.59	g/mL	309	kL	1.79E+01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	241Pu	Sludge (Solids)	2.69E+03	Ci	C	1.59	g/mL	309	kL	5.48E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-101	242Cm	Sludge (Solids)	1.17E+01	Ci	C	1.59	g/mL	309	kL	2.37E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	242Pu	Sludge (Solids)	2.67E-02	Ci	C	1.59	g/mL	309	kL	5.43E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-101	243Am	Sludge (Solids)	8.83E-01	Ci	C	1.59	g/mL	309	kL	1.80E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-101	243Cm	Sludge (Solids)	1.19E+00	Ci	C	1.59	g/mL	309	kL	2.42E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-101	244Cm	Sludge (Solids)	4.08E+01	Ci	C	1.59	g/mL	309	kL	8.30E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	3H	Sludge (Solids)	2.38E+00	Ci	S	1.59	g/mL	309	kL	4.85E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-101	59Ni	Sludge (Solids)	1.58E+02	Ci	M	1.39	g/mL	309	kL	1.85E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	60Co	Sludge (Solids)	4.36E+02	Ci	S	1.59	g/mL	309	kL	8.86E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	63Ni	Sludge (Solids)	1.48E+04	Ci	M	1.39	g/mL	309	kL	1.74E+01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	79Se	Sludge (Solids)	1.37E+01	Ci	M	1.39	g/mL	309	kL	1.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	90Sr	Sludge (Solids)	1.38E+06	Ci	S	1.59	g/mL	309	kL	2.81E+03	uCi/g	Jan 1 2001 12:00AM
241-AY-101	90Y	Sludge (Solids)	1.38E+06	Ci	C		g/mL	309	kL		uCi/g	Jan 1 2001 12:00AM
241-AY-101	93mNb	Sludge (Solids)	4.99E+02	Ci	M	1.39	g/mL	309	kL	5.84E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	93Zr	Sludge (Solids)	6.09E+02	Ci	M	1.39	g/mL	309	kL	7.13E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-101	99Tc	Sludge (Solids)	4.85E+01	Ci	M	1.39	g/mL	309	kL	5.68E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-101	Ag	Sludge (Solids)	1.17E+02	kg	S	1.59	g/mL	309	kL	2.39E+02	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 91

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AY-101	Al	Sludge (Solids)	2.71E+04	kg	E	1.59	g/mL	309	kL	5.52E+04	ug/g	Jan 1 2001 12:00AM
241-AY-101	As	Sludge (Solids)	9.37E+00	kg	S	1.59	g/mL	309	kL	1.91E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	B	Sludge (Solids)	1.21E+02	kg	S	1.59	g/mL	309	kL	2.47E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Ba	Sludge (Solids)	2.63E+02	kg	S	1.59	g/mL	309	kL	5.36E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Be	Sludge (Solids)	2.17E+00	kg	S	1.59	g/mL	309	kL	4.41E+00	ug/g	Jan 1 2001 12:00AM
241-AY-101	Bi	Sludge (Solids)	2.13E+00	kg	M	1.39	g/mL	309	kL	2.49E+00	ug/g	Jan 1 2001 12:00AM
241-AY-101	Ca	Sludge (Solids)	1.19E+03	kg	S	1.59	g/mL	309	kL	2.43E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Cd	Sludge (Solids)	6.18E+01	kg	S	1.59	g/mL	309	kL	1.26E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Ce	Sludge (Solids)	2.96E+02	kg	S	1.59	g/mL	309	kL	6.02E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Cl	Sludge (Solids)	1.65E+02	kg	S	1.59	g/mL	309	kL	3.36E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Co	Sludge (Solids)	1.56E+01	kg	S	1.59	g/mL	309	kL	3.18E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	Cr	Sludge (Solids)	1.20E+03	kg	S	1.59	g/mL	309	kL	2.44E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Cu	Sludge (Solids)	9.75E+01	kg	S	1.59	g/mL	309	kL	1.98E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	F	Sludge (Solids)	9.48E+02	kg	S	1.59	g/mL	309	kL	1.93E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Fe	Sludge (Solids)	3.57E+04	kg	S	1.59	g/mL	309	kL	7.27E+04	ug/g	Jan 1 2001 12:00AM
241-AY-101	Hg	Sludge (Solids)	1.20E+01	kg	S	1.59	g/mL	309	kL	2.44E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	K	Sludge (Solids)	2.93E+02	kg	S	1.59	g/mL	309	kL	5.96E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	La	Sludge (Solids)	1.23E+03	kg	S	1.59	g/mL	309	kL	2.51E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Li	Sludge (Solids)	2.57E+00	kg	S	1.6	g/mL	309	kL	5.19E+00	ug/g	Jan 1 2001 12:00AM
241-AY-101	Mg	Sludge (Solids)	5.02E+02	kg	S	1.59	g/mL	309	kL	1.02E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Mn	Sludge (Solids)	2.04E+03	kg	S	1.59	g/mL	309	kL	4.16E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Mo	Sludge (Solids)	1.19E+01	kg	S	1.59	g/mL	309	kL	2.43E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	Na	Sludge (Solids)	4.78E+04	kg	S	1.59	g/mL	309	kL	9.73E+04	ug/g	Jan 1 2001 12:00AM
241-AY-101	Nd	Sludge (Solids)	7.41E+02	kg	S	1.59	g/mL	309	kL	1.51E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	NH3	Sludge (Solids)	3.62E+02	kg	S	1.59	g/mL	309	kL	7.38E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Ni	Sludge (Solids)	1.33E+03	kg	S	1.59	g/mL	309	kL	2.71E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	NO2	Sludge (Solids)	1.35E+04	kg	S	1.59	g/mL	309	kL	2.74E+04	ug/g	Jan 1 2001 12:00AM
241-AY-101	NO3	Sludge (Solids)	1.14E+03	kg	S	1.59	g/mL	309	kL	2.31E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Oxalate	Sludge (Solids)	1.92E+04	kg	S	1.59	g/mL	309	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-AY-101	Pb	Sludge (Solids)	9.56E+02	kg	S	1.59	g/mL	309	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	PO4	Sludge (Solids)	3.45E+03	kg	S	1.59	g/mL	309	kL	7.03E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Rb	Sludge (Solids)	5.93E-01	kg	S	1.59	g/mL	309	kL	1.21E+00	ug/g	Jan 1 2001 12:00AM
241-AY-101	Rh	Sludge (Solids)	6.85E+00	kg	S	1.59	g/mL	309	kL	1.39E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	Sb	Sludge (Solids)	1.18E+01	kg	S	1.6	g/mL	309	kL	2.38E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	Se	Sludge (Solids)	1.96E+01	kg	S	1.6	g/mL	309	kL	3.97E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	Si	Sludge (Solids)	4.31E+02	kg	S	1.6	g/mL	309	kL	8.73E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	SO4	Sludge (Solids)	3.04E+03	kg	S	1.59	g/mL	309	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-AY-101	Sr	Sludge (Solids)	6.68E+01	kg	S	1.59	g/mL	309	kL	1.36E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Ti	Sludge (Solids)	3.52E+01	kg	S	1.59	g/mL	309	kL	7.17E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	TIC as CO3	Sludge (Solids)	8.09E+04	kg	S	1.59	g/mL	309	kL	1.65E+05	ug/g	Jan 1 2001 12:00AM
241-AY-101	Tl	Sludge (Solids)	5.61E-01	kg	S	1.59	g/mL	309	kL	1.14E+00	ug/g	Jan 1 2001 12:00AM
241-AY-101	UTOTAL	Sludge (Solids)	4.67E+02	kg	S	1.59	g/mL	309	kL	9.50E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	V	Sludge (Solids)	9.80E+00	kg	S	1.6	g/mL	309	kL	1.98E+01	ug/g	Jan 1 2001 12:00AM
241-AY-101	Zn	Sludge (Solids)	5.33E+01	kg	S	1.59	g/mL	309	kL	1.08E+02	ug/g	Jan 1 2001 12:00AM
241-AY-101	Zr	Sludge (Solids)	6.93E+02	kg	S	1.59	g/mL	309	kL	1.41E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	106Ru	Sludge (Solids)	7.54E-03	Ci	TE	1.62	g/mL	548	kL	8.01E-06	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 92

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AY-102	113mCd	Sludge (Solids)	4.83E+00	Ci	TE	1.62	g/mL	548	kL	5.13E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	125Sb	Sludge (Solids)	1.55E+00	Ci	TE	1.62	g/mL	548	kL	1.64E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	126Sn	Sludge (Solids)	2.78E-01	Ci	TE	1.62	g/mL	548	kL	2.95E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-102	129I	Sludge (Solids)	8.43E-03	Ci	TE	1.62	g/mL	548	kL	8.96E-06	uCi/g	Jan 1 2001 12:00AM
241-AY-102	134Cs	Sludge (Solids)	2.14E+02	Ci	S	1.48	g/mL	548	kL	2.63E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-102	137Cs	Sludge (Solids)	1.61E+05	Ci	S	1.48	g/mL	548	kL	1.99E+02	uCi/g	Jan 1 2001 12:00AM
241-AY-102	137mBa	Sludge (Solids)	1.53E+05	Ci	C		g/mL	548	kL		uCi/g	Jan 1 2001 12:00AM
241-AY-102	14C	Sludge (Solids)	1.74E-01	Ci	S	1.48	g/mL	548	kL	2.15E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-102	151Sm	Sludge (Solids)	1.51E+03	Ci	TE	1.62	g/mL	548	kL	1.60E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-102	152Eu	Sludge (Solids)	6.13E+01	Ci	TE	1.62	g/mL	548	kL	6.52E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-102	154Eu	Sludge (Solids)	6.77E+03	Ci	S	1.48	g/mL	548	kL	8.35E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-102	155Eu	Sludge (Solids)	5.53E+03	Ci	S	1.48	g/mL	548	kL	6.82E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-102	226Ra	Sludge (Solids)	3.66E-03	Ci	TE	1.62	g/mL	548	kL	3.89E-06	uCi/g	Jan 1 2001 12:00AM
241-AY-102	227Ac	Sludge (Solids)	1.29E-02	Ci	TE	1.62	g/mL	548	kL	1.37E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	228Ra	Sludge (Solids)	3.42E-02	Ci	TE	1.62	g/mL	548	kL	3.63E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	229Th	Sludge (Solids)	6.93E-06	Ci	TE	1.62	g/mL	548	kL	7.37E-09	uCi/g	Jan 1 2001 12:00AM
241-AY-102	231Pa	Sludge (Solids)	3.90E-04	Ci	TE	1.62	g/mL	548	kL	4.15E-07	uCi/g	Jan 1 2001 12:00AM
241-AY-102	232Th	Sludge (Solids)	6.02E-02	Ci	S	1.56	g/mL	548	kL	7.04E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	232U	Sludge (Solids)	2.55E-04	Ci	E	1.48	g/mL	548	kL	3.14E-07	uCi/g	Jan 1 2001 12:00AM
241-AY-102	233U	Sludge (Solids)	3.72E-06	Ci	E	1.48	g/mL	548	kL	4.59E-09	uCi/g	Jan 1 2001 12:00AM
241-AY-102	234U	Sludge (Solids)	1.04E+00	Ci	E	1.48	g/mL	548	kL	1.28E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	235U	Sludge (Solids)	4.01E-02	Ci	E	1.48	g/mL	548	kL	4.95E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	236U	Sludge (Solids)	7.55E-02	Ci	E	1.48	g/mL	548	kL	9.31E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	237Np	Sludge (Solids)	3.95E+00	Ci	S	1.56	g/mL	548	kL	4.62E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	238Pu	Sludge (Solids)	5.26E+02	Ci	S	1.48	g/mL	548	kL	6.48E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-102	238U	Sludge (Solids)	8.00E-01	Ci	E	1.48	g/mL	548	kL	9.87E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-102	239Pu	Sludge (Solids)	1.64E+03	Ci	E	1.48	g/mL	548	kL	2.02E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-102	240Pu	Sludge (Solids)	3.55E+02	Ci	E	1.48	g/mL	548	kL	4.38E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-102	241Am	Sludge (Solids)	7.62E+03	Ci	E	1.48	g/mL	548	kL	9.40E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-102	241Pu	Sludge (Solids)	4.42E+03	Ci	E	1.48	g/mL	548	kL	5.45E+00	uCi/g	Jan 1 2001 12:00AM
241-AY-102	242Cm	Sludge (Solids)	1.40E+01	Ci	E	1.48	g/mL	548	kL	1.72E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-102	242Pu	Sludge (Solids)	4.27E-02	Ci	E	1.48	g/mL	548	kL	5.26E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	243Am	Sludge (Solids)	5.60E-01	Ci	E	1.48	g/mL	548	kL	6.91E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-102	243Cm	Sludge (Solids)	1.27E+00	Ci	E	1.48	g/mL	548	kL	1.57E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	244Cm	Sludge (Solids)	3.03E+01	Ci	E	1.48	g/mL	548	kL	3.73E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-102	3H	Sludge (Solids)	7.31E+00	Ci	S	1.48	g/mL	548	kL	9.01E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	59Ni	Sludge (Solids)	1.10E+02	Ci	TE	1.62	g/mL	548	kL	1.17E-01	uCi/g	Jan 1 2001 12:00AM
241-AY-102	60Co	Sludge (Solids)	5.81E-01	Ci	TE	1.62	g/mL	548	kL	6.17E-04	uCi/g	Jan 1 2001 12:00AM
241-AY-102	63Ni	Sludge (Solids)	1.04E+04	Ci	TE	1.62	g/mL	548	kL	1.10E+01	uCi/g	Jan 1 2001 12:00AM
241-AY-102	79Se	Sludge (Solids)	4.39E-02	Ci	TE	1.62	g/mL	548	kL	4.67E-05	uCi/g	Jan 1 2001 12:00AM
241-AY-102	90Sr	Sludge (Solids)	5.27E+06	Ci	S	1.48	g/mL	548	kL	6.50E+03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	90Y	Sludge (Solids)	5.27E+06	Ci	C		g/mL	548	kL		uCi/g	Jan 1 2001 12:00AM
241-AY-102	93mNb	Sludge (Solids)	1.70E+00	Ci	TE	1.62	g/mL	548	kL	1.81E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	93Zr	Sludge (Solids)	1.98E+00	Ci	TE	1.62	g/mL	548	kL	2.10E-03	uCi/g	Jan 1 2001 12:00AM
241-AY-102	99Tc	Sludge (Solids)	1.39E+01	Ci	S	1.48	g/mL	548	kL	1.72E-02	uCi/g	Jan 1 2001 12:00AM
241-AY-102	Ag	Sludge (Solids)	2.52E+01	kg	S	1.45	g/mL	548	kL	3.18E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Al	Sludge (Solids)	3.87E+04	kg	S	1.45	g/mL	548	kL	4.87E+04	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 93

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AY-102	As	Sludge (Solids)	2.09E+01	kg	S	1.56	g/mL	548	kL	2.45E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	B	Sludge (Solids)	3.52E+01	kg	S	1.45	g/mL	548	kL	4.44E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Ba	Sludge (Solids)	6.84E+02	kg	S	1.45	g/mL	548	kL	8.61E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Be	Sludge (Solids)	2.63E+00	kg	S	1.56	g/mL	548	kL	3.07E+00	ug/g	Jan 1 2001 12:00AM
241-AY-102	Bi	Sludge (Solids)	1.52E+02	kg	S	1.45	g/mL	548	kL	1.91E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Ca	Sludge (Solids)	4.59E+03	kg	S	1.45	g/mL	548	kL	5.78E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Cd	Sludge (Solids)	1.03E+02	kg	S	1.45	g/mL	548	kL	1.29E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Ce	Sludge (Solids)	7.13E+02	kg	S	1.45	g/mL	548	kL	8.98E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Cl	Sludge (Solids)	1.24E+02	kg	S	1.45	g/mL	548	kL	1.56E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Co	Sludge (Solids)	2.37E+01	kg	S	1.45	g/mL	548	kL	2.99E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Cr	Sludge (Solids)	1.48E+03	kg	S	1.45	g/mL	548	kL	1.86E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Cu	Sludge (Solids)	2.01E+02	kg	S	1.45	g/mL	548	kL	2.54E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	F	Sludge (Solids)	2.49E+02	kg	S	1.45	g/mL	548	kL	3.13E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Fe	Sludge (Solids)	8.69E+04	kg	S	1.45	g/mL	548	kL	1.09E+05	ug/g	Jan 1 2001 12:00AM
241-AY-102	Hg	Sludge (Solids)	1.13E+02	kg	S	1.48	g/mL	548	kL	1.39E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	K	Sludge (Solids)	5.23E+02	kg	S	1.45	g/mL	548	kL	6.58E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	La	Sludge (Solids)	1.12E+03	kg	S	1.45	g/mL	548	kL	1.42E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Li	Sludge (Solids)	4.34E+01	kg	S	1.45	g/mL	548	kL	5.46E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Mg	Sludge (Solids)	1.74E+03	kg	S	1.45	g/mL	548	kL	2.19E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Mn	Sludge (Solids)	1.15E+04	kg	S	1.45	g/mL	548	kL	1.45E+04	ug/g	Jan 1 2001 12:00AM
241-AY-102	Mo	Sludge (Solids)	9.17E+00	kg	S	1.56	g/mL	548	kL	1.07E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Na	Sludge (Solids)	5.33E+04	kg	S	1.45	g/mL	548	kL	6.71E+04	ug/g	Jan 1 2001 12:00AM
241-AY-102	Nd	Sludge (Solids)	1.02E+03	kg	S	1.45	g/mL	548	kL	1.28E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	NH3	Sludge (Solids)	1.63E+03	kg	S	1.48	g/mL	548	kL	2.01E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Ni	Sludge (Solids)	2.11E+03	kg	S	1.45	g/mL	548	kL	2.65E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	NO2	Sludge (Solids)	5.16E+01	kg	S	1.45	g/mL	548	kL	6.50E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	NO3	Sludge (Solids)	2.91E+01	kg	S	1.45	g/mL	548	kL	3.66E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Oxalate	Sludge (Solids)	1.77E+03	kg	S	1.45	g/mL	548	kL	2.23E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Pb	Sludge (Solids)	3.52E+03	kg	S	1.45	g/mL	548	kL	4.43E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	PO4	Sludge (Solids)	9.04E+03	kg	S	1.45	g/mL	548	kL	1.14E+04	ug/g	Jan 1 2001 12:00AM
241-AY-102	Pr	Sludge (Solids)	3.01E+02	kg	S	1.56	g/mL	548	kL	3.52E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Ru	Sludge (Solids)	4.36E+02	kg	S	1.56	g/mL	548	kL	5.11E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Sb	Sludge (Solids)	2.38E+00	kg	S	1.56	g/mL	548	kL	2.78E+00	ug/g	Jan 1 2001 12:00AM
241-AY-102	Se	Sludge (Solids)	5.02E-01	kg	S	1.56	g/mL	548	kL	5.87E-01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Si	Sludge (Solids)	1.13E+02	kg	S	1.45	g/mL	548	kL	1.42E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	SO4	Sludge (Solids)	1.51E+03	kg	S	1.45	g/mL	548	kL	1.91E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	Sr	Sludge (Solids)	2.28E+02	kg	S	1.45	g/mL	548	kL	2.88E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Te	Sludge (Solids)	9.48E+01	kg	S	1.56	g/mL	548	kL	1.11E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Th	Sludge (Solids)	4.53E+02	kg	S	1.48	g/mL	548	kL	5.58E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Ti	Sludge (Solids)	1.10E+02	kg	S	1.45	g/mL	548	kL	1.38E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	TIC as CO3	Sludge (Solids)	5.45E+04	kg	S	1.45	g/mL	548	kL	6.86E+04	ug/g	Jan 1 2001 12:00AM
241-AY-102	Tl	Sludge (Solids)	2.96E+00	kg	S	1.56	g/mL	548	kL	3.46E+00	ug/g	Jan 1 2001 12:00AM
241-AY-102	UTOTAL	Sludge (Solids)	2.35E+03	kg	S	1.45	g/mL	548	kL	2.96E+03	ug/g	Jan 1 2001 12:00AM
241-AY-102	V	Sludge (Solids)	2.98E+01	kg	S	1.48	g/mL	548	kL	3.67E+01	ug/g	Jan 1 2001 12:00AM
241-AY-102	Y	Sludge (Solids)	9.81E+01	kg	S	1.48	g/mL	548	kL	1.21E+02	ug/g	Jan 1 2001 12:00AM
241-AY-102	Zn	Sludge (Solids)	1.52E+02	kg	S	1.45	g/mL	548	kL	1.91E+02	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 94

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AY-102	Zr	Sludge (Solids)	2.86E+01	kg	S	1.45	g/mL	548	kL	3.60E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	106Ru	Sludge (Solids)	3.86E+02	Ci	S	1.67	g/mL	173	kL	1.66E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	113mCd	Sludge (Solids)	1.93E+03	Ci	TE	1.51	g/mL	173	kL	8.96E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	125Sb	Sludge (Solids)	6.18E+03	Ci	S	1.68	g/mL	173	kL	2.13E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	126Sn	Sludge (Solids)	2.31E+01	Ci	S	1.68	g/mL	173	kL	7.94E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	129I	Sludge (Solids)	1.17E-01	Ci	TE	1.51	g/mL	173	kL	5.40E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	134Cs	Sludge (Solids)	2.81E+02	Ci	S	1.68	g/mL	173	kL	9.67E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	137Cs	Sludge (Solids)	2.98E+05	Ci	S	1.68	g/mL	173	kL	1.02E+03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	137mBa	Sludge (Solids)	2.82E+05	Ci	C		g/mL	173	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-101	14C	Sludge (Solids)	4.72E-01	Ci	S	1.68	g/mL	173	kL	1.62E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	151Sm	Sludge (Solids)	1.60E+05	Ci	TE	1.51	g/mL	173	kL	7.42E+02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	152Eu	Sludge (Solids)	1.31E+02	Ci	TE	1.51	g/mL	173	kL	6.07E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	154Eu	Sludge (Solids)	1.35E+04	Ci	S	1.68	g/mL	173	kL	4.63E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	155Eu	Sludge (Solids)	1.74E+04	Ci	S	1.68	g/mL	173	kL	6.00E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	226Ra	Sludge (Solids)	2.32E-04	Ci	TE	1.51	g/mL	173	kL	1.08E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	227Ac	Sludge (Solids)	2.61E-03	Ci	TE	1.51	g/mL	173	kL	1.21E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	228Ra	Sludge (Solids)	3.11E-03	Ci	TE	1.51	g/mL	173	kL	1.44E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	229Th	Sludge (Solids)	1.94E-06	Ci	TE	1.51	g/mL	173	kL	8.97E-09	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	231Pa	Sludge (Solids)	7.77E-03	Ci	TE	1.51	g/mL	173	kL	3.60E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	232Th	Sludge (Solids)	8.12E-03	Ci	S	1.68	g/mL	173	kL	2.79E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	232U	Sludge (Solids)	2.77E-02	Ci	C	1.68	g/mL	173	kL	9.53E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	233U	Sludge (Solids)	1.13E-01	Ci	C	1.68	g/mL	173	kL	3.89E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	234U	Sludge (Solids)	7.86E-01	Ci	C	1.68	g/mL	173	kL	2.71E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	235U	Sludge (Solids)	2.99E-02	Ci	C	1.68	g/mL	173	kL	1.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	236U	Sludge (Solids)	6.37E-02	Ci	C	1.68	g/mL	173	kL	2.19E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	237Np	Sludge (Solids)	1.34E+01	Ci	S	1.68	g/mL	173	kL	4.60E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	238Pu	Sludge (Solids)	1.33E+02	Ci	C	1.68	g/mL	173	kL	4.56E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	238U	Sludge (Solids)	5.44E-01	Ci	C	1.68	g/mL	173	kL	1.87E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	239Pu	Sludge (Solids)	1.15E+03	Ci	C	1.68	g/mL	173	kL	3.95E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	240Pu	Sludge (Solids)	3.46E+02	Ci	C	1.68	g/mL	173	kL	1.19E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	241Am	Sludge (Solids)	2.55E+04	Ci	S	1.68	g/mL	173	kL	8.79E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	241Pu	Sludge (Solids)	1.02E+04	Ci	C	1.68	g/mL	173	kL	3.51E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	242Cm	Sludge (Solids)	2.30E+01	Ci	C	1.68	g/mL	173	kL	7.90E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	242Pu	Sludge (Solids)	5.35E-02	Ci	C	1.68	g/mL	173	kL	1.84E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	243Am	Sludge (Solids)	5.40E+00	Ci	C	1.68	g/mL	173	kL	1.86E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	243Cm	Sludge (Solids)	3.36E+00	Ci	C	1.68	g/mL	173	kL	1.15E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	244Cm	Sludge (Solids)	7.53E+01	Ci	C	1.68	g/mL	173	kL	2.59E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	3H	Sludge (Solids)	4.05E+00	Ci	S	1.68	g/mL	173	kL	1.39E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	59Ni	Sludge (Solids)	2.68E+01	Ci	TE	1.51	g/mL	173	kL	1.24E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	60Co	Sludge (Solids)	1.09E+03	Ci	S	1.68	g/mL	173	kL	3.75E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	63Ni	Sludge (Solids)	2.95E+03	Ci	TE	1.51	g/mL	173	kL	1.37E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	79Se	Sludge (Solids)	4.67E-01	Ci	S	1.67	g/mL	173	kL	2.00E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	90Sr	Sludge (Solids)	4.94E+06	Ci	S	1.68	g/mL	173	kL	1.70E+04	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	90Y	Sludge (Solids)	4.94E+06	Ci	C		g/mL	173	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-101	93mNb	Sludge (Solids)	1.33E+02	Ci	TE	1.51	g/mL	173	kL	6.17E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	93Zr	Sludge (Solids)	2.35E+02	Ci	TE	1.51	g/mL	173	kL	1.09E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-101	99Tc	Sludge (Solids)	6.41E+01	Ci	S	1.68	g/mL	173	kL	2.21E-01	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 95

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-101	Ag	Sludge (Solids)	4.88E+01	kg	S	1.68	g/mL	173	kL	1.68E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Al	Sludge (Solids)	1.61E+04	kg	S	1.68	g/mL	173	kL	5.55E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	As	Sludge (Solids)	1.73E+01	kg	S	1.68	g/mL	173	kL	5.95E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	B	Sludge (Solids)	7.83E+01	kg	S	1.68	g/mL	173	kL	2.69E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ba	Sludge (Solids)	1.94E+02	kg	S	1.68	g/mL	173	kL	6.67E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Be	Sludge (Solids)	2.75E+00	kg	S	1.68	g/mL	173	kL	9.45E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Bi	Sludge (Solids)	1.97E+01	kg	S	1.68	g/mL	173	kL	6.80E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cd	Sludge (Solids)	1.88E+03	kg	S	1.68	g/mL	173	kL	6.49E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ce	Sludge (Solids)	2.30E+02	kg	S	1.68	g/mL	173	kL	7.91E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cl	Sludge (Solids)	2.92E+01	kg	S	1.67	g/mL	173	kL	1.25E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Co	Sludge (Solids)	1.23E+01	kg	S	1.68	g/mL	173	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cr	Sludge (Solids)	1.64E+02	kg	S	1.68	g/mL	173	kL	5.65E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Cu	Sludge (Solids)	6.37E+01	kg	S	1.68	g/mL	173	kL	2.19E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	F	Sludge (Solids)	1.41E+03	kg	S	1.68	g/mL	173	kL	4.84E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Fe	Sludge (Solids)	2.21E+04	kg	S	1.68	g/mL	173	kL	7.61E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Hg	Sludge (Solids)	5.58E-01	kg	S	1.68	g/mL	173	kL	1.92E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	K	Sludge (Solids)	9.56E+02	kg	S	1.68	g/mL	173	kL	3.29E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	La	Sludge (Solids)	9.85E+02	kg	S	1.68	g/mL	173	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Li	Sludge (Solids)	1.70E+02	kg	S	1.68	g/mL	173	kL	5.85E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Mg	Sludge (Solids)	1.78E+02	kg	S	1.68	g/mL	173	kL	6.14E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Mn	Sludge (Solids)	2.84E+02	kg	S	1.68	g/mL	173	kL	9.78E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Mo	Sludge (Solids)	1.23E+01	kg	S	1.68	g/mL	173	kL	4.21E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Na	Sludge (Solids)	2.63E+04	kg	S	1.68	g/mL	173	kL	9.05E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Nd	Sludge (Solids)	5.99E+02	kg	S	1.68	g/mL	173	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ni	Sludge (Solids)	1.37E+03	kg	S	1.68	g/mL	173	kL	4.70E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	NO2	Sludge (Solids)	1.10E+04	kg	S	1.68	g/mL	173	kL	3.78E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	NO3	Sludge (Solids)	1.03E+04	kg	S	1.68	g/mL	173	kL	3.56E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	OH	Sludge (Solids)	1.39E+03	kg	S	1.68	g/mL	173	kL	4.80E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Oxalate	Sludge (Solids)	1.47E+03	kg	S	1.68	g/mL	173	kL	5.08E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Pb	Sludge (Solids)	8.57E+01	kg	S	1.68	g/mL	173	kL	2.95E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Pd	Sludge (Solids)	3.74E-04	kg	S	1.67	g/mL	173	kL	1.60E-03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	PO4	Sludge (Solids)	1.06E+02	kg	S	1.68	g/mL	173	kL	3.64E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Pr	Sludge (Solids)	1.28E+02	kg	S	1.68	g/mL	173	kL	4.40E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Rb	Sludge (Solids)	3.74E+00	kg	S	1.68	g/mL	173	kL	1.29E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Rh	Sludge (Solids)	4.70E+01	kg	S	1.68	g/mL	173	kL	1.62E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ru	Sludge (Solids)	3.79E+02	kg	S	1.68	g/mL	173	kL	1.30E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Sb	Sludge (Solids)	2.15E+00	kg	S	1.68	g/mL	173	kL	7.40E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Se	Sludge (Solids)	7.16E+00	kg	S	1.68	g/mL	173	kL	2.46E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Si	Sludge (Solids)	4.47E+02	kg	S	1.68	g/mL	173	kL	1.54E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	SO4	Sludge (Solids)	7.59E+03	kg	S	1.68	g/mL	173	kL	2.61E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Sr	Sludge (Solids)	9.17E+01	kg	S	1.68	g/mL	173	kL	3.16E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ta	Sludge (Solids)	2.15E+00	kg	S	1.68	g/mL	173	kL	7.40E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Te	Sludge (Solids)	2.36E+01	kg	S	1.68	g/mL	173	kL	8.14E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Th	Sludge (Solids)	7.78E+01	kg	S	1.68	g/mL	173	kL	2.68E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Ti	Sludge (Solids)	9.62E+00	kg	S	1.68	g/mL	173	kL	3.31E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	TIC as CO3	Sludge (Solids)	7.50E+03	kg	S	1.68	g/mL	173	kL	2.58E+04	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 96

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-101	Tl	Sludge (Solids)	2.15E+00	kg	S	1.68	g/mL	173	kL	7.40E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-101	UTOTAL	Sludge (Solids)	1.63E+03	kg	S	1.68	g/mL	173	kL	5.62E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-101	V	Sludge (Solids)	5.35E+00	kg	S	1.67	g/mL	173	kL	2.29E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Zn	Sludge (Solids)	2.56E+01	kg	S	1.68	g/mL	173	kL	8.81E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-101	Zr	Sludge (Solids)	7.85E+03	kg	S	1.68	g/mL	173	kL	2.70E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	106Ru	Sludge	6.21E+02	Ci	E	1.47	g/mL	396	kL	1.06E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	113mCd	Sludge	8.16E+02	Ci	E	1.47	g/mL	396	kL	1.40E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	125Sb	Sludge	4.93E+03	Ci	S	1.41	g/mL	396	kL	8.83E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	126Sn	Sludge	1.25E+01	Ci	E	1.47	g/mL	396	kL	2.14E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	129I	Sludge	1.40E+00	Ci	E	1.47	g/mL	396	kL	2.40E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	134Cs	Sludge	4.47E+02	Ci	S	1.41	g/mL	396	kL	8.00E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	137Cs	Sludge	4.92E+05	Ci	S	1.41	g/mL	396	kL	8.82E+02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	137mBa	Sludge	4.66E+05	Ci	C		g/mL	396	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-102	14C	Sludge	4.80E-01	Ci	S	1.41	g/mL	396	kL	8.60E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	151Sm	Sludge	6.69E+04	Ci	E	1.47	g/mL	396	kL	1.15E+02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	152Eu	Sludge	5.23E+01	Ci	E	1.47	g/mL	396	kL	8.96E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	154Eu	Sludge	7.29E+03	Ci	S	1.41	g/mL	396	kL	1.31E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	155Eu	Sludge	1.30E+04	Ci	S	1.41	g/mL	396	kL	2.33E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	226Ra	Sludge	8.50E-05	Ci	E	1.47	g/mL	396	kL	1.46E-07	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	227Ac	Sludge	7.40E-04	Ci	E	1.47	g/mL	396	kL	1.27E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	228Ra	Sludge	5.30E-03	Ci	E	1.47	g/mL	396	kL	9.07E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	229Th	Sludge	6.83E-07	Ci	E	1.47	g/mL	396	kL	1.17E-09	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	231Pa	Sludge	1.77E-03	Ci	E	1.47	g/mL	396	kL	3.03E-06	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	232Th	Sludge	9.83E-03	Ci	S	1.41	g/mL	396	kL	1.76E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	232U	Sludge	1.07E-02	Ci	C	1.41	g/mL	396	kL	1.92E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	233U	Sludge	4.17E-02	Ci	C	1.41	g/mL	396	kL	7.47E-05	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	234U	Sludge	2.89E+00	Ci	C	1.41	g/mL	396	kL	5.17E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	235U	Sludge	6.88E-02	Ci	C	1.41	g/mL	396	kL	1.23E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	236U	Sludge	1.41E-01	Ci	C	1.41	g/mL	396	kL	2.52E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	237Np	Sludge	1.31E+01	Ci	S	1.41	g/mL	396	kL	2.34E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	238Pu	Sludge	1.79E+02	Ci	C	1.41	g/mL	396	kL	3.20E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	238U	Sludge	1.16E+00	Ci	C	1.41	g/mL	396	kL	2.09E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	239Pu	Sludge	1.54E+03	Ci	C	1.41	g/mL	396	kL	2.75E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	240Pu	Sludge	4.58E+02	Ci	C	1.41	g/mL	396	kL	8.20E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	241Am	Sludge	1.88E+04	Ci	S	1.41	g/mL	396	kL	3.36E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	241Pu	Sludge	1.32E+04	Ci	C	1.41	g/mL	396	kL	2.36E+01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	242Cm	Sludge	6.52E+00	Ci	C	1.41	g/mL	396	kL	1.17E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	242Pu	Sludge	6.57E-02	Ci	C	1.41	g/mL	396	kL	1.18E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	243Am	Sludge	5.61E+00	Ci	C	1.41	g/mL	396	kL	1.00E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	243Cm	Sludge	8.39E-01	Ci	C	1.41	g/mL	396	kL	1.50E-03	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	244Cm	Sludge	4.08E+01	Ci	C	1.41	g/mL	396	kL	7.31E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	3H	Sludge	1.22E+01	Ci	S	1.41	g/mL	396	kL	2.19E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	59Ni	Sludge	1.07E+01	Ci	E	1.47	g/mL	396	kL	1.84E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	60Co	Sludge	7.80E+02	Ci	S	1.41	g/mL	396	kL	1.40E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	63Ni	Sludge	1.19E+03	Ci	E	1.47	g/mL	396	kL	2.03E+00	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	79Se	Sludge	3.51E-01	Ci	S	1.41	g/mL	396	kL	6.29E-04	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	90Sr	Sludge	2.98E+06	Ci	S	1.41	g/mL	396	kL	5.34E+03	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 97

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-102	90Y	Sludge	2.98E+06	Ci	C		g/mL	396	kL		uCi/g	Jan 1 2001 12:00AM
241-AZ-102	93mNb	Sludge	5.25E+01	Ci	E	1.47	g/mL	396	kL	8.99E-02	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	93Zr	Sludge	9.69E+01	Ci	E	1.47	g/mL	396	kL	1.66E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	99Tc	Sludge	8.99E+01	Ci	S	1.41	g/mL	396	kL	1.61E-01	uCi/g	Jan 1 2001 12:00AM
241-AZ-102	Ag	Sludge	2.37E+02	kg	S	1.41	g/mL	396	kL	4.25E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Al	Sludge	1.99E+04	kg	E	1.41	g/mL	396	kL	3.57E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	As	Sludge	8.60E+00	kg	S	1.41	g/mL	396	kL	1.54E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	B	Sludge	1.52E+02	kg	S	1.41	g/mL	396	kL	2.73E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Be	Sludge	1.97E+00	kg	S	1.41	g/mL	396	kL	3.52E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Bi	Sludge	2.53E+01	kg	S	1.41	g/mL	396	kL	4.53E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ca	Sludge	6.92E+02	kg	S	1.41	g/mL	396	kL	1.24E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cd	Sludge	2.71E+03	kg	S	1.41	g/mL	396	kL	4.86E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ce	Sludge	1.41E+02	kg	S	1.41	g/mL	396	kL	2.53E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cl	Sludge	9.39E+01	kg	S	1.41	g/mL	396	kL	1.68E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	CN	Sludge	5.64E+00	kg	S	1.41	g/mL	396	kL	1.01E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Co	Sludge	1.13E+01	kg	S	1.41	g/mL	396	kL	2.03E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cr	Sludge	4.56E+02	kg	S	1.41	g/mL	396	kL	8.17E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Cu	Sludge	3.80E+01	kg	S	1.41	g/mL	396	kL	6.81E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	F	Sludge	4.79E+02	kg	S	1.41	g/mL	396	kL	8.57E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Fe	Sludge	2.32E+04	kg	S	1.41	g/mL	396	kL	4.16E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Hg	Sludge	3.33E+00	kg	S	1.41	g/mL	396	kL	5.97E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	K	Sludge	1.51E+03	kg	S	1.41	g/mL	396	kL	2.70E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	La	Sludge	7.93E+02	kg	S	1.41	g/mL	396	kL	1.42E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Li	Sludge	1.65E+00	kg	S	1.41	g/mL	396	kL	2.96E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Mg	Sludge	1.78E+02	kg	S	1.41	g/mL	396	kL	3.18E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Mn	Sludge	5.08E+02	kg	S	1.41	g/mL	396	kL	9.10E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Mo	Sludge	2.02E+01	kg	S	1.41	g/mL	396	kL	3.62E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Na	Sludge	2.67E+04	kg	S	1.41	g/mL	396	kL	4.79E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Nd	Sludge	4.90E+02	kg	S	1.41	g/mL	396	kL	8.78E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ni	Sludge	1.46E+03	kg	S	1.41	g/mL	396	kL	2.62E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	NO2	Sludge	1.67E+04	kg	S	1.41	g/mL	396	kL	2.99E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	NO3	Sludge	6.87E+03	kg	S	1.41	g/mL	396	kL	1.23E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	OH	Sludge	2.02E+03	kg	S	1.41	g/mL	396	kL	3.62E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Oxalate	Sludge	1.49E+03	kg	S	1.41	g/mL	396	kL	2.66E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Pb	Sludge	2.71E+02	kg	S	1.41	g/mL	396	kL	4.85E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Pd	Sludge	1.62E+01	kg	S	1.41	g/mL	396	kL	2.91E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	PO4	Sludge	6.31E+02	kg	S	1.41	g/mL	396	kL	1.13E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Pr	Sludge	9.27E+01	kg	S	1.41	g/mL	396	kL	1.66E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Rb	Sludge	1.39E+00	kg	S	1.41	g/mL	396	kL	2.49E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Rh	Sludge	9.77E+00	kg	S	1.41	g/mL	396	kL	1.75E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ru	Sludge	4.37E+01	kg	S	1.41	g/mL	396	kL	7.83E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Sb	Sludge	9.88E+00	kg	S	1.41	g/mL	396	kL	1.77E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Se	Sludge	2.79E+00	kg	S	1.41	g/mL	396	kL	4.99E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Si	Sludge	2.49E+03	kg	S	1.41	g/mL	396	kL	4.46E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	SO4	Sludge	7.05E+03	kg	S	1.41	g/mL	396	kL	1.26E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Sr	Sludge	4.79E+01	kg	S	1.41	g/mL	396	kL	8.57E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ta	Sludge	6.53E-01	kg	S	1.41	g/mL	396	kL	1.17E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 98

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AZ-102	Tc	Sludge	1.54E+01	kg	S	1.41	g/mL	396	kL	2.76E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Th	Sludge	8.93E+01	kg	S	1.41	g/mL	396	kL	1.60E+02	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Ti	Sludge	1.06E+01	kg	S	1.41	g/mL	396	kL	1.90E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	TIC as CO3	Sludge	1.90E+04	kg	S	1.41	g/mL	396	kL	3.40E+04	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Tl	Sludge	6.53E-01	kg	S	1.41	g/mL	396	kL	1.17E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	UTOTAL	Sludge	3.50E+03	kg	S	1.41	g/mL	396	kL	6.27E+03	ug/g	Jan 1 2001 12:00AM
241-AZ-102	V	Sludge	8.32E+00	kg	S	1.41	g/mL	396	kL	1.49E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	W	Sludge	4.84E+00	kg	S	1.41	g/mL	396	kL	8.66E+00	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Y	Sludge	3.41E+01	kg	S	1.41	g/mL	396	kL	6.10E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Zn	Sludge	2.45E+01	kg	S	1.41	g/mL	396	kL	4.39E+01	ug/g	Jan 1 2001 12:00AM
241-AZ-102	Zr	Sludge	3.81E+03	kg	S	1.41	g/mL	396	kL	6.83E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	106Ru	Sludge	4.06E-07	Ci	TS	1.71	g/mL	227	kL	1.45E-09	uCi/g	Jan 1 2001 12:00AM
241-C-104	106Ru	Sludge	1.80E-05	Ci	TE	1.29	g/mL	88	kL	8.40E-08	uCi/g	Jan 1 2001 12:00AM
241-C-104	106Ru	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	106Ru	Sludge	2.04E-06	Ci	TE	1.25	g/mL	80	kL	1.03E-08	uCi/g	Jan 1 2001 12:00AM
241-C-104	106Ru	Sludge	1.60E-04	Ci	M	1.46	g/mL	150	kL	5.66E-07	uCi/g	Jan 1 2001 12:00AM
241-C-104	106Ru	Sludge	4.16E-09	Ci	TS	1.49	g/mL	332	kL	8.76E-12	uCi/g	Jan 1 2001 12:00AM
241-C-104	113mCd	Sludge	1.85E+01	Ci	M	1.46	g/mL	150	kL	6.55E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	113mCd	Sludge	1.63E-01	Ci	TS	1.49	g/mL	332	kL	3.43E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	113mCd	Sludge	7.56E-02	Ci	TS	1.71	g/mL	227	kL	2.70E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	113mCd	Sludge	2.36E-01	Ci	TE	1.29	g/mL	88	kL	1.10E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	113mCd	Sludge	3.34E-01	Ci	TE	1.25	g/mL	80	kL	1.69E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	113mCd	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	125Sb	Sludge	2.71E+01	Ci	S	1.69	g/mL	150	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	125Sb	Sludge	5.99E+01	Ci	S	1.69	g/mL	332	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	125Sb	Sludge	4.10E+01	Ci	S	1.69	g/mL	227	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	125Sb	Sludge	1.59E+01	Ci	S	1.69	g/mL	88	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	125Sb	Sludge	1.86E+01	Ci	S	1.69	g/mL	103	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	125Sb	Sludge	1.44E+01	Ci	S	1.69	g/mL	80	kL	1.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	126Sn	Sludge	1.67E+00	Ci	M	1.46	g/mL	150	kL	5.92E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	126Sn	Sludge	8.22E-03	Ci	TS	1.49	g/mL	332	kL	1.73E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	126Sn	Sludge	2.82E-03	Ci	TS	1.71	g/mL	227	kL	1.01E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	126Sn	Sludge	7.58E-03	Ci	TE	1.29	g/mL	88	kL	3.54E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	126Sn	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	126Sn	Sludge	2.83E-02	Ci	TE	1.25	g/mL	80	kL	1.43E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	129I	Sludge	1.15E-01	Ci	S	1.69	g/mL	150	kL	4.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	129I	Sludge	2.55E-01	Ci	S	1.69	g/mL	332	kL	4.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	129I	Sludge	1.75E-01	Ci	S	1.69	g/mL	227	kL	4.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	129I	Sludge	6.77E-02	Ci	S	1.69	g/mL	88	kL	4.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	129I	Sludge	7.92E-02	Ci	S	1.69	g/mL	103	kL	4.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	129I	Sludge	6.15E-02	Ci	S	1.69	g/mL	80	kL	4.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	134Cs	Sludge	1.21E-02	Ci	M	1.46	g/mL	150	kL	4.28E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	134Cs	Sludge	1.98E-04	Ci	TS	1.49	g/mL	332	kL	4.17E-07	uCi/g	Jan 1 2001 12:00AM
241-C-104	134Cs	Sludge	1.04E-03	Ci	TS	1.71	g/mL	227	kL	3.72E-06	uCi/g	Jan 1 2001 12:00AM
241-C-104	134Cs	Sludge	2.02E-02	Ci	TE	1.29	g/mL	88	kL	9.44E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	134Cs	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 99

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	134Cs	Sludge	1.14E-02	Ci	TE	1.25	g/mL	80	kL	5.77E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	137Cs	Sludge	1.46E+04	Ci	S	1.69	g/mL	150	kL	5.77E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	137Cs	Sludge	3.24E+04	Ci	S	1.69	g/mL	332	kL	5.77E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	137Cs	Sludge	2.21E+04	Ci	S	1.69	g/mL	227	kL	5.77E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	137Cs	Sludge	8.57E+03	Ci	S	1.69	g/mL	88	kL	5.77E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	137Cs	Sludge	1.00E+04	Ci	S	1.69	g/mL	103	kL	5.77E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	137Cs	Sludge	7.80E+03	Ci	S	1.69	g/mL	80	kL	5.77E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	137mBa	Sludge	1.38E+04	Ci	C		g/mL	150	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	137mBa	Sludge	3.06E+04	Ci	C		g/mL	332	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	137mBa	Sludge	2.09E+04	Ci	C		g/mL	227	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	137mBa	Sludge	8.11E+03	Ci	C		g/mL	88	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	137mBa	Sludge	9.49E+03	Ci	C		g/mL	103	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	137mBa	Sludge	7.37E+03	Ci	C		g/mL	80	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	14C	Sludge	2.84E-01	Ci	S	1.69	g/mL	150	kL	1.12E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	14C	Sludge	6.28E-01	Ci	S	1.69	g/mL	332	kL	1.12E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	14C	Sludge	4.30E-01	Ci	S	1.69	g/mL	227	kL	1.12E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	14C	Sludge	1.67E-01	Ci	S	1.69	g/mL	88	kL	1.12E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	14C	Sludge	1.95E-01	Ci	S	1.69	g/mL	103	kL	1.12E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	14C	Sludge	1.51E-01	Ci	S	1.69	g/mL	80	kL	1.12E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	151Sm	Sludge	9.23E+03	Ci	M	1.46	g/mL	150	kL	3.27E+01	uCi/g	Jan 1 2001 12:00AM
241-C-104	151Sm	Sludge	4.50E+01	Ci	TS	1.49	g/mL	332	kL	9.48E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	151Sm	Sludge	1.58E+01	Ci	TS	1.71	g/mL	227	kL	5.64E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	151Sm	Sludge	2.74E+01	Ci	TE	1.29	g/mL	88	kL	1.28E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	151Sm	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	151Sm	Sludge	7.20E+01	Ci	TE	1.25	g/mL	80	kL	3.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	152Eu	Sludge	1.81E+00	Ci	M	1.46	g/mL	150	kL	6.40E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	152Eu	Sludge	6.81E-02	Ci	TS	1.49	g/mL	332	kL	1.43E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	152Eu	Sludge	1.22E-01	Ci	TS	1.71	g/mL	227	kL	4.38E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	152Eu	Sludge	2.75E-01	Ci	TE	1.29	g/mL	88	kL	1.28E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	152Eu	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	152Eu	Sludge	1.55E-01	Ci	TE	1.25	g/mL	80	kL	7.84E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	154Eu	Sludge	1.68E+02	Ci	S	1.69	g/mL	150	kL	6.61E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	154Eu	Sludge	3.71E+02	Ci	S	1.69	g/mL	332	kL	6.61E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	154Eu	Sludge	2.54E+02	Ci	S	1.69	g/mL	227	kL	6.61E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	154Eu	Sludge	9.84E+01	Ci	S	1.69	g/mL	88	kL	6.61E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	154Eu	Sludge	1.15E+02	Ci	S	1.69	g/mL	103	kL	6.61E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	154Eu	Sludge	8.94E+01	Ci	S	1.69	g/mL	80	kL	6.61E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	155Eu	Sludge	1.23E+02	Ci	S	1.69	g/mL	150	kL	4.86E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	155Eu	Sludge	2.73E+02	Ci	S	1.69	g/mL	332	kL	4.86E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	155Eu	Sludge	1.86E+02	Ci	S	1.69	g/mL	227	kL	4.86E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	155Eu	Sludge	7.23E+01	Ci	S	1.69	g/mL	88	kL	4.86E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	155Eu	Sludge	8.46E+01	Ci	S	1.69	g/mL	103	kL	4.86E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	155Eu	Sludge	6.57E+01	Ci	S	1.69	g/mL	80	kL	4.86E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	226Ra	Sludge	8.42E-04	Ci	M	1.46	g/mL	150	kL	2.98E-06	uCi/g	Jan 1 2001 12:00AM
241-C-104	226Ra	Sludge	1.16E-06	Ci	TS	1.49	g/mL	332	kL	2.44E-09	uCi/g	Jan 1 2001 12:00AM
241-C-104	226Ra	Sludge	2.98E-07	Ci	TS	1.71	g/mL	227	kL	1.07E-09	uCi/g	Jan 1 2001 12:00AM
241-C-104	226Ra	Sludge	2.52E-07	Ci	TE	1.29	g/mL	88	kL	1.18E-09	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 100

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	226Ra	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	226Ra	Sludge	5.43E-03	Ci	TE	1.25	g/mL	80	kL	2.74E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	227Ac	Sludge	1.20E+01	Ci	M	1.46	g/mL	150	kL	4.26E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	227Ac	Sludge	7.94E-06	Ci	TS	1.49	g/mL	332	kL	1.67E-08	uCi/g	Jan 1 2001 12:00AM
241-C-104	227Ac	Sludge	4.83E-02	Ci	TS	1.71	g/mL	227	kL	1.73E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	227Ac	Sludge	1.87E-06	Ci	TE	1.29	g/mL	88	kL	8.71E-09	uCi/g	Jan 1 2001 12:00AM
241-C-104	227Ac	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	227Ac	Sludge	9.68E+01	Ci	TE	1.25	g/mL	80	kL	4.89E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	228Ra	Sludge	3.84E+00	Ci	M	1.46	g/mL	150	kL	1.36E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	228Ra	Sludge	4.69E-11	Ci	TS	1.49	g/mL	332	kL	9.88E-14	uCi/g	Jan 1 2001 12:00AM
241-C-104	228Ra	Sludge	7.32E-03	Ci	TS	1.71	g/mL	227	kL	2.62E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	228Ra	Sludge	6.03E-11	Ci	TE	1.29	g/mL	88	kL	2.81E-13	uCi/g	Jan 1 2001 12:00AM
241-C-104	228Ra	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	228Ra	Sludge	1.87E+01	Ci	TE	1.25	g/mL	80	kL	9.45E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	229Th	Sludge	8.53E-02	Ci	M	1.46	g/mL	150	kL	3.02E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	229Th	Sludge	1.61E-08	Ci	TS	1.49	g/mL	332	kL	3.40E-11	uCi/g	Jan 1 2001 12:00AM
241-C-104	229Th	Sludge	6.51E-03	Ci	TS	1.71	g/mL	227	kL	2.33E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	229Th	Sludge	1.15E-08	Ci	TE	1.29	g/mL	88	kL	5.38E-11	uCi/g	Jan 1 2001 12:00AM
241-C-104	229Th	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	229Th	Sludge	8.49E-01	Ci	TE	1.25	g/mL	80	kL	4.29E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	231Pa	Sludge	2.16E+01	Ci	M	1.46	g/mL	150	kL	7.66E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	231Pa	Sludge	1.52E-05	Ci	TS	1.49	g/mL	332	kL	3.20E-08	uCi/g	Jan 1 2001 12:00AM
241-C-104	231Pa	Sludge	6.51E-02	Ci	TS	1.71	g/mL	227	kL	2.33E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	231Pa	Sludge	4.07E-06	Ci	TE	1.29	g/mL	88	kL	1.90E-08	uCi/g	Jan 1 2001 12:00AM
241-C-104	231Pa	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	231Pa	Sludge	2.18E+02	Ci	TE	1.25	g/mL	80	kL	1.10E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	232Th	Sludge	8.54E-01	Ci	S	1.69	g/mL	150	kL	3.37E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	232Th	Sludge	1.89E+00	Ci	S	1.69	g/mL	332	kL	3.37E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	232Th	Sludge	1.29E+00	Ci	S	1.69	g/mL	227	kL	3.37E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	232Th	Sludge	5.01E-01	Ci	S	1.69	g/mL	88	kL	3.37E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	232Th	Sludge	5.87E-01	Ci	S	1.69	g/mL	103	kL	3.37E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	232Th	Sludge	4.56E-01	Ci	S	1.69	g/mL	80	kL	3.37E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	232U	Sludge	2.38E+00	Ci	C	1.69	g/mL	150	kL	1.13E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	232U	Sludge	1.03E-04	Ci	TS	1.49	g/mL	332	kL	2.16E-07	uCi/g	Jan 1 2001 12:00AM
241-C-104	232U	Sludge	1.09E-02	Ci	TS	1.71	g/mL	227	kL	3.90E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	232U	Sludge	6.69E-04	Ci	TE	1.29	g/mL	88	kL	3.12E-06	uCi/g	Jan 1 2001 12:00AM
241-C-104	232U	Sludge	9.47E+00	Ci	TE	1.69	g/mL	103	kL	6.40E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	232U	Sludge	7.48E+00	Ci	TE	1.25	g/mL	80	kL	3.78E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	233U	Sludge	6.32E+01	Ci	S	1.69	g/mL	150	kL	2.49E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	233U	Sludge	1.40E+02	Ci	S	1.69	g/mL	332	kL	2.49E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	233U	Sludge	9.57E+01	Ci	S	1.69	g/mL	227	kL	2.49E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	233U	Sludge	3.71E+01	Ci	S	1.69	g/mL	88	kL	2.49E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	233U	Sludge	4.34E+01	Ci	S	1.69	g/mL	103	kL	2.49E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	233U	Sludge	3.37E+01	Ci	S	1.69	g/mL	80	kL	2.49E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	234U	Sludge	3.18E+00	Ci	S	1.69	g/mL	150	kL	1.26E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	234U	Sludge	7.04E+00	Ci	S	1.69	g/mL	332	kL	1.26E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	234U	Sludge	4.81E+00	Ci	S	1.69	g/mL	227	kL	1.26E-02	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 101

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	234U	Sludge	1.87E+00	Ci	S	1.69	g/mL	88	kL	1.26E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	234U	Sludge	2.18E+00	Ci	S	1.69	g/mL	103	kL	1.26E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	234U	Sludge	1.70E+00	Ci	S	1.69	g/mL	80	kL	1.26E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	235U	Sludge	1.40E-01	Ci	S	1.69	g/mL	227	kL	3.64E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	235U	Sludge	5.41E-02	Ci	S	1.69	g/mL	88	kL	3.64E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	235U	Sludge	6.34E-02	Ci	S	1.69	g/mL	103	kL	3.64E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	235U	Sludge	4.92E-02	Ci	S	1.69	g/mL	80	kL	3.64E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	235U	Sludge	9.23E-02	Ci	S	1.69	g/mL	150	kL	3.64E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	235U	Sludge	2.04E-01	Ci	S	1.69	g/mL	332	kL	3.64E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	236U	Sludge	1.05E-01	Ci	S	1.69	g/mL	150	kL	4.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	236U	Sludge	2.32E-01	Ci	S	1.69	g/mL	332	kL	4.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	236U	Sludge	1.58E-01	Ci	S	1.69	g/mL	227	kL	4.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	236U	Sludge	6.14E-02	Ci	S	1.69	g/mL	88	kL	4.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	236U	Sludge	7.19E-02	Ci	S	1.69	g/mL	103	kL	4.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	236U	Sludge	5.58E-02	Ci	S	1.69	g/mL	80	kL	4.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	237Np	Sludge	6.72E-01	Ci	S	1.69	g/mL	150	kL	2.65E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	237Np	Sludge	1.49E+00	Ci	S	1.69	g/mL	332	kL	2.65E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	237Np	Sludge	1.02E+00	Ci	S	1.69	g/mL	227	kL	2.65E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	237Np	Sludge	3.94E-01	Ci	S	1.69	g/mL	88	kL	2.65E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	237Np	Sludge	4.61E-01	Ci	S	1.69	g/mL	103	kL	2.65E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	237Np	Sludge	3.58E-01	Ci	S	1.69	g/mL	80	kL	2.65E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	238Pu	Sludge	3.48E+01	Ci	C	1.69	g/mL	150	kL	6.10E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	238Pu	Sludge	7.71E+01	Ci	C	1.69	g/mL	332	kL	6.10E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	238Pu	Sludge	5.27E+01	Ci	C	1.69	g/mL	227	kL	6.10E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	238Pu	Sludge	2.04E+01	Ci	C	1.69	g/mL	88	kL	6.10E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	238Pu	Sludge	2.39E+01	Ci	C	1.69	g/mL	103	kL	6.10E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	238Pu	Sludge	1.86E+01	Ci	C	1.69	g/mL	80	kL	6.10E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	238U	Sludge	1.79E+00	Ci	S	1.69	g/mL	150	kL	7.08E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	238U	Sludge	3.97E+00	Ci	S	1.69	g/mL	332	kL	7.08E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	238U	Sludge	2.72E+00	Ci	S	1.69	g/mL	227	kL	7.08E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	238U	Sludge	1.05E+00	Ci	S	1.69	g/mL	88	kL	7.08E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	238U	Sludge	1.23E+00	Ci	S	1.69	g/mL	103	kL	7.08E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	238U	Sludge	9.57E-01	Ci	S	1.69	g/mL	80	kL	7.08E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	239Pu	Sludge	8.38E+02	Ci	C	1.69	g/mL	150	kL	1.42E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	239Pu	Sludge	1.85E+03	Ci	C	1.69	g/mL	332	kL	1.42E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	239Pu	Sludge	1.27E+03	Ci	C	1.69	g/mL	227	kL	1.42E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	239Pu	Sludge	4.91E+02	Ci	C	1.69	g/mL	88	kL	1.42E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	239Pu	Sludge	5.75E+02	Ci	C	1.69	g/mL	103	kL	1.42E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	239Pu	Sludge	4.47E+02	Ci	C	1.69	g/mL	80	kL	1.42E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	240Pu	Sludge	1.65E+02	Ci	C	1.69	g/mL	150	kL	2.79E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	240Pu	Sludge	3.65E+02	Ci	C	1.69	g/mL	332	kL	2.79E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	240Pu	Sludge	2.49E+02	Ci	C	1.69	g/mL	227	kL	2.79E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	240Pu	Sludge	9.67E+01	Ci	C	1.69	g/mL	88	kL	2.79E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	240Pu	Sludge	1.13E+02	Ci	C	1.69	g/mL	103	kL	2.79E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	240Pu	Sludge	8.79E+01	Ci	C	1.69	g/mL	80	kL	2.79E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Am	Sludge	9.71E+02	Ci	E	1.69	g/mL	150	kL	3.83E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Am	Sludge	2.15E+03	Ci	E	1.69	g/mL	332	kL	3.83E+00	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 102

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	241Am	Sludge	1.47E+03	Ci	E	1.69	g/mL	227	kL	3.83E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Am	Sludge	5.70E+02	Ci	E	1.69	g/mL	88	kL	3.83E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Am	Sludge	6.67E+02	Ci	E	1.69	g/mL	103	kL	3.83E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Am	Sludge	5.18E+02	Ci	E	1.69	g/mL	80	kL	3.83E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Pu	Sludge	2.26E+03	Ci	E	1.69	g/mL	150	kL	8.92E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Pu	Sludge	5.00E+03	Ci	E	1.69	g/mL	332	kL	8.92E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Pu	Sludge	3.42E+03	Ci	E	1.69	g/mL	227	kL	8.92E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Pu	Sludge	1.33E+03	Ci	E	1.69	g/mL	88	kL	8.92E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Pu	Sludge	1.55E+03	Ci	E	1.69	g/mL	103	kL	8.92E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	241Pu	Sludge	1.21E+03	Ci	E	1.69	g/mL	80	kL	8.92E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Cm	Sludge	8.23E-01	Ci	C	1.69	g/mL	150	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Cm	Sludge	1.82E+00	Ci	C	1.69	g/mL	332	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Cm	Sludge	1.25E+00	Ci	C	1.69	g/mL	227	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Cm	Sludge	4.83E-01	Ci	C	1.69	g/mL	88	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Cm	Sludge	5.65E-01	Ci	C	1.69	g/mL	103	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Cm	Sludge	4.39E-01	Ci	C	1.69	g/mL	80	kL	3.52E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Pu	Sludge	8.52E-03	Ci	C	1.69	g/mL	88	kL	2.46E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Pu	Sludge	9.97E-03	Ci	C	1.69	g/mL	103	kL	2.46E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Pu	Sludge	7.75E-03	Ci	C	1.69	g/mL	80	kL	2.46E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Pu	Sludge	1.45E-02	Ci	C	1.69	g/mL	150	kL	2.46E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Pu	Sludge	3.21E-02	Ci	C	1.69	g/mL	332	kL	2.46E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	242Pu	Sludge	2.20E-02	Ci	C	1.69	g/mL	227	kL	2.46E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Am	Sludge	4.77E-02	Ci	C	1.69	g/mL	150	kL	2.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Am	Sludge	1.06E-01	Ci	C	1.69	g/mL	332	kL	2.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Am	Sludge	7.22E-02	Ci	C	1.69	g/mL	227	kL	2.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Am	Sludge	2.80E-02	Ci	C	1.69	g/mL	88	kL	2.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Am	Sludge	3.28E-02	Ci	C	1.69	g/mL	103	kL	2.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Am	Sludge	2.55E-02	Ci	C	1.69	g/mL	80	kL	2.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Cm	Sludge	6.60E-02	Ci	C	1.69	g/mL	150	kL	3.07E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Cm	Sludge	1.46E-01	Ci	C	1.69	g/mL	332	kL	3.07E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Cm	Sludge	9.99E-02	Ci	C	1.69	g/mL	227	kL	3.07E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Cm	Sludge	3.87E-02	Ci	C	1.69	g/mL	88	kL	3.07E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Cm	Sludge	4.53E-02	Ci	C	1.69	g/mL	103	kL	3.07E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	243Cm	Sludge	3.52E-02	Ci	C	1.69	g/mL	80	kL	3.07E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	244Cm	Sludge	2.30E+00	Ci	C	1.69	g/mL	150	kL	1.14E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	244Cm	Sludge	5.09E+00	Ci	C	1.69	g/mL	332	kL	1.14E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	244Cm	Sludge	3.48E+00	Ci	C	1.69	g/mL	227	kL	1.14E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	244Cm	Sludge	1.35E+00	Ci	C	1.69	g/mL	88	kL	1.14E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	244Cm	Sludge	1.58E+00	Ci	C	1.69	g/mL	103	kL	1.14E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	244Cm	Sludge	1.23E+00	Ci	C	1.69	g/mL	80	kL	1.14E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	3H	Sludge	8.59E+00	Ci	S	1.69	g/mL	150	kL	3.39E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	3H	Sludge	1.90E+01	Ci	S	1.69	g/mL	332	kL	3.39E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	3H	Sludge	1.30E+01	Ci	S	1.69	g/mL	227	kL	3.39E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	3H	Sludge	5.04E+00	Ci	S	1.69	g/mL	88	kL	3.39E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	3H	Sludge	5.90E+00	Ci	S	1.69	g/mL	103	kL	3.39E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	3H	Sludge	4.58E+00	Ci	S	1.69	g/mL	80	kL	3.39E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	59Ni	Sludge	4.55E+00	Ci	M	1.46	g/mL	150	kL	1.61E-02	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 103

BY: E. Bonilla
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	59Ni	Sludge	1.77E-02	Ci	TS	1.49	g/mL	332	kL	3.73E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	59Ni	Sludge	5.87E-03	Ci	TS	1.71	g/mL	227	kL	2.10E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	59Ni	Sludge	5.50E-03	Ci	TE	1.29	g/mL	88	kL	2.57E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	59Ni	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	59Ni	Sludge	0.00E+00	Ci	TE	1.25	g/mL	80	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	60Co	Sludge	4.16E+01	Ci	S	1.69	g/mL	150	kL	1.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	60Co	Sludge	9.20E+01	Ci	S	1.69	g/mL	332	kL	1.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	60Co	Sludge	6.29E+01	Ci	S	1.69	g/mL	227	kL	1.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	60Co	Sludge	2.44E+01	Ci	S	1.69	g/mL	88	kL	1.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	60Co	Sludge	2.85E+01	Ci	S	1.69	g/mL	103	kL	1.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	60Co	Sludge	2.22E+01	Ci	S	1.69	g/mL	80	kL	1.64E-01	uCi/g	Jan 1 2001 12:00AM
241-C-104	63Ni	Sludge	4.26E+02	Ci	M	1.46	g/mL	150	kL	1.51E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	63Ni	Sludge	1.61E+00	Ci	TS	1.49	g/mL	332	kL	3.39E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	63Ni	Sludge	5.59E-01	Ci	TS	1.71	g/mL	227	kL	2.00E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	63Ni	Sludge	5.48E-01	Ci	TE	1.29	g/mL	88	kL	2.55E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	63Ni	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	63Ni	Sludge	0.00E+00	Ci	TE	1.25	g/mL	80	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	79Se	Sludge	9.81E-01	Ci	S	1.69	g/mL	150	kL	3.87E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	79Se	Sludge	2.17E+00	Ci	S	1.69	g/mL	332	kL	3.87E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	79Se	Sludge	1.48E+00	Ci	S	1.69	g/mL	227	kL	3.87E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	79Se	Sludge	5.76E-01	Ci	S	1.69	g/mL	88	kL	3.87E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	79Se	Sludge	6.74E-01	Ci	S	1.69	g/mL	103	kL	3.87E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	79Se	Sludge	5.23E-01	Ci	S	1.69	g/mL	80	kL	3.87E-03	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Sr	Sludge	7.41E+04	Ci	S	1.69	g/mL	150	kL	2.92E+02	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Sr	Sludge	1.64E+05	Ci	S	1.69	g/mL	332	kL	2.92E+02	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Sr	Sludge	1.12E+05	Ci	S	1.69	g/mL	227	kL	2.92E+02	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Sr	Sludge	4.35E+04	Ci	S	1.69	g/mL	88	kL	2.92E+02	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Sr	Sludge	5.09E+04	Ci	S	1.69	g/mL	103	kL	2.92E+02	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Sr	Sludge	3.95E+04	Ci	S	1.69	g/mL	80	kL	2.92E+02	uCi/g	Jan 1 2001 12:00AM
241-C-104	90Y	Sludge	7.41E+04	Ci	C		g/mL	150	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	90Y	Sludge	1.64E+05	Ci	C		g/mL	332	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	90Y	Sludge	1.12E+05	Ci	C		g/mL	227	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	90Y	Sludge	4.35E+04	Ci	C		g/mL	88	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	90Y	Sludge	5.09E+04	Ci	C		g/mL	103	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	90Y	Sludge	3.95E+04	Ci	C		g/mL	80	kL		uCi/g	Jan 1 2001 12:00AM
241-C-104	93mNb	Sludge	9.63E+00	Ci	M	1.46	g/mL	150	kL	3.41E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	93mNb	Sludge	5.32E-02	Ci	TS	1.49	g/mL	332	kL	1.12E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	93mNb	Sludge	1.76E-02	Ci	TS	1.71	g/mL	227	kL	6.30E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	93mNb	Sludge	4.33E-02	Ci	TE	1.29	g/mL	88	kL	2.02E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	93mNb	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	93mNb	Sludge	1.56E-01	Ci	TE	1.25	g/mL	80	kL	7.89E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	93Zr	Sludge	1.13E+01	Ci	M	1.46	g/mL	150	kL	4.01E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	93Zr	Sludge	6.22E-02	Ci	TS	1.49	g/mL	332	kL	1.31E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	93Zr	Sludge	2.17E-02	Ci	TS	1.71	g/mL	227	kL	7.76E-05	uCi/g	Jan 1 2001 12:00AM
241-C-104	93Zr	Sludge	5.54E-02	Ci	TE	1.29	g/mL	88	kL	2.58E-04	uCi/g	Jan 1 2001 12:00AM
241-C-104	93Zr	Sludge	0.00E+00	Ci	TE	1.69	g/mL	103	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-104	93Zr	Sludge	2.00E-01	Ci	TE	1.25	g/mL	80	kL	1.01E-03	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 104

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	99Tc	Sludge	8.87E+00	Ci	S	1.69	g/mL	150	kL	3.50E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	99Tc	Sludge	1.96E+01	Ci	S	1.69	g/mL	332	kL	3.50E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	99Tc	Sludge	1.34E+01	Ci	S	1.69	g/mL	227	kL	3.50E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	99Tc	Sludge	5.21E+00	Ci	S	1.69	g/mL	88	kL	3.50E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	99Tc	Sludge	6.09E+00	Ci	S	1.69	g/mL	103	kL	3.50E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	99Tc	Sludge	4.73E+00	Ci	S	1.69	g/mL	80	kL	3.50E-02	uCi/g	Jan 1 2001 12:00AM
241-C-104	Ag	Sludge	8.62E+01	kg	S	1.69	g/mL	80	kL	6.37E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ag	Sludge	9.48E+01	kg	S	1.69	g/mL	88	kL	6.37E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ag	Sludge	3.58E+02	kg	S	1.69	g/mL	332	kL	6.37E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ag	Sludge	2.44E+02	kg	S	1.69	g/mL	227	kL	6.37E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ag	Sludge	1.11E+02	kg	S	1.69	g/mL	103	kL	6.37E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ag	Sludge	1.62E+02	kg	S	1.69	g/mL	150	kL	6.37E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Al	Sludge	1.38E+04	kg	S	1.69	g/mL	150	kL	5.44E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Al	Sludge	3.05E+04	kg	S	1.69	g/mL	332	kL	5.44E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Al	Sludge	2.09E+04	kg	S	1.69	g/mL	227	kL	5.44E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Al	Sludge	8.09E+03	kg	S	1.69	g/mL	88	kL	5.44E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Al	Sludge	9.47E+03	kg	S	1.69	g/mL	103	kL	5.44E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Al	Sludge	7.36E+03	kg	S	1.69	g/mL	80	kL	5.44E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	As	Sludge	3.97E+00	kg	S	1.69	g/mL	80	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	As	Sludge	1.65E+01	kg	S	1.69	g/mL	332	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	As	Sludge	4.37E+00	kg	S	1.69	g/mL	88	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	As	Sludge	5.12E+00	kg	S	1.69	g/mL	103	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	As	Sludge	7.45E+00	kg	S	1.69	g/mL	150	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	As	Sludge	1.13E+01	kg	S	1.69	g/mL	227	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	B	Sludge	6.07E+02	kg	S	1.69	g/mL	332	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	B	Sludge	4.15E+02	kg	S	1.69	g/mL	227	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	B	Sludge	2.74E+02	kg	S	1.69	g/mL	150	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	B	Sludge	1.46E+02	kg	S	1.69	g/mL	80	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	B	Sludge	1.88E+02	kg	S	1.69	g/mL	103	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	B	Sludge	1.61E+02	kg	S	1.69	g/mL	88	kL	1.08E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ba	Sludge	1.20E+01	kg	S	1.69	g/mL	80	kL	8.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ba	Sludge	1.55E+01	kg	S	1.69	g/mL	103	kL	8.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ba	Sludge	2.25E+01	kg	S	1.69	g/mL	150	kL	8.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ba	Sludge	1.32E+01	kg	S	1.69	g/mL	88	kL	8.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ba	Sludge	4.99E+01	kg	S	1.69	g/mL	332	kL	8.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ba	Sludge	3.41E+01	kg	S	1.69	g/mL	227	kL	8.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Be	Sludge	3.11E+00	kg	S	1.69	g/mL	80	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Be	Sludge	1.29E+01	kg	S	1.69	g/mL	332	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Be	Sludge	3.42E+00	kg	S	1.69	g/mL	88	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Be	Sludge	4.01E+00	kg	S	1.69	g/mL	103	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Be	Sludge	8.83E+00	kg	S	1.69	g/mL	227	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Be	Sludge	5.84E+00	kg	S	1.69	g/mL	150	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Bi	Sludge	1.11E+01	kg	S	1.69	g/mL	227	kL	2.90E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Bi	Sludge	4.31E+00	kg	S	1.69	g/mL	88	kL	2.90E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Bi	Sludge	5.05E+00	kg	S	1.69	g/mL	103	kL	2.90E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Bi	Sludge	3.92E+00	kg	S	1.69	g/mL	80	kL	2.90E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Bi	Sludge	7.35E+00	kg	S	1.69	g/mL	150	kL	2.90E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 105

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	Bi	Sludge	1.63E+01	kg	S	1.69	g/mL	332	kL	2.90E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ca	Sludge	4.57E+02	kg	S	1.69	g/mL	150	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ca	Sludge	1.01E+03	kg	S	1.69	g/mL	332	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ca	Sludge	6.91E+02	kg	S	1.69	g/mL	227	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ca	Sludge	2.68E+02	kg	S	1.69	g/mL	88	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ca	Sludge	3.14E+02	kg	S	1.69	g/mL	103	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ca	Sludge	2.44E+02	kg	S	1.69	g/mL	80	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Cd	Sludge	3.48E+02	kg	S	1.69	g/mL	332	kL	6.20E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cd	Sludge	9.21E+01	kg	S	1.69	g/mL	88	kL	6.20E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cd	Sludge	1.08E+02	kg	S	1.69	g/mL	103	kL	6.20E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cd	Sludge	1.57E+02	kg	S	1.69	g/mL	150	kL	6.20E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cd	Sludge	8.38E+01	kg	S	1.69	g/mL	80	kL	6.20E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cd	Sludge	2.38E+02	kg	S	1.69	g/mL	227	kL	6.20E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ce	Sludge	7.45E+00	kg	S	1.69	g/mL	103	kL	4.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ce	Sludge	1.64E+01	kg	S	1.69	g/mL	227	kL	4.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ce	Sludge	2.40E+01	kg	S	1.69	g/mL	332	kL	4.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ce	Sludge	6.37E+00	kg	S	1.69	g/mL	88	kL	4.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ce	Sludge	1.09E+01	kg	S	1.69	g/mL	150	kL	4.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ce	Sludge	5.79E+00	kg	S	1.69	g/mL	80	kL	4.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Cl	Sludge	1.22E+02	kg	S	1.69	g/mL	150	kL	4.83E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cl	Sludge	2.71E+02	kg	S	1.69	g/mL	332	kL	4.83E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cl	Sludge	1.85E+02	kg	S	1.69	g/mL	227	kL	4.83E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cl	Sludge	7.19E+01	kg	S	1.69	g/mL	88	kL	4.83E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cl	Sludge	8.41E+01	kg	S	1.69	g/mL	103	kL	4.83E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cl	Sludge	6.53E+01	kg	S	1.69	g/mL	80	kL	4.83E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	CN	Sludge	7.07E+00	kg	S	1.69	g/mL	332	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	CN	Sludge	1.70E+00	kg	S	1.69	g/mL	80	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	CN	Sludge	2.19E+00	kg	S	1.69	g/mL	103	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	CN	Sludge	3.19E+00	kg	S	1.69	g/mL	150	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	CN	Sludge	4.83E+00	kg	S	1.69	g/mL	227	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	CN	Sludge	1.87E+00	kg	S	1.69	g/mL	88	kL	1.26E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Co	Sludge	8.76E-01	kg	S	1.69	g/mL	88	kL	5.89E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Co	Sludge	7.96E-01	kg	S	1.69	g/mL	80	kL	5.89E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Co	Sludge	3.30E+00	kg	S	1.69	g/mL	332	kL	5.89E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Co	Sludge	1.02E+00	kg	S	1.69	g/mL	103	kL	5.89E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Co	Sludge	2.26E+00	kg	S	1.69	g/mL	227	kL	5.89E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Co	Sludge	1.49E+00	kg	S	1.69	g/mL	150	kL	5.89E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Cr	Sludge	2.24E+02	kg	S	1.69	g/mL	150	kL	8.82E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cr	Sludge	4.95E+02	kg	S	1.69	g/mL	332	kL	8.82E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cr	Sludge	3.38E+02	kg	S	1.69	g/mL	227	kL	8.82E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cr	Sludge	1.31E+02	kg	S	1.69	g/mL	88	kL	8.82E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cr	Sludge	1.53E+02	kg	S	1.69	g/mL	103	kL	8.82E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cr	Sludge	1.19E+02	kg	S	1.69	g/mL	80	kL	8.82E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Cu	Sludge	1.41E+01	kg	S	1.69	g/mL	103	kL	8.08E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Cu	Sludge	1.20E+01	kg	S	1.69	g/mL	88	kL	8.08E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Cu	Sludge	1.09E+01	kg	S	1.69	g/mL	80	kL	8.08E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Cu	Sludge	2.05E+01	kg	S	1.69	g/mL	150	kL	8.08E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 109

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	Cu	Sludge	4.53E+01	kg	S	1.69	g/mL	332	kL	8.08E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Cu	Sludge	3.10E+01	kg	S	1.69	g/mL	227	kL	8.08E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	F	Sludge	5.29E+03	kg	S	1.69	g/mL	150	kL	2.09E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	F	Sludge	1.17E+04	kg	S	1.69	g/mL	332	kL	2.09E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	F	Sludge	8.01E+03	kg	S	1.69	g/mL	227	kL	2.09E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	F	Sludge	3.11E+03	kg	S	1.69	g/mL	88	kL	2.09E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	F	Sludge	3.64E+03	kg	S	1.69	g/mL	103	kL	2.09E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	F	Sludge	2.82E+03	kg	S	1.69	g/mL	80	kL	2.09E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Fe	Sludge	4.22E+03	kg	S	1.69	g/mL	150	kL	1.67E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Fe	Sludge	9.34E+03	kg	S	1.69	g/mL	332	kL	1.67E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Fe	Sludge	6.39E+03	kg	S	1.69	g/mL	227	kL	1.67E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Fe	Sludge	2.48E+03	kg	S	1.69	g/mL	88	kL	1.67E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Fe	Sludge	2.90E+03	kg	S	1.69	g/mL	103	kL	1.67E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Fe	Sludge	2.25E+03	kg	S	1.69	g/mL	80	kL	1.67E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Hg	Sludge	1.03E+01	kg	S	1.69	g/mL	150	kL	4.06E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Hg	Sludge	2.28E+01	kg	S	1.69	g/mL	332	kL	4.06E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Hg	Sludge	1.56E+01	kg	S	1.69	g/mL	227	kL	4.06E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Hg	Sludge	6.05E+00	kg	S	1.69	g/mL	88	kL	4.06E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Hg	Sludge	7.08E+00	kg	S	1.69	g/mL	103	kL	4.06E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Hg	Sludge	5.50E+00	kg	S	1.69	g/mL	80	kL	4.06E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	K	Sludge	2.04E+02	kg	S	1.69	g/mL	150	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	K	Sludge	4.51E+02	kg	S	1.69	g/mL	332	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	K	Sludge	3.09E+02	kg	S	1.69	g/mL	227	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	K	Sludge	1.20E+02	kg	S	1.69	g/mL	88	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	K	Sludge	1.40E+02	kg	S	1.69	g/mL	103	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	K	Sludge	1.09E+02	kg	S	1.69	g/mL	80	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	La	Sludge	7.45E+00	kg	S	1.69	g/mL	150	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	La	Sludge	1.65E+01	kg	S	1.69	g/mL	332	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	La	Sludge	1.13E+01	kg	S	1.69	g/mL	227	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	La	Sludge	4.37E+00	kg	S	1.69	g/mL	88	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	La	Sludge	5.11E+00	kg	S	1.69	g/mL	103	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	La	Sludge	3.97E+00	kg	S	1.69	g/mL	80	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Li	Sludge	9.25E-01	kg	S	1.69	g/mL	150	kL	3.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Li	Sludge	4.93E-01	kg	S	1.69	g/mL	80	kL	3.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Li	Sludge	5.43E-01	kg	S	1.69	g/mL	88	kL	3.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Li	Sludge	2.05E+00	kg	S	1.69	g/mL	332	kL	3.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Li	Sludge	1.40E+00	kg	S	1.69	g/mL	227	kL	3.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Li	Sludge	6.35E-01	kg	S	1.69	g/mL	103	kL	3.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Mg	Sludge	1.85E+01	kg	S	1.69	g/mL	88	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Mg	Sludge	3.15E+01	kg	S	1.69	g/mL	150	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Mg	Sludge	4.77E+01	kg	S	1.69	g/mL	227	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Mg	Sludge	1.68E+01	kg	S	1.69	g/mL	80	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Mg	Sludge	6.98E+01	kg	S	1.69	g/mL	332	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Mg	Sludge	2.17E+01	kg	S	1.69	g/mL	103	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Mn	Sludge	1.07E+03	kg	S	1.69	g/mL	150	kL	4.24E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Mn	Sludge	2.38E+03	kg	S	1.69	g/mL	332	kL	4.24E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Mn	Sludge	1.62E+03	kg	S	1.69	g/mL	227	kL	4.24E+03	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 107

BY: E. Borrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	Mn	Sludge	6.30E+02	kg	S	1.69	g/mL	88	kL	4.24E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Mn	Sludge	7.37E+02	kg	S	1.69	g/mL	103	kL	4.24E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Mn	Sludge	5.73E+02	kg	S	1.69	g/mL	80	kL	4.24E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Mo	Sludge	8.14E+00	kg	S	1.69	g/mL	332	kL	1.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Mo	Sludge	3.68E+00	kg	S	1.69	g/mL	150	kL	1.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Mo	Sludge	1.96E+00	kg	S	1.69	g/mL	80	kL	1.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Mo	Sludge	2.16E+00	kg	S	1.69	g/mL	88	kL	1.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Mo	Sludge	5.56E+00	kg	S	1.69	g/mL	227	kL	1.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Mo	Sludge	2.52E+00	kg	S	1.69	g/mL	103	kL	1.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Na	Sludge	2.73E+04	kg	S	1.69	g/mL	150	kL	1.08E+05	ug/g	Jan 1 2001 12:00AM
241-C-104	Na	Sludge	6.03E+04	kg	S	1.69	g/mL	332	kL	1.08E+05	ug/g	Jan 1 2001 12:00AM
241-C-104	Na	Sludge	4.12E+04	kg	S	1.69	g/mL	227	kL	1.08E+05	ug/g	Jan 1 2001 12:00AM
241-C-104	Na	Sludge	1.60E+04	kg	S	1.69	g/mL	88	kL	1.08E+05	ug/g	Jan 1 2001 12:00AM
241-C-104	Na	Sludge	1.87E+04	kg	S	1.69	g/mL	103	kL	1.08E+05	ug/g	Jan 1 2001 12:00AM
241-C-104	Na	Sludge	1.45E+04	kg	S	1.69	g/mL	80	kL	1.08E+05	ug/g	Jan 1 2001 12:00AM
241-C-104	Nd	Sludge	2.48E+01	kg	S	1.69	g/mL	227	kL	6.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Nd	Sludge	8.72E+00	kg	S	1.69	g/mL	80	kL	6.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Nd	Sludge	3.62E+01	kg	S	1.69	g/mL	332	kL	6.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Nd	Sludge	9.60E+00	kg	S	1.69	g/mL	88	kL	6.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Nd	Sludge	1.12E+01	kg	S	1.69	g/mL	103	kL	6.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Nd	Sludge	1.64E+01	kg	S	1.69	g/mL	150	kL	6.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	NH3	Sludge	2.25E+02	kg	M	1.46	g/mL	150	kL	7.96E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Ni	Sludge	4.03E+02	kg	S	1.69	g/mL	150	kL	1.59E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ni	Sludge	8.92E+02	kg	S	1.69	g/mL	332	kL	1.59E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ni	Sludge	6.10E+02	kg	S	1.69	g/mL	227	kL	1.59E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ni	Sludge	2.36E+02	kg	S	1.69	g/mL	88	kL	1.59E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ni	Sludge	2.77E+02	kg	S	1.69	g/mL	103	kL	1.59E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Ni	Sludge	2.15E+02	kg	S	1.69	g/mL	80	kL	1.59E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	NO2	Sludge	5.59E+03	kg	S	1.69	g/mL	150	kL	2.20E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO2	Sludge	1.24E+04	kg	S	1.69	g/mL	332	kL	2.20E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO2	Sludge	8.46E+03	kg	S	1.69	g/mL	227	kL	2.20E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO2	Sludge	3.28E+03	kg	S	1.69	g/mL	88	kL	2.20E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO2	Sludge	3.84E+03	kg	S	1.69	g/mL	103	kL	2.20E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO2	Sludge	2.98E+03	kg	S	1.69	g/mL	80	kL	2.20E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO3	Sludge	3.00E+03	kg	S	1.69	g/mL	150	kL	1.18E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO3	Sludge	6.63E+03	kg	S	1.69	g/mL	332	kL	1.18E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO3	Sludge	4.53E+03	kg	S	1.69	g/mL	227	kL	1.18E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO3	Sludge	1.76E+03	kg	S	1.69	g/mL	88	kL	1.18E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO3	Sludge	2.06E+03	kg	S	1.69	g/mL	103	kL	1.18E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	NO3	Sludge	1.60E+03	kg	S	1.69	g/mL	80	kL	1.18E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Oxalate	Sludge	5.04E+02	kg	S	1.69	g/mL	88	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Oxalate	Sludge	1.90E+03	kg	S	1.69	g/mL	332	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Oxalate	Sludge	4.58E+02	kg	S	1.69	g/mL	80	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Oxalate	Sludge	5.90E+02	kg	S	1.69	g/mL	103	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Oxalate	Sludge	1.30E+03	kg	S	1.69	g/mL	227	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Oxalate	Sludge	8.59E+02	kg	S	1.69	g/mL	150	kL	3.39E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Pb	Sludge	1.94E+02	kg	S	1.69	g/mL	227	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 108

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	Pb	Sludge	7.51E+01	kg	S	1.69	g/mL	88	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Pb	Sludge	8.79E+01	kg	S	1.69	g/mL	103	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Pb	Sludge	6.83E+01	kg	S	1.69	g/mL	80	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Pb	Sludge	1.28E+02	kg	S	1.69	g/mL	150	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Pb	Sludge	2.83E+02	kg	S	1.69	g/mL	332	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	PO4	Sludge	4.91E+02	kg	S	1.69	g/mL	150	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	PO4	Sludge	1.09E+03	kg	S	1.69	g/mL	332	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	PO4	Sludge	7.43E+02	kg	S	1.69	g/mL	227	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	PO4	Sludge	2.88E+02	kg	S	1.69	g/mL	88	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	PO4	Sludge	3.37E+02	kg	S	1.69	g/mL	103	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	PO4	Sludge	2.62E+02	kg	S	1.69	g/mL	80	kL	1.94E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Pr	Sludge	5.72E+00	kg	S	1.69	g/mL	80	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Pr	Sludge	1.62E+01	kg	S	1.69	g/mL	227	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Pr	Sludge	6.29E+00	kg	S	1.69	g/mL	88	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Pr	Sludge	2.37E+01	kg	S	1.69	g/mL	332	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Pr	Sludge	1.07E+01	kg	S	1.69	g/mL	150	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Pr	Sludge	7.36E+00	kg	S	1.69	g/mL	103	kL	4.23E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Rb	Sludge	2.80E+01	kg	S	1.69	g/mL	103	kL	1.61E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Rb	Sludge	4.08E+01	kg	S	1.69	g/mL	150	kL	1.61E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Rb	Sludge	9.03E+01	kg	S	1.69	g/mL	332	kL	1.61E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Rb	Sludge	6.18E+01	kg	S	1.69	g/mL	227	kL	1.61E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Rb	Sludge	2.39E+01	kg	S	1.69	g/mL	88	kL	1.61E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Rb	Sludge	2.18E+01	kg	S	1.69	g/mL	80	kL	1.61E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Rh	Sludge	4.88E+01	kg	S	1.69	g/mL	332	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Rh	Sludge	1.18E+01	kg	S	1.69	g/mL	80	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Rh	Sludge	1.29E+01	kg	S	1.69	g/mL	88	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Rh	Sludge	3.34E+01	kg	S	1.69	g/mL	227	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Rh	Sludge	1.51E+01	kg	S	1.69	g/mL	103	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Rh	Sludge	2.21E+01	kg	S	1.69	g/mL	150	kL	8.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sb	Sludge	3.08E+00	kg	S	1.69	g/mL	103	kL	1.77E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sb	Sludge	2.63E+00	kg	S	1.69	g/mL	88	kL	1.77E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Se	Sludge	1.13E+01	kg	S	1.69	g/mL	227	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Se	Sludge	1.65E+01	kg	S	1.69	g/mL	332	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Se	Sludge	7.45E+00	kg	S	1.69	g/mL	150	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Se	Sludge	3.97E+00	kg	S	1.69	g/mL	80	kL	2.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Si	Sludge	1.57E+03	kg	S	1.69	g/mL	150	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Si	Sludge	3.47E+03	kg	S	1.69	g/mL	332	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Si	Sludge	2.37E+03	kg	S	1.69	g/mL	227	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Si	Sludge	9.19E+02	kg	S	1.69	g/mL	88	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Si	Sludge	1.08E+03	kg	S	1.69	g/mL	103	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	Si	Sludge	8.35E+02	kg	S	1.69	g/mL	80	kL	6.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	SO4	Sludge	5.23E+02	kg	S	1.69	g/mL	150	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	SO4	Sludge	1.16E+03	kg	S	1.69	g/mL	332	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	SO4	Sludge	7.92E+02	kg	S	1.69	g/mL	227	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	SO4	Sludge	3.07E+02	kg	S	1.69	g/mL	88	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	SO4	Sludge	3.59E+02	kg	S	1.69	g/mL	103	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM
241-C-104	SO4	Sludge	2.79E+02	kg	S	1.69	g/mL	80	kL	2.06E+03	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 109

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	Sr	Sludge	1.34E+01	kg	S	1.69	g/mL	150	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sr	Sludge	2.96E+01	kg	S	1.69	g/mL	332	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sr	Sludge	2.03E+01	kg	S	1.69	g/mL	227	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sr	Sludge	7.85E+00	kg	S	1.69	g/mL	88	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sr	Sludge	9.19E+00	kg	S	1.69	g/mL	103	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Sr	Sludge	7.14E+00	kg	S	1.69	g/mL	80	kL	5.28E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ta	Sludge	1.43E-01	kg	S	1.69	g/mL	80	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Ta	Sludge	4.05E-01	kg	S	1.69	g/mL	227	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Ta	Sludge	1.57E-01	kg	S	1.69	g/mL	88	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Ta	Sludge	2.67E-01	kg	S	1.69	g/mL	150	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Ta	Sludge	1.84E-01	kg	S	1.69	g/mL	103	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Ta	Sludge	5.92E-01	kg	S	1.69	g/mL	332	kL	1.05E+00	ug/g	Jan 1 2001 12:00AM
241-C-104	Th	Sludge	1.18E+04	kg	S	1.69	g/mL	227	kL	3.08E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Th	Sludge	5.35E+03	kg	S	1.69	g/mL	103	kL	3.08E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Th	Sludge	7.80E+03	kg	S	1.69	g/mL	150	kL	3.08E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Th	Sludge	1.73E+04	kg	S	1.69	g/mL	332	kL	3.08E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Th	Sludge	4.57E+03	kg	S	1.69	g/mL	88	kL	3.08E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Th	Sludge	4.16E+03	kg	S	1.69	g/mL	80	kL	3.08E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Ti	Sludge	1.03E+01	kg	S	1.69	g/mL	103	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ti	Sludge	3.32E+01	kg	S	1.69	g/mL	332	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ti	Sludge	2.27E+01	kg	S	1.69	g/mL	227	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ti	Sludge	8.00E+00	kg	S	1.69	g/mL	80	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ti	Sludge	1.50E+01	kg	S	1.69	g/mL	150	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Ti	Sludge	8.80E+00	kg	S	1.69	g/mL	88	kL	5.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	TIC as CO3	Sludge	7.42E+03	kg	S	1.69	g/mL	150	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	TIC as CO3	Sludge	1.64E+04	kg	S	1.69	g/mL	332	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	TIC as CO3	Sludge	1.12E+04	kg	S	1.69	g/mL	227	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	TIC as CO3	Sludge	4.36E+03	kg	S	1.69	g/mL	88	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	TIC as CO3	Sludge	5.10E+03	kg	S	1.69	g/mL	103	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	TIC as CO3	Sludge	3.96E+03	kg	S	1.69	g/mL	80	kL	2.93E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Tl	Sludge	3.30E+01	kg	S	1.69	g/mL	332	kL	5.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Tl	Sludge	1.49E+01	kg	S	1.69	g/mL	150	kL	5.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Tl	Sludge	1.02E+01	kg	S	1.69	g/mL	103	kL	5.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Tl	Sludge	2.26E+01	kg	S	1.69	g/mL	227	kL	5.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Tl	Sludge	7.96E+00	kg	S	1.69	g/mL	80	kL	5.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Tl	Sludge	8.76E+00	kg	S	1.69	g/mL	88	kL	5.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	UTOTAL	Sludge	5.40E+03	kg	S	1.69	g/mL	150	kL	2.13E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	UTOTAL	Sludge	1.20E+04	kg	S	1.69	g/mL	332	kL	2.13E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	UTOTAL	Sludge	3.17E+03	kg	S	1.69	g/mL	88	kL	2.13E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	UTOTAL	Sludge	3.71E+03	kg	S	1.69	g/mL	103	kL	2.13E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	UTOTAL	Sludge	2.88E+03	kg	S	1.69	g/mL	80	kL	2.13E+04	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 110

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-104	UTOTAL	Sludge	8.17E+03	kg	S	1.69	g/mL	227	kL	2.13E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	V	Sludge	9.22E+00	kg	S	1.69	g/mL	332	kL	1.64E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	V	Sludge	2.44E+00	kg	S	1.69	g/mL	88	kL	1.64E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	V	Sludge	4.16E+00	kg	S	1.69	g/mL	150	kL	1.64E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	V	Sludge	2.22E+00	kg	S	1.69	g/mL	80	kL	1.64E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	V	Sludge	2.86E+00	kg	S	1.69	g/mL	103	kL	1.64E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	V	Sludge	6.30E+00	kg	S	1.69	g/mL	227	kL	1.64E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	W	Sludge	3.25E+02	kg	S	1.69	g/mL	332	kL	5.80E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	W	Sludge	7.83E+01	kg	S	1.69	g/mL	80	kL	5.80E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	W	Sludge	2.22E+02	kg	S	1.69	g/mL	227	kL	5.80E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	W	Sludge	1.01E+02	kg	S	1.69	g/mL	103	kL	5.80E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	W	Sludge	8.62E+01	kg	S	1.69	g/mL	88	kL	5.80E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	W	Sludge	1.47E+02	kg	S	1.69	g/mL	150	kL	5.80E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Y	Sludge	4.31E+00	kg	S	1.69	g/mL	150	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Y	Sludge	6.52E+00	kg	S	1.69	g/mL	227	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Y	Sludge	2.30E+00	kg	S	1.69	g/mL	80	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Y	Sludge	2.53E+00	kg	S	1.69	g/mL	88	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Y	Sludge	2.96E+00	kg	S	1.69	g/mL	103	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Y	Sludge	9.54E+00	kg	S	1.69	g/mL	332	kL	1.70E+01	ug/g	Jan 1 2001 12:00AM
241-C-104	Zn	Sludge	2.06E+02	kg	S	1.69	g/mL	332	kL	3.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Zn	Sludge	5.46E+01	kg	S	1.69	g/mL	88	kL	3.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Zn	Sludge	6.39E+01	kg	S	1.69	g/mL	103	kL	3.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Zn	Sludge	4.96E+01	kg	S	1.69	g/mL	80	kL	3.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Zn	Sludge	1.41E+02	kg	S	1.69	g/mL	227	kL	3.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Zn	Sludge	9.31E+01	kg	S	1.69	g/mL	150	kL	3.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-104	Zr	Sludge	9.93E+03	kg	S	1.69	g/mL	150	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Zr	Sludge	2.20E+04	kg	S	1.69	g/mL	332	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Zr	Sludge	1.50E+04	kg	S	1.69	g/mL	227	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Zr	Sludge	5.83E+03	kg	S	1.69	g/mL	88	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Zr	Sludge	6.82E+03	kg	S	1.69	g/mL	103	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-C-104	Zr	Sludge	5.30E+03	kg	S	1.69	g/mL	80	kL	3.92E+04	ug/g	Jan 1 2001 12:00AM
241-C-106	106Ru	Sludge	5.77E-06	Ci	TE	1.3	g/mL	23	kL	8.08E-08	uCi/g	Jan 1 2001 12:00AM
241-C-106	113mCd	Sludge	5.84E+00	Ci	TE	1.3	g/mL	23	kL	8.17E-02	uCi/g	Jan 1 2001 12:00AM
241-C-106	125Sb	Sludge	4.01E-01	Ci	TE	1.3	g/mL	23	kL	5.62E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	126Sn	Sludge	1.81E+00	Ci	TE	1.3	g/mL	23	kL	2.53E-02	uCi/g	Jan 1 2001 12:00AM
241-C-106	129I	Sludge	8.28E-03	Ci	TE	1.3	g/mL	23	kL	1.16E-04	uCi/g	Jan 1 2001 12:00AM
241-C-106	134Cs	Sludge	1.00E-02	Ci	TE	1.3	g/mL	23	kL	1.41E-04	uCi/g	Jan 1 2001 12:00AM
241-C-106	137Cs	Sludge	1.14E+04	Ci	S	1.56	g/mL	23	kL	3.17E+02	uCi/g	Jan 1 2001 12:00AM
241-C-106	137mBa	Sludge	1.08E+04	Ci	C		g/mL	23	kL		uCi/g	Jan 1 2001 12:00AM
241-C-106	14C	Sludge	8.28E-03	Ci	S	1.56	g/mL	23	kL	2.31E-04	uCi/g	Jan 1 2001 12:00AM
241-C-106	151Sm	Sludge	1.01E+04	Ci	TE	1.3	g/mL	23	kL	1.41E+02	uCi/g	Jan 1 2001 12:00AM
241-C-106	152Eu	Sludge	2.85E+00	Ci	TE	1.3	g/mL	23	kL	3.99E-02	uCi/g	Jan 1 2001 12:00AM
241-C-106	154Eu	Sludge	2.64E+02	Ci	S	1.56	g/mL	23	kL	7.36E+00	uCi/g	Jan 1 2001 12:00AM
241-C-106	155Eu	Sludge	1.82E+02	Ci	S	1.56	g/mL	23	kL	5.08E+00	uCi/g	Jan 1 2001 12:00AM
241-C-106	226Ra	Sludge	3.93E-04	Ci	TE	1.3	g/mL	23	kL	5.50E-06	uCi/g	Jan 1 2001 12:00AM
241-C-106	227Ac	Sludge	2.21E-03	Ci	TE	1.3	g/mL	23	kL	3.09E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	228Ra	Sludge	2.46E-05	Ci	TE	1.3	g/mL	23	kL	3.44E-07	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 111

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-106	229Th	Sludge	2.10E-05	Ci	TE	1.3	g/mL	23	kL	2.95E-07	uCi/g	Jan 1 2001 12:00AM
241-C-106	231Pa	Sludge	2.82E-03	Ci	TE	1.3	g/mL	23	kL	3.95E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	232Th	Sludge	2.53E-03	Ci	S	1.56	g/mL	23	kL	7.04E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	232U	Sludge	1.65E-04	Ci	C	1.52	g/mL	23	kL	1.60E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	233U	Sludge	6.81E-04	Ci	C	1.52	g/mL	23	kL	6.16E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	234U	Sludge	1.34E-02	Ci	C	1.52	g/mL	23	kL	1.21E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	235U	Sludge	5.73E-04	Ci	C	1.52	g/mL	23	kL	5.18E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	236U	Sludge	2.39E-04	Ci	C	1.52	g/mL	23	kL	2.16E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	237Np	Sludge	1.66E-01	Ci	S	1.56	g/mL	23	kL	4.62E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	238Pu	Sludge	3.48E+00	Ci	C	1.56	g/mL	23	kL	4.44E-02	uCi/g	Jan 1 2001 12:00AM
241-C-106	238U	Sludge	1.37E-02	Ci	C	1.52	g/mL	23	kL	1.24E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	239Pu	Sludge	7.52E+01	Ci	C	1.56	g/mL	23	kL	9.07E-01	uCi/g	Jan 1 2001 12:00AM
241-C-106	240Pu	Sludge	1.54E+01	Ci	C	1.56	g/mL	23	kL	1.85E-01	uCi/g	Jan 1 2001 12:00AM
241-C-106	241Am	Sludge	2.25E+02	Ci	E	1.56	g/mL	23	kL	6.27E+00	uCi/g	Jan 1 2001 12:00AM
241-C-106	241Pu	Sludge	1.84E+02	Ci	E	1.56	g/mL	23	kL	5.14E+00	uCi/g	Jan 1 2001 12:00AM
241-C-106	242Cm	Sludge	3.42E-01	Ci	C	1.56	g/mL	23	kL	1.85E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	242Pu	Sludge	1.64E-03	Ci	C	1.56	g/mL	23	kL	1.98E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	243Am	Sludge	2.02E-03	Ci	TE	1.3	g/mL	23	kL	2.83E-05	uCi/g	Jan 1 2001 12:00AM
241-C-106	243Cm	Sludge	2.74E-02	Ci	C	1.56	g/mL	23	kL	1.70E-04	uCi/g	Jan 1 2001 12:00AM
241-C-106	244Cm	Sludge	5.82E-01	Ci	C	1.56	g/mL	23	kL	3.99E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	3H	Sludge	1.45E-01	Ci	S	1.56	g/mL	23	kL	4.04E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	59Ni	Sludge	6.13E+00	Ci	TE	1.3	g/mL	23	kL	8.59E-02	uCi/g	Jan 1 2001 12:00AM
241-C-106	60Co	Sludge	2.46E-01	Ci	TE	1.3	g/mL	23	kL	3.44E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	63Ni	Sludge	5.71E+02	Ci	TE	1.3	g/mL	23	kL	8.00E+00	uCi/g	Jan 1 2001 12:00AM
241-C-106	79Se	Sludge	2.77E-01	Ci	TE	1.3	g/mL	23	kL	3.88E-03	uCi/g	Jan 1 2001 12:00AM
241-C-106	90Sr	Sludge	2.82E+05	Ci	S	1.56	g/mL	23	kL	7.86E+03	uCi/g	Jan 1 2001 12:00AM
241-C-106	90Y	Sludge	2.82E+05	Ci	C		g/mL	23	kL		uCi/g	Jan 1 2001 12:00AM
241-C-106	93mNb	Sludge	1.08E+01	Ci	TE	1.3	g/mL	23	kL	1.52E-01	uCi/g	Jan 1 2001 12:00AM
241-C-106	93Zr	Sludge	1.16E+01	Ci	TE	1.3	g/mL	23	kL	1.63E-01	uCi/g	Jan 1 2001 12:00AM
241-C-106	99Tc	Sludge	1.03E+00	Ci	S	1.56	g/mL	23	kL	2.88E-02	uCi/g	Jan 1 2001 12:00AM
241-C-106	Ag	Sludge	2.63E+01	kg	S	1.52	g/mL	23	kL	7.53E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Al	Sludge	1.83E+03	kg	S	1.52	g/mL	23	kL	5.24E+04	ug/g	Jan 1 2001 12:00AM
241-C-106	As	Sludge	8.79E-01	kg	S	1.56	g/mL	23	kL	2.45E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	B	Sludge	8.98E+00	kg	S	1.52	g/mL	23	kL	2.57E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Ba	Sludge	1.52E+01	kg	S	1.52	g/mL	23	kL	4.36E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Be	Sludge	1.10E-01	kg	S	1.56	g/mL	23	kL	3.07E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	Bi	Sludge	1.11E-01	kg	TE	1.3	g/mL	23	kL	1.55E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	Ca	Sludge	7.85E+01	kg	S	1.52	g/mL	23	kL	2.25E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	Cd	Sludge	2.11E+00	kg	S	1.52	g/mL	23	kL	6.03E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Ce	Sludge	2.34E+01	kg	S	1.52	g/mL	23	kL	6.71E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Cl	Sludge	3.78E+00	kg	S	1.52	g/mL	23	kL	1.08E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	CN	Sludge	3.53E-01	kg	S	1.56	g/mL	23	kL	9.85E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	Co	Sludge	1.11E+00	kg	S	1.52	g/mL	23	kL	3.18E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Cr	Sludge	5.71E+01	kg	S	1.52	g/mL	23	kL	1.63E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	Cu	Sludge	6.86E+00	kg	S	1.52	g/mL	23	kL	1.96E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	F	Sludge	2.38E+00	kg	S	1.52	g/mL	23	kL	6.81E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Fe	Sludge	3.05E+03	kg	S	1.52	g/mL	23	kL	8.73E+04	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 112

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-106	Hg	Sludge	4.39E+00	kg	S	1.52	g/mL	23	kL	1.26E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	K	Sludge	2.11E+01	kg	S	1.52	g/mL	23	kL	6.03E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	La	Sludge	1.23E+01	kg	S	1.52	g/mL	23	kL	3.52E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Li	Sludge	1.33E+00	kg	S	1.52	g/mL	23	kL	3.80E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Mg	Sludge	2.02E+01	kg	S	1.52	g/mL	23	kL	5.79E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Mn	Sludge	7.59E+02	kg	S	1.52	g/mL	23	kL	2.17E+04	ug/g	Jan 1 2001 12:00AM
241-C-106	Mo	Sludge	3.85E-01	kg	S	1.56	g/mL	23	kL	1.07E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Na	Sludge	2.45E+03	kg	S	1.52	g/mL	23	kL	7.02E+04	ug/g	Jan 1 2001 12:00AM
241-C-106	Nd	Sludge	3.53E+01	kg	S	1.52	g/mL	23	kL	1.01E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	Ni	Sludge	1.06E+02	kg	S	1.52	g/mL	23	kL	3.03E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	NO2	Sludge	8.08E+01	kg	S	1.52	g/mL	23	kL	2.31E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	NO3	Sludge	1.18E+01	kg	S	1.52	g/mL	23	kL	3.36E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Oxalate	Sludge	6.92E+01	kg	S	1.52	g/mL	23	kL	1.98E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	Pb	Sludge	1.57E+02	kg	S	1.52	g/mL	23	kL	4.50E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	Pd	Sludge	3.88E-01	kg	S	1.56	g/mL	23	kL	1.08E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	PO4	Sludge	3.75E+02	kg	S	1.52	g/mL	23	kL	1.07E+04	ug/g	Jan 1 2001 12:00AM
241-C-106	Pr	Sludge	1.26E+01	kg	S	1.56	g/mL	23	kL	3.52E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Rb	Sludge	9.07E-02	kg	S	1.56	g/mL	23	kL	2.53E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	Rh	Sludge	8.92E-01	kg	S	1.56	g/mL	23	kL	2.49E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Ru	Sludge	1.83E+01	kg	S	1.56	g/mL	23	kL	5.11E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Sb	Sludge	9.97E-02	kg	S	1.56	g/mL	23	kL	2.78E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	Se	Sludge	2.11E-02	kg	S	1.56	g/mL	23	kL	5.87E-01	ug/g	Jan 1 2001 12:00AM
241-C-106	Si	Sludge	4.15E+01	kg	S	1.52	g/mL	23	kL	1.19E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	SO4	Sludge	6.06E+01	kg	S	1.52	g/mL	23	kL	1.73E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	Sr	Sludge	6.49E+00	kg	S	1.52	g/mL	23	kL	1.86E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Ta	Sludge	8.79E-02	kg	S	1.56	g/mL	23	kL	2.45E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	Te	Sludge	3.98E+00	kg	S	1.56	g/mL	23	kL	1.11E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Th	Sludge	1.89E+01	kg	S	1.52	g/mL	23	kL	5.41E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Ti	Sludge	4.09E+00	kg	S	1.52	g/mL	23	kL	1.17E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	TIC as CO3	Sludge	3.25E+03	kg	S	1.56	g/mL	23	kL	9.05E+04	ug/g	Jan 1 2001 12:00AM
241-C-106	Tl	Sludge	1.24E-01	kg	S	1.56	g/mL	23	kL	3.46E+00	ug/g	Jan 1 2001 12:00AM
241-C-106	UTOTAL	Sludge	4.11E+01	kg	S	1.52	g/mL	23	kL	1.18E+03	ug/g	Jan 1 2001 12:00AM
241-C-106	V	Sludge	1.37E+00	kg	S	1.52	g/mL	23	kL	3.91E+01	ug/g	Jan 1 2001 12:00AM
241-C-106	Y	Sludge	4.46E+00	kg	S	1.52	g/mL	23	kL	1.28E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Zn	Sludge	4.36E+00	kg	S	1.52	g/mL	23	kL	1.25E+02	ug/g	Jan 1 2001 12:00AM
241-C-106	Zr	Sludge	2.65E+00	kg	S	1.52	g/mL	23	kL	7.59E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	106Ru	Sludge (Solids)	7.01E-06	Ci	TS	1.59	g/mL	194	kL	2.47E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-102	106Ru	Sludge (Solids)	6.47E-06	Ci	M	1.84	g/mL	186	kL	1.89E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-102	113mCd	Sludge (Solids)	8.33E+00	Ci	TS	1.59	g/mL	194	kL	2.93E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	113mCd	Sludge (Solids)	7.69E+00	Ci	M	1.84	g/mL	186	kL	2.25E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	125Sb	Sludge (Solids)	3.92E+00	Ci	TS	1.59	g/mL	194	kL	1.38E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	125Sb	Sludge (Solids)	3.62E+00	Ci	M	1.84	g/mL	186	kL	1.06E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	126Sn	Sludge (Solids)	2.76E-01	Ci	TS	1.59	g/mL	194	kL	9.72E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	126Sn	Sludge (Solids)	2.55E-01	Ci	M	1.84	g/mL	186	kL	7.46E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	129I	Sludge (Solids)	4.55E-02	Ci	S	1.65	g/mL	186	kL	1.48E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	129I	Sludge (Solids)	4.75E-02	Ci	S	1.65	g/mL	194	kL	1.48E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 113

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-SY-102	134Cs	Sludge (Solids)	4.48E-02	Ci	TS	1.59	g/mL	194	kL	1.58E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	134Cs	Sludge (Solids)	5.79E-02	Ci	M	1.84	g/mL	186	kL	1.69E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	137Cs	Sludge (Solids)	3.34E+04	Ci	S	1.65	g/mL	194	kL	1.04E+02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	137Cs	Sludge (Solids)	3.20E+04	Ci	S	1.65	g/mL	186	kL	1.04E+02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	137mBa	Sludge (Solids)	3.16E+04	Ci	C		g/mL	194	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-102	137mBa	Sludge (Solids)	3.03E+04	Ci	C		g/mL	186	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-102	14C	Sludge (Solids)	2.85E-01	Ci	S	1.65	g/mL	194	kL	8.91E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	14C	Sludge (Solids)	2.73E-01	Ci	S	1.65	g/mL	186	kL	8.91E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	151Sm	Sludge (Solids)	1.53E+03	Ci	TS	1.59	g/mL	194	kL	5.38E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-102	151Sm	Sludge (Solids)	1.41E+03	Ci	M	1.84	g/mL	186	kL	4.12E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-102	152Eu	Sludge (Solids)	3.90E-01	Ci	TS	1.59	g/mL	194	kL	1.37E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	152Eu	Sludge (Solids)	3.59E-01	Ci	M	1.84	g/mL	186	kL	1.05E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	154Eu	Sludge (Solids)	1.48E+02	Ci	S	1.44	g/mL	194	kL	5.29E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	154Eu	Sludge (Solids)	4.25E+01	Ci	M	1.84	g/mL	186	kL	1.24E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	155Eu	Sludge (Solids)	9.35E+01	Ci	S	1.44	g/mL	194	kL	3.35E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	155Eu	Sludge (Solids)	1.15E+01	Ci	M	1.84	g/mL	186	kL	3.35E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	226Ra	Sludge (Solids)	2.04E-05	Ci	TS	1.59	g/mL	194	kL	7.18E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-102	226Ra	Sludge (Solids)	1.88E-05	Ci	M	1.84	g/mL	186	kL	5.50E-08	uCi/g	Jan 1 2001 12:00AM
241-SY-102	227Ac	Sludge (Solids)	2.13E-04	Ci	TS	1.59	g/mL	194	kL	7.49E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-102	227Ac	Sludge (Solids)	1.96E-04	Ci	M	1.84	g/mL	186	kL	5.74E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-102	228Ra	Sludge (Solids)	1.46E-02	Ci	TS	1.59	g/mL	194	kL	5.13E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	228Ra	Sludge (Solids)	1.56E-02	Ci	M	1.84	g/mL	186	kL	4.55E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	229Th	Sludge (Solids)	3.52E-04	Ci	TS	1.59	g/mL	194	kL	1.24E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	229Th	Sludge (Solids)	3.25E-04	Ci	M	1.84	g/mL	186	kL	9.51E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-102	231Pa	Sludge (Solids)	5.62E-04	Ci	TS	1.59	g/mL	194	kL	1.98E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	231Pa	Sludge (Solids)	5.19E-04	Ci	M	1.84	g/mL	186	kL	1.52E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	232Th	Sludge (Solids)	1.65E-02	Ci	S	1.65	g/mL	194	kL	5.14E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	232Th	Sludge (Solids)	1.58E-02	Ci	S	1.65	g/mL	186	kL	5.14E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	232U	Sludge (Solids)	3.66E-02	Ci	C	1.65	g/mL	194	kL	1.14E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	232U	Sludge (Solids)	6.75E-02	Ci	C	1.65	g/mL	186	kL	2.20E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	233U	Sludge (Solids)	1.50E-01	Ci	C	1.65	g/mL	194	kL	4.69E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	233U	Sludge (Solids)	2.77E-01	Ci	C	1.65	g/mL	186	kL	9.03E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	234U	Sludge (Solids)	8.38E-02	Ci	C	1.65	g/mL	194	kL	2.62E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	234U	Sludge (Solids)	1.54E-01	Ci	C	1.65	g/mL	186	kL	5.02E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	235U	Sludge (Solids)	3.53E-03	Ci	C	1.65	g/mL	194	kL	1.10E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	235U	Sludge (Solids)	6.46E-03	Ci	C	1.65	g/mL	186	kL	2.11E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	236U	Sludge (Solids)	2.02E-03	Ci	C	1.65	g/mL	194	kL	6.32E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	236U	Sludge (Solids)	3.76E-03	Ci	C	1.65	g/mL	186	kL	1.23E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	237Np	Sludge (Solids)	3.80E-01	Ci	S	1.65	g/mL	194	kL	1.19E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	237Np	Sludge (Solids)	3.64E-01	Ci	S	1.65	g/mL	186	kL	1.19E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	238Pu	Sludge (Solids)	2.83E+02	Ci	S	1.65	g/mL	194	kL	8.85E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	238Pu	Sludge (Solids)	2.72E+02	Ci	S	1.65	g/mL	186	kL	8.85E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	238U	Sludge (Solids)	7.99E-02	Ci	C	1.65	g/mL	194	kL	2.50E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	238U	Sludge (Solids)	1.46E-01	Ci	C	1.65	g/mL	186	kL	4.76E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	239Pu	Sludge (Solids)	2.67E+03	Ci	C	1.65	g/mL	194	kL	8.33E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-102	239Pu	Sludge (Solids)	1.15E+03	Ci	S	1.44	g/mL	186	kL	4.30E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-102	240Pu	Sludge (Solids)	4.19E+02	Ci	C	1.65	g/mL	194	kL	1.31E+00	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 114

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-SY-102	240Pu	Sludge (Solids)	4.42E+02	Ci	S	1.44	g/mL	186	kL	1.65E+00	uCi/g	Jan 1 2001 12:00AM
241-SY-102	241Am	Sludge (Solids)	1.20E+04	Ci	S	1.65	g/mL	194	kL	3.75E+01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	241Am	Sludge (Solids)	1.15E+04	Ci	S	1.65	g/mL	186	kL	3.75E+01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	241Pu	Sludge (Solids)	3.24E+03	Ci	C	1.65	g/mL	194	kL	1.01E+01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	241Pu	Sludge (Solids)	5.87E+01	Ci	S	1.44	g/mL	186	kL	2.19E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	242Cm	Sludge (Solids)	5.07E-02	Ci	C	1.65	g/mL	194	kL	1.58E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	242Cm	Sludge (Solids)	7.60E-04	Ci	C	1.65	g/mL	186	kL	2.48E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	242Pu	Sludge (Solids)	2.47E-02	Ci	C	1.65	g/mL	194	kL	7.72E-05	uCi/g	Jan 1 2001 12:00AM
241-SY-102	242Pu	Sludge (Solids)	1.80E-01	Ci	S	1.44	g/mL	186	kL	6.72E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	243Am	Sludge (Solids)	3.93E-01	Ci	C	1.65	g/mL	194	kL	1.23E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	243Am	Sludge (Solids)	2.80E-03	Ci	C	1.65	g/mL	186	kL	9.13E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	243Cm	Sludge (Solids)	4.61E-01	Ci	C		g/mL	194	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-102	243Cm	Sludge (Solids)	4.85E-05	Ci	C	1.65	g/mL	186	kL	1.58E-07	uCi/g	Jan 1 2001 12:00AM
241-SY-102	244Cm	Sludge (Solids)	1.10E+01	Ci	C		g/mL	194	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-102	244Cm	Sludge (Solids)	5.23E-04	Ci	C	1.65	g/mL	186	kL	1.70E-06	uCi/g	Jan 1 2001 12:00AM
241-SY-102	3H	Sludge (Solids)	3.50E-01	Ci	S	1.65	g/mL	194	kL	1.09E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	3H	Sludge (Solids)	3.35E-01	Ci	S	1.65	g/mL	186	kL	1.09E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	59Ni	Sludge (Solids)	1.44E-01	Ci	TS	1.59	g/mL	194	kL	5.06E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	59Ni	Sludge (Solids)	1.14E-01	Ci	M	1.84	g/mL	186	kL	3.32E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	60Co	Sludge (Solids)	6.24E+00	Ci	TS	1.59	g/mL	194	kL	2.20E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	60Co	Sludge (Solids)	1.89E+00	Ci	M	1.84	g/mL	186	kL	5.52E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	63Ni	Sludge (Solids)	1.34E+01	Ci	TS	1.59	g/mL	194	kL	4.72E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	63Ni	Sludge (Solids)	1.06E+01	Ci	M	1.84	g/mL	186	kL	3.10E-02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	79Se	Sludge (Solids)	4.57E-02	Ci	TS	1.59	g/mL	194	kL	1.61E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	79Se	Sludge (Solids)	4.22E-02	Ci	M	1.84	g/mL	186	kL	1.23E-04	uCi/g	Jan 1 2001 12:00AM
241-SY-102	90Sr	Sludge (Solids)	3.44E+04	Ci	S	1.65	g/mL	194	kL	1.07E+02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	90Sr	Sludge (Solids)	3.29E+04	Ci	S	1.65	g/mL	186	kL	1.07E+02	uCi/g	Jan 1 2001 12:00AM
241-SY-102	90Y	Sludge (Solids)	3.44E+04	Ci	C		g/mL	194	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-102	90Y	Sludge (Solids)	3.29E+04	Ci	C		g/mL	186	kL		uCi/g	Jan 1 2001 12:00AM
241-SY-102	93mNb	Sludge (Solids)	1.82E+00	Ci	TS	1.59	g/mL	194	kL	6.40E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	93mNb	Sludge (Solids)	1.68E+00	Ci	M	1.84	g/mL	186	kL	4.91E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	93Zr	Sludge (Solids)	2.24E+00	Ci	TS	1.59	g/mL	194	kL	7.90E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	93Zr	Sludge (Solids)	2.07E+00	Ci	M	1.84	g/mL	186	kL	6.05E-03	uCi/g	Jan 1 2001 12:00AM
241-SY-102	99Tc	Sludge (Solids)	6.47E+01	Ci	S	1.65	g/mL	194	kL	2.02E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	99Tc	Sludge (Solids)	6.20E+01	Ci	S	1.65	g/mL	186	kL	2.02E-01	uCi/g	Jan 1 2001 12:00AM
241-SY-102	Ag	Sludge (Solids)	2.83E+01	kg	S	1.65	g/mL	186	kL	9.21E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ag	Sludge (Solids)	1.54E+00	kg	S	1.65	g/mL	194	kL	4.80E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Al	Sludge (Solids)	1.39E+04	kg	S	1.65	g/mL	194	kL	4.33E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Al	Sludge (Solids)	8.87E+03	kg	S	1.65	g/mL	186	kL	2.89E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	As	Sludge (Solids)	3.04E+00	kg	S	1.65	g/mL	194	kL	9.49E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	As	Sludge (Solids)	2.91E+00	kg	S	1.65	g/mL	186	kL	9.49E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	B	Sludge (Solids)	1.38E+01	kg	S	1.65	g/mL	186	kL	4.51E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	B	Sludge (Solids)	1.52E+01	kg	S	1.65	g/mL	194	kL	4.75E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ba	Sludge (Solids)	1.31E+01	kg	S	1.65	g/mL	186	kL	4.27E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ba	Sludge (Solids)	7.81E+00	kg	S	1.65	g/mL	194	kL	2.44E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Be	Sludge (Solids)	5.47E-01	kg	S	1.44	g/mL	194	kL	1.96E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Be	Sludge (Solids)	1.49E+00	kg	S	1.65	g/mL	186	kL	4.84E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 116

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-SY-102	Bi	Sludge (Solids)	6.66E+01	kg	S	1.65	g/mL	194	kL	2.08E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Bi	Sludge (Solids)	2.73E+03	kg	S	1.65	g/mL	186	kL	8.91E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ca	Sludge (Solids)	1.74E+02	kg	S	1.65	g/mL	194	kL	5.43E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ca	Sludge (Solids)	8.95E+02	kg	S	1.65	g/mL	186	kL	2.92E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cd	Sludge (Solids)	3.26E+01	kg	S	1.65	g/mL	194	kL	1.02E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cd	Sludge (Solids)	8.77E+01	kg	S	1.65	g/mL	186	kL	2.86E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ce	Sludge (Solids)	1.48E+01	kg	S	1.65	g/mL	194	kL	4.63E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ce	Sludge (Solids)	2.43E+01	kg	S	1.65	g/mL	186	kL	7.91E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cl	Sludge (Solids)	7.81E+02	kg	S	1.65	g/mL	194	kL	2.44E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cl	Sludge (Solids)	8.16E+02	kg	S	1.65	g/mL	186	kL	2.66E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Co	Sludge (Solids)	4.47E+00	kg	S	1.65	g/mL	194	kL	1.39E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Co	Sludge (Solids)	3.44E+00	kg	S	1.65	g/mL	186	kL	1.12E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cr	Sludge (Solids)	9.47E+03	kg	S	1.65	g/mL	194	kL	2.96E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cr	Sludge (Solids)	3.92E+03	kg	S	1.65	g/mL	186	kL	1.28E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cu	Sludge (Solids)	1.09E+00	kg	S	1.44	g/mL	194	kL	3.92E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Cu	Sludge (Solids)	1.74E+01	kg	S	1.65	g/mL	186	kL	5.67E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	F	Sludge (Solids)	2.67E+02	kg	S	1.65	g/mL	194	kL	8.35E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	F	Sludge (Solids)	3.25E+02	kg	S	1.65	g/mL	186	kL	1.06E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Fe	Sludge (Solids)	6.76E+02	kg	S	1.65	g/mL	194	kL	2.11E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Fe	Sludge (Solids)	6.93E+03	kg	S	1.65	g/mL	186	kL	2.26E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Hg	Sludge (Solids)	2.97E+00	kg	S	1.65	g/mL	194	kL	9.29E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Hg	Sludge (Solids)	2.85E+00	kg	S	1.65	g/mL	186	kL	9.29E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	K	Sludge (Solids)	3.58E+02	kg	S	1.65	g/mL	194	kL	1.12E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	K	Sludge (Solids)	4.05E+02	kg	S	1.65	g/mL	186	kL	1.32E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	La	Sludge (Solids)	1.10E+01	kg	S	1.65	g/mL	194	kL	3.45E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	La	Sludge (Solids)	3.72E+01	kg	S	1.65	g/mL	186	kL	1.21E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Li	Sludge (Solids)	1.04E+01	kg	S	1.65	g/mL	194	kL	3.24E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Li	Sludge (Solids)	1.45E+01	kg	S	1.65	g/mL	186	kL	4.72E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Mg	Sludge (Solids)	2.22E+02	kg	S	1.65	g/mL	186	kL	7.22E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Mg	Sludge (Solids)	1.13E+01	kg	S	1.44	g/mL	194	kL	4.04E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Mn	Sludge (Solids)	1.84E+02	kg	S	1.65	g/mL	194	kL	5.76E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Mn	Sludge (Solids)	1.60E+03	kg	S	1.65	g/mL	186	kL	5.21E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Na	Sludge (Solids)	4.06E+04	kg	S	1.65	g/mL	194	kL	1.27E+05	ug/g	Jan 1 2001 12:00AM
241-SY-102	Na	Sludge (Solids)	3.40E+04	kg	S	1.65	g/mL	186	kL	1.11E+05	ug/g	Jan 1 2001 12:00AM
241-SY-102	Nd	Sludge (Solids)	2.79E+01	kg	S	1.65	g/mL	186	kL	9.08E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Nd	Sludge (Solids)	4.04E+01	kg	S	1.65	g/mL	194	kL	1.26E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ni	Sludge (Solids)	1.26E+02	kg	S	1.65	g/mL	194	kL	3.95E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ni	Sludge (Solids)	1.01E+02	kg	S	1.65	g/mL	186	kL	3.29E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	NO2	Sludge (Solids)	1.25E+04	kg	S	1.65	g/mL	194	kL	3.89E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	NO2	Sludge (Solids)	1.06E+04	kg	S	1.65	g/mL	186	kL	3.45E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	NO3	Sludge (Solids)	1.90E+04	kg	S	1.65	g/mL	194	kL	5.95E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	NO3	Sludge (Solids)	2.36E+04	kg	S	1.65	g/mL	186	kL	7.70E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	OH	Sludge (Solids)	4.11E+03	kg	S	1.44	g/mL	194	kL	1.47E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Oxalate	Sludge (Solids)	2.60E+04	kg	S	1.65	g/mL	194	kL	8.12E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Oxalate	Sludge (Solids)	7.62E+03	kg	S	1.65	g/mL	186	kL	2.48E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Pb	Sludge (Solids)	1.79E+02	kg	S	1.65	g/mL	194	kL	5.59E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Pb	Sludge (Solids)	3.74E+02	kg	S	1.65	g/mL	186	kL	1.22E+03	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 116

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-SY-102	PO4	Sludge (Solids)	1.10E+03	kg	S	1.65	g/mL	194	kL	3.44E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	PO4	Sludge (Solids)	5.36E+03	kg	S	1.65	g/mL	186	kL	1.75E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Rb	Sludge (Solids)	1.23E+01	kg	S	1.65	g/mL	194	kL	3.85E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Rb	Sludge (Solids)	1.18E+01	kg	S	1.65	g/mL	186	kL	3.85E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Sb	Sludge (Solids)	9.22E-01	kg	S	1.65	g/mL	194	kL	2.88E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Sb	Sludge (Solids)	8.84E-01	kg	S	1.65	g/mL	186	kL	2.88E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Se	Sludge (Solids)	2.89E+00	kg	S	1.65	g/mL	186	kL	9.42E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Se	Sludge (Solids)	3.01E+00	kg	S	1.65	g/mL	194	kL	9.42E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Si	Sludge (Solids)	1.30E+02	kg	S	1.65	g/mL	194	kL	4.07E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Si	Sludge (Solids)	8.10E+02	kg	S	1.65	g/mL	186	kL	2.64E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	SO4	Sludge (Solids)	6.50E+02	kg	S	1.65	g/mL	194	kL	2.03E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	SO4	Sludge (Solids)	1.29E+03	kg	S	1.65	g/mL	186	kL	4.21E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	Sr	Sludge (Solids)	2.75E+00	kg	S	1.65	g/mL	194	kL	8.59E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Sr	Sludge (Solids)	3.56E+01	kg	S	1.65	g/mL	186	kL	1.16E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ta	Sludge (Solids)	1.27E+00	kg	S	1.65	g/mL	194	kL	3.98E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ta	Sludge (Solids)	1.22E+00	kg	S	1.65	g/mL	186	kL	3.98E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Te	Sludge (Solids)	7.23E-01	kg	S	1.65	g/mL	186	kL	2.36E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Te	Sludge (Solids)	7.54E-01	kg	S	1.65	g/mL	194	kL	2.36E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Th	Sludge (Solids)	1.68E+02	kg	S	1.65	g/mL	194	kL	5.26E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Th	Sludge (Solids)	1.61E+02	kg	S	1.65	g/mL	186	kL	5.26E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ti	Sludge (Solids)	2.85E+00	kg	S	1.65	g/mL	194	kL	8.90E+00	ug/g	Jan 1 2001 12:00AM
241-SY-102	Ti	Sludge (Solids)	9.12E+00	kg	S	1.65	g/mL	186	kL	2.97E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	TIC as CO3	Sludge (Solids)	5.84E+03	kg	S	1.65	g/mL	194	kL	1.82E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	TIC as CO3	Sludge (Solids)	5.60E+03	kg	S	1.65	g/mL	186	kL	1.82E+04	ug/g	Jan 1 2001 12:00AM
241-SY-102	Tl	Sludge (Solids)	2.35E-01	kg	S	1.65	g/mL	194	kL	7.33E-01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Tl	Sludge (Solids)	2.25E-01	kg	S	1.65	g/mL	186	kL	7.33E-01	ug/g	Jan 1 2001 12:00AM
241-SY-102	UTOTAL	Sludge (Solids)	2.39E+02	kg	S	1.65	g/mL	194	kL	7.47E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	UTOTAL	Sludge (Solids)	4.28E+02	kg	S	1.65	g/mL	186	kL	1.43E+03	ug/g	Jan 1 2001 12:00AM
241-SY-102	V	Sludge (Solids)	4.02E+00	kg	S	1.44	g/mL	186	kL	1.50E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	V	Sludge (Solids)	5.04E+00	kg	S	1.65	g/mL	194	kL	1.57E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Y	Sludge (Solids)	5.52E+00	kg	S	1.65	g/mL	186	kL	1.80E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Y	Sludge (Solids)	5.76E+00	kg	S	1.65	g/mL	194	kL	1.80E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Zn	Sludge (Solids)	3.06E+01	kg	S	1.65	g/mL	194	kL	9.55E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Zn	Sludge (Solids)	6.79E+01	kg	S	1.65	g/mL	186	kL	2.21E+02	ug/g	Jan 1 2001 12:00AM
241-SY-102	Zr	Sludge (Solids)	2.03E+01	kg	S	1.65	g/mL	194	kL	6.35E+01	ug/g	Jan 1 2001 12:00AM
241-SY-102	Zr	Sludge (Solids)	5.48E+01	kg	S	1.65	g/mL	186	kL	1.79E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	106Ru	Total	4.14E-05	Ci	E							Jan 1 2001 12:00AM
241-AW-104	106Ru	Salt Cake (Liquids)	5.15E-06	Ci	TE	1.6	g/mL	136	kL	2.37E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	106Ru	Salt Cake (Solids)	3.46E-05	Ci	TS	1.58	g/mL	457	kL	4.79E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	106Ru	Sludge (Liquids)	1.65E-06	Ci	TE	1.6	g/mL	62	kL	1.66E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	106Ru	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	106Ru	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	113mCd	Total	3.76E+01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	113mCd	Salt Cake (Liquids)	4.68E+00	Ci	TE	1.6	g/mL	136	kL	2.15E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	113mCd	Salt Cake (Solids)	3.14E+01	Ci	TS	1.58	g/mL	457	kL	4.35E-02	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 117

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	113mCd	Sludge (Liquids)	1.50E+00	Ci	TE	1.6	g/mL	62	kL	1.51E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	113mCd	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	113mCd	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	125Sb	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	125Sb	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	125Sb	Total	2.06E+01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	125Sb	Salt Cake (Liquids)	2.57E+00	Ci	TE	1.6	g/mL	136	kL	1.18E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	125Sb	Salt Cake (Solids)	1.72E+01	Ci	TS	1.58	g/mL	457	kL	2.39E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	125Sb	Sludge (Liquids)	8.23E-01	Ci	TE	1.6	g/mL	62	kL	8.29E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	126Sn	Total	1.16E+00	Ci	E							Jan 1 2001 12:00AM
241-AW-104	126Sn	Salt Cake (Liquids)	1.45E-01	Ci	TE	1.6	g/mL	136	kL	6.65E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	126Sn	Salt Cake (Solids)	9.71E-01	Ci	TS	1.58	g/mL	457	kL	1.34E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	126Sn	Sludge (Liquids)	4.63E-02	Ci	TE	1.6	g/mL	62	kL	4.67E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	126Sn	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	126Sn	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	129I	Total	1.97E-01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	129I	Salt Cake (Liquids)	9.04E-02	Ci	TE	1.6	g/mL	136	kL	4.15E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	129I	Salt Cake (Solids)	7.79E-02	Ci	TS	1.58	g/mL	457	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	129I	Sludge (Liquids)	2.89E-02	Ci	TE	1.6	g/mL	62	kL	2.91E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	129I	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	129I	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	134Cs	Total	1.61E-01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	134Cs	Salt Cake (Liquids)	6.46E-02	Ci	TE	1.6	g/mL	136	kL	2.97E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	134Cs	Salt Cake (Solids)	7.53E-02	Ci	TS	1.58	g/mL	457	kL	1.04E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	134Cs	Sludge (Liquids)	2.07E-02	Ci	TE	1.6	g/mL	62	kL	2.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	134Cs	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	134Cs	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137Cs	Total	2.37E+05	Ci	S/E							Jan 1 2001 12:00AM
241-AW-104	137Cs	Salt Cake (Liquids)	4.14E+04	Ci	TE	1.6	g/mL	136	kL	1.90E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137Cs	Salt Cake (Solids)	1.63E+05	Ci	E	1.44	g/mL	457	kL	2.48E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137Cs	Sludge (Liquids)	1.33E+04	Ci	TE	1.6	g/mL	62	kL	1.34E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137Cs	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137Cs	Supernatant	1.89E+04	Ci	S	1.14	g/mL	347	kL	4.77E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137mBa	Total	2.24E+05	Ci	C							Jan 1 2001 12:00AM
241-AW-104	137mBa	Salt Cake (Liquids)	3.92E+04	Ci	C		g/mL	136	kL	1.80E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137mBa	Salt Cake (Solids)	1.54E+05	Ci	C		g/mL	457	kL	2.35E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137mBa	Sludge (Liquids)	1.25E+04	Ci	C		g/mL	62	kL	1.26E+02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137mBa	Sludge (Solids)	0.00E+00	Ci	C		g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	137mBa	Supernatant	1.79E+04	Ci	C		g/mL	347	kL	4.51E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	14C	Total	1.83E+01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	14C	Salt Cake (Liquids)	3.97E+00	Ci	TE	1.6	g/mL	136	kL	1.82E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	14C	Salt Cake (Solids)	1.31E+01	Ci	TS	1.58	g/mL	457	kL	1.81E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	14C	Sludge (Liquids)	1.27E+00	Ci	TE	1.6	g/mL	62	kL	1.28E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	14C	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	14C	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	151Sm	Total	6.40E+03	Ci	E							Jan 1 2001 12:00AM
241-AW-104	151Sm	Salt Cake (Liquids)	7.97E+02	Ci	TE	1.6	g/mL	136	kL	3.66E+00	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 118

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	151Sm	Salt Cake (Solids)	5.35E+03	Ci	TS	1.58	g/mL	457	kL	7.41E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	151Sm	Sludge (Liquids)	2.55E+02	Ci	TE	1.6	g/mL	62	kL	2.57E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	151Sm	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	151Sm	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	152Eu	Total	1.93E+00	Ci	E							Jan 1 2001 12:00AM
241-AW-104	152Eu	Salt Cake (Liquids)	2.41E-01	Ci	TE	1.6	g/mL	136	kL	1.11E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	152Eu	Salt Cake (Solids)	1.62E+00	Ci	TS	1.58	g/mL	457	kL	2.24E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	152Eu	Sludge (Liquids)	7.70E-02	Ci	TE	1.6	g/mL	62	kL	7.76E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	152Eu	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	152Eu	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	154Eu	Total	2.20E+02	Ci	E							Jan 1 2001 12:00AM
241-AW-104	154Eu	Salt Cake (Liquids)	2.74E+01	Ci	TE	1.6	g/mL	136	kL	1.26E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	154Eu	Salt Cake (Solids)	1.84E+02	Ci	TS	1.58	g/mL	457	kL	2.55E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	154Eu	Sludge (Liquids)	8.75E+00	Ci	TE	1.6	g/mL	62	kL	8.82E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	154Eu	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	154Eu	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	155Eu	Total	6.06E+01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	155Eu	Salt Cake (Liquids)	7.54E+00	Ci	TE	1.6	g/mL	136	kL	3.46E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	155Eu	Salt Cake (Solids)	5.07E+01	Ci	TS	1.58	g/mL	457	kL	7.02E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	155Eu	Sludge (Liquids)	2.41E+00	Ci	TE	1.6	g/mL	62	kL	2.43E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	155Eu	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	155Eu	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	226Ra	Total	7.72E-05	Ci	E							Jan 1 2001 12:00AM
241-AW-104	226Ra	Salt Cake (Liquids)	9.61E-06	Ci	TE	1.6	g/mL	136	kL	4.42E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	226Ra	Salt Cake (Solids)	6.45E-05	Ci	TS	1.58	g/mL	457	kL	8.94E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	226Ra	Sludge (Liquids)	3.07E-06	Ci	TE	1.6	g/mL	62	kL	3.10E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	226Ra	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	226Ra	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	227Ac	Total	7.87E-04	Ci	E							Jan 1 2001 12:00AM
241-AW-104	227Ac	Salt Cake (Liquids)	9.81E-05	Ci	TE	1.6	g/mL	136	kL	4.51E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	227Ac	Salt Cake (Solids)	6.58E-04	Ci	TS	1.58	g/mL	457	kL	9.11E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	227Ac	Sludge (Liquids)	3.14E-05	Ci	TE	1.6	g/mL	62	kL	3.16E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	227Ac	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	227Ac	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	228Ra	Total	9.30E-02	Ci	E							Jan 1 2001 12:00AM
241-AW-104	228Ra	Salt Cake (Liquids)	1.16E-02	Ci	TE	1.6	g/mL	136	kL	5.32E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	228Ra	Salt Cake (Solids)	7.77E-02	Ci	TS	1.58	g/mL	457	kL	1.08E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	228Ra	Sludge (Liquids)	3.70E-03	Ci	TE	1.6	g/mL	62	kL	3.73E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	228Ra	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	228Ra	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	229Th	Total	3.94E-03	Ci	E							Jan 1 2001 12:00AM
241-AW-104	229Th	Salt Cake (Liquids)	4.91E-04	Ci	TE	1.6	g/mL	136	kL	2.26E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	229Th	Salt Cake (Solids)	3.29E-03	Ci	TS	1.58	g/mL	457	kL	4.56E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	229Th	Sludge (Liquids)	1.57E-04	Ci	TE	1.6	g/mL	62	kL	1.58E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	229Th	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	229Th	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	231Pa	Total	2.12E-03	Ci	E							Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 119

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	231Pa	Salt Cake (Liquids)	2.65E-04	Ci	TE	1.6	g/mL	136	kL	1.22E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	231Pa	Salt Cake (Solids)	1.77E-03	Ci	TS	1.58	g/mL	457	kL	2.46E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	231Pa	Sludge (Liquids)	8.46E-05	Ci	TE	1.6	g/mL	62	kL	8.53E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	231Pa	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	231Pa	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232Th	Total	2.07E-02	Ci	E							Jan 1 2001 12:00AM
241-AW-104	232Th	Salt Cake (Liquids)	2.58E-03	Ci	TE	1.6	g/mL	136	kL	1.18E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232Th	Salt Cake (Solids)	1.73E-02	Ci	TS	1.58	g/mL	457	kL	2.40E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232Th	Sludge (Liquids)	8.24E-04	Ci	TE	1.6	g/mL	62	kL	8.30E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232Th	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232Th	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232U	Total	4.26E-03	Ci	E/C							Jan 1 2001 12:00AM
241-AW-104	232U	Salt Cake (Liquids)	1.59E-03	Ci	TE	1.6	g/mL	136	kL	7.32E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232U	Salt Cake (Solids)	6.47E-05	Ci	C		g/mL	457	kL	8.85E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232U	Sludge (Liquids)	5.09E-04	Ci	TE	1.6	g/mL	62	kL	5.14E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232U	Sludge (Solids)	2.09E-03	Ci	C		g/mL	188	kL	8.70E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	232U	Supernatant	5.63E-07	Ci	C		g/mL	347	kL	1.42E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	233U	Total	1.46E-02	Ci	E/C							Jan 1 2001 12:00AM
241-AW-104	233U	Salt Cake (Liquids)	6.54E-03	Ci	TE	1.6	g/mL	136	kL	3.01E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	233U	Salt Cake (Solids)	1.77E-04	Ci	C		g/mL	457	kL	2.43E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	233U	Sludge (Liquids)	2.09E-03	Ci	TE	1.6	g/mL	62	kL	2.11E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	233U	Sludge (Solids)	5.74E-03	Ci	C		g/mL	188	kL	2.39E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	233U	Supernatant	1.54E-06	Ci	C		g/mL	347	kL	3.90E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	234U	Total	3.46E+00	Ci	E/C							Jan 1 2001 12:00AM
241-AW-104	234U	Salt Cake (Liquids)	2.23E-03	Ci	TE	1.6	g/mL	136	kL	1.02E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	234U	Salt Cake (Solids)	1.04E-01	Ci	C		g/mL	457	kL	1.42E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	234U	Sludge (Liquids)	7.12E-04	Ci	TE	1.6	g/mL	62	kL	7.17E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	234U	Sludge (Solids)	3.35E+00	Ci	C		g/mL	188	kL	1.39E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	234U	Supernatant	9.01E-04	Ci	C		g/mL	347	kL	2.28E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	235U	Total	1.31E-01	Ci	E/C							Jan 1 2001 12:00AM
241-AW-104	235U	Salt Cake (Liquids)	9.14E-05	Ci	TE	1.6	g/mL	136	kL	4.20E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	235U	Sludge (Liquids)	2.92E-05	Ci	TE	1.6	g/mL	62	kL	2.95E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	235U	Sludge (Solids)	1.27E-01	Ci	C		g/mL	188	kL	5.29E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	235U	Supernatant	3.42E-05	Ci	C		g/mL	347	kL	8.65E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	235U	Salt Cake (Solids)	3.94E-03	Ci	C		g/mL	457	kL	5.38E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	236U	Total	2.84E-01	Ci	E/C							Jan 1 2001 12:00AM
241-AW-104	236U	Salt Cake (Liquids)	7.78E-05	Ci	TE	1.6	g/mL	136	kL	3.57E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	236U	Salt Cake (Solids)	8.52E-03	Ci	C		g/mL	457	kL	1.17E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	236U	Sludge (Liquids)	2.49E-05	Ci	TE	1.6	g/mL	62	kL	2.51E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	236U	Sludge (Solids)	2.76E-01	Ci	C		g/mL	188	kL	1.15E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	236U	Supernatant	7.41E-05	Ci	C		g/mL	347	kL	1.87E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	237Np	Total	3.61E-01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	237Np	Salt Cake (Liquids)	1.65E-01	Ci	TE	1.6	g/mL	136	kL	7.60E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	237Np	Salt Cake (Solids)	1.43E-01	Ci	TS	1.58	g/mL	457	kL	1.97E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	237Np	Sludge (Liquids)	5.29E-02	Ci	TE	1.6	g/mL	62	kL	5.33E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	237Np	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	237Np	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 120

BY: E. Berdos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	238Pu	Total	5.78E+01	Ci	C							Jan 1 2001 12:00AM
241-AW-104	238Pu	Salt Cake (Liquids)	1.15E-01	Ci	C		g/mL	136	kL	5.87E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238Pu	Salt Cake (Solids)	6.23E+00	Ci	C		g/mL	457	kL	8.52E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238Pu	Sludge (Liquids)	3.43E-02	Ci	C		g/mL	62	kL	3.87E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238Pu	Sludge (Solids)	5.14E+01	Ci	C		g/mL	188	kL	2.13E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238Pu	Supernatant	6.40E-03	Ci	C		g/mL	347	kL	1.62E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238U	Total	2.37E+00	Ci	E/C							Jan 1 2001 12:00AM
241-AW-104	238U	Salt Cake (Liquids)	2.00E-03	Ci	TE	1.6	g/mL	136	kL	9.21E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238U	Salt Cake (Solids)	7.11E-02	Ci	C		g/mL	457	kL	9.73E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238U	Sludge (Liquids)	6.41E-04	Ci	TE	1.6	g/mL	62	kL	6.46E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238U	Sludge (Solids)	2.30E+00	Ci	C		g/mL	188	kL	9.56E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	238U	Supernatant	6.18E-04	Ci	C		g/mL	347	kL	1.56E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	239/240Pu	Total	7.15E-02	Ci	S							Jan 1 2001 12:00AM
241-AW-104	239/240Pu	Supernatant	7.15E-02	Ci	S	1.14	g/mL	347	kL	1.81E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	239Pu	Total	4.94E+02	Ci	C							Jan 1 2001 12:00AM
241-AW-104	239Pu	Salt Cake (Liquids)	9.85E-01	Ci	C		g/mL	136	kL	5.03E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	239Pu	Salt Cake (Solids)	5.33E+01	Ci	C		g/mL	457	kL	7.29E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	239Pu	Sludge (Liquids)	2.94E-01	Ci	C		g/mL	62	kL	3.32E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	239Pu	Sludge (Solids)	4.40E+02	Ci	C		g/mL	188	kL	1.83E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	239Pu	Supernatant	5.48E-02	Ci	C		g/mL	347	kL	1.39E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	240Pu	Total	1.50E+02	Ci	C							Jan 1 2001 12:00AM
241-AW-104	240Pu	Salt Cake (Liquids)	2.99E-01	Ci	C		g/mL	136	kL	1.53E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	240Pu	Salt Cake (Solids)	1.62E+01	Ci	C		g/mL	457	kL	2.21E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	240Pu	Sludge (Liquids)	8.93E-02	Ci	C		g/mL	62	kL	1.01E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	240Pu	Sludge (Solids)	1.34E+02	Ci	C		g/mL	188	kL	5.55E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	240Pu	Supernatant	1.66E-02	Ci	C		g/mL	347	kL	4.21E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Am	Total	5.94E+01	Ci	S/C							Jan 1 2001 12:00AM
241-AW-104	241Am	Salt Cake (Liquids)	1.18E-01	Ci	C		g/mL	136	kL	6.03E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Am	Salt Cake (Solids)	6.40E+00	Ci	C		g/mL	457	kL	8.75E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Am	Sludge (Liquids)	3.53E-02	Ci	C		g/mL	62	kL	3.98E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Am	Sludge (Solids)	5.28E+01	Ci	C		g/mL	188	kL	2.19E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Am	Supernatant	1.05E-01	Ci	S	1.14	g/mL	347	kL	2.64E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Pu	Total	4.45E+03	Ci	C							Jan 1 2001 12:00AM
241-AW-104	241Pu	Salt Cake (Liquids)	8.86E+00	Ci	C		g/mL	136	kL	4.53E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Pu	Salt Cake (Solids)	4.80E+02	Ci	C		g/mL	457	kL	6.57E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Pu	Sludge (Liquids)	2.65E+00	Ci	C		g/mL	62	kL	2.99E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Pu	Sludge (Solids)	3.96E+03	Ci	C		g/mL	188	kL	1.65E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	241Pu	Supernatant	4.94E-01	Ci	C		g/mL	347	kL	1.25E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Cm	Total	1.11E-03	Ci	C							Jan 1 2001 12:00AM
241-AW-104	242Cm	Salt Cake (Liquids)	2.20E-06	Ci	C		g/mL	136	kL	1.13E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Cm	Salt Cake (Solids)	1.19E-04	Ci	C		g/mL	457	kL	1.63E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Cm	Sludge (Liquids)	6.58E-07	Ci	C		g/mL	62	kL	7.42E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Cm	Sludge (Solids)	9.84E-04	Ci	C		g/mL	188	kL	4.09E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Cm	Supernatant	2.34E-06	Ci	C		g/mL	347	kL	5.92E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Pu	Total	2.32E-02	Ci	C							Jan 1 2001 12:00AM
241-AW-104	242Pu	Salt Cake (Liquids)	4.63E-05	Ci	C		g/mL	136	kL	2.36E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Pu	Salt Cake (Solids)	2.51E-03	Ci	C		g/mL	457	kL	3.43E-06	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 121

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	242Pu	Sludge (Liquids)	1.38E-05	Ci	C		g/mL	62	kL	1.56E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Pu	Sludge (Solids)	2.07E-02	Ci	C		g/mL	188	kL	8.59E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	242Pu	Supernatant	2.58E-06	Ci	C		g/mL	347	kL	6.52E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Am	Total	4.22E-05	Ci	C							Jan 1 2001 12:00AM
241-AW-104	243Am	Salt Cake (Liquids)	8.39E-08	Ci	C		g/mL	136	kL	4.29E-10	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Am	Salt Cake (Solids)	4.55E-06	Ci	C		g/mL	457	kL	6.22E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Am	Sludge (Liquids)	2.51E-08	Ci	C		g/mL	62	kL	2.83E-10	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Am	Sludge (Solids)	3.75E-05	Ci	C		g/mL	188	kL	1.56E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Am	Supernatant	8.93E-08	Ci	C		g/mL	347	kL	2.26E-10	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Cm	Total	1.52E-04	Ci	C							Jan 1 2001 12:00AM
241-AW-104	243Cm	Salt Cake (Liquids)	3.03E-07	Ci	C		g/mL	136	kL	1.55E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Cm	Salt Cake (Solids)	1.64E-05	Ci	C		g/mL	457	kL	2.24E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Cm	Sludge (Liquids)	9.05E-08	Ci	C		g/mL	62	kL	1.02E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Cm	Sludge (Solids)	1.35E-04	Ci	C		g/mL	188	kL	5.62E-07	uCi/g	Jan 1 2001 12:00AM
241-AW-104	243Cm	Supernatant	3.22E-07	Ci	C		g/mL	347	kL	8.15E-10	uCi/g	Jan 1 2001 12:00AM
241-AW-104	244Cm	Total	6.63E-04	Ci	C							Jan 1 2001 12:00AM
241-AW-104	244Cm	Salt Cake (Liquids)	1.32E-06	Ci	C		g/mL	136	kL	6.73E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	244Cm	Salt Cake (Solids)	7.14E-05	Ci	C		g/mL	457	kL	9.76E-08	uCi/g	Jan 1 2001 12:00AM
241-AW-104	244Cm	Sludge (Liquids)	3.94E-07	Ci	C		g/mL	62	kL	4.44E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	244Cm	Sludge (Solids)	5.89E-04	Ci	C		g/mL	188	kL	2.45E-06	uCi/g	Jan 1 2001 12:00AM
241-AW-104	244Cm	Supernatant	1.40E-06	Ci	C		g/mL	347	kL	3.54E-09	uCi/g	Jan 1 2001 12:00AM
241-AW-104	3H	Total	5.33E+01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	3H	Salt Cake (Liquids)	2.44E+01	Ci	TE	1.6	g/mL	136	kL	1.12E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	3H	Salt Cake (Solids)	2.11E+01	Ci	TS	1.58	g/mL	457	kL	2.92E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	3H	Sludge (Liquids)	7.81E+00	Ci	TE	1.6	g/mL	62	kL	7.87E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	3H	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	3H	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	59Ni	Salt Cake (Liquids)	5.18E-02	Ci	TE	1.6	g/mL	136	kL	2.38E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	59Ni	Salt Cake (Solids)	1.05E+00	Ci	TS	1.58	g/mL	457	kL	1.45E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	59Ni	Sludge (Liquids)	1.66E-02	Ci	TE	1.6	g/mL	62	kL	1.67E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	59Ni	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	59Ni	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	59Ni	Total	1.12E+00	Ci	E							Jan 1 2001 12:00AM
241-AW-104	60Co	Total	1.56E+01	Ci	S/E							Jan 1 2001 12:00AM
241-AW-104	60Co	Salt Cake (Liquids)	1.26E+00	Ci	TE	1.6	g/mL	136	kL	5.80E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	60Co	Salt Cake (Solids)	1.15E+01	Ci	TS	1.58	g/mL	457	kL	1.59E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	60Co	Sludge (Liquids)	4.03E-01	Ci	TE	1.6	g/mL	62	kL	4.07E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	60Co	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	60Co	Supernatant	2.42E+00	Ci	S	1.14	g/mL	347	kL	6.12E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	63Ni	Total	1.06E+02	Ci	E							Jan 1 2001 12:00AM
241-AW-104	63Ni	Salt Cake (Liquids)	4.89E+00	Ci	TE	1.6	g/mL	136	kL	2.25E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	63Ni	Salt Cake (Solids)	9.96E+01	Ci	TS	1.58	g/mL	457	kL	1.38E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	63Ni	Sludge (Liquids)	1.56E+00	Ci	TE	1.6	g/mL	62	kL	1.58E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	63Ni	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	63Ni	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	79Se	Total	1.92E-01	Ci	E							Jan 1 2001 12:00AM
241-AW-104	79Se	Salt Cake (Liquids)	2.40E-02	Ci	TE	1.6	g/mL	136	kL	1.10E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 122

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	79Se	Salt Cake (Solids)	1.61E-01	Ci	TS	1.58	g/mL	457	kL	2.22E-04	uCi/g	Jan 1 2001 12:00AM
241-AW-104	79Se	Sludge (Liquids)	7.66E-03	Ci	TE	1.6	g/mL	62	kL	7.72E-05	uCi/g	Jan 1 2001 12:00AM
241-AW-104	79Se	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	79Se	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Sr	Total	5.11E+03	Ci	S/E							Jan 1 2001 12:00AM
241-AW-104	90Sr	Salt Cake (Liquids)	3.41E+03	Ci	TE	1.6	g/mL	136	kL	1.57E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Sr	Salt Cake (Solids)	6.00E+02	Ci	E	1.44	g/mL	457	kL	9.12E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Sr	Sludge (Liquids)	1.09E+03	Ci	TE	1.6	g/mL	62	kL	1.10E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Sr	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Sr	Supernatant	1.19E+01	Ci	S	1.14	g/mL	347	kL	3.01E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Y	Total	5.11E+03	Ci	C							Jan 1 2001 12:00AM
241-AW-104	90Y	Salt Cake (Liquids)	3.41E+03	Ci	C		g/mL	136	kL	1.57E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Y	Salt Cake (Solids)	6.00E+02	Ci	C		g/mL	457	kL	9.12E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Y	Sludge (Liquids)	1.09E+03	Ci	C		g/mL	62	kL	1.10E+01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Y	Sludge (Solids)	0.00E+00	Ci	C		g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	90Y	Supernatant	1.19E+01	Ci	C		g/mL	347	kL	3.01E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93mNb	Total	7.62E+00	Ci	E							Jan 1 2001 12:00AM
241-AW-104	93mNb	Salt Cake (Liquids)	9.49E-01	Ci	TE	1.6	g/mL	136	kL	4.36E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93mNb	Salt Cake (Solids)	6.36E+00	Ci	TS	1.58	g/mL	457	kL	8.81E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93mNb	Sludge (Liquids)	3.04E-01	Ci	TE	1.6	g/mL	62	kL	3.06E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93mNb	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93mNb	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93Zr	Total	9.49E+00	Ci	E							Jan 1 2001 12:00AM
241-AW-104	93Zr	Salt Cake (Liquids)	1.18E+00	Ci	TE	1.6	g/mL	136	kL	5.44E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93Zr	Salt Cake (Solids)	7.93E+00	Ci	TS	1.58	g/mL	457	kL	1.10E-02	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93Zr	Sludge (Liquids)	3.78E-01	Ci	TE	1.6	g/mL	62	kL	3.81E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93Zr	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	93Zr	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	99Tc	Salt Cake (Solids)	1.39E+02	Ci	E	1.44	g/mL	457	kL	2.11E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	99Tc	Sludge (Liquids)	1.49E+01	Ci	TE	1.6	g/mL	62	kL	1.51E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	99Tc	Sludge (Solids)	0.00E+00	Ci	TE	1.2	g/mL	188	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	99Tc	Supernatant	0.00E+00	Ci	TE	1.02	g/mL	347	kL	0.00E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	99Tc	Total	2.01E+02	Ci	E							Jan 1 2001 12:00AM
241-AW-104	99Tc	Salt Cake (Liquids)	4.67E+01	Ci	TE	1.6	g/mL	136	kL	2.15E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	Ag	Salt Cake (Solids)	5.65E+00	kg	S	1.6	g/mL	457	kL	7.73E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ag	Sludge (Liquids)	7.19E-01	kg	S	1.43	g/mL	62	kL	8.11E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ag	Total	3.18E+01	kg	S							Jan 1 2001 12:00AM
241-AW-104	Ag	Sludge (Solids)	2.42E+01	kg	S	1.4	g/mL	188	kL	9.21E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ag	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ag	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Al	Total	2.28E+04	kg	S							Jan 1 2001 12:00AM
241-AW-104	Al	Salt Cake (Liquids)	4.04E+03	kg	S	1.44	g/mL	136	kL	2.06E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Al	Salt Cake (Solids)	1.46E+04	kg	S	1.6	g/mL	457	kL	2.00E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Al	Sludge (Liquids)	1.02E+03	kg	S	1.43	g/mL	62	kL	1.15E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Al	Sludge (Solids)	2.57E+03	kg	S	1.28	g/mL	188	kL	1.07E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Al	Supernatant	5.73E+02	kg	S	1.08	g/mL	347	kL	1.53E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	As	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 123

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	As	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	As	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	As	Total	6.57E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	As	Sludge (Liquids)	3.73E+00	kg	S	1.33	g/mL	62	kL	4.52E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	As	Sludge (Solids)	1.13E+01	kg	S	1.4	g/mL	188	kL	4.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	B	Sludge (Solids)	6.01E+00	kg	S	1.4	g/mL	188	kL	2.29E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	B	Sludge (Liquids)	2.05E+00	kg	S	1.43	g/mL	62	kL	2.31E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	B	Supernatant	2.22E+00	kg	S	1.08	g/mL	347	kL	5.92E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	B	Salt Cake (Liquids)	6.34E+00	kg	S	1.44	g/mL	136	kL	3.24E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	B	Salt Cake (Solids)	2.22E+01	kg	S	1.6	g/mL	457	kL	3.04E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	B	Total	3.88E+01	kg	S							Jan 1 2001 12:00AM
241-AW-104	Ba	Salt Cake (Solids)	1.95E+01	kg	S	1.6	g/mL	457	kL	2.67E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ba	Sludge (Liquids)	1.87E+00	kg	S	1.33	g/mL	62	kL	2.26E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ba	Total	3.36E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Ba	Salt Cake (Liquids)	4.09E+00	kg	S	1.45	g/mL	136	kL	2.08E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ba	Sludge (Solids)	6.40E+00	kg	S	1.4	g/mL	188	kL	2.43E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ba	Supernatant	1.75E+00	kg	S	1.08	g/mL	347	kL	4.68E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Be	Sludge (Solids)	9.25E-01	kg	S	1.4	g/mL	188	kL	3.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Be	Salt Cake (Solids)	1.95E+00	kg	S	1.6	g/mL	457	kL	2.67E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Be	Total	3.65E+00	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Be	Sludge (Liquids)	1.86E-01	kg	S	1.43	g/mL	62	kL	2.10E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Be	Salt Cake (Liquids)	4.08E-01	kg	S	1.44	g/mL	136	kL	2.08E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Be	Supernatant	1.75E-01	kg	S	1.08	g/mL	347	kL	4.68E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Bi	Total	4.56E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Bi	Salt Cake (Liquids)	5.01E+00	kg	TE	1.6	g/mL	136	kL	2.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Bi	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Bi	Sludge (Liquids)	1.60E+00	kg	TE	1.6	g/mL	62	kL	1.62E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Bi	Sludge (Solids)	0.00E+00	kg	TE	1.2	g/mL	188	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Bi	Supernatant	0.00E+00	kg	TE	1.02	g/mL	347	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ca	Total	1.22E+03	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Ca	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ca	Salt Cake (Solids)	3.01E+02	kg	S	1.6	g/mL	457	kL	4.11E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ca	Sludge (Liquids)	2.56E+00	kg	TE	1.6	g/mL	62	kL	2.59E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ca	Sludge (Solids)	9.05E+02	kg	S	1.28	g/mL	188	kL	3.76E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ca	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cd	Supernatant	1.81E-01	kg	S	1.08	g/mL	347	kL	4.83E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cd	Sludge (Solids)	2.94E+01	kg	S	1.28	g/mL	188	kL	1.22E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cd	Sludge (Liquids)	1.86E-01	kg	S	1.43	g/mL	62	kL	2.10E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cd	Total	3.46E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Cd	Salt Cake (Solids)	4.45E+00	kg	S	1.6	g/mL	457	kL	6.08E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cd	Salt Cake (Liquids)	4.08E-01	kg	S	1.44	g/mL	136	kL	2.08E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ce	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ce	Sludge (Solids)	1.13E+01	kg	S	1.4	g/mL	188	kL	4.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ce	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ce	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ce	Total	6.57E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Ce	Sludge (Liquids)	3.73E+00	kg	S	1.33	g/mL	62	kL	4.52E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 124

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	Cl	Total	3.76E+03	kg	S							Jan 1 2001 12:00AM
241-AW-104	Cl	Salt Cake (Liquids)	7.59E+02	kg	S	1.44	g/mL	136	kL	3.88E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cl	Salt Cake (Solids)	2.30E+03	kg	S	1.6	g/mL	457	kL	3.14E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cl	Sludge (Liquids)	2.40E+02	kg	S	1.43	g/mL	62	kL	2.71E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cl	Sludge (Solids)	3.18E+02	kg	S	1.28	g/mL	188	kL	1.32E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cl	Supernatant	1.46E+02	kg	S	1.08	g/mL	347	kL	3.91E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Co	Salt Cake (Solids)	7.82E+00	kg	S	1.6	g/mL	457	kL	1.07E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Co	Supernatant	7.01E-01	kg	S	1.08	g/mL	347	kL	1.87E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Co	Sludge (Solids)	2.26E+00	kg	S	1.4	g/mL	188	kL	8.60E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Co	Salt Cake (Liquids)	1.63E+00	kg	S	1.45	g/mL	136	kL	8.28E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Co	Total	1.32E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Co	Sludge (Liquids)	7.44E-01	kg	S	1.33	g/mL	62	kL	9.02E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cr	Total	2.54E+03	kg	S							Jan 1 2001 12:00AM
241-AW-104	Cr	Salt Cake (Liquids)	1.02E+01	kg	S	1.44	g/mL	136	kL	5.23E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cr	Salt Cake (Solids)	2.37E+03	kg	S	1.6	g/mL	457	kL	3.24E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cr	Sludge (Liquids)	3.78E+00	kg	S	1.43	g/mL	62	kL	4.26E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cr	Sludge (Solids)	1.57E+02	kg	S	1.28	g/mL	188	kL	6.52E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cr	Supernatant	1.28E+00	kg	S	1.08	g/mL	347	kL	3.42E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cu	Sludge (Liquids)	3.73E-01	kg	S	1.33	g/mL	62	kL	4.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cu	Sludge (Solids)	1.45E+01	kg	S	1.4	g/mL	188	kL	5.51E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cu	Salt Cake (Solids)	3.90E+00	kg	S	1.6	g/mL	457	kL	5.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cu	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cu	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Cu	Total	2.00E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	F	Total	3.28E+04	kg	S							Jan 1 2001 12:00AM
241-AW-104	F	Salt Cake (Liquids)	1.66E+01	kg	S	1.45	g/mL	136	kL	8.41E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	F	Salt Cake (Solids)	3.19E+04	kg	S	1.6	g/mL	457	kL	4.36E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	F	Sludge (Liquids)	7.13E+01	kg	S	1.43	g/mL	62	kL	8.04E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	F	Sludge (Solids)	7.17E+02	kg	S	1.28	g/mL	188	kL	2.98E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	F	Supernatant	7.74E+01	kg	S	1.08	g/mL	347	kL	2.07E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Fe	Total	2.56E+03	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Fe	Salt Cake (Liquids)	4.09E+00	kg	S	1.45	g/mL	136	kL	2.08E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Fe	Salt Cake (Solids)	2.72E+02	kg	S	1.6	g/mL	457	kL	3.72E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Fe	Sludge (Liquids)	1.28E+00	kg	TE	1.6	g/mL	62	kL	1.29E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Fe	Sludge (Solids)	2.28E+03	kg	S	1.28	g/mL	188	kL	9.49E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Fe	Supernatant	1.75E+00	kg	S	1.08	g/mL	347	kL	4.68E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Hg	Total	0.00E+00	kg	E							Jan 1 2001 12:00AM
241-AW-104	Hg	Salt Cake (Liquids)	0.00E+00	kg	TE	1.6	g/mL	136	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Hg	Salt Cake (Solids)	0.00E+00	kg	TS	1.58	g/mL	457	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Hg	Sludge (Liquids)	0.00E+00	kg	TE	1.6	g/mL	62	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Hg	Sludge (Solids)	0.00E+00	kg	TE	1.2	g/mL	188	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Hg	Supernatant	0.00E+00	kg	TE	1.02	g/mL	347	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	K	Total	1.07E+04	kg	S							Jan 1 2001 12:00AM
241-AW-104	K	Salt Cake (Liquids)	2.04E+03	kg	S	1.44	g/mL	136	kL	1.04E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	K	Salt Cake (Solids)	5.93E+03	kg	S	1.6	g/mL	457	kL	8.11E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	K	Sludge (Liquids)	5.79E+02	kg	S	1.43	g/mL	62	kL	6.53E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	K	Sludge (Solids)	1.17E+03	kg	S	1.4	g/mL	188	kL	4.46E+03	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 125

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	K	Supernatant	9.92E+02	kg	S	1.08	g/mL	347	kL	2.65E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	La	Total	3.97E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	La	Salt Cake (Liquids)	1.76E-01	kg	TE	1.6	g/mL	136	kL	8.11E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	La	Salt Cake (Solids)	1.95E+01	kg	S	1.6	g/mL	457	kL	2.67E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	La	Sludge (Liquids)	5.64E-02	kg	TE	1.6	g/mL	62	kL	5.69E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	La	Sludge (Solids)	2.00E+01	kg	S	1.4	g/mL	188	kL	7.60E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	La	Supernatant	0.00E+00	kg	TE	1.02	g/mL	347	kL	0.00E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Li	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Li	Total	8.18E+00	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Li	Sludge (Liquids)	3.73E-01	kg	S	1.33	g/mL	62	kL	4.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Li	Salt Cake (Solids)	3.90E+00	kg	S	1.6	g/mL	457	kL	5.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Li	Sludge (Solids)	2.74E+00	kg	S	1.4	g/mL	188	kL	1.04E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Li	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mg	Sludge (Solids)	1.96E+02	kg	S	1.4	g/mL	188	kL	7.44E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mg	Total	2.50E+02	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Mg	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mg	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mg	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mg	Sludge (Liquids)	3.73E+00	kg	S	1.33	g/mL	62	kL	4.52E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mn	Total	1.13E+03	kg	S							Jan 1 2001 12:00AM
241-AW-104	Mn	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mn	Salt Cake (Solids)	3.41E+02	kg	S	1.6	g/mL	457	kL	4.66E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mn	Sludge (Liquids)	5.27E-01	kg	S	1.43	g/mL	62	kL	5.94E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mn	Sludge (Solids)	7.87E+02	kg	S	1.28	g/mL	188	kL	3.27E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mn	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mo	Sludge (Solids)	1.00E+01	kg	S	1.4	g/mL	188	kL	3.81E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mo	Supernatant	2.19E+00	kg	S	1.08	g/mL	347	kL	5.85E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mo	Salt Cake (Solids)	3.33E+01	kg	S	1.6	g/mL	457	kL	4.56E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mo	Salt Cake (Liquids)	8.95E+00	kg	S	1.44	g/mL	136	kL	4.57E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mo	Sludge (Liquids)	2.90E+00	kg	S	1.43	g/mL	62	kL	3.27E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Mo	Total	5.74E+01	kg	S							Jan 1 2001 12:00AM
241-AW-104	Na	Total	2.37E+05	kg	S							Jan 1 2001 12:00AM
241-AW-104	Na	Salt Cake (Liquids)	2.75E+04	kg	S	1.44	g/mL	136	kL	1.40E+05	ug/g	Jan 1 2001 12:00AM
241-AW-104	Na	Salt Cake (Solids)	1.65E+05	kg	S	1.6	g/mL	457	kL	2.25E+05	ug/g	Jan 1 2001 12:00AM
241-AW-104	Na	Sludge (Liquids)	9.98E+03	kg	S	1.43	g/mL	62	kL	1.13E+05	ug/g	Jan 1 2001 12:00AM
241-AW-104	Na	Sludge (Solids)	2.31E+04	kg	S	1.28	g/mL	188	kL	9.61E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Na	Supernatant	1.20E+04	kg	S	1.08	g/mL	347	kL	3.20E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Nd	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Nd	Sludge (Liquids)	3.73E+00	kg	S	1.33	g/mL	62	kL	4.52E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Nd	Sludge (Solids)	1.13E+01	kg	S	1.4	g/mL	188	kL	4.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Nd	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Nd	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Nd	Total	6.57E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Ni	Total	8.91E+01	kg	S							Jan 1 2001 12:00AM
241-AW-104	Ni	Salt Cake (Liquids)	1.63E+00	kg	S	1.44	g/mL	136	kL	8.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ni	Salt Cake (Solids)	2.38E+01	kg	S	1.6	g/mL	457	kL	3.25E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ni	Sludge (Liquids)	7.44E-01	kg	S	1.43	g/mL	62	kL	8.39E+00	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 128

BY: E. Benlos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	Ni	Sludge (Solids)	6.22E+01	kg	S	1.4	g/mL	188	kL	2.37E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ni	Supernatant	7.01E-01	kg	S	1.08	g/mL	347	kL	1.87E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO2	Total	6.83E+04	kg	S							Jan 1 2001 12:00AM
241-AW-104	NO2	Salt Cake (Liquids)	1.36E+04	kg	S	1.44	g/mL	136	kL	6.94E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO2	Salt Cake (Solids)	4.17E+04	kg	S	1.6	g/mL	457	kL	5.70E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO2	Sludge (Liquids)	4.32E+03	kg	S	1.43	g/mL	62	kL	4.87E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO2	Sludge (Solids)	5.82E+03	kg	S	1.28	g/mL	188	kL	2.42E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO2	Supernatant	2.85E+03	kg	S	1.08	g/mL	347	kL	7.61E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO3	Total	1.04E+05	kg	S							Jan 1 2001 12:00AM
241-AW-104	NO3	Salt Cake (Liquids)	2.03E+04	kg	S	1.44	g/mL	136	kL	1.03E+05	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO3	Salt Cake (Solids)	5.97E+04	kg	S	1.6	g/mL	457	kL	8.16E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO3	Sludge (Liquids)	7.25E+03	kg	S	1.43	g/mL	62	kL	8.18E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO3	Sludge (Solids)	1.02E+04	kg	S	1.28	g/mL	188	kL	4.25E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	NO3	Supernatant	6.24E+03	kg	S	1.08	g/mL	347	kL	1.66E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	OH	Total	1.66E+05	kg	C							Jan 1 2001 12:00AM
241-AW-104	OH	Salt Cake (Liquids)	6.68E+03	kg	S	1.45	g/mL	136	kL	3.39E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	OH	Sludge (Liquids)	1.27E+03	kg	S	1.33	g/mL	62	kL	1.54E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	OH	Supernatant	2.99E+03	kg	S	1.08	g/mL	347	kL	7.98E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Oxalate	Sludge (Liquids)	4.68E-02	kg	TE	1.6	g/mL	62	kL	4.72E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Oxalate	Supernatant	9.21E+01	kg	S	1.08	g/mL	347	kL	2.46E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Oxalate	Sludge (Solids)	6.14E+02	kg	S	1.28	g/mL	188	kL	2.55E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Oxalate	Salt Cake (Solids)	8.19E+03	kg	S	1.6	g/mL	457	kL	1.12E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Oxalate	Total	8.90E+03	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Pb	Total	1.36E+02	kg	S							Jan 1 2001 12:00AM
241-AW-104	Pb	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Pb	Salt Cake (Solids)	4.20E+01	kg	S	1.6	g/mL	457	kL	5.75E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Pb	Sludge (Liquids)	3.73E-01	kg	S	1.43	g/mL	62	kL	4.20E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Pb	Sludge (Solids)	8.16E+01	kg	S	1.4	g/mL	188	kL	3.10E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Pb	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	PO4	Total	3.29E+03	kg	S							Jan 1 2001 12:00AM
241-AW-104	PO4	Salt Cake (Liquids)	1.66E+02	kg	S	1.45	g/mL	136	kL	8.41E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	PO4	Salt Cake (Solids)	2.78E+03	kg	S	1.6	g/mL	457	kL	3.80E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	PO4	Sludge (Liquids)	3.08E+01	kg	S	1.33	g/mL	62	kL	3.74E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	PO4	Sludge (Solids)	1.46E+02	kg	S	1.28	g/mL	188	kL	6.06E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	PO4	Supernatant	1.65E+02	kg	S	1.08	g/mL	347	kL	4.40E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sb	Sludge (Liquids)	2.24E+00	kg	S	1.33	g/mL	62	kL	2.71E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sb	Salt Cake (Liquids)	4.91E+00	kg	S	1.45	g/mL	136	kL	2.49E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sb	Sludge (Solids)	6.79E+00	kg	S	1.4	g/mL	188	kL	2.58E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sb	Supernatant	2.10E+00	kg	S	1.08	g/mL	347	kL	5.61E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sb	Salt Cake (Solids)	2.34E+01	kg	S	1.6	g/mL	457	kL	3.20E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sb	Total	3.94E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Se	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Se	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Se	Sludge (Solids)	1.13E+01	kg	S	1.4	g/mL	188	kL	4.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Se	Total	6.20E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Se	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Si	Total	1.45E+03	kg	S							Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 127

BY: E. Derrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	Si	Salt Cake (Liquids)	2.19E+01	kg	S	1.44	g/mL	136	kL	1.12E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Si	Salt Cake (Solids)	9.29E+02	kg	S	1.6	g/mL	457	kL	1.27E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Si	Sludge (Liquids)	6.39E+00	kg	S	1.43	g/mL	62	kL	7.20E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Si	Sludge (Solids)	4.72E+02	kg	S	1.28	g/mL	188	kL	1.96E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Si	Supernatant	2.53E+01	kg	S	1.08	g/mL	347	kL	6.76E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	SO4	Total	1.93E+04	kg	S							Jan 1 2001 12:00AM
241-AW-104	SO4	Salt Cake (Liquids)	1.92E+02	kg	S	1.45	g/mL	136	kL	9.72E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	SO4	Salt Cake (Solids)	1.80E+04	kg	S	1.6	g/mL	457	kL	2.47E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	SO4	Sludge (Liquids)	1.95E+02	kg	S	1.43	g/mL	62	kL	2.20E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	SO4	Sludge (Solids)	5.41E+02	kg	S	1.28	g/mL	188	kL	2.25E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	SO4	Supernatant	3.36E+02	kg	S	1.08	g/mL	347	kL	8.96E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sr	Total	9.29E+00	kg	S/C/E							Jan 1 2001 12:00AM
241-AW-104	Sr	Salt Cake (Liquids)	8.33E-02	kg	C		g/mL	136	kL	3.83E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sr	Salt Cake (Solids)	3.90E+00	kg	S	1.6	g/mL	457	kL	5.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sr	Sludge (Liquids)	3.73E-01	kg	S	1.33	g/mL	62	kL	4.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sr	Sludge (Solids)	4.94E+00	kg	S	1.4	g/mL	188	kL	1.88E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Sr	Supernatant	2.91E-04	kg	C		g/mL	347	kL	7.36E-04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Th	Sludge (Liquids)	3.73E+00	kg	S	1.33	g/mL	62	kL	4.52E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Th	Salt Cake (Liquids)	8.17E+00	kg	S	1.45	g/mL	136	kL	4.14E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Th	Salt Cake (Solids)	3.90E+01	kg	S	1.6	g/mL	457	kL	5.33E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Th	Supernatant	3.50E+00	kg	S	1.08	g/mL	347	kL	9.35E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Th	Total	6.57E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Th	Sludge (Solids)	1.13E+01	kg	S	1.4	g/mL	188	kL	4.30E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ti	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ti	Total	2.10E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Ti	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ti	Sludge (Liquids)	3.73E-01	kg	S	1.33	g/mL	62	kL	4.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ti	Salt Cake (Solids)	3.90E+00	kg	S	1.6	g/mL	457	kL	5.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Ti	Sludge (Solids)	1.56E+01	kg	S	1.4	g/mL	188	kL	5.93E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	TIC as CO3	Total	5.68E+04	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	TIC as CO3	Salt Cake (Liquids)	4.69E+03	kg	S	1.44	g/mL	136	kL	2.40E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	TIC as CO3	Salt Cake (Solids)	3.48E+04	kg	S	1.6	g/mL	457	kL	4.76E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	TIC as CO3	Sludge (Liquids)	9.17E+02	kg	TE	1.6	g/mL	62	kL	9.24E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	TIC as CO3	Sludge (Solids)	1.22E+04	kg	S	1.4	g/mL	188	kL	4.64E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	TIC as CO3	Supernatant	4.16E+03	kg	S	1.08	g/mL	347	kL	1.11E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	Tl	Total	1.32E+02	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Tl	Sludge (Liquids)	7.44E+00	kg	S	1.33	g/mL	62	kL	9.02E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Tl	Supernatant	7.01E+00	kg	S	1.08	g/mL	347	kL	1.87E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Tl	Salt Cake (Liquids)	1.63E+01	kg	S	1.45	g/mL	136	kL	8.28E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Tl	Salt Cake (Solids)	7.82E+01	kg	S	1.6	g/mL	457	kL	1.07E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Tl	Sludge (Solids)	2.26E+01	kg	S	1.4	g/mL	188	kL	8.60E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 128

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-AW-104	TOC	Total	9.37E+03	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	TOC	Salt Cake (Liquids)	5.14E+02	kg	S	1.44	g/mL	136	kL	2.63E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	TOC	Salt Cake (Solids)	4.51E+03	kg	S	1.6	g/mL	457	kL	6.17E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	TOC	Sludge (Liquids)	9.46E+02	kg	TE	1.6	g/mL	62	kL	9.53E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	TOC	Sludge (Solids)	2.84E+03	kg	S	1.4	g/mL	188	kL	1.08E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	TOC	Supernatant	5.59E+02	kg	S	1.14	g/mL	347	kL	1.41E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	TotalAlpha	Salt Cake (Solids)	7.97E+01	Ci	S	1.6	g/mL	457	kL	1.09E-01	uCi/g	Jan 1 2001 12:00AM
241-AW-104	TotalAlpha	Total	7.43E+02	Ci	S							Jan 1 2001 12:00AM
241-AW-104	TotalAlpha	Salt Cake (Liquids)	1.48E+00	Ci	S	1.44	g/mL	136	kL	7.57E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	TotalAlpha	Sludge (Liquids)	4.45E-01	Ci	S	1.43	g/mL	62	kL	5.02E-03	uCi/g	Jan 1 2001 12:00AM
241-AW-104	TotalAlpha	Sludge (Solids)	6.62E+02	Ci	S	1.28	g/mL	188	kL	2.75E+00	uCi/g	Jan 1 2001 12:00AM
241-AW-104	UTOTAL	Total	7.13E+03	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	UTOTAL	Salt Cake (Liquids)	6.01E+00	kg	TE	1.6	g/mL	136	kL	2.76E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	UTOTAL	Salt Cake (Solids)	2.14E+02	kg	S	1.6	g/mL	457	kL	2.92E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	UTOTAL	Sludge (Liquids)	1.92E+00	kg	TE	1.6	g/mL	62	kL	1.94E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	UTOTAL	Sludge (Solids)	6.91E+03	kg	S	1.28	g/mL	188	kL	2.87E+04	ug/g	Jan 1 2001 12:00AM
241-AW-104	UTOTAL	Supernatant	1.86E+00	kg	S	1.14	g/mL	347	kL	4.69E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	V	Salt Cake (Liquids)	4.09E+00	kg	S	1.45	g/mL	136	kL	2.08E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	V	Sludge (Solids)	5.66E+00	kg	S	1.4	g/mL	188	kL	2.15E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	V	Salt Cake (Solids)	1.95E+01	kg	S	1.6	g/mL	457	kL	2.67E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	V	Sludge (Liquids)	1.87E+00	kg	S	1.33	g/mL	62	kL	2.26E+01	ug/g	Jan 1 2001 12:00AM
241-AW-104	V	Supernatant	1.75E+00	kg	S	1.08	g/mL	347	kL	4.68E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	V	Total	3.29E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Y	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Y	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Y	Sludge (Liquids)	3.73E-01	kg	S	1.33	g/mL	62	kL	4.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Y	Total	6.57E+00	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Y	Salt Cake (Solids)	3.90E+00	kg	S	1.6	g/mL	457	kL	5.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Y	Sludge (Solids)	1.13E+00	kg	S	1.4	g/mL	188	kL	4.29E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zn	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zn	Salt Cake (Solids)	3.90E+00	kg	S	1.6	g/mL	457	kL	5.33E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zn	Sludge (Solids)	2.76E+01	kg	S	1.4	g/mL	188	kL	1.05E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zn	Sludge (Liquids)	3.73E-01	kg	S	1.33	g/mL	62	kL	4.52E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zn	Salt Cake (Liquids)	8.17E-01	kg	S	1.45	g/mL	136	kL	4.14E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zn	Total	3.31E+01	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Zr	Total	2.41E+03	kg	S/E							Jan 1 2001 12:00AM
241-AW-104	Zr	Salt Cake (Liquids)	1.20E+00	kg	S	1.44	g/mL	136	kL	6.12E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zr	Salt Cake (Solids)	3.04E+02	kg	S	1.6	g/mL	457	kL	4.16E+02	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zr	Sludge (Liquids)	5.05E-01	kg	S	1.43	g/mL	62	kL	5.70E+00	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zr	Sludge (Solids)	2.10E+03	kg	E	1.28	g/mL	188	kL	8.73E+03	ug/g	Jan 1 2001 12:00AM
241-AW-104	Zr	Supernatant	3.50E-01	kg	S	1.08	g/mL	347	kL	9.35E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	106Ru	Total	1.13E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	106Ru	Sludge	6.83E-11	Ci	TS	1.41	g/mL	511	kL	9.48E-14	uCi/g	Jan 1 2001 12:00AM
241-C-107	106Ru	Sludge	1.50E-07	Ci	TS	1.71	g/mL	90	kL	9.78E-10	uCi/g	Jan 1 2001 12:00AM
241-C-107	106Ru	Sludge	1.13E-02	Ci	TE	1.32	g/mL	339	kL	2.52E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	113mCd	Total	1.19E+03	Ci	E							Jan 1 2001 12:00AM
241-C-107	113mCd	Sludge	1.69E-01	Ci	TS	1.41	g/mL	511	kL	2.34E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 129

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	113mCd	Sludge	2.80E-02	Ci	TS	1.71	g/mL	90	kL	1.82E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	113mCd	Sludge	1.19E+03	Ci	TE	1.32	g/mL	339	kL	2.65E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	125Sb	Total	7.42E+00	Ci	E							Jan 1 2001 12:00AM
241-C-107	125Sb	Sludge	3.37E-03	Ci	TS	1.41	g/mL	511	kL	4.67E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	125Sb	Sludge	1.06E-02	Ci	TS	1.71	g/mL	90	kL	6.88E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	125Sb	Sludge	7.41E+00	Ci	TE	1.32	g/mL	339	kL	1.66E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	126Sn	Total	6.37E+01	Ci	S							Jan 1 2001 12:00AM
241-C-107	126Sn	Sludge	3.46E+01	Ci	S	1.55	g/mL	511	kL	4.37E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	126Sn	Sludge	6.10E+00	Ci	S	1.55	g/mL	90	kL	4.37E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	126Sn	Sludge	2.30E+01	Ci	S	1.55	g/mL	339	kL	4.37E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	129I	Total	4.83E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	129I	Sludge	1.27E-03	Ci	TS	1.41	g/mL	511	kL	1.77E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	129I	Sludge	1.09E-04	Ci	TS	1.71	g/mL	90	kL	7.07E-07	uCi/g	Jan 1 2001 12:00AM
241-C-107	129I	Sludge	4.69E-02	Ci	TE	1.32	g/mL	339	kL	1.05E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	134Cs	Total	4.90E-01	Ci	E							Jan 1 2001 12:00AM
241-C-107	134Cs	Sludge	7.47E-05	Ci	TS	1.41	g/mL	511	kL	1.04E-07	uCi/g	Jan 1 2001 12:00AM
241-C-107	134Cs	Sludge	3.85E-04	Ci	TS	1.71	g/mL	90	kL	2.50E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	134Cs	Sludge	4.90E-01	Ci	TE	1.32	g/mL	339	kL	1.09E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	137Cs	Total	6.35E+04	Ci	S							Jan 1 2001 12:00AM
241-C-107	137Cs	Sludge	3.45E+04	Ci	S	1.55	g/mL	511	kL	4.36E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	137Cs	Sludge	6.08E+03	Ci	S	1.55	g/mL	90	kL	4.36E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	137Cs	Sludge	2.29E+04	Ci	S	1.55	g/mL	339	kL	4.36E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	137mBa	Total	6.01E+04	Ci	C							Jan 1 2001 12:00AM
241-C-107	137mBa	Sludge	3.27E+04	Ci	C		g/mL	511	kL	4.12E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	137mBa	Sludge	5.75E+03	Ci	C		g/mL	90	kL	4.12E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	137mBa	Sludge	2.17E+04	Ci	C		g/mL	339	kL	4.12E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	14C	Total	3.80E+00	Ci	E							Jan 1 2001 12:00AM
241-C-107	14C	Sludge	2.25E-01	Ci	TS	1.41	g/mL	511	kL	3.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	14C	Sludge	7.67E-03	Ci	TS	1.71	g/mL	90	kL	4.98E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	14C	Sludge	3.57E+00	Ci	TE	1.32	g/mL	339	kL	7.98E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	151Sm	Total	6.36E+05	Ci	E							Jan 1 2001 12:00AM
241-C-107	151Sm	Sludge	7.27E+01	Ci	TS	1.41	g/mL	511	kL	1.01E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	151Sm	Sludge	5.84E+00	Ci	TS	1.71	g/mL	90	kL	3.79E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	151Sm	Sludge	6.36E+05	Ci	TE	1.32	g/mL	339	kL	1.42E+03	uCi/g	Jan 1 2001 12:00AM
241-C-107	152Eu	Total	1.17E+02	Ci	E							Jan 1 2001 12:00AM
241-C-107	152Eu	Sludge	1.89E-02	Ci	TS	1.41	g/mL	511	kL	2.63E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	152Eu	Sludge	4.54E-02	Ci	TS	1.71	g/mL	90	kL	2.95E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	152Eu	Sludge	1.17E+02	Ci	TE	1.32	g/mL	339	kL	2.62E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	154Eu	Total	1.60E+03	Ci	E							Jan 1 2001 12:00AM
241-C-107	154Eu	Sludge	1.67E+00	Ci	TS	1.41	g/mL	511	kL	2.31E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	154Eu	Sludge	1.26E-01	Ci	TS	1.71	g/mL	90	kL	8.19E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	154Eu	Sludge	1.60E+03	Ci	E	1.55	g/mL	339	kL	3.04E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	155Eu	Total	1.04E+03	Ci	E							Jan 1 2001 12:00AM
241-C-107	155Eu	Sludge	1.26E+00	Ci	TS	1.41	g/mL	511	kL	1.75E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	155Eu	Sludge	1.74E+00	Ci	TS	1.71	g/mL	90	kL	1.13E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	155Eu	Sludge	1.04E+03	Ci	E	1.55	g/mL	339	kL	1.98E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	226Ra	Sludge	2.16E-02	Ci	TE	1.32	g/mL	339	kL	4.82E-05	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 130

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	226Ra	Total	2.16E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	226Ra	Sludge	5.91E-06	Ci	TS	1.41	g/mL	511	kL	8.20E-09	uCi/g	Jan 1 2001 12:00AM
241-C-107	226Ra	Sludge	1.10E-07	Ci	TS	1.71	g/mL	90	kL	7.18E-10	uCi/g	Jan 1 2001 12:00AM
241-C-107	227Ac	Total	1.41E-01	Ci	E							Jan 1 2001 12:00AM
241-C-107	227Ac	Sludge	3.72E-05	Ci	TS	1.41	g/mL	511	kL	5.16E-08	uCi/g	Jan 1 2001 12:00AM
241-C-107	227Ac	Sludge	1.79E-02	Ci	TS	1.71	g/mL	90	kL	1.16E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	227Ac	Sludge	1.23E-01	Ci	TE	1.32	g/mL	339	kL	2.75E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	228Ra	Total	4.85E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	228Ra	Sludge	2.52E-02	Ci	TS	1.41	g/mL	511	kL	3.50E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	228Ra	Sludge	5.25E-03	Ci	TS	1.71	g/mL	90	kL	3.41E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	228Ra	Sludge	1.80E-02	Ci	TE	1.32	g/mL	339	kL	4.02E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	229Th	Total	2.43E-03	Ci	E							Jan 1 2001 12:00AM
241-C-107	229Th	Sludge	2.21E-08	Ci	TS	1.41	g/mL	511	kL	3.07E-11	uCi/g	Jan 1 2001 12:00AM
241-C-107	229Th	Sludge	2.41E-03	Ci	TS	1.71	g/mL	90	kL	1.57E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	229Th	Sludge	1.63E-05	Ci	TE	1.32	g/mL	339	kL	3.65E-08	uCi/g	Jan 1 2001 12:00AM
241-C-107	231Pa	Total	1.92E-01	Ci	E							Jan 1 2001 12:00AM
241-C-107	231Pa	Sludge	6.53E-05	Ci	TS	1.41	g/mL	511	kL	9.06E-08	uCi/g	Jan 1 2001 12:00AM
241-C-107	231Pa	Sludge	2.41E-02	Ci	TS	1.71	g/mL	90	kL	1.57E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	231Pa	Sludge	1.68E-01	Ci	TE	1.32	g/mL	339	kL	3.74E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	232Th	Total	7.28E-02	Ci	S							Jan 1 2001 12:00AM
241-C-107	232Th	Sludge	3.96E-02	Ci	S	1.55	g/mL	511	kL	5.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	232Th	Sludge	6.97E-03	Ci	S	1.55	g/mL	90	kL	5.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	232Th	Sludge	2.63E-02	Ci	S	1.55	g/mL	339	kL	5.00E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	232U	Total	5.45E-03	Ci	E							Jan 1 2001 12:00AM
241-C-107	232U	Sludge	8.59E-06	Ci	TS	1.41	g/mL	511	kL	1.08E-08	uCi/g	Jan 1 2001 12:00AM
241-C-107	232U	Sludge	5.44E-03	Ci	TS	1.71	g/mL	90	kL	3.90E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	232U	Sludge	3.05E-06	Ci	TE	1.32	g/mL	339	kL	5.80E-09	uCi/g	Jan 1 2001 12:00AM
241-C-107	233U	Total	2.26E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	233U	Sludge	4.66E-07	Ci	TS	1.41	g/mL	511	kL	5.88E-10	uCi/g	Jan 1 2001 12:00AM
241-C-107	233U	Sludge	2.26E-02	Ci	TS	1.71	g/mL	90	kL	1.62E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	233U	Sludge	4.56E-08	Ci	TE	1.32	g/mL	339	kL	8.68E-11	uCi/g	Jan 1 2001 12:00AM
241-C-107	234U	Sludge	5.19E-01	Ci	TS	1.41	g/mL	511	kL	6.55E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	234U	Sludge	3.04E-02	Ci	TS	1.71	g/mL	90	kL	2.18E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	234U	Sludge	1.37E-02	Ci	TE	1.32	g/mL	339	kL	2.60E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	234U	Total	5.63E-01	Ci	E							Jan 1 2001 12:00AM
241-C-107	235U	Total	1.37E-01	Ci	E							Jan 1 2001 12:00AM
241-C-107	235U	Sludge	8.95E-02	Ci	E	1.55	g/mL	511	kL	1.13E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	235U	Sludge	2.59E-02	Ci	E	1.55	g/mL	90	kL	1.86E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	235U	Sludge	2.11E-02	Ci	E	1.55	g/mL	339	kL	4.01E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	236U	Total	8.92E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	236U	Sludge	5.84E-02	Ci	E	1.55	g/mL	511	kL	7.37E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	236U	Sludge	1.70E-02	Ci	E	1.55	g/mL	90	kL	1.22E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	236U	Sludge	1.38E-02	Ci	E	1.55	g/mL	339	kL	2.63E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	237Np	Total	8.07E-02	Ci	E							Jan 1 2001 12:00AM
241-C-107	237Np	Sludge	4.17E-03	Ci	TS	1.41	g/mL	511	kL	5.79E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	237Np	Sludge	4.22E-04	Ci	TS	1.71	g/mL	90	kL	2.74E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	237Np	Sludge	7.61E-02	Ci	TE	1.32	g/mL	339	kL	1.70E-04	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 131

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	238Pu	Total	6.81E+01	Ci	C							Jan 1 2001 12:00AM
241-C-107	238Pu	Sludge	3.70E+01	Ci	C		g/mL	511	kL	4.67E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	238Pu	Sludge	6.52E+00	Ci	C		g/mL	90	kL	4.67E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	238Pu	Sludge	2.46E+01	Ci	C		g/mL	339	kL	4.67E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	238U	Total	3.10E+00	Ci	E							Jan 1 2001 12:00AM
241-C-107	238U	Sludge	2.03E+00	Ci	E	1.55	g/mL	511	kL	2.56E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	238U	Sludge	5.91E-01	Ci	E	1.55	g/mL	90	kL	4.24E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	238U	Sludge	4.81E-01	Ci	E	1.55	g/mL	339	kL	9.15E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	239/240Pu	Sludge	9.20E+02	Ci	S	1.55	g/mL	339	kL	1.75E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	239/240Pu	Sludge	1.39E+03	Ci	S	1.55	g/mL	511	kL	1.75E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	239/240Pu	Total	2.55E+03	Ci	S							Jan 1 2001 12:00AM
241-C-107	239/240Pu	Sludge	2.44E+02	Ci	S	1.55	g/mL	90	kL	1.75E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	239Pu	Sludge	7.79E+02	Ci	C		g/mL	339	kL	1.48E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	239Pu	Total	2.16E+03	Ci	C							Jan 1 2001 12:00AM
241-C-107	239Pu	Sludge	1.17E+03	Ci	C		g/mL	511	kL	1.48E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	239Pu	Sludge	2.07E+02	Ci	C		g/mL	90	kL	1.48E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	240Pu	Total	3.93E+02	Ci	C							Jan 1 2001 12:00AM
241-C-107	240Pu	Sludge	2.14E+02	Ci	C		g/mL	511	kL	2.70E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	240Pu	Sludge	3.77E+01	Ci	C		g/mL	90	kL	2.70E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	240Pu	Sludge	1.42E+02	Ci	C		g/mL	339	kL	2.70E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	241Am	Total	6.75E+03	Ci	S							Jan 1 2001 12:00AM
241-C-107	241Am	Sludge	3.67E+03	Ci	S	1.55	g/mL	511	kL	4.63E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	241Am	Sludge	6.46E+02	Ci	S	1.55	g/mL	90	kL	4.63E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	241Am	Sludge	2.43E+03	Ci	S	1.55	g/mL	339	kL	4.63E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	241Pu	Total	3.73E+03	Ci	C							Jan 1 2001 12:00AM
241-C-107	241Pu	Sludge	2.03E+03	Ci	C		g/mL	511	kL	2.56E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	241Pu	Sludge	3.57E+02	Ci	C		g/mL	90	kL	2.56E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	241Pu	Sludge	1.35E+03	Ci	C		g/mL	339	kL	2.56E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	242Cm	Total	5.37E+00	Ci	C							Jan 1 2001 12:00AM
241-C-107	242Cm	Sludge	2.92E+00	Ci	C		g/mL	511	kL	3.69E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	242Cm	Sludge	5.14E-01	Ci	C		g/mL	90	kL	3.69E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	242Cm	Sludge	1.94E+00	Ci	C		g/mL	339	kL	3.69E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	242Pu	Total	2.74E-02	Ci	C							Jan 1 2001 12:00AM
241-C-107	242Pu	Sludge	1.49E-02	Ci	C		g/mL	511	kL	1.88E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	242Pu	Sludge	2.62E-03	Ci	C		g/mL	90	kL	1.88E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	242Pu	Sludge	9.87E-03	Ci	C		g/mL	339	kL	1.88E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	243Am	Total	3.47E-01	Ci	C							Jan 1 2001 12:00AM
241-C-107	243Am	Sludge	1.89E-01	Ci	C		g/mL	511	kL	2.38E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	243Am	Sludge	3.32E-02	Ci	C		g/mL	90	kL	2.38E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	243Am	Sludge	1.25E-01	Ci	C		g/mL	339	kL	2.38E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	243Cm	Total	4.21E-01	Ci	C							Jan 1 2001 12:00AM
241-C-107	243Cm	Sludge	2.29E-01	Ci	C		g/mL	511	kL	2.89E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	243Cm	Sludge	4.03E-02	Ci	C		g/mL	90	kL	2.89E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	243Cm	Sludge	1.52E-01	Ci	C		g/mL	339	kL	2.89E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	244Cm	Sludge	8.46E+00	Ci	C		g/mL	511	kL	1.07E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	244Cm	Sludge	1.49E+00	Ci	C		g/mL	90	kL	1.07E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	244Cm	Sludge	5.61E+00	Ci	C		g/mL	339	kL	1.07E-02	uCi/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 132

BY: E. Bertos
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	244Cm	Total	1.56E+01	Ci	C							Jan 1 2001 12:00AM
241-C-107	3H	Total	2.99E+01	Ci	E							Jan 1 2001 12:00AM
241-C-107	3H	Sludge	3.10E-01	Ci	TS	1.41	g/mL	511	kL	4.30E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	3H	Sludge	3.70E-02	Ci	TS	1.71	g/mL	90	kL	2.40E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	3H	Sludge	2.95E+01	Ci	TE	1.32	g/mL	339	kL	6.60E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	59Ni	Total	3.22E+02	Ci	E							Jan 1 2001 12:00AM
241-C-107	59Ni	Sludge	2.77E-02	Ci	TS	1.41	g/mL	511	kL	3.85E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	59Ni	Sludge	2.17E-03	Ci	TS	1.71	g/mL	90	kL	1.41E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	59Ni	Sludge	3.22E+02	Ci	TE	1.32	g/mL	339	kL	7.19E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	60Co	Total	2.47E+02	Ci	E							Jan 1 2001 12:00AM
241-C-107	60Co	Sludge	8.55E-03	Ci	TS	1.41	g/mL	511	kL	1.19E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	60Co	Sludge	4.45E-03	Ci	TS	1.71	g/mL	90	kL	2.89E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	60Co	Sludge	2.47E+02	Ci	E	1.55	g/mL	339	kL	4.71E-01	uCi/g	Jan 1 2001 12:00AM
241-C-107	63Ni	Total	3.01E+04	Ci	E							Jan 1 2001 12:00AM
241-C-107	63Ni	Sludge	2.37E+00	Ci	TS	1.41	g/mL	511	kL	3.29E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	63Ni	Sludge	2.07E-01	Ci	TS	1.71	g/mL	90	kL	1.35E-03	uCi/g	Jan 1 2001 12:00AM
241-C-107	63Ni	Sludge	3.01E+04	Ci	TE	1.32	g/mL	339	kL	6.72E+01	uCi/g	Jan 1 2001 12:00AM
241-C-107	79Se	Total	1.79E+01	Ci	E							Jan 1 2001 12:00AM
241-C-107	79Se	Sludge	2.06E-03	Ci	TS	1.41	g/mL	511	kL	2.86E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	79Se	Sludge	1.71E-04	Ci	TS	1.71	g/mL	90	kL	1.11E-06	uCi/g	Jan 1 2001 12:00AM
241-C-107	79Se	Sludge	1.79E+01	Ci	TE	1.32	g/mL	339	kL	4.01E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	90Sr	Total	2.24E+06	Ci	S							Jan 1 2001 12:00AM
241-C-107	90Sr	Sludge	3.69E+05	Ci	S	1.55	g/mL	511	kL	4.66E+02	uCi/g	Jan 1 2001 12:00AM
241-C-107	90Sr	Sludge	6.50E+04	Ci	S	1.55	g/mL	90	kL	4.66E+02	uCi/g	Jan 1 2001 12:00AM
241-C-107	90Sr	Sludge	1.81E+06	Ci	S	1.55	g/mL	339	kL	3.44E+03	uCi/g	Jan 1 2001 12:00AM
241-C-107	90Y	Total	2.24E+06	Ci	C							Jan 1 2001 12:00AM
241-C-107	90Y	Sludge	3.69E+05	Ci	C		g/mL	511	kL	4.66E+02	uCi/g	Jan 1 2001 12:00AM
241-C-107	90Y	Sludge	6.50E+04	Ci	C		g/mL	90	kL	4.66E+02	uCi/g	Jan 1 2001 12:00AM
241-C-107	90Y	Sludge	1.81E+06	Ci	C		g/mL	339	kL	3.44E+03	uCi/g	Jan 1 2001 12:00AM
241-C-107	93mNb	Total	6.98E+02	Ci	E							Jan 1 2001 12:00AM
241-C-107	93mNb	Sludge	8.72E-02	Ci	TS	1.41	g/mL	511	kL	1.21E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	93mNb	Sludge	6.52E-03	Ci	TS	1.71	g/mL	90	kL	4.24E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	93mNb	Sludge	6.98E+02	Ci	TE	1.32	g/mL	339	kL	1.56E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	93Zr	Sludge	8.04E-03	Ci	TS	1.71	g/mL	90	kL	5.22E-05	uCi/g	Jan 1 2001 12:00AM
241-C-107	93Zr	Sludge	7.75E+02	Ci	TE	1.32	g/mL	339	kL	1.73E+00	uCi/g	Jan 1 2001 12:00AM
241-C-107	93Zr	Total	7.75E+02	Ci	E							Jan 1 2001 12:00AM
241-C-107	93Zr	Sludge	9.78E-02	Ci	TS	1.41	g/mL	511	kL	1.36E-04	uCi/g	Jan 1 2001 12:00AM
241-C-107	99Tc	Total	3.79E+01	Ci	S							Jan 1 2001 12:00AM
241-C-107	99Tc	Sludge	2.06E+01	Ci	S	1.55	g/mL	511	kL	2.60E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	99Tc	Sludge	3.63E+00	Ci	S	1.55	g/mL	90	kL	2.60E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	99Tc	Sludge	1.37E+01	Ci	S	1.55	g/mL	339	kL	2.60E-02	uCi/g	Jan 1 2001 12:00AM
241-C-107	Ag	Total	2.94E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Ag	Sludge	7.83E+01	kg	S	1.55	g/mL	511	kL	9.89E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Ag	Sludge	1.89E+02	kg	S	1.55	g/mL	339	kL	3.60E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ag	Sludge	2.64E+01	kg	S	1.55	g/mL	90	kL	1.89E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Al	Total	5.86E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	Al	Sludge	1.90E+04	kg	S	1.55	g/mL	511	kL	2.41E+04	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 133

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	Al	Sludge	1.66E+04	kg	S	1.55	g/mL	90	kL	1.19E+05	ug/g	Jan 1 2001 12:00AM
241-C-107	Al	Sludge	2.29E+04	kg	S	1.55	g/mL	339	kL	4.37E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	As	Sludge	5.41E+00	kg	S	1.55	g/mL	511	kL	6.83E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	As	Sludge	3.59E+00	kg	S	1.55	g/mL	339	kL	6.83E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	As	Total	9.95E+00	kg	S							Jan 1 2001 12:00AM
241-C-107	As	Sludge	9.53E-01	kg	S	1.55	g/mL	90	kL	6.83E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	B	Sludge	1.06E+00	kg	S	1.55	g/mL	90	kL	7.60E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	B	Sludge	1.81E+02	kg	S	1.55	g/mL	511	kL	2.28E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	B	Total	2.08E+02	kg	S/E							Jan 1 2001 12:00AM
241-C-107	B	Sludge	2.59E+01	kg	S	1.55	g/mL	339	kL	4.94E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Ba	Sludge	1.53E+01	kg	S	1.55	g/mL	90	kL	1.10E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ba	Sludge	4.49E+02	kg	S	1.55	g/mL	339	kL	8.55E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ba	Total	7.29E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Ba	Sludge	2.64E+02	kg	S	1.55	g/mL	511	kL	3.34E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Be	Sludge	8.50E-01	kg	S	1.55	g/mL	511	kL	1.07E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Be	Sludge	1.50E-01	kg	S	1.55	g/mL	90	kL	1.07E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Be	Sludge	5.64E-01	kg	S	1.55	g/mL	339	kL	1.07E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Be	Total	1.56E+00	kg	S							Jan 1 2001 12:00AM
241-C-107	Bi	Total	1.04E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	Bi	Sludge	9.88E+03	kg	S	1.55	g/mL	511	kL	1.25E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	Bi	Sludge	4.89E+02	kg	S	1.55	g/mL	90	kL	3.50E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Bi	Sludge	5.27E+01	kg	S	1.55	g/mL	339	kL	1.00E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ca	Total	1.24E+03	kg	S							Jan 1 2001 12:00AM
241-C-107	Ca	Sludge	4.84E+02	kg	S	1.55	g/mL	511	kL	6.11E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ca	Sludge	8.49E+01	kg	S	1.55	g/mL	90	kL	6.09E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ca	Sludge	6.73E+02	kg	S	1.55	g/mL	339	kL	1.28E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Cd	Sludge	1.29E+00	kg	S	1.55	g/mL	90	kL	9.24E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Cd	Total	9.52E+01	kg	S							Jan 1 2001 12:00AM
241-C-107	Cd	Sludge	3.26E+01	kg	S	1.55	g/mL	511	kL	4.11E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Cd	Sludge	6.13E+01	kg	S	1.55	g/mL	339	kL	1.17E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ce	Sludge	4.07E+01	kg	S	1.55	g/mL	90	kL	2.92E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ce	Total	7.79E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Ce	Sludge	3.14E+02	kg	S	1.55	g/mL	511	kL	3.97E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ce	Sludge	4.24E+02	kg	S	1.55	g/mL	339	kL	8.07E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cl	Total	8.70E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Cl	Sludge	5.76E+02	kg	S	1.55	g/mL	511	kL	7.28E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cl	Sludge	5.95E+01	kg	S	1.55	g/mL	90	kL	4.27E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cl	Sludge	2.34E+02	kg	S	1.55	g/mL	339	kL	4.45E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	CN	Sludge	5.85E-01	kg	S	1.55	g/mL	90	kL	4.19E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	CN	Sludge	2.20E+00	kg	S	1.55	g/mL	339	kL	4.19E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	CN	Sludge	3.32E+00	kg	S	1.55	g/mL	511	kL	4.19E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	CN	Total	6.11E+00	kg	S/E							Jan 1 2001 12:00AM
241-C-107	Co	Sludge	1.08E+01	kg	S	1.55	g/mL	511	kL	1.36E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Co	Sludge	1.07E+00	kg	S	1.55	g/mL	90	kL	7.70E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Co	Total	2.65E+01	kg	S							Jan 1 2001 12:00AM
241-C-107	Co	Sludge	1.46E+01	kg	S	1.55	g/mL	339	kL	2.78E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Cr	Total	9.30E+02	kg	S							Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 134

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	Cr	Sludge	5.33E+02	kg	S	1.55	g/mL	511	kL	6.73E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cr	Sludge	3.65E+01	kg	S	1.55	g/mL	90	kL	2.62E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cr	Sludge	3.61E+02	kg	S	1.55	g/mL	339	kL	6.87E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cu	Sludge	1.76E+01	kg	S	1.55	g/mL	90	kL	1.26E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cu	Total	2.28E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Cu	Sludge	8.43E+01	kg	S	1.55	g/mL	511	kL	1.06E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Cu	Sludge	1.27E+02	kg	S	1.55	g/mL	339	kL	2.41E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	F	Total	6.39E+03	kg	S							Jan 1 2001 12:00AM
241-C-107	F	Sludge	5.82E+03	kg	S	1.55	g/mL	511	kL	7.35E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	F	Sludge	3.19E+02	kg	S	1.55	g/mL	339	kL	6.07E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	F	Sludge	2.52E+02	kg	S	1.55	g/mL	90	kL	1.80E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Fe	Total	1.03E+05	kg	S							Jan 1 2001 12:00AM
241-C-107	Fe	Sludge	4.20E+04	kg	S	1.55	g/mL	511	kL	5.31E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	Fe	Sludge	2.86E+03	kg	S	1.55	g/mL	90	kL	2.05E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	Fe	Sludge	5.79E+04	kg	S	1.55	g/mL	339	kL	1.10E+05	ug/g	Jan 1 2001 12:00AM
241-C-107	Hg	Total	6.70E+01	kg	S							Jan 1 2001 12:00AM
241-C-107	Hg	Sludge	3.64E+01	kg	S	1.55	g/mL	511	kL	4.60E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Hg	Sludge	6.41E+00	kg	S	1.55	g/mL	90	kL	4.60E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Hg	Sludge	2.41E+01	kg	S	1.55	g/mL	339	kL	4.60E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	K	Total	4.47E+02	kg	S/E							Jan 1 2001 12:00AM
241-C-107	K	Sludge	2.48E+02	kg	S	1.55	g/mL	511	kL	3.13E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	K	Sludge	2.63E+01	kg	S	1.55	g/mL	90	kL	1.88E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	K	Sludge	1.73E+02	kg	E	1.55	g/mL	339	kL	3.29E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	La	Total	2.70E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	La	Sludge	9.95E+01	kg	S	1.55	g/mL	511	kL	1.26E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	La	Sludge	1.73E+01	kg	S	1.55	g/mL	90	kL	1.24E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	La	Sludge	1.53E+02	kg	S	1.55	g/mL	339	kL	2.92E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Li	Total	1.67E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Li	Sludge	1.96E+01	kg	S	1.55	g/mL	339	kL	3.73E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Li	Sludge	1.32E+02	kg	S	1.55	g/mL	511	kL	1.67E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Li	Sludge	1.46E+01	kg	S	1.55	g/mL	90	kL	1.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Mg	Total	4.77E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Mg	Sludge	3.53E+01	kg	S	1.55	g/mL	90	kL	2.53E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Mg	Sludge	2.08E+02	kg	S	1.55	g/mL	339	kL	3.96E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Mg	Sludge	2.33E+02	kg	S	1.55	g/mL	511	kL	2.95E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Mn	Total	5.02E+03	kg	S							Jan 1 2001 12:00AM
241-C-107	Mn	Sludge	1.85E+03	kg	S	1.55	g/mL	511	kL	2.34E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Mn	Sludge	2.20E+02	kg	S	1.55	g/mL	90	kL	1.58E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Mn	Sludge	2.95E+03	kg	S	1.55	g/mL	339	kL	5.62E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Mo	Total	4.58E+01	kg	S/E							Jan 1 2001 12:00AM
241-C-107	Mo	Sludge	2.63E+00	kg	S	1.55	g/mL	90	kL	1.88E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Mo	Sludge	2.28E+01	kg	S	1.55	g/mL	339	kL	4.34E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Mo	Sludge	2.03E+01	kg	S	1.55	g/mL	511	kL	2.56E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Na	Total	9.52E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	Na	Sludge	5.90E+04	kg	S	1.55	g/mL	511	kL	7.45E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	Na	Sludge	7.97E+03	kg	S	1.55	g/mL	90	kL	5.71E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	Na	Sludge	2.83E+04	kg	S	1.55	g/mL	339	kL	5.38E+04	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 135

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	Nd	Sludge	3.65E+02	kg	S	1.55	g/mL	339	kL	6.95E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Nd	Sludge	2.33E+02	kg	S	1.55	g/mL	511	kL	2.94E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Nd	Total	6.33E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Nd	Sludge	3.46E+01	kg	S	1.55	g/mL	90	kL	2.48E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ni	Total	3.09E+03	kg	S							Jan 1 2001 12:00AM
241-C-107	Ni	Sludge	9.45E+02	kg	S	1.55	g/mL	511	kL	1.19E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Ni	Sludge	6.56E+02	kg	S	1.55	g/mL	90	kL	4.70E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Ni	Sludge	1.49E+03	kg	S	1.55	g/mL	339	kL	2.84E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	NO2	Total	3.53E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	NO2	Sludge	2.07E+04	kg	S	1.55	g/mL	511	kL	2.61E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	NO2	Sludge	2.61E+03	kg	S	1.55	g/mL	90	kL	1.87E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	NO2	Sludge	1.21E+04	kg	S	1.55	g/mL	339	kL	2.29E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	NO3	Total	4.78E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	NO3	Sludge	3.45E+04	kg	S	1.55	g/mL	511	kL	4.36E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	NO3	Sludge	3.24E+03	kg	S	1.55	g/mL	90	kL	2.32E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	NO3	Sludge	1.00E+04	kg	S	1.55	g/mL	339	kL	1.91E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	OH	Total	2.29E+05	kg	C							Jan 1 2001 12:00AM
241-C-107	Pb	Total	1.01E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	Pb	Sludge	3.48E+03	kg	S	1.55	g/mL	511	kL	4.40E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Pb	Sludge	1.68E+03	kg	S	1.55	g/mL	90	kL	1.21E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	Pb	Sludge	4.96E+03	kg	S	1.55	g/mL	339	kL	9.44E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	PO4	Total	5.88E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	PO4	Sludge	4.55E+04	kg	S	1.55	g/mL	511	kL	5.75E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	PO4	Sludge	8.34E+03	kg	S	1.55	g/mL	90	kL	5.98E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	PO4	Sludge	4.95E+03	kg	S	1.55	g/mL	339	kL	9.42E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Pr	Sludge	1.13E+02	kg	S	1.55	g/mL	511	kL	1.43E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Pr	Sludge	1.99E+01	kg	S	1.55	g/mL	90	kL	1.43E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Pr	Sludge	7.50E+01	kg	S	1.55	g/mL	339	kL	1.43E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Pr	Total	2.08E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Rb	Sludge	8.07E-02	kg	S	1.55	g/mL	90	kL	5.79E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	Rb	Sludge	3.04E-01	kg	S	1.55	g/mL	339	kL	5.79E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	Rb	Sludge	4.58E-01	kg	S	1.55	g/mL	511	kL	5.79E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	Rb	Total	8.43E-01	kg	S							Jan 1 2001 12:00AM
241-C-107	Rh	Sludge	2.37E+01	kg	S	1.55	g/mL	511	kL	2.99E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Rh	Total	4.36E+01	kg	S							Jan 1 2001 12:00AM
241-C-107	Rh	Sludge	1.57E+01	kg	S	1.55	g/mL	339	kL	2.99E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Rh	Sludge	4.17E+00	kg	S	1.55	g/mL	90	kL	2.99E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Ru	Sludge	3.43E+02	kg	S	1.55	g/mL	339	kL	6.53E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ru	Sludge	5.17E+02	kg	S	1.55	g/mL	511	kL	6.53E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ru	Sludge	9.10E+01	kg	S	1.55	g/mL	90	kL	6.53E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ru	Total	9.51E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Sb	Sludge	1.31E+00	kg	S	1.55	g/mL	511	kL	1.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Sb	Sludge	8.68E-01	kg	S	1.55	g/mL	339	kL	1.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Sb	Total	2.41E+00	kg	S							Jan 1 2001 12:00AM
241-C-107	Sb	Sludge	2.31E-01	kg	S	1.55	g/mL	90	kL	1.65E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Se	Sludge	4.80E-01	kg	S	1.55	g/mL	90	kL	3.44E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Se	Total	5.01E+00	kg	S							Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 136

BY: E. Barrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	Se	Sludge	2.73E+00	kg	S	1.55	g/mL	511	kL	3.44E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Se	Sludge	1.81E+00	kg	S	1.55	g/mL	339	kL	3.44E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Si	Total	1.87E+03	kg	S							Jan 1 2001 12:00AM
241-C-107	Si	Sludge	9.85E+02	kg	S	1.55	g/mL	511	kL	1.24E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Si	Sludge	1.24E+02	kg	S	1.55	g/mL	90	kL	8.86E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Si	Sludge	7.58E+02	kg	S	1.55	g/mL	339	kL	1.44E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	SO4	Total	8.43E+03	kg	S							Jan 1 2001 12:00AM
241-C-107	SO4	Sludge	4.97E+03	kg	S	1.55	g/mL	511	kL	6.27E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	SO4	Sludge	5.06E+02	kg	S	1.55	g/mL	90	kL	3.63E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	SO4	Sludge	2.95E+03	kg	S	1.55	g/mL	339	kL	5.61E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Sr	Total	2.57E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Sr	Sludge	1.65E+02	kg	S	1.55	g/mL	511	kL	2.08E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Sr	Sludge	2.45E+01	kg	S	1.55	g/mL	90	kL	1.75E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Sr	Sludge	6.84E+01	kg	S	1.55	g/mL	339	kL	1.30E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ta	Sludge	4.60E-01	kg	S	1.55	g/mL	511	kL	5.81E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	Ta	Sludge	8.11E-02	kg	S	1.55	g/mL	90	kL	5.81E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	Ta	Total	8.47E-01	kg	S/E							Jan 1 2001 12:00AM
241-C-107	Ta	Sludge	3.05E-01	kg	S	1.55	g/mL	339	kL	5.81E-01	ug/g	Jan 1 2001 12:00AM
241-C-107	Te	Sludge	9.76E+01	kg	S	1.55	g/mL	511	kL	1.23E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Te	Sludge	6.47E+01	kg	S	1.55	g/mL	339	kL	1.23E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Te	Total	1.80E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Te	Sludge	1.72E+01	kg	S	1.55	g/mL	90	kL	1.23E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Th	Sludge	2.39E+02	kg	S	1.55	g/mL	339	kL	4.54E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Th	Total	6.61E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Th	Sludge	3.60E+02	kg	S	1.55	g/mL	511	kL	4.54E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Th	Sludge	6.33E+01	kg	S	1.55	g/mL	90	kL	4.54E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ti	Sludge	1.50E+01	kg	S	1.55	g/mL	90	kL	1.08E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ti	Sludge	7.16E+01	kg	S	1.55	g/mL	339	kL	1.36E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Ti	Sludge	3.70E+01	kg	S	1.55	g/mL	511	kL	4.67E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Ti	Total	1.24E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	TIC as CO3	Sludge	4.12E+03	kg	S	1.55	g/mL	339	kL	7.84E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	TIC as CO3	Total	1.14E+04	kg	S							Jan 1 2001 12:00AM
241-C-107	TIC as CO3	Sludge	6.21E+03	kg	S	1.55	g/mL	511	kL	7.84E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	TIC as CO3	Sludge	1.09E+03	kg	S	1.55	g/mL	90	kL	7.84E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	Tl	Sludge	2.95E+00	kg	S	1.55	g/mL	511	kL	3.73E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Tl	Total	5.43E+00	kg	S							Jan 1 2001 12:00AM
241-C-107	Tl	Sludge	5.20E-01	kg	S	1.55	g/mL	90	kL	3.73E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	Tl	Sludge	1.96E+00	kg	S	1.55	g/mL	339	kL	3.73E+00	ug/g	Jan 1 2001 12:00AM
241-C-107	TOC	Total	7.36E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	TOC	Sludge	4.00E+02	kg	S	1.55	g/mL	511	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	TOC	Sludge	7.05E+01	kg	S	1.55	g/mL	90	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	TOC	Sludge	2.66E+02	kg	S	1.55	g/mL	339	kL	5.05E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	UTOTAL	Total	9.29E+03	kg	S							Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 0A
SHEET NO.: 137

BY: E. Berrios
DATE: 12/04/02

SUBJECT: Updated Emissions Run Feed Vector

Tank Name	Analyte	Waste Phase	Inventory	Inventory Units	Basis	Density	Density Units	Volume	Volume Units	Concentration	Concentration Units	Decay Date
241-C-107	UTOTAL	Sludge	6.08E+03	kg	S	1.55	g/mL	511	kL	7.68E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	UTOTAL	Sludge	1.77E+03	kg	S	1.55	g/mL	90	kL	1.27E+04	ug/g	Jan 1 2001 12:00AM
241-C-107	UTOTAL	Sludge	1.44E+03	kg	S	1.55	g/mL	339	kL	2.74E+03	ug/g	Jan 1 2001 12:00AM
241-C-107	V	Sludge	9.05E+00	kg	S	1.55	g/mL	339	kL	1.72E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	V	Sludge	2.40E+00	kg	S	1.55	g/mL	90	kL	1.72E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	V	Sludge	1.36E+01	kg	S	1.55	g/mL	511	kL	1.72E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	V	Total	2.51E+01	kg	S/E							Jan 1 2001 12:00AM
241-C-107	W	Sludge	6.46E+01	kg	S	1.55	g/mL	90	kL	4.63E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	W	Sludge	2.43E+02	kg	S	1.55	g/mL	339	kL	4.63E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	W	Sludge	3.67E+02	kg	S	1.55	g/mL	511	kL	4.63E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	W	Total	6.75E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Y	Total	9.48E+01	kg	S							Jan 1 2001 12:00AM
241-C-107	Y	Sludge	5.15E+01	kg	S	1.55	g/mL	511	kL	6.51E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Y	Sludge	3.42E+01	kg	S	1.55	g/mL	339	kL	6.51E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Y	Sludge	9.08E+00	kg	S	1.55	g/mL	90	kL	6.51E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Zn	Sludge	7.46E+01	kg	S	1.55	g/mL	511	kL	9.42E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Zn	Sludge	1.58E+01	kg	S	1.55	g/mL	90	kL	1.14E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Zn	Sludge	8.66E+01	kg	S	1.55	g/mL	339	kL	1.65E+02	ug/g	Jan 1 2001 12:00AM
241-C-107	Zn	Total	1.77E+02	kg	S							Jan 1 2001 12:00AM
241-C-107	Zr	Total	7.39E+01	kg	S							Jan 1 2001 12:00AM
241-C-107	Zr	Sludge	2.69E+01	kg	S	1.55	g/mL	511	kL	3.39E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Zr	Sludge	1.74E+00	kg	S	1.55	g/mL	90	kL	1.25E+01	ug/g	Jan 1 2001 12:00AM
241-C-107	Zr	Sludge	4.53E+01	kg	S	1.55	g/mL	339	kL	8.62E+01	ug/g	Jan 1 2001 12:00AM

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00001
SHEET REV: 1
SHEET NO.: 137

BY: E. Berrios
DATE: 10/24/02

SUBJECT: Updated Emissions Run Feed Vector

E

Appendix E
Calculation: Integrated Emissions Report PIC Estimation

24590-WTP-M4C-FRP-00002, Rev 0A

R10045070

Calculation Cover Sheet

ISSUED BY
RPP-WTP PDC
3/27/03
INIT DATE

RIVER PROTECTION PROJECT-WASTE TREATMENT PLANT		JOB NO.:	24590
CALC NO.	24590-WTP-M4C-FRP-00002	GROUP	Process Operations
SUBJECT	Integrated Emissions Report PIC Estimation		

CALCULATION STATUS DESIGNATION: ☒ PRELIMINARY ☐ COMMITTED ☐ CONFIRMED ☐ SUPERSEDED ☐ VOIDED

SOFTWARE APPLICATION	N/A	QAS	PROGRAM NAME	VERSION/RELEASE NO.
	☒	☐ YES ☐ NO		

Notes/Comments

This calculation updates the PIC estimation in accordance with the latest WTP emissions profile and also incorporates the new calculation procedure requirements. The new calculation requirements required a significant re-write on this calculation, therefore no revision bars were used.

Calculations were performed on a Compaq Personal Computer using the software Microsoft Excel® 97 SR-2

John Cook and Cuong Nguyen checked the whole calculation for the accuracy and procedural compliance.

NO.	REASON FOR REVISION	TOTAL NO. OF SHEETS	LAST SHEET NO.	BY	CHECKED	APPROVED/ ACCEPTED	DATE
0A	Update due to new Emissions Profile	19	19	E. Berrios	J. Cook/ C. Nguyen	O. Block	03/27/03
0	Initial Issue	25	25	E. Berrios	J. Bernards	O. Block	04/25/02

RECORD OF REVISIONS

3/27/03
☒ Processed/ Data Entry ☐ Copied/ QA ☐ Scanned ☐ Filed

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1 Objective

The purpose of this calculation is to estimate the emission rates of Products of Incomplete Combustion (PIC) generated from the Waste Treatment and Immobilization Plant (WTP). The results from this calculation will be reflected in the next revision of the *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant* (RPT-W375-ES00001).

2 Inputs

The methodology for calculating the PIC emissions is equivalent to the methodology presented in the *Estimation of Product of Incomplete Combustion Emissions for the River Protection Project Waste Treatment Plant* (RPT-24590-EN-00005). Stack detection limits are the same as those used in the above mentioned report. Table 1 shows the detection limits used.

Stacks stream information was obtained from the stream reports generated via the Model Run Request titled *Emissions Maximum Case Runs with Updated Parameters* (24590-WTP-MRQ-PT-03-002) and are shown in Appendix A. Data used is the following:

- Stream PVP12 (Pretreatment Stack)
  - Volumetric flow : 2.74E+03 aft^3/min
  - Pressure = 1000 mbar = 1 bar
  - Temperature = 37.3°C
  - Water mass flowrate = 5.43E+03 lb/d
- Stream LVP26 (LAW Vit Stack)
  - Volumetric flow : 5.99E+03 aft^3/min
  - Pressure = 1000 mbar = 1 bar
  - Temperature = 100°C
  - Water mass flowrate = 1.91E+04 lb/d
- Stream HOP33 (HLW Vit Stack). Flows are given for 2 melters thus to get generation per individual melter, the flowrates are divided by 2.
  - Volumetric flow : 3.04E+03 / 2 = 1.52E+03 aft^3/min
  - Pressure = 1000 mbar = 1 bar
  - Temperature = 80°C
  - Water mass flowrate = 1.89E+04 / 2 = 9.45E+03 lb/d

Standard conditions are considered to be 1.01325 bars and 20°C (293 K) per Section 5 of the EPA Method 0030 (EPA 1986).

The ideal gas law constant used was 0.08314 l*bar/(mol*K) (Perry 1984, Table 1-9).

3 Background

An updated emissions profile for the new WTP 2+2 melter configuration has been generated. As part of this update, the estimation of the Products of Incomplete Combustion needs to be re-generated. This calculation provides this update.

4 Applicable Codes and Standards

NA

5 Methodology

Generation of PICs from WTP were estimated using the methodology described below.

- Stack detection limits were obtained from Table 2 of the *Estimation of Product of Incomplete Combustion Emissions for the River Protection Project Waste Treatment Plant* (RPT-24590-EN-00005).
- Stream information for each stack was obtained from the Model Run Request titled *Emissions Maximum Case Runs with Updated Parameters* (24590-WTP-MRQ-PT-03-002). Streams analyzed were HOP33 (HLW Vit. Stack), LVP26 (LAW Vit Stack), PVP12 (Pretreatment Stack). Stack flowrate was converted from actual cubic feet per minute (ACFM) to standard cubic feet per minute (SCFM). This number was then converted to dry standard cubic meters per minute (DSCM/min).
- Information was tabulated using the software Microsoft Excel® 97 SR-2.
- Based on the stream conditions at the stack, the PIC emission rates were calculated in grams per second.

6 Assumptions

NA

7 Calculations

7.1 Pretreatment Facility

First, the ACFM was converted to SCFM:
T = 37.3°C = 310.3K
T(std) = 20°C = 293K
P = 1 bar
P(std) = 1.01325 bars
(2.74E+03 ACFM)*(293/310.3)*(1/1.01325) = 2.55E+03 SCFM

To convert the SCFM to DSCM/hr, the following calculation was done. Stream volumetric flowrate was converted from SCFM to SCMH by dividing by 35.3 and multiplying by 60 min/hr.
2.55E+03 SCFM * 1 m^3/35.3 ft^3 * 60 min/hr = 4.34E+03 SCMH

Water mass flow was then converted to molar flowrate.
5.43E+03 lb/d * 1 kg/2.2 lb * 1000g/kg * 1d/24hr * 1 mole H_2O/18 g = 5.71E+03 gmole/hr

The water volumetric flowrate was calculated by using the ideal gas law.
PV = nRT
R = 0.08314 l*bar/(mol*K)
T = 37.3°C = 310.3 K
P = 1 bar
P (std) = 1.01325 bar
V = nRT/P

V = (5.71E+03)(0.08314)(310.3)/(1)
V = 1.47E+05 l/hr * 1 m^3/1000 l = 1.47E+02 m^3/hr
Converting to sm^3/hr:
(1.47E+02)*(293/310.3)*(1/1.01325) = 1.37E+02 sm^3/hr

Water percent was calculated by dividing the water volumetric flowrate by the stream volumetric flowrate.
Water % = (1.37E+02/4.34E+03)*100 = 3.2%

SCMH value was then converted to DSCM/hr the following way:
4.33E+03 SCMH * (1-3.2/100) = 4.19E+03 DSCM/hr

Constituents stack flowrate was then calculated by multiplying the stack concentration with the DSCM/hr value. The calculation for 4-Nitrophenol is shown below as an example. All other constituent calculations were performed using the Microsoft Excel® 97 spreadsheet on a Compaq PC workstation and can be found in Table 2. Spreadsheet formulas are identical to the ones shown below.

Stack concentration = 15 µg/dscm (cell C5 of Table 2)
15 µg/dscm * 4.19E+03 DSCM/hr * 1 mg/1000µg = 63 mg/hr (calculated in cell D5 of Table 2)
Converting to g/sec:
63 mg/hr * 1 hr/3600 sec * 1 g/1000 mg = 1.75E-05 g/sec (calculated in cell E5 of Table 2)

Table 2 shows the calculations for all the PICs throughout the Pretreatment Facility.

7.2 LAW Vitrification Facility

First, the ACFM was converted to SCFM:
T = 100°C = 373K
T(std) = 20°C = 293K
P = 1 bar
P(std) = 1.01325 bars
(5.99E+03 ACFH)*(293/373)*(1/1.01325) = 4.64E+03 SCFM
To convert the SCFM to DSCM/hr, the following calculation was done. Stream volumetric flowrate was converted from SCFM to SCMH by diving by 35.3 and multiplying by 60 min/hr.
4.64E+03 SCFM * 1 m^3/35.3 ft^3 * 60 min/hr = 7.89E+03 SCMH

Water mass flow was then converted to molar flowrate.
1.91E+04 lb/d * 1 kg/2.2 lb * 1000g/kg * 1d/24hr * 1 mole H_2O/18 g = 2.01E+04 gmole/hr

The water volumetric flowrate was calculated by using the ideal gas law.
PV = nRT
R = 0.08314 l*bar/(mol*K)
T = 100°C = 373 K
P = 1 bar
V = nRT/P
V = (2.01E+04)(0.08314)(373)/(1)
V = 6.23E+05 l/hr * 1 m^3/1000 l = 6.23E+02 m^3/hr
Converting to sm^3/hr:
(6.23E+02)*(293/373)*(1/1.01325) = 4.83E+02 sm^3/hr

Water percent was calculated by dividing the water volumetric flowrate by the stream volumetric flowrate.
Water % = (4.83E+02/7.89E+03)*100 = 6.1%

SCMH value was then converted to DSCM/hr the following way:
7.89E+03 SCMH * (1-6.1/100) = 7.42E+03 DSCM/hr

Constituents stack flowrate was then calculated by multiplying the stack concentration with the DSCM/hr value. The calculation for 4-Nitrophenol is shown below as an example. All other constituent calculations were performed using the Microsoft Excel® 97 spreadsheet on a Compaq PC workstation and can be found in Table 3. Spreadsheet formulas are identical to the ones shown below.

Stack concentration = 15 μg/dscm (cell D5 of Table 3)
15 μg/dscm * 7.42E+03 DSCM/hr * 1 mg/1000μg = 111.3 mg/hr (calculated in cell E5 of Table 3)
Converting to g/sec:
111.3 mg/hr * 1 hr/3600 sec * 1 g/1000 mg = 3.09E-05 g/sec (calculated in cell F5 of Table 3)

Table 3 shows the calculations for all the PICs throughout the LAW Vitrification Facility.

7.3 HLW Vitrification Facility

First, the ACFM was converted to SCFM:
T = 80°C = 353K
T(stp) = 20°C = 293K
P = 1 bar
P(stp) = 1.01325 bars
(1.52E+03 ACFH)*(293/353)*(1/1.01325) = 1.25E+03 SCFM

To convert the SCFM to DSCM/hr, the following calculation was done. Stream volumetric flowrate was converted from SCFM to SCMH by diving by 35.3 and multiplying by 60 min/hr.
1.25E+03 SCFM * 1 m^3/35.3 ft^3 * 60 min/hr = 2.12E+03 SCMH

Water mass flow was then converted to molar flowrate.
9.45E+03 lb/d * 1 kg/2.2 lb * 1000g/kg * 1d/24hr * 1 mole H_2O/18 g = 9.94E+03 gmole/hr

The water volumetric flowrate was calculated by using the ideal gas law.
PV = nRT
R = 0.08314 l*bar/(mol*K)
T = 80°C = 353 K
P = 1 bar
V = nRT/P
V = (9.94E+03)(0.08314)(353)/(1)
V = 2.92E+05 l/hr * 1 m^3/1000 l = 2.92E+02 m^3/hr
Converting to sm^3/hr:
(2.92E+02)*(293/353)*(1/1.01325) = 2.39E+02 sm^3/hr

Water percent was calculated by dividing the water volumetric flowrate by the stream volumetric flowrate.
Water % = (2.39E+02/2.12E+03)*100 = 11.3%

SCMH value was then converted to DSCM/hr the following way:

2.12E+03 SCMH *(1-11.3/100) = 1.87E+03 DSCM/hr

Constituents stack flowrate was then calculated by multiplying the stack concentration with the DSCM/hr value. The calculation for 4-Nitrophenol is shown below as an example. All other constituent calculations were performed using the Microsoft Excel® 97 spreadsheet on a Compaq PC workstation and can be found in Table 4. Spreadsheet formulas are identical to the ones shown below.

Stack concentration = 15 μg/dscm (cell D5 of Table 4)
15 μg/dscm * 1.87E+03 DSCM/hr * 1 mg/1000μg = 28.1 mg/hr (calculated in cell E5 of Table 4)
Converting to g/sec:
28.1 mg/hr * 1 hr/3600 sec * 1 g/1000 mg = 7.81E-06 g/sec (calculated in cell F5 of Table 4)

Table 4 shows the calculations for all the PICs throughout the HLW Vitrification Facility.

8 Results and Conclusions

Tables 2, 3, and 4 show the emissions results for the PICs. The PIC generation estimates for the WTP have been updated per the latest generated emissions profile.

9 References

Project Documents

24590-WTP-MRQ-PT-03-002, Rev 0, *Emissions Maximum Case Runs with Updated Parameters*

RPT-24590-EN00005, Rev 0, *Estimation of Product of Incomplete Combustion Emissions for the River Protection Project Waste Treatment Plant*, Table 2

RPT-W375-ES00001, Rev 1, *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant*

Other Documents

EPA, 1986, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846)*, U.S. Environmental Protection Agency (EPA), Method 0030 Volatile Organic Sampling Train, Revision 0, September 1986, Section 5 (http://www.epa.gov/epaoswer/hazwaste/test/pdfs/0030.pdf)

Perry, R, 1984, *Perry's Chemical Engineers' Handbook*, Sixth Edition, McGraw Hill Company, New York, 1984, Table 1-9

10 Attachments

There are no attachments for this calculation.

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 7

BY: E. Berrios
DATE: 03/27/03

SUBJECT: Integrated Emissions Report PIC Estimation

Table 1 Constituents Stack Detection Limits

CAS Registry Number	Compound	Stack concentrations (µg/dscm)
100-02-7	4-Nitrophenol	15
100-44-7	Benzyl chloride	2
100-51-6	Benzyl alcohol	15
100-52-7	Benzaldehyde	15
101-77-9	4,4-Methylenedianiline	15
103-33-3	Azobenzene	15
103-65-1	n-Propyl benzene (Isocumene)	2
104-51-8	n-Butylbenzene	2
105-67-9	2,4-Dimethylphenol	15
106-43-4	4-Chlorotoluene (p-Tolyl chloride)	2
106-44-5	p-Cresol (4-Methyl phenol)	15
106-47-8	p-Chloroaniline	15
106-49-0	p-Toluidine	15
106-51-4	Quinone	15
106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	2
107-19-7	Propargyl alcohol	2
107-21-1	Ethylene glycol	2
107-98-2	Propylene gylcol monomethyl ether	15
108-60-1	Dichloroisopropyl ether	15
108-67-8	1,3,5-Trimethyl benzene	2
108-86-1	Bromobenzene (Phenyl bromide)	2
109-77-3	Malononitrile	2
109-86-4	2-Methoxyethanol	15
110-80-5	2-Ethoxyethanol	15
111-15-9	Ethylene glycol monoethyl ether acetate	15
111-44-4	Bis(2-chloroethyl) ether	15
111-91-1	Bis(2-chloroethoxy)methane	15
1120-71-4	1,3-Propane sultone	15
119-90-4	3,3'-Dimethoxybenzidine (ortol-dianisidine)	15
121-14-2	2,4-Dinitrotoluene	15
122-66-7	1,2-Diphenylhydrazine	15
123-33-1	Maleic hydrazide	15
124-48-1	Chlorodibromomethane	2
131-11-3	Dimethylphthalate	15
131-89-5	2-Cyclohexyl-4,6-dinitrophenol	15
133-06-2	Captan	15
135-98-8	sec-Butylbenzene	2
145-73-3	Endothall	15
156-59-2	cis-1,2-Dichloroethene	2
1746-01-6	2,3,7,8-Tetrachlorodibenzo(p)dioxin (TCDD)	9.38E-06
192-97-2	Benzo(e)pyrene	3

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 8

BY: E. Berrios
DATE: 03/27/03

SUBJECT: Integrated Emissions Report PIC Estimation

Table 1 Constituents Stack Detection Limits

CAS Registry Number	Compound	Stack concentrations (µg/dscm)
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo(p)dioxin	1.56E-05
23950-58-5	Pronamide	15
25013-15-4	Methyl styrene (mixed isomers)	2
3268-87-9	Octachlorodibenzo(p)dioxin	7.81E-05
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo(p)dioxin	3.13E-05
39001-02-0	Octachlorodibenzofuran	6.25E-05
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo(p)dioxin	1.56E-05
40321-76-4	1,2,3,7,8-Pentachlorodibenzo(p)dioxin	1.56E-05
41851-50-7	Chlorocyclopentadiene	2
460-19-5	Cyanogen	2
506-68-3	Cyanogen bromide	15
506-77-4	Cyanogen chloride	2
510-15-6	Chlorobenzilate	15
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	7.81E-06
51-28-5	2,4-Dinitrophenol	15
51-79-6	Ethyl Carbamate (urethane)	15
528-29-0	o-Dinitrobenzene	15
532-27-4	2-Chloroacetophenone	15
534-52-1	4,6-Dinitro-o-cresol	15
5385-75-1	Dibenzo(a,e)fluoranthene	3
540-73-8	1,2-Dimethylhydrazine	2
542-75-6	1,3-Dichloropropene	2
542-88-1	Dichloromethyl ether	2
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.56E-05
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	7.81E-06
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	7.81E-06
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.25E-05
57-24-9	Strychnine	15
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo(p)dioxin	1.56E-05
57-74-9	Chlordane	15
584-84-9	2,4-Toluene diisocyante	15
593-60-2	Bromoethene	2
60-11-7	Dimethyl aminoazobenzene	15
606-20-2	2,6-Dinitrotoluene	15
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.41E-05
608-93-5	Pentachlorobenzene	15
61626-71-9	Dichloropentadiene	2
62-50-0	Ethyl methanesulfonate	15
62-53-3	Aniline	15
65-85-0	Benzoic acid	15
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.56E-05
70-30-4	Hexachlorophene	15

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 9

BY: E. Berrios
DATE: 03/27/03

SUBJECT: Integrated Emissions Report PIC Estimation

Table 1 Constituents Stack Detection Limits

CAS Registry Number	Compound	Stack concentrations (µg/dscm)
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.41E-05
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1.56E-05
74-88-4	Iodomethane (Methyl iodide)	2
74-95-3	Methylene bromide	2
75-25-2	Bromoform	2
75-29-6	2-Chloropropane	2
75-44-5	Phosgene	2
76-01-7	Pentachloroethane	2
764-41-0	1,4-Dichloro-2-butene	2
765-34-4	Glycidylaldehyde	15
77-47-4	Hexachlorocyclopentadiene	15
77-78-1	Dimethyl sulfate	15
80-62-6	Methyl methacrylate	2
822-06-0	Hexamethylene-1,5-diisocyanate	15
823-40-5	Toluene-2,6-diamine	15
85-44-9	Phthalic anhydride	15
87-61-6	1,2,3-Trichlorobenzene	2
88-74-4	o-Nitroaniline (2-Nitroaniline)	15
90-04-0	o-Anisidine	15
91-57-6	2-Methylnaphthalene	3
91-94-1	3,3'-Dichlorobenzidine	15
924-16-3	N-Nitrosodi-n-butylamine	2
94-59-7	Safrole	15
95-53-4	o-Toluidine	2
95-63-6	1,2,4-Trimethyl benzene	2
95-94-3	1,2,4,5-Tetrachlorobenzene	15
96-12-8	1,2-Dibromo-3-chloropropane	15
96-18-4	1,2,3-Trichloropropane	2
96-45-7	Ethylene thiourea	15
97-63-2	Ethyl methacrylate	2
98-01-1	Furfural	15
98-06-6	tert-Butyl benzene	2
98-07-7	Benzotrichloride	15
99-35-4	1,3,5-Trinitrobenzene	15
99-65-0	1,3-Dinitrobenzene	15
99-87-6	p-Cymene	2
no cas #	Dibenzo(a,h)fluoranthene	3

By: S. Benlos
Date: 03/27/03

Subject: Integrated Emissions Report PIC Estimation

CALCULATION SHEET

PROJECT: BPP-WTP
JOB NO: 24590
CALC NO: 24590-WTP-MHC-FRP-00002
SHEET REV: 0A
SHEET NO.: 10

	A	B	C	D	E
1	Table 2 Pretreatment PIC Emissions				
2			Pretreatment PIC Emissions		
3			Stack (PVP12)		
4	CAS Registry Number	Compound	Stack Concentrations (µg/dscm)	Stack Flowrate (mg/hr)	Stack Flowrate (g/sec)
5	100-02-7	4-Nitrophenol	15	63.0	1.75E-05
6	100-44-7	Benzyl chloride	2	8.4	2.33E-06
7	100-51-6	Benzyl alcohol	15	63.0	1.75E-05
8	100-52-7	Benzaldehyde	15	63.0	1.75E-05
9	101-77-9	4,4-Methylenedianiline	15	63.0	1.75E-05
10	103-33-3	Azobenzene	15	63.0	1.75E-05
11	103-65-1	n-Propyl benzene (Isopropene)	2	8.4	2.33E-06
12	104-51-8	n-Butylbenzene	2	8.4	2.33E-06
13	105-67-9	2,4-Dimethylphenol	15	63.0	1.75E-05
14	106-43-4	4-Chlorotoluene (p-Tolyl chloride)	2	8.4	2.33E-06
15	106-44-5	p-Cresol (4-Methyl phenol)	15	63.0	1.75E-05
16	106-47-8	p-Chloroaniline	15	63.0	1.75E-05
17	106-49-0	p-Toluidine	15	63.0	1.75E-05
18	106-51-4	Quinone	15	63.0	1.75E-05
19	106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	2	8.4	2.33E-06
20	107-19-7	Propargyl alcohol	2	8.4	2.33E-06
21	107-21-1	Ethylene glycol	2	8.4	2.33E-06
22	107-98-2	Propylene glycol monomethyl ether	15	63.0	1.75E-05
23	108-60-1	Dichloroisopropyl ether	15	63.0	1.75E-05
24	108-67-8	1,3,5-Trimethyl benzene	2	8.4	2.33E-06
25	108-86-1	Bromobenzene (Phenyl bromide)	2	8.4	2.33E-06
26	108-77-3	Malononitrile	2	8.4	2.33E-06
27	109-86-4	2-Methoxyethanol	15	63.0	1.75E-05
28	110-80-5	2-Ethoxyethanol	15	63.0	1.75E-05
29	111-15-9	Ethylene glycol monoethyl ether acetate	15	63.0	1.75E-05
30	111-44-4	Bis(2-chloroethyl) ether	15	63.0	1.75E-05
31	111-91-1	Bis(2-chloroethoxy)methane	15	63.0	1.75E-05
32	1120-71-4	1,3-Propane sultone	15	63.0	1.75E-05
33	119-90-4	3,3'-Dimethoxybenzidine (ortol-dianisidine)	15	63.0	1.75E-05
34	121-14-2	2,4-Dinitrotoluene	15	63.0	1.75E-05
35	122-66-7	1,2-Diphenylhydrazine	15	63.0	1.75E-05
36	123-33-1	Maleic hydrazide	15	63.0	1.75E-05
37	124-48-1	Chlorodibromomethane	2	8.4	2.33E-06
38	131-11-3	Dimethylphthalate	15	63.0	1.75E-05
39	131-89-5	2-Cyclohexyl-4,6-dinitrophenol	15	63.0	1.75E-05
40	133-06-2	Captan	15	63.0	1.75E-05
41	135-98-8	sec-Butylbenzene	2	8.4	2.33E-06
42	145-73-3	Endothall	15	63.0	1.75E-05
43	156-59-2	cis-1,2-Dichloroethene	2	8.4	2.33E-06
44	1746-01-6	2,3,7,8-Tetrachlorodibenzo(p)dioxin (TCDD)	9.38E-06	0.0	1.10E-11
45	192-97-2	Benzo(e)pyrene	3	12.6	3.50E-06
46	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo(p)dioxin	1.56E-05	0.0	1.82E-11
47	23950-58-5	Pronamide	15	63.0	1.75E-05
48	25013-15-4	Methyl styrene (mixed isomers)	2	8.4	2.33E-06
49	3268-87-9	Octachlorodibenzo(p)dioxin	7.81E-06	0.0	9.12E-11
50	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo(p)dioxin	3.13E-05	0.0	3.65E-11
51	39001-02-0	Octachlorodibenzofuran	6.25E-05	0.0	7.30E-11
52	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo(p)dioxin	1.56E-05	0.0	1.82E-11
53	40321-76-4	1,2,3,7,8-Pentachlorodibenzo(p)dioxin	1.56E-05	0.0	1.82E-11
54	41181-20-7	Chlorocyclopentadiene	2	8.4	2.33E-06
55	460-19-5	Cyanogen	2	8.4	2.33E-06
56	506-68-3	Cyanogen bromide	15	63.0	1.75E-05
57	506-77-4	Cyanogen chloride	2	8.4	2.33E-06
58	510-15-6	Chlorobenzilate	15	63.0	1.75E-05
59	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	7.81E-06	0.0	9.12E-12
60	51-28-5	2,4-Dinitrophenol	15	63.0	1.75E-05
61	51-79-6	Ethyl Carbamate (urethane)	15	63.0	1.75E-05
62	528-29-0	o-Dinitrobenzene	15	63.0	1.75E-05
63	532-27-4	2-Chloroacetophenone	15	63.0	1.75E-05
64	534-52-1	4,6-Dinitro-o-cresol	15	63.0	1.75E-05
65	5385-75-1	Dibenzo(a,e)fluoranthene	3	12.6	3.50E-06
66	540-73-8	1,2-Dimethylhydrazine	2	8.4	2.33E-06
67	542-75-6	1,3-Dichloropropene	2	8.4	2.33E-06
68	542-88-1	Dichloromethyl ether	2	8.4	2.33E-06
69	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.56E-05	0.0	1.82E-11
70	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	7.81E-06	0.0	9.12E-12
71	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	7.81E-06	0.0	9.12E-12
72	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.25E-05	0.0	1.46E-11
73	57-24-9	Strychnine	15	63.0	1.75E-05
74	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo(p)dioxin	1.56E-05	0.0	1.82E-11
75	57-74-9	Chlordane	15	63.0	1.75E-05
76	584-84-9	2,4-Toluene diisocyanate	15	63.0	1.75E-05
77	593-60-2	Bromoethene	2	8.4	2.33E-06
78	60-11-7	Dimethyl aminoazobenzene	15	63.0	1.75E-05
79	606-20-2	2,6-Dinitrotoluene	15	63.0	1.75E-05
80	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.41E-05	0.0	1.65E-11
81	608-93-5	Pentachlorobenzene	15	63.0	1.75E-05
82	61539-71-9	Dichlorapentadiene	2	8.4	2.33E-06
83	62-50-0	Ethyl methanesulfonate	15	63.0	1.75E-05
84	62-53-3	Aniline	15	63.0	1.75E-05
85	65-85-0	Benzoic acid	15	63.0	1.75E-05
86	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.56E-05	0.0	1.82E-11
87	70-30-4	Hexachlorophene	15	63.0	1.75E-05
88	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.41E-05	0.0	1.65E-11
89	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1.56E-05	0.0	1.82E-11
90	74-88-4	Iodomethane (Methyl iodide)	2	8.4	2.33E-06
91	74-95-3	Methylene bromide	2	8.4	2.33E-06
92	75-25-2	Bromoform	2	8.4	2.33E-06
93	75-29-6	2-Chloropropane	2	8.4	2.33E-06
94	75-44-5	Phosgene	2	8.4	2.33E-06
95	76-01-7	Pentachloroethane	2	8.4	2.33E-06
96	764-41-0	1,4-Dichloro-2-butene	2	8.4	2.33E-06
97	765-34-4	Glycidylaldehyde	15	63.0	1.75E-05
98	77-47-4	Hexachlorocyclopentadiene	15	63.0	1.75E-05
99	77-78-1	Dimethyl sulfate	15	63.0	1.75E-05
100	80-62-6	Methyl methacrylate	2	8.4	2.33E-06
101	822-06-0	Hexamethylene-1,6-diisocyanate	15	63.0	1.75E-05
102	823-40-5	Toluene-2,6-diamine	15	63.0	1.75E-05
103	85-44-9	Phthalic anhydride	15	63.0	1.75E-05
104	87-61-6	1,2,3-Trichlorobenzene	2	8.4	2.33E-06
105	88-74-4	o-Nitroaniline (2-Nitroaniline)	15	63.0	1.75E-05
106	90-04-0	o-Anisidine	15	63.0	1.75E-05
107	91-57-6	2-Methylnaphthalene	3	12.6	3.50E-06
108	91-94-1	3,3'-Dichlorobenzidine	15	63.0	1.75E-05
109	924-16-3	N-Nitroso-di-n-butylamine	2	8.4	2.33E-06
110	94-59-7	Safrole	15	63.0	1.75E-05
111	95-53-4	o-Toluidine	2	8.4	2.33E-06
112	95-63-6	1,2,4-Trimethyl benzene	2	8.4	2.33E-06
113	95-94-3	1,2,4,5-Tetrachlorobenzene	15	63.0	1.75E-05
114	96-12-8	1,2-Dibromo-3-chloropropane	15	63.0	1.75E-05
115	96-18-4	1,2,3-Trichloropropane	2	8.4	2.33E-06
116	96-45-7	Ethylene thiourea	15	63.0	1.75E-05
117	97-63-2	Ethyl methacrylate	2	8.4	2.33E-06
118	98-01-1	Furfural	15	63.0	1.75E-05
119	98-06-6	tert-Butyl benzene	2	8.4	2.33E-06
120	98-07-7	Benzotrichloride	15	63.0	1.75E-05
121	99-35-4	1,3,5-Trinitrobenzene	15	63.0	1.75E-05
122	99-65-0	1,3-Dinitrobenzene	15	63.0	1.75E-05
123	99-87-6	p-Cymene	2	8.4	2.33E-06
124	no cas #	Dibenzo(a,l)fluoranthene	3	12.6	3.50E-06

BY: E. Bertos
DATE: 03/27/03

SUBJECT: Interpretive Emissions Report PIC Estimation

CALCULATION SHEET

PROJECT: 32PM/ITP
JOB NO: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 13

	B	C	D	E	F
1	Table 3 LAW Vitrification Facility PIC Emissions				
2			Low Activity Waste (LAW) PIC Emissions		
3			LAW Stack (LVF29)		
4	CAS Registry Number	Compound	Stack Benzene/Toluene (g/dscm)	Stack Fluoride (mg/m3)	Stack Formate (g/dscf)
5	100-02-7	4-Nitrophenol	15	111.3	3.09E-05
6	100-44-7	Benzyl chloride	2	14.8	4.12E-06
7	100-51-6	Benzyl alcohol	15	111.3	3.09E-05
8	100-52-7	Benzaldehyde	15	111.3	3.09E-05
9	101-77-9	4,4-Methylenedianiline	15	111.3	3.09E-05
10	103-33-3	Azobenzene	15	111.3	3.09E-05
11	105-60-2	e-Caprolactam (Isocrotene)	2	14.8	4.12E-06
12	104-51-8	n-Butylbenzene	2	14.8	4.12E-06
13	105-67-9	2,4-Dimethylphenol	15	111.3	3.09E-05
14	106-43-4	4-Chlorotoluene (p-Tolyl chloride)	2	14.8	4.12E-06
15	106-44-5	p-Cresol (4-Methyl phenol)	15	111.3	3.09E-05
16	106-47-8	p-Chloroaniline	15	111.3	3.09E-05
17	106-49-0	p-Toluidine	15	111.3	3.09E-05
18	106-51-4	Quinone	15	111.3	3.09E-05
19	106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	2	14.8	4.12E-06
20	107-19-7	Propargyl alcohol	2	14.8	4.12E-06
21	107-21-1	Ethylene glycol	2	14.8	4.12E-06
22	107-98-2	Propylene glycol monomethyl ether	15	111.3	3.09E-05
23	108-60-1	Dichloroisopropyl ether	15	111.3	3.09E-05
24	108-67-8	1,3,5-Trimethyl benzene	2	14.8	4.12E-06
25	108-86-1	Bromobenzene (Phenyl bromide)	2	14.8	4.12E-06
26	108-77-0	Melononitrile	2	14.8	4.12E-06
27	108-95-2	2-Methoxyphenol	15	111.3	3.09E-05
28	110-80-5	2-Ethoxyethanol	15	111.3	3.09E-05
29	111-15-9	Ethylene glycol monoethyl ether acetate	15	111.3	3.09E-05
30	111-44-4	Bis(2-chloroethyl) ether	15	111.3	3.09E-05
31	111-91-1	Bis(2-chloroethoxy)methane	15	111.3	3.09E-05
32	1120-71-4	1,3-Propane sultone	15	111.3	3.09E-05
33	110-80-4	3,7-Dimethyloxepanone (oxo-diazepine)	15	111.3	3.09E-05
34	121-14-2	2,4-Dinitrotoluene	15	111.3	3.09E-05
35	122-66-7	1,2-Diphenylhydrazine	15	111.3	3.09E-05
36	123-33-1	Maleic hydrazide	15	111.3	3.09E-05
37	124-48-1	Chlorodibromomethane	2	14.8	4.12E-06
38	131-11-3	Dimethylphthalate	15	111.3	3.09E-05
39	131-89-5	2-Cyclohexyl-4,6-dinitrophenol	15	111.3	3.09E-05
40	133-06-2	Captan	15	111.3	3.09E-05
41	135-98-8	sec-Butylbenzene	2	14.8	4.12E-06
42	140-79-3	Eucalyptol	15	111.3	3.09E-05
43	156-60-5	Trans-1,2-Dichloroethene	2	14.8	4.12E-06
44	1746-01-6	2,3,7,8-Tetrachlorodibenzo(p)dioxin (TCDD)	5.39E-08	7.20E-04	1.20E-11
45	152-87-2	Benzoquinone	3	22.3	6.18E-06
46	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo(p)dioxin	1.34E-08	1.20E-04	3.22E-11
47	2385-85-5	Mirex	15	111.3	3.09E-05
48	26013-16-4	Methyl styrene (mixed isomers)	2	14.8	4.12E-06
49	3268-87-9	Octachlorodibenzo(p)dioxin	7.81E-05	8.36E-04	1.81E-10
50	39227-28-6	1,2,3,4,6,7,8-Heptachlorodibenzo(p)dioxin	3.19E-08	3.36E-04	6.85E-11
51	39001-02-0	Octachlorodibenzofuran	6.26E-05	4.66E-04	1.79E-10
52	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo(p)dioxin	1.56E-08	1.20E-04	3.22E-11
53	40321-76-4	1,2,3,7,8-Pentachlorodibenzo(p)dioxin	1.56E-08	1.20E-04	3.22E-11
54	41091-30-7	Chlorocyclopentadiene	2	14.8	4.12E-06
55	460-19-5	Cyanogen	2	14.8	4.12E-06
56	506-68-3	Cyanogen bromide	15	111.3	3.09E-05
57	506-77-4	Cyanogen chloride	2	14.8	4.12E-06
58	510-15-6	Chlorobenzilate	15	111.3	3.09E-05
59	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	7.81E-05	5.56E-05	1.81E-11
60	51-28-5	2,4-Dinitrophenol	15	111.3	3.09E-05
61	51-79-6	Ethyl Carbamate (urethane)	15	111.3	3.09E-05
62	526-56-6	o-Dichlorobenzene	15	111.3	3.09E-05
63	532-27-4	2-Chloroacetophenone	15	111.3	3.09E-05
64	534-52-1	4,6-Dinitro-o-cresol	15	111.3	3.09E-05
65	5385-75-1	Dibenzofuran, chlorodibenzene	3	22.3	6.18E-06
66	540-73-8	1,2-Dimethylhydrazine	2	14.8	4.12E-06
67	542-75-6	1,3-Dichloropropene	2	14.8	4.12E-06
68	542-88-1	Dichloromethyl ether	2	14.8	4.12E-06
69	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.56E-08	1.20E-04	3.22E-11
70	57117-31-4	1,2,3,4,7,8-Hexachlorodibenzofuran	7.81E-08	5.56E-05	1.61E-11
71	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	7.81E-08	5.56E-05	1.61E-11
72	57117-44-9	2,3,4,6,7,8-Hexachlorodibenzofuran	1.56E-08	1.20E-04	3.22E-11
73	57-24-9	Strychnine	15	111.3	3.09E-05
74	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo(p)dioxin	1.56E-08	1.20E-04	3.22E-11
75	57-74-9	Chlordane	15	111.3	3.09E-05
76	584-84-9	2,4-Toluene diisocyanate	15	111.3	3.09E-05
77	593-60-2	Bromoethene	2	14.8	4.12E-06
78	60-11-7	Dimethyl aminoazobenzene	15	111.3	3.09E-05
79	606-20-2	2,6-Dinitrotoluene	15	111.3	3.09E-05
80	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.41E-05	1.08E-04	2.91E-11
81	608-93-5	Pentachlorobenzene	15	111.3	3.09E-05
82	61828-71-9	Dichlorophenylarsine	2	14.8	4.12E-06
83	62-50-0	Ethyl methanesulfonate	15	111.3	3.09E-05
84	62-53-3	Aniline	15	111.3	3.09E-05
85	65-85-0	Benzoic acid	15	111.3	3.09E-05
86	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.56E-08	1.20E-04	3.22E-11
87	70-30-4	Hexachlorophene	15	111.3	3.09E-05
88	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.41E-05	1.08E-04	2.91E-11
89	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1.56E-08	1.20E-04	3.22E-11
90	74-83-9	Iodomethane (Methyl iodide)	2	14.8	4.12E-06
91	74-95-3	Methylene bromide	2	14.8	4.12E-06
92	75-25-2	Bromoform	2	14.8	4.12E-06
93	75-00-6	2-Chloropropane	2	14.8	4.12E-06
94	75-44-5	Phosgene	2	14.8	4.12E-06
95	76-01-7	Pentachloroethane	2	14.8	4.12E-06
96	764-41-0	1,4-Dichloro-2-butene	2	14.8	4.12E-06
97	765-34-4	Glycidylacrylate	15	111.3	3.09E-05
98	77-47-4	Hexachlorocyclopentadiene	15	111.3	3.09E-05
99	77-78-1	Dimethyl sulfate	15	111.3	3.09E-05
100	80-62-6	Methyl methacrylate	2	14.8	4.12E-06
101	822-06-0	Hexamethylene-1,6-diisocyanate	15	111.3	3.09E-05
102	823-40-5	Toluene-2,6-diamine	15	111.3	3.09E-05
103	85-44-9	Phthalic anhydride	15	111.3	3.09E-05
104	87-61-6	1,2,3-Trichlorobenzene	2	14.8	4.12E-06
105	88-74-4	2-Nitroaniline (2-Nitroaniline)	15	111.3	3.09E-05
106	90-04-0	o-Anisidine	15	111.3	3.09E-05
107	91-57-6	2-Methylnaphthalene	3	22.3	6.18E-06
108	91-94-1	3,3-Dichlorobenzidine	15	111.3	3.09E-05
109	92-16-3	N-Nitrosodi-n-butylamine	2	14.8	4.12E-06
110	94-59-7	Safrole	15	111.3	3.09E-05
111	95-53-4	o-Toluidine	2	14.8	4.12E-06
112	95-63-6	1,2,4-Trimethyl benzene	2	14.8	4.12E-06
113	95-94-3	1,2,4,5-Tetrachlorobenzene	15	111.3	3.09E-05
114	96-12-8	1,2-Dibromo-3-chloropropane	15	111.3	3.09E-05
115	96-18-4	1,2,3-Trichloropropane	2	14.8	4.12E-06
116	96-45-7	Ethylene thiourea	15	111.3	3.09E-05
117	97-63-2	Ethyl methacrylate	2	14.8	4.12E-06
118	98-01-1	Furfural	15	111.3	3.09E-05
119	98-06-6	tert-Butyl benzene	2	14.8	4.12E-06
120	98-07-7	Benzotrichloride	15	111.3	3.09E-05
121	98-82-8	1,3,5-Trichlorobenzene	15	111.3	3.09E-05
122	98-95-0	3-Chlorobenzene	15	111.3	3.09E-05
123	99-87-6	p-Cymene	2	14.8	4.12E-06
124	no cas 9	Benzotrichlorophene	3	22.3	6.18E-06

Subject: Integrated Emissions Report PIC Estimates

	B	C	D	E	F
1	Table 4 HLW Vitrification Facility PIC Emissions				
2			High Level Waste (HLW) PIC Emissions		
3			HLW Stack (HOP53)		
4	CAS Registry Number	Compound	Stack Concentrations (µg/dscm)	Stack Flowrate (kg/hr)	Stack Flowrate (gm/s)
5	100-02-7	4-Nitrophenol	15	28.1	7.81E-06
6	100-44-7	Benzyl chloride	2	3.7	1.04E-06
7	100-51-6	Benzyl alcohol	15	28.1	7.81E-06
8	100-52-7	Benzaldehyde	15	28.1	7.81E-06
9	101-77-9	4,4-Methylenedianiline	15	28.1	7.81E-06
10	103-33-3	Azobenzene	15	28.1	7.81E-06
11	103-65-1	n-Propyl benzene (Isocumene)	2	3.7	1.04E-06
12	104-51-8	n-Butylbenzene	2	3.7	1.04E-06
13	105-67-9	2,4-Dimethylphenol	15	28.1	7.81E-06
14	106-43-4	4-Chlorotoluene (p-Tolyl chloride)	2	3.7	1.04E-06
15	106-44-5	p-Cresol (4-Methyl phenol)	15	28.1	7.81E-06
16	106-47-8	p-Chloroaniline	15	28.1	7.81E-06
17	106-48-0	p-Toluidine	15	28.1	7.81E-06
18	106-51-4	Quinone	15	28.1	7.81E-06
19	106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	2	3.7	1.04E-06
20	107-18-7	Propenyl alcohol	2	3.7	1.04E-06
21	107-21-1	Ethylene glycol	2	3.7	1.04E-06
22	107-98-2	Propylene glycol monomethyl ether	15	28.1	7.81E-06
23	108-60-1	Dichloroisopropyl ether	15	28.1	7.81E-06
24	108-67-8	1,3,5-Trimethyl benzene	2	3.7	1.04E-06
25	108-86-1	Bromobenzene (Phenyl bromide)	2	3.7	1.04E-06
26	109-77-3	Malononitrile	2	3.7	1.04E-06
27	109-86-4	2-Methoxyethanol	15	28.1	7.81E-06
28	110-80-5	2-Ethoxyethanol	15	28.1	7.81E-06
29	111-15-9	Ethylene glycol monoethyl ether acetate	15	28.1	7.81E-06
30	111-44-4	Bis(2-chloroethyl) ether	15	28.1	7.81E-06
31	111-91-1	Bis(2-chloroethoxy)methane	15	28.1	7.81E-06
32	1120-71-4	1,3-Propane sultone	15	28.1	7.81E-06
33	119-90-4	3,3'-Dimethoxybenzidine (ortho-dianisidine)	15	28.1	7.81E-06
34	121-14-2	2,4-Dinitrotoluene	15	28.1	7.81E-06
35	122-66-7	1,2-Diphenylhydrazine	15	28.1	7.81E-06
36	123-33-1	Maleic hydrazide	15	28.1	7.81E-06
37	124-48-1	Chlorodibromomethane	2	3.7	1.04E-06
38	131-11-3	Dimethylphthalate	15	28.1	7.81E-06
39	131-89-5	2-Cyclohexyl-4,6-dinitrophenol	15	28.1	7.81E-06
40	133-06-2	Captan	15	28.1	7.81E-06
41	135-98-8	sec-Butylbenzene	2	3.7	1.04E-06
42	145-73-3	Endothal	15	28.1	7.81E-06
43	156-59-2	cis-1,2-Dichloroethene	2	3.7	1.04E-06
44	1746-01-6	2,3,7,8-Tetrachlorodibenzo(p)dioxin (TCDD)	9.36E-08	0.0	4.68E-12
45	192-97-2	Benzo(e)pyrene	3	5.6	1.56E-06
46	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo(p)dioxin	1.56E-05	0.0	8.12E-12
47	23950-58-5	Propyzamide	15	28.1	7.81E-06
48	25013-15-4	Methyl styrene (mixed isomers)	2	3.7	1.04E-06
49	30746-87-8	Octachlorodibenzo(p)dioxin	7.81E-05	0.0	4.07E-11
50	34227-46-3	1,2,3,4,6,7,8-Heptachlorodibenzo(p)dioxin	3.12E-05	0.0	1.63E-11
51	35822-46-9	Octachlorodibenzofuran	6.25E-05	0.0	3.25E-11
52	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo(p)dioxin	1.56E-05	0.0	8.12E-12
53	40321-76-4	1,2,3,7,8-Pentachlorodibenzo(p)dioxin	1.56E-05	0.0	8.12E-12
54	41903-57-5	Chlorpyrifos-methyl	2	3.7	1.04E-06
55	440-19-5	Coumagen	2	3.7	1.04E-06
56	504-88-1	Coumagen bromide	15	28.1	7.81E-06
57	508-77-4	Coumagen chloride	2	3.7	1.04E-06
58	615-15-6	Chlorfenvinfos	15	28.1	7.81E-06
59	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	7.81E-06	0.0	4.07E-12
60	51-28-5	2,4-Dinitrophenol	15	28.1	7.81E-06
61	51-79-6	Ethyl Carbamate (urethane)	15	28.1	7.81E-06
62	528-29-0	o-Dinitrobenzene	15	28.1	7.81E-06
63	532-27-4	2-Chloroacetophenone	15	28.1	7.81E-06
64	534-52-1	4,6-Dinitro-o-cresol	15	28.1	7.81E-06
65	5385-75-1	Dibenzo(a,h)anthracene	3	5.6	1.56E-06
66	540-73-8	1,2-Dimethylhydrazine	2	3.7	1.04E-06
67	542-75-6	1,3-Dichloropropene	2	3.7	1.04E-06
68	542-88-1	Dichloromethyl ether	2	3.7	1.04E-06
69	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.56E-05	0.0	8.12E-12
70	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	7.81E-06	0.0	4.07E-12
71	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	7.81E-06	0.0	4.07E-12
72	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1.25E-05	0.0	6.51E-12
73	57-24-9	Strychnine	15	28.1	7.81E-06
74	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo(p)dioxin	1.56E-05	0.0	8.12E-12
75	57-74-9	Chlordane	15	28.1	7.81E-06
76	584-84-9	2,4-Toluene diisocyanate	15	28.1	7.81E-06
77	593-60-2	Bromoethene	2	3.7	1.04E-06
78	60-11-7	Dimethyl aminoazobenzene	15	28.1	7.81E-06
79	609-20-2	2,6-Dinitrotoluene	15	28.1	7.81E-06
80	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	1.41E-05	0.0	7.34E-12
81	608-93-5	Pentachlorobenzene	15	28.1	7.81E-06
82	61825-71-5	Dichlorogermanium	2	3.7	1.04E-06
83	62-50-0	Ethyl methanesulfonate	15	28.1	7.81E-06
84	62-53-3	Aniline	15	28.1	7.81E-06
85	65-85-0	Benzoic acid	15	28.1	7.81E-06
86	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.56E-05	0.0	8.12E-12
87	70-30-4	Hexachlorophene	15	28.1	7.81E-06
88	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1.41E-05	0.0	7.34E-12
89	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1.56E-05	0.0	8.12E-12
90	74-83-9	Iodomethane (Methyl iodide)	2	3.7	1.04E-06
91	74-95-3	Methylene bromide	2	3.7	1.04E-06
92	75-25-2	Bromoform	2	3.7	1.04E-06
93	75-29-6	2-Chloropropane	2	3.7	1.04E-06
94	75-44-5	Phosgene	2	3.7	1.04E-06
95	76-01-7	Pentachloroethane	2	3.7	1.04E-06
96	764-41-0	1,4-Dichloro-2-butene	2	3.7	1.04E-06
97	765-34-4	Glycidylaldehyde	15	28.1	7.81E-06
98	77-47-4	Hexachlorocyclopentadiene	15	28.1	7.81E-06
99	77-78-1	Dimethyl sulfate	15	28.1	7.81E-06
100	80-62-6	Methyl methacrylate	2	3.7	1.04E-06
101	822-06-0	Hexamethylene-1,6-diisocyanate	15	28.1	7.81E-06
102	823-40-5	Toluene-2,6-diamine	15	28.1	7.81E-06
103	85-44-9	Phthalic anhydride	15	28.1	7.81E-06
104	87-61-6	1,2,3-Trichlorobenzene	2	3.7	1.04E-06
105	88-72-4	o-Nitroaniline (2-Nitroaniline)	15	28.1	7.81E-06
106	90-04-0	o-Anisidine	15	28.1	7.81E-06
107	91-57-6	2-Methylnaphthalene	3	5.6	1.56E-06
108	91-94-1	3,3'-Dichlorobenzidine	15	28.1	7.81E-06
109	92-15-9	4-Nitrosodi-n-propylamine	2	3.7	1.04E-06
110	94-36-0	Benzoyl	15	28.1	7.81E-06
111	95-53-4	o-Toluidine	2	3.7	1.04E-06
112	95-63-6	1,2,4-Trimethyl benzene	2	3.7	1.04E-06
113	95-94-3	1,2,4,5-Tetrachlorobenzene	15	28.1	7.81E-06
114	96-12-8	1,2-Dibromo-3-chloropropane	15	28.1	7.81E-06
115	96-18-4	1,2,3-Trichloropropane	2	3.7	1.04E-06
116	96-45-7	Ethylene thiourea	15	28.1	7.81E-06
117	97-63-2	Ethyl methacrylate	2	3.7	1.04E-06
118	98-01-1	Furfural	15	28.1	7.81E-06
119	98-06-6	tert-Butyl benzene	2	3.7	1.04E-06
120	98-07-7	Benzotrichloride	15	28.1	7.81E-06
121	98-56-6	1,3,5-Trichlorobenzene	15	28.1	7.81E-06
122	98-82-8	1,3-Dichlorobenzene	15	28.1	7.81E-06
123	99-87-6	p-Cymene	2	3.7	1.04E-06
124	no cas #	Dibenzo(a,h)acridine	3	5.6	1.56E-06

Appendix A Stream Reports

CALCULATION SHEET

BY: E. Barrios
Date: 03/27/03

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 14

Subject: Integrated Emissions Report PIC Estimation

River Protection Project - Waste Treatment Plant

Stream Number: PVP12
Stream Name: Carbon bed adsorber discharge
Configuration: 0
0
Run Data File: H:\Working Folder 2 (john)\MRQ_03_002_run2a_Streams.csv
Run Date / Time: 1/16/2003 - 1:27:28 PM

Stream Properties Variable	Value	Units
Density	1.10E-03	g/cm^3
Enthalpy	-1.25E+06	BTU/hr
Mass Flow	1.12E+04	Lb/hr
	2.69E+05	Lb/day
Volumetric Flow	2.02E+04	GPM
Molar Flow	3.93E+02	Lbmol/hr
Volumetric Flow	2.74E+03	ft^3/min
Molecular Weight	2.85E+01	Lb/Lbmol
Pressure	1.00E+03	mbar
Temperature	3.73E+01	C
Viscosity	1.88E-02	cP
Na Molarity	0.00E+00	mol/L
pH	#NUM!	pH
Total TRU	3.17E-19	Ci/L
Total Activity	2.37E-09	Ci/L

Gaseous Components (1) Component	mol/L	Lb/day
CO	2.25E-27	1.53E-20
CO_2	1.39E-07	1.48E+00
H_2O	1.24E-03	5.43E+03
NO	5.52E-31	4.02E-24
NO_2	3.40E-40	3.80E-33
N_2	2.96E-02	2.02E+05
O_2	7.88E-03	6.13E+04
SO_2	3.82E-28	5.95E-21
NH_3	2.64E-06	1.09E+01
HNO_3	5.46E-10	8.36E-03
HCl	2.21E-33	1.96E-26
HF	3.38E-33	1.64E-26

(1) All radionuclides in gaseous streams are assumed to exist as solid particulate.

Component	Aqueous Components mol/L	Lb/gal	Lb/day	Solid Components Lb/day	Total Component Lb/day	mt/day
Total	0.00E+00	0.00E+00	0.00E+00	2.66E-04	2.66E-04	1.20764E-07
Ag^+	0.00E+00	0.00E+00	0.00E+00	9.74E-13	9.74E-13	4.42522E-16
Al^{+3}	0.00E+00	0.00E+00	0.00E+00	2.01E-10	2.01E-10	9.14472E-14
As^{+3}	0.00E+00	0.00E+00	0.00E+00	2.61E-10	2.61E-10	1.18571E-13
B^{+3}	0.00E+00	0.00E+00	0.00E+00	7.28E-12	7.28E-12	3.31054E-15
Ba^{+2}	0.00E+00	0.00E+00	0.00E+00	4.89E-12	4.89E-12	2.22341E-15
Bi^{+3}	0.00E+00	0.00E+00	0.00E+00	2.69E-12	2.69E-12	1.22474E-15
$C_2O_4^{-2}$	0.00E+00	0.00E+00	0.00E+00	2.74E-12	2.74E-12	1.2443E-15
Ca^{+2}	0.00E+00	0.00E+00	0.00E+00	6.88E-10	6.88E-10	3.12801E-13
Cd^{+2}	0.00E+00	0.00E+00	0.00E+00	1.35E-11	1.35E-11	6.14347E-15
Ce^{+3}	0.00E+00	0.00E+00	0.00E+00	4.33E-12	4.33E-12	1.96717E-15
Cl^-	0.00E+00	0.00E+00	0.00E+00	4.34E-11	4.34E-11	1.97377E-14
CO_3^{-2}	0.00E+00	0.00E+00	0.00E+00	4.59E-10	4.59E-10	2.08653E-13
Cr^{+3}	0.00E+00	0.00E+00	0.00E+00	2.36E-11	2.36E-11	1.07048E-14
Cu^{+2}	0.00E+00	0.00E+00	0.00E+00	9.22E-13	9.22E-13	4.19243E-16
F^-	0.00E+00	0.00E+00	0.00E+00	5.02E-11	5.02E-11	2.28161E-14
Fe^{+3}	0.00E+00	0.00E+00	0.00E+00	4.80E-11	4.80E-11	2.1802E-14
H^+	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
H_2O	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
Hg^{+2}	0.00E+00	0.00E+00	0.00E+00	2.66E-04	2.66E-04	1.20762E-07
K^+	0.00E+00	0.00E+00	0.00E+00	1.78E-10	1.78E-10	8.06942E-14
La^{+3}	0.00E+00	0.00E+00	0.00E+00	2.72E-12	2.72E-12	1.23799E-15
Li^+	0.00E+00	0.00E+00	0.00E+00	1.05E-12	1.05E-12	4.75862E-16
Mg^{+2}	0.00E+00	0.00E+00	0.00E+00	2.61E-11	2.61E-11	1.18833E-14
Mn^{+3}	0.00E+00	0.00E+00	0.00E+00	1.45E-11	1.45E-11	6.58001E-15
MnO_4^-	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
Na^+	0.00E+00	0.00E+00	0.00E+00	6.93E-10	6.93E-10	3.15038E-13
NH_4^+	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Ni^{+2}	0.00E+00	0.00E+00	0.00E+00	5.51E-12	5.51E-12	2.50279E-15
NO_2^-	0.00E+00	0.00E+00	0.00E+00	2.05E-10	2.05E-10	9.31115E-14
NO_3^-	0.00E+00	0.00E+00	0.00E+00	1.09E-09	1.09E-09	4.95164E-13

River Protection Project - Waste Treatment Plant

Stream Number: PVP12
Stream Name: Carbon bed adsorber discharge
Configuration: 0
0
Run Data File: H:\Working Folder 2 (john)\MRQ_03_002_run2a_Streams.csv
Run Date / Time: 1/16/2003 - 1:27:28 PM

O^{-2}				1.05E-10	1.05E-10	4.77097E-14
OH^-	0.00E+00	0.00E+00	0.00E+00	8.20E-10	8.20E-10	3.72926E-13
$OH(b)^-$	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
P^{+5}				9.14E-17	9.14E-17	4.15479E-20
Pb^{+2}	0.00E+00	0.00E+00	0.00E+00	3.81E-12	3.81E-12	1.73308E-15
Pd^{+2}	0.00E+00	0.00E+00	0.00E+00	1.01E-13	1.01E-13	4.60419E-17
PO_4^{-3}	0.00E+00	0.00E+00	0.00E+00	2.05E-10	2.05E-10	9.34071E-14
S^{+6}				2.04E-13	2.04E-13	9.29222E-17
Si^{+4}				3.73E-11	3.73E-11	1.69654E-14
SiO_4^{-4}	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
SO_4^{-2}	0.00E+00	0.00E+00	0.00E+00	8.39E-11	8.39E-11	3.81357E-14
Sr^{+2}	0.00E+00	0.00E+00	0.00E+00	4.19E-13	4.19E-13	1.90495E-16
Ti^{+4}	0.00E+00	0.00E+00	0.00E+00	5.70E-12	5.70E-12	2.58866E-15
Zn^{+2}	0.00E+00	0.00E+00	0.00E+00	2.01E-12	2.01E-12	9.12022E-16
Zr^{+4}	0.00E+00	0.00E+00	0.00E+00	1.60E-11	1.60E-11	7.25411E-15

Rad.	Aqueous Rad. Components			Solids Rad. Components (1)		
Component	Ci/L	Ci/day	Lb/day	Ci/L	Ci/day	Lb/day
Total	0.00E+00	0.00E+00	0.00E+00	2.37E-09	2.61E-01	8.82E-07
^{241}Am	0	0.00E+00	0.00E+00	2.31E-19	2.55E-11	1.64E-14
^{14}C	0.00E+00	0.00E+00	0.00E+00	1.36E-13	1.50E-05	7.42E-09
^{60}Co	0.00E+00	0.00E+00	0.00E+00	3.82E-20	4.21E-12	8.21E-18
^{243}Cm	0.00E+00	0.00E+00	0.00E+00	1.10E-20	1.22E-12	5.31E-17
^{244}Cm	0.00E+00	0.00E+00	0.00E+00	8.28E-21	9.13E-13	2.49E-17
^{137}Cs	0.00E+00	0.00E+00	0.00E+00	4.09E-17	4.51E-09	1.14E-13
^{152}Eu	0.00E+00	0.00E+00	0.00E+00	4.43E-21	4.89E-13	6.20E-18
^{154}Eu	0.00E+00	0.00E+00	0.00E+00	1.44E-19	1.59E-11	1.29E-16
^{155}Eu	0.00E+00	0.00E+00	0.00E+00	9.26E-20	1.02E-11	4.63E-17
^{3}H	0.00E+00	0.00E+00	0.00E+00	2.37E-09	2.61E-01	6.00E-08
^{129}I	0.00E+00	0.00E+00	0.00E+00	5.92E-16	6.53E-08	8.15E-07
^{63}Ni	0.00E+00	0.00E+00	0.00E+00	1.83E-20	2.02E-12	7.84E-17
^{237}Np	0.00E+00	0.00E+00	0.00E+00	2.75E-22	3.04E-14	9.50E-14
^{238}Pu	0.00E+00	0.00E+00	0.00E+00	9.02E-22	9.94E-14	1.28E-17
^{239}Pu	0.00E+00	0.00E+00	0.00E+00	8.00E-21	8.82E-13	3.13E-14
^{240}Pu	0.00E+00	0.00E+00	0.00E+00	4.46E-22	4.92E-14	4.77E-16
^{241}Pu	0.00E+00	0.00E+00	0.00E+00	5.66E-20	6.24E-12	1.34E-16
^{125}Sb	0.00E+00	0.00E+00	0.00E+00	1.32E-19	1.45E-11	3.09E-17
^{151}Sm	0.00E+00	0.00E+00	0.00E+00	8.64E-19	9.53E-11	7.98E-15
^{126}Sn	0.00E+00	0.00E+00	0.00E+00	7.54E-22	8.32E-14	1.61E-14
^{90}Sr	0.00E+00	0.00E+00	0.00E+00	2.77E-17	3.06E-09	4.88E-14
^{99}Tc	0.00E+00	0.00E+00	0.00E+00	1.04E-19	1.15E-11	1.50E-12
^{232}Th	0.00E+00	0.00E+00	0.00E+00	4.80E-24	5.29E-16	1.06E-11
^{233}U	0.00E+00	0.00E+00	0.00E+00	4.23E-23	4.67E-15	1.07E-15
^{234}U	0.00E+00	0.00E+00	0.00E+00	3.47E-23	3.83E-15	1.36E-15
^{235}U	0.00E+00	0.00E+00	0.00E+00	1.80E-24	1.98E-16	2.02E-13

CALCULATION SHEET

BY: E. Berrios
Date: 03/27/03

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 16

Subject: Integrated Emissions Report PIC Estimation

River Protection Project - Waste Treatment Plant

Stream Number: LVP26
Stream Name: Activated Carbon Column discharge to stack
Configuration: 0
0
Run Data File: H:\Working Folder 2 (john)\MRQ_03_002_run2a_Streams.csv
Run Date / Time: 1/16/2003 - 1:27:28 PM

Stream Properties Variable	Value	Units
Density	9.16E-04	g/cm^3
Enthalpy	-6.56E+06	BTU/hr
Mass Flow	1.56E+04	Lb/hr
	3.75E+05	Lb/day
Volumetric Flow	3.40E+04	GPM
Molar Flow	5.50E+02	Lbmol/hr
Volumetric Flow	5.99E+03	ft^3/min
Molecular Weight	2.84E+01	Lb/Lbmol
Pressure	1.00E+03	mbar
Temperature	1.00E+02	C
Viscosity	2.14E-02	cP
Na Molarity	0.00E+00	mol/L
pH	#NUM!	pH
Total TRU	6.08E-19	Ci/L
Total Activity	5.27E-09	Ci/L

Gaseous Components (1) Component	mol/L	Lb/day
CO	1.05E-06	1.21E+01
CO_2	8.62E-04	1.55E+04
H_2O	2.59E-03	1.91E+04
NO	1.44E-05	1.76E+02
NO_2	1.31E-06	2.46E+01
N_2	2.25E-02	2.58E+05
O_2	6.27E-03	8.21E+04
SO_2	7.69E-07	2.01E+01
NH_3	8.92E-07	6.22E+00
HNO_3	3.21E-27	8.29E-20
HCl	4.99E-07	7.45E+00
HF	1.32E-07	1.08E+00

(1) All radionuclides in gaseous streams are assumed to exist as solid particulate.

Component	Aqueous Components mol/L	Lb/gal	Lb/day	Solid Components Lb/day	Total Component Lb/day	mt/day
Total	0.00E+00	0.00E+00	0.00E+00	4.21E+01	4.21E+01	0.019121167
Ag^+	0.00E+00	0.00E+00	0.00E+00	7.05E-09	7.05E-09	3.20523E-12
Al^{+3}	0.00E+00	0.00E+00	0.00E+00	4.33E-07	4.33E-07	1.96948E-10
As^{+3}	0.00E+00	0.00E+00	0.00E+00	8.88E-05	8.88E-05	4.03514E-08
B^{+3}	0.00E+00	0.00E+00	0.00E+00	1.99E-06	1.99E-06	9.05419E-10
Ba^{+2}	0.00E+00	0.00E+00	0.00E+00	1.99E-10	1.99E-10	9.0331E-14
Bi^{+3}	0.00E+00	0.00E+00	0.00E+00	7.74E-09	7.74E-09	3.51926E-12
$C_2O_4^{-2}$	0.00E+00	0.00E+00	0.00E+00	2.72E+01	2.72E+01	0.01235332
Ca^{+2}	0.00E+00	0.00E+00	0.00E+00	1.59E-06	1.59E-06	7.20568E-10
Cd^{+2}	0.00E+00	0.00E+00	0.00E+00	5.52E-07	5.52E-07	2.50836E-10
Ce^{+3}	0.00E+00	0.00E+00	0.00E+00	2.08E-09	2.08E-09	9.46574E-13
Cl^-	0.00E+00	0.00E+00	0.00E+00	1.33E-06	1.33E-06	6.04154E-10
CO_3^{-2}	0.00E+00	0.00E+00	0.00E+00	7.05E-10	7.05E-10	3.20546E-13
Cr^{+3}	0.00E+00	0.00E+00	0.00E+00	3.65E-07	3.65E-07	1.65872E-10
Cu^{+2}	0.00E+00	0.00E+00	0.00E+00	1.15E-09	1.15E-09	5.2105E-13
F^-	0.00E+00	0.00E+00	0.00E+00	2.06E-06	2.06E-06	9.3532E-10
Fe^{+3}	0.00E+00	0.00E+00	0.00E+00	2.56E-07	2.56E-07	1.16526E-10
H^+	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
H_2O	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
Hg^{+2}	0.00E+00	0.00E+00	0.00E+00	1.33E-02	1.33E-02	6.0228E-06
K^+	0.00E+00	0.00E+00	0.00E+00	5.15E-06	5.15E-06	2.34107E-09
La^{+3}	0.00E+00	0.00E+00	0.00E+00	4.32E-10	4.32E-10	1.96591E-13
Li^+	0.00E+00	0.00E+00	0.00E+00	1.24E-06	1.24E-06	5.62212E-10
Mg^{+2}	0.00E+00	0.00E+00	0.00E+00	1.94E-07	1.94E-07	8.80755E-11
Mn^{+3}	0.00E+00	0.00E+00	0.00E+00	1.70E-08	1.70E-08	7.73996E-12
MnO_4^-	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
Na^+	0.00E+00	0.00E+00	0.00E+00	6.73E-06	6.73E-06	3.0612E-09
NH_4^+	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Ni^{+2}	0.00E+00	0.00E+00	0.00E+00	2.41E-08	2.41E-08	1.0973E-11
NO_2^-	0.00E+00	0.00E+00	0.00E+00	2.55E-10	2.55E-10	1.1576E-13
NO_3^-	0.00E+00	0.00E+00	0.00E+00	1.32E-09	1.32E-09	5.98822E-13

River Protection Project - Waste Treatment Plant

Stream Number: LVP26
Stream Name: Activated Carbon Column discharge to stack
Configuration: 0
0
Run Data File: H:\Working Folder 2 (john)\MRQ_03_002_run2a_Streams.csv
Run Date / Time: 1/16/2003 - 1:27:28 PM

O^{-2}				1.29E+01	1.29E+01	0.005844906
OH^-	0.00E+00	0.00E+00	0.00E+00	6.10E-10	6.10E-10	2.77228E-13
$OH(b)^-$	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
P^{+5}				7.32E-05	7.32E-05	3.3282E-08
Pb^{+2}	0.00E+00	0.00E+00	0.00E+00	1.45E-08	1.45E-08	6.59743E-12
Pd^{+2}	0.00E+00	0.00E+00	0.00E+00	1.51E-11	1.51E-11	6.87093E-15
PO_4^{-3}	0.00E+00	0.00E+00	0.00E+00	1.80E-10	1.80E-10	8.1639E-14
S^{+6}				2.02E+00	2.02E+00	0.000916828
Si^{+4}				1.33E-06	1.33E-06	6.03056E-10
SiO_4^{-4}	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
SO_4^{-2}	0.00E+00	0.00E+00	0.00E+00	9.79E-11	9.79E-11	4.44956E-14
Sr^{+2}	0.00E+00	0.00E+00	0.00E+00	1.51E-10	1.51E-10	6.87732E-14
Ti^{+4}	0.00E+00	0.00E+00	0.00E+00	1.16E-05	1.16E-05	5.2849E-09
Zn^{+2}	0.00E+00	0.00E+00	0.00E+00	6.12E-07	6.12E-07	2.78335E-10
Zr^{+4}	0.00E+00	0.00E+00	0.00E+00	1.37E-07	1.37E-07	6.20706E-11

Rad.	Aqueous Rad. Components			Solids Rad. Components (1)		
Component	Ci/L	Ci/day	Lb/day	Ci/L	Ci/day	Lb/day
Total	0.00E+00	0.00E+00	0.00E+00	5.27E-09	9.78E-01	1.56E-03
^{241}Am	0	0.00E+00	0.00E+00	4.39E-19	8.16E-11	5.25E-14
^{14}C	0.00E+00	0.00E+00	0.00E+00	4.93E-09	9.14E-01	4.51E-04
^{60}Co	0.00E+00	0.00E+00	0.00E+00	2.73E-18	5.07E-10	9.88E-16
^{243}Cm	0.00E+00	0.00E+00	0.00E+00	1.18E-21	2.18E-13	9.52E-18
^{244}Cm	0.00E+00	0.00E+00	0.00E+00	1.26E-21	2.34E-13	6.38E-18
^{137}Cs	0.00E+00	0.00E+00	0.00E+00	1.73E-16	3.22E-08	8.17E-13
^{152}Eu	0.00E+00	0.00E+00	0.00E+00	1.53E-18	2.84E-10	3.60E-15
^{154}Eu	0.00E+00	0.00E+00	0.00E+00	5.08E-18	9.42E-10	7.68E-15
^{155}Eu	0.00E+00	0.00E+00	0.00E+00	8.74E-18	1.62E-09	7.36E-15
^{3}H	0.00E+00	0.00E+00	0.00E+00	3.44E-10	6.39E-02	1.47E-08
^{129}I	0.00E+00	0.00E+00	0.00E+00	4.78E-13	8.87E-05	1.11E-03
^{63}Ni	0.00E+00	0.00E+00	0.00E+00	2.13E-17	3.96E-09	1.54E-13
^{237}Np	0.00E+00	0.00E+00	0.00E+00	1.89E-21	3.50E-13	1.10E-12
^{238}Pu	0.00E+00	0.00E+00	0.00E+00	2.55E-21	4.73E-13	6.09E-17
^{239}Pu	0.00E+00	0.00E+00	0.00E+00	2.98E-20	5.53E-12	1.96E-13
^{240}Pu	0.00E+00	0.00E+00	0.00E+00	5.13E-21	9.53E-13	9.25E-15
^{241}Pu	0.00E+00	0.00E+00	0.00E+00	1.27E-19	2.36E-11	5.05E-16
^{125}Sb	0.00E+00	0.00E+00	0.00E+00	4.61E-16	8.56E-08	1.82E-13
^{151}Sm	0.00E+00	0.00E+00	0.00E+00	2.90E-16	5.39E-08	4.51E-12
^{126}Sn	0.00E+00	0.00E+00	0.00E+00	1.76E-19	3.26E-11	6.33E-12
^{90}Sr	0.00E+00	0.00E+00	0.00E+00	1.90E-15	3.52E-07	5.62E-12
^{99}Tc	0.00E+00	0.00E+00	0.00E+00	1.29E-16	2.40E-08	3.12E-09
^{232}Th	0.00E+00	0.00E+00	0.00E+00	6.50E-22	1.21E-13	2.42E-09
^{233}U	0.00E+00	0.00E+00	0.00E+00	1.21E-20	2.24E-12	5.13E-13
^{234}U	0.00E+00	0.00E+00	0.00E+00	7.03E-21	1.30E-12	4.63E-13
^{235}U	0.00E+00	0.00E+00	0.00E+00	2.71E-22	5.03E-14	5.14E-11

CALCULATION SHEET

BY: E. Berrios
Date: 03/27/03

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 18

Subject: Integrated Emissions Report PIC Estimation

River Protection Project - Waste Treatment Plant

Stream Number: HOP33
Stream Name: *Activated Carbon Adsorber Discharge*
Configuration: 0
0
Run Data File: H:\Working Folder 2 (john)\MRQ_03_002_run2a_Streams.csv
Run Date / Time: 1/16/2003 - 1:27:28 PM

Stream Properties Variable	Value	Units
Density	9.12E-04	g/cm^3
Enthalpy	-4.93E+06	BTU/hr
Mass Flow	5.38E+03	Lb/hr
	1.29E+05	Lb/day
Volumetric Flow	1.18E+04	GPM
Molar Flow	2.01E+02	Lbmol/hr
Volumetric Flow	3.04E+03	ft^3/min
Molecular Weight	2.67E+01	Lb/Lbmol
Pressure	1.00E+03	mbar
Temperature	8.00E+01	C
Viscosity	1.99E-02	cP
Na Molarity	0.00E+00	mol/L
pH	#NUM!	pH
Total TRU	1.42E-17	Ci/L
Total Activity	1.03E-08	Ci/L

Gaseous Components (1) Component	mol/L	Lb/day
CO	5.04E-07	2.00E+00
CO_2	5.29E-04	3.29E+03
H_2O	7.41E-03	1.89E+04
NO	9.63E-06	4.09E+01
NO_2	8.78E-07	5.71E+00
N_2	2.05E-02	8.13E+04
O_2	5.61E-03	2.54E+04
SO_2	2.93E-06	2.65E+01
NH_3	1.49E-06	3.59E+00
HNO_3	4.97E-13	4.43E-06
HCl	3.63E-09	1.87E-02
HF	6.36E-10	1.80E-03

(1) All radionuclides in gaseous streams are assumed to exist as solid particulate.

Component	Aqueous Components mol/L	Lb/gal	Lb/day	Solid Components Lb/day	Total Component Lb/day	mt/day
Total	0.00E+00	0.00E+00	0.00E+00	3.51E+01	3.51E+01	0.015963128
Ag^+	0.00E+00	0.00E+00	0.00E+00	2.56E-10	2.56E-10	1.16498E-13
Al^{+3}	0.00E+00	0.00E+00	0.00E+00	7.33E-10	7.33E-10	3.33301E-13
As^{+3}	0.00E+00	0.00E+00	0.00E+00	3.15E-06	3.15E-06	1.43147E-09
B^{+3}	0.00E+00	0.00E+00	0.00E+00	2.28E-09	2.28E-09	1.03759E-12
Ba^{+2}	0.00E+00	0.00E+00	0.00E+00	6.12E-11	6.12E-11	2.78132E-14
Bi^{+3}	0.00E+00	0.00E+00	0.00E+00	4.37E-10	4.37E-10	1.98494E-13
$C_2O_4^{-2}$	0.00E+00	0.00E+00	0.00E+00	6.19E+00	6.19E+00	0.002814666
Ca^{+2}	0.00E+00	0.00E+00	0.00E+00	8.01E-10	8.01E-10	3.642E-13
Cd^{+2}	0.00E+00	0.00E+00	0.00E+00	4.70E-09	4.70E-09	2.13689E-12
Ce^{+3}	0.00E+00	0.00E+00	0.00E+00	1.58E-11	1.58E-11	7.16399E-15
Cl^-	0.00E+00	0.00E+00	0.00E+00	1.50E-12	1.50E-12	6.82381E-16
CO_3^{-2}	0.00E+00	0.00E+00	0.00E+00	6.97E-13	6.97E-13	3.16673E-16
Cr^{+3}	0.00E+00	0.00E+00	0.00E+00	6.22E-10	6.22E-10	2.82712E-13
Cu^{+2}	0.00E+00	0.00E+00	0.00E+00	3.40E-11	3.40E-11	1.544E-14
F^-	0.00E+00	0.00E+00	0.00E+00	4.85E-12	4.85E-12	2.20682E-15
Fe^{+3}	0.00E+00	0.00E+00	0.00E+00	4.92E-10	4.92E-10	2.23791E-13
H^+	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
H_2O	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
Hg^{+2}	0.00E+00	0.00E+00	0.00E+00	2.40E-03	2.40E-03	1.09181E-06
K^+	0.00E+00	0.00E+00	0.00E+00	5.71E-09	5.71E-09	2.59329E-12
La^{+3}	0.00E+00	0.00E+00	0.00E+00	9.17E-11	9.17E-11	4.16849E-14
Li^+	0.00E+00	0.00E+00	0.00E+00	6.46E-10	6.46E-10	2.93521E-13
Mg^{+2}	0.00E+00	0.00E+00	0.00E+00	7.12E-11	7.12E-11	3.23559E-14
Mn^{+3}	0.00E+00	0.00E+00	0.00E+00	4.05E-10	4.05E-10	1.84053E-13
MnO_4^-	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
Na^+	0.00E+00	0.00E+00	0.00E+00	1.16E-08	1.16E-08	5.27802E-12
NH_4^+	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Ni^{+2}	0.00E+00	0.00E+00	0.00E+00	3.31E-10	3.31E-10	1.50242E-13
NO_2^-	0.00E+00	0.00E+00	0.00E+00	2.59E-13	2.59E-13	1.17807E-16
NO_3^-	0.00E+00	0.00E+00	0.00E+00	1.81E-12	1.81E-12	8.20992E-16

CALCULATION SHEET

BY: E. Berrios
Date: 03/27/03

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-M4C-FRP-00002
SHEET REV: 0A
SHEET NO.: 19

Subject: Integrated Emissions Report PIC Estimation

River Protection Project - Waste Treatment Plant

Stream Number: HOP33
Stream Name: *Activated Carbon Adsorber Discharge*
Configuration: 0
0
Run Data File: H:\Working Folder 2 (john)\MRQ_03_002_run2a_Streams.csv
Run Date / Time: 1/16/2003 - 1:27:28 PM

O^{-2}				2.63E+01	2.63E+01	0.011941357
OH^{-}	0.00E+00	0.00E+00	0.00E+00	2.26E-12	2.26E-12	1.02795E-15
$OH(b)^{-}$	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
P^{+5}				1.62E-05	1.62E-05	7.37293E-09
Pb^{+2}	0.00E+00	0.00E+00	0.00E+00	1.09E-10	1.09E-10	4.96216E-14
Pd^{+2}	0.00E+00	0.00E+00	0.00E+00	2.17E-12	2.17E-12	9.87862E-16
PO_4^{-3}	0.00E+00	0.00E+00	0.00E+00	2.65E-13	2.65E-13	1.20571E-16
S^{+6}				2.65E+00	2.65E+00	0.001206005
Si^{+4}				1.51E-09	1.51E-09	6.85979E-13
SiO_4^{-4}	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0
SO_4^{-2}	0.00E+00	0.00E+00	0.00E+00	8.58E-14	8.58E-14	3.90203E-17
Sr^{+2}	0.00E+00	0.00E+00	0.00E+00	1.75E-11	1.75E-11	7.95438E-15
Ti^{+4}	0.00E+00	0.00E+00	0.00E+00	9.37E-09	9.37E-09	4.26096E-12
Zn^{+2}	0.00E+00	0.00E+00	0.00E+00	4.69E-10	4.69E-10	2.13289E-13
Zr^{+4}	0.00E+00	0.00E+00	0.00E+00	2.21E-10	2.21E-10	1.00502E-13

Rad.	Aqueous Rad. Components			Solids Rad. Components (1)		
Component	Ci/L	Ci/day	Lb/day	Ci/L	Ci/day	Lb/day
Total	0.00E+00	0.00E+00	0.00E+00	1.03E-08	6.61E-01	1.26E-04
^{241}Am	0	0.00E+00	0.00E+00	1.06E-17	6.77E-10	4.36E-13
^{14}C	0.00E+00	0.00E+00	0.00E+00	2.51E-09	1.61E-01	7.96E-05
^{60}Co	0.00E+00	0.00E+00	0.00E+00	6.57E-18	4.22E-10	8.22E-16
^{243}Cm	0.00E+00	0.00E+00	0.00E+00	3.52E-19	2.26E-11	9.84E-16
^{244}Cm	0.00E+00	0.00E+00	0.00E+00	2.64E-19	1.69E-11	4.61E-16
^{137}Cs	0.00E+00	0.00E+00	0.00E+00	3.46E-14	2.22E-06	5.63E-11
^{152}Eu	0.00E+00	0.00E+00	0.00E+00	6.12E-20	3.92E-12	4.98E-17
^{154}Eu	0.00E+00	0.00E+00	0.00E+00	6.12E-18	3.92E-10	3.20E-15
^{155}Eu	0.00E+00	0.00E+00	0.00E+00	3.43E-18	2.20E-10	9.98E-16
^{3}H	0.00E+00	0.00E+00	0.00E+00	7.78E-09	4.99E-01	1.15E-07
^{129}I	0.00E+00	0.00E+00	0.00E+00	5.73E-14	3.67E-06	4.58E-05
^{63}Ni	0.00E+00	0.00E+00	0.00E+00	4.31E-18	2.76E-10	1.07E-14
^{237}Np	0.00E+00	0.00E+00	0.00E+00	8.68E-21	5.57E-13	1.74E-12
^{238}Pu	0.00E+00	0.00E+00	0.00E+00	4.11E-20	2.63E-12	3.39E-16
^{239}Pu	0.00E+00	0.00E+00	0.00E+00	3.64E-19	2.33E-11	8.29E-13
^{240}Pu	0.00E+00	0.00E+00	0.00E+00	1.99E-20	1.28E-12	1.24E-14
^{241}Pu	0.00E+00	0.00E+00	0.00E+00	2.58E-18	1.66E-10	3.54E-15
^{125}Sb	0.00E+00	0.00E+00	0.00E+00	6.77E-17	4.35E-09	9.23E-15
^{151}Sm	0.00E+00	0.00E+00	0.00E+00	1.27E-17	8.12E-10	6.80E-14
^{126}Sn	0.00E+00	0.00E+00	0.00E+00	1.82E-20	1.16E-12	2.26E-13
^{90}Sr	0.00E+00	0.00E+00	0.00E+00	2.36E-15	1.52E-07	2.42E-12
^{99}Tc	0.00E+00	0.00E+00	0.00E+00	9.36E-16	6.00E-08	7.81E-09
^{232}Th	0.00E+00	0.00E+00	0.00E+00	9.41E-23	6.04E-15	1.21E-10
^{233}U	0.00E+00	0.00E+00	0.00E+00	1.45E-22	9.27E-15	2.12E-15
^{234}U	0.00E+00	0.00E+00	0.00E+00	4.06E-22	2.61E-14	9.25E-15
^{235}U	0.00E+00	0.00E+00	0.00E+00	3.02E-23	1.94E-15	1.98E-12

F

Appendix F
Phase Determination for COPCs Potentially Emitted from the Hanford Tank Waste Treatment and Immobilization Plant (WTP)

CNN 057415

057415 R10007466

Memorandum

An Employee-Owned Company

To: John Cook

From: Gary Bertolin

Date: 5/2/2003

Re: Phase Determination for COPCs Potentially Emitted from the Hanford Tank Waste Treatment and Immobilization Plant (WTP)

1.0 Purpose

This memorandum presents the methodology used to determine the phase type (vapor phase, particle-bound phase, and particle phase) for constituents of potential concern (COPCs) that have been identified as important to ongoing WTP risk assessment and air permitting activities. The phase type assigned to each COPC is important because it affects the decontamination factor assigned to that COPC through each step of the offgas processing system.

2.0 Criteria and Design Inputs

The calculation procedure and some of the data for COPCs were derived from the draft *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* [HHRAP] (EPA, 1998). Other vapor pressure data were obtained from Syracuse Research Corporation's online Physical Properties Database PhysProp at the website: http://www.chemfinder.com.

3.0 Applicable Codes and Standards

None.

4.0 Methodology

For the purposes of developing the project emissions inventory and air dispersion modeling, the constituents of potential concern (COPCs) were partitioned into three phase types: vapor phase, particle phase, and particle-bound phase. The phase type of a COPC affects the efficiency of the offgas control system for that compound. For example, the particle and particle-bound phases will be attenuated by HEPA filtration, whereas the vapor phase constituents will not.

Most metals and organic COPCs with very low volatility (or vapor pressure) are assumed to occur only in the particle phase. Organic COPCs with higher vapor pressures occur entirely in the vapor phase, while organic COPCs with low volatility are condensed onto the surface of particulates (particle-bound). This memorandum documents the approach used to establish the phase type for each COPC.

The draft Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities (EPA Region 6, 1998) provides a suggested approach for determining the phase of each COPC. It is based on a unitless parameter (F_v) with a range of 0.0 to 1.0, defined as the fraction of the COPC that is in the vapor phase. COPCs with F_v values approaching 0.0 have low vapor pressures and are considered to be primarily in the particle phase, while COPCs with F_v values of 1.0 have high vapor pressures and are therefore considered to exist primarily in the vapor phase. COPCs with intermediate F_v values are considered to be in the particle-bound phase.

The following criteria are the basis for determining the phase type of a COPC:

$F_v < 0.05$; phase type = particle
$F_v = 1.0$; phase type = vapor
$0.05 \leq F_v < 1.0$; phase type = particle-bound

Certain COPCs, such as all metals (with the exception of mercury), are considered to be nonvolatile and are therefore assigned an F_v of 0.0 and are particles (EPA Region 6, 1998). Mercury, however, is slightly volatile with a vapor pressure of 2.0×10^{-3} mm Hg at 25°C, and is assigned an F_v of 1.0. Radionuclides, with the exception of tritium, carbon-14, and iodine-129, are also considered to be metals and are therefore assigned an F_v of 0.0. Tritium is always found as a vapor at ambient conditions. Carbon-14 is assumed to exist as $^{14}CO_2$, and is therefore considered to be a vapor phase compound. Iodine-129 has a vapor pressure of 0.3 mm Hg at 20°C and has an F_v of 1.0.

The F_v value and phase type for all other COPCs is determined by using the equations presented in Section 7.

5.0 Assumptions and Other Applicable Data

Assumptions and other applicable data applied within this calculation include:

- The vapor pressure and other physical parameters of each COPC,
- The use of F_v as a method of determining the phase type.

6.0 References

Bidleman, T.F., 1988. Atmospheric Processes. *Environmental Science and Technology.* Volume 22, Pages 361-367.

EPA, 1998. *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume 1 (Text).* Peer Review Draft. EPA530-D-98-001A, Office of Solid Waste and Emergency Response.

EPA, 1998. *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume 2 (Appendix A).* Peer Review Draft. EPA530-D-98-001B, Office of Solid Waste and Emergency Response.

EPA, 1999. Errata - *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.* Peer Review Draft. Office of Solid Waste and Emergency Response.

7.0 Calculations

This section presents the calculations used to determine the Fv.

7.1 Calculation of F_v Values

For organic COPCs that are liquid at ambient conditions, F_v is defined by the following equation

$$F_v = 1 - (cS_T)/(p°_L + cS_T) \qquad \textbf{Equation 1}$$

where,

F_v = Fraction of compound in the vapor phase (unitless)
c = Junge constant (1.7×10^{-04} atm-cm)
$p°_L$ = Liquid phase vapor pressure of compound (atm)
S_T = Whitby's average surface area of particulates (3.5×10^{-06} cm^2/cm^3 air)

Bidleman (1998) determined that F_v is explained better by the liquid phase vapor pressure ($p°_L$) then the solid phase vapor pressure ($p°_s$). Therefore, if a COPC is a solid at ambient conditions, the following equation must be used to determine the liquid phase vapor pressure of the COPC before calculating F_v in Equation 1.

$$\text{Ln}\,(p°_L / p°_s) = \Delta S_f/R \cdot (T_m - T_a)/ T_a \qquad \textbf{Equation 2}$$

where,

p°_L = Liquid-phase vapor pressure of chemical (atm)
p°_s = Solid-phase vapor pressure of chemical (atm)
$\Delta S_f/R$ = Entropy of fusion over the universal gas constant = 6.79 (unitless)
T_m = Melting point of chemical (°K)
T_a = Ambient temperature = 298°K

7.2 Source and Interpretation of F_v Values

F_v is a unitless parameter used to classify a COPC as being in one of three categories: a vapor phase, particle phase, or particle-bound compound. F_v is defined as the fraction of the COPC in the vapor phase, so assigning a COPC to a single state is a somewhat simplistic method. However, because most organic COPCs are identified as being in the vapor phase, this is a conservative (or health-protective) approach when determining destruction efficiencies and emission rates, because vapor phase compounds are more difficult to control as effectively as particle or particle-bound compounds.

Appendix A-3 specifies the individual Fv values for 163 of the WTP's 370 organic COPCs. The Fv values for 11 of the compounds listed in Appendix A-3 were found to have been corrected and/or added by EPA in an Errata to the HHRAP dated August 2, 1999 (EPA 1999). The corrected values were used in the emissions analysis. The Fv values for organic constituents not specified in the HHRAP documents were calculated using Equations 1 & 2, presented above. Finally, there were 11 organic COPCs whose vapor pressures were not readily available. The offgas phase for these constituents were determined by reviewing the physical properties of the constituent and by comparison to Fv values available for constituents with similar structure and physical properties.

The following hierarchy and criteria was established and followed in determining organic constituent phase.

- If an Fv value is specified in EPA's Errata (EPA 1999), the value has been taken exactly as it appears with no rounding applied. For example, in the Errata the COPC 4-chloro-3-methyl phenol has an Fv of 0.999972. This constituent was therefore considered to be a particle-bound compound.

- If an Fv value is not available in the Errata, but is available in Appendix A-3 of the HHRAP (EPA 1998), it also has been taken as it appears with no rounding applied. In nearly all cases, the Fv values in Appendix A-3 are provided to three decimal places.

- If no Fv value is available in EPA guidance and the vapor pressure of the COPC could be readily obtained, the Fv has been calculated and rounded to three decimal places. The decision to round to three decimal places was made to maintain consistency with EPA in their handling of the values provided in Appendix A-3.

- If no vapor pressure data was readily available for a constituent, the phase of the constituent was established by considering the Fv value of a known constituent that had similar properties. For example, in 6 of the 11 cases, the missing vapor pressures were associated with polychlorinated biphenyl compounds (PCBs). The phase for these constituents was assumed to be particle-bound, since other PCBs for which Fv values were available fell within the particle-bound range.

7.4 Temperature Dependence on Phase Type

For those COPCs already classified as vapor phase compounds, increases in the temperature during the vitrification process will not have an effect on the phase type. This is also true of the metals, which are classified as particle phase substances, with the exception of mercury.

The only potential temperature effect may be on some of the semi-volatile organic COPCs, which might shift phase type from particle-bound to vapor phase. The temperature range of interest during the processing was determined to be 25°C and 70°C. Most of the compounds in the particle-bound phase were solids throughout this temperature range. Unfortunately, vapor pressure data for temperatures other than the standard 25°C were not readily available.

However, vapor pressures for one compound were found, dibutyl phthalate. The calculated F_v values for dibutyl phthalate were 0.989 at 25°C and 0.999 at 70°C. The conclusion is that this compound is in the particle-bound phase at both temperatures, and temperatures within this range do not appear to have significant effect on the phase type of a compound.

7.5 Discussion on the Phase Type of Dioxin and Furan Compounds

Because of the high toxicity associated with dioxin and furan compounds, a special emphasis was placed on correctly identifying their phase types. The HHRAP document discusses the partitioning of dioxin-like compounds between the vapor and particle phases (Section 2.3.1). It states that evaluation of ambient air monitoring studies suggests that the higher chlorinated congeners (hexa through hepta congeners) were principally absorbed to airborne particulates, whereas the tetra and penta congeners were significantly partitioned to the vapor phase.

However, in the very next section of the HHRAP document (Section 3-16), a quantitative method was presented to determine the primary phase of a COPC. This approach is the method outlined in this memo, using the F_v parameter. Table 1 provides the F_v values for a number of tetra through octa congeners of dioxins and furans. The F_v values come directly from Volume 2, Appendix A of the HHRAP document.

Note that the F_v values in Table 1 for the tetra and penta congeners of dioxins and furans are all in the particle-bound range (F_v = 0.21 to 0.66), well below the vapor phase threshold (F_v = 1.0). F_v values for the hexa, hepta, and octa congeners are in the range of 0.0017 to 0.0596, meaning that these compounds are all at or below the 0.05 threshold for particles. In conclusion, this quantitative analysis indicates that the congeners of dioxins and furans should all be classified as either particle-bound or particles. This conclusion is supported by review of the physical state of these compounds, since they are all solids at ambient conditions, with melting points ranging from 196°C to 325°C.

8.0 Summary

These calculations provide the basis for determining the phase type of each COPC identified in the WTP emissions estimate used to support permitting. Appendix A presents selected data for each of the COPCs being evaluated, including phase type, F_v value, and vapor pressure (when available). The results are used in determining the decontamination factor for each COPC in the offgas processing system

9.0 Conclusion

The sources of data, methods, and results of this analysis are consistent with appropriate regulatory guidance.

Table 1. Vapor Phase Partitioning (F_v) for Congeners of Dioxins and Furans.

Congener	*F_v Value for Dioxin*	*F_v Value for Furan*
Tetra		
2,3,7,8-	0.490	0.663
Penta		
1,2,3,7,8-	0.219	0.364
2,3,4,7,8-	n/a	0.263
Hexa		
1,2,3,4,7,8-	0.0596	0.0486
1,2,3,6,7,8-	0.0289	0.0515
1,2,3,7,8,9-	0.0153	0.0576
2,3,4,6,7,8-	n/a	0.0547
Hepta		
1,2,3,4,6,7,8-	0.0162	0.0347
1,2,3,4,7,8,9-	n/a	0.0201
Octa		
1,2,3,4,6,7,8,9-	0.00169	0.00167

Appendix A

Data for Individual COPCs

COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
1	100-00-5	p-Nitrochlorobenzene	vapor	1.000	2.88E-05	calc
2	100-21-0	p-Phthalic acid	vapor	1.000	1.21E-08	calc
3	100-25-4	1,4-Dinitrobenzene	particle-bound	0.999	3.43E-08	calc
4	100-41-4	Ethyl benzene	vapor	1	1.26E-02	App. A-3
5	100-42-5	Styrene	vapor	1	8.21E-02	App. A-3
6	10061-01-5	cis-1,3-Dichloropropene	vapor	1.000	4.11E-02	calc
7	10061-02-6	trans-1,3-Dichloropropene	vapor	1.000	4.63E-01	calc
8	101-55-3	4-Bromophenylphenyl ether	vapor	1	1.97E-06	App. A-3
9	101-84-8	Diphenyl ether	vapor	1.000	2.96E-05	calc
10	106-35-4	3-Heptanone	vapor	1.000	3.40E-03	calc
11	106-42-3	p-Xylene (Dimethyl benzene)	vapor	1	1.06E-02	App. A-3
12	106-46-7	1,4-Dichlorobenzene	vapor	1	1.39E-03	App. A-3
13	106-88-7	1,2-Epoxybutane	vapor	1.000	2.36E-01	calc
14	106-93-4	Ethylene dibromide (Dibromethane)	vapor	1	1.00E-02	App. A-3
15	106-97-8	Butane	vapor	1.000	2.40E+00	calc
16	106-99-0	1,3-Butadiene	vapor	1.000	2.78E+00	calc
17	107-02-8	Acrolein	vapor	1	3.50E+00	App. A-3
18	107-05-1	3-Chloropropene (Allyl chloride)	vapor	1.000	4.84E-01	calc
19	107-06-2	1,2-Dichloroethane (Ethylene chloride)	vapor	1	1.07E-01	App. A-3
20	107-12-0	Propionitrile	vapor	1.000	6.20E-02	calc
21	107-13-1	Acrylonitrile	vapor	1	1.40E-01	App. A-3
22	107-18-6	2-Propene-1-ol	vapor	1.000	3.40E-02	calc
23	107-31-3	Formic acid, methyl ester	vapor	1.000	7.71E-01	calc
24	107-66-4	Dibutylphosphate	particle-bound	0.995	1.26E-07	calc
25	107-87-9	2-Pentanone	vapor	1.000	4.60E-02	calc
26	108-03-2	1-Nitropropane	vapor	1.000	1.30E-02	calc
27	108-05-4	Vinyl acetate	vapor	1	1.43E-01	App. A-3
28	108-10-1	Hexone (4-Methyl-2-pentanone or MIBK)	vapor	1	2.50E-02	App. A-3
29	108-20-3	Bis(isopropyl)ether	vapor	1.000	1.96E-01	calc
30	108-38-3	m-Xylene (Dimethyl benzene)	vapor	1	1.06E-02	App. A-3

0574.15

COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
31	108-39-4	m-Cresol	vapor	1	1.90E-04	App. A-3
32	108-87-2	Methylcyclohexane	vapor	1.000	6.10E-02	calc
33	108-88-3	Toluene	vapor	1	3.71E-02	App. A-3
34	108-90-7	Chlorobenzene	vapor	1	1.59E-02	App. A-3
35	108-93-0	Cyclohexanol	vapor	1.000	1.05E-03	calc
36	108-94-1	Cyclohexanone	vapor	1.000	5.70E-03	calc
37	108-95-2	Phenol	vapor	1	5.74E-04	App. A-3
38	109-66-0	n-Pentane	vapor	1.000	6.76E-01	calc
39	109-99-9	Tetrahydrofuran	vapor	1	2.14E-01	App. A-3
40	110-12-3	5-Methyl-2-hexanone	vapor	1.000	0.0076	calc
41	110-43-0	2-Heptanone	vapor	1.000	5.07E-02	calc
42	110-54-3	n-Hexane	vapor	1.000	1.99E-01	calc
43	110-62-3	n-Valeraldehyde	vapor	1.000	3.42E-02	calc
44	110-82-7	Cyclohexane	vapor	1.000	1.28E-01	calc
45	110-83-8	Cyclohexene	vapor	1.000	1.17E-01	calc
46	110-86-1	Pyridine	vapor	1	2.60E-02	App. A-3
47	111-65-9	n-Octane	vapor	1.000	1.86E-02	calc
48	111-76-2	Ethylene glycol monobutyl ether	vapor	1.000	1.17E-03	calc
49	111-84-2	n-Nonane	vapor	1.000	5.90E-03	calc
50	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	particle-bound	0.935	8.49E-09	Errata
51	117-84-0	n-Dioctyl phthalate	particle-bound	0.90811	5.88E-09	Errata
52	118-74-1	Hexachlorobenzene	vapor	1	1.62E-08	App. A-3
53	120-12-7	Anthracene	vapor	1	3.35E-08	App. A-3
54	120-82-1	1,2,4-Trichlorobenzene	vapor	1	4.42E-04	App. A-3
55	120-83-2	2,4-Dichlorophenol	vapor	1	7.21E-06	App. A-3
56	121-44-8	Triethylamine	vapor	1.000	7.51E-02	calc
57	121-69-7	Dimethylaniline	vapor	1.000	9.20E-04	calc
58	122-39-4	N,N-Diphenylamine	vapor	1.000	1.06E-06	calc
59	123-19-3	4-Heptanone	vapor	1.000	8.05E-03	calc
60	123-38-6	n-Propionaldehyde	vapor	1.000	4.17E-01	calc
61	123-51-3	3-Methyl-1-butanol	vapor	1.000	3.12E-03	calc
62	123-86-4	Acetic acid n-butyl ester	vapor	1.000	1.51E-02	calc
63	123-91-1	1,4-Dioxane	vapor	1	5.00E-02	App. A-3

COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
64	126-73-8	Tributyl phosphate	vapor	1.000	5.26E-06	calc
65	126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	vapor	1	8.90E-02	App. A-3
66	127-18-4	Perchloroethylene (tetrachloroethylene)	vapor	1	2.42E-02	App. A-3
67	127-19-5	N,N-Dimethylacetamide	vapor	1.000	0.00263	calc
68	128-37-0	2,6-Bis(tert-butyl)-4-methylphenol	vapor	1.000	6.78E-06	calc
69	129-00-0	Pyrene	particle-bound	0.994635	5.59E-09	Errata
70	1321-64-8	Pentachloronaphthalene	particle-bound	0.971	1.96E-08	calc
71	1321-65-9	Trichloronaphthalene	vapor	1.000	4.13E-07	calc
72	132-64-9	Dibenzofuran	vapor	1.000	3.26E-06	calc
73	1335-87-1	Hexachloronaphthalene	particle-bound	0.990	4.38E-09	calc
74	1335-88-2	Tetrachloronaphthalene	particle-bound	0.945	1.32E-09	calc
75	1336-36-3	Polychlorinated biphenyls (PCBs)	particle-bound	0.999	6.50E-07	calc
76	141-78-6	Acetic acid ethyl ester (Ethyl acetate)	vapor	1.000	1.22E-01	calc
77	141-79-7	4-Methyl-3-penten-2-one	vapor	1.000	1.08E-02	calc
78	14265-44-2	Phosphate	particle	0	n/a	guidance
79	14280-30-9	Hydroxide	particle	0	n/a	guidance
80	142-82-5	n-Heptane	vapor	1.000	6.05E-02	calc
81	144-62-7	Oxalic acid	vapor	1.000	3.08E-07	calc
82	14797-55-8	Nitrate	particle	0	n/a	guidance
83	14797-65-0	Nitrite	particle	0	n/a	guidance
84	14808-79-8	Sulfate	particle	0	n/a	guidance
85	156-60-5	trans-1,2-Dichloroethylene	vapor	1	4.63E-01	App. A-3
86	1582-09-8	Trifluralin	particle-bound	0.994	6.03E-08	calc
87	1634-04-4	Methyl tert-butyl ether	vapor	1.000	3.29E-01	calc
88	16887-00-6	Chloride	particle	0	n/a	guidance
89	16984-48-8	Fluoride	particle	0	n/a	guidance
90	1836-75-5	Nitrofen	particle-bound	0.980	1.05E-08	calc
91	18540-29-9	Chromium (hexavalent)	particle	0	n/a	guidance
92	189-55-9	Dibenzo[a,i]pyrene	particle	0.014	2.37E-14	calc
93	189-64-0	Dibenzo[a,h]pyrene	particle	0.010	7.89E-15	calc
94	191-24-2	Benzo(g,h,i)perylene	particle-bound	0.067	1.32E-13	calc
95	191-30-0	Benzo[a,i]pyrene	particle	0.024	6.32E-13	calc
96	192-65-4	Dibenzo[a,e]pyrene	particle	0.021	9.21E-14	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
97	193-39-5	Indeno(1,2,3-cd)pyrene	particle	0.007	1.88E-13	App. A-3
98	205-82-3	Benzo(j)fluoranthene	particle-bound	0.591	3.45E-11	calc
99	205-99-2	Benzo(b)fluoranthene	particle-bound	0.822	1.60E-10	App. A-3
100	206-44-0	Fluoranthene	particle-bound	0.992	1.70E-08	App. A-3
101	207-08-9	Benzo(k)fluoranthene	particle-bound	0.149	1.32E-12	App. A-3
102	208-96-8	Acenaphthylene	vapor	1.000	1.20E-06	calc
103	218-01-9	Chrysene	particle-bound	0.761	1.03E-11	App. A-3
104	2234-13-1	Octachloronaphthalene	particle-bound	0.564	2.00E-11	calc
105	224-42-0	Dibenz[a,j]acridine	particle-bound	0.241	2.43E-12	calc
106	226-36-8	Dibenz[a,h]acridine	particle-bound	0.295	2.43E-12	calc
107	2385-85-5	Mirex	vapor	1.000	1.05E-09	calc
108	24959-67-9	Bromide	particle	0.017	1.04E-11	calc
109	25551-13-7	Trimethyl benzene	vapor	1.000	2.76E-03	calc
110	26140-60-3	Terphenyls	particle-bound	0.872	4.07E-09	calc
111	27154-33-2	Trichlorofluoroethane	vapor	1.000	n/a	assoc.
112	287-92-3	Cyclopentane	vapor	1.000	4.18E-01	calc
113	309-00-2	Aldrin	particle-bound	0.99554	2.20E-08	Errata
114	31508-00-6	2,3',4,4',5-Pentachlorobiphenyl (PBC 118)	particle-bound	0.952	1.18E-08	calc
115	319-84-6	Hexachlorocyclohexane (Lindane) Alpha BHC	vapor	1	5.61E-08	App. A-3
116	319-85-7	Hexachlorocyclohexane (Lindane) Beta BHC	particle-bound	0.999	6.45E-10	App. A-3
117	319-86-8	Delta-BHC	particle-bound	0.999	4.63E-08	calc
118	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl (TCB)	particle-bound	0.973	2.16E-08	calc
119	32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	particle-bound	0.935	8.59E-09	calc
120	32774-16-6	3,3',4,4',5,5'-Hexachlorobiphenyl	particle-bound	0.534	6.82E-10	calc
121	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl	particle-bound	0.684	1.29E-09	calc
122	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl	particle-bound	0.581	8.26E-10	calc
123	3697-24-3	5-Methylchrysene	particle-bound	0.820	3.33E-10	calc
124	3825-26-1	Ammonium perfluorooctanoate	particle-bound	n/a	n/a	assoc.
125	38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 157)	particle-bound	0.781	2.12E-09	calc
126	39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl	particle-bound	n/a	n/a	assoc.
127	4170-30-3	2-Butenaldehyde (2-Butenal or Crotonaldehyde)	vapor	1.000	3.95E-02	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
128	465-73-6	Isodrin	vapor	1.000	5.79E-08	calc
129	50-00-0	Formaldehyde	vapor	1	5.1	App. A-3
130	50-29-3	4,4-DDT	particle-bound	0.852	5.17E-10	App. A-3
131	50-32-8	Benzo(a)pyrene	particle-bound	0.265	6.43E-12	App. A-3
132	52663-72-6	2,3',4,4',5,5'-Hexachlorobiphenyl	particle-bound	0.114	7.64E-11	calc
133	53-70-3	Dibenzo(a,h)anthracene	particle	0.011	2.70E-14	App. A-3
134	540-59-0	1,2-Dichloroethylene	vapor	1.000	0.264	calc
135	540-84-1	2,2,4-Trimethylpentane	vapor	1.000	0.065	calc
136	541-73-1	1,3-Dichlorobenzene	vapor	1	3.03E-03	App. A-3
137	56-23-5	Carbon tetrachloride	vapor	1	0.148	App. A-3
138	563-80-4	3-Methyl-2-butanone	vapor	1.000	0.069	calc
139	56-49-5	3-Methylcholanthrene	particle-bound	0.714	4.34E-11	calc
140	56-55-3	Benzo(a)anthracene	particle-bound	0.881	2.03E-10	App. A-3
141	57-12-5	Cyanide	particle	0	n/a	guidance
142	57-14-7	1,1-Dimethylhydrazine	vapor	1.000	0.207	calc
143	57465-28-8	3,3',4,4',5-Pentachlorobiphenyl	particle-bound	n/a	n/a	assoc.
144	58-89-9	gamma-BHC (Lindane)	particle-bound	0.999	5.53E-08	calc
145	58-90-2	2,3,4,6-Tetrachlorophenol	vapor	1	6.60E-06	App. A-3
146	591-78-6	2-Hexanone	vapor	1.000	0.015	calc
147	59-50-7	4-Chloro-3-methylphenol	particle-bound	0.999972	1.08E-05	Errata
148	59-89-2	N-Nitrosomorpholine	vapor	1.000	4.74E-05	calc
149	602-87-9	5-Nitroacenaphthene	particle-bound	0.997	3.49E-08	calc
150	60-29-7	Ethyl ether	vapor	1.000	0.708	calc
151	603-34-9	Triphenylamine	vapor	1.000	5.15E-07	calc
152	60-34-4	Methylhydrazine	vapor	1.000	0.066	calc
153	60-35-5	Acetamide	vapor	1.000	5.26E-05	calc
154	60-57-1	Dieldrin	particle-bound	0.986	1.31E-09	Errata
155	621-64-7	Di-n-Propylnitrosamine (N-Nitroso-di-n-propylamine)	vapor	1	4.63E-03	App. A-3
156	624-83-9	Methyl isocyanate	vapor	1.000	0.458	calc
157	627-13-4	Nitric acid, propyl ester	vapor	1.000	0.031	calc
158	62-75-9	N-Nitroso-N,N-dimethylamine (Dimethylnitrosamine)	vapor	1.000	3.55E-03	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
159	630-20-6	1,1,1,2-Tetrachloroethane	vapor	1	1.60E-02	App. A-3
160	63705-05-5	Total sulfur	particle	0	n/a	guidance
161	64-17-5	Ethyl alcohol	vapor	1.000	0.078	calc
162	64-18-6	Formic acid	vapor	1	5.40E-02	App. A-3
163	64-19-7	Acetic acid	vapor	1.000	0.021	calc
164	65510-44-3	2',3,4,4',5-Pentachlorobiphenyl	particle-bound	n/a	n/a	assoc.
165	67-56-1	Methyl alcohol (Methanol)	vapor	1	0.13	App. A-3
166	67-63-0	2-Propyl alcohol (Isopropanol; Propan-2-01)	vapor	1.000	0.06	calc
167	67-64-1	2-Propanone (Acetone)	vapor	1	0.299	App. A-3
168	67-66-3	Chloroform	vapor	1	0.269	App. A-3
169	67-72-1	Hexachloroethane	vapor	1	6.21E-04	App. A-3
170	684-16-2	Hexafluoroacetone	vapor	1.000	2.934	calc
171	69782-90-7	2,3,3',4,4',5'-Hexachlorobiphenyl	particle-bound	n/a	n/a	assoc.
172	70362-50-4	3,4,4',5-Tetrachlorobiphenyl	particle-bound	n/a	n/a	assoc.
173	71-23-8	n-Propyl alcohol	vapor	1.000	0.028	calc
174	71-36-3	n-Butyl alcohol	vapor	1.000	0.0088	calc
175	71-43-2	Benzene	vapor	1	0.125	App. A-3
176	71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	vapor	1	0.163	App. A-3
177	72-20-8	Endrin	particle-bound	0.986	7.68E-10	calc
178	72-43-5	Methoxychlor	particle-bound	0.901	1.62E-09	App. A-3
179	72-54-8	4,4-DDD	particle-bound	0.925	1.14E-09	App. A-3
180	72-55-9	4,4-DDE	particle-bound	0.981	7.45E-09	App. A-3
181	7429-90-5	Aluminum	particle	0	n/a	guidance
182	7439-89-6	Iron	particle	0	n/a	guidance
183	7439-92-1	Lead	particle	0	n/a	guidance
184	7439-93-2	Lithium	particle	0	n/a	guidance
185	7439-95-4	Magnesium	particle	0	n/a	guidance
186	7439-96-5	Manganese	particle	0	n/a	guidance
187	7439-97-6	Mercury	vapor	1	2.63E-06	Errata
188	7439-98-7	Molybdenum	particle	0	n/a	guidance
189	7440-02-0	Nickel	particle	0	n/a	guidance
190	7440-09-7	Potassium	particle	0	n/a	guidance
191	7440-16-6	Rhodium	particle	0	n/a	guidance

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
192	7440-21-3	Silicon	particle	0	n/a	guidance
193	7440-22-4	Silver	particle	0	n/a	guidance
194	7440-23-5	Sodium	particle	0	n/a	guidance
195	7440-25-7	Tantalum	particle	0	n/a	guidance
196	7440-28-0	Thallium	particle	0	n/a	guidance
197	7440-31-5	Tin	particle	0	n/a	guidance
198	7440-33-7	Tungsten	particle	0	n/a	guidance
199	7440-36-0	Antimony	particle	0	n/a	guidance
200	7440-38-2	Arsenic	particle	0	n/a	guidance
201	7440-39-3	Barium	particle	0	n/a	guidance
202	7440-41-7	Beryllium	particle	0	n/a	guidance
203	7440-42-8	Boron	particle	0	n/a	guidance
204	7440-43-9	Cadmium	particle	0	n/a	guidance
205	7440-48-4	Cobalt	particle	0	n/a	guidance
206	7440-50-8	Copper	particle	0	n/a	guidance
207	7440-61-1	Uranium	particle	0	n/a	guidance
208	7440-62-2	Vanadium	particle	0	n/a	guidance
209	7440-65-5	Yttrium	particle	0	n/a	guidance
210	7440-66-6	Zinc	particle	0	n/a	guidance
211	7440-67-7	Zirconium	particle	0	n/a	guidance
212	7440-69-9	Bismuth	particle	0	n/a	guidance
213	7440-70-2	Calcium	particle	0	n/a	guidance
214	74472-37-0	2,3,4,4',5-Pentachlorobiphenyl	particle-bound	n/a	n/a	assoc.
215	74-83-9	Bromomethane (Methyl bromide)	vapor	1	2.16	App. A-3
216	74-87-3	Chloromethane (Methyl chloride)	vapor	1	5.68	App. A-3
217	74-97-5	Bromochloromethane	vapor	1.000	1.88E-01	calc
218	74-99-7	Methylacetylene	vapor	1.000	5.67	calc
219	75-00-3	Chloroethane	vapor	1	159.88	App. A-3
220	75-01-4	Vinyl chloride (1-Chloroethene)	vapor	1	3.68	App. A-3
221	75-05-8	Acetonitrile	vapor	1	0.12	App. A-3
222	75-07-0	Acetaldehyde	vapor	1	1.19	App. A-3
223	75-09-2	Dichloromethane (Methylene chloride)	vapor	1	0.487	App. A-3
224	75-12-7	Formamide	vapor	1.000	8.02E-05	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
225	75-15-0	Carbon disulfide	vapor	1	0.447	App. A-3
226	75-21-8	Ethylene oxide (Oxirane)	vapor	1	1.44	App. A-3
227	75-27-4	Bromodichloromethane	vapor	1	7.68E-02	App. A-3
228	75-34-3	1,1-Dichloroethane	vapor	1	0.3	App. A-3
229	75-35-4	1,1-Dichloroethene (Vinylidene chloride)	vapor	1	0.788	App. A-3
230	75-43-4	Dichlorofluoromethane	vapor	1.000	1.79	calc
231	75-45-6	Chlorodifluoromethane	vapor	1	5.63	App. A-3
232	75-50-3	Trimethylamine	vapor	1.000	2.12	calc
233	75-52-5	Nitromethane	vapor	1.000	4.71E-02	calc
234	75-55-8	2-Methylaziridine	vapor	1.000	1.47E-01	calc
235	75-61-6	Difluorodibromomethane	vapor	1.000	1.08	calc
236	75-63-8	Trifluorobromomethane	vapor	1.000	16	calc
237	75-65-0	2-Methyl-2-propanol	vapor	1.000	5.36E-02	calc
238	75-69-4	Trichlorofluoromethane	vapor	1	1.1	App. A-3
239	75-71-8	Dichlorodifluoromethane	vapor	1	6.4	App. A-3
240	75-99-0	2,2-Dichloropropionic acid	vapor	1.000	2.50E-04	calc
241	76-03-9	Trichloroacetic acid	vapor	1.000	7.89E-05	calc
242	76-11-9	1,1,1,2-Tetrachloro-2,2-difluoroethane	vapor	1.000	7.89E-02	calc
243	76-12-0	1,1,2,2-Tetrachloro-1,2-difluoroethane	vapor	1.000	6.64E-02	calc
244	76-13-1	1,2,2-Trichloro-1,1,2-trifluoroethane (Freon 113)	vapor	1.000	4.78E-01	calc
245	76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	vapor	1.000	2.64	calc
246	76-15-3	Chloropentafluoroethane	vapor	1.000	9.03	calc
247	76-44-8	Heptachlor	vapor	1	4.29E-07	App. A-3
248	7664-41-7	Ammonia/Ammonium	vapor	1	9.88	App. A-3
249	7723-14-0	Phosphorous	particle	0.023	8.92E-12	calc
250	7782-49-2	Selenium	particle	0.027	1.86E-13	calc
251	78-83-1	2-Methylpropyl alcohol (Isobutyl alcohol)	vapor	1.000	1.38E-02	calc
252	78-87-5	1,2-Dichloropropane	vapor	1	6.66E-02	App. A-3
253	78-92-2	1-Methylpropyl alcohol (2-Butanol)	vapor	1.000	2.41E-02	calc
254	78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	vapor	1	0.12	App. A-3
255	79-00-5	1,1,2-Trichloroethane	vapor	1	3.31E-02	App. A-3
256	79-01-6	Trichloroethylene	vapor	1	9.48E-02	App. A-3

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
257	79-09-4	Propionic acid	vapor	1.000	4.64E-03	calc
258	79-10-7	2-Propenoic acid	vapor	1.000	5.22E-03	calc
259	79-20-9	Methyl acetate	vapor	1	0.284	App. A-3
260	79-34-5	1,1,2,2-Tetrachloroethane	vapor	1	6.80E-03	App. A-3
261	8001-35-2	Toxaphene	particle-bound	0.980	8.80E-09	calc
262	82-68-8	Pentachloronitrobenzene (PCBN or quintobenzene)	vapor	1	3.10E-06	App. A-3
263	83-32-9	Acenaphthene	vapor	1	4.93E-06	App. A-3
264	84-66-2	Diethyl phthalate	vapor	1	2.17E-06	App. A-3
265	84-74-2	Dibutyl phthalate	particle-bound	0.989	5.55E-08	App. A-3
266	85-01-8	Phenanthrene	vapor	1	1.35E-03	App. A-3
267	85-68-7	Butylbenzyl phthalate	particle-bound	0.964	1.58E-08	App. A-3
268	86-73-7	Fluorene	particle-bound	0.935	1.08E-09	App. A-3
269	87-68-3	Hexachlorobutadiene	vapor	1	2.33E-04	App. A-3
270	87-86-5	Pentachlorophenol	vapor	1	7.11E-07	App. A-3
271	88-06-2	2,4,6-Trichlorophenol	vapor	1	1.55E-05	App. A-3
272	88-72-2	2-Nitrotoluene	vapor	1.000	2.47E-04	calc
273	88-75-5	2-Nitrophenol	vapor	1	2.63E-04	App. A-3
274	88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	particle-bound	0.996	9.87E-08	calc
275	88-89-1	Picric acid	particle-bound	0.938	9.87E-10	calc
276	91-20-3	Naphthalene	vapor	1	1.07E-04	App. A-3
277	91-22-5	Quinoline	vapor	1.000	7.89E-05	calc
278	91-58-7	2-Chloronapthalene	vapor	1	1.05E-05	App. A-3
279	92-52-4	1,1`-Biphenyl	vapor	1.000	1.18E-05	calc
280	92-93-3	4-Nitrobiphenyl	particle-bound	0.998	4.28E-08	calc
281	93-72-1	Silvex (2,4,5-TP)	particle-bound	0.999	1.31E-08	calc
282	93-76-5	2,4,5-T	particle-bound	0.999	4.93E-08	calc
283	94-75-7	2,4-D and esters (160C typed)	vapor	1.000	1.09E-07	calc
284	95-13-6	Indene	vapor	1.000	1.44E-03	calc
285	95-47-6	o-Xylene	vapor	1	1.06E-02	App. A-3
286	95-48-7	o-Cresol (2-Methylphenol)	vapor	1	4.16E-04	App. A-3
287	95-49-8	2-Chlorotoluene	vapor	1.000	4.51E-03	calc
288	95-50-1	o-Dichlorobenzene (1,2-Dichlorobenzene)	vapor	1	1.79E-03	App. A-3

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
289	95-57-8	2-Chlorophenol	vapor	1	2.77E-03	App. A-3
290	95-95-4	2,4,5-Trichlorophenol	vapor	1	2.15E-05	App. A-3
291	96-22-0	3-Pentanone	vapor	1.000	4.96E-02	calc
292	96-69-5	Bis(3-tert-butyl-4-hydroxy-6-methyl-phenyl)sulfide	particle-bound	n/a	n/a	assoc.
293	98-51-1	p-tert-Butyltoluene	vapor	1.000	8.82E-04	calc
294	98-82-8	Cumene	vapor	1	6.00E-03	App. A-3
295	98-83-9	alpha-Methylstyrene	vapor	1.000	2.50E-03	calc
296	98-86-2	Acetophenone	vapor	1	5.20E-04	App. A-3
297	98-95-3	Nitrobenzene	vapor	1	3.20E-04	App. A-3
298	100-02-7	4-Nitrophenol	vapor	1	1.32E-06	App. A-3
299	100-44-7	Benzyl chloride	vapor	1	1.60E-03	App. A-3
300	100-51-6	Benzyl alcohol	vapor	1	1.40E-04	App. A-3
301	100-52-7	Benzaldehyde	vapor	1	1.30E-03	App. A-3
302	10102-44-0	Nitrogen dioxide	vapor	1.000	1.18	calc
303	101-77-9	4,4-Methylenedianiline	vapor	1.000	3.91E-03	calc
304	103-33-3	Azobenzene	vapor	1.000	4.75E-07	calc
305	103-65-1	n-Propyl benzene (Isocumene)	vapor	1.000	4.50E-03	calc
306	104-51-8	n-Butylbenzene	vapor	1.000	1.39E-03	calc
307	105-67-9	2,4-Dimethylphenol	vapor	1	1.66E-04	Errata
308	106-43-4	4-Chlorotoluene (p-Tolyl chloride)	vapor	1.000	3.54E-03	calc
309	106-44-5	p-Cresol (4-Methyl phenol)	vapor	1	1.70E-04	App. A-3
310	106-47-8	p-Chloroaniline	vapor	1	3.09E-05	App. A-3
311	106-49-0	p-Toluidine	vapor	1.000	3.76E-04	calc
312	106-51-4	Quinone	vapor	1.000	1.18E-04	calc
313	106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	vapor	1.000	2.20E-02	App. A-3
314	107-19-7	Propargyl alcohol	vapor	1.000	2.05E-02	calc
315	107-21-1	Ethylene glycol	vapor	1.000	1.21E-04	calc
316	107-98-2	Propylene glycol monomethyl ether	vapor	1.000	1.64E-02	calc
317	108-60-1	Dichloroisopropyl ether (2,2'-Oxybis(1-chloropropane))	vapor	1.000	7.37E-04	calc
318	108-67-8	1,3,5-Trimethyl benzene	vapor	1	1.30E-03	App. A-3
319	108-86-1	Bromobenzene (Phenyl bromide)	vapor	1.000	5.50E-03	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
320	109-77-3	Malononitrile	vapor	1.000	2.64E-02	calc
321	109-86-4	2-Methoxyethanol	vapor	1.000	1.25E-02	calc
322	110-80-5	2-Ethoxyethanol	vapor	1.000	6.99E-03	calc
323	111-15-9	Ethylene glycol monoethyl ether acetate	vapor	1.000	3.08E-03	calc
324	111-44-4	Bis(2-chloroethyl) ether	vapor	1	1.76E-03	App. A-3
325	111-91-1	Bis(2-chloroethoxy)methane	vapor	1.000	1.74E-04	calc
326	1120-71-4	1,3-Propane sultone	vapor	1.000	3.55E-04	calc
327	119-90-4	3,3'-Dimethoxybenzidine (ortol-dianisidine)	particle-bound	0.877	3.30E-10	App. A-3
328	121-14-2	2,4-Dinitrotoluene	particle-bound	0.999	2.29E-07	App. A-3
329	122-66-7	1,2-Diphenylhydrazine	particle-bound	0.999	4.74E-08	App. A-3
330	123-33-1	Maleic hydrazide	particle-bound	0.978	3.64E-09	calc
331	124-48-1	Chlorodibromomethane	vapor	1	2.00E-02	App. A-3
332	131-11-3	Dimethylphthalate	vapor	1	2.17E-06	App. A-3
333	131-89-5	2-Cyclohexyl-4,6-dinitrophenol	particle-bound	0.376	5.51E-11	calc
334	133-06-2	Captan	particle-bound	0.867	1.18E-10	calc
335	135-98-8	sec-Butylbenzene	vapor	1.000	2.30E-03	calc
336	145-73-3	Endothall	particle	0.005	2.07E-13	calc
337	156-59-2	cis-1,2-Dichloroethene	vapor	1.000	0.23	App. A-3
338	1746-01-6	2,3,7,8-Tetrachlorodibenzo(p)dioxin (TCDD)	particle-bound	0.490154	9.74E-13	Errata
339	192-97-2	Benzo(e)pyrene	particle-bound	0.292	7.50E-12	calc
340	19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo(p)dioxin	particle	0.0153	6.45E-14	App. A-3
341	23950-58-5	Pronamide	vapor	1	5.30E-07	App. A-3
342	25013-15-4	Methyl styrene (mixed isomers)	vapor	1.000	1.97E-03	calc
343	3268-87-9	Octachlorodibenzo(p)dioxin	particle	0.001694	1.09E-15	Errata
344	35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo(p)dioxin	particle	0.0162	4.22E-14	App. A-3
345	39001-02-0	Octachlorodibenzofuran	particle	0.00167	4.93E-15	App. A-3
346	39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo(p)dioxin	particle-bound	0.0596	1.33E-13	App. A-3
347	40321-76-4	1,2,3,7,8-Pentachlorodibenzo(p)dioxin	particle-bound	0.219	1.25E-12	App. A-3
348	41851-50-7	Chlorocyclopentadiene	vapor	1.000	2.68E-02	calc
349	460-19-5	Cyanogen	vapor	1.000	5.66	calc
350	506-68-3	Cyanogen bromide	vapor	1.000	1.61E-01	calc
351	506-77-4	Cyanogen chloride	vapor	1.000	1.61	calc
352	510-15-6	Chlorobenzilate	particle-bound	0.862	2.90E-09	App. A-3

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
353	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	particle-bound	0.663449	1.17E-11	Errata
354	51-28-5	2,4-Dinitrophenol	particle-bound	0.999	1.52E-07	App. A-3
355	51-79-6	Ethyl Carbamate (urethane)	vapor	1.000	3.45E-04	calc
356	528-29-0	o-Dinitrobenzene	particle-bound	0.999	5.99E-08	calc
357	532-27-4	2-Chloroacetophenone	vapor	1.000	7.11E-06	calc
358	534-52-1	4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	particle-bound	0.999	1.39E-07	calc
359	5385-75-1	Dibenzo(a,e)fluoranthene	particle	0.018	9.64E-14	calc
360	540-73-8	1,2-Dimethylhydrazine	vapor	1.000	9.20E-02	calc
361	542-75-6	1,3-Dichloropropene	vapor	1	4.11E-02	App. A-3
362	542-88-1	Dichloromethyl ether	vapor	1.000	3.87E-02	calc
363	55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	particle	0.0201	1.41E-13	App. A-3
364	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	particle-bound	0.263	4.33E-12	App. A-3
365	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	particle-bound	0.364	3.58E-12	App. A-3
366	57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	particle-bound	0.0515	2.89E-13	App. A-3
367	57-24-9	Strychnine	particle-bound	0.086	2.20E-13	App. A-3
368	57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo(p)dioxin	particle	0.0289	4.74E-14	App. A-3
369	57-74-9	Chlordane	particle-bound	0.997	3.55E-08	App. A-3
370	584-84-9	2,4-Toluene diisocyante	vapor	1.000	1.05E-05	calc
371	593-60-2	Bromoethene	vapor	1.000	1.36	calc
372	60-11-7	Dimethyl aminoazobenzene	particle-bound	0.524	9.21E-11	calc
373	606-20-2	2,6-Dinitrotoluene	vapor	1	7.47E-07	App. A-3
374	60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	particle-bound	0.0547	2.63E-13	App. A-3
375	608-93-5	Pentachlorobenzene	vapor	1	3.10E-06	App. A-3
376	61626-71-9	Dichloropentadiene	vapor	n/a	n/a	assoc.
377	62-50-0	Ethyl methanesulfonate	vapor	1	3.50E-04	App. A-3
378	62-53-3	Aniline	vapor	1	8.80E-04	App. A-3
379	65-85-0	Benzoic acid	vapor	1	8.57E-06	App. A-3
380	67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	particle	0.0347	1.75E-13	App. A-3
381	70-30-4	Hexachlorophene	particle	0.00014	3.60E-15	App. A-3
382	70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	particle	0.0486	3.16E-13	App. A-3
383	72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	particle-bound	0.0576	2.37E-13	App. A-3
384	74-88-4	Iodomethane (Methyl iodide)	vapor	1.000	5.33E-01	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
385	74-95-3	Methylene bromide	vapor	1	2.2	App. A-3
386	75-25-2	Bromoform	vapor	1	7.82E-03	App. A-3
387	75-29-6	2-Chloropropane	vapor	1.000	6.78E-01	calc
388	75-44-5	Phosgene	vapor	1.000	1.87	calc
389	76-01-7	Pentachloroethane	vapor	1.000	4.67E-03	calc
390	764-41-0	1,4-Dichloro-2-butene	vapor	1.000	3.95E-03	calc
391	765-34-4	Glycidylaldehyde	vapor	1.000	5.96E-02	calc
392	77-47-4	Hexachlorocyclopentadiene	vapor	1	9.63E-05	App. A-3
393	77-78-1	Dimethyl sulfate	vapor	1.000	8.91E-04	calc
394	80-62-6	Methyl methacrylate	vapor	1.000	5.07E-02	calc
395	822-06-0	Hexamethylene-1,5-diisocyanate	vapor	1.000	3.95E-05	calc
396	823-40-5	Toluene-2,6-diamine	vapor	1.000	3.24E-06	calc
397	85-44-9	Phthalic anhydride	vapor	1	2.63E-07	App. A-3
398	87-61-6	1,2,3-Trichlorobenzene	vapor	1	3.20E-04	App. A-3
399	88-74-4	o-Nitroaniline (2-Nitroaniline)	vapor	1	1.07E-05	App. A-3
400	90-04-0	o-Anisidine	vapor	1.000	1.05E-04	calc
401	91-57-6	2-Methylnaphthalene	vapor	1.000	7.24E-05	calc
402	91-94-1	3,3'-Dichlorobenzidine	particle-bound	0.847	2.89E-10	App. A-3
403	924-16-3	N-Nitrosodi-n-butylamine	vapor	1	3.80E-04	App. A-3
404	94-59-7	Safrole	vapor	1.000	1.10E-04	calc
405	95-53-4	o-Toluidine	vapor	1	3.94E-04	App. A-3
406	95-63-6	1,2,4-Trimethyl benzene	vapor	1.000	2.76E-03	calc
407	95-94-3	1,2,4,5-Tetrachlorobenzene	vapor	1	7.10E-06	App. A-3
408	96-12-8	1,2-Dibromo-3-chloropropane	vapor	1	1.00E-03	App. A-3
409	96-18-4	1,2,3-Trichloropropane	vapor	1	4.90E-03	App. A-3
410	96-45-7	Ethylene thiourea	particle-bound	0.963	2.66E-09	calc
411	97-63-2	Ethyl methacrylate	vapor	1.000	2.30E-02	calc
412	98-01-1	Furfural	vapor	1.000	2.91E-03	calc
413	98-06-6	tert-Butyl benzene	vapor	1.000	2.89E-03	calc
414	98-07-7	Benzotrichloride	vapor	1.000	5.45E-04	calc
415	99-35-4	1,3,5-Trinitrobenzene	vapor	1	1.30E-07	App. A-3
416	99-65-0	1,3-Dinitrobenzene	vapor	1	4.00E-07	App. A-3
417	99-87-6	p-Cymene	vapor	1.000	1.92E-03	calc

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
418	no cas #	Dibenzo(a,h)fluoranthene	particle-bound	n/a	n/a	assoc.
419	10028-15-6	Ozone	vapor	1.000	n/a	guidance
420	630-08-0	Carbon monoxide	vapor	1.000	n/a	guidance
421	7446-09-5	Sulfur dioxide	vapor	1.000	n/a	guidance
422	no cas #	Particulate matter	particle	0	n/a	guidance
423	10028-17-8	Tritium	vapor	1	n/a	guidance
424	10045-97-3	Cesium-137	particle	0	n/a	guidance
425	10098-91-6	Yttrium-90	particle	0	n/a	guidance
426	10098-97-2	Strontium-90	particle	0	n/a	guidance
427	10198-40-0	Cobalt-60	particle	0	n/a	guidance
428	13966-29-5	Uranium-234	particle	0	n/a	guidance
429	13967-48-1	Ruthenium-106	particle	0	n/a	guidance
430	13967-70-9	Cesium-134	particle	0	n/a	guidance
431	13968-55-3	Uranium-233	particle	0	n/a	guidance
432	13981-15-2	Curium-244	particle	0	n/a	guidance
433	13981-16-3	Plutonium-238	particle	0	n/a	guidance
434	13981-37-8	Nickel-63	particle	0	n/a	guidance
435	13981-97-0	Barium-137m	particle	0	n/a	guidance
436	13982-10-0	Plutonium-242	particle	0	n/a	guidance
437	13982-63-3	Radium-226	particle	0	n/a	guidance
438	13982-70-2	Uranium-236	particle	0	n/a	guidance
439	13994-20-2	Neptunium-237	particle	0	n/a	guidance
440	14119-32-5	Plutonium-241	particle	0	n/a	guidance
441	14119-33-6	Plutonium-240	particle	0	n/a	guidance
442	14133-76-7	Technetium-99	particle	0	n/a	guidance
443	14158-29-3	Uranium-232	particle	0	n/a	guidance
444	14234-35-6	Antimony-125	particle	0	n/a	guidance
445	14331-85-2	Protactinium-231	particle	0	n/a	guidance
446	14336-70-0	Nickel-59	particle	0	n/a	guidance
447	14391-16-3	Europium-155	particle	0	n/a	guidance
448	14596-10-2	Americium-241	particle	0	n/a	guidance
449	14683-23-9	Europium-152	particle	0	n/a	guidance
450	14762-75-5	Carbon-14	vapor	1	n/a	guidance

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COPC Identification

No.	CAS Registry Number	Compound	Offgas Phase Type	Fv	Vapor Pressure at Ambient Conditions (atm)	Source/Basis for Fv Value
451	14952-40-0	Actinium-227	particle	0	n/a	guidance
452	14993-75-0	Americium-243	particle	0	n/a	guidance
453	15046-84-1	Iodine-129	vapor	1	n/a	guidance
454	15117-48-3	Plutonium-239	particle	0	n/a	guidance
455	15117-96-1	Uranium-235	particle	0	n/a	guidance
456	15262-20-1	Radium-228	particle	0	n/a	guidance
457	15510-73-3	Curium-242	particle	0	n/a	guidance
458	15585-10-1	Europium-154	particle	0	n/a	guidance
459	15594-54-4	Thorium-229	particle	0	n/a	guidance
460	15715-94-3	Samarium-151	particle	0	n/a	guidance
461	15751-77-6	Zirconium-93	particle	0	n/a	guidance
462	15757-87-6	Curium-243	particle	0	n/a	guidance
463	15832-50-5	Tin-126	particle	0	n/a	guidance
464	7440-03-1	Niobium-93m	particle	0	n/a	guidance
465	7440-24-6	Strontium (total)	particle	0.009	5.58E-12	calc
466	7440-29-1	Thorium-232	particle	0	n/a	guidance
467	7440-61-1	Uranium-238	particle	0	n/a	guidance
468	no cas #	Cadmium-113m	particle	0	n/a	guidance
469	no cas #	Selenium-79	particle	0	n/a	guidance

Notes for Source/Basis of Fv Value:

1. App. A-3 – Fv values taken directly from Appendix A, HHRAP, 1998.
2. Calc – Fv values calculated using equations given in HHRAP, 1998.
3. Errata – Fv values taken directly from Errata sheet for HHRAP, 1999.
4. Assoc. – Offgas phase type determined by comparison with Fv values for similar compounds.
5. Guidance – Offgas phase type identified by general EPA guidance in HHRAP, 1998 (e.g., metals with the exception of mercury have an Fv = 0.0).

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G

Appendix G
Organic Abatement DFs in Pretreatment PVP System

Appendix G provides the methodology used to determine the organic constituents decontamination factors through the pretreatment vessel vent system thermal oxidizer and carbon beds. The numbers provided are conservative and provide bounding conditions for the emissions profile analysis.

Appendix G

Pretreatment Vessel Vent Organic Constituents Decontamination Factor Analysis

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List of Acronyms

Acronym	Description
AIT	Auto Ignition Temperature
CAS #	Chemical Abstract Service registry number
COPC	Constituent of Potential Concern
DF	Decontamination Factor
MSDS	Material Safety Data Sheet
MW	Molecular Weight
NFPA	National Fire Protection Association
PCBs	Poly-Chlorinated Biphenyls
ppmv	part per million by volume
PT	Pretreatment
PVP	Pretreatment Vessel Vent Process System
RTO	Regenerative Thermal Oxidizer
DF	Decontamination Factor
DE	Destruction Efficiency
RE	Removal Efficiency
LFL	Lower Flammability Limit
SLRA	Final Work Plan for Screening Level Risk Assessment for the RPP-WTP
VLE	Vapor-Liquid Equilibrium
VOC	Volatile Organic Compound
EPA	Environmental Protection Agency
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1 Objective

The objective of this analysis is to determine the decontamination factors (DFs) for abatement of potential organic constituents in the pretreatment (PT) vessel vent process (PVP) system.

2 Existing Design Inputs

2.1 RTO Design Criteria

Conditions of combustion within the regenerative thermal oxidizer (RTO) unit are 1.0 second residence time at 1600 °F according to the *System Description for Pretreatment Vessel Vent Process System* (24590-PTF-3YD-PVP-00001).

2.2 Carbon Adsorber Design Criteria

Carbon adsorbers are designed to contain the largest volume of carbon media possible within the limits of pressure drop and facility size limitations for exchanging spent adsorbers with freshly charged adsorbers (24590-PTF-M0C-PVP-00003, p 3-4).

3 Background

3.1 Origins of Organic Compounds in the PVP system

Historical characterization of Hanford tank waste shows various organic compounds in the solids, liquids, and headspace vapors of numerous double and single shelled tanks. Organic solvents and complexants were used in nuclear fuel processing and account for the bulk of the original organic material sent to the waste tanks. Since then, complex reactions have taken place where the original organic waste compounds have undergone radiolytic decomposition to form other compounds. The decomposition products can continuously change in composition since many of them are reactive with other organic decomposition products or may undergo further radiolytic decay. The sustained radioactive exposure to original organic waste material accounts for potentially thousands of different organic compounds present in the waste at trace quantities.

Waste batches will be sent from Hanford tank farms to the Hanford Tank Waste Treatment and Immobilization Plant (WTP) PT facility for processing prior to vitrification. While in PT, process vessels are swept with forced and passive air purges to ensure that radiolytically generated hydrogen does not concentrate in vessel headspaces to a flammable level. The sweeping of process vessel headspaces allows for the removal of organic compounds as governed by the vapor-liquid equilibrium (VLE) of each compound at the system conditions.

3.2 Organic Abatement in PVP system

Air purges from PT process vessels are removed, and treated through the Pretreatment Vessel Vent Process System (PVP) prior to discharge to the environment. To ensure that the concentration of Volatile Organic Compounds (VOCs) in the PT off gas is reduced before release to the environment, the stream is processed through a Regenerative Thermal Oxidizer (RTO) and a carbon adsorber. In the RTO, organic compounds are destroyed via combustion. The combustion reaction is induced by the application of high temperature and the availability of excess oxygen. Destruction of contaminants is followed by a polishing

step in the adsorber where some removal of remaining organic compounds takes place. In the adsorber, organic contaminants are removed from the vent gas by capture on the surface of the activated carbon media.

3.3 Organic Characterization of Hanford Tank Wastes

Due to the difficulties associated with sample handling and analysis of radioactive tank waste, the organic characterization of waste liquid and solids remains largely incomplete with respect to the species and concentration of each organic compound. The most abundant organic characterization data comes from tank headspace analyses. A wide range of target organic compounds have been detected in various tank headspace samples on behalf of the relative ease of vapor phase sample handling during analysis. Over 1200 different organic compounds have been detected through historical sampling and analyses of Hanford tank wastes (Wiemers 1998 p 4.13). Nearly all 1200 of these compounds have been detected in the headspace samples of single shell tanks (Stock 2000, p 2).

In spite of the organic analysis data available to date, there is still significant uncertainty in determining the potential concentrations of the individual and collective organic compounds within the PVP vent stream. Arguably, organic concentrations will be appreciably less in the PVP vent gas than detected concentrations from historical headspace analysis. Most of the data was collected several years ago and the organic compounds continue to be depleted by ventilation of the waste tanks. However, those compounds which have been detected at higher concentrations are generally the most credible in terms of their presence in multiple tanks. As such, the organic compounds most likely to be detectable in the PVP system vent gas are those which have been detected in some abundance in several different waste tanks.

3.4 Constituents of Potential Concern

In the *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant* (RPT-W375-ES00001), 250 organic Constituents of Potential Concern (COPCs) were identified as being relevant to emissions estimates for permitting. These 250 COPCs were identified during development of the *Final Work Plan for Screening Level Risk Assessment* (SLRA) *for the RPP-WTP* (RPT-W375-EN00001). These constituents have been included in emissions estimates used for permitting the WTP. As such, they are also considered in this analysis to establish conservative DFs to be included when determining future emissions estimates used in permitting activities.

Of the 250 COPCs, 14 are coplanar Poly-Chlorinated Biphenyls (PCBs). These 14 PCBs have been included individually in the list on behalf of the tendency for the coplanar molecules to exhibit dioxin-like properties (RPT-W375-ES00001, p 13). The specific PCBs are shown in addition to the generally identified compound, PCB (CAS # 1336-36-3), which is inclusive of the entire family of individual PCBs.

3.5 Organic Destruction via Combustion –Theory

Thermal oxidation of organic material is a combustion process. Combustion is defined as the burning of gases, liquids, or solids, in which the substance is oxidized, evolving heat and often light (Lewandowski 2000, p 1). For combustion to occur, 3 elements of the reaction need to be in place. These are fuel (the organic contaminant in this case), oxygen (present in the vent gas which is mostly air), and an ignition source. The ignition source can be thought of as the source of activation energy to initiate the chemical (combustion) reaction. In general, combustion reactions are exothermic and under the correct conditions of oxygen and fuel, initiated combustion can release enough heat to sustain a continuous ignition source (the burning process or a "fire"). The following chemical equation shows the products of combustion for a typical hydrocarbon.

Equation G-1

$$C_xH_{2y} + \left(X + \frac{Y}{2}\right)O_2 + Q_{activation} \rightarrow XCO_2 + YH_2O + Q_{combustion}$$

Where:

X and Y	= stoichiometric coefficients
C	= Carbon
H	= Hydrogen
CO_2	= carbon dioxide combustion product
H_2O	= water vapor combustion product
$Q_{activation}$	= activation energy to initiate the reaction
$Q_{combustion}$	= combustion energy released by forming the combustion products

Within a thermal oxidation system, the primary performance requirement is the extent of destruction or Destruction Efficiency (DE) of the organic contaminants. Important parameters which affect the DE of organics by thermal oxidation are sometimes called the "three T's" of combustion. The "T's" are time, temperature, and turbulence. The other most important parameter is availability of oxygen. The extent of oxygen present in a combustion system essentially determines the importance of time and turbulence. As the availability of oxygen increases, the need for time and turbulence (mixing) will decrease for the same DE since there is more likelihood for the same number of contaminants to contact and react with an oxygen molecule. Typically, thermal oxidizers use a fuel supply and burner system to maintain the system operating temperature. In such cases, the excess oxygen is usually managed to levels which are only slightly higher than the stoichiometric requirement. The reason for limiting the excess oxygen is a cost consideration which limits the fuel required to maintain the system temperature (fuel efficiency). In systems where oxygen is rigorously controlled, time and turbulence become a vital design consideration to ensure equivalent DE.

The PVP system will use a RTO which will maintain operating temperature by heat input from an electric element as opposed to a burner system. In this service, the extent of excess oxygen is very near 20.9% (the oxygen concentration in ambient air) since the organic contaminants in the PVP stream are expected to be extremely dilute. The RTO will recover energy from the high temperature exhaust by exchanging heat with (preheating) the feed gas via ceramic heat transfer beds. Oxidizers which use ceramic heat transfer beds in alternating flow cycles are known as "regenerative". This manner of heat recovery will maximize the energy efficiency of the oxidizer as well as providing some additional residence time at temperatures very near the operating temperature.

The design parameters required for the PVP oxidizer are 1.0 second residence time at 1600 degrees Fahrenheit. This is consistent with EPA reported results of commercial incinerators (fuel-fired) where 0.75 seconds and 1600 °F have been shown to ensure DEs remain above 98% for non-halogenated VOCs (EPA 1999, p 1). Additionally, electric heating elements used in existing RTOs have demonstrated proven reliability when operating at 1500 °F and the capability of operating as high as 1800 °F. It should be noted here that the EPA reference which states destruction performance for this operating temperature has derived the information from historical performance of fired oxidizers (as opposed to electric). The reference states the importance of mixing and residence time in this type of system since the availability of oxygen is limited by the system's operationally practical fuel efficiency.

3.6 Organic Removal via Adsorption – Theory

The adsorption of VOCs on activated carbon media occurs by a physical adsorption mechanism in which weak attractive forces, resulting from Van der Waals forces between the contaminant and the carbon adsorbent (also known as Hydrogen bonding forces or London dispersion forces) adhere the contaminant to the surface of the carbon. The process is exothermic and usually evolves slightly more energy than the heat of vaporization of the adsorbed compound (Cooper 1994, p 381). The contaminant essentially

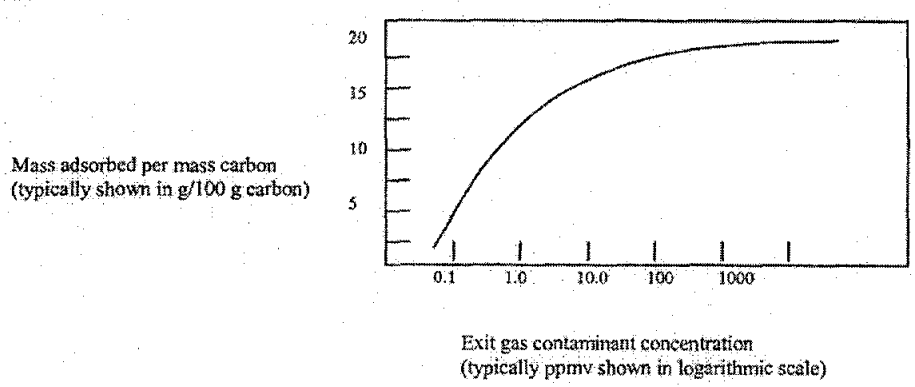
moves out of the vapor phase to behave like a liquid or solid phase trapped on the solid surface of the adsorbent media. Adsorption is usually reversible. Under appropriate sustained conditions of temperature, pressure, and concentration, most adsorbed compounds can re-enter the vapor phase as governed by thermodynamic equilibrium.

In general, the potential for activated carbon to adsorb a particular contaminant depends primarily on the boiling point and molecular weight (MW) of that compound. The reason is that some molecules tend to have more potential for intermolecular attraction via London dispersion forces. A generally predictive measure of intermolecular forces is normal boiling point since the change of phase requires enough energy to break the intermolecular forces which hold the compound together in its liquid phase. A higher boiling point corresponds with a higher intermolecular attraction (Brown 1994, p 374) and hence more potential for strong adsorption. Consequently, boiling point is the strongest indicator for the "adsorbability" of a particular VOC. Boiling point is followed closely by MW as an indicator of adsorption potential. Large molecules with large MWs tend to have more atoms and therefore more potential to be polarized. The polar characteristic of a molecule adds to the attractive forces due to the pull between dissimilar charges. The more "polarizable" a molecule is, the more intermolecular force it exhibits and hence the more adsorbable it may be.

3.6.1 Adsorption Isotherms

Adsorption is governed by thermodynamics of chemical equilibrium; therefore, contaminant concentration in the treated gas is an important factor in determining the capacity of the carbon to collect or load a particular constituent. Temperature and pressure conditions also impact the extent of adsorption so that higher pressure and lower temperature favor a higher adsorption capacity. This is consistent with the observation that gas phase adsorption is exothermic at essentially the latent heat of vaporization. The adsorption behaves like a phase change; both high pressure and low temperature favor this transition. At constant pressure and temperature, the relationship between contaminant concentration in the exit gas and the equilibrium capacity of the adsorbent is known as an adsorption isotherm. Figure G-1, below, depicts a generalized relationship between carbon loading capacity and equilibrium exit gas concentration.

Figure G-1



Isotherms are empirically created from experimental or industrial data and are commonly available for numerous VOCs on adsorbents developed for several types of gas cleaning services. However, at extremely dilute concentrations, the predictive capability of empirically developed isotherms becomes unreliable. The reason is that adsorption data is not widely available at extremely low concentrations since there is not normally a regulatory driver to apply adsorption technology to significantly dilute streams. Industrial experience would suggest that adsorption capacities for dilute contaminant concentrations should be determined through pilot testing of each adsorbent media considered for the service. The performance or Removal Efficiency (RE) of activated carbon will vary depending on media

particle size, type of activation processing (internal pore size, pore distribution, and void fraction), and carbon source material.

3.6.2 Multi Component Adsorption

In multi component adsorption, the adsorption capacity of any particular compound may no longer follow its particular single compound isotherm. Complex and unpredictable component-to-component interactions may take place. This can change the thermodynamic equilibrium of the collective adsorption system. It is known however, that in systems where a weakly attracted compound has been adsorbed, it can later be displaced by a more strongly adsorbed compound if the relative concentrations favor the exchange. This "selective" behavior greatly adds to the complexity and unpredictability of multi component adsorption.

Processing of each batch of Hanford tank waste is likely to evolve multiple species of VOCs at dilute concentrations, each with its own unique organic signature. In the case where potentially hundreds of different organic compounds may be present at different concentrations, the contaminants will be competing for the same adsorption sites. The prediction of equilibrium for any given compound becomes virtually impossible. Given the unpredictable mix of compounds and concentrations in the PVP system vent gas, those compounds which are only slightly adsorbable are not likely to exhibit any appreciable removal from the stream.

3.7 Compound Physical Property Sources

The list of contaminants considered by this analysis includes compounds that have been detected through various historical analysis of Hanford tank wastes and those which have been given consideration due to regulatory concern. These compounds exhibit a wide range of physical properties. Not all of the relevant physical property values were found to be readily available. For the most part, chemistry and engineering handbooks and texts have been referenced to supply the important physical properties used in this analysis. In addition, several internet databases containing information on chemical compounds, chemistry, and chemical safety were used to further complete the collection of physical properties. In some cases, manufacturer's material safety data sheets (MSDS) were used to provide the Auto-Ignition Temperatures (AITs), solubilities, and/or boiling points of certain compounds.

This group of sources however, did not provide all of the required information for every compound. To fill the remaining gaps, comparisons were made to similar compounds for which data was found available. The missing physical property information was then conservatively estimated. Primarily, chemical structure was used to assign AITs and normal boiling points. To a lesser extent, molecular weight, solubility, and National Fire Prevention Association (NFPA) hazard rankings were taken into consideration. General chemical trends were accounted for when assessing the conservatism of each estimated value. Examples of trends would include: 1) the polarity of a compound with respect to estimated boiling point and 2) the number of halogen substitutions, chemical resonance, or length of alkane chain with respect to estimated AIT.

3.8 Representative Organic Compounds

Given the total number of historically detected organic compounds which could be considered for tracking through the PVP system, a criteria was needed to select a smaller and more manageable number of representative compounds. The "representative" compounds will include organic COPCs identified by the SLRA. The organic COPCs contain numerous halogenated and aromatic compounds which appear at the extreme ends of the range of physical property values used to assign DFs. The representative compounds can then bound the behavior of those which may not be tracked in the PVP system. By including several compounds which are difficult to destroy or remove from the PVP vent gas, future

emissions estimates can establish bounding conservatism by assigning higher concentrations to these low abated compounds.

Since the compounds under consideration are those which may be present within the PVP vent gas, the considerable data collected from headspace (vapor) samples of the single shell tanks was considered to be the widest and most representative information. A single source document containing the maximum detected concentration of nearly 1200 compounds (Stock 2000) was used to set the selection criteria for some of the representative compounds. It is appropriate to include the organic COPCs in this analysis because of their inclusion in emissions estimates which affect WTP permitting. The criteria for selecting the remaining compounds was decided to be a maximum detected concentration of 0.1 part per million by volume (ppmv) or higher.

Some of the compounds detected at 0.1 ppmv or higher are COPCs[CJD1][1]. However, all tabular data presented in this analysis are shown as two lists: 1) the COPCs and 2) those detected over the concentration threshold. This is done to more easily locate particular compound information based on the different end uses expected from this analysis. The total number of individual compounds considered in this analysis is 436. Tables 1-1 and 1-2 of the Appendix show the COPCs and detected compounds in tank headspace respectively.

All organic COPCs identified in the SLRA will be included in this analysis with the exception of the individual coplanar PCBs. Due to the similarity of PCBs across all the various specific structures and physical properties, the 14 listed coplanar PCBs will not be treated individually in this analysis. Those compounds are assigned a single DF identified by the descriptive name (PCBs) and the Chemical Abstract Service number (CAS #) 1336-36-3.

3.9 Compound Physical Properties

Tables 1-1 and 1-2 show a CAS #, MW, chemical formula, boiling point, and AIT for each compound. A two dimensional structure is also shown for each compound where the structure is not obvious by its compound name and/or where it is significant to the determination of any estimated physical property value. Values which could not be found in available references have been estimated as described in Section 3.7 of this analysis. Source information and notes concerning particular physical property values are included at the end of each table. As can be expected with such a large collection of data from several different references, some values may be found to be inconsistent with other references. However, since conservatism has been exercised at each occurrence of estimation or enabling assumption, the individual and collective physical property inputs are considered to be bounding as supported by the best available information. As such, their effect on the analysis result with respect to the accuracy of assigned DFs is expected to be conservatively bounding.

3.10 Destruction Criteria

Section 2.1 gives the design conditions of residence time and operating temperature of the RTO. For a given constituent, the availability of oxygen and its AIT are the other important factors for determining DE in the RTO system.

3.10.1 Oxygen Concentration

Final Vapor-Liquid Equilibrium (VLE) for organic compounds in the PVP vent gas will take place in the caustic scrubber which is controlled to near standard conditions. These conditions are essentially the same as waste tank storage conditions at the Hanford Site. Therefore the expected concentration of

[1] Not all of the COPCs have been detected in analysis of headspace samples of Hanford tank waste.

organic compounds will be much less than 1% since most volatile compounds have already been depleted from the waste. As such, the oxygen concentration of the vent gas is essentially that of saturated ambient air (>20%) and well in excess of typical combustion systems where excess oxygen is controlled for fuel efficiency.

3.10.2 Basis of Destruction

Given the design criteria of the RTO and the extent of available oxygen for combustion, the DF for destruction of each compound will be determined by their AIT. See Section 5.4 for a detailed explanation on AIT and the relationship of destruction efficiency in the RTO.

3.11 Removal Criteria

For the assigning of DFs across the carbon adsorber, normal boiling point, MW, and concentration is considered. It is understood that the concentration of any given constituent in the PVP vent gas can not be accurately predicted. However, some constituents are known to be extensively destroyed in the oxidizer leaving a very small concentration in the feed gas to the downstream adsorber. This qualitative behavior is taken into consideration on those compounds which have high DFs across the RTO. For a detailed explanation of how boiling point, MW, and concentration are used to assign adsorber DFs, see Section 5.5.

4 Methodology

4.1 Definition of DF

The mathematical definition of DF is generally the ratio of mass flow in the feed to mass flow in the treated stream. DFs will be calculated by using the DE or RE in the following relationship.

Equation G-2

$$DF = \frac{1}{\left[1 - \frac{eff}{100}\right]}$$

where:

eff = the contaminant DE or RE in %

4.2 Destruction DF

Each compound's referenced or estimated AIT will be compared with the operating temperature of the RTO. The difference in these two temperatures will be used to assign a destruction DF based on the criteria from Table G-2.

4.3 Removal DF

Compound removal DFs across carbon adsorption will be assigned based on the estimated adsorption capacity of each compound. The estimated adsorption capacities are based on normal boiling point, molecular weight, and available calculated adsorption capacities (Yaws 1995) for certain compounds which are included in this analysis. Where the capacity estimation via molecular weight and normal boiling point differs from the calculated prediction for a specific compound, the lower value is used to ensure conservatism. For the 35 instances where the correlation gives the lower capacity estimate, the

correlation value was rounded down to the nearest graduated capacity from Table G-3. The selected adsorption capacity is then used to assign the removal DFs according to Table G-4.

4.4 Combined DF

The carbon adsorption system normally treats gas that has been processed in the RTO. As such, the inlet concentration of certain constituents has the potential of being extremely low (<<0.1 ppmv for compounds which are readily combustible). The potential for extremely low contaminant concentrations will be accounted for by applying a reduction scalar on compounds which have a DF of 50 and higher across the RTO. For these compounds, the adsorption DF used to calculate the combined DF will be reduced by a factor of 10 (not to decrease below 1.0). The combined DF will then be determined by multiplication of the DFs for the RTO and carbon adsorber.

5 Assumptions

5.1 Physical Property Sources

Due to the number and species of the organic compounds considered by this analysis, not all physical property values were found to be readily available. In addition, certain sources were found in contradiction of each other regarding AIT and normal boiling point. A good example of this is the chemical compound Pyridine (CAS # 110-86-1). Physical property source #1 and #6 from Table 1-2 show the normal boiling point to be 115.2 °C and 208 °C respectively. Another example is Naphthalene (CAS # 91-20-3). Source #1 and #23 from Table 1-2 show the AIT as 568 °C and 526 °C respectively. Likewise, numerous AIT temperatures were found by searching MSDS and chemical safety databases, and in some cases, two available sources will show different AITs. In all instances where differing values were found, the more conservative (high AIT and low boiling point) were used. However, due to the number of discrepancies found and the apparent potential for inaccuracy, the physical data has been treated with conservatism in determining the destruction and removal DFs. The physical property data as assembled in Tables 1-1 and 1-2 is assumed to be best available information and appropriate to determine combined DFs. This assumption (and any specific physical property value) is not unreasonable since the inaccuracy of the physical property data is not likely to significantly impact the combined DF of any compound. In addition, the DFs determined by this analysis are likely to be used with a very conservative estimation of unabated organic emissions due to the uncertainty of organic content in the tank waste. In this manner, an estimation of abated organic emissions from the PT PVP system can be considered bounding.

5.2 Physical Property Values

Numerous uncommon organic species are contained within the collective compounds considered by this analysis. As not all physical properties were found for several of these compounds, the AIT and normal boiling point were estimated in some cases to enable the DFs to be assigned. As discussed in Section 3.7, the compound physical structures were used to estimate the AIT and/or boiling point by comparison to similar compounds for which the values were known. When estimating the AITs, certain trends related to elemental composition and chemical structure were recognized. In general, the following patterns are reflected in the reference AITs:

- Aromatics tend to have higher AITs due to resonance stability.
- Halogenated compounds have higher AITs.
- Higher Carbon to Halogen atomic ratios have lower AITs.
- Methyl or alkane substitutions of otherwise identical structures lowers the AIT.

- Compounds with longer alkane chains tend to have lower AIT.
- Carbon, Nitrogen, or Oxygen double bonds tend to raise AIT in most compounds.
- Higher Hydrogen to Carbon ratios tend to lower AIT temperature.

All of these trends were taken into consideration to ensure that the estimated AITs were bounded by conservatism. When estimating normal boiling point, more extreme conservatism was exercised to ensure that the lower boiling point compounds were reflected as lower than the actual value (resulting in conservative adsorption DF). At higher values of boiling point, the accuracy of the estimates becomes less important as the graduated categories for adsorption capacities are associated with wide ranges of boiling point. In many cases, the molecular weight of compounds with unknown boiling points were so high that the boiling point of similar structures was far in excess of the maximum criteria for assigning adsorption DF. On behalf of these measures of conservatism, the estimated physical properties which affect the destruction or removal are assumed to be bounding and their criteria will not contribute any non-conservative error to the assigned DFs.

5.3 Unidentified and Non-included Organic Compounds

It is assumed that previously unidentified or lesser detected compounds will behave similarly to the 400+ compounds considered by this analysis. The COPCs include an abundance of halogenated compounds which are most difficult to destroy in the thermal oxidizer. In addition, several of the halogenated compounds are methanes and ethanes (refrigerants) which have little or no adsorption potential. For this reason, the individual compounds considered by this analysis are assumed to be conservatively representative of the potential organic compounds which could be evolved from the waste. In order for an emissions estimate to establish a conservative bound for emissions, both the implementation of the DFs established by this analysis and a conservative estimate of organic compounds in the feed is required.

5.4 Destruction Efficiency

Time, turbulence, and temperature are commonly referred to as the most important factors on the extent of complete combustion in thermal oxidation or incineration abatement systems. The three "T's" however do not specifically address the availability of oxygen (one of the components of the combustion triangle). The reason is that most commonly the systems under consideration are fired with auxiliary fuel in some type of burner arrangement. In such cases, the oxygen content is usually regulated at a concentration slightly in excess of stoichiometric for the sake of fuel efficiency. Stoichiometric oxygen is typically limited at 3.0 volume percent in the exhaust gas of fired systems. Predictions of destruction efficiency in systems with limited oxygen are not based purely on temperature. The following sections discuss the basis for assigning combustion DFs in the PVP system.

5.4.1 Excess Oxygen

A general relationship between operating temperature, contaminant AIT, residence time, turbulence, percent excess oxygen in the exhaust gas, and DE has been developed and used in the design of incineration systems. Data showing the dependency of DE on temperature and residence time is shown in the table below (Lewandowski 2000 p 27).

Table G-1

Destruction Efficiency (%)	Degrees Above AIT (°F)	Residence Time (s)
95	300	0.5
98	400	0.5
99	475	0.75
99.9	550	1.0
99.99	650	2.0

The table shows DE as a function of the operating temperature in excess of contaminant AIT. This relationship assumes that a threshold turbulence (Reynolds number ≥10,000) and 3.0% excess oxygen are achieved. The upper bound values given in the table suggest that not all of a contaminant is completely destroyed. Even at a temperature of 650 °F above the AIT of a contaminant, 0.01% of the compound is shown to remain undestroyed in the stream.

Oxygen starved pathways are presumed to be responsible for the un-combusted residual (Lewandowski 2000 p-26). A study of destruction mechanisms to help predict the DEs in oxygen deficient systems was conducted by the EPA. The resulting EPA Incinerability Ranking was developed to provide relative destruction of compounds under oxygen deficient conditions. The study and its results were published in an Environmental Science and Technology article entitled *Development of a Thermal Stability Based Ranking of Hazardous Organic Compound Incinerability* (Dellinger 1990). Various relationships were discussed in the article suggesting factors such as elemental composition of the contaminants and the potential for formation of reactive radicals are primary indicators of thermal stability (or instability). Figure 9 of the article shows a 2-dimensional plot of temperature vs the remaining fraction of contaminant (see Attachment 5) illustrating the effect of varying excess oxygen. Numerous data sets are plotted, each representing a different extent of excess oxygen (shown as oxygen equivalence ratio {stoichiometric oxygen/actual oxygen}). A dramatic separation occurs between the plots of oxygen equivalence ratios 1.0 and 1.001. With only the additional 1/1000th of stoichiometric oxygen provided when moving from the equivalence ratio of 1.001 to 1.0, equal destruction is achieved at a significantly lower temperature (more than 100°C lower). In general, the plots all follow the trend of higher available oxygen equating to a lower temperature of equal destruction. However, the differences are subtle until the ratio drops below a value of 1.01. This established trend is a clear indication that oxygen content is the most significant variable to account for when determining destruction efficiency at temperatures above the AIT. As oxygen availability increases, the required temperature for equivalent destruction decreases toward the AIT.

5.4.2 Basis of Destruction

Based on the results shown in Figure 9 of the reference discussed above, and the expected concentration of oxygen in the treated gas of the RTO, the contaminant AIT is assumed to be the single determining variable in assigning organic DFs. Considering the design residence time of 1.0 second under the conditions of excess oxygen in the PVP vent gas (see Section 3.10.1), the DEs shown in Table G-1 are considered to be conservatively bounding and valid for assigning DFs in the PVP system RTO. In order to assign DFs at lower extents than what is shown in Table G-1, data points were extrapolated and fitted to a well behaved plotted function (see trendline of Figure G-2 below). Table G-2 shows the data points for the DFs associated with each predicted destruction efficiency.

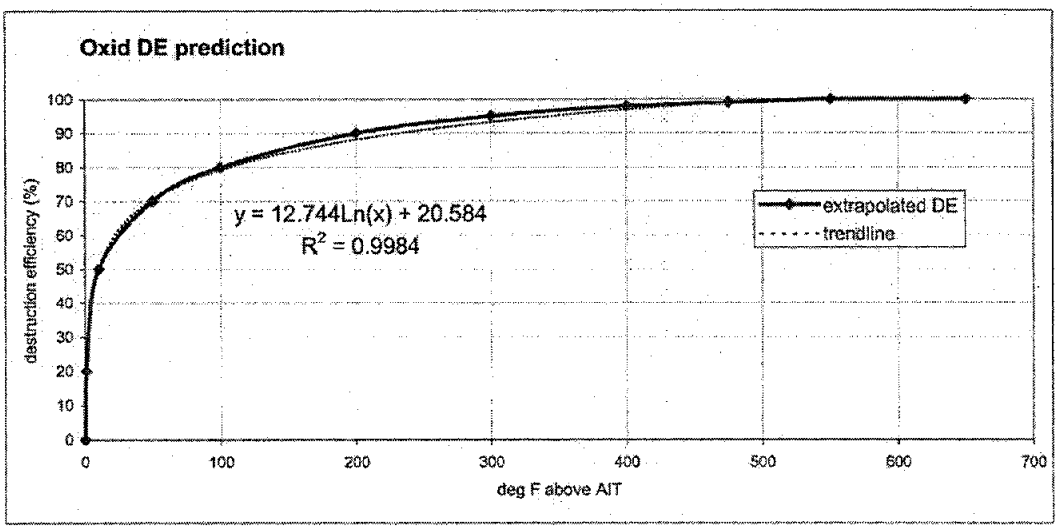
Table G-2

Degrees Above AIT (°F)	Destruction Efficiency (%)	DF (massflow in/massflow out)
<0.2	0	1
1	20	1.25
10	50	2
50	70	3.33
100	80	5
200	90	10
300	95	20
400	98	50
475	99	100
550	99.9	1000
≥650	99.99	10000

The data point for 0.2 °F at zero destruction efficiency is included for the sake of fitting the extrapolated data to the trend line on the plot and for establishing the lower boundary of DE at a conservative fixed point. Given the 1.0 second residence time at operating temperature, some destruction can be expected to take place at the AIT threshold. However, to remain conservative the DF assigned to compounds with AITs of higher than 1599 °F (operating temperature is 1600 degrees) will be 1.0.

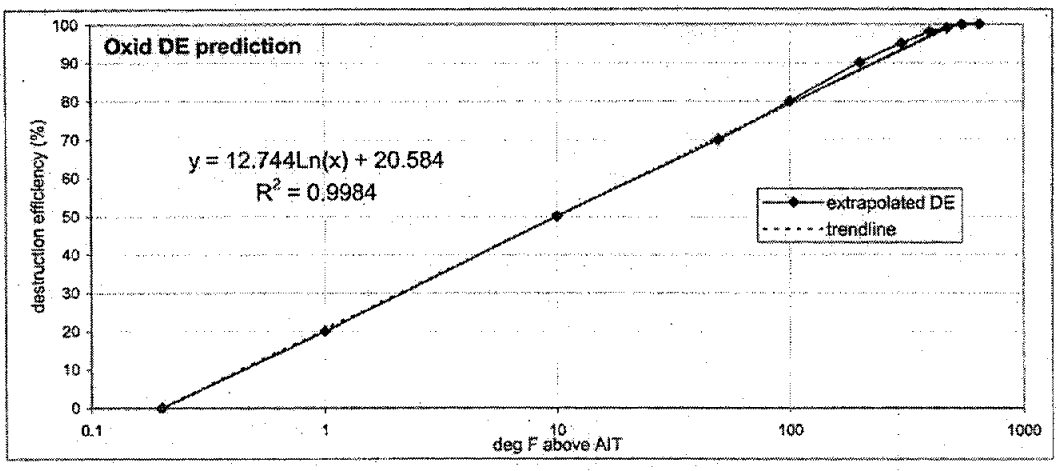
Figure G-2 shows the plotted data points on normal scale and Figure G-3 show the data on a logarithmic scale to better resolve the DE at temperatures just above the AIT.

Figure G-2



General behavior of the plot is reasonable for DE since one would expect the efficiency to be near zero at the initial occurrence of the AIT and then become appreciable rapidly as the temperature increases.

Figure G-3



The plot shown on logarithmic scale indicates that the prediction for destruction efficiency decreases to zero before the operating temperature decreases below the AIT.

While the extrapolation is not expected to be perfectly accurate for each compound, it does reflect reasonable behavior under the combustion conditions of the electric RTO. Given the conservatism applied in assigning AITs and the maximum extent of available oxygen in the treated stream, the DFs are assumed to be both appropriate and achievable.

5.4.3 Residence Time

The design residence time of 1.0 second is assumed to be adequate for all of the above AITs and associated DFs to be valid. This assumption is made while taking into consideration the data shown in Table G-1. The DE of 99.99% is shown for 650 °F above the AIT and a 2.0 second residence time. The extra second of residence time (2 seconds compared to 1.0 in this system) can be thought of as increasing the likelihood of small remaining amounts of contaminant finding an available oxygen and reacting. Given that the data was derived from systems operating with 3.0% excess oxygen, the increase to nearly 21% oxygen (in this system) should more than compensate for the shortened residence time at equal predicted DE.

5.5 Removal Efficiency

The extent of removal for a contaminant depends on its adsorption potential and concentration. Adsorption potential can be estimated for individual compounds based on physical properties; provided the concentration of the contaminant is not dilute beyond the limits of isotherm data. Multi component adsorption is much more difficult since contaminant interactions can be unpredictable. The organic signature of the PVP vent gas will change throughout the operation of the WTP. As such, enabling assumptions are needed to assign individual adsorption potentials. Given that the adsorbers will be designed within the recommended gas loading rate of 10-100 ft/min (24590-PTF-M0C-PVP-00003, p 6), the following assumptions are conservatively bounding with respect to adsorption potential and removal DFs.

5.5.1 Equilibrium Gas Concentrations

No definitive information exists which can predict the concentration of an individual contaminant in the feed to the carbon adsorber. Arguably, the more volatile compounds may already be depleted from the waste due to the continuous removal by the ventilation systems of the waste tanks in the tank farm.

Those which are not volatile enough to have already escaped from the tank waste are not likely to be volatile enough to be appreciably present in the PVP system due to the comparable conditions of temperature and pressure. Overall, the probability of any single constituent to exceed 0.1 ppmv in the adsorber feed is quite small. This presents difficulty when assigning adsorption capacity for any compound since adsorption technology is not traditionally applied to such dilute concentrations of contaminants. As such, little or no isotherm data are available for compounds at below 0.1 ppmv.

To enable adsorption assignments, the exit gas concentration will be assumed to be 0.1 ppmv for each compound. This concentration is the lowest for which reference data can be reasonably extrapolated. Selecting this reference point will establish the best available comparison for use in assigning a conservative adsorption capacity for each contaminant from Tables 1-1 and 1-2.

5.5.2 Adsorption Capacity Estimate Methodology

As a starting point to consider the various different adsorption potentials in this analysis, molecular weight, and boiling point criteria from a technology paper on vapor phase carbon adsorption was used to set graduated thresholds of capacity. The paper, *Activated Carbon Adsorption for Treatment of VOC Emissions* (Shepherd 2001), provides relative adsorption capacities of several common organic compounds (see Attachment 6). The capacities exhibit the governing behavior of adsorption potential based primarily on boiling point and MW of each compound. From the relative capacities and trends shown by the compounds included in this source, the following table was developed to assign the graduated capacities for the same criteria of PVP contaminants:

Table G-3

Contaminant Normal Boiling Point	Contaminant Molecular Weight	Estimated Adsorption Capacity
°C	g/mol	g adsorbed/100g carbon
<25	-	0
-	<50	0
25-50	<150	0.5
<50	-	1
50-100	<150	1
50-100	-	2
100-150	<150	2
100-150	-	5
>150	<150	10
150-200	-	20
>200	-	40

*Note- The dash (-) indicates all values are applicable - given that the compound is not classified by criteria from a previous row.

This graduated assignment of capacity is potentially too general with respect to compounds in a given classification of boiling point and MW since the property value ranges are large. Additionally, no reference is made to compound concentration within the relative capacities presented by the technology paper.

To qualify the values of Table G-3, the assigned capacities of several compounds were compared to the corresponding predicted results of a correlation equation. The equation was developed from available isotherm data of numerous organic compounds (Yaws 1995). The results for common organic compounds having 4 or less carbon atoms were obtained from a quadratic equation as a function each contaminant's assumed concentration and compound-specific quadratic coefficients (see Attachment 7). The logarithmic series expansion equation is shown below:

Equation G-3

$$\log_{10} Q = A + B \log_{10} y + C[\log_{10} y]^2$$

Where:

Q = adsorption capacity at equilibrium (g/100 g carbon)
y = contaminant concentration in ppmv
A, B, & C = quadratic coefficients (contaminant specific)

Of the 436 compounds considered by this analysis, 95 of them were found to have coefficients for prediction of their adsorption capacity by this correlation. In general, the predicted results were in alignment with the estimated capacities assigned from Table G-3 criteria. However, the correlation capacity results were lower than the estimated capacities for 35 of the 95 compounds. The differences in predicted capacities (difference = correlation results - estimated capacity) ranged from -1.9 to 16 (g/100 g carbon). This shows that the graduated capacities determined by the estimation method are generally conservative and in agreement with the correlation. For most compounds, the estimation method is well below the correlation result. It is assumed that the lower predicted capacity from either Table G-3 criteria or the correlation equation (where contaminant constants are available) is achievable by carbon in the PVP adsorption system.

Lastly, it is recognized that some contaminants will be extensively destroyed in the thermal oxidizer and will appear in the adsorption system at extremely dilute concentrations. These low concentrations may be considerably lower than the valid lower limit of either predictive method for capacity. To account for this uncertainty, the estimated adsorption DF of those compounds which show a high DF in the RTO will be reduced by a safety factor. It is assumed that a reduction factor of 10 for adsorption DFs on compounds which have an assigned DF of ≥ 50 in the RTO will adequately compensate for uncertainties in the predicted value based on low concentration. This assumption is incorporated in the analysis methodology (Section 4.4). However, since the combustion DFs have been assigned conservatively, it is recognized that some compounds may achieve a DF of greater than 50 in the RTO even though they have been assigned a lower DF. In these cases, or where the originating evolved contaminant concentrations are appreciably lower than 0.1 ppmv, it is possible that the conservatism of each assigned removal efficiency (adsorption DF) may no longer be conservatively bounding. While this may be the case for numerous identified (or unidentified) compounds, the effect of introduced error on predictions made using the estimated removal DFs will be insignificant. In those cases where the adsorption removal efficiencies may not be bounding due to low concentration, the effect on a mass balance or emissions estimate will be negligible.

5.6 Adsorption RE and DF relationship

As discussed in Section 3.6, removal of a contaminant from a gas stream via adsorption is dependant on the attraction between the contaminant and the adsorbent, the concentration of the contaminant, and the physical properties of the contaminant. These factors are used with empirical data to generate carbon loading capacities and adsorption isotherms. However, the generated (or calculated) isotherms are typically valid for gas phase concentrations above 0.1 or 1.0 ppmv. Extrapolations of equations or relationships which predict loading capacity or isotherm data to concentrations below 0.1 ppmv may become quite inexact. Historical process knowledge would suggest that pilot scale tests should be

conducted to determine exact adsorption performance. This is impractical for the PVP adsorption system since wastes processed in PT contain numerous trace organic compounds and each waste has a different organic signature. Information from pilot testing of a single waste may not be applicable to a different waste source. Therefore the relationship between removal efficiency and DF will be estimated on a more general basis by the following table.

Table G-4

Adsorption Capacity (g adsorbed/100 g carbon)	Removal Efficiency (RE) %	DF mass flow in / mass flow out
0	0	1
0.5	20	1.25
1	50	2
2	80	5
5	90	10
10	95	20
≥20	98	50

This relationship takes into account the conservatism which has been placed on the assignment of each adsorption capacity. Each assigned adsorption capacity has taken into account the potential for selective adsorption (replacement of a weakly attracted contaminant by a strongly attracted compound) and the potential for compounds to be present in much lower than reference concentrations (<0.1 ppmv).

The relationship between estimated adsorption capacity and DF is an enabling assumption. While every attempt has been made to add reasonable conservatism, the above DFs are only a generalized estimate. Any other more accurate means of assigning DFs would require both of two virtually non-attainable pieces of information: 1) the specific compounds and concentrations of adsorbable contaminants in the post oxidizer PVP vent gas, and 2) the specific multi component isotherm for each compound. Once the adsorption system is in service with off gas evolved from PT waste processing, it will be possible to take upstream and downstream samples and establish the extent to which this assumption is conservatively bounding.

6 Analysis

In order to handle data for the numerous compounds maintained in each of the separate lists, the computations were performed on Microsoft® Excel spreadsheets. Example compounds are shown in the remainder of this section to illustrate how the compound physical property data and analysis methodology are used in the computations to assign the DFs. Trans-1,3-Dichloropropene, Ethylene Dibromide, (compound numbers 7 and 14 from Table 1-1) and 1-Heptanol (compound number 95 from Table 1-2), are examples which show the various considerations underpinning the assigned DF methodology.

6.1 Trans-1,3-Dichloropropene

The AIT of Trans-1,3-Dichloropropene is shown as 1130 °F (an estimated value see source 29 at the end of Table 1-1). This value is subtracted from the operating temperature of the RTO (1600 °F) to establish the extent of destruction temperature above the AIT.

1600-1130 = 470 °F

The difference is then compared to the criteria of Table G-2. The difference of 470 °F is higher than 400 °F but not higher than 475 °F. The assigned destruction DE for this compound in the RTO is 98% as associated with compounds having AITs of at least 400 °F below the operating temperature. This value is shown in Table 2-1 of Attachment 2 (compound no. 7).

The DF is calculated using the DE of 98% and Equation G-2 as follows:

$$DF = \frac{1}{\left(1 - \frac{98}{100}\right)} = 50$$

The DF is shown in Table 2-1 beside the DE value.

Next, the boiling point and molecular weight are compared with the criteria from Table G-3 to assign an adsorption capacity. Trans-1,3-Dichloropropene shows a molecular weight of 111 g/mol and a normal boiling point of 112 °C. The uppermost row of Table G-3 for which this compound fits is the boiling range of 100-150 °C and molecular weight of <150. The estimated capacity is 2.0 g/100 g carbon. No quadratic constants for this compound are provided in the prediction correlation from Yaws 1995, therefore the assigned capacity is 2.0 g/100 g carbon. This capacity is compared to the criteria from Table G-4 which shows the corresponding RE of 80%. Equation G-2 applied to this RE gives a DF of 5. The adsorption RE and DF are shown in Table 3-1.

The final consideration for Trans-1,3-Dichloropropene is the potential for extremely low concentration in the feed gas to the adsorption process on behalf of extensive destruction in the RTO. Table 4-1 shows the assigned DFs for combustion and adsorption (see compound no. 7). Since the oxidizer DF is at least 50, the adsorption DF is reduced by a factor of 10. The reduced adsorption DF becomes 5/10 or 0.5 but the minimum DF as defined in Equation is 1.0. The reduced DF for Trans-1,3-Dichloropropene is shown as 1.0 in Table 4-1. This DF will result in a more conservative combined DF since credit is no longer being taken for removal via adsorption. The combined DF is:

oxidation DF x reduced adsorption DF = combined DF = 50 x 1 = 50 (as shown in Attachment 4, Table 4-1)

6.2 Ethylene Dibromide

The AIT of Ethylene Dibromide is shown as 1600 °F (an estimated value). According to the cited physical property source, the compound is considered non-flammable. Given that brominated methanes and ethanes (commonly classified as halons) are used as fire suppression agents and no other information was found available, the AIT value was assigned to be 1600 °F. This ensures that no credit for destruction will be taken in the RTO since the difference between AIT and operating temperature is zero. Criteria from Table G-2 shows that no credit for destruction is taken unless the operating temperature is at least 1.0 degree higher than the AIT. The corresponding DE is 0% and so the DF has been assigned as 1.0 in accordance with Equation . The DF is shown in Attachment 2 - Table 2-1 beside the DE value (compound no. 14).

Next, the boiling point and molecular weight are compared with the criteria from Table G-3 to assign an adsorption capacity. Ethylene Dibromide shows a molecular weight of ~188 g/mol and a normal boiling point of 131.7 °C. The uppermost row of Table G-3 for which this compound fits is the boiling range of 100-150 °C and molecular weight of at least 150. The corresponding estimated adsorption capacity is 5.0 g/100 g carbon.

Quadratic constants were found for using the capacity prediction correlation from Yaws 1995. The constants cited are:

A = 1.4423
B = 0.255
C= -0.0267

The predicted capacity by Equation G-3 is:

$$\log_{10} Q = A + B\log_{10} y + C[\log_{10} y]^2 = 1.4423 + 0.255\log_{10}(0.1) + (^-0.0267)[\log_{10}(0.1)]^2 = 1.16$$

$Q = 10^{1.16} = 14.5$ g ads/100 g carbon

This predicted value is higher than the estimated value using the graduated criteria from Table G-3 and so the estimated adsorption capacity of 5.0 (g /100 g carbon) is selected for this compound.

This capacity is compared to the criteria from Table G-4 which shows the corresponding RE of 90%. Equation G-2 applied to this RE gives a DF of 10. The adsorption RE and DF are shown in Table 4-1.

The final consideration for Ethylene Dibromide is the potential for extremely low concentration in the feed gas to the adsorption process on behalf of extensive destruction in the RTO. Since no credit is taken for combustion of this compound, it does not have a destruction DF of 50 or higher. The combined DF and adsorption DF are the same for Ethylene Dibromide as shown in Table 4-1.

6.3 1-Heptanol

The AIT of 1-Heptanol is shown as 320 °C (608°F). This is a conservatively estimated value which is based on a referenced compound and the recognized trend of longer alkane chains associated with lower AITs (see source 34 at the end of Table 1-2). This value is subtracted from the operating temperature of the RTO (1600 °F) to establish the extent of combustion temperature above the AIT.

1600-608 = 992 °F

This difference is then compared to the criteria of Table G-2. The difference of 992 °F is higher than the maximum DE temperature criteria of 650 °F. The assigned destruction DE for this compound in the RTO is 99.99% as associated with compounds having AITs of at least 650 °F below the operating temperature. This value is shown in Table 2-2 of Appendix 2 (compound no. 95).

The DF is calculated using the DE of 99.99% and Equation G-2 as follows:

$$DF = \frac{1}{\left(1 - \frac{99.99}{100}\right)} = 10{,}000$$

The DF is shown in Table 2-2 beside the DE value.

Next, the boiling point and molecular weight are compared with the criteria from Table G-3 to assign an estimated adsorption capacity. 1-Heptanol shows a molecular weight of 116 g/mol and a normal boiling point of 176 °C. The uppermost row of Table G-3 for which this compound fits is the boiling range of >150 °C and molecular weight of <150. The assigned capacity is 10.0 g/100 g carbon. This capacity is

compared to the criteria from Table G-4 which shows the corresponding RE of 95%. Equation G-2 applied to this RE gives a DF of 20. The adsorption RE and DF are shown in Table 3-2.

The final consideration for 1-Heptanol is the potential for extremely low concentration in the feed gas to the adsorption process on behalf of extensive destruction in the RTO. Table 4-2 shows the assigned DFs for combustion and adsorption (see compound no. 95). Since the oxidizer DF for 1-Heptanol (10,000) is at least 50, the adsorption DF is reduced by a factor of 10. The reduced adsorption DF becomes 20/10 or 2.0 as shown in Table 4-2.

Each of the compounds from Table 1-1 and 1-2 are assigned DFs by the same methodology as these example compounds and are shown in Attachments 2, 3, and 4 in their respective tables.

7 Results and Conclusion

Results of this analysis as defined in the objective are shown in Tables 4-1 and 4-2 of Attachment 4. Without the correct identification of exact species and concentrations of organic contaminants in the PVP system off gas, a more sophisticated method for estimating adsorption performance cannot be used. For contaminants which may be present at less than measurable quantities in the adsorber feed gas, the extent of adsorption capacity may be significantly lower than what would be shown by criteria from Table G-3. However, at concentrations which may be relevant to environmental emissions estimates (near 0.1 ppmv), the analysis methodology can be considered conservative with respect to oxidation DFs. For adsorption DFs, every effort has been made to ensure that the methodology is reasonable and conservative. Pending the operational confirmation that criteria in Table G-4 is bounding behavior for the organic contaminants, the methodology for RE can be considered reasonable for contaminant concentrations near 0.1 ppmv.

The reduction of adsorption DF for use in calculating the combined DF of compounds with high DEs has been implemented to provide additional conservatism. Although the specific adsorption behavior of contaminants at ultra low concentrations is not known, the cumulative effect of compounds at trace quantities is negligible in terms of regulatory importance. As such, the assigned adsorption DFs from this analysis do not present any special requirements for the design of the adsorption system. The adsorption system can be considered complimentary to the oxidation abatement system as exemplified by Ethylene Dibromide (Section 6.2).

8 References

Project Documents

RPT-W375-EN00001, Rev 1, *Final Work Plan for Screening Level Risk Assessment for the RPP-WTP.*

RPT-W375-ES00001, Rev 1, *Integrated Emissions Baseline Report for the River Protection Project Waste Treatment Plant.*

24590-PTF-3YD-PVP-00001, Rev 0, *System Description for Pretreatment Vessel Vent Process System.*

24590-PTF-M0C-PVP-00003, Rev A, *Batch Size of Pretreatment Vessel Vent Carbon Adsorbers (PVP-ABS-00001A/B).*

Other Documents

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9 Attachments

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Table 4-1	COPCs
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Attachment 5	Thermal Stability Ranking Study: Figure 9 of Technical Article *Development of a Thermal Stability Based Ranking of Hazardous Organic Compound Incinerability* (Dellinger 2000)
Attachment 6	VOC Properties and Adsorption Potential: Technology Paper *Activated Carbon Adsorption for Treatment of VOC Emissions* (Shepherd 2001)
Attachment 7	Prediction of VOC Adsorption Capacity: Technical Article *Determining VOC Adsorption Capacity* (Yaws 1995)

Attachment 1 Tables of Contaminants and Physical Properties

Table 1-1 COPCs
Table 1-2 Compounds detected >0.1 ppmv

Table 1-1 COPCs

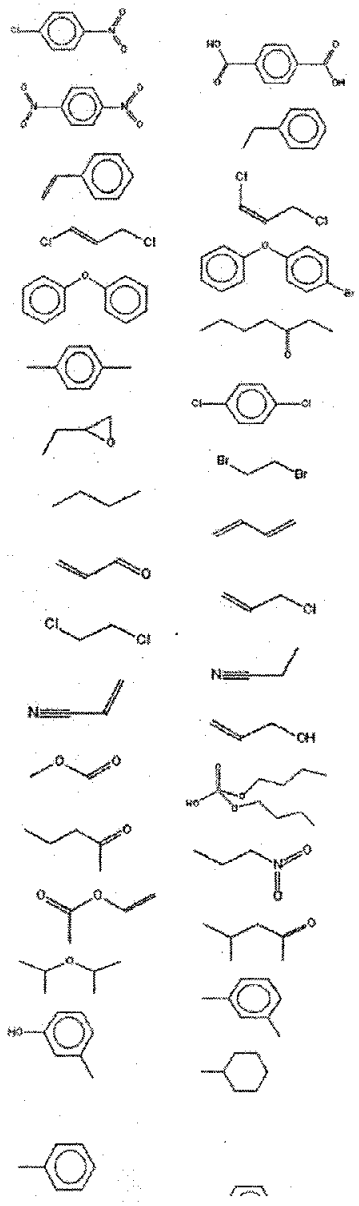
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound Information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	1	100-00-5	p-Nitrochlorobenzene	157.56	C6H4ClNO2		242	0.01	510	950	47	
	2	100-21-0	p-Phthalic acid	166.13	C8H6O4	300	sublimes	0.6	677	1250	51	
	3	100-25-4	1,4-Dinitrobenzene	168.11	C6H4N2O4	173	173	0.05	450	842	54	
	4	100-41-4	Ethyl benzene	106.16	C8H10		136.2	0.026	432	810	1	
	5	100-42-5	Styrene	104.14	C8H8		145.2	0.032	490	915	22	
	6	10061-01-5	cis-1,3-Dichloropropene	110.97	C3H4Cl2		104.3	0.1	600	1112	27	
	7	10061-02-6	trans-1,3-Dichloropropene	110.97	C3H4Cl2		112	0.1	610	1130	29	
	8	101-55-3	4-Bromophenylphenyl ether	249.11	C12H9BrO		310.14	0.000001	839	1542.02	none	4
	9	101-84-8	Diphenyl ether	170.21	C12H10O	26.8	498	insoluble	618	1144	5	
	10	106-35-4	3-Heptanone	114.19	C7H14O		147	0.43	390	734	47	
	11	106-42-3	p-Xylene (Dimethyl benzene)	106.16	C8H10		138.3	0.02	530	986	1	
	12	106-46-7	1,4-Dichlorobenzene	147.01	C6H4Cl2	53.1	173.4	0.00813	640	1184	47	
	13	106-88-7	1,2-Epoxybutane	72.12	C4H8O		63.3	6	479	894.2	17	
	14	106-93-4	Ethylene dibromide (Dibromoethane)	187.88	C2H4Br2		131.7	0.41	871	1600	31	1
	15	106-97-8	Butane (R-600)	58.123	C4H10		-0.45	0.0061	405	761	1	
	16	106-99-0	1,3-Butadiene	54.091	C4H6		-4.4	0.05	449	840.2	22	
	17	107-02-8	Acrolein	56.06	C3H4O		52.7	21.25	235	455	1	
	18	107-05-1	3-Chloropropene (Allyl chloride)	76.526	C3H5Cl		44	0.337	485	905	1	
	19	107-06-2	1,2-Dichloroethane (Ethylene chloride) (freon 150	98.96	C2H4Cl2		83.5	0.86	412	773.6	1	
	20	107-12-0	Propionitrile	55.079	C3H5N		97.2	decomposes	510	950	7	
	21	107-13-1	Acrylonitrile	53.06	C3H3N		77.3	7.45	481	897.8	1	
	22	107-18-6	2-Propene-1-ol	58.08	C3H6O		97	32	378	712.4	1	
	23	107-31-3	Formic acid, methyl ester	60.05	C2H4O2		32	10	465	869	1	
	24	107-66-4	Dibutylphosphate	210.21	C8H19O4P		100	slightly	510	950	26	
	25	107-87-9	2-Pentanone	86.133	C5H10O		100	4.3	505	941	1	
	26	108-03-2	1-Nitropropane	89.09	C3H7NO2		131	1.4	420	788	1	
	27	108-05-4	Vinyl acetate	86.09	C4H6O2		72.3	2	427	800.6	1	
	28	108-10-1	Hexone (4-Methyl-2-pentanone or MIBK)	100.16	C6H12O		117.4	1.9	459	858	1	
	29	108-20-3	Bis(isopropyl)ether	102.18	C6H14O		68.5	0.2	443	829	9	
	30	108-38-3	m-Xylene (Dimethyl benzene)	106.16	C8H10		139.1	0.02	530	986	1	
	31	108-39-4	m-Cresol	108.13	C7H8O		202	1	559	1038.2	5	
	32	108-87-2	Methylcyclohexane	98.188	C7H14		101	insoluble	250	482	1	
	33	108-88-3	Toluene	92.13	C7H8		110.6	0.053	480	896	1	

Table 1-1 COPCs

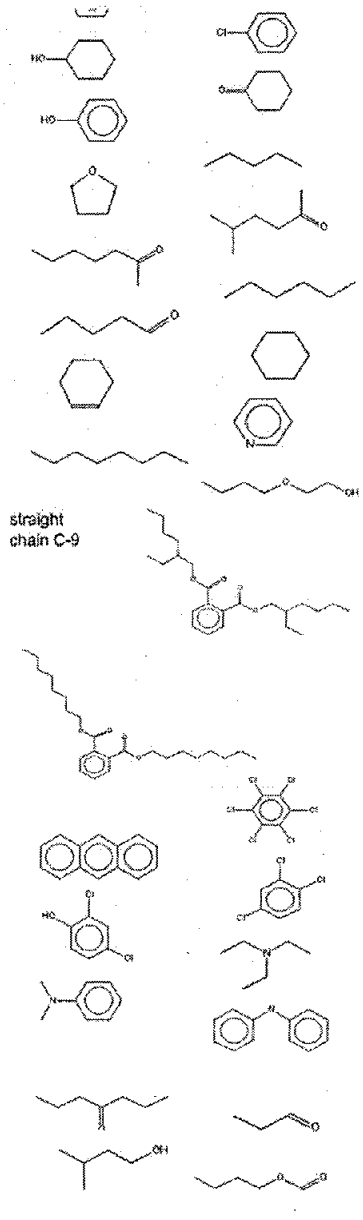
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	34	108-90-7	Chlorobenzene	112.56	C6H5Cl		130	0.05	674	1245	22	
	35	108-93-0	Cyclohexanol	100.16	C6H12O		161	3.6	300	572	5	
	36	108-94-1	Cyclohexanone	98.2	C6H10O		155.6	5	420	788	1	
	37	108-95-2	Phenol	94.11	C6H6O		181.7	8.3	715	1319	21	
	38	109-66-0	n-Pentane	72.15	C5H12		36.1	0.04	260	500	1	
	39	109-99-9	Tetrahydrofuran	72.1	C4H8O		66	30	321	609.8	1	
	40	110-12-3	5-Methyl-2-hexanone	114.19	C7H14O		144	0.5	191	376	6	
	41	110-43-0	2-Heptanone	114.19	C7H14O		150	0.43	393	739	5	
	42	110-54-3	n-Hexane	86.177	C6H14		69	0.00095	225	437	1	
	43	110-62-3	n-Valeraldehyde	86.13	C5H10O		103	0.1	260	500	3	
	44	110-82-7	Cyclohexane	84.161	C6H12		80.7	0.1	245	473	1	
	45	110-83-8	Cyclohexene	82.145	C6H10		83	0.02	310	590	1	
	46	110-86-1	Pyridine	79.1	C5H5N		115.2	miscible	482	899.6	1	
	47	111-65-9	n-Octane	114.23	C8H18		126	slightly	220	428	1	
	48	111-76-2	Ethylene glycol monobutyl ether	118	C6H14O2		171	5	238	460.4	5	
straight chain C-9	49	111-84-2	n-Nonane	128.26	C9H20		150.8	0.1	190	374	1	
	50	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	390.54	C24H38O4		386.9	0.000034	390	734	5	
	51	117-84-0	n-Dioctyl phthalate	390.56	C24H38O4		220	0.0003	391	735.08	55	
	52	118-74-1	Hexachlorobenzene	284.8	C6Cl6		332	0.00000062	839	1542.02	none	4
	53	120-12-7	Anthracene	178.22	C14H10		340	0.00000434	538	1000.4	55	
	54	120-82-1	1,2,4-Trichlorobenzene	181.46	C6H3Cl3		214.4	0.0049	571	1060	50	
	55	120-83-2	2,4-Dichlorophenol	163.01	C6H4Cl2O		210	0.45	839	1542.02	none	4
	56	121-44-8	Triethylamine	101.19	C6H15N		88.9	0.02	249	480	5	
	57	121-69-7	Dimethylaniline	121.18	C8H11N		194	1.6	371	699.8	5	
	58	122-39-4	N,N-Diphenylamine	169.23	C12H11N	52	302	0.03	634	1173	5	
	59	123-19-3	4-Heptanone	114.19	C7H14O		144	0.53	450	842	34	
	60	123-38-6	n-Propionaldehyde	58.08	C3H6O		49	5	207	404.6	1	
	61	123-51-3	3-Methyl-1-butanol	88.15	C5H12O		130	5.4	350	662	1	

Table 1-1 COPCs

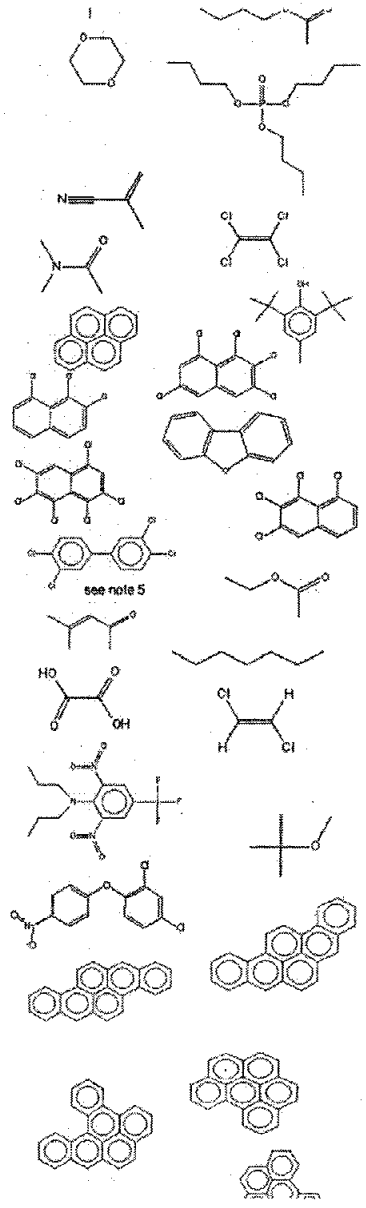
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	62	123-86-4	Acetic acid n-butyl ester	116.16	C6H12O2		126.1	0.68	425	797	1	
	63	123-91-1	1,4-Dioxane	88.1	C4H8O2		101.1	miscible	180	356	1	
	64	126-73-8	Tributyl phosphate	266.32	C12H27O4P		289	0.1	482	899.6	47	
	65	126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	67.09	C4H5N		90.3	2.5	460	860	11	
	66	127-18-4	Perchloroethylene (tetrachloroethylene)	165.85	C2Cl4		121.1	0.015	871	1600	30	1
	67	127-19-5	N,N-Dimethylacetamide	87.12	C4H9NO		166	miscible	490	914	1	
	68	128-37-0	2,6-Bis(tert-butyl)-4-methylphenol	220.35	C15H24O		265	insoluble	470	878	47	
	69	129-00-0	Pyrene	202.24	C16H10	156	404	0.0000013	839	1542.02	none	4
	70	1321-64-8	Pentachloronaphthalene	300.4	C10H3Cl5		327	insoluble	839	1542.02	none	4
	71	1321-65-9	Trichloronaphthalene	231.51	C10H5Cl3		304	insoluble	839	1542.02	none	4
	72	132-64-9	Dibenzofuran	168.19	C12H8O		285	0.1	839	1542.02	none	4
	73	1335-87-1	Hexachloronaphthalene	334.84	C10H2Cl6		343	insoluble	839	1542.02	none	4
	74	1335-88-2	Tetrachloronaphthalene	265.95	C10 H4 Cl4		316	insoluble	839	1542.02	none	4
see note 5	75	1336-36-3	Polychlorinated biphenyls (PCBs)	322	C12HxCly (x+y=10		>195	slightly	839	1542.02	none	4 & 5
	76	141-78-6	Acetic acid ethyl ester (Ethyl acetate)	88.1	C4H8O2		77.1	8	486	906.8	22	
	77	141-79-7	4-Methyl-3-penten-2-one	98.16	C6H10O		127	3	344	651	1	
	78	142-82-5	n-Heptane	100.2	C7H16		98.4	<0.01	223	433.4	1	
	79	144-62-7	Oxalic acid	90.035	C2H2O4		190	10	760	1400	39	
	80	156-60-5	trans-1,2-Dichloroethylene	96.95	C2H2Cl2		47.5	0.63	460	860	1	
	81	1582-09-8	Trifluralin	335.29	C13H16F3N3O4		139	0.01	471	880	33	
	82	1634-04-4	Methyl tert-butyl ether	88.15	C5H12O		55.2	5.1	435	815	5	
	83	1836-75-5	Nitrofen	284.1	C12H7Cl2NO3		180	<0.1	839	1542.02	35	4
	84	189-55-9	Dibenzo[a,i]pyrene	302.37	C24H14	308	404	0.0000013	839	1542.02	none	4
	85	189-64-0	Dibenzo[a,h]pyrene	302.37	C24H14	308	404	0.0000013	839	1542.02	none	4
	86	191-24-2	Benzo(g,h,i)perylene	276.34	C22H12		500	0.000000026	839	1542.02	none	4
	87	191-30-0	Benzo[a,i]pyrene	302.37	C24H14	162	404	0.0000013	839	1542.02	none	4

Table 1-1 COPCs

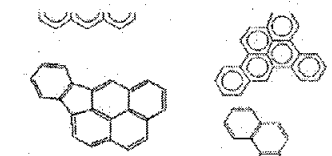
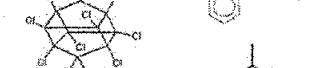
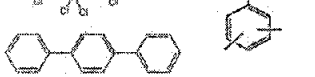
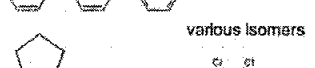
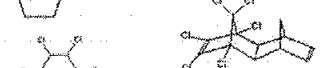
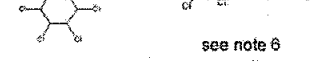
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	88	192-65-4	Dibenzo[a,e]pyrene	302.37	C24H14	241	sublimes	0.0000013	839	1542.02	none	4
	89	193-39-5	Indeno(1,2,3-cd)pyrene	276.34	C22H12	162.5	536	0.0000062	839	1542.02	none	4
	90	205-82-3	Benzo(j)fluoranthene	252.31	C20H12	165	350	0.00000012	839	1542.02	none	4
	91	205-99-2	Benzo(b)fluoranthene	252.32	C20H12	167	357	0.00000012	839	1542.02	none	4
	92	206-44-0	Fluoranthene	202.26	C16H10	110.8	375	0.0000265	839	1542.02	none	4
	93	207-08-9	Benzo(k)fluoranthene	252.32	C20H12	215.7	480	0.000000055	839	1542.02	none	4
	94	208-96-8	Acenaphthylene	152.21	C12H8	93.5	265	0.000393	839	1542.02	none	4
	95	218-01-9	Chrysene	228.28	C18H12	255.8	448	0.00000018	839	1542.02	none	4
	96	2234-13-1	Octachloronaphthalene	403.73	C10Cl8	185	440	insoluble	839	1542.02	none	4
	97	224-42-0	Dibenz[a,j]acridine	279.34	C21H13N	216	>346	not found	839	1542.02	none	4
	98	226-36-8	Dibenz[a,h]acridine	279.34	C21H13N	228	>346	not found	839	1542.02	none	4
	99	2385-85-5	Mirex	545.55	C10Cl12	485	composes	<0.1	839	1542.02	none	4
	100	25551-13-7	Trimethyl benzene	120.19	C9H12		164.7	insoluble	550	1022	1	
	101	26140-60-3	Terphenyls	230.31	C18H14	68	337	insoluble	839	1542.02	none	4
various isomers	102	27154-33-2	Trichlorofluoroethane	151.4	C2H2Cl3F		146.5	0.3	871	1600	36	2
	103	287-92-3	Cyclopentane	70.134	C5H10		49	insoluble	380	716	1	
	104	309-00-2	Aldrin	364.93	C12H8Cl6	104	145	0.000018	839	1542.02	35	
	105	319-84-6	Hexachlorocyclohexane (Lindane) Alpha BHC	290	C6H6Cl6	112	288	0.0002	839	1542.02	none	4
see note 6	106	319-85-7	Hexachlorocyclohexane (Lindane) Beta BHC	290.83	C6H6Cl6	112	288	0.0005	839	1542.02	none	4 & 6
see note 6	107	319-86-8	Delta-BHC	290.85	C6H6Cl6	112	288	0.00213	839	1542.02	none	4 & 6
	108	3697-24-3	5-Methylchrysene	242.32	C19H14	171	404	0.0000013	839	1542.02	none	4
	109	3825-26-1	Ammonium perfluorooctanoate	431.1	C8H4F15NO2	59	192	not found	839	1542.02	none	4
	110	4170-30-3	2-Butenaldehyde (2-Butenal)	70.091	C4H6O		102	18	230	446	16	
	111	465-73-6	Isodrin	364.91	C12H8Cl6	93	304	insoluble	839	1542.02	none	4
	112	50-00-0	Formaldehyde	30.03	CH2O		-19.5	55	430	806	1	
	113	50-29-3	4,4-DDT	354.48	C14H9Cl5	108.5	260	0.000000017	839	1542.02	none	4

Table 1-1 COPCs

Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	114	50-32-8	Benzo(a)pyrene	252.3	C20H12	176.5	495	0.00000038	839	1542.02	none	4
	115	53-70-3	Dibenzo(a,h)anthracene	278.33	C22H14	266	524	0.00000005	839	1542.02	none	4
	116	540-59-0	1,2-Dichloroethylene	96.94	C2H2Cl2		48	0.5	460	860	21	
	117	540-84-1	2,2,4-Trimethylpentane	114.23	C8H18		99.2	insoluble	415	779	1	
	118	541-73-1	1,3-Dichlorobenzene	147.01	C6H4Cl2		173	0.0125	640	1184	47	
	119	56-23-5	Carbon tetrachloride (R-10)	153.84	CCl4		76.7	0.0805	871	1600	8	1
	120	563-80-4	3-Methyl-2-butanone	86.133	C5H10O		94	slightly	452	845.6	6	
	121	56-49-5	3-Methylcholanthrene	268.36	C21H16	179	280	0.0000013	839	1542.02	none	4
	122	56-55-3	Benzo(a)anthracene	228.28	C18H12	159.8	437.6	0.0000014	839	1542.02	none	4
	123	57-14-7	1,1-Dimethylhydrazine	60.099	C2H8N2		63	decomposes	249	480.2	1	
see note 6	124	58-89-9	gamma-BHC (Lindane)	290.83	C6H6Cl6	112.9	323.4	decomposes	839	1542.02	none	4
	125	58-90-2	2,3,4,6-Tetrachlorophenol	231.9	C6H2Cl4O	70	150	slightly	839	1542.02	none	4
	126	591-78-6	2-Hexanone	100.16	C6H12O		127	1.4	533	991	1	
	127	59-50-7	4-Chloro-3-methylphenol	142.58	C7H7ClO	67	235	0.385	839	1542.02	none	4
	128	59-89-2	N-Nitrosomorpholine	116.12	C4H8N2O2	29	224	10	500	932	40	
	129	602-87-9	5-Nitroacenaphthene	199.21	C12H9NO2	102	279	0.1	839	1542.02	none	4
	130	60-29-7	Ethyl ether	74.12	C4H10O		34.6	6.9	160	320	1	
	131	603-34-9	Triphenylamine	245.32	C18H15N	127	347	0.1	839	1542.02	none	4
	132	60-34-4	Methylhydrazine	46.072	CH6N2		87.8	0.1	196	384.8	1	
	133	60-35-5	Acetamide	59.07	C2H5NO		221	10	480	896	15	
	134	60-57-1	Dieldrin	380.93	C12H8Cl6O	176	385	0.00002	839	1542.02	none	4
	135	621-64-7	Di-n-Propylnitrosamine	130.19	C6H14N2O		206	0.9894	275	527	43	
	36	624-83-9	Methyl isocyanate	57.052	C2H3NO		39	decomposes	535	995	13	
	37	627-13-4	Nitric acid, propyl ester	105.09	C3H7NO3		110	insoluble	420	788	28	
	138	62-75-9	N-Nitroso-N,N-dimethylamine	74.1	C2H6N2O		153	10	500	932	37	
	139	630-20-6	1,1,1,2-Tetrachloroethane	167.85	C2H2Cl4		130.5	0.1	871	1600	24	1
	140	64-17-5	Ethyl alcohol	46.069	C2H6O		78.3	10	426	798.8	22	
	141	64-18-6	Formic acid	46.03	CH2O2		100.7	miscible	434	813.2	1	
	142	64-19-7	Acetic acid	60.052	C2H4O2		118	miscible	465	869	1	
	143	67-56-1	Methyl alcohol (Methanol)	32.04	CH4O		64.6	miscible	470	878	1	
	144	67-63-0	2-Propyl alcohol (Isopropanol)	60.096	C3H8O		82.4	miscible	456	852.8	1	
	145	67-64-1	2-Propanone (Acetone)	58.08	C3H6O		56.2	miscible	465	869	1	

Table 1-1 COPCs

Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	146	67-66-3	Chloroform (R-20)	119.39	CHCl3		61.7	0.795	1000	1832	6	
	147	67-72-1	Hexachloroethane	236.74	C2Cl6	187	sublimes	0.005	871	1600	none	4
	148	684-16-2	Hexafluoroacetone	166.02	C3F6O		-26	miscible/reacts	671	1600	23	1
	149	71-23-8	n-Propyl alcohol	60.096	C3H8O		97.2	miscible	440	824	1	
	150	71-36-3	n-Butyl alcohol	74.1	C4H10O		117.6	6.32	367	692.6	22	
	151	71-43-2	Benzene	78.11	C6H6		80.1	0.18	592	1097.6	22	
	152	71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	133.42	C2H3Cl3		74.1	0.1495	537	999	9	
	153	72-20-8	Endrin	380.93	C12H8Cl6O	200	245	0.000026	839	1542.02	none	4
	154	72-43-5	Methoxychlor	345.65	C16H16Cl3O2	78	346	0.0001	839	1542.02	none	4
	155	72-54-8	4,4-DDD	320.05	C14H10Cl4	109	193	0.000016	839	1542.02	none	4
	156	72-55-9	4,4-DDE	319.03	C14H8Cl4	88.4	316.5	0.00000013	839	1542.02	none	4
	157	74-83-9	Bromomethane (Methyl bromide) (halon 1001)	94.95	CH3Br		3.56	1.5	537	998.6	9	
	158	74-87-3	Chloromethane (Methyl chloride) (R-40)	50.49	CH3Cl		-24.2	0.533	662	1223.6	22	
	159	74-97-5	Bromochloromethane (halon 1011)	129.39	CH2BrCl		67.8	0.1	871	1600	24	1
	160	74-99-7	Methylacetylene	40.07	C3H4		-23	not found	340	644	12	
	161	75-00-3	Chloroethane	64.52	C2H5Cl		12.3	0.574	519	966.2	8	
	162	75-01-4	Vinyl chloride (1-Chloroethene)	62.5	C2H3Cl		-13.9	0.11	472	881.6	9	
	163	75-05-8	Acetonitrile	41.05	C2H3N		81.6	miscible	524	975.2	1	
	164	75-07-0	Acetaldehyde	44.05	C2H4O		20.1	miscible	175	347	1	
	165	75-09-2	Dichloromethane (Methylene chloride) (R-30)	84.94	CH2Cl2		39.8	1.32	662	1223.6	58	
	166	75-12-7	Formamide	45.04	CH3NO		210	miscible	500	932	4	
	167	75-15-0	Carbon disulfide	76.14	CS2		46.2	0.12	125	257	1	
	168	75-21-8	Ethylene oxide (Oxirane)	44.05	C2H4O		10.7	miscible	429	804.2	1	
	169	75-27-4	Bromodichloromethane	163.83	CHBrCl2		90.1	0.674	871	1600	none	3
	170	75-34-3	1,1-Dichloroethane	98.97	C2H4Cl2		57.3	0.51	456	852.8	1	
	171	75-35-4	1,1-Dichloroethene (Vinylidene chloride)	96.95	C2H2Cl2		31.7	0.23	457	854.6	9	
	172	75-43-4	Dichlorofluoromethane (R-21)	102.92	CHCl2F		9	insoluble	552	1026	56	2
	173	75-45-6	Chlorodifluoromethane (R-22)	86.47	CHClF2		-40.8	0.3	632	1170	9	
	174	75-50-3	Trimethylamine	59.11	C3H9N		2.87	miscible	190	374	6	
	175	75-52-5	Nitromethane	61.04	CH3NO2		101	9.5	418	784.4	1	
	176	75-55-8	2-Methylaziridine	57.1	C3H7N		66	miscible	490	914	14	
	177	75-61-6	Difluorodibromomethane (freon 12B2- halon 120	209.82	CBr2F2		24	0.1	871	1600	9	2
	178	75-63-8	Trifluorobromomethane (R-13B1)	148.91	CBrF3		-57.8	0.03	871	1600	9	1

Table 1-1 COPCs

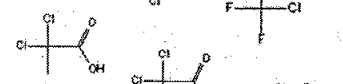
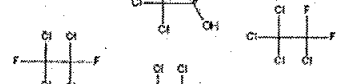
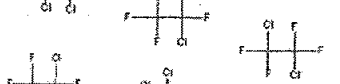
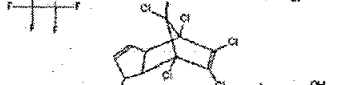
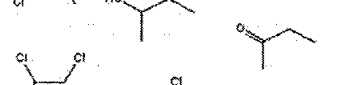
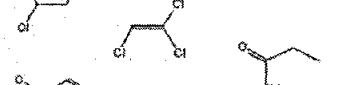
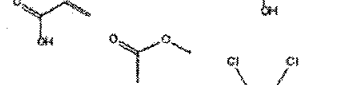
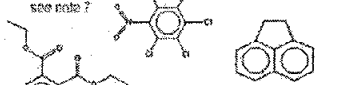
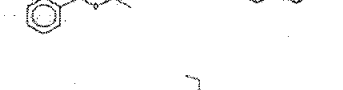
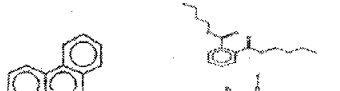
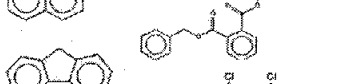
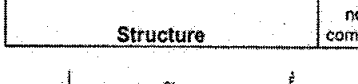
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	179	75-65-0	2-Methyl-2-propanol	74.122	C4H10O		82.2	miscible	478	892.4	5	
	180	75-69-4	Trichlorofluoromethane (R-11)	137.38	CCl3F		23.8	0.124	871	1600	8	2
	181	75-71-8	Dichlorodifluoromethane (R-12)	120.92	CCl2F2		-29.79	0.03	871	1600	9	2
	182	75-99-0	2,2-Dichloropropionic acid	142.97	C3H4Cl2O2		202	50.2	600	1112	46	
	183	76-03-9	Trichloroacetic acid	163.39	C2HCl3O2	57	196	10	871	1600	5	2
	184	76-11-9	1,1,1,2-Tetrachloro-2,2-difluoroethane (R-112a)	203.83	C2Cl4F2	41	91	0.01	732	1350	25	
	185	76-12-0	1,1,2,2-Tetrachloro-1,2-difluoroethane (R-112)	203.83	C2Cl4F2	26	93	0.01	732	1350	25	
	186	76-13-1	1,2,2-Trichloro-1,1,2-trifluoroethane (Freon 113)	187.38	C2Cl3F3		47.6	0.02	680	1256	9	
	187	76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R-114)	170.92	C2Cl2F4		3.8	slightly	871	1600	9	2
	188	76-15-3	Chloropentafluoroethane (R-115)	154.47	C2ClF5		-39.1	insoluble	871	1600	9	2
	189	76-44-8	Heptachlor	373.35	C10H5Cl7	95	135	0.000018	839	1542.02	none	4
	190	78-83-1	2-Methylpropyl alcohol (Isobutyl alcohol)	74.12	C4H10O		107.9	9.5	415	779	9	
	191	78-87-5	1,2-Dichloropropane	112.99	C3H6Cl2		96.8	0.27	557	1034	1	
	192	78-92-2	1-Methylpropyl alcohol (2-Butanol)	74.122	C4H10O		99.5	15	406	762.8	1	
	193	78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	72.1	C4H8O		79.6	25.6	516	960.8	2	
	194	79-00-5	1,1,2-Trichloroethane	133.42	C2H3Cl3		113.8	0.442	500	932	22	2
	195	79-01-6	Trichloroethylene	131.4	C2HCl3		86.7	0.11	420	788	5	
	196	79-09-4	Propionic acid	74.08	C3H6O2		140.7	37	490	914	18	
	197	79-10-7	2-Propenoic acid	72.06	C3H4O2	12	141.6	10	438	820.4	5	
	198	79-20-9	Methyl acetate	74.08	C3H6O2		56.9	24.5	502	935.6	1	
	199	79-34-5	1,1,2,2-Tetrachloroethane	167.86	C2H2Cl4		146.3	0.3	871	1600	9	2
see note 7	200	8001-35-2	Toxaphene	414	C10H10Cl8	65	composes	0.000055	839	1542.02	none	4 & 7
	201	82-68-8	Pentachloronitrobenzene (PCBN)	295.36	C6Cl5NO2	144	328	0.000059	839	1542.02	none	4
	202	83-32-9	Acenaphthene	154.21	C12H10	95	279	0.00035	839	1542.02	none	4
	203	84-66-2	Diethyl phthalate	222.24	C12H14O4		298	0.09	457	855	5	
	204	84-74-2	Dibutyl phthalate	278.34	C16H22O4		340	0.0013	402	756	5	
	205	85-01-8	Phenanthrene	178.22	C14H10	99.5	340	0.00012	839	1542.02	none	4
	206	85-68-7	Butylbenzyl phthalate	312.39	C19H20O4		370	0.00027	233	451.4	52	
	207	86-73-7	Fluorene	166.22	C13H10	116	295	0.000019	839	1542.02	none	4
	208	87-68-3	Hexachlorobutadiene	260.76	C4Cl6		210	0.00032	610	1130	55	
	209	87-86-5	Pentachlorophenol	266.34	C6HCl5O	174	310	0.0014	839	1542.02	none	4

Table 1-1 COPCs

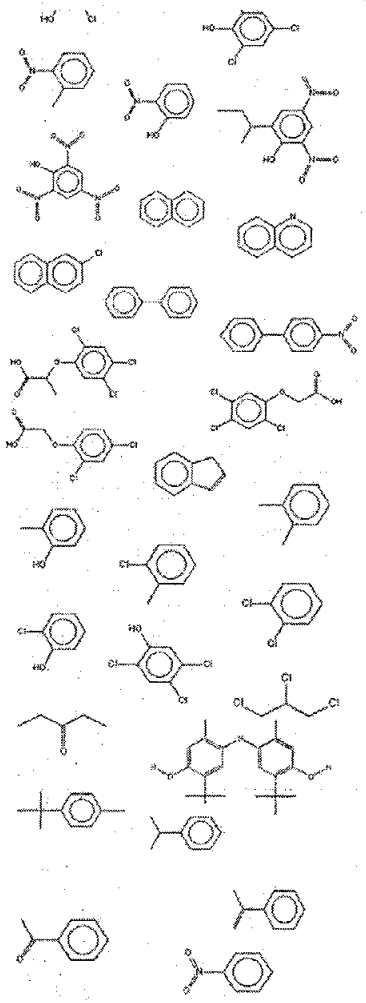
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		
	210	88-06-2	2,4,6-Trichlorophenol	197.46	C6H3Cl3O	69.5	244.5	0.08	839	1542.02	none	4
	211	88-72-2	2-Nitrotoluene	137.13	C7H7NO2		221	0.06	305	581	44	
	212	88-75-5	2-Nitrophenol	139.11	C6H5NO3	45.3	214.6	0.21	839	1542.02	none	4
	213	88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	240.22	C10H12N2O5	55.5	>300	0.0052	839	1542.02	none	4
	214	88-89-1	Picric acid	229.11	C6H3N3O7	122	>300	1.4	300	572	none	
	215	91-20-3	Naphthalene	128.16	C10H8	80.6	218	0.00031	568	1054	1	
	216	91-22-5	Quinoline	129.16	C9H7N		238	0.01	480	896	5	
	217	91-58-7	2-Chloronapthalene	162.61	C10H7Cl	59.5	256	0.000674	839	1542.02	none	4
	218	92-52-4	1,1'-Biphenyl	154.21	C12H10	70	255	insoluble	540	1004	55	
	219	92-93-3	4-Nitrobiphenyl	199.21	C12H9NO2	113.8	340	insoluble	839	1542.02	none	4
	220	93-72-1	Silvex (2,4,5-TP)	269.51	C9H7Cl3O3	176	200	0.014	839	1542.02	none	4
	221	93-76-5	2,4,5-T	255.48	C8H5Cl3O3	158	composes	decomposes	839	1542.02	none	4
	222	94-75-7	2,4-D and esters (180C typed)	221.04	C8H6Cl2O3	138	160	decomposes	839	1542.02	none	4
	223	95-13-6	Indene	116.16	C9H8	58	181.6	insoluble	526	979	41	
	224	95-47-6	o-Xylene	106.16	C8H10		144	0.017	465	869	1	
	225	95-48-7	o-Cresol (2-Methylphenol)	108.13	C7H8O	30.9	191	0.1	559	1038.2	5	
	226	95-49-8	2-Chlorotoluene	126.59	C7H7Cl		159	slightly	500	932	37	
	227	95-50-1	o-Dichlorobenzene (1,2-Dichlorobenzene)	147.01	C6H4Cl2		180.5	0.0084	640	1184	47	
	228	95-57-8	2-Chlorophenol	128.56	C6H5ClO	7	175.6	2.85	415	779	53	
	229	95-95-4	2,4,5-Trichlorophenol	197.46	C6H3Cl3O	68	253	0.12	839	1542.02	none	4
	230	96-18-4	1,2,3-Trichloropropane	147.43	C3H5Cl3		156	0.18	500	932	37	
	231	96-22-0	3-Pentanone	86.133	C5H10O		101	4.7	450	842	1	
	232	96-69-5	Bis(3-tert-butyl-4-hydroxy-6-methyl-phenyl)sulfide	358.54	C22H30O2S	150	316	<0.01	839	1542.02	none	4
	233	98-51-1	p-tert-Butyltoluene	148.25	C11H16		193	<0.1	510	950	47	
	234	98-82-8	Cumene	120.19	C9H12		151	0.005	424	795	1	
	235	98-83-9	alpha-Methylstyrene	118.18	C9H10		165.4	<0.1	574	1065.2	42	
	236	98-86-2	Acetophenone	120.5	C8H8O	19.6	201.7	0.55	571	1059.8	5	
	237	98-95-3	Nitrobenzene	123.11	C6H5NO2	5.7	210.8	0.19	482	899.6		

Table 1-1 COPCs

Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		

Notes:
General- Boiling points were taken from Chemfinder (http://chemfinder.cambridgesoft.com) or NIST (http://webbook.nist.gov/chemistry/) where lowest value is not found with the AIT source.
1- MSDS shows compound is non flammable. AIT shown is reported as 1600 deg F to ensure that minimal credit is taken for removal efficiency through thermal oxidizer.
2- MSDS shows no AIT information and reports neglible fire hazard. AIT shown is 1600 deg F for same reason as note 1.
3- No MSDS or AIT information can be found for this compound. Due to its single carbon and 3 halogen structure, it will be treated similar to chloroform.
4- compounds with normal boiling points above 200, contain aromatic rings, and contain numerous halogen substitutions are treated as PCB in terms of AIT - in cases where no AIT information could be found - an AIT of 1542 will be used in this case in accordance with TSCA guidlines for destruction of PCBs of 2192 deg F, 2 sec res time, and 3% excess air in combustion products (this is a back calculated AIT from the efficiency predicted in table 3-2 of Lewandowski - Design on Thermal Oxidation Systems. This will be used for non halogenated napthalenic compounds as well in order to be conservative (pyrene, perlene etc).
5- structure shown is 1-1'-biphenyl,3,3',4,4'-tetrachloro (CAS# 32598-13-3) and is shown under the general context of PCBs to present a typical structure for chlorine substitutions on the biphenyl structure. Numerous variations of chlorine substitutions exist with the broad group of PCBs, however within this calculation, the treatment of PCBs under one set of compound properties is appropriate since the important properties do not range across DF boundary threshold values.
6- All BHC compound structures are the same except for the cis/trans orientation of the chlorine substitutions. (see Alpha BHC - CAS#319-84-6)
7- Camphene is the root structure of toxaphene which has 8 chlorine substitutions - no structure was found for toxaphene

AIT Sources

1 Lange's Handbook of Chemistry - 14th edition
2 MSDS - EXXON CHEMICAL AMERICAS DIV.
(http://www.temarry.com/MSDS/Methyl_Ethyl_Ketone_msds.htm)
3 n-Valeraldehyde is a synonym for pentanal. The AIT is estimated from the sequence of increasing carbon aldehydes: acetaldehyde (ethanal)-175 deg C, propionaldehyde (propanal)-207 deg C, butanal-230 deg C.
4 MSDS from Internation Programme on Chemical Safety
(http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/_icsc08/icsc0891.pdf)
5 MSDS from JT Baker (http://www.jtbaker.com/msds/a0120.htm)
6 MSDS (http://www.bandj.com/MainWindowPages/MSDS/DimAcetaMSDS.htm#5)
7 estimated from MSDS of acetonitrile - precision pure solvents (http://www.purificationtech.com/techacmsds3.htm)-524 deg C and safety data of butyronitrile from Physical and Theoretical Chemistry Lab (http://physchem.ox.ac.uk/MSDS/BU/butyronitrile.html)-488 deg C.
8 MSDS - BOC Gases (http://www.vngas.com/pdf/g32.pdf)

9 MSDS - MATHESON TRI-GAS, INC (http://www.matheson-trigas.com/mathportal/msds/)

10 estimated from Langes Handbook of chemistry for 1,1-dichloroethylene - (570 deg C) instead of cis-1,2-dichloroethylene - (460 deg C)
11 AIT is estimated by comparison with the following compounds: (see structures to the right)

2-methyl propane - 462 deg C (source #1)
2-methyl butane - 420 deg C (source #9)
2-nitropropane - 428 deg C (source #1)
dimethylamine - 400 deg C (source #1)
diethylamine - 312 deg C (source #1)
acrylonitrile - 481 deg C (source #1)
isopropyl amine - 402 deg C (source #1)

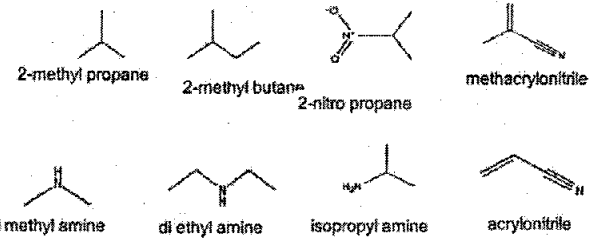
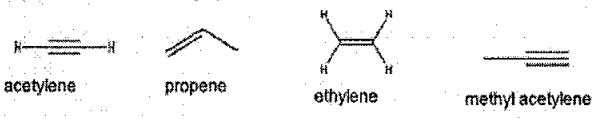


Table 1-1 COPCs

Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound Information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		

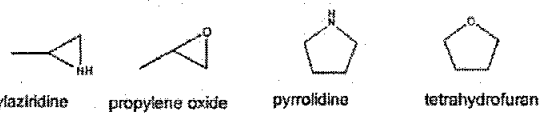
12 AIT is estimated by comparison with the following compounds: (see structures to the right)

acetylene - 305 deg C (source # 1)
propene - 460 deg C (source # 1)
ethylene - 490 deg C (source # 1)



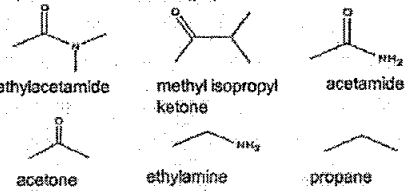
13 University of Akron Hazardous Chemical Database (http://ull.chemistry.uakron.edu/erd/)
14 AIT is estimated by comparison with the following compounds: (see structures to the right)

pyrrolidine - 345 deg C (source: BASF MSDS (http://www.basf.com/businesses/chemicals/pdfs/pyrrdine.pdf)
tetrahydrofuran - 321 deg C (source # 1)
propylene oxide - 449 deg C (source # 1)



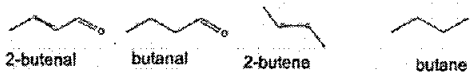
15 AIT is estimated by comparison with the following compounds: (see structures to the right)

ethylamine - 385 deg C (source: #1)
propane - 450 deg C (source # 1)
acetone - 465 deg C (source # 1)
dimethylacetamide - 490 deg C (source #1)
methyl isopropyl ketone - 452 deg C (source #6)



16 AIT is estimated by comparison with the following compounds: (see structures to the right)

butanal - 230 deg C (source #1)
butane - 405 deg C (source #1)
2-butene - 324 deg C (source #1)



17 AIT is estimated from ethylene oxide (429 deg C) and propylene oxide (449 deg C) (CAS# 's 75-21-8 and 75-56-9 from AIT source #1)
18 AIT is estimated from formic acid (434 deg C) and acetic acid (465 deg C) CAS#'s 64-18-6 and 64-19-7 from AIT source #1
19 AIT is estimated by comparison with the following compounds: (see structures to the right)

trimethyl amine - 249 deg C (source #1)
methyl isocyanate - 535 deg C (source #1)
2-nitropropane - 428 deg C (source #1)
dimethyl hydrazine - 249 deg C (source #1)

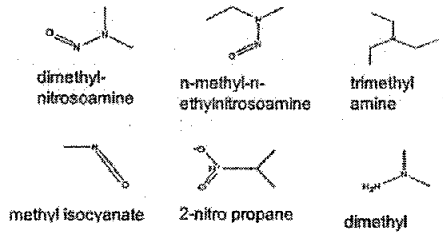
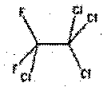


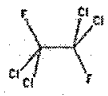
Table 1-1 COPCs

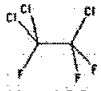
Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		

20 sigma chemical MSDS (http://msds.pdc.cornell.edu/msds/siri/msds/h/q427/q266.html)
21 occupational safety and health guideline for phenol (http://www.osha-slc.gov/SLTC/healthguidelines/phenol/)
22 "Optimized Design and Operating Parameters for Minimixing Emissions During VOC Thermal Oxidation", Edward Donley and David Lewandowski. 88th Annual Meeting of Air & Waste Mgmt Assoc., 1995
23 MSDS from P & M Scientific Industrial Assoc (http://www.fluorine.ru/products/msds/others/hexafluoroacetone_msds.html)
24 International Chemical safety cards (http://hazard.com/msds/mf/cards/list.html)
25 AIT is estimated from 1,1,2-trichloro-1,2,2-trifluoroethane (see structures to below)

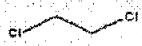
1,1,2,-trichloro-1,2,2-trifluoroethane - 680 deg C
1,1,1,2-tetrachloro-2,2-difluoroethane - 732 deg C
1,1,2,2-tetrachloro-1,2-difluoroethane - 732 deg C

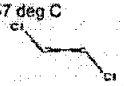

1,1,1,2-tetrachloro-2,2-difluoroethane

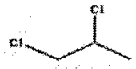

1,1,2,2-tetrachloro-1,2-difluoroethane


1,1,2,-trichloro-1,2,2-trifluoroethane

26 MSDS from OxyChem (http://new-www.oxychem.com/products/msds/m7623.pdf)
27 estimated from 1,2-dichloropropane (AIT is 557 deg C from source 1)
28 estimated from 1-nitropropane (AIT is 420 deg C from source 1)
29 AIT is estimated from 1,2 dichloropropane (see structures to below)
1,2-dichloroethane - 412 deg C
1,2-dichloroethylene - 460 deg C
1,2-dichloropropane - 557 deg C


1,2-dichloroethane


1,2-dichloroethylene

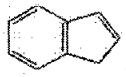

1,2-dichloropropane

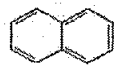
1,3-dichloropropene

30 Hill Brothers Chemical Co. MSDS (http://hillbrothers.com/msds/perchloro.htm)
31 OCCUPATIONAL SAFETY AND HEALTH GUIDELINE FOR ETHYLENE DIBROMIDE (http://www.osha-slc.gov/SLTC/healthguidelines/ethylenedibromide/recognition.html#healthhazard)
32 OCCUPATIONAL SAFETY AND HEALTH GUIDELINE FOR HEPTACHLOR (http://www.osha-slc.gov/SLTC/healthguidelines/heptachlor/)
33 Albaugh, INC. MSDS (http://www.cdms.net/ldat/mp4JE001.pdf)
34 AIT estimated from 2-heptanone - 393 deg C (source #5)
35 No AIT information was found available. Because this molecule has multiple unsaturated bonds and chlorine attachments, its AIT is estimated at 1542 deg F. This temperature fits the prediction table by back calculation when using TSCA guidelines on incineration of PCBs at minimum temperatures of 2192 deg F for achieving 99.99% destruction.

36 AIT is estimated by comparison with tetrachloroethanes from above (CAS#'s 630-20-6 and 79-34-5)
37 AIT is Conservatively estimated at 500 deg C since MSDS has no stated AIT but uses NFPA fire rating of 2 - compound is therefore assumed flammable at a reasonable AIT

38 AIT is estimated from N-Nitroso-N,N-dimethylamine (CAS# 62-75-9)
39 Compound is shown to decompose at high temperatures. AIT is estimated at 1400 deg F to be conservative
40 Compound is conservatively estimated to have AIT of less than 500 deg C based on its lack of halogens and double bonds (resonance stabilized structure)
41 AIT is estimated by Napthalene (see structures below)


indene


naphthalene

42 AMS MSDS (http://www.kpb.co.kr/eng/product/msds_AMS.htm)
43 Chemical Land 21.com Phys and Chem properties (http://www.chemicalland21.com/arokorhi/industrialchem/organic/DIPROPYLAMINE.htm)
44 Physical and Theoretical Chemistry Laboratory - Oxford University (http://physchem.ox.ac.uk/MSDS/)
45 AIT is conservatively estimated at 1600 deg F by comparison to Phenol with additional chlorine substitutions

Table 1-1 COPCs

Structure	no. of compound	CAS #	COPCs	MW	formula	melting point (if above 0°C)	normal boiling point	water solubility	AIT	AIT	AIT source	Compound information Note
			Compound	g/mol		°C	°C	g/100mL	deg C	deg F		

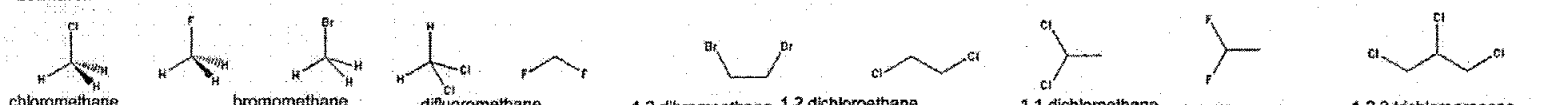
46 AIT is conservatively estimated from Trans-1,3-dichloropropene (610 deg C) and 1,2 dichloropropane (557 deg C)
47 MSDS - Fisher Scientific Canada (http://www.fishersci.ca/homepage2.nsf/frmSearch?CreateDocument&lang=E&AID=waSearch&DB=msds.nsf) or by link at (http://www-woc.sci.kun.nl/cgi-bin/view?xylenol)
48 occupational safety and health guideline (http://www.osha-slc.gov/SLTC/healthguidelines)
49 No AIT information was found available - AIT is conservatively estimated at 1600 deg F since compound has multiple halogen substitutions
50 MSDS - Baxter Healthcare Burdick & Jackson Div. (http://www-woc.sci.kun.nl/cgi-bin/view?xylenol)
51 MSDS - Amoco (http://www-woc.sci.kun.nl/cgi-bin/view?xylenol)
52 MSDS from NPS chemical repository (http://ntp-support.niehs.nih.gov/ntp_reports/ntp_chem_h&s/ntp_chem8/radian85-68-7.txt)
53 AIT is estimated from 4-chlorophenol which is listed in source 5
54 AIT is estimated from 1-chloro-4-nitrobenzene (CAS# 100-00-5)
55 MSDS - NTP chemical repository (http://157.98.10.135/NTP_Reports/NTP_Chem_H&S/NTP_Chem1/Radian117-84-0.txt)
56 Chemical Properties Handbook, C. L. Yaws, 1999 McGraw-Hill Publishing
57 estimated from the following sources and structural comparison:

Sources:
* 1,1 difluoroethane AIT of 849 deg F - from Dupont chemical MSDS (http://www.dupont.com/msds/40_37_3027fr.html)
* difluoromethane AIT of 986 deg F - from National Industrial Chemicals Notification and assessment Scheme Report: (http://www.nicnas.gov.au/publications/CAR/new/NA/NAFULLR/NA0500FR/NA563FR.pdf)
* No AIT for flouromethane could be found - however, the NFPA flammability rating for this compound is 4 and the AIT is assumed to be much less than difluoromethane.

*1,2 dichloromethane AIT of 1186 deg F is listed above
*chloromethane AIT of 1224 deg F is listed above
*1,2 dichloroethane AIT of 774 deg F is listed above
*1,1 dichloroethane AIT of 853 deg F is from Langes Handbook (source 1 from above)
* 1,2,3 trichloropropane AIT of 580 deg F - from NTP chemical repository MSDS: (http://ntp-server.niehs.nih.gov/htdocs/Chem_H&S/NTP_Chem9/Radian96-18-4.html)

*bromomethane AIT of 998.6 deg F is listed above

Estimation



58 University of Akron - Chemical Database (http://ull.chemistry.uakron.edu/erd/)

Table 1-2 Compounds detected > 0.1 ppmv

Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[1]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			
none	1	Cyclotrisiloxane, hexamethyl-	222.5	541-05-9	C6H18O3Si3	65	134	"moisture sensitive"	1	400	53		
	2	Cyclotetrasiloxane, octamethyl-	296.6	556-67-2	C8H24O4Si4	17.6	175	"insoluble"	6	400	42	2	typically found in adhesives and sealant materials
	3	tetramethylcyclotrisiloxane	194.0	USI000-06	C4H14O3Si3	-65	135	"insoluble"	3	250	2	3	made for tetramethylcyclotetrasiloxane - also shows reactive with water
	4	Benzenesulfonamide, N-butyl-	213.3	3622-84-2	C10H15NO2S		314	practically insoluble"	2	800	54	1	
	5	2(3H)-Furanone, dihydro-3,5-dimethyl-	114.1	5145-07-1	C6H10O2	-31	206	"completely"	4	425	13		
	6	Pyridine, 2,4-dimethyl-	107.2	108-47-4	C7H9N	-60	159		5	482	3		
	7	Furan, tetrahydro-	72.1	109-99-9	C4H8O		66	<0.1	1	321	1		
	8	Furan	68.1	110-00-9	C4H4O	-85.6	31.4	<0.1	1	360	42		
	9	Pyridine	79.1	110-86-1	C5H5N	-41.6	115.2	"miscible"	1	482	1		
	10	Furan, 2,5-dihydro-	70.1	1708-29-8	C4H6O		67		5	450	10		
	11	2H-Pyran-2-one, tetrahydro-5,6-dimethyl-, tr	128.2	24405-16-1	C7H12O2		180		7	350	12		
	12	Pyrimidine	80.1	289-95-2	C4H4N2	20	123		1	450	11		
	13	Pyrazine	80.1	290-37-9	C4H4N2	52	115		1	450	11		
	14	Furan, 2-methyl-	82.1	534-22-5	C5H6O	-88.7	63	<0.1	1	450	10		
	15	Oxirane, ethenyl-	70.1	930-22-3	C4H6O	-65.7	67	1-5	5	429	14		
	16	2(3H)-Furanone, dihydro- (gamma butyrolact	86.1	96-48-0	C4H6O2	-43	205	10	5	450	10		
	17	1,3-Propanediol, dinitrate	166.1	3457-90-7	C3H6N2O6		100		7	450	9		boiling pt estimated by nitric acid propyl ester
	18	1,4-Butanediol, dinitrate	180.1	3457-91-8	C4H8N2O6	12	130		5*	450	9		boiling pt estimated by nitric acid butyl ester
	19	Nitrous acid, butyl ester	103.1	544-16-1	C4H9NO2		78		5	450	7	3	
	20	Nitrous acid, methyl ester	61.0	624-91-9	CH3NO2	-83	64.6		6	500	8		
	21	Nitric acid, ethyl ester	91.1	625-58-1	C2H5NO3	-102	88	"decomposes"	5	90	1		
	22	Butane, 1-nitro-	103.1	627-05-4	C4H9NO2	-81	153	slightly	5	450	4		
	23	Nitric acid, propyl ester	105.1	627-13-4	C3H7NO3	-100	110	"insoluble"	1	175	1		reported as "insoluble"
	24	Methanamine, N-methyl-N-nitroso- and othe	74.1	62-75-9	C2H6N2O		153		5	500	17		
	25	Nitric acid, butyl ester	119.1	928-45-0	C4H9NO3		136		5	400	5		
	26	Pyrrolidine	71.1	123-75-1	C4H9N	-61	87		5	450	6		
	27	Methanamine, N-(1-methylbutylidene)-	99.2	22431-09-0	C6H13N		130		7	350	16		boiling pt estimated from hexamethylenimine
	28	2-Pyrrolidinone	85.1	616-45-5	C4H7NO	24	245		1	450	15		
	29	Methanamine, N,N-dimethyl-	59.1	75-50-3	C3H9N	-117	2.9	miscible	1	190	1		
	30	Propanenitrile	55.1	107-12-0	C3H5N	-93	97	5-10	5	510	17		reported to decompose in aqueous solution
	31	Butanenitrile	69.1	109-74-0	C4H7N	-112	118	slightly	1	488	18		
	32	Pentanenitrile	83.1	110-59-8	C5H9N	-96	139	0.1-0.5	1	475	19		
similar to above	33	Octanenitrile	125.2	124-12-9	C8H15N	-45	199		1	450	19		
similar to above	34	Nonanenitrile	139.2	2243-27-8	C9H17N	-35	224		1	440	19		
similar to above	35	Hexanenitrile	97.2	628-73-9	C6H11N	-80	162		5	470	19		
similar to above	36	Heptanenitrile	111.2	629-08-3	C7H13N	-63	180		5	460	19		
	37	Acetonitrile	41.1	75-05-8	C2H3N	-48	81	miscible	1	524	1		
	38	Butanoic acid, butyl ester	144.2	109-21-7	C8H16O2	-92	166		1	450	20		
	39	Tetradecanoic acid, 1-methylethyl ester	270.5	110-27-0	C17H27O2		300		1*	400	21		boiling pt estimated from Pentadecanoic acid
	40	Butanedioic acid, diethyl ester	174.2	123-25-1	C8H14O4	-20	217		1	350	24	1	
	41	Acetic acid, butyl ester	116.2	123-86-4	C6H12O2	-108	126	0.68	1	425	1		
	42	Phosphoric acid tributyl ester	266.3	126-73-8	C12H27O4P	-80	289	0.1	1	482	17		
	43	Acetic acid ethyl ester	88.1	141-78-6	C4H8O2	-83	77.1	8	1	482	17		

Table 1-2 Compounds detected > 0.1 ppmv

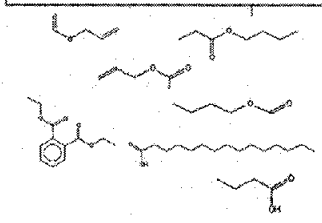
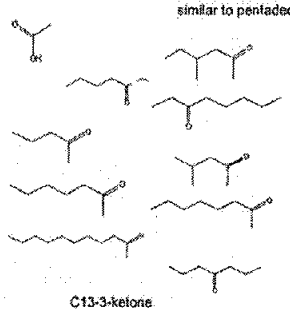
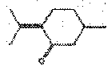
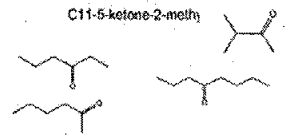
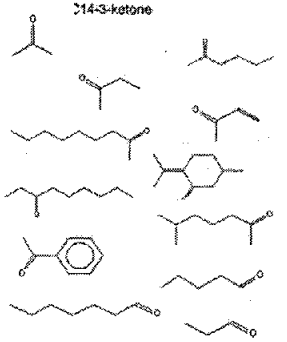
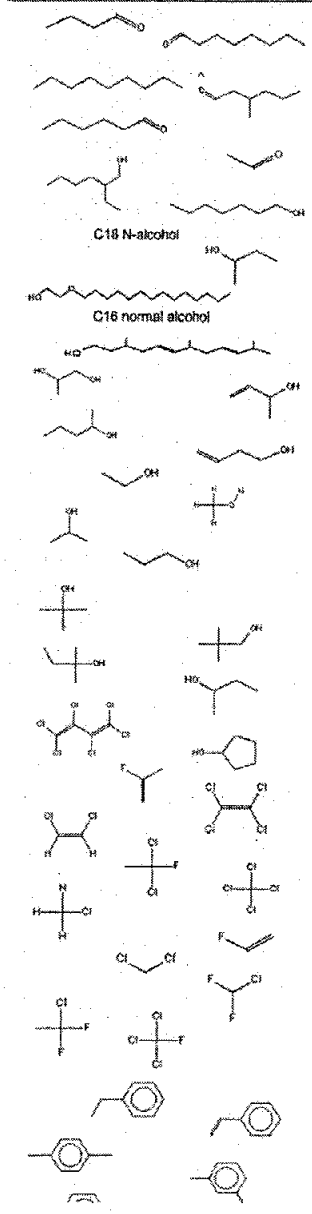
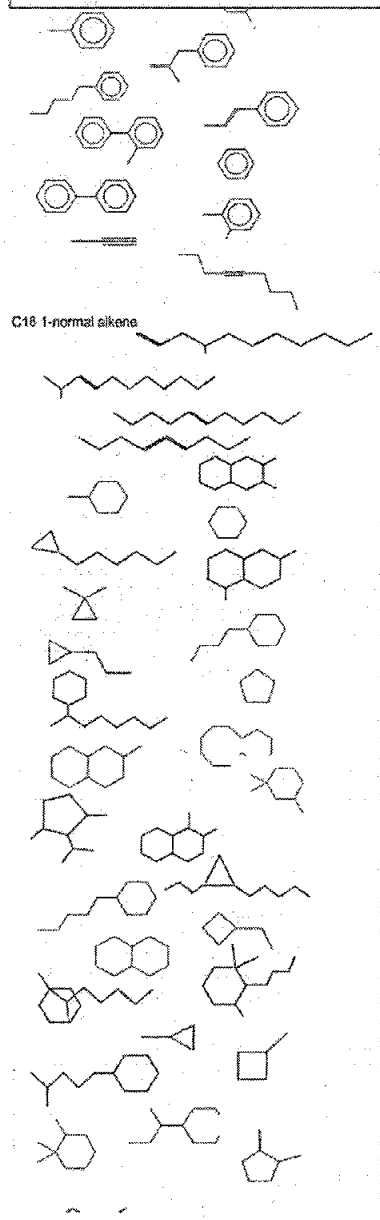
Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[1]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			
	44	Formic acid, 2-propenyl ester	86.1	1838-59-1	C4H6O2		83		6	500	25		
	45	Propanoic acid, butyl ester	130.2	590-01-2	C7H14O2	-75	145		1	427	1		
	46	Acetic acid, 2-propenyl ester	100.1	591-87-7	C5H8O2		103	"slightly"	1	475	28		
	47	Formic acid, butyl ester	102.1	592-84-7	C5H10O2	-90	107	"slightly"	1	322	1		
	48	1,2-Benzenedicarboxylic acid, diethyl ester	222.2	84-66-2	C12H14O4	-3	298	0.0896	1	540	22		
	49	Pentadecanoic acid	242.4	1002-84-2	C15H30O2	52	339		1	400	27		
	50	Butanoic acid	88.1	107-92-6	C4H8O2	-7.9	163.5	soluble	1	450	1		
	51	9-Hexadecenoic acid	254.4	2091-29-4	C16H30O2		350		7	400	27		boiling pt estimated by hexadecanoic acid
similar to pentadecanoic acid	52	Tetradecanoic acid	228.4	544-63-8	C14H28O2	53.9	326		8	400	27		
similar to pentadecanoic acid	53	Hexadecanoic acid	256.4	57-10-3	C16H32O2	62	399		5	400	27		
	54	Acetic acid	60.1	64-19-7	C2H4O2	16.3	118	miscible	5	465	1		
	55	2-Hexanone, 4-methyl-	114.2	105-42-0	C7H14O		140		5	457	28		
	56	3-Heptanone	114.2	106-35-4	C7H14O		147		5	390	17		
	57	3-Octanone	128.2	106-68-3	C8H16O		166		5	525	28		
	58	2-Pentanone	86.1	107-87-9	C5H10O	-77	102		5	505	1		
	59	2-Pentanone, 4-methyl- (MIBK)	100.2	108-10-1	C6H12O	-80	117.4		1	457	13		
	60	2-Heptanone	114.2	110-43-0	C7H14O	-35	150		5	533	13		
	61	2-Octanone	128.2	111-13-7	C8H16O	-21	173		5	525	28		
	62	2-Undecanone	170.3	112-12-9	C11H22O	17	229		5	400	27		
	63	4-Heptanone	114.2	123-19-3	C7H14O	-33	144		5	533	28		
C13-3-ketone	64	3-Tridecanone	198.4	1534-26-5	C13H26O	31	263		6*	400	27		boiling pt estimated by 2-tridecanone
C12-3-ketone	65	3-Dodecanone	184.3	1534-27-6	C12H24O	20	250		5*	400	27		boiling pt estimated by 2-tridecanone
	66	Cyclohexanone, 5-methyl-2-(1-methylethylid	152.2	15932-80-6	C10H16O	<25	224		8	500	29		
C13-6-ketone	67	6-Tridecanone	198.4	22026-12-6	C13H26O		263		6*	400	27		boiling pt estimated from 2-tridecanone (phys prop ref 6)
C11-3-ketone	68	3-Undecanone	170.3	2216-87-7	C11H22O	12	227		5	400	27		
C11-5-ketone-2-methy	69	5-Undecanone, 2-methyl-	184.3	50639-02-8	C12H24O		210		7	400	27		
	70	2-Butanone, 3-methyl-	86.1	563-80-4	C5H10O	-93	94		5	500	30		
	71	3-Hexanone	100.2	589-38-8	C6H12O	-55.6	123		5	533	28		
	72	4-Octanone	128.2	589-63-9	C8H16O		166		5	525	28		
	73	2-Hexanone	100.2	591-78-6	C6H12O	-57	127		5	533	23		
C13-2-ketone	74	2-Tridecanone	198.4	593-08-8	C13H26O		255		5	400	27		
C14-3-ketone	75	3-Tetradecanone	212.4	629-23-2	C14H28O		263		5*	400	27		boiling pt estimated by 2-tridecanone
	76	2-Propanone	58.1	67-64-1	C3H6O	-95	56		5	465	1		
	77	3-Hexen-2-one	98.1	763-93-9	C6H10O		140		8	550	28		
	78	2-Butanone	72.1	78-93-3	C4H8O	-86	80	25.6	1	516	1		
	79	3-Buten-2-one	70.1	78-94-4	C4H6O		82		5	550	31		
	80	2-Nonanone	142.2	821-55-6	C9H18O	-67	195		5	500	32		
	81	Cyclohexanone, 5-methyl-2-(1-methylethylid	152.2	89-82-7	C10H16O	<25	224		8	500	29		
	82	3-Nonanone	142.2	925-78-0	C9H18O	-8	188		1	500	32		
	83	2-Heptanone, 6-methyl-	128.2	928-68-7	C8H16O		165		5	525	28		
	84	Ethanone, 1-phenyl-	120.2	98-86-2	C8H8O	19.6	201.7	0.55	1	571	1		
	85	Pentanal	86.1	110-62-3	C5H10O	-91.5	103	0.1	1	222	23		
	86	Heptanal	114.2	111-71-7	C7H14O	-43	153	<0.1	1	300	33		
	87	Propanal	58.1	123-38-6	C3H6O	-81	49	10	1	207	1		

Table 1-2 Compounds detected > 0.1 ppmv



Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[1]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			
	88	Butanal	72.1	123-72-8	C4H8O	-96	76	<0.1	1	230	1		
	89	Octanal	128.2	124-13-0	C8H16O	12	171		1	300	33		
	90	Nonanal	142.2	124-19-6	C9H18O	63	191	<0.1	8	300	33		
	91	Hexanal, 3-methyl-	114.2	19269-28-4	C7H14O		143		8	200	33		
	92	Hexanal	100.2	66-25-1	C6H12O	-56	131		1	300	33		
	93	Acetaldehyde	44.1	75-07-0	C2H4O	-124	20.1	miscible	1	175	1		
	94	1-Hexanol, 2-ethyl-	130.2	104-76-7	C8H18O	-76	183	0.1	1	300	34		
	95	1-Heptanol	118.2	111-70-6	C7H16O	-36	176		1	320	34		
	96	1-Octadecanol	270.5	112-92-5	C18H38O	61	336		1	300	34		
	97	2-Butanol	74.1	14898-79-4	C4H10O	-114	100		1	406	1		
	98	Ethanol, 2-(tetradecyloxy)-	258.4	2136-70-1	C16H34O2		253		7	300	34		boiling pt estimated by tetradecane
	99	1-Hexadecanol	242.4	36653-82-4	C16H34O	49	344		6	300	34		
	100	6,10-Dodecadien-1-ol, 3,7,11-trimethyl-	224.4	51411-24-6	C15H28O		216		7	300	34		boiling pt estimated by dodecane
	101	1,2-Propanediol	76.1	57-55-6	C3H8O2	-59	187.6	>10	1	371	1		
	102	3-Buten-2-ol	72.1	598-32-3	C4H8O		96		1	450	36		
	103	2-Pentanol	88.2	6032-29-7	C5H12O	-50	118		1	343	1		
	104	3-Buten-1-ol	72.1	627-27-0	C4H8O		113		1	450	36		
	105	Ethanol	46.1	64-17-5	C2H6O	-114	78.3	miscible	1	423	1		
	106	Methanol	32.0	67-56-1	CH4O	-98	64.6	miscible	1	470	1		
	107	2-Propanol	60.1	67-63-0	C3H8O	-88.5	82.4	miscible	1	399	23		
	108	1-Propanol	60.1	71-23-8	C3H8O	-126	97.2	miscible	1	440	1		
	109	2-Propanol, 2-methyl-	74.1	75-65-0	C4H10O	25.5	82.2	miscible	1	480	1		
	110	1-Propanol, 2,2-dimethyl-	88.2	75-84-3	C5H12O	50	113		1	480	36		
	111	2-Butanol, 2-methyl-	88.2	75-85-4	C5H12O	-12	102		1	437	1		
	112	2-Butanol	74.1	78-92-2	C4H10O	-115	99.5	15	1	406	1		
	113	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	260.8	87-68-3	C4Cl6	-21	210	0.00032	1	610	1		
	114	Cyclopentanol	86.1	96-41-3	C5H10O	-19	139	slightly	1	350	37		
	115	1-Propene, 2-fluoro-	60.1	1184-60-7	C3H5F		-24		8	600	35		
	116	Ethene, tetrachloro-	165.8	127-18-4	C2Cl4	-22.3	121.1	0.015	1	871	40	0	flammability of zero is from MSDS - J Baker (http://www.rose-
	117	Ethene, 1,2-dichloro-, (Z)-	96.9	156-59-2	C2H2Cl2	-80.5	60	0.08	1	460	38		
	118	Ethane, 1,1-dichloro-1-fluoro- (freon 14b)	117.0	1717-00-6	C2H3Cl2F	-104	32	0.17	6	550	42	0	flammability of zero is from MSDS - Static Specialists Co (flammability of zero is from MSDS)
	119	Methane, tetrachloro-	153.8	56-23-5	CCl4	-22.9	76.7	0.0805	1	900	41	3	described as non-flammable by phys property source 6 - rating of 3 is for evolved gases
	120	Methane, chloro- (R-40)	50.5	74-87-3	CH3Cl	-97	-24.2	0.5325	1	662	40		
	121	Ethene, fluoro-	46.0	75-02-5	C2H3F	-161	-72	insoluble	6	385	42		
	122	Methane, dichloro-	84.9	75-09-2	CH2Cl2	-96.7	39.8	05-Jan	6	662	42		
	123	Methane, chlorodifluoro- (R-22)	86.5	75-45-6	CHClF2	-146	-40.8	0.3	6	632	42		
	124	Ethane, 1-chloro-1,1-difluoro- (R-142)	100.5	75-68-3	C2H3ClF2	-131	-10	slightly	6	632	42		
	125	Methane, trichlorofluoro- (R-11)	137.4	75-69-4	CCl3F	-111	23.7	0.1	6	900	41	0	
	126	Benzene, (1-methylpentyl)-	162.3	6031-02-3	C12H18		208		6	490	43		
	127	Benzene, ethyl-	106.2	100-41-4	C8H10	-94.9	136.2	0.0206	1	432	1		
	128	Benzene, ethenyl-	104.2	100-42-5	C8H8	-30.6	145.2	0.032	1	490	23		
	129	Benzene, 1,4-dimethyl-	106.2	106-42-3	C8H10	13.3	1.38E+02	insoluble	1	529	23		
	130	Benzene, 1,3-dimethyl-	106.2	108-38-3	C8H10	-47.8	139.1	insoluble	1	528	23		

Table 1-2 Compounds detected > 0.1 ppmv



Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[3]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			
	131	Benzene, methyl-	92.1	108-88-3	C7H8	-93	110.6	0.0526	1	482	42		
	132	Benzene, (2-methyl-2-propenyl)-	132.2	3290-53-7	C10H12	-48	183		6	490	43		
	133	Benzene, pentyl-	148.3	538-68-1	C11H16	-75	205		1	420	43		
	134	Benzene, 1-propenyl-	118.2	637-50-3	C9H10	-27.1	175.5		1	490	43		
	135	1,1'-Biphenyl, 2-methyl-	168.2	643-58-3	C13H12	-0.2	256		6	495	23		
	136	Benzene	78.1	71-43-2	C6H6	5.5	80.1	0.18	1	562	1		
	137	1,1'-Biphenyl	154.2	92-52-4	C12H10	70	255	insoluble	1	540	23		
	138	Benzene, 1,2-dimethyl-	106.2	95-47-6	C8H10	-25.2	144	insoluble	1	464	23		
	139	1-Propyne	40.1	74-99-7	C3H4	-103	-23	0.36	6	340	40		
	140	4-Nonyne	124.2	20184-91-2	C9H16		154		6	320	39		
	141	4-Undecene, 4-methyl-	168.3	61142-40-3	C12H26		193		7	500	44		boiling pt estimated by 3-undecene and 1-undecene
	142	1-Hexadecene	224.4	629-73-2	C16H32	4	274		1	500	44		
	143	1-Undecene, 4-methyl-	168.3	74630-39-0	C12H24		193		7	500	44		boiling pt estimated by 3-undecene and 1-undecene
	144	3-Undecene, 2-methyl-, (Z)-	168.3	74630-48-1	C12H24		193		7	500	44		boiling pt estimated by 3-undecene and 1-undecene
	145	5-Undecene, (Z)-	154.3	764-96-5	C11H22	-107	192.3		6	500	44		
	146	4,5-Nonadiene	124.2	821-74-9	C9H16		142.5		7	550	44		boiling pt estimated by 1,8-nonadiene
	147	Naphthalene, decahydro-2,3-dimethyl-	168.3	1008-80-6	C12H22		187		7	288	45		boiling pt estimated by Decahydronaphthalene
	148	Cyclohexane, methyl-	98.2	108-87-2	C7H14	-126	101	insoluble	1	250	1		
	149	Cyclohexane	84.2	110-82-7	C6H12	6.6	80.7	<0.1	1	245	1		
	150	Cyclopropane, octyl-	154.3	1472-09-9	C11H22		150.6		7	498	46		boiling pt estimated by nonane
	151	Naphthalene, decahydro-2,6-dimethyl-	166.3	1618-22-0	C12H22		187		7	288	45		boiling pt estimated by Decahydronaphthalene
	152	Cyclopropane, 1,1-dimethyl-	70.1	1630-94-0	C5H10	-109	21		1	498	46		
	153	Cyclohexane, butyl-	140.3	1678-93-9	C10H20	-75	181		1	246	23		
	154	Cyclopropane, propyl-	84.2	2415-72-7	C6H12		69		1	498	46		
	155	Cyclopentane	70.1	287-92-3	C5H10	-93.9	49.3	insoluble	1	380	1		
	156	Octane, 2-cyclohexyl-	196.4	2883-05-8	C14H28		181		7	246	47		boiling pt estimated by butylcyclohexane
	157	Cyclododecane	168.3	294-62-2	C12H24	61	239		1	235	48		
	158	Naphthalene, decahydro-2-methyl-	152.3	2958-76-1	C11H20		201		6	288	45		
	159	Cyclohexane, 1,1,3-trimethyl-	126.2	3073-66-3	C9H18	-66.7	136.6		5	320	49		
	160	Cyclopentane, 1,3-dimethyl-2-(1-methylethyl-	140.3	32281-85-9	C10H20		92		7	350	49		boiling pt estimated by Cyclopentane, 1,2-dimethyl-, trans-
	161	Naphthalene, decahydro-1,2-dimethyl-	166.3	3604-14-6	C12H22		187		7	288	45		boiling pt estimated by Decahydronaphthalene
	162	Cyclopropane, 1-pentyl-2-propyl-	154.3	41977-33-7	C11H22		151		7	498	46		boiling pt estimated by nonane
	163	Cyclohexane, pentyl-	154.3	4292-92-6	C11H22	-57.5	203.7		6	270	51		
	164	Cyclobutane, ethyl-	84.2	4806-61-5	C6H12	-143	71		1	212	23		
	165	Naphthalene, decahydro-, trans-	138.3	493-02-7	C10H18	-30.4	187.3		6	288	45		
	166	Cyclohexane, 2-butyl-1,1,3-trimethyl-	182.4	54676-39-0	C13H26		203.7		7	320	49		boiling pt estimated by pentylcyclohexane
	167	Bicyclo[4.1.0]heptane, 2-methyl-7-pentyl-	180.3	55937-92-3	C13H24		203.7		7	320	49		boiling pt estimated by pentylcyclohexane
	168	Cyclopropane, methyl-	56.1	594-11-6	C4H8	-178	0.7		6	498	46		
	169	Cyclobutane, methyl-	70.1	598-61-8	C5H10	-162	36.3		6	250	50		
	170	Cyclohexane, (4-methylpentyl)-	168.3	61142-20-9	C12H24		203.7		7	270	51		boiling pt estimated by pentylcyclohexane
	171	Cyclohexane, (1-methylpropyl)-	140.3	7058-01-7	C10H20		179.3		6	270	51		
	172	Cyclohexane, 1,1,2-trimethyl-	126.2	7094-26-0	C9H18	-29	145.2		6	270	51		
	173	Cyclopentane, 1,2-dimethyl-, trans-	98.2	822-50-4	C7H14	-118	92		6	350	49		
	174	Undecane, 3-methyl-	170.3	1002-43-3	C12H26	-54.5	195		5*	500	44		boiling pt estimated by undecane

Table 1-2 Compounds detected > 0.1 ppmv

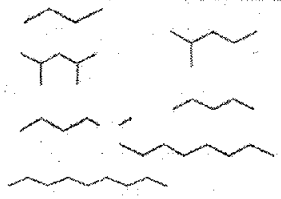
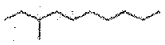
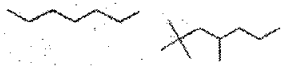
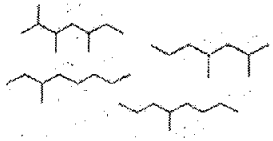
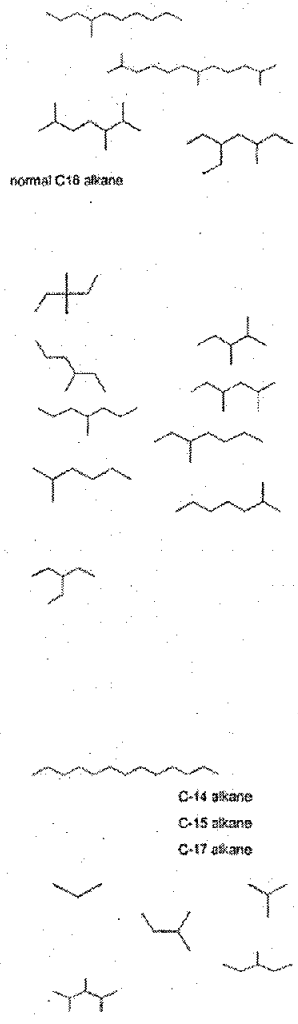
Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[1]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			
	175	Butane	58.1	106-97-8	C4H10	-139	-0.45	0.0061	1	405	1		
	176	Pentane, 2-methyl-	86.2	107-83-5	C6H14	-154	62	insoluble	1	306	42		
	177	Pentane, 2,4-dimethyl-	100.2	108-08-7	C7H16	-119	81		1	337	42		
	178	Pentane	72.2	109-66-0	C5H12	-130	36.1	0.04	1	260	23		
	179	Hexane	86.2	110-54-3	C6H14	-95	69	0.00095	1	225	1		
	180	Octane	114.2	111-65-9	C8H18	-56.8	126	slightly	1	220	1		
	181	Nonane	128.3	111-84-2	C9H20	-53	150.8	<0.1	1	206	42		
normal C-11 alkane	182	Undecane	156.3	1120-21-4	C11H24	-25.6	195.6	insoluble	1	202	42		
normal C-12 alkane	183	Dodecane	170.3	112-40-3	C12H26	-9.6	216.3	0.37	8	204	42		
normal C-10 alkane	184	Decane	142.3	124-18-5	C10H22	-29.7	174.1	insoluble	6	210	1		
	185	Decane, 3-methyl-	156.3	13151-34-3	C11H24	-76	190		1	225	52		
	186	Decane, 5-methyl-	156.3	13151-35-4	C11H24		190		7	225	52		boiling pt estimated by Decane, 3-methyl-
	187	Tridecane, 3-ethyl-	212.4	13286-73-2	C15H32		252		7	220	52		boiling pt estimated by tetradecane
	188	Tridecane, 6-methyl-	198.4	13287-21-3	C14H30		235		7	220	52		boiling pt estimated by tridecane
	189	Heptane	100.2	142-82-5	C7H16	-90.6	98.4	0.01	1	223	1		
	190	Heptane, 2,2,4-trimethyl-	142.3	14720-74-2	C10H22		148		1	275	52		
	191	Tridecane, 2-methyl-	198.4	1560-96-9	C14H30	-25	248		1	205	52		
	192	Undecane, 5-methyl-	170.3	1632-70-8	C12H26	-67.7	195		5*	220	52		boiling pt estimated by undecane
	193	Undecane, 2,6-dimethyl-	184.4	17301-23-4	C13H28		195		7	250	52		boiling pt estimated by undecane
	194	Undecane, 2,8-dimethyl-	184.4	17301-25-6	C13H28		195		7	250	52		boiling pt estimated by undecane
	195	Undecane, 2,10-dimethyl-	184.4	17301-27-8	C13H28		195		7	250	52		boiling pt estimated by undecane
	196	Undecane, 3,7-dimethyl-	184.4	17301-29-0	C13H28		195		7	250	52		boiling pt estimated by undecane
	197	Undecane, 3,8-dimethyl-	184.4	17301-30-3	C13H28		195		7	250	52		boiling pt estimated by undecane
	198	Undecane, 4,7-dimethyl-	184.4	17301-32-5	C13H28		195		7	250	52		boiling pt estimated by undecane
	199	Nonane, 4-methyl-	142.3	17301-94-9	C10H22	-99	165.7		6	220	52		
	200	Nonane, 2,6-dimethyl-	156.3	17302-28-2	C11H24		165		7	250	52		boiling pt estimated by 4-methyl nonane
	201	Nonane, 3,7-dimethyl-	156.3	17302-32-8	C11H24		165		7	250	52		boiling pt estimated by 4-methyl nonane
	202	Decane, 2,5-dimethyl-	170.3	17312-50-4	C12H26	-61.8	196		5*	250	52		boiling pt estimated by undecane
	203	Dodecane, 3-methyl-	184.4	17312-57-1	C13H28	-59.4	216		5*	220	52		boiling pt estimated by dodecane
	204	Undecane, 6-ethyl-	184.4	17312-60-6	C13H28		216		7	220	52		boiling pt estimated by dodecane
	205	Undecane, 5,5-dimethyl-	184.4	17312-73-1	C13H28		216		7	250	52		boiling pt estimated by dodecane
	206	Undecane, 6,6-dimethyl-	184.4	17312-76-4	C13H28		216		7	250	52		boiling pt estimated by dodecane
	207	Undecane, 2,3-dimethyl-	184.4	17312-77-5	C13H28		216		7	250	52		boiling pt estimated by dodecane
	208	Undecane, 2,4-dimethyl-	184.4	17312-80-0	C13H28		216		7	250	52		boiling pt estimated by dodecane
	209	Undecane, 4,6-dimethyl-	184.4	17312-82-2	C13H28		216		7	250	52		boiling pt estimated by dodecane
	210	Undecane, 5-ethyl-	184.4	17453-94-0	C13H28		216		7	220	52		boiling pt estimated by dodecane
	211	Heptane, 2,3,5-trimethyl-	142.3	20278-85-7	C10H22		160.7		6	275	52		
	212	Heptane, 2,4-dimethyl-	128.3	2213-23-2	C9H20		133		1	330	52		
	213	Octane, 3-methyl-	128.3	2216-33-3	C9H20	-108	144		1	220	23		
	214	Octane, 4-methyl-	128.3	2216-34-4	C9H20	-113	142		1	220	23		
	215	Tetradecane, 4-methyl-	212.4	25117-24-2	C15H32	-33	253.7		5*	220	52		boiling pt estimated by tetradecane
	216	Tridecane, 5-methyl-	198.4	25117-31-1	C14H30	-53.6	235		5*	220	52		boiling pt estimated by tridecane
	217	Tridecane, 4-methyl-	198.4	26730-12-1	C14H30	-45.7	235		5*	220	52		boiling pt estimated by tridecane
	218	Tridecane, 7-methyl-	198.4	26730-14-3	C14H30	-37.2	235		8*	225	52		boiling pt estimated by tridecane

Table 1-2 Compounds detected > 0.1 ppmv



Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[1]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			
	219	Decane, 4-methyl-	156.3	2847-72-5	C11H24	-77.5	187		6	225	52		
	220	Undecane, 4-methyl-	170.3	2980-69-0	C12H26	-66.5	210		5	220	52		
	221	Dodecane, 2,6,11-trimethyl-	212.4	31295-56-4	C15H32		252		7	250	52		boiling pt is estimated by Dodecane, 2,6,10-trimethyl-
	222	Dodecane, 2,6,10-trimethyl-	212.4	3891-98-3	C15H32		252		5	250	52		
	223	Heptane, 2,3,6-trimethyl-	142.3	4032-83-3	C10H22		156		1	275	52		
	224	Heptane, 3-ethyl-5-methyl-	142.3	52896-90-9	C10H22		158.2		6	275	52		
	225	Hexadecane	226.4	544-76-3	C16H34	18.2	287	insoluble	6	202	23		
	226	Tridecane, 4,8-dimethyl-	212.4	55030-62-1	C15H32		253.7		7	250	52		boiling pt estimated by tetradecane
	227	Dodecane, 2-methyl-6-propyl-	226.4	55045-07-3	C16H34		253.7		7	250	52		boiling pt estimated by tetradecane
	228	Tridecane, 5-propyl-	226.4	55045-11-9	C18H38		253.7		7	225	52		boiling pt estimated by tetradecane
	229	Pentane, 3,3-dimethyl-	100.2	562-49-2	C7H16	-135	90		5	350	52		
	230	Dodecane, 2,5-dimethyl-	198.4	56292-65-0	C14H30		235		7	225	52		boiling pt estimated by tridecane
	231	Pentane, 2,3-dimethyl-	100.2	565-59-3	C7H16	-134	90		5	337	42		
	232	Hexane, 3-methyl-	100.2	589-34-4	C7H16	-119	92		1	280	23		
	233	Hexane, 2,4-dimethyl-	114.2	589-43-5	C8H18		109		1	437	42		
	234	Heptane, 4-methyl-	114.2	589-53-7	C8H18	-121	118		1	250	52		
	235	Heptane, 3-methyl-	114.2	589-81-1	C8H18	-121	119		1	239	42		
	236	Hexane, 2-methyl-	100.2	591-76-4	C7H16	-118	90		1	280	23		
	237	Heptane, 2-methyl-	114.2	592-27-8	C8H18	-109	118	insoluble	6	247	42		
	238	Dodecane, 4,6-dimethyl-	198.4	61141-72-8	C14H30		235		7	225	52		boiling pt estimated by tridecane
	239	Dodecane, 4-methyl-	184.4	6117-97-1	C13H28		216		7	220	52		boiling pt estimated by dodecane
	240	3-Ethylpentane	100.2	617-78-7	C7H16	-119	93		1	275	52		
	241	Octane, 2,3,3-trimethyl-	156.3	62016-30-2	C11H24		174		7	290	52		boiling pt estimated by decane
	242	Octane, 2,3,7-trimethyl-	156.3	62016-34-6	C11H24		174		7	290	52		boiling pt estimated by decane
	243	Decane, 6-ethyl-2-methyl-	184.4	62108-21-8	C13H28		216		7	275	52		boiling pt estimated by dodecane
	244	Decane, 2,6,7-trimethyl-	184.4	62108-25-2	C13H28		216		7	290	52		boiling pt estimated by dodecane
	245	Decane, 2,4,6-trimethyl-	184.4	62108-27-4	C13H28		216		7	290	52		boiling pt estimated by dodecane
	246	Decane, 2,3,7-trimethyl-	184.4	62238-13-5	C13H28		216		7	290	52		boiling pt estimated by dodecane
	247	Tridecane	184.4	629-50-5	C13H28	-5.5	235.4		1	202	42		
	248	Tetradecane	198.4	629-59-4	C14H30	5.9	253.7		1	200	23		
	249	Pentadecane	212.4	629-62-9	C15H32	9.9	270.6		1	202	42		
	250	Heptadecane	240.5	629-78-7	C17H36	22	301.8		1	202	42		
	251	Propane	44.1	74-98-6	C3H8	-188	-42	0.01	1	450	1		
	252	Propane, 2-methyl-	58.1	75-28-5	C4H10	-255	-11.7	slightly	6	462	1		
	253	Butane, 2-methyl-	72.2	78-78-4	C5H12	-160	30	<0.1	1	420	42		
	254	Pentane, 3-methyl-	86.2	96-14-0	C6H14	-118	64	insoluble	6	278	23		
	255	Pentane, trimethyl-, isomer	114.3	565-75-3	C8H18	-109	113.5		1	427	42		

Notes

1 "quotes" imply the information is shown as written in the source
2 this compound was assigned two different CAS numbers in TWINS
* boiling point was estimated based on criteria of physical property source #7 and the available melting pt of the compound

pysical property sources

1 chemfinder (http://chemfinder.cambridgesoft.com/)
2 msds (http://www.unitexchemical.com/MSD/Uniplex214.htm)

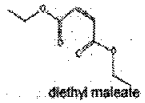
Table 1-2 Compounds detected > 0.1 ppmv

Structure (some obvious structures are not shown due to chain length)	no. of compounds	Chemical Name	Molecular Weight	Chemical Id	formula	melting pt	normal boiling pt	(water) solubility[1]	phys prop source	AIT	AIT source	NFPA flammability rating	comments
		UNITS				°C	°C	g/100 ml		°C			

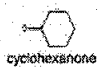
3 estimated from msds for tetramethylcyclotetrasiloxane (http://www.schumacher.com/products/msds/tomcat_0926.pdf)
4 estimated from 2(3H)-Furanone, dihydro-5-methyl- msds (http://www.pschem.com/MSDS/pdf/GammaValerolactonePENN.PDF)
5 National Institute of Standards and Technology (NIST) database (http://webbook.nist.gov)
6 University of Akron - Chemical Database (http://ull.chemistry.uakron.edu/erd/)
7 values estimated from similar structures - boiling pt is reported conservatively low as to not overstate adsorption potential on activated carbon
8 Interactive PhysProp Database Demo: (http://esc.syrres.com/interkow/physdemo.htm)

AIT sources (estimates are considered conservatively high based on trends within similar chemical structures)

1 Lange's Handbook of Chemistry - 14th edition
2 estimated from msds for tetramethylcyclotetrasiloxane (http://www.schumacher.com/products/msds/tomcat_0926.pdf)
3 estimated from pyridine which has same root structure - in general, alkane substitutions on any root will lower the AIT
4 estimated from 2-nitrobutane (reference 2 shows 1-nitropropane AIT is 420, nitroethane is 414, nitromethane is 418)
5 estimated from nitric acid ethyl ester (90 deg C) and nitric acid propyl ester (175 deg C)
6 estimated based on pyrolidine and tetrahydrofuran
7 estimated from MSDS which shows this compound is explosive when heated (Matheson Tri-Gas MSDS)
8 Estimated from nitrous acid -butyl ester (butyl nitrite)
9 estimated from nitric acid - propyl ester -shown with an AIT of 175 deg C by reference 2
10 estimated from tetrahydrofuran - accounting for double bonds (e.g. cyclo hexane AIT=245, benzene=562 and butane = 405, 1,3-butadiene = 420)
11 estimated from pyradine and benzene (AIT 482 and 562 respectively) accounting for the nitrogen reactivity to help oxidize the molecule
12 estimated from BASF technical data sheet (http://www.basf.com/businesses/chemicals/diols/pdfs/dihydro.pdf) showing 3,4-dihydro-2H-pyran AIT of 240 deg C.
13 estimated from 2(3H)-Furanone, dihydro-
14 estimated based on ethylene oxide AIT=429, this compound is expected to have lower AIT based on the alkane branch
15 estimated from pyridine and taking into acount that there is no resonant structure containing double bonds
16 estimated from trimethylamine AIT of 190 deg C
17 AIT reference is on COPC sheet
18 safety data from (http://physchem.ox.ac.uk/MSDS/BU/butyronitrile.html)
19 estimated based on propanenitrile and butanenitrile - in general, as the alkane chain grows, the AIT will decrease
20 estimated based on butanoic acid - alkane esters will lower the AIT below 450 deg C as shown by reference 2
21 estimated to be less than 400 deg C based on length of alkane chain
22 estimated from dimethyl phthalate and dibutylphthalate 556 and 403 deg C respectively - shown in reference 23
23 Rules of Thumb for Chemical Engineers, Gulf Publishing 1994, by Carl Branan
24 estimated from diethyl maleate (see structure on left) AIT = 350 deg C shown by reference 23
25 estimated from ethyl formate AIT of 455 deg C from reference 23
26 estimated from propyl acetate AIT of 450 deg C from reference 23
27 estimated from stearic acid (heptadecanoic (C17) acid) AIT of 395 deg C from reference 23 - this is considered valid for all of the longer chain carboxylic acids, esters, and keytones.
28 estimated from MIBK (4-methyl-2-pentanone) and 2-heptanone (AIT=457, and 533 deg C respectively) from reference 23
29 estimated from methyl phenyl ketone and cyclohexanone (AIT 570 and 420 repsectively) from reference 23 - see structures to left
30 estimated from butanone (AIT=516 deg C) considering the extra methyl substitution as an element which lowers the AIT
31 estimated from butanone (AIT=516 deg C) considering the double bond which raises the AIT
32 estimated from heptanone and nonane (AIT = 533 and 190 deg C respectively) from reference 1 - accounting for the longer alkane chain which will lower the AIT from that of heptanone
33 estimated from the trend of AITs for increasing alkane chain length within available aldehydes from reference 23
34 estimated from 1-dodecanol (AIT=275) and the trend of AIT temperature which increases as the alkane chain length decreases
35 estimated from ethyl chloride, propyl chloride, 1-2-dichloropropane, dichloroethylene, hexachlorobutadiene, and perfluorodimethylcyclohexane
36 estimated from 2-butanol, isopropyl alcohol, and 2-pentanol from reference 23
37 estimated based on cyclohexanol (AIT=300 deg C) from reference 23
38 taken from OSHA Safety and Health Guideline database: (http://www.osha-slc.gov/SLTC/healthguidelines/1_2-dichloroethylene/recognition.html)
39 estimated from acetylene and similar length alkene from reference 1 (i.e. decene AIT = 244 deg C)
40 see AIT sources for COPCs
41 AIT for this compound can not be found - available references for safety data and MSDS indicate the compound is not flammable - to show that no credit will be taken for destruction via oxidation, the AIT is reported as 900 deg C
42 University of Akron - Chemical Database (http://ull.chemistry.uakron.edu/erd/)
43 estimated from isopropyl benzene, styrene, and butyl benzene from reference 23
44 estimated from 2-methylundecane from reference 23, however the general trend for long chain branched alkanes is a low AIT - this value (500 deg C) is considered unreasonable high - it is used here to be most conservative
45 estimated from decahydronaphthalene from reference 23 (288 deg C) -the methyl substitutions will lower the AIT
46 estimated from cyclopropane (AIT = 498 deg C)- long alkane substitution should appreciably lower the AIT
47 estimated from octylcyclohexane, cyclohexane, and methylcyclohexane from reference 1 and 23 (AIT=238, 245, and 250 respectively)
48 estimated from cyclo decane (AIT=235 deg C from reference 23)
49 estimated from methyl cyclopentane, hexylcyclopentane, and 1,2,4 and 1,3,5 trimethylcyclohexane from reference 23
50 estimated from ethyl cyclobutane from reference 23
51 estimated from propylcyclohexane from reference 23 (AIT = 269 deg C)
52 estimated from reference 23 which shows AIT for common alkanes, and their single, double and triple branched derivatives - not all compounds are represented, however general trends appear and all AITs (except methane) are below 500 deg C
53 estimated from reference 42 indication that this compound is a flammable solid
54 estimated from the compound structure - no data or similar compound data were found available - the 800 deg C estimate will ensure that the compound is conservatively accounted for (Benzene AIT is 562 deg C and referenceable amines range from the low 300 deg C to mid 600 deg C for aromatic amines)



diethyl maleate
(2-betenedioic acid, diethyl ester)



cyclohexanone

methyl phenyl ketone

Attachment 2 Tables of Destruction DFs

Table 2-1 COPCs
Table 2-2 Compounds detected >0.1 ppmv

Table 2-1 COPCs

no. of compound	CAS #	COPC Compound	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
1	100-00-5	p-Nitrochlorobenzene	950.0	650.0	99.99	10000
2	100-21-0	p-Phthalic acid	1250.0	350.0	95	20
3	100-25-4	1,4-Dinitrobenzene	842.0	758.0	99.99	10000
4	100-41-4	Ethyl benzene	810.0	790.0	99.99	10000
5	100-42-5	Styrene	915.0	685.0	99.99	10000
6	10061-01-5	cis-1,3-Dichloropropene	1112.0	488.0	99	100
7	10061-02-6	trans-1,3-Dichloropropene	1130.0	470.0	98	50
8	101-55-3	4-Bromophenylphenyl ether	1542.0	58.0	70	3.33
9	101-84-8	Diphenyl ether	1144.0	456.0	98	50
10	106-35-4	3-Heptanone	734.0	866.0	99.99	10000
11	106-42-3	p-Xylene (Dimethyl benzene)	986.0	614.0	99.9	1000
12	106-46-7	1,4-Dichlorobenzene	1184.0	416.0	98	50
13	106-88-7	1,2-Epoxybutane	894.2	705.8	99.99	10000
14	106-93-4	Ethylene dibromide (Dibromoethane)	1600.0	0.0	0	1
15	106-97-8	Butane (R-600)	761.0	839.0	99.99	10000
16	106-99-0	1,3-Butadiene	840.2	759.8	99.99	10000
17	107-02-8	Acrolein	455.0	1145.0	99.99	10000
18	107-05-1	3-Chloropropene (Allyl chloride)	905.0	695.0	99.99	10000
19	107-06-2	1,2-Dichloroethane (Ethylene chloride) (freon 150)	773.6	826.4	99.99	10000
20	107-12-0	Propionitrile	950.0	650.0	99.99	10000
21	107-13-1	Acrylonitrile	897.8	702.2	99.99	10000
22	107-18-6	2-Propene-1-ol	712.4	887.6	99.99	10000
23	107-31-3	Formic acid, methyl ester	869.0	731.0	99.99	10000
24	107-66-4	Dibutylphosphate	950.0	650.0	99.99	10000
25	107-87-9	2-Pentanone	941.0	659.0	99.99	10000
26	108-03-2	1-Nitropropane	788.0	812.0	99.99	10000
27	108-05-4	Vinyl acetate	800.6	799.4	99.99	10000
28	108-10-1	Hexone (4-Methyl-2-pentanone or MIBK)	858.0	742.0	99.99	10000
29	108-20-3	Bis(isopropyl)ether	829.0	771.0	99.99	10000
30	108-38-3	m-Xylene (Dimethyl benzene)	986.0	614.0	99.9	1000
31	108-39-4	m-Cresol	1038.2	561.8	99.9	1000
32	108-87-2	Methylcyclohexane	482.0	1118.0	99.99	10000
33	108-88-3	Toluene	896.0	704.0	99.99	10000
34	108-90-7	Chlorobenzene	1245.0	355.0	95	20
35	108-93-0	Cyclohexanol	572.0	1028.0	99.99	10000
36	108-94-1	Cyclohexanone	788.0	812.0	99.99	10000
37	108-95-2	Phenol	1319.0	281.0	90	10
38	109-66-0	n-Pentane	500.0	1100.0	99.99	10000
39	109-99-9	Tetrahydrofuran	609.8	990.2	99.99	10000
40	110-12-3	5-Methyl-2-hexanone	376.0	1224.0	99.99	10000
41	110-43-0	2-Heptanone	739.0	861.0	99.99	10000
42	110-54-3	n-Hexane	437.0	1163.0	99.99	10000
43	110-62-3	n-Valeraldehyde	500.0	1100.0	99.99	10000

Table 2-1 COPCs

no. of compound	CAS #	COPC Compound	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
44	110-82-7	Cyclohexane	473.0	1127.0	99.99	10000
45	110-83-8	Cyclohexene	590.0	1010.0	99.99	10000
46	110-86-1	Pyridine	899.6	700.4	99.99	10000
47	111-65-9	n-Octane	428.0	1172.0	99.99	10000
48	111-76-2	Ethylene glycol monobutyl ether	460.4	1139.6	99.99	10000
49	111-84-2	n-Nonane	374.0	1226.0	99.99	10000
50	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	734.0	866.0	99.99	10000
51	117-84-0	n-Dioctyl phthalate	735.1	864.9	99.99	10000
52	118-74-1	Hexachlorobenzene	1542.0	58.0	70	3.33
53	120-12-7	Anthracene	1000.4	599.6	99.9	1000
54	120-82-1	1,2,4-Trichlorobenzene	1060.0	540.0	99	100
55	120-83-2	2,4-Dichlorophenol	1542.0	58.0	70	3.33
56	121-44-8	Triethylamine	480.0	1120.0	99.99	10000
57	121-69-7	Dimethylaniline	699.8	900.2	99.99	10000
58	122-39-4	N,N-Diphenylamine	1173.0	427.0	98	50
59	123-19-3	4-Heptanone	842.0	758.0	99.99	10000
60	123-38-6	n-Propionaldehyde	404.6	1195.4	99.99	10000
61	123-51-3	3-Methyl-1-butanol	662.0	938.0	99.99	10000
62	123-86-4	Acetic acid n-butyl ester	797.0	803.0	99.99	10000
63	123-91-1	1,4-Dioxane	356.0	1244.0	99.99	10000
64	126-73-8	Tributyl phosphate	899.6	700.4	99.99	10000
65	126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	860.0	740.0	99.99	10000
66	127-18-4	Perchloroethylene (tetrachloroethylene)	1600.0	0.0	0	1
67	127-19-5	N,N-Dimethylacetamide	914.0	686.0	99.99	10000
68	128-37-0	2,6-Bis(tert-butyl)-4-methylphenol	878.0	722.0	99.99	10000
69	129-00-0	Pyrene	1542.0	58.0	70	3.33
70	1321-64-8	Pentachloronaphthalene	1542.0	58.0	70	3.33
71	1321-65-9	Trichloronaphthalene	1542.0	58.0	70	3.33
72	132-64-9	Dibenzofuran	1542.0	58.0	70	3.33
73	1335-87-1	Hexachloronaphthalene	1542.0	58.0	70	3.33
74	1335-88-2	Tetrachloronaphthalene	1542.0	58.0	70	3.33
75	1336-36-3	Polychlorinated biphenyls (PCBs)	1542.0	58.0	70	3.33
76	141-78-6	Acetic acid ethyl ester (Ethyl acetate)	906.8	693.2	99.99	10000
77	141-79-7	4-Methyl-3-penten-2-one	651.0	949.0	99.99	10000
78	142-82-5	n-Heptane	433.4	1166.6	99.99	10000
79	144-62-7	Oxalic acid	1400.0	200.0	90	10
80	156-60-5	trans-1,2-Dichloroethylene	860.0	740.0	99.99	10000
81	1582-09-8	Trifluralin	880.0	720.0	99.99	10000
82	1634-04-4	Methyl tert-butyl ether	815.0	785.0	99.99	10000
83	1836-75-5	Nitrofen	1542.0	58.0	70	3.33
84	189-55-9	Dibenzo[a,i]pyrene	1542.0	58.0	70	3.33
85	189-64-0	Dibenzo[a,h]pyrene	1542.0	58.0	70	3.33
86	191-24-2	Benzo(g,h,i)perylene	1542.0	58.0	70	3.33
87	191-30-0	Benzo[a,i]pyrene	1542.0	58.0	70	3.33

Table 2-1 COPCs

no. of compound	CAS #	COPC Compound	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
88	192-65-4	Dibenzo[a,e]pyrene	1542.0	58.0	70	3.33
89	193-39-5	Indeno(1,2,3-cd)pyrene	1542.0	58.0	70	3.33
90	205-82-3	Benzo(j)fluoranthene	1542.0	58.0	70	3.33
91	205-99-2	Benzo(b)fluoranthene	1542.0	58.0	70	3.33
92	206-44-0	Fluoranthene	1542.0	58.0	70	3.33
93	207-08-9	Benzo(k)fluoranthene	1542.0	58.0	70	3.33
94	208-96-8	Acenaphthylene	1542.0	58.0	70	3.33
95	218-01-9	Chrysene	1542.0	58.0	70	3.33
96	2234-13-1	Octachloronaphthalene	1542.0	58.0	70	3.33
97	224-42-0	Dibenz[a,j]acridine	1542.0	58.0	70	3.33
98	226-36-8	Dibenz[a,h]acridine	1542.0	58.0	70	3.33
99	2385-85-5	Mirex	1542.0	58.0	70	3.33
100	25551-13-7	Trimethyl benzene	1022.0	578.0	99.9	1000
101	26140-60-3	Terphenyls	1542.0	58.0	70	3.33
102	27154-33-2	Trichlorofluoroethane	1600.0	0.0	0	1
103	287-92-3	Cyclopentane	716.0	884.0	99.99	10000
104	309-00-2	Aldrin	1542.0	58.0	70	3.33
105	319-84-6	Hexachlorocyclohexane (Lindane) Alpha BHC	1542.0	58.0	70	3.33
106	319-85-7	Hexachlorocyclohexane (Lindane) Beta BHC	1542.0	58.0	70	3.33
107	319-86-8	Delta-BHC	1542.0	58.0	70	3.33
108	3697-24-3	5-Methylchrysene	1542.0	58.0	70	3.33
109	3825-26-1	Ammonium perfluorooctanoate	1542.0	58.0	70	3.33
110	4170-30-3	2-Butenaldehyde (2-Butenal)	446.0	1154.0	99.99	10000
111	465-73-6	Isodrin	1542.0	58.0	70	3.33
112	50-00-0	Formaldehyde	806.0	794.0	99.99	10000
113	50-29-3	4,4-DDT	1542.0	58.0	70	3.33
114	50-32-8	Benzo(a)pyrene	1542.0	58.0	70	3.33
115	53-70-3	Dibenzo(a,h)anthracene	1542.0	58.0	70	3.33
116	540-59-0	1,2-Dichloroethylene	860.0	740.0	99.99	10000
117	540-84-1	2,2,4-Trimethylpentane	779.0	821.0	99.99	10000
118	541-73-1	1,3-Dichlorobenzene	1184.0	416.0	98	50
119	56-23-5	Carbon tetrachloride (R-10)	1600.0	0.0	0	1
120	563-80-4	3-Methyl-2-butanone	845.6	754.4	99.99	10000
121	56-49-5	3-Methylcholanthrene	1542.0	58.0	70	3.33
122	56-55-3	Benzo(a)anthracene	1542.0	58.0	70	3.33
123	57-14-7	1,1-Dimethylhydrazine	480.2	1119.8	99.99	10000
124	58-89-9	gamma-BHC (Lindane)	1542.0	58.0	70	3.33
125	58-90-2	2,3,4,6-Tetrachlorophenol	1542.0	58.0	70	3.33
126	591-78-6	2-Hexanone	991.0	609.0	99.9	1000
127	59-50-7	4-Chloro-3-methylphenol	1542.0	58.0	70	3.33
128	59-89-2	N-Nitrosomorpholine	932.0	668.0	99.99	10000
129	602-87-9	5-Nitroacenaphthene	1542.0	58.0	70	3.33
130	60-29-7	Ethyl ether	320.0	1280.0	99.99	10000
131	603-34-9	Triphenylamine	1542.0	58.0	70	3.33

Table 2-1 COPCs

no. of compound	CAS #	COPC Compound	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
132	60-34-4	Methylhydrazine	384.8	1215.2	99.99	10000
133	60-35-5	Acetamide	896.0	704.0	99.99	10000
134	60-57-1	Dieldrin	1542.0	58.0	70	3.33
135	621-64-7	Di-n-Propylnitrosamine	527.0	1073.0	99.99	10000
136	624-83-9	Methyl isocyanate	995.0	605.0	99.9	1000
137	627-13-4	Nitric acid, propyl ester	788.0	812.0	99.99	10000
138	62-75-9	N-Nitroso-N,N-dimethylamine	932.0	668.0	99.99	10000
139	630-20-6	1,1,1,2-Tetrachloroethane	1600.0	0.0	0	1
140	64-17-5	Ethyl alcohol	798.8	801.2	99.99	10000
141	64-18-6	Formic acid	813.2	786.8	99.99	10000
142	64-19-7	Acetic acid	869.0	731.0	99.99	10000
143	67-56-1	Methyl alcohol (Methanol)	878.0	722.0	99.99	10000
144	67-63-0	2-Propyl alcohol (Isopropanol)	852.8	747.2	99.99	10000
145	67-64-1	2-Propanone (Acetone)	869.0	731.0	99.99	10000
146	67-66-3	Chloroform (R-20)	1832.0	-232.0	0	1
147	67-72-1	Hexachloroethane	1600.0	0.0	0	1
148	684-16-2	Hexafluoroacetone	1600.0	0.0	0	1
149	71-23-8	n-Propyl alcohol	824.0	776.0	99.99	10000
150	71-36-3	n-Butyl alcohol	692.6	907.4	99.99	10000
151	71-43-2	Benzene	1097.6	502.4	99	100
152	71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	999.0	601.0	99.9	1000
153	72-20-8	Endrin	1542.0	58.0	70	3.33
154	72-43-5	Methoxychlor	1542.0	58.0	70	3.33
155	72-54-8	4,4-DDD	1542.0	58.0	70	3.33
156	72-55-9	4,4-DDE	1542.0	58.0	70	3.33
157	74-83-9	Bromomethane (Methyl bromide) (halon 1001)	998.6	601.4	99.9	1000
158	74-87-3	Chloromethane (Methyl chloride) (R-40)	1223.6	376.4	95	20
159	74-97-5	Bromochloromethane (halon 1011)	1600.0	0.0	0	1
160	74-99-7	Methylacetylene	644.0	956.0	99.99	10000
161	75-00-3	Chloroethane	966.2	633.8	99.9	1000
162	75-01-4	Vinyl chloride (1-Chloroethene)	881.6	718.4	99.99	10000
163	75-05-8	Acetonitrile	975.2	624.8	99.9	1000
164	75-07-0	Acetaldehyde	347.0	1253.0	99.99	10000
165	75-09-2	Dichloromethane (Methylene chloride) (R-30)	1223.6	376.4	95	20
166	75-12-7	Formamide	932.0	668.0	99.99	10000
167	75-15-0	Carbon disulfide	257.0	1343.0	99.99	10000
168	75-21-8	Ethylene oxide (Oxirane)	804.2	795.8	99.99	10000
169	75-27-4	Bromodichloromethane	1600.0	0.0	0	1
170	75-34-3	1,1-Dichloroethane	852.8	747.2	99.99	10000
171	75-35-4	1,1-Dichloroethene (Vinylidene chloride)	854.6	745.4	99.99	10000
172	75-43-4	Dichlorofluoromethane (R-21)	1026.0	574.0	99.9	1000
173	75-45-6	Chlorodifluoromethane (R-22)	1170.0	430.0	98	50
174	75-50-3	Trimethylamine	374.0	1226.0	99.99	10000
175	75-52-5	Nitromethane	784.4	815.6	99.99	10000

Table 2-1 COPCs

no. of compound	CAS #	COPC Compound	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
176	75-55-8	2-Methylaziridine	914.0	686.0	99.99	10000
177	75-61-6	Difluorodibromomethane (freon 12B2- halon 1202)	1600.0	0.0	0	1
178	75-63-8	Trifluorobromomethane (R-13B1)	1600.0	0.0	0	1
179	75-65-0	2-Methyl-2-propanol	892.4	707.6	99.99	10000
180	75-69-4	Trichlorofluoromethane (R-11)	1600.0	0.0	0	1
181	75-71-8	Dichlorodifluoromethane (R-12)	1600.0	0.0	0	1
182	75-99-0	2,2-Dichloropropionic acid	1112.0	488.0	99	100
183	76-03-9	Trichloroacetic acid	1600.0	0.0	0	1
184	76-11-9	1,1,1,2-Tetrachloro-2,2-difluoroethane (R-112a)	1350.0	250.0	90	10
185	76-12-0	1,1,2,2-Tetrachloro-1,2-difluoroethane (R-112)	1350.0	250.0	90	10
186	76-13-1	1,2,2-Trichloro-1,1,2-trifluoroethane (Freon 113)	1256.0	344.0	95	20
187	76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R-114)	1600.0	0.0	0	1
188	76-15-3	Chloropentafluoroethane (R-115)	1600.0	0.0	0	1
189	76-44-8	Heptachlor	1542.0	58.0	70	3.33
190	78-83-1	2-Methylpropyl alcohol (Isobutyl alcohol)	779.0	821.0	99.99	10000
191	78-87-5	1,2-Dichloropropane	1034.0	566.0	99.9	1000
192	78-92-2	1-Methylpropyl alcohol (2-Butanol)	762.8	837.2	99.99	10000
193	78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	960.8	639.2	99.9	1000
194	79-00-5	1,1,2-Trichloroethane	932.0	668.0	99.99	10000
195	79-01-6	Trichloroethylene	788.0	812.0	99.99	10000
196	79-09-4	Propionic acid	914.0	686.0	99.99	10000
197	79-10-7	2-Propenoic acid	820.4	779.6	99.99	10000
198	79-20-9	Methyl acetate	935.6	664.4	99.99	10000
199	79-34-5	1,1,2,2-Tetrachloroethane	1600.0	0.0	0	1
200	8001-35-2	Toxaphene	1542.0	58.0	70	3.33
201	82-68-8	Pentachloronitrobenzene (PCBN)	1542.0	58.0	70	3.33
202	83-32-9	Acenaphthene	1542.0	58.0	70	3.33
203	84-66-2	Diethyl phthalate	855.0	745.0	99.99	10000
204	84-74-2	Dibutyl phthalate	756.0	844.0	99.99	10000
205	85-01-8	Phenanthrene	1542.0	58.0	70	3.33
206	85-68-7	Butylbenzyl phthalate	451.4	1148.6	99.99	10000
207	86-73-7	Fluorene	1542.0	58.0	70	3.33
208	87-68-3	Hexachlorobutadiene	1130.0	470.0	98	50
209	87-86-5	Pentachlorophenol	1542.0	58.0	70	3.33
210	88-06-2	2,4,6-Trichlorophenol	1542.0	58.0	70	3.33
211	88-72-2	2-Nitrotoluene	581.0	1019.0	99.99	10000
212	88-75-5	2-Nitrophenol	1542.0	58.0	70	3.33
213	88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	1542.0	58.0	70	3.33
214	88-89-1	Picric acid	572.0	1028.0	99.99	10000
215	91-20-3	Naphthalene	1054.0	546.0	99	100
216	91-22-5	Quinoline	896.0	704.0	99.99	10000
217	91-58-7	2-Chloronapthalene	1542.0	58.0	70	3.33
218	92-52-4	1,1`-Biphenyl	1004.0	596.0	99.9	1000

Table 2-1 COPCs

no. of compound	CAS #	COPC Compound	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
219	92-93-3	4-Nitrobiphenyl	1542.0	58.0	70	3.33
220	93-72-1	Silvex (2,4,5-TP)	1542.0	58.0	70	3.33
221	93-76-5	2,4,5-T	1542.0	58.0	70	3.33
222	94-75-7	2,4-D and esters (160C typed)	1542.0	58.0	70	3.33
223	95-13-6	Indene	979.0	621.0	99.9	1000
224	95-47-6	o-Xylene	869.0	731.0	99.99	10000
225	95-48-7	o-Cresol (2-Methylphenol)	1038.2	561.8	99.9	1000
226	95-49-8	2-Chlorotoluene	932.0	668.0	99.99	10000
227	95-50-1	o-Dichlorobenzene (1,2-Dichlorobenzene)	1184.0	416.0	98	50
228	95-57-8	2-Chlorophenol	779.0	821.0	99.99	10000
229	95-95-4	2,4,5-Trichlorophenol	1542.0	58.0	70	3.33
230	96-18-4	1,2,3-Trichloropropane	932.0	668.0	99.99	10000
231	96-22-0	3-Pentanone	842.0	758.0	99.99	10000
232	96-69-5	Bis(3-tert-butyl-4-hydroxy-6-methyl-phenyl)sulfide	1542.0	58.0	70	3.33
233	98-51-1	p-tert-Butyltoluene	950.0	650.0	99.99	10000
234	98-82-8	Cumene	795.0	805.0	99.99	10000
235	98-83-9	alpha-Methylstyrene	1065.2	534.8	99	100
236	98-86-2	Acetophenone	1059.8	540.2	99	100
237	98-95-3	Nitrobenzene	899.6	700.4	99.99	10000

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
1	541-05-9	Cyclotrisiloxane, hexamethyl-	400	752	848	99.99	10000
2	556-67-2	Cyclotetrasiloxane, octamethyl-	400	752	848	99.99	10000
3	USI000-06	tetramethylcyclotrisiloxane	250	482	1118	99.99	10000
4	3622-84-2	Benzenesulfonamide, N-butyl-	800	1472	128	80	5
5	5145-07-1	2(3H)-Furanone, dihydro-3,5-dimethyl-	425	797	803	99.99	10000
6	108-47-4	Pyridine, 2,4-dimethyl-	482	899.6	700.4	99.99	10000
7	109-99-9	Furan, tetrahydro-	321	609.8	990.2	99.99	10000
8	110-00-9	Furan	360	680	920	99.99	10000
9	110-86-1	Pyridine	482	899.6	700.4	99.99	10000
10	1708-29-8	Furan, 2,5-dihydro-	450	842	758	99.99	10000
11	24405-16-1	2H-Pyran-2-one, tetrahydro-5,6-dimethyl-, trans-	350	662	938	99.99	10000
12	289-95-2	Pyrimidine	450	842	758	99.99	10000
13	290-37-9	Pyrazine	450	842	758	99.99	10000
14	534-22-5	Furan, 2-methyl-	450	842	758	99.99	10000
15	930-22-3	Oxirane, ethenyl-	429	804.2	795.8	99.99	10000
16	96-48-0	2(3H)-Furanone, dihydro- (gamma butyrolactone)	450	842	758	99.99	10000
17	3457-90-7	1,3-Propanediol, dinitrate	450	842	758	99.99	10000
18	3457-91-8	1,4-Butanediol, dinitrate	450	842	758	99.99	10000
19	544-16-1	Nitrous acid, butyl ester	450	842	758	99.99	10000
20	624-91-9	Nitrous acid, methyl ester	500	932	668	99.99	10000
21	625-58-1	Nitric acid, ethyl ester	90	194	1406	99.99	10000
22	627-05-4	Butane, 1-nitro-	450	842	758	99.99	10000
23	627-13-4	Nitric acid, propyl ester	175	347	1253	99.99	10000
24	62-75-9M	Methanamine, N-methyl-N-nitroso- and others	500	932	668	99.99	10000
25	928-45-0	Nitric acid, butyl ester	400	752	848	99.99	10000
26	123-75-1	Pyrrolidine	450	842	758	99.99	10000
27	22431-09-0	Methanamine, N-(1-methylbutylidene)-	350	662	938	99.99	10000
28	616-45-5	2-Pyrrolidinone	450	842	758	99.99	10000
29	75-50-3	Methanamine, N,N-dimethyl-	190	374	1226	99.99	10000
30	107-12-0	Propanenitrile	510	950	650	99.99	10000
31	109-74-0	Butanenitrile	488	910.4	689.6	99.99	10000
32	110-59-8	Pentanenitrile	475	887	713	99.99	10000
33	124-12-9	Octanenitrile	450	842	758	99.99	10000
34	2243-27-8	Nonanenitrile	440	824	776	99.99	10000
35	628-73-9	Hexanenitrile	470	878	722	99.99	10000
36	629-08-3	Heptanenitrile	460	860	740	99.99	10000
37	75-05-8	Acetonitrile	524	975.2	624.8	99.9	1000
38	109-21-7	Butanoic acid, butyl ester	450	842	758	99.99	10000
39	110-27-0	Tetradecanoic acid, 1-methylethyl ester	400	752	848	99.99	10000
40	123-25-1	Butanedioic acid, diethyl ester	350	662	938	99.99	10000
41	123-86-4	Acetic acid, butyl ester	425	797	803	99.99	10000

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
42	126-73-8	Phosphoric acid tributyl ester	482	899.6	700.4	99.99	10000
43	141-78-6	Acetic acid ethyl ester	482	899.6	700.4	99.99	10000
44	1838-59-1	Formic acid, 2-propenyl ester	500	932	668	99.99	10000
45	590-01-2	Propanoic acid, butyl ester	427	800.6	799.4	99.99	10000
46	591-87-7	Acetic acid, 2-propenyl ester	475	887	713	99.99	10000
47	592-84-7	Formic acid, butyl ester	322	611.6	988.4	99.99	10000
48	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	540	1004	596	99.9	1000
49	1002-84-2	Pentadecanoic acid	400	752	848	99.99	10000
50	107-92-6	Butanoic acid	450	842	758	99.99	10000
51	2091-29-4	9-Hexadecenoic acid	400	752	848	99.99	10000
52	544-63-8	Tetradecanoic acid	400	752	848	99.99	10000
53	57-10-3	Hexadecanoic acid	400	752	848	99.99	10000
54	64-19-7	Acetic acid	465	869	731	99.99	10000
55	105-42-0	2-Hexanone, 4-methyl-	457	854.6	745.4	99.99	10000
56	106-35-4	3-Heptanone	390	734	866	99.99	10000
57	106-68-3	3-Octanone	525	977	623	99.9	1000
58	107-87-9	2-Pentanone	505	941	659	99.99	10000
59	108-10-1	2-Pentanone, 4-methyl- (MIBK)	457	854.6	745.4	99.99	10000
60	110-43-0	2-Heptanone	533	991.4	608.6	99.9	1000
61	111-13-7	2-Octanone	525	977	623	99.9	1000
62	112-12-9	2-Undecanone	400	752	848	99.99	10000
63	123-19-3	4-Heptanone	533	991.4	608.6	99.9	1000
64	1534-26-5	3-Tridecanone	400	752	848	99.99	10000
65	1534-27-6	3-Dodecanone	400	752	848	99.99	10000
66	15932-80-6	Cyclohexanone, 5-methyl-2-(1-methylethylidene)-	500	932	668	99.99	10000
67	22026-12-6	6-Tridecanone	400	752	848	99.99	10000
68	2216-87-7	3-Undecanone	400	752	848	99.99	10000
69	50639-02-6	5-Undecanone, 2-methyl-	400	752	848	99.99	10000
70	563-80-4	2-Butanone, 3-methyl-	500	932	668	99.99	10000
71	589-38-8	3-Hexanone	533	991.4	608.6	99.9	1000
72	589-63-9	4-Octanone	525	977	623	99.9	1000
73	591-78-6	2-Hexanone	533	991.4	608.6	99.9	1000
74	593-08-8	2-Tridecanone	400	752	848	99.99	10000
75	629-23-2	3-Tetradecanone	400	752	848	99.99	10000
76	67-64-1	2-Propanone	465	869	731	99.99	10000
77	763-93-9	3-Hexen-2-one	550	1022	578	99.9	1000
78	78-93-3	2-Butanone	516	960.8	639.2	99.9	1000
79	78-94-4	3-Buten-2-one	550	1022	578	99.9	1000
80	821-55-6	2-Nonanone	500	932	668	99.99	10000
81	89-82-7	Cyclohexanone, 5-methyl-2-(1-methylethylidene)	500	932	668	99.99	10000
82	925-78-0	3-Nonanone	500	932	668	99.99	10000

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
83	928-68-7	2-Heptanone, 6-methyl-	525	977	623	99.9	1000
84	98-86-2	Ethanone, 1-phenyl-	571	1059.8	540.2	99	100
85	110-62-3	Pentanal	222	431.6	1168.4	99.99	10000
86	111-71-7	Heptanal	300	572	1028	99.99	10000
87	123-38-6	Propanal	207	404.6	1195.4	99.99	10000
88	123-72-8	Butanal	230	446	1154	99.99	10000
89	124-13-0	Octanal	300	572	1028	99.99	10000
90	124-19-6	Nonanal	300	572	1028	99.99	10000
91	19269-28-4	Hexanal, 3-methyl-	200	392	1208	99.99	10000
92	66-25-1	Hexanal	300	572	1028	99.99	10000
93	75-07-0	Acetaldehyde	175	347	1253	99.99	10000
94	104-76-7	1-Hexanol, 2-ethyl-	300	572	1028	99.99	10000
95	111-70-6	1-Heptanol	320	608	992	99.99	10000
96	112-92-5	1-Octadecanol	300	572	1028	99.99	10000
97	14898-79-4	2-Butanol	406	762.8	837.2	99.99	10000
98	2136-70-1	Ethanol, 2-(tetradecyloxy)-	300	572	1028	99.99	10000
99	36653-82-4	1-Hexadecanol	300	572	1028	99.99	10000
100	51411-24-6	6,10-Dodecadien-1-ol, 3,7,11-trimethyl-	300	572	1028	99.99	10000
101	57-55-6	1,2-Propanediol	371	699.8	900.2	99.99	10000
102	598-32-3	3-Buten-2-ol	450	842	758	99.99	10000
103	6032-29-7	2-Pentanol	343	649.4	950.6	99.99	10000
104	627-27-0	3-Buten-1-ol	450	842	758	99.99	10000
105	64-17-5	Ethanol	423	793.4	806.6	99.99	10000
106	67-56-1	Methanol	470	878	722	99.99	10000
107	67-63-0	2-Propanol	399	750.2	849.8	99.99	10000
108	71-23-8	1-Propanol	440	824	776	99.99	10000
109	75-65-0	2-Propanol, 2-methyl-	480	896	704	99.99	10000
110	75-84-3	1-Propanol, 2,2-dimethyl-	480	896	704	99.99	10000
111	75-85-4	2-Butanol, 2-methyl-	437	818.6	781.4	99.99	10000
112	78-92-2	2-Butanol	406	762.8	837.2	99.99	10000
113	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	610	1130	470	98	50
114	96-41-3	Cyclopentanol	350	662	938	99.99	10000
115	1184-60-7	1-Propene, 2-fluoro-	600	1112	488	99	100
116	127-18-4	Ethene, tetrachloro-	871	1599.8	0.2	0	1
117	156-59-2	Ethene, 1,2-dichloro-, (Z)-	460	860	740	99.99	10000
118	1717-00-6	Ethane, 1,1-dichloro-1-fluoro- (freon 14b)	550	1022	578	99.9	1000
119	56-23-5	Methane, tetrachloro-	900	1652	-52	0	1
120	74-87-3	Methane, chloro- (R-40)	662	1223.6	376.4	95	20
121	75-02-5	Ethene, fluoro-	385	725	875	99.99	10000
122	75-09-2	Methane, dichloro-	662	1223.6	376.4	95	20
123	75-45-6	Methane, chlorodifluoro- (R-22)	632	1169.6	430.4	98	50

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
124	75-68-3	Ethane, 1-chloro-1,1-difluoro- (R-142)	632	1169.6	430.4	98	50
125	75-69-4	Methane, trichlorofluoro- (R-11)	900	1652	-52	0	1
126	6031-02-3	Benzene, (1-methylpentyl)-	490	914	686	99.99	10000
127	100-41-4	Benzene, ethyl-	432	809.6	790.4	99.99	10000
128	100-42-5	Benzene, ethenyl-	490	914	686	99.99	10000
129	106-42-3	Benzene, 1,4-dimethyl-	529	984.2	615.8	99.9	1000
130	108-38-3	Benzene, 1,3-dimethyl-	528	982.4	617.6	99.9	1000
131	108-88-3	Benzene, methyl-	482	899.6	700.4	99.99	10000
132	3290-53-7	Benzene, (2-methyl-2-propenyl)-	490	914	686	99.99	10000
133	538-68-1	Benzene, pentyl-	420	788	812	99.99	10000
134	637-50-3	Benzene, 1-propenyl-	490	914	686	99.99	10000
135	643-58-3	1,1`-Biphenyl, 2-methyl-	495	923	677	99.99	10000
136	71-43-2	Benzene	562	1043.6	556.4	99.9	1000
137	92-52-4	1,1`-Biphenyl	540	1004	596	99.9	1000
138	95-47-6	Benzene, 1,2-dimethyl-	464	867.2	732.8	99.99	10000
139	74-99-7	1-Propyne	340	644	956	99.99	10000
140	20184-91-2	4-Nonyne	320	608	992	99.99	10000
141	61142-40-3	4-Undecene, 4-methyl-	500	932	668	99.99	10000
142	629-73-2	1-Hexadecene	500	932	668	99.99	10000
143	74630-39-0	1-Undecene, 4-methyl-	500	932	668	99.99	10000
144	74630-48-1	3-Undecene, 2-methyl-, (Z)-	500	932	668	99.99	10000
145	764-96-5	5-Undecene, (Z)-	500	932	668	99.99	10000
146	821-74-9	4,5-Nonadiene	550	1022	578	99.9	1000
147	1008-80-6	Naphthalene, decahydro-2,3-dimethyl-	288	550.4	1049.6	99.99	10000
148	108-87-2	Cyclohexane, methyl-	250	482	1118	99.99	10000
149	110-82-7	Cyclohexane	245	473	1127	99.99	10000
150	1472-09-9	Cyclopropane, octyl-	498	928.4	671.6	99.99	10000
151	1618-22-0	Naphthalene, decahydro-2,6-dimethyl-	288	550.4	1049.6	99.99	10000
152	1630-94-0	Cyclopropane, 1,1-dimethyl-	498	928.4	671.6	99.99	10000
153	1678-93-9	Cyclohexane, butyl-	246	474.8	1125.2	99.99	10000
154	2415-72-7	Cyclopropane, propyl-.	498	928.4	671.6	99.99	10000
155	287-92-3	Cyclopentane	380	716	884	99.99	10000
156	2883-05-8	Octane, 2-cyclohexyl-	246	474.8	1125.2	99.99	10000
157	294-62-2	Cyclododecane	235	455	1145	99.99	10000
158	2958-76-1	Naphthalene, decahydro-2-methyl-	288	550.4	1049.6	99.99	10000
159	3073-66-3	Cyclohexane, 1,1,3-trimethyl-	320	608	992	99.99	10000
160	32281-85-9	Cyclopentane, 1,3-dimethyl-2-(1-methylethyl)-	350	662	938	99.99	10000
161	3604-14-6	Naphthalene, decahydro-1,2-dimethyl-	288	550.4	1049.6	99.99	10000
162	41977-33-7	Cyclopropane, 1-pentyl-2-propyl-	498	928.4	671.6	99.99	10000
163	4292-92-6	Cyclohexane, pentyl-	270	518	1082	99.99	10000
164	4806-61-5	Cyclobutane, ethyl-	212	413.6	1186.4	99.99	10000

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
165	493-02-7	Naphthalene, decahydro-, trans-	288	550.4	1049.6	99.99	10000
166	54676-39-0	Cyclohexane, 2-butyl-1,1,3-trimethyl-	320	608	992	99.99	10000
167	55937-92-3	Bicyclo[4.1.0]heptane, 2-methyl-7-pentyl-	320	608	992	99.99	10000
168	594-11-6	Cyclopropane, methyl-	498	928.4	671.6	99.99	10000
169	598-61-8	Cyclobutane, methyl-	250	482	1118	99.99	10000
170	61142-20-9	Cyclohexane, (4-methylpentyl)-	270	518	1082	99.99	10000
171	7058-01-7	Cyclohexane, (1-methylpropyl)-	270	518	1082	99.99	10000
172	7094-26-0	Cyclohexane, 1,1,2-trimethyl-	270	518	1082	99.99	10000
173	822-50-4	Cyclopentane, 1,2-dimethyl-, trans-	350	662	938	99.99	10000
174	1002-43-3	Undecane, 3-methyl-	500	932	668	99.99	10000
175	106-97-8	Butane	405	761	839	99.99	10000
176	107-83-5	Pentane, 2-methyl-	306	582.8	1017.2	99.99	10000
177	108-08-7	Pentane, 2,4-dimethyl-	337	638.6	961.4	99.99	10000
178	109-66-0	Pentane	260	500	1100	99.99	10000
179	110-54-3	Hexane	225	437	1163	99.99	10000
180	111-65-9	Octane	220	428	1172	99.99	10000
181	111-84-2	Nonane	206	402.8	1197.2	99.99	10000
182	1120-21-4	Undecane	202	395.6	1204.4	99.99	10000
183	112-40-3	Dodecane	204	399.2	1200.8	99.99	10000
184	124-18-5	Decane	210	410	1190	99.99	10000
185	13151-34-3	Decane, 3-methyl-	225	437	1163	99.99	10000
186	13151-35-4	Decane, 5-methyl-	225	437	1163	99.99	10000
187	13286-73-2	Tridecane, 3-ethyl-	220	428	1172	99.99	10000
188	13287-21-3	Tridecane, 6-methyl-	220	428	1172	99.99	10000
189	142-82-5	Heptane	223	433.4	1166.6	99.99	10000
190	14720-74-2	Heptane, 2,2,4-trimethyl-	275	527	1073	99.99	10000
191	1560-96-9	Tridecane, 2-methyl-	205	401	1199	99.99	10000
192	1632-70-8	Undecane, 5-methyl-	220	428	1172	99.99	10000
193	17301-23-4	Undecane, 2,6-dimethyl-	250	482	1118	99.99	10000
194	17301-25-6	Undecane, 2,8-dimethyl-	250	482	1118	99.99	10000
195	17301-27-8	Undecane, 2,10-dimethyl-	250	482	1118	99.99	10000
196	17301-29-0	Undecane, 3,7-dimethyl-	250	482	1118	99.99	10000
197	17301-30-3	Undecane, 3,8-dimethyl-	250	482	1118	99.99	10000
198	17301-32-5	Undecane, 4,7-dimethyl-	250	482	1118	99.99	10000
199	17301-94-9	Nonane, 4-methyl-	220	428	1172	99.99	10000
200	17302-28-2	Nonane, 2,6-dimethyl-	250	482	1118	99.99	10000
201	17302-32-8	Nonane, 3,7-dimethyl-	250	482	1118	99.99	10000
202	17312-50-4	Decane, 2,5-dimethyl-	250	482	1118	99.99	10000
203	17312-57-1	Dodecane, 3-methyl-	220	428	1172	99.99	10000
204	17312-60-6	Undecane, 6-ethyl-	220	428	1172	99.99	10000
205	17312-73-1	Undecane, 5,5-dimethyl-	250	482	1118	99.99	10000

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
206	17312-76-4	Undecane, 6,6-dimethyl-	250	482	1118	99.99	10000
207	17312-77-5	Undecane, 2,3-dimethyl-	250	482	1118	99.99	10000
208	17312-80-0	Undecane, 2,4-dimethyl-	250	482	1118	99.99	10000
209	17312-82-2	Undecane, 4,6-dimethyl-	250	482	1118	99.99	10000
210	17453-94-0	Undecane, 5-ethyl-	220	428	1172	99.99	10000
211	20278-85-7	Heptane, 2,3,5-trimethyl-	275	527	1073	99.99	10000
212	2213-23-2	Heptane, 2,4-dimethyl-	330	626	974	99.99	10000
213	2216-33-3	Octane, 3-methyl-	220	428	1172	99.99	10000
214	2216-34-4	Octane, 4-methyl-	220	428	1172	99.99	10000
215	25117-24-2	Tetradecane, 4-methyl-	220	428	1172	99.99	10000
216	25117-31-1	Tridecane, 5-methyl-	220	428	1172	99.99	10000
217	26730-12-1	Tridecane, 4-methyl-	220	428	1172	99.99	10000
218	26730-14-3	Tridecane, 7-methyl-	225	437	1163	99.99	10000
219	2847-72-5	Decane, 4-methyl-	225	437	1163	99.99	10000
220	2980-69-0	Undecane, 4-methyl-	220	428	1172	99.99	10000
221	31295-56-4	Dodecane, 2,6,11-trimethyl-	250	482	1118	99.99	10000
222	3891-98-3	Dodecane, 2,6,10-trimethyl-	250	482	1118	99.99	10000
223	4032-93-3	Heptane, 2,3,6-trimethyl-	275	527	1073	99.99	10000
224	52896-90-9	Heptane, 3-ethyl-5-methyl-	275	527	1073	99.99	10000
225	544-76-3	Hexadecane	202	395.6	1204.4	99.99	10000
226	55030-62-1	Tridecane, 4,8-dimethyl-	250	482	1118	99.99	10000
227	55045-07-3	Dodecane, 2-methyl-8-propyl-	250	482	1118	99.99	10000
228	55045-11-9	Tridecane, 5-propyl-	225	437	1163	99.99	10000
229	562-49-2	Pentane, 3,3-dimethyl-	350	662	938	99.99	10000
230	56292-65-0	Dodecane, 2,5-dimethyl-	225	437	1163	99.99	10000
231	565-59-3	Pentane, 2,3-dimethyl-	337	638.6	961.4	99.99	10000
232	589-34-4	Hexane, 3-methyl-	280	536	1064	99.99	10000
233	589-43-5	Hexane, 2,4-dimethyl-	437	818.6	781.4	99.99	10000
234	589-53-7	Heptane, 4-methyl-	250	482	1118	99.99	10000
235	589-81-1	Heptane, 3-methyl-	239	462.2	1137.8	99.99	10000
236	591-76-4	Hexane, 2-methyl-	280	536	1064	99.99	10000
237	592-27-8	Heptane, 2-methyl-	247	476.6	1123.4	99.99	10000
238	61141-72-8	Dodecane, 4,6-dimethyl-	225	437	1163	99.99	10000
239	6117-97-1	Dodecane, 4-methyl-	220	428	1172	99.99	10000
240	617-78-7	3-Ethylpentane	275	527	1073	99.99	10000
241	62016-30-2	Octane, 2,3,3-trimethyl-	290	554	1046	99.99	10000
242	62016-34-6	Octane, 2,3,7-trimethyl-	290	554	1046	99.99	10000
243	62108-21-8	Decane, 6-ethyl-2-methyl-	275	527	1073	99.99	10000
244	62108-25-2	Decane, 2,6,7-trimethyl-	290	554	1046	99.99	10000
245	62108-27-4	Decane, 2,4,6-trimethyl-	290	554	1046	99.99	10000
246	62238-13-5	Decane, 2,3,7-trimethyl-	290	554	1046	99.99	10000

Table 2-2 Compounds detected >0.1 ppmv

no of compound	CAS #	headspace detects >0.1 ppmv Compound name	AIT deg C	AIT deg F	RTO degrees above AIT deg F	est DE %	est DF mass in / mass out
247	629-50-5	Tridecane	202	395.6	1204.4	99.99	10000
248	629-59-4	Tetradecane	200	392	1208	99.99	10000
249	629-62-9	Pentadecane	202	395.6	1204.4	99.99	10000
250	629-78-7	Heptadecane	202	395.6	1204.4	99.99	10000
251	74-98-6	Propane	450	842	758	99.99	10000
252	75-28-5	Propane, 2-methyl-	462	863.6	736.4	99.99	10000
253	78-78-4	Butane, 2-methyl-	420	788	812	99.99	10000
254	96-14-0	Pentane, 3-methyl-	278	532.4	1067.6	99.99	10000
255	565-75-3	Pentane, trimethyl-, isomer	427	800.6	799.4	99.99	10000

Attachment 3 Tables of Removal DFs

Table 3-1 COPCs
Table 3-2 Compounds detected >0.1 ppmv

no of compound	CAS	Compound Name (COPC)	MW	Boiling pt.	Yaws capacity correlation carbon loading quadratic constants			assumed outlet equilibrium of isotherm-PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
								0.10			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
			g/mol	deg C	A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
1	100-00-5	p-Nitrochlorobenzene	157.6	242							40	98	50	40	98	50
2	100-21-0	p-Phthalic acid	166.1	sublimes							40	98	50	40	98	50
3	100-25-4	1,4-Dinitrobenzene	168.1	173							20	98	50	20	98	50
4	100-41-4	Ethyl benzene	106.2	136.2							2	80	5	2	80	5
5	100-42-5	Styrene	104.1	145.2							2	80	5	2	80	5
6	10061-01-5	cis-1,3-Dichloropropene	111.0	104.3							2	80	5	2	80	5
7	10061-02-6	trans-1,3-Dichloropropene	111.0	112							2	80	5	2	80	5
8	101-55-3	4-Bromophenylphenyl ether	249.1	310.14							40	98	50	40	98	50
9	101-84-8	Diphenyl ether	170.2	498							40	98	50	40	98	50
10	106-35-4	3-Heptanone	114.2	147							2	80	5	2	80	5
11	106-42-3	p-Xylene (Dimethyl benzene)	106.2	138.3							2	80	5	2	80	5
12	106-46-7	1,4-Dichlorobenzene	147.0	173.4							10	95	20	10	95	20
13	106-88-7	1,2-Epoxybutane	72.1	63.3	0.36719	0.37654	-0.0236	0.93	(0.07)	(7.88)	1	50	2	0.5	20	1.25
14	106-93-4	Ethylene dibromide (Dibromoethane)	187.9	131.7	1.44231	0.255	-0.02666	14.48	9.48	65.46	5	90	10	5	90	10
15	106-97-8	Butane	58.1	-0.45	0.03071	0.34304	-0.01596	0.47	0.47	100.00	0	0	1	0	0	1
16	106-99-0	1,3-Butadiene	54.1	-4.4	-0.03359	0.34764	-0.01297	0.40	0.40	100.00	0	0	1	0	0	1
17	107-02-8	Acrolein	56.1	52.7	-0.29632	0.49437	-0.02471	0.15	(0.85)	(553.73)	1	50	2	0	0	1
18	107-05-1	3-Chloropropene (Allyl chloride)	76.5	44	0.32792	0.36553	-0.01853	0.88	0.38	43.10	0.5	20	1.25	0.5	20	1.25
19	107-06-2	1,2-Dichloroethane (Ethylene chloride)	99.0	83.5	0.55343	0.37072	-0.02161	1.45	0.45	30.99	1	50	2	1	50	2
20	107-12-0	Propionitrile	55.1	97.2	0.05925	0.51747	-0.03781	0.32	(0.68)	(213.35)	1	50	2	0	0	1
21	107-13-1	Acrylonitrile	53.1	77.3	0.07669	0.49986	-0.035	0.35	(0.65)	(187.19)	1	50	2	0	0	1
22	107-18-6	2-Propene-1-ol	58.1	97	0.3239	0.49368	-0.0437	0.61	(0.39)	(63.49)	1	50	2	0.5	20	1.25
23	107-31-3	Formic acid, methyl ester	60.1	32	-0.99586	0.61693	-0.01847	0.02	(0.48)	(2039.09)	0.5	20	1.25	0	0	1
24	107-66-4	Dibutylphosphate	210.2	100							2	80	5	2	80	5
25	107-87-9	2-Pentanone	86.1	100							1	50	2	1	50	2
26	108-03-2	1-Nitropropane	89.1	131	0.91328	0.34648	-0.0373	3.38	1.38	40.91	2	80	5	2	80	5
27	108-05-4	Vinyl acetate	86.1	72.3	0.61067	0.34797	-0.02595	1.72	0.72	42.02	1	50	2	1	50	2
28	108-10-1	Hexone (4-Methyl-2-pentanone or MIBK)	100.2	117.4							2	80	5	2	80	5
29	108-20-3	Bis(isopropyl)ether	102.2	68.5							1	50	2	1	50	2
30	108-38-3	m-Xylene (Dimethyl benzene)	106.2	139.1							2	80	5	2	80	5
31	108-39-4	m-Cresol	108.1	202							10	95	20	10	95	20
32	108-87-2	Methylcyclohexane	98.2	101							2	80	5	2	80	5
33	108-88-3	Toluene	92.1	110.6							2	80	5	2	80	5
34	108-90-7	Chlorobenzene	112.6	130							2	80	5	2	80	5
35	108-93-0	Cyclohexanol	100.2	161							10	95	20	10	95	20
36	108-94-1	Cyclohexanone	98.2	155.6							10	95	20	10	95	20
37	108-95-2	Phenol	94.1	181.7							10	95	20	10	95	20
38	109-66-0	n-Pentane	72.2	36.1							0.5	20	1.25	0.5	20	1.25
39	109-99-9	Tetrahydrofuran	72.1	66	0.29856	0.35648	-0.0155	0.84	(0.16)	(18.42)	1	50	2	0.5	20	1.25
40	110-12-3	5-Methyl-2-hexanone	114.2	144							2	80	5	2	80	5
41	110-43-0	2-Heptanone	114.2	150							2	80	5	2	80	5
42	110-54-3	n-Hexane	86.2	69							1	50	2	1	50	2
43	110-62-3	n-Valeraldehyde	86.1	103							2	80	5	2	80	5
44	110-82-7	Cyclohexane	84.2	80.7							1	50	2	1	50	2
45	110-83-8	Cyclohexene	82.1	83							1	50	2	1	50	2
46	110-86-1	Pyridine	79.1	115.2							2	80	5	2	80	5
47	111-65-9	n-Octane	114.2	126							2	80	5	2	80	5
48	111-76-2	Ethylene glycol monobutyl ether	118.0	171							10	95	20	10	95	20
49	111-84-2	n-Nonane	128.3	150.8							10	95	20	10	95	20
50	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	390.5	386.9							40	98	50	40	98	50
51	117-84-0	n-Dioctyl phthalate	390.6	220							40	98	50	40	98	50

no of compound	CAS	Compound Name (COPC)	MW	Boiling pt.	Yaws capacity correlation carbon loading quadratic constants			assumed outlet equilibrium of Isotherm-PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
								0.10			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
			g/mol	deg C	A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
52	118-74-1	Hexachlorobenzene	284.8	332							40	98	50	40	98	50
53	120-12-7	Anthracene	178.2	340							40	98	50	40	98	50
54	120-82-1	1,2,4-Trichlorobenzene	181.5	214.4							40	98	50	40	98	50
55	120-83-2	2,4-Dichlorophenol	163.0	210							40	98	50	40	98	50
56	121-44-8	Triethylamine	101.2	88.9							1	50	2	1	50	2
57	121-69-7	Dimethylaniline	121.2	194							10	95	20	10	95	20
58	122-39-4	N,N-Diphenylamine	169.2	302							40	98	50	40	98	50
59	123-19-3	4-Heptanone	114.2	144							2	80	5	2	80	5
60	123-38-6	n-Propionaldehyde	58.1	49	0.05519	0.49738	-0.04331	0.33	(0.17)	(52.92)	0.5	20	1.25	0	0	1
61	123-51-3	3-Methyl-1-butanol	88.2	130							2	80	5	2	80	5
62	123-86-4	Acetic acid n-butyl ester	116.2	126.1							2	80	5	2	80	5
63	123-91-1	1,4-Dioxane	88.1	101.1	0.66781	0.36208	-0.03034	1.89	(0.11)	(6.08)	2	80	5	1	50	2
64	126-73-8	Tributyl phosphate	266.3	289							40	98	50	40	98	50
65	126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	67.1	90.3	0.46855	0.3889	-0.03042	1.11	0.11	10.30	1	50	2	1	50	2
66	127-18-4	Perchloroethylene (tetrachloroethylene)	165.9	121.1	1.40596	0.20802	-0.02097	15.03	10.03	66.73	5	90	10	5	90	10
67	127-19-5	N,N-Dimethylacetamide	87.1	166	1.20026	0.26124	-0.03263	8.26	(1.76)	(21.23)	10	95	20	5	90	10
68	128-37-0	2,6-Bis(tert-butyl)-4-methylphenol	220.4	265							40	98	50	40	98	50
69	129-00-0	Pyrene	202.2	404							40	98	50	40	98	50
70	1321-64-8	Pentachloronaphthalene	300.4	327							40	98	50	40	98	50
71	1321-65-9	Trichloronaphthalene	231.5	304							40	98	50	40	98	50
72	132-64-9	Dibenzofuran	168.2	285							40	98	50	40	98	50
73	1335-87-1	Hexachloronaphthalene	334.8	343							40	98	50	40	98	50
74	1335-88-2	Tetrachloronaphthalene	266.0	316							40	98	50	40	98	50
75	1336-36-3	Polychlorinated biphenyls (PCBs)	322.0	>195							40	98	50	40	98	50
76	141-78-6	Acetic acid ethyl ester (Ethyl acetate)	88.1	77.1	0.63612	0.34441	-0.02691	1.84	0.84	45.65	1	50	2	1	50	2
77	141-79-7	4-Methyl-3-penten-2-one	98.2	127							2	80	5	2	80	5
78	142-82-5	n-Heptane	100.2	98.4							1	50	2	1	50	2
79	144-62-7	Oxalic acid	90.0	190							10	95	20	10	95	20
80	156-60-5	trans-1,2-Dichloroethylene	97.0	47.5	0.47567	0.39061	-0.02554	1.15	0.65	56.40	0.5	20	1.25	0.5	20	1.25
81	1582-09-8	Trifluralin	335.3	139							5	90	10	5	90	10
82	1634-04-4	Methyl tert-butyl ether	88.2	55.2							1	50	2	1	50	2
83	1836-75-5	Nitrofen	284.1	180							20	98	50	20	98	50
84	189-55-9	Dibenzo[a,j]pyrene	302.4	404							40	98	50	40	98	50
85	189-64-0	Dibenzo[a,h]pyrene	302.4	404							40	98	50	40	98	50
86	191-24-2	Benzo(g,h,i)perylene	276.3	500							40	98	50	40	98	50
87	191-30-0	Benzo[a,l]pyrene	302.4	404							40	98	50	40	98	50
88	192-65-4	Dibenzo[a,e]pyrene	302.4	sublimes							40	98	50	40	98	50
89	193-39-5	Indeno(1,2,3-cd)pyrene	276.3	536							40	98	50	40	98	50
90	205-82-3	Benzo(j)fluoranthene	252.3	350							40	98	50	40	98	50
91	205-99-2	Benzo(b)fluoranthene	252.3	357							40	98	50	40	98	50
92	206-44-0	Fluoranthene	202.3	375							40	98	50	40	98	50
93	207-08-9	Benzo(k)fluoranthene	252.3	480							40	98	50	40	98	50
94	208-96-8	Acenaphthylene	152.2	265							40	98	50	40	98	50
95	218-01-9	Chrysene	228.3	448							40	98	50	40	98	50
96	2234-13-1	Octachloronaphthalene	403.7	440							40	98	50	40	98	50
97	224-42-0	Dibenz[a,j]acridine	279.3	>346							40	98	50	40	98	50
98	226-36-8	Dibenz[a,h]acridine	279.3	>346							40	98	50	40	98	50
99	2385-85-5	Mirex	545.6	composes							40	98	50	40	98	50
100	25551-13-7	Trimethyl benzene	120.2	164.7							10	95	20	10	95	20
101	26140-60-3	Terphenyls	230.3	337							40	98	50	40	98	50
102	27154-33-2	Trichlorofluoroethane	151.4	148.5							5	90	10	5	90	10

no of compo und	CAS	Compound Name (COPC)	MW	Boiling pt.	Yaws capacity correlation carbon loading quadratic constants			assumed outlet equilibrium of isotherm-PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
								0.10			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
			g/mol	deg C	A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
103	287-92-3	Cyclopentane	70.1	49							0.5	20	1.25	0.5	20	1.25
104	309-00-2	Aldrin	364.9	145							5	90	10	5	90	10
105	319-84-6	Hexachlorocyclohexane (Lindane) Alpha BHC	290.0	288							40	98	50	40	98	50
106	319-85-7	Hexachlorocyclohexane (Lindane) Beta BHC	290.8	288							40	98	50	40	98	50
107	319-86-8	Delta-BHC	290.9	288							40	98	50	40	98	50
108	3697-24-3	5-Methylchrysene	242.3	404							40	98	50	40	98	50
109	3825-26-1	Ammonium perfluorooctanoate	431.1	192							20	98	50	20	98	50
110	4170-30-3	2-Butenaldehyde (2-Butenal)	70.1	102	0.68353	0.3656	-0.034	1.92	(0.08)	(4.02)	2	80	5	1	50	2
111	465-73-6	Isodrin	364.9	304							40	98	50	40	98	50
112	50-00-0	Formaldehyde	30.0	-19.5	-2.48524	0.69123	-0.00375	0.00	0.00	100.00	0	0	1	0	0	1
113	50-29-3	4,4-DDT	354.5	260							40	98	50	40	98	50
114	50-32-8	Benzo(a)pyrene	252.3	495							40	98	50	40	98	50
115	53-70-3	Dibenzo(a,h)anthracene	278.3	524							40	98	50	40	98	50
116	540-59-0	1,2-Dichloroethylene	96.9	48	0.47567	0.39061	-0.02554	1.15	0.65	56.40	0.5	20	1.25	0.5	20	1.25
117	540-84-1	2,2,4-Trimethylpentane	114.2	99.2							1	50	2	1	50	2
118	541-73-1	1,3-Dichlorobenzene	147.0	173							10	95	20	10	95	20
119	56-23-5	Carbon tetrachloride	153.8	76.7	1.07481	0.28186	-0.02276	5.89	3.89	66.05	2	80	5	2	80	5
120	563-80-4	3-Methyl-2-butanone	86.1	94							1	50	2	1	50	2
121	56-49-5	3-Methylcholanthrene	268.4	280							40	98	50	40	98	50
122	56-55-3	Benzo(a)anthracene	228.3	437.6							40	98	50	40	98	50
123	57-14-7	1,1-Dimethylhydrazine	60.1	63							1	50	2	1	50	2
124	58-89-9	gamma-BHC (Lindane)	290.8	323.4							40	98	50	40	98	50
125	58-90-2	2,3,4,6-Tetrachlorophenol	231.9	150							5	90	10	5	90	10
126	591-78-6	2-Hexanone	100.2	127							2	80	5	2	80	5
127	59-50-7	4-Chloro-3-methylphenol	142.6	235							10	95	20	10	95	20
128	59-89-2	N-Nitrosomorpholine	116.1	224							10	95	20	10	95	20
129	602-87-9	5-Nitroacenaphthene	199.2	279							40	98	50	40	98	50
130	60-29-7	Ethyl ether	74.1	34.6	0.23477	0.36044	-0.02236	0.71	0.21	29.69	0.5	20	1.25	0.5	20	1.25
131	603-34-9	Triphenylamine	245.3	347							40	98	50	40	98	50
132	60-34-4	Methylhydrazine	46.1	87.8							0	0	1	0	0	1
133	60-35-5	Acetamide	59.1	221	1.23333	0.21723		10.38	0.38	3.64	10	95	20	10	95	20
134	60-57-1	Dieldrin	380.9	385							40	98	50	40	98	50
135	621-64-7	Di-n-Propylnitrosamine	130.2	206							10	95	20	10	95	20
136	624-83-9	Methyl isocyanate	57.1	39	-1.07579	0.85881	-0.06876	0.01	(0.49)	(4938.83)	0.5	20	1.25	0	0	1
137	627-13-4	Nitric acid, propyl ester	105.1	110							2	80	5	2	80	5
138	62-75-9	N-Nitroso-N,N-dimethylamine	74.1	153							2	95	20	2	95	20
139	630-20-6	1,1,1,2-Tetrachloroethane	167.9	130.5							5	90	10	5	90	10
140	64-17-5	Ethyl alcohol	46.1	78.3	-0.51153	0.67525	-0.04473	0.06	0.06	100.00	0	0	1	0	0	1
141	64-18-6	Formic acid	46.0	100.7	-1.77731	1.09503	-0.06354	1.16E-03	0.00	100.00	0	0	1	0	0	1
142	64-19-7	Acetic acid	60.1	118	-0.05553	0.6841	-0.06071	0.16	(1.84)	(1162.90)	2	80	5	0	0	1
143	67-56-1	Methyl alcohol (Methanol)	32.0	64.6							0	0	1	0	0	1
144	67-63-0	2-Propyl alcohol (Isopropanol)	60.1	82.4	0.27183	0.46419	-0.03682	0.59	(0.41)	(69.50)	1	50	2	0.5	20	1.25
145	67-64-1	2-Propanone (Acetone)	58.1	56.2	-0.14546	0.47497	-0.02286	0.23	(0.77)	(339.84)	1	50	2	0	0	1
146	67-66-3	Chloroform	119.4	61.7	0.67102	0.36148	-0.02288	1.93	0.93	48.32	1	50	2	1	50	2
147	67-72-1	Hexachloroethane	236.7	sublimes							40	98	50	40	98	50
148	684-16-2	Hexafluoroacetone	166.0	-26							0	0	1	0	0	1
149	71-23-8	n-Propyl alcohol	60.1	97.2	0.38644	0.48033	-0.04505	0.73	(0.27)	(37.70)	1	50	2	0.5	20	1.25
150	71-36-3	n-Butyl alcohol	74.1	117.6	0.89881	0.32534	-0.03648	3.44	1.44	41.92	2	80	5	2	80	5
151	71-43-2	Benzene	78.1	80.1							1	50	2	1	50	2
152	71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	133.4	74.1	0.97331	0.28737	-0.02277	4.60	3.60	78.28	1	50	2	1	50	2
153	72-20-8	Endrin	380.9	245							40	98	50	40	98	50

no of compo und	CAS	Compound Name (COPC)	MW	Boiling pt.	Yaws capacity correlation carbon loading quadratic constants			assumed outlet equilibrium of isotherm-PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
								0.10			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
			g/mol	deg C	A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
154	72-43-5	Methoxychlor	345.7	346							40	98	50	40	98	50
155	72-54-8	4,4-DDD	320.1	193							20	98	50	20	98	50
156	72-55-9	4,4-DDE	319.0	316.5							40	98	50	40	98	50
157	74-83-9	Bromomethane (Methyl bromide)	95.0	3.56	-1.23835	0.78564	-0.05521	0.01	0.01	100.00	0	0	1	0	0	1
158	74-87-3	Chloromethane (Methyl chloride)	50.5	-24.2	-1.91871	0.62053	-0.00549	0.00	0.00	100.00	0	0	1	0	0	1
159	74-97-5	Bromochloromethane	129.4	67.8	0.61399	0.41353	-0.02531	1.50	0.50	33.19	1	50	2	1	50	2
160	74-99-7	Methylacetylene	40.1	-23	-2.52865	1.74715	-0.21635	0.00	0.00	100.00	0	0	1	0	0	1
161	75-00-3	Chloroethane	64.5	12.3	-0.50828	0.50364	-0.02179	0.09	0.09	100.00	0	0	1	0	0	1
162	75-01-4	Vinyl chloride (1-Chloroethene)	62.5	-13.9	-0.98889	0.66564	-0.0432	0.02	0.02	100.00	0	0	1	0	0	1
163	75-05-8	Acetonitrile	41.1	81.6	-0.79666	0.63512	-0.02598	0.03	0.03	100.00	0	0	1	0	0	1
164	75-07-0	Acetaldehyde	44.1	20.1	-1.17047	0.62766	-0.02475	0.02	0.02	100.00	0	0	1	0	0	1
165	75-09-2	Dichloromethane (Methylene chloride)	84.9	39.8	-0.07043	0.4921	-0.02276	0.26	(0.24)	(92.42)	0.5	20	1.25	0	0	1
166	75-12-7	Formamide	45.0	210	1.30981	0.25274		11.40	11.40	100.00	0	0	1	0	0	1
167	75-15-0	Carbon disulfide	76.1	46.2							0.5	20	1.25	0.5	20	1.25
168	75-21-8	Ethylene oxide (Oxirane)	44.1	10.7	-2.42379	0.94878	-0.04062	0.00	0.00	100.00	0	0	1	0	0	1
169	75-27-4	Bromodichloromethane	163.8	90.1							2	80	5	2	80	5
170	75-34-3	1,1-Dichloroethane	99.0	57.3	0.54485	0.36091	-0.02192	1.45	0.45	31.14	1	50	2	1	50	2
171	75-35-4	1,1-Dichloroethene (Vinylidene chloride)	97.0	31.7							0.5	20	1.25	0.5	20	1.25
172	75-43-4	Dichlorofluoromethane	102.9	9							0	0	1	0	0	1
173	75-45-6	Chlorodifluoromethane	86.5	-40.8							0	0	1	0	0	1
174	75-50-3	Trimethylamine	59.1	2.87	-0.09422	0.32583	-0.00337	0.36	0.36	100.00	0	0	1	0	0	1
175	75-52-5	Nitromethane	61.0	101	-0.32847	0.70602	-0.05111	0.08	(1.92)	(2335.73)	2	80	5	0	0	1
176	75-55-8	2-Methylaziridine	57.1	66	0.06919	0.43529	-0.02293	0.41	(0.59)	(144.92)	1	50	2	0	0	1
177	75-61-6	Difluorodibromomethane	209.8	24	0.82076	0.30701	-0.01384	3.16	3.16	100.00	0	0	1	0	0	1
178	75-63-8	Trifluorobromomethane	148.9	-57.8							0	0	1	0	0	1
179	75-65-0	2-Methyl-2-propanol	74.1	82.2							1	50	2	1	50	2
180	75-69-4	Trichlorofluoromethane	137.4	23.8	0.17307	0.40715	-0.01915	0.56	0.56	100.00	0	0	1	0	0	1
181	75-71-8	Dichlorodifluoromethane	120.9	-29.79	-0.0735	0.40145	-0.01404	0.32	0.32	100.00	0	0	1	0	0	1
182	75-99-0	2,2-Dichloropropionic acid	143.0	202							10	95	20	10	95	20
183	76-03-9	Trichloroacetic acid	163.4	196							20	98	50	20	98	50
184	76-11-9	1,1,1,2-Tetrachloro-2,2-difluoroethane	203.8	91							2	80	5	2	80	5
185	76-12-0	1,1,2,2-Tetrachloro-1,2-difluoroethane	203.8	93	1.37307	0.17625	-0.01465	15.21	13.21	86.85	2	80	5	2	80	5
186	76-13-1	1,2,2-Trichloro-1,1,2-trifluoroethane (Freon 113)	187.4	47.6	1.27368	0.18656	-0.01231	11.88	10.88	91.58	1	50	2	1	50	2
187	76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	170.9	3.8							0	0	1	0	0	1
188	76-15-3	Chloropentafluoroethane	154.5	-39.1	0.08264	0.34756	-0.01343	0.53	0.53	100.00	0	0	1	0	0	1
189	76-44-8	Heptachlor	373.4	135							5	90	10	5	90	10
190	78-83-1	2-Methylpropyl alcohol (Isobutyl alcohol)	74.1	107.9	0.84818	0.33155	-0.03559	3.03	1.03	33.93	2	80	5	2	80	5
191	78-87-5	1,2-Dichloropropane	113.0	96.8	0.98872	0.287	-0.02571	4.74	3.74	78.91	1	50	2	1	50	2
192	78-92-2	1-Methylpropyl alcohol (2-Butanol)	74.1	99.5	0.76814	0.34611	-0.03478	2.44	1.44	59.00	1	50	2	1	50	2
193	78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	72.1	79.6	0.46525	0.37688	-0.02801	1.15	0.15	12.98	1	50	2	1	50	2
194	79-00-5	1,1,2-Trichloroethane	133.4	113.8	1.17163	0.27791	-0.02746	7.35	5.35	72.79	2	80	5	2	80	5
195	79-01-6	Trichloroethylene	131.4	86.7	1.02411	0.29929	-0.02539	5.01	4.01	80.02	1	50	2	1	50	2
196	79-09-4	Propionic acid	74.1	140.7	0.77846	0.4457	-0.05209	1.91	(0.09)	(4.80)	2	80	5	1	50	2
197	79-10-7	2-Propenoic acid	72.1	141.6	0.75549	0.47108	-0.05615	1.69	(0.31)	(18.24)	2	80	5	1	50	2
198	79-20-9	Methyl acetate	74.1	56.9	0.13314	0.42849	-0.02188	0.48	(0.52)	(107.60)	1	50	2	0	0	1
199	79-34-5	1,1,2,2-Tetrachloroethane	167.9	146.3	1.52322	0.17848	-0.02019	21.11	16.11	76.32	5	90	10	5	90	10
200	8001-35-2	Toxaphene	414.0	composes							40	98	50	40	98	50
201	82-68-8	Pentachloronitrobenzene (PCBN)	295.4	328							40	98	50	40	98	50
202	83-32-9	Acenaphthene	154.2	279							40	98	50	40	98	50
203	84-66-2	Diethyl phthalate	222.2	298							40	98	50	40	98	50
204	84-74-2	Dibutyl phthalate	278.3	340							40	98	50	40	98	50

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								0.10			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
			g/mol	deg C	A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
205	85-01-8	Phenanthrene	178.2	340							40	98	50	40	98	50
206	85-68-7	Butylbenzyl phthalate	312.4	370							40	98	50	40	98	50
207	86-73-7	Fluorene	166.2	295							40	98	50	40	98	50
208	87-68-3	Hexachlorobutadiene	260.8	210							40	98	50	40	98	50
209	87-86-5	Pentachlorophenol	266.3	310							40	98	50	40	98	50
210	88-06-2	2,4,6-Trichlorophenol	197.5	244.5							40	98	50	40	98	50
211	88-72-2	2-Nitrotoluene	137.1	221							10	95	20	10	95	20
212	88-75-5	2-Nitrophenol	139.1	214.6							10	95	20	10	95	20
213	88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	240.2	>300							40	98	50	40	98	50
214	88-89-1	Picric acid	229.1	>300							40	98	50	40	98	50
215	91-20-3	Naphthalene	128.2	218							10	95	20	10	95	20
216	91-22-5	Quinoline	129.2	238							10	95	20	10	95	20
217	91-58-7	2-Chloronapthalene	162.6	256							40	98	50	40	98	50
218	92-52-4	1,1'-Biphenyl	154.2	255							40	98	50	40	98	50
219	92-93-3	4-Nitrobiphenyl	199.2	340							40	98	50	40	98	50
220	93-72-1	Silvex (2,4,5-TP)	269.5	200							20	98	50	20	98	50
221	93-76-5	2,4,5-T	255.5	composes							40	98	50	40	98	50
222	94-75-7	2,4-D and esters (160C typed)	221.0	160							20	98	50	20	98	50
223	95-13-6	Indene	116.2	181.6							10	95	20	10	95	20
224	95-47-6	o-Xylene	106.2	144							2	80	5	2	80	5
225	95-48-7	o-Cresol (2-Methylphenol)	108.1	191							10	95	20	10	95	20
226	95-49-8	2-Chlorotoluene	126.6	159							10	95	20	10	95	20
227	95-50-1	o-Dichlorobenzene (1,2-Dichlorobenzene)	147.0	180.5							10	95	20	10	95	20
228	95-57-8	2-Chlorophenol	128.6	175.6							10	95	20	10	95	20
229	95-95-4	2,4,5-Trichlorophenol	197.5	253							40	98	50	40	98	50
230	96-18-4	1,2,3-Trichloropropane	147.4	156	1.47241	0.18136	-0.02165	18.60	8.60	46.22	10	95	20	10	95	20
231	96-22-0	3-Pentanone	86.1	101							2	80	5	2	80	5
232	96-69-5	Bis(3-tert-butyl-4-hydroxy-6-methyl-phenyl)sulfide	358.5	316							40	98	50	40	98	50
233	98-51-1	p-tert-Butyltoluene	148.3	193							10	95	20	10	95	20
234	98-82-8	Cumene	120.2	151							10	95	20	10	95	20
235	98-83-0	alpha-Methylstyrene	118.2	165.4							10	95	20	10	95	20
236	98-86-2	Acetophenone	120.5	201.7							10	95	20	10	95	20
237	98-95-3	Nitrobenzene	123.1	210.8							10	95	20	10	95	20

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								0.100			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
					A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
1	541-05-9	Cyclotrisiloxane, hexamethyl-	222.5	134							5	90	10	5	90	10
2	556-67-2	Cyclotetrasiloxane, octamethyl-	296.6	175							20	98	50	20	98	50
3	US1000-06	tetramethylcyclotrisiloxane	194.0	135							5	90	10	5	90	10
4	3622-84-2	Benzenesulfonamide, N-butyl-	213.3	314							40	98	50	40	98	50
5	5145-07-1	2(3H)-Furanone, dihydro-3,5-dimethyl-	114.1	206							10	95	20	10	95	20
6	108-47-4	Pyridine, 2,4-dimethyl-	107.2	159							10	95	20	10	95	20
7	109-99-9	Furan, tetrahydro-	72.1	66	0.29856	0.35648	-0.0155	0.844	(0.156)	-18.42	1	50	2	0.5	20	1.25
8	110-00-9	Furan	68.1	31.4	0.04084	0.40613	-0.0162	0.415	(0.085)	-20.35	0.5	20	1.25	0	0	1
9	110-86-1	Pyridine	79.1	115.2							2	80	5	2	80	5
10	1708-29-8	Furan, 2,5-dihydro-	70.1	67	0.3399	0.40041	-0.02451	0.822	(0.178)	-21.62	1	50	2	0.5	20	1.25
11	24405-16-	2H-Pyran-2-one, tetrahydro-5,6-dimethyl-, trans-	128.2	180							10	95	20	10	95	20
12	289-95-2	Pyrimidine	80.1	123							2	80	5	2	80	5
13	290-37-9	Pyrazine	80.1	115							2	80	5	2	80	5
14	534-22-5	Furan, 2-methyl-	82.1	63							1	50	2	1	50	2
15	930-22-3	Oxirane, ethenyl-	70.1	67							1	50	2	1	50	2
16	96-48-0	2(3H)-Furanone, dihydro- (gamma butyrolactone)	86.1	205	1.29434	0.29719	-0.04658	8.924	(1.076)	-12.05	10	95	20	5	90	10
17	3457-90-7	1,3-Propanediol, dinitrate	166.1	100							2	80	5	2	80	5
18	3457-91-8	1,4-Butanediol, dinitrate	180.1	130							5	90	10	5	90	10
19	544-16-1	Nitrous acid, butyl ester	103.1	78							1	50	2	1	50	2
20	624-91-9	Nitrous acid, methyl ester	61.0	64.6							1	50	2	1	50	2
21	625-58-1	Nitric acid, ethyl ester	91.1	88							1	50	2	1	50	2
22	627-05-4	Butane, 1-nitro-	103.1	153							10	95	20	10	95	20
23	627-13-4	Nitric acid, propyl ester	105.1	110							2	80	5	2	80	5
24	62-75-9M	Methanamine, N-methyl-N-nitroso- and others	74.1	153							10	95	20	10	95	20
25	928-45-0	Nitric acid, butyl ester	119.1	136							2	80	5	2	80	5
26	123-75-1	Pyrrolidine	71.1	87	0.60693	0.36363	-0.03004	1.634	0.634	38.80	1	50	2	1	50	2
27	22431-09-	Methanamine, N-(1-methylbutylidene)-	99.2	130							2	80	5	2	80	5
28	616-45-5	2-Pyrrolidinone	85.1	245							10	95	20	10	95	20
29	75-50-3	Methanamine, N,N-dimethyl-	59.1	2.9	-0.09422	0.32583	-0.00337	0.377	0.377	100.00	0	0	1	0	0	1
30	107-12-0	Propanenitrile	55.1	97	0.05925	0.51747	-0.03781	0.319	(0.681)	-213.35	1	50	2	0	0	1
31	109-74-0	Butanenitrile	69.1	118	0.64311	0.38787	-0.03822	1.648	(0.352)	-21.34	2	80	5	1	50	2
32	110-59-8	Pentanenitrile	83.1	139							2	80	5	2	80	5
33	124-12-9	Octanenitrile	125.2	199							10	95	20	10	95	20
34	2243-27-8	Nonanenitrile	139.2	224							10	95	20	10	95	20
35	628-73-9	Hexanenitrile	97.2	162							10	95	20	10	95	20
36	629-08-3	Heptanenitrile	111.2	180							10	95	20	10	95	20
37	75-05-8	Acetonitrile	41.1	81	-0.79666	0.63512	-0.02598	0.035	(0.965)	-2769.19	1	50	2	0	0	1
38	109-21-7	Butanoic acid, butyl ester	144.2	166							10	95	20	10	95	20
39	110-27-0	Tetradecanoic acid, 1-methylethyl ester	270.5	300							40	98	50	40	98	50
40	123-25-1	Butanedioic acid, diethyl ester	174.2	217							40	98	50	40	98	50
41	123-86-4	Acetic acid, butyl ester	116.2	126							2	80	5	2	80	5
42	126-73-8	Phosphoric acid tributyl ester	266.3	289							40	98	50	40	98	50
43	141-78-6	Acetic acid ethyl ester	88.1	77.1	0.63612	0.34441	-0.02691	1.840	0.840	45.65	1	50	2	1	50	2
44	1838-59-1	Formic acid, 2-propenyl ester	86.1	83							1	50	2	1	50	2
45	590-01-2	Propanoic acid, butyl ester	130.2	145							2	80	5	2	80	5
46	591-87-7	Acetic acid, 2-propenyl ester	100.1	103							2	80	5	2	80	5
47	592-84-7	Formic acid, butyl ester	102.1	107							2	80	5	2	80	5
48	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	222.2	298							40	98	50	40	98	50
49	1002-84-2	Pentadecanoic acid	242.4	339							40	98	50	40	98	50

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					A	B	C	0.100 g ads/100 g carbon			Estimated Carbon Capacity g/100 g C	Predicted RE %	DF mass in / mass out	Estimated Carbon Capacity g/100 g C	Predicted RE %	DF mass in / mass out
50	107-92-6	Butanoic acid	88.1	163.5	1.22589	0.26481	-0.03737	8.389	(1.611)	-19.20	10	95	20	5	90	10
51	2091-29-4	9-Hexadecenoic acid	254.4	350							40	98	50	40	98	50
52	544-63-8	Tetradecanoic acid	228.4	326							40	98	50	40	98	50
53	57-10-3	Hexadecanoic acid	256.4	399							40	98	50	40	98	50
54	64-19-7	Acetic acid	60.1	118	-0.05553	0.6841	-0.06071	0.158	(1.842)	-1162.90	2	80	5	0	0	1
55	105-42-0	2-Hexanone, 4-methyl-	114.2	140							2	80	5	2	80	5
56	106-35-4	3-Heptanone	114.2	147							2	80	5	2	80	5
57	106-68-3	3-Octanone	128.2	166							10	95	20	10	95	20
58	107-87-9	2-Pentanone	86.1	102							2	80	5	2	80	5
59	108-10-1	2-Pentanone, 4-methyl- (MIBK)	100.2	117.4							2	80	5	2	80	5
60	110-43-0	2-Heptanone	114.2	150							2	80	5	2	80	5
61	111-13-7	2-Octanone	128.2	173							10	95	20	10	95	20
62	112-12-9	2-Undecanone	170.3	229							40	98	50	40	98	50
63	123-19-3	4-Heptanone	114.2	144							2	80	5	2	80	5
64	1534-26-5	3-Tridecanone	198.4	263							40	98	50	40	98	50
65	1534-27-6	3-Dodecanone	184.3	250							40	98	50	40	98	50
66	15932-80-(	Cyclohexanone, 5-methyl-2-(1-methylethylidene)-	152.2	224							40	98	50	40	98	50
67	22026-12-6	6-Tridecanone	198.4	263							40	98	50	40	98	50
68	2216-87-7	3-Undecanone	170.3	227							40	98	50	40	98	50
69	50639-02-(	5-Undecanone, 2-methyl-	184.3	210							40	98	50	40	98	50
70	563-80-4	2-Butanone, 3-methyl-	86.1	94							1	50	2	1	50	2
71	589-38-8	3-Hexanone	100.2	123							2	80	5	2	80	5
72	589-63-9	4-Octanone	128.2	166							10	95	20	10	95	20
73	591-78-6	2-Hexanone	100.2	127							2	80	5	2	80	5
74	593-08-8	2-Tridecanone	198.4	255							40	98	50	40	98	50
75	629-23-2	3-Tetradecanone	212.4	263							40	98	50	40	98	50
76	67-64-1	2-Propanone	58.1	56	-0.14546	0.47497	-0.02286	0.227	(0.773)	-339.84	1	50	2	0	0	1
77	763-93-9	3-Hexen-2-one	98.1	140							2	80	5	2	80	5
78	78-93-3	2-Butanone	72.1	80	0.46525	0.37688	-0.02801	1.149	0.149	12.98	1	50	2	1	50	2
79	78-94-4	3-Buten-2-one	70.1	82							1	50	2	1	50	2
80	821-55-6	2-Nonanone	142.2	195							10	95	20	10	95	20
81	89-82-7	Cyclohexanone, 5-methyl-2-(1-methylethylidene)	152.2	224							40	98	50	40	98	50
82	925-78-0	3-Nonanone	142.2	188							10	95	20	10	95	20
83	928-68-7	2-Heptanone, 6-methyl-	128.2	165							10	95	20	10	95	20
84	98-86-2	Ethanone, 1-phenyl-	120.2	201.7							10	95	20	10	95	20
85	110-62-3	Pentanal	86.1	103							2	80	5	2	80	5
86	111-71-7	Heptanal	114.2	153							10	95	20	10	95	20
87	123-38-6	Propanal	58.1	49	0.05519	0.49738	-0.04331	0.327	(0.173)	-52.92	0.5	20	1.25	0	0	1
88	123-72-8	Butanal	72.1	76	0.45056	0.37372	-0.02669	1.122	0.122	10.86	1	50	2	1	50	2
89	124-13-0	Octanal	128.2	171							10	95	20	10	95	20
90	124-19-6	Nonanal	142.2	93							1	50	2	1	50	2
91	19269-28-(	Hexanal, 3-methyl-	114.2	143							2	80	5	2	80	5
92	66-25-1	Hexanal	100.2	131							2	80	5	2	80	5
93	75-07-0	Acetaldehyde	44.1	20.1	-1.17047	0.62766	-0.02475	0.015	0.015	100.00	0	0	1	0	0	1
94	104-76-7	1-Hexanol, 2-ethyl-	130.2	183							10	95	20	10	95	20
95	111-70-6	1-Heptanol	116.2	176							10	95	20	10	95	20
96	112-92-5	1-Octadecanol	270.5	336							40	98	50	40	98	50
97	14898-79-(	2-Butanol	74.1	100	0.76814	0.34611	-0.03478	2.439	1.439	59.00	1	50	2	1	50	2
98	2136-70-1	Ethanol, 2-(tetradecyloxy)-	258.4	253							40	98	50	40	98	50

no of compound	CAS	Compound Name (COPC)	MW	Boiling pt.	carbon loading estimate constants			assumed outlet equilibrium of Isotherm PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
								0.100			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
					A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
99	36653-82--	1-Hexadecanol	242.4	344							40	98	50	40	98	50
100	51411-24-6	6,10-Dodecadien-1-ol, 3,7,11-trimethyl-	224.4	216							40	98	50	40	98	50
101	57-55-6	1,2-Propanediol	76.1	187.6							10	95	20	10	95	20
102	598-32-3	3-Buten-2-ol	72.1	96							1	50	2	1	50	2
103	6032-29-7	2-Pentanol	88.2	116							2	80	5	2	80	5
104	627-27-0	3-Buten-1-ol	72.1	113							2	80	5	2	80	5
105	64-17-5	Ethanol	46.1	78.3	-0.51153	0.67525	-0.04473	0.059	(0.941)	-1604.16	1	50	2	0	0	1
106	67-56-1	Methanol	32.0	64.6	-1.96739	0.82107	-0.01393	0.002	(0.998)	-63343.92	1	50	2	0	0	1
107	67-63-0	2-Propanol	60.1	82.4	0.27183	0.46419	-0.03682	0.590	(0.410)	-69.50	1	50	2	0.5	20	1.25
108	71-23-8	1-Propanol	60.1	97.2	0.38644	0.48033	-0.04505	0.726	(0.274)	-37.70	1	50	2	0.5	20	1.25
109	75-65-0	2-Propanol, 2-methyl-	74.1	82.2							1	50	2	1	50	2
110	75-84-3	1-Propanol, 2,2-dimethyl-	88.2	113							2	80	5	2	80	5
111	75-85-4	2-Butanol, 2-methyl-	88.2	102							2	80	5	2	80	5
112	78-92-2	2-Butanol	74.1	99.5	0.76814	0.34611	-0.03478	2.439	1.439	59.00	1	50	2	1	50	2
113	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	260.8	210							40	98	50	40	98	50
114	96-41-3	Cyclopentanol	86.1	139							2	80	5	2	80	5
115	1184-60-7	1-Propene, 2-fluoro-	60.1	-24							0	0	1	0	0	1
116	127-18-4	Ethene, tetrachloro-	165.8	121.1	1.40596	0.20802	-0.02097	15.030	10.030	66.73	5	90	10	5	90	10
117	156-59-2	Ethene, 1,2-dichloro-, (Z)-	96.9	60	0.47567	0.39061	-0.02554	1.147	0.147	12.81	1	50	2	1	50	2
118	1717-00-6	Ethane, 1,1-dichloro-1-fluoro- (freon 14b)	117.0	32							0.5	20	1.25	0.5	20	1.25
119	56-23-5	Methane, tetrachloro-	153.8	76.7	1.07481	0.28186	-0.02273	5.891	3.891	66.05	2	80	5	2	80	5
120	74-87-3	Methane, chloro- (R-40)	50.5	-24.2	-1.91871	0.62053	-0.00549	0.003	0.003	100.00	0	0	1	0	0	1
121	75-02-5	Ethene, fluoro-	46.0	-72							0	0	1	0	0	1
122	75-09-2	Methane, dichloro-	84.9	39.8	-0.07043	0.4921	-0.02276	0.260	(0.240)	-92.42	0.5	20	1.25	0	0	1
123	75-45-6	Methane, chlorodifluoro- (R-22)	86.5	-40.8							0	0	1	0	0	1
124	75-68-3	Ethane, 1-chloro-1,1-difluoro- (R-142)	100.5	-10							0	0	1	0	0	1
125	75-69-4	Methane, trichlorofluoro- (R-11)	137.4	23.7	0.17307	0.40715	-0.01915	0.558	0.558	100.00	0	0	1	0	0	1
126	6031-02-3	Benzene, (1-methylpentyl)-	162.3	208							40	98	50	40	98	50
127	100-41-4	Benzene, ethyl-	106.2	136.2							2	80	5	2	80	5
128	100-42-5	Benzene, ethenyl-	104.2	145.2							2	80	5	2	80	5
129	106-42-3	Benzene, 1,4-dimethyl-	106.2	138							2	80	5	2	80	5
130	108-38-3	Benzene, 1,3-dimethyl-	106.2	139.1							2	80	5	2	80	5
131	108-88-3	Benzene, methyl-	92.1	110.6							2	80	5	2	80	5
132	3290-53-7	Benzene, (2-methyl-2-propenyl)-	132.2	183							10	95	20	10	95	20
133	538-68-1	Benzene, pentyl-	148.3	205							10	95	20	10	95	20
134	637-50-3	Benzene, 1-propenyl-	118.2	175.5							10	95	20	10	95	20
135	643-58-3	1,1'-Biphenyl, 2-methyl-	168.2	255							40	98	50	40	98	50
136	71-43-2	Benzene	78.1	80.1							1	50	2	1	50	2
137	92-52-4	1,1'-Biphenyl	154.2	255							40	98	50	40	98	50
138	95-47-6	Benzene, 1,2-dimethyl-	106.2	144							2	80	5	2	80	5
139	74-99-7	1-Propyne	40.1	-23	-2.52865	1.74715	-0.21635	0.000	0.000	100.00	0	0	1	0	0	1
140	20184-91-4	4-Nonyne	124.2	154							10	95	20	10	95	20
141	61142-40-4	4-Undecene, 4-methyl-	168.3	193							20	98	50	20	98	50
142	629-73-2	1-Hexadecene	224.4	274							40	98	50	40	98	50
143	74630-39-4	1-Undecene, 4-methyl-	168.3	193							20	98	50	20	98	50
144	74630-48-1	3-Undecene, 2-methyl-, (Z)-	168.3	193							20	98	50	20	98	50
145	764-96-5	5-Undecene, (Z)-	154.3	192.3							20	98	50	20	98	50
146	821-74-9	4,5-Nonadiene	124.2	142.5							2	80	5	2	80	5
147	1008-80-6	Naphthalene, decahydro-2,3-dimethyl-	166.3	187							20	98	50	20	98	50

no of compound	CAS	Compound Name (COPC)	MW	Boiling pt.	carbon loading estimate constants			assumed outlet equilibrium of isotherm PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
					A	B	C	0.100 g ads/100 g carbon			Estimated Carbon Capacity g/100 g C	Predicted RE %	DF mass in / mass out	Estimated Carbon Capacity g/100 g C	Predicted RE %	DF mass in / mass out
148	108-87-2	Cyclohexane, methyl-	98.2	101							2	80	5	2	80	5
149	110-82-7	Cyclohexane	84.2	80.7							1	50	2	1	50	2
150	1472-09-9	Cyclopropane, octyl-	154.3	150.8							20	98	50	20	98	50
151	1618-22-0	Naphthalene, decahydro-2,6-dimethyl-	166.3	187							20	98	50	20	98	50
152	1630-94-0	Cyclopropane, 1,1-dimethyl-	70.1	21							0	0	1	0	0	1
153	1678-93-9	Cyclohexane, butyl-	140.3	181							10	95	20	10	95	20
154	2415-72-7	Cyclopropane, propyl-	84.2	69							1	50	2	1	50	2
155	287-92-3	Cyclopentane	70.1	49.3							0.5	20	1.25	0.5	20	1.25
156	2883-05-8	Octane, 2-cyclohexyl-	196.4	181							20	98	50	20	98	50
157	294-62-2	Cyclododecane	168.3	239							40	98	50	40	98	50
158	2958-76-1	Naphthalene, decahydro-2-methyl-	152.3	201							40	98	50	40	98	50
159	3073-66-3	Cyclohexane, 1,1,3-trimethyl-	126.2	136.6							2	80	5	2	80	5
160	32281-85-4	Cyclopentane, 1,3-dimethyl-2-(1-methylethyl)-	140.3	92							1	50	2	1	50	2
161	3604-14-6	Naphthalene, decahydro-1,2-dimethyl-	166.3	187							20	98	50	20	98	50
162	41977-33-1	Cyclopropane, 1-pentyl-2-propyl-	154.3	151							20	98	50	20	98	50
163	4292-92-6	Cyclohexane, pentyl-	154.3	203.7							40	98	50	40	98	50
164	4806-61-5	Cyclobutane, ethyl-	84.2	71							1	50	2	1	50	2
165	493-02-7	Naphthalene, decahydro-, trans-	138.3	187.3							10	95	20	10	95	20
166	54676-39-1	Cyclohexane, 2-butyl-1,1,3-trimethyl-	182.4	203.7							40	98	50	40	98	50
167	55937-92-3	Bicyclo[4.1.0]heptane, 2-methyl-7-pentyl-	180.3	203.7							40	98	50	40	98	50
168	594-11-6	Cyclopropane, methyl-	56.1	0.7							0	0	1	0	0	1
169	598-61-8	Cyclobutane, methyl-	70.1	36.3							0.5	20	1.25	0.5	20	1.25
170	61142-20-1	Cyclohexane, (4-methylpentyl)-	168.3	203.7							40	98	50	40	98	50
171	7058-01-7	Cyclohexane, (1-methylpropyl)-	140.3	179.3							10	95	20	10	95	20
172	7094-26-0	Cyclohexane, 1,1,2-trimethyl-	126.2	145.2							2	80	5	2	80	5
173	822-50-4	Cyclopentane, 1,2-dimethyl-, trans-	98.2	92							1	50	2	1	50	2
174	1002-43-3	Undecane, 3-methyl-	170.3	195							20	98	50	20	98	50
175	106-97-8	Butane	58.1	-0.45	0.03071	0.34304	-0.01596	0.470	0.470	100.00	0	0	1	0	0	1
176	107-83-5	Pentane, 2-methyl-	86.2	62							1	50	2	1	50	2
177	108-08-7	Pentane, 2,4-dimethyl-	100.2	81							1	50	2	1	50	2
178	109-66-0	Pentane	72.2	36.1							0.5	20	1.25	0.5	20	1.25
179	110-54-3	Hexane	86.2	69							1	50	2	1	50	2
180	111-65-9	Octane	114.2	126							2	80	5	2	80	5
181	111-84-2	Nonane	128.3	150.8							10	95	20	10	95	20
182	1120-21-4	Undecane	156.3	195.6							20	98	50	20	98	50
183	112-40-3	Dodecane	170.3	216.3							40	98	50	40	98	50
184	124-18-5	Decane	142.3	174.1							10	95	20	10	95	20
185	13151-34-3	Decane, 3-methyl-	156.3	190							20	98	50	20	98	50
186	13151-35-4	Decane, 5-methyl-	156.3	190							20	98	50	20	98	50
187	13286-73-1	Tridecane, 3-ethyl-	212.4	252							40	98	50	40	98	50
188	13287-21-1	Tridecane, 6-methyl-	198.4	235							40	98	50	40	98	50
189	142-82-5	Heptane	100.2	98.4							1	50	2	1	50	2
190	14720-74-2	Heptane, 2,2,4-trimethyl-	142.3	148							2	80	5	2	80	5
191	1560-96-9	Tridecane, 2-methyl-	198.4	248							40	98	50	40	98	50
192	1632-70-8	Undecane, 5-methyl-	170.3	195							20	98	50	20	98	50
193	17301-23-4	Undecane, 2,6-dimethyl-	184.4	195							20	98	50	20	98	50
194	17301-25-6	Undecane, 2,8-dimethyl-	184.4	195							20	98	50	20	98	50
195	17301-27-8	Undecane, 2,10-dimethyl-	184.4	195							20	98	50	20	98	50
196	17301-29-1	Undecane, 3,7-dimethyl-	184.4	195							20	98	50	20	98	50

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								0.100			Estimated Carbon Capacity	Predicted RE	DF	Estimated Carbon Capacity	Predicted RE	DF
					A	B	C	g ads/100 g carbon			g/100 g C	%	mass in / mass out	g/100 g C	%	mass in / mass out
197	17301-30-	Undecane, 3,8-dimethyl-	184.4	195							20	98	50	20	98	50
198	17301-32-	Undecane, 4,7-dimethyl-	184.4	195							20	98	50	20	98	50
199	17301-94-	Nonane, 4-methyl-	142.3	165.7							10	95	20	10	95	20
200	17302-28-	Nonane, 2,6-dimethyl-	156.3	165							20	98	50	20	98	50
201	17302-32-	Nonane, 3,7-dimethyl-	156.3	165							20	98	50	20	98	50
202	17312-50-	Decane, 2,5-dimethyl-	170.3	195							20	98	50	20	98	50
203	17312-57-	Dodecane, 3-methyl-	184.4	216							40	98	50	40	98	50
204	17312-60-	Undecane, 6-ethyl-	184.4	216							40	98	50	40	98	50
205	17312-73-	Undecane, 5,5-dimethyl-	184.4	216							40	98	50	40	98	50
206	17312-76-	Undecane, 6,6-dimethyl-	184.4	216							40	98	50	40	98	50
207	17312-77-	Undecane, 2,3-dimethyl-	184.4	216							40	98	50	40	98	50
208	17312-80-	Undecane, 2,4-dimethyl-	184.4	216							40	98	50	40	98	50
209	17312-82-	Undecane, 4,6-dimethyl-	184.4	216							40	98	50	40	98	50
210	17453-94-	Undecane, 5-ethyl-	184.4	216							40	98	50	40	98	50
211	20278-85-	Heptane, 2,3,5-trimethyl-	142.3	160.7							10	95	20	10	95	20
212	2213-23-2	Heptane, 2,4-dimethyl-	128.3	133							2	80	5	2	80	5
213	2216-33-3	Octane, 3-methyl-	128.3	144							2	80	5	2	80	5
214	2216-34-4	Octane, 4-methyl-	128.3	142							2	80	5	2	80	5
215	25117-24-	Tetradecane, 4-methyl-	212.4	253.7							40	98	50	40	98	50
216	25117-31-	Tridecane, 5-methyl-	198.4	235							40	98	50	40	98	50
217	26730-12-	Tridecane, 4-methyl-	198.4	235							40	98	50	40	98	50
218	26730-14-	Tridecane, 7-methyl-	198.4	235							40	98	50	40	98	50
219	2847-72-5	Decane, 4-methyl-	156.3	187							20	98	50	20	98	50
220	2980-69-0	Undecane, 4-methyl-	170.3	210							40	98	50	40	98	50
221	31295-56-	Dodecane, 2,6,11-trimethyl-	212.4	252							40	98	50	40	98	50
222	3891-98-3	Dodecane, 2,6,10-trimethyl-	212.4	252							40	98	50	40	98	50
223	4032-93-3	Heptane, 2,3,6-trimethyl-	142.3	156							10	95	20	10	95	20
224	52896-90-	Heptane, 3-ethyl-5-methyl-	142.3	158.2							10	95	20	10	95	20
225	544-76-3	Hexadecane	226.4	287							40	98	50	40	98	50
226	55030-62-	Tridecane, 4,8-dimethyl-	212.4	253.7							40	98	50	40	98	50
227	55045-07-	Dodecane, 2-methyl-8-propyl-	226.4	253.7							40	98	50	40	98	50
228	55045-11-	Tridecane, 5-propyl-	226.4	253.7							40	98	50	40	98	50
229	562-49-2	Pentane, 3,3-dimethyl-	100.2	90							1	50	2	1	50	2
230	56292-65-	Dodecane, 2,5-dimethyl-	198.4	235							40	98	50	40	98	50
231	565-59-3	Pentane, 2,3-dimethyl-	100.2	90							1	50	2	1	50	2
232	589-34-4	Hexane, 3-methyl-	100.2	92							1	50	2	1	50	2
233	589-43-5	Hexane, 2,4-dimethyl-	114.2	109							2	80	5	2	80	5
234	589-53-7	Heptane, 4-methyl-	114.2	118							2	80	5	2	80	5
235	589-81-1	Heptane, 3-methyl-	114.2	119							2	80	5	2	80	5
236	591-76-4	Hexane, 2-methyl-	100.2	90							1	50	2	1	50	2
237	592-27-8	Heptane, 2-methyl-	114.2	118							2	80	5	2	80	5
238	61141-72-	Dodecane, 4,6-dimethyl-	198.4	235							40	98	50	40	98	50
239	6117-97-1	Dodecane, 4-methyl-	184.4	216							40	98	50	40	98	50
240	617-78-7	3-Ethylpentane	100.2	93							1	50	2	1	50	2
241	62016-30-	Octane, 2,3,3-trimethyl-	156.3	174							20	98	50	20	98	50
242	62016-34-	Octane, 2,3,7-trimethyl-	156.3	174							20	98	50	20	98	50
243	62108-21-	Decane, 6-ethyl-2-methyl-	184.4	216							40	98	50	40	98	50
244	62108-25-	Decane, 2,6,7-trimethyl-	184.4	216							40	98	50	40	98	50
245	62108-27-	Decane, 2,4,6-trimethyl-	184.4	216							40	98	50	40	98	50

no of compound	CAS	Compound Name (COPC)	MW	Boiling pt.	carbon loading estimate constants			assumed outlet equilibrium of isotherm PPMV (y)	difference with BP and MW estimation	% error with Yaws prediction	estimated by BP and MW as per A. Shepherd (Shepherd 2001)			estimated by BP and MW with conservativatism for mixing and values no higher than predicted by Yaws (Yaws 1995)		
					A	B	C	0.100 g ads/100 g carbon			Estimated Carbon Capacity g/100 g C	Predicted RE %	DF mass in / mass out	Estimated Carbon Capacity g/100 g C	Predicted RE %	DF mass in / mass out
246	62238-13-	Decane, 2,3,7-trimethyl-	184.4	216							40	98	50	40	98	50
247	629-50-5	Tridecane	184.4	235.4							40	98	50	40	98	50
248	629-59-4	Tetradecane	198.4	253.7							40	98	50	40	98	50
249	629-62-9	Pentadecane	212.4	270.6							40	98	50	40	98	50
250	629-78-7	Heptadecane	240.5	301.8							40	98	50	40	98	50
251	74-98-6	Propane	44.1	-42	-0.7946	0.49029	-0.02398	0.049	0.049	100.00	0	0	1	0	0	1
252	75-28-5	Propane, 2-methyl-	58.1	-11.7	-0.01676	0.33495	-0.01274	0.432	0.432	100.00	0	0	1	0	0	1
253	78-78-4	Butane, 2-methyl-	72.2	30							0.5	20	1.25	0.5	20	1.25
254	96-14-0	Pentane, 3-methyl-	86.2	64							1	50	2	1	50	2
255	565-75-3	Pentane, trimethyl-, isomer	114.3	113.5							2	80	5	2	80	5

Attachment 4 Tables of DF Analysis Results

Table 4-1 COPCs
Table 4-2 Compounds detected >0.1 ppmv

Table 4-1 COPCs

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
1	100-00-5	p-Nitrochlorobenzene	10000	50	5	50000
2	100-21-0	p-Phthalic acid	20	50	50	1000
3	100-25-4	1,4-Dinitrobenzene	10000	50	5	50000
4	100-41-4	Ethyl benzene	10000	5	1	10000
5	100-42-5	Styrene	10000	5	1	10000
6	10061-01-5	cis-1,3-Dichloropropene	100	5	1	100
7	10061-02-6	trans-1,3-Dichloropropene	50	5	1	50
8	101-55-3	4-Bromophenylphenyl ether	3.33	50	50	167
9	101-84-8	Diphenyl ether	50	50	5	250
10	106-35-4	3-Heptanone	10000	5	1	10000
11	106-42-3	p-Xylene (Dimethyl benzene)	1000	5	1	1000
12	106-46-7	1,4-Dichlorobenzene	50	20	2	100
13	106-88-7	1,2-Epoxybutane	10000	1.25	1	10000
14	106-93-4	Ethylene dibromide (Dibromoethane)	1	10	10	10
15	106-97-8	Butane (R-600)	10000	1	1	10000
16	106-99-0	1,3-Butadiene	10000	1	1	10000
17	107-02-8	Acrolein	10000	1	1	10000
18	107-05-1	3-Chloropropene (Allyl chloride)	10000	1.25	1	10000
19	107-06-2	1,2-Dichloroethane (Ethylene chloride) (freon 150)	10000	2	1	10000
20	107-12-0	Propionitrile	10000	1	1	10000
21	107-13-1	Acrylonitrile	10000	1	1	10000
22	107-18-6	2-Propene-1-ol	10000	1.25	1	10000
23	107-31-3	Formic acid, methyl ester	10000	1	1	10000
24	107-66-4	Dibutylphosphate	10000	5	1	10000
25	107-87-9	2-Pentanone	10000	5	1	10000
26	108-03-2	1-Nitropropane	10000	5	1	10000
27	108-05-4	Vinyl acetate	10000	2	1	10000
28	108-10-1	Hexone (4-Methyl-2-pentanone or MIBK)	10000	5	1	10000
29	108-20-3	Bis(isopropyl)ether	10000	2	1	10000
30	108-38-3	m-Xylene (Dimethyl benzene)	1000	5	1	1000
31	108-39-4	m-Cresol	1000	20	2	2000
32	108-87-2	Methylcyclohexane	10000	5	1	10000
33	108-88-3	Toluene	10000	5	1	10000
34	108-90-7	Chlorobenzene	20	5	5	100
35	108-93-0	Cyclohexanol	10000	20	2	20000
36	108-94-1	Cyclohexanone	10000	20	2	20000
37	108-95-2	Phenol	10	20	20	200
38	109-66-0	n-Pentane	10000	1.25	1	10000
39	109-99-9	Tetrahydrofuran	10000	1.25	1	10000
40	110-12-3	5-Methyl-2-hexanone	10000	5	1	10000
41	110-43-0	2-Heptanone	10000	5	1	10000
42	110-54-3	n-Hexane	10000	2	1	10000

Table 4-1 COPCs

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
43	110-62-3	n-Valeraldehyde	10000	5	1	10000
44	110-82-7	Cyclohexane	10000	2	1	10000
45	110-83-8	Cyclohexene	10000	2	1	10000
46	110-86-1	Pyridine	10000	5	1	10000
47	111-65-9	n-Octane	10000	5	1	10000
48	111-76-2	Ethylene glycol monobutyl ether	10000	20	2	20000
49	111-84-2	n-Nonane	10000	20	2	20000
50	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	10000	50	5	50000
51	117-84-0	n-Dioctyl phthalate	10000	50	5	50000
52	118-74-1	Hexachlorobenzene	3.33	50	50	167
53	120-12-7	Anthracene	1000	50	5	5000
54	120-82-1	1,2,4-Trichlorobenzene	100	50	5	500
55	120-83-2	2,4-Dichlorophenol	3.33	50	50	167
56	121-44-8	Triethylamine	10000	2	1	10000
57	121-69-7	Dimethylaniline	10000	20	2	20000
58	122-39-4	N,N-Diphenylamine	50	50	5	250
59	123-19-3	4-Heptanone	10000	5	1	10000
60	123-38-6	n-Propionaldehyde	10000	1	1	10000
61	123-51-3	3-Methyl-1-butanol	10000	5	1	10000
62	123-86-4	Acetic acid n-butyl ester	10000	5	1	10000
63	123-91-1	1,4-Dioxane	10000	2	1	10000
64	126-73-8	Tributyl phosphate	10000	50	5	50000
65	126-98-7	2-Methyl-2-propenenitrile (Methacrylonitrile)	10000	2	1	10000
66	127-18-4	Perchloroethylene (tetrachloroethylene)	1	10	10	10
67	127-19-5	N,N-Dimethylacetamide	10000	10	1	10000
68	128-37-0	2,6-Bis(tert-butyl)-4-methylphenol	10000	50	5	50000
69	129-00-0	Pyrene	3.33	50	50	167
70	1321-64-8	Pentachloronaphthalene	3.33	50	50	167
71	1321-65-9	Trichloronaphthalene	3.33	50	50	167
72	132-64-9	Dibenzofuran	3.33	50	50	167
73	1335-87-1	Hexachloronaphthalene	3.33	50	50	167
74	1335-88-2	Tetrachloronaphthalene	3.33	50	50	167
75	1336-36-3	Polychlorinated biphenyls (PCBs)	3.33	50	50	167
76	141-78-6	Acetic acid ethyl ester (Ethyl acetate)	10000	2	1	10000
77	141-79-7	4-Methyl-3-penten-2-one	10000	5	1	10000
78	142-82-5	n-Heptane	10000	2	1	10000
79	144-62-7	Oxalic acid	10	20	20	200
80	156-60-5	trans-1,2-Dichloroethylene	10000	1.25	1	10000
81	1582-09-8	Trifluralin	10000	10	1	10000
82	1634-04-4	Methyl tert-butyl ether	10000	2	1	10000
83	1836-75-5	Nitrofen	3.33	50	50	167
84	189-55-9	Dibenzo[a,i]pyrene	3.33	50	50	167

Table 4-1 COPCs

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
85	189-64-0	Dibenzo[a,h]pyrene	3.33	50	50	167
86	191-24-2	Benzo(g,h,i)perylene	3.33	50	50	167
87	191-30-0	Benzo[a,i]pyrene	3.33	50	50	167
88	192-65-4	Dibenzo[a,e]pyrene	3.33	50	50	167
89	193-39-5	Indeno(1,2,3-cd)pyrene	3.33	50	50	167
90	205-82-3	Benzo(j)fluoranthene	3.33	50	50	167
91	205-99-2	Benzo(b)fluoranthene	3.33	50	50	167
92	206-44-0	Fluoranthene	3.33	50	50	167
93	207-08-9	Benzo(k)fluoranthene	3.33	50	50	167
94	208-96-8	Acenaphthylene	3.33	50	50	167
95	218-01-9	Chrysene	3.33	50	50	167
96	2234-13-1	Octachloronaphthalene	3.33	50	50	167
97	224-42-0	Dibenz[a,j]acridine	3.33	50	50	167
98	226-36-8	Dibenz[a,h]acridine	3.33	50	50	167
99	2385-85-5	Mirex	3.33	50	50	167
100	25551-13-7	Trimethyl benzene	1000	20	2	2000
101	26140-60-3	Terphenyls	3.33	50	50	167
102	27154-33-2	Trichlorofluoroethane	1	10	10	10
103	287-92-3	Cyclopentane	10000	1.25	1	10000
104	309-00-2	Aldrin	3.33	10	10	33
105	319-84-6	Hexachlorocyclohexane (Lindane) Alpha BHC	3.33	50	50	167
106	319-85-7	Hexachlorocyclohexane (Lindane) Beta BHC	3.33	50	50	167
107	319-86-8	Delta-BHC	3.33	50	50	167
108	3697-24-3	5-Methylchrysene	3.33	50	50	167
109	3825-26-1	Ammonium perfluorooctanoate	3.33	50	50	167
110	4170-30-3	2-Butenaldehyde (2-Butenal)	10000	2	1	10000
111	465-73-6	Isodrin	3.33	50	50	167
112	50-00-0	Formaldehyde	10000	1	1	10000
113	50-29-3	4,4-DDT	3.33	50	50	167
114	50-32-8	Benzo(a)pyrene	3.33	50	50	167
115	53-70-3	Dibenzo(a,h)anthracene	3.33	50	50	167
116	540-59-0	1,2-Dichloroethylene	10000	1.25	1	10000
117	540-84-1	2,2,4-Trimethylpentane	10000	2	1	10000
118	541-73-1	1,3-Dichlorobenzene	50	20	2	100
119	56-23-5	Carbon tetrachloride (R-10)	1	5	5	5
120	563-80-4	3-Methyl-2-butanone	10000	2	1	10000
121	56-49-5	3-Methylcholanthrene	3.33	50	50	167
122	56-55-3	Benzo(a)anthracene	3.33	50	50	167
123	57-14-7	1,1-Dimethylhydrazine	10000	2	1	10000
124	58-89-9	gamma-BHC (Lindane)	3.33	50	50	167
125	58-90-2	2,3,4,6-Tetrachlorophenol	3.33	10	10	33
126	591-78-6	2-Hexanone	1000	5	1	1000

Table 4-1 COPCs

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
127	59-50-7	4-Chloro-3-methylphenol	3.33	20	20	67
128	59-89-2	N-Nitrosomorpholine	10000	20	2	20000
129	602-87-9	5-Nitroacenaphthene	3.33	50	50	167
130	60-29-7	Ethyl ether	10000	1.25	1	10000
131	603-34-9	Triphenylamine	3.33	50	50	167
132	60-34-4	Methylhydrazine	10000	1	1	10000
133	60-35-5	Acetamide	10000	20	2	20000
134	60-57-1	Dieldrin	3.33	50	50	167
135	621-64-7	Di-n-Propylnitrosamine	10000	20	2	20000
136	624-83-9	Methyl isocyanate	1000	1	1	1000
137	627-13-4	Nitric acid, propyl ester	10000	5	1	10000
138	62-75-9	N-Nitroso-N,N-dimethylamine	10000	20	2	20000
139	630-20-6	1,1,1,2-Tetrachloroethane	1	10	10	10
140	64-17-5	Ethyl alcohol	10000	1	1	10000
141	64-18-6	Formic acid	10000	1	1	10000
142	64-19-7	Acetic acid	10000	1	1	10000
143	67-56-1	Methyl alcohol (Methanol)	10000	1	1	10000
144	67-63-0	2-Propyl alcohol (Isopropanol)	10000	1.25	1	10000
145	67-64-1	2-Propanone (Acetone)	10000	1	1	10000
146	67-66-3	Chloroform (R-20)	1	2	2	2
147	67-72-1	Hexachloroethane	1	50	50	50
148	684-16-2	Hexafluoroacetone	1	1	1	1
149	71-23-8	n-Propyl alcohol	10000	1.25	1	10000
150	71-36-3	n-Butyl alcohol	10000	5	1	10000
151	71-43-2	Benzene	100	2	1	100
152	71-55-6	Methyl chloroform (1,1,1-Trichloroethane)	1000	2	1	1000
153	72-20-8	Endrin	3.33	50	50	167
154	72-43-5	Methoxychlor	3.33	50	50	167
155	72-54-8	4,4-DDD	3.33	50	50	167
156	72-55-9	4,4-DDE	3.33	50	50	167
157	74-83-9	Bromomethane (Methyl bromide) (halon 1001)	1000	1	1	1000
158	74-87-3	Chloromethane (Methyl chloride) (R-40)	20	1	1	20
159	74-97-5	Bromochloromethane (halon 1011)	1	2	2	2
160	74-99-7	Methylacetylene	10000	1	1	10000
161	75-00-3	Chloroethane	1000	1	1	1000
162	75-01-4	Vinyl chloride (1-Chloroethene)	10000	1	1	10000
163	75-05-8	Acetonitrile	1000	1	1	1000
164	75-07-0	Acetaldehyde	10000	1	1	10000
165	75-09-2	Dichloromethane (Methylene chloride) (R-30)	50	1	1	50
166	75-12-7	Formamide	10000	1	1	10000

Table 4-1 COPCs

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
167	75-15-0	Carbon disulfide	10000	1.25	1	10000
168	75-21-8	Ethylene oxide (Oxirane)	10000	1	1	10000
169	75-27-4	Bromodichloromethane	1	5	5	5
170	75-34-3	1,1-Dichloroethane	10000	2	1	10000
171	75-35-4	1,1-Dichloroethene (Vinylidene chloride)	10000	1.25	1	10000
172	75-43-4	Dichlorofluoromethane (R-21)	1000	1	1	1000
173	75-45-6	Chlorodifluoromethane (R-22)	50	1	1	50
174	75-50-3	Trimethylamine	10000	1	1	10000
175	75-52-5	Nitromethane	10000	1	1	10000
176	75-55-8	2-Methylaziridine	10000	1	1	10000
177	75-61-6	Difluorodibromomethane (freon 12B2-halon 1202)	1	1	1	1
178	75-63-8	Trifluorobromomethane (R-13B1)	1	1	1	1
179	75-65-0	2-Methyl-2-propanol	10000	2	1	10000
180	75-69-4	Trichlorofluoromethane (R-11)	1	1	1	1
181	75-71-8	Dichlorodifluoromethane (R-12)	1	1	1	1
182	75-99-0	2,2-Dichloropropionic acid	100	20	2	200
183	76-03-9	Trichloroacetic acid	1	50	50	50
184	76-11-9	1,1,1,2-Tetrachloro-2,2-difluoroethane (R-112a)	20	5	5	100
185	76-12-0	1,1,2,2-Tetrachloro-1,2-difluoroethane (R-112)	20	5	5	100
186	76-13-1	1,2,2-Trichloro-1,1,2-trifluoroethane (Freon 113)	20	2	2	40
187	76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R-114)	1	1	1	1
188	76-15-3	Chloropentafluoroethane (R-115)	1	1	1	1
189	76-44-8	Heptachlor	3.33	10	10	33
190	78-83-1	2-Methylpropyl alcohol (Isobutyl alcohol)	10000	5	1	10000
191	78-87-5	1,2-Dichloropropane	1000	2	1	1000
192	78-92-2	1-Methylpropyl alcohol (2-Butanol)	10000	2	1	10000
193	78-93-3	Methyl ethyl ketone (MEK, 2-Butanone)	1000	2	1	1000
194	79-00-5	1,1,2-Trichloroethane	10000	5	1	10000
195	79-01-6	Trichloroethylene	10000	2	1	10000
196	79-09-4	Propionic acid	10000	2	1	10000
197	79-10-7	2-Propenoic acid	10000	2	1	10000
198	79-20-9	Methyl acetate	10000	1	1	10000
199	79-34-5	1,1,2,2-Tetrachloroethane	1	10	10	10
200	8001-35-2	Toxaphene	3.33	50	50	167
201	82-68-8	Pentachloronitrobenzene (PCBN)	3.33	50	50	167
202	83-32-9	Acenaphthene	3.33	50	50	167
203	84-66-2	Diethyl phthalate	10000	50	5	50000
204	84-74-2	Dibutyl phthalate	10000	50	5	50000

Table 4-1 COPCs

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
205	85-01-8	Phenanthrene	3.33	50	50	167
206	85-68-7	Butylbenzyl phthalate	10000	50	5	50000
207	86-73-7	Fluorene	3.33	50	50	167
208	87-68-3	Hexachlorobutadiene	50	50	5	250
209	87-86-5	Pentachlorophenol	3.33	50	50	167
210	88-06-2	2,4,6-Trichlorophenol	3.33	50	50	167
211	88-72-2	2-Nitrotoluene	10000	20	2	20000
212	88-75-5	2-Nitrophenol	3.33	20	20	67
213	88-85-7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	3.33	50	50	167
214	88-89-1	Picric acid	10000	50	5	50000
215	91-20-3	Naphthalene	100	20	2	200
216	91-22-5	Quinoline	10000	20	2	20000
217	91-58-7	2-Chloronapthalene	3.33	50	50	167
218	92-52-4	1,1'-Biphenyl	1000	50	5	5000
219	92-93-3	4-Nitrobiphenyl	3.33	50	50	167
220	93-72-1	Silvex (2,4,5-TP)	3.33	50	50	167
221	93-76-5	2,4,5-T	3.33	50	50	167
222	94-75-7	2,4-D and esters (160C typed)	3.33	50	50	167
223	95-13-6	Indene	1000	20	2	2000
224	95-47-6	o-Xylene	10000	5	1	10000
225	95-48-7	o-Cresol (2-Methylphenol)	1000	20	2	2000
226	95-49-8	2-Chlorotoluene	10000	20	2	20000
227	95-50-1	o-Dichlorobenzene (1,2-Dichlorobenzene)	50	20	2	100
228	95-57-8	2-Chlorophenol	10000	20	2	20000
229	95-95-4	2,4,5-Trichlorophenol	3.33	50	50	167
230	96-18-4	1,2,3-Trichloropropane	10000	20	2	20000
231	96-22-0	3-Pentanone	10000	5	1	10000
232	96-69-5	Bis(3-tert-butyl-4-hydroxy-6-methyl-phenyl)sulfide	3.33	50	50	167
233	98-51-1	p-tert-Butyltoluene	10000	20	2	20000
234	98-82-8	Cumene	10000	20	2	20000
235	98-83-9	alpha-Methylstyrene	100	20	2	200
236	98-86-2	Acetophenone	100	20	2	200
237	98-95-3	Nitrobenzene	10000	20	2	20000

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
1	541-05-9	Cyclotrisiloxane, hexamethyl-	10000	10	1	10000
2	556-67-2	Cyclotetrasiloxane, octamethyl-	10000	50	5	50000
3	USI000-06	tetramethylcyclotrisiloxane	10000	10	1	10000
4	3622-84-2	Benzenesulfonamide, N-butyl-	5	50	50	250
5	5145-07-1	2(3H)-Furanone, dihydro-3,5-dimethyl-	10000	20	2	20000
6	108-47-4	Pyridine, 2,4-dimethyl-	10000	20	2	20000
7	109-99-9	Furan, tetrahydro-	10000	1.25	1	10000
8	110-00-9	Furan	10000	1	1	10000
9	110-86-1	Pyridine	10000	5	1	10000
10	1708-29-8	Furan, 2,5-dihydro-	10000	1.25	1	10000
11	24405-16-1	2H-Pyran-2-one, tetrahydro-5,6-dimethyl-, trans-	10000	20	2	20000
12	289-95-2	Pyrimidine	10000	5	1	10000
13	290-37-9	Pyrazine	10000	5	1	10000
14	534-22-5	Furan, 2-methyl-	10000	2	1	10000
15	930-22-3	Oxirane, ethenyl-	10000	2	1	10000
16	96-48-0	2(3H)-Furanone, dihydro- (gamma butyrolactone)	10000	10	1	10000
17	3457-90-7	1,3-Propanediol, dinitrate	10000	5	1	10000
18	3457-91-8	1,4-Butanediol, dinitrate	10000	10	1	10000
19	544-16-1	Nitrous acid, butyl ester	10000	2	1	10000
20	624-91-9	Nitrous acid, methyl ester	10000	2	1	10000
21	625-58-1	Nitric acid, ethyl ester	10000	2	1	10000
22	627-05-4	Butane, 1-nitro-	10000	20	2	20000
23	627-13-4	Nitric acid, propyl ester	10000	5	1	10000
24	62-75-9M	Methanamine, N-methyl-N-nitroso- and others	10000	20	2	20000
25	928-45-0	Nitric acid, butyl ester	10000	5	1	10000
26	123-75-1	Pyrrolidine	10000	2	1	10000
27	22431-09-0	Methanamine, N-(1-methylbutylidene)-	10000	5	1	10000
28	616-45-5	2-Pyrrolidinone	10000	20	2	20000
29	75-50-3	Methanamine, N,N-dimethyl-	10000	1	1	10000
30	107-12-0	Propanenitrile	10000	1	1	10000
31	109-74-0	Butanenitrile	10000	2	1	10000
32	110-59-8	Pentanenitrile	10000	5	1	10000
33	124-12-9	Octanenitrile	10000	20	2	20000
34	2243-27-8	Nonanenitrile	10000	20	2	20000
35	628-73-9	Hexanenitrile	10000	20	2	20000
36	629-08-3	Heptanenitrile	10000	20	2	20000
37	75-05-8	Acetonitrile	1000	1	1	1000
38	109-21-7	Butanoic acid, butyl ester	10000	20	2	20000
39	110-27-0	Tetradecanoic acid, 1-methylethyl ester	10000	50	5	50000
40	123-25-1	Butanedioic acid, diethyl ester	10000	50	5	50000

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
41	123-86-4	Acetic acid, butyl ester	10000	5	1	10000
42	126-73-8	Phosphoric acid tributyl ester	10000	50	5	50000
43	141-78-6	Acetic acid ethyl ester	10000	2	1	10000
44	1838-59-1	Formic acid, 2-propenyl ester	10000	2	1	10000
45	590-01-2	Propanoic acid, butyl ester	10000	5	1	10000
46	591-87-7	Acetic acid, 2-propenyl ester	10000	5	1	10000
47	592-84-7	Formic acid, butyl ester	10000	5	1	10000
48	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	1000	50	5	5000
49	1002-84-2	Pentadecanoic acid	10000	50	5	50000
50	107-92-6	Butanoic acid	10000	10	1	10000
51	2091-29-4	9-Hexadecenoic acid	10000	50	5	50000
52	544-63-8	Tetradecanoic acid	10000	50	5	50000
53	57-10-3	Hexadecanoic acid	10000	50	5	50000
54	64-19-7	Acetic acid	10000	1	1	10000
55	105-42-0	2-Hexanone, 4-methyl-	10000	5	1	10000
56	106-35-4	3-Heptanone	10000	5	1	10000
57	106-68-3	3-Octanone	1000	20	2	2000
58	107-87-9	2-Pentanone	10000	5	1	10000
59	108-10-1	2-Pentanone, 4-methyl- (MIBK)	10000	5	1	10000
60	110-43-0	2-Heptanone	1000	5	1	1000
61	111-13-7	2-Octanone	1000	20	2	2000
62	112-12-9	2-Undecanone	10000	50	5	50000
63	123-19-3	4-Heptanone	1000	5	1	1000
64	1534-26-5	3-Tridecanone	10000	50	5	50000
65	1534-27-6	3-Dodecanone	10000	50	5	50000
66	15932-80-6	Cyclohexanone, 5-methyl-2-(1-methylethylidene)-	10000	50	5	50000
67	22026-12-6	6-Tridecanone	10000	50	5	50000
68	2216-87-7	3-Undecanone	10000	50	5	50000
69	50639-02-6	5-Undecanone, 2-methyl-	10000	50	5	50000
70	563-80-4	2-Butanone, 3-methyl-	10000	2	1	10000
71	589-38-8	3-Hexanone	1000	5	1	1000
72	589-63-9	4-Octanone	1000	20	2	2000
73	591-78-6	2-Hexanone	1000	5	1	1000
74	593-08-8	2-Tridecanone	10000	50	5	50000
75	629-23-2	3-Tetradecanone	10000	50	5	50000
76	67-64-1	2-Propanone	10000	1	1	10000
77	763-93-9	3-Hexen-2-one	1000	5	1	1000
78	78-93-3	2-Butanone	1000	2	1	1000
79	78-94-4	3-Buten-2-one	1000	2	1	1000
80	821-55-6	2-Nonanone	10000	20	2	20000
81	89-82-7	Cyclohexanone, 5-methyl-2-(1-methylethylidene)	10000	50	5	50000

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
82	925-78-0	3-Nonanone	10000	20	2	20000
83	928-68-7	2-Heptanone, 6-methyl-	1000	20	2	2000
84	98-86-2	Ethanone, 1-phenyl-	100	20	2	200
85	110-62-3	Pentanal	10000	5	1	10000
86	111-71-7	Heptanal	10000	20	2	20000
87	123-38-6	Propanal	10000	1	1	10000
88	123-72-8	Butanal	10000	2	1	10000
89	124-13-0	Octanal	10000	20	2	20000
90	124-19-6	Nonanal	10000	2	1	10000
91	19269-28-4	Hexanal, 3-methyl-	10000	5	1	10000
92	66-25-1	Hexanal	10000	5	1	10000
93	75-07-0	Acetaldehyde	10000	1	1	10000
94	104-76-7	1-Hexanol, 2-ethyl-	10000	20	2	20000
95	111-70-6	1-Heptanol	10000	20	2	20000
96	112-92-5	1-Octadecanol	10000	50	5	50000
97	14898-79-4	2-Butanol	10000	2	1	10000
98	2136-70-1	Ethanol, 2-(tetradecyloxy)-	10000	50	5	50000
99	36653-82-4	1-Hexadecanol	10000	50	5	50000
100	51411-24-6	6,10-Dodecadien-1-ol, 3,7,11-trimethyl-	10000	50	5	50000
101	57-55-6	1,2-Propanediol	10000	20	2	20000
102	598-32-3	3-Buten-2-ol	10000	2	1	10000
103	6032-29-7	2-Pentanol	10000	5	1	10000
104	627-27-0	3-Buten-1-ol	10000	5	1	10000
105	64-17-5	Ethanol	10000	1	1	10000
106	67-56-1	Methanol	10000	1	1	10000
107	67-63-0	2-Propanol	10000	1.25	1	10000
108	71-23-8	1-Propanol	10000	1.25	1	10000
109	75-65-0	2-Propanol, 2-methyl-	10000	2	1	10000
110	75-84-3	1-Propanol, 2,2-dimethyl-	10000	5	1	10000
111	75-85-4	2-Butanol, 2-methyl-	10000	5	1	10000
112	78-92-2	2-Butanol	10000	2	1	10000
113	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	50	50	5	250
114	96-41-3	Cyclopentanol	10000	5	1	10000
115	1184-60-7	1-Propene, 2-fluoro-	100	1	1	100
116	127-18-4	Ethene, tetrachloro-	1	10	10	10
117	156-59-2	Ethene, 1,2-dichloro-, (Z)-	10000	2	1	10000
118	1717-00-6	Ethane, 1,1-dichloro-1-fluoro- (freon 14b)	1000	1.25	1	1000
119	56-23-5	Methane, tetrachloro-	1	5	5	5
120	74-87-3	Methane, chloro- (R-40)	20	1	1	20
121	75-02-5	Ethene, fluoro-	10000	1	1	10000
122	75-09-2	Methane, dichloro-	20	1	1	20
123	75-45-6	Methane, chlorodifluoro- (R-22)	50	1	1	50

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
124	75-68-3	Ethane, 1-chloro-1,1-difluoro- (R-142)	50	1	1	50
125	75-69-4	Methane, trichlorofluoro- (R-11)	1	1	1	1
126	6031-02-3	Benzene, (1-methylpentyl)-	10000	50	5	50000
127	100-41-4	Benzene, ethyl-	10000	5	1	10000
128	100-42-5	Benzene, ethenyl-	10000	5	1	10000
129	106-42-3	Benzene, 1,4-dimethyl-	1000	5	1	1000
130	108-38-3	Benzene, 1,3-dimethyl-	1000	5	1	1000
131	108-88-3	Benzene, methyl-	10000	5	1	10000
132	3290-53-7	Benzene, (2-methyl-2-propenyl)-	10000	20	2	20000
133	538-68-1	Benzene, pentyl-	10000	20	2	20000
134	637-50-3	Benzene, 1-propenyl-	10000	20	2	20000
135	643-58-3	1,1`-Biphenyl, 2-methyl-	10000	50	5	50000
136	71-43-2	Benzene	1000	2	1	1000
137	92-52-4	1,1`-Biphenyl	1000	50	5	5000
138	95-47-6	Benzene, 1,2-dimethyl-	10000	5	1	10000
139	74-99-7	1-Propyne	10000	1	1	10000
140	20184-91-2	4-Nonyne	10000	20	2	20000
141	61142-40-3	4-Undecene, 4-methyl-	10000	50	5	50000
142	629-73-2	1-Hexadecene	10000	50	5	50000
143	74630-39-0	1-Undecene, 4-methyl-	10000	50	5	50000
144	74630-48-1	3-Undecene, 2-methyl-, (Z)-	10000	50	5	50000
145	764-96-5	5-Undecene, (Z)-	10000	50	5	50000
146	821-74-9	4,5-Nonadiene	1000	5	1	1000
147	1008-80-6	Naphthalene, decahydro-2,3-dimethyl-	10000	50	5	50000
148	108-87-2	Cyclohexane, methyl-	10000	5	1	10000
149	110-82-7	Cyclohexane	10000	2	1	10000
150	1472-09-9	Cyclopropane, octyl-	10000	50	5	50000
151	1618-22-0	Naphthalene, decahydro-2,6-dimethyl-	10000	50	5	50000
152	1630-94-0	Cyclopropane, 1,1-dimethyl-	10000	1	1	10000
153	1678-93-9	Cyclohexane, butyl-	10000	20	2	20000
154	2415-72-7	Cyclopropane, propyl-	10000	2	1	10000
155	287-92-3	Cyclopentane	10000	1.25	1	10000
156	2883-05-8	Octane, 2-cyclohexyl-	10000	50	5	50000
157	294-62-2	Cyclododecane	10000	50	5	50000
158	2958-76-1	Naphthalene, decahydro-2-methyl-	10000	50	5	50000
159	3073-66-3	Cyclohexane, 1,1,3-trimethyl-	10000	5	1	10000
160	32281-85-9	Cyclopentane, 1,3-dimethyl-2-(1-methylethyl)-	10000	2	1	10000
161	3604-14-6	Naphthalene, decahydro-1,2-dimethyl-	10000	50	5	50000
162	41977-33-7	Cyclopropane, 1-pentyl-2-propyl-	10000	50	5	50000
163	4292-92-6	Cyclohexane, pentyl-	10000	50	5	50000
164	4806-61-5	Cyclobutane, ethyl-	10000	2	1	10000
165	493-02-7	Naphthalene, decahydro-, trans-	10000	20	2	20000

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
166	54676-39-0	Cyclohexane, 2-butyl-1,1,3-trimethyl-	10000	50	5	50000
167	55937-92-3	Bicyclo[4.1.0]heptane, 2-methyl-7-pentyl-	10000	50	5	50000
168	594-11-6	Cyclopropane, methyl-	10000	1	1	10000
169	598-61-8	Cyclobutane, methyl-	10000	1.25	1	10000
170	61142-20-9	Cyclohexane, (4-methylpentyl)-	10000	50	5	50000
171	7058-01-7	Cyclohexane, (1-methylpropyl)-	10000	20	2	20000
172	7094-26-0	Cyclohexane, 1,1,2-trimethyl-	10000	5	1	10000
173	822-50-4	Cyclopentane, 1,2-dimethyl-, trans-	10000	2	1	10000
174	1002-43-3	Undecane, 3-methyl-	10000	50	5	50000
175	106-97-8	Butane	10000	1	1	10000
176	107-83-5	Pentane, 2-methyl-	10000	2	1	10000
177	108-08-7	Pentane, 2,4-dimethyl-	10000	2	1	10000
178	109-66-0	Pentane	10000	1.25	1	10000
179	110-54-3	Hexane	10000	2	1	10000
180	111-65-9	Octane	10000	5	1	10000
181	111-84-2	Nonane	10000	20	2	20000
182	1120-21-4	Undecane	10000	50	5	50000
183	112-40-3	Dodecane	10000	50	5	50000
184	124-18-5	Decane	10000	20	2	20000
185	13151-34-3	Decane, 3-methyl-	10000	50	5	50000
186	13151-35-4	Decane, 5-methyl-	10000	50	5	50000
187	13286-73-2	Tridecane, 3-ethyl-	10000	50	5	50000
188	13287-21-3	Tridecane, 6-methyl-	10000	50	5	50000
189	142-82-5	Heptane	10000	2	1	10000
190	14720-74-2	Heptane, 2,2,4-trimethyl-	10000	5	1	10000
191	1560-96-9	Tridecane, 2-methyl-	10000	50	5	50000
192	1632-70-8	Undecane, 5-methyl-	10000	50	5	50000
193	17301-23-4	Undecane, 2,6-dimethyl-	10000	50	5	50000
194	17301-25-6	Undecane, 2,8-dimethyl-	10000	50	5	50000
195	17301-27-8	Undecane, 2,10-dimethyl-	10000	50	5	50000
196	17301-29-0	Undecane, 3,7-dimethyl-	10000	50	5	50000
197	17301-30-3	Undecane, 3,8-dimethyl-	10000	50	5	50000
198	17301-32-5	Undecane, 4,7-dimethyl-	10000	50	5	50000
199	17301-94-9	Nonane, 4-methyl-	10000	20	2	20000
200	17302-28-2	Nonane, 2,6-dimethyl-	10000	50	5	50000
201	17302-32-8	Nonane, 3,7-dimethyl-	10000	50	5	50000
202	17312-50-4	Decane, 2,5-dimethyl-	10000	50	5	50000
203	17312-57-1	Dodecane, 3-methyl-	10000	50	5	50000
204	17312-60-6	Undecane, 6-ethyl-	10000	50	5	50000
205	17312-73-1	Undecane, 5,5-dimethyl-	10000	50	5	50000
206	17312-76-4	Undecane, 6,6-dimethyl-	10000	50	5	50000
207	17312-77-5	Undecane, 2,3-dimethyl-	10000	50	5	50000

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
208	17312-80-0	Undecane, 2,4-dimethyl-	10000	50	5	50000
209	17312-82-2	Undecane, 4,6-dimethyl-	10000	50	5	50000
210	17453-94-0	Undecane, 5-ethyl-	10000	50	5	50000
211	20278-85-7	Heptane, 2,3,5-trimethyl-	10000	20	2	20000
212	2213-23-2	Heptane, 2,4-dimethyl-	10000	5	1	10000
213	2216-33-3	Octane, 3-methyl-	10000	5	1	10000
214	2216-34-4	Octane, 4-methyl-	10000	5	1	10000
215	25117-24-2	Tetradecane, 4-methyl-	10000	50	5	50000
216	25117-31-1	Tridecane, 5-methyl-	10000	50	5	50000
217	26730-12-1	Tridecane, 4-methyl-	10000	50	5	50000
218	26730-14-3	Tridecane, 7-methyl-	10000	50	5	50000
219	2847-72-5	Decane, 4-methyl-	10000	50	5	50000
220	2980-69-0	Undecane, 4-methyl-	10000	50	5	50000
221	31295-56-4	Dodecane, 2,6,11-trimethyl-	10000	50	5	50000
222	3891-98-3	Dodecane, 2,6,10-trimethyl-	10000	50	5	50000
223	4032-93-3	Heptane, 2,3,6-trimethyl-	10000	20	2	20000
224	52896-90-9	Heptane, 3-ethyl-5-methyl-	10000	20	2	20000
225	544-76-3	Hexadecane	10000	50	5	50000
226	55030-62-1	Tridecane, 4,8-dimethyl-	10000	50	5	50000
227	55045-07-3	Dodecane, 2-methyl-8-propyl-	10000	50	5	50000
228	55045-11-9	Tridecane, 5-propyl-	10000	50	5	50000
229	562-49-2	Pentane, 3,3-dimethyl-	10000	2	1	10000
230	56292-65-0	Dodecane, 2,5-dimethyl-	10000	50	5	50000
231	565-59-3	Pentane, 2,3-dimethyl-	10000	2	1	10000
232	589-34-4	Hexane, 3-methyl-	10000	2	1	10000
233	589-43-5	Hexane, 2,4-dimethyl-	10000	5	1	10000
234	589-53-7	Heptane, 4-methyl-	10000	5	1	10000
235	589-81-1	Heptane, 3-methyl-	10000	5	1	10000
236	591-76-4	Hexane, 2-methyl-	10000	2	1	10000
237	592-27-8	Heptane, 2-methyl-	10000	5	1	10000
238	61141-72-8	Dodecane, 4,6-dimethyl-	10000	50	5	50000
239	6117-97-1	Dodecane, 4-methyl-	10000	50	5	50000
240	617-78-7	3-Ethylpentane	10000	2	1	10000
241	62016-30-2	Octane, 2,3,3-trimethyl-	10000	50	5	50000
242	62016-34-6	Octane, 2,3,7-trimethyl-	10000	50	5	50000
243	62108-21-8	Decane, 6-ethyl-2-methyl-	10000	50	5	50000
244	62108-25-2	Decane, 2,6,7-trimethyl-	10000	50	5	50000
245	62108-27-4	Decane, 2,4,6-trimethyl-	10000	50	5	50000
246	62238-13-5	Decane, 2,3,7-trimethyl-	10000	50	5	50000
247	629-50-5	Tridecane	10000	50	5	50000
248	629-59-4	Tetradecane	10000	50	5	50000
249	629-62-9	Pentadecane	10000	50	5	50000
250	629-78-7	Heptadecane	10000	50	5	50000

Table 4-2 Compounds detected >0.1 ppmv

no of compound	CAS #	Compound	Oxidizer DF massflow in / massflow out	Adsorption DF massflow in / massflow out	reduced Adsorption DF massflow in / massflow out	Combined DF massflow in / massflow out
251	74-98-6	Propane	10000	1	1	10000
252	75-28-5	Propane, 2-methyl-	10000	1	1	10000
253	78-78-4	Butane, 2-methyl-	10000	1.25	1	10000
254	96-14-0	Pentane, 3-methyl-	10000	2	1	10000
255	565-75-3	Pentane, trimethyl-, isomer	10000	5	1	10000

Attachment 5 Thermal Stability Ranking Study

Figure 9 of Technical Article *Development of a Thermal Stability Based Ranking of Hazardous Organic Compound Incinerability* (Dellinger 2000)

Table IV. ΔT_{99} as a Function of Waste Feed Concentration (Radical Concentration) for Five Model Compounds*

A/A_0	R/R_0	$CHCl_3$	CH_2Cl_2	$C_6H_5CH_3$	CH_3Cl	C_6H_6
1.1	1.02	<-1	<-1	<-1	<-1	-3
1.3	1.06	<-1	<-1	<-1	-2	-14
1.5	1.10	<-1	<-1	-1	-3	-23
2.0	1.20	<-1	<-1	-1	-6	-46
3.0	1.40	<-1	<-1	-2	-12	-85

*In this analysis, we have assumed that the additional radical concentration (R/R_0) abstracts a H atom from the model compound at the same rate as a Cl atom. The relationship between waste feed concentration (A/A_0) and radical concentration was determined from a series of equilibrium calculations for nominal incinerability mixtures at 1000 °C.

sumption above 750 °C while H metathesis by OCl and C_2Cl_5 are significant destruction pathways at lower temperatures (*15*).

Effect of Varying Waste Feed Rate and Radical Chains. On the basis of the known complexity of hydrocarbon and chlorinated hydrocarbon reaction systems (*47, 14–17*) it may seem fortuitous that such a simple kinetic model can predict the thermal decomposition behavior of such a wide range of species. We acknowledge the need for detailed chemical kinetic mechanisms to predict the thermal decomposition behavior of a given species over wide ranges of experimental conditions. However, the goal of this kinetic analysis was simply the prediction of T_{99}s for one experimental condition.

Using eq 1, we have iteratively calculated the effect of increases in the waste feed concentration on T_{99} for the five model compounds. As shown in Table IV, results indicate that acceptably small decreases in T_{99} (<20 °C) were observed for all compounds for a factor of 2 increase in waste feed rate and acceptably small decreases were observed for all compounds except benzene for a factor of 3 increase in waste feed concentration (~40% increase in radical concentration). For chloroform and dichloromethane, the insensitivity of T_{99} on waste feed concentration is consistent with mechanisms dominated by molecular elimination reactions. The variance in T_{99} for the other compounds is due to the relative contributions of bimolecular radical attack versus unimolecular reaction.

In principle, radical chain reactions can increase the effect of varying radical concentration. Significant chain lengths ($\lambda > 2$) are not expected under incineration conditions due to termination by the formation of stable H_2 and HCl molecules. Polymerization reactions may have longer chain lengths but these reactions are not likely to contribute to POHC destruction in the H- and Cl-rich environment of an incinerator. Both pseudoequilibrium and kinetic calculations indicate that other readily formed polyatomic radicals (e.g., CH_3, CCl_3) that can participate in short chains are in concentrations lower by a factor of 10–100 than H and Cl. Thus, chain lengths for these species would have to be on the order of 10–100 before they would contribute to POHC destruction, which is highly unlikely. Our calculations indicate that chains of $\lambda \leq 2$ produce shifts in T_{99} of equal or lesser magnitude than the effect of changing the radical concentration of up to a factor of 2.

The above analysis indicates that exceptional compounds that are resistant to unimolecular reaction and exhibit large shifts in T_{99} with small increases in radical concentration do exist (e.g., C_6H_6). However, since the stability of all compounds undergoing bimolecular decomposition will shift in the same direction as the radical concentration is varied, changes in their *relative* T_{99} values

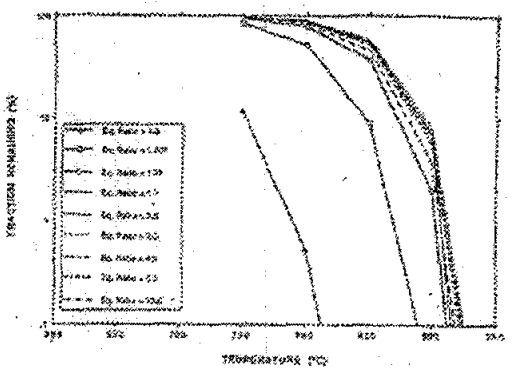

Figure 9. Sensitivity of toluene thermal decomposition behavior as a function of waste/oxygen equivalence ratio. Mixture elemental composition, C_6H_5Cl; t_r = 2.0 s.

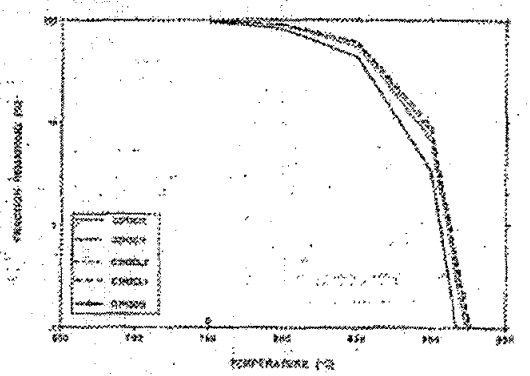

Figure 10. Sensitivity of toluene thermal decomposition behavior as a function of organic mixture Cl atom population. Φ = 3.0; t_r = 2.0 s.

will be suppressed. Since compounds at the top of the ranking decompose predominantly via bimolecular reactions, changes in their relative incinerability are expected to be minimal. Only as we descend through the ranking to where different compounds decompose by bimolecular versus unimolecular pathways will the ranking be expected to exhibit some variance. However, in this regime unimolecular decomposition reactions are available for compounds dominated by bimolecular pathways at nominal conditions. Thus, changes in T_{99} are again expected to be minimal.

Effect of Varying Equivalence Ratio and Waste Feed Composition. Toluene was selected as the model compound for further analysis, as this compound decomposes by numerous bimolecular reactions that are sensitive to changes in reaction atmosphere. We have analyzed the effect of reaction atmosphere by varying the fuel/oxygen stoichiometry ($0.05 < \Phi < 10.0$) for nominal values of mixture elemental composition and by varying mixture elemental composition ($0.33 < H/Cl < 20.0$) for nominal values of fuel/oxygen stoichiometry. Figure 9 presents the results of the sensitivity analysis for variation of waste/oxygen equivalence ratio while Figure 10 presents the results in relation to a variation of Cl and H atom populations, respectively.

Inspection of Figure 9 indicates that for waste/oxygen equivalence ratios ranging from 2.0 to 5.0, there is no significant difference (±10 °C) in T_{99}. As one decreases this parameter to 10.0, a small decrease in T_{99} was ob-

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Attachment 6 VOC Properties and Adsorption Potential

Technology Paper *Activated Carbon Adsorption for Treatment of VOC Emissions* (Shepherd 2001)

ACTIVATED CARBON ADSORPTION FOR TREATMENT OF VOC EMISSIONS

Presented at the 13th Annual EnviroExpo, Boston Massachusetts—May 2001

Austin Shepherd, P.E., C.I.H.
Vice President, Technical Director, CARBTROL Corporation
e-mail: a.shepherd@carbtrol.com

A review of the characteristics of activated carbon and its applicability to emission control of VOC's. Design and costs of carbon systems are also discussed.

INTRODUCTION

The principal use of vapor phase activated carbon in the environmental field is for the removal of volatile organic compounds such as hydrocarbons, solvents, toxic gases and organic based odors. In addition, chemically impregnated activated carbons can be used to control certain inorganic pollutants such as hydrogen sulfide, mercury, or radon.

When properly applied, the adsorption process will remove pollutants for which it is designed, to virtually non-detectable levels. In fact one of the first large- scale uses of activated carbon was in military gas masks where complete contaminant removal is essential. Carbon adsorption is equally effective on single component emissions as well as complex mixtures of pollutants.

In the industrial area, the most common applications of activated carbon are for process off-gases, tank vent emissions, work area air purification, and odor control, either within the plant or related to plant exhausts. Additionally, activated carbon is used in the hazardous waste remediation area to treat off-gases from air strippers and from soil vapor extraction remediation projects.

EVALUATION OF ALTERNATIVE TREATMENT PROCESSES	LOW VOC LEVELS	HIGH VOC LEVELS	CONTINUOUS LOADS	INTERMITTENT LOADS	HALOGENATED ORGANICS	TEMP>180F	TEMP<450F	HIGH FLOWS	LOW FLOWS	HIGH HUMIDITY	INORGANIC PARTICLES
ACTIVATED CARBON	•		•	•	•		•	•	•		
THERMAL OXIDATION		•	•			•			•	•	
SCRUBBERS	•	•	•			•	•	•	•		
PARTICULATE FILTERS			•	•			•			•	•
CATALYTIC OXIDATION		•	•			•			•	•	

TABLE I

APPLICATION CONSIDERATIONS

One of the major issues that must first be addressed when evaluating a specific environmental VOC problem is what treatment technology to consider. For a given situation there are likely a number of treatment alternatives that appear to have some utility.

The first step in this evaluation is to effectively characterize the application. You will need to know at least the following information:

Flow Rate - Continuous vs Intermittent
Contaminants Present - Individual contaminants, concentration and variability
Temperature - Average and maximum
Flamability - Upper and lower explosive limits

Once you have characterized your problem, each technology can be considered for its ability to deal with the conditions identified. As an example, *Table I* lists some of the more common technologies used to control industrial vapor phase pollutants, and the conditions under which they might be most favorably applied. I can't stress enough the importance of this review, as this is where most technical solutions fail. If you solve the wrong problem or pick a technical solution that does not respond to all the variables of your application, poor performance will likely result.

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HOW IT WORKS

In the adsorption process, molecules of a contaminated gas are attracted to and accumulate on the surface of the activated carbon. Carbon is a commonly used adsorbent due to its very large surface area. It can be made from a variety of base materials including coal, wood and coconut shells, and is manufactured or activated in a high temperature controlled oxidation process. A pound of highly activated carbon has a surface area approaching 140 acres.

CROSS SECTION OF CARBON

This *Figure 1* presents an artist's rendition of the cross section of an activated carbon particle. Note that almost all of the surface area available for adsorption is associated with its internal pore structure. Also note the relative change in pore diameters, going from very large at the granule surface boundary, to much smaller within the particle interior. Balancing of the large and small pore volumes during the activation process is what makes individual activated carbons perform differently. Molecules of a contaminant tend to adsorb most strongly in areas where the pore diameter of the adsorbent is close to the molecular diameter of the compound.

While most organic compounds will adsorb on activated carbon to some degree, the adsorption process is most effective on higher molecular weight and high boiling point compounds.

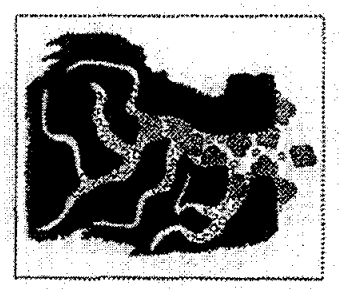

FIGURE 1

LIST OF ORGANIC COMPOUNDS

RELATIVE ADSORBTION RATE

		MOLECULAR WEIGHT	BOILING POINT	CARBON CAPACITY %
STRONGER	NITROBENZENE	123	211 C	51
	TETRACHLOROETHANE	166	147 C	40
	TETRACHLOROETHYLENE	165	121 C	35
	STYRENE	104	145 C	25
	XYLENE	106	138 C	21
	NAPATHYLENE	128	217 C	20
	TOLUNE	92	111 C	20
	BENZENE	78	80 C	12
	MTBE	88	55 C	12
	HEXANE	86	68 C	7
	ETHLY ACRILATE	100	97 C	5
	DICHLOROETHANE	99	99 C	7
	METHYL ETHYLKETONE	72	80 C	4
	METHYLENE CHLORIDE	84	40 C	2
	ACRILONITRILE	53	74 C	2
	ACETONE	58	56 C	0.8
	VINYLCHLORIDE	62	neg 14 C	0.7
	CHLOROETHANE	64	12 C	0.5
	BROMOTRI FLOROMETHANE	149	neg 58 C	0.13
WEAKER	METHANE	16	neg 161 C	0.0003

TABLE II

Compounds having a molecular weight over 50 and a boiling point greater than 50 degrees centigrade are good candidates for adsorption. *TABLE II* presents a representative list of organic compounds and their relative adsorption strength. Organic contaminants are often classified as weakly, moderately, or strongly adsorbed. You will note that a compound such as nitrobenzene having a molecular weight of 123 and a boiling point of 211 C is characterized as a very strong adsorber. On the other hand a compound such as methane which has a molecular weight of 16 and a boiling point of –161 C is a very weakly adsorbed compound. In fact, at this capacity, for all practical purposes, methane removal with activated carbon would not be cost effective.

ABSORPTION CAPACITY

Physical adsorption is dependent on the characteristics of the contaminant to be adsorbed, the temperature of the gas stream to be processed, and the concentration of the contaminant in the gas stream. The adsorption capacity for a particular contaminant represents the amount of the contaminant that can be adsorbed on a unit weight of activated carbon consumed at the conditions present in the application. Typical adsorption capacities for moderately adsorbed compounds range from 5 to 30 percent of the weight of the carbon.

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TRICHLOROETHYLENE ISOTHERM

The adsorption isotherm plot shows the influence of concentration on adsorption capacity. *Figure II* presents an adsorption isotherm used to predict adsorption capacity for trichloroethylene. Note how the adsorption capacity varies from 20 to 55 percent over the concentration range of 10 to 10000 ppm in the gas stream.

A series of isotherms at differing temperatures shows the influence of temperature on adsorption capacity. In Figure III you can see the effect of temperature on the same trichloroethylene compound. At 100ppm the capacity of activated carbon for trichloroethylene varies from 17 to 40 percent as the temperature changes from 140 to 32 degrees F.

Fortunately, most carbon suppliers have developed isotherms for a range of environmental contaminants. At Carbtrol we have built a computerized database of adsorption isotherms so that we can easily model most environmental applications. By supplying to us the gas flow rate, the contaminant concentration and the temperature of the gas stream, a carbon usage prediction can be made.

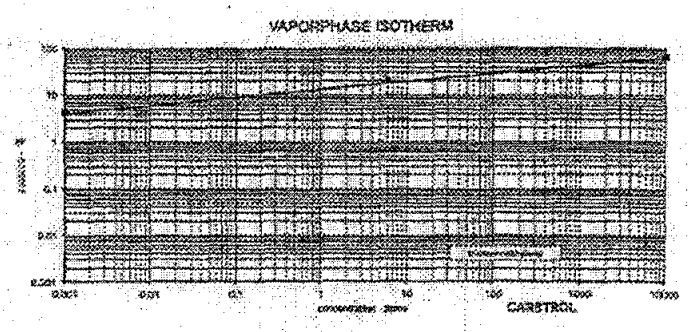


FIGURE II

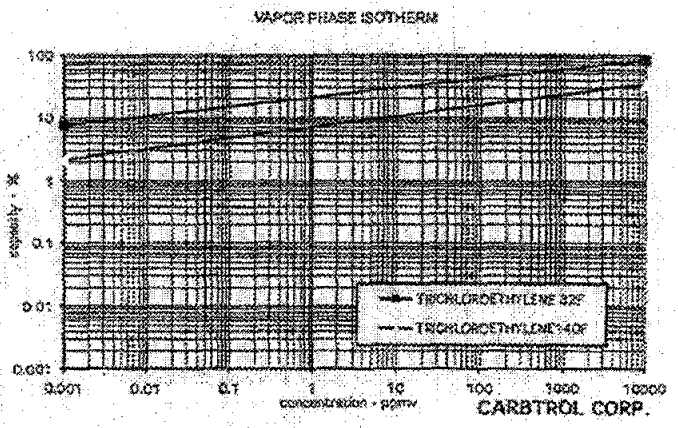
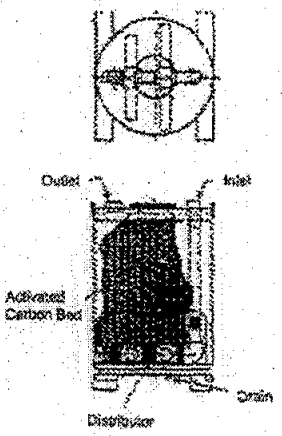


FIGURE III

DESIGN CONSIDERATIONS



CARBTROL G-4 ADSORBER

FIGURE IV

Activated carbons used in the air pollution control field are normally supplied in a granular form with a particle size ranging from 1 to 5 millimeters. In the granular form activated carbon can easily be packed into a containment device through which a contaminated gas stream can be processed for purification.

Figure IV shows the cross section of a typical fixed bed vapor phase adsorber. An adsorption system in its simplest form is made of a containment device (drum or vessel), distribution and collection devices to effect proper circulation of the gas stream through the activated carbon bed, and a means for moving the gas stream through the bed (such as a fan, a blower or pressurized gas displacement). Packed activated carbon beds can be conveniently config-

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ured into small transportable drums or tanks, or into large fixed contacting devices depending on the application.

Adsorber sizing for a particular application is governed primarily by bed surface loading rate. With a standard 4-foot carbon bed depth, a maximum gas loading rate of 100 cfm per square foot of bed surface should be maintained. This insures adequate gas contact and sufficient time to reach adsorption equilibrium. Higher gas flows are handled by increasing the carbon bed surface (larger adsorbers) or adding multiple beds in parallel.

One of the chief advantages of granular activated carbon adsorption is its simplicity of application. Pre-engineered fixed bed adsorbers can be purchased and installed on most existing exhaust systems with a minimum of capital expenditure. Transportable adsorbers from 100 to 5000 pounds are readily available as standard supply from several manufacturers. Air flows for these stock units go up to as much as 5000 CFM. Larger systems up to 20,000 CFM or higher are available on a custom basis. Once installed these systems operate for the most part unattended until the carbon becomes spent and requires replacement. The frequency of replacement will vary for each application but may range from weekly to annually.

Another significant advantage of an adsorption process is that it provides on line reserve capacity on a passive basis. The system is, in effect, available on a continuos basis to handle varying loads but only consumes carbon when contaminants are present in the exhaust stream. Other processes may have significant fuel or chemical operating costs even when no contaminants are being treated.

REACTIVATION

Once the activated carbon has become spent it must be removed from service and replaced with fresh carbon in order to maintain the effectiveness of treatment. The spent carbon can be disposed of and replaced with virgin carbon, or the spent carbon can be returned to the supplier for reactivation and reuse. Reactivation restores most of the original carbon adsorption capacity and avoids expensive disposal costs. Most carbon adsorption applications rely on offsite reactivation to support their activated carbon supply.

The spent carbon can be vacuumed from fixed adsorption vessels and shipped to the reactivation center in bulk, or returned to the reactivation facility in a transportable adsorber that serves both as an adsorption vessel and a UN shipping container.

CAPITAL AND OPERATING COSTS

Adsorption system capital and operating costs can vary widely but depend primarily on the gas volume to be treated and the amount of carbon consumed.

A simple100 cubic foot per minute adsorption system consisting of two 200 pound canisters and a blower would require about 20 sq ft of area and cost about 2-$3,000. When spent these smaller adsorption units can often be exchanged for new units with the original supplier.

Larger custom carbon adsorption systems can cost from several thousand, up to several hundred thousand dollars, and are usually supported with off site reactivation services.

A 5000 cfm system with two adsorbers and an exhaust blower would have a capital cost in the 20-$40,000 range and if skid mounted would take up an area of about 100sq ft.

The Custom reactivation service to support this system usually costs about $2.00 per pound of carbon processed including transportation.

ACTIVATED CARBON QUALITY

You should be aware that there is a significant difference in adsorption capacity among the various commercial activated carbon products available. When procuring activated carbons it is important to recognize that the value of the activated carbon product that you are purchasing is related to its adsorption capacity, and not its weight or volume.

The carbon manufacturing industry, in conjunction with ASTM, has developed several standard tests that enable comparison of the relative adsorption capacities of various activated carbons. These tests can be used to assess the quality of a virgin or reactivated carbon product and to predict its cost effectiveness.

The industry standard quality tests for VAPOR PHASE activated carbons is the CARBON TETRACHLORIDE ADSORPTION CAPACITY, or ASTM D3467. Typical vapor phase virgin activated carbons have CARBON TETRACHLORIDE ADSORPTION CAPACITIES ranging from 45 to 70 percent by weight.

When procuring either virgin or reactivated carbon products, make sure the appropriate adsorption number is specified. Then compare the alternative product specifications to insure you are getting the best activated carbon value.

SUMMARY

In summary, activated carbon has been shown to be applicable for treatment of a wide variety of environmental contaminants. It is a proven technology that is simple to install and easy to operate and maintain. Capital costs are among the least expensive for most alternative treatment technologies. Operating costs are primarily related to the amount of activated carbon consumed in the adsorption process.

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Attachment 7 Prediction of VOC Adsorption Capacity

Technical Article *Determining VOC Adsorption Capacity* (Yaws 1995)

POLLUTION ENGINEERING

Determining VOC Adsorption Capacity

Capacity data for the adsorption of VOCs on activated carbon is needed when meeting stricter air regs.

by Carl L. Yaws, Li Bu and Sachin Nijhawan

Physical and thermodynamic property data for organic compounds are especially helpful to engineers and scientists in industry. In particular, capacity data for adsorption of volatile organic compounds (VOCs) on activated carbon is becoming increasingly important in engineering and environmental studies because of more stringent air emissions regulations.

Results are presented for adsorption capacity as a function of the VOC concentration in the gas. The results can be used in engineering and environmental studies. Capacity data resulting from the correlation are useful in the engineering design of carbon adsorption systems to remove trace pollutants from gases. For pollution control to very low emission levels, such systems could include carbon adsorption followed by conventional steam regeneration with solvent recovery, or carbon adsorption followed by thermal or catalytic oxidation.

Adsorption capacity correlation

The correlation for adsorption on activated carbon is based on a logarithmic series expansion of concentration in the gas:

$$\log_{10}Q = A + B\log_{10}y + C[\log_{10}y]^2$$

where Q = adsorption capacity at equilibrium, g of compound/100 g of carbon

y = concentration in gas at 25°C and 1 atm, parts per million by volume, ppmv

A,B and C = correlation constants

The correlation constants (A,B and C) in Table 1 were determined from regression of the available data for adsorption on activated carbon. The tabulation is arranged by carbon number (C1, C2, C3...) so data can be quickly located using the chemical formula.

Estimation equation

In preparing the correlation, a literature search was conducted to identify sources for a database of adsorption capacity values at different concentrations (partial pressures). The database also served to check the accuracy of the correlation.

Adsorption capacity for the remaining compounds was then estimated. The following equation (developed by Calgon) was used to estimate the equilibrium adsorption capacity of activated carbon as a fifth order polynomial function of its adsorption potential:

$$\log_{10}Q = A + B\mu + C\mu^2 + D\mu^3 + E\mu^4 + F\mu^5$$

where Q = adsorption capacity at equilibrium, cm_3 of liquid compound/100 g of carbon

μ = adsorption potential of compound, $T/(V_L\Gamma_L)\log(P^{vp}/p_i)$

T = temperature, K

V_L = liquid molar volume of compound, cm^3/g-mol

Γ_L = molive polarizability,

$$[(n^2-1)(n^2+3)]/[(n^2+1)(n^2-1)]_{wavelength}$$

n = refractive index

P^{vp} = vapor pressure of compound, atm

p_i = partial pressure of compound, atm

A = 1.71

B = -1.46E-02

C = 1.65E-03

D = -4.11E-04

E = 3.14E-05

F = -6.75E-07

Examples

The correlation may be used to determine adsorption capacity of activated carbon for pollutants.

For example, the air from a paint-spraying operation contains 10 ppmv of n-butanol ($C_4H_{10}O$). The goal is to estimate the adsorption capacity of activated carbon for removing the pollutant at 25° C and 1 atm.

Substitution of the correlation constants from the table and concentration into the correlation equation yields

$$\log_{10}Q = 0.39881 + 0.32534\log_{10}(10) - 0.00648[\log_{10}(10)]^2 = 1.18767$$

Q = 15.41 g of n-butanol/100 g of carbon

In another case the air from an industrial operation contains 100 ppmv of methyl ethyl ketone (C_4H_8O). The adsorption capacity of activated carbon for removing the pollutant at 25° C and 1 atm must be estimated.

Substitution of the correlation constants from the table and concentration into the correlation equation yields

$$\log_{10}Q = 0.46525 + 0.37888\log_{10}(100) - 0.02803[\log_{10}(100)]^2 = 1.10697$$

Q = 12.79 g of methyl ethyl ketone/100 g of carbon

Operation and design

In actual operation under plant conditions, the capacity of an adsorption bed will seldom achieve equilibrium. Air

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Table 1. Adsorption on Activated Carbon

No.	Formula	Name	[illegible] A	B	C	Min	Max	[illegible] Q @ 10 ppmv	Q @ 100 ppmv	Q @ 1000 ppmv
1	[illegible]	Bromotrichloromethane	1.39542	0.23228	-0.02184	10	10000	40.63	[illegible]	79.20
2	[illegible]	Bromotrifluoromethane	-1.96147	0.53816	-0.01044	10	10000	0.13	0.46	1.56
3	[illegible]	Dibromodifluoromethane	0.20076	[illegible]	-0.01364	10	10000	[illegible]	23.96	41.42
4	[illegible]	Chlorotrifluoromethane	-1.43748	0.55563	-0.00450	10	10000	0.13	0.45	1.54
5	[illegible]	Dichlorodifluoromethane	-0.07359	0.40145	-0.01404	10	10000	2.06	4.71	10.10
6	[illegible]	Phosgene	[illegible]	[illegible]	[illegible]	10	10000	0.59	2.78	7.93
7	[illegible]	Trichlorofluoromethane	[illegible]	0.40217	[illegible]	10	10000	3.64	8.14	15.88
8	CCl_3NO_2	Chloropicrin	1.26245	0.20884	[illegible]	10	10000	29.04	42.93	59.61
9	[illegible]	Carbon Tetrachloride	[illegible]	[illegible]	[illegible]	10	10000	21.37	35.23	51.98
10	[illegible]	Tribromomethane	[illegible]	[illegible]	[illegible]	10	7258	81.07	109.85	[illegible]
11	[illegible]	Chloroform	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
12	[illegible]	Hydrogen Cyanide	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
13	[illegible]	Bromochloromethane	-2.01790	0.41555	-0.02311	10	10000	10.65	21.87	42.35
14	[illegible]	Bromofluoromethane	-0.45485	0.36733	-0.01606	10	10000	6.34	13.10	[illegible]
15	[illegible]	Dibromomethane	1.06376	0.37211	-0.02238	10	10000	26.57	45.94	[illegible]
16	[illegible]	Dichloromethane	[illegible]	0.49220	[illegible]	10	10000	2.51	6.63	[illegible]
17	[illegible]	Diiodomethane	1.94796	0.24904	[illegible]	10	1524	119.65	147.70	169.67
18	[illegible]	Formaldehyde	-2.48534	0.69132	-0.00375	10	10000	[illegible]	[illegible]	0.35
19	[illegible]	Formic Acid	-1.77231	1.20303	-0.06154	10	10000	0.14	1.24	5.43
20	[illegible]	Methyl Bromide	[illegible]	0.76564	-0.05527	10	10000	[illegible]	1.29	4.19
21	[illegible]	Methyl Chloride	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
22	[illegible]	Methyl Trichlorosilane	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
23	[illegible]	Methyl Iodide	0.73397	0.32985	-0.01330	10	15000	[illegible]	22.21	40.72
24	CH_3NO	Formamide	1.38985	0.25324	—	10	80	36.53	—	—
25	[illegible]	Nitromethane	-0.32547	0.50602	-0.00313	10	10000	2.12	7.37	21.36
26	[illegible]	Methane	-4.33096	0.77883	-0.02836	10	10000	2.9E-04	1.7E-03	[illegible]
27	[illegible]	Methyl Dichlorosilane	-0.73271	0.25305	-0.01822	10	10000	10.12	17.82	[illegible]
28	[illegible]	Methanol	-1.36739	0.82107	[illegible]	10	10000	[illegible]	0.42	[illegible]
29	[illegible]	Methyl Mercaptan	-1.32286	0.65973	-0.02094	10	10000	[illegible]	[illegible]	[illegible]
30	[illegible]	Methylamine	-1.33563	0.64730	-0.02027	10	20000	[illegible]	0.31	0.81
31	[illegible]	Tetranitromethane	[illegible]	0.18181	-0.01894	10	10000	43.01	60.22	73.35
32	[illegible]	Carbon Monoxide	[illegible]	0.96721	-0.01329	10	10000	[illegible]	[illegible]	[illegible]
33	[illegible]	Carbonyl Sulfide	-1.62852	0.53101	[illegible]	10	10000	[illegible]	0.37	[illegible]
34	[illegible]	Carbon Dioxide	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
35	[illegible]	Carbon Disulfide	[illegible]	0.47080	-0.01481	10	10000	[illegible]	4.34	[illegible]
36	[illegible]	1,2-Dibromotetrafluoroethane	0.90558	0.25695	-0.00874	10	10000	14.26	22.97	30.84
37	[illegible]	Chloropentafluoroethane	0.06264	0.34756	-0.01348	10	10000	2.61	5.56	10.10
38	[illegible]	1,1,2-Trichlorotrifluoroethane	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
39	[illegible]	Tetrachloroethylene	[illegible]	0.26905	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
40	[illegible]	1,1,2,2-Tetrachlorodifluoroethane	1.33107	0.17625	-0.01466	10	10000	[illegible]	[illegible]	[illegible]
41	[illegible]	Halothane	0.92405	0.31204	[illegible]	10	10000	[illegible]	29.38	[illegible]
42	[illegible]	Trichloroethylene	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
43	[illegible]	Dichloroacetyl Chloride	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
45	[illegible]	Pentachloroethane	1.64586	0.13515	[illegible]	10	[illegible]	[illegible]	71.30	[illegible]
46	[illegible]	Trifluoroacetic Acid	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
47	[illegible]	Acetylene	-2.24177	0.42434	-0.03340	10	10000	[illegible]	0.19	0.84
48	[illegible]	1,1,2,2-Tetrabromoethane	—	—	—	—	—	[illegible]	—	—
49	[illegible]	1,1-Dichloroethylene	0.48740	0.33287	-0.01622	10	10000	[illegible]	[illegible]	[illegible]
50	[illegible]	cis-1,2-Dichloroethylene	0.37967	0.33061	[illegible]	10	10000	6.90	[illegible]	[illegible]
51	[illegible]	trans-1,2-Dichloroethylene	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	14.28	26.16
52	[illegible]	Dichloroacetic Acid	[illegible]	[illegible]	—	10	233	[illegible]	[illegible]	—
53	[illegible]	1,1,1,2-Tetrachloroethane	1.44097	0.19166	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
54	[illegible]	1,1,2,2-Tetrachloroethane	[illegible]	[illegible]	-0.02019	10	[illegible]	48.03	63.01	[illegible]
55	[illegible]	Vinyl Chloride	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
56	[illegible]	Acetyl Chloride	0.03427	0.45528	[illegible]	10	10000	2.95	7.30	[illegible]
57	[illegible]	Methyl Chloroformate	0.41136	0.42776	[illegible]	10	10000	[illegible]	14.35	[illegible]
58	[illegible]	1,1,1-Trichloroethane	0.97331	0.28737	-0.02277	10	10000	[illegible]	28.64	42.79
59	[illegible]	1,1,2-Trichloroethane	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	41.46	[illegible]
60	[illegible]	Acetonitrile	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	7.50
61	[illegible]	Methyl Isocyanate	[illegible]	0.85381	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
62	[illegible]	Ethylene	-2.27792	0.61231	-0.01487	10	10000	[illegible]	[illegible]	[illegible]
63	[illegible]	1,1-Dibromoethane	1.27260	0.25571	-0.02516	10	10000	40.19	61.51	[illegible]
64	[illegible]	1,2-Dibromoethane	1.44231	0.25540	[illegible]	10	10000	[illegible]	[illegible]	92.77
65	[illegible]	1,1-Dichloroethane	0.34431	0.36281	-0.02192	10	10000	[illegible]	[illegible]	[illegible]
66	[illegible]	1,2-Dichloroethane	0.35143	0.37072	-0.02161	10	10000	[illegible]	16.15	[illegible]
67	[illegible]	Bis(chloromethyl)ether	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
68	[illegible]	1,2-Difluoroethane	[illegible]	2.57842	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
69	[illegible]	Acetaldehyde	[illegible]	[illegible]	[illegible]	10	10000	0.27	0.97	[illegible]
70	[illegible]	Ethylene Oxide	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	0.20	1.14
71	[illegible]	Acetic Acid	[illegible]	[illegible]	[illegible]	10	10000	3.70	11.74	[illegible]
72	[illegible]	Methyl Formate	[illegible]	[illegible]	[illegible]	10	10000	0.40	[illegible]	4.88
73	[illegible]	Thiacyclopropane	[illegible]	0.45520	[illegible]	10	10000	[illegible]	7.03	[illegible]
74	[illegible]	Bromoethane	0.31763	0.41540	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
75	[illegible]	Ethyl Chloride	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
76	[illegible]	2-Chloroethanol	[illegible]	[illegible]	[illegible]	10	8446	[illegible]	[illegible]	[illegible]
77	[illegible]	Ethyl Iodide	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
78	[illegible]	Ethyleneimine	[illegible]	0.91226	-0.07460	10	10000	0.47	[illegible]	7.98
79	[illegible]	N-Methylformamide	1.23313	0.21743	—	10	333	[illegible]	[illegible]	—
80	[illegible]	Nitroethane	[illegible]	[illegible]	-0.04612	10	10000	7.86	18.17	33.56
81	[illegible]	Ethane	[illegible]	0.66107	[illegible]	10	10000	[illegible]	[illegible]	0.29
82	[illegible]	Ethanol	[illegible]	[illegible]	[illegible]	10	10000	1.32	4.37	12.83
83	[illegible]	Dimethyl Sulfoxide	1.24042	0.31302	[illegible]	10	202	32.03	47.40	—

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Table 1. Adsorption on Activated Carbon

No.	Formula	Name	A	B	C	Min	Max	Q @ 10 ppmv	Q @ 100 ppmv	Q @ 1000 ppmv
84	$C_2H_6O_2$	Ethylene Glycol	[illegible]	[illegible]	[illegible]	10	[illegible]	36.77	47.09	—
85	$C_2H_6O_4S$	Dimethyl Sulfate	1.24617	0.21539	-0.02336	10	[illegible]	34.53	49.21	—
86	C_2H_6S	Dimethyl Sulfide	0.48472	0.37358	-0.02770	10	10000	6.77	13.32	23.35
87	C_2H_6S	Ethyl Mercaptan	0.10532	0.40536	-0.01802	10	10000	2.47	5.54	11.44
88	$C_2H_6S_2$	Dimethyl Disulfide	0.79678	0.33828	-0.02953	10	10000	12.36	21.87	37.25
89	C_2H_7N	Dimethylamine	-1.22492	0.63962	-0.03266	10	10000	0.36	0.64	2.51
90	C_2H_7NO	Monoethanolamine	1.21569	0.21994	—	10	483	27.23	45.24	—
91	$C_2H_8N_2$	Ethylenediamine	0.56304	0.46307	-0.04789	10	10000	9.15	18.94	32.36
92	C_3H_3Cl	Propargyl Chloride	0.27135	0.40480	-0.02135	10	10000	4.52	9.50	19.56
93	C_3H_3N	Acrylonitrile	0.07869	0.49586	-0.03500	10	10000	3.48	8.64	18.25
94	C_3H_3NO	Oxazole	-0.93150	[illegible]	[illegible]	10	10000	[illegible]	14.15	[illegible]
95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
96	$C_3H_4Cl_2$	2,3-Dichloropropene	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	28.20	41.84
97	C_3H_4O	Acrolein	0.29632	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
98	C_3H_4O	Propargyl Alcohol	[illegible]	0.37711	-0.02441	10	10000	[illegible]	14.67	29.81
99	$C_3H_4O_2$	Acrylic Acid	0.75549	0.47108	-0.05615	10	3221	14.81	29.72	46.08
100	$C_3H_4O_3$	Pyruvic Acid	1.07410	0.41416	-0.04768	10	1629	25.95	46.95	62.72
101	C_3H_5Br	3-Bromo-1-Propene	0.24873	0.32392	-0.01398	10	10000	14.05	25.12	40.19
102	C_3H_5Cl	3-Chloropropene	0.32792	0.35593	-0.01853	10	10000	4.73	9.66	18.10
103	C_3H_5ClO	alpha-Epichlorohydrin	0.83203	0.29983	-0.03932	10	10000	15.23	28.47	44.42
104	$C_3H_5ClO_2$	Methyl Chloroacetate	[illegible]	0.32514	-0.03617	10	[illegible]	[illegible]	38.21	53.27
105	$C_3H_5ClO_2$	Ethyl Chloroformate	0.84901	0.32528	[illegible]	10	10000	17.48	29.62	43.33
106	$C_3H_5Cl_3$	1,2,3-Trichloropropane	[illegible]	0.18136	[illegible]	10	4843	29.87	36.04	[illegible]
107	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10000	[illegible]	31.70	[illegible]
108	C_3H_5N	Propionitrile	[illegible]	[illegible]	[illegible]	10	10000	3.40	8.77	18.68
109	C_3H_5NO	Hydracrylonitrile	1.20994	0.17037	—	10	106	41.73	53.79	—
110	C_3H_5NO	Lactonitrile	1.24758	[illegible]	—	10	117	37.03	49.58	—
111	C_3H_6	Propylene	-0.91674	0.37775	[illegible]	10	10000	0.40	1.12	2.82
112	$C_3H_6Cl_2$	1,1-Dichloropropane	0.55379	0.28781	-0.02487	10	10000	16.49	16.92	29.24
113	$C_3H_6Cl_2$	1,2-Dichloropropane	0.98872	0.24700	[illegible]	10	10000	17.78	28.81	41.81
114	$C_3H_6Cl_2$	1,3-Dichloropropane	1.10540	[illegible]	-0.02824	10	10000	12.57	33.23	48.25
115	$C_3H_6Cl_2$	2,2-Dichloropropane	0.82314	0.29437	-0.02353	10	10000	13.33	22.47	34.13
116	[illegible]	Acetone	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
117	C_3H_6O	Allyl Alcohol	0.32320	[illegible]	-0.04370	10	10000	5.94	13.83	22.80
118	[illegible]	n-Propionaldehyde	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	7.52	[illegible]
119	C_3H_6O	1,2-Propylene Oxide	[illegible]	[illegible]	-0.02357	10	10000	1.21	3.46	[illegible]
120	C_3H_6O	1,3-Propylene Oxide	[illegible]	0.51922	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
121	$C_3H_6O_2$	Ethyl Formate	0.12618	0.42280	-0.02050	10	10000	[illegible]	[illegible]	[illegible]
122	$C_3H_6O_2$	Methyl Acetate	0.12314	0.42443	[illegible]	10	10000	3.42	7.93	16.66
123	$C_3H_6O_2$	Propionic Acid	0.77846	0.44570	-0.05209	10	4572	14.86	28.94	44.34
124	$C_3H_6O_2S$	3-Mercaptopropionic Acid	1.88023	0.05915	—	10	66	[illegible]	—	—
125	$C_3H_6O_3$	Lactic Acid	1.60722	[illegible]	—	10	107	50.08	[illegible]	—
126	$C_3H_6O_3$	Methoxyacetic Acid	[illegible]	[illegible]	—	10	71	[illegible]	—	—
127	C_3H_6S	Thiacyclobutane	[illegible]	0.37225	[illegible]	10	10000	10.35	19.63	32.16
128	C_3H_7Br	1-Bromopropane	0.83471	[illegible]	-0.02407	10	10000	[illegible]	[illegible]	39.04
129	C_3H_7Br	2-Bromopropane	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	22.18	[illegible]
130	[illegible]	[illegible] Chloride	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
131	[illegible]	[illegible] Chloride	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
132	[illegible]	[illegible] Iodide	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
133	[illegible]	[illegible] Iodide	[illegible]	[illegible]	-0.02250	10	10000	[illegible]	[illegible]	[illegible]
134	[illegible]	Allylamine	[illegible]	0.39815	[illegible]	10	10000	2.46	7.49	14.71
135	[illegible]	Propyleneimine	[illegible]	[illegible]	-0.01283	10	10000	2.03	7.05	14.75
136	C_3H_7NO	N,N-Dimethylformamide	0.90253	0.32875	[illegible]	10	5220	17.22	30.14	42.83
137	$C_3H_7NO_2$	1-Nitropropane	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	25.64	41.40
138	$C_3H_7NO_2$	2-Nitropropane	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
139	[illegible]	Propane	[illegible]	[illegible]	[illegible]	10	10000	0.47	[illegible]	[illegible]
140	[illegible]	Isopropanol	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	11.90	[illegible]
141	[illegible]	n-Propanol	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
142	$C_3H_8O_2$	2-Methoxyethanol	0.74339	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
143	$C_3H_8O_2$	Methylal	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	[illegible]
144	$C_3H_8O_2$	1,2-Propylene Glycol	1.48275	[illegible]	—	10	70	[illegible]	51.84	—
145	$C_3H_8O_2$	1,3-Propylene Glycol	1.58503	0.08305	—	10	58	[illegible]	—	—
146	C_3H_8S	n-Propyl Mercaptan	[illegible]	[illegible]	-0.02190	10	10000	7.65	13.52	[illegible]
147	C_3H_8S	Isopropyl Mercaptan	0.35775	[illegible]	[illegible]	10	10000	7.12	[illegible]	[illegible]
148	C_3H_8S	Ethyl-Methyl-Sulfide	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	14.90	22.78
149	C_3H_9N	n-Propylamine	0.05768	[illegible]	-0.01241	10	10000	[illegible]	5.09	9.85
150	C_3H_9N	Isopropylamine	0.07404	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	11.14
151	C_3H_9N	Trimethylamine	[illegible]	[illegible]	[illegible]	10	10000	1.69	3.50	7.13
152	C_3H_9NO	1-Amino-2-Propanol	1.23496	[illegible]	[illegible]	10	677	30.69	43.04	—
153	C_3H_9NO	3-Amino-1-Propanol	1.53733	[illegible]	—	10	101	[illegible]	50.37	—
154	[illegible]	Methylethanolamine	1.14745	[illegible]	[illegible]	10	1422	[illegible]	36.18	[illegible]
155	$C_3H_9O_3P$	Trimethyl Phosphite	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
156	$C_3H_9O_4P$	Trimethyl Phosphate	[illegible]	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]	[illegible]
157	$C_3H_{10}N_2$	1,2-Propanediamine	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
158	[illegible]	Furan	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	6.14	12.98
159	$C_4H_4O_2$	Diketene	[illegible]	[illegible]	[illegible]	10	10000	16.06	28.69	[illegible]
160	C_4H_4S	Thiophene	0.60753	[illegible]	[illegible]	10	10000	[illegible]	22.32	34.17
161	C_4H_5Cl	Chloroprene	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
162	C_4H_5N	trans-Crotonitrile	[illegible]	0.37264	[illegible]	10	10000	11.05	[illegible]	[illegible]
163	C_4H_5N	cis-Crotonitrile	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	16.54	[illegible]
164	C_4H_5N	Methacrylonitrile	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	22.40
165	C_4H_5N	Pyrrole	[illegible]	[illegible]	[illegible]	10	10000	14.50	26.97	[illegible]
166	C_4H_5N	Vinylacetonitrile	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	18.80	[illegible]
167	$C_4H_5NO_2$	Methyl Cyanoacrylate	[illegible]	0.05143	—	10	[illegible]	[illegible]	56.07	—
168	C_4H_6	1,3-Butadiene	[illegible]	0.34764	-0.01297	10	10000	[illegible]	[illegible]	7.81
169	C_4H_6	Dimethylacetylene	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	[illegible]
170	C_4H_6	Ethylacetylene	-0.02918	[illegible]	[illegible]	10	10000	[illegible]	[illegible]	7.67
171	$C_4H_6Cl_2$	1,3-Dichloro-trans-2-Butene	1.30208	[illegible]	[illegible]	10	10000	30.24	41.42	[illegible]
172	$C_4H_6Cl_2$	1,4-Dichloro-cis-2-Butene	1.40119	[illegible]	[illegible]	10	2353	[illegible]	47.24	[illegible]

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Table 1. Adsorption on Activated Carbon

No.	Formula	Name	Log Q = A + B Log Y + C (Log Y)[2]: A	B	C	Q = g of compound/100 g of carbon, Y = ppmv in gas at 25 C and 1 atm: Min	Max	Q @ 10 ppmv	Q @ 100 ppmv	Q @ 1000 ppmv
173	$C_4H_6Cl_2$	1,4-Dichloro-trans-2-Butene	1.60904	0.18520	-0.02779	10	4503	27.03	46.34	67.09
174	$C_4H_6Cl_2$	3,4-Dichloro-1-Butene	1.25394	0.21475	-0.02135	10	10000	25.75	37.85	48.54
175	C_4H_6O	trans-Crotonaldehyde	0.68535	0.16560	-0.03400	10	10000	10.35	19.50	20.81
176	[illegible]	2,5-Dihydrofuran	[illegible]	[illegible]	[illegible]	10	10000	5.20	11.03	20.92
177	C_4H_6O	Methacrolein	0.48461	0.37819	-0.02454	10	10000	6.03	11.97	27.01
178	[illegible]	gamma-Butyrolactone	[illegible]	[illegible]	[illegible]	10	597	35.67	50.39	—
179	$C_4H_6O_2$	cis-Crotonic Acid	1.30871	0.25008	-0.03752	10	773	33.33	45.28	—
180	$C_4H_6O_2$	Methacrylic Acid	1.23098	0.27649	-0.02892	10	1282	29.33	42.44	51.19
181	$C_4H_6O_2$	Methyl Acrylate	0.43864	0.32154	-0.02001	10	10000	3.75	10.48	17.45
182	$C_4H_6O_2$	Vinyl Acetate	0.61067	0.34297	-0.02595	10	10000	8.66	15.35	26.36
183	$C_4H_6O_3$	Acetic Anhydride	1.07386	0.21682	-0.01573	10	7774	21.13	35.63	48.37
184	[illegible]	n-Butyronitrile	[illegible]	[illegible]	[illegible]	10	10000	[illegible]	18.45	[illegible]
185	C_4H_7N	Isobutyronitrile	0.52657	0.30937	-0.03321	10	10000	[illegible]	15.32	25.90
186	C_4H_7NO	3-Methoxypropionitrile	1.14283	0.29534	-0.03752	10	7598	24.04	35.31	44.98
187	C_4H_8	1-Butene	0.07373	0.32798	-0.01432	10	10000	2.41	4.57	8.31
188	$C_4H_8Br_2$	1,2-Dibromobutane	1.69234	0.12766	-0.01497	10	4034	63.43	77.23	87.22
189	$C_4H_8Br_2$	2,3-Dibromobutane	1.63175	0.12928	-0.01452	10	4934	62.52	75.95	86.12
190	$C_4H_8Cl_2$	1,4-Dichlorobutane	1.38278	0.17796	-0.02080	10	5427	34.75	45.80	54.20
191	[illegible]	n-Butyraldehyde	[illegible]	[illegible]	[illegible]	10	10000	5.37	12.31	21.36
192	C_4H_8O	Isobutyraldehyde	0.59313	0.36715	-0.02579	10	10000	5.45	10.77	19.08
193	C_4H_8O	1,2-Epoxybutane	0.36733	0.37654	-0.02365	10	10000	5.25	10.61	19.75
194	[illegible]	Methyl Ethyl Ketone	[illegible]	[illegible]	[illegible]	10	10000	6.52	12.79	[illegible]
195	C_4H_8O	Ethyl Vinyl Ether	0.53511	[illegible]	-0.01513	10	10000	4.47	8.59	[illegible]
196	[illegible]	Tetrahydrofuran	[illegible]	[illegible]	[illegible]	10	10000	4.36	[illegible]	[illegible]
197	$C_4H_8O_2$	Isobutyric Acid	1.14221	0.25364	-0.03303	10	3348	24.66	36.88	48.02
198	[illegible]	n-Butyric Acid	[illegible]	[illegible]	[illegible]	10	1244	28.40	40.37	48.56
199	$C_4H_8O_2$	1,4-Dioxane	0.46278	0.35610	-0.03004	10	10000	3.60	16.52	[illegible]
200	[illegible]	Ethyl Acetate	[illegible]	[illegible]	[illegible]	10	10000	8.39	16.47	[illegible]
201	$C_4H_8O_2$	Methyl Propionate	0.54373	0.33480	-0.02752	10	10000	3.72	16.56	27.57
202	$C_4H_8O_2$	n-Propyl Formate	0.49455	0.34346	-0.02230	10	10000	9.43	17.39	27.82
203	$C_4H_8O_2S$	Sulfolane	1.77762	0.00118	-0.00008	10	10000	60.13	60.28	60.48
204	C_4H_8S	Tetrahydrothiophene	0.83277	0.35117	-0.02877	10	10000	17.22	27.87	38.44
205	C_4H_9Br	1-Bromobutane	1.16098	0.24262	-0.02270	10	10000	24.44	38.62	48.44
206	C_4H_9Br	2-Bromobutane	1.13857	0.24401	-0.02203	10	10000	22.99	34.59	47.30
207	C_4H_9Cl	n-Butyl Chloride	0.80224	0.29734	-0.02270	10	10000	11.89	19.40	29.27
208	C_4H_9Cl	sec-Butyl Chloride	0.73366	0.28110	-0.02312	10	10000	11.46	17.36	[illegible]
209	C_4H_9Cl	tert-Butyl Chloride	0.68573	0.29679	[illegible]	10	10000	8.37	[illegible]	[illegible]
210	[illegible]	Pyrrolidine	[illegible]	[illegible]	[illegible]	10	10000	8.72	16.37	28.79
211	C_4H_9NO	N,N-Dimethylacetamide	1.20615	0.29526	-0.03263	10	7621	26.23	37.34	49.74
212	C_4H_9NO	Morpholine	1.00373	0.30572	-0.03294	10	10000	19.03	30.53	42.47
213	[illegible]	n-Butane	[illegible]	[illegible]	[illegible]	10	10000	2.28	4.50	9.23
214	[illegible]	Isobutane	[illegible]	[illegible]	[illegible]	10	10000	2.02	4.00	7.49
215	$C_4H_{10}O$	n-Butanol	0.89981	0.32534	-0.03643	10	9276	15.41	25.33	35.30
216	[illegible]	sec-Butanol	[illegible]	[illegible]	[illegible]	10	10000	12.21	20.93	31.15
217	$C_4H_{10}O$	Diethyl Ether	0.23477	0.35564	-0.01236	10	10000	4.24	7.85	14.08
218	$C_4H_{10}O$	Methyl-Propyl-Ether	0.36794	0.32893	-0.01707	10	10000	4.27	8.00	14.92
219	$C_4H_{10}O$	Methyl Isopropyl Ether	0.36073	0.33380	-0.01647	10	10000	4.84	8.64	14.93
220	$C_4H_{10}O$	Isobutanol	0.84353	0.35239	[illegible]	10	10000	9.14	23.39	38.30
221	$C_4H_{10}O_2$	1,3-Butanediol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40.82	[illegible]	[illegible]
222	$C_4H_{10}O_2$	1,4-Butanediol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37.19	[illegible]	[illegible]
223	$C_4H_{10}O_2$	2,3-Butanediol	1.50640	0.09719	—	10	239	39.70	49.11	—
224	$C_4H_{10}O_2$	t-Butyl Hydroperoxide	1.08551	0.27496	-0.03033	10	7206	21.80	31.28	42.45
225	$C_4H_{10}O_2$	1,2-Dimethoxyethane	0.74981	0.31230	-0.02616	10	10000	10.39	14.70	28.46
226	$C_4H_{10}O_2$	2-Ethoxyethanol	1.07971	0.22797	-0.03199	10	6281	27.14	32.14	42.15
227	$C_4H_{10}O_4S$	Diethyl Sulfate	1.64792	0.05935	—	10	278	50.42	58.08	—
228	$C_4H_{10}S$	n-Butyl Mercaptan	0.96035	0.24398	-0.02251	10	10000	15.33	22.91	32.33
229	$C_4H_{10}S$	Isobutyl Mercaptan	0.93708	0.24902	-0.02173	10	10000	14.57	22.18	30.35
230	$C_4H_{10}S$	sec-Butyl Mercaptan	0.92387	0.24856	-0.02146	10	10000	14.13	21.39	29.88
231	$C_4H_{10}S$	tert-Butyl Mercaptan	0.84130	0.24937	-0.01939	10	10000	11.85	18.41	26.12
232	$C_4H_{10}S$	Diethyl Sulfide	0.95599	0.24655	-0.02145	10	10000	14.73	22.69	31.35
233	$C_4H_{10}S$	Isopropyl-Methyl-Sulfide	0.92769	0.24689	-0.02132	10	10000	14.25	21.69	29.96
234	$C_4H_{10}S$	Methyl-n-Propyl-Sulfide	0.97737	0.24453	-0.02229	10	10000	15.26	23.53	32.60
235	$C_4H_{10}S_2$	Diethyl Disulfide	1.42794	0.12364	-0.01373	10	9527	34.55	41.91	47.70
236	$C_4H_{11}N$	n-Butylamine	0.64870	0.31857	-0.02370	10	10000	8.53	15.14	25.45
237	$C_4H_{11}N$	Isobutylamine	0.40137	0.37638	-0.02369	10	10000	7.82	13.72	21.59
238	$C_4H_{11}N$	sec-Butylamine	0.57706	0.37254	-0.02257	10	10000	7.36	12.85	20.32
239	$C_4H_{11}N$	tert-Butylamine	0.30036	0.38834	-0.01897	10	10000	6.09	10.74	17.37
240	$C_4H_{11}N$	Diethylamine	0.54770	0.30796	-0.02107	10	10000	6.81	12.01	19.14
241	$C_4H_{11}NO$	Dimethylethanolamine	1.16681	0.23249	-0.02857	10	4183	24.42	34.21	42.69
242	$C_4H_{12}Si$	Tetramethylsilane	0.70867	0.23099	-0.01505	10	10000	8.49	12.69	18.45
243	$C_4H_{13}N_3$	Diethylene Triamine	1.54270	0.06479	—	10	308	40.30	47.02	—

stripper bed capacity is said to be 30 percent to 40 percent of equilibrium for plant operating conditions. The EPA Design Manual suggests a working factor of 3 for design of adsorption beds. The total carbon requirements for an adsorption system are obtained by determining carbon required from equilibrium capacity and then multiplying by the working factor.

Factors affecting adsorption bed capacity include loss due to adsorption zone, loss due to heat wave (adsorption is an exothermic process); loss due to moisture in entering gas and loss due to residual moisture on the carbon.

Carl L. Yaws is a professor of chemical engineering at Lamar University, Beaumont, Texas, and Li Bu and Sachin Nijhawan are graduate students at Lamar University. A computer program with data for all compounds is available for a fee from Yaws at 409-880-8787.

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Attachment 2

Estimated Organic Emissions from Process Cells (24590-WTP-HAC-50-00001, Rev C)

Attachment 2
Estimated Organic Emissions from Process Cells (24590-WTP-HAC-50-00001, Rev C)

Orientation

This report documents the methods, calculations, and results associated with organic emission from process cells.

ISSUED BY
RPP-WTP PDC
INIT 7/16/03
DATE

Calculation Cover Sheet

RIVER PROTECTION PROJECT-WASTE TREATMENT PLANT	JOB NO.: 24590
CALC NO. 24590-WTP-HAC-50-00001	GROUP E&NS
SUBJECT Estimated Organic Emissions from Process Cells	

CALCULATION STATUS DESIGNATION	☒ PRELIMINARY ☐ SUPERSEDED	☐ COMMITTED PRELIMINARY		☐ CONFIRMED ☐ VOIDED	
COMPUTER PROGRAM/TYPE	N/A ☒	SCP ☐ YES ☐ NO	☐ STAND-ALONE ☐ NETWORKED	PROGRAM NAME	VERSION/RELEASE NO.

Notes/Comments

The software tool used was Microsoft Excel Version 97.

Originator – John Sipkowski
Reviewer – Lee Bostic
Approver – Phil Peistrup

NO.	REASON FOR REVISION	TOTAL NO OF SHEETS	LAST SHEET NO	BY	CHECKED	APPROVED/ ACCEPTED	DATE
C	Preliminary Calculation. Complete revision based upon updated source data. Reformatted to include Excel tables as an appendix.	39	A-29	J. Sipkowski	L. Bostic	P. Peistrup	7/14/03
B	Preliminary Calculation. Table 1 from Version A deleted. The summary was revised accordingly.	47	47	J. Sipkowski	L. Bostic	P. Peistrup	10/3/02 7-15-03
A	Preliminary Calculation	48	48	J. Sipkowski	L. Bostic	P. Peistrup	8/22/02 7-15-03

RECORD OF REVISIONS

CALCULATION SHEET

PROJECT: RPP-WTP
JOB NO.: 24590
CALC NO.: 24590-WTP-HAC-50-00001
SHEET REV: C
SHEET NO.: 1

BY: John Sipkowski
DATE: July 9, 2003

SUBJECT: Estimated Organic Emissions from Process Cells

Contents

Sheet 1. Contents and Acronyms

Sheet 2. Discussion

Sheet 8. References

Sheet 10. Appendix A. Excel Worksheets: Table 1 through Table 9

Acronyms

EPA	US Environmental Protection Agency
HEPA	high efficiency particulate air (filter)
HLW	high-level waste
LAW	low-activity waste
PICs	products of incomplete combustion
SOCMI	synthetic organic chemical manufacturing industry
WAC	Washington Administrative Code
WTP	Hanford Tank Waste Treatment and Immobilization Plant

BY: John Sipkowski
DATE: July 9, 2003

SUBJECT: Estimated Organic Emissions from Process Cells

Summary

This calculation estimates the potential emission of organic compounds from ancillary equipment located within the Hanford Tank Treatment and Immobilization Plant (WTP) process cells. First, the release of organic compounds from ancillary equipment into the process cells was estimated. The release amount was then apportioned to each individual organic compound. Only a portion of the released organic material will result in uncontrolled emission. Particulate and particle-bound organics will be abated by the HEPA filters in the process cell offgas treatment system. The vapor phase will not be abated by the HEPA filters and will comprise the potential organic emissions from the process cells.

1 Introduction

This calculation estimates the potential emission of organic compounds from the WTP process cells as a result of treating the Hanford tank waste. The process cells will be operated under negative pressure with respect to atmospheric pressure, and the air from the process cells will be released to the atmosphere through a stack or flue. According to the Washington Administrative Code (WAC), WAC 173-400-030(32), fugitive emissions "means emissions which do not pass and which could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening." Consequently, the Washington State Department of Ecology (Ecology) has agreed (CCN 023430) that fugitive emissions are not applicable to the WTP. However, Ecology requested that the WTP estimate the potential emission of organic compounds that are not abated by the WTP offgas treatment systems.

In response to that request, this calculation estimates the potential unabated emission of organic compounds from the WTP process cells. This estimate is based upon Environmental Protection Agency (EPA) guidance documents. The emission estimate was made using the following process:

- Estimate the annual release of organic material into the process cells from ancillary equipment for the pretreatment plant, the low-activity waste (LAW) vitrification plant, and the high-level waste (HLW) vitrification plant
- Determine the weight fraction of individual organic compounds in the streams being evaluated
- Apportion the annual release of organic material to the individual organic compounds
- Apply ventilation abatement to the applicable organic compounds

This process resulted in an estimate of the potential emission of each organic compound from the pretreatment plant, the LAW plant, and the HLW plant process cells given in Appendix A, Tables 7, 8, and 9, respectively.

The scope of this calculation is limited to providing an estimate of potential organic compound emission from process cells to support the WTP risk assessment process.

2 Release Calculation Methodology

Building ventilation and process offgases will be treated by abatement systems that employ best available control technology for criteria pollutants, radionuclides, and toxic air pollutants prior to discharge into the atmosphere through a stack or flue. Organic compounds may be released into the process cells from ancillary equipment. Process cell ventilation will be treated by high efficiency particulate air (HEPA)

filters that will abate particulate or particle bound organic compounds. Vapor phase organic compounds will not be abated by the HEPA filters and are considered in this calculation to be process cell organic emissions.

The following sections present the formula for estimating the release of organic compounds from ancillary equipment within process cells and describes adjustments to the formula based upon the design and operation of the WTP.

2.1 Release Calculation Formula

The estimated release of organic material from ancillary equipment was calculated using the EPA guidance document, *Protocol for Equipment Leak Emission Estimates* (EPA 1995). This guidance provides several different methods to determine releases. The guidance recommends using the method that best matches the type of process being evaluated and the data available on that process. Since the WTP is not in operation, actual release measurements are not available, thus average release factors, given in the guidance, were used for the calculation. The formula for estimating releases using the average release factors is:

$$E_{HO} = N \cdot R_{avg} \cdot WF_s \cdot H$$

Where:

E_{HO} = estimated annual release of organic compounds, kg/year
N = ancillary equipment count by equipment type
R_{avg} = average release factor by equipment type, kg/hour
H = hours of operation, hours/year
WF_S = weight fraction of organic material by waste stream

An explanation of each formula value is discussed in the following sections, and the calculations are presented in Appendix A, Table 1.

2.2 Count of Ancillary Equipment by Equipment Type

The EPA guidance (EPA 1995) determined that the following ancillary equipment types are sources of potential release:

- Valves
- Pump seals
- Compressor seals
- Pressure relief valves
- Connectors
- Agitator seals
- Open-ended lines
- Sampling connections

The potential to emit for each of these ancillary equipment types are discussed below as they pertain to the design and operation of the WTP.

Valves

Valves that contact the waste were included in the release estimate.

Pumps

Reverse flow diverter pumps were not considered in this calculation since these offgases will be captured in process vessel ductwork, treated by the offgas treatment train, and released from the plant stack. The resultant estimated emissions are already included in the *Integrated Emissions Baseline Report for the Hanford Tank Waste Treatment and Immobilization Plant* (Emission Baseline Report) (24590-WTP-RPT-PO-03-008).

The WTP will also use conventional, centrifugal pumps. Centrifugal pumps that contact the waste will be equipped with double mechanical seals with an inert barrier fluid at greater pressure than the waste. It is assumed that there is no potential for releases from these pumps.

Compressors

The design of the WTP does not include compressors that contact the waste.

Pressure relief valves

Pressure relief valves on the process vessels and tanks were not considered sources of release in this calculation since all of the process vessels and tanks that manage the Hanford tank waste will operate under one to two inches of water gauge vacuum. The EPA guidance (EPA 1995) considers equipment under vacuum to be zero release.

Connections

Welded connections are considered to be zero release in the EPA guidance (EPA 1995). Other types of connectors such as gasketed flanged connections that contact the waste were included in this release estimate.

Agitator seals

Most of the process vessels that are agitated will use pulse jet mixers located within the vessels being agitated. Emissions from pulse jet mixers were not considered in this calculation since these offgases will be captured in the process vessel ductwork, treated by the offgas treatment train, and released from the plant stacks. The resultant estimated emissions are already included in the Emission Baseline Report (24590-WTP-RPT-PO-03-008).

Certain vessels will employ mechanical agitators that do employ a seal. These seals will be in the vapor space of the vessel, and the vessels will be under one to two inches of water gauge vacuum. The EPA guidance (EPA 1995) considers equipment under vacuum to be zero release.

Open-ended lines

The design of the WTP does not include open-ended lines.

Sampling systems

Sampling systems in the WTP will be closed-loop and are considered in the EPA guidance (EPA 1995) to be zero emission.

Thus, this calculation includes release calculations for valves and gasketed flanged type connectors that will contact the Hanford tank waste.

The ancillary equipment count by equipment type, N, is given in Appendix A, Table 1. The count of connectors that contact the Hanford tank waste was provided by Melter Systems (CCN 068046, CCN 068047) and the Pretreatment Jumper Group (CCN 068045). The count of valves was taken from the Plant Item List (PIL-4.08.06).

2.3 Average Release Factors

The EPA developed the average release factors through extensive measurements of actual processes in operation. This calculation used average release factors developed for the synthetic organic chemical manufacturing industry (SOCMI) since the processes proposed for the WTP are similar to the processes used in SOCMI.

The SOCMI average release factors for valves are based upon the type of service. The EPA guidance (EPA 1995) defines the types of service as:

- Gas/vapor – material in a gaseous state at operating conditions;
- Light liquid – material in a liquid state in which the sum of the concentrations of individual constituents with a vapor pressure over 0.3 kilopascals at 20° C is greater than or equal to twenty weight percent; or,
- Heavy liquid – not in gas/vapor service or light liquid service.

The release factor for heavy liquid service was used in this calculation since the *RPP-WTP Waste Feed Assessment* report (RPT-24590-EN00003) determined the total organic carbon content of the Hanford waste to be bounded at four weight percent.

The average release factor for connectors is the same regardless of the type of service. The average release factors, R_{avg}, applicable to the WTP are shown in Appendix A, Table 1.

2.4 Weight Fraction of Organic Material

The EPA guidance (EPA 1995) states that the weight fraction must be determined for each waste stream under evaluation. Four waste streams were evaluated for the calculation of ancillary equipment releases. These four waste streams are:

(1) The waste feed from receipt through the pretreatment evaporator process labeled the "pretreatment feed stream"
(2) The waste stream after the pretreatment evaporator labeled the "post-evaporator stream"
(3) The LAW concentrate through the LAW vitrification process labeled the "LAW stream"
(4) The HLW concentrate through the HLW vitrification process labeled the "HLW stream"

Section 3 addresses the determination of the weight fraction of the individual organic compounds in each of the four evaluated streams. The individual weight fractions were summed for each of the evaluated streams and entered onto Appendix A, Table 1 as the respective waste stream organic weight fraction, WF_S.

2.5 Hours of Operation

The calculation will use 8760 hours of operation which represents continuous operation for a year. The operating hours used is conservative since the average operational availability of the WTP is approximately 71% as determined in *LAW Vitrification Capacity and Availability Study* (24590-LAW-RPT-ENG-01-001). In addition, most of the transfer pipes will remain empty between transfers and will be flushed with water after transfer to prevent solids from settling in the line and to minimize corrosion.

2.6 Estimated Release of Organic Material

Appendix A, Table 1 gives the estimated release of organic material, E_{HO}, into the process cells of the pretreatment plant feed and post-evaporator streams, the LAW stream, and the HLW stream as a result of applying the average release calculation formula.

3 Weight Fraction of Individual Organic Compounds

The following sections discuss the determination of the weight fraction of each organic compound in each of the four evaluated streams.

3.1 Weight Fraction of Organic Compounds in the Pretreatment Feed Stream

The *RPP-WTP Waste Feed Assessment* (RPT-24590-EN00003) determined the upper bound concentration of individual organic compounds in the Hanford waste feed to the WTP. These concentrations are the starting point for the organic emissions calculations from the three production plants. The concentrations were given in milligrams per liter, mg/L. The formula given in the EPA guidance (1995) in section 2.1 to estimate the release of organic compounds requires the organic concentration to be expressed as a weight fraction. The milligrams per liter, mg/L, were converted to weight fractions, mg/kg, using the density, ρ, of the waste provided in the *RPP-WTP Waste Feed Assessment* (RPT-24590-EN00003). The values are given in Appendix A, Table 2. The individual weight fractions were summed in Appendix A, Table 2 to yield the waste stream organic weight fraction, WF_S, for the pretreatment feed stream and entered onto Appendix A, Table 1.

3.2 Weight Fraction of Organic Compounds in the Post-Evaporator, LAW, and HLW Streams

The Emission Baseline Report (24590-WTP-RPT-03-008) estimated the mass flow rate of fifty organic compounds in the waste using a computer model. The fifty organic compounds were selected as representative of the full spectrum of organic compounds in the waste. These fifty organic compounds were organized into thirty-five groups, termed Henry's Grouping, based upon the similarity of properties such as Henry's Law constant, molecular weight, vapor pressure, and solubility. The unmodeled organic compounds in the waste were assigned to one of the thirty-five groups based upon that compound's similar Henry's Grouping properties.