5A
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5186179 SAS No.: 8260B SDG No.: D5F250124

Lab File ID: RR2752 BFB Injection Date: 07/01/05

Instrument ID: R2 BFB Injection Time: 0749

GC Column: HP624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	30.1
75	30.0 - 60.0% of mass 95	58.9
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.5
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	50.0 - 100.0% of mass 95	70.4
175	5.0 - 9.0% of mass 174	5.2 (7.3)1
176	95.0 - 101.0% of mass 174	69.4 (98.6)1
177	5.0 - 9.0% of mass 176	5.1 (7.4)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SUPP010	SUPP010	RR2754	07/01/05	0836
02	MAIN010	MAIN010	RR2755	07/01/05	0856
03	LCS	LCS	RR2757	07/01/05	0935
04	VBLK	VBLK	RR2759	07/01/05	1014
05	TB-062405	HED621AA	RR2760	07/01/05	1034
06	FB-062405	HED661AA	RR2761	07/01/05	1054
07	BH-9E-1216	HED7C1AA	RR2762	07/01/05	1113
08	BH-E-1216	HED7E1AA	RR2763	07/01/05	1133
09	BH-E-1216	HED7E1AC	RR2764	07/01/05	1153
10	BH-E-1216	HED7E1AD	RR2765	07/01/05	1213
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Report Date: 05-Jul-2005 09:53

Calibration History

Method : /chem/R2.i/070105.b/R2-20ml-h2o.m
Start Cal Date: 29-JUN-2005 21:50
End Cal Date : 30-JUN-2005 01:24

Initial Calibration

Injection Date	Sublist	Calibration File
Cal Level: 1 , Cal Amount: 1.00000		
29-JUN-2005 23:47	1-main	/chem/R2.i/062905i.b/rr2695.d
29-JUN-2005 22:10	2-supp	/chem/R2.i/062905i.b/rr2690.d
Cal Level: 2 , Cal Amount: 2.00000		
30-JUN-2005 00:07	1-main	/chem/R2.i/062905i.b/rr2696.d
29-JUN-2005 21:50	2-supp	/chem/R2.i/062905i.b/rr2689.d
Cal Level: 3 , Cal Amount: 5.00000		
30-JUN-2005 00:26	1-main	/chem/R2.i/062905i.b/rr2697.d
29-JUN-2005 22:29	2-supp	/chem/R2.i/062905i.b/rr2691.d
Cal Level: 4 , Cal Amount: 10.0000		
30-JUN-2005 00:45	1-main	/chem/R2.i/062905i.b/rr2698.d
29-JUN-2005 22:49	2-supp	/chem/R2.i/062905i.b/rr2692.d
Cal Level: 5 , Cal Amount: 30.0000		
30-JUN-2005 01:05	1-main	/chem/R2.i/062905i.b/rr2699.d
29-JUN-2005 23:08	2-supp	/chem/R2.i/062905i.b/rr2693.d
Cal Level: 6 , Cal Amount: 60.0000		
30-JUN-2005 01:24	1-main	/chem/R2.i/062905i.b/rr2700.d
29-JUN-2005 23:28	2-supp	/chem/R2.i/062905i.b/rr2694.d

Continuing Calibration

01-JUL-2005 08:36	2-supp	/chem/R2.i/070105.b/rr2754.d
01-JUL-2005 08:56	1-main	/chem/R2.i/070105.b/rr2755.d

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 29-JUN-2005 21:50
End Cal Date : 30-JUN-2005 01:24
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/R2.i/070105.b/R2-20ml-h2o.m
Cal Date : 01-Jul-2005 14:09 zhouh

Calibration File Names:
Level 1: /chem/R2.i/062905i.b/rr2695.d
Level 2: /chem/R2.i/062905i.b/rr2696.d
Level 2: /chem/R2.i/062905i.b/rr2697.d
Level 4: /chem/R2.i/062905i.b/rr2698.d
Level 5: /chem/R2.i/062905i.b/rr2699.d
Level 6: /chem/R2.i/062905i.b/rr2700.d

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
M 1 1,2-Dichloroethene (total)	0.21923	0.20362	0.21719	0.18234	0.19631	0.20139	AVRG		0.20335		6.73700
M 2 Xylene (total)	4.14066	3.61373	3.85482	3.83047	3.57519	3.63058	AVRG		3.77424		5.68184
3 dichlorodifluoromethane	0.49170	0.45639	0.49625	0.36996	0.41725	0.41129	AVRG		0.44047		11.28376
4 dichlorotetrafluoroethane	0.22237	0.18370	0.20400	0.21918	0.21055	0.20371	AVRG		0.20726		6.68411
5 Chloromethane	0.40822	0.39877	0.37027	0.32068	0.35247	0.33263	AVRG		0.36384		9.67618
6 Vinyl Chloride	0.37819	0.36471	0.36226	0.28345	0.31611	0.27962	AVRG		0.33072		13.15435
7 Ethylene Oxide	+++++	0.00230	0.00295	0.00334	0.00320	0.00322	AVRG		0.00300		13.90194
8 Bromomethane	0.24076	0.21083	0.20909	0.17232	0.19759	0.18692	AVRG		0.20292		11.56473
9 Chloroethane	0.13573	0.13682	0.11978	0.10880	0.11758	0.11217	AVRG		0.12181		9.73499

59

STL Denver

INITIAL CALIBRATION DATA

:tart Cal Date : 29-JUN-2005 21:50
:nd Cal Date : 30-JUN-2005 01:24
:uant Method : ISTD
'arget Version : 3.40
:ntegrator : HP RTE
lethod file : /chem/R2.i/070105.b/R2-20ml-h2o.m
:al Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
10 Dichlorofluoromethane	0.67743	0.42399	0.58401	0.61056	0.58320	0.56211	AVRG		0.57355		14.55831
11 Trichlorofluoromethane	0.51603	0.47403	0.48279	0.38700	0.47307	0.45196	AVRG		0.46415		9.30005
12 Ethanol	7516	10302	18079	41421	140421	+++++	LINR	1.43325	0.00094		0.99457
13 1,2-dichloro-1,1,2-trifluoroe	0.22080	0.19812	0.19331	0.20493	0.18329	0.17974	AVRG		0.19670		7.64050
14 Ethyl Ether	0.11673	0.09420	0.09221	0.09108	0.08339	0.08297	AVRG		0.09343		13.20186
15 2,2-dichloro-1,1,1-trifluoroe	0.41661	0.38666	0.36426	0.38162	0.35226	0.34501	AVRG		0.37440		7.00703
16 Acrolein	1253	3684	6898	18167	86726	291537	QUAD	1.53967	388	-626	0.99762
17 Trichlorotrifluoroethane	0.20376	0.17305	0.17456	0.17558	0.16419	0.17475	AVRG		0.17765		7.57894
18 Acetone	+++++	0.03572	0.03272	0.02646	0.02760	0.02595	AVRG		0.02969		14.52378
19 1,1-Dichloroethene	0.21232	0.19869	0.21752	0.17806	0.18303	0.19061	AVRG		0.19671		8.04718
20 2-Propanol	12086	19407	49102	89710	287389	611110	WLINR	0.32581	0.00562		0.99198
21 Iodomethane	0.46215	0.47033	0.47546	0.41307	0.43161	0.43835	AVRG		0.44850		5.49183
22 Acetonitrile	0.00987	0.00978	0.00922	0.00838	0.00890	0.00802	AVRG		0.00903		8.22781
23 Methyl acetate	0.08795	0.06654	0.06667	0.06678	0.06199	0.06564	AVRG		0.06926		13.47606
24 Carbon Disulfide	1.05367	0.97085	0.89111	0.93258	0.86469	0.90711	AVRG		0.93667		7.24159
25 Allyl Chloride	0.50523	0.47182	0.42215	0.41933	0.39514	0.42202	AVRG		0.43928		9.30094
26 tert-Butyl alcohol	0.00705	0.00669	0.00677	0.00630	0.00697	0.00602	AVRG		0.00663		6.04320

60

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 29-JUN-2005 21:50
End Cal Date : 30-JUN-2005 01:24
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/R2.i/070105.b/R2-20ml-h2o.m
Cal Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
27 Methylene Chloride	+++++	52510	102755	193932	547641	1171998	WLINR	-0.11302	0.17429		0.99644
28 Acrylonitrile	0.02343	0.02325	0.02294	0.02170	0.02407	0.02112	AVRG		0.02275		4.92173
29 Methyl t-butyl ether	0.32695	0.31296	0.31656	0.32116	0.29677	0.29307	AVRG		0.31124		4.34878
30 trans-1,2-Dichloroethene	0.22721	0.21337	0.22052	0.18676	0.19755	0.20082	AVRG		0.20770		7.35199
31 Hexane	0.35765	0.38115	0.30749	0.31456	0.29750	0.30652	AVRG		0.32748		10.30631
32 Vinyl acetate	62905	143435	279359	506186	1649515	3013234	WLINR	-0.08994	0.25124		0.99809
33 Isopropyl ether	0.08661	0.08697	0.09637	0.08250	0.08254	0.08862	AVRG		0.08727		5.84930
34 1,1-Dichloroethane	0.52813	0.50230	0.54940	0.47248	0.46719	0.48534	AVRG		0.50081		6.48965
35 Chloroprene	0.44690	0.40836	0.43891	0.39975	0.38637	0.41820	AVRG		0.41641		5.56328
36 ETBE	0.64168	0.55443	0.53145	0.54221	0.50649	0.48550	AVRG		0.54363		9.95352
37 2-Butanone	0.04887	0.04289	0.04375	0.03556	0.04058	0.03835	AVRG		0.04166		11.11155
38 Ethyl Acetate	+++++	0.10117	0.09410	0.09253	0.09030	0.09131	AVRG		0.09388		4.59481
39 Propionitrile	0.00910	0.00788	0.00845	0.00690	0.00806	0.00773	AVRG		0.00802		9.17604
40 cis-1,2-Dichloroethene	0.21125	0.19387	0.21385	0.17792	0.19507	0.20197	AVRG		0.19899		6.61120
41 2,2-Dichloropropane	0.41132	0.38825	0.41587	0.35407	0.35355	0.35312	AVRG		0.37936		7.84353
42 Methacrylonitrile	0.06848	0.06432	0.06803	0.05757	0.06597	0.05636	AVRG		0.06345		8.28363
43 Bromochloromethane	0.08162	0.08100	0.08346	0.07329	0.07770	0.07460	AVRG		0.07861		5.20020

STL Denver

INITIAL CALIBRATION DATA

:art Cal Date : 29-JUN-2005 21:50
ıd Cal Date : 30-JUN-2005 01:24
ıant Method : ISTD
ırget Version : 3.40
ıtegrator : HP RTE
:thod file : /chem/R2.i/070105.b/R2-20ml-h2o.m
ıl Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
44 Chloroform	0.57061	0.53850	0.57177	0.47442	0.51020	0.49064	AVRG		0.52602		7.79283
45 Tetrahydrofuran	+++++	0.02067	0.01890	0.01836	0.01727	0.01772	AVRG		0.01858		7.09555
47 1,1,1-Trichloroethane	0.46711	0.42067	0.45662	0.39814	0.38976	0.40553	AVRG		0.42297		7.55744
48 Isobutanol	0.00310	0.00270	0.00268	0.00253	0.00269	0.00237	AVRG		0.00268		8.99583
49 Cyclohexane	0.39898	0.39520	0.35830	0.37250	0.33554	0.35182	AVRG		0.36872		6.78167
50 1,1-Dichloropropene	0.41815	0.39257	0.41859	0.36699	0.38712	0.38462	AVRG		0.39467		5.13284
51 Carbon Tetrachloride	0.43258	0.41319	0.44670	0.40356	0.40376	0.42590	AVRG		0.42095		4.08853
53 1,2-Dichloroethane	0.32530	0.32971	0.34508	0.30363	0.31964	0.29196	AVRG		0.31922		5.94767
54 Benzene	0.81688	0.73154	0.82038	0.74040	0.70996	0.73503	AVRG		0.75903		6.23479
55 TAME	0.41151	0.33826	0.32822	0.31648	0.32822	0.33557	AVRG		0.34304		10.02357
57 n-Butanol	+++++	0.00215	0.00186	0.00163	0.00178	0.00150	AVRG		0.00178		13.81938
58 Trichloroethene	0.21029	0.19904	0.21521	0.18871	0.18634	0.19577	AVRG		0.19923		5.79503
59 2-Pentanone	0.07991	0.07115	0.06441	0.06303	0.06246	0.06251	AVRG		0.06724		10.44562
60 Methyl Methacrylate	0.01069	0.01240	0.01058	0.01108	0.01128	0.01156	AVRG		0.01126		5.90521
61 1,2-Dichloropropane	0.20767	0.19741	0.21746	0.18553	0.19228	0.19735	AVRG		0.19962		5.69177
62 Methyl cyclohexane	0.41304	0.41013	0.35194	0.38606	0.36126	0.37610	AVRG		0.38309		6.53337
63 1,4-Dioxane	+++++	0.00045	0.00050	0.00047	0.00060	0.00044	AVRG		0.00049		13.07053

STL Denver

INITIAL CALIBRATION DATA

:tart Cal Date : 29-JUN-2005 21:50
:nd Cal Date : 30-JUN-2005 01:24
)uant Method : ISTD
'arget Version : 3.40
:ntegrator : HP RTE
lethod file : /chem/R2.i/070105.b/R2-20ml-h2o.m
'al Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
64 Dibromomethane	0.11083	0.11886	0.12313	0.10550	0.11731	0.10942	AVRG		0.11417		5.82234
65 Bromodichloromethane	0.33144	0.31008	0.32967	0.29528	0.31949	0.32360	AVRG		0.31826		4.28226
66 2-nitropropane	+++++	0.18753	0.18324	0.20336	0.18015	0.17839	AVRG		0.18653		5.37454
67 2-Chloroethyl vinyl ether	+++++	3744	9504	22885	97132	244184	LINR	0.32252	0.22196		0.99065
68 cis-1,3-Dichloropropene	1.61573	1.54558	1.52129	1.55792	1.43667	1.53857	AVRG		1.53596		3.79829
69 4-Methyl-2-pentanone	0.57046	0.50891	0.50466	0.50530	0.48486	0.49029	AVRG		0.51075		6.01816
71 Toluene	4.04663	3.71511	3.59692	3.74864	3.41951	3.75765	AVRG		3.71408		5.57255
72 trans-1,3-Dichloropropene	1.26890	1.26248	1.28709	1.21949	1.17507	1.17276	AVRG		1.23097		4.01701
73 Ethyl methacrylate	0.56064	0.51521	0.52864	0.54478	0.49502	0.51102	AVRG		0.52589		4.54814
74 1,1,2-Trichloroethane	0.53627	0.46445	0.44378	0.46346	0.42298	0.45441	AVRG		0.46423		8.29114
75 2-Hexanone	0.39427	0.33374	0.33496	0.32278	0.31813	0.30932	AVRG		0.33553		9.04655
76 1,3-Dichloropropane	0.92063	0.83739	0.84062	0.81791	0.76079	0.78287	AVRG		0.82670		6.72905
77 Tetrachloroethene	0.99621	0.90058	0.91227	0.86871	0.80529	0.91319	AVRG		0.89937		6.94894
78 Dibromochloromethane	0.99963	0.86199	0.91225	0.93511	0.92853	0.91027	AVRG		0.92463		4.84476
79 Tetrahydrothiophene	0.07429	0.06400	0.06225	0.05979	0.06245	0.06197	AVRG		0.06413		8.04537
80 1,2-Dibromoethane	0.57816	0.55124	0.54668	0.56914	0.54287	0.54153	AVRG		0.55493		2.73077
81 1-Chlorohexane	1.71596	1.36739	1.49341	1.44554	1.36624	1.42371	AVRG		1.46871		8.88119

63

STL Denver

INITIAL CALIBRATION DATA

tart Cal Date : 29-JUN-2005 21:50
nd Cal Date : 30-JUN-2005 01:24
uant Method : ISTD
arget Version : 3.40
ntegrator : HP RTE
ethod file : /chem/R2.i/070105.b/R2-20ml-h2o.m
al Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
83 Chlorobenzene	2.31007	2.11666	2.08510	2.00776	1.99027	1.99677	AVRG		2.08444		5.85139
84 1,1,1,2-Tetrachloroethane	1.03438	0.90049	0.99569	0.92555	0.84258	0.88191	AVRG		0.93010		7.76146
85 Ethylbenzene	1.14111	1.00051	1.01931	1.03765	0.93678	1.02329	AVRG		1.02644		6.46941
86 m and p-Xylene	1.40487	1.20103	1.27159	1.31135	1.22527	1.25453	AVRG		1.27811		5.69658
87 o-Xylene	1.33091	1.21167	1.31164	1.20776	1.12465	1.12153	AVRG		1.21803		7.31401
88 Styrene	2.04098	1.91413	2.03101	1.92814	1.83129	1.82267	AVRG		1.92804		4.86623
89 Bromoform	0.45083	0.40385	0.41039	0.41695	0.44421	0.44451	AVRG		0.42846		4.74965
90 isopropyl benzene	4.26259	3.58074	3.72654	3.80555	3.44603	3.67831	AVRG		3.74996		7.47218
91 c-1,4-Dichloro-2-butene	0.12548	0.12638	0.10209	0.13212	0.12413	0.14187	AVRG		0.12534		10.47750
92 Cyclohexanone	0.01649	0.01376	0.01446	0.01324	0.01529	0.01289	AVRG		0.01436		9.43779
94 1,1,2,2-Tetrachloroethane	0.55629	0.52163	0.52457	0.50718	0.52049	0.50365	AVRG		0.52230		3.57200
95 t-1,4-Dichloro-2-butene	0.07018	0.09915	0.07978	0.08284	0.09901	0.10323	AVRG		0.08903		14.92481
96 1,2,3-Trichloropropane	883	3187	7291	14766	49109	100204	WLINR	0.01772	0.06198		0.99779
97 Bromobenzene	0.65111	0.67306	0.66365	0.68391	0.63214	0.62200	AVRG		0.65431		3.65584
98 n-Propylbenzene	0.60439	0.57337	0.62134	0.61964	0.53245	0.60904	AVRG		0.59337		5.81366
99 2-Chlorotoluene	0.63588	0.60390	0.62036	0.61999	0.57589	0.61614	AVRG		0.61202		3.34125
100 1,3,5-Trimethylbenzene	2.17786	2.16683	2.17581	2.30397	2.08250	2.10401	AVRG		2.16850		3.57513

64

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 29-JUN-2005 21:50
End Cal Date : 30-JUN-2005 01:24
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/R2.i/070105.b/R2-20ml-h2o.m
Cal Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
101 4-Chlorotoluene	0.64813	0.59673	0.58439	0.62683	0.57570	0.60211	AVRG		0.60565		4.48816
102 tert-Butylbenzene	2.05350	1.96365	1.98081	1.85695	1.65067	1.89045	AVRG		1.89934		7.38039
103 1,2,4-Trimethylbenzene	2.06670	2.32812	2.27083	1.99457	2.00195	1.99861	AVRG		2.11013		7.11555
104 sec-Butylbenzene	0.32589	0.37484	0.38525	0.34219	0.34604	0.32354	AVRG		0.34963		7.25464
105 4-Isopropyltoluene	2.58088	2.40751	2.34325	2.31078	2.05718	2.18246	AVRG		2.31367		7.82998
106 m-Dichlorobenzene	1.29222	1.25905	1.16376	1.21780	1.10557	1.18450	AVRG		1.20382		5.59623
108 p-dichlorobenzene	1.15914	1.12094	1.13050	1.09983	1.06564	1.13197	AVRG		1.11800		2.86346
109 1,2,3-Trimethylbenzene	1.81723	2.01418	1.79551	1.86682	1.93372	1.74256	AVRG		1.86167		5.31850
110 n-Butylbenzene	2.91664	2.90301	2.94996	2.99091	2.56932	2.71040	AVRG		2.84004		5.78088
111 o-Dichlorobenzene	0.94623	1.00317	0.96413	0.94089	0.94337	0.94342	AVRG		0.95687		2.52932
112 1,2-Dibromo-3-chloropropane	+++++	0.04784	0.04595	0.04833	0.05463	0.04648	AVRG		0.04865		7.16185
113 1,2,4-Trichlorobenzene	0.49712	0.53938	0.54112	0.50435	0.48383	0.44021	AVRG		0.50100		7.52082
114 Hexachlorobutadiene	0.48519	0.46756	0.47950	0.48924	0.43468	0.40372	AVRG		0.45998		7.36255
115 Napthalene	0.56795	0.62700	0.57708	0.60233	0.61664	0.49586	AVRG		0.58114		8.17152
116 1,2,3-Trichlorobenzene	0.37701	0.40693	0.37888	0.38264	0.38176	0.32515	AVRG		0.37539		7.17447
$ 46 Dibromofluoromethane	0.32490	0.28063	0.27540	0.26046	0.26995	0.26519	AVRG		0.27942		8.37485

65

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 29-JUN-2005 21:50
End Cal Date : 30-JUN-2005 01:24
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/R2.i/070105.b/R2-20ml-h2o.m
Cal Date : 01-Jul-2005 14:09 zhouh

Compound	1 Level 1	2 Level 2	5 Level 3	10 Level 4	30 Level 5	60 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
$ 52 1,2-Dichloroethane-d4	0.33847	0.26913	0.26493	0.26879	0.26021	0.25157	AVRG		0.27552		11.44255
$ 70 Toluene-d8	3.29228	3.16453	2.96500	3.15593	2.96323	2.90828	AVRG		3.07487		4.91419
$ 93 Bromofluorobenzene	1.29527	1.11320	1.10212	1.28191	1.04508	1.11278	AVRG		1.15839		8.98135

Curve	Formula	Units
Averaged	Amt = Rsp/m1	Response
Linear	Amt = b + Rsp/m1	Response
Wt Linear	Amt = b + Rsp/m1	Response
Quad	Amt = b + m1*Rsp + m2*Rsp^2	Response

INITIAL CALIBRATION VERIFICATION

Instrument ID: R2.i
Lab File ID: rr2701.d
Analysis Type: WATER

Injection Date: 30-JUN-2005 01:43
Lab Sample ID: ICV030
Method File: /chem/R2.i/062905i.b/R2-20ml-h2o.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
85 1,2-Dichloroethene (total)	60.0000	59.2408	1.3	25.0
83 Xylene (total)	90.0000	85.4299	5.1	25.0
64 dichlorodifluoromethane	30.0000	30.2474	0.8	25.0
1 Chloromethane	30.0000	25.9361	13.5	25.0
4 Vinyl Chloride	30.0000	27.4527	8.5	25.0
2 Bromomethane	30.0000	28.7136	4.3	25.0
5 Chloroethane	30.0000	29.3436	2.2	25.0
11 Trichlorofluoromethane	30.0000	28.8795	3.7	25.0
7 Acetone	60.0000	56.3131	6.1	25.0
12 1,1-Dichloroethene	30.0000	30.0084	0.0	25.0
6 Methylene Chloride	30.0000	30.1735	0.6	25.0
0 trans-1,2-Dichloroethene	30.0000	30.7400	2.5	25.0
15 1,1-Dichloroethane	30.0000	30.2353	0.8	25.0
20 2-Butanone	60.0000	56.2048	6.3	25.0
0 cis-1,2-Dichloroethene	30.0000	28.5009	5.0	25.0
93 2,2-Dichloropropane	30.0000	27.4548	8.5	25.0
13 Bromochloromethane	30.0000	29.8251	0.6	25.0
17 Chloroform	30.0000	29.5228	1.6	25.0
22 1,1,1-Trichloroethane	30.0000	29.9087	0.3	25.0
94 1,1-Dichloropropene	30.0000	29.2025	2.7	25.0
23 Carbon Tetrachloride	30.0000	30.7504	2.5	25.0
16 1,2-Dichloroethane	30.0000	28.6923	4.4	25.0
30 Benzene	30.0000	29.4848	1.7	25.0
90 Fluorobenzene	10.0000	10.0000	0.0	25.0
29 Trichloroethene	30.0000	30.3806	1.3	25.0
26 1,2-Dichloropropane	30.0000	28.9052	3.6	25.0
34 Dibromomethane	30.0000	28.2338	5.9	25.0
25 Bromodichloromethane	30.0000	30.8518	2.8	25.0
28 cis-1,3-Dichloropropene	30.0000	28.1728	6.1	25.0
38 4-Methyl-2-pentanone	60.0000	50.9755	15.0	25.0
45 Toluene	30.0000	28.3396	5.5	25.0
31 trans-1,3-Dichloropropene	30.0000	28.3049	5.7	25.0
32 1,1,2-Trichloroethane	30.0000	25.9974	13.3	25.0
109 1,3-Dichloropropane	30.0000	27.3878	8.7	25.0
43 2-Hexanone	60.0000	54.7635	8.7	25.0
42 Tetrachloroethene	30.0000	28.2939	5.7	25.0
36 Dibromochloromethane	30.0000	28.3401	5.5	25.0
58 1,2-Dibromoethane	30.0000	27.6388	7.9	25.0
92 1-Chlorohexane	30.0000	23.8146	20.6	25.0

INITIAL CALIBRATION VERIFICATION

Instrument ID: R2.i
Lab File ID: rr2701.d
Analysis Type: WATER

Injection Date: 30-JUN-2005 01:43
Lab Sample ID: ICV030
Method File: /chem/R2.i/062905i.b/R2-20ml-h2o.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
39 Chlorobenzene-d5	10.0000	10.0000	0.0	25.0
46 Chlorobenzene	30.0000	28.8758	3.7	25.0
74 1,1,1,2-Tetrachloroethane	30.0000	26.2548	12.5	25.0
47 Ethylbenzene	30.0000	27.0235	9.9	25.0
0 m and p-Xylene	60.0000	59.6518	0.6	25.0
49 Styrene	30.0000	26.0017	13.3	25.0
0 o-Xylene	30.0000	25.7781	14.1	25.0
37 Bromoform	30.0000	28.6736	4.4	25.0
79 isopropyl benzene	30.0000	25.2420	15.9	25.0
40 1,1,2,2-Tetrachloroethane	30.0000	27.0555	9.8	25.0
50 1,2,3-Trichloropropane	30.0000	27.5937	8.0	25.0
95 Bromobenzene	30.0000	27.6058	8.0	25.0
96 n-Propylbenzene	30.0000	29.3936	2.0	25.0
97 2-Chlorotoluene	30.0000	29.5595	1.5	25.0
98 1,3,5-Trimethylbenzene	30.0000	27.1556	9.5	25.0
99 4-Chlorotoluene	30.0000	28.2961	5.7	25.0
100 tert-Butylbenzene	30.0000	27.7222	7.6	25.0
101 1,2,4-Trimethylbenzene	30.0000	28.2891	5.7	25.0
102 sec-Butylbenzene	30.0000	30.1784	0.6	25.0
103 4-Isopropyltoluene	30.0000	27.9839	6.7	25.0
61 m-Dichlorobenzene	30.0000	28.3826	5.4	25.0
91 1,4-Dichlorobenzene-d4	10.0000	10.0000	0.0	25.0
62 p-dichlorobenzene	30.0000	27.9036	7.0	25.0
104 n-Butylbenzene	30.0000	27.7428	7.5	25.0
63 o-Dichlorobenzene	30.0000	27.2120	9.3	25.0
75 1,2-Dibromo-3-chloropropane	30.0000	26.5552	11.5	25.0
105 1,2,4-Trichlorobenzene	30.0000	24.6808	17.7	25.0
106 Hexachlorobutadiene	30.0000	25.7512	14.2	25.0
107 Napthalene	30.0000	25.9832	13.4	25.0
108 1,2,3-Trichlorobenzene	30.0000	24.4406	18.5	25.0

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: R2.i
Lab File ID: rr2755.d
Analysis Type: WATER

Injection Date: 01-JUL-2005 08:56
Lab Sample ID: MAIN010
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D	
85 1,2-Dichloroethene (total)	20.0000	18.9122	5.4	50.0	
83 Xylene (total)	30.0000	29.6736	1.1	50.0	
64 dichlorodifluoromethane	10.0000	9.6926	3.1	50.0	
1 Chloromethane	10.0000	9.5648	4.4	50.0	
4 Vinyl Chloride	10.0000	9.2307	7.7	20.0	
2 Bromomethane	10.0000	9.9071	0.9	50.0	
5 Chloroethane	10.0000	9.9886	0.1	50.0	
11 Trichlorofluoromethane	10.0000	10.4085	4.1	50.0	
3 Ethanol	500.0000	409.6780	18.1	50.0	
8 Acrolein	100.0000	205.1528	105.2	50.0	<- NC
7 Acetone	40.0000	35.1687	12.1	50.0	
12 1,1-Dichloroethene	10.0000	9.4304	5.7	20.0	
21 Iodomethane	10.0000	9.4587	5.4	50.0	
68 Acetonitrile	100.0000	83.4155	16.6	50.0	
86 tert-Butyl alcohol	200.0000	175.7401	12.1	50.0	
6 Methylene Chloride	10.0000	8.9561	10.4	50.0	
9 Acrylonitrile	100.0000	85.6490	14.4	50.0	
0 trans-1,2-Dichloroethene	10.0000	9.5610	4.4	50.0	
84 Isopropyl ether	50.0000	46.7458	6.5	50.0	
15 1,1-Dichloroethane	10.0000	9.7404	2.6	50.0	
69 Chloroprene	10.0000	9.3151	6.8	50.0	
20 2-Butanone	40.0000	34.2028	14.5	50.0	
70 Propionitrile	100.0000	88.6355	11.4	50.0	
0 cis-1,2-Dichloroethene	10.0000	9.3512	6.5	50.0	
93 2,2-Dichloropropane	10.0000	9.6700	3.3	50.0	
72 Methacrylonitrile	100.0000	89.7280	10.3	50.0	
13 Bromochloromethane	10.0000	9.0726	9.3	50.0	
17 Chloroform	10.0000	8.8943	11.1	20.0	
22 1,1,1-Trichloroethane	10.0000	9.4216	5.8	50.0	
71 Isobutanol	200.0000	157.0974	21.5	50.0	
94 1,1-Dichloropropene	10.0000	9.6987	3.0	50.0	
23 Carbon Tetrachloride	10.0000	9.9281	0.7	50.0	
16 1,2-Dichloroethane	10.0000	9.1849	8.2	50.0	
30 Benzene	10.0000	9.4154	5.8	50.0	
88 n-Butanol	200.0000	160.7165	19.6	50.0	
29 Trichloroethene	10.0000	9.8184	1.8	50.0	
26 1,2-Dichloropropane	10.0000	9.5262	4.7	20.0	
57 1,4-Dioxane	500.0000	443.9770	11.2	50.0	
34 Dibromomethane	10.0000	8.6457	13.5	50.0	

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: R2.i
Lab File ID: rr2755.d
Analysis Type: WATER

Injection Date: 01-JUL-2005 08:56
Lab Sample ID: MAIN010
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
25 Bromodichloromethane	10.0000	9.0291	9.7	50.0
28 cis-1,3-Dichloropropene	10.0000	8.5367	14.6	50.0
38 4-Methyl-2-pentanone	40.0000	34.6414	13.4	50.0
45 Toluene	10.0000	9.6961	3.0	20.0
31 trans-1,3-Dichloropropene	10.0000	9.0844	9.2	50.0
32 1,1,2-Trichloroethane	10.0000	8.9689	10.3	50.0
109 1,3-Dichloropropane	10.0000	8.9590	10.4	50.0
43 2-Hexanone	40.0000	35.1845	12.0	50.0
42 Tetrachloroethene	10.0000	9.6219	3.8	50.0
36 Dibromochloromethane	10.0000	9.2403	7.6	50.0
58 1,2-Dibromoethane	10.0000	9.3455	6.5	50.0
92 1-Chlorohexane	10.0000	9.7033	3.0	50.0
46 Chlorobenzene	10.0000	9.5722	4.3	50.0
74 1,1,1,2-Tetrachloroethane	10.0000	8.8029	12.0	50.0
47 Ethylbenzene	10.0000	9.3882	6.1	20.0
0 m and p-Xylene	20.0000	20.0346	0.2	50.0
49 Styrene	10.0000	9.6401	3.6	50.0
0 o-Xylene	10.0000	9.6390	3.6	50.0
37 Bromoform	10.0000	8.7230	12.8	50.0
79 isopropyl benzene	10.0000	9.6461	3.5	50.0
76 Cyclohexanone	400.0000	342.2525	14.4	50.0
40 1,1,2,2-Tetrachloroethane	10.0000	9.1977	8.0	50.0
50 1,2,3-Trichloropropane	10.0000	9.0024	10.0	50.0
95 Bromobenzene	10.0000	8.9008	11.0	50.0
96 n-Propylbenzene	10.0000	9.7851	2.1	50.0
97 2-Chlorotoluene	10.0000	9.7124	2.9	50.0
98 1,3,5-Trimethylbenzene	10.0000	9.6027	4.0	50.0
99 4-Chlorotoluene	10.0000	9.9344	0.7	50.0
100 tert-Butylbenzene	10.0000	8.9250	10.8	50.0
101 1,2,4-Trimethylbenzene	10.0000	9.6801	3.2	50.0
102 sec-Butylbenzene	10.0000	9.9047	1.0	50.0
103 4-Isopropyltoluene	10.0000	9.8328	1.7	50.0
61 m-Dichlorobenzene	10.0000	8.9308	10.7	50.0
62 p-dichlorobenzene	10.0000	9.6833	3.2	50.0
104 n-Butylbenzene	10.0000	10.2068	2.1	50.0
63 o-Dichlorobenzene	10.0000	9.0566	9.4	50.0
75 1,2-Dibromo-3-chloropropane	10.0000	8.4417	15.6	50.0
105 1,2,4-Trichlorobenzene	10.0000	9.4661	5.3	50.0
106 Hexachlorobutadiene	10.0000	10.4824	4.8	50.0

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: R2.i
Lab File ID: rr2755.d
Analysis Type: WATER

Injection Date: 01-JUL-2005 08:56
Lab Sample ID: MAIN010
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
107 Napthalene	10.0000	9.3141	6.9	50.0
108 1,2,3-Trichlorobenzene	10.0000	9.5246	4.8	50.0

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: R2.i
Lab File ID: rr2755.d
Analysis Type: WATER
Lab Sample ID: MAIN010
Quant Type: ISTD

Injection Date: 01-JUL-2005 08:56
Init. Calibration Date(s): 06/29/5 06/30/5
Init. Calibration Times: 21:50 01:24
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

	COMPOUND	RRF	RF10	MIN RRF	%D	MAX %D
M	1 1,2-Dichloroethene (total)	0.203	0.192	0.010	5.4	50.0
M	2 Xylene (total)	3.774	3.735	0.010	1.0	50.0
	3 dichlorodifluoromethane	0.440	0.427	0.010	3.1	50.0
	5 Chloromethane	0.364	0.348	0.100	4.4	50.0
	6 Vinyl Chloride	0.331	0.305	0.020	7.7	20.0
	8 Bromomethane	0.203	0.201	0.010	0.9	50.0
	9 Chloroethane	0.122	0.122	0.010	0.1	50.0
	11 Trichlorofluoromethane	0.464	0.483	0.010	-4.1	50.0
	12 Ethanol	0.001	0.001	0.000	N/A	N/A
	16 Acrolein	387.692	0.005	0.001	N/A	N/A
	19 1,1-Dichloroethene	0.197	0.186	0.020	5.7	20.0
	18 Acetone	0.030	0.026	0.001	12.1	50.0
	21 Iodomethane	0.448	0.424	0.010	5.4	50.0
	22 Acetonitrile	0.009	0.008	0.000	16.6	50.0
	27 Methylene Chloride	0.174	0.176	0.010	N/A	N/A
	26 tert-Butyl alcohol	0.007	0.006	0.000	12.1	50.0
	28 Acrylonitrile	0.023	0.019	0.001	14.4	50.0
	30 trans-1,2-Dichloroethene	0.208	0.199	0.010	4.4	50.0
	34 1,1-Dichloroethane	0.501	0.488	0.100	2.6	50.0
	33 Isopropyl ether	0.087	0.082	0.010	6.5	50.0
	35 Chloroprene	0.416	0.388	0.010	6.8	50.0
	40 cis-1,2-Dichloroethene	0.199	0.186	0.010	6.5	50.0
	37 2-Butanone	0.042	0.036	0.010	14.5	50.0
	41 2,2-Dichloropropane	0.379	0.367	0.010	3.3	50.0
	39 Propionitrile	0.008	0.007	0.001	11.4	50.0
	42 Methacrylonitrile	0.063	0.057	0.010	10.3	50.0
	43 Bromochloromethane	0.079	0.071	0.010	9.3	50.0
	44 Chloroform	0.526	0.468	0.020	11.1	20.0
	47 1,1,1-Trichloroethane	0.423	0.399	0.010	5.8	50.0
	50 1,1-Dichloropropene	0.395	0.383	0.010	3.0	50.0
	51 Carbon Tetrachloride	0.421	0.418	0.010	0.7	50.0
	48 Isobutanol	0.003	0.002	0.000	21.5	50.0
	54 Benzene	0.759	0.715	0.010	5.8	50.0
	53 1,2-Dichloroethane	0.319	0.293	0.010	8.2	50.0
	57 n-Butanol	0.002	0.001	0.000	19.6	50.0

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: R2.i
Lab File ID: rr2755.d
Analysis Type: WATER
Lab Sample ID: MAIN010
Quant Type: ISTD

Injection Date: 01-JUL-2005 08:56
Init. Calibration Date(s): 06/29/5 06/30/5
Init. Calibration Times: 21:50 01:24
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	RRF	RF10	MIN RRF	%D	MAX %D
58 Trichloroethene	0.199	0.196	0.010	1.8	50.0
61 1,2-Dichloropropane	0.200	0.190	0.020	4.7	20.0
64 Dibromomethane	0.114	0.099	0.010	13.5	50.0
63 1,4-Dioxane	0.000	0.000	0.000	11.2	50.0
65 Bromodichloromethane	0.318	0.287	0.010	9.7	50.0
68 cis-1,3-Dichloropropene	1.536	1.311	0.010	14.6	50.0
69 4-Methyl-2-pentanone	0.511	0.442	0.010	13.4	50.0
71 Toluene	3.714	3.601	0.020	3.0	20.0
72 trans-1,3-Dichloropropene	1.231	1.118	0.010	9.2	50.0
74 1,1,2-Trichloroethane	0.464	0.416	0.010	10.3	50.0
76 1,3-Dichloropropane	0.827	0.741	0.010	10.4	50.0
77 Tetrachloroethene	0.899	0.865	0.010	3.8	50.0
75 2-Hexanone	0.336	0.295	0.010	12.0	50.0
78 Dibromochloromethane	0.925	0.854	0.010	7.6	50.0
80 1,2-Dibromoethane	0.555	0.519	0.010	6.5	50.0
81 1-Chlorohexane	1.469	1.425	0.010	3.0	50.0
83 Chlorobenzene	2.084	1.995	0.300	4.3	50.0
84 1,1,1,2-Tetrachloroethane	0.930	0.819	0.010	12.0	50.0
85 Ethylbenzene	1.026	0.964	0.020	6.1	20.0
86 m and p-Xylene	1.278	1.280	0.010	-0.2	50.0
87 o-Xylene	1.218	1.174	0.010	3.6	50.0
88 Styrene	1.928	1.859	0.010	3.6	50.0
89 Bromoform	0.428	0.374	0.101	12.8	50.0
90 isopropyl benzene	3.750	3.617	0.010	3.5	50.0
92 Cyclohexanone	0.014	0.012	0.001	14.4	50.0
94 1,1,2,2-Tetrachloroethane	0.522	0.480	0.300	8.0	50.0
97 Bromobenzene	0.654	0.582	0.010	11.0	50.0
96 1,2,3-Trichloropropane	0.062	0.055	0.010	N/A	N/A
98 n-Propylbenzene	0.593	0.581	0.010	2.1	50.0
99 2-Chlorotoluene	0.612	0.594	0.010	2.9	50.0
100 1,3,5-Trimethylbenzene	2.168	2.082	0.010	4.0	50.0
101 4-Chlorotoluene	0.606	0.602	0.010	0.7	50.0
102 tert-Butylbenzene	1.899	1.695	0.010	10.8	50.0
103 1,2,4-Trimethylbenzene	2.110	2.043	0.010	3.2	50.0
104 sec-Butylbenzene	0.350	0.346	0.010	1.0	50.0

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: R2.i
Lab File ID: rr2755.d
Analysis Type: WATER
Lab Sample ID: MAIN010
Quant Type: ISTD

Injection Date: 01-JUL-2005 08:56
Init. Calibration Date(s): 06/29/5 06/30/5
Init. Calibration Times: 21:50 01:24
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	RRF	RF10	MIN RRF	%D	MAX %D
106 m-Dichlorobenzene	1.204	1.075	0.010	10.7	50.0
105 4-Isopropyltoluene	2.314	2.275	0.010	1.7	50.0
108 p-dichlorobenzene	1.118	1.083	0.010	3.2	50.0
110 n-Butylbenzene	2.840	2.899	0.010	-2.1	50.0
111 o-Dichlorobenzene	0.957	0.867	0.010	9.4	50.0
112 1,2-Dibromo-3-chloropropane	0.049	0.041	0.010	15.6	50.0
113 1,2,4-Trichlorobenzene	0.501	0.474	0.010	5.3	50.0
114 Hexachlorobutadiene	0.460	0.482	0.010	-4.8	50.0
115 Napthalene	0.581	0.541	0.010	6.9	50.0
116 1,2,3-Trichlorobenzene	0.375	0.358	0.010	4.8	50.0

Data File: /chem/R2.i/070105.b/rr2754.d
Report Date: 07/01/2005

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: R2.i
Lab File ID: rr2754.d
Analysis Type: WATER

Injection Date: 01-JUL-2005 08:36
Lab Sample ID: SUPP010
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D	
122 dichlorotetrafluoroethane	10.0000	9.8358	1.6	50.0	
110 Ethylene Oxide	1250.0000	1300.0314	4.0	50.0	
87 Dichlorofluoromethane	10.0000	11.2312	12.3	50.0	
129 1,2-dichloro-1,1,2-trifluoroeth	10.0000	10.1806	1.8	50.0	
77 Ethyl Ether	10.0000	8.6944	13.1	50.0	
130 2,2-dichloro-1,1,1-trifluoroeth	10.0000	9.9954	0.0	50.0	
65 Trichlorotrifluoroethane	10.0000	10.3607	3.6	50.0	
131 2-Propanol	200.0000	164.4423	17.8	50.0	
124 Methyl acetate	50.0000	44.6584	10.7	50.0	
10 Carbon Disulfide	10.0000	9.8177	1.8	50.0	
67 Allyl Chloride	10.0000	9.9620	0.4	50.0	
53 Methyl t-butyl ether	10.0000	9.5231	4.8	50.0	
54 Hexane	10.0000	9.8917	1.1	50.0	
24 Vinyl acetate	20.0000	20.1149	0.6	50.0	
125 ETBE	50.0000	44.6635	10.7	50.0	
78 Ethyl Acetate	20.0000	17.9713	10.1	50.0	
56 Tetrahydrofuran	20.0000	17.3908	13.0	50.0	
89 Dibromofluoromethane	10.0000	14.7875	47.9	50.0	
115 Cyclohexane	10.0000	9.3509	6.5	50.0	
303 1,2-Dichloroethane-d4	10.0000	13.8480	38.5	50.0	
126 TAME	50.0000	43.6414	12.7	50.0	
116 2-Pentanone	40.0000	34.8657	12.8	50.0	
73 Methyl Methacrylate	20.0000	17.4617	12.7	50.0	
127 Methyl cyclohexane	10.0000	9.4477	5.5	50.0	
82 2-nitropropane	10.0000	8.1134	18.9	50.0	
35 2-Chloroethyl vinyl ether	10.0000	9.1832	8.2	50.0	
301 Toluene-d8	10.0000	15.0928	50.9	50.0	<-
41 Ethyl methacrylate	20.0000	16.2946	18.5	50.0	
128 Tetrahydrothiophene	10.0000	8.8642	11.4	50.0	
117 c-1,4-Dichloro-2-butene	10.0000	8.9080	10.9	50.0	
302 Bromofluorobenzene	10.0000	14.4529	44.5	50.0	
60 t-1,4-Dichloro-2-butene	10.0000	10.9061	9.1	50.0	
123 1,2,3-Trimethylbenzene	10.0000	10.3922	3.9	50.0	

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: R2.i
Lab File ID: rr2754.d
Analysis Type: WATER
Lab Sample ID: SUPP010
Quant Type: ISTD

Injection Date: 01-JUL-2005 08:36
Init. Calibration Date(s): 06/29/5 06/30/5
Init. Calibration Times: 21:50 01:24
Method File: /chem/R2.i/070105.b/R2-20ml-h2o.m

COMPOUND	RRF	RF10	MIN RRF	%D	MAX %D	
$ 46 Dibromofluoromethane	0.279	0.413	0.010	-47.9	50.0	
$ 52 1,2-Dichloroethane-d4	0.276	0.382	0.010	-38.5	50.0	
$ 70 Toluene-d8	3.075	4.641	0.010	-50.9	50.0	<-
$ 93 Bromofluorobenzene	1.158	1.674	0.010	-44.5	50.0	
4 dichlorotetrafluoroethane	0.207	0.204	0.010	1.6	50.0	
7 Ethylene Oxide	0.003	0.003	0.001	-4.0	50.0	
10 Dichlorofluoromethane	0.574	0.644	0.010	-12.3	50.0	
13 1,2-dichloro-1,1,2-trifluor	0.197	0.200	0.010	-1.8	50.0	
14 Ethyl Ether	0.093	0.081	0.010	13.1	50.0	
15 2,2-dichloro-1,1,1-trifluor	0.374	0.374	0.010	0.0	50.0	
17 Trichlorotrifluoroethane	0.178	0.184	0.010	-3.6	50.0	
20 2-Propanol	0.006	0.005	0.001	N/A	N/A	
23 Methyl acetate	0.069	0.062	0.010	10.7	50.0	
24 Carbon Disulfide	0.937	0.920	0.010	1.8	50.0	
25 Allyl Chloride	0.439	0.438	0.010	0.4	50.0	
29 Methyl t-butyl ether	0.311	0.296	0.010	4.8	50.0	
31 Hexane	0.327	0.324	0.010	1.1	50.0	
32 Vinyl acetate	0.251	0.264	0.010	N/A	N/A	
36 ETBE	0.544	0.486	0.010	10.7	50.0	
38 Ethyl Acetate	0.094	0.084	0.010	10.1	50.0	
45 Tetrahydrofuran	0.019	0.016	0.003	13.0	50.0	
49 Cyclohexane	0.369	0.345	0.010	6.5	50.0	
55 TAME	0.343	0.299	0.010	12.7	50.0	
59 2-Pentanone	0.067	0.059	0.001	12.8	50.0	
60 Methyl Methacrylate	0.011	0.010	0.008	12.7	50.0	
62 Methyl cyclohexane	0.383	0.362	0.010	5.5	50.0	
66 2-nitropropane	0.187	0.151	0.010	18.9	50.0	
67 2-Chloroethyl vinyl ether	0.222	0.132	0.001	N/A	N/A	
73 Ethyl methacrylate	0.526	0.428	0.010	18.5	50.0	
79 Tetrahydrothiophene	0.064	0.057	0.010	11.4	50.0	
91 c-1,4-Dichloro-2-butene	0.125	0.112	0.010	10.9	50.0	
95 t-1,4-Dichloro-2-butene	0.089	0.097	0.010	-9.1	50.0	
109 1,2,3-Trimethylbenzene	1.862	1.935	0.010	-3.9	50.0	

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5186179 SAS No.: 8260B SDG No.: D5F250124

Lab File ID (Standard): RR2754 Date Analyzed: 07/01/05

Instrument ID: R2 Time Analyzed: 0836

GC Column: HP624 ID: 0.32 (mm) Heated Purge: (Y/N) N

		IS1(CBZ) AREA #	RT #	IS2 AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	177168	8.76	964832	6.07	215905	10.95
	UPPER LIMIT	354336	9.26	1929664	6.57	431810	11.45
	LOWER LIMIT	88584	8.26	482416	5.57	107952	10.45
	EPA SAMPLE NO.						
01	LCS	174184	8.76	989906	6.07	247626	10.95
02	VBLK	185406	8.76	998430	6.07	242295	10.94
03	TB-062405	179256	8.77	1047180	6.07	232293	10.94
04	FB-062405	185191	8.76	1061871	6.07	252605	10.95
05	BH-9E-1216	189824	8.76	1017093	6.07	234838	10.95
06	BH-E-1216	196403	8.76	1100594	6.07	268168	10.95
07	BH-E-1216	206180	8.77	1195961	6.07	272876	10.94
08	BH-E-1216	200189	8.76	1190289	6.08	268852	10.95
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (CBZ) = Chlorobenzene-d5
IS2 = Fluorobenzene
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5186179 SAS No.: 8260B SDG No.: D5F250124

Lab File ID (Standard): RR2698 Date Analyzed: 06/30/05

Instrument ID: R2 Time Analyzed: 0045

GC Column: HP624 ID: 0.32 (mm) Heated Purge: (Y/N) N

		IS1(CBZ) AREA #	RT #	IS2 AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	175964	8.75	1050691	6.07	234441	10.94
	UPPER LIMIT	351928	9.25	2101382	6.57	468882	11.44
	LOWER LIMIT	87982	8.25	525346	5.57	117220	10.44
	EPA SAMPLE NO.						
01	ICV030	211908	8.76	1104328	6.06	279911	10.94
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (CBZ) = Chlorobenzene-d5
IS2 = Fluorobenzene
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

Volatile GC/MS

CLP-Like Forms

Lot ID: D5F250124

Client: Ashland Chemical Company

Method: SW846 8260B

Associated Samples: 005, 006, 009 through 013

Batch: 5181482

SEVERN TRENT STL

Ashland Chemical Company

Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-B-0102
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-005
Matrix:	SOLID	**Lab WorkOrder:**	HED691AC
% Moisture:	13	**Date/Time Collected:**	06/24/05 10:10
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 18:12
Sample Aliquot:	6.06 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	**0.20**	0.20	5.8	J

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	118	32	133	
2037-26-5	Toluene-d8	97	25	145	
1868-53-7	Dibromofluoromethane	104	43	131	
460-00-4	4-Bromofluorobenzene	89	29	148	

U Result is less than the method detection limit (MDL).

J Estimated result. Result is less than RL.

SEVERN TRENT STL

Ashland Chemical Company

Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-B-0506
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-006
Matrix:	SOLID	**Lab WorkOrder:**	HED7A1AC
% Moisture:	18	**Date/Time Collected:**	06/24/05 10:18
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 18:33
Sample Aliquot:	6.2 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	0.21	0.21	6.1	U

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	110	32	133	
2037-26-5	Toluene-d8	98	25	145	
1868-53-7	Dibromofluoromethane	99	43	131	
460-00-4	4-Bromofluorobenzene	93	29	148	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company
Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-A-0102
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-009
Matrix:	SOLID	**Lab WorkOrder:**	HED7F1AC
% Moisture:	12	**Date/Time Collected:**	06/24/05 11:36
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 18:54
Sample Aliquot:	6.42 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	**0.28**	0.19	5.7	J

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	112	32	133	
2037-26-5	Toluene-d8	95	25	145	
1868-53-7	Dibromofluoromethane	101	43	131	
460-00-4	4-Bromofluorobenzene	86	29	148	

U Result is less than the method detection limit (MDL).

J Estimated result. Result is less than RL.

SEVERN TRENT STL

Ashland Chemical Company

Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-A-0506
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-010
Matrix:	SOLID	**Lab WorkOrder:**	HED7H1AC
% Moisture:	14	**Date/Time Collected:**	06/24/05 11:40
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 19:16
Sample Aliquot:	6.09 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	0.20	0.20	5.8	U

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	119	32	133	
2037-26-5	Toluene-d8	89	25	145	
1868-53-7	Dibromofluoromethane	100	43	131	
460-00-4	4-Bromofluorobenzene	86	29	148	

U Result is less than the method detection limit (MDL).

STL

Ashland Chemical Company
Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-9A-0506
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-011
Matrix:	SOLID	**Lab WorkOrder:**	HED7K1AC
% Moisture:	14	**Date/Time Collected:**	06/24/05 12:00
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 19:37
Sample Aliquot:	5.96 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	0.20	0.20	5.8	U

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	119	32	133	
2037-26-5	Toluene-d8	97	25	145	
1868-53-7	Dibromofluoromethane	104	43	131	
460-00-4	4-Bromofluorobenzene	93	29	148	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company
Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	AC-BH002-0405
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-012
Matrix:	SOLID	**Lab WorkOrder:**	HED7M1AC
% Moisture:	17	**Date/Time Collected:**	06/24/05 12:36
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 19:58
Sample Aliquot:	5.97 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	0.21	0.21	6.0	U

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	108	32	133	
2037-26-5	Toluene-d8	95	25	145	
1868-53-7	Dibromofluoromethane	95	43	131	
460-00-4	4-Bromofluorobenzene	95	29	148	

U Result is less than the method detection limit (MDL).

Form 1 Analysis Data Sheet Equivalent

SEVERN TRENT STL

Ashland Chemical Company

Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	AC-BH002-0708
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-013
Matrix:	SOLID	**Lab WorkOrder:**	HED7P1AC
% Moisture:	19	**Date/Time Collected:**	06/24/05 12:40
Basis:	Dry	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 20:19
Sample Aliquot:	6.23 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	0.21	0.21	6.1	U

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	106	32	133	
2037-26-5	Toluene-d8	96	25	145	
1868-53-7	Dibromofluoromethane	99	43	131	
460-00-4	4-Bromofluorobenzene	96	29	148	

U Result is less than the method detection limit (MDL).

SW846 8260B SURROGATE RECOVERY

Lab Name: Severn Trent Laboratories, Inc. Client: Ashland Chemical Company

Lab Code: STLDEN SDG No:

Lot #: D5F250124

Extraction: XXA4BQK01

	CLIENT ID.	SRG01	SRG02	SRG03	SRG04	TOT OUT
01	BH-D-1112	108	102	98	110	00
02	BH-C-1112	102	93	92	109	00
03	METHOD BLK. HEX3M1AA	98	90	85	92	00
04	LCS HEX3M1AC	119	112	106	117	00
05	LCSD HEX3M1AD	109	101	104	111	00

SURROGATES		QC LIMITS
SRG01	= Dibromofluoromethane	(71-126)
SRG02	= 1,2-Dichloroethane-d4	(61-129)
SRG03	= Toluene-d8	(68-128)
SRG04	= 4-Bromofluorobenzene	(80-128)

\# Column to be used to flag recovery values
* Values outside of required QC Limits
D System monitoring Compound diluted out

FORM II

SW846 8260B SURROGATE RECOVERY

Lab Name: Severn Trent Laboratories, Inc. Client: Ashland Chemical Company

Lab Code: STLDEN SDG No:

Lot #: D5F250124

Extraction: XXA4DQK01

	CLIENT ID.	SRG01	SRG02	SRG03	SRG04	TOT OUT
01	BH-B-0102	104	118	97	89	00
02	BH-B-0506	99	110	98	93	00
03	BH-A-0102	101	112	95	86	00
04	BH-A-0506	100	119	89	86	00
05	BH-9A-0506	104	119	97	93	00
06	AC-BH002-0405	95	108	95	95	00
07	AC-BH002-0708	99	106	96	96	00
08	METHOD BLK. HEP4F1AA	104	111	102	88	00
09	LCS HEP4F1AC	99	107	100	91	00
10	LCSD HEP4F1AD	100	103	97	86	00

SURROGATES		QC LIMITS
SRG01	= Dibromofluoromethane	(71-126)
SRG02	= 1,2-Dichloroethane-d4	(61-129)
SRG03	= Toluene-d8	(68-128)
SRG04	= 4-Bromofluorobenzene	(80-128)

\# Column to be used to flag recovery values
* Values outside of required QC Limits
D System monitoring Compound diluted out

FORM II

SW846 8260B SURROGATE RECOVERY

Lab Name: Severn Trent Laboratories, Inc. Client: Ashland Chemical Company

Lab Code: STLDEN SDG No:

Lot #: D5F250124

Extraction: XXI25QK01

	CLIENT ID.	SRG01	SRG02	SRG03	SRG04	TOT OUT
01	TB-062405	93	88	100	89	00
02	FB-062405	90	90	94	93	00
03	BH-9E-1216	100	88	94	92	00
04	BH-E-1216	96	88	105	100	00
05	METHOD BLK. HEV4K1AA	100	90	103	92	00
06	LCS HEV4K1AC	100	97	111	102	00
07	BH-E-1216 D	92	85	100	96	00
08	BH-E-1216 S	93	89	105	96	00

SURROGATES		QC LIMITS
SRG01	= Dibromofluoromethane	(73-118)
SRG02	= 1,2-Dichloroethane-d4	(62-128)
SRG03	= Toluene-d8	(77-117)
SRG04	= 4-Bromofluorobenzene	(78-118)

\# Column to be used to flag recovery values
* Values outside of required QC Limits
D System monitoring Compound diluted out

FORM II

SEVERN TRENT STL

Ashland Chemical Company

Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F300000-482C
Matrix:	SOLID	**Lab WorkOrder:**	HEP4F1AC
% Moisture:	0.0	**Date/Time Collected:**	
Basis:	Wet	**Date/Time Received:**	
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 09:46
Sample Aliquot:	5 g	**Instrument ID:**	G
Dilution Factor:	1		

Analyte	True	Found	%Rec	Q	Limits
Benzene	50.0	51.5	103		78 - 130
Toluene	50.0	51.2	102		76 - 126
Trichloroethene	50.0	50.5	101		80 - 127
Chlorobenzene	50.0	52.3	105		79 - 120
1,1-Dichloroethene	50.0	47.9	96		54 - 124

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	107	61	129	
2037-26-5	Toluene-d8	100	68	128	
1868-53-7	Dibromofluoromethane	99	71	126	
460-00-4	4-Bromofluorobenzene	91	80	128	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company
Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F300000-482L
Matrix:	SOLID	**Lab WorkOrder:**	HEP4F1AD
% Moisture:	0.0	**Date/Time Collected:**	
Basis:	Wet	**Date/Time Received:**	
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 16:26
Sample Aliquot:	5 g	**Instrument ID:**	G
Dilution Factor:	1		

Analyte	True	Found	C	% Rec	Q	RPD	Q	QC Limits	
								% Rec	RPD
Benzene	50.0	45.3		91		13		78 - 130	20
Toluene	50.0	49.9		100		2.7		76 - 126	20
Trichloroethene	50.0	45.9		92		9.4		80 - 127	20
Chlorobenzene	50.0	50.3		101		4.0		79 - 120	20
1,1-Dichloroethene	50.0	40.8		82		16		54 - 124	22

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	103	61	129	
2037-26-5	Toluene-d8	97	68	128	
1868-53-7	Dibromofluoromethane	100	71	126	
460-00-4	4-Bromofluorobenzene	86	80	128	

U Result is less than the method detection limit (MDL).

Form 3 LCSD Analysis Data Sheet Equivalent

SEVERN TRENT STL

Ashland Chemical Company

Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F300000-482B
Matrix:	SOLID	**Lab WorkOrder:**	HEP4F1AA
% Moisture:		**Date/Time Collected:**	
Basis:	Wet	**Date/Time Received:**	
Analysis Method:	8260B	**Date/Time Leached:**	
Unit:	ug/kg	**Date/Time Extracted:**	06/25/05 10:00
QC Batch ID:	5181482	**Date/Time Analyzed:**	06/29/05 17:51
Sample Aliquot:	5 g	**Instrument ID:**	G
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
127-18-4	Tetrachloroethene	0.17	0.17	5.0	U

CAS No.	Surrogate	% Rec	Lower Limit	Upper Limit	Q
17060-07-0	1,2-Dichloroethane-d4	111	32	133	
2037-26-5	Toluene-d8	102	25	145	
1868-53-7	Dibromofluoromethane	104	43	131	
460-00-4	4-Bromofluorobenzene	88	29	148	

U Result is less than the method detection limit (MDL).

BLANK WORKORDER NO.

HEP4F1AA

SW846 8260B METHOD BLANK SUMMARY

Lab Name: Severn Trent Laboratories, Inc.

Lab Code: STLDEN

SDG Number:

Lab File ID: G3292.D

Lot Number: D5F250124

Date Analyzed: 06/29/05

Time Analyzed: 17:51

Matrix: SOLID

Date Extracted:06/25/05

GC Column: DB-624 ID: .32

Extraction Method: 5035

Instrument ID: G

Level:(low/med) LOW

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS, LCSD, MS , MSD:

	CLIENT ID.	SAMPLE WORK ORDER #	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	BH-B-0102	HED691AC	G3293.D	06/29/05	18:12
02	BH-B-0506	HED7A1AC	G3294.D	06/29/05	18:33
03	BH-A-0102	HED7F1AC	G3295.D	06/29/05	18:54
04	BH-A-0506	HED7H1AC	G3296.D	06/29/05	19:16
05	BH-9A-0506	HED7K1AC	G3297.D	06/29/05	19:37
06	AC-BH002-0405	HED7M1AC	G3298.D	06/29/05	19:58
07	AC-BH002-0708	HED7P1AC	G3299.D	06/29/05	20:19
08	CHECK SAMPLE	HEP4F1AC C	G3270.D	06/29/05	09:46
09	DUPLICATE CHECK	HEP4F1AD L	G3288.D	06/29/05	16:26
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

COMMENTS:

FORM IV

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5181482 SAS No.: 8260B SDG No.: D5F250124

Lab File ID: G2695 BFB Injection Date: 06/09/05

Instrument ID: G BFB Injection Time: 1413

GC Column: HP624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15.0 - 40.0% of mass 95	19.1	
75	30.0 - 60.0% of mass 95	45.7	
95	Base Peak, 100% relative abundance	100.0	
96	5.0 - 9.0% of mass 95	6.6	
173	Less than 2.0% of mass 174	0.0	(0.0)1
174	50.0 - 100.0% of mass 95	80.6	
175	5.0 - 9.0% of mass 174	6.9	(8.6)1
176	95.0 - 101.0% of mass 174	76.9	(95.4)1
177	5.0 - 9.0% of mass 176	6.5	(8.5)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SUPP005	SUPP005	G2703	06/09/05	1652
02	SUPP010	SUPP010	G2704	06/09/05	1713
03	SUPP020	SUPP020	G2705	06/09/05	1734
04	SUPP050	SUPP050	G2706	06/09/05	1755
05	SUPP100	SUPP100	G2707	06/09/05	1817
06	SUPP200	SUPP200	G2708	06/09/05	1838
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5181482 SAS No.: 8260B SDG No.: D5F250124

Lab File ID: G3230 BFB Injection Date: 06/28/05

Instrument ID: G BFB Injection Time: 1413

GC Column: HP624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	20.9
75	30.0 - 60.0% of mass 95	47.6
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	7.3
173	Less than 2.0% of mass 174	0.6 (0.8)1
174	50.0 - 100.0% of mass 95	77.4
175	5.0 - 9.0% of mass 174	6.3 (8.1)1
176	95.0 - 101.0% of mass 174	75.0 (96.8)1
177	5.0 - 9.0% of mass 176	4.7 (6.3)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	MAIN005	MAIN005	G3232	06/28/05	1448
02	MAIN010	MAIN010	G3233	06/28/05	1510
03	MAIN020	MAIN020	G3234	06/28/05	1531
04	MAIN050	MAIN050	G3235	06/28/05	1552
05	MAIN100	MAIN100	G3236	06/28/05	1614
06	MAIN200	MAIN200	G3237	06/28/05	1635
07	ICV	MAIN050	G3239I	06/28/05	1718
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5181482 SAS No.: 8260B SDG No.: D5F250124

Lab File ID: G3267 BFB Injection Date: 06/29/05

Instrument ID: G BFB Injection Time: 0829

GC Column: HP624 ID: 0.32 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15.0 - 40.0% of mass 95	25.3	
75	30.0 - 60.0% of mass 95	46.8	
95	Base Peak, 100% relative abundance	100.0	
96	5.0 - 9.0% of mass 95	8.9	
173	Less than 2.0% of mass 174	0.0	(0.0)1
174	50.0 - 100.0% of mass 95	62.3	
175	5.0 - 9.0% of mass 174	4.4	(7.1)1
176	95.0 - 101.0% of mass 174	62.9	(100.9)1
177	5.0 - 9.0% of mass 176	4.1	(6.5)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	MAIN050	MAIN050	G3268	06/29/05	0845
02	SUPP050	SUPP050	G3269	06/29/05	0925
03	LCS	LCS	G3270	06/29/05	0946
04	LCSD	LCSD	G3288	06/29/05	1626
05	PBLK	PBLK	G3292	06/29/05	1751
06	BH-B-1112	HED691AC	G3293	06/29/05	1812
07	BH-B-0506	HED7A1AC	G3294	06/29/05	1833
08	BH-A-0102	HED7F1AC	G3295	06/29/05	1854
09	BH-A-0506	HED7H1AC	G3296	06/29/05	1916
10	BH-9A-0506	HED7K1AC	G3297	06/29/05	1937
11	AC-BH002-040	HED7M1AC	G3298	06/29/05	1958
12	AC-BH002-070	HED7P1AC	G3299	06/29/05	2019
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

Report Date : 30-Jun-2005 17:02

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Calibration File Names:
Level 1: /chem/G.i/060905i.b/g2703.d
Level 2: /chem/G.i/060905i.b/g2704.d
Level 3: /chem/G.i/060905i.b/g2705.d
Level 4: /chem/G.i/060905i.b/g2706.d
Level 5: /chem/G.i/060905i.b/g2707.d
Level 6: /chem/G.i/060905i.b/g2708.d

	Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
M	1 1,2-Dichloroethene (total)	0.52565	0.44146	0.50106	0.45816	0.44801	0.43373	AVRG		0.46801		7.87543
M	2 Xylene (total)	4.46447	4.32176	4.29873	4.26125	4.26512	4.17815	AVRG		4.29825		2.20893
	3 dichlorodifluoromethane	0.50943	0.42973	0.44582	0.40101	0.39785	0.38208	AVRG		0.42765		10.81535
	4 Dichlorotetrafluoroethane	0.39439	0.33816	0.32625	0.33209	0.32842	0.28641	AVRG		0.33429		10.38245
	5 Chloromethane	0.91771	0.75555	0.77239	0.69053	0.67253	0.64644	AVRG		0.74252		13.27581
	6 Vinyl Chloride	0.82354	0.70430	0.72240	0.67311	0.64177	0.61397	AVRG		0.69651		10.59414
	7 Ethylene Oxide	0.02259	0.02022	0.02152	0.02245	0.02338	0.01960	AVRG		0.02163		6.79391
	8 Bromomethane	0.48934	0.40888	0.41644	0.39801	0.41372	0.46780	AVRG		0.43236		8.55145
	9 Chloroethane	0.39520	0.33240	0.34547	0.31242	0.30899	0.31481	AVRG		0.33488		9.75372

97

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
10 Dichlorofluoromethane	1.26789	1.11374	1.13231	1.17820	1.21448	1.08909	AVRG		1.16595		5.77397
11 Trichlorofluoromethane	0.69484	0.62507	0.64116	0.58377	0.56618	0.56836	AVRG		0.61323		8.21093
12 Ethanol	+++++	0.00674	0.00855	0.00810	0.00820	0.00927	AVRG		0.00817		11.27268
126 1,2-dichloro-1,1,2-trifluoroe	0.61601	0.54825	0.57251	0.57422	0.56990	0.50672	AVRG		0.56460		6.35789
13 Ethyl Ether	0.51681	0.45017	0.47165	0.48847	0.48302	0.44849	AVRG		0.47643		5.40233
127 2,2-dichloro-1,1,1-trifluoroe	0.93618	0.79145	0.82177	0.83812	0.84254	0.74595	AVRG		0.82934		7.64760
14 Acrolein	0.13641	0.11988	0.13324	0.12523	0.12293	0.13283	AVRG		0.12842		5.16161
15 Acetone	0.27193	0.21428	0.21186	0.20008	0.19118	0.20099	AVRG		0.21505		13.53703
16 Trichlorotrifluoroethane	0.49715	0.42332	0.43886	0.44074	0.43709	0.39212	AVRG		0.43821		7.79121
17 1,1-Dichloroethene	0.55186	0.47672	0.49110	0.44566	0.44651	0.44175	AVRG		0.47560		8.89359
128 2-Propanol	0.03726	0.03483	0.03688	0.03878	0.04027	0.03756	AVRG		0.03760		4.87770
18 Iodomethane	1.08078	0.95589	1.01562	0.94392	0.96084	0.97237	AVRG		0.98823		5.22421
19 Acetonitrile	0.05880	0.05237	0.06294	0.06785	0.06991	0.07223	AVRG		0.06402		11.71154
20 Methyl Acetate	0.40959	0.36864	0.40639	0.40388	0.40292	0.37149	AVRG		0.39382		4.71436
21 Allyl Chloride	0.82015	0.69918	0.69019	0.70479	0.71847	0.63083	AVRG		0.71060		8.67648
22 Carbon Disulfide	2.14004	1.86470	1.89806	1.89560	1.88914	1.66744	AVRG		1.89250		7.93498
23 tert-Butyl alcohol	0.07491	0.06038	0.06781	0.06857	0.06709	0.07245	AVRG		0.06854		7.29673

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
24 Methylene Chloride	130909	227528	410631	1018342	2115008	4321146	WLINR	-0.05062	0.57114		0.99858
25 Acrylonitrile	0.22777	0.21059	0.23188	0.22027	0.21497	0.21732	AVRG		0.22047		3.63599
26 Methyl t-butyl ether	1.04989	0.97562	0.97328	0.99602	1.00176	0.94761	AVRG		0.99070		3.50880
27 trans-1,2-Dichloroethene	0.54945	0.47137	0.52978	0.48505	0.47753	0.46168	AVRG		0.49581		7.12668
28 Hexane	1.99736	1.67015	1.84129	1.72007	1.76865	1.70708	AVRG		1.78410		6.72646
29 Vinyl acetate	0.82122	0.75142	0.75878	0.76766	0.74163	0.66547	AVRG		0.75103		6.70335
30 Isopropyl ether	0.33315	0.30031	0.32703	0.28804	0.28183	0.27570	AVRG		0.30101		7.98310
31 1,1-Dichloroethane	0.96208	0.85131	0.88619	0.78090	0.78336	0.76329	AVRG		0.83785		9.20200
32 Chloroprene	0.48305	0.42828	0.45359	0.42876	0.42140	0.41433	AVRG		0.43824		5.85171
33 ETBE	0.93547	0.85675	0.87052	0.88050	0.86428	0.59911	AVRG		0.83444		14.21998
34 2-Butanone	0.27308	0.22312	0.24633	0.22693	0.21946	0.23140	AVRG		0.23672		8.49507
35 Ethyl Acetate	0.36877	0.32335	0.33448	0.32716	0.34391	0.31615	AVRG		0.33564		5.60560
36 Propionitrile	0.06441	0.05313	0.06343	0.05980	0.05784	0.05906	AVRG		0.05961		6.83633
37 cis-1,2-Dichloroethene	0.50186	0.41154	0.47234	0.43127	0.41849	0.40577	AVRG		0.44021		8.73484
38 2,2-Dichloropropane	0.49880	0.41312	0.45287	0.40060	0.40256	0.38494	AVRG		0.42548		10.00816
39 Methacrylonitrile	0.29225	0.25226	0.27845	0.26228	0.24646	0.19699	AVRG		0.25478		12.94177
40 Bromochloromethane	0.30882	0.27678	0.29554	0.27055	0.26398	0.25684	AVRG		0.27875		7.09419

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
41 Chloroform	0.79125	0.73165	0.76467	0.67526	0.65734	0.63857	AVRG		0.70979		8.71698
42 Tetrahydrofuran	0.08374	0.07303	0.07659	0.07695	0.07700	0.07371	AVRG		0.07684		4.94202
44 1,1,1-Trichloroethane	0.49521	0.46305	0.48708	0.44350	0.43745	0.42999	AVRG		0.45938		5.89110
45 Isobutanol	0.01672	0.01426	0.01596	0.01486	0.01433	0.01543	AVRG		0.01526		6.33891
46 Cyclohexane	0.49424	0.44712	0.44797	0.43485	0.44442	0.39941	AVRG		0.44467		6.83540
47 1,1-Dichloropropene	0.49341	0.46660	0.49555	0.45826	0.44561	0.42981	AVRG		0.46487		5.61168
48 Carbon Tetrachloride	0.51398	0.47745	0.49290	0.45926	0.44854	0.44539	AVRG		0.47292		5.70894
50 1,2-Dichloroethane	0.60292	0.52056	0.53628	0.49615	0.49213	0.47338	AVRG		0.52024		8.87558
51 Benzene	1.42158	1.26166	1.32279	1.21591	1.23215	1.15462	AVRG		1.26812		7.35387
52 TAME	0.68964	0.63960	0.65359	0.68142	0.66962	0.52287	AVRG		0.64279		9.56870
54 n-Butanol	0.01211	0.01021	0.01031	0.01123	0.01145	0.01274	AVRG		0.01134		8.73226
55 Trichloroethene	0.43386	0.40521	0.40362	0.35479	0.39464	0.36888	AVRG		0.39350		7.16481
56 2-Pentanone	0.24890	0.22349	0.24186	0.24399	0.25012	0.23363	AVRG		0.24033		4.21748
57 Methyl Methacrylate	0.07333	0.06987	0.07317	0.08000	0.07655	0.07212	AVRG		0.07417		4.82696
58 1,2-Dichloropropane	0.44436	0.38818	0.40741	0.36735	0.37581	0.36360	AVRG		0.39112		7.80980
59 Methyl Cyclohexane	0.46814	0.38486	0.39529	0.38574	0.37661	0.31584	AVRG		0.38775		12.54310
60 1,4-Dioxane	0.00459	0.00388	0.00449	0.00447	0.00446	0.00459	AVRG		0.00441		6.03952

100

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
61 Dibromomethane	0.43249	0.34973	0.37319	0.32741	0.32153	0.32253	AVRG		0.35448		12.16492
62 Bromodichloromethane	0.58143	0.52079	0.55848	0.51037	0.49965	0.50989	AVRG		0.53010		6.11394
63 2-nitropropane	0.25281	0.20892	0.22852	0.22267	0.22718	0.23091	AVRG		0.22850		6.23791
64 2-Chloroethyl vinyl ether	+++++	14042	30456	94222	222474	539125	WLINR	0.12943	0.09936		0.99314
65 cis-1,3-Dichloropropene	0.56117	0.54020	0.58183	0.56148	0.58503	0.57615	AVRG		0.56764		2.95686
66 4-Methyl-2-pentanone	1.64606	1.53656	1.57221	1.65174	1.59795	1.50886	AVRG		1.58556		3.64006
68 Toluene	5.24941	4.85081	4.84249	4.92015	4.69972	4.74179	AVRG		4.88406		4.01056
69 trans-1,3-Dichloropropene	1.81423	1.83551	1.80985	1.93032	1.91570	1.94319	AVRG		1.87480		3.27627
70 Ethyl methacrylate	1.22879	1.17995	1.35557	1.30098	1.36542	1.38726	AVRG		1.30299		6.36676
71 1,1,2-Trichloroethane	1.48055	1.38140	1.33073	1.32762	1.32986	1.31400	AVRG		1.36069		4.63837
72 2-Hexanone	1.07263	1.07271	1.15136	1.22716	1.22529	1.27121	AVRG		1.17006		7.23804
73 1,3-Dichloropropane	2.36180	2.22385	2.20718	2.07294	2.07124	2.08118	AVRG		2.16970		5.38008
74 Tetrachloroethene	1.37766	1.20041	1.21114	1.18520	1.15929	1.13073	AVRG		1.21074		7.16903
75 Dibromochloromethane	1.96908	1.83259	1.85463	1.94839	1.92605	1.99792	AVRG		1.92144		3.39086
76 Tetrahydrothiophene	0.60265	0.60763	0.59588	0.56527	0.61845	0.64834	AVRG		0.60637		4.49961
77 1,2-Dibromoethane	1.81349	1.70246	1.70865	1.75866	1.77670	1.82059	AVRG		1.76342		2.85692
78 1-Chlorohexane	1.76039	1.81770	1.81487	1.99501	1.96180	1.98067	AVRG		1.88841		5.40331

101

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
80 Chlorobenzene	4.29780	4.09505	3.88075	3.77644	3.93739	3.85922	AVRG		3.97444		4.79696
81 1,1,1,2-Tetrachloroethane	1.54997	1.44838	1.41936	1.43897	1.46809	1.45549	AVRG		1.46338		3.10769
82 Ethylbenzene	1.85980	1.78820	1.79064	1.79294	1.79032	1.75298	AVRG		1.79581		1.93736
83 m and p-Xylene	2.25978	2.26791	2.15882	2.30240	2.26916	2.24554	AVRG		2.25060		2.16412
84 o-Xylene	2.22853	2.31566	2.22537	2.28198	2.39120	2.32519	AVRG		2.29466		2.75819
85 Styrene	3.19616	3.64218	3.60408	3.87885	4.11013	4.12499	AVRG		3.75940		9.41232
86 Bromoform	1.40897	1.36682	1.37179	1.46093	1.46948	1.57472	AVRG		1.44212		5.40696
87 isopropyl benzene	5.29405	5.44597	5.44863	5.82778	5.82499	5.88408	AVRG		5.62091		4.50649
88 cis-1,4-Dichloro-2-butene	0.32935	0.32736	0.33952	0.36054	0.36403	0.37309	AVRG		0.34898		5.56245
89 Cyclohexanone	0.08525	0.07637	0.08387	0.08992	0.09074	0.09371	AVRG		0.08664		7.16454
91 1,1,2,2-Tetrachloroethane	1.75104	1.48619	1.52262	1.49695	1.40902	1.44054	AVRG		1.51773		7.99714
92 t-1,4-Dichloro-2-butene	0.17194	0.15079	0.17002	0.17532	0.17573	0.18768	AVRG		0.17191		7.00293
93 1,2,3-Trichloropropane	0.41119	0.34002	0.35267	0.33377	0.32435	0.33504	AVRG		0.34951		9.04324
94 Bromobenzene	1.29427	1.21231	1.21463	1.17136	1.19355	1.22350	AVRG		1.21827		3.41683
95 n-Propylbenzene	1.00619	0.96364	1.00098	0.96769	0.99844	1.00359	AVRG		0.99009		1.93309
96 2-Chlorotoluene	1.06808	1.00215	1.01484	1.00784	0.96685	1.00134	AVRG		1.01019		3.25318
97 1,3,5-Trimethylbenzene	3.10889	2.87364	3.01930	3.10707	2.98980	3.04761	AVRG		3.02439		2.90011

102

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
98 4-Chlorotoluene	1.04084	0.91240	1.00909	1.03542	0.98091	1.03132	AVRG		1.00166		4.89236
99 tert-Butylbenzene	2.71261	2.46236	2.52256	2.69044	2.92153	2.88032	AVRG		2.69830		6.82919
100 1,2,4-Trimethylbenzene	2.98984	2.92482	3.15625	3.18523	3.20593	3.07942	AVRG		3.09025		3.67037
101 sec-Butylbenzene	3.85715	3.79966	3.98635	4.14163	4.09268	3.91587	AVRG		3.96556		3.37075
102 4-Isopropyltoluene	3.04430	3.03038	3.21918	3.43654	3.34562	3.33577	AVRG		3.23530		5.19971
103 m-Dichlorobenzene	2.21189	2.02462	1.97834	2.04930	2.03279	1.99661	AVRG		2.04893		4.09092
105 p-dichlorobenzene	2.23820	2.19746	2.12387	2.13563	2.07803	2.05333	AVRG		2.13775		3.27755
106 1,2,3-Trimethylbenzene	3.06858	2.81877	2.82341	2.83752	2.90074	2.87664	AVRG		2.88761		3.26376
107 n-Butylbenzene	3.24442	3.15377	3.28196	3.54966	3.46876	3.31770	AVRG		3.33605		4.40806
108 o-Dichlorobenzene	2.12589	1.97439	1.96235	2.03030	1.96144	1.89917	AVRG		1.99226		3.89671
109 1,2-Dibromo-3-chloropropane	0.33107	0.29134	0.29813	0.30702	0.30060	0.30890	AVRG		0.30618		4.48815
110 1,2,4-Trichlorobenzene	1.28977	1.20074	1.18181	1.32325	1.31951	1.29958	AVRG		1.26911		4.87292
111 Hexachlorobutadiene	0.80086	0.73518	0.66039	0.73415	0.70981	0.66917	AVRG		0.71826		7.15085
112 Napthalene	2.73656	2.50949	2.62692	3.04657	3.06151	2.96823	AVRG		2.82488		8.25885
113 1,2,3-Trichlorobenzene	1.21816	1.17368	1.15629	1.25659	1.23292	1.20238	AVRG		1.20667		3.09146
$ 43 Dibromofluoromethane	0.49172	0.51042	0.48976	0.49504	0.49368	0.45348	AVRG		0.48902		3.86600

103

STL Denver

INITIAL CALIBRATION DATA

Start Cal Date : 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35
Quant Method : ISTD
Target Version : 3.40
Integrator : HP RTE
Method file : /chem/G.i/062905.b/G5030-8260B-soil.m
Cal Date : 29-Jun-2005 10:06 appelhad

Compound	5 Level 1	10 Level 2	20 Level 3	50 Level 4	100 Level 5	200 Level 6	Curve	Coefficients b	m1	m2	%RSD or R^2
$ 49 1,2-Dichloroethane-d4	0.35941	0.37483	0.36730	0.36848	0.37903	0.32848	AVRG		0.36292		5.00515
$ 67 Toluene-d8	3.95266	4.12390	3.98778	3.99318	4.11753	3.92783	AVRG		4.01714		2.08406
$ 90 Bromofluorobenzene	1.86363	1.93688	1.86247	1.87155	1.96872	1.87297	AVRG		1.89603		2.38914

Curve	Formula	Units
Averaged	Amt = Rsp/m1	Response
Wt Linear	Amt = b + Rsp/m1	Response

INITIAL CALIBRATION VERIFICATION

Instrument ID: G.i
Lab File ID: g3239i.d
Analysis Type: SOIL

Injection Date: 28-JUN-2005 17:18
Lab Sample ID: MAIN050
Method File: /chem/G.i/062805i.b/G5030-8260B-soil.

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
85 1,2-Dichloroethene (total)	100.0000	96.9617	3.0	25.0
83 Xylene (total)	150.0000	140.3239	6.5	25.0
64 dichlorodifluoromethane	50.0000	48.6209	2.8	25.0
1 Chloromethane	50.0000	43.5523	12.9	25.0
4 Vinyl Chloride	50.0000	47.5232	5.0	25.0
2 Bromomethane	50.0000	47.3806	5.2	25.0
5 Chloroethane	50.0000	46.7808	6.4	25.0
11 Trichlorofluoromethane	50.0000	48.2016	3.6	25.0
7 Acetone	100.0000	95.0535	4.9	25.0
12 1,1-Dichloroethene	50.0000	48.7158	2.6	25.0
6 Methylene Chloride	50.0000	51.2463	2.5	25.0
0 trans-1,2-Dichloroethene	50.0000	49.5430	0.9	25.0
15 1,1-Dichloroethane	50.0000	45.5334	8.9	25.0
20 2-Butanone	100.0000	96.7864	3.2	25.0
0 cis-1,2-Dichloroethene	50.0000	47.4187	5.2	25.0
93 2,2-Dichloropropane	50.0000	44.9644	10.1	25.0
13 Bromochloromethane	50.0000	45.7609	8.5	25.0
17 Chloroform	50.0000	45.1265	9.7	25.0
22 1,1,1-Trichloroethane	50.0000	45.8407	8.3	25.0
94 1,1-Dichloropropene	50.0000	45.0779	9.8	25.0
23 Carbon Tetrachloride	50.0000	45.7207	8.6	25.0
16 1,2-Dichloroethane	50.0000	44.9700	10.1	25.0
30 Benzene	50.0000	45.6919	8.6	25.0
90 Fluorobenzene	50.0000	50.0000	0.0	25.0
29 Trichloroethene	50.0000	46.7312	6.5	25.0
26 1,2-Dichloropropane	50.0000	47.4609	5.1	25.0
34 Dibromomethane	50.0000	44.7915	10.4	25.0
25 Bromodichloromethane	50.0000	46.4756	7.0	25.0
28 cis-1,3-Dichloropropene	50.0000	49.1312	1.7	25.0
38 4-Methyl-2-pentanone	100.0000	95.1029	4.9	25.0
45 Toluene	50.0000	45.7360	8.5	25.0
31 trans-1,3-Dichloropropene	50.0000	48.1060	3.8	25.0
32 1,1,2-Trichloroethane	50.0000	45.5573	8.9	25.0
43 2-Hexanone	100.0000	96.9863	3.0	25.0
109 1,3-Dichloropropane	50.0000	45.8582	8.3	25.0
42 Tetrachloroethene	50.0000	45.5506	8.9	25.0
36 Dibromochloromethane	50.0000	48.0259	3.9	25.0
58 1,2-Dibromoethane	50.0000	49.6120	0.8	25.0
92 1-Chlorohexane	50.0000	44.1747	11.7	25.0

INITIAL CALIBRATION VERIFICATION

Instrument ID: G.i
Lab File ID: g3239i.d
Analysis Type: SOIL

Injection Date: 28-JUN-2005 17:18
Lab Sample ID: MAIN050
Method File: /chem/G.i/062805i.b/G5030-8260B-soil.

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
39 Chlorobenzene-d5	50.0000	50.0000	0.0	25.0
46 Chlorobenzene	50.0000	48.0285	3.9	25.0
47 Ethylbenzene	50.0000	47.5816	4.8	25.0
74 1,1,1,2-Tetrachloroethane	50.0000	48.0684	3.9	25.0
0 m and p-Xylene	100.0000	90.8491	9.2	25.0
0 o-Xylene	50.0000	49.4748	1.1	25.0
49 Styrene	50.0000	51.0703	2.1	25.0
37 Bromoform	50.0000	49.8369	0.3	25.0
79 isopropyl benzene	50.0000	47.2918	5.4	25.0
40 1,1,2,2-Tetrachloroethane	50.0000	47.0539	5.9	25.0
50 1,2,3-Trichloropropane	50.0000	49.2155	1.6	25.0
95 Bromobenzene	50.0000	48.9571	2.1	25.0
96 n-Propylbenzene	50.0000	48.9500	2.1	25.0
97 2-Chlorotoluene	50.0000	49.4702	1.1	25.0
98 1,3,5-Trimethylbenzene	50.0000	49.7474	0.5	25.0
99 4-Chlorotoluene	50.0000	49.2768	1.4	25.0
100 tert-Butylbenzene	50.0000	47.5248	5.0	25.0
101 1,2,4-Trimethylbenzene	50.0000	48.8419	2.3	25.0
102 sec-Butylbenzene	50.0000	50.6981	1.4	25.0
103 4-Isopropyltoluene	50.0000	47.8669	4.3	25.0
61 m-Dichlorobenzene	50.0000	45.5126	9.0	25.0
91 1,4-Dichlorobenzene-d4	50.0000	50.0000	0.0	25.0
62 p-dichlorobenzene	50.0000	47.5783	4.8	25.0
104 n-Butylbenzene	50.0000	48.5649	2.9	25.0
63 o-Dichlorobenzene	50.0000	48.5831	2.8	25.0
75 1,2-Dibromo-3-chloropropane	50.0000	47.4801	5.0	25.0
105 1,2,4-Trichlorobenzene	50.0000	49.5931	0.8	25.0
106 Hexachlorobutadiene	50.0000	44.5483	10.9	25.0
107 Napthalene	50.0000	52.6883	5.4	25.0
108 1,2,3-Trichlorobenzene	50.0000	47.7573	4.5	25.0

Report Date: 30-Jun-2005 17:02

Calibration History

Method : /chem/G.i/062905.b/G5030-8260B-soil.m
Start Cal Date: 26-JAN-2005 11:49
End Cal Date : 28-JUN-2005 16:35

Initial Calibration

Injection Date	Sublist	Calibration File
Cal Level: 1 , Cal Amount: 5.00000		
09-JUN-2005 16:52	2-supp	/chem/G.i/060905i.b/g2703.d
28-JUN-2005 14:48	1-main	/chem/G.i/062805i.b/g3232.d
Cal Level: 2 , Cal Amount: 10.0000		
09-JUN-2005 17:13	2-supp	/chem/G.i/060905i.b/g2704.d
28-JUN-2005 15:10	1-main	/chem/G.i/062805i.b/g3233.d
Cal Level: 3 , Cal Amount: 20.0000		
09-JUN-2005 17:34	2-supp	/chem/G.i/060905i.b/g2705.d
28-JUN-2005 15:31	1-main	/chem/G.i/062805i.b/g3234.d
Cal Level: 4 , Cal Amount: 50.0000		
09-JUN-2005 17:55	2-supp	/chem/G.i/060905i.b/g2706.d
28-JUN-2005 15:52	1-main	/chem/G.i/062805i.b/g3235.d
Cal Level: 5 , Cal Amount: 100.000		
09-JUN-2005 18:17	2-supp	/chem/G.i/060905i.b/g2707.d
28-JUN-2005 16:14	1-main	/chem/G.i/062805i.b/g3236.d
Cal Level: 6 , Cal Amount: 200.000		
09-JUN-2005 18:38	2-supp	/chem/G.i/060905i.b/g2708.d
28-JUN-2005 16:35	1-main	/chem/G.i/062805i.b/g3237.d

Continuing Calibration

29-JUN-2005 09:25	2-supp	/chem/G.i/062905.b/g3269.d
29-JUN-2005 08:45	1-main	/chem/G.i/062905.b/g3268.d

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: G.i
Lab File ID: g3268.d
Analysis Type: SOIL

Injection Date: 29-JUN-2005 08:45
Lab Sample ID: MAIN050
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
85 1,2-Dichloroethene (total)	100.0000	96.5095	3.5	50.0
83 Xylene (total)	150.0000	152.7070	1.8	50.0
64 dichlorodifluoromethane	50.0000	52.0888	4.2	50.0
1 Chloromethane	50.0000	49.8796	0.2	50.0
4 Vinyl Chloride	50.0000	51.5021	3.0	20.0
2 Bromomethane	50.0000	49.3783	1.2	50.0
5 Chloroethane	50.0000	51.2795	2.6	50.0
11 Trichlorofluoromethane	50.0000	53.8383	7.7	50.0
3 Ethanol	2500.0000	2246.6717	10.1	50.0
8 Acrolein	500.0000	496.1965	0.8	50.0
7 Acetone	200.0000	181.4698	9.3	50.0
12 1,1-Dichloroethene	50.0000	46.5149	7.0	20.0
68 Acetonitrile	500.0000	539.6765	7.9	50.0
21 Iodomethane	50.0000	46.7872	6.4	50.0
86 tert-Butyl alcohol	1000.0000	936.0901	6.4	50.0
6 Methylene Chloride	50.0000	50.2035	0.4	50.0
9 Acrylonitrile	500.0000	491.2520	1.7	50.0
0 trans-1,2-Dichloroethene	50.0000	48.0790	3.8	50.0
84 Isopropyl ether	250.0000	249.0824	0.4	50.0
15 1,1-Dichloroethane	50.0000	47.7283	4.5	50.0
69 Chloroprene	50.0000	48.5815	2.8	50.0
20 2-Butanone	200.0000	189.2618	5.4	50.0
70 Propionitrile	500.0000	492.6457	1.5	50.0
0 cis-1,2-Dichloroethene	50.0000	48.4305	3.1	50.0
93 2,2-Dichloropropane	50.0000	50.7345	1.5	50.0
72 Methacrylonitrile	500.0000	524.7834	5.0	50.0
13 Bromochloromethane	50.0000	49.2827	1.4	50.0
17 Chloroform	50.0000	50.0732	0.1	20.0
71 Isobutanol	1000.0000	965.0366	3.5	50.0
22 1,1,1-Trichloroethane	50.0000	48.8045	2.4	50.0
94 1,1-Dichloropropene	50.0000	46.7473	6.5	50.0
23 Carbon Tetrachloride	50.0000	47.7434	4.5	50.0
16 1,2-Dichloroethane	50.0000	48.5292	2.9	50.0
30 Benzene	50.0000	46.0418	7.9	50.0
88 n-Butanol	1000.0000	879.4580	12.1	50.0
29 Trichloroethene	50.0000	48.2145	3.6	50.0
26 1,2-Dichloropropane	50.0000	48.7378	2.5	20.0
57 1,4-Dioxane	2500.0000	2297.8436	8.1	50.0
34 Dibromomethane	50.0000	47.0375	5.9	50.0

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: G.i
Lab File ID: g3268.d
Analysis Type: SOIL

Injection Date: 29-JUN-2005 08:45
Lab Sample ID: MAIN050
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

	COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
25	Bromodichloromethane	50.0000	49.4829	1.0	50.0
28	cis-1,3-Dichloropropene	50.0000	50.8623	1.7	50.0
38	4-Methyl-2-pentanone	200.0000	197.0785	1.5	50.0
45	Toluene	50.0000	49.3703	1.3	20.0
31	trans-1,3-Dichloropropene	50.0000	52.1794	4.4	50.0
32	1,1,2-Trichloroethane	50.0000	47.9835	4.0	50.0
43	2-Hexanone	200.0000	201.9788	1.0	50.0
109	1,3-Dichloropropane	50.0000	50.0064	0.0	50.0
42	Tetrachloroethene	50.0000	47.1465	5.7	50.0
36	Dibromochloromethane	50.0000	50.4305	0.9	50.0
58	1,2-Dibromoethane	50.0000	48.3323	3.3	50.0
92	1-Chlorohexane	50.0000	50.6610	1.3	50.0
46	Chlorobenzene	50.0000	49.6712	0.7	50.0
47	Ethylbenzene	50.0000	48.9206	2.2	20.0
74	1,1,1,2-Tetrachloroethane	50.0000	49.4993	1.0	50.0
0	m and p-Xylene	100.0000	101.9856	2.0	50.0
49	Styrene	50.0000	52.0898	4.2	50.0
0	o-Xylene	50.0000	50.7214	1.4	50.0
37	Bromoform	50.0000	49.5322	0.9	50.0
79	isopropyl benzene	50.0000	51.8337	3.7	50.0
76	Cyclohexanone	2000.0000	1737.0656	13.1	50.0
40	1,1,2,2-Tetrachloroethane	50.0000	48.2427	3.5	50.0
50	1,2,3-Trichloropropane	50.0000	46.3960	7.2	50.0
95	Bromobenzene	50.0000	49.4720	1.1	50.0
96	n-Propylbenzene	50.0000	50.4631	0.9	50.0
98	1,3,5-Trimethylbenzene	50.0000	49.3448	1.3	50.0
97	2-Chlorotoluene	50.0000	48.6755	2.6	50.0
99	4-Chlorotoluene	50.0000	50.1742	0.3	50.0
100	tert-Butylbenzene	50.0000	53.3858	6.8	50.0
101	1,2,4-Trimethylbenzene	50.0000	49.8125	0.4	50.0
102	sec-Butylbenzene	50.0000	50.1008	0.2	50.0
103	4-Isopropyltoluene	50.0000	51.4651	2.9	50.0
61	m-Dichlorobenzene	50.0000	49.7274	0.5	50.0
62	p-dichlorobenzene	50.0000	49.0547	1.9	50.0
104	n-Butylbenzene	50.0000	51.3406	2.7	50.0
63	o-Dichlorobenzene	50.0000	49.5502	0.9	50.0
75	1,2-Dibromo-3-chloropropane	50.0000	43.2491	13.5	50.0
105	1,2,4-Trichlorobenzene	50.0000	49.8460	0.3	50.0
106	Hexachlorobutadiene	50.0000	48.1082	3.8	50.0

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: G.i
Lab File ID: g3268.d
Analysis Type: SOIL

Injection Date: 29-JUN-2005 08:45
Lab Sample ID: MAIN050
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D
107 Napthalene	50.0000	45.2179	9.6	50.0
108 1,2,3-Trichlorobenzene	50.0000	48.5250	3.0	50.0

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: G.i
Lab File ID: g3268.d
Analysis Type: SOIL
Lab Sample ID: MAIN050
Quant Type: ISTD

Injection Date: 29-JUN-2005 08:45
Init. Calibration Date(s): JAN/26/5 06/28/5
Init. Calibration Times: 11:49 16:35
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

	COMPOUND	RRF	RF50	MIN RRF	%D	MAX %D
M	1 1,2-Dichloroethene (total)	0.468	0.452	0.010	3.5	50.0
M	2 Xylene (total)	4.298	4.167	0.010	3.1	50.0
	3 dichlorodifluoromethane	0.428	0.446	0.010	-4.2	50.0
	5 Chloromethane	0.743	0.741	0.100	0.2	50.0
	6 Vinyl Chloride	0.697	0.717	0.020	-3.0	20.0
	8 Bromomethane	0.432	0.427	0.010	1.2	50.0
	9 Chloroethane	0.335	0.343	0.010	-2.6	50.0
	11 Trichlorofluoromethane	0.613	0.660	0.010	-7.7	50.0
	12 Ethanol	0.008	0.007	0.000	10.1	50.0
	14 Acrolein	0.128	0.127	0.005	0.8	50.0
	17 1,1-Dichloroethene	0.476	0.442	0.020	7.0	20.0
	15 Acetone	0.215	0.195	0.010	9.3	50.0
	18 Iodomethane	0.988	0.925	0.010	6.4	50.0
	19 Acetonitrile	0.064	0.069	0.001	-7.9	50.0
	24 Methylene Chloride	0.571	0.602	0.010	N/A	N/A
	23 tert-Butyl alcohol	0.069	0.064	0.001	6.4	50.0
	25 Acrylonitrile	0.220	0.217	0.010	1.7	50.0
	27 trans-1,2-Dichloroethene	0.496	0.477	0.010	3.8	50.0
	31 1,1-Dichloroethane	0.838	0.800	0.100	4.5	50.0
	30 Isopropyl ether	0.301	0.300	0.010	0.4	50.0
	32 Chloroprene	0.438	0.426	0.010	2.8	50.0
	34 2-Butanone	0.237	0.224	0.010	5.4	50.0
	37 cis-1,2-Dichloroethene	0.440	0.426	0.010	3.1	50.0
	38 2,2-Dichloropropane	0.425	0.432	0.010	-1.5	50.0
	36 Propionitrile	0.060	0.059	0.001	1.5	50.0
	39 Methacrylonitrile	0.255	0.267	0.010	-5.0	50.0
	40 Bromochloromethane	0.279	0.275	0.010	1.4	50.0
	41 Chloroform	0.710	0.711	0.020	-0.1	20.0
	44 1,1,1-Trichloroethane	0.459	0.448	0.010	2.4	50.0
	47 1,1-Dichloropropene	0.465	0.435	0.010	6.5	50.0
	48 Carbon Tetrachloride	0.473	0.452	0.010	4.5	50.0
	45 Isobutanol	0.015	0.015	0.000	3.5	50.0
	51 Benzene	1.268	1.168	0.010	7.9	50.0
	50 1,2-Dichloroethane	0.520	0.505	0.010	2.9	50.0
	54 n-Butanol	0.011	0.010	0.000	12.1	50.0

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: G.i
Lab File ID: g3268.d
Analysis Type: SOIL
Lab Sample ID: MAIN050
Quant Type: ISTD

Injection Date: 29-JUN-2005 08:45
Init. Calibration Date(s): JAN/26/5 06/28/5
Init. Calibration Times: 11:49 16:35
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

COMPOUND	RRF	RF50	MIN RRF	%D	MAX %D
55 Trichloroethene	0.393	0.379	0.010	3.6	50.0
58 1,2-Dichloropropane	0.391	0.381	0.020	2.5	20.0
60 1,4-Dioxane	0.004	0.004	0.000	8.1	50.0
61 Dibromomethane	0.354	0.333	0.010	5.9	50.0
62 Bromodichloromethane	0.530	0.525	0.010	1.0	50.0
65 cis-1,3-Dichloropropene	0.568	0.577	0.010	-1.7	50.0
66 4-Methyl-2-pentanone	1.586	1.562	0.010	1.5	50.0
68 Toluene	4.884	4.823	0.020	1.3	20.0
69 trans-1,3-Dichloropropene	1.875	1.957	0.010	-4.4	50.0
71 1,1,2-Trichloroethane	1.361	1.306	0.010	4.0	50.0
74 Tetrachloroethene	1.211	1.142	0.010	5.7	50.0
73 1,3-Dichloropropane	2.170	2.170	0.010	0.0	50.0
72 2-Hexanone	1.170	1.182	0.010	-1.0	50.0
75 Dibromochloromethane	1.921	1.938	0.010	-0.9	50.0
77 1,2-Dibromoethane	1.763	1.705	0.010	3.3	50.0
78 1-Chlorohexane	1.888	1.913	0.010	-1.3	50.0
80 Chlorobenzene	3.974	3.948	0.300	0.7	50.0
81 1,1,1,2-Tetrachloroethane	1.463	1.449	0.010	1.0	50.0
82 Ethylbenzene	1.796	1.757	0.010	2.2	20.0
83 m and p-Xylene	2.251	2.295	0.010	-2.0	50.0
84 o-Xylene	2.295	2.328	0.010	-1.4	50.0
85 Styrene	3.759	3.917	0.010	-4.2	50.0
86 Bromoform	1.442	1.429	0.101	0.9	50.0
87 isopropyl benzene	5.621	5.827	0.010	-3.7	50.0
89 Cyclohexanone	0.087	0.075	0.005	13.1	50.0
91 1,1,2,2-Tetrachloroethane	1.518	1.464	0.300	3.5	50.0
94 Bromobenzene	1.218	1.205	0.010	1.1	50.0
93 1,2,3-Trichloropropane	0.350	0.324	0.010	7.2	50.0
95 n-Propylbenzene	0.990	0.999	0.010	-0.9	50.0
96 2-Chlorotoluene	1.010	0.983	0.010	2.6	50.0
97 1,3,5-Trimethylbenzene	3.024	2.985	0.010	1.3	50.0
98 4-Chlorotoluene	1.002	1.005	0.010	-0.3	50.0
99 tert-Butylbenzene	2.698	2.881	0.010	-6.8	50.0
100 1,2,4-Trimethylbenzene	3.090	3.079	0.010	0.4	50.0
101 sec-Butylbenzene	3.966	3.974	0.010	-0.2	50.0

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: G.i
Lab File ID: g3268.d
Analysis Type: SOIL
Lab Sample ID: MAIN050
Quant Type: ISTD

Injection Date: 29-JUN-2005 08:45
Init. Calibration Date(s): JAN/26/5 06/28/5
Init. Calibration Times: 11:49 16:35
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

COMPOUND	RRF	RF50	MIN RRF	%D	MAX %D
103 m-Dichlorobenzene	2.049	2.038	0.010	0.5	50.0
102 4-Isopropyltoluene	3.235	3.330	0.010	-2.9	50.0
105 p-dichlorobenzene	2.138	2.097	0.010	1.9	50.0
107 n-Butylbenzene	3.336	3.425	0.010	-2.7	50.0
108 o-Dichlorobenzene	1.992	1.974	0.010	0.9	50.0
109 1,2-Dibromo-3-chloropropane	0.306	0.265	0.010	13.5	50.0
110 1,2,4-Trichlorobenzene	1.269	1.265	0.010	0.3	50.0
111 Hexachlorobutadiene	0.718	0.691	0.010	3.8	50.0
112 Napthalene	2.825	2.555	0.010	9.6	50.0
113 1,2,3-Trichlorobenzene	1.207	1.171	0.010	3.0	50.0

CONTINUING CALIBRATION COMPOUNDS
PERCENT DRIFT REPORT

Instrument ID: G.i
Lab File ID: g3269.d
Analysis Type: SOIL

Injection Date: 29-JUN-2005 09:25
Lab Sample ID: SUPP050
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

	COMPOUND	EXPECTED CONC.	MEASURED CONC.	%D	MAX %D	
118	Dichlorotetrafluoroethane	50.0000	86.9475	73.9	80.0	
120	Ethylene Oxide	6250.0000	8348.4973	33.6	50.0	
87	Dichlorofluoromethane	50.0000	44.0541	11.9	50.0	
126	1,2-dichloro-1,1,2-trifluoroeth	50.0000	35.8303	28.3	50.0	
77	Ethyl Ether	50.0000	50.5057	1.0	50.0	
127	2,2-dichloro-1,1,1-trifluoroeth	50.0000	42.2115	15.6	50.0	
65	Trichlorotrifluoroethane	50.0000	38.4656	23.1	50.0	
128	2-Propanol	1000.0000	1235.8081	23.6	50.0	
121	Methyl Acetate	250.0000	318.8294	27.5	50.0	
67	Allyl Chloride	50.0000	50.4579	0.9	50.0	
10	Carbon Disulfide	50.0000	56.1214	12.2	50.0	
53	Methyl t-butyl ether	50.0000	57.4368	14.9	50.0	
54	Hexane	50.0000	57.5428	15.1	50.0	
24	Vinyl acetate	100.0000	125.9942	26.0	50.0	
122	ETBE	250.0000	315.4120	26.2	50.0	
78	Ethyl Acetate	100.0000	130.3438	30.3	50.0	
56	Tetrahydrofuran	100.0000	135.1460	35.1	50.0	
89	Dibromofluoromethane	50.0000	46.3397	7.3	50.0	
115	Cyclohexane	50.0000	51.4707	2.9	80.0	
303	1,2-Dichloroethane-d4	50.0000	49.7772	0.4	50.0	
123	TAME	250.0000	294.3728	17.7	50.0	
116	2-Pentanone	200.0000	271.4952	35.7	50.0	
73	Methyl Methacrylate	100.0000	118.5860	18.6	50.0	
124	Methyl Cyclohexane	50.0000	55.8251	11.7	50.0	
82	2-nitropropane	50.0000	67.1119	34.2	50.0	
35	2-Chloroethyl vinyl ether	50.0000	36.2550	27.5	50.0	
301	Toluene-d8	50.0000	44.6623	10.7	50.0	
41	Ethyl methacrylate	100.0000	125.2418	25.2	50.0	
125	Tetrahydrothiophene	50.0000	37.6281	24.7	50.0	
117	cis-1,4-Dichloro-2-butene	50.0000	62.9603	25.9	50.0	
302	Bromofluorobenzene	50.0000	42.3394	15.3	50.0	
60	t-1,4-Dichloro-2-butene	50.0000	81.3077	62.6	50.0	<-
119	1,2,3-Trimethylbenzene	50.0000	54.9482	9.9	50.0	

STL Denver

CONTINUING CALIBRATION COMPOUNDS

Instrument ID: G.i
Lab File ID: g3269.d
Analysis Type: SOIL
Lab Sample ID: SUPP050
Quant Type: ISTD

Injection Date: 29-JUN-2005 09:25
Init. Calibration Date(s): JAN/26/5 06/28/5
Init. Calibration Times: 11:49 16:35
Method File: /chem/G.i/062905.b/G5030-8260B-soil.m

COMPOUND	RRF	RF50	MIN RRF	%D	MAX %D
$ 43 Dibromofluoromethane	0.489	0.453	0.010	7.3	50.0
$ 49 1,2-Dichloroethane-d4	0.363	0.361	0.010	0.4	50.0
$ 67 Toluene-d8	4.017	3.588	0.010	10.7	50.0
$ 90 Bromofluorobenzene	1.896	1.606	0.010	15.3	50.0
4 Dichlorotetrafluoroethane	0.334	0.581	0.010	-73.9	80.0
7 Ethylene Oxide	0.022	0.029	0.010	-33.6	50.0
10 Dichlorofluoromethane	1.166	1.027	0.010	11.9	50.0
126 1,2-dichloro-1,1,2-trifluor	0.565	0.405	0.010	28.3	50.0
13 Ethyl Ether	0.476	0.481	0.010	-1.0	50.0
127 2,2-dichloro-1,1,1-trifluor	0.829	0.700	0.010	15.6	50.0
16 Trichlorotrifluoroethane	0.438	0.337	0.010	23.1	50.0
128 2-Propanol	0.038	0.046	0.001	-23.6	50.0
20 Methyl Acetate	0.394	0.502	0.010	-27.5	50.0
21 Allyl Chloride	0.711	0.717	0.010	-0.9	50.0
22 Carbon Disulfide	1.892	2.124	0.010	-12.2	50.0
26 Methyl t-butyl ether	0.991	1.138	0.010	-14.9	50.0
28 Hexane	1.784	2.053	0.010	-15.1	50.0
29 Vinyl acetate	0.751	0.946	0.010	-26.0	50.0
33 ETBE	0.834	1.053	0.010	-26.2	50.0
35 Ethyl Acetate	0.336	0.437	0.010	-30.3	50.0
42 Tetrahydrofuran	0.077	0.104	0.010	-35.1	50.0
46 Cyclohexane	0.445	0.458	0.010	-2.9	80.0
52 TAME	0.643	0.757	0.010	-17.7	50.0
56 2-Pentanone	0.240	0.326	0.010	-35.7	50.0
57 Methyl Methacrylate	0.074	0.088	0.010	-18.6	50.0
59 Methyl Cyclohexane	0.388	0.433	0.010	-11.7	50.0
63 2-nitropropane	0.229	0.307	0.010	-34.2	50.0
64 2-Chloroethyl vinyl ether	0.099	0.059	0.002	N/A	N/A
70 Ethyl methacrylate	1.303	1.632	0.010	-25.2	50.0
76 Tetrahydrothiophene	0.606	0.456	0.010	24.7	50.0
88 cis-1,4-Dichloro-2-butene	0.349	0.439	0.010	-25.9	50.0
92 t-1,4-Dichloro-2-butene	0.172	0.280	0.010	-62.6	50.0 <-
106 1,2,3-Trimethylbenzene	2.888	3.173	0.010	-9.9	50.0

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5181482 SAS No.: 8260B SDG No.: D5F250124

Lab File ID (Standard): G3235 Date Analyzed: 06/28/05

Instrument ID: G Time Analyzed: 1552

GC Column: DB624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1(CBZ) AREA #	RT #	IS2 AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	470913	9.92	1716754	7.77	761061	12.22
	UPPER LIMIT	941826	10.42	3433508	8.27	1522122	12.72
	LOWER LIMIT	235456	9.42	858377	7.27	380530	11.72
	CLIENT SAMPLE NO.						
01	ICV	520603	9.92	1860854	7.78	826143	12.22
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (CBZ) = Chlorobenzene-d5
IS2 = Fluorobenzene
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: STL-DENVER Contract:

Lab Code: Case No.: 5181482 SAS No.: 8260B SDG No.: D5F250124

Lab File ID (Standard): G3269 Date Analyzed: 06/29/05

Instrument ID: G Time Analyzed: 0925

GC Column: DB624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1(CBZ) AREA #	RT #	IS2 AREA #	RT #	IS3(DCB) AREA #	RT #
	12 HOUR STD	480435	9.91	1693277	7.77	719920	12.21
	UPPER LIMIT	960870	10.41	3386554	8.27	1439840	12.71
	LOWER LIMIT	240218	9.41	846638	7.27	359960	11.71
	CLIENT SAMPLE NO.						
01	LCS	454190	9.91	1607731	7.77	670389	12.20
02	LCSD	353500	9.91	1403983	7.78	492718	12.21
03	PBLK	424215	9.92	1547297	7.77	617719	12.22
04	BH-B-1112	438584	9.91	1555423	7.78	640552	12.21
05	BH-B-0506	405399	9.92	1551238	7.77	589168	12.21
06	BH-A-0102	423980	9.92	1516057	7.78	585137	12.21
07	BH-A-0506	425919	9.92	1508997	7.78	641557	12.21
08	BH-9A-0506	419615	9.91	1506685	7.77	612693	12.21
09	AC-BH002-040	458373	9.91	1675543	7.77	660021	12.21
10	AC-BH002-070	492170	9.91	1727971	7.77	784238	12.20
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (CBZ) = Chlorobenzene-d5
IS2 = Fluorobenzene
IS3 (DCB) = 1,4-Dichlorobenzene-d4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

General Chemistry

CLP-Like Forms

Lot ID: D5F250124

Client: Ashland Chemical Company

Method: MCAWW Percent Moisture

Associated Samples: 002, 004, 005, 006, 009, 010, 011, 012, 013

SEVERN TRENT STL

Ashland Chemical Company
Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-D-1112
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-002
Matrix:	SOLID	**Lab WorkOrder:**	HED64
% Moisture:	19	**Date/Time Collected:**	06/24/05 09:28
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	19		0.10	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company

Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-C-1112
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-004
Matrix:	SOLID	**Lab WorkOrder:**	HED67
% Moisture:	19	**Date/Time Collected:**	06/24/05 09:52
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	**19**		0.10	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company

Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-B-0102
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-005
Matrix:	SOLID	**Lab WorkOrder:**	HED69
% Moisture:	13	**Date/Time Collected:**	06/24/05 10:10
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	13		0.10	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company

Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-B-0506
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-006
Matrix:	SOLID	**Lab WorkOrder:**	HED7A
% Moisture:	18	**Date/Time Collected:**	06/24/05 10:18
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	18		0.10	

U Result is less than the method detection limit (MDL).

STL

Ashland Chemical Company
Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-A-0102
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-009
Matrix:	SOLID	**Lab WorkOrder:**	HED7F
% Moisture:	12	**Date/Time Collected:**	06/24/05 11:36
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	12		0.10	

U Result is less than the method detection limit (MDL).

Form 1 Analysis Data Sheet Equivalent

SEVERN TRENT STL

Ashland Chemical Company
Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-A-0506
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-010
Matrix:	SOLID	**Lab WorkOrder:**	HED7H
% Moisture:	14	**Date/Time Collected:**	06/24/05 11:40
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	14		0.10	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company

Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-9A-0506
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-011
Matrix:	SOLID	**Lab WorkOrder:**	HED7K
% Moisture:	14	**Date/Time Collected:**	06/24/05 12:00
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	14		0.10	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company

Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	AC-BH002-0405
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-012
Matrix:	SOLID	**Lab WorkOrder:**	HED7M
% Moisture:	17	**Date/Time Collected:**	06/24/05 12:36
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	17		0.10	

U Result is less than the method detection limit (MDL).

SEVERN TRENT STL

Ashland Chemical Company
Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	AC-BH002-0708
Lot/SDG Number:	D5F250124	**Lab Sample ID:**	D5F250124-013
Matrix:	SOLID	**Lab WorkOrder:**	HED7P
% Moisture:	19	**Date/Time Collected:**	06/24/05 12:40
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
Sample Aliquot:		**Instrument ID:**	BAL
Dilution Factor:	1		

CAS No.	Analyte	Conc.	MDL	RL	Q
Q1028	Percent Moisture	19		0.10	

U Result is less than the method detection limit (MDL).

Form 1 Analysis Data Sheet Equivalent

SEVERN TRENT STL

Ashland Chemical Company

Wet Chemistry Analysis Data Sheet

Lab Name:	STL DENVER	**Client Sample ID:**	BH-D-1112 DUP
Lot/SDG Number:	D5F250124	**MSD Lab Sample ID:**	D5F250124-002X
Matrix:	SOLID	**MSD Lab WorkOrder:**	HED64
% Moisture:	19	**Date/Time Collected:**	06/24/05 09:28
Basis:	Wet	**Date/Time Received:**	06/25/05 08:30
Analysis Method:	160.3 MOD	**Date/Time Leached:**	
Unit:	%	**Date/Time Extracted:**	07/05/05 12:00
QC Batch ID:	5186520	**Date/Time Analyzed:**	07/05/05 15:00
MSD Sample Aliquot:		**Instrument ID:**	BAL
MSD Dilution Factor:	1		

Analyte	RPD Limit	Sample Result	C	Duplicate Result	C	RPD	Q
Percent Moisture	20	19		18		5.3	

U Result is less than the method detection limit (MDL).

Chain of Custody Record

2.6° 6/25/05

SEVERN TRENT **STL**

Severn Trent Laboratories, Inc.

STL Denver
4955 Yarrow Street
Arvada, CO 80002

128

STL-4124 (0901)

Client: URS CORP	Project Manager: DEAN STOCKWELL	Date: 6-24-05	Chain of Custody Number: 327937
Address: 700 3RD ST SOUTH SUITE 700	Telephone Number (Area Code)/Fax Number: 612-373-6881 612-370-1378	Lab Number	Page 1 of 2
City: MINNEAPOLIS State: MN Zip Code: 55415	Site Contact: LAWRENCE CANNON	Lab Contact: PAT MCENTEE	Analysis (Attach list if more space is needed)
Project Name and Location (State): ASHLANT CHEMICAL CLEARFIELD UT	Carrier/Waybill Number: FED EX		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		8260 B PCE	Special Instructions/ Conditions of Receipt
TB-062405	5-15-05			X							2				X	LAB PREPARED
BH-D-1112	6-24-05	928				X		4							X	PCE ONLY
FB-062405	6-24-05	930		X							3				X	PCE ONLY
BH-C-1112	6-24-05	952				X		4							X	PCE ONLY
BH-B-0102	6-24-05	1010				X		4							X	PCE ONLY
BH-B-0506	6-24-05	1018				X		4							X	PCE ONLY
BH-9E-1216	6-24-05	9:00		X				3			3				X	PCE ONLY
BH-E-1216	6-24-05	1100		X				9			9				X	PCE ONLY MS/MSD
BH-A-0102	6-24-05	1136				X		4							X	PCE ONLY
BH-A-0506	6-24-05	1140				X		4							X	PCE ONLY
BH-9A-0506	6-24-05	1200				X		4							X	PCE ONLY
AC-BH002-0405	6-24-05	1236				X		4							X	PCE ONLY

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days ☐ 21 Days ☐ Other_____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	6-24-05	1300	1. Received By	6/25/05	0830
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Chain of Custody Record

SEVERN TRENT **STL**

Severn Trent Laboratories, Inc.

STL Denver
4955 Yarrow Street
Arvada, CO 80002

129

STL-4124 (0901)

Client: URS CORP	Project Manager: DEAN STOCKWELL	Date: 6-24-05	Chain of Custody Number: 327938
Address: 700 3RD ST SOUTH SUITE 700	Telephone Number (Area Code)/Fax Number: 612-373-6881 612-370-1378	Lab Number	Page 2 of 2
City: MINNEAPOLIS State: MN Zip Code: 55415	Site Contact: LAWRENCE CANNON	Lab Contact: PAT MCENTEE	
Project Name and Location (State): ASHLAND CHEMICAL CLEARFIELD UT	Carrier/Waybill Number: FED EX		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		8260B PCE ONLY	TEMPERATURE									Special Instructions/ Conditions of Receipt
AC-BH002-0708	6-24-05	1240				X		4							X										PCE ONLY
TEMP BLANK				X				1								X									

Matrix: Air, Aqueous, Sed., Soil. Containers & Preservatives: Unpres., H2SO4, HNO3, HCl, NaOH, ZnAc/NaOH.

Analysis (Attach list if more space is needed)

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

1. Relinquished By	Date: 6-24-05	Time: 1300	1. Received By	Date: 6/25/05	Time: 0830
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

STL Denver

Sample Receiving Checklist

Lot #: D5F250124 Date/Time Received: 6/25/05

Company Name & Sampling Site: ASHLAND Clearfield UT

PM to Complete This Section: *Yes* *No* *Yes* *No*

Residual chlorine check required: ☐ ☑ Quarantined : ☐ ☑

Quote #: 65347

Special Instructions:

En Cores - LAB pres. within 48 hours

Time Zone:

• EDT/EST • CDT/CST • MDT/MST • PDT/PST • OTHER

Unpacking Checks:

Cooler #(s): 1

Temperatures (°C): 2.6

N/A	*Yes*	*No*		*Initials*
☐	☑	☐	1. Cooler seals intact? (N/A if hand delivered) If no, document on CUR.	
	☒	☐	2. Chain of custody present? If no, document on CUR.	
	☐	☑	3. Bottles broken and/or are leaking? If yes, document on CUR.	
	☐	☑	4. Multiphasic samples obvious? If yes, document on CUR.	
	☑	☐	5. Proper container & preservatives used? (ref. Attachment D of SOP# DEN-QA-0003) If no, document on CUR.	
☑	☐	☐	6. pH of all samples checked and meet requirements? If no, document on CUR.	
	☑	☐	7. Sufficient volume provided for all analysis requested? (ref. Attachment D of SOP# DEN-QA-0003) If no, document on CUR, and contact PM before proceeding.	
	☐	☑	8. Did chain of custody agree with labels ID and samples received? If no, document on CUR.	
☐	☑	☐	9. Were VOA samples without headspace? If no, document on CUR.	
☐	☑	☐	10. Were VOA vials preserved? Preservative ☒HCl ☐4±2°C ☐Sodium Thiosulfate ☐ Ascorbic Acid	
	☐	☑	11. Did samples require preservation with sodium thiosulfate?	
☑	☐	☐	12. If yes to #11, did the samples contain residual chlorine? If yes, document on CUR.	
☑	☐	☐	13. Sediment present in dissolved/filtered bottles? If yes, document on CUR.	
☑	☐	☐	14. Is sufficient volume provided for client requested MS, MSD or matrix duplicates? If no, document on CUR, and contact PM before proceeding.	
	☐	☑	15. Receipt date(s) > 48 hours past the collection date(s)? If yes, notify PA/PM.	
	☑	☐	16. Are analyses with short holding times requested?	
	☐	☑	17. Was a quick Turn Around (TAT) requested?	

STL Denver

Sample Receiving Checklist

Lot # DSF 250124

Login Checks: *Initials* [illegible]

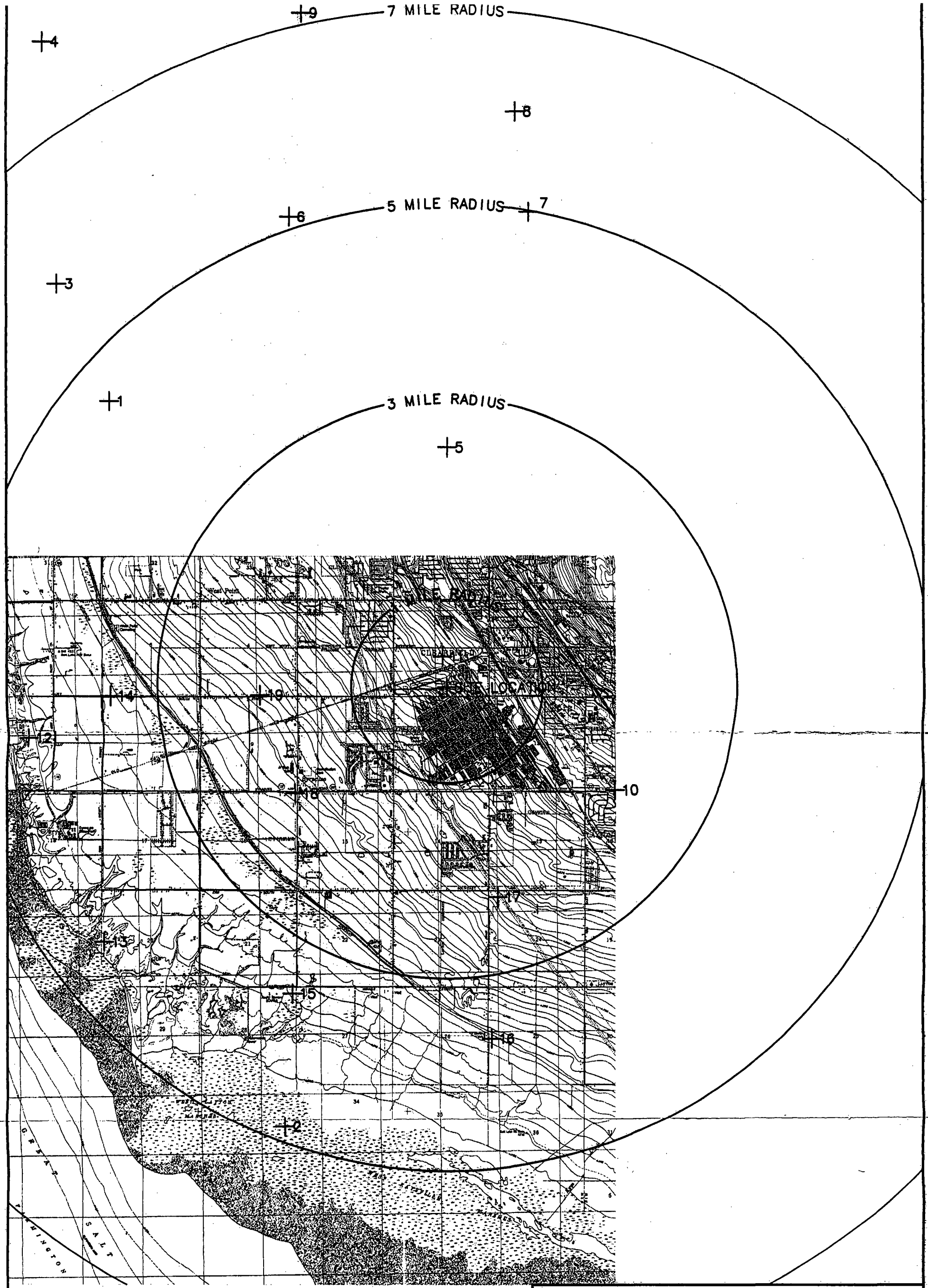
N/A	Yes	No		
	☒	☐	18.	Sufficient volume provided for all analysis requested? (ref. Attachment D of SOP# DEN-QA-0003) If no, document on CUR, and contact PM before proceeding.
☒	☐	☐	19.	Is sufficient volume provided for client requested MS, MSD or matrix duplicates? If no, document on CUR, and contact PM before proceeding.
	☒	☐	20.	Did the chain of custody includes "received by" and "relinquished" by signatures, dates, and times?
☐	☒	☐	21.	Were special log in instructions read and followed?
☒	☐	☐	22.	Were AFCEE metals logged for refrigerated storage?
	☒	☐	23.	Were tests logged checked against the COC? Which samples were confirmed? A4
☒	☐	☐	24.	Was a Rush form completed for quick TAT?
☐	☒	☐	25.	Was a Short Hold form completed for any short holds?
	☐	☒	26.	Is "Strict ICOC" required?
	☐	☒	27.	Were special archiving instructions indicated in the General Comments? If so, what were they?

Labeling and Storage Checks: *Initials* BB

☒	☐	☐	28.	Was the subcontract COC signed and sent with samples to bottle prep?
	☒	☐	29.	Were sample labels double-checked by a second person?
☒	☐	☐	30.	Were sample bottles and COC double checked for dissolved/filtered metals by a second person?
	☒	☐	31.	Did the sample ID, Date, and Time from label match what was logged?
☒	☐	☐	32.	Were stickers for special archiving instructions affixed to each box and to the ICOC? See #27
☒	☐	☐	33.	Were AFCEE metals stored refrigerated?
☒	☐	☐	34.	Were "Strict ICOC" copies given to satellite storage areas?

Document any problems or discrepancies and the actions taken to resolve them on a Condition Upon Receipt Anomaly Report (CUR).

APPENDIX C
NURE Data



+8 # SAMPLE LOCATION

0 5000
SCALE IN FEET

URS

Thresher Square
700 Third Street South
Minneapolis, MN 55415
612.370.0700 Tel
612.370.1378 Fax

SITE LOCATION PLAN
NURE DATA POINT
LOCATIONS
CLEARFIELD, UTAH

DRN BY: JAA	DATE: 01/15/03	PROJECT NO.	FIG. NO.
CHK'D BY: BG	DATE: 01/15/03	52010-125	APP C

PLOT DATE: Jan 15, 2003 2:44pm DISK FILE NAME: (15.08) V:\URS Projects\Ashland Inc\CLFD 46546-040\CADD\GPS-BASEMAP.dwg

Appendix C
National Uranium Reconnaissance Evaluation Data
Ashland Inc. / Clearfield DSO

REC_NO	TAPEFILE	DOELAB	SRLID	LLLID	REPLC	LAT	LONG	STATE	QUAD	MAPCODE	SAMPTYP	SSAMPTYP	SAMPDAT	SAMPLER	GRABS	WTRTEMP	PH	COND	ALK	SCIN	SGEOUNIT	ROCKTYP	SEDTYPE	STRWDTHC	STRDPTHC
5134404	XG0602-01	4	BCDH001S1		000	41.1468	-112.1023	UT	BRIGHAM CITY	NK1207	50	E	79/09/24	082	10	16.0000	7.5000	530.0000	5.8000	55.0000	QTRN	H	K	6	5
5134405	XG0602-01	4	BCDH002S1		000	41.1395	-112.0663	UT	BRIGHAM CITY	NK1207	59	G	79/09/24	082	10					40.0000	QTRN	H	I	D	D
5134406	XG0602-01	4	BCDH003S1		000	41.1642	-112.1121	UT	BRIGHAM CITY	NK1207	59	G	79/09/24	082	10					29.0000	QTRN	H	I	D	D
5134407	XG0602-01	4	BCDH004S1		000	41.2015	-112.1116	UT	BRIGHAM CITY	NK1207	59	G	79/09/24	082	10					40.0000	QTRN	H	I	D	D
5134409	XG0602-01	4	BCDH006S1		000	41.1400	-112.0345	UT	BRIGHAM CITY	NK1207	59	G	79/09/25	082	10					32.0000	QTRN	Z	I	D	D
5134410	XG0602-01	4	BCDH007S1		000	41.1752	-112.0641	UT	BRIGHAM CITY	NK1207	59	G	79/09/25	082	10					34.0000	QTRN	Z	I	D	D
5134411	XG0602-01	4	BCDH008S1		000	41.1763	-112.0187	UT	BRIGHAM CITY	NK1207	59	G	79/09/25	082	10					36.0000	QTRN	Z	I	D	D
5134412	XG0602-01	4	BCDH009S1		000	41.1905	-112.0204	UT	BRIGHAM CITY	NK1207	59	G	79/09/25	082	10					25.0000	QTRN	A	S	D	D
5134415	XG0602-01	4	BCDH012S1		000	41.2054	-112.0631	UT	BRIGHAM CITY	NK1207	59	G	79/09/26	082	10					32.0000	QTRN	Z	I	D	D
5134419	XG0602-01	4	BCDH016S1		000	41.0896	-112.0020	UT	BRIGHAM CITY	NK1207	59	G	79/10/02	082	10					50.0000	QTRN	Z	I	D	D
5134421	XG0602-01	4	BCDH018S1		000	41.1105	-112.0354	UT	BRIGHAM CITY	NK1207	59	G	79/10/09	082	10					50.0000	QTRN	Z	I	D	D
5134424	XG0602-01	4	BCDH021S1		000	41.0899	-112.1181	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					32.0000	QTRN	Z	S	D	D
5134426	XG0602-01	4	BCDH023S1		000	41.0688	-112.1025	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					55.0000	QTRN	Z	S	D	D
5134427	XG0602-01	4	BCDH024S1		000	41.1043	-112.1020	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					42.0000	QTRN	Z	I	D	D
5134428	XG0602-01	4	BCDH025S1		000	41.0601	-112.0641	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					42.0000	QTRN	Z	I	D	D
5134429	XG0602-01	4	BCDH026S1		000	41.0531	-112.0250	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					44.0000	QTRN	Z	I	D	D
5134430	XG0602-01	4	BCDH027S1		000	41.0744	-112.0243	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					44.0000	QTRN	Z	I	D	D
5134431	XG0602-01	4	BCDH028S1		000	41.0895	-112.0641	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					50.0000	QTRN	Z	I	D	D
5134432	XG0602-01	4	BCDH029S1		000	41.1040	-112.0716	UT	BRIGHAM CITY	NK1207	59	G	79/10/04	082	10					32.0000	QTRN	Z	I	D	D

WTRLEVEL	VEGTYPE	VEGDENS	RELIEF	CONTAMC	ANALDATE	U_XX_MTHD	U_XX_PPM	U_DN_PPM	AG_PPM	AL_PCT	AS_PPM	AU_PPM	BA_PPM	BE_PPM	CA_PCT	CD_PPM	CE_PPM	CO_PPM	CR_PPM	CU_PPM	DY_PPM	EU_PPM	FE_PCT	HF_PPM	K_PCT
N	G	M	I	G	80/12/16	SR3-XU	0.8000	1.8000	0.2000	2.1000	1.0000	-0.0100	33.0000	1.0000	0.0400		30.0000	15.0000	35.0000	26.0000	2.0000	-2.0000	0.7700	5.0000	1.4000
D	Z	S	I	F	81/02/13	SR3-XU	0.4000	2.4000	0.6000	3.2400	2.0000	-0.0100	43.0000	1.0000	2.7400		79.0000	-5.0000	20.0000	14.0000	0.1000	-2.0000	1.9600	10.0000	1.7000
D	Z	D	I	F	80/12/16	SR3-XU	0.5000	2.0000	0.2000	3.1300	1.0000	-0.0100	45.0000	2.0000	0.4100		28.0000	5.0000	30.0000	19.0000	2.9000	-2.0000	1.3800	7.0000	1.7000
D	G	D	I	G	81/02/13	SR3-XU	0.4000	2.1000	0.9000	2.6800	2.0000	-0.0100	48.0000	1.5000	3.2000		22.0000	5.0000	20.0000	15.0000		1.5000	1.0600	9.0000	1.6000
D	G	D	I	Z	80/12/16	SR3-XU	0.4000	1.8000	0.4000	1.8600	3.0000	-0.0100	33.0000	1.0000	0.7900		28.0000	-5.0000	20.0000	22.0000	1.6000	-2.0000	1.0200	10.0000	1.5000
D	G	M	I	0	80/12/16	SR3-XU	0.5000	2.5000	0.9000	2.2600	9.0000	-0.0100	60.0000	1.0000	3.8900		28.0000	-5.0000	25.0000	12.0000	0.9000	-2.0000	0.6000	7.0000	1.4000
D	G	M	I	F	80/12/16	SR3-XU	0.5000	2.1000	0.2000	2.6500	1.0000	-0.0100	70.0000	0.5000	0.0800		37.0000	-5.0000	25.0000	17.0000	0.3000	1.3000	1.5600	7.0000	1.6000
D	G	M	I	G	81/02/12	SR3-XU	0.6000	3.4000	0.4000	1.0900	3.0000	-0.0100	68.0000	1.0000	0.0400		48.0000	-5.0000	25.0000	18.0000	3.1000	-2.0000	1.4700	32.0000	1.3000
D	G	D	I	G	81/02/12	SR3-XU	0.6000	1.8000	0.5000	1.6900	1.0000	-0.0100	25.0000	1.0000	0.8600		11.0000	-5.0000	20.0000	18.0000	2.9000	-2.0000	0.8300	6.0000	1.5000
D	Z	M	I	F	80/12/16	SR3-XU	0.6000	1.5000	0.3000	2.7800	6.0000	-0.0100	18.0000	1.0000	1.1000		27.0000	8.0000	30.0000	19.0000	0.3000	1.0000	1.4600	6.0000	1.7000
D	Z	M	I	F	80/12/16	SR3-XU	0.4000	2.5000	0.4000	3.5300	4.0000	-0.0100	53.0000	1.0000	0.7800		34.0000	-5.0000	35.0000	15.0000	2.1000	-2.0000	0.8000	9.0000	1.7000
D	G	M	I	G	80/12/17	SR3-XU	0.4000	2.6000	0.5000	2.8100	4.0000	-0.0100	15.0000	1.0000	1.4300		15.0000	5.0000	20.0000	24.0000	2.7000	-2.0000	0.8900	11.0000	1.7000
D	G	S	I	G	80/12/17	SR3-XU	0.4000	1.6000	0.9000	2.2800		-0.0100	63.0000	1.0000	3.6900		44.0000	-5.0000	20.0000	15.0000		-2.0000	1.2000	4.0000	1.8000
D	G	M	I	G	80/12/17	SR3-XU	0.4000	2.2000	0.8000	2.3200		-0.0100	23.0000	1.5000	2.8900		33.0000	8.0000	20.0000	13.0000		-2.0000	1.1200	8.0000	1.5000
D	G	M	I	G	80/12/17	SR3-XU	0.4000	2.4000	0.6000	3.1800		-0.0100	70.0000	1.0000	1.7600		43.0000	5.0000	20.0000	18.0000	0.4000	-2.0000	1.9700	9.0000	1.5000
D	G	M	I	G	81/02/11	SR3-XU	1.1000	2.1000	0.5000	2.0800		-0.0100	15.0000	1.0000	1.3400		18.0000	-5.0000	25.0000	14.0000	4.6000	-2.0000	-0.5000	10.0000	1.7000
D	Z	M	I	F	81/02/12	SR3-XU	0.5000	2.0000	0.4000	2.2400	1.0000	-0.0100	35.0000	1.5000	0.3100		30.0000	-5.0000	30.0000	18.0000		-2.0000	1.6500	3.0000	1.8000
D	Z	M	I	F	80/12/17	SR3-XU	0.4000	2.2000	0.3000	3.4300	4.0000	-0.0100	33.0000	1.5000	0.2100		65.0000	8.0000	40.0000	18.0000		-2.0000	1.6800	6.0000	1.8000
D	Z	M	I	F	80/12/17	SR3-XU	0.3000	1.8000	0.7000	2.5800	5.0000	-0.0100	25.0000	1.5000	2.9400		12.0000	-5.0000	25.0000	11.0000	1.4000	1.2000	1.4300	5.0000	1.6000

LA_PPM	LI_PPM	LU_PPM	MG_PCT	MN_PPM	MO_PPM	NA_PCT	NB_PPM	NI_PPM	P_PPM	PB_PPM	SC_PPM	SE_PPM	SM_PPM	SN_PPM	TH_PPM	TI_PPM	V_PPM	W_PPM	Y_PPM	YB_PPM	ZN_PPM	METHODS
13.0000	9.0000		0.3450	180.0000	3.0000	0.3000	25.0000	15.0000	700.0000	15.0000	4.0000	2.0000	3.0000	10.0000	7.0000	1200.0000	40.0000	-2.0000	35.0000	-2.0000	48.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
	16.0000		0.2050	450.0000	-2.0000	0.5000	10.0000	10.0000	1100.0000	35.0000	4.7000	2.0000	3.0000	-5.0000	9.0000	2400.0000	40.0000	-2.0000	20.0000	-2.0000	40.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
69.0000	19.0000		0.3350	320.0000	-2.0000	0.5500	10.0000	10.0000	1000.0000	35.0000	2.9000	-1.0000	4.0000	-5.0000	7.0000	1600.0000	50.0000	-2.0000	30.0000	4.3000	58.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
	21.0000		0.4050	360.0000	2.0000	0.4300	5.0000	13.0000	1500.0000	50.0000	5.1000	2.0000	-5.0000	-5.0000	10.0000	1800.0000	40.0000	-2.0000	20.0000	-2.0000	33.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
10.0000	9.0000	0.3000	0.1650	190.0000	3.0000	0.2100	5.0000	8.0000	800.0000	40.0000	2.3000	2.0000	3.0000	10.0000	4.0000	1000.0000		-2.0000	20.0000	-2.0000	68.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
9.0000	9.0000		0.2800	190.0000	-2.0000	0.1600	10.0000	10.0000	700.0000	15.0000	3.5000	1.0000	1.0000	-5.0000	4.0000	500.0000	30.0000	-2.0000	25.0000	-2.0000	28.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
21.0000	15.0000	0.3000	0.0700	350.0000	2.0000	0.4700	10.0000	8.0000	800.0000	25.0000	4.1000	-1.0000	3.0000	-5.0000	9.0000	1400.0000	40.0000	-2.0000	25.0000	2.4000	45.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
	30.0000	0.5000	0.0250	200.0000	2.0000	0.1800	5.0000	-5.0000	800.0000	-10.0000	4.6000	-1.0000	2.0000	-5.0000	8.0000	1700.0000	20.0000	-2.0000	25.0000	-2.0000	53.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
	14.0000		0.2450	280.0000	-2.0000	0.3200	5.0000	8.0000	1000.0000	45.0000	0.7000	-1.0000	-5.0000	-5.0000	5.0000	1600.0000	30.0000	-2.0000	20.0000	-2.0000	100.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
20.0000	17.0000	0.2000	0.2100	2930.0000	2.0000		5.0000	13.0000	800.0000	35.0000	2.4000	-1.0000	3.0000	-5.0000	7.0000	3100.0000	40.0000	-2.0000	30.0000	-2.0000	58.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
14.0000	25.0000	0.2000	0.4100	280.0000	2.0000	0.2300	5.0000	10.0000	1100.0000	45.0000	5.1000	-1.0000	3.0000	-5.0000	4.0000	1300.0000	20.0000	-2.0000	10.0000	-2.0000	55.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
15.0000	23.0000	0.3000	0.6000	180.0000	-2.0000	0.3300	5.0000	8.0000	1300.0000	85.0000	5.6000	-1.0000	3.0000	-5.0000	6.0000	900.0000	10.0000	-2.0000	5.0000	-2.0000	45.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
18.0000	50.0000		0.4000	2970.0000	2.0000		5.0000	13.0000	1400.0000	25.0000	2.6000	1.0000	3.0000	-5.0000	6.0000		30.0000	-2.0000	15.0000	2.3000	33.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
16.0000	21.0000		0.6750	270.0000	-2.0000	0.3200	5.0000	8.0000	1300.0000	35.0000	3.7000	-1.0000	4.0000	-5.0000	5.0000	1700.0000	30.0000	-2.0000	10.0000	2.2000	58.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
28.0000	14.0000	0.4000	0.3850	390.0000	-2.0000	0.5700	5.0000	10.0000	1100.0000	30.0000	4.7000	1.0000	4.0000	-5.0000	9.0000	1600.0000	30.0000	-2.0000	-5.0000	-2.0000	38.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
38.0000	20.0000	0.3000	0.5000	290.0000	-2.0000	0.3000	5.0000	10.0000	1500.0000	40.0000	4.5000	1.0000	2.0000	-5.0000	7.0000	1600.0000	30.0000	-2.0000	-5.0000	6.4000	45.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
	24.0000		0.3750	270.0000	2.0000	0.2600	5.0000	10.0000	1300.0000	35.0000	2.0000	1.0000	3.0000	-5.0000	7.0000	1700.0000	30.0000	2.0000	5.0000	-2.0000	53.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
25.0000	25.0000		0.4100	410.0000	2.0000	0.4000	5.0000	10.0000	900.0000	45.0000	4.8000	1.0000	5.0000	-5.0000	12.0000	1400.0000	30.0000	-2.0000	15.0000	-2.0000	63.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX
19.0000	13.0000	0.2000	0.3950	280.0000	-2.0000	0.3100	5.0000	8.0000	500.0000	35.0000	4.0000	1.0000	3.0000	-5.0000	6.0000	1500.0000	30.0000	-2.0000	5.0000	-2.0000	35.0000	SR1, SR2, SR3-AA;CA;FE;XU;XX

REFORMAT	COMMENTS	COMMENT2
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		
SUPPLEMENTAL ANALYSIS DATA ADDED FROM XG0602-04 RECORD: GOLD VALUE(-.01) ADDED BASED ON GJBX(82)-135 EXPLANATION		

Notes:
All datapoints are within one tenth of a degree of the latitude and longitude of the site.

APPENDIX D

Human Health Risk Assessment Methodology

APPENDIX D
HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

The purpose of the human health risk assessment (HHRA) for the Ashland Clearfield facility (the Facility) is to provide a risk-based interpretation of the data collected during the Phase I and II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and to provide conservative estimates of potential human health risks posed by chemicals that are present in environmental media at the Facility. The data collected during implementation of the Phase I RFI Work Plan (URS Diamond, 2000) and Phase II RFI Work Plan (URS Diamond, 2005) were used to develop the HHRA for the solid waste management units (SWMUs) at the Facility.

1.0 OVERVIEW

In accordance with the Utah Department of Environmental Quality (UDEQ) guidance for Cleanup Action and Risk-Based Closure Standards (Utah Administrative Code [UAC] R315-101), the methodology for developing the HHRA follows guidance presented in the *Risk Assessment Guidance for Superfund: Vol. I Part A – Human Health Evaluation Manual* ("RAGS, Part A", USEPA, 1989) and several more recent regulatory guidance documents and resources as appropriate such as:

- *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (OSWER 9355.4-24, December 2002) (USEPA, 2002a)
- *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment* ("RAGS, Part E", USEPA/540/R/99/005, OSWER 9285.7-02EP, PB99-963312, July 2004) (USEPA, 2004a)
- *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites* (OSWER 9285.6-10 December 2002) (USEPA, 2002b)

The approach for developing an HHRA for the Facility incorporated the following fundamental components:

- Data Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization
- Uncertainty Analysis

As discussed in Section 3.1.1 of the Phase I RFI Work Plan (URS Diamond, 2000), the HHRA was completed using actual exposure scenarios defined for the Facility.

The HHRA focuses on SWMUs, environmental media and constituents of concern (COCs) identified by UDEQ as requiring further evaluation subsequent to the Phase I RFI (per UDEQ's September 22, 2004 and February 14, 2005 correspondence). The Phase I RFI included a

detailed screening risk assessment and served to identify COCs in specific environmental media as Facility SWMUs. UDEQ indicated that COCs requiring further evaluation were as follows:

- Tetrachloroethylene (PCE) in soil at SWMUs 2, 3, 5, and 10
- PCE in groundwater at SWMU 7
- Dibenz(a,h)anthracene (D[a,h)A) and benzo(a)pyrene (B[a]P) at SWMU 4

Therefore, the HHRA will focus on data relative to these COCs collected during the Phase I and II RFI.

1.2 RISK ASSESSMENT

SWMUs containing chemical concentrations that exceed screening values (e.g. soil screening levels [SSLs] for soil and maximum contaminant levels [MCLs] for groundwater) require an HHRA as outlined in Section IV.J in the Hazardous Waste Permit for the Facility (UDEQ, 1997). The HHRA is a site-specific evaluation of a SWMU or a combination of several SWMUs. The evaluations included varying degrees of sophistication depending on the SWMU conditions and the nature and extent of impact as indicated below.

- If a SWMU or area poses a risk less than 1E-6 for carcinogens and a hazard index (HI) of less than 1 for noncarcinogens, then a No Further Action (NFA) petition is submitted to UDEQ.
- If the SWMU or area poses a cancer risk greater than 1E-6 for carcinogens, then the mitigation of potential risks are addressed using a Site Management Plan (SMP).
- If a SWMU or area poses a risk to human health greater than 1E-4 or an HI greater than one using the actual exposure scenario, then a Corrective Action Plan (CAP) is required.

2.0 DATA EVALUATION AND IDENTIFICATION OF CONSTITUENTS OF PRELIMINARY CONCERN

Presented in this appendix is detailed information regarding the approach that was used for developing an HHRA for the Facility.

2.1 DATA EVALUATION

One of the first steps of the HHRA process is to review data collected for previous investigations to develop a data set to support the Facility-specific HHRA. The analytical data from the Facility was reviewed to:

(1) Validate and organize sampling data that are of acceptable quality for their use in the detailed HHRA; and

(2) Identify COCs for the Facility.

Presented below is detailed information with respect to the methods that was used for the data quality evaluation.

2.2 DATA REVIEW PROTOCOL

The data review task included efforts related to the compilation of available analytical and field data for the Facility. The data from Phase I and Phase II RFIs were reviewed to:

- Identify the nature and extent of COCs; and
- Evaluate data usability, including any uncertainties associated with the data.

Described below is information relative to the methods that was used to develop a data set to support the development of the Facility-specific HHRA.

2.2.1 Qualified Data

Qualifiers pertaining to uncertainty in the identity or the reported concentration of an analyte may be assigned to certain analytical data by the laboratories or by persons performing data validation. Presented below is information with respect to the use of qualified data in the HHRA.

QUALIFIER	DEFINITION	USE OF QUALIFIED DATA IN HHRA?
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit (SQL).	If the analyte is selected as a COC, then it will be assumed to be present at one-half the SQL.
J	The analyte was positively identified; however, the associated numerical value is an estimate of the concentration of the analyte in the sample.	If the analyte is selected as a COC, it will be assumed to be present at the estimated concentration.

QUALIFIER	DEFINITION	USE OF QUALIFIED DATA IN HHRA?
UJ	The analyte was not detected above the reported SQL. However, the reported SQL is an estimate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.	If the analyte is selected as a COC, then it will be assumed to be present at one-half the SQL.
R	The sample results are rejected and are, therefore, unusable due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.	Data will be excluded from the quantitative HHRA.

2.2.2 Duplicate Results

Listed below are methodologies that were used to select the concentration term from duplicate analytical sampling results:

- If a chemical was detected in both samples, the average of measured concentrations was used as the concentration term.
- If a chemical was detected in one sample, then the measured concentration was selected as the concentration term, regardless of whether it was detected in the original or duplicate sample.
- If both duplicate samples were non-detect, then one-half of the lower reporting limit was adopted as the concentration term.

2.3 DATA TABULATION

The validated analytical results are presented in Tables 7 through 9 for soil and Tables 10 through 12 for groundwater in this Phase II RFI Report. Summary tables prepared in accordance with the format recommended in *RAGS, Part A* (USEPA, 1989), to present relevant statistical data, such as the frequency of detection, detection limits, the range of detected concentrations, the distribution of data set and the source term concentrations to be used in the HHRA are presented in Table D-1a and D-1b.

2.4 IDENTIFICATION OF PRELIMINARY CHEMICALS OF CONCERN

Although many chemicals might be identified in the environmental samples collected for RFIs, the results of an HHRA are often driven by a few chemicals and exposure pathways. To streamline the risk-based evaluation process, several methods have been developed by the regulatory agencies and the scientific community for the identification of chemicals and pathways that contribute significantly to the total risks posed by a site. For this Facility, only those chemicals with concentrations exceeding readily-available screening values (e.g., USEPA SSLs for soil and MCLs for groundwater) and inorganic background concentrations were evaluated further in the HHRA. This approach is outlined in Section IV.E of the Hazardous Waste Permit (UDEQ, 1997) and UAC R315-101. The detailed evaluation was provided in the

Phase I RFI (URS, 2003). Subsequent to the RFI, UDEQ identified the constituents PCE in soil and groundwater and B(a)P and D(a,h)A in soil as requiring further evaluation to support completion of the RFI. These compounds serve as the COCs selected for evaluation in the HHRA.

2.4.1 Risk-based Screening Approach

Evaluation of the data for the COCs from the Phase I and II RFI required development of appropriate exposure point concentrations (EPCs). The lesser of the maximum detected concentration and the 95% upper confidence limit of the arithmetic mean (95%UCL) of a chemical was selected as the EPC. The methodology used to calculate the 95% UCL is presented in the following paragraphs.

2.4.1.1 Calculation of 95%UCL

The approach used for computing the 95% UCL is consistent with the guidance provided in USEPA (2002b). The latest version of USEPA's ProUCL software was used as a tool for calculating the 95% UCL (USEPA, 2004b). ProUCL computes multiple statistics, and presents a recommendation for the appropriate exposure concentration. However, there are limitations to the application of ProUCL. Specifically, the currently available ProUCL does not consider nondetects in distribution testing and subsequent derivation of UCLs (although integration of nondetects is reportedly under development by USEPA). Therefore, manual modifications were made to the decision logic in ProUCL, which include the following:

- For purposes of calculating the 95% UCL, one-half of the SQL was adopted as surrogate values to represent nondetects.
- For data sets in which greater than 50% of the data are nondetects, non-parametric statistics were used to determine the 95% UCL, regardless of the value recommended in ProUCL.

Tables D-2 to D-5 present the output statistics generated by ProUCL.

3.0 EXPOSURE ASSESSMENT

Exposure assessment involves the identification of the potential human exposure pathways at the Facility based on the current and potential future land use scenarios. The exposure pathways link the sources, locations, types of environmental releases, and environmental fate with receptor locations and activity patterns. Generally, an exposure pathway is considered complete if it consists of the following four elements:

- A source and mechanism of release;
- A transport medium;
- An exposure point (i.e., point of potential contact with a potentially impacted medium); and
- An exposure route (e.g., ingestion) at the exposure point.

As outlined in Section 3.1.1 of the Phase I RFI Workplan, potential current and future use scenarios were presented. However, only complete exposure pathways were selected for a quantitative evaluation. Justifications for those scenarios and exposure pathways not evaluated in the HHRA are also provided in Section 3.1.1 of the Phase I Workplan (URS Diamond, 2000) and Section 5 of this report.

3.1 HUMAN HEALTH CONCEPTUAL FACILITY MODEL

The first step in the exposure assessment is to characterize areas to be evaluated in the HHRA with respect to its physical characteristics as well as those of the potential human populations at or near a site. Information gathered in this step will be used to support the identification and selection of exposure pathways that warrant further evaluation in the Facility-specific HHRA.

3.1.1 Known and Suspected Sources of COCs and Release Mechanisms

Based on information with respect to the history of the Facility and the results of the RFIs, the potential sources of COCs were primarily associated with past industrial operations. It is not clear that all constituent detections at the property are directly related to Facility operations alone as baseline environmental conditions were not determined for the beginning and end of the periods of use for all historical property owners and operators. Ashland leased the Facility in 1982 after the property was utilized for 40 years as part of a US Navy Supply Depot and more recently after 20 years as a railroad round house where locomotive servicing and repair was conducted. While the Facility has operated with close supervision from USEPA and UDEQ, previous operations at the property were conducted during timeframes when environmental practices and regulations were less formalized, if available or followed at all.

As to potential source and release mechanisms, the location and environmental media must be considered for the COCs. COCs were detected in subsurface soil and groundwater. Subsurface soil and groundwater may act as secondary sources of COCs through mechanisms such as leaching from soil to groundwater and wind and mechanical erosion of chemicals in soil (i.e., if subsurface soils are exposed during excavation).

3.1.2 Retention or Transport Media

Soil is the primary medium of interest, as direct releases to groundwater have not been demonstrated in the Phase I and II RFI. Dust could be considered a potential transport medium in the case where COCs in uncovered soil may become entrained in fugitive dust.

3.1.3 Transport Pathways

Further evaluation of release mechanisms and transport pathways on a SWMU-by-SWMU or a Facility-wide basis depending upon the exposure medium was conducted using the findings of the Phase I and II RFI. From a soils perspective, COCs were detected in subsurface soils and groundwater. Listed below are potential cross-media transfer mechanisms of COCs that can be conservatively identified:

- COCs in subsurface soil may enter groundwater.
- COCs in subsurface soil exposed during excavation activities may be transported to the atmosphere via volatilization or fugitive dust emission.

3.1.4 Receptors and Exposure Scenario

The Facility is part of a large manufacturing and industrial storage complex (Freeport Center) and is expected to remain as an industrial use area in the future. A chain-link fence restricts access to the Facility on a 24 hour basis. Facility access is limited by security protocols. The Facility and, more specifically, the SWMUs of interest, are paved or covered and do not contain subsurface structures (i.e., basements or crawlspaces where Facility visitors would work or enter into). Potential current and future human receptor populations include:

- Authorized visitors
- Ashland on-site workers
- Contract construction workers

The text below outlines the rationale for inclusion or exclusion of the potential receptors in the HHRA.

3.1.4.1 Potential Exposure to COCs in Soil and Groundwater

Industrial/Commercial Land Use Scenario: Authorized Visitors
Exposure is primarily limited to personnel working at the Facility and individuals permitted to enter the area. Risks to authorized visitors potentially exposed to soil or groundwater at the Facility would be less than those risks associated with on-site workers or construction workers because authorized visitors to the Facility would be present on a limited basis. In addition, visitors must wear appropriate personal protective equipment and follow the Facility's procedures regarding health and safety to mitigate the potential for exposure. In general, visitors would not be expected to come in contact with subsurface soils or groundwater at the SWMUs as groundwater is not utilized for potable or non-potable purposes and soils are covered or paved at

the Facility (i.e., the potential pathway is incomplete). Therefore, authorized visitors were not evaluated in the HHRA for the Facility.

Industrial/Commercial Land Use Scenario: Ashland On-site Workers
On-site workers are defined as current and future industrial/commercial employees who might be exposed to chemicals in surface soil or groundwater while performing non-intrusive, operational activities. Because SWMUs are generally covered by pavement and structures and groundwater at the SWMUs is not utilized for potable or non-potable purposes, exposure to surface soil and groundwater is considered incomplete. Workers are not involved in intrusive or subsurface activities. Therefore, there is no exposure to subsurface soil or groundwater (i.e., the potential pathway is incomplete). The on-site worker receptor was not quantitatively evaluated for the HHRA.

Industrial/Commercial Land Use Scenario: Contract Construction Workers
As indicated soils at the SWMUs are largely covered or paved and groundwater is not utilized for potable or non-potable purposes at the facility. Therefore, exposure to COCs in subsurface soil or groundwater would require subsurface intrusive or excavation activities for soils to be uncovered or groundwater to be encountered. It was conservatively assumed that construction activities could occur at the Facility and it is possible for construction workers to be exposed to COCs detected in subsurface soil and groundwater via incidental ingestion, inhalation, and dermal contact.

3.2 QUANTITATION OF CHEMICAL INTAKE

Integration of data gathered in the exposure assessment (i.e., the extent, frequency, and duration of exposure for the receptors) into a quantitative expression of chemical-specific intake is necessary to perform a quantitative HHRA.

The potential for human receptors to be exposed to COCs in environmental media through relevant routes of exposure (e.g., inhalation, ingestion and dermal contact) were evaluated. Exposure pathways considered not to be applicable, based on Facility-specific information, were excluded from the quantitative evaluation in the HHRA. Rationale for the elimination of exposure pathways are discussed in detail in Section 3.1.1 of the Phase I RFI Work Plan (URS Diamond, 2000) and summarized in Section 3.1.4 of this appendix.

Described below is the basic equation used to calculate the intake of COCs by human receptors (USEPA, 1989):

$$DI = \frac{C \times IR \times EF \times ED}{BW \times AT}$$

Where:

DI	=	Daily intake (mg of chemical per kg of body weight per day)
C	=	Concentration of a COC (e.g., mg/kg in soil, mg/L in water)
IR	=	Intake rate; the amount of impacted medium contacted over the exposure period (e.g., mg/day for soil, L/day for water and m^3/day for air)
EF	=	Exposure frequency; describes how often exposure occurs (days/year).
ED	=	Exposure duration; describes how long exposure occurs (years).

BW = Body weight; the average body weight over the exposure period (kg)
AT = Averaging time; period over which exposure is averaged (days)

Each of the intake variables in the above equation consists of a range of values in the literature. A reasonable maximum exposure (RME) scenario, which represents the maximum exposure that is reasonably likely to occur, was calculated using the 95% UCL concentrations of COCs and a combination of the mean and upper-bound exposure parameters over an appropriate exposure area.

4.0 TOXICITY ASSESSMENT

The toxicity assessment provides a framework for characterizing the relationship between the magnitude of exposure to a COC and the nature and likelihood of adverse health effects that may result from such exposure. In an HHRA, chemical toxicity is typically divided into two categories: carcinogenic and non-carcinogenic effects. Potential health effects are evaluated separately for these two categories, because their toxicity criteria are based on different mechanistic assumptions and associated risks are expressed in different units. Provided in this subsection is an overview of the methodology that was used to develop a toxicity assessment as part of the HHRA for the Facility.

4.1 SOURCES OF TOXICITY INFORMATION

Pertinent toxicological and dose-response information for COCs were selected from the following sources in order of preference, in accordance with USEPA guidance (USEPA, 2003):

- Tier 1 – Integrated Risk Information System (IRIS), available on-line (USEPA, 2005)
- Tier 2 – USEPA's Provisional Peer-Reviewed Toxicity Values (PPRTVs)
- Tier 3 – Other Toxicity Values (e.g., California Environmental Protection Agency, The Agency for Toxic Substances and Disease Registry, and USEPA's Health Effects Assessment Summary Tables [USEPA, 1997]).

4.2 METHODOLOGY FOR EVALUATING CARCINOGENIC EFFECTS

For purposes of assessing risks for potential carcinogens, USEPA has adopted the science policy position of "no-threshold," i.e., there is essentially no level of exposure to a carcinogen that will not result in some finite possibility of tumor formation. This approach requires the development of dose-response curves correlating risks associated with given levels of exposure. Linear dose-risk response curves are generally assumed.

Carcinogenic risks associated with a given level of exposure to potential carcinogens are typically extrapolated based on slope factors (SFs) or unit risks. SFs are the upper 95% confidence limit of the slope of the dose-response curve, expressed in terms of risk per unit dose (given in $[\text{mg/kg-day}]^{-1}$). Unit risks relate the risk of cancer development with the concentration of a carcinogen in the given environmental medium, expressed as either risk per unit concentration in air (given in $[\mu\text{g/m}^3]^{-1}$) or drinking water (given in $[\mu\text{g/L}]^{-1}$).

Current USEPA guidance for calculating a dermal SF is to adjust the oral SF with an oral absorption factor specific for that chemical. It should be noted that the oral absorption factor used in the calculation refers to absorption of the chemicals in the species upon which the SF is based; i.e., generally not absorption data in humans.

The equation for extrapolation of a default dermal SF is as follows:

$$\textit{Default Dermal SF}\left([\textit{mg/kg - day}]^{-1}\right) = \textit{Oral SF}\left([\textit{mg/kg - day}]^{-1}\right) \div \textit{Oral Absorption Factor}\,(\%)$$

4.3 METHODOLOGY FOR EVALUATING NON-CARCINOGENIC EFFECTS

The USEPA has adopted the science policy position that protective mechanisms (such as repair, detoxification, and compensation) must be overcome before the adverse systemic health effect is manifested. Therefore, a range of exposures exists from zero to some finite value that can be tolerated by the organism without appreciable risk of expressing adverse effects.

The approach used by the USEPA to gauge potential non-carcinogenic effects is to identify the upper boundary of the tolerance range (threshold) for each chemical and to derive an estimate of the exposure below which adverse health effects are not expected to occur. Such an estimate calculated for the oral route of exposure is an oral reference dose (RfD), and for the inhalation route of exposure is an inhalation reference concentration (RfC). The oral RfD is typically expressed as mg chemical per kg body weight per day (mg/kg-day), and the inhalation RfC is usually expressed in terms of concentration in the air (i.e., mg chemical per m^3 of air). However, for purposes of the Facility-specific HHRA, inhalation RfC values can be converted to units of dose by multiplying by the inhalation rate (20 m^3/day, an upper-bound estimate for combined indoor-outdoor activity) and dividing by the body weight (70 kg, average body weight), as detailed in the following equation:

$$\textit{Inhalation RfD}\,(mg/kg\text{ - }day) = RfC\,(mg/m^3) \times 20\ m^3/day \div 70\ kg$$

Currently, two types of oral RfDs/inhalation RfCs are available from the USEPA, depending on the length of exposure being evaluated, chronic and subchronic. Chronic oral RfDs/inhalation RfCs are specifically developed to be protective for long-term exposure to a chemical, and are generally used to evaluate the non-carcinogenic effects associated with exposure periods between seven years (approximately 10 percent of a human lifetime) and lifetime. Subchronic oral RfDs/inhalation RfCs are useful for characterizing potential non-carcinogenic effects associated with shorter-term exposures. Current USEPA guideline requires that subchronic oral RfDs/inhalation RfCs be used to evaluate the potential non-carcinogenic effects of exposure periods between two weeks and seven years (USEPA, 1989).

Toxicological criteria specifically derived for gauging potential human health effects associated with the dermal route of exposure have not been developed by USEPA. For purposes of the HHRA, default dermal RfD values will be extrapolated from oral RfDs in accordance with the current USEPA guidance (USEPA, 1989), if:

- Health effects following exposure are not route-specific.
- Portal-of-entry effects (e.g., dermatitis associated with dermal exposure and respiratory effects associated with inhalation exposure) are not the principal effects of concern.

Exposures with the dermal route are generally calculated as absorbed doses, while oral RfDs are expressed as administered doses. Therefore, adjustments are necessary to match the dermal exposure estimates with the oral RfDs. Current USEPA guidance is to adjust the oral RfD with oral absorption factor (i.e., percent chemical that is absorbed) to extrapolate a default dermal RfD (USEPA, 1989; USEPA 2004a). It should be noted that the oral absorption factor used in the calculation refers to absorption of the chemicals in the species upon which the reference dose is based; (i.e., generally not absorption data in humans).

The equation for extrapolation of a default RfD is as follows:

$$\textit{Dermal RfD}\,(mg/kg\text{ - }day) = \textit{Oral RfD}\,(mg/kg\text{ - }day) \times \textit{Oral Absorption Factor}\,(\%)$$

5.0 RISK CHARACTERIZATION

In this step of the HHRA, information obtained from the exposure and toxicity assessments were integrated to characterize the potential risks posed by COCs selected for the HHRA.

5.1 RISK FOR INDIVIDUAL COCs

The methods that were used for characterizing risk potentially associated with exposure to individual COCs are briefly outlined as follows:

5.1.1 Carcinogenic Effects

Potential risks for carcinogenic effects are typically estimated by calculating incremental lifetime cancer risk (CR) as a result of exposure to carcinogens. Calculation of a CR for an exposure pathway involves multiplying the chronic daily intake for each chemical by its upper-bound cancer slope factor, as described by the following equation (USEPA, 1989):

$$CR = CDI \times SF$$

Where:

CR	=	Cancer risk (unitless).
CDI	=	Chronic daily intake of chemicals (expressed in mg/kg-day);
SF	=	Slope factor (expressed in $[mg/kg\text{-}day]^{-1}$); Chemical-specific SF values were used in the calculation if available, values extrapolated from a surrogate were used, if appropriate.

For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper-bound lifetime CR to an individual of between one in ten thousand (10^{-4}) and one in a million (10^{-6}).

5.1.2 Noncarcinogenic Effects

Potential risks for noncarcinogenic effects are typically estimated by calculating the hazard quotient (HQ) for each COC, using the following equation:

$$HQ = \frac{CDI}{RfD}$$

Where:

HQ	=	Hazard quotient (unitless).
CDI	=	Chronic daily intake of chemicals (expressed in mg/kg-day).
RfD	=	Reference dose (expressed in mg/kg-day); chemical-specific RfD values will be used in the calculation if available, values extrapolated from a surrogate will be used, if appropriate.

5.2 RISK FOR CUMULATIVE COCs

The methodology used for characterizing potential risk for exposures to multiple chemicals is briefly outlined as follows:

1. Organize outputs of exposure and toxicity assessments by the duration and route of exposure for each receptor population.

   The total upper-bound excess lifetime CRs and the HQs were tabulated separately for each COC.

2. Quantify total carcinogenic and noncarcinogenic risks for each pathway by summing the risks estimated for each COC.

   The total upper-bound excess lifetime CR for each pathway was obtained by summing CRs calculated for individual COCs. For known or suspected carcinogens, exposure levels that represent an excess upper-bound lifetime cancer risk to an individual greater than 10^{-6} are addressed as outlined in Section 1.2 of this appendix and the Hazardous Waste Permit for the Facility (UDEQ, 1997).

   The sum of the HQs of all COCs under consideration is termed the HI. The HI is a useful reference point for gauging the potential noncarcinogenic effects of environmental exposures to complex exposures. In general, an HI that is less than or equal to one is regarded as not likely to be associated with any health risks, and is, therefore, less likely to be of regulatory concern as compared to hazard indices greater than one. However, a conclusion should not be categorically drawn that all HI's greater than one are "unacceptable" because of the following reasons:

   ⇒ There is perhaps one order of magnitude or greater uncertainty inherent in estimates of oral RfDs and inhalation RfCs due to the conservative approach used to derive these estimates.

   ⇒ There are uncertainties related to the assumption that individual HQ's are additive.

   Therefore, if the HI exceeds one, the HI will be re-calculated by segregating the chemicals into subgroups based on the target organs affected and the mechanism of action. However, for this HHRA this step was unnecessary because the HI is considerably less than 1.

3. Estimate overall risks that affect each population over the same time period by combining risks across pathways.

   Risks were combined across different pathways that are likely to affect the same population over the same time periods to address the possibility of a population that is exposed to more than one pathway.

Table D-6 to D-8 present the risk calculations for the construction worker potentially exposed to B(a)P and D(a,h)A in soil, PCE in soil, and PCE in groundwater, respectively.

6.0 UNCERTAINTY ANALYSIS

The objective of conducting an uncertainty analysis is to evaluate the assumptions and uncertainties inherent in the HHRA to place the results of the risk estimate in proper perspective. Presented below are the types of uncertainties that were evaluated in the HHRA report.

6.1 DATA EVALUATION

Uncertainties associated with the data validation process are discussed to identify key issues, if any, that contribute most to the overall quality of the analytical data evaluated in the HHRA.

The QA/QC review (Appendix B) indicated that the data are acceptable for the purpose of evaluating potential impacts of tetrachloroethene in soil and groundwater at this site.

6.2 EXPOSURE ASSESSMENT

Uncertainties associated with the findings of the exposure assessment may result from several sources. For this Facility, exposure assessment uncertainties include:

- Groundwater samples were collected as grab samples. Therefore, the concentrations of chemicals in these samples are expected to be higher than concentrations found in developed monitoring wells. The use of grab sample data is likely to result in an overestimate of risks potentially posed by PCE in groundwater.
- The use of the maximum detected concentration of PCE in groundwater to estimate construction worker risk. This is a conservative approach because the concentration of groundwater construction workers might contact could be significantly lower than the maximum concentration because PCE was a COC for SWMU 7 only. It was nondetect or present at low levels at the remaining Facility SWMUs.
- Conservative assumptions regarding exposure scenarios (e.g., land use, exposed populations, activity patterns) for the construction worker exposed to groundwater. The Soil and Water Management Plan (SWMP) implemented by Ashland for the Facility defines the required work practices to be used to minimize exposure if groundwater is encountered during excavation activities. Although the SWMP ensures that construction workers would not contact groundwater, this pathway was quantified for an informational purpose.
- Applicability and assumptions of models selected to predict the fate and transport of COCs in the environment. For this HHRA, it was conservatively assumed that chemicals present in soil and groundwater did not undergo biodegradation and natural attenuation.
- Exposure parameters for estimating intake of COCs in soil and groundwater were mostly default values recommended by USEPA and most likely overestimate the actual exposures for construction workers at the site.

6.3 TOXICITY ASSESSMENT

The following sources of uncertainties associated with the results of a toxicity assessment:

- Uncertainty inherent in the standard risk evaluation process, e.g., the default approach for deriving dermal toxicity criteria. Currently there are no toxicity values available to evaluate the dermal exposure pathway. Therefore, oral RfDs and oral SFs are used to assess systemic toxicity from dermal exposures. When oral toxicity values for systemic effects are applied to dermal exposures, uncertainty in the risk assessment is introduced because differences in the mechanisms of action between the oral and dermal exposures are not taken into account. Use of oral toxicity factors can result in the over- or underestimation of risk, depending on the chemical. It is not possible to make a general statement about the direction or magnitude of this uncertainty.
- Uncertainty common to current agency guidance on the risk evaluation, e.g., the use of animal data to extrapolate toxicity values necessary for estimating risk for human receptors.

6.4 RISK CHARACTERIZATION

Level of confidence in the results of the risk characterization were analyzed in light of uncertainties associated with the data validation, exposure assessment and toxicity assessment in an attempt to identify the following:

- Major COCs and pathways driving the risks
- Major factors that may reduce the uncertainty associated with the results of the risk characterization

The overall confidence of the conclusions made for this Facility-specific HHRA is high because the approach used to select EPCs, exposure pathways, and exposure parameters used to estimate risk and hazard are inherently conservative and are not likely to underestimate risk to receptors potentially exposed to chemicals in soil and groundwater at the Facility.

7.0 REFERENCES

Ashland Distribution Company. 2002. Response to Utah DEQ Comments on the RFI Workplan, Workplan Addendum, Ashland Chemical, Inc. July.

Utah Department of Environmental Quality (UDEQ). 1997. Hazardous Waste Storage Permit. Ashland Distribution Company. Freeport Center, Clearfield Utah. August 8, 1997.

UDEQ. 2001. 315 Utah Administrative Code. 101.

UDEQ. 2002. Approval of the RFI Workplan and RFI Workplan Addendum for the Ashland Distribution Facility located in Clearfield, Utah. July.

UDEQ. 2004. Comments on Phase I RCRA Facility Investigation Report. September.

UDEQ. 2005a. Request for Extension of Response to Comments on Phase I RCRA Facility Investigation Report. February.

UDEQ. 2005b. Approval of RCRA Facility Investigation Phase II Work Plan. May.

URS Diamond. 2000. Phase I RCRA Facility Investigation Workplan Ashland Distribution Company Clearfield, Utah Facility. June.

URS Diamond. 2003. Phase I RCRA Facility Investigation Report Ashland Distribution Company Clearfield, Utah. January.

URS Diamond. 2005. RCRA Facility Investigation Phase II Work Plan Ashland, Inc. – Clearfield, Utah. April.

US Environmental Protection Agency (USEPA), 1989. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part A.* USEPA/540/R/99/005, OSWER 9285.7-02EP, PB99-963312. November 1989.

USEPA, 1997. *Health Effects Assessment Summary Table.* Office of Research and Development. Solid Waste and Emergency Response. USEPA-540-R-97-036. July 1997.

USEPA, 2002a. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Solid Waste and Emergency Response. OSWER 9355.4-24. December 2002.

USEPA, 2002b. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites.* OSWER 9285.6-10. December 2002.

USEPA 2003. *Human Health Toxicity Values in Superfund Risk Assessments.* Office of Solid Waste and Emergency Response. OSWER Directive 9285.7-53. December 2003.

USEPA, 2004a. *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment.* USEPA/540/R/99/005, OSWER 9285.7-02EP, PB99-963312. July 2004

USEPA, 2004b. ProUCL Software for Calculating Upper Confidence Limits (UCLs). Technical Support Center for Monitoring and Facility Characterization . Version 3.00.02 Registration. On-line. http://www.epa.gov/nerlesd1/tsc/form.htm.

USEPA, 2005. *Integrated Risk Information System.* On-line. http://www.epa.gov/iris/.

U.S. Geological Survey, 2001. Reformatted data from the National Uranium Resource Evaluation (NURE) Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) Program. Open File Report 97-492.

Table D-1a
Analytical Data Used for Human Health Risk Assessment
All Soil Depths
Ashland – Clearfield, Utah

Sample ID	Sample Depth (feet)	Tetrachloroethene Result[a] (ug/kg)		Benzo(a)pyrene Result[a] (ug/kg)	Dibenz(a,h)anthracene Result[a] (ug/kg)
BH001	4.5'-6'	2.8	U	NS	NS
BH002	4'-5'	100	J	NS	NS
BH003	2'-4'	2.7	U	NS	NS
BH003	6'	4.75	U	NS	NS
BH004	2.5'-4.5'	3.05	U	NS	NS
BH005	5'-6'	300		NS	NS
BH006	2.5'-3.5'	2.95	U	NS	NS
BH007/D	3.5'-4.5'	3.95	J	165 U	165 U
BH008	3.5'-4.5'	3.05	U	930	370
BH009	3'-4'	1.9	J	165 U	165 U
BH010	4'-6'	53	J	200 U	200 U
BH011	6'-7'	3	U	NS	NS
BH012	6'-7.5'	3.05	U	NS	NS
BH012	9'	3.05	U	NS	NS
BH013	3.5'-4'	5.8		NS	NS
BH013	12'	290	J	NS	NS
BH014	4'-5'	3.1	U	NS	NS
BH015	5'-6'			NS	NS
BH016	3.5'	200	J	NS	NS
BH016	8'	4	U	NS	NS
BH-A	1'-2'	0.28	J	NS	NS
BH-A	5'-6'	0.1	U	NS	NS
BH-B	1'-2'	0.2	J	NS	NS
BH-B	5'-6'	0.105	U	NS	NS
BH-C	11'-12'	16.5	U	NS	NS
BH-D	11'-12'	16.5	U	NS	NS
BH002	4'-5'	0.105	U	NS	NS
BH002	7'-8'	0.105	U	NS	NS
BH-9A	5'-6'	0.1	U	NS	NS

Average Detected Concentration	95.5	930	370
Minimum Detected Concentration	0.2	930	370
Maximum Detected Concentration	300	930	370
Number of Samples Analyzed	28	4	4
Number of Detections	10	1	1
Percentage of Samples with no PCE Detections	64	75	75

Notes:

All concentration units are micrograms per kilogram (ug/kg).

[a] Results presented included detected results and one half the sample quantitation limit for nondetect results.

NS – Not sampled.

U – Chemical not detected

J – Estimated result

Table D-1b
Analytical Data Summary for Tetrachloroethene, Benzo(a)pyrene, and Dibenz(a,h)anthracene in Soil
Ashland – Clearfield, Utah

Chemical	Frequency of Detection	Detected Concentration		Average	Calculated[a] UCL Concentration	UCL Basis	Exposure Point Concentration	Rationale for Selection
		Minimum	Maximum					
Volatile Organic Compounds (µg/kg)								
Tetrachloroethene	10 / 28	0.2	300	95.5	194	99% Chebyshev (Mean, Sd) UCL	194	UCL less than maximum detected concentration.
Semivolatile Organic Compounds (µg/kg)								
Benzo(a)pyrene	1 / 4	930	930	930	1187	95% Chebyshev (Mean, Sd) UCL	930	Maximum detected concentration less than UCL.
Dibenz(ah)anthracene	1 / 4	370	370	370	429	Approximate Gamma UCL	370	Maximum detected concentration less than UCL.

Notes:

[a] Upper confidence limit (UCL) concentrations calculated using USEPA's ProUCL software (USEPA, 2003).

Table D-2
Tetrachloroethene ProUCL Output
Ashland – Clearfield, Utah

Raw Statistics	
Number of Valid Samples	28
Number of Unique Samples	21
Minimum	0.1
Maximum	300
Mean	36.576607
Median	3.05
Standard Deviation	83.923464
Variance	7043.1478
Coefficient of Variation	2.2944573
Skewness	2.5851742

Gamma Statistics	
k hat	0.2873548
k star (bias corrected)	0.2803763
Theta hat	127.28728
Theta star	130.45542
nu hat	16.091868
nu star	15.701072
Approx.Chi Square Value (.05)	7.7504717
Adjusted Level of Significance	0.0404
Adjusted Chi Square Value	7.4056566

Log-transformed Statistics	
Minimum of log data	-2.302585
Maximum of log data	5.7037825
Mean of log data	1.1827974
Standard Deviation of log data	2.4093895
Variance of log data	5.8051578

RECOMMENDATION

Data are Non-parametric (0.05)

Use 99% Chebyshev (Mean, Sd) UCL

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.4848975
Shapiro-Wilk 5% Critical Value	0.924
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	63.590832

Gamma Distribution Test	
A-D Test Statistic	2.3616212
A-D 5% Critical Value	0.8596734
K-S Test Statistic	0.2969121
K-S 5% Critical Value	0.1799791
Data do not follow gamma distribution at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	74.097678
Adjusted Gamma UCL	77.547743

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.8995045
Shapiro-Wilk 5% Critical Value	0.924
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	494.25233
95% Chebyshev (MVUE) UCL	158.23311
97.5% Chebyshev (MVUE) UCL	208.09421
99% Chebyshev (MVUE) UCL	306.03669

95% Non-parametric UCLs	
CLT UCL	62.664058
Adj-CLT UCL (Adjusted for skewness)	70.943396
Mod-t UCL (Adjusted for skewness)	64.882241
Jackknife UCL	63.590832
Standard Bootstrap UCL	62.344457
Bootstrap-t UCL	84.527194
Hall's Bootstrap UCL	64.13469
Percentile Bootstrap UCL	63.687857
BCA Bootstrap UCL	72.528393
95% Chebyshev (Mean, Sd) UCL	105.70894
97.5% Chebyshev (Mean, Sd) UCL	135.62255
99% Chebyshev (Mean, Sd) UCL	***194.38205***

Incorporates averaging of results at BH007/FD

Table D-3
Benzo(a)pyrene ProUCL Output
Ashland – Clearfield, Utah

Raw Statistics	
Number of Valid Samples	4
Number of Unique Samples	3
Minimum	165
Maximum	930
Mean	365
Median	182.5
Standard Deviation	377.02785
Variance	142150
Coefficient of Variation	1.032953
Skewness	1.9886366

Gamma Statistics	
k hat	1.7427361
k star (bias corrected)	0.6023507
Theta hat	209.44077
Theta star	605.95929
nu hat	13.941889
nu star	4.8188056
Approx.Chi Square Value (.05)	1.0690284
Adjusted Level of Significance	N/A
Adjusted Chi Square Value	N/A

Log-transformed Statistics	
Minimum of log data	5.1059455
Maximum of log data	6.8351846
Mean of log data	5.5863482
Standard Deviation of log data	0.8374819
Variance of log data	0.7013759

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.6626208
Shapiro-Wilk 5% Critical Value	0.748
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	808.64175

Gamma Distribution Test	
A-D Test Statistic	0.8078102
A-D 5% Critical Value	0.6614864
K-S Test Statistic	0.4260894
K-S 5% Critical Value	0.3987181
Data do not follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	1645.2921
Adjusted Gamma UCL	N/A

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.7080604
Shapiro-Wilk 5% Critical Value	0.748
Data not lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	14714.303
95% Chebyshev (MVUE) UCL	936.28527
97.5% Chebyshev (MVUE) UCL	1193.1428
99% Chebyshev (MVUE) UCL	1697.6898

95% Non-parametric UCLs	
CLT UCL	675.07781
Adj-CLT UCL (Adjusted for skewness)	875.36321
Mod-t UCL (Adjusted for skewness)	839.88222
Jackknife UCL	808.64175
Standard Bootstrap UCL	N/R
Bootstrap-t UCL	N/R
Hall's Bootstrap UCL	N/R
Percentile Bootstrap UCL	N/R
BCA Bootstrap UCL	N/R
95% Chebyshev (Mean, Sd) UCL	***1186.7131***
97.5% Chebyshev (Mean, Sd) UCL	1542.2691
99% Chebyshev (Mean, Sd) UCL	2240.6899

RECOMMENDATION

Data are Non-parametric (0.05)

Use 95% Chebyshev (Mean, Sd) UCL

Recommended UCL exceeds the maximum observation

Incorporates averaging of results at BH007/FD

Table D-4
Dibenz(a,h)anthracene ProUCL Output
Ashland – Clearfield, Utah

Raw Statistics	
Number of Valid Samples	4
Number of Unique Samples	3
Minimum	165
Maximum	370
Mean	225
Median	182.5
Standard Deviation	98.064605
Variance	9616.6667
Coefficient of Variation	0.4358427
Skewness	1.8387058

Gamma Statistics	
k hat	8.4726633
k star (bias corrected)	2.2848325
Theta hat	26.555995
Theta star	98.475491
nu hat	67.781306
nu star	18.27866
Approx.Chi Square Value (.05)	9.5911591
Adjusted Level of Significance	N/A
Adjusted Chi Square Value	N/A

Log-transformed Statistics	
Minimum of log data	5.1059455
Maximum of log data	5.913503
Mean of log data	5.3559278
Standard Deviation of log data	0.3826188
Variance of log data	0.1463971

Normal Distribution Test	
Shapiro-Wilk Test Statisitic	0.7464209
Shapiro-Wilk 5% Critical Value	0.748
Data not normal at 5% significance level	

95% UCL (Assuming Normal Distribution)	
Student's-t UCL	340.39082

Gamma Distribution Test	
A-D Test Statistic	0.6126482
A-D 5% Critical Value	0.6576896
K-S Test Statistic	0.3371946
K-S 5% Critical Value	0.3952232
Data follow gamma distribution	
at 5% significance level	

95% UCLs (Assuming Gamma Distribution)	
Approximate Gamma UCL	***428.80099***
Adjusted Gamma UCL	N/A

Lognormal Distribution Test	
Shapiro-Wilk Test Statisitic	0.7851261
Shapiro-Wilk 5% Critical Value	0.748
Data are lognormal at 5% significance level	

95% UCLs (Assuming Lognormal Distribution)	
95% H-UCL	528.30656
95% Chebyshev (MVUE) UCL	408.17757
97.5% Chebyshev (MVUE) UCL	488.0079
99% Chebyshev (MVUE) UCL	644.81912

95% Non-parametric UCLs	
CLT UCL	305.65096
Adj-CLT UCL (Adjusted for skewness)	353.81745
Mod-t UCL (Adjusted for skewness)	347.90382
Jackknife UCL	340.39082
Standard Bootstrap UCL	N/R
Bootstrap-t UCL	N/R
Hall's Bootstrap UCL	N/R
Percentile Bootstrap UCL	N/R
BCA Bootstrap UCL	N/R
95% Chebyshev (Mean, Sd) UCL	438.72685
97.5% Chebyshev (Mean, Sd) UCL	531.20663
99% Chebyshev (Mean, Sd) UCL	712.86525

RECOMMENDATION

Data follow gamma distribution (0.05)

Use Approximate Gamma UCL

Recommended UCL exceeds the maximum observation

Incorporates averaging of results at BH007/FD

Table D-5a
Toxicity Value Summary
Ashland – Clearfield, Utah

Chemical	CAS	RfDo-C	Source	RfDo-S	Source	RfDi-C	Source	RfDi-S	Source	SFo	Source	SFi	Source	WOE	Source
Tetrachloroethene	127184	1E-02	IRIS	1E-01	HEAST	1.71E-01	NCEA	NV	–	5.2E-02	NCEA	2.03E-03	NCEA	NA	IRIS
Benzo(a)pyrene	50328	NV	–	NV	–	NV	–	NV	–	7.3E+00	IRIS	3.08E+00	NCEA	B2	IRIS
Dibenzo(a,h)anthracene	53703	NV	–	NV	–	NV	–	NV	–	7.3E+00	IRIS	NV	–	B2	IRIS

RfDo-C – Chronic oral reference dose (mg/kg-day)
RfDo-S – Subchronic oral reference dose (mg/kg-day)
RfDi-C – Chronic inhalation reference dose (mg/kg-day)
RfDi-S – Subchronic inhalation reference dose (mg/kg-day)
SFo – Oral slope factor $(mg/kg\text{-}day)^{-1}$
SFi – Inhalation slope factor $(mg/kg\text{-}day)^{-1}$
WOE – Weight of evidence for carcinogenicity
IRIS – Integrated Risk Information System (on-line database)
NCEA – National Center for Environmental Assessment
HEAST – Health Effects Assessment Summary Tables
NA – Not applicable
NV – No value available
B2 – Probable human carcinogen

Table D-5b
Chemical/Physical Parameter Summary
Ashland – Clearfield, Utah

Chemical	CAS No	ABSd		GIABS		Di		Dw		Kd		H'	
Tetrachloroethene	127184	NA	EPA, 2004a	1.00E+00	EPA, 2004a	7.20E-02	EPA, 2002a	8.20E-06	EPA, 2002a	6.41E-01	EPA, 2002a	7.24E-01	EPA, 2002a
Benzo(a)pyrene	50328	1.30E-01	EPA, 2004a	1.00E+00	EPA, 2004a	4.30E-02	EPA, 2002a	9.00E-06	EPA, 2002a	4.72E+03	EPA, 2002a	1.87E-05	EPA, 2002a
Dibenzo(a,h)anthracene	53703	1.30E-01	EPA, 2004a	1.00E+00	EPA, 2004a	2.02E-02	EPA, 2002a	5.18E-06	EPA, 2002a	1.57E+04	EPA, 2002a	5.03E-06	EPA, 2002a

ABSd – Dermal absorption factor (unitless)
GIABS – Gastrointestinal absorption value (unitless)
Di – Diffusivity in air (cm^2/s)
Dw – Diffusivity in water (cm^2/s)
Kd – Soil-water partition coefficient (cm^3/g)
H' – Dimensionless Henry's law constant
EPA – United States Environmental Protection Agency

Table D-6.1
Construction Worker: Soil Pathway Exposure Parameter Values
Ashland – Clearfield, Utah

Exposure Pathway	Parameter	Construction Worker		
		Description	RME	Source
Incidental Soil Ingestion	SIR	Soil Ingestion Rate (mg/day)	330	(a)
	EF	Exposure Frequency (days/year)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	FI	Fraction Ingested (unitless)	1	(b)
	BW	Body Weight (kg)	70	(d,e,f)
	ATc	Averaging Time for Carcinogens (days) (h)	25,550	(d,e,f)
Dermal Contact with Soil	SA	Skin Surface Area Exposed (cm^2)	3,300	(g)
	SSAF	Soil-to-Skin Adherence Factor (mg/cm^2)	0.3	(h)
	CF	Conversion Factor (kg/mg)	1E-06	–
	EF	Exposure Frequency (day/year)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	EV	Event Frequency (events/day)	1	(h)
	BW	Body Weight (kg)	70	(d,e,f)
	ATc	Averaging Time for Carcinogens (days) (h)	25,550	(d,e,f)
Inhalation of Derived Chemicals	IR	Inhalation Rate (m^3/day)	20	(i)
	EF	Exposure Frequency (day/year)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	BW	Body Weight (kg)	70	(d,e,f)
	ATc	Averaging Time for Carcinogens (days) (h)	25,550	(d,e,f)

Notes:
RME - Reasonable Maximum Exposure.
(a) U.S. EPA. 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Exhibit 1-2.
(b) Conservative assumption based on the industrial land use.
(c) Construction activities are assumed to occur over a 1 year period.
(d) U.S. EPA, 1991. *Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors.*
(e) U.S. EPA, 1989. *RAGS, Volume I, Human Health Evaluation Manual (Part A).*
(f) 70 kg body weight and 70 year lifetime are used to be consistent with the development of cancer slope factors.
(g) U.S. EPA, 2004. *RAGS, Volume 1, Human Health Evaluation Manual (Part E),* Exhibit 3-5.
(h) U.S. EPA, 2004. *RAGS, Volume 1, Human Health Evaluation Manual (Part E),* Exhibit 3-2.
(i) U.S. EPA, 1997. *Exposure Factors Handbook, Volume 1,* Table 5-23. Short-term exposures for outdoor workers, heavy activity.

Table D-6.2a
Risk Calculations
Construction Worker: Incidental Ingestion of Soil Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Ing-Risk} = \frac{(\text{Csoil} \times \text{SFo} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{SIR} \times \text{FI})}{(\text{BW} \times \text{ATc})}$$

Equation	Ing - Risk	= (	Csoil	×	SFo	×	CF	×	EF	×	ED	×	SIR	×	FI	) ÷ (	BW	×	ATc	)
Units	unitless		mg/kg		kg-day/mg		kg/mg		days/year		years		mg/day		unitless		kg		days	
Benzo(a)pyrene	3E-08	= (	9.30E-01	×	7.30E+00	×	1E-06	×	20	×	1	×	330	×	1	) ÷ (	70	×	25550	)
Dibenzo(a,h)anthracene	9E-09	= (	3.25E-01	×	7.30E+00	×	1E-06	×	20	×	1	×	330	×	1	) ÷ (	70	×	25550	)

Notes:

Ing - Risk – Ingestion risk
Csoil – Concentration in soil
SFo – Oral Slope Factor.
CF – Unit Conversion Factor
EF – Exposure Frequency
ED – Exposure Duration
SIR – Soil Ingestion Rate
FI – Fraction Ingested from Contaminated Source
BW – Body Weight
ATc – Averaging Time for Carcinogens

Table D-6.2b
Risk Calculations
Construction Worker: Incidental Ingestion of Soil Pathway – Noncarcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Ing - HQ} = \frac{(\text{Csoil} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{SIR} \times \text{FI})}{(\text{BW} \times \text{ATn} \times \text{RfDo})}$$

Equation	Ing - HQ	= (	Csoil	×	CF	×	EF	×	ED	×	SIR	×	FI	) ÷ (	BW	×	ATn	×	RfDo	)
Units	unitless		mg/kg		kg/mg		days/year		years		mg/day		unitless		kg		days		mg/kg-day	
Benzo(a)pyrene	NA	= (	9.30E-01	×	1E-06	×	20	×	1	×	330	×	1	) ÷ (	70	×	365	×	NV	)
Dibenzo(a,h)anthracene	NA	= (	3.25E-01	×	1E-06	×	20	×	1	×	330	×	1	) ÷ (	70	×	365	×	NV	)

Notes:

Ing - HQ – Ingestion Hazard
Csoil – Concentration in Soil
EF – Exposure Frequency
ED – Exposure Duration
SIR – Soil Ingestion Rate
FI – Fraction Ingested from Contaminated Source
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
RfDo – Oral reference dose
NV – No toxicity value available for this pathway.
NA – Not Applicable

Table D-6.3a
Risk Calculations
Construction Worker: Incidental Dermal Contact with Soil Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Derm - Risk} = \frac{(\text{Csoil} \times \text{SFabs} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{EV} \times \text{SA} \times \text{SSAF} \times \text{ABSd})}{(\text{BW} \times \text{ATc})}$$

Equation	Derm - Risk = (	Csoil	×	SFabs	×	CF	×	EF	×	ED	×	EV	×	SA	×	SSAF	×	ABSd	) ÷ (	BW	×	ATc	)
Units	unitless	mg/kg		kg-day/mg		kg/mg		days/year		years		events/day		cm²		mg/cm²-event		unitless		kg		days	
Benzo(a)pyrene	9.8E-09	= (	9.30E-01	×	7.30E+00	×	1E-06	×	20	×	1	×	1	×	3,300	×	0.3	×	1.30E-01) ÷ (	70	×	25,550	)
Dibenzo(a,h)anthracene	3.4E-09	= (	3.25E-01	×	7.30E+00	×	1E-06	×	20	×	1	×	1	×	3,300	×	0.3	×	1.30E-01) ÷ (	70	×	25,550	)

Notes:

Derm - Risk – Dermal Risk
Csoil – Concentration in Soil
SFabs – Absorbed slope factor (SFo ÷ ABSgi)
CF – Conversion factor
EF – Exposure Frequency
ED – Exposure Duration
EV – Event Frequency
SA – Skin Surface Area
SSAF – Soil-to-skin Adherence Factor
ABSd – Dermal Soil Absorption Factor
BW – Body Weight
ATc – Averaging Time for Carcinogens
NA – Not Applicable

Table D-6.3b
Risk Calculations
Construction Worker: Incidental Dermal Contact with Soil Pathway – Noncarcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Derm - HQ} = \frac{(\text{Csoil} \times \text{EF} \times \text{EF} \times \text{ED} \times \text{EV} \times \text{SA} \times \text{SSAF} \times \text{ABSd})}{(\text{BW} \times \text{ATn} \times \text{RfDabs})}$$

Equation	Derm - HQ	= (	Csoil	×	CF	×	EF	×	ED	×	EV	×	SA	×	SSAF	×	ABSd	) ÷ (	BW	×	ATn	×	RfDabs	)
Units	unitless		mg/kg		kg/mg		days/year		years		events/day		cm²		mg/cm²-event		unitless		kg		days		mg/kg-day	
Benzo(a)pyrene	NA	= (	9.30E-01	×	1E-06	×	20	×	1	×	1	×	3,300	×	0.3	×	1.30E-01	) ÷ (	70	×	365	×	NA	)
Dibenzo(a,h)anthracene	NA	= (	3.25E-01	×	1E-06	×	20	×	1	×	1	×	3,300	×	0.3	×	1.30E-01	) ÷ (	70	×	365	×	NA	)

Notes:

Derm - HQ – Dermal Hazard Quotient
Csoil – Concentration in Soil
EF – Exposure Frequency
ED – Exposure Duration
EV – Event Frequency
SA – Skin Surface Area
SSAF – Soil-to-skin Adherence Factor
ABSd – Dermal Soil Absorption Factor
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
RfDabs – Absorbed reference dose (RfDo ×ABSgi)
NA – Not Applicable

Table D-6.4a
Risk Calculations
Construction Worker: Incidental Inhalation of Soil (Fugitive Emissions and Volatile Compounds) Pathway– Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Inh - Risk} = \frac{(\text{Csoil} \times \text{SFi} \times \text{IR} \times \text{EF} \times \text{ED} \times [(1/\text{VF}) + (1/\text{PEF})])}{(\text{BW} \times \text{ATc})}$$

Equation	Inh - Risk	= (	Csoil	×	SFi	×	IR	×	EF	×	ED	× [	1 /	VF	+	1 /	PEF	]) ÷ (	BW	×	ATc	)
Units	unitless		mg/kg		kg-day/mg		m³/day		days/year		year			m³/kg			m³/kg		kg		days	
Benzo(a)pyrene	1.13E-11	= (	9.30E-01	×	3.08E+00	×	20	×	20	×	1	× [	1 /	NA	+	1 /	5.67E+07	]) ÷ (	70	×	25,550	)
Dibenzo(a,h)anthracene	NA	= (	3.25E-01	×	NV	×	20	×	20	×	1	× [	1 /	NA	+	1 /	5.67E+07	]) ÷ (	70	×	25,550	)

Notes:

Inh - Risk – Inhalation Risk
Csoil – Concentration in Soil
SFi – Inhalation Slope Factor
IR – Inhalation Rate
EF – Exposure frequency
ED – Exposure duration
VF – Volatilization Factor
PEF – Particulate Emission Factor
BW – Body Weight
ATc – Averaging Time for Carcinogens
NV – No toxicity value available for this pathway.

Table D-6.4b
Risk Calculations
Construction Worker: Incidental Inhalation of Soil (Fugitive Emissions and Volatile Compounds) Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Inh - HQ} = \frac{(\text{Csoil} \times \text{IR} \times \text{EF} \times \text{ED} \times ([1/\text{VF}] + [1/\text{PEF}]))}{(\text{BW} \times \text{ATn} \times \text{RfDi})}$$

Equation	Inh - HQ	= (	Csoil	×	IR	×	EF	×	ED	× [	1 /	VF	+ 1 /	PEF	] ÷ (	BW	×	ATn	×	RfDi	)
Units	unitless		mg/kg		m³/day		days/year		year			m³/kg		m³/kg		kg		days		mg/kg-day	
Benzo(a)pyrene	NA	= (	9.30E-01	×	20	×	20	×	1	× [	1 /	NA	+ 1 /	5.67E+07	] ÷ (	70	×	365	×	1.30E-01	)
Dibenzo(a,h)anthracene	NA	= (	3.25E-01	×	20	×	20	×	1	× [	1 /	NA	+ 1 /	5.67E+07	] ÷ (	70	×	365	×	1.30E-01	)

Notes:

Inh - Risk – Inhalation Hazard Quotient
Csoil – Concentration in Soil
IR – Inhalation Rate
EF – Exposure frequency
ED – Exposure duration
VF – Volatilization Factor
PEF – Particulate Emission Factor
RfDi – Inhalation Reference Dose
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
NV – No toxicity value available for this pathway.
NA – Not Applicable

Table D-6.4c
Construction Worker: Particulate Emission Factor Calculations
Ashland – Clearfield, Utah

$$PEF_{sc} = Q/C_{sr} \times \frac{1}{F_D} \times \left[\frac{T \times A_R}{556 \times \left(\frac{W}{3}\right) \times p \times \Sigma VKT} \right]$$

PEF_{sc} – Subchronic road particulate emission factor
Q/C_{sr} – Inverse of a 1-hour average air concentrations along a straight road segment
F_D – Dispersion correction factor (unitless)
T – Total time over which construction occurs (in seconds), 960 hrs x 60 min/hr x 60 sec/min = 3.46E+06 sec
A_R – Surface area of contaminated road segment (m^2)

0.826443 acres × (4,048 m^2/acre) = 3345.44 m^2. The square root of 3345.44 m^2 is 57.84 m
Assuming the road is 57.84 m (189.76 ft) long and 16 ft wide
$A_R = L_R \times W_R \times 0.092903\ m^2/ft^2$

W – Mean vehicle weight, where:
W = 40 tons
p – Percentage of days with at least 0.01 inches of precipitation, minimum of 80 days/yr for Salt Lake City, based on Exhibit 5-2 (70/365 = 0.19).
ΣVKT – Sum of fleet vehicle traveled during the exposure duration (kilometers), assuming all trucks travel once a day, where:
ΣVKT = 1 vehicles × 1.4 km/day × (2 wks/yr ÷ 2) × 5 days/wk
= 7

Equation	PEF_{sc}	=	Q/C_{sr}	× [1 ÷	F_D	] × { (	T	×	A_R	) ÷ [	556	× (	W	/ 3)$^{0.4}$	×	*p*	× ΣVKT] }
Units	m^3/kg		g/m^2-s per kg/m^3		unitless		s		m^2				tons				km
All Chemicals	5.67E+07	=	23.02	× [1 ÷	0.19	] × { (	3.46E+06	×	2.82E+02	) ÷ [	556	× (	40	/ 3)$^{0.4}$	×	0.19	× 7] }

Default values are as presented in Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002a).

CALCULATION OF SURFACE AREA OF CONTAMINATED ROAD SEGMENTS (A_R)

A_R	=	L_R	×	W_R	×	0.092903
m^2		ft		ft		m^2/ft^2
2.82E+02	=	189.76	×	16	×	0.092903

where:

A_R = Surface area of contaminated road segment (m^2)
L_R = Length of road segment (ft)
L_R = square root of site surface contamination (0.826443 acres)
= (4,048 m^2/acre × 0.826443 acres = $(3345.44\ m^2)^{1/2}$ = 57.84 m = 1.89.76 ft
W_R = Width of road segment (ft)

Table D-6.4d
Construction Worker: Dispersion Correction Factor Calculations
Ashland – Clearfield, Utah

Equation:

$$F_D = 0.1852 + \frac{5.3537}{t_c} + \frac{-9.6318}{t_c^2}$$

F_D = Dispersion correction factor (unitless)
t_c = Duration of construction (hr), estimated using the following equation:
t_c = (8 hrs/workday) × (20 workdays/month) × 6 months = 960 hrs

F_D	=	0.1852	+ (	5.3537	÷	t_c hours	) + ((	-	9.6318	) ÷ (	t_c hours	) ^{2})
0.19	=	0.1852	+ (	5.3537	÷	960	) + ((	-	9.6318	) ÷ (	960	) ^{2})

Table D-6.5
Chemicals in Surface and Surface and Subsurface Soil
Risk and Hazard Summary
Construction Worker
Ashland – Clearfield, Utah

	Carcinogenic Risk								Noncarcinogenic Hazard							
Equation Units	CR unitless	=	Ingestion unitless	+	Dermal unitless	+	Inahalation unitless		HQ unitless	=	Ingestion unitless	+	Dermal unitless	+	Inahalation unitless	
Benzo(a)pyrene	3E-08	=	2.51E-08	+	9.77E-09	+	1.13E-11		NA	=	NA	+	NA	+	NA	
Dibenzo(a,h)anthracene	1E-08	=	8.76E-09	+	3.42E-09	+	NA		NA	=	NA	+	NA	+	NA	
Soil CR	**5E-08**	=	3.38E-08	+	1.32E-08	+	NA	**Soil HI**	NA	=	NA	+	NA	+	NA	

Notes:

NA – Not Applicable
CR – Cancer Risk
HQ – Hazard Quotient
HI – Hazard Index

Table D-7.1
Construction Worker: Soil Pathway Exposure Parameter Values
Ashland – Clearfield, Utah

Exposure Pathway	Parameter	Construction Worker		
		Description	RME	Source
Incidental Soil Ingestion	SIR	Soil Ingestion Rate (mg/day)	330	(a)
	EF	Exposure Frequency (days/year)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	FI	Fraction Ingested (unitless)	1	(b)
	BW	Body Weight (kg)	70	(d,e,f)
	ATc	Averaging Time for Carcinogens (days) (h)	25,550	(d,e,f)
Dermal Contact with Soil	SA	Skin Surface Area Exposed (cm^2)	3,300	(g)
	SSAF	Soil-to-Skin Adherence Factor (mg/cm^2)	0.3	(h)
	CF	Conversion Factor (kg/mg)	1E-06	–
	EF	Exposure Frequency (day/year)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	EV	Event Frequency (events/day)	1	(h)
	BW	Body Weight (kg)	70	(d,e,f)
	ATc	Averaging Time for Carcinogens (days) (h)	25,550	(d,e,f)
Inhalation of Derived Chemicals	IR	Inhalation Rate (m^3/day)	20	(i)
	EF	Exposure Frequency (day/year)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	BW	Body Weight (kg)	70	(d,e,f)
	ATc	Averaging Time for Carcinogens (days) (h)	25,550	(d,e,f)

Notes:
RME - Reasonable Maximum Exposure.
(a) U.S. EPA. 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Exhibit 1-2.
(b) Conservative assumption based on the industrial land use.
(c) Construction activities are assumed to occur over a 1 year period.
(d) U.S. EPA, 1991. *Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors.*
(e) U.S. EPA, 1989. *RAGS, Volume I, Human Health Evaluation Manual (Part A).*
(f) 70 kg body weight and 70 year lifetime are used to be consistent with the development of cancer slope factors.
(g) U.S. EPA, 2004. *RAGS, Volume 1, Human Health Evaluation Manual (Part E),* Exhibit 3-5.
(h) U.S. EPA, 2004. *RAGS, Volume 1, Human Health Evaluation Manual (Part E),* Exhibit 3-2.
(i) U.S. EPA, 1997. *Exposure Factors Handbook, Volume 1,* Table 5-23. Short-term exposures for outdoor workers, heavy activity.

Table D-7.2a
Risk Calculations
Construction Worker: Incidental Ingestion of Soil Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Ing-Risk} = \frac{(\text{Csoil} \times \text{SFo} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{SIR} \times \text{FI})}{(\text{BW} \times \text{ATc})}$$

Equation	Ing - Risk	= (	Csoil	×	SFo	×	CF	×	EF	×	ED	×	SIR	×	FI	) ÷ (	BW	×	ATc	)
Units	unitless		mg/kg		kg-day/mg		kg/mg		days/year		years		mg/day		unitless		kg		days	
Tetrachloroethene	4E-11	= (	1.94E-01	×	5.20E-02	×	1E-06	×	20	×	1	×	330	×	1	) ÷ (	70	×	25550	)

Notes:

Ing - Risk – Ingestion risk
Csoil – Concentration in soil
SFo – Oral Slope Factor.
CF – Unit Conversion Factor
EF – Exposure Frequency
ED – Exposure Duration
SIR – Soil Ingestion Rate
FI – Fraction Ingested from Contaminated Source
BW – Body Weight
ATc – Averaging Time for Carcinogens

Table D-7.2b
Risk Calculations
Construction Worker: Incidental Ingestion of Soil Pathway – Noncarcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Ing - HQ} = \frac{(\text{Csoil} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{SIR} \times \text{FI})}{(\text{BW} \times \text{ATn} \times \text{RfDo})}$$

Equation	Ing - HQ	= (	Csoil	×	CF	×	EF	×	ED	×	SIR	×	FI	) ÷ (	BW	×	ATn	×	RfDo	)
Units	unitless		mg/kg		kg/mg		days/year		years		mg/day		unitless		kg		days		mg/kg-day	
Tetrachloroethene	5.0E-06	= (	1.94E-01	×	1E-06	×	20	×	1	×	330	×	1	) ÷ (	70	×	365	×	1.0E-02	)

Notes:

Ing - HQ – Ingestion Hazard
Csoil – Concentration in Soil
EF – Exposure Frequency
ED – Exposure Duration
SIR – Soil Ingestion Rate
FI – Fraction Ingested from Contaminated Source
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
RfDo – Oral reference dose

Table D-7.3a
Risk Calculations
Construction Worker: Incidental Dermal Contact with Soil Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Derm - Risk} = \frac{(\text{Csoil} \times \text{SFabs} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{EV} \times \text{SA} \times \text{SSAF} \times \text{ABSd})}{(\text{BW} \times \text{ATc})}$$

Equation	Derm - Risk = (	Csoil	×	SFabs	×	CF	×	EF	×	ED	×	EV	×	SA	×	SSAF	×	ABSd	) ÷ (	BW	×	ATc	)
Units	unitless	mg/kg		kg-day/mg		kg/mg		days/year		years		events/day		cm²		mg/cm²-event		unitless		kg		days	
Tetrachloroethene	NA	= (1.94E-01	×	5.20E-02	×	1E-06	×	20	×	1	×	1	×	3,300	×	0.3	×	NA	) ÷ (	70	×	25,550	)

Notes:

Derm - Risk – Dermal Risk
Csoil – Concentration in Soil
SFabs – Absorbed slope factor (SFo ÷ABSgi)
CF – Conversion factor
EF – Exposure Frequency
ED – Exposure Duration
EV – Event Frequency
SA – Skin Surface Area
SSAF – Soil-to-skin Adherence Factor
ABSd – Dermal Soil Absorption Factor
BW – Body Weight
ATc – Averaging Time for Carcinogens
NA – Not Applicable

Table D-7.3b
Risk Calculations
Construction Worker: Incidental Dermal Contact with Soil Pathway – Noncarcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Derm - HQ} = \frac{(\text{Csoil} \times \text{EF} \times \text{EF} \times \text{ED} \times \text{EV} \times \text{SA} \times \text{SSAF} \times \text{ABSd})}{(\text{BW} \times \text{ATn} \times \text{RfDabs})}$$

Equation	Derm - HQ	= (	Csoil	×	CF	×	EF	×	ED	×	EV	×	SA	×	SSAF	×	ABSd	) ÷ (	BW	×	ATn	×	RfDabs	)
Units	unitless		mg/kg		kg/mg		days/year		years		events/day		cm²		mg/cm²-event		unitless		kg		days		mg/kg-day	
Tetrachloroethene	NA	= (	1.94E-01	×	1E-06	×	20	×	1	×	1	×	3,300	×	0.3	×	NA	) ÷ (	70	×	365	×	1.00E-02	)

Notes:

Derm - HQ – Dermal Hazard Quotient
Csoil – Concentration in Soil
EF – Exposure Frequency
ED – Exposure Duration
EV – Event Frequency
SA – Skin Surface Area
SSAF – Soil-to-skin Adherence Factor
ABSd – Dermal Soil Absorption Factor
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
RfDabs – Absorbed reference dose (RfDo ×ABSgi)
NA – Not Applicable

Table D-7.4a
Risk Calculations
Construction Worker: Incidental Inhalation of Soil (Fugitive Emissions and Volatile Compounds) Pathway– Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Inh - Risk} = \frac{(\text{Csoil} \times \text{SFi} \times \text{IR} \times \text{EF} \times \text{ED} \times [(1/\text{VF}) + (1/\text{PEF})])}{(\text{BW} \times \text{ATc})}$$

Equation	Inh - Risk	= (	Csoil	×	SFi	×	IR	×	EF	×	ED	× [	1 /	VF	+	1 /	PEF	]) ÷ (	BW	×	ATc	)
Units	unitless		mg/kg		kg-day/mg		m³/day		days/year		year			m³/kg			m³/kg		kg		days	
Tetrachloroethene	1.68E-08	= (	1.94E-01	×	2.03E-03	×	20	×	20	×	1	× [	1 /	5.24E+00	+	1 /	1.60E+08	]) ÷ (	70	×	25,550	)

Notes:

Inh - Risk – Inhalation Risk
Csoil – Concentration in Soil
SFi – Inhalation Slope Factor
IR – Inhalation Rate
EF – Exposure frequency
ED – Exposure duration
VF – Volatilization Factor
PEF – Particulate Emission Factor
BW – Body Weight
ATc – Averaging Time for Carcinogens

Table D-7.4b
Risk Calculations
Construction Worker: Incidental Inhalation of Soil (Fugitive Emissions and Volatile Compounds) Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Inh - HQ} = \frac{(\text{Csoil} \times \text{IR} \times \text{EF} \times \text{ED} \times ([1/\text{VF}] + [1/\text{PEF}]))}{(\text{BW} \times \text{ATn} \times \text{RfDi})}$$

Equation	Inh - HQ	= (	Csoil	×	IR	×	EF	×	ED	× [1 /	VF	+ 1 /	PEF	]) ÷ (	BW	×	ATn	×	RfDi	)
Units	unitless		mg/kg		m³/day		days/year		year		m³/kg		m³/kg		kg		days		mg/kg-day	
Tetrachloroethene	3.39E-03	= (	1.94E-01	×	20	×	20	×	1	× [1 /	5.24E+00	+ 1 /	1.60E+08	]) ÷ (	70	×	365	×	1.71E-01	)

Notes:

Inh - Risk – Inhalation Hazard Quotient
Csoil – Concentration in Soil
IR – Inhalation Rate
EF – Exposure frequency
ED – Exposure duration
ET – Exposure Time
VF – Volatilization Factor
PEF – Particulate Emission Factor
RfDi – Inhalation Reference Dose
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
NV – No toxicity value available for this pathway.
NA – Not Applicable

Table D-7.4c
Construction Worker: Volatilization Factor Calculations
Ashland – Clearfield, Utah

Equation:

$$VF_{sc} = \left[\frac{(3.14 \times D_A \times T)^{1/2}}{2 \times \rho_b \times D_A}\right] \times 10^{-4}\, m^2/cm^2 \times Q/C_{sa} \times \frac{1}{F_D}$$

Chemical	Q/C_{sa} $(g/m^2\text{-}s)/(kg/m^3)$	π	D_A (cm^2/s)	T (s)	2	ρb (g/cm^3)	10^{-4} (m^2/cm^2)	$1/F_D$ unitless	VF (m^3/kg)
Tetrachloroethene	13.01	3.14	4.69E-03	1.73E+06	2	1.5	1.00E-04	5.24E+00	2.14E-03

Notes: Default values are as presented in Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002a).

VF – Volatilization Factor (m^3/kg) (calculated)
π – pi (3.14)
DA – Apparent Diffusivity (cm^2/s)
T – Exposure interval (s)
ρb – Dry soil bulk density (g/cm^3) (site-specific value)

$$Q/C_{sa} = A \times \exp\left[\frac{(\ln A_c - B)^2}{C}\right]$$

Q/C_{sa} – Inverse of the ratio of the 1-h. geometric mean air concentration and the volatilization flux at the center of a square emission source (g/m^2-s per kg/m^3)
A – 2.4538
B – 17.566
C – 189.0426
A_c – Areal extent of site soil contamination (36,000 sq ft or 0.826443 acres).

Equation	Q/C_{sa}	=	A	$ln\, A_c$	B	C
Units	$(g/m^2\text{-s per } kg/m^3)$			acres		
All Chemicals	13.01	=	2.4538	0.826443	17.57	189.0426

Table D-7.4d
Construction Worker: Apparent Diffusivity Calculations
Ashland – Clearfield, Utah

Equation:

$$D_A = \frac{\left(\theta_a^{3.33} \times D_i \times H'\right) + \left(\theta_w^{3.33} \times D_w\right)}{\eta^2} \times \frac{1}{\left(\rho_b \times K_d\right) + \theta_w + \left(\theta_a \times H'\right)}$$

Chemical Units	θ_a (Lair /Lsoil)	D_i (cm^2/s)	H' unitless	θ_w (Lwater /Lsoil)	D_w (cm^2/s)	η (Lpore /Lsoil)	ρ_b (g/cm^3)	ρ_s (g/cm^3)	K_{oc} (cm^3/g)	K_d (cm^3/g)	D_A (cm^2/s)	Source D_i	 D_w	 K_{oc}
Tetrachloroethene	2.84E-01	7.20E-02	7.54E-01	0.15	8.20E-06	4.34E-01	1.5	2.65	1.55E+02	9.30E-01	4.69E-03	ORNL	SSL	SSL

D_A – apparent diffusivity
θ_a – air-filled soil porosity
D_i – diffusivity in air
H' – dimensionless Henry's law constant
θ_w – water-filled soil porosity
D_w – diffusivity in water
η – total soil porosity
ρ_b – dry soil bulk density
ρ_s – soil particle density
K_d – soil-water partition coefficient, where:
$K_d = K_{oc} \times f_{oc}$
K_{oc} – soil organic carbon partition coefficient (cm^3/g)
f_{oc} – fraction organic carbon in soil (g/g) (A default value of 0.006 g/g was used.)
ORNL – Oak Ridge National Laboratory Risk Assessment Information System http://risk.lsd.ornl.gov/cgi-bin/tox/TOX_select?select=csf
SSL – Supplemental Guidance for Developing Soil Screening Levels For Superfund Sites (USEPA, 2002a)

Table D-7.4e
Construction Worker: Particulate Emission Factor Calculations
Ashland – Clearfield, Utah

$$PEF_{sc} = Q/C_{sr} \times \frac{1}{F_D} \times \left[\frac{T \times A_R}{556 \times \left(\frac{W}{3}\right)^{0.4} \times p \times \Sigma VKT} \right]$$

PEF_{sc} – Subchronic road particulate emission factor

Q/C_{sr} – Inverse of a 1-hour average air concentrations along a straight road segment

F_D – Dispersion correction factor (unitless)

T – Total time over which construction occurs (in seconds), 960 hrs x 60 min/hr x 60 sec/min = 3.46E+06 sec

A_R – Surface area of contaminated road segment (m^2)

6.5 acres × (4,048 m^2/acre) = 26,304.36 m^2. The square root of 2,025,000 m^2 is 162.21 m
Assuming the road is 162.19 m (535.29 ft) long and 16 ft wide
$A_R = L_R \times W_R \times 0.092903\ m^2/ft^2$

W – Mean vehicle weight, where:
W = 40 tons

p – Percentage of days with at least 0.01 inches of precipitation, minimum of 80 days/yr for Salt Lake City, based on Exhibit 5-2 (70/365 = 0.19).

ΣVKT – Sum of fleet vehicle traveled during the exposure duration (kilometers), assuming all trucks travel once a day, where:
ΣVKT = 1 vehicles × 1.4 km/day × (2 wks/yr ÷ 2) × 5 days/wk
= 7

Equation	PEF_{sc}	=	Q/C_{sr}	× [1 ÷	F_D	] × { (	T	×	A_R	) ÷ [556 × (W / 3) $^{0.4}$	× *p*	× ΣVKT] }
Units	m^3/kg		g/m^2-s per kg/m^3		unitless		s		m^2	tons		km
All Chemicals	1.60E+08	=	23.02	× [1 ÷	0.19	] × { (	3.46E+06	×	7.96E+02	) ÷ [556 × (40 / 3) $^{0.4}$	× 0.19	× 7] }

Default values are as presented in Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002).

CALCULATION OF SURFACE AREA OF CONTAMINATED ROAD SEGMENTS (A_R)

A_R	=	L_R	×	W_R	×	0.092903
m^2		ft		ft		m^2/ft^2
7.96E+02	=	535.29	×	16	×	0.092903

where:

A_R = Surface area of contaminated road segment (m^2)

L_R = Length of road segment (ft)

L_R = square root of site surface contamination (6.5 acres)
= (4,048 m^2/acre × 6.5 acres = (2.63E+04 m^2)$^{1/2}$ = 162.21 m = 535.29 ft

W_R = Width of road segment (ft)

Table D-7.4f
Construction Worker: Dispersion Correction Factor Calculations
Ashland – Clearfield, Utah

Equation:

$$F_D = 0.1852 + \frac{5.3537}{t_c} + \frac{-9.6318}{t_c^2}$$

F_D = Dispersion correction factor (unitless)
t_c = Duration of construction (hr), estimated using the following equation:
t_c = (8 hrs/workday) × (20 workdays/month) × 6 months = 960 hrs

F_D	=	0.1852	+ (	5.3537	÷	t_c hours	) + ((	-	9.6318	) ÷ (	t_c hours	) ^{2})
0.19	=	0.1852	+ (	5.3537	÷	960	) + ((	-	9.6318	) ÷ (	960	) ^{2})

Table D-7.5
Chemicals in Surface and Surface and Subsurface Soil
Risk and Hazard Summary
Construction Worker
Ashland – Clearfield, Utah

	Carcinogenic Risk								Noncarcinogenic Hazard						
Equation Units	CR unitless	=	Ingestion unitless	+	Dermal unitless	+	Inahalation unitless		HQ unitless	=	Ingestion unitless	+	Dermal unitless	+	Inahalation unitless
Tetrachloroethene	2E-08	=	3.73E-11	+	NA	+	1.68E-08		3E-03	=	5.02E-06	+	NA	+	3.39E-03
Soil CR	**2E-08**	=	3.73E-11	+	NA	+	1.68E-08	**Soil HI**	**3E-03**	=	5.02E-06	+	NA	+	3.39E-03

Notes:

NA – Not Applicable
CR – Cancer Risk
HQ – Hazard Quotient
HI – Hazard Index

Table D-8.1
Construction Worker: Water Pathway Exposure Parameter Values
Ashland – Clearfield, Utah

Exposure Pathway	Parameter	Description	Construction Worker RME	Construction Worker Source
Incidental Ground Water Ingestion	WIR	Ground Water Ingestion Rate (L/day)	0.024	(a)
	EF	Exposure Frequency (d/yr)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	ET	Exposure Time (hours/event)	0.5	(b)
	BW	Body Weight (kg)	70	(d,f)
	AT_n	Averaging Time Noncarcinogens (days)	365	(e)
	AT_c	Averaging Time Carcinogens (days)	25,550	(d,f)
Dermal Contact with Ground Water	SA	Skin Surface Area Exposed (cm^2)	3,300	(g)
	EF	Exposure Frequency (d/yr)	20	(b)
	ED	Exposure Duration (years)	1	(c)
	EV	Event Frequency	1	(f)
	ET	Exposure Time (hours/event)	0.5	(b)
	BW	Body Weight (kg)	70	(d,f)
	AT_n	Averaging Time Noncarcinogens (days)	365	(e)
	AT_c	Averaging Time Carcinogens (days) (l)	25,550	(d,f)

Notes:
RME - Reasonable Maximum Exposure.
(a) USEPA, 1989. Risk Assessment Guidance for Superfund, Volume I. Value is one-fiftieth of that assumed to occur during a swimming event.
(b) Site-specific value. It is assumed that excavation activities would take 20 days to complete.
(c) Construction activities area assumed to occur over a 1 year period.
(d) USEPA, 1989. Risk Assessment Guidance for Superfund, Volume I (Part A).
(e) The averaging time for noncarcinogens is equal to the Exposure Duration (in yrs) × 365 day/yr (US EPA, 1989).
(f) 70 year lifetime is used to be consistent with the development of cancer slope factors.
(g) USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Exhibit 3-5. Skin surface area available for contact for industrial workers.

Table D-8.2a
Risk Calculations
Construction Worker: Incidental Ingestion of Groundwater Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Ing-Risk} = \frac{(\text{Cwater} \times \text{WIR} \times \text{EF} \times \text{ED} \times \text{SFo})}{(\text{BW} \times \text{ATc})}$$

Equation	Ing - Risk	= (	Cwater	×	WIR	×	EF	×	ED	×	SFo	) ÷ (	BW	×	ATc	)
Units	unitless		mg/L		L/day		days/year		years		kg-day/mg		kg		days	
Tetrachloroethene	8.51E-11	= (	6.10E-03	×	2.40E-02	×	20	×	1	×	5.20E-02	) ÷ (	70	×	25,550	)

Notes:

Ing-Risk – Carcinogenic Risk Water Ingestion Pathway
Cwater – Concentration in Water
WIR – Water Ingestion Rate
EF – Exposure Frequency
ED – Exposure Duration
SFo – Oral Slope Factor
BW – Body Weight
ATc – Averaging Time for Carcinogens

Table D-8.2b
Risk Calculations
Construction Worker: Incidental Ingestion of Groundwater Pathway – Noncarcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Inh-HQ} = \frac{(\text{Cwater} \times \text{WIR} \times \text{EF} \times \text{ED})}{(\text{BW} \times \text{ATn} \times \text{RfDo})}$$

Equation	Ing - HQ	= (	Cwater	×	WIR	×	EF	×	ED	) ÷ (	BW	×	ATn	×	RfDo	)
Units	unitless		mg/L		L/day		days/year		years		kg		days		mg/kg-day	
Tetrachloroethene	1.15E-05	= (	6.10E-03	×	2.40E-02	×	20	×	1	) ÷ (	70	×	365	×	1.00E-02	)

Notes:

Ing-HQ – Water Ingestion Pathway Hazard Quotient
Cwater – Concentration in water
WIR – Water Ingestion Rate
EF – Exposure Frequency
ED – Exposure Duration
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
RfDo – Oral Reference Dose

Table D-8.3a
Risk Calculations
Construction Worker: Dermal Contact with Groundwater Pathway – Carcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Derm-Risk} = \frac{(DA_{event} \times EV \times ED \times EF \times SA \times SFabs)}{(BW \times ATc)}$$

Equation	Derm-Risk	= (	DA_{event}	×	EV	×	ED	×	EF	×	SA	×	SFabs	) ÷ (	BW	×	ATc	)
Units	unitless		mg/cm²-event		events/day		years		days/year		cm²		kg-day/mg		kg		days	
Tetrachloroethene	1.38E-06	= (	7.19E-04	×	1	×	1	×	20	×	3,300	×	5.20E-02	) ÷ (	70	×	25,550	)

Notes:

Derm-Risk – Carcinogenic Risk Dermal Contact with Water Pathway
DA_{event} – Absorbed Dose per Event
EV – Event Frequency
ED – Exposure Duration
EF – Exposure Frequency
SA – Skin Surface Area Available for Contact
SFabs – Absorbed Slope Factor
BW – Body Weight
ATc – Averaging Time for Carcinogens

Table D-8.3b
Risk Calculations
Construction Worker: Dermal Contact with Groundwater Pathway – Noncarcinogenic Effects
Ashland – Clearfield, Utah

$$\text{Derm-HQ} = \frac{(DA_{event} \times EV \times ED \times EF \times SA)}{(BW \times ATn \times RfDabs)}$$

Equation	Derm-Risk	= (	DA_{event}	×	EV	×	ED	×	EF	×	SA	) ÷ (	BW	×	ATn	×	RfDabs	)
Units	unitless		mg/cm²-event		events/day		years		days/year		cm²		kg		days		mg/kg-day	
Tetrachloroethene	1.86E-01	= (	7.19E-04	×	1	×	1	×	20	×	3,300	) ÷ (	70	×	365	×	1.00E-02	)

Notes:

Derm-HQ – Dermal Contact with Water Pathway Hazard Quotient
DA_{event} – Absorbed Dose per Event
EV – Event Frequency
ED – Exposure Duration
EF – Exposure Frequency
SA – Skin Surface Area Available for Contact
BW – Body Weight
ATn – Averaging Time for Noncarcinogens
RfDabs – Absorbed Reference Dose

Table D-8.3c
Dermal Absorbed Dose per Event for Organic Chemicals in Water
Ashland – Clearfield, Utah

If $t_{event} > t^*$, then: $$DA_{event} = FA \times K_p \times Cwater \left[\frac{t_{event}}{1+B} + 2\tau_{event} + \left(\frac{1+3B+3B^2}{(1+B)^2} \right) \right]$$

Equation	DA_{event}	=	FA	×	K_p	×	Cwater	× { (	t_{event}	/ 1 +	B	) + 2	τ_{event}	+ [1 + (3	B	) + (3	B	²)] / (1 +	B	) ²] }
Units	mg/cm²-event		unitless		cm/hour		mg/cm³		hour/event		unitless		hour/event		unitless		unitless		unitless	
Tetrachloroethene	7.19E-04	=	1	×	3.34E-02	×	6.10E-03	× { (	0.5	/ 1 +	1.66E-01	) + 2	0.91	+ [1 + (3	1.66E-01	) + (3	1.66E-01	²)] / (1 +	1.66E-01	) ²] }

Notes:

DA_{event} – Absorbed Dose per Event
FA – Fraction Absorbed Water
K_p – Dermal Permeability Coefficient of Compound in Water
C_{water} – Concentration in Water
τ_{event} – Lag Time per Event
t_{event} – Event Duration
B – Dimensionless Ratio of the Permeability Coefficient
t* – Time to Reach Steady-state

Table D-8.4
Chemical in Groundwater
Risk and Hazard Summary
Construction Worker
Ashland – Clearfield, Utah

	Carcinogenic Risk					Noncarcinogenic Hazard				
Equation	CR	=	Ingestion	+	Dermal	HQ	=	Ingestion	+	Dermal
Units	unitless		unitless		unitless	unitless		unitless		unitless
Tetrachloroethene	*1E-06*	=	8.51E-11	+	1.38E-06	2E-01	=	1.15E-05	+	1.86E-01

Groundwater CR	**1E-06**	=	8.51E-11	+	1.38E-06	**Groundwater HI**	**2E-01**	=	1.15E-05	+	1.86E-01
Soil CR	**7E-08**					**Soil HI**	**5E-03**				
Groundwater + Soil CR	**1E-06**					**Groundwater + Soil HI**	**2E-01**				

Notes:

NA – Not Applicable
CR – Cancer Risk
HQ – Hazard Quotient
HI – Hazard Index