Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP42 Section: 2.3

Background Chapter 4

Reference: 3

Title: Medical Waste Incineration Emission Test Report, Jordan Hospital, Plymouth, Massachusetts.

Prepared for the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. February 1992.

EMB Report 90-MWI-6.

TABLE 2-1. EMISSIONS TEST LOG;
JORDAN HOSPITAL (1991)

DATE	RUN NO./ CONDITION	TEST TYPE *	INLET		OUTLET	
			RUN TIME	PORT CHANGES	RUN TIME	PORT CHANGES
3/05/91	1/Burn	PM/TM	09:50-16:49	13:26-14:10	09:47-16:49	13:07-13:10
3/05/91	1/Burn	CDD/CDF	09:44-16:49	13:20-14:09	09:45-16:49	13:06-13:15
3/05/91	1A/Burn	HCl	09:56-11:26		09:45-11:15	
3/05/91	1B/Burn	HCl	12:43-13:43		11:25-12:55	
3/05/91	1C/Burn	HCl	14:21-15:51		14:21-15:51	
3/05/91	1D/Burn	HCl	16:20-16:49		16:21-16:49	
3/05/91	1/Burn	Spore	09:38-16:18			
3/05/91	1/Burn	PSD	11:28-11:58			
	Burn Period		09:47-16:49			
3/05/91	2/Burndown	PM/TM	17:35-22:10	20:23-20:48	16:49-22:13	20:09-20:12
3/05/91	2/Burndown	CDD/CDF	17:35-22:10	20:23-20:48	16:49-22:13	20:09-20:14
3/05/91	2A/Burndown	HCl	17:45-19:15		17:45-19:15	
3/05/91	2B/Burndown	HCl	19:23-20:53		19:24-20:54	
3/05/91	2/Burndown	Spore	16:45-22:05			
	Burndown Period		16:49-22:11			
3/07/91	3/Burn	PM/TM	09:32-16:30	13:08-13:22	09:32-16:30	12:52-13:01
3/07/91	3/Burn	CDD/CDF	09:30-16:30	13:06-13:22	09:32-16:30	13:01-13:04
3/07/91	3A/Burn	HCl	09:31-11:01		09:32-11:02	
3/07/91	3B/Burn	HCl	11:12-12:42		11:13-12:43	
3/07/91	3C/Burn	HCl	12:53-14:23		12:58-14:28	
3/07/91	3D/Burn	HCl	14:35-16:05		14:35-16:05	
3/07/91	3/Burn	Spore	09:31-16:11			
	Burn Period		09:30-16:38			
3/07/91	4/Burndown	PM/TM	16:35-21:57	19:23-19:34	16:34-22:00	19:54-20:15
3/07/91	4/Burndown	CDD/CDF	16:34-21:58	19:22-19:34	16:33-21:59	19:53-20:15
3/07/91	4A/Burndown	HCl	16:59-18:29		17:00-18:30	
3/07/91	4B/Burndown	HCl	18:42-20:12		18:42-20:12	
3/07/91	4C/Burndown	HCl	20:20-21:57		20:20-21:50	
3/07/91	4/Burndown	Spore	16:30-22:59			
3/07/91	4/Burndown	PSD	15:02-17:42			
	Burndown Period		16:38-21:58			

TABLE 2-1. EMISSIONS TEST LOG (continued);
JORDAN HOSPITAL (1991)

DATE	RUN NO./ CONDITION	TEST TYPE *	INLET RUN TIME	INLET PORT CHANGES	OUTLET RUN TIME	OUTLET PORT CHANGES
3/09/91	5/Burn	PM/TM	09:25-16:30	13:01-13:08	09:27-16:32	12:47-12:53
3/09/91	5/Burn	CDD/CDF	09:25-16:29	13:01-13:08	09:27-16:32	12:47-12:52
3/09/91	5A/Burn	HCl	09:43-11:13		09:37-11:07	
3/09/91	5B/Burn	HCl	11:33-13:03		11:33-13:03	
3/09/91	5C/Burn	HCl	13:19-14:49		13:19-14:49	
3/09/91	5D/Burn	HCl	15:08-16:29		15:08-16:32	
3/09/91	5/Burn	Spore	09:26-16:06			
	Burn Period		09:25-16:25			
3/09/91	6/Burndown	PM/TM	16:31-21:44	19:19-19:27	16:44-21:46	20:04-20:11
3/09/91	6/Burndown	CDD/CDF	16:29-21:44	19:17-19:27	16:42-21:46	20:02-20:10
3/09/91	6A/Burndown	HCl	17:03-18:33		17:08-18:38	
3/09/91	6B/Burndown	HCl	18:48-20:18		18:48-20:18	
3/09/91	6C/Burndown	HCl	20:26-21:44		20:26-21:46	
3/09/91	6/Burndown	Spore	16:28-21:46			
3/09/91	6/Burndown	PSD	11:14-13:46			
	Burndown Period		16:25-21:44			

* HCl = manual HCl/HBr/HF tests

PM/TM = Particulate Matter/Toxic Metals tests

CDD/CDF = Tetra - Octa polychlorinated debenzo-p-dioxins/dibenzo furans tests

Spore = Indicator Spore Microbial Survivability tests

PSD = Particle Size Distribution tests

TABLE 2-7. CDD/CDF EMISSIONS AVERAGED OVER EACH TEST DAY; JORDAN HOSPITAL (1991)

CONGENER	DAY 1 (RUNS 1 & 2)		DAY 2 (RUNS 3 & 4)		DAY 3 (RUNS 5 & 6)	
	Inlet (ug/hr)	Outlet (ug/hr)	Inlet (ug/hr)	Outlet (ug/hr)	Inlet (ug/hr)	Outlet (ug/hr)
DIOXINS						
2378 TCDD	(0.064)	1.121	(0.156)	1.906	0.499	0.922
Other TCDD	0.053	471.472	4.504	648.288	4.774	483.748
12378 PCDD	[0.029]	6.789	0.890	12.871	2.131	4.147
Other PCDD	(0.109)	470.229	9.374	663.518	12.072	325.052
123478 HxCDD	[0.043]	3.700	1.700	8.506	2.602	3.348
123678 HxCDD	0.020	6.109	1.410	12.533	2.781	5.240
123789 HxCDD	[0.036]	9.932	4.590	21.776	5.090	9.130
Other HxCDD	0.153	191.522	13.426	401.833	24.306	174.528
1234678-HpCDD	0.110	11.851	11.566	30.664	40.064	10.787
Other Hepta-CDD	0.000	20.692	0.074	51.356	0.000	17.698
Octa-CDD	0.312	4.378	46.470	10.265	132.643	4.969
Total CDD	0.775	1197.793	63.372	1863.517	226.961	1039.568
FURANS						
2378 TCDF	0.063	12.188	1.078	18.700	3.799	8.420
Other TCDF	0.737	867.766	51.160	1254.464	97.873	687.347
12378 PCDF	(0.034)	15.112	1.125	28.469	12.611	9.972
23478 PCDF	0.093	26.177	2.709	60.423	11.846	16.351
Other PCDF	0.523	379.780	23.153	810.764	142.402	303.518
123478 HxCDF	0.207	50.956	8.304	93.655	51.977	34.080
123678 HxCDF	0.070	14.560	2.781	27.595	26.587	10.317
234678 HxCDF	0.143	19.901	6.262	40.393	25.201	14.297
123789 HxCDF	[0.026]	0.474	0.960	1.108	2.115	0.328
Other HxCDF	0.347	126.954	14.396	227.011	132.138	81.657
1234678-HpCDF	0.299	18.140	11.247	41.591	85.886	19.651
1234789-HpCDF	0.270	1.247	2.854	3.099	18.227	1.746
Other Hepta-CDF	0.433	10.465	7.240	23.565	64.989	11.352
Octa-CDF	0.651	2.242	24.180	4.760	195.247	2.551
TOTAL CDF	3.718	1545.961	156.900	2635.596	870.898	1201.589
TOTAL CDD+CDF	4.493	2743.754	220.272	4499.113	1097.859	2241.157

[ ] = Minimum Detection Limit

( ) = Estimated Maximum Possible Concentration.

TABLE 2-15. CDD/CDF STACK EMISSIONS AND OUTLET/INLET EMISSIONS RATIOS FOR THE BURNDOWN CONDITION (RUNS 2,4,6); JORDAN HOSPITAL (1991)

	RUN 2 EMISSIONS			RUN 4 EMISSIONS			RUN 6 EMISSIONS			BURNDOWN AVG EMISSIONS		
CONGENER	INLET (ug/hr)	OUTLET (ug/hr)	OUT/IN RATIO	INLET (ug/hr)	OUTLET (ug/hr)	OUT/IN RATIO	INLET (ug/hr)	OUTLET (ug/hr)	OUT/IN RATIO	INLET (ug/hr)	OUTLET (ug/hr)	OUT/IN RATIO
DIOXINS												
2378 TCDD	(0.064)	0.83	12.93	(0.156)	(0.859)	5.51	1.09	0.34	0.31	0.44	0.39	6.25
Other TCDD	0.03	274.0	8567.17	10.4	267.0	25.59	8.9	122.4	13.77	6.45	221.12	2868.84
12378 PCDD	[0.015]	6.5	433.40	0.9	8.6	9.66	4.7	2.3	0.49	2.81	5.80	147.85
Other PCDD	(0.087)	380.0	4367.96	21.8	407.1	18.71	26.0	174.6	6.72	15.95	320.58	1464.46
123478 HxCDD	[0.024]	3.4	140.36	1.7	5.4	3.19	5.7	1.3	0.23	3.69	3.38	47.93
123678 HxCDD	0.02	5.1	214.36	3.3	8.5	2.62	5.9	2.2	0.38	3.06	5.29	72.45
123789 HxCDD	[0.015]	8.7	579.18	4.6	14.8	3.23	10.8	3.7	0.34	7.72	9.08	194.25
Other HxCDD	0.01	160.1	20024.55	31.4	271.4	8.65	49.4	71.7	1.45	26.94	167.76	6678.22
1234678-HpCDD	0.10	9.8	102.25	26.9	19.3	0.72	88.1	5.2	0.06	38.35	11.41	34.34
Other Hepta-CDD	0.00	17.8	NA	0.0	31.3	NA	0.0	7.9	NA	0.00	19.01	NA
Octa-CDD	0.38	3.5	9.24	46.5	6.3	0.14	296.3	2.0	0.01	114.40	3.95	3.13
Total CDD	0.7	869.8	1252.14	147.5	1040.6	7.06	497.0	393.7	0.79	215.06	768.05	420.00
FURANS												
2378 TCDF	0.06	9.6	149.69	2.4	9.1	3.75	8.2	3.7	0.45	3.58	7.49	51.30
Other TCDF	0.74	538.9	732.60	118.9	476.3	4.01	207.3	236.3	1.14	108.98	417.16	245.91
12378 PCDF	(0.040)	13.2	329.48	2.6	16.5	6.36	28.6	5.1	0.18	10.41	11.57	112.01
23478 PCDF	0.09	22.5	255.36	6.2	36.0	5.80	25.6	7.8	0.31	10.62	22.10	87.15
Other PCDF	0.36	328.4	912.81	54.0	465.5	8.62	315.0	134.7	0.43	123.12	309.55	307.29
123478 HxCDF	0.19	43.0	223.91	19.2	65.8	3.42	116.5	16.3	0.14	45.31	41.66	75.82
123678 HxCDF	0.06	12.7	198.66	6.4	19.2	2.98	60.3	4.9	0.08	22.26	12.25	67.24
234678 HxCDF	0.12	17.7	147.84	14.5	27.2	1.87	55.4	6.0	0.11	23.34	16.98	49.94
123789 HxCDF	[0.015]	0.5	33.88	1.0	0.9	0.89	4.8	0.2	0.04	2.88	0.52	11.61
Other HxCDF	0.36	108.1	300.50	33.6	153.5	4.57	299.6	38.5	0.13	111.19	100.04	101.73
1234678-HpCDF	0.35	16.0	45.36	26.0	30.0	1.15	193.7	6.6	0.03	73.36	17.50	15.51
1234789-HpCDF	0.27	1.1	3.91	6.6	2.1	0.32	41.0	(0.552)	0.01	15.95	1.06	1.42
Other Hepta-CDF	0.90	9.3	10.36	16.8	16.9	1.01	146.9	4.0	0.03	54.85	10.07	3.80
Octa-CDF	1.28	1.7	1.29	55.9	3.2	0.06	439.8	1.0	0.00	165.66	1.94	0.45
TOTAL CDF	4.82	1122.5	232.82	364.3	1322.1	3.63	1942.5	465.6	0.24	770.5	970.1	78.90
TOTAL CDD+CDF	5.52	1992.3	361.20	511.8	2362.7	4.62	2439.5	859.3	0.35	985.6	1738.1	122.06

[ ] = Minimum Detection Limit.

TABLE 2-24. AVERAGE METALS EMISSION RATES AND REMOVAL EFFICIENCIES FOR BURN AND BURNDOWN CONDITIONS; JORDAN HOSPITAL (1991)

CONDITION	BURN											
RUN NO.	RUN 1			RUN 3			RUN 5			AVERAGE		
LOCATION	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)
Antimony	0.023	0.004	82.5	0.016	0.004	77.3	0.017	0.005	68.4	0.019	0.004	76.1
Arsenic	0.001	[0.0002]	> 80	[0.0002]	[0.0002]	NA	[0.001]	[0.0002]	NA	0.001	[0.0002]	>80
Barium	0.007	0.002	62.3	0.018	0.002	89.1	0.004	0.002	54.4	0.010	0.002	68.6
Beryllium	[0.0001]	[0.00005]	NA	[0.0001]	[0.00005]	NA	[0.0001]	[0.00005]	NA	[0.0001]	[0.00005]	NA
Cadmium	0.059	0.004	93.8	0.023	0.002	92.1	0.017	0.001	92.5	0.033	0.002	92.8
Chromium	0.019	0.005	72.9	0.013	0.003	78.0	0.014	0.003	80.8	0.015	0.004	77.2
Lead	0.966	0.007	99.3	0.642	0.011	98.2	0.787	0.008	98.9	0.798	0.009	98.8
Mercury	0.710	0.241	66.1	2.897	0.514	82.3	0.283	0.035	87.8	1.297	0.263	78.7
Nickel	0.003	0.004	-28.9	0.003	0.019	-517.5	0.016	0.008	50.3	0.007	0.010	-165.4
Silver	[0.0005]	0.007	NA	0.003	0.001	54.0	0.002	[0.0003]	> 85	0.002	0.003	54.0
Thallium	[0.001]	[0.0005]	NA	[0.001]	[0.0005]	NA	[0.001]	[0.0005]	NA	[0.001]	[0.0005]	NA
CONDITION	BURNDOWN											
RUN NO.	RUN 2			RUN 4			RUN 6			AVERAGE		
LOCATION	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)	INLET (g/hr)	OUTLET (g/hr)	REMOVAL EFFICIENCY (%)
Antimony	0.053	0.004	92.1	0.089	0.006	93.0	0.118	[0.001]	> 99.2	0.087	0.003	92.6
Arsenic	0.003	[0.0002]	> 93.3	0.001	[0.0002]	> 80	0.007	[0.0002]	> 97.1	0.004	[0.0002]	>90.1
Barium	0.015	0.003	80.1	0.103	0.003	97.0	0.058	0.005	92.0	0.059	0.004	89.7
Beryllium	[0.0001]	[0.00005]	NA	[0.0001]	[0.00006]	NA	[0.0001]	[0.00007]	NA	[0.0001]	[0.00006]	NA
Cadmium	0.168	0.002	98.9	0.179	0.002	98.9	0.170	0.003	98.1	0.172	0.002	98.6
Chromium	0.031	0.002	94.3	0.016	0.004	76.9	0.017	0.003	81.7	0.021	0.003	84.3
Lead	5.75	0.039	99.3	3.57	0.022	99.4	5.06	0.051	99.0	4.791	0.038	99.2
Mercury	0.725	0.285	60.7	6.12	1.22	80.1	0.716	0.214	70.1	2.520	0.572	70.3
Nickel	0.011	0.001	91.7	0.008	0.002	79.9	0.015	0.004	72.7	0.011	0.002	81.4
Silver	0.002	0.004	-95.2	[0.001]	[0.0003]	NA	0.006	[0.0004]	> 93.3	0.003	0.001	NA
Thallium	[0.001]	[0.001]	NA	[0.001]	[0.001]	NA	[0.001]	[0.001]	NA	[0.001]	[0.001]	NA

Note: Values enclosed in brackets represent the minimum detection limits for compounds not detected in the samples. Detection limits are not included in the averages unless otherwise indicated.

NA = Not applicable

[] = Minimum Detection Limit.

TABLE 2-37. METALS/PM EMISSIONS SAMPLING AND FLUE GAS PARAMETERS AT INLET; JORDAN HOSPITAL (1991)

	BURN CONDITION			
RUN NUMBER	Run 1	Run 3	Run 5	AVERAGE
DATE	03/05/91	03/07/91	03/09/91	
Total Sampling Time (min.)	375	403	418	NA
Average Sampling Rate (dscfm)	0.20	0.20	0.15	0.18
Metered Volume (dscf)	74.21	79.22	63.4	72.28
Metered Volume (dscm)	2.102	2.244	1.795	2.047
Average Stack Temperature (F)	1171	1195	1183	1183
O2 Concentration (%V)	8.8	9.6	11.2	9.9
CO2 Concentration (%V)	7.5	5.9	5.1	6.2
Stack Gas Moisture (%V)	9.0	10.8	9.6	9.8
Volumetric Flow Rate (dscfm)	910	733	625	756
Volumetric Flow Rate (dscmm)	25.77	20.75	17.69	21.40
Percent Isokinetic	90.9	111	101	NA
	BURNDOWN CONDITION			
RUN NUMBER	Run 2	Run 4	Run 6	AVERAGE
DATE	03/05/91	03/07/91	03/09/91	
Total Sampling Time (min.)	250	311	305	NA
Average Sampling Rate (dscfm)	0.18	0.11	0.11	0.13
Metered Volume (dscf)	44.74	33.07	33.63	37.15
Metered Volume (dscm)	1.267	0.936	0.952	1.052
Average Stack Temperature (F)	1108	1130	1228	1155
O2 Concentration (%V)	8.9	10.3	8.6	9.3
CO2 Concentration (%V)	8.9	6.3	7.7	7.6
Stack Gas Moisture (%V)	8.0	10.2	6.5	8.3
Volumetric Flow Rate (dscfm)	756	548	524	609
Volumetric Flow Rate (dscmm)	21.40	15.52	14.85	17.26
Percent Isokinetic	99.0	81.1	87.1	NA

NA = Not applicable.

TABLE 2-38. METALS/PM EMISSIONS SAMPLING AND FLUE GAS PARAMETERS AT OUTLET; JORDAN HOSPITAL (1991)

	BURN CONDITION			
RUN NUMBER DATE	Run 1 03/05/91	Run 3 03/07/91	Run 5 03/09/91	AVERAGE
Total Sampling Time (min.)	415	404	419	NA
Average Sampling Rate (dscfm)	0.43	0.41	0.42	0.42
Metered Volume (dscf)	176.47	165.54	177.41	173.14
Metered Volume (dscm)	4.998	4.688	5.024	4.903
Average Stack Temperature (F)	181	192	176	183
O2 Concentration (%V)	17.6	17.1	17.3	17.3
CO2 Concentration (%V)	1.8	2.2	2.2	2.1
Stack Gas Moisture (%V)	15.8	16.2	13.2	15.0
Volumetric Flow Rate (dscfm)	1368	1232	1333	1311
Volumetric Flow Rate (dscmm)	38.74	34.90	37.75	37.13
Percent Isokinetic	96.4	103	100	NA
	BURNDOWN CONDITION			
RUN NUMBER DATE	Run 2 03/05/91	Run 4 03/07/91	Run 6 03/09/91	AVERAGE
Total Sampling Time (min.)	321	305	295	NA
Average Sampling Rate (dscfm)	0.47	0.39	0.3	0.39
Metered Volume (dscf)	152.22	118.72	89.84	120.26
Metered Volume (dscm)	1.311	3.362	2.544	2.406
Average Stack Temperature (F)	187	193	180	186
O2 Concentration (%V)	17.8	17.5	17.4	17.6
CO2 Concentration (%V)	1.9	2.1	2.4	2.1
Stack Gas Moisture (%V)	13.92	14.65	11.95	13.5
Volumetric Flow Rate (dscfm)	1434	1153	1028	1205
Volumetric Flow Rate (dscmm)	40.60	32.66	29.12	34.13
Percent Isokinetic	103	105	93.3	NA

NA = Not applicable

TABLE 2-43. PARTICULATE MATTER CONCENTRATIONS AND EMISSIONS FOR BURN CONDITION; JORDAN HOSPITAL (1991)

DATE	LOCATION	RUN NUMBER	TIME	FLUE GAS CONCENTRATION (grains/dscf)	(grains/dscf @ 7% O2)	(grams/dscm)	(grams/dscm @ 7% O2)	FLUE GAS EMISSION RATE (lb/hr)	(kg/hr)	a REMOVAL EFFICIENCY (%)
03/05/91	INLET	1	09:50-16:49	0.0035	0.0040	0.0080	0.0092	0.027	0.012	
03/07/91	INLET	3	09:32-16:30	0.0028	0.0035	0.0064	0.0079	0.018	0.0080	
03/09/91	INLET	5	09:25-16:30	0.0029	0.0041	0.0065	0.0094	0.015	0.0069	
			AVERAGES	0.0031	0.0039	0.0070	0.0088	0.020	0.0091	
03/05/91	OUTLET	1	09:47-16:49	NA	NA	NA	NA	NA	NA	NA
03/07/91	OUTLET	3	09:32-16:30	0.00045	0.0016	0.0010	0.0038	0.0048	0.0022	72.7
03/09/91	OUTLET	5	09:25-16:30	0.00058	0.0022	0.0013	0.0051	0.0066	0.0030	56.9
			AVERAGES	0.00052	0.0019	0.0012	0.0044	0.0057	0.0026	64.8

NA = Not applicable, particulate matter was not detected in this sample.

a = Removal efficiency is based on inlet and outlet emission rates. {(1-out/in)*100}

TABLE 2-44. PARTICULATE MATTER CONCENTRATIONS AND EMISSIONS FOR BURNDOWN CONDITION; JORDAN HOSPITAL (1991)

DATE	LOCATION	RUN NUMBER	TIME	FLUE GAS CONCENTRATION (grains/dscf)	(grains/dscf @ 7% O2)	(grams/dscm)	(grams/dscm @ 7% O2)	FLUE GAS EMISSION RATE (lb/hr)	(kg/hr)	a REMOVAL EFFICIENCY (%)
03/05/91	INLET	2	17:35-22:10	0.014	0.016	0.033	0.038	0.092	0.042	
03/07/91	INLET	4	16:35-21:57	0.017	0.022	0.038	0.050	0.078	0.035	
03/09/91	INLET	6	16:31-21:44	0.037	0.042	0.084	0.095	0.165	0.075	
			AVERAGES	0.023	0.027	0.052	0.061	0.112	0.051	
03/05/91	OUTLET	2	16:49-22:13	0.00017	0.00076	0.00039	0.0017	0.0021	0.00090	97.7
03/07/91	OUTLET	4	16:34-22:00	0.00044	0.0018	0.0010	0.0041	0.0043	0.0020	94.5
03/09/91	OUTLET	6	16:44-21:46	0.00093	0.0037	0.0021	0.0085	0.0082	0.0037	95.0
			AVERAGES	0.00051	0.0021	0.0012	0.0048	0.0049	0.0022	95.7

a = Removal efficiency is based on inlet and outlet emission rates. {(1-out/in)*100}

TABLE 2-47. SUMMARY OF HCl RESULTS AT THE INLET; JORDAN HOSPITAL (1991)

HCl TEST RUN NUMBER	MEASURED CONCENTRATIONS				EMISSION RATES	
	(mg/dscm)	(mg/dscm @7% O2)	(ppmv)	(ppmv @7% O2)	(g/hr)	(lb/hr)
1A	60.5	65.2	39.9	43.0	83.5	0.184
1B	65.7	75.5	43.4	49.8	90.8	0.200
1C	185.9	228.6	122.6	150.8	256.7	0.566
1D	150.9	189.0	99.6	124.7	194.0	0.428
AVERAGE	115.7	139.6	76.3	92.1	156.3	0.345
2A	610.9	653.2	403.0	430.9	785.4	1.731
2B	46.6	61.1	30.8	40.3	59.9	0.132
AVERAGE	328.8	357.2	216.9	235.6	422.7	0.932
3A	27.8	32.5	18.3	21.4	33.0	0.073
3B	76.5	90.1	50.4	59.4	90.8	0.200
3C	236.2	285.6	155.8	188.4	280.4	0.618
3D	178.2	223.1	117.5	147.2	211.4	0.466
AVERAGE	194.4	238.9	128.2	157.6	230.7	0.509
4A	327.6	367.2	216.1	242.2	336.8	0.743
4B	300.8	394.5	198.4	260.2	309.4	0.682
4C	269.8	364.1	178.0	240.2	277.5	0.612
AVERAGE	299.4	375.3	197.5	247.5	307.9	0.679
5A	31.81	68.025	20.982	44.870	36.054	0.0795
5B	14.2	18.5	9.4	12.2	16.1	0.036
5C	140.9	179.6	92.9	118.5	159.7	0.352
5D	202.9	261.1	133.8	172.3	230.0	0.507
AVERAGE	97.3	131.5	64.2	86.7	110.3	0.243
6A	412.5	374.7	272.1	247.2	371.2	0.818
6B	397.7	536.7	262.3	354.0	357.9	0.789
6C	574.5	760.5	378.9	501.7	517.1	1.140
AVERAGE	461.5	557.3	304.4	367.6	415.4	0.916

TABLE 2-48. SUMMARY OF HCl RESULTS AT THE OUTLET (STACK); JORDAN HOSPITAL (1991)

HCl TEST RUN NUMBER	MEASURED CONCENTRATIONS				EMISSION RATES	
	(mg/dscm)	(mg/dscm @7% O2)	(ppmv)	(ppmv @7% O2)	(g/hr)	(lb/hr)
1A	4.12	15.47	2.72	10.21	9.19	0.020
1B	5.19	20.62	3.43	13.60	11.58	0.026
1C	5.76	26.68	3.80	17.60	12.84	0.028
1D	8.68	38.91	5.72	25.66	22.25	0.049
AVERAGE	5.94	25.42	3.92	16.77	13.96	0.031
2A	47.82	207.70	31.54	137.00	122.59	0.270
2B	7.94	38.07	5.24	25.11	20.36	0.045
AVERAGE	27.88	122.88	18.39	81.05	71.48	0.158
3A	3.84	12.12	2.53	7.99	9.10	0.020
3B	6.16	21.96	4.06	14.49	14.61	0.032
3C	21.71	86.24	14.32	56.88	51.48	0.114
3D	9.73	38.63	6.42	25.48	23.06	0.051
AVERAGE	10.36	39.74	6.83	26.21	24.56	0.054
4A	40.39	160.41	26.64	105.81	87.61	0.193
4B	49.50	208.52	32.65	137.54	107.38	0.237
4C	38.48	137.14	25.38	90.46	83.46	0.184
AVERAGE	42.79	168.69	28.22	111.27	92.82	0.205
5A	8.48	22.36	5.59	14.75	19.37	0.043
5B	NC	NC	NC	NC	NC	NC
5C	4.86	13.70	3.20	9.03	11.10	0.024
5D	6.20	17.49	4.09	11.54	14.18	0.031
AVERAGE	6.51	17.85	4.30	11.77	14.88	0.033
6A	15.16	39.53	10.00	26.07	27.43	0.060
6B	10.45	26.75	6.89	17.65	18.91	0.042
6C	7.16	18.97	4.73	12.51	12.97	0.029
AVERAGE	10.92	28.42	7.21	18.74	19.77	0.044

NC = Analysis not completed due to improper sample recovery.

TABLE 2-49. SUMMARY OF HF RESULTS AT THE INLET; JORDAN HOSPITAL (1991)

TEST RUN NUMBER	MEASURED CONCENTRATIONS				EMISSION RATE	
	(mg/dscm)	(mg/dscm @7% O2)	(ppmv)	(ppmv @7% O2)	(g/hr)	(lb/hr)
1A	[0.4448]	[0.4788]	[0.5348]	[0.5758]	[0.6138]	[0.0018]
1B	[0.6348]	[0.7288]	[0.7628]	[0.8758]	[0.8768]	[0.0028]
1C	[0.4368]	[0.5368]	[0.5248]	[0.6458]	[0.6028]	[0.0018]
AVERAGE	[0.505]	[0.581]	[0.607]	[0.698]	[0.697]	[0.001]
2A	[1.1489]	[1.4389]	[1.3809]	[1.7289]	[1.4769]	[0.0039]
2B	[0.4339]	[0.4639]	[0.5219]	[0.5579]	[0.5579]	[0.0019]
2C	[0.4098]	[0.5368]	[0.4928]	[0.6458]	[0.5268]	[0.0018]
AVERAGE	[0.6642]	[0.8132]	[0.7985]	[0.9775]	[0.8539]	[0.0025]
3A	[0.4408]	[0.5148]	[0.5298]	[0.6188]	[0.5228]	[0.0018]
3B	[0.4328]	[0.5098]	[0.5198]	[0.6118]	[0.5138]	[0.0018]
3C	[0.4680]	[0.5660]	[0.5630]	[0.6800]	[0.5550]	[0.0010]
3D	[0.4419]	[0.5529]	[0.5309]	[0.6649]	[0.5239]	[0.0019]
AVERAGE	[0.445]	[0.535]	[0.535]	[0.643]	[0.528]	[0.001]
4A	[0.5119]	[0.5739]	[0.6149]	[0.6889]	[0.5269]	[0.0019]
4B	[0.4520]	[0.5930]	[0.5430]	[0.7120]	[0.4650]	[0.0010]
4C	[0.3990]	[0.5380]	[0.4800]	[0.6480]	[0.4100]	[0.0010]
AVERAGE	[0.454]	[0.568]	[0.546]	[0.683]	[0.467]	[0.001]
5A	1.165	2.491	1.400	2.995	1.320	0.003
5B	[0.4430]	[0.5750]	[0.5330]	[0.6920]	[0.5020]	[0.0010]
5C	[0.4430]	[0.5650]	[0.5330]	[0.6800]	[0.5020]	[0.0010]
5D	[0.4680]	[0.6020]	[0.5630]	[0.7250]	[0.5300]	[0.0010]
AVERAGE	1.165	2.491	1.400	2.995	1.320	0.003
6A	[0.4169]	[0.3789]	[0.5009]	[0.4549]	[0.3749]	[0.0019]
6B	[0.4312]	[0.5822]	[0.5182]	[0.6992]	[0.3882]	[0.0012]
6C	[0.4792]	[0.6342]	[0.5762]	[0.7632]	[0.4312]	[0.0012]
AVERAGE	[0.442]	[0.531]	[0.531]	[0.639]	[0.398]	[0.001]

[ ] = Minimum detection limit.

TABLE 2-50. SUMMARY OF HF RESULTS AT THE OUTLET; JORDAN HOSPITAL (1991)

TEST RUN NUMBER	MEASURED CONCENTRATIONS				EMISSION RATE	
	(mg/dscm)	(mg/dscm @7% O2)	(ppmv)	(ppmv @7% O2)	(g/hr)	(lb/hr)
1A	[0.2579]	[0.9659]	[0.3099]	[1.1619]	[0.5739]	[0.0019]
1B	[0.2438]	[0.9658]	[0.2928]	[1.1608]	[0.5428]	[0.0018]
1C	[0.2218]	[1.0248]	[0.2668]	[1.2328]	[0.4938]	[0.0018]
AVERAGE	[0.240]	[0.985]	[0.289]	[1.184]	[0.536]	[0.001]
2A	[0.7188]	[3.2198]	[0.8638]	[3.8708]	[1.8418]	[0.0048]
2B	[0.2216]	[0.9606]	[0.2666]	[1.1556]	[0.5676]	[0.0016]
2C	[0.2216]	[0.9606]	[0.2666]	[1.1556]	[0.5676]	[0.0016]
AVERAGE	[0.3873]	[1.7137]	[0.4657]	[2.0607]	[0.9923]	[0.0027]
3A	[0.2198]	[0.6928]	[0.2638]	[0.8318]	[0.5198]	[0.0018]
3B	[0.2198]	[0.7818]	[0.2638]	[0.9378]	[0.5198]	[0.0018]
3C	[0.2199]	[0.8709]	[0.2639]	[1.0449]	[0.5199]	[0.0019]
3D	[0.2258]	[0.8948]	[0.2708]	[1.0728]	[0.5348]	[0.0018]
AVERAGE	[0.221]	[0.809]	[0.265]	[0.971]	[0.523]	[0.001]
4A	[0.2048]	[0.8108]	[0.2458]	[0.9738]	[0.4428]	[0.0018]
4B	[0.2699]	[1.1339]	[0.3239]	[1.3619]	[0.5839]	[0.0019]
4C	[0.2008]	[0.7138]	[0.2408]	[0.8558]	[0.4348]	[0.0018]
AVERAGE	[0.224]	[0.885]	[0.269]	[1.063]	[0.486]	[0.001]
5A	[0.2401]	[0.6331]	[0.2891]	[0.7621]	[0.5481]	[0.0011]
5B	[0.2138]	[0.5188]	[0.2568]	[0.6228]	[0.4878]	[0.0018]
5C	[0.2188]	[0.6158]	[0.2628]	[0.7398]	[0.4988]	[0.0018]
5D	[0.2391]	[0.6741]	[0.2871]	[0.8091]	[0.5461]	[0.0011]
AVERAGE	[0.228]	[0.610]	[0.274]	[0.733]	[0.520]	[0.001]
6A	[0.2239]	[0.5829]	[0.2689]	[0.6999]	[0.4049]	[0.0019]
6B	[0.2228]	[0.5688]	[0.2678]	[0.6838]	[0.4028]	[0.0018]
6C	[0.2428]	[0.6418]	[0.2918]	[0.7708]	[0.4388]	[0.0018]
AVERAGE	[0.229]	[0.597]	[0.275]	[0.717]	[0.415]	[0.001]

[ ] = Minimum detection limit.

TABLE 2-51. SUMMARY OF HBr RESULTS AT THE INLET; JORDAN HOSPITAL (1991)

TEST RUN NUMBER	MEASURED CONCENTRATIONS				EMISSION RATE	
	(mg/dscm)	(mg/dscm @7% O2)	(ppmv)	(ppmv @7% O2)	(g/hr)	(lb/hr)
1A	[0.1306]	[0.1406]	[0.0396]	[0.0426]	[0.1806]	[0.0006]
1B	[0.1867]	[0.2147]	[0.0557]	[0.0637]	[0.2577]	[0.0017]
1C	[0.1286]	[0.1576]	[0.0386]	[0.0476]	[0.1776]	[0.0006]
AVERAGE	[0.148]	[0.170]	[0.044]	[0.051]	[0.205]	[0.000]
2A	[0.3367]	[0.4217]	[0.1007]	[0.1257]	[0.4327]	[0.0017]
2B	[0.1277]	[0.1367]	[0.0387]	[0.0417]	[0.1637]	[0.0007]
2C	[0.1207]	[0.1577]	[0.0367]	[0.0477]	[0.1547]	[0.0007]
AVERAGE	[0.1950]	[0.2387]	[0.0587]	[0.0717]	[0.2504]	[0.0010]
3A	[0.1296]	[0.1516]	[0.0386]	[0.0446]	[0.1536]	[0.0006]
3B	[0.1266]	[0.1486]	[0.0376]	[0.0446]	[0.1506]	[0.0006]
3C	(0.1569)	(0.1899)	(0.0469)	(0.0569)	(0.1859)	(0.0009)
3D	[0.1297]	[0.1627]	[0.0387]	[0.0487]	[0.1537]	[0.0007]
AVERAGE	0.156	0.189	0.046	0.056	0.185	0.001
4A	[0.1507]	[0.1687]	[0.0457]	[0.0507]	[0.1547]	[0.0007]
4B	[0.1297]	[0.1697]	[0.0387]	[0.0507]	[0.1337]	[0.0007]
4C	[0.1147]	[0.1547]	[0.0347]	[0.0467]	[0.1177]	[0.0007]
AVERAGE	[0.131]	[0.164]	[0.039]	[0.049]	[0.135]	[0.000]
5A	[0.1257]	[0.2677]	[0.0377]	[0.0797]	[0.1427]	[0.0007]
5B	[0.1277]	[0.1657]	[0.0387]	[0.0497]	[0.1447]	[0.0007]
5C	[0.1267]	[0.1617]	[0.0377]	[0.0477]	[0.1437]	[0.0007]
5D	[0.1346]	[0.1726]	[0.0406]	[0.0516]	[0.1526]	[0.0006]
AVERAGE	[0.128]	[0.191]	[0.038]	[0.057]	[0.145]	[0.000]
6A	[0.1227]	[0.1117]	[0.0367]	[0.0337]	[0.1107]	[0.0007]
6B	[0.1237]	[0.1667]	[0.0377]	[0.0507]	[0.1117]	[0.0007]
6C	[0.1376]	[0.1816]	[0.0416]	[0.0546]	[0.1236]	[0.0006]
AVERAGE	[0.127]	[0.153]	[0.038]	[0.046]	[0.115]	[0.000]

[ ] = Minimum detection limit.

( ) = Estimated maximum possible concentration.

TABLE 2-52. SUMMARY OF HBr RESULTS AT THE OUTLET; JORDAN HOSPITAL (1991)

TEST RUN NUMBER	MEASURED CONCENTRATIONS (mg/dscm)	(mg/dscm @7% O2)	(ppmv)	(ppmv @7% O2)	EMISSION RATE (g/hr)	(lb/hr)
1A	[0.0757]	[0.2827]	[0.0227]	[0.0837]	[0.1677]	[0.0007]
1B	[0.0716]	[0.2826]	[0.0216]	[0.0836]	[0.1586]	[0.0006]
1C	[0.0656]	[0.3016]	[0.0196]	[0.0886]	[0.1456]	[0.0006]
AVERAGE	[0.070]	[0.288]	[0.021]	[0.085]	[0.157]	[0.000]
2A	[0.2106]	[0.9426]	[0.0626]	[0.2786]	[0.5386]	[0.0016]
2B	[0.0656]	[0.2826]	[0.0196]	[0.0836]	[0.1676]	[0.0006]
2C	[0.0656]	[0.3126]	[0.0196]	[0.0916]	[0.1676]	[0.0006]
AVERAGE	[0.1139]	[0.5126]	[0.0339]	[0.1513]	[0.2913]	[0.0009]
3A	[0.0646]	[0.2026]	[0.0196]	[0.0606]	[0.1526]	[0.0006]
3B	0.910	3.244	0.271	0.964	2.158	0.005
3C	1.036	4.114	0.308	1.223	2.457	0.005
3D	[0.0666]	[0.2626]	[0.0206]	[0.0796]	[0.1566]	[0.0006]
AVERAGE	0.973	3.679	0.289	1.094	2.307	0.005
4A	[0.0606]	[0.2386]	[0.0186]	[0.0716]	[0.1306]	[0.0006]
4B	[0.0797]	[0.3337]	[0.0237]	[0.0977]	[0.1717]	[0.0007]
4C	[0.0596]	[0.2106]	[0.0186]	[0.0646]	[0.1286]	[0.0006]
AVERAGE	[0.066]	[0.260]	[0.020]	[0.077]	[0.143]	[0.000]
5A	[0.0697]	[0.1827]	[0.0217]	[0.0557]	[0.1587]	[0.0007]
5B	[0.0626]	[0.1516]	[0.0186]	[0.0446]	[0.1426]	[0.0006]
5C	[0.0646]	[0.1806]	[0.0196]	[0.0546]	[0.1466]	[0.0006]
5D	[0.0687]	[0.1927]	[0.0207]	[0.0567]	[0.1557]	[0.0007]
AVERAGE	[0.066]	[0.176]	[0.020]	[0.052]	[0.150]	[0.000]
6A	[0.0657]	[0.1707]	[0.0197]	[0.0507]	[0.1187]	[0.0007]
6B	[0.0656]	[0.1666]	[0.0196]	[0.0496]	[0.1186]	[0.0006]
6C	[0.0716]	[0.1886]	[0.0216]	[0.0566]	[0.1286]	[0.0006]
AVERAGE	[0.067]	[0.175]	[0.020]	[0.052]	[0.121]	[0.000]

[ ] = Minimum detection limit.

TABLE 2-54. CONTINUOUS EMISSIONS MONITORING TEST AVERAGES AS MEASURED; JORDAN HOSPITAL (1991)

TIME	INLET SO2 (ppmV/dry)	OUTLET SO2 (ppmV/dry)	INLET O2 (ppmV/dry)	OUTLET O2 (ppmV/dry)	INLET CO2 (ppmV/dry)	OUTLET CO2 (ppmV/dry)	INLET NOx (ppmV/dry)	INLET CO (ppmV/dry)	INLET HCl (ppmV/wet) a	OUTLET HCl (ppmV/wet) a	INLET THC (ppmV/wet)	OUTLET THC (ppmV/wet)
RUN1 BURN AVG	6.16	0.71	8.80	17.63	7.51	1.78	76.74	7.03	323.00	NA	12.11	0.85
RUN 2 BURNDOWN AVG	33.29	3.50	8.85	17.77	8.88	1.86	108.85	6.16	266.40	NA	5.58	0.84
RUN 3 BURN AVG	8.84	0.35	9.56	17.06	5.91	2.20	65.28	8.87	211.02	NA	NA	NA
RUN 4 BURNDOWN AVG	23.05	1.11	10.32	17.46	6.30	2.11	75.43	0.09	452.24	NA	NA	NA
RUN 5 BURN AVG	4.60	0.53	11.18	17.26	5.13	2.16	60.41	1.72	422.47	NA	5.94	NA
RUN 6 BURNDOWN AVG	41.30	5.27	8.61	17.41	7.75	2.38	103.41	53.46	485.98	NA	8.58	NA

a HCl concentrations were determined by manual methods as well. A comparison of CEM vs. manual results is presented in Section 2.6.

NA = Not available: THC instrument was not operating during that time interval.

The outlet HCl instrument showed poor resolution in the lower concentration ranges.

TABLE 2-58. SUMMARY OF INCINERATOR FEED AMOUNTS AND ASH GENERATION PER RUN; JORDAN HOSPITAL (1991)

RUN [a] NUMBER	TEST DAY	DATE	DESIGN LOAD RATE (lbs)	TIMES	WET SPORE [b] SPIKE AMOUNTS (total spores)	DRY SPORE SPIKE AMOUNTS (total spores)	TOTAL WASTE FEED (lbs)	TOTAL ASH WEIGHT (lbs) [c]
1,2	1	03/05/91	750	08:45	1.71E+12	1.7E+8 d	719.07	70.34
3,4	2	03/07/91	750	08:30	1.71E+12	9.0E+7 e	702.21	94.87
5,6	3	03/09/91	750	08:25	1.58E+12	2.6E+8 f	729.38	60.35

a Two indicator spore emissions test runs were conducted every day. One during the Burn and one during the Burndown.
b Wet spores were added in eight ~250 ml aliquots spread over separate waste bags.
c Total ash weight includes relatively large pieces of material (glass, metal, etc.)
d Eight mesh containers were placed in each of the eight wet spike bags. Nine pipes were placed on the floor.
e Nine pipes were placed on the floor.
f Eight mesh containers were placed in each of eight wet spore spike bags. Nine pipes and nine mesh containers were placed on the floor.