ARB/SS-87-01

Evaluation Test On A Hospital Refuse Incinerator At Saint Agnes Medical Center, Fresno, CA

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CALIFORNIA AIR RESOURCES BOARD

STATIONARY SOURCE DIVISION
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II. PROCESS DESCRIPTION

The Saint Agnes Medical Center operates a multichambered waste heat recovery incinerator located at 1303 E. Herndon Avenue, Fresno, CA. The incinerator, Model 1000 - TE incinerator/heat recovery system, is manufactured by Environmental Control Products, Inc. This system consists of a dual chambered, natural gas fired, hospital refuse burning incinerator which passes its exhaust gases through a waste heat boiler for steam generation. A schematic of the incinerator/heat recovery system is shown in Figure 1. The average refuse feed rate to the incinerator during the test period was 783 lb/hr. The refuse is fed to the first or lower chamber with a ram.

The refuse composition was considered to be typical for hospital incinerators i.e., moisture 10 percent, plastic 30 percent, paper 65 percent and other 5 percent. The heating value was estimated at 10,000 BTU per pound. The operating temperature of the lower chamber is between 1500 and 1600°F and the second chamber between 1800 and 2000°F. The lower chamber is initially fired with natural gas until the refuse-laden chamber comes up to operating temperature, then the natural gas firing is discontinued. The upper or second chamber is fired with natural gas at a rate required to maintain second chamber operating temperatures.

TABLE 4

CONCENTRATIONS OF OXYGEN, CARBON DIOXIDE, CARBON MONOXIDE, SULFUR DIOXIDE, OXIDES OF NITROGEN, TOTAL HYDROCARBONS, PARTICULATE MATTER, AND HYDROCHLORIC ACID IN THE STACK GAS AT SAINT AGNES

			CONCENTRATIONS							
Date	Test	Time	PM gr/DSCF	O_2[a] Percent	CO_2[a] Percent	CO[a] ppmv	NO_x[b,c] ppmv	SO_2[c] ppmv	HC[c,d] ppmv	HCL[c] ppmv
8-12-86	DT-1S	1000-1600	-	13.6	5.5	<50	-	22	2	-
	RT-1S	1000-1200	-	12.3	7.2	<50	-	11	2	-
	HCL-1S	1015-1215	-	12.3	7.2	<50	-	11	2	764
	1-M5	1515-1630	0.08	14.1	4.6	<50	-	27	3	-
8-13-86	DT-2S	0900-1500	-	16.1	3.6	<50	-	18	4	-
	RT-2S	0900-1100	-	15.1	4.3	<50	-	14	3	-
	HCL-2S	0915-1115	-	15.1	4.3	<50	-	14	3	926
	2-M5	1330-1430	0.08	17.1	2.6	<50	-	24	5	-
8-14-86	3-M5	0930-1030	0.09	16.3	3.8	<50	155	20	1	-

a/ The O_2, CO_2 and CO values were used to determine the molecular weight of the stack gas and mass emission rates.
b/ NO_x analyzer inoperative on 8-12 and -8-13-86.
c/ NO_x, SO_2, HC and HCL data corrected to 3 percent O_2.
d/ Total hydrocarbon data reported as propane.

TABLE 5

STACK CONDITIONS FOR INCINERATOR
AT SAINT AGNES MEDICAL CENTER

Date	Run No.	Stack Gas Velocity (Ft/Sec)	Stack Gas Flow Rate (DSCFM)	Moisture Content (% by Vol.)	Stack Gas Temperature (°F)
8-12-86	DT-1S	36.1	2913	8.8	235
	RT-1S	36.0	2905	8.8	235
	HCL-1S	36.0	2905	8.8	235
	1-M5	35.3	2800	8.8	248
8-13-86	DT-2S	34.2	2751	9.7	230
	RT-2S	34.2	2751	9.7	230
	HCL-2S	34.2	2751	9.7	230
	2-M5	33.9	2650	9.7	250
8-14-86	3-M5	32.4	2472	12.5	245

C-86-059
ACJ-8-19-86

TABLE 10

SUMMARY OF 2,3,7,8-SUBSTITUTED DIOXIN/FURAN TEST RESULTS

RUN #	C-86-059-DT-1S		C-86-059-DT-2S	
Sampling date	8-12-86		8-13-86	
	MASS EMISSIONS RATE (ng/sec)	CONC. (ng/M^3)	MASS EMISSIONS RATE (ng/sec)	CONC. (ng/M^3)
DIOXINS				
2,3,7,8-TCDD	ND	ND	0.53	0.41
Total TCDD	52.9	38.5	4.32	3.33
1,2,3,7,8-PeCDD	2.60	1.89	1.59	1.23
Total PeCDD	32.4	23.5	23.7	18.2
1,2,3,4,7,8-HxCDD	3.91	2.84	3.44	2.65
1,2,3,6,7,8-HxCDD	6.90	5.02	3.51	2.70
1,2,3,7,8,9-HxCDD	5.27	3.83	2.46	1.89
Total 2,3,7,8-isomer	16.1	11.7	9.41	7.24
Total HxCDD	74.8	54.4	50.2	38.7
1,2,3,4,6,7,8-HpCDD	79.3	57.7	48.3	37.2
Total HpCDD	189	137	111	85.5
Total OCDD	270	196	188	145
Total PCDD	618	450	377	290
FURANS				
2,3,7,8-TCDF	2.29	1.66	2.77	2.14
Total TCDF	89.2	64.9	102	78.7
1,2,3,7,8-PeCDF	13.4	9.71	12.8	9.86
2,3,4,7,8-PeCDF	13.5	9.85	11.8	9.07
Total 2,3,7,8-isomer	26.9	19.6	24.6	18.9
Total PeCDF	187	136	169	130
1,2,3,4,7,8-HxCDF	21.9	16.0	19.6	15.1
1,2,3,6,7,8-HxCDF	21.9	15.9	18.1	13.9
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	43.9	32.0	34.8	26.8
Total 2,3,7,8-isomer	87.8	63.8	72.6	55.9
Total HxCDF	278	202	220	170
1,2,3,4,6,7,8-HpCDF	160	116	96.6	74.4
1,2,3,4,7,8,9-HpCDF	22.7	16.5	17.0	13.1
Total 2,3,7,8-isomer	183	133	114	87.5
Total HpCDF	319	232	207	160
Total OCDF	207	150	215	166
Total PCDF	1080	785	914	704

The mass emission rates and concentrations shown above do not include the contribution of the dioxin spike mix.

TABLE 11

MASS EMISSION RATES OF HYDROCHLORIC ACID

DATE	Emissions LB/HR
8-12-86	6.05
8-13-86	4.69

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TABLE 13

MASS EMISSION RATES OF ARSENIC, CADMIUM CHROMIUM, IRON, MANGANESE, NICKEL AND LEAD IN STACK GAS

MASS EMISSION RATES, POUNDS/HOUR, ($x10^{-6}$)

RUN NO.	AS	Cd	Cr	Fe	Mn	Ni	Pb
PT-1S	84	1601	200	3979	154	108	21893
PT-2S	29	1174	113	1557	62	62	12129
PT-3S	28	971	238	3290	108	110	16884

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