

CONTINUOUS AMBIENT AIR MONITORING FOR CDFs AND CDDs: NIAGARA FALLS
NEW YORK, 1988-1989

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INTRODUCTION:

We have been monitoring the atmosphere for chlorinated dibenzofurans and dioxins at two locations in heavily industrialized Niagara Falls, N.Y. since 1984. This represents the longest study of atmospheric CDFs/CDDs done anywhere. Our ongoing goals are to re-evaluate the air contamination and associated risk and attempt to identify CDF/CDD sources by isolating factors that may influence these concentrations.

Our last reported data included samples collected from April 1, 1987 to 1988 (1). From these data we were able to triangulate wind direction and suggest a dominant municipal waste combustor point source in the area. A "background" of CDFs and CDDs from other unidentified sources was also isolated.

The present study reports the results of air samples collected from April 1, 1988 to 1989 and compares those results with previous data. Air samples (and duplicates) were collected at an industrial downwind (CAM) and upwind "control" (HRB) location every twelve days. These samples were analyzed for 2,3,7,8-substituted and total tetra- through octa- CDFs and CDDs.

ANALYTICAL METHOD:

Samples were collected by the New York State Department of Environmental Conservation. The method consisted of fiberglass filter/polyurethane foam sampling with Ultra 2 GC/LRMS (2).

RESULTS AND CONCLUSIONS:

Table 1 summarizes our results for 64 samples collected at two locations during 1988-89. The CDF/CDD homolog group concentrations, total dioxins and furans, and 2,3,7,8-TCDD equivalents are given. Specific isomers were measured but are not shown.

Figure 1 compares the 1988-89 total CDF+CDD concentrations with the previous year's results for the CAM downwind location. A wide concentration range is seen. We previously have correlated high CDF/CDD concentrations in Niagara Falls air with wind direction from a local source. Considering the wide concentration ranges observed during the year, the average annual total CDF+CDD concentrations changed little if any from 1987-88 to 1988-89. For 1988-89, the downwind CAM site again had higher CDF and CDD concentrations than the HRB site (10.0 vs 3.7 $\mu\text{g}/\text{m}^3$ total CDFs+CDDs). While a seasonal trend of total dioxins and furans is not apparent, we are investigating seasonal differences of isomers.

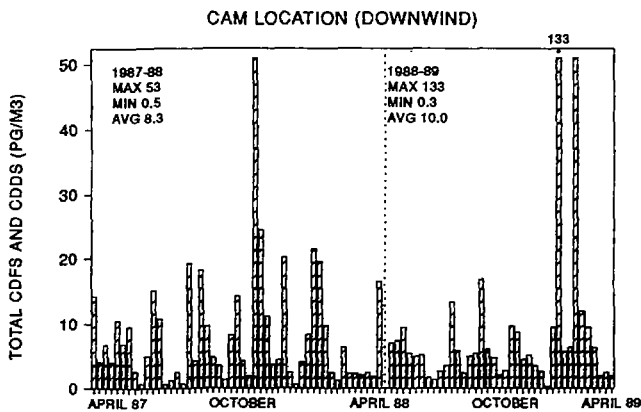


Figure 1

Principal components analysis: Ten concentrations (Cl₄ to Cl_g D & F) for 64 samples were plotted (SIMCA model) using log-converted homolog group data (fig. not shown). Samples 29 and 22 appeared as high-concentration outliers at the right of this PC plot. When these data were normalized (non-log) to emphasize differences in homolog group patterns (Figure 2), we saw a separation of samples by pattern but no distinct separation into groups. Principal component one accounted for 68% of the variance; PC2 for 14%. For comparison, selected emission and air data (1,3-5) are also plotted on this graph.

The above is a preliminary and brief assessment of these data. A more complete data interpretation is currently underway by NYSDEC.

HARRIS FALLS AMBIENT AIR
 SAMPLE RESULTS SUMMARY
 7 HOURS AT 3 LOCATIONS, 64 SAMPLES, 1/1/88 TO 1/1/89
 CONCENTRATIONS IN PB/M³

NO.	DATE	TOTD4	TOTD5	TOTD6	TOTD7	DB	TOTF4	TOTF5	TOTF6	TOTF7	F8	TOTAL D4F	TOTD EQUIV MYS EPA
CAM LOCATION:													
MIN	8 JUNE 2 88	0.018 >	0.029 >	0.032 >	0.160	0.160	0.320	0.300	0.037	0.073	0.120 >	1.37	0.05 0.10
MAX	29 JAN 15 89	0.880	2.300	5.700	31.000	40.000	5.800	5.400	11.000	22.000	5.800	135.59	0.79 1.26
AVG		0.15	0.29	0.70	1.67	2.47	1.16	1.01	1.01	1.22	0.53	10.04	0.12 0.23
STD		0.19	0.47	1.79	5.12	6.36	0.59	1.19	2.10	3.76	1.07	22.03	0.79 1.26
N=38, 0 substituted for DL													
HRS LOCATION:													
MIN	43 MAY 21 80	0.009 >	0.012 >	0.088	0.150	0.160	0.120	0.052	0.053	0.046	0.063	0.99	0.02 0.04
MAX	31 NOV 19 86	0.170	0.440	0.970	1.300	2.000	2.600	1.100	1.300	1.600	3.100	15.28	0.13 0.26
AVG		0.08	0.11	0.18	0.44	1.11	0.95	0.39	0.29	0.24	0.27	3.66	0.06 0.11
STD		0.14	0.21	0.23	0.30	0.63	0.72	0.58	0.43	0.33	0.53	3.41	0.05 0.10
N=25, 0 substituted for DL													

NORMALIZED PLOT OF ALL AIR SAMPLES AND
SELECTED COMPARISON DATA

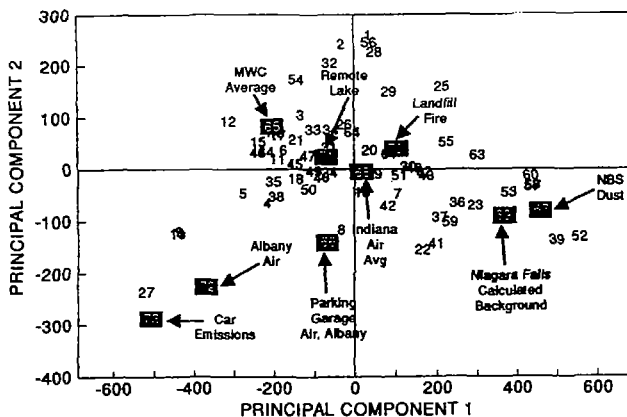


Figure 2

ACKNOWLEDGEMENT

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REFERENCES:

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