

DIOXIN/FURAN SAMPLES- AIR (pg/cubic meter)

Note: The results below are derivations of the analysis reported by Twin Cities Laboratory. The calculations performed to derive the results in pg/cubic meter from the pg/sample data reported by Twin Cities Laboratory are illustrated in the following memo.

(Results given are 2378-TCDD equivalences.)

<u>LOCATION</u>	<u>ID #</u>	<u>DATE</u>	<u>TYPE</u>	<u>RESULTS</u>	<u>COMMENTS</u>
BLISS	2211692-S.ISO	11/06/92	AIR	0.251	<u>BASEMENT-N.ISOLATION</u>
BLISS	2211892-N.ISO	11/08/92	AIR	0.070	<u>BASEMENT-S.ISOLATION</u>
BLISS	2211892-RM 312	11/08/92	AIR	0.057	<u>RM 312- OUTSIDE</u>

Allison,

The following are the calculations used in determining the results of Dioxin Air samples taken in Bliss Hall.

Sample Number: 2211892-N.ISO Date: 11/8/92

Location: Bliss Hall, Basement, North side of Isolation Wall.

Sample Duration: 3:30 P.M. 11/5/92 to 4:30 A.M. 11/8/92
Total Minutes = 3,660

Flow Rate: Rotameter Reading - 25.48 SCFH
25.48 SCFH / 2.12 = 12.02 l/min.

Analysis Result: 3.1 pg/sample

Calculations: (12.02 l/min)(3,660 min) = 43,993.0 liters
43,993.0 l / 1,000 = 43.993 m³
3.1 pg/sample = 0.070 pg/m³
43.993 m³

Sample Number: 2211892-RM-312 Date: 11/8/92

Location: Bliss Hall, Third Floor, Outside of Room 312

Sample Duration: 4:00 P.M. 11/5/92 to 11:00 A.M. 11/8/92
Total Minutes = 4,020

Flow Rate: Rotameter Reading - 32.0 SCFH
32.0 SCFH / 2.12 = 15.09 l/min.

Analysis Result: 3.5 pg/sample

Calculations: (15.09 l/min)(4,020 min) = 60,661.8 liters
60,661.8 / 1,000 = 60.662m³
3.5 pg/sample = 0.057 pg/m³
60.662 m³

Calculations Continued.

Sample Number: 2211692-S.ISO Date: 11/6/92

Location: Bliss Hall, Basement, South Side of
Isolation Wall

Sample Duration: 3:30 P.M. 11/4/92 to 2:25 P.M. 11/6/92
Total Minutes = 2,815

Flow Rate: Rotameter Reading - 48.0 SCFH
48.0 SCFH / 2.12 = 22.64 l/min.

Analysis Result: 16.0 pg/sample

Calculations: $(22.64 \text{ l/min})(2,815 \text{ min}) = 63,731.6 \text{ liters}$
 $63,731.6 / 1,000 = 63.732 \text{ m}^3$
 $\frac{16.0 \text{ pg/sample}}{63.732 \text{ m}^3} = 0.251 \text{ pg/m}^3$

 TWIN CITY TESTING CORPORATION
 * PCDF/PCDD ANALYSIS RESULTS *

 Client....CLEAN HARBORS

Sample ID (Client's#)....2211692 - S.ISO
 Sample ID (TCT#).....301352
 Analysis Date.....11/11/92
 Filename.....V21111S
 Analyst.....MCH
 Sample Amount..... 0.50 sample
 ICAL Date.....11/11/92
 CCAL Filename.....V21111J
 Extraction Date.....11/7/92

DRAFT

NATIVE ISOMERS	CONC. ng/sample	DL ng/sample	INTERNAL STANDARDS	ng's ADDED	PERCENT RECOVERY
2378-TCDF	0.0072	-----	2378-TCDF-C13....	10.00	73
TOTAL TCDF	0.1300	-----	2378-TCDD-C13....	10.00	72
2378-TCDD	nd	0.0210	12378-PeCDF-C13..	10.00	71
TOTAL TCDD	0.0480	-----	123678-HxCDF-C13.	10.00	80
12378-PeCDF	0.0110	-----	123678-HxCDD-C13.	10.00	56
23478-PeCDF	0.0120	-----	1234678-HpCDF-C13	10.00	51
TOTAL PeCDF	0.0530	-----	1234678-HpCDD-C13	10.00	54
12378-PeCDD	nd	0.0110	OCDD-C13.....	20.00	61
TOTAL PeCDD	nd	-----			47
			RECOVERY STANDARDS		
123478-HxCDF	0.0140	-----	1234-TCDD-C13....	10.00	na
123678-HxCDF	nd	0.0084	123789-HxCDD-C13.	10.00	na
123789-HxCDF	0.0099	-----			
234678-HxCDF	nd	0.0110	SURROGATE STANDARDS		
TOTAL HxCDF	0.0380	-----			
123478-HxCDD	0.0070	-----	2378-TCDD-C137...	5.00	61
123678-HxCDD	0.0420	-----	23478-PeCDF-C13..	5.00	91
123789-HxCDD	nd	0.0200	123478-HxCDF-C13.	5.00	90
TOTAL HxCDD	0.2600	-----	123478-HxCDD-C13.	5.00	120
1234678-HpCDF	0.0330	-----	1234789-HpCDF-C13	5.00	92
1234789-HpCDF	0.0170	-----			
TOTAL HpCDF	0.0650	-----			
1234678-HpCDD	0.0670	-----			
TOTAL HpCDD	0.1200	-----			
OCDF	0.0470	-----	Total 2378-TCDD		
OCDD	0.1600	-----	Equivalence =	0.016 ng/sample	
			(Using 1989 ITE Factors)		

CONC= Concentrations, calculated as described in EPA Method 23.

DL= Detection limits, calculated as described in EPA Method 23.

na= not applicable

nd= not detected

TCT Invoice Number....4410 93-0341

 TWIN CITY TESTING CORPORATION
 * PCDF/PCDD ANALYSIS RESULTS *

 Client....Clean Harbor

Sample ID (Client's#)....2211892 - N.ISO
 Sample ID (TCT#).....301391
 Analysis Date.....11-12-92
 Filename.....V21112K
 Analyst.....MCH
 Sample Amount.....0.50 sample
 ICAL Date.....11/12/92
 CCAL Filename.....V21112E
 Extraction Date.....11-9-92

NATIVE ISOMERS	CONC. pg/sample	DL pg/sample	INTERNAL STANDARDS	pg's ADDED	PERCENT RECOVERY
2378-TCDF	nd	5.0	2378-TCDF-C13....	10000	87
TOTAL TCDF	42.0	-----	2378-TCDD-C13....	10000	107
2378-TCDD	nd	9.7	12378-PeCDF-C13..	10000	95
TOTAL TCDD	43.0	-----	12378-PeCDD-C13..	10000	141
12378-PeCDF	nd	3.3	123678-HxCDF-C13.	10000	68
23478-PeCDF	nd	4.3	123678-HxCDD-C13.	10000	82
TOTAL PeCDF	nd	-----	1234678-HpCDF-C13	10000	84
12378-PeCDD	nd	2.7	1234678-HpCDD-C13	10000	95
TOTAL PeCDD	nd	-----	OCDD-C13.....	20000	84
123478-HxCDF	nd	2.5	RECOVERY STANDARDS		
123678-HxCDF	6.8	-----	1234-TCDD-C13....	10000	na
123789-HxCDF	nd	14.0	123789-HxCDD-C13.	10000	na
234678-HxCDF	nd	3.3	SURROGATE STANDARDS		
TOTAL HxCDF	11.0	-----	2378-TCDD-C137...	5000	62
123478-HxCDD	nd	3.9	23478-PeCDF-C13..	5000	110
123678-HxCDD	15.0	-----	123478-HxCDF-C13.	5000	94
123789-HxCDD	4.9	-----	123478-HxCDD-C13.	5000	112
TOTAL HxCDD	130.0	-----	1234789-HpCDF-C13	5000	87
1234678-HpCDF	nd	95.0			
1234789-HpCDF	nd	6.7			
TOTAL HpCDF	nd	-----			
1234678-HpCDD	37.0	-----			
TOTAL HpCDD	80.0	-----			
OCDF	8.5	-----			
OCDD	93.0	-----			
			Total 2378-TCDD Equivalence = 3.1 pg/sample (Using 1989 ITE Factors)		

CONC= Concentrations, calculated as described in EPA Method 23.

DL= Detection limits, calculated as described in EPA Method 23.

na= not applicable

nd= not detected

TCT Invoice Number....4410 93-0343

 TWIN CITY TESTING CORPORATION
 * PCDF/PCDD ANALYSIS RESULTS *

 Client....Clean Harbors

Sample ID (Client's#)....2211892 - RM- 312
 Sample ID (TCT#).....301392
 Analysis Date.....11-12-92
 Filename.....V21112J
 Analyst.....MCH
 Sample Amount.....0.50 sample
 ICAL Date.....11/12/92
 CCAL Filename.....V21112E
 Extraction Date.....11-9-92

NATIVE ISOMERS	CONC. pg/sample	DL pg/sample	INTERNAL STANDARDS	pg's ADDED	PERCENT RECOVERY
2378-TCDF	nd	6.4	2378-TCDF-C13....	10000	69
TOTAL TCDF	24.0	-----	2378-TCDD-C13....	10000	83
			12378-PeCDF-C13..	10000	75
2378-TCDD	nd	12.0	12378-PeCDD-C13..	10000	118
TOTAL TCDD	nd	-----	123678-HxCDF-C13.	10000	62
			123678-HxCDD-C13.	10000	88
12378-PeCDF	nd	5.1	1234678-HpCDF-C13	10000	78
23478-PeCDF	3.3	-----	1234678-HpCDD-C13	10000	79
TOTAL PeCDF	3.3	-----	OCDD-C13.....	20000	55
12378-PeCDD	nd	4.0			
TOTAL PeCDD	nd	-----			
123478-HxCDF	nd	4.8	1234-TCDD-C13....	10000	na
123678-HxCDF	nd	3.7	123789-HxCDD-C13.	10000	na
123789-HxCDF	nd	5.6			
234678-HxCDF	nd	4.0			
TOTAL HxCDF	nd	-----			
123478-HxCDD	3.5	-----	2378-TCDD-C137...	5000	63
123678-HxCDD	8.8	-----	23478-PeCDF-C13..	5000	119
123789-HxCDD	2.6	-----	123478-HxCDF-C13.	5000	113
TOTAL HxCDD	15.0	-----	123478-HxCDD-C13.	5000	92
			1234789-HpCDF-C13	5000	75
1234678-HpCDF	5.5	-----			
1234789-HpCDF	nd	4.9			
TOTAL HpCDF	5.5	-----			
1234678-HpCDD	17.0	-----			
TOTAL HpCDD	17.0	-----			
OCDF	12.0	-----			
OCDD	94.0	-----			

Total 2378-TCDD Equivalence = 3.5 ng/sample
 (Using 1989 ITE Factors)

CONC= Concentrations, calculated as described in EPA Method 23.
 DL= Detection limits, calculated as described in EPA Method 23.
 na= not applicable
 nd= not detected

TCT Invoice Number....4410 93-0343