AIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
301/587-8202

Centimeter

Inches

MANUFACTURED TO AIM STANDARDS
BY APPLIED IMAGE, INC.

1 of 1

BNL -60512
Informal Report

**QUANTIFICATION OF HOOD EFFECTIVENESS AND ENTRAINED SUBSURFACE AIR
IN A SEATTLE HOSPITAL**

DRAFT REPORT

**R. N. Dietz and R. W. Goodrich
Tracer Technology Center
Brookhaven National Laboratory
Upton, NY 11973-5000**

May 1994

**Prepared for
Prezant Associates, Inc.
and
University of Washington
Health Sciences Center
Seattle, Washington**

MASTER

**UNDER CONTRACT NO. DE-AC02-76CH00016 WITH THE
UNITED STATES DEPARTMENT OF ENERGY.**

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED *g7d*

ABSTRACT

An underground 3-story wing of a hospital having problems with sewer air odors was tested with perfluorocarbon tracer (PFT) technology to quantify the performance of the mechanical ventilation system and determine the extent of sewer air entrainment and chemical hood effectiveness.

Two complete tests gave identical total wing ventilation (about $13 \pm 2\text{h}^{-1}$) and corroborated the fan ratings of the system.

The percentage composition of sewer air found on the three floors was from 0.00 to 0.03%, 0.00 to 0.05%, and 0.00 to 2% on floors M1, 1, and 2, respectively. One area (hematology) of room NW-220 had 1.2 to 2% sewer air, the CPA area of the same room had 0.4 to 0.9%, but a different room on that floor (NW-225) had only 0.00 to 0.06%.

The percentage of tracer material released into the hoods on each floor, but showing up in the room air, ranged from 0.5% on Floor M1, 1.5% on Floor 1, and up to 3.2% on Floor 2.

The problem appeared to be the excessively negatively-balanced air ventilation on Floor 2, especially in room NW-220. Additional tests are recommended to verify the current ventilation performance, and then again after mitigating strategies have been implemented.

SUMMARY

The occupants of an unusual 3-story wing of a hospital, entirely underground, had complaints related to sick building syndrome, including the presence of sewer odors suspected of being entrained from the nearby principal city sewer main and exacerbated by the negatively-balanced pressure deliberately being maintained within the building. Problems with the efficiency of the more than 40 hoods were also suspected.

Different types of perfluorocarbon tracer (PFT) sources were deployed on each of the 3 floors, the sewer main, and the hoods. Passive sampling was performed during Tests 1 and 3, over 5-day periods each, to quantify each floor's air infiltration and exfiltration rates, the rates of air exchange between the floors, and the source rates of the sewer and hood PFTs entrained into each floor relative to the total source strength deployed. The calculated sewer rates were then equated to a percentage composition of sewer air found at several locations throughout the three floors. Test 2 was performed to verify some of the earlier Test 1 measurements.

The ventilation rates determined with the PFT technology were found to be in good agreement with the rated fan capacities and total northwest (NW)-wing air change per hour (ACH) rates were identical in the two primary tests (12.9 ± 1.8 and $12.9 \pm 1.6 \text{ h}^{-1}$, respectively.) The exhaust air fan rating for Floor 2 was 53,000 cfm (90,000 m^3/h), comparable to measured values during Tests 1 and 3 of $118,000 \pm 33,000$ and $117,000 \pm 25,000 \text{ m}^3/\text{h}$, respectively; the Floor M1 rating of 32,000 cfm (54,000 m^3/h) agreed perfectly with the measured values ($55,000 \pm 8,000$ and $48,500 \pm 7,000 \text{ m}^3/\text{h}$, respectively).

Air exchange between the three floors was nearly absent. The major exchange was about 15% of Floor 1 air flowing to Floor 2, and about 5% to Floor M1, implying that Floor 2 was the most negatively-balanced zone, Floor M1 next, and Floor 1 with the least negative pressure. All else being equal, Floor 2, then, should have had the most problems with soil air and sewer air entrainment and hood performance.

An examination of the chromatograms from the analysis of passive samplers placed in several locations on the floors, in the exhaust fan ducts (appropriately shielded), in sewer manholes and building sewer vents, and in several outside air and

air intake locations showed the presence not only of the PFTs, but also, in the case of sewer air samples, a unique consistent signature of four prominent peaks.

The percentage of sewer air contained on each floor was estimated to be as follows for Test 3 (8/4-9/93):

<u>Floor</u>	<u>Exhaust Fan</u>	<u>Floor Location</u>	
	<u>% Sewer Air</u>	<u>Room</u>	<u>% Sewer Air</u>
M1	0.00 to 0.02	NW-036	0.00 to 0.03
1	0.7 to 1.4	NW-120	0.00 to 0.05
2	2 to 4	NW-220/hema.	1.2 to 2
		NW-220/CPA	0.4 to 0.9
		NW-225	0.00 to 0.06
Air Intake		180	0.01 to 0.03

The high concentration of sewer air on Floor 2 is consistent with the hypothesized and known negatively-balanced pressures.

The amount of hood air tracer found on each floor as a percentage of the amount released into hoods on that floor was as follows for Test 3:

<u>Floor</u>	<u>Tracer</u>	<u>Exhaust Fan</u>	<u>Floor Location</u>	
	<u>Rate, $\mu\text{L}/\text{h}$</u>	<u>% of PFT rate</u>	<u>Room</u>	<u>% of PFT rate</u>
M1	26.9	0.5	NW-036	0.5
1	10.3	1.8	NW-120	1.5
2	18.6	4.1	NW-220/hema.	3.2
			NW-225	1.8
Air Intake			180	0.4

Again it appeared that the negative pressure on Floor 2, and in NW-220 in particular, was causing performance problems. Even the outside air intake plenum 180 showed a trace of sewer air and significant hood tracer.

Verification of the current operating inadequacy was recommended through the use of a new type of tracer that elutes early in the analysis chromatogram away from

any sewer air interferences. A study of the sewer main plans was recommended. The lower floor hoods should be tagged with one type of tracer, and those on Floor 2 with a different type. Then the test should be repeated again after reducing the extent of negative pressure on Floor 2, and in particular in NW-220.

INTRODUCTION

The northwest (NW) wing of the University of Washington Medical Center is unusual in that it consists of three floors entirely underground below a courtyard entrance to the main hospital building.

A significant number of indoor air quality (IAQ) complaints by the hospital workers (with several needing emergency room treatment) prompted an investigation. Sewer odors were observed on Floor 2. The lowest floor level is M1 (minus 1); next, Floor 1; and finally, Floor 2, the closest to, but still below, the ground-level courtyard.

Certain of the laboratory facilities on these floors are dealing with materials requiring air containment within the lab spaces. Thus, the floors of this building are operating under negative pressure with respect to the outside soil air surrounding the building.

Two problems could occur as a result. In one case, if the exhaust air from the more than 40 hoods is not controlled properly, a portion of the exhausted fumes could be drawn back into the occupied spaces. In the other case, a nearby primary sewer main for the city of Seattle was being maintained under positive ventilation because of construction work. This would allow sewer air from pipe leaks to migrate through the soil and into the negatively-balanced air of the NW wing.

Experiments were designed to make use of the BNL air infiltration measurement system (BNL-AIMS)¹ to measure the ventilation performance of the wings air handling systems, which are primarily once-through air, and to quantify any entrainment of sewer air or exhausted hood air.

The former was performed by tagging each of the three floor's separate supply air systems with a different perfluorocarbon tracer (PFT) source, and the latter by tagging the sewer main's ventilation fan with another PFT-type, and the hoods with a fifth PFT-type. By measuring the 5 different PFT concentrations at numerous locations of concern for IAQ, as well as in the floors' primary exhaust fan ducts, air flows could be calculated, as well as the extent of entrainment of sewer and hood air.²⁻⁴

This report describes the results of three measurement periods in July and August 1993. Between Tests 1 and 3, mitigating strategies were performed to alleviate problems of hood exhaust air and sewer air entrainment found to be present from the interpretation of the Test 1 results.

EXPERIMENTAL

The PFT tagging and passive air sampling by the capillary adsorption tube samplers (CATS) were performed at the following locations:

<u>Locale</u>	<u>PFT Tagging</u>			<u>CATS</u>	
	<u>Location</u>	<u>Type</u>	<u>Quantity</u>	<u>Location</u>	<u>Quantity</u>
Floor M1	SA ^a fan(s)	PTCH	80	EF ^a	1 or 2
				Rooms	1
Floor 1	SA fan(s)	PMCP	8	EF	1
				Rooms	2
Floor 2	SA fan(s)	ptPDCH	40	EF	1
				Rooms	4 to 6
Floor M1	9 hoods	PMCH	20		
Floor 1	3 hoods	PMCH	8		
Floor 2	8 hoods	PMCH	14		
Sewer	SW inter	ocPDCH	50	Manhole	1
	Vent A				1
	Vent B				1
	Vent C				1
	Vent D				1
Outside				NW intake	1 or 2
				Courtyard	0 to 2

^a Supply air (SA) fans and exhaust fans (EF)

Tests were performed as follows:

<u>Test</u>	<u>Dates</u>	<u>No. of CATS</u>	<u>Description</u>
1	7/7-12/93	19	Full ventilation and IAQ
2	7/26-28/93	8	Repeat of several sites
3	8/4-9/93	23	Full ventilation and IAQ

The second and third tests were performed after some mitigating corrective strategies were implemented, and also after identifying other sewer vents and concerns (e.g., quality of air above as well as below ceilings in various rooms).

RESULTS AND DISCUSSION

In this section, the tracer concentrations found on the passive sampling tubes during the three measurement periods and the calculated ventilation rates are presented, several of the gas chromatograms of the CATS analyses from Test 3, as well as the area and height information given in tables, are presented in order to demonstrate some interference with the integration of some of the PFT peaks in the presence of sewer air, and, lastly, both the tracers released into the sewer and hoods plus some tracers-of-opportunity in the sewer air will be used to document the extent of entrainment of sewer and hood air into the occupied spaces.

Tracer Concentrations and Ventilation Rates. The complete results for the three test periods are shown on the following three pages. The CATS tracer concentrations for the 5-day periods for Tests 1 and 3 are shown at the bottom of the BNL-AIMS sheets with the computed air flow rates at the top. The overall ACH in Test 3 ($12.9 \pm 1.6 \text{ h}^{-1}$) is identical to that found in Test 1 ($12.9 \pm 1.8 \text{ h}^{-1}$) and the individual outside (infiltration) air rates range from 8 to 16 h^{-1} (for zones 1 to 3 in Test 3), about the same as in Test 1 (9.5 to 16 h^{-1} , respectively).

The individual flow rates can be compared in some cases with fan ratings. For example, the exhaust air fan rating for Floor 2 (53000 cfm or $90,000 \text{ m}^3/\text{h}$) compares well, within their uncertainties, with the measured exfiltration rates of 118,000 and $117,000 \text{ m}^3/\text{h}$ for Tests 1 and 3, respectively. That for the combined M1 floor and mechanical room fans of 32000 cfm ($54,000 \text{ m}^3/\text{h}$) agrees very well with the Test 1 (55,000) and Test 3 ($48,500 \text{ m}^3/\text{h}$) exfiltration results.

To perform the flow calculations, certain CATS such as controls, sewer samples, and outside and intake air were deleted entirely. For several, a particular PFT value was deleted because it was shown to be in error or non-representative. For example, in

reality, there was no PTCH present in either test at the EF-2 location, but rather, as will be discussed in the next part, an interferant was detected. Thus, position 1 was deleted.

A comparison of the tracer concentrations at the same locations in the 3 tests shows remarkable agreement. The controls (unused) CATS in Tests 1 and 3 showed no PFT. For Zone 1 (M1 floor), the exhaust fan (EF) and NW-036 values were nearly identical; both had trivial indication of hood (PMCH) and sewer (ocPDCH) tracer present. The comp. exhaust had lower PTCH and more PMCH indicating the presence of air from Floor 1; it also had significant hood (PMCH) but negligible sewer tracer.

For Zone 2 (Floor 1), the EF-1, NW-177, and NW-120 results for both tests are nearly identical, including the primary tracer (PMCP). The hood tracer (PMCH) is now trivial in the EF-1 sample for Test 3 indicating the condition present in Test 1 was corrected. An examination of the chromatograms in the next part will show that there are significant interferences in the EF-1 sample with the pt PDCH (Floor 2) and ocPDCH (sewer) tracers. In reality, little of either is present above their ambient background concentrations given in the first page of Appendix B. Thus, there is effectively little sewer tracer on Floor 1.

TEST 1

BNL-AIMS

10:11:10 10-04-1993

PROJECT: U.WASH.MED
HOUSE:MED.CENTERSTART: 16:30 (07-07-1993)
STOP: 14:00 (07-12-1993)BNL CODE: 8025A0
ANALYZED: 07-20-1993

***** RATES *****

OVERALL INFILTRATION RATE = %248265.2 $\pm$ 34169.3(m³/h)
OVERALL AIR EXCHANGE RATE = 12.897 $\pm$ 1.814(1/h)

ZONE	LOCATION	SOURCE RATE @21.5C QTY (nL/m)	EXFILTRATION RATE (m ³ /h)	INFILTRATION RATE (m ³ /h)	ACH
1	M1	4.1 80	55182.5	51030.8	9.521
2	FLR 1	31.8 8	75337.1	90215.7	12.291
3	FLR 2	7.5 40	117745.6	107018.8	16.339

ZONE-ZONE	RATE $\pm$ SD (m ³ /h)	ZONE-ZONE	RATE $\pm$ SD (m ³ /h)
1 - 2	2003.3 2919.2	2 - 1	5257.1 1266.3
1 - 3	-331.2 451.1	3 - 1	566.7 194.9
2 - 3	13506.0 7960.9	3 - 2	1881.2 1422.2

ZONE	RATE $\pm$ SD (m ³ /h)	ACH $\pm$ SD (1/h)	ZONE	RATE $\pm$ SD (m ³ /h)	ACH $\pm$ SD (1/h)
1	56854.6 8050.0	10.607 1.593	2	94100.2 18248.0	12.820 2.567
3	120193.6 33275.7	18.350 5.162			

***** ANALYSIS *****

VOL	SOURCE TYPE	AVG. TRACER CONC.(background corrected) (pL/L) $\pm$ SD			
1	5360 T-PTCH	0.275 $\pm$ 0.027	0.013 $\pm$ 0.001	0.002 $\pm$ 0.000	
2	7340 PNCB	0.006 $\pm$ 0.008	0.134 $\pm$ 0.022	0.003 $\pm$ 0.002	
3	6550 pTPCH	-0.000 $\pm$ 0.000	0.015 $\pm$ 0.007	0.130 $\pm$ 0.033	

CONCENTRATION(pL/L)

CATS#	T-PTCH	PNCB	pTPCH	PNCB	PNCB	ocPNCB	apPNCB	apPNCB	apPNCB	2-PTCH		
1	10103	0.275	0.016	0.006	0.000	0.008	0.002	0.009	0.015	0.026	0.000	EF-M1
1	852	0.354	0.011	0.007	0.000	0.008	0.003	0.012	0.017	0.031	0.000	NW-036
2	10698	0.012	0.158	0.021	0.000	0.034	0.009	0.000	0.076	0.079	0.000	DELETED 3,
2	4373	0.000	0.141	0.006	0.000	0.006	0.001	0.009	0.013	0.022	0.000	EF-1
2	5025	0.006	0.114	0.008	0.000	0.005	0.000	0.010	0.018	0.029	0.000	NW-177
3	11117	0.084	0.029	0.154	0.000	0.013	0.018	0.000	0.295	0.295	0.000	DELETED 1,
3	2569	0.000	0.012	0.153	0.000	0.008	0.003	0.000	0.174	0.179	0.000	EF-2
3	11276	0.000	0.008	0.123	0.000	0.008	0.002	0.000	0.141	0.146	0.000	NW-225
3	5858	0.029	0.022	0.141	0.000	0.010	0.010	0.000	0.224	0.226	0.000	NW-275
3	8963	0.000	0.014	0.100	0.000	0.007	0.002	0.000	0.119	0.123	0.000	DELETED 1,
3	8853	0.000	0.024	0.086	0.000	0.008	0.003	0.000	0.120	0.125	0.000	NW-220/hema.
3	9439	0.096	0.019	0.182	0.000	0.014	0.023	0.000	0.372	0.372	0.000	" " /CPA
3	9225	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	" " /adj w fume hoods
3	5154	0.025	0.026	0.533	0.000	0.023	0.050	0.000	1.008	1.008	0.000	" " /adj Cobas fara
3	11782	0.016	0.010	0.007	0.000	0.005	0.001	0.007	0.013	0.021	0.000	Control
3	5598	0.399	0.082	0.670	0.000	0.152	0.231	0.000	2.762	2.762	0.000	Sewer Manhole
3	3014	0.000	0.006	0.006	0.000	0.006	0.001	0.010	0.014	0.026	0.000	Sewer Vent A
3	1840	0.000	0.011	0.006	0.000	0.048	0.012	0.000	0.008	0.008	0.000	" " B
3	7183	0.000	0.275	0.050	0.000	1.389	0.247	0.000	0.264	0.264	0.000	Courtyard near Sewer
												" " Exhaust
												Bottom Intake 180

C.F.: PNCB PNCB PNCB ocPNCB pTPCH mPNCB PNCB COEFFICIENTS FILE
0.88 0.88 0.02 1.00 0.81 0.65 1.38 68160

***** NOTES *****
All gas volumes are reported at 21.5 C. and 1 atm.
The standard deviation in the source strength has been set at 10 %.
The standard deviation in the volume measurement has been set at 5 %.
The overall normalized condition number (K(C)/N^{1.5})= 0.583

TEST 2
(7/26-28/93)

CONCENTRATION (pL/L)								
FILE	CATS ID	HOURS	PMCH	ocPDCH	ptPDCH	PMCP	PTCH	
8026A1	474	51.50	0.0060	0.0035	0.0231	0.0071	0.0000	T-wing airst intake
8026A2	9961	50.82	0.0078	0.0030	0.0055	0.0009	0.0000	E wing air intake
8026A3	4499	49.97	0.0103	0.0023	0.1466	0.0076	0.0000	Rm AA 214
8026A4	4538	49.98	0.2311	0.0000	0.0000	0.0328	0.4080	NW 043
8026A5	4685	50.13	0.0081	0.0000	0.2166	0.0069	0.0000	NW 220 dumb waiter/KPA
8026A6	239	50.12	0.0126	0.0151	0.2853	0.0100	0.1221	" Judy's office/home
8026A7	3699	50.00	0.0055	0.0000	0.0077	0.0111	0.0000	NW wing air intake
8026A8	9787	50.00	0.0045	0.0000	0.0000	0.0047	0.0000	"

TEST 3

BNL-AIMS

08:42:43 10-04-1993

PROJECT: U. Wash.
HOUSE: Med. CenterSTART: 09:56 (08-04-1993)
STOP: 08:52 (08-09-1993)BNL CODE: 8028A0
ANALYZED: 08-22-1993

***** RATES *****

OVERALL INFILTRATION RATE = %248756.6 $\pm$ 29654.1(m³/h)
OVERALL AIR EXCHANGE RATE = 12.922 $\pm$ 1.586(1/h)

ZONE	LOCATION	SOURCE RATE @21.5C QTY (nL/m)	EXFILTRATION RATE (nL/h)	EXFILTRATION RATE (m ³ /h)	INFILTRATION RATE (m ³ /h)	ACH	SD
1	M-1	4.1 80	15594	48486.4	7090.6	43796.3	6290.2
2	1st FLOOR	31.8 8	12588	83568.4	20289.4	101222.0	20875.2
3	2nd FLOOR	7.5 40	15571	116701.9	24585.2	103738.3	23398.0

ZONE-ZONE	RATE	$\pm$	SD (m ³ /h)	ZONE-ZONE	RATE	$\pm$	SD (m ³ /h)
1 - 2	596.7	1118.1		2 - 1	5357.6	1341.9	
1 - 3	545.2	1174.3		3 - 1	474.4	131.9	
2 - 3	14857.4	9339.6		3 - 2	1964.6	921.2	

ZONE	RATE $\pm$ SD (m ³ /h)	ACH $\pm$ SD (/h)	ZONE	RATE $\pm$ SD (m ³ /h)	ACH $\pm$ SD (/h)
1	49628.3 7021.1	9.259 1.389	2	103783.4 21367.6	14.139 2.99
3	119141.0 24969.5	18.189 3.919			

***** ANALYSIS *****

VOL	SOURCE	TYPE	AVG. TRACER CONC.(background corrected) (pL/L) $\pm$ SD			
m ³			T-PTCH	PNCB	ptPNCB	
1	5360	T-PTCH	0.314 $\pm$ 0.031	0.013 $\pm$ 0.001	0.002 $\pm$ 0.000	
2	7340	PNCB	0.002 $\pm$ 0.003	0.122 $\pm$ 0.022	0.002 $\pm$ 0.001	
3	6550	ptPNCB	0.002 $\pm$ 0.003	0.015 $\pm$ 0.009	0.131 $\pm$ 0.024	

CONCENTRATION(pL/L)

Cycle No.	CATSH	T-PTCH	PNCB	ptPNCB	PNCB	PNCB	ocPNCB	apPNCB	apPNCB	apPNCB	2-PTCH	
1	2184	0.315	0.016	0.006	0.000	0.007	0.002	0.009	0.013	0.023	0.000	EF-M1
1	10126	0.189	0.092	0.009	0.000	0.482	0.002	0.000	0.013	0.014	0.000	DELETED COMP. Exhaust
1	7774	0.440	0.012	0.007	0.000	0.008	0.003	0.012	0.015	0.028	0.000	DELETED NW-036
2	6225	0.000	0.137	0.029	0.000	0.006	0.006	0.000	0.073	0.074	0.000	DELETED 3, EF-1
2	7075	0.000	0.150	0.006	0.000	0.006	0.001	0.008	0.013	0.022	0.000	NW-177
2	8038	0.006	0.108	0.007	0.000	0.005	0.001	0.009	0.015	0.025	0.000	NW-120
2	4792	0.085	0.105	0.008	0.000	0.053	0.002	0.009	0.015	0.025	0.000	DELETED 1, Fan Rm 135
3	10793	0.052	0.021	0.173	0.000	0.011	0.017	0.000	0.287	0.287	0.000	DELETED 1,3, EF-2
3	10643	0.007	0.014	0.116	0.000	0.008	0.004	0.000	0.151	0.156	0.000	NW-220/CPA
3	4830	0.000	0.017	0.170	0.000	0.010	0.009	0.000	0.243	0.243	0.000	NW-220/hema.
3	1715	0.000	0.008	0.118	0.000	0.007	0.001	0.000	0.133	0.138	0.000	NW-225
3	4162	0.000	0.012	0.160	0.000	0.008	0.002	0.000	0.182	0.186	0.000	NW-275
3	507	0.004	0.075	0.058	0.000	0.007	0.001	0.000	0.073	0.076	0.000	DELETED NW-220/CPA(above ceiling)
3	4781	0.003	0.025	0.133	0.000	0.008	0.004	0.000	0.166	0.171	0.000	NW-220/hema.
3	7486	0.000	0.033	0.116	0.000	0.007	0.002	0.000	0.134	0.139	0.000	NW-225
3	5485	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	DELETED Control
3	17	5806	0.000	0.007	0.006	0.000	0.005	0.001	0.007	0.012	0.020	DELETED NW Intake 180(on duct)
3	8314	0.000	0.007	0.007	0.000	0.008	0.002	0.009	0.016	0.025	0.000	DELETED " " " (near ladder)
3	19	6517	0.000	0.079	2.074	0.000	0.307	0.728	0.000	7.080	7.080	DELETED Sewer Vent A
3	8820	0.000	0.000	1.629	0.000	0.123	0.372	0.000	4.998	4.998	0.000	DELETED " " B
3	10626	0.068	0.023	0.421	0.000	0.008	0.021	0.000	0.641	0.641	0.000	DELETED " " C
3	7028	0.000	0.000	0.793	0.000	0.080	0.186	0.000	2.332	2.332	0.000	DELETED " " D
3	23	10220	0.000	0.000	0.469	0.000	0.009	0.032	0.000	0.740	0.000	DELETED Sewer Manhole

C.F.: PNCB PNCB PNCB ocPNCB ptPNCB apPNCB PNCB
0.88 0.88 0.82 1.00 0.81 0.65 1.38COEFFICIENTS FILE
68160

For Zone 3 (Floor 2), there is also reasonable agreement for the results of all three tests as shown:

<u>Location</u>	<u>Test</u>	<u>PTCH</u>	<u>PMCP</u>	<u>ptPDCH</u>	<u>PMCH</u>	<u>ocPDCH</u>
EF-2	1	-a	0.029	0.154	0.013	-a
	3	-a	0.021	0.173	0.011	-a
NW-225	1	0.000	0.012	0.153	0.008	0.003
	3	0.000	0.008	0.118	0.007	0.001
NW-275	1	0.000	0.008	0.123	0.008	0.002
	3	0.000	0.012	0.160	0.008	0.002
NW-220CPA	1	0.000	0.014	0.100	0.007	0.002
	2	0.000	0.007	0.217	0.008	0.000
	3	0.007	0.014	0.116	0.008	0.004
NW-220 hema.	1	-a	0.022	0.141 ^a	0.010	0.010 ^a
	2	-a	0.010	0.285 ^a	0.013	0.015 ^a
	3	-a	0.017	0.170 ^a	0.010	0.009 ^a

^a Values uncertain because of contamination

Lastly, as will be shown next, the high ptPDCH levels found in the sewer vent and manhole samples are entirely a measure of a contaminant rather than tracer. Also, the sewer tracer (ocPDCH) results may be uncertain by 20 to 50% or more.

Selected Gas Chromatograms (GCs) and External Standard Tables. In order to provide an indication of the reliability of the measurement results, copies of 13 chromatograms given in Appendix A, along with copies of the integration reports (External Standard Tables) in Appendix B, will be discussed in this part. The building samples are from Test 3.

An example of a usual outside air chromatogram is given in GC-gram 1 in Appendix A. The Data File number (8030C4) appears in the summary table and also on the GC-gram. The first page of Appendix B lists the expected retention times of each PFT and also reference and interferent peaks. PMCP, the Floor 1 tracer, is the first PFT

to elute at 1.47 min; PMCH, the hood tracer, is next at 2.33 min; ocPDCH, the sewer tracer, is at 3.86 min; and ptPDCH, the Floor 2 tracer is at 5.22 min. The ambient concentration of ocPDCH at 0.4×10^{-15} L/L of air, seen in just a 3-day (0.6-L) CATS sample, indicates the sensitivity of this technology. PTCH, the Floor M1 tracer, elutes on p. 2 of the GC-gram at 10.15 ± 0.03 min; p. 2 is not shown because the low ambient background level of 0.0001 pL/L is not detectable in a 3-day CATS exposure which this sample of New York City outside air represents.

The next GC-gram 2 is of a 5-day CATS exposure to outside air but collected at the air intake plenum 180 in the building. Remarkably, the picture looks very similar to usual outside air with the exception that the REF-3 peak and an interferent peak (INT-4) at 5.77 min. are slightly elevated. The location of the two isomers of PTCH, a trivial amount in background air, is shown on p. 2.

The next three GC-grams are from floor samples at NW-036, NW-120, and NW-225, respectively. As shown on p.1 of Appendix A, the height of interferent peaks at REF-3, INT-1, and INT-4 locations is identical to that in ambient air and there is no interference with the analysis of the PFT peaks. Note that the two isomers of PTCH are clearly seen on p. 2 of Data File 8028A3 and that 2-PTCH is typically about 40% of the height of 1-PTCH. On p.1 of Data File 8028A11 from a sample at NW-225, the Floor 2 tracer, ptPDCH is clearly seen at 5.22 min along with its slightly taller isomer pcPDCH at 4.50 min.

The next two GC-grams, Data Files 8028A19 and 23, were obtained from sewer vent A and sewer manhole samples, respectively. They are remarkably identical except that the manhole sample is about 6-fold smaller than that from sewer vent A. The REF-3 peak at 3.1 min and the INT-4 peak at 5.77 min are huge compared to their levels in ambient air as shown in the table of heights on p.1 of Appendix A. On the other hand, the sewer tracer (ocPDCH) peak is not clearly discernible from the other, more dominant peaks. Note also the small peak at 4.17 min (INT-1) that is basically absent in clean air. It should also be noted that there does not appear to be any interference with PMCP (at 1.47 min) and PMCH (at 2.33 min), but there is an interferent peak near PTCH.

The next three GC-grams, Data Files 8028A1, 4 and 8, are from samples from the exhaust fan air of M1, Floor 1, and Floor 2, respectively. The EF-M1 GC-gram (p.1)

looks very much like normal outside air, but with an elevated PMCP peak and, on p.2, a high PTCH (two isomers) signal (the tracer released on that floor). However, the sample from EF-1 (Data File 8028A4, p.1) clearly shows the signature peaks of sewer air. The ocPDCH magnitude is uncertain by a factor of about 2 and the peak at 5.18 min is not entirely ptPDCH (5.24 min), but perhaps 75% sewer interferent (5.14 min) and 25% ptPDCH. Page 2 shows the interference with PTCH; the retention time is not that of PTCH and the PTCH doubleton peak is not present.

The GC-gram (Data File 8028A8) from EF-2 shows the sewer air signature also, but the presence of ptPDCH, the tracer released on that floor, is greater (about 62% of the peak at 5.20 min). Note that the percentage of ptPDCH in the peak is given by

$$\% \text{ ptPDCH} = 625 \Delta - 350$$

where Δ is the difference in retention time between the two apparent pPDCH peaks. The PTCH interference is again seen on p. 2. Also, the next two GC-grams (Data Files 8028A9 and 10) of samples from NW-220 (near the CPA and hematology, respectively) show a significant amount of the signature of sewer air but also the emerging dominance of the pPDCH isomers; the calculated fraction of ptPDCH in the respective peaks using the equation above is 94 and 81%.

Estimation of Sewer and Hood Air Entrainment. Using the BNL-AIMS pollutant source rate determination model ²⁻⁴ and based on the ocPDCH sewer air tracer concentration as being equal to 0.728 nL/m³ (i.e., that found in sewer vent A during Test 3), the percentage of sewer air present at the different building sampling locations is summarized in Table 1. Based on the heights of the three (3) sewer vent A opportune tracers (REF-3, INT-1, and INT-4) in Test 3 as equivalent to 100% sewer air and correcting for their content in clean ambient air, the percentage of sewer air at each location is also computed and shown in Table 1.

The results are consistent by either approach, but probably more reliable at the lower percentages (<0.5%) based on the tracers-of-opportunity because of the uncertainty in the determination of the ocPDCH intentionally-added tracer in the presence of the sewer air interferents. The best estimates of the percentage of sewer air present at each location can be summarized as follows:

<u>Location</u>	<u>% Sewer Air</u>
EF-M1	0.00 to 0.02
NW-036	0.00 to 0.03
EF-1	0.7 to 1.4
NW-120	0.00 to 0.05
EF-2	2.2 to 4.0
NW-220/hema.	1.2 to 2.0
NW-220/CPA	0.4 to 0.8
NW-225	0.00 to 0.06
NW Intake Air	0.01 to 0.03

It would appear that even in the best of conditions (at the intake air plenum 180 and on Floor M1), a very small percentage (0.01 to 0.02%) of the air is comprised of sewer air. However, the exhaust fans for Floors 1 and 2 appear to draw in a significant amount of sewer air (0.5 to 4.0%). In addition, parts of the room NW-220 also have significant sewer air, 0.5 to 1% near the CPA and up to 2% near hematology, yet other portions on Floors 2 and 1 have just a trace, less than 0.06%

The results of the hood air entrainment calculations are summarized in Table 2 for Tests 1 and 3. The percentage represents the fraction of the hood tracer rate present on that floor, rather than a fraction based on the total number of hood PFT sources because there is little air flow between floors except that 15% of the air leaving Floor 1 flows to Floor 2 and about 5% to Floor M1, causing less than a 10% error by the assumption above. The implication of the slight zone-to-zone air flows is that Floor 2 is the most negative in pressure, Floor M1 next, and Floor 1 the least negative with respect to ambient pressure.

Table 1

**Estimated Sewer Air Content (%) at Different Locations
(Test 3: 8/4-9/93)**

Location	Cycle No.	CATS No.	Height (cts) of Opportune Tracers						From ocPDCH, %	
			REF-3(3.05) ^a	% ^b	INT-1(4.19) ^a	% ^b	INT-4(5.77) ^a	% ^b	Test 3	Test 1
Sewer Vent A	19	6517	120650	100	10302	100	44480	100	—	—
Sewer Manhole	23	10220	18670	15.4	732	7.0	8695	19.5	—	—
EF-M1	1	2184	47	0.01	10	0.00	39	0.02	0.2	0.0
NW-036	3	7776	51	0.01	12	0.00	47	0.03	0.3	0.4
EF-1	4	6225	931	0.7	94	0.8	675	1.4	0.6	1.2
NW-120	6	8034	56	0.01	11	0.00	54	0.05	0.07	0.0
EF-2	8	10793	2650	2.2	314	2.9	2040	4.5	2.4	3.1
NW-220/hema.	10	4830	1420	1.2	146	1.3	1020	2.2	1.2	1.4
NW-220/CPA	9	10643	564	0.4	70	0.6	451	0.9	0.6	0.3
NW-225	11	1715	62	0.02	5	0.00	~60	0.06	0.14	0.3
NW Intake 180	17	5806	54	0.01	15	0.03	47	0.03	0.07	?
Ambient Air	c		37	—	16	—	32	—		

^a Retention time (min) of peak in chromatogram tables of Appendix B.

^b Based on sewer vent A sample as 100% sewer air.

^c 3-day CATS exposure from File 8030C4; opportune tracer heights adjusted to 5 days.

Table 2
Estimated Percentage of Hood Air Tracer Found at Different Locations
--Comparing Tests 1 (7/7-12/93) and 3 (8/4-9/93)--

<u>Percentage^a of Floor Hood Tracer</u>		
<u>Location</u>	<u>Test 1</u>	<u>Test 3</u>
EF-M1	0.2	0.5
NW-036	0.7	0.5
EF-1	27.1	1.8
NW-120	1.3	1.5
EF-2	3.6	4.1
NW-220/hema	4.0	3.2
NW-225	2.5	1.8
NW Intake 180	?	0.4

^a Based on PMCH sources in hoods on each respective floor

The results are not significantly different between the two tests except for the substantial reduction of hood tracer in the EF-1 air from Test 1 to Test 3. Floor M1 appears to have the least problem with hood air entrainment, only about 0.5%. Floor 1 has about 1.3 to 1.8%, but Floor 2 from 2 to 4% depending on location.

CONCLUSIONS AND RECOMMENDATIONS

The following observations have been made:

1. Air flow from Floor 1 into Floor 2 is greatest into NW-220 implying the lowest negative pressure in that location (PMCP is higher in NW-220 than in NW-225 or NW-275).
2. Sewer air concentration is very much higher in NW-220 compared to any other location, except that from the exhaust fan for that floor.
3. Hood air tracer is highest in NW-220 and not much higher in the exhaust fan for that floor.

- 4, A trace of sewer air (0.01 to 0.03%) and hood tracer (0.4%) is present even in the intake air at plenum 180.

Clearly, then, the problem of sewer and hood air entrainment is being caused by the excessive negative pressure in NW-220. There may be a direct connection to a sewer vent such as an open (no water) trap which should certainly be checked, but most likely there is not.

The trace of sewer and hood air present at the air intake (item 4) may have been alleviated by the recent (subsequent to Test 3) re-location of sewer vents C and D, but it is unlikely to have reduced the levels in NW-220.

Under no circumstances should any sewer air be tolerated within the occupied spaces, and certainly not up to 1 to 2%. The presence of the ocPDCH tracer used to tag the sewer air is reasonably unequivocal, but the presence of the unknown sewer air signature peaks in the room air further verifies and quantifies the extent of entrainment.

It is well known from the substantial number of radon studies, that the cause of elevated radon within the building is

- the presence of the pollutant in the surrounding soil air and,
- the negative pressure in the winter time in the basement of most naturally ventilated buildings because of the temperature stack effect.

In the case of the hospital building, the negative pressure caused by the ventilation system(s) is pulling in surrounding soil air, which contains sewer air from the nearby sewer main. Another important question to ask is

- what is the level of radon concentrations in the building and sewer air?

In order to verify that, indeed, sewer air is entering Floor 2, an alternative tracer, PDCB, can be used which elutes early in the chromatogram where there is no interference from the unknown sewer air components. The 13th GC-gram in Appendix A is of a 3-day air sample analyzed on a different instrument, GC1. As shown, PDCP elutes about 0.08 min ahead of PMCP, that is at 1.84 min versus 1.92 min for the PMCP

on GC1. PDCB has about the same ambient background concentration as oPDCH, the previous sewer tracer, but its source emission rate is about 6 times higher so it would be more readily seen.

The following recommendations are made:

1. Repeat a 5-day measurement test in the building under conditions similar to Test 3, but with the following changes:
 - a. Replace the 50 oPDCH sources with 50 PDCB sources
 - b. Remove the PMCH sources from the hoods on Floor M1 and Floor 1 and replace with oPDCH sources
 - c. Distribute the additional PMCH sources into the hoods on Floor 2.
2. Reduce the extent of negative pressure on Floor 2, and especially in Room NW-220, and then repeat the test above.
3. Strongly consider not returning any exhaust air from Floors 1 and 2 back to the supply air if that is currently done.
4. Obtain more detailed information from the City of Seattle on the nature of the sewer main system near the hospital complex.

REFERENCES

1. Dietz, R. N., Goodrich, R. W., Cote, E. A., and Wieser, R. F. Detailed description and performance of a passive perfluorocarbon tracer system for building ventilation and air exchange measurements. In Measured Air Leakage of Buildings, H. R. Trechsel and P. L. Lagus, Editors, pp. 203-64, ASTM STP 904, American Society for Testing and Materials, Philadelphia, 1986.
2. Horn, E. G., Dietz, R. N., Aldous, K. M., Eadon, G. A., Honan, L. J., and Seiffert, K. K. Binghamton state office building: Decontamination of the basement mechanical room. Presented at the EPRI 1991 PCB Seminar, Baltimore, Oct. 1991. (BNL 47706).

3. Dietz, R. N. and Goodrich, R. W. PFT measurements for determining pollutant source strengths. Brookhaven National Laboratory. Informal Note, June 1992.
4. Thomas, K. W., Pellizzari, E. D., Dietz, R. N., Goodrich, R. W., Nelson, W. C., and Wallace, L. A. Temporal variability of benzene exposures for residents in several New Jersey homes with attached garages or tobacco smoke. J. Exposure Anal. & Environ. Epidemiology, Vol. 3, No. 1, pp. 49-73, 1993.

Appendix A

List of Chromatograms Comparing PFT and Contaminant Peaks (Building measurements from Test 3)

<u>GC-gram No.</u>	<u>Data File</u>	<u>CATS No.</u>	<u>Floor</u>	<u>Location</u>	<u>Heights^a (cts) of Contaminant Peaks</u>		
					<u>REF-3(3.05)^b</u>	<u>INT-1(4.19)^b</u>	<u>INT-4(5.77)^b</u>
1	8030C4	3-day	-	NYC Outside Air (GC2)	37 ^c	16 ^c	32 ^c
2	8028A17	5806	M1	Intake 180	54	15	47
3	3	7776	M1	NW-036	51	12	47
4	6	8038	1	NW-120	56	11	54
5	11	1715	2	NW-225	62	5	~60
6	19	6517	--	Sewer vent A	120650	10302	44480
7	23	10220	--	Sewer manhole	18670	732	8695
8	1	2184	M1	Exhaust Fan (EF)	47	10	39
9	4	6225	1	Exhaust Fan	931	94	675
10	8	10793	2	Exhaust Fan	2650	314	2040
11	9	10643	2	NW-220(CPA)	564	70	451
12	10	4830	2	NW-220 (near hematology)	1420	146	1020
13	8031C1	3-Day	--	NYC Outside Air (GC1)	40 ^c	--	42 ^c

^a Peak heights (counts = microvolts) from External Standard Tables in Appendix B

^b Retention time (min) of peaks in chromatograms of GC2

^c 3-day CATS exposure adjusted to 5-day height

Data File = B:8030C4.PTS Printed on 10-03-1993 at 09:09:04
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4928 cts High Value: 5420 cts Scale factor: 2.7

Data File = B:8028A17.PTS Printed on 10-02-1993 at 10:58:22
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4955 cts High Value: 5540 cts Scale factor: 2.7

Data File = B:8028A17.PTS Printed on 10-02-1993 at 11:02:31
Start time: 6.60 min. Stop time: 14.50 min. Offset: 0 cts
Low Value: 4917 cts High Value: 5007 cts Scale factor: 0.8

Data File = B:8028A3.PTS Printed on 10-02-1993 at 09:41:06
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4941 cts High Value: 5500 cts Scale factor: 0.8

Data File = B:8028A3.PTS Printed on 10-02-1993 at 09:45:04
Start time: 6.60 min. Stop time: 14.50 min. Offset: 0 cts
Low Value: 4838 cts High Value: 6766 cts Scale factor: 0.8

Data File = B:8028A6.PTS Printed on 10-02-1993 at 09:58:03
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4966 cts High Value: 10130 cts Scale factor: 20.0

Data File = 8:8028A6.PTS Printed on 10-02-1993 at 10:09:49
Start time: 6.60 min. Stop time: 14.50 min. Offset: 0 cts
Low Value: 4905 cts High Value: 5015 cts Scale factor: 0.8

Data File = B:8028A11.PTS Printed on 10-02-1993 at 10:17:47
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4961 cts High Value: 6996 cts Scale factor: 0.8

Data File = B:8028A11.PTS Printed on 10-02-1993 at 10:25:00
 Start time: 6.60 min. Stop time: 14.50 min. Offset: 0 cts
 Low Value: 4938 cts High Value: 5008 cts Scale factor: 0.8

Data File = B:8028A19.PTS Printed on 10-02-1993 at 11:50:05
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 5925 cts High Value: 138952 cts Scale factor: 0.8

Data File = 8:8028A23.PTS Printed on 10-02-1993 at 11:58:27
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 5779 cts High Value: 37018 cts Scale factor: 1.3

Data File = B:8028A23.PTS Printed on 10-02-1993 at 12:10:09
Start time: 6.50 min. Stop time: 14.50 min. Offset: 0 cts
Low Value: 1148 cts High Value: 13536 cts Scale factor: 0.8

Data File = B:8028A1.PTS Printed on 10-02-1993 at 10:48:03
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4951 cts High Value: 5987 cts Scale factor: 4.3

Data File = B:8028A1.PTS Printed on 10-02-1993 at 10:53:01
Start time: 6.50 min. Stop time: 14.50 min. Offset: 0 cts
Low Value: 4888 cts High Value: 6213 cts Scale factor: 0.8

Data File = 8:8028A4.PTS Printed on 10-02-1993 at 10:36:25
Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
Low Value: 4996 cts High Value: 11464 cts Scale factor: 5.0

Data File = 8:8028A4.PTS Printed on 10-02-1993 at 10:40:28
Start time: 5.50 min. Stop time: 14.50 min. Offset: 0 cts
Low Value: 4513 cts High Value: 5715 cts Scale factor: 0.8

Data File = 8:8028A8.PTS Printed on 10-02-1993 at 11:15:32
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4967 cts High Value: 8877 cts Scale factor: 0.8

Data File = B:8028A8.PTS Printed on 10-02-1993 at 11:19:32
 Start time: 6.50 min. Stop time: 14.50 min. Offset: 0 cts
 Low Value: 4056 cts High Value: 7074 cts Scale factor: 0.8

Data File = B:8028A9.PTS Printed on 10-03-1993 at 17:01:18
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4970 cts High Value: 7076 cts Scale factor: 0.8

Data File = B:8028A9.PTS Printed on 10-03-1993 at 17:05:57
 Start time: 6.60 min. Stop time: 14.50 min. Offset: 0 cts
 Low Value: 4753 cts High Value: 5443 cts Scale factor: 0.8

Data File = B:8028A10.PTS Printed on 10-02-1993 at 11:26:04
 Start time: 1.20 min. Stop time: 6.80 min. Offset: 0 cts
 Low Value: 4944 cts High Value: 8334 cts Scale factor: 0.8

Data File = 8:8028A10.PTS Printed on 10-02-1993 at 11:35:14
 Start time: 6.60 min. Stop time: 14.50 min. Offset: 0 cts
 Low Value: 4544 cts High Value: 6046 cts Scale factor: 0.8

Data File = A:8031C1.PTS Printed on 10-03-1993 at 09:52:01
 Start time: 1.60 min. Stop time: 7.60 min. Offset: 0 cts
 Low Value: 5450 cts High Value: 5652 cts Scale factor: 0.8

Data File = A:8031C1.PTS Printed on 10-03-1993 at 09:59:42
 Start time: 1.75 min. Stop time: 3.40 min. Offset: 10 cts
 Low Value: 5460 cts High Value: 5652 cts Scale factor: 0.8

Appendix B

External Standard Tables (In order of increasing Data File No.)

<u>Table Nos.</u>	<u>Root Data File</u>	<u>Cycle Nos. ^{c,d}</u>	<u>Sampling Location</u>
1-11	8028A ^a	1,3,4,6,8, 9,10,11, 17, 19,23	Building air Building air Building intake plenum air Sewer vent A and manhole air
12	8030C ^b	4	NYC (Manhattan) outside air
13	8031C ^b	1 (on GC1)	NYC (Brooklyn) outside air

^a Sampling duration of 5 days

^b Sampling duration of 3 days

^c Order of analysis as listed on BNL-AIMS output sheet in text

^d All analyses on instrument GC2, except the last was on GC1

Peak Retention Times for GC2

<u>Peak</u>	<u>Retention time, min</u>	<u>Ambient Bkd. pL/L</u>	<u>Tagging Location</u>
PMCP	1.47 ± 0.01	0.0033	Floor 1
PMCH	2.34 ± 0.01	0.0040	Hoods
REF-3	3.05 ± 0.05		Found in sewer air
ocPDCH	3.84 ± 0.02	0.0004	Sewer air
INT-1	4.19 ± 0.02		Interferent in sewer air
pcPDCH	4.50 ± 0.02		Other isomer of pPDCH
INT-2	4.57 ± 0.02		Interferent in sewer air
INT-3	5.14 ± 0.02		Interferent in sewer air
ptPDCH	5.24 ± 0.02	0.0045	Floor 2
INT-4	5.77 ± 0.02		Interferent in sewer air
REF-4	7.73 ± 0.02		Found in air (little) and sewer air (more)
REF-5	8.76 ± 0.03		Found in air (little) and sewer air (more)
1-PTCH	10.15 ± 0.03	0.0001	Floor M1
2-PTCH			Other isomer at ~40% height of 1-PTCH

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 10:45:07 Version 5.2.0 *****
 * Sample Name: 2184, UNIV WA Tst3 Data File: B:8028A1
 * Date: 08-22-1993 23:24:43 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8
 * Interface: 2 Cycle#: 1 Operator: RND Channel: A Vial#: N.A.
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6'
 * Solvent Description: 17.2 CC/MIN
 * Conditions: 160C
 * Detector 0: ECD N163 Detector 1:
 * Misc. Information: LPT2:
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	RET PEAK	% DELTA RET TIME	CONC/AREA
1	1.480	PMCP	2814.9001	3.7929%	2815	709	4.0 1	0	0	1.0000E+00
2	1.760		178.8000	0.2409%	179	32	5.5 1			1.0000E+00
4	2.010		46.8000	0.0631%	47	10	4.8 1			1.0000E+00
5	2.360	PMCH	1048.7203	1.4131%	1049	178	5.9 2	0	.8547	1.0000E+00
6	2.580	REF-2	183.0844	0.2467%	183	19	9.6 2	0	1.176	1.0000E+00
7	3.100		853.5001	1.1500%	854	47	18.1 1			1.0000E+00
8	3.850	ocPDCH	571.2375	0.7697%	571	49	11.6 2	0	.2604	1.0000E+00
9	4.510	pcPDCH	2804.3252	3.7787%	2804	169	16.6 2	0	-1.096	1.0000E+00
10	4.810	ncPDCH	1901.4376	2.5621%	1901	150	12.7 2	0	.8385	1.0000E+00
11	5.250	ptPDCH	993.5438	1.3387%	994	68	14.7 2	0	.5747	1.0000E+00
12	5.870		1221.8535	1.6464%	1222	39	31.6 2			1.0000E+00
13	7.140		494.7563	0.6667%	495	25	20.0 2			1.0000E+00
14	7.890		985.3969	1.3278%	985	92	10.8 2			1.0000E+00
15	8.100		1120.8750	1.5103%	1121	98	11.4 2			1.0000E+00
16	9.200		3384.7126	4.5607%	3385	130	26.0 2			1.0000E+00
17	10.180	1-PTCH	49147.4258	66.2234%	49147	1297	37.9 2	0	1.293	1.0000E+00
18	12.470		6463.2002	8.7088%	6463	116	55.9 1			1.0000E+00

TOTAL AMOUNT = 74214.5703

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 09:39:21 Version 5.2.0 *****
 * Sample Name: 7776 UW3 Data File: 8:8028A3 *
 * Date: 08-22-1993 23:54:42 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 3 Operator: RND Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 B' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD Ni63 Detector 1: *
 * Misc. Information: LPT2: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in *****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.480	PMCP	2142.4502	2.1918X	2142	481	4.4 2	0	0	1.0000E+00
2	1.750		194.7563	0.1992X	195	38	5.2 2			1.0000E+00
4	2.110	REF-1	89.1000	0.0912X	89	15	6.0 1	0	.9569	1.0000E+00
5	2.340	PMCH	1128.0000	1.1540X	1128	190	5.9 1	0	0	1.0000E+00
7	3.060	REF-3	932.4185	0.9539X	932	51	18.1 2	0	1.324	1.0000E+00
8	3.840	ocPOCH	798.6375	0.8170X	799	65	12.2 2	0	0	1.0000E+00
9	4.490	ntPOCH	3565.0688	3.6471X	3565	198	18.0 2	0	.8988	1.0000E+00
10	4.800	ncPOCH	2271.9009	2.3242X	2272	178	12.8 2	0	.6289	1.0000E+00
11	5.250	ptPOCH	1258.4063	1.2874X	1258	80	15.8 2	0	.5747	1.0000E+00
12	5.840		1675.3876	1.7140X	1675	47	35.5 2			1.0000E+00
13	7.060		720.6000	0.7372X	721	30	24.4 1			1.0000E+00
14	7.900		1293.7969	1.3236X	1294	127	10.2 2			1.0000E+00
15	8.080		59.2875	0.0607X	59	90	0.7 2			1.0000E+00
16	9.100		4351.0879	4.4513X	4351	172	25.2 2			1.0000E+00
17	10.130	1-PTCH	68941.3516	70.5285X	68941	1836	37.5 2	0	.7960	1.0000E+00
18	12.410		8327.4004	8.5191X	8327	148	56.3 1			1.0000E+00

TOTAL AMOUNT = 97749.6484

NEW TIMED EVENTS FROM 68160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 10:33:23 Version 5.2.0 *****
 * Sample Name: 6225,UW3 Data File: B:802804 *
 * Date: 08-23-1993 00:09:43 Method: 68160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 4 Operator: RND Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD N163 Detector 1: *
 * Misc. Information: LPT2: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in *****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.470	PMCP	23330.7012	17.2831%	23331	6402	3.6 1	0	-.6756	1.0000E+00
2	1.760		635.6033	0.4708%	636	140	4.5 3			1.0000E+00
3	1.860		53.7920	0.0398%	54	13	4.2 4			1.0000E+00
4	2.120	RET-1	30.6000	0.0227%	31	10	3.0 1	0	1.435	1.0000E+00
5	2.340	PMCH	886.8000	0.6569%	887	161	5.5 1	0	0	1.0000E+00
6	2.540	RET-2	147.0000	0.1089%	147	30	4.9 2	0	-.3921	1.0000E+00
7	2.680		354.0000	0.2622%	354	48	7.4 2			1.0000E+00
8	2.790		138.0000	0.1022%	138	27	5.1 2			1.0000E+00
9	3.090		14734.2002	10.9149%	14734	931	15.8 1			1.0000E+00
10	3.850	ocPOCH	1617.9188	1.1985%	1618	145	11.2 2	0	.2604	1.0000E+00
11	4.210		1039.4250	0.7700%	1039	94	11.1 2			1.0000E+00
12	4.580	pcPOCH	16579.6270	12.2820%	16580	927	17.9 2	0	.4385	1.0000E+00
13	5.180	ptPOCH	6543.2349	4.8472%	6543	353	18.5 2	0	-.7662	1.0000E+00
14	5.780		22006.2383	16.3020%	22006	675	32.6 2			1.0000E+00
15	7.100		5081.9000	3.7047%	5081	214	23.4 1			1.0000E+00
16	7.760	REF-4	16232.7002	12.0250%	16233	872	18.6 1	0	.6485	1.0000E+00
17	8.790	REF-5	18642.5254	13.8102%	18643	593	31.4 2	0	.8027	1.0000E+00
18	10.230		6155.4751	4.5599%	6155	125	49.2 2			1.0000E+00
19	11.770		447.0000	0.3311%	447	23	19.4 2			1.0000E+00
20	12.780		415.2000	0.3076%	415	13	30.9 1			1.0000E+00

TOTAL AMOUNT = 134991.0469

NEW TIMED EVENTS FROM 68160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 09:55:35 Version 5.2.0 *****
 * Sample Name: 8038 UW3 Data File: 8:8028A6 *
 * Date: 08-23-1993 00:39:43 Method: 68160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 6 Operator: RND Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD Ni63 Detector 1: *
 * Misc. Information: LPT2: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.470	PMCP	18336.0000	51.6119%	18336	5040	3.6 1	0	-.6756	1.0000E+00
2	1.750		148.2000	0.4414%	148	37	4.0 1			1.0000E+00
3	2.340	PMCH	791.6754	2.3579%	792	134	5.9 2	0	0	1.0000E+00
4	2.530	REF-2	212.1281	0.6318%	212	22	9.6 2	0	-.7843	1.0000E+00
5	3.080	REF-3	1088.4000	3.2417%	1088	56	19.4 2	0	1.986	1.0000E+00
6	3.830	acPOCH	304.2000	0.9060%	304	30	10.1 2	0	-.2604	1.0000E+00
7	4.150		70.8000	0.2109%	71	11	6.4 2			1.0000E+00
8	4.490	ntPOCH	5185.2002	15.4436%	5185	201	25.8 2	0	.8988	1.0000E+00
9	5.220	ptPOCH	1457.4000	4.3407%	1457	96	15.2 2	0	0	1.0000E+00
10	5.790		1855.2001	5.5255%	1855	54	34.4 2			1.0000E+00
11	7.070		514.8000	1.5333%	515	23	22.4 2			1.0000E+00
12	7.710	REF-4	1124.1001	3.3480%	1124	64	17.6 1	0	0	1.0000E+00
13	8.690	REF-5	726.6000	2.1641%	727	31	23.4 1	0	-.3440	1.0000E+00
14	10.080	1-PICH	1497.0000	4.4587%	1497	41	36.7 1	0	.2985	1.0000E+00
15	11.980		263.4000	0.7845%	263	13	20.6 1			1.0000E+00

TOTAL AMOUNT = 33575.1016

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 11:14:05 Version 5.2.0 *****
 * Sample Name: 10793, UW3 Data File: B:8028A8
 * Date: 08-23-1993 01:09:43 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8
 * Interface: 2 Cycle#: 8 Operator: RND Channel: A Vial#: N.A.
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6'
 * Solvent Description: 17.2 CC/MIN
 * Conditions: 160C
 * Detector 0: ECD N163 Detector 1:
 * Misc. Information: LPT2:
 * Starting Delay: 0.40 Ending retention time: 14.50
 * Area reject: 30 One sample per 0.600 sec.
 * Amount injected: 1.00 Dilution factor: 1.00
 * Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in *****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.470	PMCP	3534.0002	1.0217%	3534	814	4.3 1	0	-.6756	1.0000E+00
2	1.750		252.9703	0.0731%	253	54	4.7 2			1.0000E+00
4	2.110	REF-1	309.0375	0.0893%	309	39	7.9 2	0	.9569	1.0000E+00
5	2.330	PMCH	1542.2532	0.4459%	1542	269	5.7 2	0	-.4273	1.0000E+00
6	2.660		1021.6922	0.2954%	1022	143	7.2 2			1.0000E+00
7	2.770		606.7078	0.1754%	607	107	5.7 2			1.0000E+00
8	3.080	REF-3	41134.2031	11.6320%	41134	2648	15.5 1	0	1.986	1.0000E+00
9	3.830	ocPOCH	4846.2476	1.4011%	4846	421	11.5 2	0	-.2604	1.0000E+00
10	4.180		4139.3252	1.1967%	4139	314	13.2 2			1.0000E+00
11	4.540	pcPOCH	62130.5273	17.9621%	62131	3728	16.7 2	0	-.4385	1.0000E+00
12	5.200	ptPOCH	36286.2031	10.4905%	36286	2008	18.1 2	0	-.3831	1.0000E+00
13	5.770		69617.5547	20.1267%	69618	2043	34.1 2			1.0000E+00
14	7.100		18123.5449	5.2396%	18124	678	26.7 2			1.0000E+00
15	7.720	REF-4	45064.0008	13.0284%	45065	2280	19.8 1	0	.1297	1.0000E+00
16	8.740	REF-5	45143.4023	13.0511%	45143	1539	29.3 1	0	.2293	1.0000E+00
17	9.720		1330.0310	0.3845%	1330	84	15.9 2			1.0000E+00
18	10.170	1-PTCH	8059.9878	2.3302%	8060	257	31.4 2	0	1.194	1.0000E+00
19	11.840		987.1125	0.2854%	987	34	28.8 2			1.0000E+00
20	12.750		1767.4501	0.5110%	1767	49	36.3 2			1.0000E+00

TOTAL AMOUNT = 345897.0625

NEW TIMED EVENTS FROM 68160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-03-1993 16:58:53 Version 5.2.0 *****
 * Sample Name: 10643 UW3 Data File: B:8028A9 *
 * Date: 08-23-1993 01:24:43 Method: 68160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 9 Operator: RND Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD N163 Detector 1: *
 * Misc. Information: LPT2: *
 * Starting Delay: 0.40 Ending retention time: 14.50
 * Area reject: 30 One sample per 0.600 sec.
 * Amount injected: 1.00 Dilution factor: 1.00
 * Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.470	PMCP	2432.4001	2.1685X	2432	636	3.8 2	0	-6756	1.0000E+00
2	1.540		3157.9595	2.8153X	3158	804	3.9 3			1.0000E+00
3	1.740		149.8406	0.1336X	150	33	4.5 4			1.0000E+00
4	1.970		50.2641	0.0448X	50	11	4.6 2			1.0000E+00
5	2.060	REF-1	128.8313	0.1149X	129	20	6.6 2	0	-1.435	1.0000E+00
6	2.330	PMCH	1133.4000	1.0104X	1133	194	5.8 1	0	-4.273	1.0000E+00
7	2.640		306.2906	0.2731X	306	37	8.4 2			1.0000E+00
8	2.770		139.5070	0.1244X	140	25	5.7 2			1.0000E+00
9	3.070	REF-3	8719.8008	7.7736X	8720	564	15.5 1	0	1.655	1.0000E+00
10	3.840	ocPOCH	1275.3750	1.1370X	1275	112	11.4 2	0	0	1.0000E+00
11	4.250		789.3844	0.7037X	789	70	11.3 2			1.0000E+00
12	4.500	ntPOCH	32513.3262	28.9854X	32513	2068	15.7 2	0	1.123	1.0000E+00
13	5.210	ptPOCH	20585.4844	18.3518X	20585	1368	15.0 2	0	-1.1915	1.0000E+00
14	5.750		14989.5752	13.3631X	14990	451	33.3 2			1.0000E+00
15	7.060		3892.8752	3.4705X	3893	150	26.0 2			1.0000E+00
16	7.720	REF-4	9713.2129	8.6593X	9713	450	21.6 2	0	.1297	1.0000E+00
17	8.430		4278.7222	3.8144X	4279	256	16.7 2			1.0000E+00
18	8.740	REF-5	6160.2754	5.4918X	6160	287	21.5 2	0	.2293	1.0000E+00
19	9.740		124.0266	0.1106X	124	14	8.8 2			1.0000E+00
20	10.130	1-PTCH	1442.5875	1.2861X	1443	53	27.1 2	0	.7960	1.0000E+00
21	11.800		188.4000	0.1680X	188	16	12.1 1			1.0000E+00

TOTAL AMOUNT = 112171.5234

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 11:24:28 Version 5.2.0 *****
 * Sample Name: 4830.UW3 Data File: B:8028A10 *
 * Date: 08-23-1993 01:39:42 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 10 Operator: RND Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD N163 Detector 1: *
 * Misc. Information: LPT2: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.480	PMCP	2876.8594	1.3801%	2877	609	4.7 2	0	0	1.0000E+00
2	1.770		547.7953	0.2628%	548	116	4.7 2			1.0000E+00
3	1.900		43.0477	0.0207%	43	13	3.2 2			1.0000E+00
4	2.100	REF-1	104.1000	0.0499%	104	17	6.1 1	0	.4784	1.0000E+00
5	2.350	PMCH	1368.6001	0.6566%	1369	243	5.6 1	0	.4273	1.0000E+00
6	2.670		581.3110	0.2789%	581	73	8.0 2			1.0000E+00
7	2.800		280.8891	0.1347%	281	44	6.4 2			1.0000E+00
8	3.100		21770.4004	10.4438%	21770	1418	15.4 1			1.0000E+00
9	3.850	ocPOCH	2500.7942	1.1997%	2501	216	11.6 2	0	.2604	1.0000E+00
10	4.190		1522.9641	0.7306%	1523	146	10.4 2			1.0000E+00
11	4.540	pcPOCH	52014.5469	24.9527%	52015	3259	16.0 2	0	-.4385	1.0000E+00
12	5.230	ptPOCH	32362.3516	15.5250%	32362	2071	15.6 2	0	.1915	1.0000E+00
13	5.790		34430.5508	16.5172%	34431	1018	33.8 2			1.0000E+00
14	7.100		8564.9258	4.1088%	8565	328	26.1 2			1.0000E+00
15	7.740	REF-4	21042.1133	10.0944%	21042	995	21.1 2	0	.3891	1.0000E+00
16	8.450		9684.9004	4.6461%	9685	553	17.5 2			1.0000E+00
17	8.750	REF-5	13760.0068	6.6010%	13760	652	21.1 2	0	.3440	1.0000E+00
18	9.680		826.7250	0.3966%	827	42	19.7 2			1.0000E+00
19	10.210		3490.8752	1.6747%	3491	122	28.6 2			1.0000E+00
20	11.860		337.8000	0.1621%	338	18	19.0 1			1.0000E+00
21	12.800		341.4000	0.1638%	341	17	19.8 1			1.0000E+00

TOTAL AMOUNT = 208452.9531

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 10:14:21 Version 5.2.0 *****
 * Sample Name: 1715 UW3 Data File: B:8028A11 *
 * Date: 08-23-1993 01:54:43 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 11 Operator: RND Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD Ni63 Detector 1: *
 * Misc. Information: LPT2: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in *****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	RET PEAK	% DELTA RET TIME	CONC/AREA
1	1.460	PMCP	1307.4000	2.2499X	1307	399	3.3 1	0	-1.351	1.0000E+00
2	1.750		155.7000	0.2679X	156	43	3.6 1			1.0000E+00
3	2.330	PMCH	1019.4000	1.7543X	1019	182	5.6 1	0	-.4273	1.0000E+00
4	2.530	REF-2	196.8000	0.3387X	197	17	11.5 1	0	-.7843	1.0000E+00
5	3.040	REF-3	1174.2001	2.0207X	1174	62	19.0 1	0	.6622	1.0000E+00
6	3.820	ocPOCH	484.3315	0.8335X	484	43	11.2 2	0	-.5208	1.0000E+00
7	4.500	ntPOCH	27946.1074	48.0928X	27946	1987	14.1 2	0	1.123	1.0000E+00
8	5.220	ptPOCH	19587.3750	33.7081X	19587	1417	13.8 2	0	0	1.0000E+00
9	6.110		3535.0127	6.0834X	3535	121	29.3 2			1.0000E+00
10	7.730	REF-4	870.5438	1.4981X	871	48	18.0 2	0	.2594	1.0000E+00
11	8.760	REF-5	1218.3750	2.0967X	1218	41	29.6 2	0	.4587	1.0000E+00
12	9.770		123.9000	0.2132X	124	9	13.7 1			1.0000E+00
13	11.770		160.8000	0.2767X	161	14	11.7 1			1.0000E+00
14	12.940		136.2000	0.2344X	136	10	13.3 1			1.0000E+00
15	13.570		192.6000	0.3314X	193	10	19.7 1			1.0000E+00

TOTAL AMOUNT = 58108.7422

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 10:56:59 Version 5.2.0 *****
 * Sample Name: 5806.UW3 Data File: B:8028A17
 * Date: 08-23-1993 03:24:43 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8
 * Interface: 2 Cycle#: 17 Operator: RND Channel: A Vial#: N.A.
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6'
 * Solvent Description: 17.2 CC/MIN
 * Conditions: 160C
 * Detector 0: ECD Ni63 Detector 1:
 * Misc. Information: LPT2:
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ***	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT	REF PEAK	% DELTA RET TIME	CONC./AREA
1	1.470	PMCP	1182.6001	8.1473X	1183	232	5.1 1	0	-.6756	1.0000E+00
2	1.750		719.5122	4.9570X	720	151	4.8 3			1.0000E+00
3	1.860		63.7831	0.4394X	64	14	4.7 4			1.0000E+00
4	2.330	PMCH	688.2844	4.7418X	688	122	5.7 2	0	-.4273	1.0000E+00
5	2.510	REF-2	112.1156	0.7724X	112	24	4.6 2	0	-1.568	1.0000E+00
6	3.140		1145.4000	7.8910X	1145	54	21.3 1			1.0000E+00
7	3.860	ocPOCH	406.5188	2.8006X	407	28	14.3 2	0	.5208	1.0000E+00
8	4.470	ntPOCH	2644.9595	18.2220X	2645	154	17.2 2	0	.4494	1.0000E+00
9	4.760	mcPOCH	1740.5344	11.9911X	1741	130	13.4 2	0	-.2096	1.0000E+00
10	5.230	ptPOCH	1206.5947	8.3126X	1207	77	15.7 2	0	.1915	1.0000E+00
11	5.770		1657.3876	11.4183X	1657	47	35.6 2			1.0000E+00
12	7.730	REF-4	1329.9000	9.1621X	1330	64	20.8 1	0	.2594	1.0000E+00
13	8.710	REF-5	672.6000	4.6338X	673	30	22.4 1	0	-.1146	1.0000E+00
14	9.920	1-PTCH	325.2000	2.2404X	325	12	26.2 1	0	-1.293	1.0000E+00
15	11.500		135.5063	0.9335X	136	12	11.0 2			1.0000E+00
16	11.820		184.3031	1.2697X	184	13	13.9 2			1.0000E+00
17	12.480		65.9813	0.4546X	66	9	7.4 2			1.0000E+00
18	12.840		87.3188	0.6016X	87	9	9.2 2			1.0000E+00
19	13.550		146.7000	1.0107X	147	9	17.0 1			1.0000E+00

TOTAL AMOUNT = 14515.1992

NEW TIMED EVENTS FROM 68160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 11:46:34 Version 5.2.0 *****
 * Sample Name: 6517.UW3 Data File: 8:8028A19
 * Date: 08-23-1993 03:54:44 Method: 68160H5A 09-21-1993 09:05:10 Version: 8
 * Interface: 2 Cycle#: 19 Operator: RND Channel: A Vial#: N.A.
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6'
 * Solvent Description: 17.2 CC/MIN
 * Conditions: 160C
 * Detector 0: ECD Ni63 Detector 1:
 * Misc. Information: LPT2:

 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.470	PMCP	6265.8096	0.0979%	6266	1367	4.6 1	5	-.2493	1.0000E+00
2	1.780		1282.2001	0.0200%	1282	214	6.0 1			1.0000E+00
3	1.990		5385.6470	0.0842%	5386	1014	5.3 2			1.0000E+00
4	2.140	REF-1	20643.2637	0.3227%	20643	2884	7.2 2	5	2.831	1.0000E+00
5	2.330	PMCH	42215.7031	0.6598%	42216	7034	6.0 2	5	0	1.0000E+00
6	2.670		67713.2266	1.0583%	67713	9288	7.3 2			1.0000E+00
7	2.780		28235.1289	0.4413%	28235	5168	5.5 2			1.0000E+00
8	3.080		1879596.6250	29.3778%	1879597	120647	15.6 1			1.0000E+00
9	3.850	ocPOCH	156569.7031	2.4472%	156570	12879	12.2 2	5	.6907	1.0000E+00
10	4.180		128181.5469	2.0035%	128182	10302	12.4 2			1.0000E+00
11	4.580	pcPOCH	1074192.2500	16.7894%	1074192	68306	15.7 2	5	.8696	1.0000E+00
12	5.140	ptPOCH	379702.0938	5.9347%	379702	19508	19.5 2	5	-1.109	1.0000E+00
13	5.770		1332025.2500	20.8193%	1332025	44477	29.9 2			1.0000E+00
14	7.090		253405.8125	3.9607%	253406	11237	22.6 1			1.0000E+00
15	7.730	REF-4	643075.5000	10.0512%	643076	34950	18.4 1	5	.6896	1.0000E+00
16	8.750	REF-5	379531.8125	5.9320%	379532	18876	20.1 1	5	.7746	1.0000E+00

TOTAL AMOUNT = 6398021.5000

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-02-1993 11:55:10 Version 5.2.0 *****
 * Sample Name: 10220.UW3 Data File: 8:8028A23
 * Date: 08-23-1993 04:54:44 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8
 * Interface: 2 Cycle#: 23 Operator: RND Channel: A Vial#: N.A.
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5
 * Instrument Type: 60008, SERIAL 0150 Column Type: SP1000 6'
 * Solvent Description: 17.2 CC/MIN
 * Conditions: 160C
 * Detector 0: ECD N163 Detector 1:
 * Misc. Information: LPT2:
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.530		8112.0005	0.5847%	8112	2437	3.3 1			1.0000E+00
2	2.330	PMCH	1337.4000	0.0964%	1337	262	5.1 1	0	-.4273	1.0000E+00
3	2.660		15950.7002	1.1498%	15951	1699	9.4 1			1.0000E+00
4	3.100		237295.2344	17.1046%	237295	18671	12.7 1			1.0000E+00
5	3.850	ocPOCH	9580.4531	0.6906%	9580	711	13.5 2	0	.2604	1.0000E+00
6	4.170		9768.6846	0.7041%	9769	732	13.3 2			1.0000E+00
7	4.570	pcPOCH	150329.2188	10.8360%	150329	10100	14.9 2	0	.2193	1.0000E+00
8	5.140	ptPOCH	100157.8203	7.2195%	100158	5687	17.6 2	0	-1.532	1.0000E+00
9	5.770		292787.1250	21.1046%	292787	8695	33.7 2			1.0000E+00
10	7.080		80950.8047	5.8351%	80951	3159	25.6 1			1.0000E+00
11	7.740	REF-4	186999.3125	13.4792%	186999	9880	18.9 1	0	.3891	1.0000E+00
12	8.350		13965.6055	1.0067%	13966	1053	13.3 2			1.0000E+00
13	8.740	REF-5	142618.3750	10.2802%	142618	3976	35.9 2	0	.2293	1.0000E+00
14	9.680		43294.8984	3.1208%	43295	1224	35.4 2			1.0000E+00
15	10.210		75462.5859	5.4395%	75463	1074	70.3 2			1.0000E+00
16	11.930		18706.7813	1.3484%	18707	382	49.0 2			1.0000E+00

TOTAL AMOUNT = 1387317.0000

NEW TIMED EVENTS FROM 6B160H5A

***** EXTERNAL STANDARD TABLE *****

***** 10-03-1993 09:07:47 Version 5.2.0 *****
 * Sample Name: 3742, CONED Data File: B:8030C4 *
 * Date: 08-23-1993 16:46:47 Method: 6B160H5A 09-21-1993 09:05:10 Version: 8 *
 * Interface: 2 Cycle#: 4 Operator: GIS Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000B, SERIAL 0150 Column Type: SP1000 6' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 160C *
 * Detector 0: ECD N163 Detector 1: *
 * Misc. Information: LPT2: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ****	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.470	PMCP	946.8600	10.3273X	947	187	5.1 2	0	-.6756	1.0000E+00
2	1.750		257.8781	2.8127X	258	58	4.4 2			1.0000E+00
3	2.060	REF-1	108.9891	1.1887X	109	17	6.5 2	0	-1.435	1.0000E+00
4	2.330	PMCH	614.3115	6.7002X	614	108	5.7 2	0	-.4273	1.0000E+00
5	2.560	REF-2	134.9156	1.4715X	135	18	7.4 2	0	.3921	1.0000E+00
6	2.980	REF-3	516.6000	5.6345X	517	22	23.4 1	0	-1.324	1.0000E+00
7	3.860	acPOCH	231.4500	2.5244X	231	20	11.8 2	0	.5208	1.0000E+00
8	4.470	mtPOCH	2073.3000	22.6133X	2073	122	17.1 2	0	.4494	1.0000E+00
9	4.760	acPOCH	1450.7251	15.8229X	1451	112	12.9 2	0	-.2096	1.0000E+00
10	5.220	ptPOCH	742.1409	8.0945X	742	49	15.0 2	0	0	1.0000E+00
11	5.800		707.2500	7.7139X	707	19	36.5 2			1.0000E+00
12	7.100		294.6000	3.2132X	295	16	18.4 1			1.0000E+00
13	7.780	REF-4	387.8438	4.2302X	388	15	25.6 2	0	.9079	1.0000E+00
14	8.780	REF-5	242.0250	2.6397X	242	13	19.1 2	0	.6880	1.0000E+00
15	10.720	2-PTCH	148.8000	1.6230X	149	11	13.4 1	0	.6572	1.0000E+00
16	12.020		310.8000	3.3899X	311	14	22.9 1			1.0000E+00

TOTAL AMOUNT = 9168.4893

NEW TIMED EVENTS FROM 6A177H4A

***** EXTERNAL STANDARD TABLE *****

***** 10-03-1993 09:50:40 Version 5.2.0 *****
 * Sample Name: 8102, CONED Data File: A:8031C1 *
 * Date: 08-24-1993 09:37:01 Method: 6A177H4A 09-19-1993 13:06:25 Version: 6 *
 * Interface: 0 Cycle#: 1 Operator: RF Channel: A Vial#: N.A. *
 * Starting Peak Width: 6 Threshold: .03 Area Threshold: 5 *
 * Instrument Type: 6000A SERIAL 2481 Column Type: SP1000 8' *
 * Solvent Description: 17.2 CC/MIN *
 * Conditions: 177C *
 * Detector 0: ECD Ni 63 Detector 1: *
 * Misc. Information: LPT1: *
 Starting Delay: 0.40 Ending retention time: 14.50
 Area reject: 30 One sample per 0.600 sec.
 Amount injected: 1.00 Dilution factor: 1.00
 Sample Weight: 1.00000

PEAK NUM	RET TIME	PEAK NAME	CONCENTRATION in ***	NORMALIZED CONC	AREA	HEIGHT	AREA/ HEIGHT BL	REF PEAK	% DELTA RET TIME	CONC/AREA
1	1.840	PDCB	118.5984	1.3159X	119	43	2.8 2	0	0	1.0000E+00
2	1.920	PMCP	780.1969	8.6563X	780	185	4.2 2	0	0	1.0000E+00
4	2.950	PMCH	716.2781	7.9472X	716	121	5.9 2	0	0	1.0000E+00
5	3.150	REF-2	102.4500	1.1367X	102	17	6.0 2	0	-.6309	1.0000E+00
6	3.690	REF-3	181.4063	2.0127X	181	24	7.6 2	0	-.8064	1.0000E+00
7	3.850		269.5875	2.9911X	270	21	13.0 2			1.0000E+00
8	4.440		49.2000	0.5459X	49	10	4.8 2			1.0000E+00
9	4.660	ocPDCB	278.0438	3.0849X	278	28	9.9 2	0	0	1.0000E+00
10	5.340	mtPDCB	1906.3219	21.1508X	1906	112	17.0 2	0	.5649	1.0000E+00
11	5.720	mcPDCB	1660.6688	18.4252X	1661	132	12.6 2	0	.1751	1.0000E+00
12	6.230	ptPDCB	862.5115	9.5696X	863	60	14.3 2	0	0	1.0000E+00
13	6.680		676.1063	7.5014X	676	25	27.2 2			1.0000E+00
14	8.810	REF-4	250.4093	2.7783X	250	18	13.8 2	0	.9163	1.0000E+00
15	9.930	REF-5	579.3750	6.4282X	579	24	24.6 2	0	1.120	1.0000E+00
16	10.710		143.9344	1.5970X	144	11	13.3 2			1.0000E+00
17	11.990	2-PTCH	148.2938	1.6453X	148	12	12.3 2	0	-.3324	1.0000E+00
18	12.780		217.0313	2.4080X	217	11	18.9 2			1.0000E+00
19	13.270		72.6000	0.8055X	73	10	7.1 1			1.0000E+00

TOTAL AMOUNT = 9013.0127

v

b

b

p

DATE

FILMED

9/14/94

END