
Air Monitoring for Volatile Organic Compounds at the Pilot Plant Complex, Aberdeen Proving Ground, Maryland

**Energy Systems Division
Argonne National Laboratory**



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Telephone (708) 252-3724

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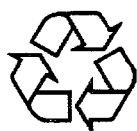
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H.A. Cobo, D.P. O'Reilly, and R.E. Zimmerman

Center for Environmental Restoration Systems, Energy Systems Division,
Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois 60439

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Notation

ANL	Argonne National Laboratory
APG	Aberdeen Proving Ground
CWA	chemical warfare agent
EA	Edgewood Area
FPD	flame photometric detector
GC	gas chromatograph
ITTRI	Illinois Institute of Technology Research Institute
L	liter
L/L	liters per liter
MS	mass spectrometer
ng/L	nanograms per liter
nL/L	nanoliters per liter
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
ppbv	parts per billion by volume, or 10^{-9} L/L
PPC	Pilot Plant Complex
pptv	parts per trillion by volume, or 10^{-12} L/L
RT	retention time

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Summary

The U.S. Army's Aberdeen Proving Ground has been a test site for a variety of munitions, including chemical warfare agents (CWA). The Pilot Plant Complex (PPC) at Aberdeen was the site of development, manufacture, storage, and disposal of CWA. Deterioration of the buildings and violations of environmental laws led to closure of the complex in 1986. Since that time, all equipment, piping, and conduit in the buildings have been removed. The buildings have been declared free of surface CWA contamination as a result of air sampling using the military system. However, no air sampling has been done to determine if other hazardous volatile organic compounds are present in the PPC, although a wide range of toxic and/or hazardous materials other than CWA was used in the PPC. The assumption has been that the air in the PPC is not hazardous. The purpose of this air-monitoring study was to screen the indoor air in the PPC to confirm the assumption that the air does not contain volatile organic contaminants at levels that would endanger persons in the buildings. A secondary purpose was to identify any potential sources of volatile organic contaminants that need to be monitored in subsequent sampling efforts.

More than 180 air samples from the PPC were sampled and analyzed by Argonne National Laboratory in the fall of 1994. The majority of the volatile organic compounds found are those compounds commonly present in any building (hydrocarbons and chlorinated solvents). In general, no chemical contaminant was found that contradicts the assumption that the air in the PPC is not hazardous. Polychlorinated biphenyls (PCBs) were identified at low levels (1-50 ng/L). (The OSHA-allowable exposure level for workers is 500 ng/L [time-weighted average]). Additional sampling for PCBs will be done by taking wipe samples in areas suspected of having PCB contamination. The results also indicated the presence of organic compounds in the air samples taken in one room (E134 of Building E5625) that are unique to the operations performed in the PPC in the past (for example, 1,4-dithiane and 1,4-oxathiane).

1 Introduction

The U.S. Army's Aberdeen Proving Ground (APG) has been a test site for a variety of munitions, including chemical warfare agents (CWA). At APG, the Pilot Plant Complex (PPC) was the site of development, manufacture, storage, and disposal of CWA. The PPC is located in the Edgewood Area (EA) of Aberdeen, which is situated 21 miles northeast of Baltimore, in the Atlantic Coastal Plain, in an area to the west of Chesapeake Bay (Figure 1). The area in which the PPC is located sits in the Canal Creek basin. The complex, originally designated Complex 87, was constructed in 1941 prior to the entry of the United States into World War II; it contains nine buildings, as shown in Figure 2.

Deterioration of the buildings and violations of environmental laws led to closure of the complex in 1986. Since that time, all equipment, piping, and conduit in the buildings have been removed. The buildings have been declared free of surface CWA contamination as a result of air sampling by using the military system (Lattin 1994). However, no air sampling has been done to determine if other hazardous volatile organic compounds are present in the PPC, although a wide

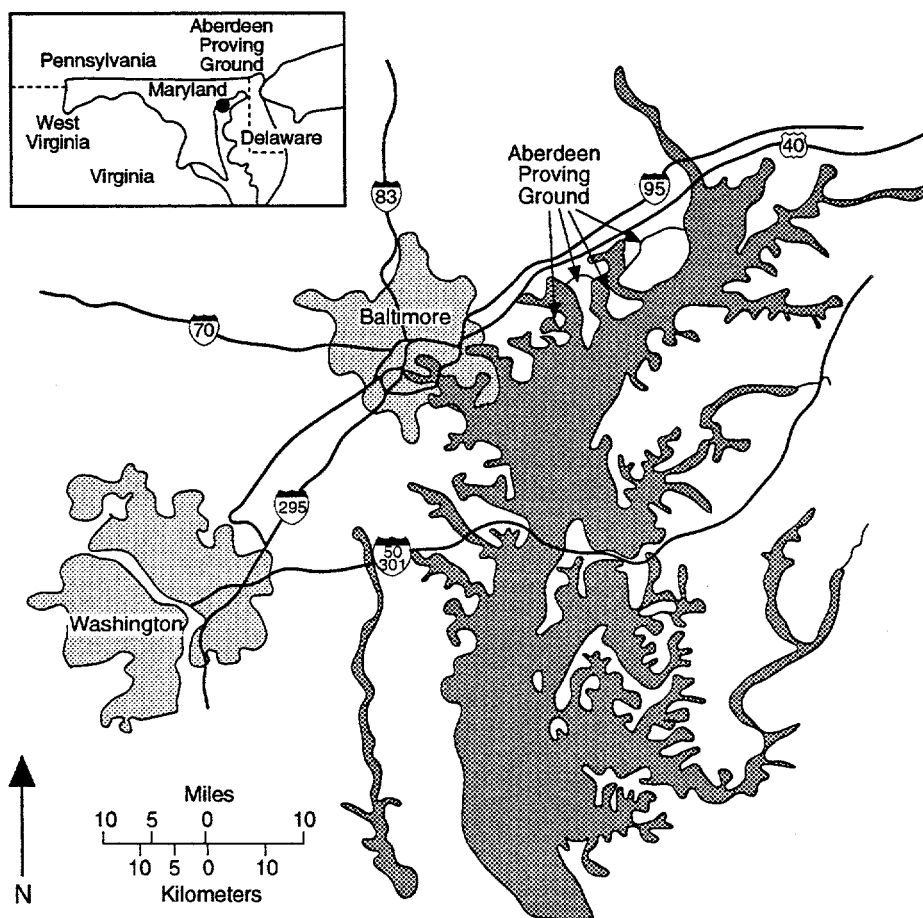


FIGURE 1 Location of Aberdeen Proving Ground

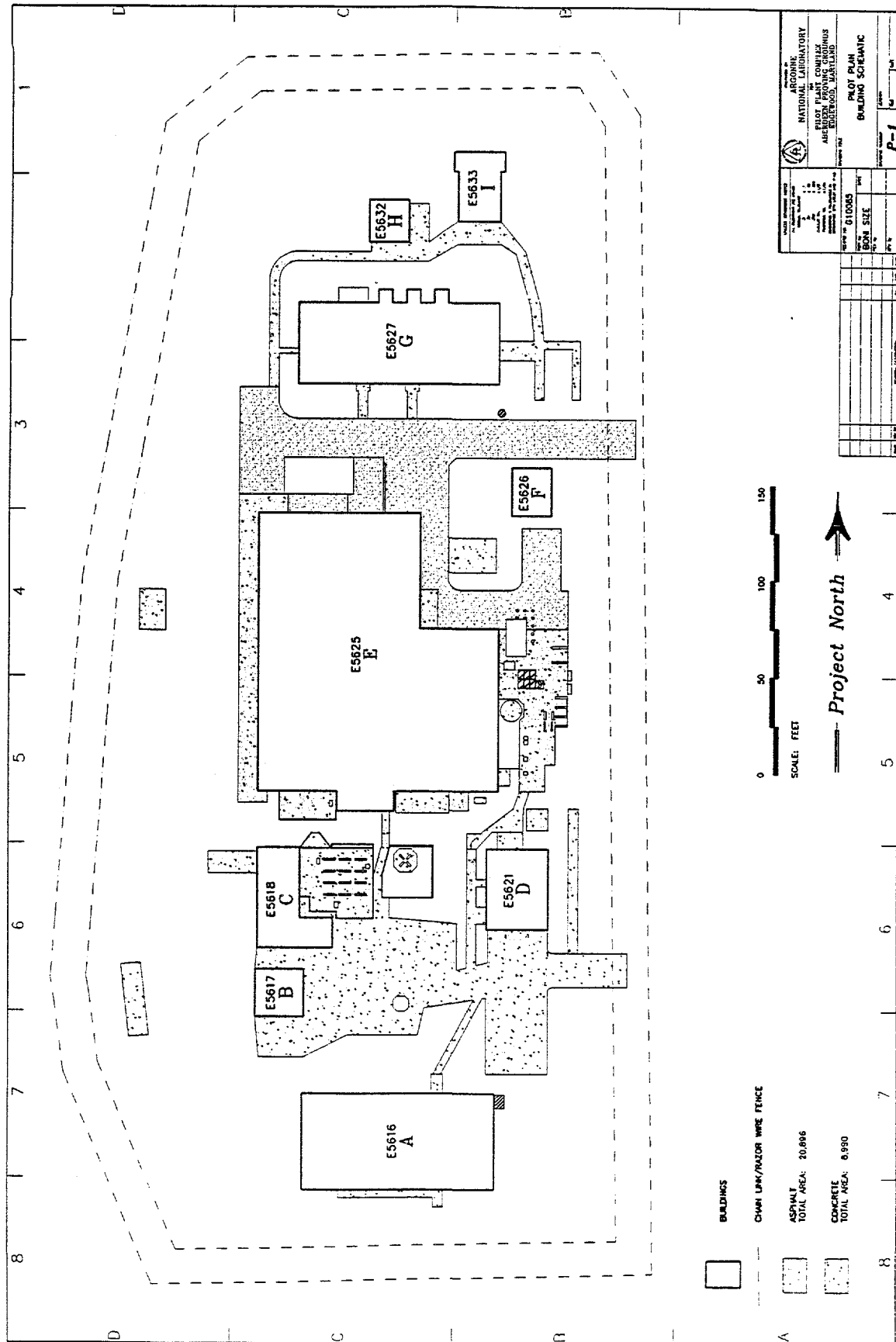


FIGURE 2 General Layout of the Pilot Plant Complex

range of toxic and/or hazardous materials other than CWA was used in the PPC. The assumption has been that the air in the PPC is not hazardous.

As part of a program currently being undertaken by Argonne National Laboratory (ANL), the air in the PPC was sampled and analyzed in the fall of 1994. The purpose of this air-monitoring study was to screen the indoor air in the PPC to confirm the assumption that the air does not contain volatile organic contaminants at levels that would endanger persons in the building. A secondary purpose was to identify any potential sources of volatile organic contaminants that need to be monitored in subsequent sampling efforts. The air monitoring discussed in this report is the first phase of a study undertaken to evaluate the condition of the PPC.

The initial air-monitoring effort involved a preliminary survey of the PPC by the Illinois Institute of Technology Research Institute (IITRI) to determine what ambient contaminants can be detected with sampling and analysis technology using preconcentration sorbent tubes. The IITRI report is presented as Appendix A of this report. ANL then proceeded to systematically survey every room and building within the PPC with their air-monitoring procedures. As part of the ANL survey, air samples were also collected by SciTech Services, Inc., for CWA screening. SciTech Services used procedures employed by the Edgewood Research, Development, and Engineering Center, Air Monitoring Branch. The SciTech report is included as Appendix B.

The scope of the ambient-air-monitoring activity conducted by ANL was to screen virtually every laboratory and room of the PPC to determine a spatial distribution of the various ambient air components. This information will be used to plan more extensive sampling and analysis activities in those areas containing the highest levels of contamination. Of particular importance in the ambient-air screening was the search for degradation products of CWA, which may suggest the presence of residual neat chemical agents, and the detection of such environmental contaminants as polychlorinated biphenyls (PCBs). The results of this ambient-air-monitoring survey are described in this report.

2 Methods and Procedures

Air samples were collected and analyzed on-site by ANL in early fall 1994. A total of 186 air samples were collected at numerous locations in the PPC, while additional samples were collected outside the PPC to serve as control samples. The floor plans for the buildings studied are shown in Appendix C, Figures C.1-C.13. At least one air sample was collected from each room.

Sampling was performed by a two-man team, who wore modified level-D personal protection equipment. A personnel sampling pump, model AIRPRO 6000 manufactured by BIOS International, was used to draw ambient air through Tenax TA sorbent polymer sampling cartridge traps (4 mm I.D. $\times$ 11.5 cm) at the rate of 500 mL for 40 min, yielding a 20-L sample volume. The pump was calibrated by using a flow-through meter at the beginning of each sample run and checking it again at the end of the run. The cartridges were analyzed by thermally desorbing the trapped organic compounds, by means of a Dynatherm model 900 ACEM thermal desorption unit, onto a Hewlett-Packard 5890 series II gas chromatograph (GC) equipped with a Hewlett-Packard 5972 mass spectrometer (MS) and flame photometric detector (FPD). The FPD was specific for sulfur- or phosphorous-containing compounds.

In the Dynatherm, carrier gas was used to sweep away any moisture trapped in the sample cartridge. Then the cartridge was heated to high temperature to desorb the compounds, which were collected on a focusing trap. The focusing trap concentrated the compounds in a small volume for introduction onto the capillary GC column in a narrow band. The GC column was a J&W DB-5 column, 30 m $\times$ 0.32 mm I.D. The outlet was split, with 50% of the flow going to the MS and 50% going to the FPD.

The MS was used for detecting and identifying organic compounds desorbed from the Tenax traps. A standard mixture of volatile organics was run daily to ensure that the instrument was calibrated properly. Spectra were obtained by scanning from 45 to 400 atomic mass units at a rate of two scans per second. Identifications were made on the basis of mass spectral interpretation and computer searching of the 140,000-peak Wiley spectral library. All quantitations are estimates, using the assumption that analyte response factors are similar to that of toluene in the standard mixture of volatile organics.

Because of the history of the PPC in the production and storage of CWA, and because CWA and CWA degradation products contain sulfur and/or phosphorous, the FPD was used to screen for organic compounds containing sulfur or phosphorous atoms. This information was also useful in identifying unknown organic compounds. Appendix D contains the data obtained by ANL during the on-site screening.

3 Quality Assurance/Quality Control

The purpose of the indoor-air screening performed by ANL was to confirm that the air in the PPC does not contain volatile organic contaminants at levels that would endanger persons in the buildings. A secondary purpose was to identify potential sources of volatile organic contaminants that may need to be monitored in subsequent sampling efforts. This type of screening, classified as level 2, is considered by the U.S. Environmental Protection Agency to be appropriate for determining areas of contamination at a site. If contamination is found, additional sampling at a higher level of quality assurance/quality control is required for confirmation.

The analytical equipment used (GC/MS/FPD) was calibrated daily by using a certified standard mixture supplied by Supelco. The MS was tuned by using perfluorotributyl amine at the maximum sensitivity autotune. Since the purpose of this survey was for screening, no analytes were targeted.

All quantitations were made by assuming the response factor for a compound to be similar to the response factor for toluene, which was run in the certified standard mixture. One-point calibration was done, assuming the GC/MS to be linear over the concentration range of interest. Standard mixtures were run daily.

Identification of the spectral data was accomplished as follows. Appropriate settings or parameters for integrating all but the tiniest peaks and noise in a typical chromatogram were determined experimentally. The peaks then were integrated, and the Wiley library of more than 140,000 peaks was searched by computer. The ANL team examined the Wiley library assignments of structure for each peak and decided, using retention time data, whether any of the library assignments were correct. If the assignment appeared correct, the concentration of the compound was calculated. If the team thought the assignment was incorrect, they examined the mass spectrum and, when possible, made an assignment by using such techniques as looking at the side of the peak to remove impurities, stepping through successive spectra to see if a pure spectrum could be found, or performing background subtraction or subtraction of an interfering peak.

4 Results

The results of the air-monitoring study of the PPC have been summarized on a room-by-room basis. This summary appears in Table 1. Results of analysis of three samples from outside Building E5625 are shown in Table 2. A compilation of all the screening data by building and room number is given in Appendix D.

TABLE 1 Summary of Analytical Results

Room	Sample Number	Sampling Location	Findings
<i>Building E5625</i>			
E103	PP006	Middle of back half of the room	No significant findings
E104	PP004	Middle of the south half of the room	PCBs at 0.1 nL/L
E104	PP005	Middle of the north half of the room	PCBs at 2.3 nL/L
E104	PP148		PCBs at 1.20 nL/L
E104	PP149		PCBs at 0.70 nL/L
E104	PP179		PCBs at 0.50 nL/L
E105	PP007	Middle of the room	No significant findings
E105	PP139	Middle of the room	No significant findings
E107	PP008	Middle of the room	No significant findings
E108	PP009	Middle of the south half of the room	No significant findings
E113	PP013	Middle of the room	Unidentified peak with RT = 20.41 min of a sulfur-containing compound at sub-ppbv level
E115	PP012	Middle of the room	PCBs at 1 nL/L
E116	PP011	Middle of the room	PCBs at 5.7 nL/L Benzothiazole at sub-ppbv level Unidentified peak with RT = 20.41 min of a sulfur-containing compound at sub-ppbv level

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
E116	PP153		PCBs at 17.7 nL/L
E117	PP010	Middle of the room	Unidentified peak with RT = 20.41 min of a sulfur-containing compound at sub-ppbv level
E118	PP014	Middle of the room	No significant findings
E120	PP020	Middle of the elevator	No significant findings
E121	PP015	Middle of the room	No significant findings
E122	PP019	Middle of the room	No significant findings
E123	PP017	Middle of the north half of the room	PCBs at 9.8 nL/L
E123	PP018	In front of the elevator shaft in the south half of the room	No significant findings
E124	PP016	Middle of the room	No significant findings
E128	PP028	Middle of the room	No significant findings
E128	PP029	Middle of the room as a duplicate of PP028	No significant findings
E129	PP025	Middle of the east half of the room	No significant findings
E131	PP023	Near the sump in the north half of the room	1,4-oxathiane at sub-ppbv level Unknown sulfur-containing compound with RT = 15.41 min at sub-ppbv level O,O-diethyl-S-ethyl phosphorothioate at sub-ppbv level Phosphoric acid triethyl ester at 0.53 nL/L
E131	PP026	Middle of the south end of the hallway	1,4-oxathiane at sub-ppbv level PCBs at 7.3 nL/L
E131	PP124	South side of the room as a duplicate of PP026	Diisopropylamine is the largest peak (~1 ng/L) Oxathiane at sub-ppbv level No PCBs present in repeat of sample PP026

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
E132	PP021	Middle of the room	1,4-oxathiane at sub-ppbv level Unknown sulfur-containing compound with RT = 15.41 min at sub-ppbv level O,O-diethyl-S-ethyl phosphorothioate at sub-ppbv level
E134	PP001 PP002	Southeast section Northwest section }	1,4-oxathiane at ~0.5 nL/L 1,4-dithiane at sub-ppbv level O,O-diethyl-S-ethyl phosphorothioate at sub-ppbv level Benzothiazole at sub-ppbv level Unknown sulfur-containing compounds with RTs of 11.91, 6.38, 17.11, and 17.37 min at sub-ppbv levels
E134	PP022	Middle of the room; sampled for 100 min for a total volume of 50 L	1,4-oxathiane at sub-ppbv level 1,4-dithiane at sub-ppbv level O,O-diethyl-S-ethyl phosphorothioate at sub-ppbv level Benzothiazole at sub-ppbv level Unknown sulfur-containing compounds with RTs of 11.91, 16.38, 17.11, and 17.37 min at sub-ppbv levels
E135	PP024	In room E129 at the opening to room E135	O,O-diethyl-S-ethyl phosphorothioate at sub-ppbv level Unknown sulfur-containing compound with RT = 18.28 min at sub-ppbv level
E201	PP046		PCBs at ~0.7 nL/L
E203	PP032 PP033 }		PCBs at ~0.5 nL/L Biphenyl and diphenyl ether (components of Dowtherm) are the compounds present in the greatest amount. Naphthalene at 0.2 nL/L
E204	PP030 PP031 }		Findings similar to Room E203 except no PCBs
E205	PP036		1,4-oxathiane at sub-ppbv level PCBs at ~0.4 nL/L
E207	PP037		PCBs 8.1 nL/L; 20 different congeners identified Dowtherm components also found

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
E208	PP034 } PP035 }		PCBs at ~0.2 nL/L
E209	PP038		No significant findings but more aldehydes and ketones than most samples; e.g., acetophenone = 0.11 nL/L benzaldehyde = 0.16 nL/L
E211	PP039		Findings similar to room E209
E213	PP042		PCBs at ~0.3 nL/L
E214	PP043		PCBs at ~0.2 nL/L
E215	PP044		PCBs at ~1 nL/L
E216	PP040 } PP041 }		No significant findings
E217	PP045		Aromatic hydrocarbons are higher than usual PCBs at ~0.4 nL/L
E220	PP047	Southeast corner	PCBs at 11.9 nL/L
E220	PP048	Southwest	PCBs at 1.80 nL/L
E220	PP049	West	PCBs at 0
E220	PP050	Northwest	PCBs at 1.10 nL/L
E301	PP052		PCBs at ~0.2 nL/L
E303	PP056 } PP057 }		No significant findings
E305	PP054	South side of room	Trace PCBs
E305	PP055	North side of room	PCBs at 4.9 nL/L
E306	PP053		PCBs at ~0.05 nL/L
E308	PP060 } PP061 }		Higher volatile content than nearby rooms; mainly aromatics

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
E309	PP058 } PP059 }		No significant findings
E310	PP063		Aromatic content totaling ~15 ng/L
E311	PP062	South	No significant findings
E311	PP064		Aromatic content of ~15 ng/L
E313	PP065		No significant findings
E314	PP066	North	PCBs at ~3 nL/L
E314	PP067	South	No significant findings
E317	PP073	Center	No significant findings
E318	PP071	Center	No significant findings
E319	PP070	Center	No significant findings
E320	PP069	Center	No significant findings
E403	PP078	North	No significant findings
E403	PP079	South	No significant findings
E405	PP074	Northeast	No significant findings
E405	PP075	Southwest	No significant findings
E408	PP076	Northeast	No significant findings
E408	PP077	Southwest	No significant findings
E409	PP086R	West	PCBs at ~1 nL/L
E409	PP085	East	No significant findings
E411	PP084	Doorway	No significant findings
E412	PP080	North	No significant findings
E412	PP081	South	No significant findings

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
E415	PP090	Center	Unidentified sulfur-containing peak at RT = 20.52 min PCBs at ~0.4 nL/L
E416	PP089R	Center	Unidentified sulfur-containing peaks at RTs of 18.49 and 20.52 min PCBs at ~0.5 nL/L
E416	PP166		PCBs at 1.60 nL/L
E417	PP088	Center	No significant findings
E418	PP087	Center	Unidentified sulfur-containing peak at RT = 20.52 min PCBs at ~0.2 nL/L
Elevator mechanical room	PP125		Ethyl hexanol at 0.47 nL/L
<i>Samples analyzed with P filter on FPD</i>			
E133			Nothing on FPD-P filter
E134			Nothing on FPD-P filter
<i>Building 5625 Sumps</i>			
A104	PP122	West sump	TCE (~4 ng/L) and PCE (~2.3 ng/L) are only compounds over 1 ng/L
A116	PP121	South wall sump	Many compounds over 1 ng/L in this sample Largest peak is aniline (~120 ng/L); next highest is diisopropylamine (~85 ng/L) Many chlorinated organic compounds Perhaps >200 compounds in this sample; 24 peaks appear in FPD (oxathiane and some disulfides identified)
A131	PP123	North sump	Many brominated and chlorinated compounds; possible chloroacetophenone at ~0.1 ng/L; trichlorobenzene is largest peak at ~2 ng/L

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
Building E5616			
A107	PP114 PP116 PP117 PP118		Naphthalene was the largest peak in each of the four samples; only naphthalene was >1 ng/L (in SW corner) PCBs ranged from 0 in NW and NE corners to 0.4 nL/L in SW and 0.3 nL/L in SE corners
A109	PP120	North sump	Cyclohexanone at ~0.5 ng/L (did not appear in other samples) Large unknown peak identified as octene around RT = 30 min
A110	PP119		No significant findings
Building E5617			
B101	PP106	Southeast	No significant findings other than PCBs at ~0.5 nL/L
Building E5618			
C101	PP093	Center	Benzothiophene at ~1.5 ng/L Naphthalene level at 0.76 nL/L PCBs at 1.2 nL/L
C101	PP173	Middle	PCBs at 18.8 nL/L
C102	PP100 PP101	Northeast Southwest	Naphthalene at ~4 ng/L, substituted naphthalene at ~2 ng/L PCBs at 5.5 nL/L in both samples
C103	PP102 PP103	Northeast Southwest	Naphthalene at ~4 ng/L, substituted naphthalene at ~1 ng/L PCBs at 3.8 nL/L Concentrations slightly lower in sample PP103 Benzothiophene found in PP102 (both MS and FPD)
C103	PP170	Southwest	PCBs at ~47 nL/L
C104	PP104 PP105	Northeast Southwest	Naphthalene at ~1 ng/L PCBs at 1.4 nL/L Slightly higher concentrations in sample PP105 than sample PP104
C104	PP171	Northeast	PCBs at ~50 nL/L

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
<i>Building E5621</i>			
D101	PP108	Northeast sump	Many higher aliphatic hydrocarbons but nothing significant PCBs at ~0.2 nL/L
D101	PP109	10 ft south of sump	Pinene at ~2 ng/L Naphthalene at ~1.4 ng/L Methyl naphthalene at ~4 ng/L Benzothiophene at ~ 0.3 ng/L PCBs at ~0.2 nL/L
D101	PP112	West wall next to stained concrete	Pinene at ~1.5 ng/L Naphthalene at ~3.8 ng/L Methyl naphthalene at ~2 ng/L Dimethyl naphthalene at ~1.5 ng/L Phenanthrene at ~1 ng/L. Many aliphatic and aromatic hydrocarbons PCBs at ~0.6 nL/L
D102	PP111		PCBs at ~0.06 nL/L
D103	PP094	Center	Benzothiophene at ~7.5 ng/L.
D103	PP110		Naphthalene at ~10 ng/L Methyl naphthalene at ~4 ng/L Dimethyl naphthalene at ~2 ng/L Many aliphatic hydrocarbons
D104	PP113		No significant findings
<i>Building E5626</i>			
F104	PP083	Center	No significant findings
<i>Building E5627</i>			
G110	PP098	Center	No significant findings
G118	PP096	Center	No significant findings
G120	PP095	West	No significant findings
G120	PP097	East	No significant findings

TABLE 1 (Cont.)

Room	Sample Number	Sampling Location	Findings
<i>Building E5633</i>			
I101	PP091	Center	No significant findings

TABLE 2 Analytical Results for Samples from Outside Building E5625

Sampling Date	Sample Number	Sampling Location	Findings
8-10-94	PP072	North	No significant findings
8-11-94	PP082	North	No significant findings
8-12-94	PP092	North	No significant findings

5 Discussion

The majority of the volatile organic compounds found (hydrocarbons and chlorinated solvents) during the PPC air monitoring by ANL are compounds commonly found in any building. No CWA were found at detectable levels, but the CWA-related compounds 1,4-dithiane and 1,4-oxathiane were found in room E134 of Building E5625.

In the analysis of a sample from room E134 of Building E5625, an unknown peak with a retention time (RT) of 18.327 min was detected on the sulfur channel of the GC/FPD. This RT is similar to that of bis (2-chloroethyl) sulfide (mustard). The unknown compound was estimated to be present at a concentration (0.1 part per trillion volume [pptv]) below the level detectable by MS. To further investigate the unknown CWA found in room E134, an air sample was collected for 300 min at a rate of 500 mL of air per minute. The sample volume was 150 L. Figure 3 is the FPD chromatogram of this sample, showing peaks for 1,4-dithiane (RT = 16.421 min; concentration of ~0.17 pptv or 10^{-12} L/L) and 1,4-oxathiane (RT = 12.822; concentration of ~0.45 pptv or 10^{-12} L/L), and the unknown peak. Assuming that the response for bis (2-chloroethyl) sulfide is similar to that for 1,4-dithiane, the limit of detection for bis (2-chloroethyl) sulfide is estimated to be approximately 100 parts per quadrillion volume (10^{-15} L/L) for this volume of sample (150 L).

Over 150 compounds have been identified in the various samples. Many other compounds are part of isomeric categories and are not listed individually. At least 20 different congeners of PCBs are collectively called PCBs. The PCB data was utilized to identify those locations within the PPC that will require more extensive sampling for PCB contamination. This activity will involve the analysis of wipe samples from specific rooms and buildings within the PPC to determine if PCB contamination exceeds regulatory limits.

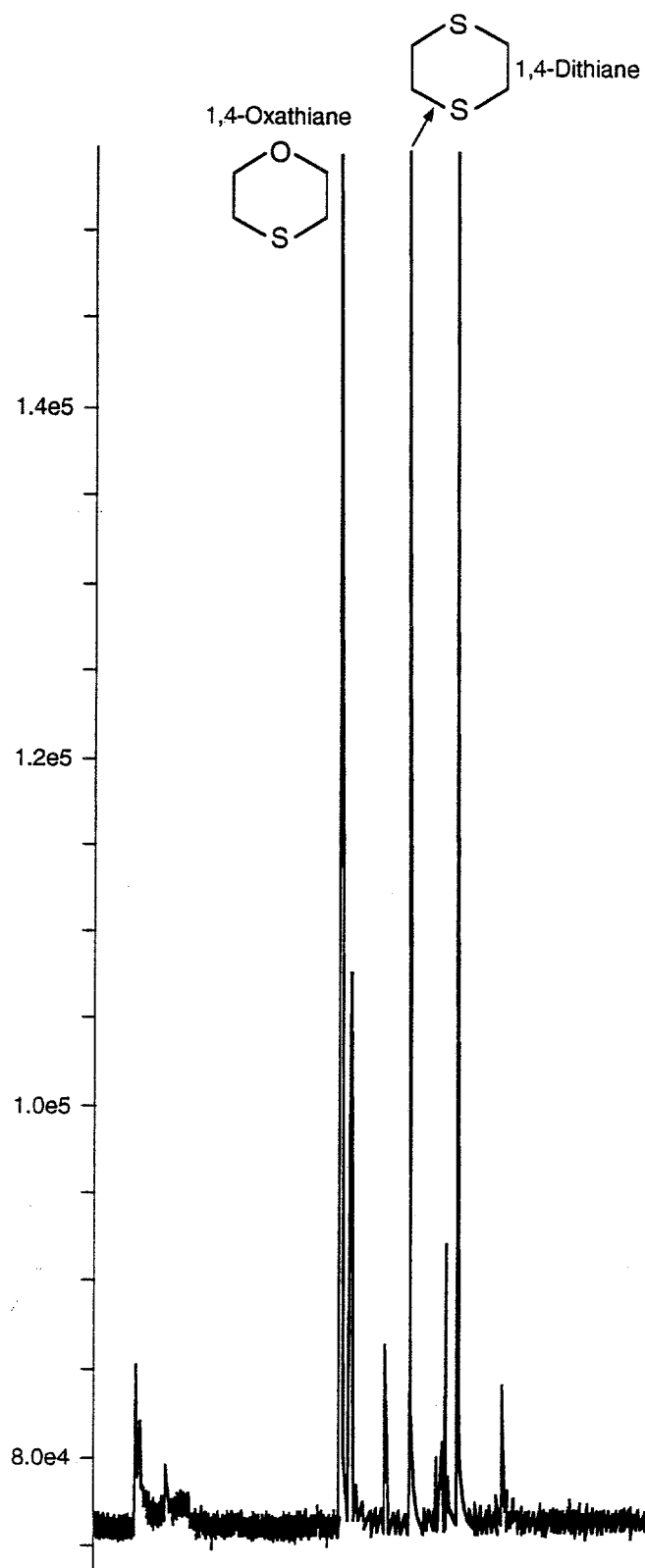


FIGURE 3 Chromatogram for Air Sample PP022 from Room E134 of Building E5625

6 Conclusions

Over 180 air samples from the buildings of the PPC were analyzed by ANL. The majority of the volatile organic compounds found (hydrocarbons and chlorinated solvents) are commonly present in any building. In general, no chemical contaminant was found that would contradict the assumption that the air in the PPC is not hazardous. The findings in the IITRI report (Appendix A) and the SciTech report (Appendix B) are in agreement with the ANL work. PCBs were identified at low levels (1-50 ng/L). (The OSHA-allowable PCB exposure level for workers is 500 ng/L [time-weighted average]). Additional sampling for PCBs will be done by taking wipe samples in areas suspected of having PCB contamination. The results also indicated the presence of organic compounds in the air that are unique to the operations performed in the PPC in the past (for example, 1,4 dithiane and 1,4 oxathiane). This information will be useful in determining if additional sampling of the PPC is required and, if so, where in the PPC such sampling should be done.

It should be emphasized that the ambient-air sampling of the PPC only allows the evaluation of the presence of CWAs and other toxic compounds that are volatile under ambient conditions. The PPC will have to be surveyed by other techniques for the nonvolatile analytes of concern to ensure their absence from the facility prior to demolition.

7 Reference

Lattin, F.G., 1994, unpublished information, Edgewood Research and Development Engineering Center, Aberdeen Proving Ground, Md.

Appendix A:

**Illinois Institute of Technology Research Institute Report
on Analysis of Pilot Plant Complex Air Samples**

**BROAD SPECTRUM GC/MS ANALYSES
ON COLLECTED TENAX CARTRIDGES**

Submitted to:

University of Chicago-Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439-4873

By:

Michael Miller
IIT Research Institute
10 West 35th Street
Chicago, Illinois 60616



COMMITMENT TO EXCELLENCE

VOLATILE ORGANIC COMPOUNDS ON TENAX

ANALYTICAL PROCEDURE

Sample Collection

The volatile organics present in the gas-phase emissions at the APG Pilot Plant sampling locations were collected by Argonne personnel using Tenax-GR cartridges and sampling equipment supplied by IITRI. Clean glass cartridges (10 cm x 1.5 cm i.d.) were packed with approximately 2 grams of 60-80 mesh Tenax-GR which was held in place using clean glass wool plugs. The packed cartridges then were thermally-conditioned at 285°C under constant flow of helium gas for four (4) hours. These conditioned cartridges were sealed in clean Teflon-lined screw-cap culture tubes inside sealed metal cans and stored cold until use. Machined Teflon plugs were used to isolate and immobilize the Tenax cartridges within the cultures tubes in order to reduce contamination and the risk of breakage during transport.

Two Tenax-GR samples were collected at each sampling site - one 20-liter and one 10-liter. The reason for sampling at two different air volumes was to provide a "range-finding" sample in each case. If the first sample saturated the detector of the mass spectrometer, the experimental conditions could be suitably adjusted to give a successful analysis using the second sample.

The volatile organic compounds (VOCs) were collected by attaching the Tenax cartridge to the suction side of a pump, positioning the collector at the sampling location and drawing the required volume through it. A calibrated flowmeter was used to monitor the flowrate (500 cc/min), which was controlled with a valve. The cartridges that were used for sample collection and then analyzed by GC/MS are identified in Table 1.

Sample Transfer and GC/MS Analysis

Characterization and quantification of the VOCs were accomplished by thermal desorption and purging of the Tenax-GR cartridges with helium into a liquid-nitrogen cooled nickel

Table 1. Tenax Sample Identification

Sample Location	Cartridge Number	Collection Date	Sample Volume, (L)	GC/MS File Name
1I3	TG2-25	6/22	20.0	ANL1I320
2D2	TG2-01	6/22	~ 20.0	ANL2D220
3D2	TG2-10	6/22	20.0	ANL3D220
4D2	TG2-04	6/22	20.0	ANL4D220

capillary trap (using a Tekmar 5010 GT thermal desorber). After an 8 minute desorption at 285°C, the cryotrap was rapidly heated to 250°C and the compounds flushed with helium onto a high-resolution capillary gas chromatographic column, to separate the components. Identification and quantification were achieved by mass spectrometric measurement of the total ion current signal, followed by computer enhancement of the raw GC/MS data.

Samples were analyzed on a 60 m x 0.32 mm i.d. DB1701 chemically-bonded fused-silica capillary column, with a carrier gas flow rate of ~ 1.0 ml/min. The column was initially held at a temperature of 35°C for 5 minutes, then heated at 4°C/min to 220°C. The column was coupled directly to the ion source of the mass spectrometer, a Finnigan MAT 44S quadrupole instrument, which was cyclically scanned from m/z 29 to m/z 300 every 1.5 sec during each run. The data were acquired and stored using a Zenith personal computer.

Data Enhancement and Spectrum Identification

Clean mass spectra were extracted from the raw GC/MS data by application of a data-enhancement algorithm.¹ This program produces clean spectra automatically by subtracting background contributions and resolving overlapping peaks. Identification of the resolved spectra was established using two computer-based mass spectral library search systems and by manual comparison of the unknown spectra with a compendium of standard spectra.

¹ R. G. Dromey, M. J. Stefik, T. C. Rindfleisch, and A. M. Duffield, Anal. Chem. 48, 1368 (1976).

Semi-Quantitative Estimates of Compound Concentrations

The intensity of response is given by the areas of the individual peaks in the GC/MS profiles, and is related to the actual concentration of the compounds present. A standard was used to convert peak areas to estimates of the actual amounts of each chemical in the sample. For this study, toluene was used as the standard. A known quantity of toluene was loaded onto a Tenax-GR cartridge and used to generate a response under standard GC/MS operating conditions. The relationship between the amount of toluene analyzed and its peak area response was used to estimate the amount of each compound in the sample. Division of this amount by the volume of air sampled gave a semi-quantitative estimate of the concentration (ng/L) of the component. These values were converted into parts-per-billion by volume (ppbv) by taking into account the molecular weight of each identified compound. Compounds vary in response within the analytical system (GC/MS) and therefore the accuracy of these values is dependent upon the similarity of each compound's response with that of toluene.

RESULTS AND DISCUSSION

The total ion current profiles obtained by GC/MS analysis of the air samples listed in Table 1 are shown in Figures 1 - 4. (The x-axis represents the number of acquired scans (1.5 sec/scan) and the y-axis the component intensity, in arbitrary units.) These plots represent the volatile organic compounds present in the gas-phase at the sampling locations. Using procedures described above, the GC/MS peaks were identified, and semi-quantitative estimates of their concentrations were determined. These results are summarized in Tables 2 - 5. The data, which have been re-arranged according to compound class, are presented in Tables 6 - 9.

A field or trip-blank also was analyzed in order to access possible contamination from the field or the storage conditions. The total ion current profile and analytical results for this blank are presented in Figure 5 and Tables 10 and 11, respectively.

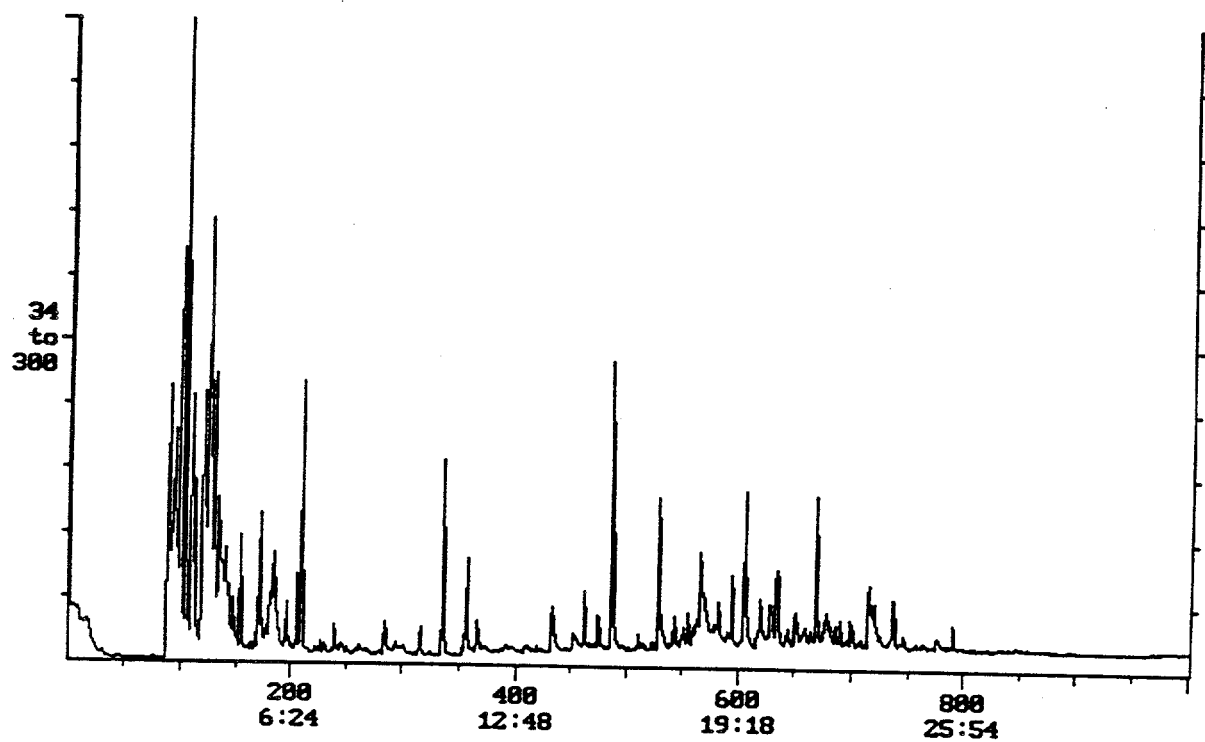


Figure 1. Total Ion Current Profile From the GC/MS Analysis of the Air Sample Collected in the APG Pilot Plant at the 1I3 Location.

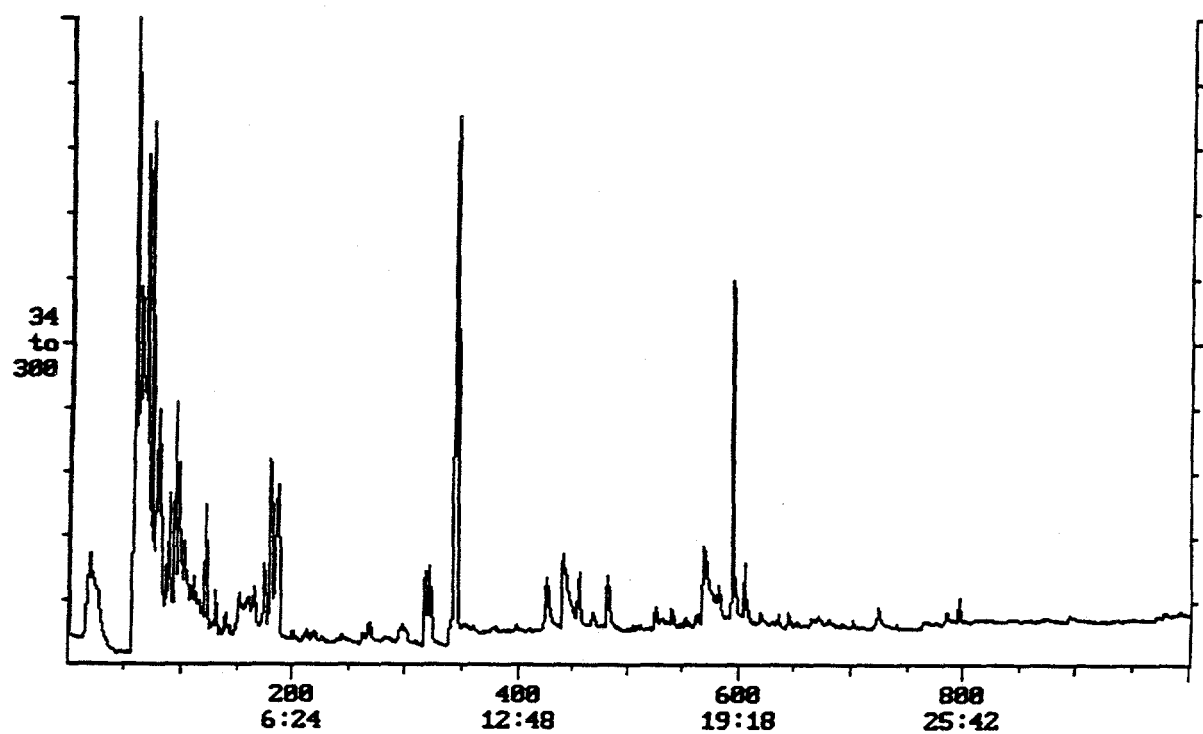


Figure 2. Total Ion Current Profile From the GC/MS Analysis of the Air Sample Collected in the APG Pilot Plant at the 2D2 Location.

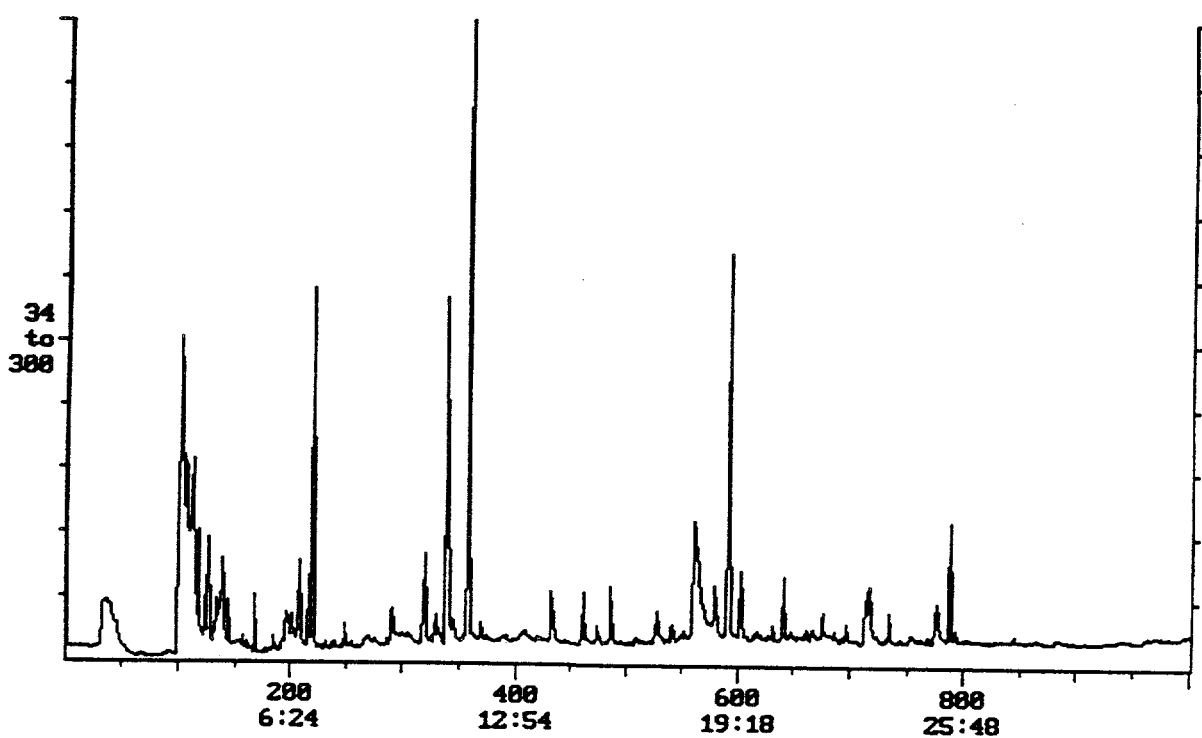


Figure 3. Total Ion Current Profile From the GC/MS Analysis of the Air Sample Collected in the APG Pilot Plant at the 3D2 Location.

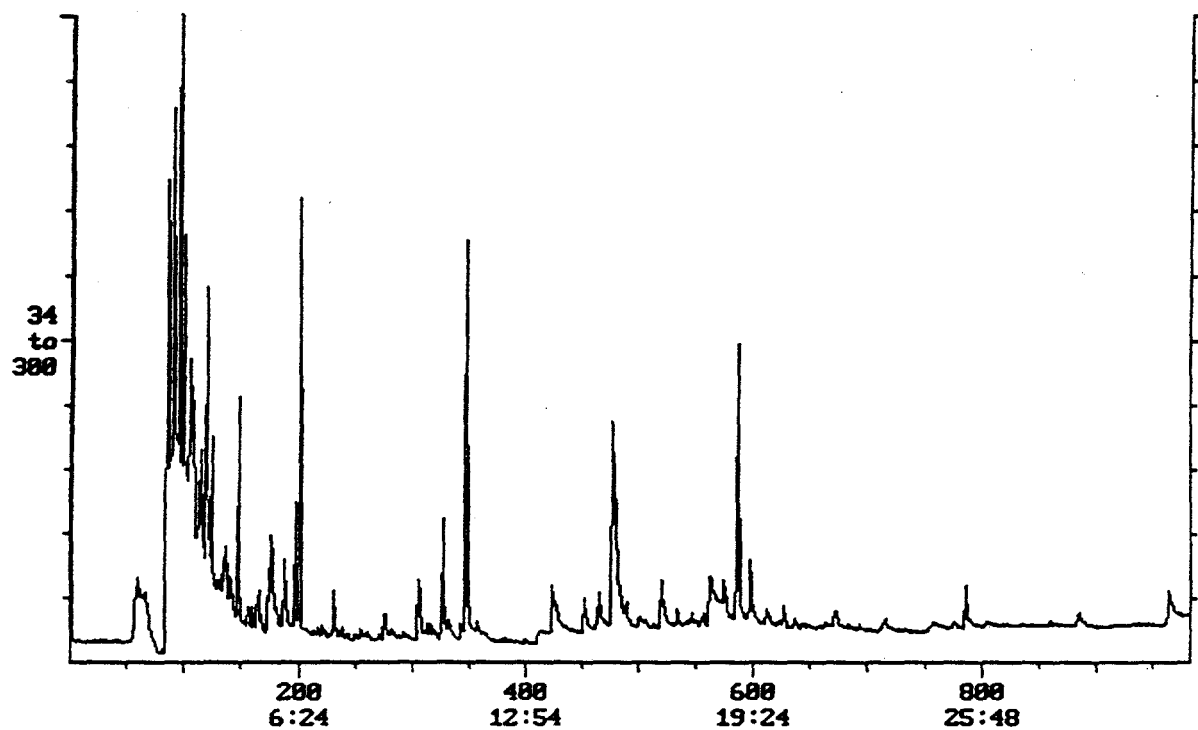


Figure 4. Total Ion Current Profile From the GC/MS Analysis of the Air Sample Collected in the APG Pilot Plant at the 4D2 Location.

Table 2. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 113 Location

Sample Code : TG2-25

Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
94	C4 H8	56	1-Butene	0.3	0.1	6.9
100	C5 H12	72	2-Methylbutane	6.5	2.0	130
104	C Cl3 F	136	Fluorotrichloromethane +	9.1	1.5	182
104	C5 H12	72	Pentane			
110	C5 H8	68	2-Methylbutadiene	0.5	0.2	10
112	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.3	< 0.1	5.5
113	C4 H4 O	68	Furan	0.5	0.1	9.1
118	C S2	76	Carbon disulfide	0.1	< 0.1	1.5
119	C6 H14	86	2-Methylpentane	0.3	0.1	5.0
121	C2 H6 O	46	Ethanol	4.3	2.1	86
125	C3 H8 O	58	Acetone	14	5.5	284
130	C6 H14	86	n-Hexane	0.7	0.2	13
131	C H2 C2	84	Dichloromethane	0.3	0.1	6.4
134	C3 H6 O	60	Isopropanol	< 0.1	< 0.1	trace
141	C2 H3 N	41	Acetonitrile or isocyanomethane	0.2	0.1	4.5
143	C4 H6 O	70	2-Butenal +	0.2	0.1	3.6
143	C7 H16	100	2-Methylhexane			
146	C4 H8 O	72	2-Methylpropanal	0.1	< 0.1	1.2
148	C6 H12	84	Methylcyclopentane	0.1	< 0.1	2.4
154	C5 H6 O	82	2-Methylfuran	0.4	0.1	8.7
164	C5 H6 O	82	3-Methylfuran	< 0.1	< 0.1	0.6
170	C4 H7 N O	85	2-isocyanatopropane (tent)	< 0.1	< 0.1	1.1
171	C6 H12	84	Cyclohexane	0.2	0.1	4.1
172	C4 H8 O	72	n-Butanal	0.5	0.2	10
178	C3 H8 O	60	n-Propanol	0.3	0.1	6.1
181	C4 H8 O2	88	Ethyl acetate	0.1	< 0.1	2.6
183	C2 H3 Cl3	132	1,1,1-Trichloroethane	0.2	< 0.1	4.5
185	C4 H8 O	72	2-Butanone (MEK)	0.3	0.1	6.8
189	C H Cl3	118	Chloroform	< 0.1	< 0.1	0.8
196	C7 H16	100	n-Heptane	0.4	0.1	7.0
205	C6 H6	78	Benzene	0.4	0.1	7.4
226	C7 H14	98	Methylcyclohexane	0.1	< 0.1	1.2
230	C9 H20	128	Dimethylheptane isomer	< 0.1	< 0.1	0.6
240	C2 H Cl3	130	Trichloroethylene	0.2	< 0.1	3.5
245	C5 H10 O	86	3-Methyl-2-butanone	0.1	< 0.1	1.4
284	C5 H10 O	86	2-Pentanone (MPK) +	0.2	< 0.1	3.5
284	C5 H8 O2	100	2-Butenoic acid methyl ester (tent)			
294	C7 H10 O	110	2-Propylfuran	< 0.1	< 0.1	0.5
301	C6 H12 O	100	3,3-Dimethyl-2-butanone	< 0.1	< 0.1	0.9
316	C8 H18	114	n-Octane +	0.2	< 0.1	3.2
316	C7 H12 O	112	2,2,3-Trimethylcyclobutanone			
335	C7 H8	92	Toluene	1.1	0.3	21
352	C6 H12 O	100	4-Methyl-2-pentanone	< 0.1	< 0.1	0.7
366	C2 Cl4	164	Tetrachloroethylene	0.2	< 0.1	4.2
372	C8 H16	112	Ethylcyclohexane (tent)	< 0.1	< 0.1	0.5
409	C9 H20	128	Dimethylheptane isomer	0.1	< 0.1	1.2
412	C6 H14 O	102	2-Hexanol (tent)	< 0.1	< 0.1	1.0
433	C6 H12 O	100	n-Hexanal	0.4	0.1	7.8
462	C9 H20	128	n-Nonane	0.3	< 0.1	5.3

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 2. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 113 Location

Sample Code : TG2-25						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
475	C8 H10	106	Ethylbenzene	0.2	< 0.1	4.1
486	C8 H10	106	m/p-Xylene	1.8	0.4	36
511	C10 H22	142	Methylnonane isomer	0.1	< 0.1	2.7
516	C9 H18	126	n-Propylcyclohexane	< 0.1	< 0.1	0.5
524	C10 H22	142	Dimethyloctane isomer	< 0.1	< 0.1	0.4
529	C8 H10	106	o-Xylene	1.1	0.2	22
543	C8 H8	104	Styrene	0.3	0.1	6.2
552	C10 H22	142	Methylnonane isomer	0.1	< 0.1	2.6
555	C7 H14	98	Ethylcyclopentane (v. tent)	0.1	< 0.1	1.4
559	C10 H16	136	Camphene	< 0.1	< 0.1	0.7
560	C4 H8 O S	104	1,4-Thioxane	0.1	< 0.1	2.9
564	C7 H14 O	114	3-Heptanone +	0.1	< 0.1	2.2
564	C9 H12	120	Isopropylbenzene			
565	C10 H22	142	Methylnonane isomer +	0.1	< 0.1	2.6
565	C5 H4 O2	96	Furfural			
580	C7 H14 O	114	2-Heptanone	0.1	< 0.1	1.2
582	C7 H14 O	114	n-Heptanal	0.3	0.1	5.7
591	C10 H20	140	C4-alkyl cyclohexane	< 0.1	< 0.1	0.8
605	C10 H22	142	n-Decane	1.0	0.2	19
607	C9 H12	120	n-Propylbenzene	0.1	< 0.1	1.5
618	C6 H10 O	98	Cyclohexanone	0.1	< 0.1	2.4
620	C9 H12	120	Ethyltoluene isomer	0.3	0.1	5.7
623	C12 H26	170	Dimethyldecane isomer	0.1	< 0.1	1.2
629	C9 H12	120	Trimethylbenzene isomer	0.4	0.1	7.6
634	C8 H16 O	128	6-Methyl-3-heptanone	0.7	0.1	14
644	C13 H28	184	Trimethyldecane isomer	0.2	< 0.1	3.0
651	C9 H12	120	Ethyltoluene isomer	0.2	< 0.1	3.9
658	C11 H24	156	Dimethylnonane isomer	0.1	< 0.1	1.4
660	C10 H20	140	n-Butylcyclohexane	0.1	< 0.1	2.3
668	C9 H12	120	Trimethylbenzene isomer	0.9	0.2	18
678	C10 H16	136	l-Limonene	0.1	< 0.1	3.0
681	C11 H24	156	Dimethylnonane isomer	0.1	< 0.1	2.9
685	C7 H9 N O	123	2-Methoxybenzenamine	0.1	< 0.1	1.3
690	C12 H26	170	Dimethyldecane isomer	0.2	< 0.1	3.6
700	C10 H14	134	1-Methyl-(1-methylethyl)benzene isomer	0.2	< 0.1	3.5
702	C10 H18	138	Decahydronaphthalene	< 0.1	< 0.1	0.7
708	C13 H28	184	Dimethylundecane isomer +	< 0.1	< 0.1	0.8
708	C8 H13 N	123	1-Butyl-1H-pyrrole			
715	C9 H12	120	Trimethylbenzene isomer	0.3	0.1	5.6
716	C7 H6 O	106	Benzaldehyde +	0.3	0.1	6.6
716	C8 H6 O	118	Benzofuran (tent)			
720	C8 H16 O	128	n-Octanal	0.2	< 0.1	3.2
726	C9 H18	126	Methyl-ethylcyclohexane isomer	< 0.1	< 0.1	0.6
734	C9 H10	118	Propenylbenzene	< 0.1	< 0.1	0.7
737	C11 H24	156	n-Undecane +	0.3	< 0.1	6.9
737	C10 H14	134	Methylpropylbenzene			
746	C10 H14	134	Dimethyl-ethylbenzene isomer	0.1	< 0.1	1.9
764	C10 H14	134	sec-Butylbenzene	< 0.1	< 0.1	0.5
777	C7 H5 N	103	Benzonitrile	0.1	< 0.1	2.3

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.

tent = Tentative Identification

v. tent = Very Tentative Identification

Table 3. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 2D2 Location

Sample Code : TG2-01						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
61	C Cl ₂ F ₂	120	Dichlorodifluoromethane +	0.2	< 0.1	4.5
61	C H ₃ Cl	50	Chloromethane			
64	S O ₂	64	Sulfur dioxide	0.1	0.1	3.0
68	C ₅ H ₁₂	72	2-Methylbutane	2.2	0.7	45
73	C ₅ H ₁₂	72	Pentane +	0.9	0.3	17
73	C Cl ₃ F	136	Fluorotrichloromethane			
74	C H ₄ O	32	Methanol	0.2	0.1	3.5
79	C ₅ H ₈	68	2-Methylbutadiene	0.3	0.1	6.2
80	C ₂ Cl ₃ F ₃	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.2	< 0.1	3.5
82	C ₄ H ₄ O	68	Furan	0.4	0.1	7.1
83	C ₂ H ₂ Cl ₂	96	1,1-Dichloroethylene	< 0.1	< 0.1	0.3
86	C S ₂	76	Carbon disulfide	< 0.1	< 0.1	0.9
87	C ₈ H ₁₄	86	2-Methylpentane	0.1	< 0.1	2.0
89	C ₂ H ₆ O	46	Ethanol +	0.5	0.2	9.7
89	C ₈ H ₁₄ O ₂	142	2,5-Dimethyl-3,4-hexanedione (tent)			
94	C ₃ H ₈ O	58	Acetone	0.5	0.2	10
98	C ₆ H ₁₄	86	n-Hexane	0.3	0.1	6.4
99	C H ₂ Cl ₂	84	Dichloromethane	0.1	< 0.1	1.8
109	C ₂ H ₃ N	41	Acetonitrile or isocyanomethane	< 0.1	< 0.1	trace
111	C ₄ H ₆ O	70	2-Butenal	0.1	< 0.1	1.9
122	C ₅ H ₆ O	82	2-Methylfuran	0.3	0.1	5.7
131	C ₅ H ₆ O	82	3-Methylfuran	0.2	0.1	4.9
140	C ₄ H ₈ O	72	n-Butanal +	0.1	< 0.1	1.3
140	C ₆ H ₁₂	84	Cyclohexane			
152	C ₄ H ₈ O	72	2-Butanone (MEK) +	0.1	< 0.1	1.7
152	C ₂ H ₃ Cl ₃	132	1,1,1-Trichloroethane			
153	C Cl ₄	152	Carbon tetrachloride	< 0.1	< 0.1	0.6
160	C ₇ H ₁₄	98	Methylcyclohexane isomer +	0.1	< 0.1	1.2
160	C H Cl ₃	118	Chloroform +			
160	C ₅ H ₁₀	70	Dimethylcyclopropane (tent)			
165	C ₇ H ₁₆	100	n-Heptane	0.1	< 0.1	1.9
174	C ₇ H ₁₆	100	Methylhexane isomer	< 0.1	< 0.1	0.7
176	C ₆ H ₆	78	Benzene	0.3	0.1	6.1
213	C ₂ H Cl ₃	130	Trichloroethylene	< 0.1	< 0.1	0.8
269	C ₅ H ₁₀ O	86	3-Methylbutanal +	0.1	< 0.1	1.7
269	C ₆ H ₆ S O ₄	174	4-Hydroxy benzenesulfonic acid (tent)			
298	C ₈ H ₁₈	114	n-Octane +	0.1	< 0.1	1.9
298	C ₈ H ₁₆	112	1-Octene			
322	C ₇ H ₈	92	Toluene	0.1	< 0.1	2.0
426	C ₆ H ₁₂ O	100	n-Hexanal	0.2	0.1	4.9
442	C ₂ H ₄ O ₂	60	Acetic acid	0.5	0.2	9.5
456	C ₉ H ₂₀	128	n-Nonane	0.2	< 0.1	3.4
469	C ₈ H ₁₀	106	Ethylbenzene	0.1	< 0.1	1.3
482	C ₈ H ₁₀	106	m/p-Xylene	0.2	< 0.1	4.7

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 3. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 2D2 Location

Sample Code : TG2-01

Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
510	C5 H3 N O	93	2-Furancarbitile	< 0.1	< 0.1	trace
527	C8 H10	106	o-Xylene +	0.1	< 0.1	1.9
527	C10 H16	136	alpha-Pinene			
541	C8 H8	104	Styrene	0.1	< 0.1	1.3
556	C10 H16	136	Camphene	< 0.1	< 0.1	trace
564	C7 H14 O	114	3-Heptanone	< 0.1	< 0.1	0.9
569	C5 H4 O2	98	2-Furancarboxaldehyde	0.2	< 0.1	3.9
582	C7 H14 O	114	n-Heptanal	0.1	< 0.1	1.8
605	C10 H22	142	n-Decane	0.2	< 0.1	3.1
635	C11 H24	156	Trimethyloctane isomer	< 0.1	< 0.1	0.7
645	C8 H16 O	128	2-Ethylhexanal	0.1	< 0.1	1.2
680	C10 H16	136	l-Limonene	< 0.1	< 0.1	trace
702	C10 H14	134	1,1-Dimethylethylbenzene	< 0.1	< 0.1	trace
724	C7 H6 O	106	Benzaldehyde	0.1	< 0.1	1.3
741	C11 H24	156	n-Undecane	< 0.1	< 0.1	trace
766	C8 H6 O2	110	5-Methyl-2-furancarboxaldehyde	< 0.1	< 0.1	trace
786	C8 H18 O	130	2-Ethylhexanol +	0.1	< 0.1	1.0
786	C7 H5 N	103	Isocyanobenzene			
874	C8 H8 O	120	Acetophenone	< 0.1	< 0.1	trace
894	C6 H6 O	94	Phenol	< 0.1	< 0.1	trace
1013	C5 H6 O2	98	2-Furanmethanol	0.2	< 0.1	3.7

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative Identification

Table 4. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 3D2 Location

Sample Code : TG2-10						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
107	C H3 Cl	50	Chloromethane +	0.4	0.2	7.2
107	C4 H8	56	2-Methylbutene			
108	S O2	64	Sulfur dioxide	0.3	0.1	5.1
113	C5 H12	72	2-Methylbutane	1.1	0.3	22
118	C Cl3 F	136	Fluorotrichloromethane +	0.4	0.1	8.1
118	C5 H12	72	Pentane			
124	C5 H8	68	2-Methylbutadiene or 1,3-Pentadiene	0.1	< 0.1	1.7
126	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.1	< 0.1	1.0
127	C4 H4 O	68	Furan	0.4	0.1	7.0
132	C S2	76	Carbon disulfide	0.1	< 0.1	1.4
134	C3 H4 O	56	2-Propenal +	0.6	0.2	12
134	C5 H6	66	1,3-Cyclopentadiene or 3-Penten-1-yne			
139	C3 H8 O	58	Acetone	0.6	0.2	12
144	C6 H14	86	n-Hexane	0.1	< 0.1	2.7
145	C H2 Cl2	84	Dichloromethane	< 0.1	< 0.1	0.4
157	C4 H6 O	70	2-Butenal	< 0.1	< 0.1	0.8
160	C4 H8 O	72	2-Methylpropanal +	< 0.1	< 0.1	0.4
160	C6 H12	84	Methylcyclopentane			
168	C5 H6 O	82	2-Methylfuran	0.2	0.1	4.3
177	C5 H6 O	82	3-Methylfuran	0.0	< 0.1	0.8
185	C4 H8 O	72	n-Butanal	0.1	< 0.1	1.5
196	C2 H3 Cl3	132	1,1,1-Trichloroethane	< 0.1	< 0.1	0.7
197	C4 H8 O	72	2-Butanone (MEK) +	0.1	< 0.1	2.3
197	C Cl4	152	Carbon tetrachloride			
201	C H Cl3	118	Chloroform +	0.1	< 0.1	2.6
201	C2 H4 O2	60	Acetic acid			
207	C3 H10 O Si	90	Trimethylsilanol	0.2	< 0.1	3.4
208	C7 H16	100	n-Heptane	0.4	0.1	8.8
217	C6 H6	78	Benzene	0.6	0.2	13
231	C7 H14	98	Heptene isomer	< 0.1	< 0.1	trace
236	C7 H14	98	Methylcyclohexane	< 0.1	< 0.1	trace
240	C5 H10 O	86	Methylbutanal isomer	< 0.1	< 0.1	0.9
249	C2 H Cl3	130	Trichloroethylene	0.1	< 0.1	2.6
269	C4 H6 O	70	2,5-Dihydrofuran	0.1	< 0.1	1.5
276	C8 H18	114	Dimethylhexane	< 0.1	< 0.1	trace
291	C5 H10 O	86	Methylbutanal isomer (tent)	0.3	0.1	5.8
306	C6 H12 O	100	3,3-Dimethyl-2-butanone (tent)	< 0.1	< 0.1	0.8
319	C8 H16	112	1,2,3-Trimethylcyclopentane (tent)	0.5	0.1	9.5
320	C8 H18	114	n-Octane	0.3	< 0.1	5.1
328	C2 H6 S2	94	Dimethyl disulfide	0.1	< 0.1	1.7
329	C8 H16	112	2,2-Dimethyl-3-hexene	0.1	< 0.1	2.1
332	C8 H16	112	Octene isomer	0.1	< 0.1	1.4
339	C7 H8	92	Toluene	2.3	0.6	46
345	C8 H16	112	Octene isomer	0.1	< 0.1	2.7
369	C2 Cl4	164	Tetrachloroethylene	0.1	< 0.1	1.4
374	C8 H14	110	3-Methyl-1,5-heptadiene	< 0.1	< 0.1	0.6

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.

tent = Tentative Identification

Table 4. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 3D2 Location

Sample Code : TG2-10						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
408	C7 H14 O	114	2,4-Dimethyl-3-pentanone	< 0.1	< 0.1	0.9
420	C9 H20	128	4-Ethyl-2-methylhexane	< 0.1	< 0.1	0.8
433	C6 H12 O	100	n-Hexanal	0.4	0.1	7.5
461	C9 H20	128	n-Nonane	0.3	< 0.1	5.7
474	C8 H10	106	Ethylbenzene	0.1	< 0.1	2.0
486	C8 H10	106	m/p-Xylene	0.3	0.1	6.6
509	C10 H22	142	Methylnonane isomer +	< 0.1	< 0.1	0.6
509	C10 H16	136	alpha-Pinene			
528	C8 H10	106	o-Xylene	0.2	< 0.1	4.2
541	C8 H8	104	Styrene	0.1	< 0.1	2.3
559	C7 H14 O	114	3-Heptanone	0.2	< 0.1	3.9
561	C5 H4 O2	96	Furfural	1.4	0.3	28
579	C7 H14 O	114	n-Heptanal	0.3	0.1	5.3
602	C10 H22	142	n-Decane	0.3	0.1	7.0
605	C9 H12	120	n-Propylbenzene	< 0.1	< 0.1	0.6
617	C9 H12	120	Ethyltoluene isomer	0.1	< 0.1	1.2
627	C9 H12	120	Ethyltoluene isomer	< 0.1	< 0.1	0.6
631	C11 H24	156	Trimethyloctane isomer	0.1	< 0.1	2.2
640	C8 H16 O	128	2-Ethylhexanal	0.4	0.1	8.1
646	C9 H14 O	138	2-Pentylfuran	0.1	< 0.1	1.0
648	C9 H12	120	Ethyltoluene isomer	< 0.1	< 0.1	0.6
662	C9 H10	118	2-Phenylpropene	0.1	< 0.1	1.7
667	C9 H12	120	Trimethylbenzene isomer	0.1	< 0.1	2.1
670	C6 H6 O2	110	1-(2-Furanyl)ethanone	< 0.1	< 0.1	trace
676	C10 H16	136	l-Limonene	0.1	< 0.1	2.0
677	C8 H17 Cl	148	1-Chloro-2-ethylhexane	0.1	< 0.1	2.1
687	C12 H26	170	Dimethyldecane isomer	< 0.1	< 0.1	0.9
697	C10 H14	134	1-Methyl-(methylethyl)benzene isomer	0.1	< 0.1	2.1
714	C9 H12	120	Trimethylbenzene isomer +	0.3	0.1	6.8
714	C7 H6 O	106	Benzaldehyde			
715	C8 H6 O	118	Benzofuran	< 0.1	< 0.1	0.8
717	C8 H16 O	128	n-Octanal	0.2	< 0.1	4.8
734	C11 H24	156	n-Undecane	0.1	< 0.1	2.9
744	C10 H14	134	1-Methyl-(methylethyl)benzene isomer +	< 0.1	< 0.1	0.4
744	C9 H19 Cl	162	1-Chlorononane			
754	C6 H6 O2	110	5-Methyl-2-furancarboxaldehyde	< 0.1	< 0.1	0.7
775	C7 H5 N	103	Benzonitrile	0.1	< 0.1	1.5
776	C8 H18 O	130	2-Ethylhexanol	0.3	0.1	5.9
845	C9 H18 O	142	n-Nonanal	< 0.1	< 0.1	0.7
865	C8 H8 O	120	Acetophenone	< 0.1	< 0.1	trace
881	C6 H6 O	94	Phenol	< 0.1	< 0.1	trace

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 5. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 4D2 Location

Sample Code : TG2-04

Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
90	C4 H8	56	1-Butene +	1.1	0.4	21
90	S O2	64	Sulfur dioxide			
96	C5 H12	72	2-Methylbutane +	3.4	1.0	67
96	C H3 Br	94	Bromomethane			trace
99	C Cl3 F	136	Fluorotrichloromethane +	0.4	0.1	8.2
99	C5 H12	72	Pentane			
102	C5 H10	70	2-Methyl-1-butene	0.1	< 0.1	1.3
105	C5 H8	68	2-Methylbutadiene	0.2	0.1	3.8
106	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.1	< 0.1	2.8
108	C4 H4 O	68	Furan +	0.4	0.1	8.5
108	C2 H2 Cl2	96	1,1-Dichloroethylene			
112	C S2	76	Carbon disulfide	0.2	0.1	3.9
113	C6 H14	86	2-Methylpentane	0.3	0.1	5.6
114	C5 H6	66	Cyclopentadiene or 3-Penten-1-yne	0.1	< 0.1	1.0
117	C2 H6 O	46	Ethanol	0.2	0.1	4.9
118	C6 H14	86	3-Methylpentane	0.1	< 0.1	1.8
119	C3 H8 O	58	Acetone	2.9	1.1	59
124	C6 H14	86	n-Hexane +	0.5	0.1	9.4
124	C H2 Cl2	84	Dichloromethane			
130	C2 H3 N	41	Acetonitrile or Isocyanomethane	0.1	0.1	2.2
136	C4 H6 O	70	2-Butenal +	0.3	0.1	5.0
136	C7 H16	100	2-Methylhexane			trace
139	C4 H8 O	72	2-Methylpropanal	< 0.1	< 0.1	0.3
141	C6 H12	84	Methylcyclopentane +	0.1	< 0.1	1.0
141	C3 H3 N	53	Propenenitrile +			
141	C4 H10 Si O2	118	Trimethylsilanol formate			
147	C5 H6 O	82	2-Methylfuran	0.6	0.2	11
156	C5 H6 O	82	3-Methylfuran	0.1	< 0.1	1.1
160	C7 H16	100	2-Methylhexane	< 0.1	< 0.1	1.0
165	C4 H8 O	72	n-Butanal +	0.1	< 0.1	2.5
165	C6 H8	80	1-Methyl-1,3-cyclopentadiene			
173	C5 H10	70	Dimethylcyclopropane	< 0.1	< 0.1	0.9
175	C2 H3 Cl3	132	1,1,1-Trichloroethane +	0.3	0.1	6.1
175	C4 H6 O2	86	2,3-Butanedione (tent)			
177	C Cl4	152	Carbon tetrachloride +	0.2	< 0.1	4.1
177	C4 H8 O	72	2-Butanone (MEK)			
181	C H Cl3	118	Chloroform	< 0.1	< 0.1	0.7
187	C7 H16	100	n-Heptane +	0.3	0.1	6.8
187	C3 H10 Si O	90	Trimethylsilanol			
197	C6 H6	78	Benzene	0.4	0.1	8.1
228	C H3 O2 Cl S	114	Methane sulfonyl chloride (tent)	0.1	< 0.1	1.1
231	C2 H Cl3	130	Trichloroethylene	0.2	< 0.1	4.0
238	C6 H8 O	96	Dimethylfuran	< 0.1	< 0.1	0.8
276	C5 H10 O	86	3-Methylbutanal +	0.1	< 0.1	2.1
276	C6 H6 S O4	174	4-Hydroxy benzenesulfonic acid (tent)			

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 5. Air Monitoring Results Determined from the Tenax-GR Sample Collected in the APG Pilot Plant at the 4D2 Location

Sample Code : TG2-04						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
306	C7 H12 O	112	2,2,3-Trimethylcyclobutanone (tent)	0.3	0.1	6.3
307	C8 H18	114	n-Octane	0.1	< 0.1	1.7
314	C2 H6 S2	94	Dimethyl disulfide	< 0.1	< 0.1	1.0
326	C7 H8	92	Toluene	0.5	0.1	9.3
332	C8 H16	112	Trimethylcyclopentane isomer	< 0.1	< 0.1	0.9
343	C6 H12 O	100	4-Methyl-2-pentanone	0.1	< 0.1	2.5
357	C2 Cl4	164	Tetrachloroethylene	0.1	< 0.1	1.0
424	C6 H12 O	100	n-Hexanal	0.2	< 0.1	3.7
453	C9 H20	128	n-Nonane	0.2	< 0.1	4.4
466	C8 H10	106	Ethylbenzene +	0.3	0.1	5.3
466	C H2 O2	46	Formic acid			
478	C8 H10	106	m/p-Xylene +	1.4	0.3	28
478	C2 H4 O2	80	Acetic acid			
521	C8 H10	106	o-Xylene	0.3	0.1	5.0
535	C8 H8	104	Styrene	0.1	< 0.1	1.8
546	C12 H26 O	186	2-Butyl-1-octanol (v. tent)	0.1	< 0.1	1.1
557	C10 H22	142	Methylnonane isomer	0.1	< 0.1	1.3
562	C5 H4 O2	96	Furfural	0.2	< 0.1	3.5
575	C7 H14 O	114	n-Heptanal	0.1	< 0.1	2.3
597	C10 H22	142	n-Decane +	0.3	< 0.1	5.2
597	C9 H12	120	n-Propylbenzene			
612	C9 H12	120	Ethyltoluene isomer	0.1	< 0.1	1.6
627	C13 H28	184	Trimethyldecane isomer	0.1	< 0.1	1.2
637	C8 H16 O	128	2-Ethylhexanal	0.1	< 0.1	1.3
672	C10 H16	136	l-Limonene	0.1	< 0.1	1.1
693	C10 H14	134	1-Methyl-(1-methylethyl)benzene isomer	< 0.1	< 0.1	0.5
776	C7 H5 N	103	Benzonitrile +	< 0.1	< 0.1	0.7
776	C8 H18 O	130	2-Ethylhexanol (tent)			
786	C4 H4 O2	84	2(3H)-Furanone	0.2	< 0.1	3.2
884	C6 H6 O	94	Phenol	0.1	< 0.1	1.7
962	C7 H8 O2	124	1-(2-Furanyl)-1-propanone (tent)	0.1	< 0.1	1.1

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.

tent = Tentative Identification

v. tent = Very Tentative Identification

Table 6. Air Monitoring Results Sorted By Major Compound Classes Found in the Air Sample Collected at the 113 Location

Sample Code : TG2-25						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
ALKANES & ALKENES						
94	C4 H8	56	1-Butene	0.3	0.1	6.9
100	C5 H12	72	2-Methylbutane	6.5	2.0	130
104	C5 H12	72	Pentane			
110	C5 H8	68	2-Methylbutadiene	0.5	0.2	10
119	C6 H14	86	2-Methylpentane	0.3	0.1	5.0
130	C6 H14	86	n-Hexane	0.7	0.2	13
143	C7 H16	100	2-Methylhexane			
198	C7 H16	100	n-Heptane	0.4	0.1	7.0
230	C9 H20	128	Dimethylheptane isomer	< 0.1	< 0.1	0.6
316	C8 H18	114	n-Octane +	0.2	< 0.1	3.2
409	C9 H20	128	Dimethylheptane isomer	0.1	< 0.1	1.2
462	C9 H20	128	n-Nonane	0.3	< 0.1	5.3
511	C10 H22	142	Methylnonane isomer	0.1	< 0.1	2.7
524	C10 H22	142	Dimethyloctane isomer	< 0.1	< 0.1	0.4
552	C10 H22	142	Methylnonane isomer	0.1	< 0.1	2.6
565	C10 H22	142	Methylnonane isomer +	0.1	< 0.1	2.6
605	C10 H22	142	n-Decane	1.0	0.2	19
623	C12 H26	170	Dimethyldecane isomer	0.1	< 0.1	1.2
644	C13 H28	184	Trimethyldecane isomer	0.2	< 0.1	3.0
658	C11 H24	156	Dimethynonane isomer	0.1	< 0.1	1.4
681	C11 H24	156	Dimethylnonane isomer	0.1	< 0.1	2.9
690	C12 H26	170	Dimethyldecane isomer	0.2	< 0.1	3.6
708	C13 H28	184	Dimethylundecane isomer +	< 0.1	< 0.1	0.8
737	C11 H24	156	n-Undecane +	0.3	< 0.1	6.9
CYCLOALKANES						
148	C6 H12	84	Methylcyclopentane	0.1	< 0.1	2.4
171	C6 H12	84	Cyclohexane	0.2	0.1	4.1
226	C7 H14	98	Methylcyclohexane	0.1	< 0.1	1.2
372	C8 H16	112	Ethylcyclohexane (tent)	< 0.1	< 0.1	0.5
516	C9 H18	126	n-Propylcyclohexane	< 0.1	< 0.1	0.5
555	C7 H14	98	Ethylcyclopentane (v. tent)	0.1	< 0.1	1.4
591	C10 H20	140	C4-alkyl cyclohexane	< 0.1	< 0.1	0.8
660	C10 H20	140	n-Butylcyclohexane	0.1	< 0.1	2.3
726	C9 H18	126	Methyl-ethylcyclohexane isomer	< 0.1	< 0.1	0.6
ALDEHYDES						
143	C4 H6 O	70	2-Butenal +	0.2	0.1	3.6
146	C4 H8 O	72	2-Methylpropanal	0.1	< 0.1	1.2
172	C4 H8 O	72	n-Butanal	0.5	0.2	10
433	C6 H12 O	100	n-Hexanal	0.4	0.1	7.8
565	C5 H4 O2	96	Furfural			
582	C7 H14 O	114	n-Heptanal	0.3	0.1	5.7
716	C7 H6 O	106	Benzaldehyde +	0.3	0.1	6.6
720	C8 H16 O	128	n-Octanal	0.2	< 0.1	3.2
ALCOHOLS						
121	C2 H6 O	46	Ethanol	4.3	2.1	86
134	C3 H8 O	60	Isopropanol	< 0.1	< 0.1	trace
178	C3 H8 O	60	n-Propanol	0.3	0.1	6.1
412	C6 H14 O	102	2-Hexanol (tent)	< 0.1	< 0.1	1.0
SULFUR-CONTAINING						
118	C S2	76	Carbon disulfide	0.1	< 0.1	1.5
560	C4 H8 O S	104	1,4-Thioxane	0.1	< 0.1	2.9
ACID ESTERS						
181	C4 H8 O2	88	Ethyl acetate	0.1	< 0.1	2.6
284	C5 H8 O2	100	2-Butenoic acid methyl ester (tent)			

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.

tent = Tentative Identification

v. tent = Very Tentative Identification

Table 6. Air Monitoring Results Sorted By Major Compound Classes Found in the Air Sample Collected at the 113 Location

Sample Code : TG2-25						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
KETONES						
125	C3 H8 O	58	Acetone	14	5.5	284
185	C4 H8 O	72	2-Butanone (MEK)	0.3	0.1	6.8
245	C5 H10 O	86	3-Methyl-2-butanone	0.1	< 0.1	1.4
284	C5 H10 O	86	2-Pentanone (MPK) +	0.2	< 0.1	3.5
301	C6 H12 O	100	3,3-Dimethyl-2-butanone	< 0.1	< 0.1	0.9
316	C7 H12 O	112	2,2,3-Trimethylcyclobutanone			
352	C6 H12 O	100	4-Methyl-2-pentanone	< 0.1	< 0.1	0.7
564	C7 H14 O	114	3-Heptanone +	0.1	< 0.1	2.2
580	C7 H14 O	114	2-Heptanone	0.1	< 0.1	1.2
618	C6 H10 O	98	Cyclohexanone	0.1	< 0.1	2.4
634	C8 H16 O	128	6-Methyl-3-heptanone	0.7	0.1	14
AROMATICS						
205	C6 H6	78	Benzene	0.4	0.1	7.4
335	C7 H8	92	Toluene	1.1	0.3	21
475	C8 H10	106	Ethylbenzene	0.2	< 0.1	4.1
486	C8 H10	106	m/p-Xylene	1.8	0.4	36
529	C8 H10	106	o-Xylene	1.1	0.2	22
543	C8 H8	104	Styrene	0.3	0.1	6.2
564	C9 H12	120	Isopropylbenzene			
607	C9 H12	120	n-Propylbenzene	0.1	< 0.1	1.5
620	C9 H12	120	Ethyltoluene isomer	0.3	0.1	5.7
629	C9 H12	120	Trimethylbenzene isomer	0.4	0.1	7.6
651	C9 H12	120	Ethyltoluene isomer	0.2	< 0.1	3.9
668	C9 H12	120	Trimethylbenzene isomer	0.9	0.2	18
700	C10 H14	134	1-Methyl-(1-methylethyl)benzene isomer	0.2	< 0.1	3.5
702	C10 H18	138	Decahydronaphthalene	< 0.1	< 0.1	0.7
715	C9 H12	120	Trimethylbenzene isomer	0.3	0.1	5.6
734	C9 H10	118	Propenylbenzene	< 0.1	< 0.1	0.7
737	C10 H14	134	Methylpropylbenzene			
746	C10 H14	134	Dimethyl-ethylbenzene isomer	0.1	< 0.1	1.9
764	C10 H14	134	sec-Butylbenzene	< 0.1	< 0.1	0.5
HALOGEN-CONTAINING						
104	C Cl3 F	136	Fluorotrichloromethane +	9.1	1.5	182
112	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.3	< 0.1	5.5
131	C H2 Cl2	84	Dichloromethane	0.3	0.1	6.4
183	C2 H3 Cl3	132	1,1,1-Trichloroethane	0.2	< 0.1	4.5
189	C H Cl3	118	Chloroform	< 0.1	< 0.1	0.8
240	C2 H Cl3	130	Trichloroethylene	0.2	< 0.1	3.5
366	C2 Cl4	164	Tetrachloroethylene	0.2	< 0.1	4.2
NITROGEN-CONTAINING						
141	C2 H3 N	41	Acetonitrile or isocyanomethane	0.2	0.1	4.5
170	C4 H7 N O	85	2-Isocyanatopropane (tent)	< 0.1	< 0.1	1.1
685	C7 H9 N O	123	2-Methoxybenzenamine	0.1	< 0.1	1.3
708	C8 H13 N	123	1-Butyl-1H-pyrrole			
777	C7 H5 N	103	Benzonitrile	0.1	< 0.1	2.3
OTHER OXYGEN-CONTAINING						
113	C4 H4 O	68	Furan	0.5	0.1	9.1
154	C5 H6 O	82	2-Methylfuran	0.4	0.1	8.7
164	C5 H6 O	82	3-Methylfuran	< 0.1	< 0.1	0.6
294	C7 H10 O	110	2-Propylfuran	< 0.1	< 0.1	0.5
716	C8 H6 O	118	Benzofuran (tent)			
TERPENES						
559	C10 H16	136	Camphene	< 0.1	< 0.1	0.7
678	C10 H16	136	l-Limonene	0.1	< 0.1	3.0

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative Identification

Table 7. Air Monitoring Results Sorted By Major Compound Classes Found in the Air Sample Collected at the 2D2 Location

Sample Code : TG2-01						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
ALKANES & ALKENES						
68	C5 H12	72	2-Methylbutane	2.2	0.7	45
73	C5 H12	72	Pentane +	0.9	0.3	17
79	C5 H8	68	2-Methylbutadiene	0.3	0.1	6.2
87	C6 H14	86	2-Methylpentane	0.1	< 0.1	2.0
98	C6 H14	86	n-Hexane	0.3	0.1	6.4
165	C7 H16	100	n-Heptane	0.1	< 0.1	1.9
174	C7 H16	100	Methylhexane isomer	< 0.1	< 0.1	0.7
298	C8 H16	112	1-Octene			
298	C8 H18	114	n-Octane +	0.1	< 0.1	1.9
456	C9 H20	128	n-Nonane	0.2	< 0.1	3.4
605	C10 H22	142	n-Decane	0.2	< 0.1	3.1
635	C11 H24	156	Trimethyloctane isomer	< 0.1	< 0.1	0.7
741	C11 H24	156	n-Undecane	< 0.1	< 0.1	trace
CYCLOALKANES						
140	C6 H12	84	Cyclohexane			
160	C7 H14	98	Methylcyclohexane isomer +	0.1	< 0.1	1.2
160	C5 H10	70	Dimethylcyclopropane (tent)			
ALDEHYDES						
111	C4 H6 O	70	2-Butenal	0.1	< 0.1	1.9
140	C4 H8 O	72	n-Butanal +	0.1	< 0.1	1.3
269	C5 H10 O	86	3-Methylbutanal +	0.1	< 0.1	1.7
426	C6 H12 O	100	n-Hexanal	0.2	0.1	4.9
569	C5 H4 O2	96	2-Furancarboxaldehyde	0.2	< 0.1	3.9
582	C7 H14 O	114	n-Heptanal	0.1	< 0.1	1.8
645	C8 H16 O	128	2-Ethylhexanal	0.1	< 0.1	1.2
724	C7 H6 O	106	Benzaldehyde	0.1	< 0.1	1.3
766	C6 H6 O2	110	5-Methyl-2-furancarboxaldehyde	< 0.1	< 0.1	trace
ALCOHOLS						
74	C H4 O	32	Methanol	0.2	0.1	3.5
89	C2 H6 O	46	Ethanol +	0.5	0.2	9.7
786	C8 H18 O	130	2-Ethylhexanol +	0.1	< 0.1	1.0
894	C6 H6 O	94	Phenol	< 0.1	< 0.1	trace
1013	C5 H6 O2	98	2-Furanmethanol	0.2	< 0.1	3.7
KETONES						
89	C8 H14 O2	142	2,5-Dimethyl-3,4-hexanedione (tent)			
94	C3 H8 O	58	Acetone	0.5	0.2	10
152	C4 H8 O	72	2-Butanone (MEK) +	0.1	< 0.1	1.7
564	C7 H14 O	114	3-Heptanone	< 0.1	< 0.1	0.9
874	C8 H8 O	120	Acetophenone	< 0.1	< 0.1	trace
ORGANIC ACIDS						
442	C2 H4 O2	60	Acetic acid	0.5	0.2	9.5

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.

tent = Tentative Identification

Table 7. Air Monitoring Results Sorted By Major Compound Classes Found in the Air Sample Collected at the 2D2 Location

Sample Code : TG2-01						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
AROMATICS						
176	C6 H6	78	Benzene	0.3	0.1	6.1
322	C7 H8	92	Toluene	0.1	< 0.1	2.0
469	C8 H10	106	Ethylbenzene	0.1	< 0.1	1.3
482	C8 H10	106	m/p-Xylene	0.2	< 0.1	4.7
527	C8 H10	106	o-Xylene +	0.1	< 0.1	1.9
541	C8 H8	104	Styrene	0.1	< 0.1	1.3
702	C10 H14	134	1,1-Dimethylethylbenzene	< 0.1	< 0.1	trace
HALOGEN-CONTAINING						
61	C Cl2 F2	120	Dichlorodifluoromethane +	0.2	< 0.1	4.5
61	C H3 Cl	50	Chloromethane			
73	C Cl3 F	136	Fluorotrichloromethane			
80	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.2	< 0.1	3.5
83	C2 H2 Cl2	96	1,1-Dichloroethylene	< 0.1	< 0.1	0.3
99	C H2 Cl2	84	Dichloromethane	0.1	< 0.1	1.8
152	C2 H3 Cl3	132	1,1,1-Trichloroethane			
153	C Cl4	152	Carbon tetrachloride	< 0.1	< 0.1	0.6
160	C H Cl3	118	Chloroform +			
213	C2 H Cl3	130	Trichloroethylene	< 0.1	< 0.1	0.8
SULFUR-CONTAINING						
64	S O2	64	Sulfur dioxide	0.1	0.1	3.0
86	C S2	76	Carbon disulfide	< 0.1	< 0.1	0.9
269	C6 H6 S O4	174	4-Hydroxy benzenesulfonic acid (tent)			
NITROGEN-CONTAINING						
109	C2 H3 N	41	Acetonitrile or Isocyanomethane	< 0.1	< 0.1	trace
510	C5 H3 N O	93	2-Furancarboxinitile	< 0.1	< 0.1	trace
786	C7 H5 N	103	Isocyanobenzene			
OTHER OXYGEN-CONTAINING						
82	C4 H4 O	68	Furan	0.4	0.1	7.1
122	C5 H6 O	82	2-Methylfuran	0.3	0.1	5.7
131	C5 H6 O	82	3-Methylfuran	0.2	0.1	4.9
TERPENES						
527	C10 H16	136	alpha-Pinene			
556	C10 H16	136	Camphene	< 0.1	< 0.1	trace
680	C10 H16	136	l-Limonene	< 0.1	< 0.1	trace

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 8. Air Monitoring Results Sorted By Major Compound Classes Found in the Air Sample Collected at the 3D2 Location

Sample Code : TG2-10						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
ALKANES & ALKENES						
107	C4 H8	56	2-Methylbutene			
113	C5 H12	72	2-Methylbutane	1.1	0.3	22
118	C5 H12	72	Pentane			
124	C5 H8	68	2-Methylbutadiene or 1,3-Pentadiene	0.1	< 0.1	1.7
144	C6 H14	86	n-Hexane	0.1	< 0.1	2.7
208	C7 H16	100	n-Heptane	0.4	0.1	8.8
231	C7 H14	98	Heptene isomer	< 0.1	< 0.1	trace
276	C8 H18	114	Dimethylhexane	< 0.1	< 0.1	trace
320	C8 H18	114	n-Octane	0.3	< 0.1	5.1
329	C8 H16	112	2,2-Dimethyl-3-hexene	0.1	< 0.1	2.1
332	C8 H16	112	Octene isomer	0.1	< 0.1	1.4
345	C8 H16	112	Octene isomer	0.1	< 0.1	2.7
374	C8 H14	110	3-Methyl-1,5-heptadiene	< 0.1	< 0.1	0.6
420	C9 H20	128	4-Ethyl-2-methylhexane (tent)	< 0.1	< 0.1	0.8
461	C9 H20	128	n-Nonane	0.3	< 0.1	5.7
509	C10 H22	142	Methylnonane isomer +	< 0.1	< 0.1	0.6
602	C10 H22	142	n-Decane	0.3	0.1	7.0
631	C11 H24	156	Trimethyloctane isomer	0.1	< 0.1	2.2
687	C12 H26	170	Dimethyldecane isomer	< 0.1	< 0.1	0.9
734	C11 H24	156	n-Undecane	0.1	< 0.1	2.9
ALKYNES & CYCLOALKANES/ALKENES						
134	C5 H6	66	1,3-Cyclopentadiene or 3-Penten-1-yne			
160	C6 H12	84	Methylcyclopentane			
236	C7 H14	98	Methylcyclohexane	< 0.1	< 0.1	trace
319	C8 H16	112	1,2,3-Trimethylcyclopentane (tent)	0.5	0.1	9.5
ALDEHYDES						
134	C3 H4 O	56	2-Propenal +	0.6	0.2	12
157	C4 H6 O	70	2-Butenal	< 0.1	< 0.1	0.8
160	C4 H8 O	72	2-Methylpropanal +	< 0.1	< 0.1	0.4
185	C4 H8 O	72	n-Butanal	0.1	< 0.1	1.5
240	C5 H10 O	86	Methylbutanal isomer	< 0.1	< 0.1	0.9
291	C5 H10 O	86	Methylbutanal isomer (tent)	0.3	0.1	5.8
433	C6 H12 O	100	n-Hexanal	0.4	0.1	7.5
561	C5 H4 O2	96	Furfural	1.4	0.3	28
579	C7 H14 O	114	n-Heptanal	0.3	0.1	5.3
640	C8 H16 O	128	2-Ethylhexanal	0.4	0.1	8.1
714	C7 H6 O	106	Benzaldehyde			
717	C8 H16 O	128	n-Octanal	0.2	< 0.1	4.8
754	C6 H6 O2	110	5-Methyl-2-furancarboxaldehyde	< 0.1	< 0.1	0.7
845	C9 H18 O	142	n-Nonanal	< 0.1	< 0.1	0.7
ALCOHOLS						
776	C8 H18 O	130	2-Ethylhexanol	0.3	0.1	5.9
881	C6 H6 O	94	Phenol	< 0.1	< 0.1	trace
KETONES						
139	C3 H8 O	58	Acetone	0.6	0.2	12
197	C4 H8 O	72	2-Butanone (MEK) +	0.1	< 0.1	2.3
306	C6 H12 O	100	3,3-Dimethyl-2-butanone (tent)	< 0.1	< 0.1	0.8
408	C7 H14 O	114	2,4-Dimethyl-3-pentanone	< 0.1	< 0.1	0.9
559	C7 H14 O	114	3-Heptanone	0.2	< 0.1	3.9
670	C6 H6 O2	110	1-(2-Furanyl)ethanone	< 0.1	< 0.1	trace
865	C8 H8 O	120	Acetophenone	< 0.1	< 0.1	trace

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative Identification

Table 8. Air Monitoring Results Sorted By Major Compound Classes Found in the Air Sample Collected at the 3D2 Location

Sample Code : TG2-10						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
ORGANIC ACIDS						
201	C2 H4 O2	60	Acetic acid			
AROMATICS						
217	C6 H6	78	Benzene	0.6	0.2	13
339	C7 H8	92	Toluene	2.3	0.6	46
474	C8 H10	106	Ethylbenzene	0.1	< 0.1	2.0
486	C8 H10	106	m/p-Xylene	0.3	0.1	6.6
528	C8 H10	106	o-Xylene	0.2	< 0.1	4.2
541	C8 H8	104	Styrene	0.1	< 0.1	2.3
605	C9 H12	120	n-Propylbenzene	< 0.1	< 0.1	0.6
617	C9 H12	120	Ethyltoluene isomer	0.1	< 0.1	1.2
627	C9 H12	120	Ethyltoluene isomer	< 0.1	< 0.1	0.6
648	C9 H12	120	Ethyltoluene isomer	< 0.1	< 0.1	0.6
662	C9 H10	118	2-Phenylpropene	0.1	< 0.1	1.7
667	C9 H12	120	Trimethylbenzene isomer	0.1	< 0.1	2.1
697	C10 H14	134	1-Methyl-(methylethyl)benzene isomer	0.1	< 0.1	2.1
714	C9 H12	120	Trimethylbenzene isomer +	0.3	0.1	6.8
715	C8 H6 O	118	Benzofuran	< 0.1	< 0.1	0.8
744	C10 H14	134	1-Methyl-(methylethyl)benzene isomer +	< 0.1	< 0.1	0.4
HALOGEN-CONTAINING						
107	C H3 Cl	50	Chloromethane +	0.4	0.2	7.2
118	C Cl3 F	136	Fluorotrichloromethane +	0.4	0.1	8.1
126	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.1	< 0.1	1.0
145	C H2 Cl2	84	Dichloromethane	< 0.1	< 0.1	0.4
196	C2 H3 Cl3	132	1,1,1-Trichloroethane	< 0.1	< 0.1	0.7
197	C Cl4	152	Carbon tetrachloride			
201	C H Cl3	118	Chloroform +	0.1	< 0.1	2.6
249	C2 H Cl3	130	Trichloroethylene	0.1	< 0.1	2.6
369	C2 Cl4	164	Tetrachloroethylene	0.1	< 0.1	1.4
677	C8 H17 Cl	148	1-Chloro-2-ethylhexane	0.1	< 0.1	2.1
744	C9 H19 Cl	162	1-Chlorononane			
SULFUR-CONTAINING						
108	S O2	64	Sulfur dioxide	0.3	0.1	5.1
132	C S2	76	Carbon disulfide	0.1	< 0.1	1.4
328	C2 H6 S2	94	Dimethy disulfide	0.1	< 0.1	1.7
NITROGEN-CONTAINING						
775	C7 H5 N	103	Benzonitrile	0.1	< 0.1	1.5
OTHER OXYGEN-CONTAINING						
127	C4 H4 O	68	Furan	0.4	0.1	7.0
168	C5 H6 O	82	2-Methylfuran	0.2	0.1	4.3
177	C5 H6 O	82	3-Methylfuran	0.0	< 0.1	0.8
207	C3 H10 O Si	90	Trimethylsilanol	0.2	< 0.1	3.4
269	C4 H6 O	70	2,5-Dihydrofuran	0.1	< 0.1	1.5
646	C9 H14 O	138	2-Pentylfuran	0.1	< 0.1	1.0
TERPENES						
509	C10 H16	136	alpha-Pinene			
676	C10 H16	136	l-Limonene	0.1	< 0.1	2.0

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 9. Air Monitoring Results Sorted by Major Compound Classes Found in the Air Sample Collected at the 4D2 Location

Sample Code : TG2-04						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
ALKANES & ALKENES						
90	C4 H8	56	1-Butene +	1.1	0.4	21
96	C5 H12	72	2-Methylbutane +	3.4	1.0	67
99	C5 H12	72	Pentane			
102	C5 H10	70	2-Methyl-1-butene	0.1	< 0.1	1.3
105	C5 H8	68	2-Methylbutadiene	0.2	0.1	3.8
113	C6 H14	86	2-Methylpentane	0.3	0.1	5.6
118	C6 H14	86	3-Methylpentane	0.1	< 0.1	1.8
124	C6 H14	86	n-Hexane +	0.5	0.1	9.4
136	C7 H16	100	2-Methylhexane			Trace
160	C7 H16	100	2-Methylhexane	< 0.1	< 0.1	1.0
187	C7 H16	100	n-Heptane +	0.3	0.1	6.8
307	C8 H18	114	n-Octane	0.1	< 0.1	1.7
453	C9 H20	128	n-Nonane	0.2	< 0.1	4.4
557	C10 H22	142	Methylnonane isomer	0.1	< 0.1	1.3
597	C10 H22	142	n-Decane +	0.3	< 0.1	5.2
627	C13 H28	184	Trimethyldecane isomer	0.1	< 0.1	1.2
ALKYNES & CYCLOALKANES/ALKENES						
114	C5 H6	66	Cyclopentadiene or 3-Penten-1-yne	0.1	< 0.1	1.0
141	C6 H12	84	Methylcyclopentane +	0.1	< 0.1	1.0
165	C6 H8	80	1-Methyl-1,3-cyclopentadiene			
173	C5 H10	70	Dimethylcyclopropane	< 0.1	< 0.1	0.9
332	C8 H16	112	Trimethylcyclopentane isomer	< 0.1	< 0.1	0.9
ALDEHYDES						
136	C4 H6 O	70	2-Butenal +	0.3	0.1	5.0
139	C4 H8 O	72	2-Methylpropanal	< 0.1	< 0.1	0.3
165	C4 H8 O	72	n-Butanal +	0.1	< 0.1	2.5
276	C5 H10 O	86	3-Methylbutanal +	0.1	< 0.1	2.1
424	C6 H12 O	100	n-Hexanal	0.2	< 0.1	3.7
562	C5 H4 O2	96	Furfural	0.2	< 0.1	3.5
575	C7 H14 O	114	n-Heptanal	0.1	< 0.1	2.3
637	C8 H16 O	128	2-Ethylhexanal	0.1	< 0.1	1.3
ALCOHOLS						
117	C2 H6 O	46	Ethanol	0.2	0.1	4.9
546	C12 H26 O	186	2-Butyl-1-octanol (v. tent)	0.1	< 0.1	1.1
776	C8 H18 O	130	2-Ethylhexanol (tent)			
884	C6 H6 O	94	Phenol	0.1	< 0.1	1.7
KETONES						
119	C3 H8 O	58	Acetone	2.9	1.1	59
175	C4 H6 O2	86	2,3-Butanedione (tent)			
177	C4 H8 O	72	2-Butanone (MEK)			
306	C7 H12 O	112	2,2,3-Trimethylcyclobutanone (tent)	0.3	0.1	6.3
343	C6 H12 O	100	4-Methyl-2-pentanone	0.1	< 0.1	2.5
962	C7 H8 O2	124	1-(2-Furanyl)-1-propanone (tent)	0.1	< 0.1	1.1

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.

tent = Tentative Identification

v. tent = Very Tentative Identification

Table 9. Air Monitoring Results Sorted by Major Compound Classes Found in the Air Sample Collected at the 4D2 Location.

Sample Code : TG2-04						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
ORGANIC ACIDS						
466	C H2 O2	46	Formic acid			
478	C2 H4 O2	60	Acidic acid			
AROMATICS						
197	C6 H6	78	Benzene	0.4	0.1	8.1
326	C7 H8	92	Toluene	0.5	0.1	9.3
466	C8 H10	106	Ethylbenzene +	0.3	0.1	5.3
478	C8 H10	106	m/p-Xylene +	1.4	0.3	28
521	C8 H10	106	o-Xylene	0.3	0.1	5.0
535	C8 H8	104	Styrene	0.1	< 0.1	1.8
597	C9 H12	120	n-Propylbenzene			
612	C9 H12	120	Ethyltoluene isomer	0.1	< 0.1	1.6
693	C10 H14	134	1-Methyl-(1-methylethyl)benzene isomer	< 0.1	< 0.1	0.5
HALOGEN-CONTAINING						
96	C H3 Br	94	Bromomethane			Trace
99	C Cl3 F	136	Fluorotrichloromethane +	0.4	0.1	8.2
106	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane	0.1	< 0.1	2.8
108	C2 H2 Cl2	96	1,1-Dichloroethylene			
124	C H2 Cl2	84	Dichloromethane			
175	C2 H3 Cl3	132	1,1,1-Trichloroethane +	0.3	0.1	6.1
177	C Cl4	152	Carbon tetrachloride +	0.2	< 0.1	4.1
181	C H Cl3	118	Chloroform	< 0.1	< 0.1	0.7
231	C2 H Cl3	130	Trichloroethylene	0.2	< 0.1	4.0
357	C2 Cl4	164	Tetrachloroethylene	0.1	< 0.1	1.0
SULFUR-CONTAINING						
90	S O2	64	Sulfur dioxide			
112	C S2	76	Carbon disulfide	0.2	0.1	3.9
228	C H3 O2 Cl S	114	Methane sulfonyl chloride (tent)	0.1	< 0.1	1.1
276	C6 H6 S O4	174	4-Hydroxy benzenesulfonic acid (tent)			
314	C2 H6 S2	94	Dimethyl disulfide	< 0.1	< 0.1	1.0
NITROGEN-CONTAINING						
130	C2 H3 N	41	Acetonitrile or isocyanomethane	0.1	0.1	2.2
141	C3 H3 N	53	Propenenitrile +			
776	C7 H5 N	103	Benzonitrile +	< 0.1	< 0.1	0.7
OTHER OXYGEN-CONTAINING						
108	C4 H4 O	68	Furan +	0.4	0.1	8.5
141	C4 H10 Si O2	118	Trimethylsilanol formate			
147	C5 H6 O	82	2-Methylfuran	0.6	0.2	11
156	C5 H6 O	82	3-Methylfuran	0.1	< 0.1	1.1
187	C3 H10 Si O	90	Trimethylsilanol			
238	C6 H8 O	96	Dimethylfuran	< 0.1	< 0.1	0.8
786	C4 H4 O2	84	2(3H)-Furanone	0.2	< 0.1	3.2
TERPENES						
672	C10 H16	136	l-Limonene	0.1	< 0.1	1.1

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

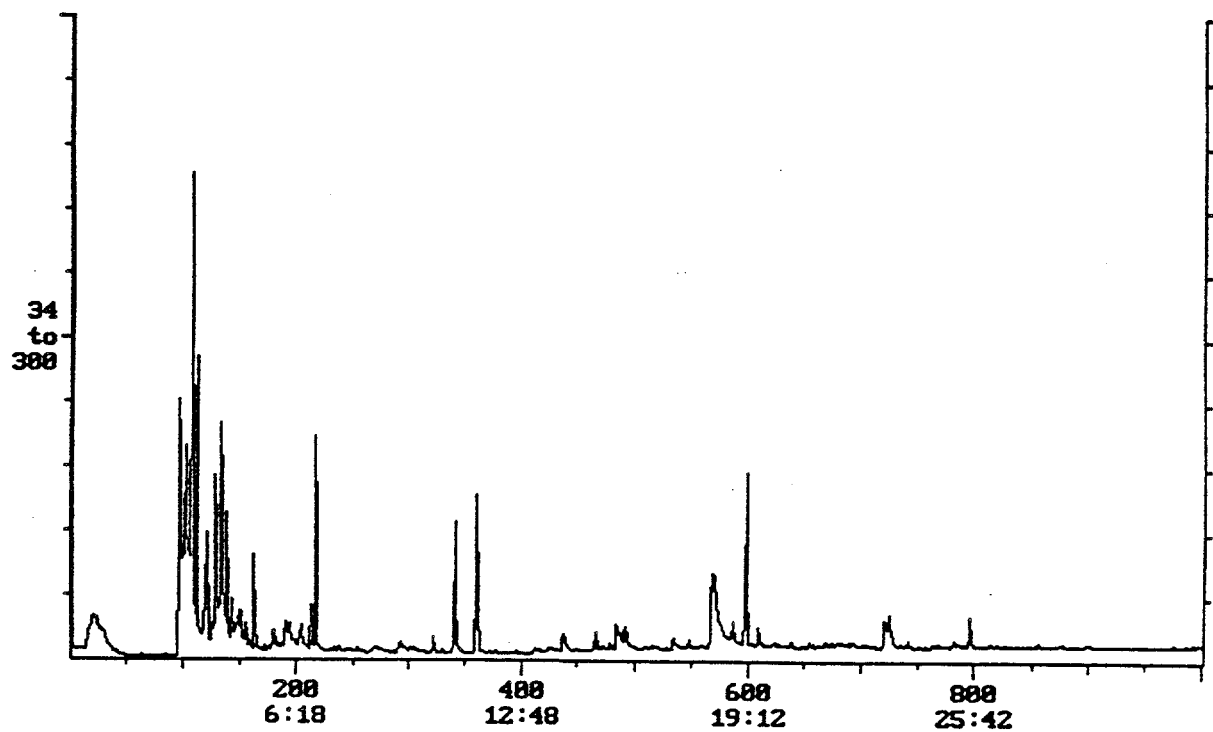


Figure 5. Total Ion Current Profile From the GC/MS Analysis of the Field Blank.

Table 10. Air Monitoring Results Determined from the Tenax-GR Field Blank

Sample Code : TG2-35						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
104	S O ₂	64	Sulfur dioxide	0.1	< 0.1	1.1
109	C ₅ H ₁₂	72	2-Methylbutane	11	3.3	212
113	C Cl ₃ F	136	Fluorotrichloromethane +	1.1	0.2	21
113	C ₅ H ₁₂	72	Pentane			
120	C H ₄ O	32	Methanol +	111	78	2226
120	C ₂ Cl ₃ F ₃	186	1,1,2-Trifluoro-1,2,2-trichloroethane			
122	C ₄ H ₄ O	68	Furan	1.3	0.4	26
127	C S ₂	76	Carbon disulfide	< 0.1	< 0.1	0.5
130	C ₂ H ₆ O	46	Ethanol	9.4	4.6	187
134	C ₃ H ₈ O	58	Acetone	1.7	0.6	33
139	C ₆ H ₁₄	86	n-Hexane	0.5	0.1	9.2
140	C H ₂ Cl ₂	84	Dichloromethane	0.1	< 0.1	1.7
143	C ₃ H ₈ O	60	Isopropanol	0.2	0.1	3.3
150	C ₂ H ₃ N	41	Acetonitrile or isocyanomethane	0.1	0.1	1.9
152	C ₄ H ₆ O	70	2-Butenal +	0.1	< 0.1	2.1
155	C ₄ H ₈ O	72	2-Methylpropanal	0.1	< 0.1	1.4
157	C ₆ H ₁₂	84	Methylcyclopentane	< 0.1	< 0.1	0.9
163	C ₅ H ₆ O	82	2-Methylfuran	0.4	0.1	9.0
173	C ₅ H ₆ O	82	3-Methylfuran	< 0.1	< 0.1	0.3
180	C ₆ H ₁₂	84	Cyclohexane	0.1	< 0.1	2.2
191	C ₂ H ₃ Cl ₃	132	1,1,1-Trichloroethane +	0.1	< 0.1	1.8
191	C ₅ H ₁₀	70	Dimethylcyclopropane (tent)			
192	C ₄ H ₆ O ₂	86	2,3-Butanedione (tent)	0.1	< 0.1	1.9
194	C ₄ H ₈ O	72	2-Butanone (MEK)	0.1	< 0.1	2.1
205	C ₇ H ₁₆	100	n-Heptane	0.2	< 0.1	3.6
205	C ₃ H ₁₀ Si O	90	Trimethylsilanol			
213	C ₆ H ₆	78	Benzene	0.3	0.1	5.4
254	C ₆ H ₈ O	96	2,5-Dimethylfuran	< 0.1	< 0.1	0.8
271	C ₄ H ₆ O	70	2,5-Dihydrofuran	< 0.1	< 0.1	0.5
292	C ₅ H ₁₀ O	86	3-Methylbutanal	0.1	< 0.1	2.3
322	C ₈ H ₁₈	114	n-Octane	0.1	< 0.1	1.7
330	C ₂ H ₆ S ₂	94	Dimethyl disulfide	< 0.1	< 0.1	0.6
341	C ₇ H ₈	92	Toluene	0.8	0.2	17
438	C ₆ H ₁₂ O	100	n-Hexanal	0.2	< 0.1	3.2
466	C ₉ H ₂₀	128	n-Nonane	0.2	< 0.1	3.2
479	C ₈ H ₁₀	106	Ethylbenzene	< 0.1	< 0.1	trace
484	C ₂ H ₄ O ₂	60	Acidic acid	< 0.1	< 0.1	trace
492	C ₈ H ₁₀	106	m/p-Xylene	0.1	< 0.1	2.8
534	C ₈ H ₁₀	106	o-Xylene	0.1	< 0.1	1.4
542	C ₈ H ₆	102	Ethynylbenzene	< 0.1	< 0.1	trace
548	C ₈ H ₈	104	Styrene	0.1	< 0.1	1.3
569	C ₅ H ₄ O ₂	96	Furfural	0.9	0.2	19
587	C ₇ H ₁₄ O	114	n-Heptanal	0.1	< 0.1	2.8
609	C ₁₀ H ₂₂	142	n-Decane	0.1	< 0.1	2.0
722	C ₇ H ₆ O	106	Benzaldehyde	0.3	0.1	6.9
725	C ₈ H ₁₆ O	128	n-Octanal	0.2	< 0.1	3.3
742	C ₁₁ H ₂₄	156	Trimethyloctane isomer	< 0.1	< 0.1	0.9
783	C ₇ H ₅ N	103	Benzonitrile	0.1	< 0.1	1.5
896	C ₆ H ₆ O	94	Phenol	< 0.1	< 0.1	trace

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative identification

Table 11. Air Monitoring Results Sorted By Major Compound Classes Found in the Tenax-GR Field Blank

Sample Code : TG2-35						
Spectrum Number	Formula	MW	Compound	Concentration		Amount (ng)
				(ng/L)	(ppbv)	
109	C5 H12	72	2-Methylbutane	11	3.3	212
113	C5 H12	72	n-Pentane			
139	C6 H14	86	n-Hexane	0.5	0.1	9.2
205	C7 H16	100	n-Heptane	0.2	< 0.1	3.6
322	C8 H18	114	n-Octane	0.1	< 0.1	1.7
466	C9 H20	128	n-Nonane	0.2	< 0.1	3.2
609	C10 H22	142	n-Decane	0.1	< 0.1	2.0
742	C11 H24	156	Trimethyloctane isomer	< 0.1	< 0.1	0.9
CYCLOALKANES						
157	C6 H12	84	Methylcyclopentane	< 0.1	< 0.1	0.9
180	C6 H12	84	Cyclohexane	0.1	< 0.1	2.2
191	C5 H10	70	Dimethylcyclopropane (tent)			
ALDEHYDES						
152	C4 H6 O	70	2-Butenal +	0.1	< 0.1	2.1
155	C4 H8 O	72	2-Methylpropanal	0.1	< 0.1	1.4
292	C5 H10 O	86	3-Methylbutanal	0.1	< 0.1	2.3
438	C6 H12 O	100	n-Hexanal	0.2	< 0.1	3.2
569	C5 H4 O2	96	Furfural	0.9	0.2	19
587	C7 H14 O	114	n-Heptanal	0.1	< 0.1	2.8
722	C7 H6 O	106	Benzaldehyde	0.3	0.1	6.9
725	C8 H16 O	128	n-Octanal	0.2	< 0.1	3.3
ALCOHOLS						
120	C4 H4 O	32	Methanol +	111	78	2226
130	C2 H6 O	46	Ethanol	9.4	4.6	187
143	C3 H8 O	60	Isopropanol	0.2	0.1	3.3
898	C6 H6 O	94	Phenol	< 0.1	< 0.1	trace
KETONES						
134	C3 H8 O	58	Acetone	1.7	0.6	33
192	C4 H6 O2	86	2,3-Butanedione (tent)	0.1	< 0.1	1.9
194	C4 H8 O	72	2-Butanone (MEK)	0.1	< 0.1	2.1
ORGANIC ACIDS						
484	C2 H4 O2	60	Acidic acid	< 0.1	< 0.1	trace
AROMATICS						
213	C6 H6	78	Benzene	0.3	0.1	5.4
341	C7 H8	92	Toluene	0.8	0.2	17
479	C8 H10	106	Ethylbenzene	< 0.1	< 0.1	trace
492	C8 H10	106	m/p-Xylene	0.1	< 0.1	2.8
534	C8 H10	106	o-Xylene	0.1	< 0.1	1.4
542	C8 H6	102	Ethynylbenzene	< 0.1	< 0.1	trace
548	C8 H8	104	Styrene	0.1	< 0.1	1.3
HALOGEN-CONTAINING						
113	C Cl3 F	136	Fluorotrichloromethane +	1.1	0.2	21
120	C2 Cl3 F3	186	1,1,2-Trifluoro-1,2,2-trichloroethane			
140	C H2 Cl2	84	Dichloromethane	0.1	< 0.1	1.7
191	C2 H3 Cl3	132	1,1,1-Trichloroethane +	0.1	< 0.1	1.8
SULFUR-CONTAINING						
104	S O2	64	Sulfur dioxide	0.1	< 0.1	1.1
127	C S2	76	Carbon disulfide	< 0.1	< 0.1	0.5
330	C2 H6 S2	94	Dimethyl disulfide	< 0.1	< 0.1	0.6
NITROGEN-CONTAINING						
150	C2 H3 N	41	Acetonitrile or Isocyanomethane	0.1	0.1	1.9
783	C7 H5 N	103	Benzonitrile	0.1	< 0.1	1.5
OTHER OXYGEN-CONTAINING						
122	C4 H4 O	68	Furan	1.3	0.4	26
163	C5 H6 O	82	2-Methylfuran	0.4	0.1	9.0
173	C5 H6 O	82	3-Methylfuran	< 0.1	< 0.1	0.3
205	C3 H10 Si O	90	Trimethylsilanol			
254	C6 H8 O	96	2,5-Dimethylfuran	< 0.1	< 0.1	0.8
271	C4 H6 O	70	2,5-Dihydrofuran	< 0.1	< 0.1	0.5

Concentrations are semi-quantitative estimates determined by comparison to the response for a known amount of Toluene.
tent = Tentative Identification

The VOC levels were in the range where only the 20 liter samples required analyses. The 1I3 location contained the largest number of identified compounds and the 2D2 location the fewest number. Table 12 provides a summary of the total semi-quantitative results from the four sampled locations.

Table 12. Semiquantitative Result Totals From the Air Monitoring Within the APG Pilot Plant

Location	Concentration		Amount (ng)
	(ng/L)	(ppbv)	
1I3	54	15	1085
2D2	9.7	2.3	198
3D2	16	3.1	327
4D2	17	4.4	354

Appendix B:

**SciTech Services, Inc., Report
on Analysis of Pilot Plant Complex
Air Samples**



ANALYSIS OF PILOT PLANT AIR SAMPLES

February 24, 1995

Prepared for:

**Argonne National Laboratory
P.O. Box 96
Aberdeen Proving Ground, Maryland 21010**

Prepared by:

**SciTech Services, Inc.
1311 Continental Drive, Suite G
Abingdon, Maryland 21009**

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ANALYSIS OF PILOT PLANT AIR SAMPLES

I. Introduction

In support of Argonne National Laboratory's effort to dismantle Building E5625 (the Pilot Plant), SciTech Services, Inc. was asked to analyze a series of air samples collected on Depot Area Agent Monitoring System (DAAMS) tubes containing Tenax sorbent. SciTech's analysis of the Pilot Plant air samples used protocols and methods based on the approved laboratory operating procedures (LOP) of the U.S. Army Edgewood Research, Development and Engineering Center's (ERDEC's) Air Monitoring Branch or standard Environmental Protection Agency (EPA) methods. An extensive list of possible contaminants was composed by Argonne National Laboratory containing over 150 compounds (Enclosure 1). Some are inorganic chemicals or salts of organic chemicals that would not be volatile enough to be detected by DAAMS tube technology, such as lead from paint or sodium hydroxide. Some are volatile solvents commonly found in many chemical facilities. The most volatile components of the list, such as dimethyl ether and chloromethane, should have evaporated and disappeared years ago. The compounds of interest for this air monitoring exercise were split into chemical warfare (CW) agents and non-agents that were volatile or semivolatile. The CW agents were screened by Gas Chromatography - Dual Flame Photometric Detector (GC- (dual) FPD). Non-agent analytes were analyzed by Gas Chromatography-Mass Spectrometry (GC-MS) and included the following categories of compounds: experimental agents, agent precursors, agent breakdown products, agent stimulants, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons, and halogenated hydrocarbons.

The GC-MS analysis for non-agents used a semiquantitative approach recommended by Argonne based on the detector response to 1 ng of toluene. This response factor was used for the other analytes' selected target ions to generate very approximate concentrations.

Quality control was practiced on several levels. Standard quality control procedures were defined in the Air Monitoring Branch Quality Assurance/Quality Control manual which is available on request. Several steps were taken above the standard procedures. This included steps such as analyzing sorbent tube blanks by GC-MS for laboratory contamination and holding the samples at 0-5°C until analyzed.

II. Experimental

A. Air Sampling Procedures

Two to four Tenax air sample tubes at each site were collected by Air Monitoring Branch personnel using a flow of approximately 0.2 L/minute for 120 minutes. One tube from each site was screened for CW agents using LOP # MB-9, approved by the Center Quality Assurance Branch (CQAB) and used daily in the Air Monitoring Branch. This assay utilized Gas Chromatography (GC) with a very sensitive dual Flame Photometric Detector (FPD) allowing simultaneous detection of all the major CW agents (GB, GD, VX, and HD). Positive results were

confirmed by either GC-Atomic Emission Detector (GC-AED) or GC-Mass Spectrometry (GC-MS) with a second tube. When GC-MS was used as a confirmation method, this second tube was also used to identify agent precursors, agent breakdown products, and hazardous chemicals collected on the sample tubes.

B. Gas Chromatography-Flame Photometric Detector (GC-FPD) Screening Procedure

The instruments include a Hewlett-Packard Gas Chromatograph (GC), Dynatherm Inc. ACEM 900 and other related accessories. The system receives a Depot Area Agent Monitoring System (DAAMS) solid sorbent tube, desorbs the agents from this tube onto a capillary column which separates the agents and delivers them onto a dual Flame Photometric Detector (FPD) which detects qualitatively and quantitatively the presence of these agents. The dual FPD design allows quantification of both HD and nerve agents simultaneously.

At the beginning of each workday, the operator checked, signed, and dated the pre-operational checklist. The GC-FPD was checked daily for any error messages displayed. The operator checked all gas tanks to ensure there was enough supply of gasses for the day (no less than 300 pounds per square inch), GC and ACEM 900 parameters (cycle times for tube dry, tube heat, tube cool, trap heat; temperature settings for valves, transfer lines, tube, and trap), all temperature settings, supply of paper and ink on the integrator, if used. The operator took appropriate actions to correct any malfunctions found. This pre-operational instrument check should be recorded in the log book by the operator.

One calibration standard is prepared to be approximately 0.25 TWA for each agent in one solution. This standard is injected at incremental levels. The levels are 0.25, 0.50, 0.75, 1.0 and 1.25 TWA. The combination standard is used for routine operations. However, there are occasions where any combinations of standards may be used in establishing the standard curves. The selection of agents was GB, GD, VX, and HD for the customary FPD screen. The general procedures are as follows.

1. Remove agent from cold storage and place in fume hood.
2. Allow 15 minutes for agent to reach room temperature.
3. Place a previously conditioned Tenax filled sorbent tube into a Dynatherm model 10 tube conditioner. Note, flow in conditioner should be no less than 200 ml/min.
4. Using a 10 microliter syringe, withdraw one microliter of agent from the agent vial.
5. Spike the tube in the tube conditioner by depressing the plunger on the syringe. Allow the spiked tube to aspirate for three minutes.
6. Remove the spiked calibration tube from the tube conditioner and place into the Dynatherm ACEM 900 tube desorber connected to a Hewlett-Packard 5890 GC equipped with a dual FPD.

The calibration procedure is initiated by pushing the start button on the ACEM 900. Complete calibration procedure by repeating the above steps with increasing agent volumes by one microliter up to a final volume of five microliters. Normal sample analysis may begin after suitable standard curves are generated for the desired agents.

C. Data Storage and Evaluation

The data collected from each GC-FPD is processed and stored on a Hewlett-Packard Laboratory Information Management System (LIMS) which has a weekly tape backup routine. The chromatogram consists of peak area, peak height, retention time, and other related information. Results of analyses are checked for validity. The integrator reports the results in nanograms on column. These values are evaluated with reference to sampling time and rate of air flow during sampling, e.g. TWA level for HD is 72 ng on column, if sampled for 120 minutes at 0.2 liters per minute air flow. If any chromatogram indicated higher than TWA level of any agent in any of the sample, a duplicate DAAMS tube is assayed using either a GC-AED (atomic emission detector) or GC-MS to confirm the result.

D. Quality Control

A Quality Plant (QP) sample tube that has been spiked with a known volume of CW agent standard is periodically analyzed as a control sample. This QP sample, which has laboratory air aspirated through it at 0.2 L/minute for 120 minutes, validates the ability of the GC-FPD to detect the agent in field samples. A Quality Laboratory (QL) sample (DAAMS tube spiked with 3 ul of dilute agent standard at the 0.25 TWA level) is assayed every ten samples, as well as at the beginning and end of each day to ensure that the system is in calibration.

E. CW Agent Confirmation and Analysis for Semivolatiles and Volatiles by GC-MS

DAAMS tubes were analyzed by GC-MS using the same general procedures outlined above except the GC's detector is a Hewlett-Packard Mass Selective Detector (MSD) Model 5970B. The MSD was tuned and scanned according to the specifications of EPA Method 8270 for semivolatiles. The GC oven program was as follows: 60°C (2 or 4 min) at 20°C/min to 280°C (2 min). In the GC-MS assays that used a 2 minute initial time, the overall run time is 2 minutes less and the components elute approximately 2 minutes less. This shorter initial temperature time was used on the samples that were analyzed for CW agent confirmation by GC-MS. The interface was at 280°C and the electron multiplier was at 600 V above tune levels. Ions used as indicators of the CW agents were as follows: GB at m/z 125, 99, and 81, GD at m/z 126, 99, and 82, HD at m/z 160, 158, 111, and 109, and VX at m/z 167, 127, and 114.

During the general characterization analysis of the Pilot Plant air samples, the MSD was in the full scan mode from 50 to 500 AMU. Component spectrum identification was made on the basis of an automated search of the Wiley Library and on visual comparison with standard spectra. Retention times and spectra of standards for the chemical warfare agents and some of the target compounds were obtained by injecting the compounds on a DAAMS tube and analyzing the tube

in the same manner as the samples. The concentrations reported in the tables were determined by using the area response of 1 ng of toluene on column as 7.190,000. Blanks were analyzed at the beginning of each day for contamination.

III. Results and Discussion

A. Chemical Warfare Agent Screen

All sites were screened for the presence of GB, GD, VX, and HD in selected DAAMS tubes by GC-FPD. Several DAAMS tubes initially appeared positive for HD (4D2-S) and GB (3D2-N, 3D2-S, 3ET-N, 3ET-S, 4D2-N, 1FB, 1FA, and E/205-S) at levels below the TWA reporting limits. Several samples initially appeared positive for VX (1C-1, 1C-2, 1D-1, and 1I-1) at or above the TWA reporting level. In an attempt to confirm these low levels, other tubes from the same sites were analyzed by GC-MSD or GC-AED. None of the initial GC-FPD positive results could be confirmed by GC-MSD or GC-AED; therefore, the overall results were negative for the agents analyzed as seen in Table 1. The probable cause of the false positives was a high level of organic interference seen during the GC-MSD full scan analysis of the air samples for non-agent hazardous materials. The identity of some of these interferences, which included phosphorous and sulfur containing compounds, will be discussed below.

One additional sample was received from Room 134, also called the "V" room. This sample represented the collection of 660 L of air by a DAAMS tube. The purpose was to look for trace amounts of mustard, none of which was detected. The method detection limit in this case was 1.5 pg/L. The negative finding should be cautiously interpreted because the high sample volume could cause break through.

B. Hazardous Chemical Screen

Sample tubes were screened for volatile and semivolatile chemicals by GC-MS using either a 2 or 4 minute initial temperature time. The 2 minute initial time was used for samples that were originally analyzed for confirmation of CW agent contamination. Samples analyzed using the 2 minute hold time yield components with lower retention times and an overall run time of 14.5 minutes. The decision to change to a 4 minute initial time was based on the need to increase separation early in the chromatographic assay. This need was driven by the presence of compounds such as trichlorofluoromethane, hexane, and trichloroethylene. Four minutes also allows the contents of the focusing trap of the Dynatherm to be completely evacuated onto the capillary column before the GC oven temperature is ramped. Results are shown in the Appendix 1 (Figures 1-26) for representative ion chromatograms and Appendix 2 (Tables 2-14) for a list of possible components. These tables are not inclusive and other components could be hidden in the complex data.

The total ion chromatograms indicated the complexity of the data recovered from analysis of the DAAMS tubes. Many peaks seen in the chromatograms represented substances that were not listed as possible contaminants by a historical report done by Argonne National Laboratory on the Pilot Plant (see Enclosure 1). The identity of some of these chemicals has yet to be determined as

noted by the "unknown" under the compound name. Besides the master table of contents for each sample and the total ion chromatogram, there are two groups of ion chromatograms that indicate the possible presence of selected compounds. Figures with ion chromatograms of m/z 294, 292, and 290 were generated to highlight the presence of polychlorinated biphenyls (PCBs) in the samples. The concentration was calculated by comparing the area found for an analyte to that of the area response of 1 ng of toluene. This yielded very approximate quantities of analyte on column which was divided by the volume of air sample collected (24 L) to pg/L of air.

Several chemicals found in the general GC-MS assay could readily interfere in the standard GC-FPD screen for CW agents. These include 1,4-oxathiane, O,O-diethyl-S-phosphorothioate, and phosphoric acid triethyl ester which have either sulfur, phosphorus, or both atoms that are the targets of the FPD. These chemicals or closely related compounds are possible sources of the false positives in the standard screen.

Most of the compounds that eluted during the first 8 to 10 minutes are very volatile. They are not due to contamination from the analysis facility since the laboratory blanks were void of most of these compounds with certain exceptions. The following chemicals were found in the blanks at what appeared to be lower levels than were seen in the samples and were included in the tables: hexane, benzaldehyde, benzoic acid, limonene, diethyl phthalate, dioctyl phthalate, and hexadecanoic acid. There were several alkyl acids, column bleed components, and hydrocarbons that were omitted from the tables because they were common to both samples and blanks at similar levels.

Polychlorobiphenyls (PCBs) were seen in all samples to some degree as evidenced by the extracted ion chromatograms showing masses m/z 294, 292, and 290 for each sample. In all cases, levels were in the part per trillion level. However, these quantities were determined by highly approximate methods. The actual amounts may be considerably different than reported in this study. A more cautious evaluation of the PCB levels should be undertaken using stricter criteria to determine the concentration. Also, future studies of the higher boiling components such as PCBs should take into account the sample collection temperature. An air sample study conducted in the cold of winter will yield levels that are lower than that of a summer study. However, for the lower boiling point components the opposite should be true. Colder temperature will allow the compounds to be more effectively trapped by the tenax filled DAAMS tubes.

TABLE 1. RESULTS OF GC-FPD SCREEN FOR CW AGENTS

Sampling Location	Laboratory Tube #	GB	GD	VX	HD
3D2-N	0116	negative	negative	negative	negative
3D2-S	0901	negative	negative	negative	negative
3ET-N	0028	negative	negative	negative	negative
3ET-S	0957	negative	negative	negative	negative
4D2-N	0133	negative	negative	negative	negative
4D2-S	0071	negative	negative	negative	negative
4FT-N	0357	negative	negative	negative	negative
4FT-S	0599	negative	negative	negative	negative
4C-N	0601	negative	negative	negative	negative
4C-S	0055	negative	negative	negative	negative
4A-N	0715	negative	negative	negative	negative
4A-S	0769	negative	negative	negative	negative
1FB	0951	negative	negative	negative	negative
1FA	0906	negative	negative	negative	negative
1C-1	0918	negative	negative	negative	negative
1C-2	0935	negative	negative	negative	negative
1D-1	0948	negative	negative	negative	negative
E/205-N	0955	negative	negative	negative	negative
E/205-S	0947	negative	negative	negative	negative
1I-1	0333	negative	negative	negative	negative
1I-3	0947	negative	negative	negative	negative
132	0912	negative	negative	negative	negative

APPENDIX 1:
FIGURES 1 THROUGH 26

FIGURE 1: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 3D2, TUBE 0942

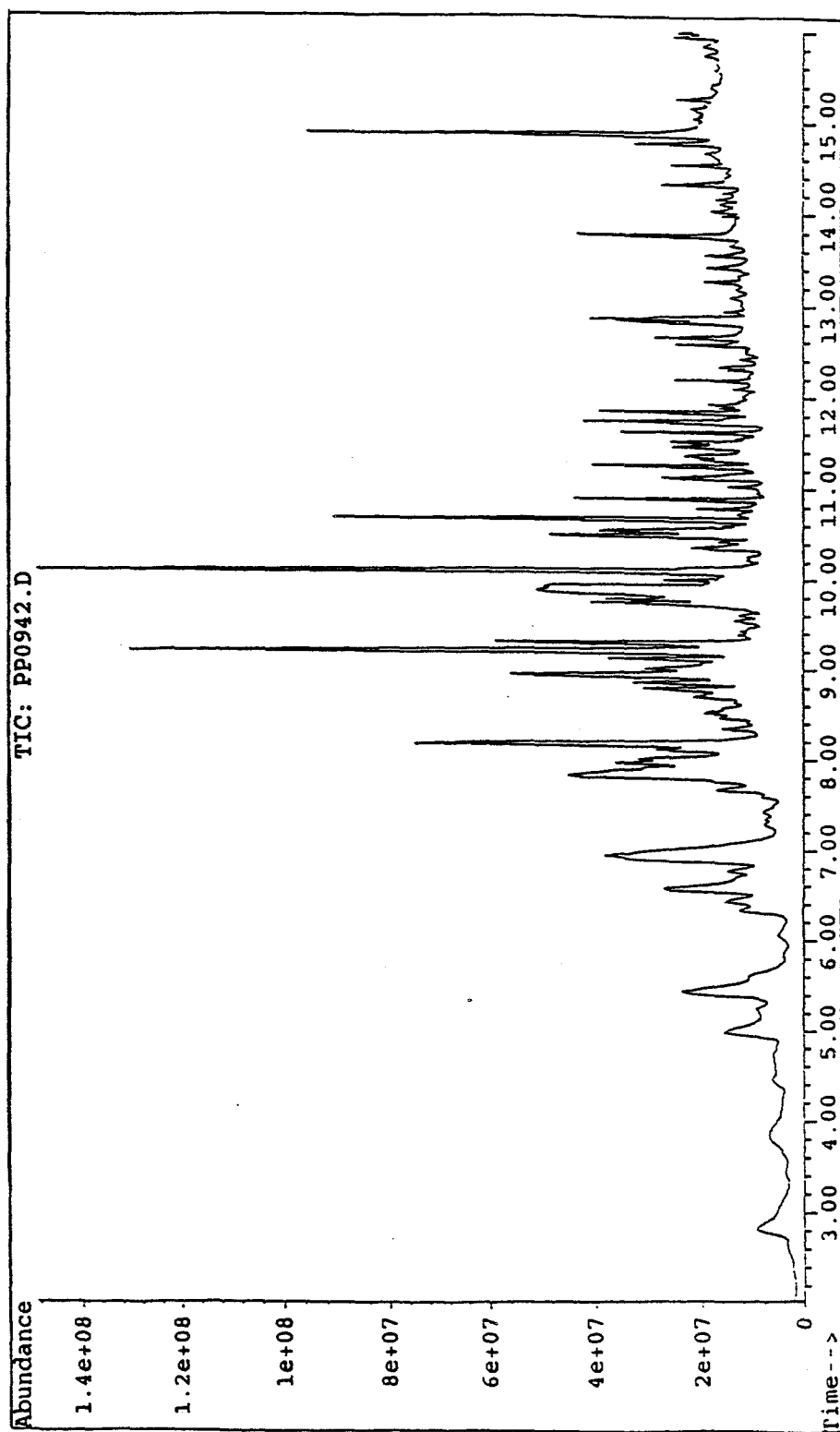


FIGURE 2: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 3D2, TUBE 0942

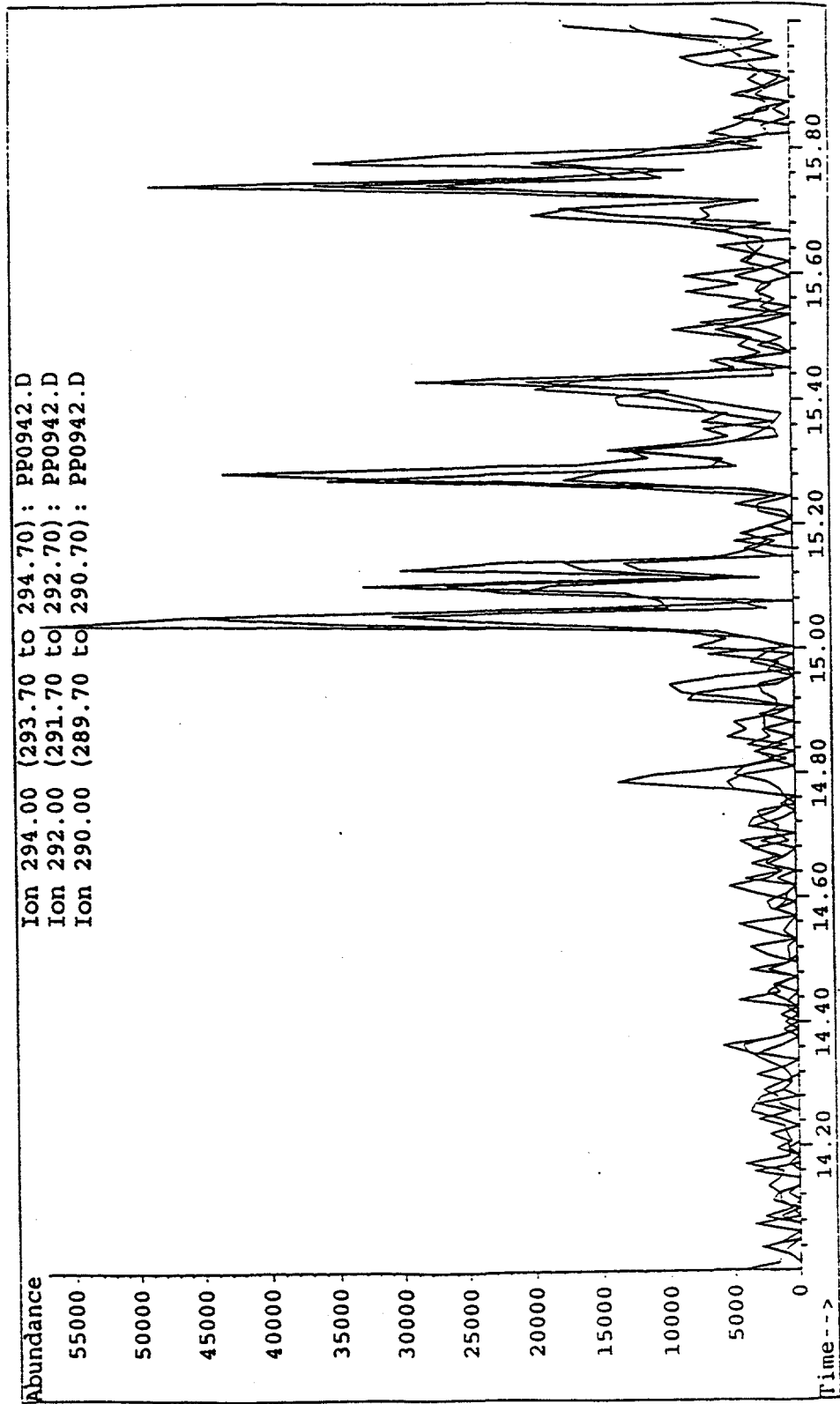


FIGURE 3: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 3ET, TUBE 0958

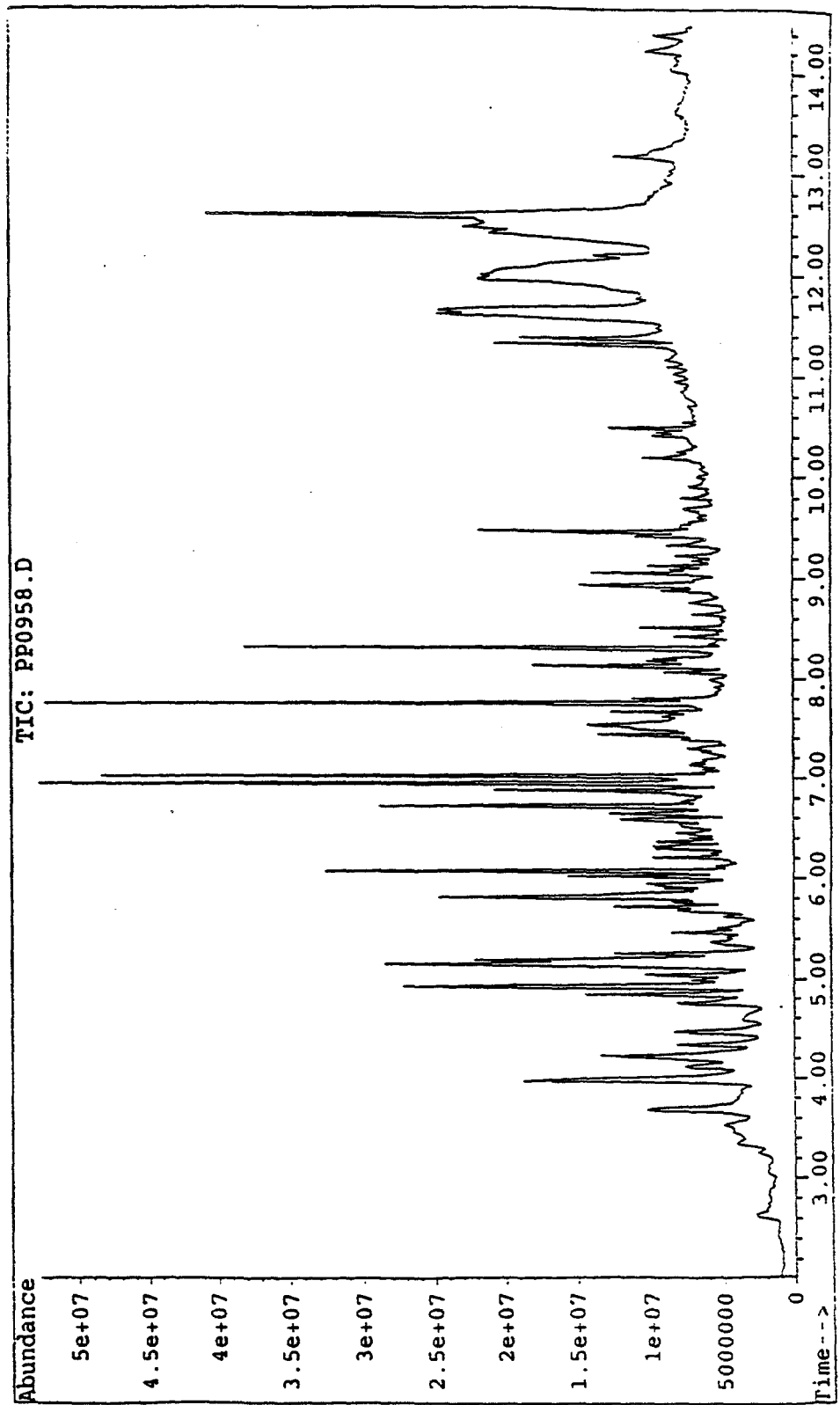


FIGURE 4: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 3ET, TUBE 0958

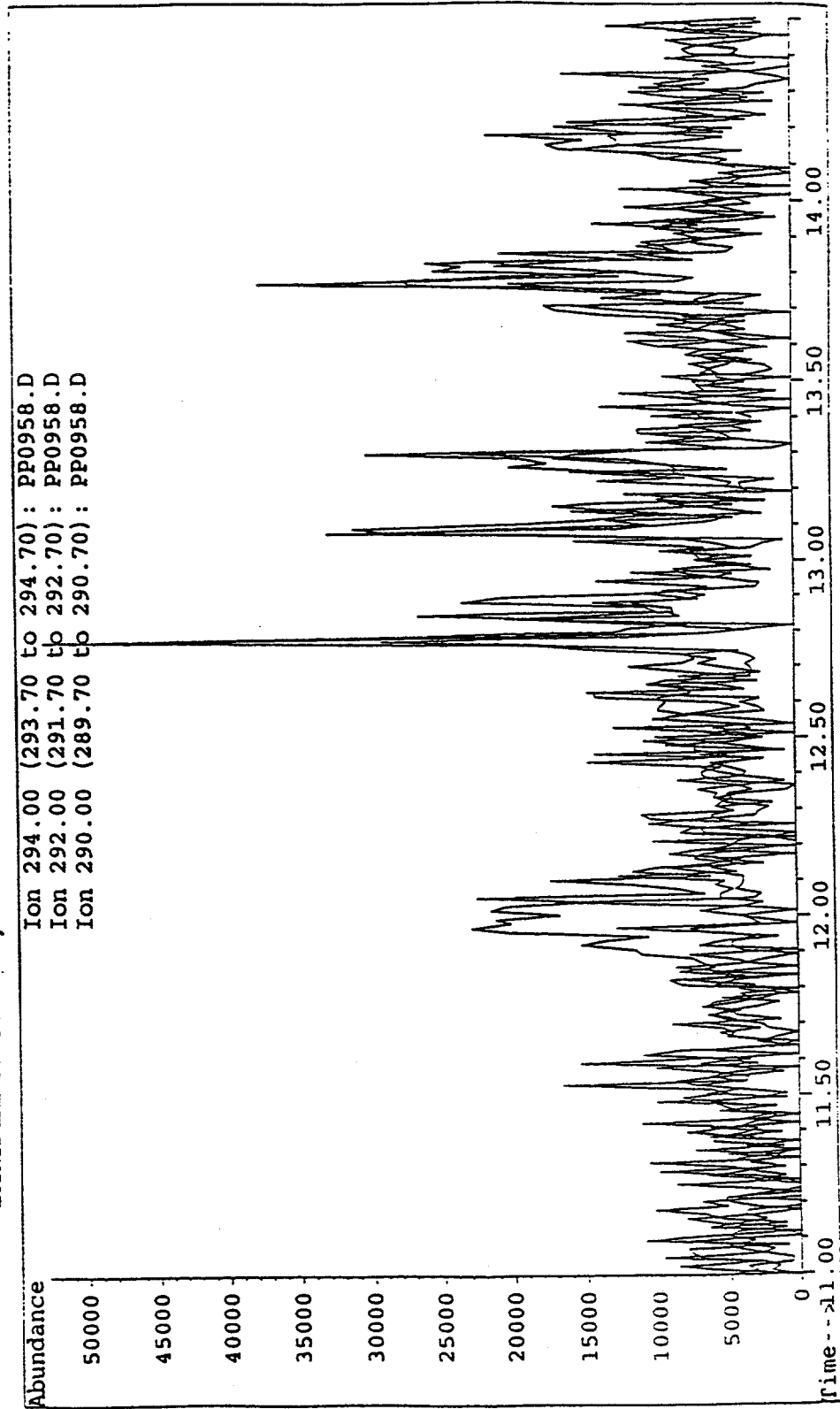


FIGURE 5: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 4D2, TUBE 0954

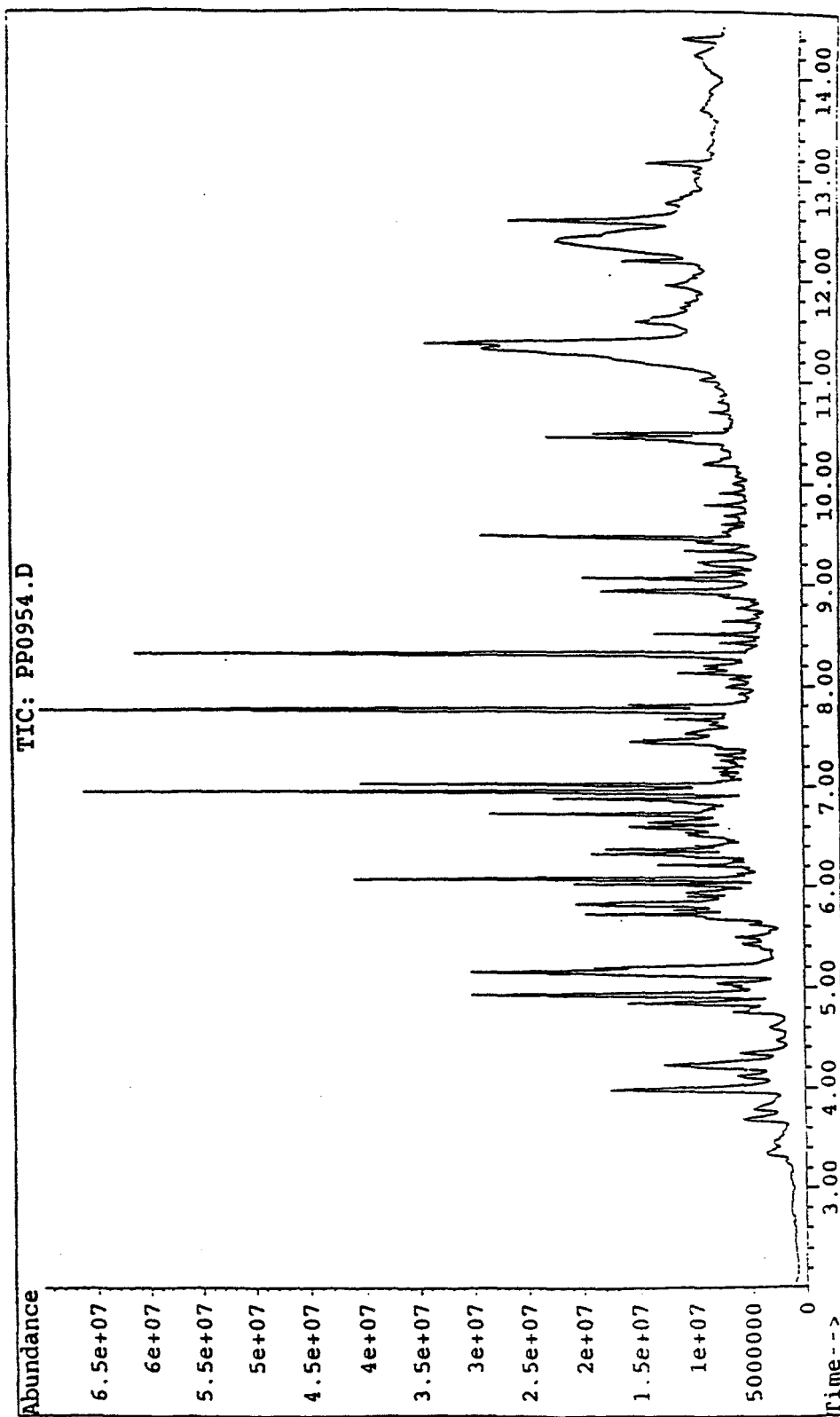


FIGURE 6: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 4D2, TUBE 0954

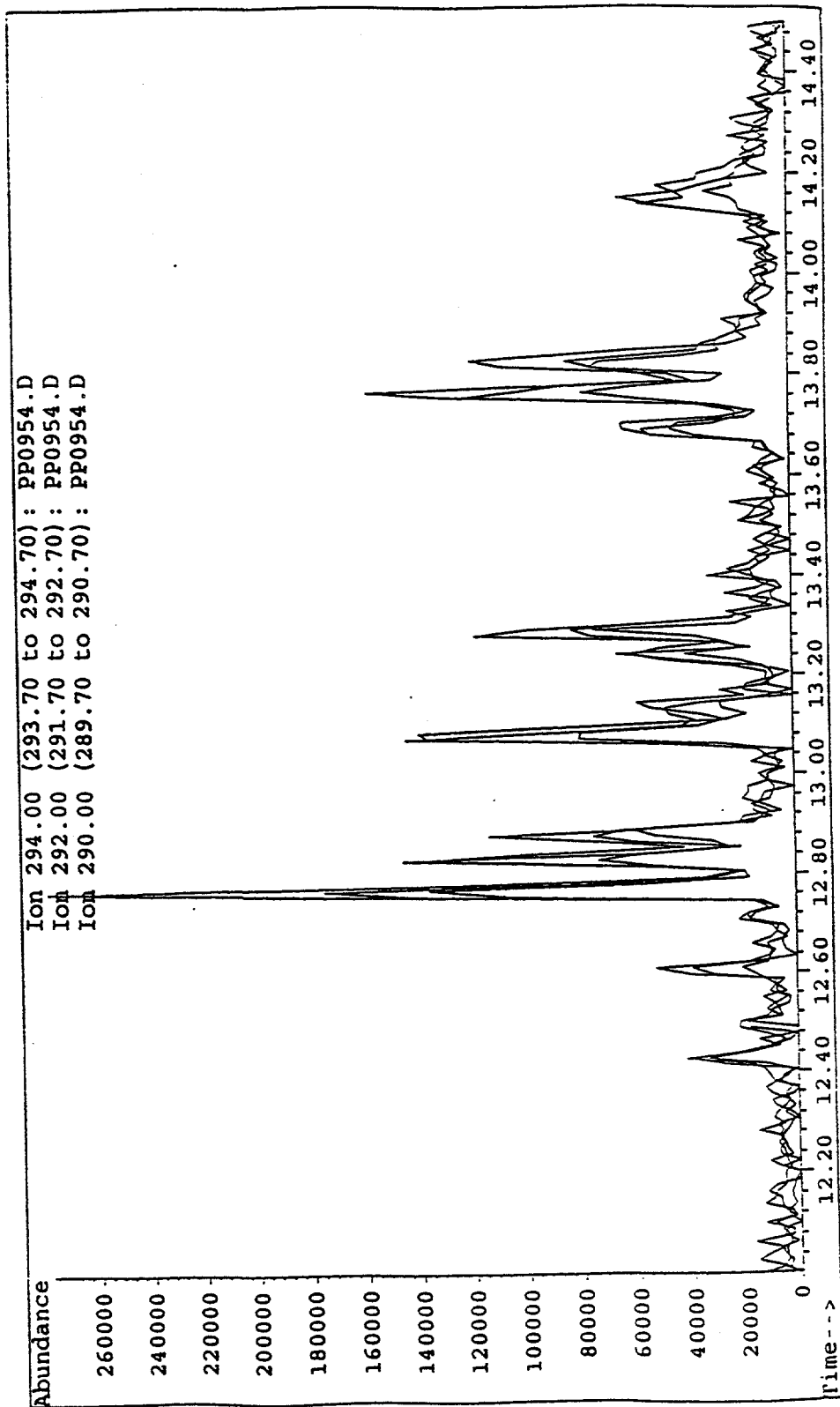


FIGURE 7: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 4FT, TUBE 0936

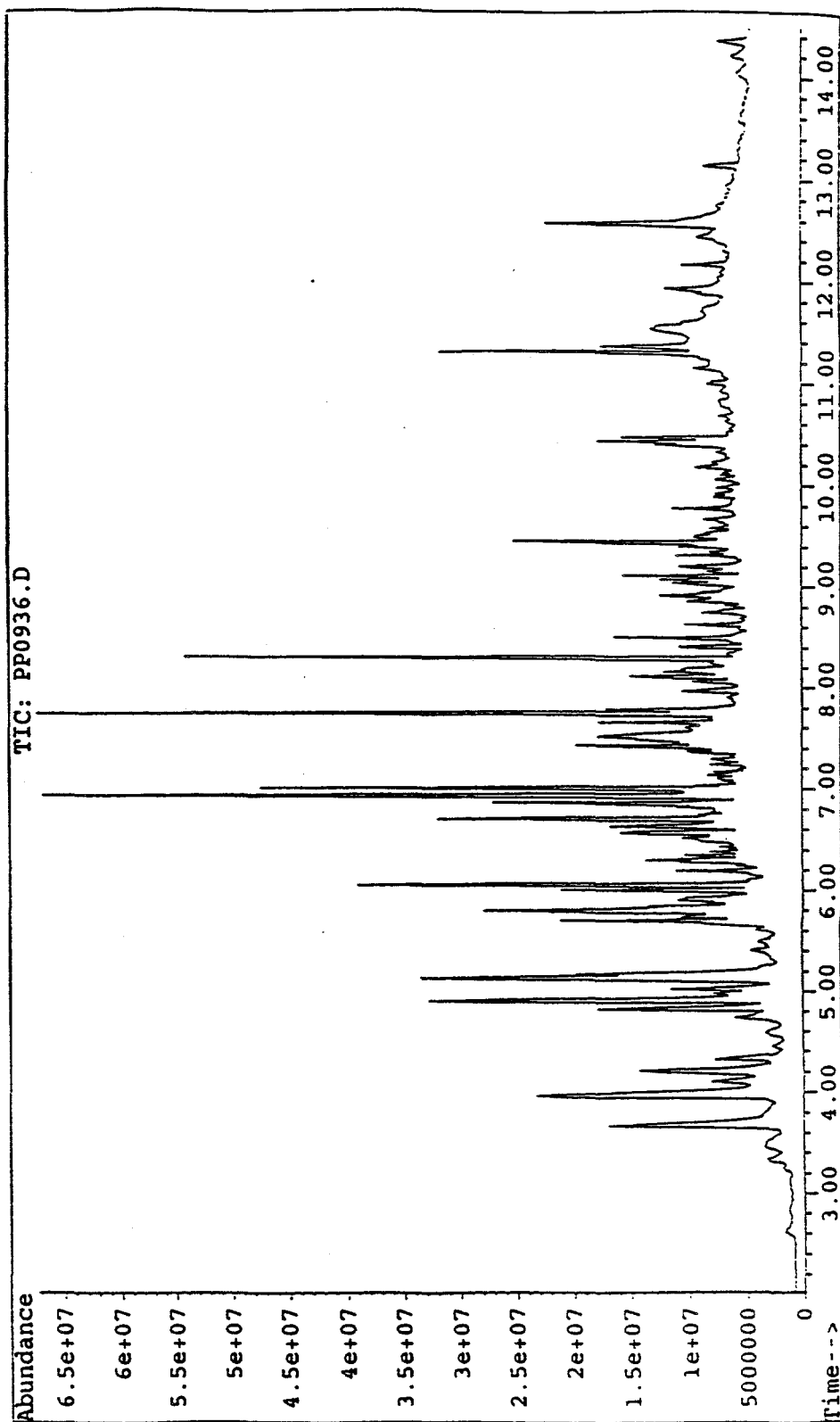


FIGURE 8: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 4FT, TUBE 0936

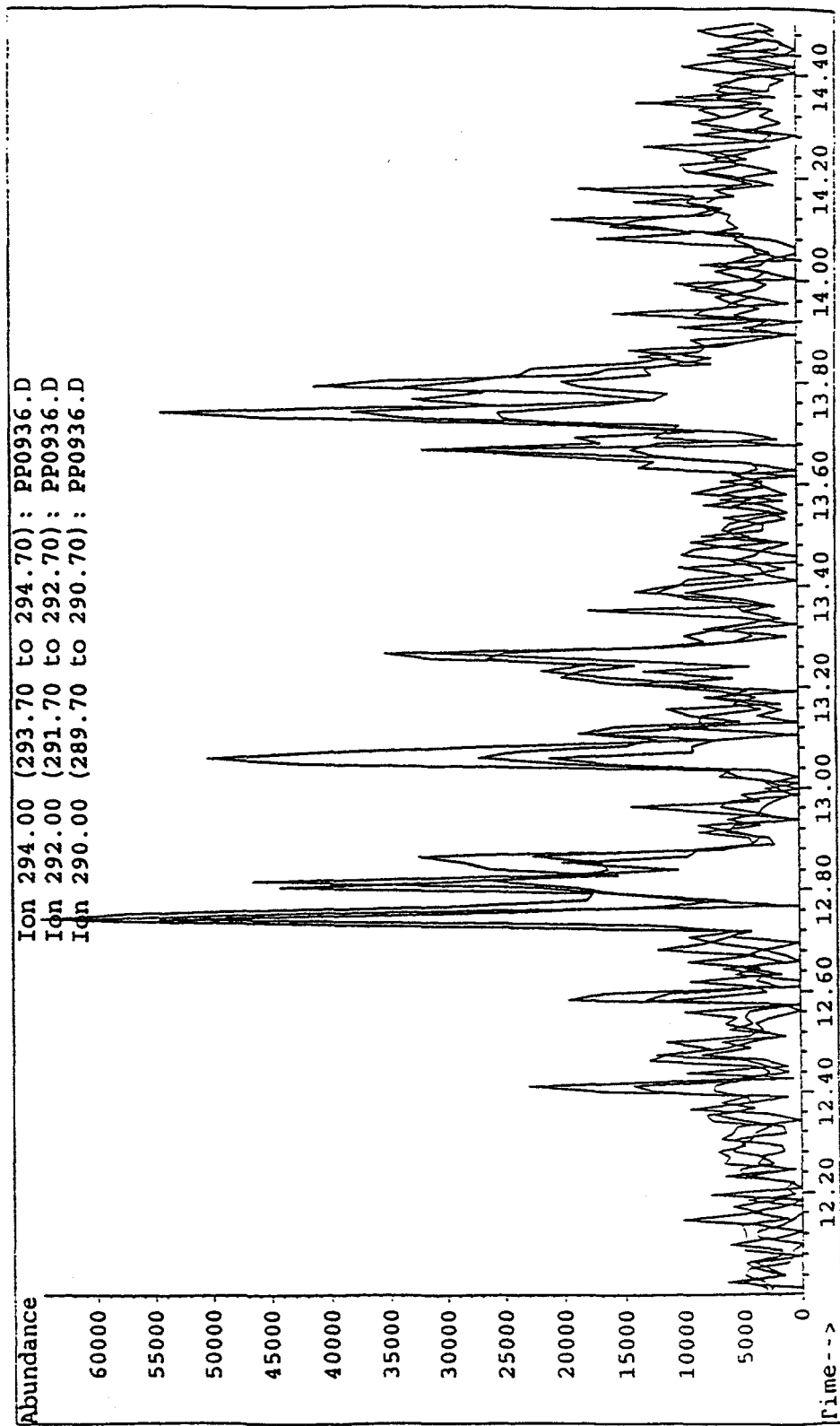


FIGURE 9: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 4C, TUBE 0714

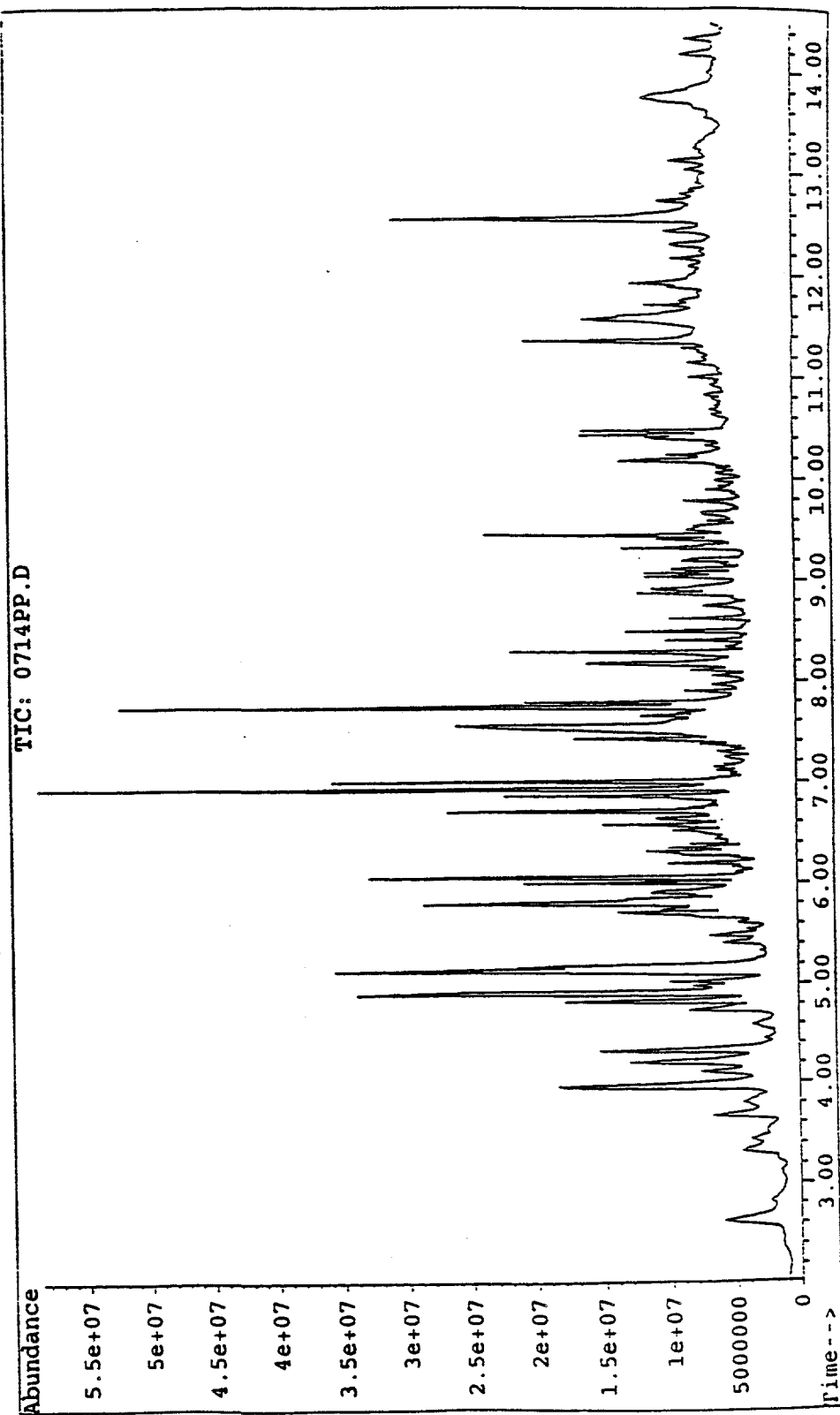


FIGURE 10: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 4C, TUBE 0714

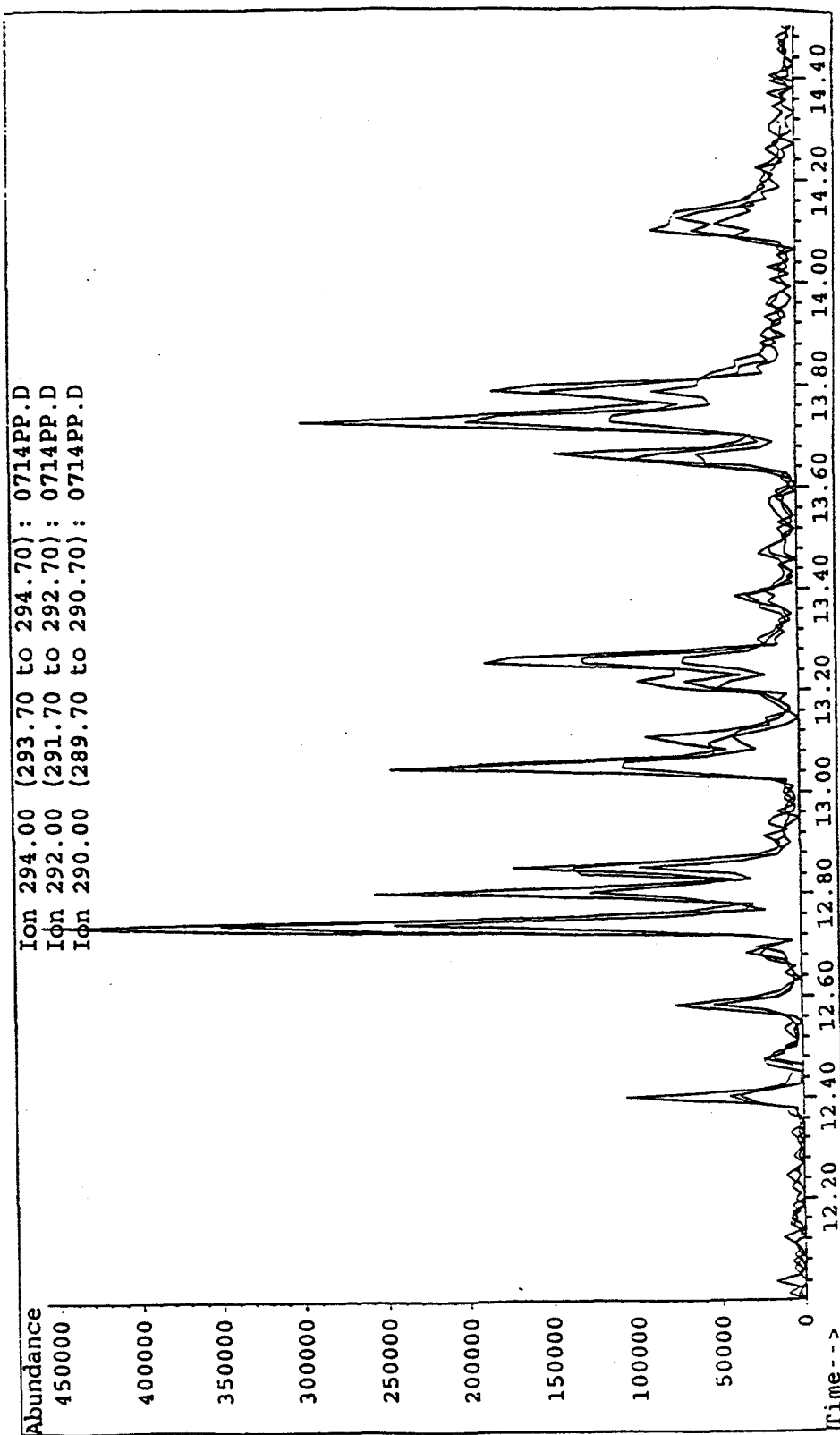


FIGURE 11: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 4A, TUBE 0959

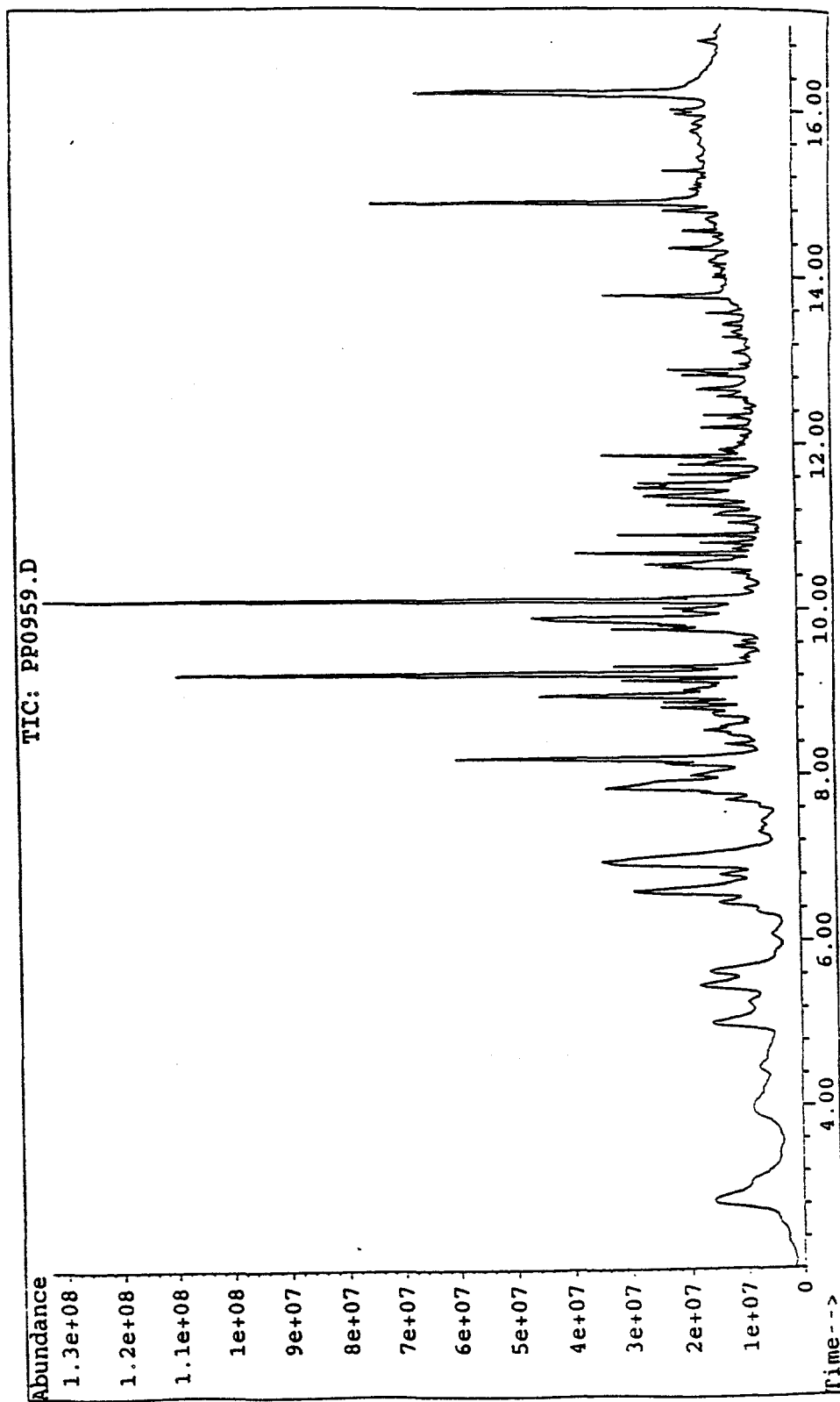


FIGURE 12: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 4A, TUBE 0959

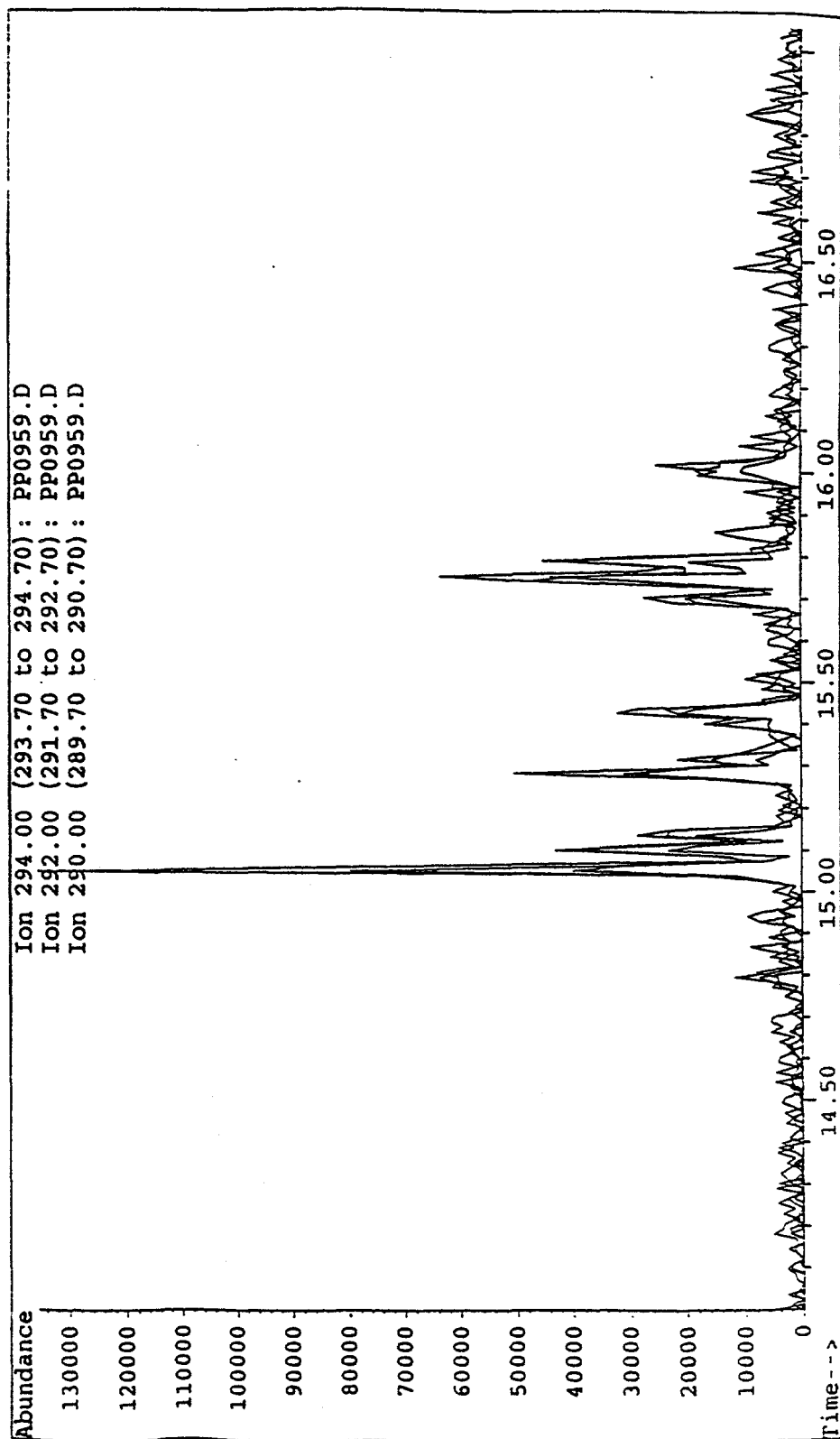


FIGURE 13: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 1FA, TUBE 0824

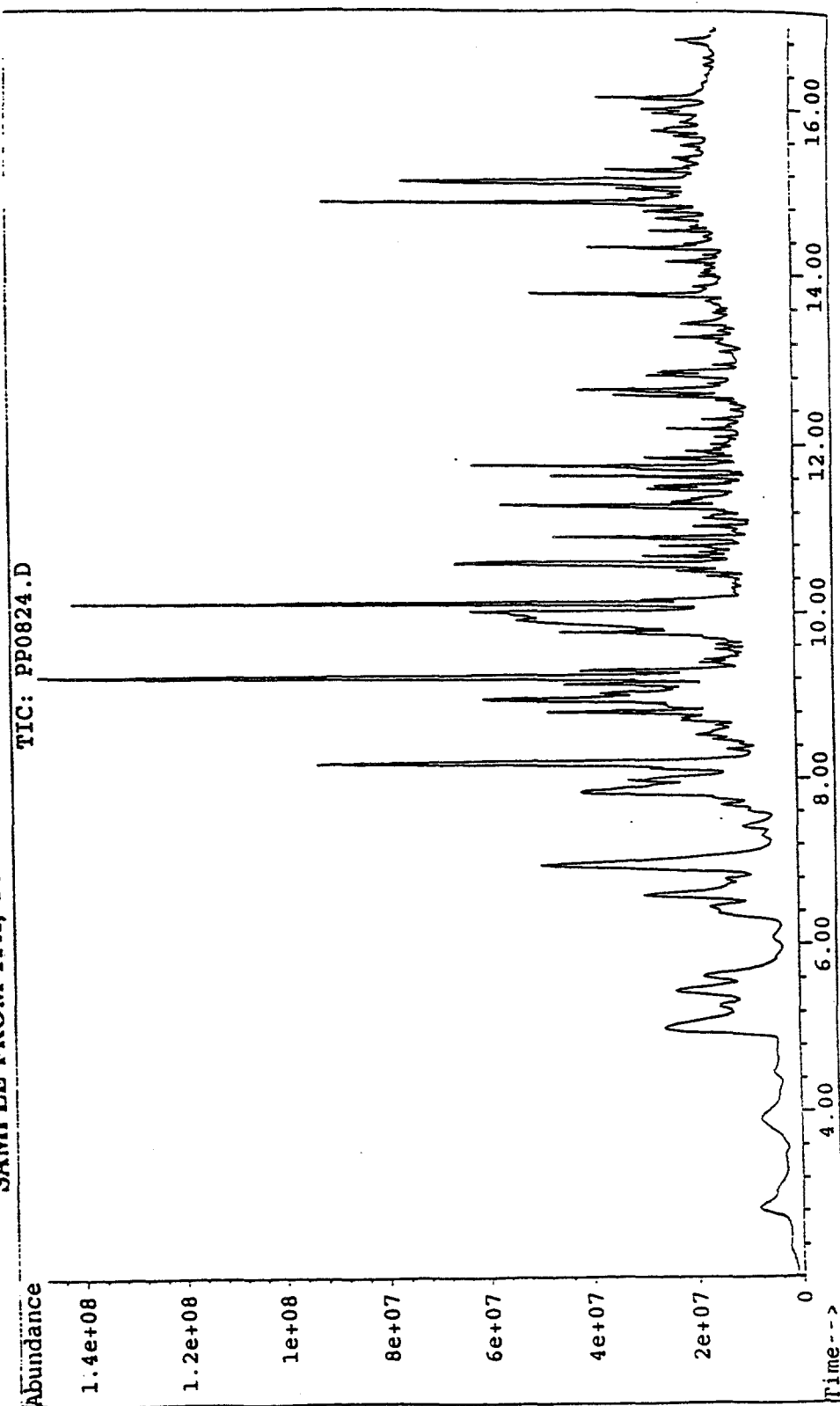


FIGURE 14: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 1FA, TUBE 0824

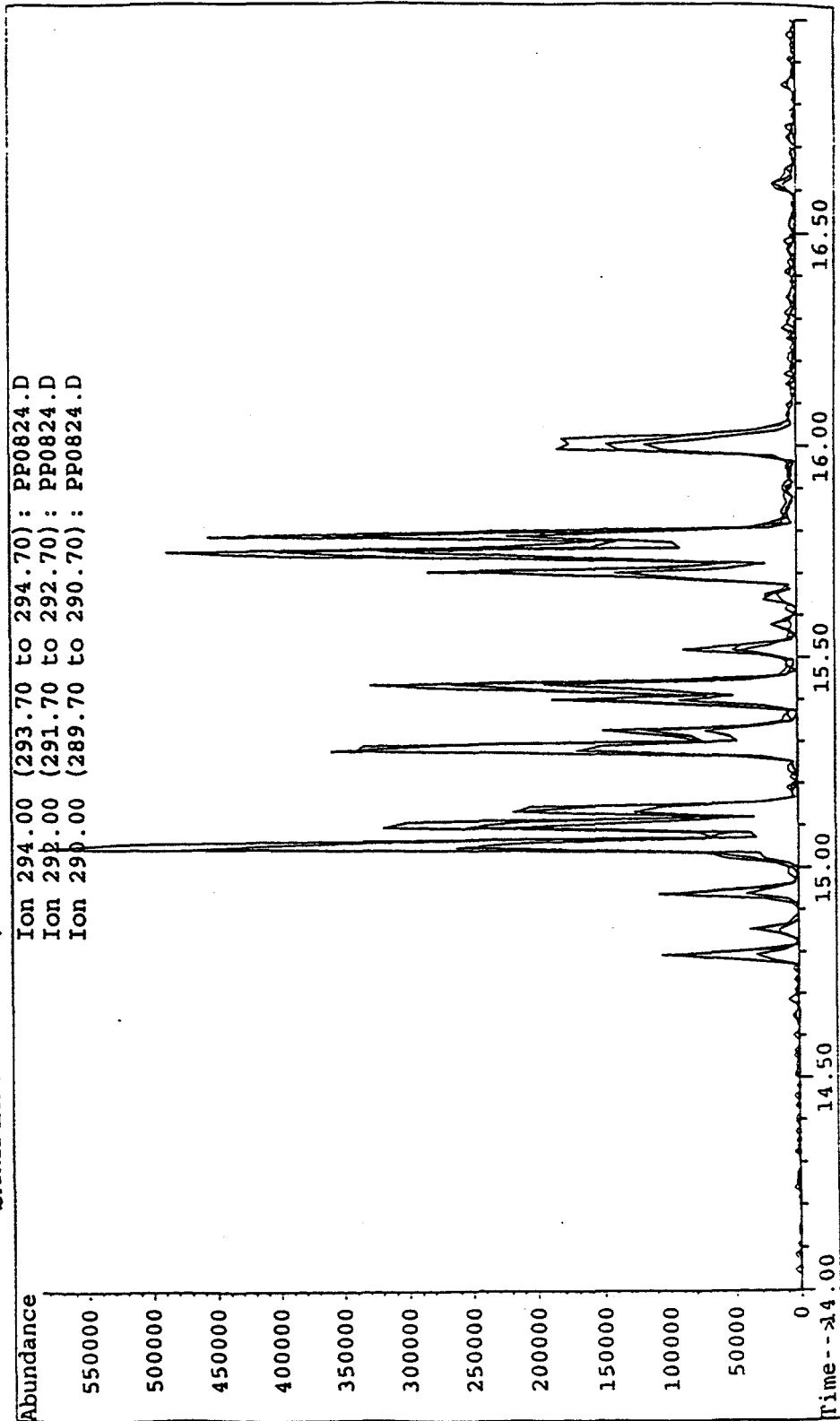


FIGURE 15: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM IC2, TUBE 0963

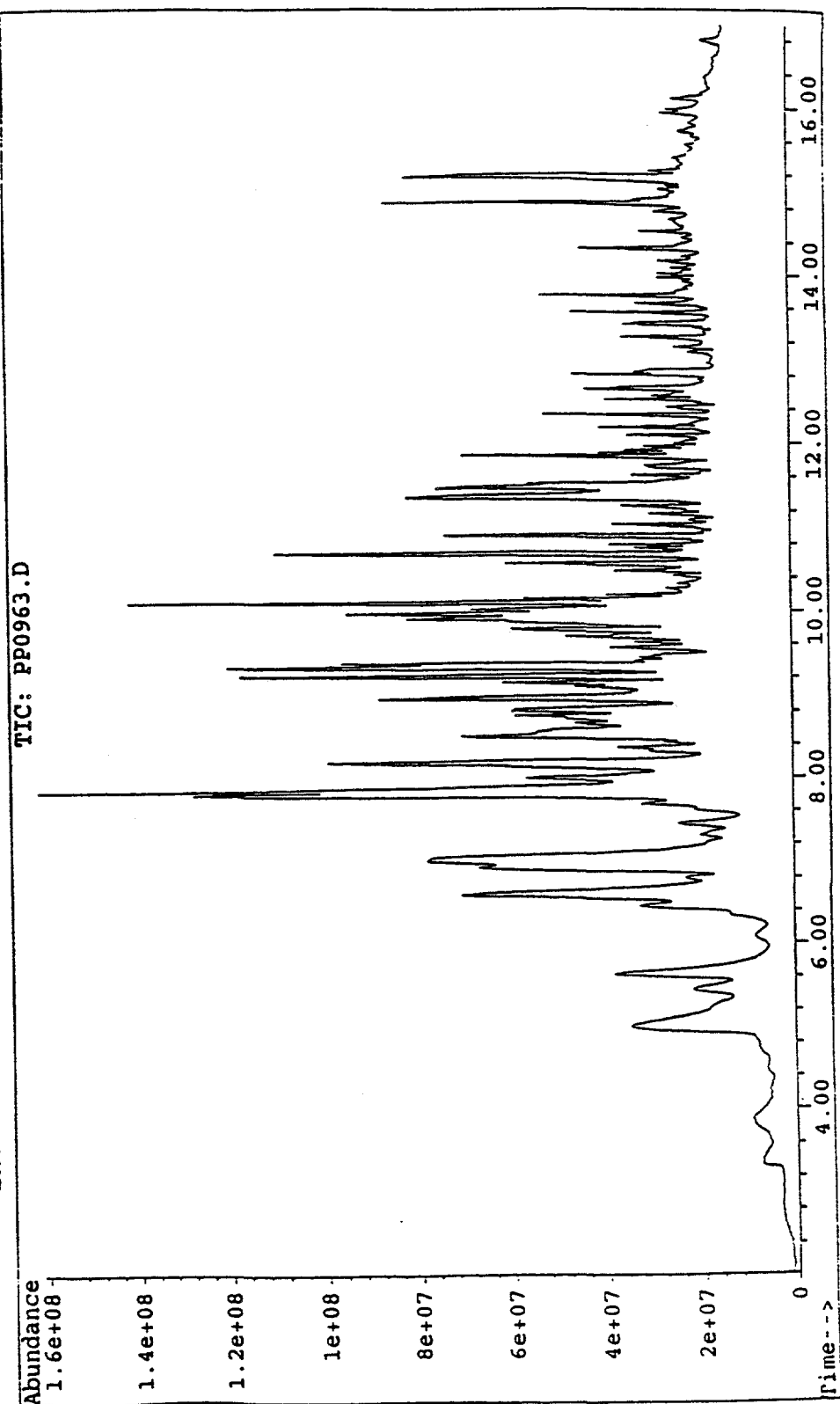


FIGURE 16: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 1C2, TUBE 0963

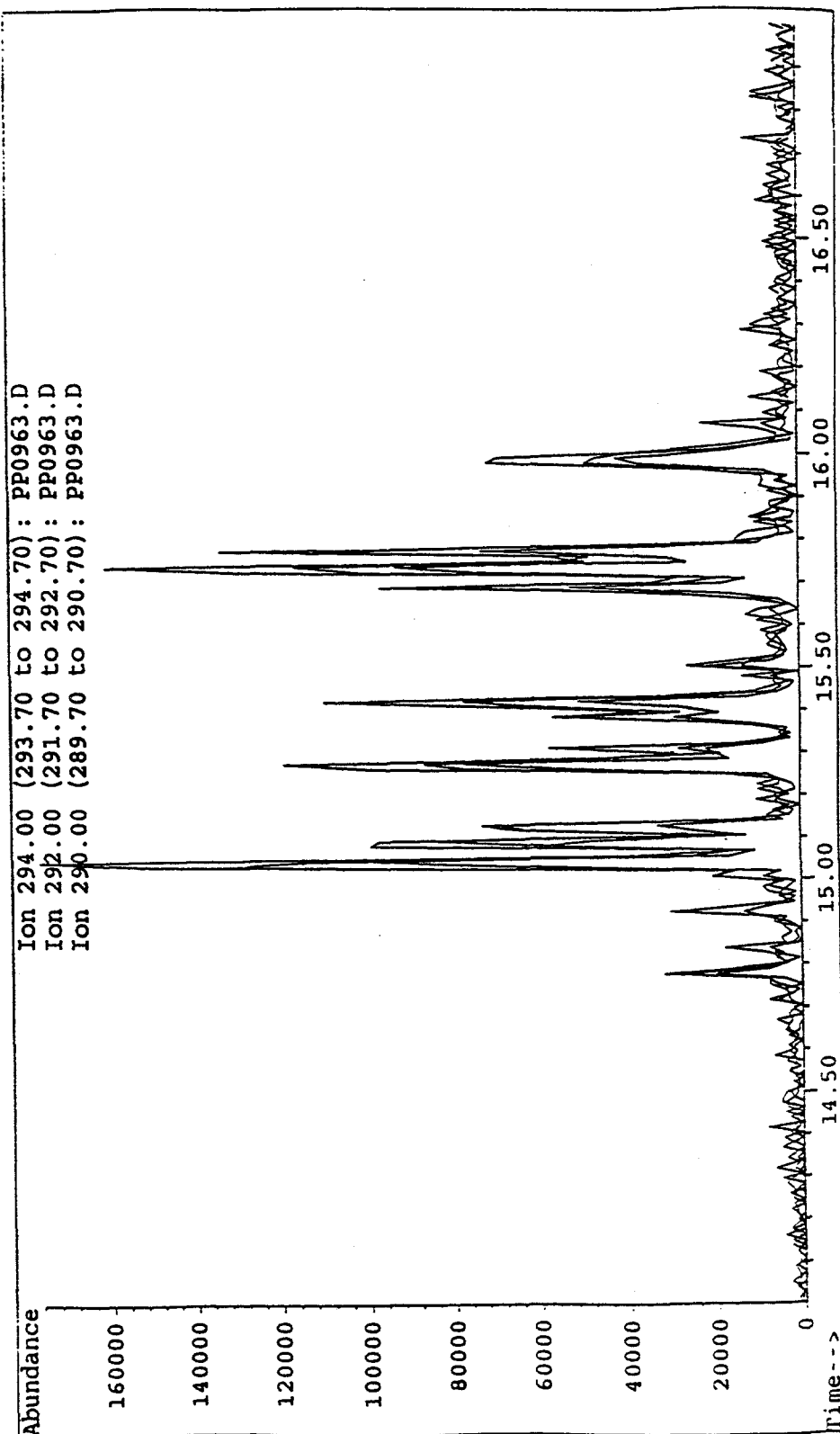


FIGURE 17: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 1D1, TUBE 0953

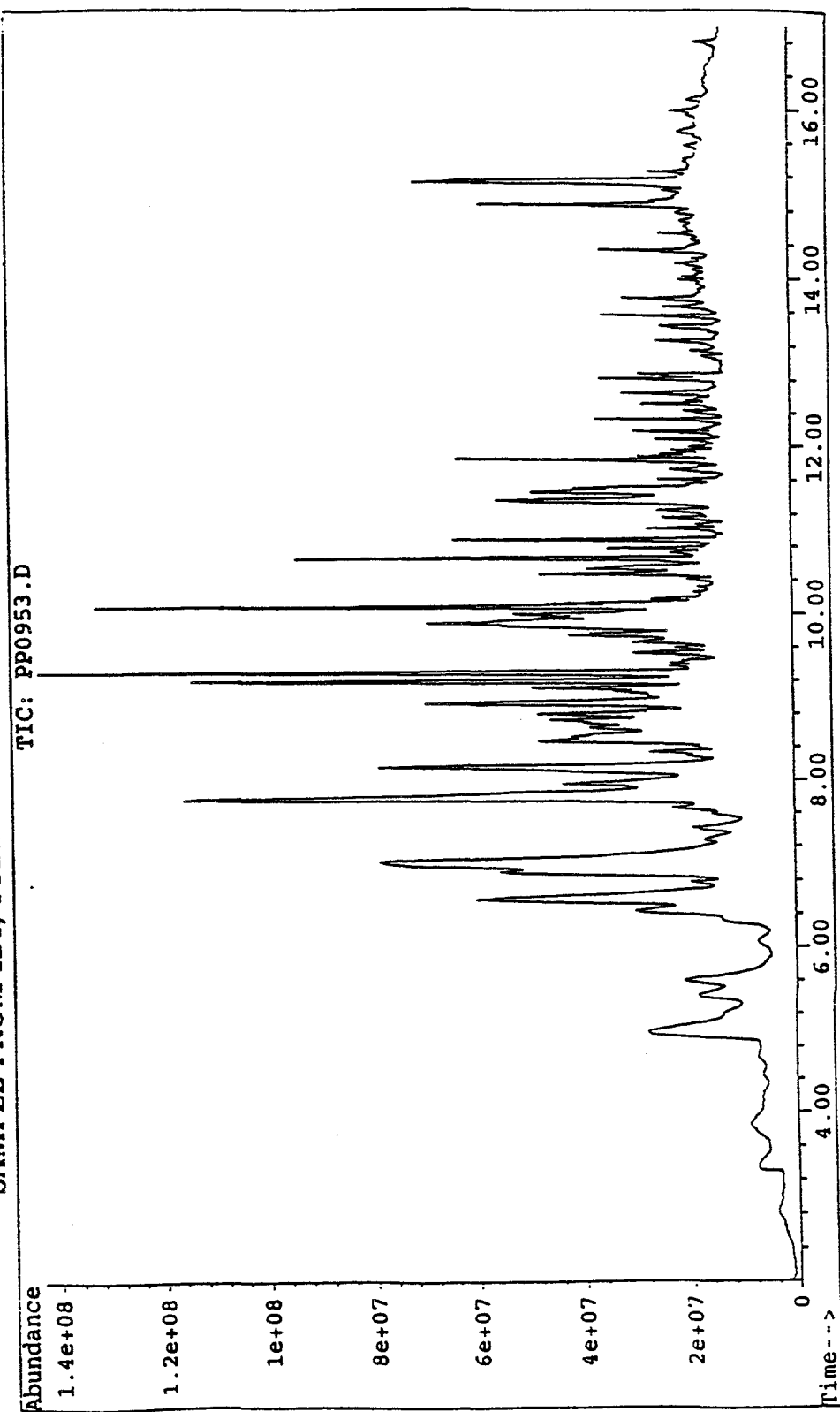


FIGURE 18: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 1D1, TUBE 0953

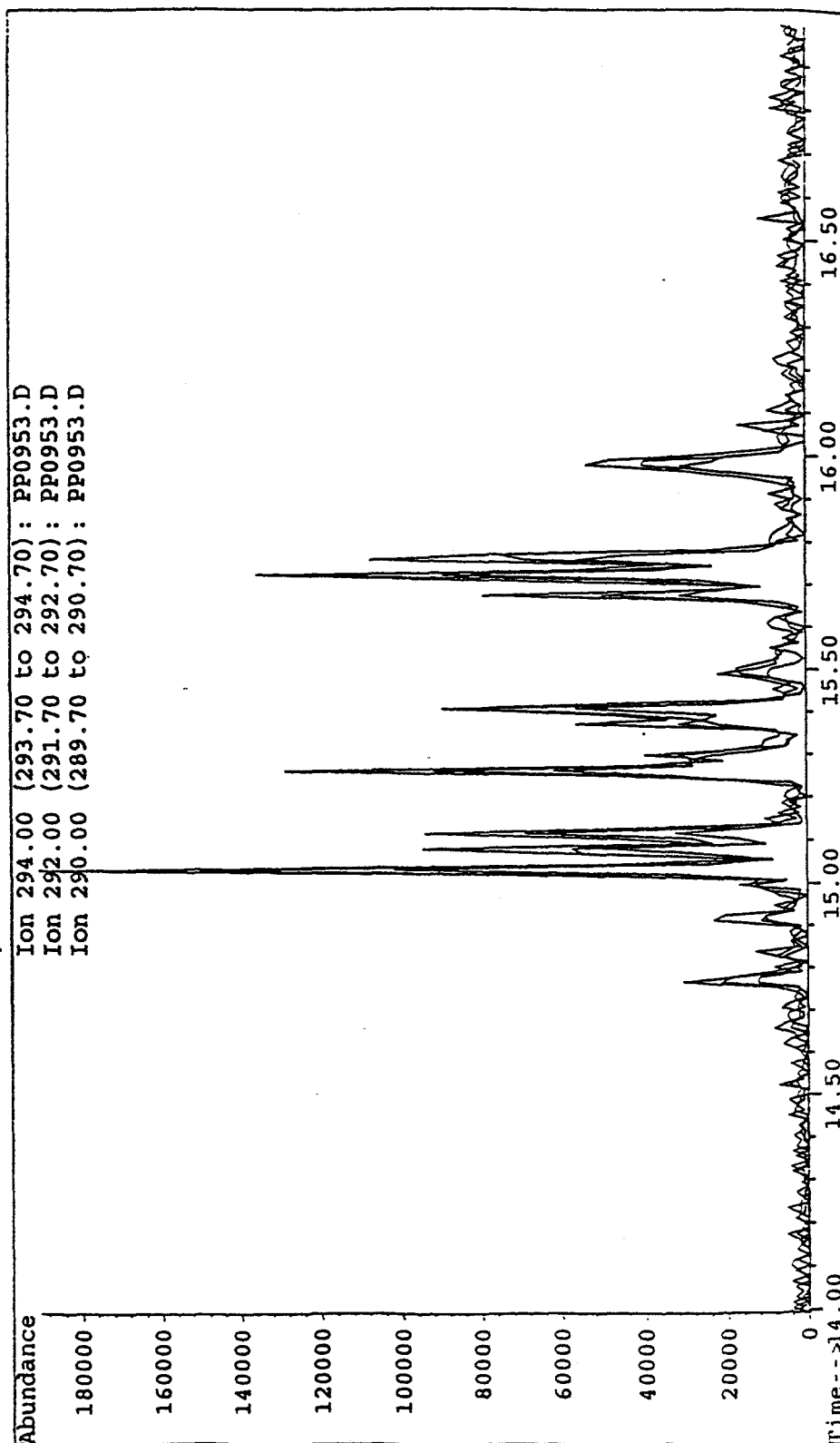


FIGURE 19: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM E205, TUBE 0924

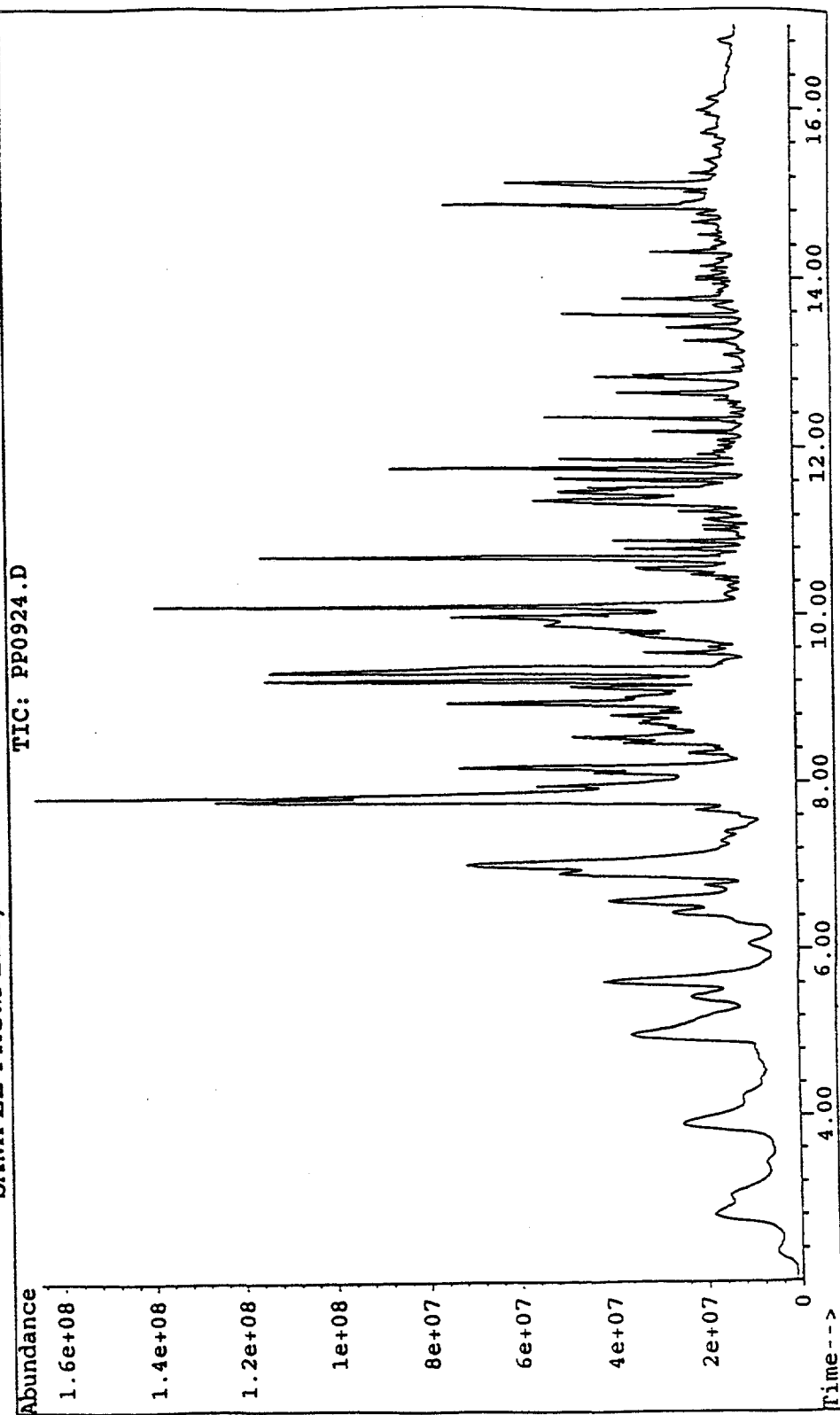


FIGURE 20: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM E205, TUBE 0924

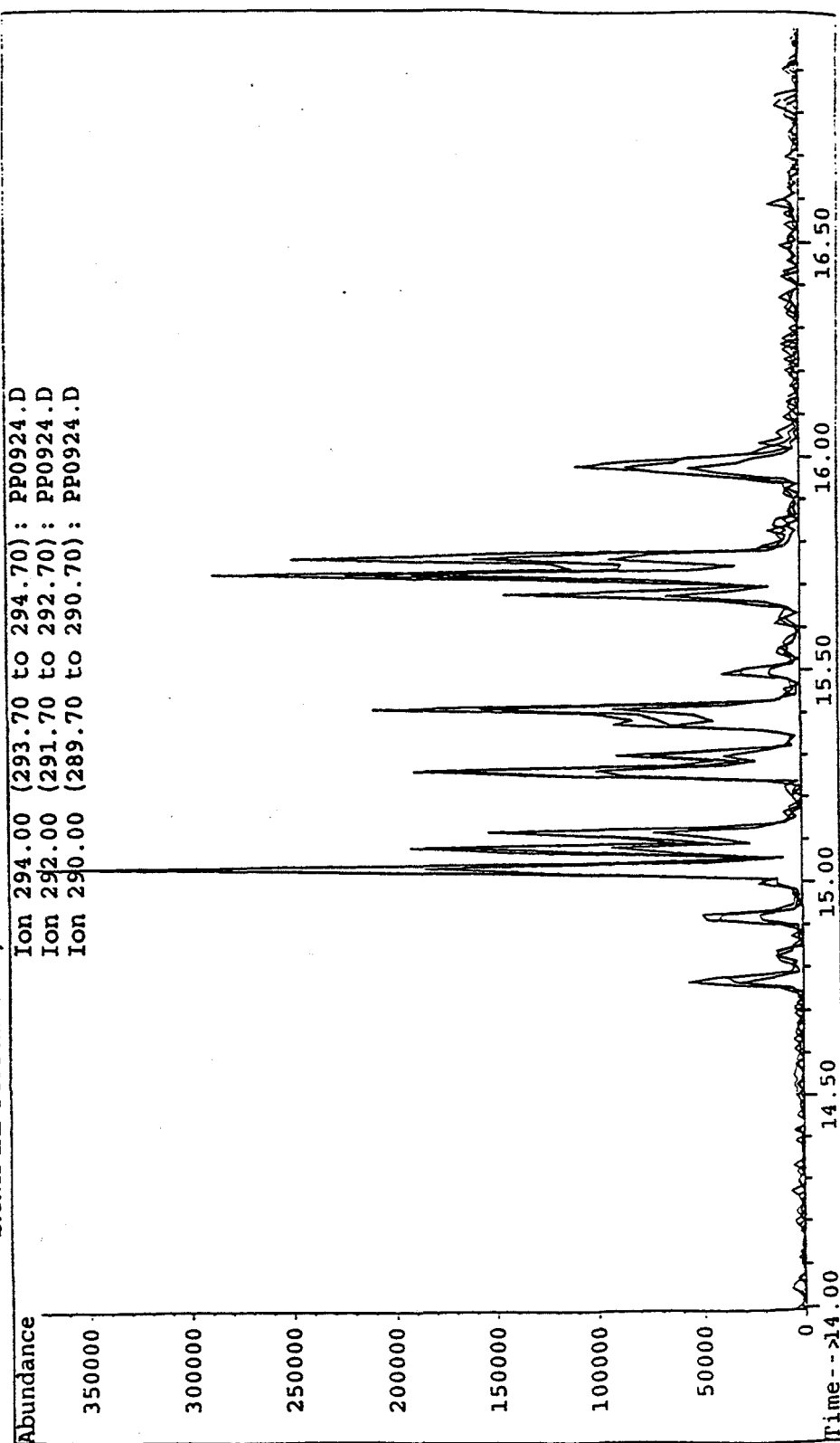


FIGURE 21: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM III, TUBE 0365

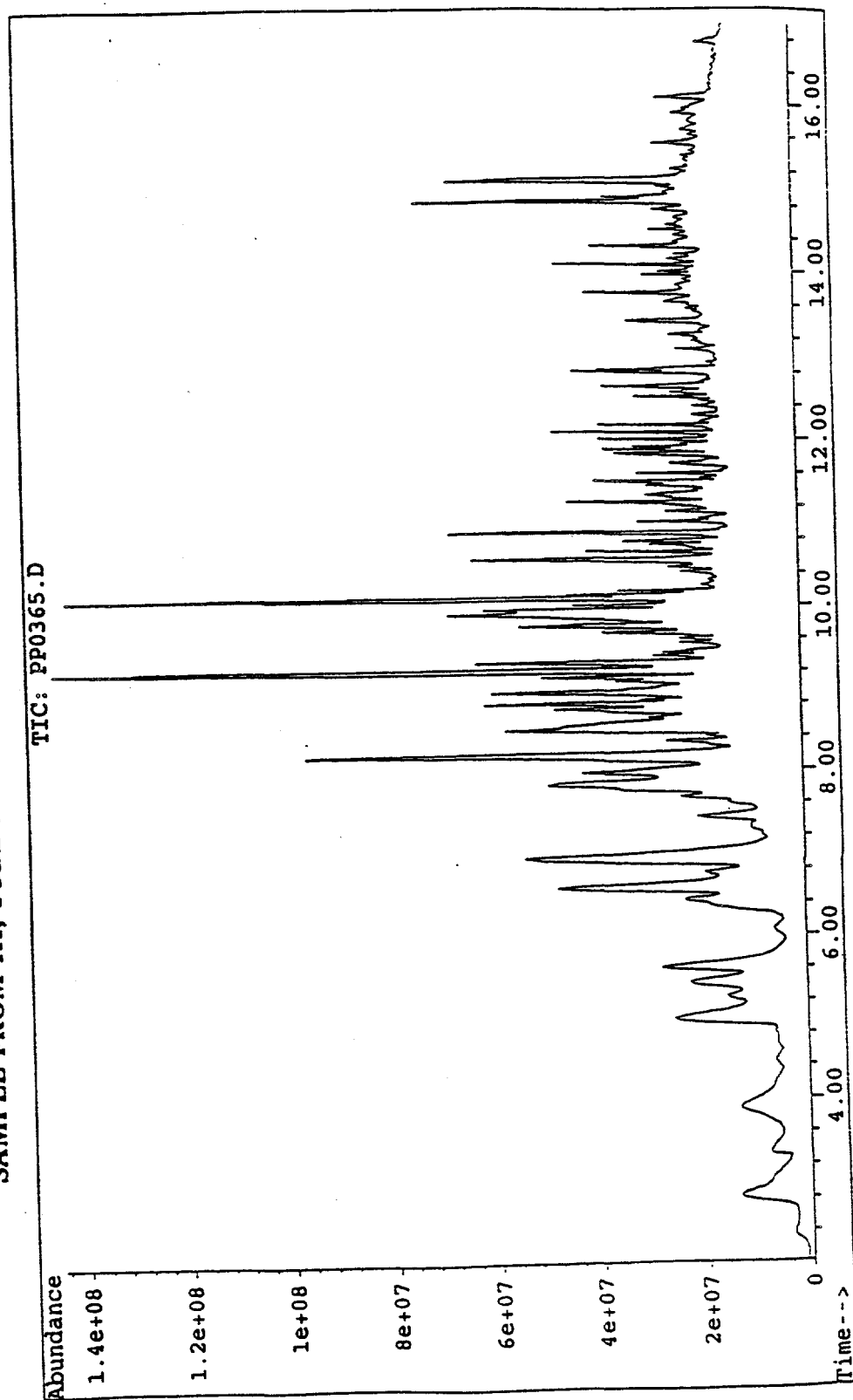


FIGURE 22: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM III, TUBE 0365

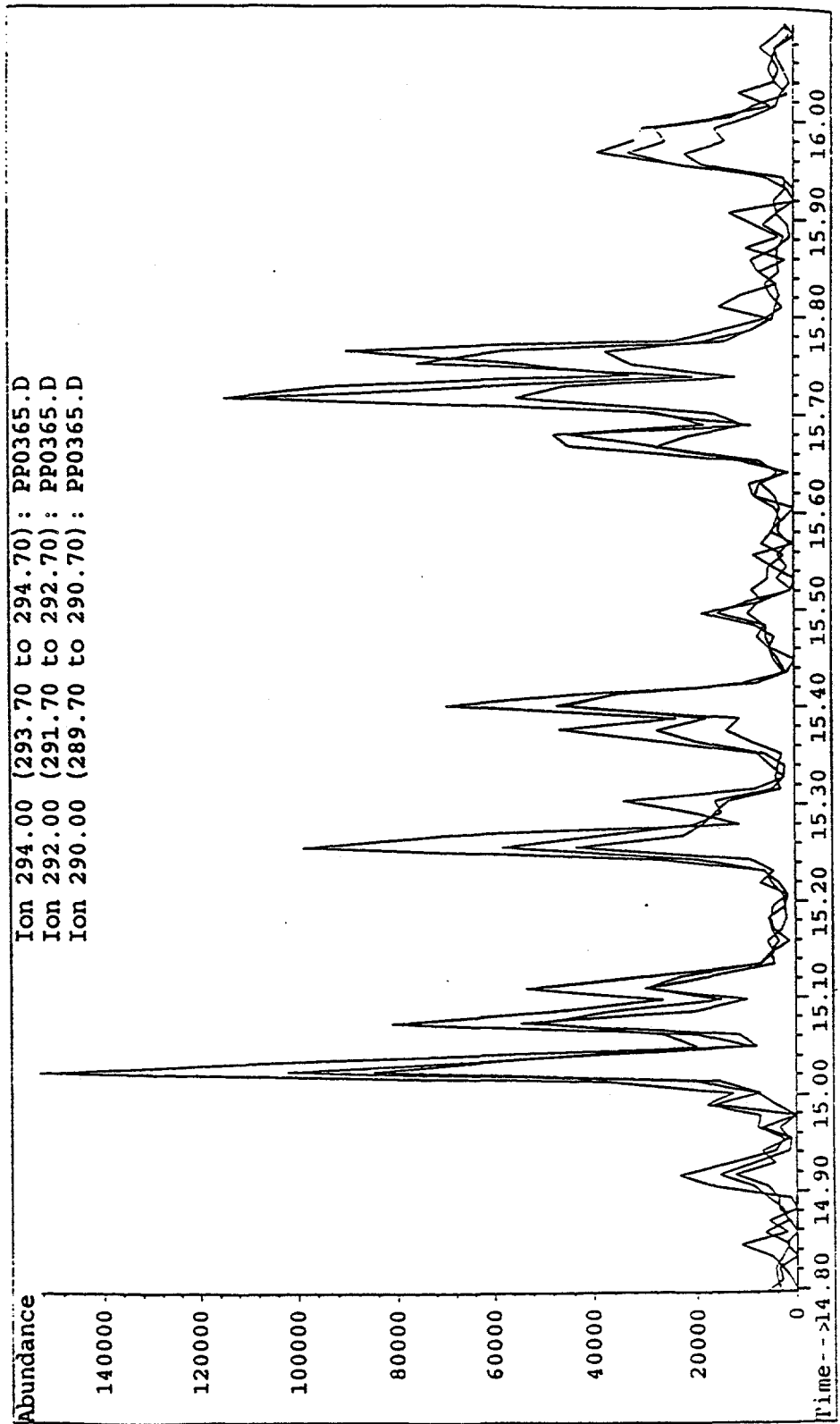


FIGURE 23: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 113, TUBE 0670

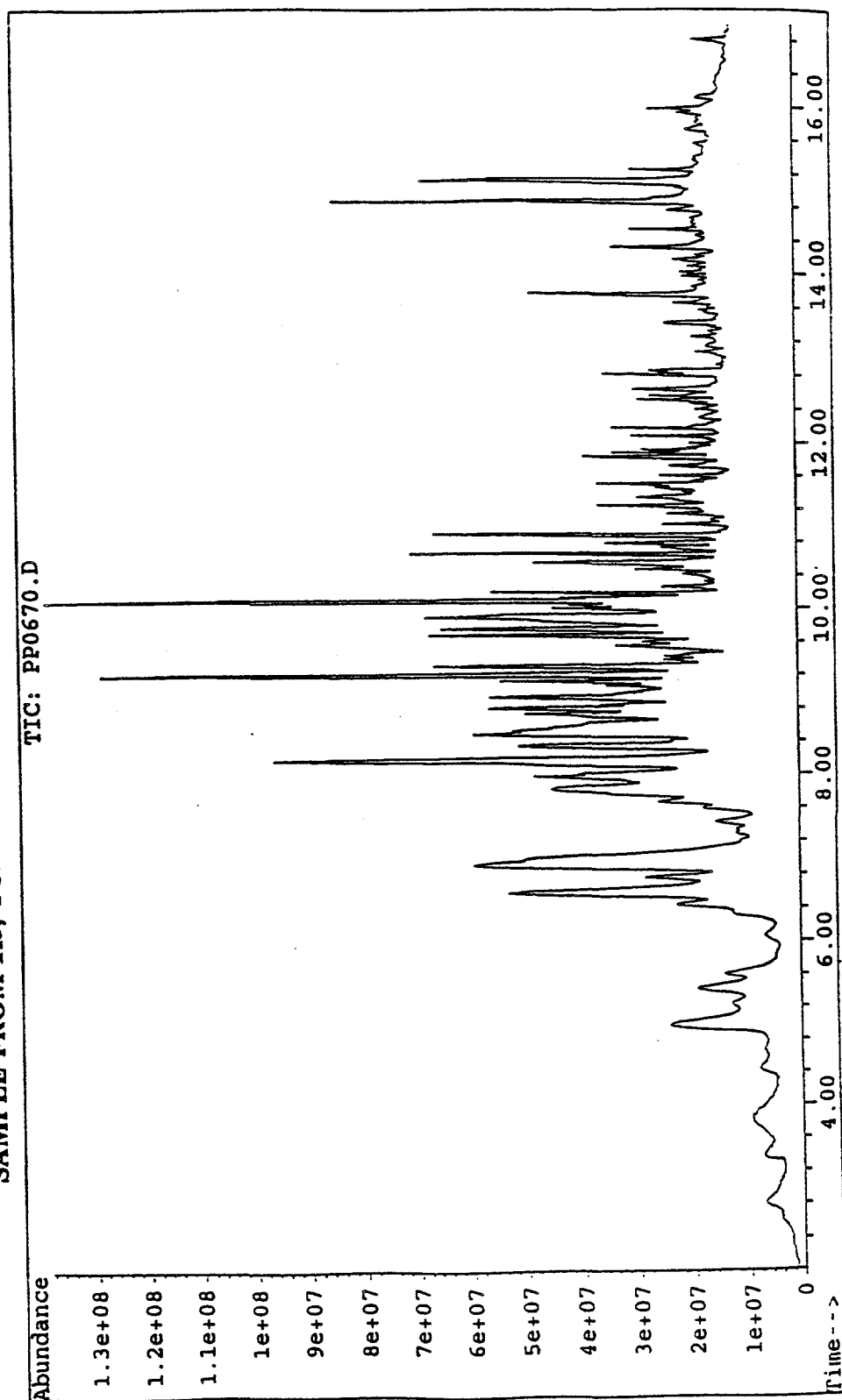


FIGURE 24: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 113, TUBE 0670

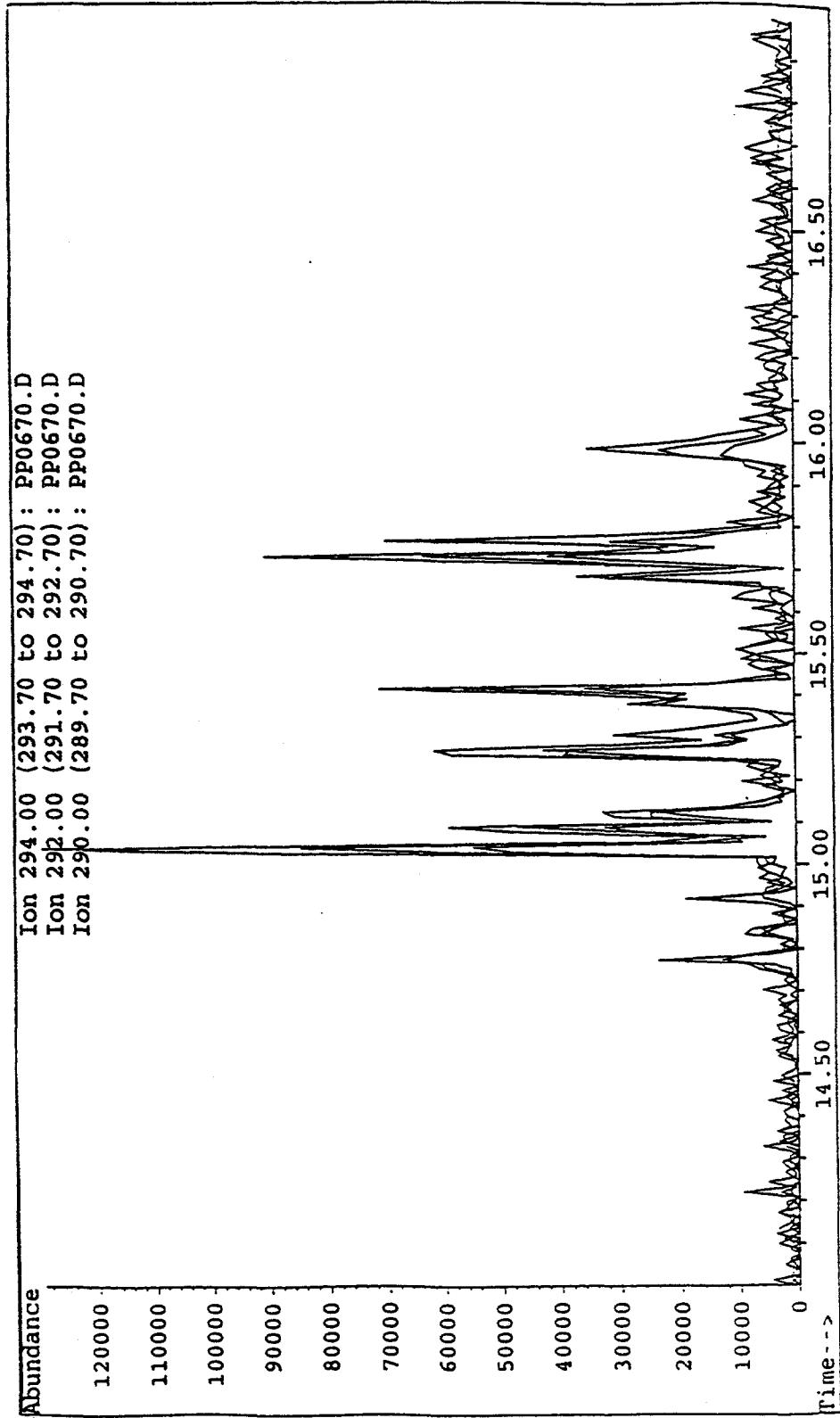


FIGURE 25: TOTAL ION CHROMATOGRAM OF AIR
SAMPLE FROM 132, TUBE 0929

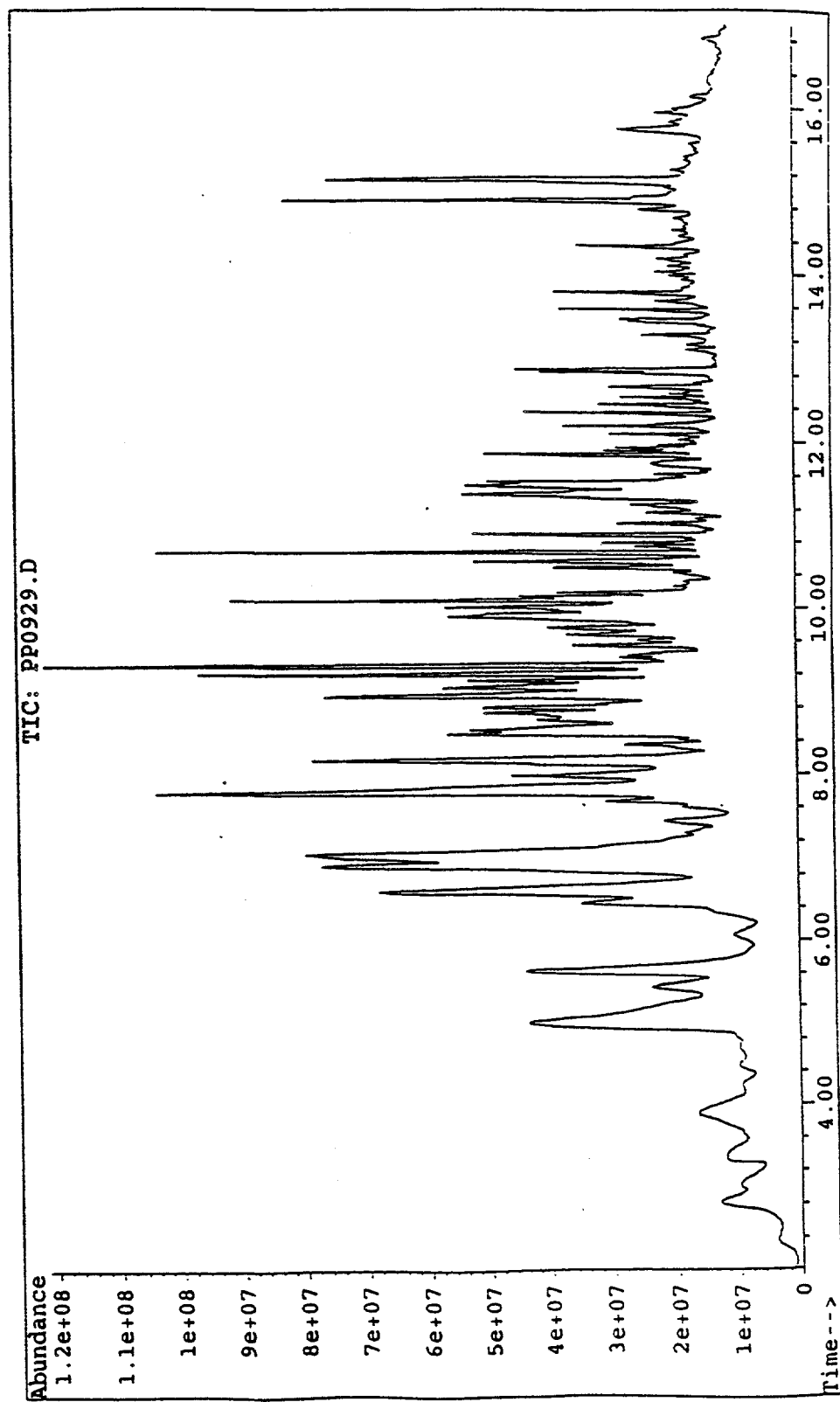
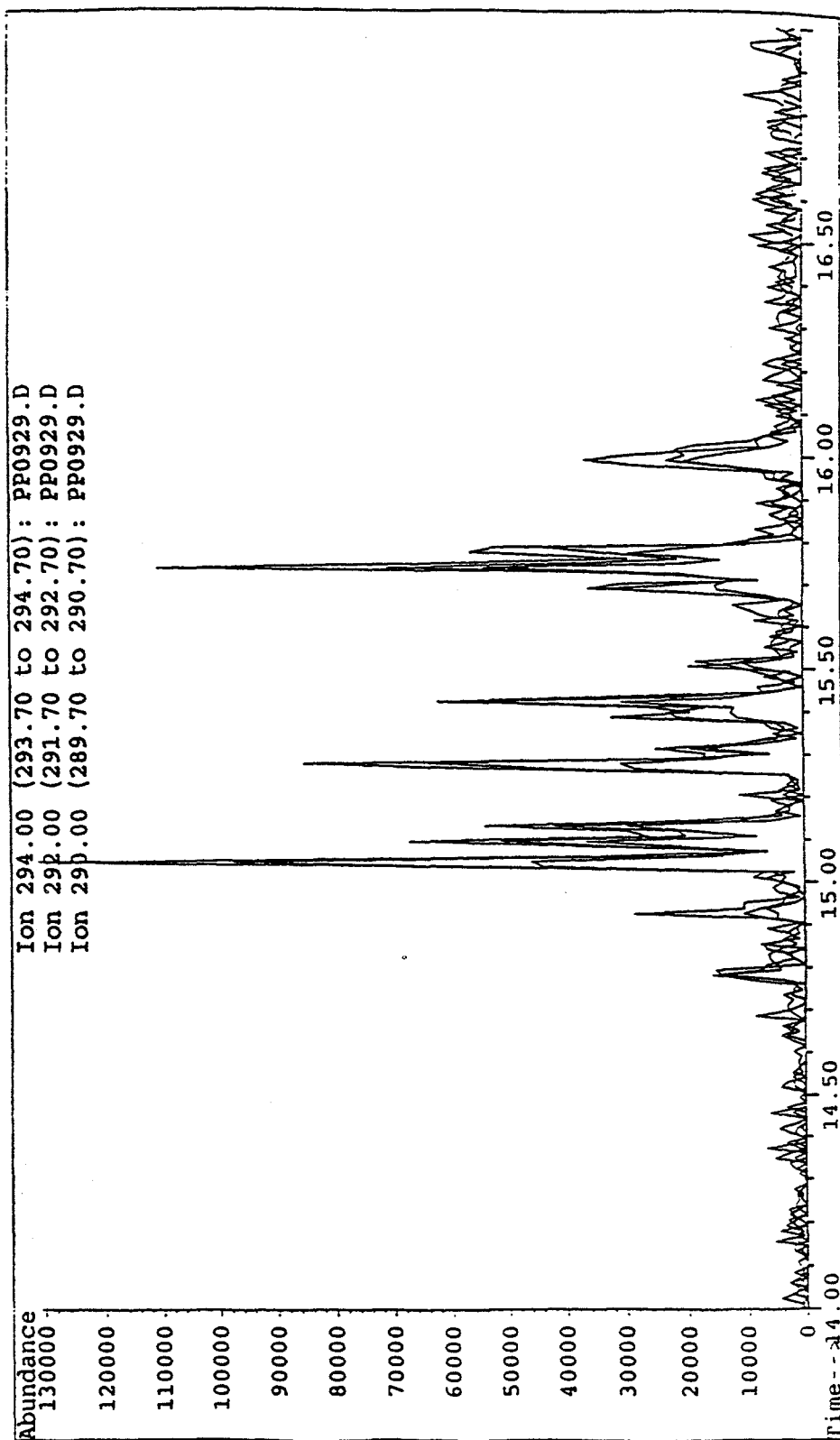


FIGURE 26: PCB EXTRACTED ION CHROMATOGRAM OF AIR
SAMPLE FROM 132, TUBE 0929



APPENDIX 2:
TABLES 2 THROUGH 14

TABLE 2. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 3D2, TUBE 0942

Site 3D2-S, Tube 0942 Compound	Retention Time (minutes)	Concentration pg/L
4-methyl-2-pentanone	not found	not found
pentachlorobiphenyl	not found	not found
trichlorofluoromethane	2.32	7.9
hexane	2.82	20
diisopropylamine	3.37	0.10
trichloroethylene	3.90	12
toluene	4.99	390
1-octene	5.27	1.0
3-heptanone	5.39	82
tetrachloroethylene	5.61	17
dimethyl benzene	6.90	140
propyl benzene	7.75	16
benzaldehyde	7.82	400
dichlorobenzene	8.34	0.70
2,3,6-trimethyl octane	8.42	1.0
unknown	8.59	0.50
C3 benzene	8.70	10
acetophenone	8.94	230
O,O-diethyl-S-ethylphosphorothioate	9.40	0.0
triethyl ester phosphoric acid	9.47	0.20
decahydro-2-methyl naphthalene	9.62	2.3
unknown	9.80	4.6
benzoic acid	9.92	650
naphthalene	10.13	100

TABLE 2. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 3D2, TUBE 0942

Site 3D2-S, Tube 0942 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.13	1.4
unknown	10.35	210
unknown	10.43	1.8
benzothiazole	10.47	260
unknown	10.52	0.60
2-[bis[1-isopropyl]aminoethanol	10.73	0.90
N,N-dibutylformamide	10.73	0.90
2-methyl naphthalene	10.88	2.1
trichlorophenol	11.12	0.10
1-methyl naphthalene	11.15	13
unknown	11.29	1.4
biphenyl	11.61	43
1,1'-oxybis-benzene	11.73	63
N,N-diethylbenzamide	11.92	0.10
n-propyl-benzamide	12.03	12
4-methyl-2,6-di(tert)butyl phenol	12.09	0.60
C3 naphthalene	12.15	0.60
1,6-dimethylnaphthalene	12.19	2.1
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	12.22	0.30
1,2-dihydro-acenaphthylene	12.23	0.30
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4- dione	12.32	0.50
2-methyl-1,1'-biphenyl	12.32	2.1

TABLE 2. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 3D2, TUBE 0942

Site 3D2-S, Tube 0942 Compound	Retention Time (minutes)	Concentration pg/L
unknown	12.64	36
unknown	12.85	24
diethyl phthalate	12.85	140
diphenylamine	12.94	0.20
diphenylmethanone	12.98	1.0
unknown	13.09	0.20
isopropyl myristate	13.77	3.1
trichlorobiphenyl	13.92	0.20
4-hydroxy-3,5-di-tert-butylbenzaldehyde	14.12	0.10
trichlorobiphenyl	14.17	1.1
phenanthrene	14.34	14
dibutyl phthalate	14.54	1.9
trichlorobiphenyl	14.59	0.40
hexadecanoic acid	14.69	2.9
tetrachlorobiphenyl	14.79	0.10
tetrachlorobiphenyl (nc)	14.94	0.30
tetrachlorobiphenyl	15.14	0.30
dioctyl phthalate	15.30	0.10
tetrachlorobiphenyl	15.43	0.40
tetrachlorobiphenyl	15.46	0.0
pentachlorobiphenyl	15.62	0.0
tetrachlorobiphenyl	15.62	0.10

TABLE 3. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 3ET, TUBE 0958

Site 3ET-S, Tube 0958 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.14	0.40
diisopropylamine	2.60	0.0
hexane	2.65	8.8
trichloroethylene	2.97	0.0
4-methyl-2-pentanone	3.69	42
toluene	3.98	300
3-heptanone	4.20	23
1-octene	4.22	0.30
tetrachloroethylene	4.35	40
dimethyl benzene	5.14	76
benzaldehyde	5.81	110
propyl benzene	6.07	19
2,3,6-trimethyl octane	6.35	0.70
dichlorobenzene	6.47	1.5
unknown	6.68	1.7
C3 benzene	6.71	57
acetophenone	6.71	57
triethyl ester phosphoric acid	7.05	1.0
unknown	7.44	22
decahydro-2-methyl naphthalene	7.53	0.20
benzoic acid	7.53	140
O,O-diethyl-S-ethylphosphorothioate	7.69	0.0
naphthalene	7.75	5.4

TABLE 3. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 3ET, TUBE 0958

Site 3ET-S, Tube 0958 Compound	Retention Time (minutes)	Concentration pg/L
unknown	7.80	0.50
unknown	7.93	1.0
benzothiazole	8.12	130
unknown	8.17	0.60
unknown	8.19	2.1
unknown	8.43	0.40
2-methyl naphthalene	8.51	0.80
2-[bis[1-isopropyl]aminoethanol	8.71	0.90
N,N-dibutylformamide	8.71	0.90
1-methyl naphthalene	8.77	6.9
n-propyl-benzamide	9.02	1.0
trichlorophenol	9.09	0.10
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	9.13	0.90
biphenyl	9.21	9.2
N,N-diethylbenzamide	9.31	0.40
1,1'-oxybis-benzene	9.33	12.0
1,6-dimethylnaphthalene	9.42	3.8
C3 naphthalene	9.51	1.1
1,2-dihydro-acenaphthylene	9.54	0.50
2-methyl-1,1'-biphenyl	9.60	0.10
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene- 1,4-dione	9.60	0.60
4-methyl-2,6-di(tert)butyl phenylol	9.85	0.10

TABLE 3. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 3ET, TUBE 0958

Site 3ET-S, Tube 0958 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.00	0.30
unknown	10.03	0.50
diphenylamine	10.06	0.40
diphenylmethanone	10.10	0.10
unknown	10.15	0.20
diethyl phthalate	10.22	0.80
trichlorobiphenyl	10.86	0.20
4-hydroxy-3,5-di-tert-butylbenzaldehyde	11.03	0.50
isopropyl myristate	11.24	0.20
hexadecanoic acid	11.36	0.30
trichlorobiphenyl	11.37	0.30
phenanthrene	11.43	0.30
trichlorobiphenyl	11.52	0.10
tetrachlorobiphenyl	11.53	0.20
tetrachlorobiphenyl (nc)	11.58	0.20
dioctyl phthalate	11.60	22
dibutyl phthalate	11.64	200
tetrachlorobiphenyl	11.81	0.10
tetrachlorobiphenyl	11.81	0.10
tetrachlorobiphenyl (nc)	12.08	0.20
pentachlorobiphenyl	12.18	0.10
tetrachlorobiphenyl	12.45	0.10
diisooctyl phthalate	12.73	0.30
pentachlorobiphenyl	12.74	0.10

TABLE 4. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4D2, TUBE 0954

Site 4D2-S, Tube 0954 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.13	0.10
diisopropylamine	2.60	0.0
hexane	2.67	0.60
trichloroethylene	3.11	0.0
4-methyl-2-pentanone	3.69	23
toluene	3.98	290
3-heptanone	4.20	41
1-octene	4.22	0.20
tetrachloroethylene	4.34	29
dimethyl benzene	5.14	100
benzaldehyde	5.75	4.6
propyl benzene	6.06	30
2,3,6-trimethyl octane	6.37	0.40
dichlorobenzene	6.47	2.5
C3 benzene	6.51	2.7
unknown	6.69	3.2
acetophenone	6.83	2.6
triethyl ester phosphoric acid	7.04	3.7
decahydro-2-methyl naphthalene	7.18	4.3
unknown	7.42	30
unknown	7.57	3.7
O,O-diethyl-S-ethylphosphorothioate	7.68	0.10
naphthalene	7.75	9.8
benzoic acid	7.80	5.6

TABLE 4. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4D2, TUBE 0954

Site 4D2-S, Tube 0954 Compound	Retention Time (minutes)	Concentration pg/L
unknown	7.84	0.80
benzothiazole	8.12	77
unknown	8.19	2.9
2-[bis[1-isopropyl]aminoethanol	8.31	0.30
N,N-dibutylformamide	8.31	0.30
unknown	8.57	0.50
trichlorophenol	8.66	0.20
1-methyl naphthalene	8.76	10
2-methyl naphthalene	8.76	10
unknown	8.78	0.30
n-propyl-benzamide	9.04	0.40
1,6-dimethylnaphthalene	9.12	0.40
biphenyl	9.21	17
1,1'-oxybis-benzene	9.33	24
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4-dione	9.46	10.0
1,2-dihydro-acenaphthylene	9.51	0.70
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl-bicyclo[3.1.0]hexan-2-one	9.53	0.50
2-methyl-1,1'-biphenyl	9.59	0.10
unknown	9.65	0.20
N,N-diethylbenzamide	9.65	0.20
4-methyl-2,6-di(tert)butyl phenol	9.85	0.50
C3 naphthalene	9.93	0.40
unknown	10.00	0.40

TABLE 4. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4D2, TUBE 0954

Site 4D2-S, Tube 0954 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.19	0.30
diphenylmethanone	10.20	0.20
diethyl phthalate	10.23	0.50
diphenylamine	10.48	0.70
4-hydroxy-3,5-di-tert-butylbenzaldehyde	10.62	0.30
trichlorobiphenyl	10.98	0.10
isopropyl myristate	11.25	0.20
hexadecanoic acid	11.32	0.10
trichlorobiphenyl	11.32	0.10
phenanthrene	11.40	0.30
trichlorobiphenyl	11.59	0.20
dibutyl phthalate	11.60	62
dioctyl phthalate	11.60	7.6
tetrachlorobiphenyl	11.83	0.0
tetrachlorobiphenyl	11.94	0.20
tetrachlorobiphenyl (nc)	12.00	0.10
tetrachlorobiphenyl (nc)	12.05	0.10
tetrachlorobiphenyl	12.05	0.0
tetrachlorobiphenyl	12.16	0.10
pentachlorobiphenyl	12.60	0.20
diisooctyl phthalate	12.70	0.60
pentachlorobiphenyl	12.74	0.10

TABLE 5. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4FT, TUBE 0936

Site 4FT-S, Tube 0936 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.12	0.10
diisopropylamine	2.51	0.0
hexane	2.68	0.30
trichloroethylene	2.97	0.10
4-methyl-2-pentanone	3.68	93
toluene	3.97	420
3-heptanone	4.19	29
1-octene	4.22	0.20
tetrachloroethylene	4.33	38
dimethyl benzene	5.13	110
benzaldehyde	5.8	13
propyl benzene	6.05	32
dichlorobenzene	6.46	3.4
2,3,6-trimethyl octane	6.64	0.9
unknown	6.68	2.8
C3 benzene	6.74	13
acetophenone	6.74	13
triethyl ester phosphoric acid	7.03	0.80
O,O-diethyl-S-ethylphosphorothioate	7.35	0.0
unknown	7.42	38
decahydro-2-methyl naphthalene	7.48	0.40
unknown	7.54	0.70
naphthalene	7.74	9.4
benzoic acid	7.77	12

TABLE 5. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4FT, TUBE 0936

Site 4FT-S, Tube 0936 Compound	Retention Time (minutes)	Concentration pg/L
unknown	7.83	0.50
unknown	7.97	59
benzothiazole	8.11	93
unknown	8.41	1.5
unknown	8.54	0.40
2-[bis[1-isopropyl]aminoethanol	8.57	0.60
N,N-dibutylformamide	8.57	0.60
1-methyl naphthalene	8.75	16
2-methyl naphthalene	8.75	16
trichlorophenol	9.06	0.20
n-propyl-benzamide	9.07	1.8
biphenyl	9.20	17
N,N-diethylbenzamide	9.30	0.10
1,1'-oxybis-benzene	9.32	19
4-methyl-2,6-di(tert)butyl phenylol	9.44	0.80
C3 naphthalene	9.50	2.6
1,6-dimethylnaphthalene	9.50	7.8
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	9.58	4.2
2-methyl-1,1'-biphenyl	9.59	0.30
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene- 1,4-dione	9.62	0.90
1,2-dihydro-acenaphthylene	9.82	0.30
unknown	9.99	1.0
unknown	10.02	0.20

TABLE 5. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4FT, TUBE 0936

Site 4FT-S, Tube 0936 Compound	Retention Time (minutes)	Concentration pg/L
diphenylamine	10.08	0.60
unknown	10.14	0.10
diphenylmethanone	10.14	0.40
diethyl phthalate	10.23	0.20
4-hydroxy-3,5-di-tert-butylbenzaldehyde	10.65	0.10
trichlorobiphenyl	11.12	0.10
isopropyl myristate	11.20	0.20
trichlorobiphenyl	11.32	0.10
trichlorobiphenyl	11.36	0.20
dioctyl phthalate	11.49	0.30
tetrachlorobiphenyl	11.55	0.10
dibutyl phthalate	11.55	76
tetrachlorobiphenyl (nc)	11.57	0.40
phenanthrene	11.68	2.6
hexadecanoic acid	11.76	0.40
tetrachlorobiphenyl (nc)	12.06	0.10
tetrachlorobiphenyl	12.09	0.0
tetrachlorobiphenyl	12.23	0.0
tetrachlorobiphenyl	12.23	0.0
pentachlorobiphenyl	12.60	0.10
diisooctylphthalate	12.73	0.70
pentachlorobiphenyl	12.74	0.10

TABLE 6. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4C, TUBE 0714

Site 4C, Tube 0714 Compound	Retention Time (minutes)	Concentration pg/L
2-[bis[1-isopropyl]aminoethanol	not found	not found
trichlorofluoromethane	2.15	1.9
diisopropylamine	2.51	0.10
n-(isopropyl)-2-propanamine	2.62	31
hexane	2.62	24
chloroform	2.67	0.10
trichloroethylene	2.95	0.0
4-methyl-2-pentanone	3.67	30
toluene	3.97	310
1-octene	4.11	3.0
3-heptanone	4.18	30.0
tetrachloroethylene	4.33	95
dimethyl benzene	5.13	140
1,4-oxathiane	5.68	0.70
benzaldehyde	5.79	140
propyl benzene	5.91	7.0
phenol	6.27	0.20
2,3,6-trimethyl octane	6.34	0.30
dichlorobenzene	6.45	2.1
acetophenone	6.50	3.2
unknown	6.67	2.7
limonene	6.92	1.4
decahydro-2-methyl naphthalene	7.00	0.20

TABLE 6. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4C, TUBE 0714

Site 4C, Tube 0714 Compound	Retention Time (minutes)	Concentration pg/L
triethyl ester phosphoric acid	7.03	4.1
C3 benzene	7.14	1.5
benzoic acid	7.53	380
unknown	7.69	4.3
unknown	7.70	1.4
naphthalene	7.77	79
unknown	7.77	0.80
O,O-diethyl-S-ethylphosphorothioate	7.89	0.10
benzothiazole	8.10	38
trichlorobenzene	8.17	0.10
unknown	8.17	1.6
unknown	8.45	0.70
N,N-dibutylformamide	8.50	12
1-methyl naphthalene	8.62	28
unknown	8.93	0.30
trichlorophenol	9.22	0.10
2-methyl naphthalene	9.30	12
1,1'-oxybis-benzene	9.30	35
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4-dione	9.39	0.50
biphenyl	9.40	2.1
1,6-dimethylnaphthalene	9.64	6.9
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl-bicyclo[3.1.0]hexan-2-one	9.67	0.30

TABLE 6. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4C, TUBE 0714

Site 4C, Tube 0714 Compound	Retention Time (minutes)	Concentration pg/L
diethyl phthalate	9.81	0.40
2-methyl-1,1'-biphenyl	9.88	2.9
4-methyl-2,6-di(tert)butyl phenylol	10.03	0.20
1,2-dihydro-acenaphthylene	10.04	2.7
n-propyl-benzamide	10.10	8.3
unknown	10.10	8.3
diphenylamine	10.22	1.5
N,N-diethylbenzamide	10.23	0.50
unknown	10.28	0.20
C3 naphthalene	10.44	5.2
unknown	10.62	1.2
diphenylmethanone	10.68	0.80
trichlorobiphenyl	10.82	0.10
isopropyl myristate	11.26	0.30
4-hydroxy-3,5-di-tert-butylbenzaldehyde	11.45	0.20
trichlorobiphenyl	11.47	0.50
trichlorobiphenyl	11.47	0.50
dibutyl phthalate	11.57	160
tetrachlorobiphenyl (nc)	11.64	0.20
tetrachlorobiphenyl	11.64	0.20
tetrachlorobiphenyl	11.72	0.10
phenanthrene	11.88	36
tetrachlorobiphenyl (nc)	11.95	0.10

**TABLE 6. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4C,
TUBE 0714**

Site 4C, Tube 0714 Compound	Retention Time (minutes)	Concentration pg/L
dioctyl phthalate	12.05	0.20
pentachlorobiphenyl	12.23	0.10
hexadecanoic acid	12.56	27
tetrachlorobiphenyl	12.74	6.7
diisooctyl phthalate	12.93	3.0
tetrachlorobiphenyl	13.05	4.8
pentachlorobiphenyl	13.20	0.10

TABLE 7. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4A, TUBE 0959

Site 4A-S, Tube 0959 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.37	78
hexane	2.82	120
diisopropylamine	3.23	0.60
trichloroethylene	3.92	44
4-methyl-2-pentanone	4.42	6.9
toluene	5.00	610
1-octene	5.06	0.20
3-heptanone	5.44	43
tetrachloroethylene	5.64	130
dimethyl benzene	6.91	180
propyl benzene	7.76	23
benzaldehyde	7.83	240
2,3,6-trimethyl octane	8.12	3.3
dichlorobenzene	8.43	4.0
unknown	8.59	0.50
C3 benzene	8.71	5.8
acetophenone	8.93	150
triethyl ester phosphoric acid	9.03	0.70
decahydro-2-methyl naphthalene	9.25	0.20
unknown	9.51	4.1
unknown	9.70	2.9
O,O-diethyl-S-ethylphosphorothioate	9.86	0.10
benzoic acid	9.88	480

TABLE 7. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4A, TUBE 0959

Site 4A-S, Tube 0959 Compound	Retention Time (minutes)	Concentration pg/L
naphthalene	10.14	88
unknown	10.38	42
unknown	10.44	1.4
benzothiazole	10.49	150
2-[bis[1-isopropyl]aminoethanol	10.67	0.50
N,N-dibutylformamide	10.67	0.50
unknown	10.80	1.0
unknown	10.88	0.90
2-methyl naphthalene	10.89	1.1
1-methyl naphthalene	11.16	13
trichlorophenol	11.56	0.20
1,6-dimethylnaphthalene	11.62	0.40
1,1'-oxybis-benzene	11.74	17
biphenyl	11.84	0.80
n-propyl-benzamide	12.12	3.7
C3 naphthalene	12.16	0.70
unknown	12.23	2.1
2-methyl-1,1'-biphenyl	12.27	0.1
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	12.28	0.200
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4- dione	12.32	0.60
N,N-diethylbenzamide	12.38	0.30
1,2-dihydro-acenaphthylene	12.50	1.4

TABLE 7. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 4A, TUBE 0959

Site 4A-S, Tube 0959 Compound	Retention Time (minutes)	Concentration pg/L
4-methyl-2,6-di(tert)butyl phenol	12.61	0.20
unknown	12.65	20.0
diethyl phthalate	12.86	41
diphenylamine	12.93	0.20
diphenylmethanone	12.99	0.60
unknown	13.07	0.50
4-hydroxy-3,5-di-tert-butylbenzaldehyde	13.64	0.10
isopropyl myristate	13.77	2.4
trichlorobiphenyl	13.87	0.10
trichlorobiphenyl	14.17	1.3
phenanthrene	14.35	26
dibutyl phthalate	14.55	1.9
trichlorobiphenyl	14.60	0.50
tetrachlorobiphenyl (nc)	14.84	0.10
dioctyl phthalate	14.87	0.0
tetrachlorobiphenyl	15.05	1.2
hexadecanoic acid	15.11	0.70
tetrachlorobiphenyl	15.31	0.30
tetrachlorobiphenyl	15.40	0.20
tetrachlorobiphenyl (nc)	15.42	0.90
tetrachlorobiphenyl	15.70	0.40
diisooctyl phthalate	16.20	350
pentachlorobiphenyl	16.29	0.10
pentachlorobiphenyl	16.32	0.30

TABLE 8. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1FA, TUBE 0824

Site 1F-A, Tube 0824 Compound	Retention Time (minutes)	Concentration pg/L
4-methyl-2-pentanone	not found	not found
unknown	not found	not found
trichlorofluoromethane	2.36	29
hexane	2.81	16
diisopropylamine	3.22	0.30
trichloroethylene	3.96	55
toluene	5.02	1200
1-octene	5.28	3.0
3-heptanone	5.42	120
tetrachloroethylene	5.64	170
dimethyl benzene	6.91	140
propyl benzene	7.76	40.0
benzaldehyde	7.83	340
2,3,6-trimethyl octane	8.12	3.9
dichlorobenzene	8.43	10.0
C3 benzene	8.71	16
acetophenone	8.71	16
unknown	8.91	6.1
triethyl ester phosphoric acid	9.09	0.50
decahydro-2-methyl naphthalene	9.21	0.30
O,O-diethyl-S-ethylphosphorothioate	9.40	0.0
benzoic acid	9.69	9.3
unknown	9.75	58
unknown	10.10	17

TABLE 8. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1FA, TUBE 0824

Site 1F-A, Tube 0824 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.10	6.8
naphthalene	10.14	150
benzothiazole	10.49	96
unknown	10.81	2.5
2-methyl naphthalene	10.89	2.8
2-[bis[1-isopropyl]aminoethanol	10.90	42
N,N-dibutylformamide	10.90	42
unknown	10.96	9.0
trichlorophenol	11.11	0.20
1-methyl naphthalene	11.16	20.0
biphenyl	11.62	85
1,6-dimethylnaphthalene	11.62	0.80
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	11.71	0.50
1,1'-oxybis-benzene	11.74	110
N,N-diethylbenzamide	11.93	0.20
4-methyl-2,6-di(tert)butyl phenylol	12.01	0.60
n-propyl-benzamide	12.03	13
C3 naphthalene	12.16	0.60
unknown	12.23	22
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene- 1,4-dione	12.32	1.0
2-methyl-1,1'-biphenyl	12.33	3.3
unknown	12.53	0.60
1,2-dihydro-acenaphthylene	12.62	1.0

TABLE 8. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1FA, TUBE 0824

Site 1F-A, Tube 0824 Compound	Retention Time (minutes)	Concentration pg/L
unknown	12.64	72
diethyl phthalate	12.86	70
diphenylamine	12.87	1.1
diphenylmethanone	12.99	1.1
4-hydroxy-3,5-di-tert-butylbenzaldehyde	13.61	0.10
isopropyl myristate	13.78	4.3
trichlorobiphenyl	14.18	8.8
phenanthrene	14.35	59
trichlorobiphenyl	14.40	4.0
trichlorobiphenyl	14.60	1.1
tetrachlorobiphenyl	14.79	1.4
hexadecanoic acid	15.05	2.0
dibutyl phthalate	15.12	72
dioctyl phthalate	15.13	21
tetrachlorobiphenyl	15.32	2.0
tetrachlorobiphenyl	15.40	2.8
tetrachlorobiphenyl (nc)	15.52	1.5
tetrachlorobiphenyl	15.75	8.2
tetrachlorobiphenyl	15.75	8.2
pentachlorobiphenyl	16.33	0.80
pentachlorobiphenyl	16.71	0.30

TABLE 9. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1C2, TUBE 0963

Site 1C-2, Tube 0963 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.32	0.10
hexane	2.81	0.0
diisopropylamine	3.34	4.6
trichloroethylene	3.91	26
4-methyl-2-pentanone	4.44	5.1
toluene	4.97	1500
1-octene	5.31	1.7
3-heptanone	5.42	76
tetrachloroethylene	5.63	480
dimethyl benzene	6.91	530
propyl benzene	7.75	64
benzaldehyde	7.83	320
2,3,6-trimethyl octane	8.12	14
dichlorobenzene	8.43	22
C3 benzene	8.47	160
unknown	8.60	3.3
acetophenone	8.69	13
triethyl ester phosphoric acid	9.37	15
decahydro-2-methyl naphthalene	9.62	8.8
O,O-diethyl-S-ethylphosphorothioate	9.68	24
unknown	9.91	24
benzoic acid	9.92	180
unknown	10.09	14
unknown	10.10	5.5

TABLE 9. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1C2, TUBE 0963

Site 1C-2, Tube 0963 Compound	Retention Time (minutes)	Concentration pg/L
naphthalene	10.13	200
unknown	10.18	87
benzothiazole	10.48	140
2-methyl naphthalene	10.89	8.7
N,N-dibutylformamide	10.89	160
2-[bis[1-isopropyl]aminoethanol	10.89	160
unknown	10.94	4.6
1-methyl naphthalene	11.16	54
unknown	11.29	15
1,6-dimethylnaphthalene	11.60	1.4
biphenyl	11.61	37
trichlorophenol	11.65	0.60
n-propyl-benzamide	11.71	140
1,1'-oxybis-benzene	11.73	19
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	11.84	1.2
C3 naphthalene	12.14	1.3
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4- dione	12.31	1.3
2-methyl-1,1'-biphenyl	12.32	11
N,N-diethylbenzamide	12.43	1.2
unknown	12.44	49
4-methyl-2,6-di(tert)butyl phenylol	12.58	0.90
1,2-dihydro-acenaphthylene	12.61	2.2
unknown	12.84	13

TABLE 9. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1C2, TUBE 0963

Site 1C-2, Tube 0963 Compound	Retention Time (minutes)	Concentration pg/L
diethyl phthalate	12.85	100
diphenylmethanone	12.97	2.4
unknown	13.04	0.60
diphenylamine	13.40	3.5
4-hydroxy-3,5-di-tert-butylbenzaldehyde	13.68	0.20
isopropyl myristate	13.76	4.4
trichlorobiphenyl	13.92	0.20
phenanthrene	14.33	98
dibutyl phthalate	14.55	5.3
trichlorobiphenyl	14.58	0.50
tetrachlorobiphenyl	14.78	0.40
trichlorobiphenyl	14.89	1.2
tetrachlorobiphenyl (nc)	14.92	0.40
tetrachlorobiphenyl	15.03	2.3
hexadecanoic acid	15.15	0.70
dioctyl phthalate	15.18	28
tetrachlorobiphenyl (nc)	15.42	2.8
tetrachlorobiphenyl	15.73	2.3
tetrachlorobiphenyl	16.07	0.20
diisooctyl phthalate	16.29	1.3
pentachlorobiphenyl	16.31	0.20
pentachlorobiphenyl	16.31	0.30

TABLE 10. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1D1, TUBE 0953

Site 1D-1, Tube 0953 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.43	0.30
hexane	2.79	4.5
diisopropylamine	3.34	11
trichloroethylene	3.89	20
4-methyl-2-pentanone	4.44	5.0
toluene	4.99	1000
1-octene	5.31	0.30
3-heptanone	5.42	54
tetrachloroethylene	5.61	180
dimethyl benzene	6.90	430
benzaldehyde	7.81	370
propyl benzene	7.84	110
dichlorobenzene	8.42	13
C3 benzene	8.45	85
2,3,6-trimethyl octane	8.48	1.0
unknown	8.89	7.0
acetophenone	9.02	38
triethyl ester phosphoric acid	9.31	160
O,O-diethyl-S-ethylphosphorothioate	9.65	12
decahydro-2-methyl naphthalene	9.67	0.9
unknown	9.89	14
benzoic acid	9.91	600
unknown	10.07	12
naphthalene	10.07	16

TABLE 10. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1D1, TUBE 0953

Site 1D-1, Tube 0953 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.17	50
benzothiazole	10.46	220
unknown	10.60	1.4
2-methyl naphthalene	10.87	5.2
N,N-dibutylformamide	10.88	140
2-[bis[1-isopropyl]aminoethanol	10.88	140
unknown	10.90	1.5
1-methyl naphthalene	11.14	37
trichlorophenol	11.18	0.40
unknown	11.27	11
1,6-dimethylnaphthalene	11.60	1.2
1,1'-oxybis-benzene	11.72	9.8
biphenyl	11.82	1.9
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	11.82	0.50
n-propyl-benzamide	12.01	8.0
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4- dione	12.30	0.80
2-methyl-1,1'-biphenyl	12.31	6.7
unknown	12.39	7.7
unknown	12.43	36
N,N-diethylbenzamide	12.48	0.40
unknown	12.51	1.9
4-methyl-2,6-di(tert)butyl phenylol	12.57	0.70
1,2-dihydro-acenaphthylene	12.60	1.5

TABLE 10. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 1D1, TUBE 0953

Site 1D-1, Tube 0953 Compound	Retention Time (minutes)	Concentration pg/L
C3 naphthalene	12.75	3.2
diethyl phthalate	12.84	52
diphenylamine	12.92	0.30
diphenylmethanone	12.97	1.5
4-hydroxy-3,5-di-tert-butylbenzaldehyde	13.66	0.20
isopropyl myristate	13.81	0.10
trichlorobiphenyl	13.91	0.30
phenanthrene	14.32	83
trichlorobiphenyl	14.57	0.80
tetrachlorobiphenyl	14.77	0.60
tetrachlorobiphenyl (nc)	14.84	0.20
trichlorobiphenyl	14.87	1.4
hexadecanoic acid	15.02	0.90
tetrachlorobiphenyl	15.03	2.0
dibutyl phthalate	15.10	61
dioctyl phthalate	15.12	21
tetrachlorobiphenyl (nc)	15.49	0.60
tetrachlorobiphenyl	15.72	2.0
tetrachlorobiphenyl	16.06	0.10
pentachlorobiphenyl	16.34	0.0
pentachlorobiphenyl	16.34	0.10

TABLE 11. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM E205, TUBE 0924

Site E205 S, Tube 0924 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.35	100
hexane	2.81	87
diisopropylamine	3.24	0.20
trichloroethylene	3.90	180
4-methyl-2-pentanone	4.45	1.3
toluene	4.97	1400
1-octene	5.30	1.1
3-heptanone	5.39	45
tetrachloroethylene	5.62	510
dimethyl benzene	6.90	190
benzaldehyde	7.82	390
propyl benzene	7.84	39
dichlorobenzene	8.31	1.1
2,3,6-trimethyl octane	8.50	3.4
C3 benzene	8.68	15
acetophenone	8.68	15
unknown	8.89	3.9
triethyl ester phosphoric acid	9.02	2.7
O,O-diethyl-S-ethylphosphorothioate	9.42	0.0
unknown	9.49	5.7
decahydro-2-methyl naphthalene	9.61	2.9
unknown	9.69	11
benzoic acid	9.90	190
naphthalene	10.08	19

TABLE 11. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM E205, TUBE 0924

Site E205 S, Tube 0924 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.42	2.7
unknown	10.47	0.40
unknown	10.54	6.4
benzothiazole	10.63	7.8
1-methyl naphthalene	10.71	5.4
2-[bis[1-isopropyl]aminoethanol	10.72	1.8
N,N-dibutylformamide	10.72	1.8
2-methyl naphthalene	10.87	2.1
unknown	11.28	2.8
1,6-dimethylnaphthalene	11.60	1.7
biphenyl	11.60	140
trichlorophenol	11.64	0.20
n-propyl-benzamide	11.70	240
1,1'-oxybis-benzene	11.72	160
N,N-diethylbenzamide	11.97	0.50
C3 naphthalene	12.18	1.2
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	12.23	0.20
1,2-dihydro-acenaphthylene	12.23	0.50
2-methyl-1,1'-biphenyl	12.27	0.20
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4- dione	12.30	0.40
4-methyl-2,6-di(tert)butyl phenylol	12.57	0.0
unknown	12.62	62
unknown	12.84	22

TABLE 11. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM E205, TUBE 0924

Site E205 S, Tube 0924 Compound	Retention Time (minutes)	Concentration pg/L
diethyl phthalate	12.84	130
diphenylamine	12.92	0.20
diphenylmethanone	13.04	1.7
unknown	13.07	0.30
isopropyl myristate	13.75	2.8
trichlorobiphenyl	13.91	0.50
4-hydroxy-3,5-di-tert-butylbenzaldehyde	14.10	0.10
phenanthrene	14.32	42
dibutyl phthalate	14.49	3.9
trichlorobiphenyl	14.57	1.1
tetrachlorobiphenyl	14.77	1.1
trichlorobiphenyl	14.87	2.3
tetrachlorobiphenyl (nc)	14.92	0.90
tetrachlorobiphenyl	15.03	4.7
hexadecanoic acid	15.08	1.0
dioctyl phthalate	15.12	16
tetrachlorobiphenyl	15.41	3.5
tetrachlorobiphenyl	15.72	4.2
tetrachlorobiphenyl	16.03	0.30
pentachlorobiphenyl	16.29	0.50
pentachlorobiphenyl	16.30	0.30

**TABLE 12. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 111,
TUBE 0365**

Site 11-1, Tube 0365 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.35	61
hexane	2.81	35
diisopropylamine	3.35	11
trichloroethylene	3.91	100
4-methyl-2-pentanone	4.26	0.40
toluene	4.99	1100
1-octene	5.26	1.8
3-heptanone	5.39	160
tetrachloroethylene	5.62	310
dimethyl benzene	6.90	310
benzaldehyde	7.81	330
propyl benzene	7.84	110
dichlorobenzene	8.42	11
C3 benzene	8.47	100
2,3,6-trimethyl octane	8.48	3.2
acetophenone	8.68	12
unknown	8.89	8.2
triethyl ester phosphoric acid	9.29	97
decahydro-2-methyl naphthalene	9.66	0.90
O,O-diethyl-S-ethylphosphorothioate	9.66	24
unknown	9.90	7.5
benzoic acid	9.92	680
unknown	10.04	5.4
naphthalene	10.07	24

**TABLE 12. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 111,
TUBE 0365**

Site 11-1, Tube 0365 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.07	16
benzothiazole	10.47	67
unknown	10.54	3.5
2-methyl naphthalene	10.88	7.6
N,N-dibutylformamide	10.88	140
2-[bis[1-isopropyl]amino ethanol	10.88	140
unknown	10.91	1.5
trichlorophenol	11.12	0.30
1-methyl naphthalene	11.14	42
unknown	11.28	7.2
1,6-dimethylnaphthalene	11.60	1.3
1,1'-oxybis-benzene	11.72	14
biphenyl	11.81	1.3
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	11.99	33
n-propyl-benzamide	12.08	9.8
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4- dione	12.31	1.7
2-methyl-1,1'-biphenyl	12.31	5.6
N,N-diethylbenzamide	12.47	0.40
unknown	12.51	1.6
1,2-dihydro-acenaphthylene	12.57	4.5
4-methyl-2,6-di(tert)butyl phenylol	12.58	0.40
C3 naphthalene	12.75	3.5
unknown	12.79	2.3

TABLE 12. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 111, TUBE 0365

Site 11-1, Tube 0365 Compound	Retention Time (minutes)	Concentration pg/L
unknown	12.83	18
diethyl phthalate	12.83	108
diphenylamine	12.85	1.5
diphenylmethanone	12.97	1.7
isopropyl myristate	13.76	2.4
trichlorobiphenyl	13.91	0.20
4-hydroxy-3,5-di-tert-butylbenzaldehyde	14.16	0.40
trichlorobiphenyl	14.16	1.7
phenanthrene	14.31	56
tetrachlorobiphenyl	14.85	0.20
trichlorobiphenyl	14.88	0.90
dibutyl phthalate	14.91	82
tetrachlorobiphenyl (nc)	14.92	0.50
hexadecanoic acid	15.03	1.2
dioctyl phthalate	15.10	17
tetrachlorobiphenyl	15.38	0.80
tetrachlorobiphenyl	15.40	0.70
tetrachlorobiphenyl	15.71	1.8
tetrachlorobiphenyl	15.71	1.7
pentachlorobiphenyl	16.22	0.10
pentachlorobiphenyl	16.31	0.30

**TABLE 13. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 113,
TUBE 0670**

Site 11-3, Tube 0670 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.41	3.7
hexane	2.88	2.9
diisopropylamine	3.37	0.90
trichloroethylene	3.90	31
4-methyl-2-pentanone	4.44	16
toluene	4.97	1000
1-octene	5.29	0.70
3-heptanone	5.39	70
tetrachloroethylene	5.61	120
dimethyl benzene	6.90	410
benzaldehyde	7.81	280
propyl benzene	7.84	120
dichlorobenzene	8.42	11
C3 benzene	8.47	100
acetophenone	8.68	11
unknown	8.89	9.3
triethyl ester phosphoric acid	9.31	100
unknown	9.52	6.1
decahydro-2-methyl naphthalene	9.61	6.7
O,O-diethyl-S-ethylphosphorothioate	9.67	59
unknown	9.67	10
benzoic acid	9.92	610
unknown	10.09	7.0
naphthalene	10.12	190

TABLE 13. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 113, TUBE 0670

Site 11-3, Tube 0670 Compound	Retention Time (minutes)	Concentration pg/L
unknown	10.17	140
benzothiazole	10.25	6.1
unknown	10.47	1.3
N,N-dibutylformamide	10.88	140
2-[bis[1-isopropyl]aminoethanol	10.88	140
2-methyl naphthalene	10.88	5.7
1-methyl naphthalene	11.14	36
unknown	11.29	6.9
trichlorophenol	11.63	0.60
1,1'-oxybis-benzene	11.72	14
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	11.78	0.50
biphenyl	11.81	1.2
N,N-diethylbenzamide	11.92	0.10
n-propyl-benzamide	12.08	4.7
1,6-dimethylnaphthalene	12.17	3.3
1,2-dihydro-acenaphthylene	12.20	1.5
2-methyl-1,1'-biphenyl	12.31	5.7
2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene- 1,4-dione	12.31	1.5
unknown	12.43	9.1
4-methyl-2,6-di(tert)butyl phenylol	12.58	0.50
C3 naphthalene	12.75	3.4
unknown	12.84	8.6
diethyl phthalate	12.84	74

TABLE 13. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 113, TUBE 0670

Site 11-3, Tube 0670 Compound	Retention Time (minutes)	Concentration pg/L
diphenylmethanone	12.97	1.5
unknown	13.05	0.40
diphenylamine	13.40	2.4
4-hydroxy-3,5-di-tert-butylbenzaldehyde	13.63	0.20
phenanthrene	14.33	60
isopropyl myristate	14.43	0.30
trichlorobiphenyl	14.47	0.30
trichlorobiphenyl	14.58	0.60
tetrachlorobiphenyl	14.77	0.30
trichlorobiphenyl	14.88	0.90
dibutyl phthalate	14.92	30
tetrachlorobiphenyl (nc)	14.92	0.30
tetrachlorobiphenyl	15.09	0.70
tetrachlorobiphenyl	15.09	0.70
dioctyl phthalate	15.11	17
hexadecanoic acid	15.16	0.80
tetrachlorobiphenyl	15.41	1.6
tetrachlorobiphenyl	15.41	0.80
pentachlorobiphenyl	15.58	0.0
pentachlorobiphenyl	16.62	0.10

TABLE 14. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 132, TUBE 0929

Site 132, Tube 0929 Compound	Retention Time (minutes)	Concentration pg/L
trichlorofluoromethane	2.36	74
hexane	2.81	27
chloroform	3.06	300
diisopropylamine	3.31	600
trichloroethylene	3.90	57
4-methyl-2-pentanone	4.40	4.3
toluene	4.95	1700
1-octene	5.19	1.9
3-heptanone	5.42	0.0
tetrachloroethylene	5.63	560
benzaldehyde	6.45	210
dimethyl benzene	6.56	57
1,4-oxathiane	6.60	46
propyl benzene	7.68	30
acetophenone	8.15	280
trimethyl octane	8.30	1.1
limonene	8.32	14
dichlorobenzene	8.43	12
methyl ethyl benzene	8.47	100

TABLE 14. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 132, TUBE 0929

Site 132, Tube 0929 Compound	Retention Time (minutes)	Concentration pg/L
unknown	8.48	7.8
triethyl ester phosphoric acid	8.60	0.30
decahydro-2-methyl naphthalene	9.18	1.3
unknown	9.20	29
unknown	9.42	12
unknown	9.52	2.4
benzoic acid	9.53	5.3
O,O-diethyl-S-ethylphosphorothioate	9.68	18
unknown	10.00	2.6
trichlorobenzene	10.01	37
unknown	10.08	4.9
1-methyl naphthalene	10.26	9.0
benzothiazole	10.48	73
N,N-dibutylformamide	10.62	2.7
2-[bis[1-isopropyl]amino ethanol	10.63	2.7
biphenyl	10.79	1.0
trichlorophenol	11.03	0.10
N-propyl benzamide	11.05	2.0
2-methyl naphthalene	11.16	45

TABLE 14. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 132, TUBE 0929

Site 132, Tube 0929 Compound	Retention Time (minutes)	Concentration pg/L
1,5-bis(1,1-dimethylethyl)-3,3-dimethyl- bicyclo[3.1.0]hexan-2-one	11.26	0.50
1,1'-oxybisbenzene	11.41	0.10
1,6-dimethylnaphthalene	11.53	0.50
C3 naphthalene	11.61	3.7
2,6-bis(1,1-dimethylethyl)-2,5- cyclohexadiene-1,4-dione	11.63	0.10
2-methyl-1,1'-biphenyl	11.70	1.4
N,N-diethylbenzamide	11.84	0.30
unknown	11.88	0.40
1,2-dihydro-acenaphthylene	11.96	1.7
4-methyl-2,6-di(tert)butyl phenol	12.02	0.60
unknown	12.22	36
diphenylmethanone	12.33	0.70
diphenylamine	12.81	1.5
diethyl phthalate	12.84	140
trichlorobiphenyl	13.31	0.10
4-hydroxy-3,5-di-tert-butylbenzaldehyde	13.40	0.10
isopropyl myristate	13.65	0.20
trichlorobiphenyl	13.82	0.0

TABLE 14. SEMIQUANTITATIVE GC-MS RESULTS OF AIR SAMPLE FROM 132, TUBE 0929

Site 132, Tube 0929 Compound	Retention Time (minutes)	Concentration pg/L
tetrachlorobiphenyl (nc)	14.16	0.10
tetrachlorobiphenyl	14.17	1.9
phenanthrene	14.34	60
hexadecanoic acid	14.45	0.30
dialkyl phthalate (butyl)	14.49	3.6
tetrachlorobiphenyl	14.55	0.0
dioctyl phthalate	14.58	0.0
tetrachlorobiphenyl (nc)	14.71	0.10
tetrachlorobiphenyl	14.93	0.30
tetrachlorobiphenyl	14.98	0.0
pentachlorobiphenyl	15.31	0.30
diisooctylphthalate	15.36	6.4
pentachlorobiphenyl	15.84	0.10

ENCLOSURE 1:
MASTER LIST OF POTENTIAL CONTAMINANTS OF PILOT PLANT
BUILDING E5625

**MASTER LIST OF POTENTIAL CONTAMINANTS OF PILOT PLANT
BUILDING E5625**

Chemicals Possibly throughout the Building, from 1941 to 1985

1. PCBs
2. lead (in paint)
3. asbestos
- 3-A. mercury
- 3-B. chromium salts

Chemicals Possibly throughout the Building, from 1942 CC2 Production

4. N,N',2,2',4,4',6,6'-octachlorocarbaniide (CC2)
5. N,N'-diphenylurea (DPU)
6. bis(trichlorophenylurea) (TCPU)
7. acetic acid/sodium acetate
8. chlorine
9. N,N'-dichloro-bis(dichlorophenyl)urea
10. tetrachloroquinone
11. 1,1,2,2-tetrachloroethane
12. ethyl acetate
13. lead (cf #2)
14. copper
15. zinc

**Chemicals from Large-Scale GB Piloting, 1951-1956 or Longer, and
Bench-Scale G-Agent Synthesis, Laboratories 2D2, 2F, 3D2, 4D1, 4D2,
and 4F**

8. chlorine
16. isopropyl methylphosphonofluoridate (GB)
17. methanol/methoxide
18. phosphorus trichloride (TH)
19. dimethyl hydrogen phosphite (DMHP)
20. hydrogen fluoride (or sometimes sodium fluoride?)
21. hydrogen chloride (hydrochloric acid)
22. chloromethane
23. dimethyl ether
24. monomethyl dihydrogen phosphite
25. phosphorous acid
26. "phosphates"
27. tributylamine
28. N,N'-diisopropylcarbodiimide

- 28-A. N,N'-diisopropylurea
- 28-B. N,N'-dicyclohexylcarbodiimide
- 28-C. N,N'-dicyclohexylurea
- 29. xylene
- 30. carbon tetrachloride
- 31. trichloroethylene
- 32. Dowtherm A (73.5:26.5 diphenyl oxide/biphenyl)
- 33. monomethyl methylphosphonic acid ("phosphonic acid")
- 34. methylphosphonic acid anhydride ("pyrophosphonic acid")
- 35. methylphosphonyl dichloride ("dichloro")
- 36. methylphosphonyl difluoride (DF or "difluoro")
- 37. phosphorus oxychloride
- 38. isopropyl alcohol
- 39. sodium hydroxide (NW) (aqueous)
- 40. ethylene glycol
- 41. charcoal (exhausted adsorbent)
- 42. diisopropyl methylphosphonate (DIMP)
- 43. phosgene (CG)
- 44. isopropyl methylphosphonochloridate ("chloro-GB")
- 45. diisopropyl dimethylpyrophosphonate ("pyro")
- 46. dihydrogen dimethylpyrophosphonate ("pyro acid")
- 47. 2-chloropropane
- 48. isopropyl methylphosphonic acid ("i-acid") (or salts)
- 49. methylphosphonofluoridic acid
- 50. methylene chloride (?)
- 51. ethyl acetoacetate
- 52. pinacolyl methylphosphonofluoridate (GD)
- 53. cyclohexyl methylphosphonofluoridate (GF)
- 54. 2-methylcyclohexyl methylphosphonofluoridate (EA 1356)
- 55. trans-2-methylcyclohexyl methylphosphonofluoridate (EA 3534)
- 56. pinacolyl alcohol [$\text{CH}(\text{CH}_3)(\text{C}[\text{CH}_3]_3\text{OH})$]
- 57. cyclohexanol
- 58. cis/trans-2-methylcyclohexanol
- 59. trans-2-methylcyclohexanol
- 60. pinacolyl methylphosphonic acid (or salts)
- 61. cyclohexyl methylphosphonic acid (or salts)
- 62. cis/trans-2-methylcyclohexyl methylphosphonic acid (or salts)
- 63. trans-2-methylcyclohexyl methylphosphonic acid (or salts)
- 63-A. methylphosphonic acid (and salts)

**Chemicals from Limited Production of "Difluoro", 1975-1985,
Laboratories 3E, 4E, and 4F**

- 20. hydrogen fluoride (or sometimes sodium fluoride?)
- 35. methylphosphonyl dichloride ("dichloro")
- 36. methylphosphonyl difluoride (DF or "difluoro")
- 39. sodium hydroxide (NW) (aqueous)

Chemicals from VX Production, 1975-1985, Roof over 3rd-Floor Hall and Maintenance Shop (Step 1), Rooms 2A and 3A (Step 2), Room 113 (Step 3, Actual Conversion to VX)

21. hydrogen chloride (hydrochloric acid)
64. O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate (VX)
65. methyldichlorophosphine (SW)
66. ethanol (ZS)
67. butane and/or isobutane (RM)
68. Gulf BT (apparently a hydrocarbon mixture)
69. cumene (isopropylbenzene)
70. diethyl methylphosphonite (DEMP)
71. 2-diisopropylaminoethanol (KB)
72. ammonia (ZK)/ammonium chloride (RX)
73. sulfur
74. ethyl 2-diisopropylaminoethyl methylphosphonite (QL)
75. O-ethyl O-2-diisopropylaminoethyl methylphosphonothionate
76. ethyl hydrogen methylphosphonite
77. diaminomethylphosphine
78. chloroethane (JO)
79. bis(2-diisopropylaminoethyl) methylphosphonite (LT)
80. ethyl 2-diisopropylaminoethyl methylphosphonate
81. bis(2-diisopropylaminoethyl) methylphosphonate
82. ethyl methylphosphonic acid
83. methylphosphondiamide
84. Socony SV Light Oil
85. exhausted charcoal and particulate filters
- 85-A. 2-diisopropylaminoethanethiol
- 85-B. O-ethyl methylphosphonothioate
- 85-C. bis(diisopropylaminoethyl) sulfide
- 85-D. O-ethyl methylphosphonic acid anhydride
- 85-E. diethyl methylphosphonate

Chemicals from Production of Binary Agent (GB and VX) Reaction Fluids, 1968-1985, Pipe Storage Room (plus Laboratories 2B, 3E, 4B, 4E and 4F for Polysulfide)

36. methylphosphonyl difluoride (DF or "difluoro")
38. isopropyl alcohol
39. sodium hydroxide (NW) (aqueous)
73. sulfur
74. ethyl 2-diisopropylaminoethyl methylphosphonite (QL)
86. isopropylamine
87. dimethyl disulfide
88. dimethyl polysulfide (nominally pentasulfide) (NM)
89. polyisobutyl methacrylate
90. triethyl phosphonite
91. ethyl acetate
92. dibutylamine
93. "Alkyloid X125" thickener
94. calcium hypochlorite or sodium hypochlorite

- 95. monoethanolamine
- 96. acetone
- 97. benzene
- 98. methanesulfonate ion.

Chemicals from Limited Production of Glycolate Agents, 1961-1971, Laboratories 2C, 3C, 4A

- 17. methanol/methoxide
- 38. isopropyl alcohol
- 39. sodium hydroxide (NW) (aqueous)
- 40. ethylene glycol
- 99. 3-Quinuclidinyl Benzilate (BZ)
- 100. N-Methyl-4-Piperidyl Cyclopentylphenylglycolate (EA3443)
- 101. N-Methyl-4-Piperidyl Cyclobutylphenylglycolate (EA3580)
- 102. N-Methyl-4-Piperidyl Isopropylphenylglycolate (EA3834)
- 103. heptane
- 104. 3-quinuclidinol
- 105. sodium benzilate
- 106. N-methyl-4-piperidinol
- 107. sodium cyclopentylphenylglycolate
- 108. sodium cyclobutylphenylglycolate
- 109. sodium isopropylphenylglycolate
- 109-A. methyl benzilate
- 109-B. methyl cyclopentylphenylglycolate
- 109-C. methyl cyclobutylphenylglycolate
- 109-D. methyl isopropylphenylglycolate

Chemicals Involved In B-1 Dye Production, 1978-1984, Laboratories 2B and 3B

- 7. acetic acid/sodium acetate
- 21. hydrogen chloride (hydrochloric acid)
- 66. ethanol (ZS)
- 110. 1-p-nitrophenyl-2-aminonaphthalene (B-1 Dye)
- 111. p-nitrobenzenediazonium salts
- 112. 2-amino-1-naphthalenesulfonic acid (Tobias acid)
- 113. p-nitroaniline
- 114. sulfamic acid
- 115. sodium nitrite
- 116. 2-ethoxyethanol

Chemicals Involved in BBC Production, 1966, Laboratory 4B

- 39. sodium hydroxide (NW) (aqueous)
- 66. ethanol (ZS)
- 117. alpha-bromobenzyl cyanide
- 118. benzyl chloride
- 119. benzyl cyanide
- 120. bromine

- 121. hydrogen bromide
- 122. sodium bromate
- 123. sodium cyanide (or potassium cyanide)
- 124. sulfuric acid

XR (Botulinum Toxin from Clostridium botulinum) (Place and Time Not Known)

- 126. botulinum toxin (XR) in fermentation broth

Lysergic Acid and LSD (Lysergic Acid Diethylamide), 1964-1966, Laboratory 4C

- 127. lysergic acid
- 128. lysergic acid diethylamide agent thickeners
- 129. polyisobutyl methacrylate
- 130. Alkyloid X125

Chemicals Involved in Filling Operations, 1948-1985, 11 Laboratory Complex (111, 112, 113, 114, and 115)

- 16. isopropyl methylphosphonofluoridate (GB)
- 38. isopropyl alcohol
- 39. sodium hydroxide (NW) (aqueous)
- 40. ethylene glycol
- 52. pinacolyl methylphosphonofluoridate (GD)
- 53. cyclohexyl methylphosphonofluoridate (GF)
- 54. 2-methylcyclohexyl methylphosphonofluoridate (EA 1356)
- 55. trans-2-methylcyclohexyl methylphosphonofluoridate (EA 3534)
- 64. O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate (VX)
- 94. calcium hypochlorite or sodium hypochlorite
- 123. sodium cyanide (or potassium cyanide)
- 131. O-ethyl N,N-dimethylphosphoramidocyanidate (GA)
- 131-A. O-ethyl N,N-dimethylphosphoramidic acid
- 131-B. ethyl phosphorocyanidic acid
- 132. bis(2-chloroethyl) sulfide (H or HD)
- 132-A. bis(2-chloroethyl) sulfoxide
- 132-B. bis(2-chloroethyl) sulfone
- 132-C. 2-hydroxyethyl 2'-chloroethyl sulfide
- 132-D. 2-hydroxyethyl 2'-chloroethyl sulfoxide
- 132-E. 2-hydroxyethyl 2'-chloroethyl sulfone
- 132-F. thiodiglycol
- 132-G. bis(2-hydroxyethyl) sulfoxide
- 132-H. bis(2-hydroxyethyl) sulfone
- 132-I. 2-chloroethyl vinyl sulfide
- 132-J. 2-chloroethyl vinyl sulfoxide
- 132-J. 2-chloroethyl vinyl sulfone
- 132-K. divinyl sulfide
- 132-L. divinyl sulfoxide

- 132-M. divinyl sulfone
- 132-N. 1,4-dithiane
- 132-O. 1,4-thioxane

Chemicals Involved in Agent Transfer Operations, 1970-1985, 1I Laboratory Complex (1I1, 1I2, 1I3, 1I4, and 1I5)

- 16. isopropyl methylphosphonofluoridate (GB)
- 39. sodium hydroxide (NW) (aqueous)
- 43. phosgene (CG)
- 52. pinacolyl methylphosphonofluoridate (GD)
- 54. 2-methylcyclohexyl methylphosphonofluoridate (EA 1356)
- 64. O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate (VX)
- 94. calcium hypochlorite or sodium hypochlorite
- 131. O-ethyl N,N-dimethylphosphoramidocyanidate (GA)
- 132. bis(2-chloroethyl) sulfide (H or HD)
- 133. mixture of bis(2-chloroethylthioethyl) ether (T) with mustard (HD) (#132) -- known as HT
- 134. 2-chlorovinylchlorarsine (lewisite or L)
- 134-A. 2-chlorovinylarsonic acid
- 134-B. inorganic arsenic salts or oxide
- 135. cyanogen chloride (CK)

Chemicals Involved in Bulk Detoxification, 1970-1985, Laboratories 1I1, 1I4, and 1I5

- 39. sodium hydroxide (NW) (aqueous)
- 43. phosgene (CG)
- 94. calcium hypochlorite or sodium hypochlorite
- 132. bis(2-chloroethyl) sulfide (H or HD)
- 134. 2-chlorovinylchlorarsine (lewisite or L)
- 135. cyanogen chloride (CK)
- 136. nitrogen mustards (HN) (HN-1 and HN-3)
- 137. trichloronitromethane (chloropicrin or PS)
- 138. hydrogen cyanide (AC) (see #123)

Antiriot Agents CS, CS-1 and CS-2, Filling Operations, 1973-1975, Laboratories 1G and 1H

- 39. sodium hydroxide (NW) (aqueous)
- 139. o-chlorobenzylidenemalononitrile (CS), pure or coated with agents to prevent sticking
- 139-A. o-chlorobenzaldehyde
- 139-B. malononitrile

Filling Operations, 1973-1975, 1I Laboratory Complex (1I1, 1I2, 1I3, 1I4, and 1I5)

- 39. sodium hydroxide (NW) (aqueous)

- 43. phosgene (CG)
- 135. cyanogen chloride (CK)
- 137. trichloronitromethane (chloropicrin or PS)

Pilot Plant Incineration of War Gas Identification Sets, 1976-1977, Laboratories 1C and 115

- 16. isopropyl methylphosphonofluoridate (GB)
- 39. sodium hydroxide (NW) (aqueous)
- 43. phosgene (CG)
- 123. sodium cyanide (or potassium cyanide)
- 132. bis(2-chloroethyl) sulfide (H or HD)
- 134. 2-chlorovinyl dichlorarsine (lewisite or L)
- 135. cyanogen chloride (CK)
- 136. nitrogen mustards (HN) (HN-1 and HN-3)
- 137. trichloronitromethane (chloropicrin or PS)
- 140. chloroacetophenone (CN)
- 141. phenarsazine chloride (adamsite or DM)
- 142. triphosgene (CG simulant)
- 143. hexamethylene glycol (G-simulant)
- 144. 2-methoxyethanol (G-simulant)
- 145. tetrahydrofurfuryl alcohol
- 146. N-methylglucamine (V-simulant)
- 147. diethylene glycol (V-simulant)
- 148. isoamyl salicylate (H-simulant)

CR Dilution and Filling, 1979-1980, Laboratory 1A

- 149. dibenzo[b,f]-1,4-oxazepine (CR)
- 150. propylene glycol

Incineration of CR Solutions, 1981, Laboratory 1C

- 149. dibenzo[b,f]-1,4-oxazepine (CR)
- 150. propylene glycol

Incineration of CK, 1981, Laboratories 1C and 115

- 39. sodium hydroxide (NW) (aqueous)
- 135. cyanogen chloride (CK)

Toxic Base-Catalyzed Decomposition Products of VX and L, 1975-1985, 11 Laboratory Complex (111, 112, 113, 114, and 115) and Laboratory 1C

- 151. bis(diisopropylaminoethyl) disulfide (EA4196)
- 152. S-diisopropylaminoethyl methylphosphonothioic acid (EA2192)
- 153. 2-chlorovinylarsenoxide (lewisite oxide)

Appendix C:

**Floor Plans for Buildings
Monitored at the Pilot Plant Complex**

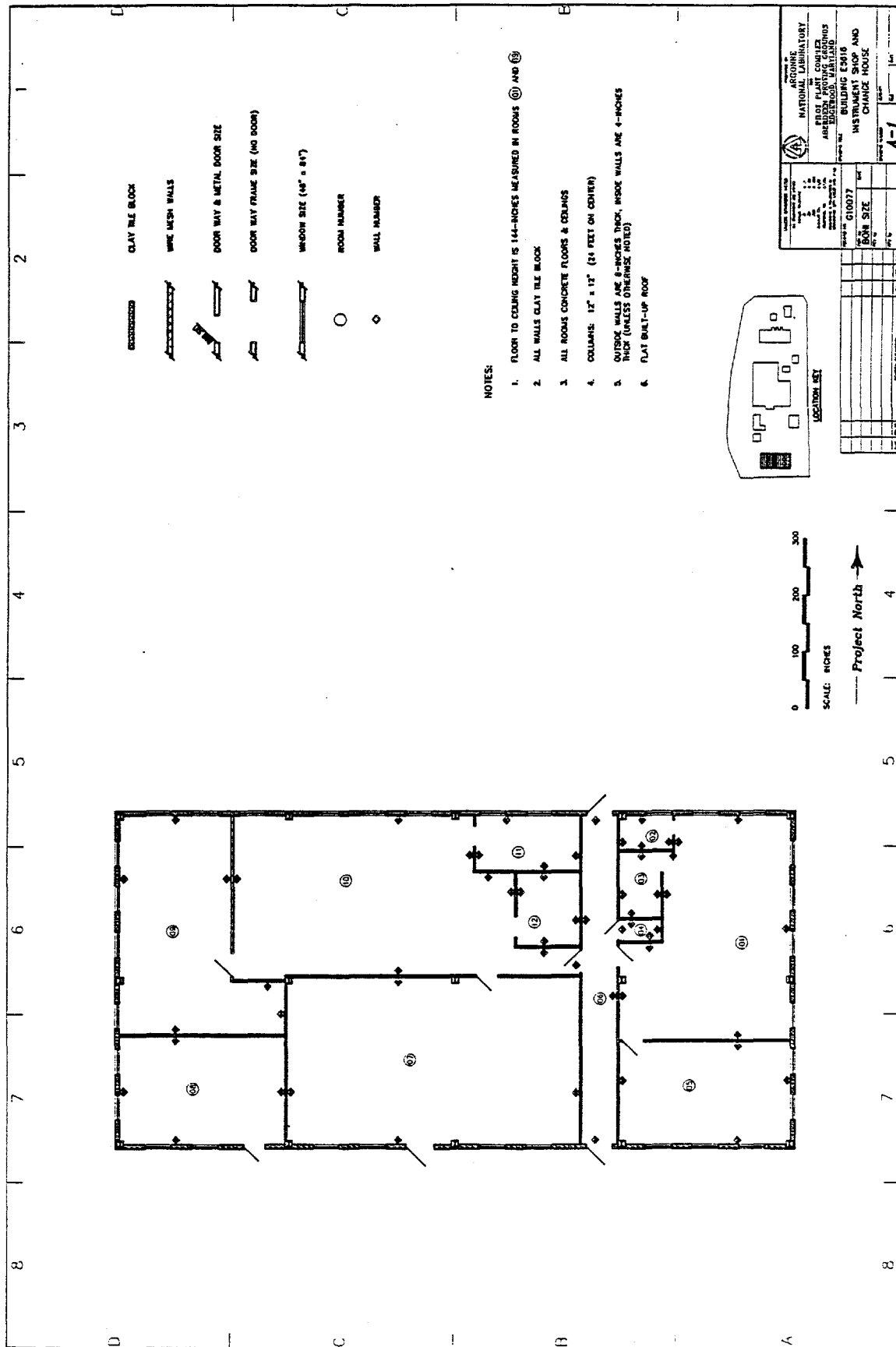


FIGURE C-1 Building E5616, Instrument Shop and Change House

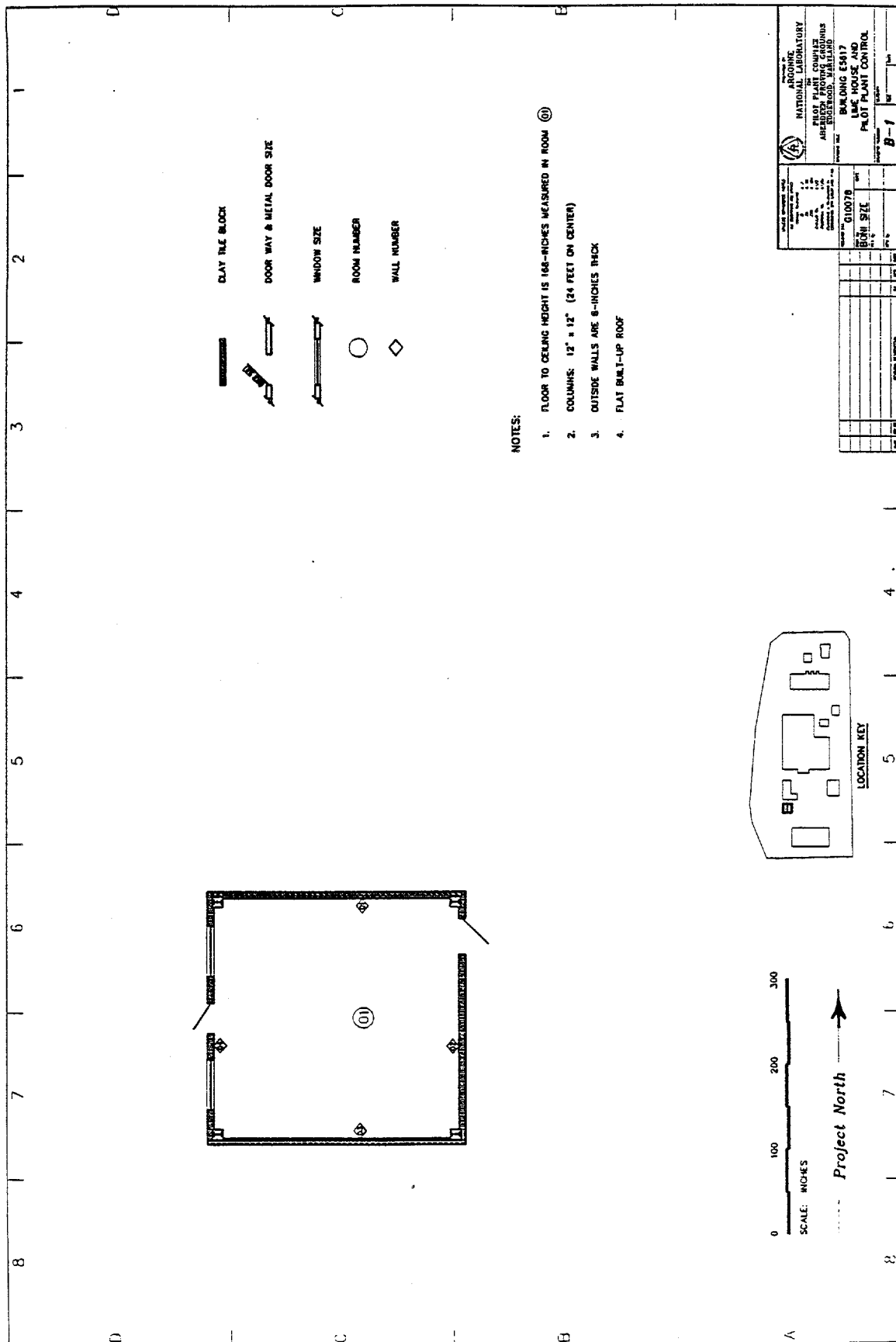


FIGURE C-2 Building E5617, Lime House and Pilot Plant Control

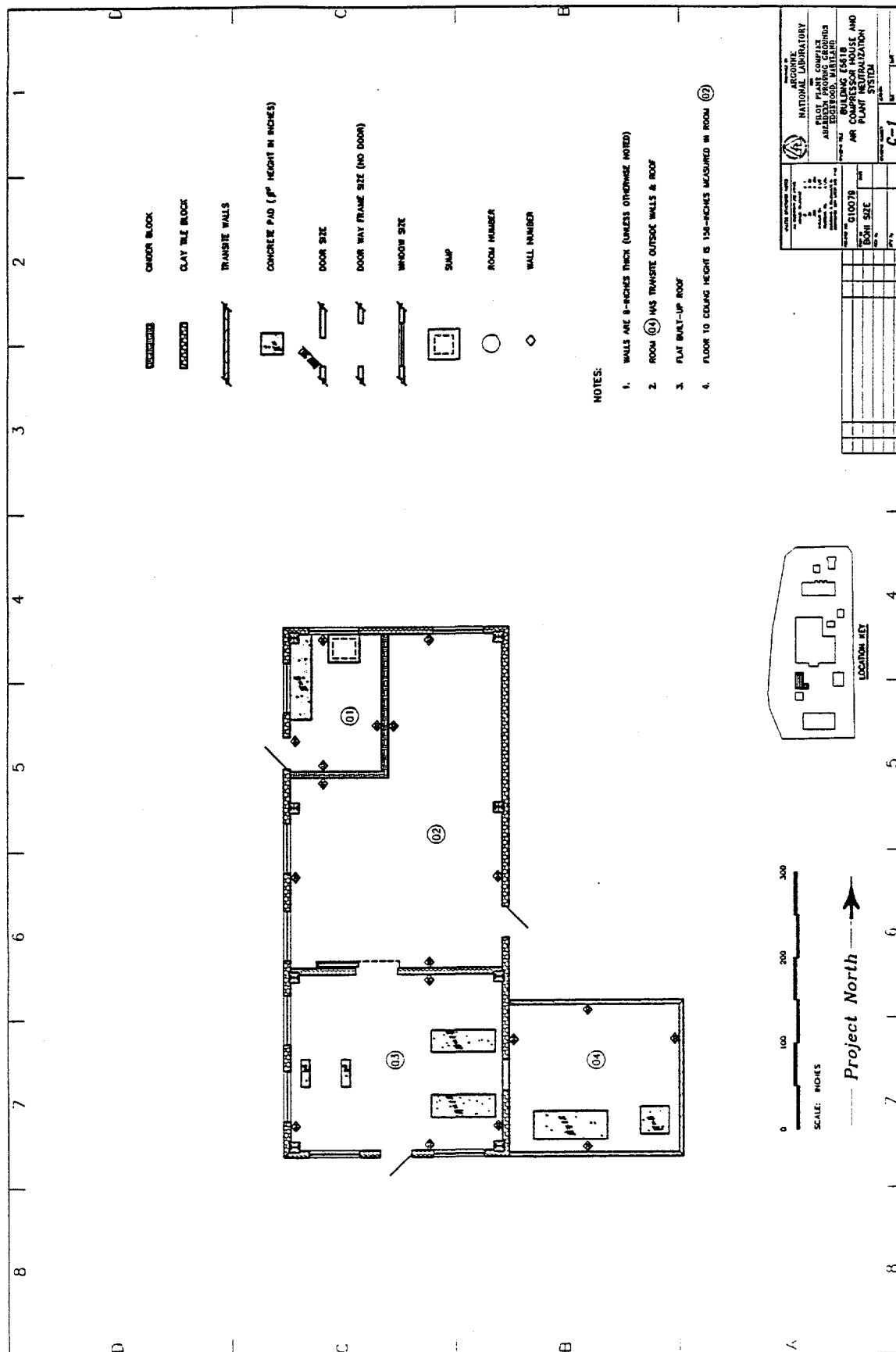


FIGURE C-3 Building E5618, Air Compressor House and Plant Neutralization System

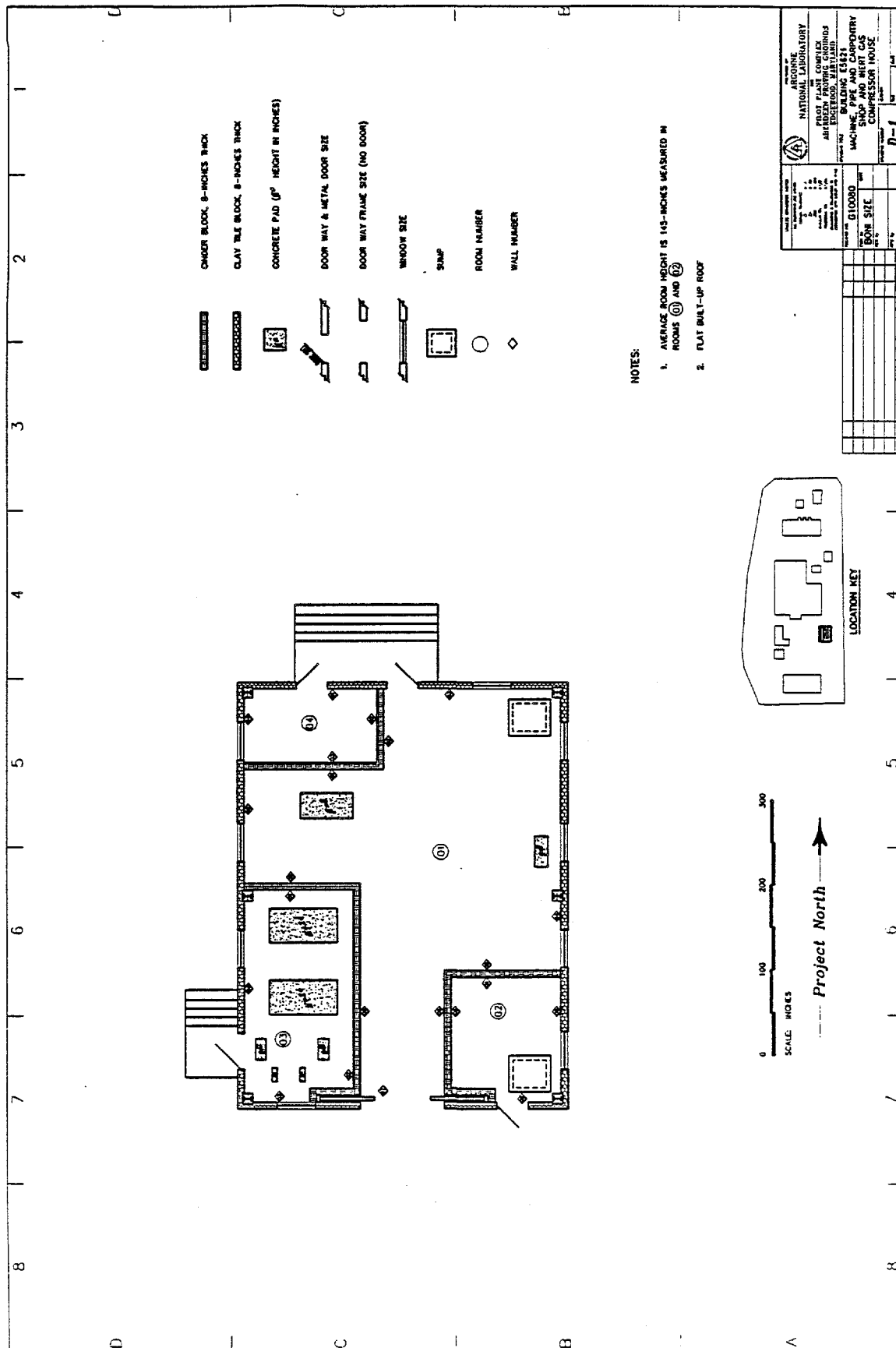


FIGURE C-4 Building E5621, Machine, Pipe, and Inert Gas Compressor House

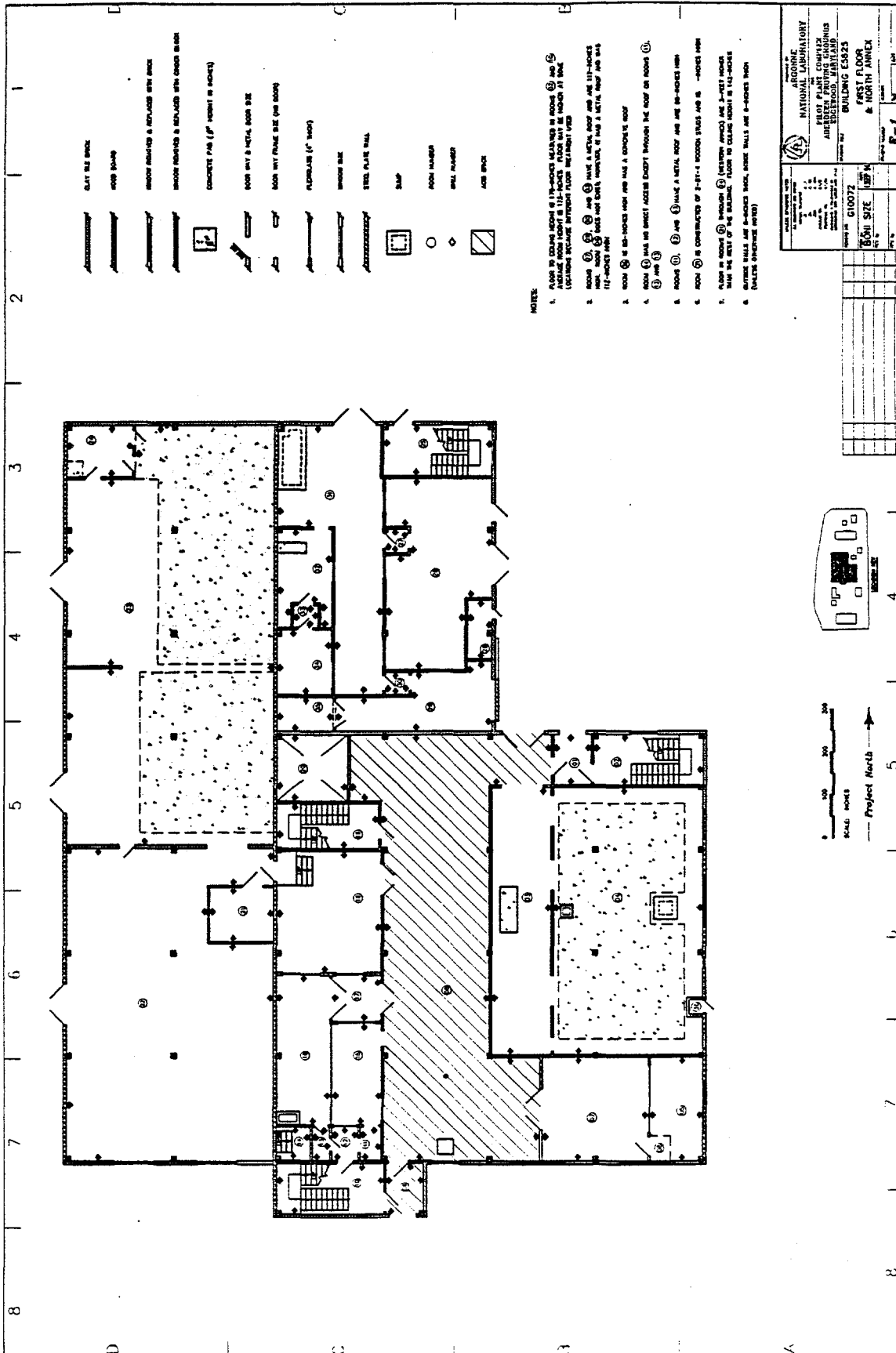


FIGURE C-5 Building E5625, First Floor and North Annex

FIGURE C-6 Building E5625, Second Floor and North Annex

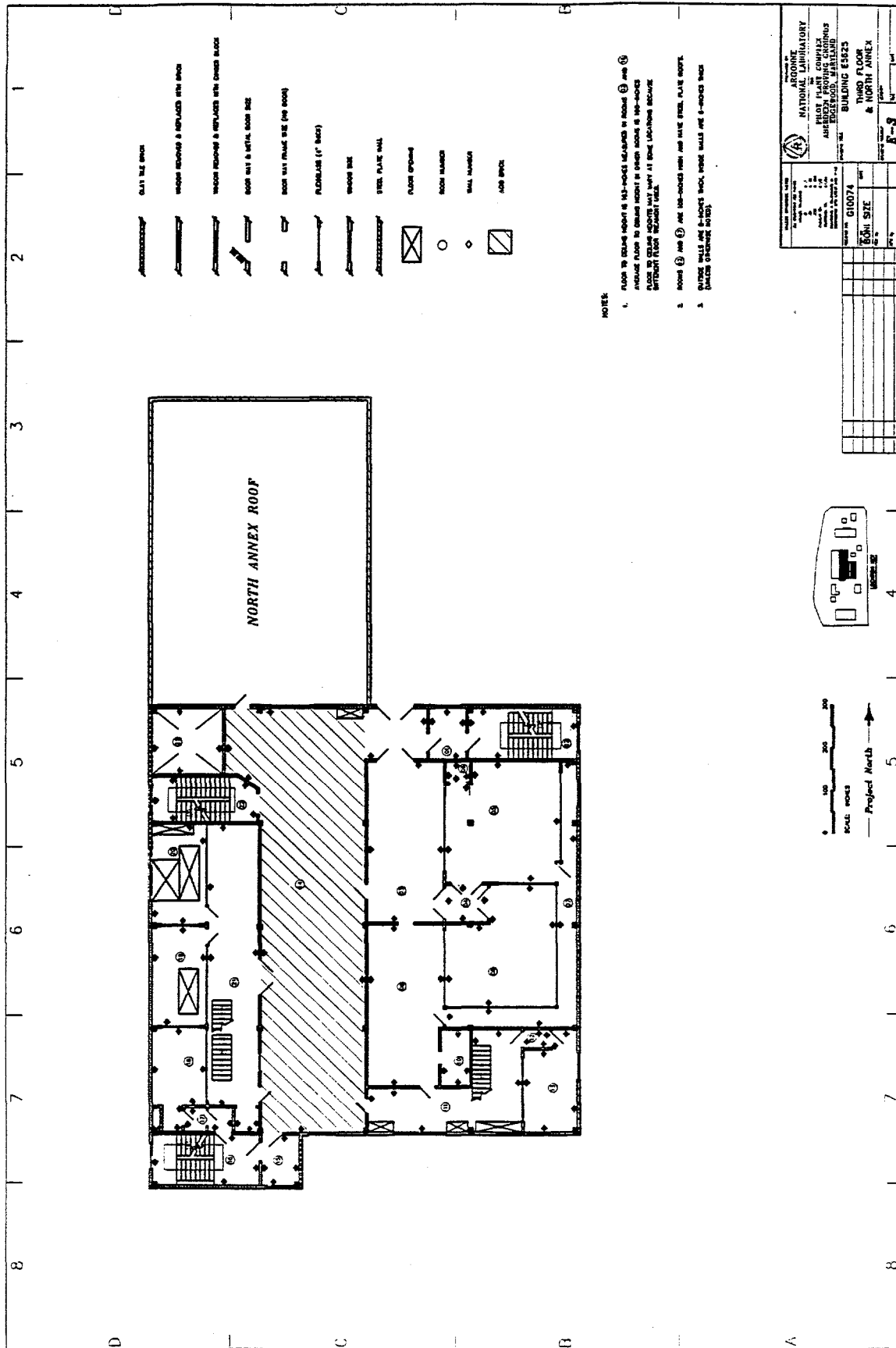


FIGURE C-7 Building E5625, Third Floor and North Annex

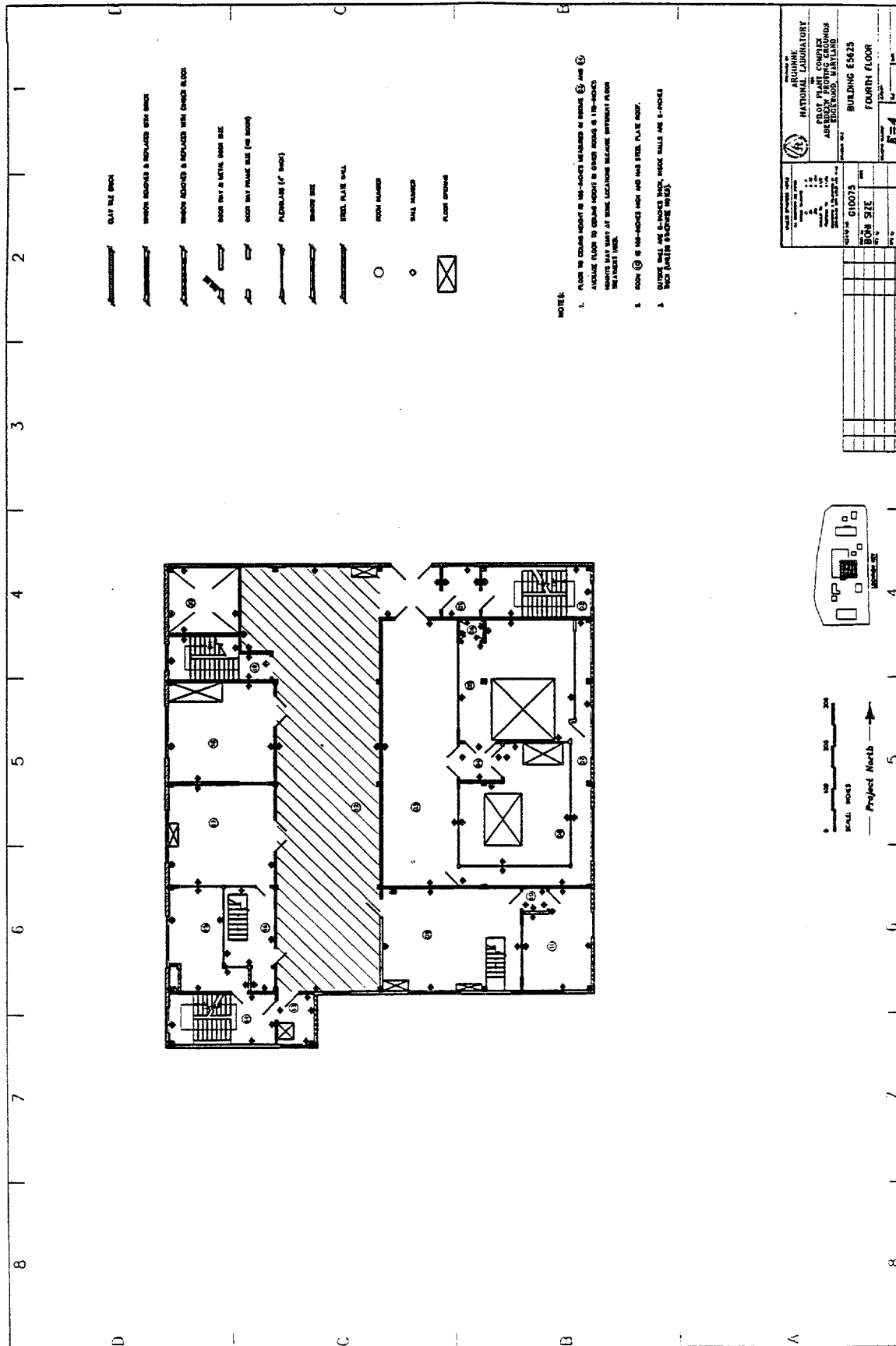


FIGURE C-8 Building E5625, Fourth Floor

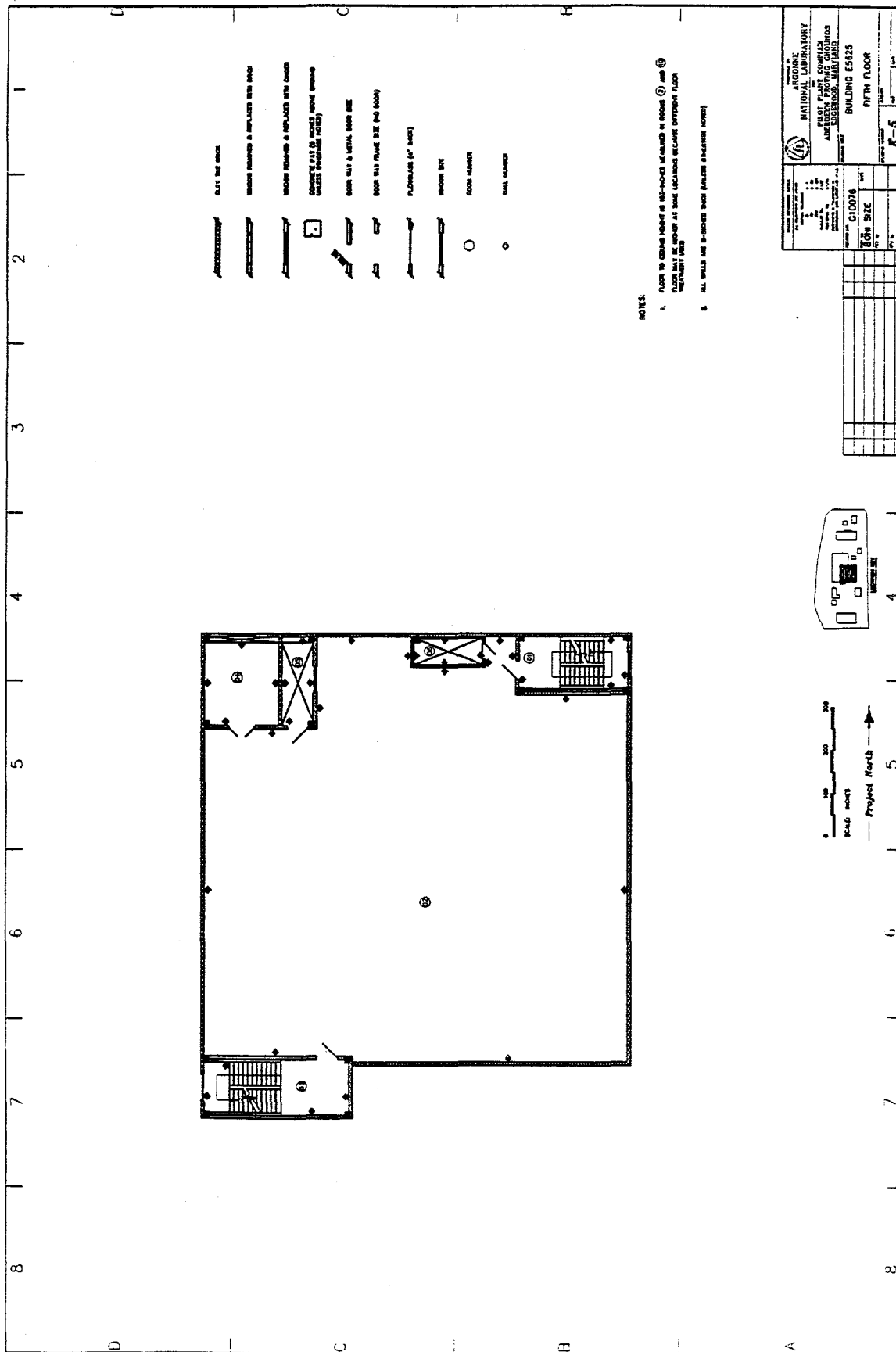


FIGURE C-9 Building E5625, Fifth Floor

FIGURE C-10 Building E5626, Guard House and Security Building

FIGURE C-11 Building E5627, Administration, First Aid, and Quality Control

FIGURE C-12 . Building E5632, Refrigerated Storage Building

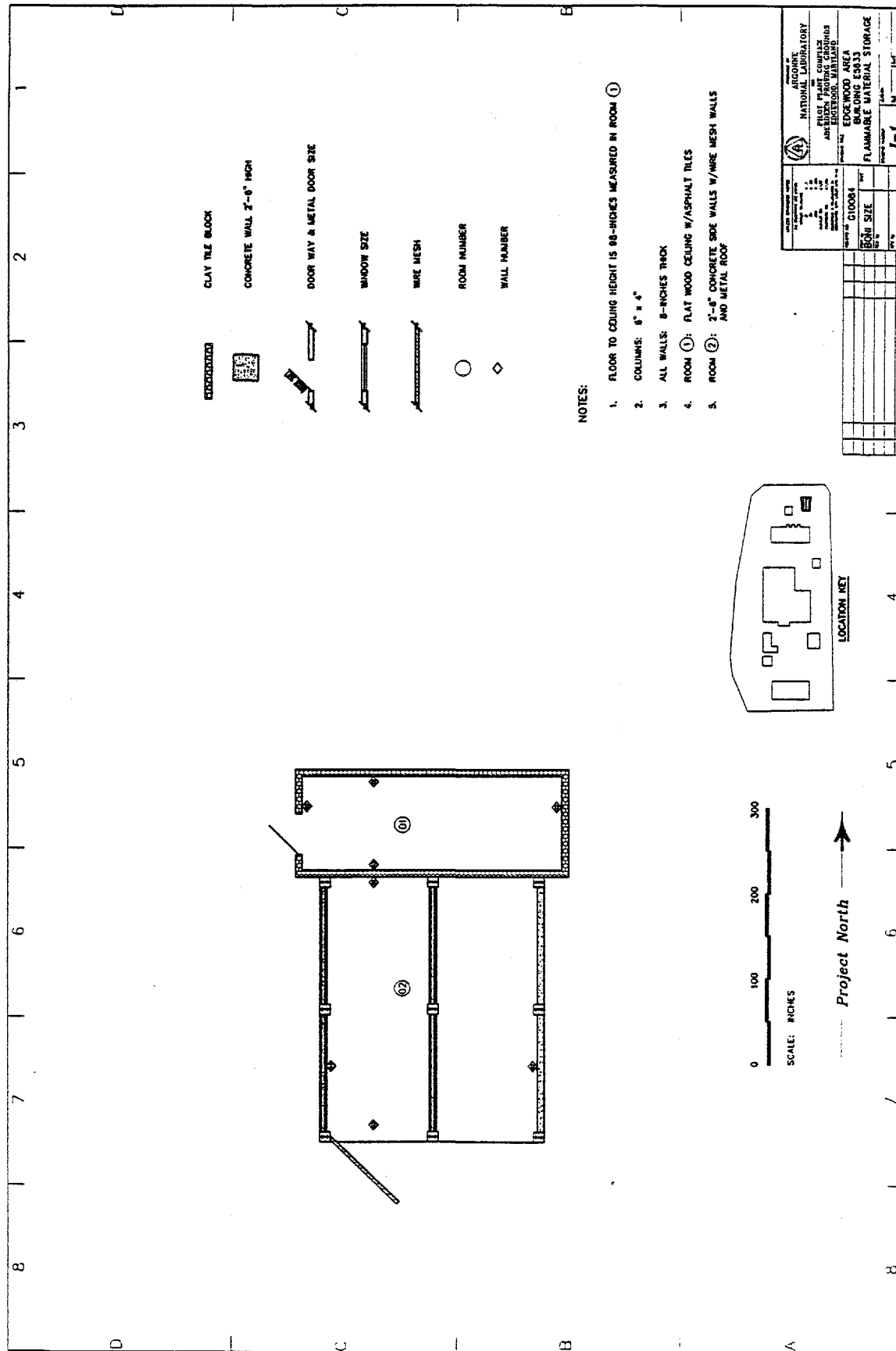


FIGURE C-13 Building E5633, Flammable Material Storage

Appendix D:

**Results of Analysis of
Pilot Plant Complex Air Samples
by Argonne National Laboratory**

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	116	118	114	115	117	120	119	106	107	93	173	100	167
				A107	A107	A107		A107	A109	A110	B101		C101	C101	C102	C102
	Tentative Identification			ne	nw	se	o	sw	n	m	se	o	m	m	ne	ne
1	sulfur dioxide	1.55	64								0.09	0.14				
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84					0.15								
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78		0.02	0.03	0.05			0.00	0.04	0.02		0.22	0.02	0.53
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130											0.01		0.02
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.04	0.06	0.09	0.03	0.09	0.01	0.01	0.15	0.13	0.03	0.58	0.12	1.22
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114													0.13
18	hexanal	8.33	100											0.59		
19	tetrachloroethene	8.79	164	0.00	0.00	0.01			0.00	0.01	0.02	0.01				
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.01	0.01	0.02	0.01	0.02	0.00	0.01	0.03	0.03		0.14	0.02	0.20
23	p,m-xylene	10.81	106	0.02	0.02	0.06	0.03	0.07	0.01	0.01	0.07	0.06		0.15	0.07	0.51
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118		0.01					0.00						
26	3-heptanone	11.37	114													
27	o-xylene	11.49	106		0.01	0.01	0.01	0.03		0.01	0.04	0.03			0.03	0.21
28	heptanal	11.60	114													
29	n-nonane	11.67	128		0.02	0.03		0.04			0.02				0.01	0.45
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120													
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136													
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120		0.01	0.02						0.01				0.13
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.02	0.03	0.04	0.44	0.09	0.02	0.02	0.04	0.04	0.06	0.40	0.03	0.83
42	C3-benzene	13.25	120								0.03	0.03			0.04	0.31
43	C3-benzene	13.41	120			0.04									0.05	0.08
44	phenol	13.57	94	0.01	0.02		0.06	0.06		0.01	0.03		0.02	0.72		0.15
45	aniline	13.61	93													
46	C3-benzene	13.68	120													
47	6-methyl-5-hepten-2-one	13.69	126											0.11		
48	benzonitrile	13.72	103				0.02				0.03			0.15		
49	1-decene	13.83	140													
50	C3-benzene	13.99	120	0.02		0.05										
51	n-decane	14.07	142	0.02	0.04	0.07		0.08		0.02	0.03	0.01			0.01	
52	octanal	14.09	128										0.01	0.29		
53	dichlorobenzene	14.40	146					0.02								
54	4-methyl decane	14.56	156													
55	C3-benzene	14.57	120													
56	C4-benzene	14.60	134													
57	2-ethyl hexanol	14.64	130			0.04		0.03	0.23	0.28	0.09			0.37		
58	limonene	14.75	136											0.20	0.01	
59	benzene methanol	14.77	108													
60	indan	14.87	118													
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134													

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in part per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	116	118	114	115	117	120	119	106	107	93	173	100	167
				A107 ne	A107 nw	A107 se	o	A107 sw	A109 n	A110 m	B101 se	o	C101 m	C101 m	C102 ne	C102 ne
64	5-methyl decane	15.21	156													
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134													
67	2-methyl decane	15.34	156													
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120		0.04	0.07	0.36	0.08		0.03	0.03	0.03	0.05	0.35		0.61
70	C4-benzene	15.47	134													0.13
71	3-methyl decane	15.48	156													
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134													
74	C4-benzene	15.72	134													
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134													
77	1-undecene	15.95	154													
78	n-undecane	16.05	156	0.01	0.02	0.03		0.03	0.01	0.01	0.01					0.11
79	nonanal	16.12	142	0.02	0.04	0.05		0.06	0.02	0.02	0.04	0.02	0.02	0.59		0.31
80	C4-benzene	16.24	134													
81	phosphoric acid, triethyl ester	16.41	182													
82	C4-benzene	16.43	134													
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134													
85	cis methyl decalin	16.74	152													
86	C5-benzene	16.79	148													
87	methyl indan	17.14	132													
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198													
89	methyl indan	17.29	132													
90	trichlorobenzene	17.64	180													
91	1-dodecene	17.66	168													
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170											0.05		
95	naphthalene	17.79	128	0.05	0.10	0.18	0.01	0.19	0.01	0.04	0.08	0.01	0.76	0.40	0.69	2.06
96	C5-benzene	17.87	148													
97	decanal	17.90	156		0.03	0.03		0.04	0.01	0.04	0.03	0.02	0.03	0.48		0.42
98	benzothiophene	17.90	134													0.08
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135											0.20		
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146													
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecene	19.38	184											0.03		
107	N,N-dibutyl formamide	19.51	157													
108	2-methyl naphthalene	19.61	142	0.01	0.02	0.06		0.05		0.01	0.01		0.10	0.09	0.17	0.38
109	phthalate	19.80	390				0.01		0.02	0.03						
110	1,3-isobenzofurandione	19.81	148							0.02				0.07		
111	1-methyl naphthalene	19.91	142			0.03		0.03					0.06	0.11		0.21
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196													
114	n-tetradecane	20.86	198								0.01			0.05		
115	biphenyl	20.87	154	0.01	0.02	0.03	0.00	0.04		0.01	0.01	0.00			0.03	0.05
116	1,1'-oxy bis(benzene)	21.17	186													
117	2,4,6-trichloroaniline	21.20	195		0.01	0.02		0.02	0.01					0.03		
118	C2-naphthalene	21.28	156	0.00												
119	C2-naphthalene	21.51	156		0.01	0.02		0.04							0.04	0.12
120	C2-naphthalene	21.58	156													
121	tribromobenzene	21.62	312													
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-1-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220													
124	1-pentadecene	22.16	210													
125	n-pentadecane	22.26	212					0.02								
126	methyl biphenyl	22.30	168													
127	1,2-dihydroacenaphthylene	22.50	168													

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clst closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

[illegible]

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	101	168	102	169	170	103	104	105	171	172	109	112	108
				C102 sw	C102 sw	C103 ne	C103 ne	C103 sw	C103 sw	C104 ne	C104 sw	C104 ne	C104 sw	D101 e	D101 w	D101 ne
	Tentative Identification															
1	sulfur dioxide	1.55	64													
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84								0.23					
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78		0.09	0.03	0.08	0.36	0.02	0.01	0.03	0.26	0.48	0.03		0.01
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130					t				0.01	0.01			
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.07	0.10	0.13		0.60	0.09	0.07	0.15	1.06	0.89	0.13	0.11	0.08
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114					0.27								
18	hexanal	8.33	100		0.14		0.13						2.91			
19	tetrachloroethene	8.79	164			0.02			0.02	0.01	0.02			0.01		0.01
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.02	t		t	0.19	0.02	0.02	0.03	0.15	0.34	0.01	0.03	0.02
23	p,m-xylene	10.81	106	0.07	t	0.05	t	0.22	0.04	0.04	0.07	0.31	0.29	0.09	0.11	0.07
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118						0.01						0.02	0.01
26	3-heptanone	11.37	114													
27	o-xylene	11.49	106	0.04	t	0.02			0.02	0.02	0.03	0.26			0.04	0.02
28	heptanal	11.60	114										0.41			
29	n-nonane	11.67	128	0.01	0.13	0.01	0.07	0.35	0.01	0.01	0.02					
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120													
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136									0.06		0.32	0.26	0.18
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120								0.01					
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.03	0.20	0.03	0.20	0.80	0.03	0.02	0.02	0.70	2.00	0.03	0.06	0.03
42	C3-benzene	13.25	120	0.04		0.03					0.03					0.03
43	C3-benzene	13.41	120	0.05												
44	phenol	13.57	94					0.19				0.15	0.25	0.04	0.04	0.01
45	aniline	13.61	93													
46	C3-benzene	13.68	120													
47	6-methyl-5-hepten-2-one	13.69	126				0.06	0.08				0.08				
48	benzonitrile	13.72	103		0.03							0.16	0.20			
49	1-decene	13.83	140													
50	C3-benzene	13.99	120									0.10				
51	n-decane	14.07	142													
52	octanal	14.09	128		0.11		0.18	0.40				0.05	0.40			
53	dichlorobenzene	14.40	146													
54	4-methyl decane	14.56	156													
55	C3-benzene	14.57	120													
56	C4-benzene	14.60	134	0.03												
57	2-ethyl hexanol	14.64	130		0.06	0.02	0.11	0.09				0.09	0.58	0.06	0.13	0.11
58	limonene	14.75	136		0.04	0.01					0.02			0.05	0.07	0.05
59	benzene methanol	14.77	108													
60	indan	14.87	118													
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134													

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; guard skrm guard shack stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	101	168	102	169	170	103	104	105	171	172	109	112	108
				C102	C102	C103	C103	C103	C103	C104	C104	C104	C104	D101	D101	D101
				sw	sw	ne	ne	sw	sw	ne	sw	ne	sw	e	w	ne
64	5-methyl decane	15.21	156													
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134													
67	2-methyl decane	15.34	156													
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120		0.18		0.11	0.32				0.40	0.69			
70	C4-benzene	15.47	134													
71	3-methyl decane	15.48	156													
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134													
74	C4-benzene	15.72	134													
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134													
77	1-undecene	15.95	154													
78	n-undecene	16.05	156									0.08	0.06			
79	nonanal	16.12	142		0.30	0.03	0.52	0.92	0.04		0.02	0.19	0.87	0.04	0.07	
80	C4-benzene	16.24	134													
81	phosphoric acid, triethyl ester	16.41	182													
82	C4-benzene	16.43	134													
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134													
85	cis methyl decalin	16.74	152													
86	C5-benzene	16.79	148													
87	methyl indan	17.14	132													
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198													
89	methyl indan	17.29	132													
90	trichlorobenzene	17.64	180													
91	1-dodecene	17.66	168													
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170													
95	naphthalene	17.79	128	0.81	0.04	0.68	0.10	1.76	0.43	0.16	0.32	1.43	0.89	0.26	0.68	0.20
96	C5-benzene	17.87	148													
97	decanal	17.90	156		0.34	0.04	0.67	0.98	0.04		0.03	0.17	0.67	0.03	0.06	
98	benzothiophene	17.90	134	0.03				0.07								
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135						0.01							
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146													
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecene	19.38	184													
107	N,N-dibutyl formamide	19.51	157													
108	2-methyl naphthalene	19.61	142	0.11		0.09		0.31	0.06	0.02	0.04	0.25	0.15	0.07	0.21	0.06
109	phthalate	19.80	390													
110	1,3-isobenzofurandione	19.81	148		0.03								0.13			
111	1-methyl naphthalene	19.91	142	0.06		0.05		0.24			0.02	0.14	0.11	0.05	0.13	0.04
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196													
114	n-tetradecene	20.86	198									0.10				
115	biphenyl	20.87	154	0.03		0.03		0.10	0.02	0.01	0.01	0.05	0.04	0.04	0.10	0.03
116	1,1'-oxy bis(benzene)	21.17	186													
117	2,4,6-trichloroaniline	21.20	195													
118	C2-naphthalene	21.28	156												0.07	
119	C2-naphthalene	21.51	156	0.04					0.01			0.07		0.08	0.04	0.01
120	C2-naphthalene	21.56	156													
121	tribromobenzene	21.62	312													
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220													
124	1-pentadecene	22.16	210													
125	n-pentadecene	22.26	212			0.01						0.03				
126	methyl biphenyl	22.30	168											0.01		
127	1,2-dihydroacenaphthylene	22.50	168												0.04	

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; skrm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

[illegible]

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	111	94	110	113	6	4	5	148	149	179	180	181	122
				D102	D103	D103	D104	E103	E104	E104	E104	E104	E104			E104
	Tentative Identification			m	m	s	nw	m/r	m/s	m/n	se	w	ne	o	o	w/m
1	sulfur dioxide	1.55	64						1.49							
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84													
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78	0.02		0.03	0.03			0.39	0.97	1.22	0.97	1.06	1.00	
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130							0.59	1.12	1.29	0.35	0.05	0.04	0.75
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.11	0.14	0.13	0.10	4.84		12.89	2.11	2.75	4.67	4.47	3.00	0.03
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114							0.31	0.43	0.24	0.18	0.34	0.22	
18	hexanal	8.33	100													
19	tetrachloroethene	8.79	164	0.00	0.02					0.31		0.60		0.81		0.34
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.02	0.03	0.02	0.02	0.38		0.87	0.31	0.49	0.88	1.03	0.59	0.01
23	p,m-xylene	10.81	106	0.07	0.10	0.09	0.06	1.34		2.86	0.60	0.92	2.71	2.56	1.52	0.04
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118	0.01	0.02		0.01			0.42						
26	3-heptanone	11.37	114								0.19					
27	o-xylene	11.49	106	0.03	0.04	0.03	0.03	0.47		1.08	0.48	0.50	1.61	1.84	1.11	0.02
28	heptanal	11.60	114													
29	n-nonane	11.67	128							0.21	0.60	0.30				
30	C3-benzene	12.20	120										0.12	0.18		
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120							0.08						
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136	0.15	0.26	0.18	0.04			0.45			0.25			
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal	13.02	128				0.03									
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120							0.32	0.36	0.31	0.54	0.74	0.44	
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.03	0.04	0.02	0.03	0.30		0.22	2.60	2.60		3.70	2.40	0.02
42	C3-benzene	13.25	120	0.04	0.06	0.05	0.03	0.92		1.35			1.56	1.49	0.77	
43	C3-benzene	13.41	120		0.02			0.44		0.56			0.68	0.70	0.42	0.01
44	phenol	13.57	94												0.37	0.03
45	aniline	13.61	93													
46	C3-benzene	13.68	120							0.63	0.31	0.42				
47	6-methyl-5-hepten-2-one	13.69	126							0.28						
48	benzonitrile	13.72	103							0.48	0.44					
49	1-decene	13.83	140													
50	C3-benzene	13.99	120				0.05			1.56						
51	n-decane	14.07	142		0.04					0.65						
52	octanal	14.09	128				0.02				0.40	0.17				
53	dichlorobenzene	14.40	146							0.25						0.01
54	4-methyl decane	14.56	156													
55	C3-benzene	14.57	120								0.24	0.22	0.57	0.44	0.25	
56	C4-benzene	14.60	134					0.38		0.75				0.55		
57	2-ethyl hexanol	14.64	130		0.11		0.12				0.37	0.30	0.94			
58	limonene	14.75	136	0.03	0.05	0.03	0.02	0.21		0.72			0.56			0.01
59	benzene methanol	14.77	108													
60	indan	14.87	118							0.24	0.30	0.21	0.32	0.29	0.24	
61	dichlorobenzene	14.89	146											0.35	0.18	
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134					0.24		0.37	0.34					

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; skrm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	111	94	110	113	6	4	5	148	149	179	180	181	122
				D102	D103	D103	D104	E103	E104	E104	E104	E104	E104			E104
	Tentative Identification			m	m	s	nw	m/r	m/s	m/n	se	w	ne	o	o	w/m
64	5-methyl decane	15.21	156													
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134					0.26		0.56		0.09	0.55		0.29	
67	2-methyl decane	15.34	156													
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120				0.03				2.21	1.46	0.67	1.99	1.52	0.01
70	C4-benzene	15.47	134							0.33	0.17	0.08	0.56		0.30	
71	3-methyl decane	15.48	156													
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134										0.20	0.15	0.09	
74	C4-benzene	15.72	134							0.38			0.19	0.16		
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134					0.26		0.63			0.72	0.69	0.41	
77	1-undecene	15.95	154													
78	n-undecane	16.05	156					0.40	0.01	0.40	0.35	0.42				
79	nonanal	16.12	142		0.05		0.04				0.96	0.38	0.31	0.97	0.38	0.01
80	C4-benzene	16.24	134								0.14		0.19	0.11		
81	phosphoric acid, triethyl ester	16.41	182													
82	C4-benzene	16.43	134					0.17		0.24						
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134					0.21		0.50						
85	cis methyl decalin	16.74	152							0.08						
86	C5-benzene	16.79	148							0.08	0.10					
87	methyl indan	17.14	132					0.33		0.48			0.29			
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198													
89	methyl indan	17.29	132							0.33	0.16	0.21				
90	trichlorobenzene	17.64	180													
91	1-dodecene	17.66	168													
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170								0.10	0.15	0.23	0.13	0.08	
95	naphthalene	17.79	128	0.76	3.33	1.86	0.05	0.72		0.20	0.41	0.58	0.90	0.41	0.29	0.02
96	C5-benzene	17.87	148							0.18						
97	decanal	17.90	156				0.02				0.94	0.34	0.25	0.77	0.24	
98	benzothiofene	17.90	134	0.03	0.09	0.06										
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135													
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146							0.08						
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecene	19.38	184							0.08	0.13	0.06	0.11	0.08		
107	N,N-dibutyl formamide	19.51	157													
108	2-methyl naphthalene	19.61	142	0.18	1.47	0.43	0.01	0.32		0.40	0.18	0.25	0.24	0.12	0.07	0.02
109	phthalate	19.80	390													
110	1,3-isobenzofurandione	19.81	148								0.23	0.11		0.09	0.08	
111	1-methyl naphthalene	19.91	142	0.11	0.55	0.24		0.18		0.28	0.15	0.10	0.19		0.07	
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196								0.10	0.10				
114	n-tetradecane	20.86	198					0.18		0.08			0.06	0.07		
115	biphenyl	20.87	154	0.05	0.20	0.08	0.01						0.06			0.01
116	1,1'-oxy bis(benzene)	21.17	186								0.07					
117	2,4,6-trichloroaniline	21.20	195							0.14	0.18	0.10	0.17			
118	C2-naphthalene	21.28	156	0.14	0.18											0.03
119	C2-naphthalene	21.51	156		0.19	0.05				0.02	0.20		0.09			0.04
120	C2-naphthalene	21.56	156		0.09						0.20					
121	tribromobenzene	21.62	312													
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220													
124	1-pentadecene	22.16	210													
125	n-pentadecane	22.26	212					0.09			0.08		0.03	0.04		
126	methyl biphenyl	22.30	168	0.01		0.02					0.20					
127	1,2-dihydroacenaphthylene	22.50	168	0.02	0.11						0.20					

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; slkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

	Compound	RT	MW	D102 m	D103 m	D103 s	D104 nw	E103 m/r	E104 m/s	E104 m/n	E104 se	E104 w	E104 ne	O o	O o	E104 w/m
Tentative Identification																
128 C3-naphthalene	22.65	170														
129 phenyl maleic anhydride	22.90	214												0.34	0.28	
130 dibenzofuran	22.93	168	0.03	0.10	0.05	0.01							0.03			
131 1-hexadecene	22.47	224														
132 n-hexadecane	23.57	226							0.01		0.07		0.02			
133 benzenedicarboxylic acid, diethyl ester	23.64	222									0.18					
134 1,3-dibromo-2,2-bis(bromomethyl) propane	24.17	384														
135 diphenyl diazene	24.23	182														
136 benzophenone	24.30	182							0.01		0.18	0.10		0.10	0.09	
137 1-heptadecene	24.71	238														
138 n-heptadecane	24.81	240		0.05		0.01			0.03							
139 N-(phenylmethylene) benzamine	24.83	181														
140 9H-fluoren-9-one	25.28	180														
141 tribromobenzamine	25.39	327														
142 trimethyl indan	25.45	160														
143 dibenzothiophene	25.58	184														
144 tetrabromobenzene	25.86	390														
145 n-octadecane	25.88	254		0.05												
146 phenanthrene/anthracene	26.37	178	0.08	0.17	0.07	0.02			0.04	0.29		0.17	0.69			0.03
147 methyl dibenzothiophene	26.98	198														
148 n-nonadecane	27.04	268														
149 2-methyl anthracene/phenanthrene	27.48	192														0.01
150 1-methyl anthracene/phenanthrene	27.57	192														0.01
151 2,6-dibutyl-2,5-cyclohexadien-1,4-dione	31.30	220												1.27	0.73	
152 Total PCB's			0.06						0.10	2.30	1.20	0.70	0.50			

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	7	139	8	9	13	12	11	153	121	150	151	152	10
				E105	E105	E107	E108	E113	E115	E116	E116	E116	E116			E117
	Tentative Identification			m	m	m	m/s	m	m	m	c	sw	sw	o	o	m
1	sulfur dioxide	1.55	64						1.29							
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116			5.36	2.85									
4	N-ethyl ethanamine	2.36	73									0.16				
5	2-butanone	2.56	72									0.40				
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84													
8	N-(1-methylethyl)-2-propanamine	3.59	101									19.50			0.40	
9	benzene	3.64	78							0.32	1.76		0.02	1.00	1.01	0.10
10	2-pentanone	4.08	86									0.14				
11	trichloroethene	4.47	130	0.51		0.57		0.13		0.34	0.93	0.39	0.05	0.05	0.05	
12	N-(1-methylethylidene)-2-propanamine	4.62	99								1.34	0.02				
13	toluene	6.97	92	1.47	0.06	12.96	1.59	1.04	0.09	1.75	4.77	0.45	0.18	2.00	1.44	0.29
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115									0.07				
15	3-hexanone	7.75	100									0.09				
16	2-hexanone	7.92	100									0.30				
17	n-octane	8.29	114													
18	hexanal	8.33	100			0.60					4.10	0.27		1.40		0.08
19	tetrachloroethene	8.79	164	0.30		0.27		0.14	0.01	0.23		0.68				0.10
20	methyl ethyl disulfide	9.68	108									0.08				
21	chlorobenzene	10.05	112									0.23				
22	ethyl benzene	10.57	106			0.88		0.19	0.01	0.29	1.07	0.20	0.02	0.52	0.27	0.05
23	p,m-xylene	10.81	106	0.54		2.38	0.20	0.65	0.06	1.06	3.12	0.86	0.02	0.38	0.63	0.13
24	1,4-oxathiane	11.00	104									trace				
25	styrene	11.30	118			2.14	0.16	0.08		0.36						
26	3-heptanone	11.37	114									0.49				
27	o-xylene	11.49	106	0.21		1.41		0.30	0.03	0.43	1.15	0.27	0.01	0.17	0.41	0.12
28	heptanal	11.60	114							0.24				0.66		
29	n-nonane	11.67	128			0.90		0.08			1.16	0.09			0.54	
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127									0.07				
32	C3-benzene	12.33	120			0.37						0.65				
33	3-methyl nonane	12.51	142			0.55									0.24	
34	pinene	12.61	136													
35	2-methyl cyclohexanol	12.62	114									0.67				
36	3-octanone	12.71	128					0.15			0.58					0.14
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126									0.16				
39	propyl benzene	13.05	120			0.82		0.11		0.27						0.04
40	N-butyl-1-butanamine	13.17	129									3.05				
41	benzaldehyde	13.18	106	0.21	0.07		0.30	0.19	0.01	0.67			0.50	10.92	7.03	0.41
42	C3-benzene	13.25	120	0.24		5.06		0.43	0.03	0.62						
43	C3-benzene	13.41	120			1.38		0.16		0.31						
44	phenol	13.57	94		0.02		0.34			0.51						0.27
45	aniline	13.61	93									29.14				
46	C3-benzene	13.68	120			1.48		0.23	0.03		0.80					
47	6-methyl-5-hepten-2-one	13.69	126								0.48					
48	benzonitrile	13.72	103				0.38					0.16		0.62	0.41	
49	1-decene	13.83	140							0.21						
50	C3-benzene	13.99	120								1.14	0.13				
51	n-decane	14.07	142			2.68		0.32	0.03	0.68	0.52	5.10			0.18	0.26
52	octanal	14.09	128								1.48		0.24	1.18	0.31	
53	dichlorobenzene	14.40	146			trace				0.15						
54	4-methyl decane	14.56	156									0.40			0.08	
55	C3-benzene	14.57	120								0.75					
56	C4-benzene	14.60	134					0.24			0.93					
57	2-ethyl hexanol	14.64	130			4.30	0.13		0.03	2.50	0.84	3.55	2.95	0.65	0.93	0.16
58	limonene	14.75	136			1.87		0.37	0.02	0.54	0.28				0.38	
59	benzene methanol	14.77	108													0.14
60	indan	14.87	118								0.59					
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134			0.79		0.14		0.31	0.51					

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

			7	139	8	9	13	12	11	153	121	150	151	152	10
	Compound	RT	E105	E105	E107	E108	E113	E115	E116	E116	E116	E116			E117
	Tentative Identification		m	m	m	m/s	m	m	m	c	sw	sw	o	o	m
64	5-methyl decane	15.21	156				0.06				0.47				
65	4-methyl decane	15.29	156								0.55				
66	C4-benzene	15.30	134		0.70		0.12		0.25	1.28					
67	2-methyl decane	15.34	156								0.85				
68	1,4-dithiane	15.39	120												
69	acetophenone	15.47	120		0.05		0.10		0.32	1.36	trace	0.17	7.25	4.18	0.24
70	C4-benzene	15.47	134		0.77		0.13								
71	3-methyl decane	15.48	156								1.25				
72	methyl benzaldehyde	15.51	120						0.27						
73	C4-benzene	15.64	134		0.31					0.33					
74	C4-benzene	15.72	134							1.11					
75	A,A-dimethyl benzene methanol	15.80	136												
76	C4-benzene	15.86	134		0.77		0.13		0.51						
77	1-undecene	15.95	154								0.26				
78	n-undecane	16.05	156	0.21		1.95	0.10	0.24	0.01	0.29	6.67			0.20	0.09
79	nonanal	16.12	142		0.02	0.69		0.31	0.02	0.49	3.58	0.57	1.97	0.95	0.22
80	C4-benzene	16.24	134												
81	phosphoric acid, triethyl ester	16.41	182												
82	C4-benzene	16.43	134		0.41		0.10			0.39					
83	trans methyl decalin	16.50	152								0.44				
84	C4-benzene	16.55	134		0.63		0.11		0.30	0.44					
85	cis methyl decalin	16.74	152		0.39										
86	C5-benzene	16.79	148												
87	methyl indan	17.14	132												
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198												
89	methyl indan	17.29	132							0.90					
90	trichlorobenzene	17.64	180						0.16		0.50				
91	1-dodecene	17.66	168						0.17						
92	1-(4-methylphenyl) ethanone	17.67	134												
93	N,N-dibutyl-1-butanamine	17.72	142								4.72				
94	n-dodecane	17.80	170		1.21					0.38	0.86				
95	naphthalene	17.79	128	0.25			0.19	0.34	0.02	0.55	1.29				0.18
96	C5-benzene	17.87	148												
97	decanal	17.90	156				0.09		0.25	3.28		0.71	1.49	1.15	0.13
98	benzothiophene	17.90	134												
99	1,4-oxathiane, 4,4-dioxide	18.35	136												
100	benzothiazole	18.40	135												
101	benzene propanenitrile	18.53	131												
102	dimethyl indan	18.80	146												
103	3-tetradecene	18.85	196												
104	N-butyl-N-nitroso N-butanamine	18.91	158												
105	1-tridecene	19.26	182						0.17						
106	n-tridecane	19.38	184		0.18		0.07		0.10	0.21					
107	N,N-dibutyl formamide	19.51	157							0.18				0.13	
108	2-methyl naphthalene	19.61	142			0.11	0.13		0.13		0.17				0.13
109	phthalate	19.80	390												
110	1,3-isobenzofurandione	19.81	148									0.37	0.88	0.41	
111	1-methyl naphthalene	19.91	142				0.08			1.18					0.05
112	1-methyl-4-(propylthio) benzene	20.37	166				0.08		0.16						
113	1-tetradecene	20.76	196												
114	n-tetradecane	20.86	198	0.11		0.15	0.06	0.07		0.16					
115	biphenyl	20.87	154								0.09				0.09
116	1,1'-oxy bis(benzene)	21.17	186	0.14	0.01		0.05			0.69					0.05
117	2,4,6-trichloroaniline	21.20	195									0.04			
118	C2-naphthalene	21.28	156												0.05
119	C2-naphthalene	21.51	156							0.48					0.09
120	C2-naphthalene	21.56	156							0.21					
121	tribromobenzene	21.62	312												
122	6,10-dimethyl-5,9-undecadiene-2-one	21.65	194												
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220		0.22										
124	1-pentadecene	22.16	210					0.02	0.13						
125	n-pentadecane	22.26	212			0.07		0.01		0.13		0.06		0.09	0.02
126	methyl biphenyl	22.30	168												
127	1,2-dihydroacenaphthylene	22.50	168							0.12					

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; skrm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

[illegible]

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	14	20	15	19	18	17	154	155	16	27	28	29
				E118	E120	E121	E122	E123	E123	E123	E123	E124	E126	E128	E128
	Tentative Identification			m	elev	m	m	se	m/n	ne	nw	m		m	m
1	sulfur dioxide	1.55	64												
2	2-propanone	1.89	58												
3	1-fluoro-1,1-dichloroethane	1.95	116												
4	N-ethyl ethanamine	2.36	73												
5	2-butanone	2.56	72												
6	N-ethyl-N-methyl ethanamine	2.94	87												
7	dichloromethane	3.15	84						0.18						
8	N-(1-methylethyl)-2-propanamine	3.59	101												
9	benzene	3.64	78		0.18			0.09	0.14	0.82	0.14	0.08		0.52	0.14
10	2-pentanone	4.08	86												
11	trichloroethene	4.47	130							0.11	t				
12	N-(1-methylethylidene)-2-propanamine	4.62	99												
13	toluene	6.97	92	0.83	0.71	0.58	0.54	0.43	0.52	1.19		0.38	0.94		0.68
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115												
15	3-hexanone	7.75	100												
16	2-hexanone	7.92	100												
17	n-octane	8.29	114												
18	hexanal	8.33	100						0.24	0.74	0.47				
19	tetrachloroethene	8.79	164	0.08	0.08	0.06	0.09								
20	methyl ethyl disulfide	9.68	108												
21	chlorobenzene	10.05	112												
22	ethyl benzene	10.57	106	0.12	0.11	0.09	0.09	0.08	0.07	0.25	t	0.05	0.17	0.08	0.15
23	p,m-xylene	10.81	106	0.40	0.31	0.22	0.24	0.22	0.18	0.49	t	0.13	0.91	0.30	
24	1,4-oxathiane	11.00	104												0.55
25	styrene	11.30	118					0.06							
26	3-heptanone	11.37	114												
27	o-xylene	11.49	106			0.16	0.10	0.11	0.15	0.34		0.12			0.20
28	heptanal	11.60	114												
29	n-nonane	11.67	128	0.07		0.07		0.04	0.06	0.5		0.04			
30	C3-benzene	12.20	120												
31	N-butylidene-1-butanamine	12.28	127												
32	C3-benzene	12.33	120												
33	3-methyl nonane	12.51	142												
34	pinene	12.61	136					0.04							
35	2-methyl cyclohexanol	12.62	114												
36	3-octanone	12.71	128			0.07							0.26		
37	2-ethyl hexanal	13.02	128				0.14		0.03						
38	1-chloro-2-methyl benzene	13.03	126												
39	propyl benzene	13.05	120	0.09				0.05	0.04				0.14		0.09
40	N-butyl-1-butanamine	13.17	129												
41	benzaldehyde	13.18	106	0.21	0.16	0.41	0.11	0.17	0.14	3.2	0.5	0.12		0.06	0.09
42	C3-benzene	13.25	120	0.32	0.20		0.16	0.16	0.14			0.12	0.52	0.19	0.26
43	C3-benzene	13.41	120										0.33	0.06	0.10
44	phenol	13.57	94	0.44	0.10	0.11	0.14	0.25	0.12		0.47	0.24			
45	aniline	13.61	93												
46	C3-benzene	13.68	120		0.10								0.42	0.07	0.10
47	6-methyl-5-hepten-2-one	13.69	126			0.28	0.22		0.16						
48	benzonitrile	13.72	103		0.10					0.33					
49	1-decene	13.83	140												
50	C3-benzene	13.99	120							0.22			1.43	0.43	0.81
51	n-decane	14.07	142	0.42		0.29			0.18			0.16	0.29	0.07	0.12
52	octanal	14.09	128				0.13			0.72	0.43				
53	dichlorobenzene	14.40	146												
54	4-methyl decane	14.56	156										0.09		
55	C3-benzene	14.57	120		0.14								0.55		
56	C4-benzene	14.60	134		0.14										
57	2-ethyl hexanol	14.64	130	0.31		0.80	2.18	0.12	0.99	3.39	1.00	0.27		0.33	0.50
58	limonene	14.75	136	0.15	0.08	0.35		0.11				0.16	0.11	0.12	0.12
59	benzene methanol	14.77	108												
60	indan	14.87	118												
61	dichlorobenzene	14.89	146												
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129												
63	C4-benzene	15.10	134	0.11		0.08		0.05					0.23	0.08	0.10

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	14	20	15	19	18	17	154	155	16	27	28	29
				E118	E120	E121	E122	E123	E123	E123	E123	E124	E126	E128	E128
	Tentative Identification			m	elev	m	m	se	m/n	ne	nw	m		m	m
64	5-methyl decane	15.21	156										0.08		
65	4-methyl decane	15.29	156												
66	C4-benzene	15.30	134	0.10				0.07					0.23	0.13	0.21
67	2-methyl decane	15.34	156												
68	1,4-dithiane	15.39	120												
69	acetophenone	15.47	120	0.10	0.16	0.20		0.10	0.16	2.00	0.40	0.15			
70	C4-benzene	15.47	134	0.12						0.24					0.08
71	3-methyl decane	15.48	156										0.17		
72	methyl benzaldehyde	15.51	120												
73	C4-benzene	15.64	134												
74	C4-benzene	15.72	134										0.23	0.04	0.11
75	A,A-dimethyl benzene methanol	15.80	136	0.08		0.08							0.21	0.07	0.10
76	C4-benzene	15.86	134	0.08				0.06							
77	1-undecene	15.95	154												
78	n-undecane	16.05	156	0.22		0.13		0.03	0.07			0.06	0.24	0.09	0.12
79	nonanal	16.12	142	0.21	0.12	0.25	0.14	0.11	0.29	2.03	1.04	0.23		0.06	0.15
80	C4-benzene	16.24	134												
81	phosphoric acid, triethyl ester	16.41	182												
82	C4-benzene	16.43	134										0.15	0.06	0.08
83	trans methyl decalin	16.50	152												
84	C4-benzene	16.55	134										0.15	0.06	0.08
85	cis methyl decalin	16.74	152												
86	C5-benzene	16.79	148												
87	methyl indan	17.14	132										0.27	0.06	0.11
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198												
89	methyl indan	17.29	132												
90	trichlorobenzene	17.64	180												
91	1-dodecene	17.66	168												
92	1-(4-methylphenyl) ethanone	17.67	134			0.05									
93	N,N-dibutyl-1-butanamine	17.72	142												
94	n-dodecane	17.80	170												
95	naphthalene	17.79	128	0.28	0.25	0.42	0.22	0.18	0.16	0.62		0.14		0.20	0.24
96	C5-benzene	17.87	148												
97	decanal	17.90	156	0.06	0.08	0.17	0.13	0.06	0.11	2.03	1.41	0.08		0.07	0.12
98	benzothiophene	17.90	134												
99	1,4-oxathiane, 4,4-dioxide	18.35	136												
100	benzothiazole	18.40	135								0.08				
101	benzene propanenitrile	18.53	131												
102	dimethyl indan	18.80	146												
103	3-tetradecene	18.85	196												
104	N-butyl-N-nitroso N-butanamine	18.91	158												
105	1-tridecene	19.26	182												
106	n-tridecane	19.38	184	0.07										0.05	0.06
107	N,N-dibutyl formamide	19.51	157												
108	2-methyl naphthalene	19.61	142	0.17	0.06	0.16		0.04	0.07	0.48		0.06	0.06	0.07	0.14
109	phthalate	19.80	390												
110	1,3-isobenzofurandione	19.81	148				0.03			1.56	0.72				
111	1-methyl naphthalene	19.91	142	0.09		0.11								0.08	0.10
112	1-methyl-4-(propylthio) benzene	20.37	166												
113	1-tetradecene	20.76	196												
114	n-tetradecane	20.86	198	0.07										0.06	0.08
115	biphenyl	20.87	154			0.07		0.03	0.03			0.03			
116	1,1'-oxy bis(benzene)	21.17	186			0.04									
117	2,4,6-trichloroaniline	21.20	195								0.13				
118	C2-naphthalene	21.28	156	0.13		0.08									
119	C2-naphthalene	21.51	156	0.10		0.05								0.03	0.07
120	C2-naphthalene	21.56	156	0.08		0.03									
121	tribromobenzene	21.62	312												
122	6,10-dimethyl-5,9-undecadiene-2-one	21.65	194				0.04								
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220									0.03			
124	1-pentadecene	22.16	210												
125	n-pentadecane	22.26	212											0.02	
126	methyl biphenyl	22.30	168												
127	1,2-dihydroacenaphthylene	22.50	168												

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				14	20	15	19	18	17	154	155	16	27	28	29
Compound				E118	E120	E121	E122	E123	E123	E123	E123	E124	E126	E128	E128
Tentative Identification		RT	MW	m	elev	m	m	se	m/n	ne	nw	m		m	m
128	C3-naphthalene	22.85	170	0.03											
129	phenyl maleic anhydride	22.90	214												
130	dibenzofuran	22.93	168			0.01				0.11					
131	1-hexadecene	22.47	224												
132	n-hexadecane	23.57	226												
133	benzenedicarboxylic acid, diethyl ester	23.64	222									0.03			
134	1,3-dibromo-2,2-bis(bromomethyl) propane	24.17	384												
135	diphenyl diazene	24.23	182												
136	benzophenone	24.30	182							0.18					
137	1-heptadecene	24.71	238												
138	n-heptadecane	24.81	240												
139	N-(phenylmethylene) benzamine	24.83	181												
140	9H-fluoren-9-one	25.28	180						0.32						
141	tribromobenzamine	25.39	327												
142	trimethyl indan	25.45	160												
143	dibenzothiophene	25.58	184						0.29						
144	tetrabromobenzene	25.86	390												
145	n-octadecane	25.88	254						0.13						
146	phenanthrene/anthracene	26.37	178	0.06		0.07			1.23	0.37		0.10			
147	methyl dibenzothiophene	26.98	198						0.19						
148	n-nonadecane	27.04	268						0.12						
149	2-methyl anthracene/phenanthrene	27.48	192						0.26						
150	1-methyl anthracene/phenanthrene	27.57	192						0.75						
151	2,6-dibutyl-2,5-cyclohexadien-1,4-dione	31.30	220												
152	Total PCB's								9.80	10	0.9				

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound Tentative Identification	RT	MW	25	24	23	26	124	123	141	142	146	147	178	21	127
				E129 m/e	E129 ne	E131 n	E131 s	E131 s	E131 n	E131 s	E131 nw	E131 nw	E131 ne	E131 sump	E132 m	E133 m
1	sulfur dioxide	1.55	64													
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84								0.32					0.36
8	N-(1-methylethyl)-2-propanamine	3.59	101					0.24		0.21		0.74		0.23		0.20
9	benzene	3.64	78						0.06			0.88	1.05	1.36		
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130			0.36	0.14		0.24	0.03	0.04	1.29	1.06	0.57	0.33	
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.64	0.75	1.29	0.48	0.13	0.03	0.12	0.05	2.57	2.42	4.79	1.04	
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114											0.15		
18	hexanal	8.33	100									0.47	0.30			
19	tetrachloroethene	8.79	164	0.17	0.16	0.52	0.18	0.02	0.15	0.04	0.04	1.43	0.60		0.52	
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.15	0.15	0.32	0.12	0.03	0.03			0.48	0.41	0.91	0.33	
23	p,m-xylene	10.81	106	0.92	1.10	1.98	0.86	0.20	0.22	0.21	0.06	3.12	0.82	3.55	2.61	0.04
24	1,4-oxathiane	11.00	104			0.32		0.01				0.18	0.02	0.01	0.33	0.02
25	styrene	11.30	118			0.18		0.01							0.17	
26	3-heptanone	11.37	114													
27	o-xylene	11.49	106	0.53	0.58	0.98	0.49	0.10	0.09	0.10	0.03	1.73	0.49	2.20	1.25	0.02
28	heptanal	11.60	114													
29	n-nonane	11.67	128			0.14		0.02				0.40	0.30		0.16	
30	C3-benzene	12.20	120					0.01	0.01					0.26		
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120									0.28				
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136			0.22		0.02				0.12		0.46		
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128			0.17		0.04				0.46			0.26	
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120	0.10	0.11	0.27	0.11	0.02				0.52	0.30	0.64	0.26	
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.16	0.13	0.31		0.03	0.02	0.12		2.30	1.90		0.31	
42	C3-benzene	13.25	120	0.40	0.43	0.66	0.62	0.08		0.04				1.75	0.74	
43	C3-benzene	13.41	120	0.26	0.29	0.52	0.27	0.04		0.05		0.68	0.38	0.76	0.66	0.01
44	phenol	13.57	94				0.24	0.03	0.02	0.04						
45	aniline	13.61	93													
46	C3-benzene	13.68	120	0.16	0.19	0.34	0.13	0.05		0.12		1.51	0.35		0.32	
47	6-methyl-5-hepten-2-one	13.69	126									0.21	0.24		0.27	
48	benzonitrile	13.72	103						0.01							
49	1-decene	13.83	140													
50	C3-benzene	13.99	120	0.91	1.12	1.68	0.99	0.18			0.02		0.27		1.91	0.03
51	n-decane	14.07	142	0.29	0.35	0.57	0.30	0.05		0.06					0.73	0.01
52	octanal	14.09	128									0.29	0.25			
53	dichlorobenzene	14.40	146			trace		0.03	0.06							
54	4-methyl decane	14.56	156	0.04	0.12	0.20	0.08					0.28			0.29	
55	C3-benzene	14.57	120							0.06		0.93	0.35	0.75		0.01
56	C4-benzene	14.60	134									0.23	0.41			
57	2-ethyl hexanol	14.64	130	0.54	0.80	2.09	0.97	0.10	0.02	0.13	0.03	1.51	0.46	0.72	1.93	
58	limonene	14.75	136					0.01						0.64	0.22	
59	benzene methanol	14.77	108			0.25										
60	indan	14.87	118									0.53	0.20	0.32		
61	dichlorobenzene	14.89	146		0.23	0.19			0.05						0.50	
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129									0.33			0.78	
63	C4-benzene	15.10	134	0.20	0.26	0.41	0.19			0.03					0.52	

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Air Monitoring Results

Sample number and room number
at the top of each data column

				25	24	23	26	124	123	141	142	146	147	178	21	127
	Compound			E129	E129	E131	E131	E131	E131	E131	E131	E131	E131	E131	E132	E133
	Tentative Identification	RT	MW	m/e	ne	n	s	s	n	s	nw	nw	ne	sump	m	m
64	5-methyl decane	15.21	156	0.07		0.14									0.19	
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134	0.16	0.19	0.30	0.13			0.02			0.12	0.58	0.39	
67	2-methyl decane	15.34	156			0.15									0.23	
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120					0.01	0.01	0.10	0.02	1.19	0.95	0.73		
70	C4-benzene	15.47	134		0.23	0.19						0.39	0.08	0.49		
71	3-methyl decane	15.48	156	0.16		0.37									0.46	
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134							0.02				0.40	0.24	
74	C4-benzene	15.72	134	0.08	0.10	0.13									0.20	
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134	0.14	0.19	0.29	0.12							0.80	0.38	
77	1-undecene	15.95	154													
78	n-undecane	16.05	156	0.17	0.24	0.31	0.16	0.03					0.44		0.44	0.01
79	nonanal	16.12	142	0.16	0.17			0.03		0.07	0.01	0.83	0.52	0.26		
80	C4-benzene	16.24	134										0.14	0.18		
81	phosphoric acid, triethyl ester	16.41	182			0.53						0.31			0.39	
82	C4-benzene	16.43	134	0.12			0.11						0.20			
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134	0.12	0.14	0.23	0.09					0.24	0.08		0.30	
85	cis methyl decalin	16.74	152			0.14										
86	C5-benzene	16.79	148									0.43	0.11			
87	methyl indan	17.14	132										0.20	0.30		
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198		0.19	0.19	0.09								0.23	
89	methyl indan	17.29	132										0.21			
90	trichlorobenzene	17.64	180			0.23		0.01	0.28			0.82		0.19	0.25	
91	1-dodecene	17.66	168									0.21				
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170										0.14	0.15		
95	naphthalene	17.79	128	0.21	0.12	0.33	0.15	0.05	0.01	0.04		0.56	0.68	0.42	0.41	0.01
96	C5-benzene	17.87	148													
97	decanal	17.90	156					0.01		0.01			0.67			
98	benzothiophene	17.90	134													
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135		0.09											
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146													
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecene	19.38	184									0.16	0.14	0.11		
107	N,N-dibutyl formamide	19.51	157		0.05	0.12						0.33			0.09	
108	2-methyl naphthalene	19.61	142	0.06	0.11	0.11	0.04	0.01		0.02		0.26	0.27	0.12	0.12	
109	phthalate	19.80	390													
110	1,3-isobenzofurandione	19.81	148							0.03		0.19	0.13			
111	1-methyl naphthalene	19.91	142						0.02			0.16	0.21	0.10		
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196										0.20			
114	n-tetradecane	20.86	198	0.05	0.07	0.05		0.01		0.01					0.12	
115	biphenyl	20.87	154					0.01	0.02			0.07	0.07			
116	1,1'-oxy bis(benzene)	21.17	186						0.04			0.08	0.09			
117	2,4,6-trichloroaniline	21.20	195					0.01		0.01		0.18	0.24			
118	C2-naphthalene	21.28	156									0.17				
119	C2-naphthalene	21.51	156						0.03							
120	C2-naphthalene	21.56	156													
121	tribromobenzene	21.62	312						0.04			0.04				
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220									0.20				
124	1-pentadecene	22.16	210													
125	n-pentadecane	22.26	212										0.06			
126	methyl biphenyl	22.30	168													
127	1,2-dihydroacenaphthylene	22.50	168						0.04							

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Air Monitoring Results

Sample number and room number
at the top of each data column

		143	1	2	22	144	128	129	140	138	46	33	32	30	31	36
	Compound	E133	E134	E134	E134	E134	E134		E135	E200	E201	E203	E203	E204	E204	E205
	Tentative Identification	m	se	nw	m	m	m	o		m	m	n	s	n	s	m
1	sulfur dioxide															
2	2-propanone			2.60												
3	1-fluoro-1,1-dichloroethane		1.75													
4	N-ethyl ethanamine					0.14										
5	2-butanone															
6	N-ethyl-N-methyl ethanamine															
7	dichloromethane															
8	N-(1-methylethyl)-2-propanamine	0.13	0.69		2.68	0.22			0.12							
9	benzene											0.01		0.01	0.01	0.02
10	2-pentanone															
11	trichloroethene	0.04			0.41											
12	N-(1-methylethylidene)-2-propanamine															
13	toluene	0.05	1.46	1.01	2.20	0.11			0.08	0.04		0.36	0.28	0.28	0.33	0.06
14	N-methyl-N-(1-methylethyl)-2-propanamine															
15	3-hexanone															
16	2-hexanone															
17	n-octane															
18	hexanal															
19	tetrachloroethene	0.05			1.05	0.07						0.03	0.02	0.01	0.02	0.02
20	methyl ethyl disulfide															
21	chlorobenzene															
22	ethyl benzene		0.33	0.26	1.03							0.04	0.02	0.03	0.03	0.01
23	p,m-xylene	0.14	2.32	1.87	6.88	0.25	0.02		0.08			0.17	0.13	0.15	0.16	0.05
24	1,4-oxathiane	0.02	0.48	0.47	1.74	0.10										0.00
25	styrene		0.22	0.11								0.02	0.02	0.02	0.03	
26	3-heptanone															
27	o-xylene	0.07	1.10	0.87	3.77	0.13	0.01		0.03			0.07	0.05	0.05	0.03	0.03
28	heptanal															
29	n-nonane			0.11	0.33											
30	C3-benzene											0.04	0.02	0.02		0.02
31	N-butylidene-1-butanamine															
32	C3-benzene				0.29											
33	3-methyl nonane															
34	pinene															
35	2-methyl cyclohexanol															
36	3-octanone		0.24	0.18	0.63											
37	2-ethyl hexanal															
38	1-chloro-2-methyl benzene															
39	propyl benzene		0.21	0.15	0.60							0.03		0.01		
40	N-butyl-1-butanamine					0.07										
41	benzaldehyde	0.06	0.97	0.55		0.07		0.06		0.05	0.03	0.07	0.05	0.07	0.06	0.08
42	C3-benzene	0.01	0.81	0.45	2.47							0.11	0.08	0.10	0.10	0.02
43	C3-benzene	0.03	0.59	0.39	1.49	0.05						0.05	0.04	0.03	0.05	
44	phenol	0.02				0.03				0.01				0.08		
45	aniline															
46	C3-benzene	0.06			0.66	0.12									0.16	
47	6-methyl-5-hepten-2-one															
48	benzonitrile		0.98	0.70												
49	1-decene															
50	C3-benzene				4.43				0.04							
51	n-decane	0.06	0.64	0.46	1.36	0.08			0.02			0.16	0.11	0.15	0.12	0.07
52	octanal															
53	dichlorobenzene			0.23	trace									0.02		
54	4-methyl decane		0.15	0.16	0.62									0.01		
55	C3-benzene	0.03		0.86		0.06			0.02					0.03		
56	C4-benzene		0.94													
57	2-ethyl hexanol	0.06			4.48	0.14	0.01		0.11		0.07	0.14	0.10		0.08	0.11
58	limonene		0.07	0.12							0.10			0.01	0.12	0.03
59	benzene methanol		0.16		0.72									0.07		
60	indan															
61	dichlorobenzene			0.24	1.04											
62	N-ethyl-N-(1-methylethyl)-2-propanamine		0.19													
63	C4-benzene	0.01	0.21	0.31	0.71	0.04										

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

		143	1	2	22	144	128	129	140	138	46	33	32	30	31	36
	Compound	E133	E134	E134	E134	E134	E134		E135	E200	E201	E203	E203	E204	E204	E205
	Tentative Identification	m	se	nw	m	m	m	o		m	m	n	s	n	s	m
64	5-methyl decane		0.15	0.11	0.45									0.02		
65	4-methyl decane															
66	C4-benzene		0.28	0.21	1.00											
67	2-methyl decane		0.21	0.42	0.45									0.02		
68	1,4-dithiane				2.06	0.05										
69	acetophenone	0.05				0.06		0.04		0.03				0.11		
70	C4-benzene		0.48													
71	3-methyl decane															
72	methyl benzaldehyde															
73	C4-benzene															
74	C4-benzene				1.04											
75	A,A-dimethyl benzene methanol															
76	C4-benzene		0.26	0.14	0.94	0.01									0.08	
77	1-undecene															
78	n-undecane		0.34	0.21	1.10				0.02			0.20	0.15	0.17	0.14	0.06
79	nonanal	0.06				0.08				0.02		0.08	0.04	0.09	0.08	0.05
80	C4-benzene				0.39											
81	phosphoric acid, triethyl ester				1.80											
82	C4-benzene		0.17	0.13												
83	trans methyl decalin															
84	C4-benzene		0.23	0.11	0.72									0.02		
85	cis methyl decalin				0.49											
86	C5-benzene															
87	methyl indan															
88	O,O-diethyl-S-ethyl phosphorothioate				0.63											
89	methyl indan															
90	trichlorobenzene			0.04	0.38	0.01										
91	1-dodecene															
92	1-(4-methylphenyl) ethanone				0.22											
93	N,N-dibutyl-1-butanamine															
94	n-dodecane															
95	naphthalene	0.02	0.35	0.26	0.99	0.05			0.01	0.01		0.21	0.15	0.16	0.16	0.08
96	C5-benzene															
97	decanal	0.04				0.04								0.03		0.03
98	benzothiophene															
99	1,4-oxathiane, 4,4-dioxide					0.02										
100	benzothiazole				0.33											
101	benzene propanenitrile															
102	dimethyl indan															
103	3-tetradecene		0.19	0.11												
104	N-butyl-N-nitroso N-butanamine				0.32											
105	1-tridecene															
106	n-tridecene				0.23											
107	N,N-dibutyl formamide		0.25	0.18	0.56	0.03										
108	2-methyl naphthalene	0.00	0.19	0.08	0.50	0.02							0.05	0.04	0.02	
109	phthalate														0.03	
110	1,3-isobenzofurandione															
111	1-methyl naphthalene				0.39	0.03										
112	1-methyl-4-(propylthio) benzene															
113	1-tetradecene															
114	n-tetradecane		0.11	0.11	0.17											
115	biphenyl									0.01		0.09	0.07	0.09	0.08	0.07
116	1,1'-oxy bis(benzene)									0.02				0.01	0.06	
117	2,4,6-trichloroaniline					0.01						0.04	0.04	0.09	0.07	
118	C2-naphthalene															
119	C2-naphthalene															
120	C2-naphthalene															
121	tribromobenzene															
122	6,10-dimethyl-5,9-undecadien-2-one															
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione															
124	1-pentadecene															
125	n-pentadecane		0.09	0.11												
126	methyl biphenyl															
127	1,2-dihydroacenaphthylene															

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

[illegible]

Air Monitoring Results

Sample number and room number
at the top of each data column

			37	163	35	34	38	39	42	43	44	41	40	45	47	
	Compound		E207	E207	E208	E208	E209	E211	E213	E214	E215	E216	E216	E217	E220	
	Tentative Identification	RT	MW	m	m	n	s	o/bal	clost	m	m	m	n	s	m	se
1	sulfur dioxide	1.55	64													
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84	0.04												
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78		2.53	0.01	0.01	0.02		0.01	0.02	0.03		0.01	0.08	0.15
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130		1.19											
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.15	6.25	0.01	0.13	0.06	0.05	0.05	0.07	0.65	0.06	0.06	1.11	0.97
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114		0.30											
18	hexanal	8.33	100													
19	tetrachloroethene	8.79	164	0.02	1.59	0.01	0.03	0.01	0.01	0.01	0.02	0.05	0.01	0.01	0.08	0.04
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.02	1.28	0.02	0.02	0.01	0.01	0.01	0.01	0.12	0.01	0.01	0.23	0.16
23	p,m-xylene	10.81	106	0.05	3.44	0.05	0.05	0.01	0.04	0.02	0.03	0.42	0.05	0.03	0.76	0.51
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118		0.46		0.01	0.02				0.04		0.01	0.09	0.08
26	3-heptanone	11.37	114													
27	o-xylene	11.49	106	0.03	1.50	0.03	0.03	0.01	0.02	0.01	0.01	0.15	0.02	0.01	0.28	0.19
28	heptanal	11.60	114													
29	n-nonane	11.67	128	0.01			0.03	0.04				0.02	0.02	0.01	0.04	0.03
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120													
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136		0.21							0.05			0.08	0.09
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120		0.66							0.05			0.07	0.04
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.09		0.06	0.07	0.16	0.05	0.06	0.07	0.05	0.06	0.08	0.06	0.12
42	C3-benzene	13.25	120		2.61							0.18	0.01		0.31	0.21
43	C3-benzene	13.41	120		0.52							0.06			0.10	0.08
44	phenol	13.57	94													
45	aniline	13.61	93													
46	C3-benzene	13.68	120		0.89											
47	6-methyl-5-hepten-2-one	13.69	126													
48	benzonitrile	13.72	103	0.08										0.07		
49	1-decene	13.83	140													
50	C3-benzene	13.99	120													
51	n-decane	14.07	142	0.09	0.52	0.06	0.06		0.07	0.08		0.09	0.04	0.05	0.11	0.08
52	octanal	14.09	128													
53	dichlorobenzene	14.40	146		0.44							0.02			0.04	
54	4-methyl decane	14.56	156		0.16											
55	C3-benzene	14.57	120		0.48											
56	C4-benzene	14.60	134		0.19											
57	2-ethyl hexanol	14.64	130	0.09		0.04	0.15	0.06	0.04	0.04		0.14	0.06	0.11		
58	limonene	14.75	136					0.01	0.03	0.01	0.03	0.11	0.01	0.01	0.16	0.09
59	benzene methanol	14.77	108													
60	indan	14.87	118		0.32											
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134		0.70											

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; stkm stockroom; drwy doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

				37	163	35	34	38	39	42	43	44	41	40	45	47
	Compound			E207	E207	E208	E208	E209	E211	E213	E214	E215	E216	E216	E217	E220
	Tentative Identification	RT	MW	m	m	n	s	o/bal	clost	m	m	m	n	s	m	se
64	5-methyl decane	15.21	156													
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134													
67	2-methyl decane	15.34	156													
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120		1.02			0.11								
70	C4-benzene	15.47	134													
71	3-methyl decane	15.48	156													
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134		0.35											
74	C4-benzene	15.72	134		0.78											
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134													
77	1-undecene	15.95	154													
78	n-undecane	16.05	156	0.07		0.03			0.02			0.06	0.03	0.02	0.11	0.07
79	nonanal	16.12	142	0.05	0.15	0.06		0.10	0.08	0.12	0.08		0.08	0.04		
80	C4-benzene	16.24	134													
81	phosphoric acid, triethyl ester	16.41	182													
82	C4-benzene	16.43	134		0.12											
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134													
85	cis methyl decalin	16.74	152													
86	C5-benzene	16.79	148													
87	methyl indan	17.14	132		0.33											
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198													
89	methyl indan	17.29	132													
90	trichlorobenzene	17.64	180													
91	1-dodecene	17.66	168													
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170		0.37											
95	naphthalene	17.79	128	0.07	1.77	0.09	0.06	0.01	0.04	0.05	0.05	0.16	0.06	0.03	0.24	0.25
96	C5-benzene	17.87	148													
97	decanal	17.90	156			0.03	0.04	0.03	0.04	0.11	0.06		0.07	0.02		
98	benzothiophene	17.90	134													
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135													
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146													
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecane	19.38	184		0.14											
107	N,N-dibutyl formamide	19.51	157													
108	2-methyl naphthalene	19.61	142	0.04	0.21	0.04	0.03		0.02	0.03	0.02	0.06	0.04	0.02	0.10	0.12
109	phthalate	19.80	390													
110	1,3-isobenzofurandione	19.81	148													
111	1-methyl naphthalene	19.91	142		0.11											
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196													
114	n-tetradecane	20.86	198		0.08											0.05
115	biphenyl	20.87	154	0.05	0.11	0.03	0.02		0.06	0.02		0.03	0.04	0.06	0.04	
116	1,1'-oxy bis(benzene)	21.17	186		0.17											
117	2,4,6-trichloroaniline	21.20	195	0.02	0.11	0.03	0.01					0.02				0.04
118	C2-naphthalene	21.28	156		0.14											
119	C2-naphthalene	21.51	156			0.03	0.02			0.15	0.26		0.11	0.10		0.09
120	C2-naphthalene	21.56	156													
121	tribromobenzene	21.62	312													
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220													
124	1-pentadecene	22.16	210													
125	n-pentadecane	22.26	212		0.06											
126	methyl biphenyl	22.30	168													
127	1,2-dihydroacenaphthylene	22.50	168													

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Compound		37 163 35 34 38 39 42 43 44 41 40 45 47															
		E207	E207	E208	E208	E209	E211	E213	E214	E215	E216	E216	E217	E220			
Tentative Identification		RT	MW	m	m	n	s	o/bal	clost	m	m	m	n	s	m	se	
128	C3-naphthalene	22.65	170														
129	phenyl maleic anhydride	22.90	214														
130	dibenzofuran	22.93	168														
131	1-hexadecene	22.47	224														
132	n-hexadecane	23.57	226		0.03												
133	benzenedicarboxylic acid, diethyl ester	23.64	222														
134	1,3-dibromo-2,2-bis(bromomethyl) propane	24.17	384														
135	diphenyl diazene	24.23	182														
136	benzophenone	24.30	182														
137	1-heptadecene	24.71	238														
138	n-heptadecane	24.81	240														
139	N-(phenylmethylene) benzamine	24.83	181														
140	9H-fluoren-9-one	25.28	180														
141	tribromobenzamine	25.39	327														
142	trimethyl indan	25.45	160														
143	dibenzothiophene	25.58	184														
144	tetrabromobenzene	25.86	390														
145	n-octadecane	25.88	254														
146	phenanthrene/anthracene	26.37	178	0.12	0.15	0.01	0.01		0.01	0.06	0.02	0.04	0.02		0.02	0.13	
147	methyl dibenzothiophene	26.98	198														
148	n-nonadecane	27.04	268														
149	2-methyl anthracene/phenanthrene	27.48	192														
150	1-methyl anthracene/phenanthrene	27.57	192														
151	2,6-dibutyl-2,5-cyclohexadien-1,4-dione	31.30	220		0.19												
152	Total PCB's			8.10	1.60	0.20	0.20			0.30	0.20	1.00			0.40	11.90	

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	48 E220	49 E220	50 E220	51 E220	137 E220	156 E220	157 E220	158 E220	159 E220	160	161	162	52 E301
	Tentative Identification			sw	w	nw	o	se	se	ne	nw	nw	o	o	o	m
1	sulfur dioxide	1.55	64											0.96		
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84													
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78		0.06				1.77	0.24	3.17	2.72	0.83	0.40	0.53	
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130						t	0.02	0.13	0.15	0.02	0.02	t	
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.54	0.74	0.59	0.00	0.02	0.97	0.21	1.24	1.28	1.48	1.06	0.51	0.03
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114													
18	hexanal	8.33	100						0.49	0.28	0.57	0.37		0.59		
19	tetrachloroethene	8.79	164	0.03	0.04											0.00
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.11	0.13	0.12			0.21	0.12	0.23	0.25	0.21	0.14	0.03	0.01
23	p,m-xylene	10.81	106	0.41	0.44	0.38			0.52	0.16	0.44	0.53	0.53	0.25	0.10	0.01
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118		0.06	0.03									0.06	
26	3-heptanone	11.37	114													
27	o-xylene	11.49	106	0.14	0.17	0.15			0.29	0.1	0.18	0.29	0.28	0.10	0.05	0.01
28	heptanal	11.60	114								0.94	0.41				
29	n-nonane	11.67	128	0.03	0.03	0.03			0.31	0.33						0.00
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120													
33	3-methyl nonane	12.51	142						0.18			0.30				
34	pinene	12.61	136	0.05	0.05	0.02						0.33			0.14	
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal 12.72	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120		0.07	0.06			0.32							
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.08	0.07	0.09			2.03	0.93	2.77	2.08	5.25	6.34	1.43	0.04
42	C3-benzene	13.25	120	0.16	0.19	0.20			0.25							
43	C3-benzene	13.41	120	0.06	0.07	0.05						0.21				
44	phenol	13.57	94										1.55			
45	aniline	13.61	93													
46	C3-benzene	13.68	120													
47	6-methyl-5-hepten-2-one	13.69	126						0.15	0.17	0.51			0.21		
48	benzonitrile	13.72	103						0.42		0.58	0.46	0.41	0.32	0.14	
49	1-decene	13.83	140													
50	C3-benzene	13.99	120										0.23			
51	n-decane	14.07	142	0.09	0.09	0.10			0.19			0.26				0.01
52	octanal	14.09	128						0.29	0.38	1.22		0.15	0.35	0.03	
53	dichlorobenzene	14.40	146		0.03	0.03										
54	4-methyl decane	14.56	156													
55	C3-benzene	14.57	120						0.27		0.72	0.49				
56	C4-benzene	14.60	134						0.13	0.18	0.51	0.15				
57	2-ethyl hexanol	14.64	130	0.16	0.21				0.57	0.27	0.72	0.39			0.26	
58	limonene	14.75	136	0.04	0.05	0.05										
59	benzene methanol	14.77	108													
60	indan	14.87	118						0.17			0.25				
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134						0.27	0.23		0.34				

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; skrm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	48	49	50	51	137	156	157	158	159	160	161	162	52
				E220 sw	E220 w	E220 nw	o	se	se	ne	nw	nw	o	o	o	E301 m
	Tentative Identification															
64	5-methyl decane	15.21	156													
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134						0.32		0.4	0.41				
67	2-methyl decane	15.34	156													
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120				0.00	0.01	1.06	0.68	1.57	1.53	3.84	3.41	1.34	0.03
70	C4-benzene	15.47	134						0.08							
71	3-methyl decane	15.48	156													
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134									0.25				
74	C4-benzene	15.72	134									0.24				
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134													
77	1-undecene	15.95	154													
78	n-undecane	16.05	156	0.07	0.07	0.07			0.25			0.68		0.10		0.01
79	nonanal	16.12	142			0.04	0.01		0.86	0.76	2.53	0.83	0.44	1.27	0.10	0.01
80	C4-benzene	16.24	134													
81	phosphoric acid, triethyl ester	16.41	182													
82	C4-benzene	16.43	134													
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134													
85	cis methyl decalin	16.74	152													
86	C5-benzene	16.79	148													
87	methyl indan	17.14	132													
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198													
89	methyl indan	17.29	132						0.13			0.26				
90	trichlorobenzene	17.64	180							0.15						
91	1-dodecene	17.66	168													
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170						0.09			0.18				
95	naphthalene	17.79	128	0.19	0.25	0.23		0.01	0.44	0.37	0.83	0.68				0.01
96	C5-benzene	17.87	148									0.20				
97	decanal	17.90	156				0.00		0.68	0.7	1.38	0.37	0.38	1.36	0.08	0.01
98	benzothiophene	17.90	134													
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135								0.07					
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146													
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecene	19.38	184						0.17			0.32				
107	N,N-dibutyl formamide	19.51	157													
108	2-methyl naphthalene	19.61	142	0.08	0.13	0.11						0.26				
109	phthalate	19.80	390													
110	1,3-isobenzofurandione	19.81	148									0.13			0.06	
111	1-methyl naphthalene	19.91	142									0.16				
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196								0.21					
114	n-tetradecane	20.86	198	0.05	0.05				0.63			0.15				
115	biphenyl	20.87	154			0.06						0.08				0.00
116	1,1'-oxy bis(benzene)	21.17	186									0.07				
117	2,4,6-trichloroaniline	21.20	195	0.02	0.04	0.04			0.17		0.14	0.17				
118	C2-naphthalene	21.28	156						0.14			0.08				
119	C2-naphthalene	21.51	156	0.03	0.05	0.04					0.15	0.09				
120	C2-naphthalene	21.56	156								0.2					
121	tribromobenzene	21.62	312													
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220													
124	1-pentadecene	22.16	210													
125	n-pentadecane	22.26	212						0.09		0.1	0.11				
126	methyl biphenyl	22.30	168													
127	1,2-dihydroacenaphthylene	22.50	168						0.06		0.08	0.06				

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Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	56	57	54	164	55	53	60	61	134	58	59	63	64
				E303 n	E303 s	E305 s	E305 ne	E305 n	E306 m	E308 s	E308 n	E308 E308	E309 n	E309 s	E310 m	E311 m
Tentative Identification																
1	sulfur dioxide	1.55	64													
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84					0.11								
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78			0.01	0.40	0.04		0.03	0.06			0.03	0.05	0.06
10	2-pentanone	4.08	86													
11	trichloroethene	4.47	130				0.14								0.02	
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92	0.07	0.05	0.07	0.90	0.16	0.11	0.74	0.56		0.24	0.17	0.51	0.66
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114				0.07									
18	hexanal	8.33	100													
19	tetrachloroethene	8.79	164	0.02	0.02	0.01	0.11	0.02	0.01	0.04	0.03			0.04	0.03	0.08
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106	0.02	0.01	0.02	0.18	0.03	0.02	0.18	0.14		0.05	0.04	0.15	0.17
23	p,m-xylene	10.81	106	0.03	0.02	0.04	0.49	0.06	0.05	0.60	0.48		0.07	0.06	0.48	0.48
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118		0.00	0.01	0.04	0.01	0.01	0.08	0.03			0.01		
26	3-heptanone	11.37	114													0.08
27	o-xylene	11.49	106		0.01	0.02	0.28	0.03	0.02	0.22	0.17			0.03	0.18	0.19
28	heptanal	11.60	114													
29	n-nonane	11.67	128	0.03	0.00	0.01		0.02	0.02	0.04	0.03			0.02	0.03	0.04
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120													
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136							0.05	0.03					
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120	0.01			0.10		0.01	0.06	0.05			0.01	0.06	0.06
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106	0.08	0.06	0.05	0.48	0.08	0.05	0.05	0.04		0.14	0.12	0.08	0.09
42	C3-benzene	13.25	120				0.26			0.27	0.21				0.23	0.22
43	C3-benzene	13.41	120				0.05			0.09	0.07				0.07	0.06
44	phenol	13.57	94											0.08		
45	aniline	13.61	93													
46	C3-benzene	13.68	120							0.16	0.07				0.10	0.13
47	6-methyl-5-hepten-2-one	13.69	126													
48	benzonitrile	13.72	103				0.07		0.05							
49	1-decene	13.83	140													
50	C3-benzene	13.99	120												0.39	0.33
51	n-decane	14.07	142		0.01	0.03		0.06	0.04	0.11	0.08			0.06	0.11	0.11
52	octanal	14.09	128													
53	dichlorobenzene	14.40	146			0.00				0.04	0.03			0.02		0.03
54	4-methyl decane	14.56	156												0.01	
55	C3-benzene	14.57	120				0.08								0.03	
56	C4-benzene	14.60	134							0.14	0.11					0.14
57	2-ethyl hexanol	14.64	130	0.03	0.01	0.02	0.07	0.43	0.02							0.12
58	limonene	14.75	136				0.09			0.15	0.06				0.04	0.04
59	benzene methanol	14.77	108											0.07		
60	indan	14.87	118				0.03									
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134								0.07			0.20	0.08	0.07

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Air Monitoring Results

Sample number and room number
at the top of each data column

			56	57	54	164	55	53	60	61	134	58	59	63	64
	Compound		E303	E303	E305	E305	E305	E306	E308	E308	E308	E309	E309	E310	E311
	Tentative Identification	RT	MW	n	s	s	ne	n	m	s	n	n	s	m	m
64	5-methyl decane	15.21	156										0.02	0.05	0.05
65	4-methyl decane	15.29	156												
66	C4-benzene	15.30	134											0.06	0.06
67	2-methyl decane	15.34	156										0.02		
68	1,4-dithiane	15.39	120												
69	acetophenone	15.47	120	0.08	0.06	0.04	0.19	0.07	0.03			0.09	0.11		
70	C4-benzene	15.47	134											0.08	0.10
71	3-methyl decane	15.48	156												
72	methyl benzaldehyde	15.51	120												
73	C4-benzene	15.64	134				0.03								
74	C4-benzene	15.72	134												
75	A,A-dimethyl benzene methanol	15.80	136												
76	C4-benzene	15.86	134						0.08	0.06				0.07	0.08
77	1-undecene	15.95	154												
78	n-undecane	16.05	156	0.03	0.02	0.03	0.11	0.04	0.03	0.12	0.09	0.07	0.08	0.14	0.12
79	nonanal	16.12	142	0.04	0.03	0.02	0.12	0.07	0.05	0.03	0.03		0.07	0.04	0.06
80	C4-benzene	16.24	134				0.03								
81	phosphoric acid, triethyl ester	16.41	182												
82	C4-benzene	16.43	134											0.05	0.04
83	trans methyl decalin	16.50	152												
84	C4-benzene	16.55	134										0.02	0.05	0.04
85	cis methyl decalin	16.74	152												
86	C5-benzene	16.79	148												
87	methyl indan	17.14	132												
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198												
89	methyl indan	17.29	132				0.11								
90	trichlorobenzene	17.64	180												
91	1-dodecene	17.66	168												
92	1-(4-methylphenyl) ethanone	17.67	134												
93	N,N-dibutyl-1-butanamine	17.72	142												
94	n-dodecane	17.80	170				0.03								
95	naphthalene	17.79	128	0.02	0.01	0.02	0.15	0.03	0.04	0.20	0.15		0.05	0.18	0.16
96	C5-benzene	17.87	148												
97	decanal	17.90	156	0.03	0.02	0.01	0.13	0.07	0.05				0.03		0.04
98	benzothiophene	17.90	134												
99	1,4-oxathiane, 4,4-dioxide	18.35	136												
100	benzothiazole	18.40	135												
101	benzene propanenitrile	18.53	131												
102	dimethyl indan	18.80	146												
103	3-tetradecene	18.85	196												
104	N-butyl-N-nitroso N-butanamine	18.91	158												
105	1-tridecene	19.26	182												
106	n-tridecene	19.38	184												
107	N,N-dibutyl formamide	19.51	157												
108	2-methyl naphthalene	19.61	142				0.05		0.05	0.04			0.01	0.06	0.03
109	phthalate	19.80	390												
110	1,3-isobenzofurandione	19.81	148				0.05								
111	1-methyl naphthalene	19.91	142				0.04								
112	1-methyl-4-(propylthio) benzene	20.37	166												
113	1-tetradecene	20.76	196												
114	n-tetradecane	20.86	198												
115	biphenyl	20.87	154	0.01	0.00	0.01		0.02	0.01	0.07	0.04		0.01	0.04	0.07
116	1,1'-oxy bis(benzene)	21.17	186				0.04		0.06	0.04			0.01	0.03	0.09
117	2,4,6-trichloroaniline	21.20	195			0.01	0.03		0.01	0.01	0.02			0.02	0.02
118	C2-naphthalene	21.28	156												
119	C2-naphthalene	21.51	156						0.02	0.02				0.02	
120	C2-naphthalene	21.56	156												
121	tribromobenzene	21.62	312												
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194												
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220												
124	1-pentadecene	22.16	210												
125	n-pentadecane	22.26	212												
126	methyl biphenyl	22.30	168												
127	1,2-dihydroacenaphthylene	22.50	168												

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

[illegible]

Air Monitoring Results

Sample number and room number
at the top of each data column

			62	65	135	136	66	165	67	73	71	72	70	69	68
	Compound		E311	E313	E313		E314	E314	E314	E317	E318		E319	E320	E321
	Tentative Identification	RT	MW	s	m	o	n	n	s	m	m	o	m	m	n
1	sulfur dioxide	1.55	64												
2	2-propanone	1.89	58												
3	1-fluoro-1,1-dichloroethane	1.95	116												
4	N-ethyl ethanamine	2.36	73												
5	2-butanone	2.56	72												
6	N-ethyl-N-methyl ethanamine	2.94	87												
7	dichloromethane	3.15	84				0.04								
8	N-(1-methylethyl)-2-propanamine	3.59	101												
9	benzene	3.64	78	0.01				0.36	0.00					0.04	
10	2-pentanone	4.08	86												
11	trichloroethene	4.47	130					0.05							
12	N-(1-methylethylidene)-2-propanamine	4.62	99												
13	toluene	6.97	92	0.16	0.00		0.00	0.51	0.05					0.11	
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115												
15	3-hexanone	7.75	100												
16	2-hexanone	7.92	100												
17	n-octane	8.29	114												
18	hexanal	8.33	100									0.03			
19	tetrachloroethene	8.79	164	0.01					0.00					0.01	
20	methyl ethyl disulfide	9.68	108												
21	chlorobenzene	10.05	112												
22	ethyl benzene	10.57	106	0.05	0.00		0.00	0.07	0.01					0.03	
23	p,m-xylene	10.81	106	0.17	0.01		0.01	0.21	0.03					0.08	
24	1,4-oxathiane	11.00	104												
25	styrene	11.30	118												
26	3-heptanone	11.37	114												
27	o-xylene	11.49	106	0.06	0.00		0.00	0.24	0.01					0.04	
28	heptanal	11.60	114												
29	n-nonane	11.67	128	0.01	0.01				0.00						
30	C3-benzene	12.20	120												
31	N-butylidene-1-butanamine	12.28	127												
32	C3-benzene	12.33	120												
33	3-methyl nonane	12.51	142												
34	pinene	12.61	136												
35	2-methyl cyclohexanol	12.62	114												
36	3-octanone	12.71	128												
37	2-ethyl hexanal	13.02	128									0.01			
38	1-chloro-2-methyl benzene	13.03	126												
39	propyl benzene	13.05	120	0.02											
40	N-butyl-1-butanamine	13.17	129												
41	benzaldehyde	13.18	106	0.03	0.01	0.16		0.48	0.01			0.07	0.01		
42	C3-benzene	13.25	120	0.08	0.05									0.05	
43	C3-benzene	13.41	120	0.02	0.01									0.01	
44	phenol	13.57	94			0.05		0.12				0.02			
45	aniline	13.61	93												
46	C3-benzene	13.68	120	0.03											
47	6-methyl-5-hepten-2-one	13.69	126									0.02			
48	benzonitrile	13.72	103									0.02		0.03	
49	1-decene	13.83	140												
50	C3-benzene	13.99	120	0.12	0.06									0.07	
51	n-decane	14.07	142	0.03	0.02										
52	octanal	14.09	128					0.09				0.03			
53	dichlorobenzene	14.40	146												
54	4-methyl decane	14.56	156												
55	C3-benzene	14.57	120												
56	C4-benzene	14.60	134	0.04		0.03								0.03	
57	2-ethyl hexanol	14.64	130		0.04			0.05	0.03	0.04		0.08			
58	limonene	14.75	136	0.01	0.04	0.03									
59	benzene methanol	14.77	108												
60	indan	14.87	118												
61	dichlorobenzene	14.89	146												
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129												
63	C4-benzene	15.10	134											0.02	

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

			62	65	135	136	66	165	67	73	71	72	70	69	68
	Compound		E311	E313	E313		E314	E314	E314	E317	E318		E319	E320	E321
	Tentative Identification	RT	MW	s	m	o	n	n	s	m	m	o	m	m	n
64	5-methyl decane	15.21	156												
65	4-methyl decane	15.29	156												
66	C4-benzene	15.30	134												
67	2-methyl decane	15.34	156												
68	1,4-dithiane	15.39	120												
69	acetophenone	15.47	120	0.01		0.01	0.17		0.53	0.01		0.06	0.01		
70	C4-benzene	15.47	134												
71	3-methyl decane	15.48	156												
72	methyl benzaldehyde	15.51	120												
73	C4-benzene	15.64	134												
74	C4-benzene	15.72	134												
75	A,A-dimethyl benzene methanol	15.80	136												
76	C4-benzene	15.86	134											0.02	
77	1-undecene	15.95	154												
78	n-undecane	16.05	156	0.03	0.01				0.01					0.01	
79	nonanal	16.12	142	0.01				0.23	0.02			0.05			
80	C4-benzene	16.24	134												
81	phosphoric acid, triethyl ester	16.41	182												
82	C4-benzene	16.43	134												
83	trans methyl decalin	16.50	152												
84	C4-benzene	16.55	134												
85	cis methyl decalin	16.74	152												
86	C5-benzene	16.79	148												
87	methyl indan	17.14	132												
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198												
89	methyl indan	17.29	132												
90	trichlorobenzene	17.64	180												
91	1-dodecene	17.66	168												
92	1-(4-methylphenyl) ethanone	17.67	134												
93	N,N-dibutyl-1-butanamine	17.72	142												
94	n-dodecane	17.80	170												
95	naphthalene	17.79	128	0.05	0.04				0.01					0.02	
96	C5-benzene	17.87	148												
97	decanal	17.90	156	0.01				0.20	0.02			0.05			
98	benzothiophene	17.90	134												
99	1,4-oxathiane, 4,4-dioxide	18.35	136												
100	benzothiazole	18.40	135												
101	benzene propanenitrile	18.53	131												
102	dimethyl indan	18.80	146												
103	3-tetradecene	18.85	196												
104	N-butyl-N-nitroso N-butanamine	18.91	158												
105	1-tridecene	19.26	182												
106	n-tridecane	19.38	184												
107	N,N-dibutyl formamide	19.51	157												
108	2-methyl naphthalene	19.61	142	0.01	0.01									0.01	
109	phthalate	19.80	390												
110	1,3-isobenzofurandione	19.81	148					0.03							
111	1-methyl naphthalene	19.91	142												
112	1-methyl-4-(propylthio) benzene	20.37	166												
113	1-tetradecene	20.76	196												
114	n-tetradecane	20.86	198												
115	biphenyl	20.87	154	0.01	0.02				0.00					0.01	
116	1,1'-oxy bis(benzene)	21.17	186	0.02	0.03									0.01	
117	2,4,6-trichloroaniline	21.20	195												
118	C2-naphthalene	21.28	156												
119	C2-naphthalene	21.51	156												
120	C2-naphthalene	21.56	156												
121	tribromobenzene	21.62	312												
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194												
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220												
124	1-pentadecene	22.16	210												
125	n-pentadecane	22.26	212												
126	methyl biphenyl	22.30	168												
127	1,2-dihydroacenaphthylene	22.50	168												

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Compound		RT	MW	62 E311	65 E313	135 E313	136	66 E314	165 E314	67 E314	73 E317	71 E318	72	70 E319	69 E320	68 E321
Tentative Identification		RT	MW	s	m		o	n	n	s	m	m	o	m	m	n
128	C3-naphthalene	22.85	170													
129	phenyl maleic anhydride	22.90	214				0.02		0.07							
130	dibenzofuran	22.93	168													
131	1-hexadecene	22.47	224													
132	n-hexadecane	23.57	226													
133	benzenedicarboxylic acid, diethyl ester	23.64	222													
134	1,3-dibromo-2,2-bis(bromomethyl) propane	24.17	384													
135	diphenyl diazene	24.23	182													
136	benzophenone	24.30	182													
137	1-heptadecene	24.71	238													
138	n-heptadecane	24.81	240													
139	N-(phenylmethylene) benzamine	24.83	181													
140	9H-fluoren-9-one	25.28	180													
141	tribromobenzamine	25.39	327													
142	trimethyl indan	25.45	160	0.04				0.01								
143	dibenzothiophene	25.58	184													
144	tetrabromobenzene	25.86	390													
145	n-octadecane	25.88	254													
146	phenanthrene/anthracene	26.37	178					0.04							0.02	
147	methyl dibenzothiophene	26.98	198													
148	n-nonadecane	27.04	268					0.02								
149	2-methyl anthracene/phenanthrene	27.48	192													
150	1-methyl anthracene/phenanthrene	27.57	192													
151	2,6-dibutyl-2,5-cyclohexadien-1,4-dione	31.30	220						0.65							
152	Total PCB's							3.00								

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nl/l.)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	78	79	74	75	76	77	132	85	86	84	130	81	82
				E403 s	E403 n	E405 ne	E405 sw	E408 ne	E408 sw	E408	E409 e	E409 w	E411 drway	E411	E412 s	E412 o
1	sulfur dioxide	1.55	64													
2	2-propanone	1.89	58													
3	1-fluoro-1,1-dichloroethane	1.95	116													
4	N-ethyl ethanamine	2.36	73													
5	2-butanone	2.56	72													
6	N-ethyl-N-methyl ethanamine	2.94	87													
7	dichloromethane	3.15	84							0.22						
8	N-(1-methylethyl)-2-propanamine	3.59	101													
9	benzene	3.64	78													
10	2-pentanone	4.08	86							0.08						
11	trichloroethene	4.47	130													
12	N-(1-methylethylidene)-2-propanamine	4.62	99													
13	toluene	6.97	92		0.06	0.07	0.07	0.15	0.21	0.15	0.08	0.17	0.29	0.02		
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115													
15	3-hexanone	7.75	100													
16	2-hexanone	7.92	100													
17	n-octane	8.29	114													
18	hexanal	8.33	100													
19	tetrachloroethene	8.79	164													
20	methyl ethyl disulfide	9.68	108													
21	chlorobenzene	10.05	112													
22	ethyl benzene	10.57	106			0.01					0.01	0.03	0.06			
23	p,m-xylene	10.81	106		0.02	0.03	0.03	0.07		0.06	0.06	0.11	0.23			
24	1,4-oxathiane	11.00	104													
25	styrene	11.30	118													
26	3-heptanone	11.37	114													
27	o-xylene	11.49	106			0.01				0.02	0.03	0.04	0.09			
28	heptanal	11.60	114													
29	n-nonane	11.67	128													
30	C3-benzene	12.20	120													
31	N-butylidene-1-butanamine	12.28	127													
32	C3-benzene	12.33	120													
33	3-methyl nonane	12.51	142													
34	pinene	12.61	136									0.02				
35	2-methyl cyclohexanol	12.62	114													
36	3-octanone	12.71	128													
37	2-ethyl hexanal	13.02	128													
38	1-chloro-2-methyl benzene	13.03	126													
39	propyl benzene	13.05	120													
40	N-butyl-1-butanamine	13.17	129													
41	benzaldehyde	13.18	106		0.02	0.01	0.01	0.03		0.05		0.03		0.02	0.02	
42	C3-benzene	13.25	120			0.01					0.03	0.06	0.12			
43	C3-benzene	13.41	120								0.04		0.04			
44	phenol	13.57	94					0.03		0.01		0.02				
45	aniline	13.61	93													
46	C3-benzene	13.68	120							0.01		0.05		0.01		
47	6-methyl-5-hepten-2-one	13.69	126													
48	benzonitrile	13.72	103													
49	1-decene	13.83	140													
50	C3-benzene	13.99	120									0.10	0.18			
51	n-decane	14.07	142							0.02		0.03	0.02	0.01		
52	octanal	14.09	128		0.03										0.01	
53	dichlorobenzene	14.40	146													
54	4-methyl decane	14.56	156													
55	C3-benzene	14.57	120													
56	C4-benzene	14.60	134										0.06			
57	2-ethyl hexanol	14.64	130				0.04	0.09		0.01	0.02	0.06				
58	limonene	14.75	136								0.01	0.06	0.03			
59	benzene methanol	14.77	108													
60	indan	14.87	118													
61	dichlorobenzene	14.89	146													
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129													
63	C4-benzene	15.10	134										0.03			

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	78	79	74	75	76	77	132	85	86	84	130	81	82
				E403 s	E403 n	E405 ne	E405 sw	E408 ne	E408 sw	E408	E409 e	E409 w	E411 drway	E411	E412 s	
Tentative Identification																
64	5-methyl decane	15.21	156													
65	4-methyl decane	15.29	156													
66	C4-benzene	15.30	134										0.04			
67	2-methyl decane	15.34	156													
68	1,4-dithiane	15.39	120													
69	acetophenone	15.47	120		0.03			0.04		0.04				0.02	0.01	
70	C4-benzene	15.47	134													
71	3-methyl decane	15.48	156													
72	methyl benzaldehyde	15.51	120													
73	C4-benzene	15.64	134													
74	C4-benzene	15.72	134													
75	A,A-dimethyl benzene methanol	15.80	136													
76	C4-benzene	15.86	134									0.02	0.02			
77	1-undecene	15.95	154													
78	n-undecane	16.05	156		0.02	trace				0.02		0.03	0.02	0.01		
79	nonanal	16.12	142		0.03		0.02	0.03				0.03			0.01	
80	C4-benzene	16.24	134													
81	phosphoric acid, triethyl ester	16.41	182													
82	C4-benzene	16.43	134													
83	trans methyl decalin	16.50	152													
84	C4-benzene	16.55	134													
85	cis methyl decalin	16.74	152													
86	C5-benzene	16.79	148													
87	methyl indan	17.14	132													
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198													
89	methyl indan	17.29	132													
90	trichlorobenzene	17.64	180													
91	1-dodecene	17.66	168													
92	1-(4-methylphenyl) ethanone	17.67	134													
93	N,N-dibutyl-1-butanamine	17.72	142													
94	n-dodecane	17.80	170													
95	naphthalene	17.79	128		0.02	0.01		0.02		0.01	0.01	0.05	0.04	0.00		
96	C5-benzene	17.87	148													
97	decanal	17.90	156		0.02		0.02	0.04				0.02			0.01	
98	benzothioephene	17.90	134													
99	1,4-oxathiane, 4,4-dioxide	18.35	136													
100	benzothiazole	18.40	135					0.02								
101	benzene propanenitrile	18.53	131													
102	dimethyl indan	18.80	146													
103	3-tetradecene	18.85	196													
104	N-butyl-N-nitroso N-butanamine	18.91	158													
105	1-tridecene	19.26	182													
106	n-tridecane	19.38	184													
107	N,N-dibutyl formamide	19.51	157													
108	2-methyl naphthalene	19.61	142													
109	phthalate	19.80	390													
110	1,3-isobenzofurandione	19.81	148													
111	1-methyl naphthalene	19.91	142													
112	1-methyl-4-(propylthio) benzene	20.37	166													
113	1-tetradecene	20.76	196													
114	n-tetradecane	20.86	198													
115	biphenyl	20.87	154									0.02				
116	1,1'-oxy bis(benzene)	21.17	186									0.03				
117	2,4,6-trichloroaniline	21.20	195									0.03				
118	C2-naphthalene	21.28	156													
119	C2-naphthalene	21.51	156													
120	C2-naphthalene	21.56	156													
121	tribromobenzene	21.62	312													
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194													
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220													
124	1-pentadecene	22.16	210													
125	n-pentadecane	22.26	212													
126	methyl biphenyl	22.30	168													
127	1,2-dihydroacenaphthylene	22.50	168													

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clst closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	78	79	74	75	76	77	132	85	86	84	130	81	82
				E403	E403	E405	E405	E408	E408	E408	E409	E409	E411	E411	E412	
	Tentative Identification			s	n	ne	sw	ne	sw		e	w	drway		s	o
128	C3-naphthalene	22.65	170													
129	phenyl maleic anhydride	22.90	214													
130	dibenzofuran	22.93	168													
131	1-hexadecene	22.47	224													
132	n-hexadecane	23.57	226													
133	benzenedicarboxylic acid, diethyl ester	23.64	222													
134	1,3-dibromo-2,2-bis(bromomethyl) propane	24.17	384													
135	diphenyl diazene	24.23	182													
136	benzophenone	24.30	182													
137	1-heptadecene	24.71	238													
138	n-heptadecane	24.81	240													
139	N-(phenylmethylene) benzamine	24.83	181													
140	9H-fluoren-9-one	25.28	180													
141	tribromobenzamine	25.39	327													
142	trimethyl indan	25.45	160		0.01	0.01		0.03		0.01						
143	dibenzothiophene	25.58	184													
144	tetrabromobenzene	25.86	390													
145	n-octadecane	25.88	254													
146	phenanthrene/anthracene	26.37	178		0.01							0.01				
147	methyl dibenzothiophene	26.98	198													
148	n-nonadecane	27.04	268													
149	2-methyl anthracene/phenanthrene	27.48	192													
150	1-methyl anthracene/phenanthrene	27.57	192													
151	2,6-dibutyl-2,5-cyclohexadien-1,4-dione	31.30	220													
152	Total PCB's											1.00				

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; stkr stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

				80	90	131	89	166	88	87	133	125	126		
	Compound			E412	E415	E415	E416	E416	E417	E418	E418	roof	126		
	Tentative Identification	RT	MW	n	m		m	m	m	m		elev	o		
1	sulfur dioxide	1.55	64												
2	2-propanone	1.89	58												
3	1-fluoro-1,1-dichloroethane	1.95	116												
4	N-ethyl ethanamine	2.36	73												
5	2-butanone	2.56	72												
6	N-ethyl-N-methyl ethanamine	2.94	87												
7	dichloromethane	3.15	84	0.19											
8	N-(1-methylethyl)-2-propanamine	3.59	101												
9	benzene	3.64	78		0.03	0.01	0.07	0.85	0.38	0.61					
10	2-pentanone	4.08	86												
11	trichloroethene	4.47	130		0.02	0.01	0.04	0.25		0.33					
12	N-(1-methylethylidene)-2-propanamine	4.62	99												
13	toluene	6.97	92		0.20	0.03	0.38	2.19	2.01	3.66	0.02	0.01			
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115												
15	3-hexanone	7.75	100												
16	2-hexanone	7.92	100												
17	n-octane	8.29	114					0.13							
18	hexanal	8.33	100												
19	tetrachloroethene	8.79	164		0.02		0.04	0.52		0.31					
20	methyl ethyl disulfide	9.68	108												
21	chlorobenzene	10.05	112												
22	ethyl benzene	10.57	106		0.05	0.01		0.36	0.45	0.89					
23	p,m-xylene	10.81	106		0.17			1.05	1.63	3.18		0.01			
24	1,4-oxathiane	11.00	104												
25	styrene	11.30	118							0.30					
26	3-heptanone	11.37	114												
27	o-xylene	11.49	106		0.06			0.84	0.58	1.21					
28	heptanal	11.60	114												
29	n-nonane	11.67	128							0.22					
30	C3-benzene	12.20	120					0.11							
31	N-butylidene-1-butanamine	12.28	127												
32	C3-benzene	12.33	120		0.02										
33	3-methyl nonane	12.51	142												
34	pinene	12.61	136												
35	2-methyl cyclohexanol	12.62	114												
36	3-octanone	12.71	128												
37	2-ethyl hexanal	13.02	128												
38	1-chloro-2-methyl benzene	13.03	126												
39	propyl benzene	13.05	120		0.02			0.29		0.40					
40	N-butyl-1-butanamine	13.17	129												
41	benzaldehyde	13.18	106	0.03	0.02	0.03		1.00	0.21	0.38	0.03	0.02			
42	C3-benzene	13.25	120		0.08			0.60	0.76	1.49					
43	C3-benzene	13.41	120		0.03			0.27	0.23	0.47					
44	phenol	13.57	94									0.02			
45	aniline	13.61	93												
46	C3-benzene	13.68	120		0.02	0.00									
47	6-methyl-5-hepten-2-one	13.69	126												
48	benzonitrile	13.72	103												
49	1-decene	13.83	140												
50	C3-benzene	13.99	120		0.12										
51	n-decane	14.07	142		0.03				0.23	0.46	0.01				
52	octanal	14.09	128												
53	dichlorobenzene	14.40	146												
54	4-methyl decane	14.56	156												
55	C3-benzene	14.57	120					0.13							
56	C4-benzene	14.60	134		0.05			0.23							
57	2-ethyl hexanol	14.64	130	0.12		0.01		0.16				0.47	0.01		
58	limonene	14.75	136		0.02			0.10		0.59					
59	benzene methanol	14.77	108												
60	indan	14.87	118					0.20							
61	dichlorobenzene	14.89	146												
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129												
63	C4-benzene	15.10	134		0.02					0.45					

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; clost closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nl/l)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound			80	90	131	89	166	88	87	133	125	126		
				E412	E415	E415	E416	E416	E417	E418	E418	roof			
	Tentative Identification	RT	MW	n	m		m	m	m	m		elev	o		
64	5-methyl decane	15.21	156												
65	4-methyl decane	15.29	156												
66	C4-benzene	15.30	134		0.03			0.20		0.37					
67	2-methyl decane	15.34	156												
68	1,4-dithiane	15.39	120												
69	acetophenone	15.47	120	0.02		0.01		0.47		0.26	0.03	0.02	0.01		
70	C4-benzene	15.47	134												
71	3-methyl decane	15.48	156												
72	methyl benzaldehyde	15.51	120												
73	C4-benzene	15.64	134					0.07							
74	C4-benzene	15.72	134												
75	A,A-dimethyl benzene methanol	15.80	136												
76	C4-benzene	15.86	134		0.02			0.32							
77	1-undecene	15.95	154												
78	n-undecane	16.05	156		0.02			0.11		0.35					
79	nonanal	16.12	142	0.01				0.38			0.02	0.03	0.01		
80	C4-benzene	16.24	134					0.08							
81	phosphoric acid, triethyl ester	16.41	182												
82	C4-benzene	16.43	134												
83	trans methyl decalin	16.50	152												
84	C4-benzene	16.55	134		0.01										
85	cis methyl decalin	16.74	152												
86	C5-benzene	16.79	148												
87	methyl indan	17.14	132												
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198												
89	methyl indan	17.29	132												
90	trichlorobenzene	17.64	180												
91	1-dodecene	17.66	168												
92	1-(4-methylphenyl) ethanone	17.67	134												
93	N,N-dibutyl-1-butanamine	17.72	142												
94	n-dodecane	17.80	170					0.12							
95	naphthalene	17.79	128		0.05	0.08		0.23	0.41	0.87		0.01			
96	C5-benzene	17.87	148												
97	decanal	17.90	156					0.32				0.02			
98	benzothiophene	17.90	134												
99	1,4-oxathiane, 4,4-dioxide	18.35	136												
100	benzothiazole	18.40	135												
101	benzene propanenitrile	18.53	131												
102	dimethyl indan	18.80	146												
103	3-tetradecene	18.85	196												
104	N-butyl-N-nitroso N-butanamine	18.91	158												
105	1-tridecene	19.26	182												
106	n-tridecane	19.38	184					0.03							
107	N,N-dibutyl formamide	19.51	157												
108	2-methyl naphthalene	19.61	142		0.01			0.05	0.13	0.23					
109	phthalate	19.80	390									0.04			
110	1,3-isobenzofurandione	19.81	148					0.04				0.05			
111	1-methyl naphthalene	19.91	142					0.07		0.18					
112	1-methyl-4-(propylthio) benzene	20.37	166												
113	1-tetradecene	20.76	196												
114	n-tetradecane	20.86	198												
115	biphenyl	20.87	154		0.01			0.05							
116	1,1'-oxy bis(benzene)	21.17	186		0.02			0.07		0.15					
117	2,4,6-trichloroaniline	21.20	195					0.05		0.23					
118	C2-naphthalene	21.28	156												
119	C2-naphthalene	21.51	156					0.06		0.06					
120	C2-naphthalene	21.56	156												
121	tribromobenzene	21.62	312												
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194												
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220												
124	1-pentadecene	22.16	210												
125	n-pentadecane	22.26	212												
126	methyl biphenyl	22.30	168												
127	1,2-dihydroacenaphthylene	22.50	168												

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; slkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;

RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	83	98	99	96	97	95	91	92	175	176	174	177
				F104	G110		G118	G120	G120	I101		I101		I101	I101
	Tentative Identification			Stkm	m	o	m	e	w	m	o	m	o	sump	sump
1	sulfur dioxide	1.55	64							0.01					
2	2-propanone	1.89	58												
3	1-fluoro-1,1-dichloroethane	1.95	116												
4	N-ethyl ethanamine	2.36	73												
5	2-butanone	2.56	72												
6	N-ethyl-N-methyl ethanamine	2.94	87												
7	dichloromethane	3.15	84												
8	N-(1-methylethyl)-2-propanamine	3.59	101												
9	benzene	3.64	78		0.01				0.03			0.36	0.52	0.38	0.31
10	2-pentanone	4.08	86												
11	trichloroethene	4.47	130									0.03	t	0.52	0.30
12	N-(1-methylethylidene)-2-propanamine	4.62	99												
13	toluene	6.97	92	0.24	0.09	0.06	0.08	0.10	0.11	0.04	0.07	1.23	0.82	0.97	0.48
14	N-methyl-N-(1-methylethyl)-2-propanamine	7.27	115												
15	3-hexanone	7.75	100												
16	2-hexanone	7.92	100												
17	n-octane	8.29	114												
18	hexanal	8.33	100									0.10		0.30	0.27
19	tetrachloroethene	8.79	164		0.01		0.02	0.01	0.01						
20	methyl ethyl disulfide	9.68	108												
21	chlorobenzene	10.05	112												
22	ethyl benzene	10.57	106		0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.24	0.12	0.16	0.12
23	p,m-xylene	10.81	106	0.13	0.05	0.06	0.05	0.06	0.06	0.02	0.03	0.32	0.16	0.31	0.16
24	1,4-oxathiane	11.00	104												
25	styrene	11.30	118		0.01		0.01	0.01	0.01						
26	3-heptanone	11.37	114									0.06			
27	o-xylene	11.49	106		0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.28	0.15	0.23	
28	heptanal	11.60	114												
29	n-nonane	11.67	128		0.01		0.01		0.01	0.02					0.23
30	C3-benzene	12.20	120												
31	N-butylidene-1-butanamine	12.28	127												
32	C3-benzene	12.33	120												
33	3-methyl nonane	12.51	142												
34	pinene	12.61	136		0.01		0.01	0.02	0.02	0.01		0.09			
35	2-methyl cyclohexanol	12.62	114							0.02		0.28			
36	3-octanone	12.71	128												
37	2-ethyl hexanal	13.02	128												
38	1-chloro-2-methyl benzene	13.03	126												
39	propyl benzene	13.05	120									0.13			
40	N-butyl-1-butanamine	13.17	129												
41	benzaldehyde	13.18	106		0.07	0.08	0.05	0.05	0.04	0.02	0.05	1.50	1.90	1.10	0.56
42	C3-benzene	13.25	120	0.07		0.02	0.03	0.03	0.03	0.01	0.01	0.22			
43	C3-benzene	13.41	120				0.02		0.01						
44	phenol	13.57	94		0.03	0.02	0.02	0.03		0.02	0.02		0.67		0.16
45	aniline	13.61	93												
46	C3-benzene	13.68	120		0.03			0.02							
47	6-methyl-5-hepten-2-one	13.69	126												
48	benzonitrile	13.72	103									0.20	0.11		0.10
49	1-decene	13.83	140												
50	C3-benzene	13.99	120						0.07						
51	n-decane	14.07	142				0.03		0.02	0.02					
52	octanal	14.09	128			0.01	0.04	0.03		0.02	0.01				0.19
53	dichlorobenzene	14.40	146				0.01		0.01						
54	4-methyl decane	14.56	156												
55	C3-benzene	14.57	120												
56	C4-benzene	14.60	134												
57	2-ethyl hexanol	14.64	130		0.04	0.01	0.08	0.05	0.05	0.03		0.49			
58	limonene	14.75	136	0.23			0.02	0.04	0.02	0.01	0.01				
59	benzene methanol	14.77	108		0.02										
60	indan	14.87	118												
61	dichlorobenzene	14.89	146											0.18	0.11
62	N-ethyl-N-(1-methylethyl)-2-propanamine	15.07	129												
63	C4-benzene	15.10	134							0.02					

n north; s south; e east; w west; m middle; r rear; elev elevator; bal balcony; closet closet; stkm stockroom; drway doorway;
RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Air Monitoring Results

Sample number and room number
at the top of each data column

	Compound	RT	MW	83	98	99	96	97	95	91	92	175	176	174	177
				F104	G110	o	G118	G120	G120	I101	o	I101	o	I101	I101
	Tentative Identification			Stkrm	m		m	e	w	m		m		sump	sump
64	5-methyl decane	15.21	156												
65	4-methyl decane	15.29	156												
66	C4-benzene	15.30	134							0.04					
67	2-methyl decane	15.34	156												
68	1,4-dithiane	15.39	120												
69	acetophenone	15.47	120		0.03	0.04	0.04	0.05		0.03	0.05	0.77	1.35	0.48	0.45
70	C4-benzene	15.47	134												
71	3-methyl decane	15.48	156												
72	methyl benzaldehyde	15.51	120												
73	C4-benzene	15.64	134												
74	C4-benzene	15.72	134												
75	A,A-dimethyl benzene methanol	15.80	136												
76	C4-benzene	15.86	134												
77	1-undecene	15.95	154												
78	n-undecane	16.05	156		0.01		0.03	0.02	0.02	0.01		0.09			0.12
79	nonanal	16.12	142		0.03	0.02	0.04	0.04	0.03	0.03	0.02	0.19	0.25	0.38	0.12
80	C4-benzene	16.24	134												
81	phosphoric acid, triethyl ester	16.41	182												
82	C4-benzene	16.43	134												
83	trans methyl decalin	16.50	152												
84	C4-benzene	16.55	134												
85	cis methyl decalin	16.74	152												
86	C5-benzene	16.79	148												
87	methyl indan	17.14	132												
88	O,O-diethyl-S-ethyl phosphorothioate	17.16	198												
89	methyl indan	17.29	132												
90	trichlorobenzene	17.64	180												
91	1-dodecene	17.66	168												
92	1-(4-methylphenyl) ethanone	17.67	134												
93	N,N-dibutyl-1-butanamine	17.72	142												
94	n-dodecane	17.80	170												
95	naphthalene	17.79	128	0.08	0.04	0.01	0.09	0.07	0.07	0.02	0.01	0.14		0.06	
96	C5-benzene	17.87	148												
97	decanal	17.90	156		0.01	0.02	0.02	0.02		0.02	0.03	0.12	0.07	0.15	
98	benzothioephene	17.90	134												
99	1,4-oxathiane, 4,4-dioxide	18.35	136												
100	benzothiazole	18.40	135							0.01					0.10
101	benzene propanenitrile	18.53	131												
102	dimethyl indan	18.80	146												
103	3-tetradecene	18.85	196												
104	N-butyl-N-nitroso N-butanamine	18.91	158												
105	1-tridecene	19.26	182												
106	n-tridecane	19.38	184	0.02	0.01			0.01				0.05			
107	N,N-dibutyl formamide	19.51	157												
108	2-methyl naphthalene	19.61	142		0.02		0.03	0.02	0.02	0.01		0.04		0.08	
109	phthalate	19.80	390												
110	1,3-isobenzofurandione	19.81	148												0.03
111	1-methyl naphthalene	19.91	142				0.01	0.01		0.00				0.19	
112	1-methyl-4-(propylthio) benzene	20.37	166												
113	1-tetradecene	20.76	196					0.01							
114	n-tetradecane	20.86	198	0.05						0.01		0.05		0.06	0.02
115	biphenyl	20.87	154		0.01		0.01	0.02	0.01						
116	1,1'-oxy bis(benzene)	21.17	186												
117	2,4,6-trichloroaniline	21.20	195									0.03			
118	C2-naphthalene	21.28	156				0.01								0.05
119	C2-naphthalene	21.51	156					0.01				0.12		0.35	0.09
120	C2-naphthalene	21.56	156												
121	tribromobenzene	21.62	312												
122	6,10-dimethyl-5,9-undecadien-2-one	21.65	194												
123	2,6-di-t-butyl-2,5-cyclohexadiene-1,4-dione	22.06	220												
124	1-pentadecene	22.16	210							0.01					
125	n-pentadecane	22.26	212	0.04	0.01			0.01				0.04			
126	methyl biphenyl	22.30	168												
127	1,2-dihydroacenaphthylene	22.50	168												

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)

Compound		83 98 99 96 97 95 91 92 175 176 174 177													
Tentative Identification		RT	MW	F104	G110		G118	G120	G120	I101		I101		I101	I101
				Stkrm	m	o	m	e	w	m	o	m	o	sump	sump
128	C3-naphthalene	22.65	170									0.15		0.29	
129	phenyl maleic anhydride	22.90	214										0.13		0.09
130	dibenzofuran	22.93	168				0.01		0.01						
131	1-hexadecene	22.47	224												
132	n-hexadecane	23.57	226	0.03											
133	benzenedicarboxylic acid, diethyl ester	23.64	222												0.05
134	1,3-dibromo-2,2-bis(bromomethyl) propane	24.17	384												
135	diphenyl diazene	24.23	182												
136	benzophenone	24.30	182									0.08	0.08	0.28	0.03
137	1-heptadecene	24.71	238												
138	n-heptadecane	24.81	240	0.02											
139	N-(phenylmethylene) benzamine	24.83	181												
140	9H-fluoren-9-one	25.28	180												
141	tribromobenzamine	25.39	327												
142	trimethyl indan	25.45	160		0.01			0.01			0.01				
143	dibenzothiophene	25.58	184												
144	tetrabromobenzene	25.86	390												
145	n-octadecane	25.88	254												
146	phenanthrene/anthracene	26.37	178		0.01		0.01	0.01	0.01						
147	methyl dibenzothiophene	26.98	198												
148	n-nonadecane	27.04	268												
149	2-methyl anthracene/phenanthrene	27.48	192												
150	1-methyl anthracene/phenanthrene	27.57	192												
151	2,6-dibutyl-2,5-cyclohexadien-1,4-dione	31.30	220									0.38	1.36		0.31
152	Total PCB's														

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RT retention time; MW molecular weight; Concentrations in parts per billion volume (nL/L)