#1

Air Quality Monitoring Program for Northwest Portland
Interim Report - by Robert Amundson, PhD
September 2000 – February 2001

History

Although the Chevron settlement was completed in July of 2000, official approval of the structure of the administration of the grant was not completed until September. Thus, this first six-month interim report covers the period from September 2000 through February 2001. Sampling for volatile organic compounds (VOCs) occurred on 5 separate dates during this period.

Rationale for Sampling

This current Northwest-neighborhood air-quality sampling program builds on information gathered by neighbors since 1997 and adds to information obtained by DEQ from previous hazardous air quality sampling programs. This air quality sampling study has focused on three issues; what toxic compounds are in the air, what are their sources, and are the concentrations high enough to be of concern?

The project manager and neighborhood advisory group chose to use only EPA-certified methods during this reporting period for greater flexibility and to eliminate the need for cross checking the analyses for accuracy. In earlier studies, the neighbors used bucket samplers for monitoring for VOCs. The bucket samplers proved to be highly effective, but once a sample is taken it must arrive at the analytical laboratory in California within 48 hours. This time constraint makes sampling on Fridays and Saturdays problematic because the samples may not reach the laboratory within 48 hours. The SUMMA canisters, chosen for sampling during this period, have no such constraints and thus allowed neighbors to sample anytime.

Results of Sampling for Volatile Organic Compounds with SUMMA Canisters

September 2000

Five locations around the ESCO Foundry were sampled on September 13th for volatile organic compounds: 2230 NW 22nd Place, NW 24th Place and NW Vaughn, NW 26th and NW Nicolai, 2518 NW Savier, and 3204 NW Wilson. The samples were initiated by an odor from the ESCO Foundry that was detected around 8:40 AM at 24th Place and NW Vaughn. Sampling commenced at that time and continued for 30 minutes. The odor dissipated shortly after 8:40, but sampling continued at all locations. A steady wind from the northwest was present throughout the sampling period; therefore 24th Place and NW Vaughn was directly downwind from ESCO.

Volatile organic compounds varied greatly with location (Table 1). Twelve compounds were highest at NW 26th and Nicolai, directly upwind from the ESCO Foundry; whereas

only ethanol and acrolein concentrations were highest directly downwind from the ESCO Foundry (Table 2). Acetone, octane, total xylenes, nonane and the total of all tentatively identified compounds were highest at the NW Wilson site. These results illustrate the high variability of VOC concentrations near the Northwest Industrial Neighborhood Association/NorthWest District Association interface. This variability in VOC concentrations, no doubt, results from the variable emissions from the many different sources of VOCs in the area.

October 2000

The presence of a strong ESCO odor at 2466 NW Thurman triggered sampling at 8:00 AM on 5 October 2000 at that location and at 2518 NW Savier two blocks away where the odor was not detected. At both locations, a 30-minute sample (8:00 – 8:30 AM) and a 24-hour sample (8:00 AM – 8:00 AM 6 October) were taken. The strong odor persisted at 2466 NW Thurman throughout the 30-minute interval, but was not present by the afternoon of 5 October. No strong ESCO odor was detected during either sample period at the NW Savier site. The wind was steady from the northwest.

Concentrations of only two VOCs, isopropyl alcohol and 2 butanone, were higher at the NW Savier site than at the NW Thurman site during the 30-minute sample (Tables 3 and 4). Eighteen VOCs were higher during the 30-minute sample period at the NW Thurman site compared to the NW Savier site. This pattern persisted in the 24-hour sample. Concentrations of benzene at the Thurman site exceeded any monitored by neighbors during the 1997-1998 study.

Both ethanol and acrolein tested much higher when the ESCO odor was present. This is similar to the samples taken on 13 September where both compounds tested higher downwind of ESCO even though the odor event persisted for only about 5 minutes. Although the absolute concentration of ethanol was high at the Thurman site (190 micrograms per cubic meter), it has no health effects at that concentration. In contrast, the concentration of acrolein (4.4 micrograms per cubic meter) exceeded California's acute exposure reference exposure limit (REL), which presents a health concern for those exposed to such concentrations. Acute exposure to acrolein can cause respiratory problems or can exacerbate ongoing respiratory conditions such as asthma.

November 2000

The 2466 NW Thurman and 2518 NW Savier sites were resampled on 2 November for two 30-minute intervals: 5:00 – 5:00 AM and 8:00 – 8:30 AM. No odors associated with ESCO occurred during either sample interval and the air was calm. Only a few automobiles passed either site during the 5:00 AM sampling, but traffic was heavy and backed up on NW 25th from NW Vaughn to south of NW Savier by 8:00 AM. Gasoline odors were detected only at 2518 NW Savier during the 8:00 AM sampling period.

During the 5:00 AM to 5:30 AM interval, all but five compounds had similar concentrations at both sites (Tables 5 and 6) with two compounds being higher at one site and three higher at the other site. During the 8:00 AM to 8:30 AM interval, sixteen compounds had higher concentrations at the NW Savier site compared to the NW Thurman site. The compounds found in higher concentrations at the NW Savier site compared to the NW Thurman site are associated with automobile emissions. Emissions from traffic backed up on NW 25th, most likely, contributed to the elevated concentrations of VOCs at the NW Savier site.

December 2000

A strong diesel-like odor initiated a 30-minute sample on 5 December at 3204 NW Wilson Street. The sample was taken on the porch, which sits high above the street. Little traffic passes this residence on NW Wilson. The high concentrations of VOCs found substantiate the homeowners' concern about their exposure to high levels of these toxic compounds (Table 7); however, their source or sources remain unidentified.

On December 21, two 30-minute samples were taken to compare VOC concentrations inside and outside a house at 2856 NW Thurman. A third 30-minute sample was taken nearby on a porch at 2518 NW Savier.

The differences between VOC concentrations inside and outside were striking. Ethanol, acetone, alpha-pinene, d-limonene, and butyl acetate tested higher inside the house at 2856 NW Thurman compared to outside on the porch. Not surprisingly, some of these compounds are associated with cooking and wood care products. In contrast, industrial solvents and compounds associated with vehicle exhaust: benzene, isopropanol, methyl tert-butyl ether, n-hexane, toluene, xylenes were higher on the porch than inside the house.

Comparison of the two samples taken on porches indicated that concentrations of ethanol, acrolein, acetone, isopropanol, vinyl acetate, benzene, toluene, tetrachloroethene, ethylbenzene, xylenes, and d-limonene were higher at 2518 NW Savier than at 2856 NW Thurman. Only methyl tert-butyl ether, styrene, and n-nonane were higher at the Thurman site compared to the Savier site, with the later two compounds measured near their detection limits. Wind was negligible and no odors were detected during sampling. A brief strong odor was detected at the NW Savier site prior to sampling.

Conclusions:

What compounds are in the air?

Thirteen of the 79 VOCs tested for were found in all 17 samples: dichlorodifluoromethane, ethanol, acetone, trichlorofluoromethane, isopropanol, 2-butanone, n-hexane, benzene, toluene, ethylbenzene, m- & p-xylene, o-xylene, and 1,2,4-trimethylbenzene. The lowest number of VOCs detected in any sample was 19 while the highest number was 31. For each sample, many other chemicals and their concentrations were tentatively identified (TICs); the number of TICs in the 17 samples ranged from six to 16. The concentrations of the TICs are estimated. Furthermore, some of the compounds reported may be associated with instrumentation error. Therefore, I caution against over interpreting the TIC data.

If the number of VOCs detected remained constant at all locations one could conclude that they originated from a common source or activity such as mobile sources which operate throughout the neighborhood. However, the wide range in number of VOCs detected (19 –31) illustrates the changing nature of the suite of VOCs in Northwest Portland.

What are the sources of the VOCs?

Through the use of odor-survey forms, neighbors have identified several sources of odors in the neighborhood. The most often noted sources are the ESCO Foundry, coffee roasters, Faulkner Electric, vehicle exhaust and frequent strong fuel-like odors from unidentified sources. VOC samples in this study suggest that acrolein and ethanol are associated with the ESCO odor. It is less clear how much the ESCO odor contributed to the high concentrations of benzene, toluene and xylenes 2466 NW Thurman on October 5th, because these compounds were also found in high concentrations on November 2nd at 2518 NW Savier in the absence of an ESCO odor. It is clear that mobile sources are contributing substantially to their elevated concentrations. The source or sources of the strong fuel-like odors at 3204 NW Wilson are still unknown.

Are the concentrations of the VOCs high enough to be of concern?

Yes! Concentrations of benzene, 1,3-butadiene and acrolein sampled high enough to be of concern (Table 8). All three compounds were found to be above EPA and CA health benchmarks or exposure limits.

Benzene. Benzene concentrations in all 17 samples varied from 16 to 73 times above the EPA cancer benchmark and from 67 to 293 times the California cancer benchmark. The cancer benchmarks are the concentrations above which one would expect an additional 1 cancer per 1 million people after a lifetime of exposure.

1,3 butadiene. Concentrations of 1,3-butadiene were above their detection limit for only 5 of the 17 samples, but the highest recorded concentration was 350 times the EPA cancer benchmark (Table 8). Because the detection limit for the method used to look for these VOCs is 1 microgram per cubic meter, a **non detect** (**ND**) reading only indicates that the concentration of any given VOC not detected was below that level. A non-detect does not assure that the compound is not present in the sample. To illustrate, 1,3-butadiene, a VOC associated with automobile emissions, is always present in urban air, but because of its detection limit of 1 μgram per cubic meter for the method used in this study, it was not detected in 12 of the 17 samples. Since the EPA cancer benchmark for 1,3-butadiene is 0.004 micrograms per cubic meter, a non-detect reading for such a compound can not be construed to mean that levels of 1,3 butadiene are safe.

Acrolein. Acrolein was found above its detection limit in 12 of the 17 samples (Table 8). The highest acrolein concentration was 220 times the reference concentrations for chronic exposure. The U.S. Environmental Protection Agency estimates that inhalation of the reference concentration (Rfc) or less, over a lifetime, would not likely result in the occurrence of chronic, noncancer effects. California has also set an acute reference exposure level (REL) for acrolein at 2.5 microgram per cubic meter. The highest concentration monitored in this study was 1.76 times that concentration. This occurred during a strong ESCO odor event.

Factors Influencing Why Infants and Children Might be more Susceptible than Adults.
Very few scientific studies in the published literature have explored the toxic effects of environmental chemicals on children. It has been standard practice to base risk assessments on adults, using adult parameters and data obtained from occupational studies, or studies in mature laboratory animals. There are a number of reasons to suspect that risk assessments based on adults underpredict the risks of exposure in infants and children.

There is a growing body of evidence that children receive greater doses of environmental toxicants on a body weight basis than adults through common exposure pathways (such as inhalation and ingestion). These greater doses stem from greater exposures, from unique exposures, and from factors influencing the amounts of toxicants available at body sites where absorption occurs.

A primary physiological difference between children and adults is the higher breathing rates of children. This difference in breathing rates is due to the greater oxygen consumption rates of children, a result of their increased energy expenditure levels. Children expend more energy primarily because of their rapid growth and high levels of physical activity. Children also expend more energy for thermogenesis because they have a larger body surface area relative to their weight than adults.

The mean breathing rate is almost twice as great for children as it is for adults (452 vs. 232 liters per kilogram-day, respectively "authors note: volume of air breathed per kilogram of body weight for one day"). Because children inhale a greater volume of air

per unit time and body weight than adults they receive higher doses of airborne contaminants.

Another factor influencing inhalation exposure, in particular for particle exposures, is the difference in alveolar surface area between children and adults. Bronchioles develop completely prenatally but 85% of alveoli develop in the postnatal period. A newborn infant may have as few as 10 million alveoli while adults have up to 300 million ---. This represents a greater than 20-fold increase in alveolar surface area. For particles, when viewed as a dose (number of impacted particles) per alveolar surface area, the disparities between the adult and infant/young child are even greater than on a body weight basis. The number of alveoli reaches about 90% of adult values by age three. *

Other compounds of concern. The following chemicals were found in the neighborhood in earlier studies, but could not be detected with the technology used in this study: acetaldehyde, formaldehyde, phthalates, manganese, lead, chromium, nickel, zinc and cadmium.

*Prioritization of Toxic Air Contaminants Under the Children's Environmental Health Protection Act. Office of Environmental Health Hazard Assessment. California Environmental Protection Agency. March 2001.

Table 1. Volatile Organic Compound Concentrations monitored on September 13, 2000.

Client Sample ID :		2-NWDA	3-NWDA	4-NWDA	5-NWDA	1-NWDA
		Locations				
		NW 24th & Vaughn	NW 26th & Nicolai	2518 NW Savier	3204 NW Wilson	2230 NW 22nd Place
CAS #	Compound	µg/M^{3*}	µg/M^3	µg/M^3	µg/M^3	µg/M^3
115-07-1	Propene	2.7	2.9	2.7	2.0	2.5
75-71-8	Dichlorodifluoromethane	4.6	7.1	5.1	5.2	4.4
74-87-3	Chloromethane	2.1	2.4	2.1	2.2	2.0
76-14-2	Dichlorotetrafluoroethane	ND	ND	ND	ND	ND
75-01-4	Vinyl Chloride	ND	ND	ND	ND	ND
106-99-0	1,3-Butadiene	ND	ND	ND	ND	ND
74-83-9	Bromomethane	ND	ND	ND	ND	ND
75-00-3	Chloroethane	ND	ND	ND	ND	ND
64-17-5	Ethanol	130	53	40	44	37
75-05-8	Acetonitrile	1.5	19	ND	1.3	1.2
107-02-8	Acrolein	1.8	1.0	ND	ND	ND
67-64-1	Acetone	37	38	41	47	23
75-56-9	Propylene Oxide	ND	ND	ND	ND	ND
75-69-4	Trichlorofluoromethane	1.9	2.0	2.0	2.1	1.9
67-63-0	Isopropyl Alcohol	18	34	3.2	16	13
107-13-1	Acrylonitrile	ND	ND	ND	ND	ND
75-35-4	1,1-Dichloroethene	ND	ND	ND	ND	ND
75-09-2	Methylene Chloride	4.4	6.1	3.8	1.5	3.1
107-05-1	Allyl Chloride	ND	ND	ND	ND	ND
76-13-1	Trichlorotrifluoroethane	ND	0.81 TR	0.77 TR	0.74 TR	0.79 TR
75-15-0	Carbon Disulfide	ND	3.5	ND	ND	ND
156-60-5	trans-1,2-Dichloroethene	ND	ND	ND	ND	ND
75-34-3	1,1-Dichloroethane	ND	ND	ND	ND	ND
156-59-2	cis-1,2-Dichloroethene	ND	ND	ND	ND	ND
1634-04-4	tert-Butyl Methyl Ether	ND	ND	ND	ND	ND
108-05-4	Vinyl Acetate	ND	ND	ND	ND	ND
78-93-3	2-Butanone	8.3	13	4.3	6.1	4.2
96-14-0	3-Methylpentane	1.9	2.9	1.9	2.8	2.1
141-78-6	Ethyl Acetate	ND	ND	ND	ND	1.1
110-54-3	n-Hexane	2.8	6.2	2.9	4.6	4.3
67-66-3	Chloroform	ND	ND	ND	ND	ND
107-06-2	1,2-Dichloroethane	ND	ND	ND	ND	ND
71-55-6	1,1,1-Trichloroethane	ND	ND	ND	ND	ND
71-43-2	Benzene	3.1	5.4	2.5	2.4	3.4
56-23-5	Carbon Tetrachloride	ND	ND	ND	ND	ND
78-87-5	1,2-Dichloropropane	ND	ND	ND	ND	ND
123-91-1	1,4-Dioxane	ND	ND	ND	ND	ND
75-27-4	Bromodichloromethane	ND	ND	ND	ND	ND
79-01-6	Trichloroethene	ND	ND	ND	ND	ND
106-89-8	Epichlorohydrin	ND	ND	ND	ND	ND
10061-01-5	cis-1,3-Dichloropropene	ND	ND	ND	ND	ND
108-10-1	4-Methyl-2-pentanone	ND	ND	ND	ND	ND
10061-02-6	trans-1,3-Dichloropropene	ND	ND	ND	ND	ND

* = micrograms per cubic meter

Table 1. Continued

Client Sample ID :		2-NWDA	3-NWDA	4-NWDA	5-NWDA	1-NWDA
		Locations				
		NW 24th & Vaughn	NW 26th & Nicolai	2518 NW Savier	3204 NW Wilson	2230 NW 22nd Place
CAS #	COMPOUND	µg/M^3	µg/M^3	µg/M^3	µg/M^3	µg/M^3
79-00-5	1,1,2-Trichloroethane	ND	ND	ND	ND	ND
108-88-3	Toluene	17	42	12	18	15
591-78-6	2-Hexanone	ND	ND	ND	ND	ND
124-48-1	Dibromochloromethane	ND	ND	ND	ND	ND
123-86-4	Butyl Acetate	1.2	1.2	ND	1.3	ND
111-65-9	Octane	ND	0.82 TR	ND	2.8	ND
106-93-4	1,2-Dibromoethane	ND	ND	ND	ND	ND
127-18-4	Tetrachloroethene	ND	0.92 TR	ND	ND	0.94 TR
108-90-7	Chlorobenzene	ND	ND	ND	ND	ND
100-41-4	Ethylbenzene	1.9	2.5	1.5	2.4	1.8
1330-20-7	m & p - Xylenes	7.3	9.5	5.5	9.7	7.2
75-25-2	Bromoform	ND	ND	ND	ND	ND
100-42-5	Styrene	ND	ND	ND	ND	ND
79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND
111-84-2	Nonane	ND	ND	ND	1.8	ND
95-47-6	o - Xylene	2.1	2.9	1.7	2.9	2.2
98-82-8	Cumene	ND	ND	ND	ND	ND
111-70-6	1-Heptanol	ND	ND	ND	ND	ND
622-96-8	4-Ethyltoluene	ND	ND	ND	ND	ND
2437-95-8	a-Pinene	ND	0.95 TR	0.92 TR	0.90 TR	1.3
111-44-4	Bis (2-chloroethyl) Ether	ND	ND	ND	ND	ND
108-67-8	1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND
124-18-5	n-Decane	1.7	3.4	1.0	3.5	ND
19902-08-0	beta-Pinene	ND	ND	ND	ND	ND
95-63-6	1,2,4-Trimethylbenzene	1.5	2.5	1.4	2.2	1.7
100-44-7	Benzyl Chloride	ND	ND	ND	ND	ND
541-73-1	1,3-Dichlorobenzene	ND	ND	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	ND	ND	ND	ND	ND
5989-27-5	d-Limonene	ND	ND	ND	ND	ND
95-50-1	1,2-Dichlorobenzene	ND	ND	ND	ND	ND
96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND
1120-21-4	n-Undecane	1.4	7.0	1.3	3.1	ND
112-40-3	n-Dodecane	ND	2.5	1.5	1.5	ND
120-82-1	1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND
91-20-3	Naphthalene	ND	ND	ND	ND	ND
87-68-3	Hexachlorobutadiene	ND	ND	ND	ND	ND

Table 1. Continued

		Locations				
		NW 24th & Vaughn	NW 26th & Nicolai	2518 NW Savier	3204 NW Wilson	2230 NW 22nd Place
		µg/M^3	µg/M^3	µg/M^3	µg/M^3	µg/M^3
Time	Tentative Compound					
4.92	1,1-Difluoroethane		20			
5.93	Isobutane	20	20	10	10	10
6.50	Butane	10	10	20	30	10
8.30	Isopentane		10	7	20	10
9.10	Pentane	8	10	9	20	8
11.62	2-Methylpentane		6	6	8	6
13.60	Tetrahydrofuran		20			
15.98	Pentenal	2				
16.92	Heptane	1	2	1	1	1
20.05	Hexanal	2	3	3	2	2
21.35	Hexamethylcyclotrisiloxane			4		5
25.87	Benzaldehyde			3	6	5
27.12	Octamethylcyclotetrasiloxane			4	10	20
29.09	C11 Branched Alkane				10	3
29.63	C12 Branched Alkane				10	4
29.97	Unidentified Silane or Siloxane				6	
31.29	Unidentified Silane or Siloxane					20

Table 2. Comparison of Volatile Organic Compound Concentrations sampled around ESCO on September 13, 2000.

VOCs with about the same concentration at all locations

propene
chloromethane
trichlorotrifluoromethane

VOCs with highest concentrations directly downwind of ESCO (NW 24th Place and NW Vaughn)

ethanol
acrolein

VOCs with highest concentrations directly upwind of ESCO (NW 26th and NW Nicolai)

acetonitrile
dichlorodifluoromethane
carbon disulfide
2 - butanone
n - hexane
benzene
toluene
isopropyl alcohol
n-undecane
n-dodecane
methylene chloride

VOCs with highest concetrations at 3204 NW Wilson

acetone
nonane
octane
ethyl acetate
total TICs (particularly butane)

Table 3. Comparison of Volatile Organic Compound Concentrations at two locations in Northwest Portland during either 30-minute or 24-hour sample periods.

	Thurman higher than Savier		Savier higher than Thurman	
	Sample interval		Sample interval	
Compound	1/2 hour	24 hour	1/2 hour	24 hour
propene	x	x		
1,3 butadiene	x	x		
ethanol	x			x
acrolein	x			
acetone	x			
isopropyl alcohol		x	x	
methyl chloride	x	x		
3-methylpentane	x	x		
n-hexane	x	x		
benzene	x	x		
toluene	x	x		
butyl acetate	x	x		
chlorobenzene	x	x		
xylenes	x	x		
nonane	x	x		
styrene	x	x		
alpha-pinene	x	x		
trimethylbenzenes	x	x		
2 butanone			x	x
TICs	x			x

Table 4. Volatile Organic Compound Concentrations monitored October 5, 2000.

	Client Sample ID :	6-NWDA	8-NWDA	9-NWDA	7-NWDA
	Duration	30 minute	24 hour	24 hour	30 minute
			Locations		
	Location	2466 Thurman	2518 Savier	2466 Thurman	2518 Savier
CAS #	Compound	µg/M^{3*}	µg/M^3	µg/M^3	µg/M^3
115-07-1	Propene	6.8	2.7	6.0	4.9
75-71-8	Dichlorodifluoromethane	4.5	3.9	3.6	4.3
74-87-3	Chloromethane	1.9	1.9 TR	1.9	2.0
76-14-2	Dichlorotetrafluoroethane	ND	ND	ND	ND
75-01-4	Vinyl Chloride	ND	ND	ND	ND
106-99-0	1,3-Butadiene	1.2	ND	1.4	ND
74-83-9	Bromomethane	ND	ND	ND	ND
75-00-3	Chloroethane	ND	ND	ND	ND
64-17-5	Ethanol	190	35	17	58
75-05-8	Acetonitrile	ND	1.4 TR	0.75 TR	3.1
107-02-8	Acrolein	4.4	1.8 TR	1.6	1.8
67-64-1	Acetone	60	27	28	36
75-56-9	Propylene Oxide	ND	ND	ND	ND
75-69-4	Trichlorofluoromethane	2.0	2.1	1.9	2.1
67-63-0	Isopropyl Alcohol	27	5.1	14	51
107-13-1	Acrylonitrile	1.1 TR	ND	ND	ND
75-35-4	1,1-Dichloroethene	ND	ND	ND	ND
75-09-2	Methylene Chloride	4.2	2.1	4.0	2.8
107-05-1	Allyl Chloride	ND	ND	ND	ND
76-13-1	Trichlorotrifluoroethane	0.89 TR	ND	0.80 TR	ND
75-15-0	Carbon Disulfide	ND	ND	ND	ND
156-60-5	trans-1,2-Dichloroethene	ND	ND	ND	ND
75-34-3	1,1-Dichloroethane	ND	ND	ND	ND
156-59-2	cis-1,2-Dichloroethene	ND	ND	ND	ND
1634-04-4	tert-Butyl Methyl Ether	ND	ND	ND	ND
108-05-4	Vinyl Acetate	ND	ND	ND	ND
78-93-3	2-Butanone	8.0	7.4	4.9	9.9
96-14-0	3-Methylpentane	3.3	2.8	3.2	2.0
141-78-6	Ethyl Acetate	ND	ND	1.7	1.4
110-54-3	n-Hexane	4.5	4.3	4.5	3.2
67-66-3	Chloroform	ND	ND	ND	ND
107-06-2	1,2-Dichloroethane	ND	ND	ND	ND
71-55-6	1,1,1-Trichloroethane	ND	ND	ND	ND
71-43-2	Benzene	8.0	2.6	7.6	4.1
56-23-5	Carbon Tetrachloride	ND	ND	ND	ND
78-87-5	1,2-Dichloropropane	ND	ND	ND	ND
123-91-1	1,4-Dioxane	ND	ND	ND	ND
75-27-4	Bromodichloromethane	ND	ND	ND	ND
79-01-6	Trichloroethene	ND	ND	ND	ND
106-89-8	Epichlorohydrin	ND	ND	ND	ND
10061-01-5	cis-1,3-Dichloropropene	ND	ND	ND	ND
108-10-1	4-Methyl-2-pentanone	ND	ND	ND	ND
10061-02-6	trans-1,3-Dichloropropene	ND	ND	ND	ND

* = micrograms per cubic meter

Table 4. Continued

	Client Sample ID :	6-NWDA	8-NWDA	9-NWDA	7-NWDA
	Duration	30 minute	24 hour	24 hour	30 minute
			Locations		
	Location	2466 Thurman	2518 Savier	2466 Thurman	2518 Savier
CAS #	Compound	µg/M^3	µg/M^3	µg/M^3	µg/M^3
79-00-5	1,1,2-Trichloroethane	ND	ND	ND	
108-88-3	Toluene	27	12	23	24
591-78-6	2-Hexanone	ND	ND	ND	ND
124-48-1	Dibromochloromethane	ND	ND	ND	ND
123-86-4	Butyl Acetate	2.8	ND	2.1	1.7
111-65-9	Octane	2.3	ND	2.2	ND
106-93-4	1,2-Dibromoethane	ND	ND	ND	ND
127-18-4	Tetrachloroethene	ND	ND	ND	ND
108-90-7	Chlorobenzene	ND	ND	ND	ND
100-41-4	Ethylbenzene	4.7	1.4 TR	4.0	2.9
1330-20-7	m & p - Xylenes	20	5.7	17	12
75-25-2	Bromoform	ND	ND	ND	ND
100-42-5	Styrene	0.85 TR	ND	0.70 TR	ND
79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
111-84-2	Nonane	2.2	ND	2.3	ND
95-47-6	o - Xylene	8.4	1.8 TR	8.4	5.0
98-82-8	Cumene	ND	ND	ND	ND
111-70-6	1-Heptanol	ND	ND	ND	ND
622-96-8	4-Ethyltoluene	ND	ND	2.9	ND
2437-95-8	a-Pinene	1.3	ND	1.5	1.2
111-44-4	Bis (2-chloroethyl) Ether	ND	ND	ND	ND
108-67-8	1,3,5-Trimethylbenzene	3.3	ND	3.6	1.4
124-18-5	n-Decane	ND	1.3 TR	2.8	ND
19902-08-0	beta-Pinene	ND	ND	ND	ND
95-63-6	1,2,4-Trimethylbenzene	11	1.3 TR	12	5.0
100-44-7	Benzyl Chloride	ND	ND	ND	ND
541-73-1	1,3-Dichlorobenzene	ND	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	ND	ND	ND	ND
5989-27-5	d-Limonene	ND	ND	ND	ND
95-50-1	1,2-Dichlorobenzene	ND	ND	ND	ND
96-12-8	1,2-Dibromo-3-chloropropane	ND	ND	ND	ND
1120-21-4	n-Undecane	ND	2.2	ND	ND
112-40-3	n-Dodecane	ND	1.9 TR	ND	ND
120-82-1	1,2,4-Trichlorobenzene	ND	ND	ND	ND
91-20-3	Naphthalene	1.0	ND	1.1	ND
87-68-3	Hexachlorobutadiene	ND	ND	ND	ND

Table 4. Continued

	Client Sample ID :	6-NWDA	8-NWDA	9-NWDA	7-NWDA
	Duration	30 minute	24 hour	24 hour	30 minute
			Locations		
	Location	2466 Thurman	2518 Savier	2466 Thurman	2518 Savier
		µg/M^3	µg/M^3	µg/M^3	µg/M^3
Time	Tentative Compound				
5.77	Acetaldehyde + Isobutane	30		20	10
5.87	Isobutane + Acetaldehyde		30		
6.16	C4 Alkene	7			
6.33	Butane	20	50	30	20
8.23	Isopentane		20	20	10
8.92	Pentane	9	10	9	6
11.46	2-Methylpentane	7		7	
11.59	Butanal	8			
12.37	2-Butanol	6		5	
15.81	3-Methylhexane + Pentanal	4			
19.99	Hexanal		10		
21.29	Hexamethylcyclotrisiloxane		20	4	
23.69	Heptanal		30		
25.69	Benzaldehyde	6	8	6	10
26.16	Ethylmethylbenzene	9		10	
26.98	Unidentified Silane or Siloxar	6			
27.09	Octanal + Octanalmethylcyclo		60	5	10
30.01	Nonanal		30		

Table 5. Comparison of Volatile Organic Compound Concentrations before and during the morning-rush hour on 2 November 2000.

21 compounds plus total TICs higher at 8:00 than at 5:00 AM
2 compounds higher at 5:00 than at 8:00 AM (carbon disulfide, tetrachloroethene)

5:00 AM Samples

Compound	Highest at Thurman	Highest at Savier
carbon disulfide		x
tetrachloroethene	x	
xylenes	x	
ethanol		x
trimethylbenzene	x	

8:00 AM Samples

	Highest at Thurman	Highest at Savier
propene		x
1,3-butadiene		x
ethanol		x
isopropanol		x
3-methylpentane		x
n-hexane		x
benzene		x
toluene		x
ethylbenzene		x
xylenes		x
styrene		x
4-ethyltoluene		x
trimethylbenzene		x
naphthalene		x
n-dodecane		x
TICs		x

Table 6. Volatile Organic Compound Concentrations monitored on November 2, 2000.

		Davies 5:00 AM	Gannett 5:00 AM	Gannett 8:00 AM	Davies 8:00 AM
		Locations			
		2518 Savier	2466 Thurman	2466 Thurman	2518 Savier
CAS #	Compound	µg/M^{3*}	µg/M^3	µg/M^3	µg/M^3
115-07-1	Propene	ND	ND	2.9	6.8
75-71-8	Dichlorodifluoromethane	3.8	3.4	3.6	3.5
74-87-3	Chloromethane	ND	ND	ND	ND
76-14-2	Freon 114	ND	ND	ND	ND
75-01-4	Vinyl Chloride	ND	ND	ND	ND
106-99-0	1,3-Butadiene	ND	ND	ND	1.3
74-83-9	Bromomethane	ND	ND	ND	ND
75-00-3	Chloroethane	ND	ND	ND	ND
64-17-5	Ethanol	27	20	17	42
75-05-8	Acetonitrile	ND	ND	ND	ND
107-02-8	Acrolein	1.0	ND	2.0	1.9
67-64-1	Acetone	8.9	8.2	15	14
75-69-4	Trichlorofluoromethane	1.8	1.7	1.7	1.8
67-63-0	Isopropanol	3.3	2.3	1.5	3.9
107-13-1	Acrylonitrile	ND	ND	ND	ND
75-35-4	1,1-Dichloroethene	ND	ND	ND	ND
75-09-2	Methylene Chloride	ND	0.91 TR	ND	ND
107-05-1	Allyl Chloride	ND	ND	ND	ND
76-13-1	Trichlorotrifluoroethane	0.62 TR	ND	0.66 TR	ND
75-15-0	Carbon Disulfide	2.0	ND	ND	ND
156-60-5	trans-1,2-Dichloroethene	ND	ND	ND	ND
75-34-3	1,1-Dichloroethane	ND	ND	ND	ND
1634-04-4	Methyl tert-Butyl Ether	ND	ND	ND	ND
108-05-4	Vinyl Acetate	ND	ND	ND	ND
78-93-3	2-Butanone	1.6	1.5	2.3	2.3
96-14-0	3-Methylpentane	1.7	2.1	1.6	4.6
156-59-2	cis-1,2-Dichloroethene	ND	ND	ND	ND
141-78-6	Ethyl Acetate	ND	ND	ND	ND
110-54-3	n-Hexane	3.4	3.5	2.1	6.4
67-66-3	Chloroform	ND	ND	ND	ND
107-06-2	1,2-Dichloroethane	ND	ND	ND	ND
71-55-6	1,1,1-Trichloroethane	ND	ND	ND	ND
71-43-2	Benzene	3.3	3.8	3.4	8.8
56-23-5	Carbon Tetrachloride	ND	ND	ND	ND
78-87-5	1,2-Dichloropropane	ND	ND	ND	ND
75-27-4	Bromodichloromethane	ND	ND	ND	ND
79-01-6	Trichloroethene	ND	ND	ND	ND
123-91-1	1,4-Dioxane	ND	ND	ND	ND
106-89-8	Epichlorohydrin	ND	ND	ND	ND

* = micrograms per cubic meter

Table 6. Continued

CAS #	COMPOUND	Davies 5:00 AM 2518 Savier µg/M³	Gannett 5:00 AM Locations 2466 Thurman µg/M³	Gannett 8:00 AM 2466 Thurman µg/M³	Davies 8:00 AM 2518 Savier µg/M³
79-00-5	1,1,2-Trichloroethane	ND	ND	ND	ND
108-88-3	Toluene	12	13	10	24
591-78-6	2-Hexanone	ND	ND	ND	ND
124-48-1	Dibromochloromethane	ND	ND	ND	ND
106-93-4	1,2-Dibromoethane	ND	ND	ND	ND
123-86-4	Butyl Acetate	ND	ND	ND	ND
111-65-9	n-Octane	ND	ND	1.1	1.0
127-18-4	Tetrachloroethene	0.86 TR	4.6	ND	ND
108-90-7	Chlorobenzene	ND	ND	ND	ND
100-41-4	Ethylbenzene	1.3	1.6	1.6	3.3
1330-20-7	m- & p-Xylene	4.4	5.8	5.6	12
75-25-2	Bromoform	ND	ND	ND	ND
100-42-5	Styrene	ND	ND	ND	0.78 TR
95-47-6	o-Xylene	1.5	2.2	2.0	4.3
111-84-2	n-Nonane	ND	ND	ND	ND
79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
98-82-8	Cumene	ND	ND	ND	ND
110-70-6	1-Heptanol	ND	ND	ND	ND
7785-70-8	alpha-Pinene	0.89 TR	1.1	ND	ND
111-44-4	Bis-(2-chloroethyl) ether	ND	ND	ND	ND
622-96-8	4-Ethyltoluene	ND	ND	ND	1.0
108-67-8	1,3,5-Trimethylbenzene	ND	0.83 TR	ND	1.3
19902-08-0	beta-Pinene	ND	ND	ND	ND
95-63-6	1,2,4-Trimethylbenzene	0.77 TR	2.6	1.7	4.3
124-18-5	n-Decane	ND	1.0	ND	ND
100-44-7	Benzyl Chloride	ND	ND	ND	ND
541-73-1	1,3-Dichlorobenzene	ND	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	ND	ND	ND	ND
95-50-1	1,2-Dichlorobenzene	ND	ND	ND	ND
5989-27-5	d-Limonene	ND	0.72 TR	ND	ND
96-12-8	1,2-Dibromo-3-Chloropropa	ND	ND	ND	ND
1120-21-4	n-Undecane	ND	1.1	ND	ND
120-82-1	1,2,4-Trichlorobenzene	ND	ND	ND	ND
91-20-3	Naphthalene	ND	ND	ND	1.9
112-40-3	n-Dodecane	ND	0.85 TR	ND	2.5
87-68-3	Hexachloro-1,3-butadiene	ND	ND	ND	ND

Table 6. Continued

		Davies 5:00 AM	Gannett 5:00 AM	Gannett 8:00 AM	Davies 8:00 AM
			Locations		
		2518 Savier	2466 Thurman	2466 Thurman	2518 Savier
CAS #	Compound	µg/M³	µg/M³	µg/M³	µg/M³
Time	Tentative Compound				
4.88	Propane	4	6		
5.36	Isobutane + Acetaldehyde	7	3	7	7
5.58	C4H8 Alkene or Cycloalkane	2	2	3	5
5.68	n-Butane	10	10	8	20
6.89	2-Methylbutane	20	20		20
7.43	n-Pentane	8	8	5	10
9.49	Butanal			3	
9.35	2-Methylpentane	4	5	4	10
11.48	Methylcyclopentane	2	3		5
12.98	2-Methylhexane	1	2		4
13.10	2,3-Dimethylpentane	1	1		3
13.36	3-Methylhexane	1	2	3	4
13.94	Isooctane	1	1		
14.29	n-Heptane	1	1		
15.50	Dimethyl disulfide				10
17.44	Hexanal			3	4
19.09	Hexamethylcyclotrisiloxane	6	2	9	10
21.48	Heptanal			3	
23.23	Benzaldehyde				10
23.66	3-ethyltoluene	1	3		
24.26	Octanal		3		
24.47	unidentified siloxane			6	10
25.97	decahydronaphthalene isomer			4	
27.09	unidentified siloxane			4	8

Table 7. Volatile Organic Compound Concentrations monitored in December 2000.

Client Sample ID :		16-NWDA-2000	17-NWDA-2000	14-NWDA-2000	15-NWDA-2000
		Locations			
		Inside 2856 Thurman	Outside 2856 Thurman	Davies 2518 Savier	Patte 3204 Wilson
CAS #	Compound	µg/M³*	µg/M³	µg/M³	µg/M³
75-71-8	Dichlorodifluoromethane	3.0	3.0	2.2	4.8
74-87-3	Chloromethane	0.66 TR	ND	ND	ND
76-14-2	Freon 114	ND	ND	ND	ND
75-01-4	Vinyl Chloride	ND	ND	ND	ND
106-99-0	1,3-Butadiene	ND	ND	0.80 TR	0.79 TR
74-83-9	Bromomethane	ND	ND	ND	ND
75-00-3	Chloroethane	ND	ND	ND	ND
64-17-5	Ethanol	180	74	89	65
75-05-8	Acetonitrile	ND	ND	ND	ND
107-02-8	Acrolein	1.0	1.1	2.2	ND
67-64-1	Acetone	21	12	35	32
75-69-4	Trichlorofluoromethane	1.8	1.7	1.6	11
67-63-0	Isopropanol	3.8	7.2	11	18
107-13-1	Acrylonitrile	ND	ND	ND	ND
75-35-4	1,1-Dichloroethene	ND	ND	ND	ND
75-09-2	Methylene Chloride	ND	0.67 TR	ND	2.0
107-05-1	Allyl Chloride	ND	ND	ND	ND
76-13-1	Trichlorotrifluoroethane	ND	0.61 TR	0.95 TR	ND
75-15-0	Carbon Disulfide	1.3	ND	ND	1.3
156-60-5	trans-1,2-Dichloroethene	ND	ND	ND	ND
75-34-3	1,1-Dichloroethane	ND	ND	ND	ND
1634-04-4	Methyl tert-Butyl Ether	ND	1.4	ND	ND
108-05-4	Vinyl Acetate	ND	ND	4.7	ND
78-93-3	2-Butanone	4.0	3.6	3.6	19
156-59-2	cis-1,2-Dichloroethene	0.73 TR	ND	ND	0.97 TR
110-54-3	n-Hexane	1.4	2.9	3.2	13
67-66-3	Chloroform	ND	ND	ND	ND
107-06-2	1,2-Dichloroethane	ND	ND	ND	ND
71-55-6	1,1,1-Trichloroethane	ND	ND	ND	ND
71-43-2	Benzene	2.0	2.8	4.9	6.2
56-23-5	Carbon Tetrachloride	ND	ND	ND	ND
78-87-5	1,2-Dichloropropane	ND	ND	ND	ND
75-27-4	Bromodichloromethane	ND	ND	ND	ND
79-01-6	Trichloroethene	ND	ND	1.9	ND
123-91-1	1,4-Dioxane	ND	ND	ND	ND
106-89-8	Epichlorohydrin	ND	ND	ND	ND

* = micrograms per cubic meter

Table 7. Continued

Client Sample ID :		16-NWDA-2000	17-NWDA-2000	14-NWDA-2000	15-NWDA-2000
		Locations			
		Inside 2856 Thurman	Outside 2856 Thurman	Davies 2518 Savier	Patte 3204 Wilson
CAS #	Compound	µg/M^3	µg/M^3	µg/M^3	µg/M^3
10061-02-5	cis-1,3-Dichloropropene	ND	ND	ND	ND
108-10-1	4-Methyl-2-Pentanone	ND	ND	ND	0.68 TR
10061-02-6	trans-1,3-Dichloropropene	ND	ND	ND	ND
79-00-5	1,1,2-Trichloroethane	ND	ND	ND	ND
108-88-3	Toluene	4.9	9.2	13	26
591-78-6	2-Hexanone	0.75 TR	0.96 TR	0.77 TR	ND
124-48-1	Dibromochloromethane	ND	ND	ND	ND
106-93-4	1,2-Dibromoethane	ND	ND	ND	ND
123-86-4	Butyl Acetate	8.1	ND	0.79 TR	1.8
127-18-4	Tetrachloroethene	0.95 TR	ND	4.6	ND
108-90-7	Chlorobenzene	ND	ND	ND	ND
100-41-4	Ethylbenzene	0.92 TR	1.2	2.1	4.6
1330-20-7	m- & p-Xylene	3.2	4.5	7.5	16
75-25-2	Bromoform	ND	ND	ND	ND
100-42-5	Styrene	ND	0.62 TR	ND	ND
95-47-6	o-Xylene	1.1	1.7	2.7	5.2
111-84-2	n-Nonane	ND	0.74 TR	ND	3.4
79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
98-82-8	Cumene	ND	ND	ND	ND
7785-70-8	alpha-Pinene	2.4	ND	ND	3.9
622-96-8	4-Ethyltoluene	ND	0.61 TR	0.75 TR	1.1
108-67-8	1,3,5-Trimethylbenzene	ND	0.64 TR	0.86 TR	1.2
95-63-6	1,2,4-Trimethylbenzene	1.4	2.4	2.5	3.9
100-44-7	Benzyl Chloride	ND	ND	ND	ND
541-73-1	1,3-Dichlorobenzene	ND	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	ND	ND	ND	ND
95-50-1	1,2-Dichlorobenzene	ND	ND	ND	ND
5989-27-5	d-Limonene	4.1	ND	1.3	1.5
96-12-8	1,2-Dibromo-3-Chloropropa	ND	ND	ND	ND
120-82-1	1,2,4-Trichlorobenzene	ND	ND	ND	ND
91-20-3	Naphthalene	ND	ND	ND	0.86 TR
87-68-3	Hexachloro-1,3-butadiene	ND	ND	ND	ND

Table 7. Continued

	Client Sample ID :	16-NWDA-2000	17-NWDA-2000	14-NWDA-2000	15-NWDA-2000
		Locations			
		Inside	Outside	Davies	Patte
		2856 Thurman	2856 Thurman	2518 Savier	3204 Wilson
CAS #	Compound	µg/M^3	µg/M^3	µg/M^3	µg/M^3
Time	Tentative Compound				
4.72	Propene		4		
4.76	Propane	10	4		30
5.22	Isobutane + Acetaldehyde	8	6	7	50
5.44	C_4H_8 Compound	6			
5.55	n-Butane	7	7	10	100
6.71	Isopentane		10		100
7.28	n-Pentane	4	5	7	50
7.69	tert-Butanol	4			
8.97	Trimethylsilanol			2	
9.11	C5H8 Compound		2		8
9.22	2-Methylpentane	3	3		20
9.33	Butanal		2		
9.70	3-Methylpentane		2		10
11.34	Methylcyclopentane		2		9
12.08	1-Butanol	4	10		
12.84	2-Methylhexane			3	7
13.20	3-Methylhexane		1	3	8
14.15	n-Heptane			2	9
15.17	Methylcyclohexane				6
17.33	Hexanal	4			
18.22	n-Octane				8
18.98	Hexamethylcyclotrisiloxan	20			30
21.36	Heptanal	3			
23.12	Benzaldehyde	8			
23.58	3-Ethyltoluene		2	3	
24.41	Unidentified Siloxane	30			
24.56	n-Decane		3		
24.89	3-Carene	30			
27.02	Unidentified Siloxane	20			
30.78	C15H24 compound			3	
30.98	Thujopsene (C15H24)			3	

Table 8. Volatile Organic Compounds monitored at concentrations above health benchmarks.

Benzene

EPA cancer benchmark = 0.12 μg/cubic meter; CA cancer benchmark = 0.03 μg/cubic meter

Sample date	μg/cubic meter					Odor type
September 13	3.1*a	5.4 b	2.5 c	2.4 d	3.4 e	ESCO (brief)
October 5	8.0 f	2.6** c	7.6** f	4.1 c		ESCO (strong)
November 2	3.3 c	3.8 f	3.4 f	8.8 c		vehicles
December 5	6.2 d					fuel (strong)
December 21	2.0 g	2.8 g	4.9 c			no odor

* Underlined values taken in presence of odor type at end of row.
** 24-hour average; all other values = 30 minute average

Locations:
a = 24th Place & NW Vaughn; b = 26th & NW Nicolai; c = 2518 NW Savier; d = 3204 NW Wilson; e = 2230 NW 22nd Pl.; f = 2466 NW Thurman; g = 2856 NW Thurman.

Multiple over EPA cancer benchmark for high value (8.8) = 73; over CA benchmark = 293.

Table 8. Continued

1,3 butadiene

EPA cancer benchmark = 0.004 μg/cubic meter; CA cancer benchmark = 0.01 μg/cubic meter

Sample date	μg/cubic meter					Odor type
September 13	nd*a	nd b	nd c	nd d	nd e	ESCO (brief)
October 5	1.2 f	nd** c	1.4** f	nd c		ESCO (strong)
November 2	nd c	nd f	nd f	1.3 c		vehicles
December 5	0.8 d					fuel (strong)
December 21	nd g	nd g	0.8c			no odor

* Underlined values taken in presence of odor type at end of row.
** 24-hour average; all other values = 30 minute average

Locations:
a = 24th Place & NW Vaughn; b = 26th & NW Nicolai; c = 2518 NW Savier; d = 3204 NW Wilson; e = 2230 NW 22nd Pl.; f = 2466 NW Thurman; g = 2856 NW Thurman.

Multiple over EPA cancer benchmark for high value (1.3) = 350; over CA benchmark = 140.

Table 8. Continued

Acrolein

EPA reference Rfc benchmark = 0.02 μg/cubic meter;
CA REL = 0.02 μg/cubic meter (chronic exposure);
CA REL = 2.5 μg/cubic meter (acute).

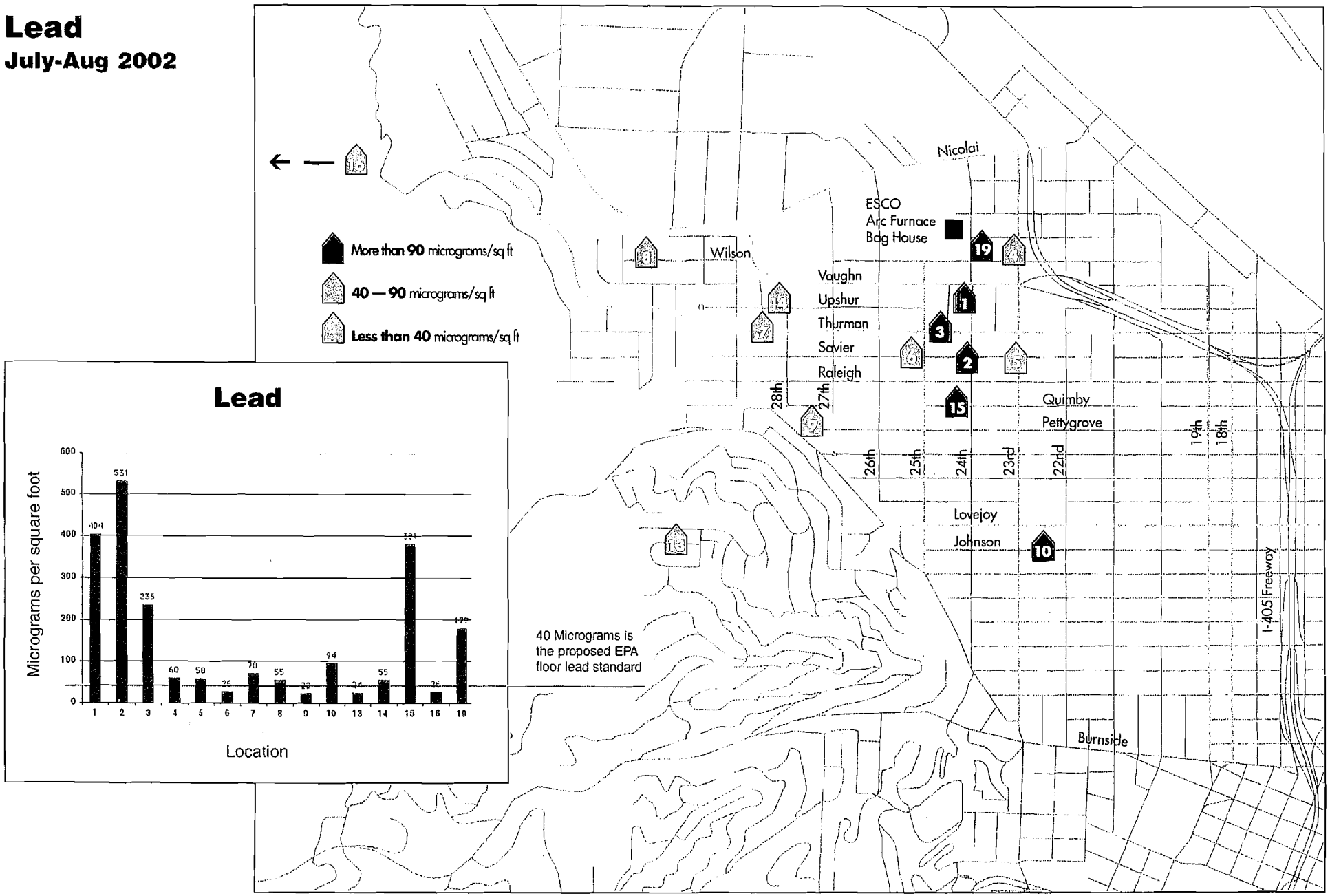
Sample date	μg/cubic meter					Odor type
September 13	1.8*a	1.0 b	nd c	nd d	nd e	ESCO (brief)
October 5	4.4 f	1.8**c	1.6**f	1.8 c		ESCO (strong)
November 2	1.0 c	nd f	2.0 f	1.9 c		vehicles
December 5	nd d					fuel (strong)
December 21	1.0g	1.1 g	2.2 c			no odor

*** Underlined values taken in presence of odor type at end of row.**
**** 24-hour average; all other values = 30 minute average**

Locations:
a = 24th Place & NW Vaughn; b = 26th & NW Nicolai; c = 2518 NW Savier; d = 3204 NW Wilson; e = 2230 NW 22nd Pl.; f = 2466 NW Thurman; g = 2856 NW Thurman.

Multiple over EPA & CA REL (chronic exposure) for high value (4.4) = 220;
Multiple over CA REL (acute exposure) = 1.76.

Figure 1. Lead found in dust collected on NW Portland Porches from 1 July to 26 August 2002.



11/02

Table 4. Volatile Organic Compound Concentrations Monitored during August 2001.

Sample number		NWDA-2-2001	NWDA-3-2001	NWDA-4-2001	
Sample location		2200 NW Johnson	2800 NW Thurman	2800 NW Thurman	
Sample date		8/8/01	8/6/01	8/1/01	
CAS #	COMPOUND	RESULT µg/m³	RESULT µg/m³	RESULT µg/m³	REPORTING LIMIT µg/m³
124-48-1	Dibromochloromethane	ND	ND	ND	5.0
106-93-4	1,2-Dibromoethane	ND	ND	ND	5.0
123-86-4	Butyl Acetate	ND	ND	ND	5.0
127-18-4	Tetrachloroethene	ND	ND	ND	5.0
108-90-7	Chlorobenzene	ND	ND	ND	5.0
100-41-4	Ethylbenzene	ND	ND	ND	5.0
136777-61-2	*m,p*-Xylenes	ND	5.7	ND	5.0
75-25-2	Bromoform	ND	ND	ND	5.0
100-42-5	Styrene	ND	ND	ND	5.0
95-47-6	o-Xylene	ND	ND	ND	5.0
111-84-2	n-Nonane	ND	ND	ND	5.0
79-34-5	1,1,2,2-Tetrachloroethane	ND	ND	ND	5.0
98-82-8	Cumene	ND	ND	ND	5.0
80-56-8	a-pinene	ND	ND	ND	5.0
622-96-8	4-Ethyltoluene	ND	ND	ND	5.0
108-67-8	1,3,5-Trimethylbenzene	ND	ND	ND	5.0
95-63-6	1,2,4-Trimethylbenzene	ND	ND	ND	5.0
100-44-7	Benzyl Chloride	ND	ND	ND	5.0
541-73-1	1,3-Dichlorobenzene	ND	ND	ND	5.0
106-46-7	1,4-Dichlorobenzene	ND	ND	ND	5.0
95-50-1	1,2-Dichlorobenzene	ND	ND	ND	5.0
5989-27-5	d-Limonene	ND	ND	ND	5.0
96-12-8	1,2-Dibromo-3-Chloropropane	ND	ND	ND	5.0
120-82-1	1,2,4-Trichlorobenzene	ND	ND	ND	5.0
91-2-3	Naphthalene	ND	ND	ND	5.0
87-68-3	Hexachlorobutadiene	ND	ND	ND	5.0

ND = Compound was analyzed for, but not above lab reporting limit.

Retention Time (min.)	Tentatively Identified Compounds in micrograms per cubic meter			
4.27	Hexafluoropropene		10	
4.51	Propane + Carbonyl Sulfide		10	
4.56	Propene	10		
5.25	n-Butane		10	7
6.89	n-Pentane		10	8
8.72	2-Methylpentane		10	
23.83	n-Decane		30	10
24.35	n-Decane	30		
25.98	n-Undecane		90	10
26.39	n-Dodecane	30		
27.60	n-Dodecane		90	20
28.90	n-Tridecane		10	

Table 4. Volatile Organic Compound Concentrations Monitored during August 2001.

Sample number	NWDA-2-2001	NWDA-3-2001	NWDA-4-2001
Sample location	2200 NW Johnson	2800 NW Thurman	2800 NW Thurman
Sample date	8/8/01	8/6/01	8/1/01

CAS #	COMPOUND	RESULT µg/m³	RESULT µg/m³	RESULT µg/m³	REPORTING LIMIT µg/m³
75-71-8	Dichlorodifluoromethane	ND	ND	ND	10
74-87-3	Chloromethane	ND	ND	ND	5.0
76-14-2	Dichlorotetrafluoroethane	ND	ND	ND	15
75-01-4	Vinyl Chloride	ND	ND	ND	5.0
106-99-0	1,3-Butadiene	ND	ND	ND	5.0
74-83-9	Bromomethane	ND	ND	ND	10
75-00-3	Chloroethane	ND	ND	ND	5.0
64-17-5	Ethanol	22	22	47	5.0
75-05-8	Acetonitrile	ND	ND	ND	5.0
107-02-8	Acrolein	6.3	ND	ND	5.0
67-64-1	Acetone	27	19	17	5.0
75-69-4	Trichlorofluoromethane	ND	ND	ND	10
67-63-0	Isopropyl Alcohol	22	63	22	5.0
107-13-1	Acrylonitrile	5.7	ND	ND	5.0
75-35-4	1,1-Dichloroethene	ND	ND	ND	5.0
75-09-2	Methylene chloride	8.3	8.1	ND	5.0
107-05-1	Allyl Chloride	ND	ND	ND	5.0
76-13-1	Trichlorotrifluoroethane	ND	ND	ND	15
75-15-0	Carbon Disulfide	ND	ND	ND	5.0
156-60-5	trans-1,2-Dichloroethene	ND	ND	ND	5.0
75-34-3	1,1-Dichloroethane	ND	ND	ND	5.0
1634-04-4	Methyl tert-Butyl Ether	ND	ND	ND	5.0
108-05-4	Vinyl Acetate	ND	ND	ND	5.0
78-93-3	2-Butanone (MEK)	ND	ND	ND	5.0
156-59-2	cis-1,2-Dichloroethene	ND	ND	ND	5.0
110-54-3	n-Hexane	ND	ND	ND	5.0
67-66-3	Chloroform	ND	ND	ND	5.0
107-06-2	1,2-Dichloroethane	ND	ND	ND	5.0
71-55-6	1,1,1-Trichloroethane	ND	ND	ND	5.0
71-43-2	Benzene	5.7	ND	ND	5.0
56-23-5	Carbon Tetrachloride	ND	ND	ND	5.0
78-87-5	1,2-Dichloropropane	ND	ND	ND	5.0
75-27-4	Bromodichloromethane	ND	ND	ND	5.0
79-01-6	Trichloroethene	ND	ND	ND	5.0
123-91-1	1,4-Dioxane	ND	ND	ND	5.0
106-89-8	Epichlorohydrin	ND	ND	ND	5.0
10061-01-5	cis-1,3-Dichloropropene	ND	ND	ND	5.0
108-10-1	4-Methyl-2-pentanone	ND	ND	ND	5.0
10061-02-6	trans-1,3-Dichloropropene	ND	ND	ND	5.0
79-00-5	1,1,2-Trichloroethane	ND	ND	ND	5.0
108-88-3	Toluene	13	18	16	5.0
591-78-6	2-Hexanone	ND	ND	ND	5.0

Hourly Benzene Conc. in NW Portland (Sep. 6- 7 Oct. 2001).