

charcoal, 6-14 mesh, stock number 5-685-B, which we conditioned by heating at 500°C for one hour. The front section of the column contained approximately 7 grams of charcoal and the rear section contained approximately 1.5 grams of charcoal. The charcoal sections were separated by a loose plug of glass wool. The charcoal was kept in each end of the column with a loose plug of glass wool. A serum stopper was placed in each end of the column except during actual sampling and analysis. A 27-gauge 3/8 inch hypodermic needle was inserted through the serum stopper on the rear of the column to control the sample flowrate. A vacuum pump pulled air through the hypodermic needle producing a critical orifice to control flowrate. The front serum stopper was removed during sampling. The flowrate through the hypodermic needle-charcoal column system was measured before and after sampling. An average flowrate was used for the calculations. The column was mounted vertically during sampling to prevent channeling of sample air. The columns were protected from sunlight at all times.

The integrated samples were collected simultaneously at five sites continuously from midnight on May 8, 1974, until midnight on May 15, 1974. Each sampler was operated for a 24-hour period. Two integrated sampling systems were located at each site so that when one stopped sampling, another automatically started sampling.

One grab sample method used consisted of Glenco 20 ml and 50 ml syringes with locking plungers. The syringes were flushed several times prior to sample collection.

The other grab sample method used a tedlar bag approximately 6x6 inches inside a plastic food container. A diagram is shown in Attachment A, Figure 3. The food container is the standard kitchen type with removable lid capable of an air-tight seal. The tedlar bag valve was attached air tight to the food container. The tedlar bag valve extended outside of the food container. A second valve was attached to the food container so a vacuum could be applied to the food container, pulling air into the tedlar bag.

The area surrounding the plant was patrolled and plume direction observed. Odors associated with the manufacture of polyvinyl chloride were sought. When these were located, grab samples were collected. All grab samples were collected in areas where the local residents and/or workers of neighboring industries would be exposed. No sample was taken from B. F. Goodrich Chemical Company property.

For experimental purposes, special sampling was done by helicopter on May 15, 1974, for approximately one hour. The helicopter was equipped with a special sampling probe which extended in front of the helicopter approximately two feet beyond the propellers. The probe extended into the helicopter to a vacuum pump which continuously pulled air through the probe. Grab samples were taken from a connection at the point where the sample probe connected to the vacuum pump. Grab samples were collected with this helicopter sampling system at altitudes of 300, 400 and 500 feet approximately 0.5 mile from the B. F. Goodrich Chemical

Company. These samples were taken at random around the plant while the helicopter was in motion at speeds varying from 10 to 30 miles per hour. Attachment A, Figures 4, 5, and 6, show the sampling site locations.

No samples were taken above B. F. Goodrich Chemical Company property.

INTEGRATED SAMPLER SITE DESCRIPTION

For security purposes, each integrated sampler site was referred to during the study by two or three code letters. These code letters are identified below in parentheses with the complete site description. See Attachment A, Figure 7.

Metropolitan Sewer District Pumping Station (MSD)

This site borders the east side of the plant on Bells Lane. It is approximately 100 yards from several storage tanks reported to be where vinyl chloride is stored. The charcoal columns were on the roof with good exposure in all directions, approximately 25 feet above the ground.

Residence, 4011 Bells Lane (NFL)

This site is at the corner of 41st Street and Bells Lane. It is approximately 0.4 mile from the plant. The charcoal columns were approximately 6 feet above the ground with exposure in all directions except north.

Mid South Coating Corporation (SOP)

This site borders the north side of the plant on Bells Lane. It is approximately 0.2 mile from the plant. The charcoal columns were approximately 4 feet above the ground with exposure in all directions except north.

Airco Carbide Corporation (DPT)

This site borders the west side of the plant on Bells Lane. It is approximately 0.2 mile from the plant. The charcoal columns were approximately 5 feet above the ground with exposure in all directions except south.

Residence, 3613 Campground Road (CP)

This site is south of the plant on Campground Road. It is approximately 0.6 mile from the plant. The charcoal columns were approximately 4 feet above the ground with exposure in all directions except east.

GRAB SAMPLE SITE DESCRIPTION

Site codes are assigned so the data in Table 1 can be related to the location on the map in Attachment A, Figure 8.

<u>Site Code</u>	<u>Site Description</u>
A	B. F. Goodrich Chemical Company at main gate on Bells Lane approximately 200 yards west of railroad tracks.
B	Bells Lane at railroad tracks. Northeast corner of B. F. Goodrich Chemical Company.

Site CodeSite Description

C	41st Street and Bells Lane. Same site as integrated sample NFL.
D	41st Street and Bells Lane; approximately 100 yards from Bells Lane; approximately 100 yards from B. F. Goodrich Chemical Company. Same site as integrated sample MSD.
E	Bells Lane below Interstate 264 Cloverleaf.
F	41st Street midway between Bells Lane and Algonquin Parkway.
G	41st Street and Algonquin Parkway.
H	Algonquin Parkway at railroad tracks approximately 100 yards west of 41st Street.
I	Campground Road and Ralph Road.
J	Campground Road approximately 150 yards west of Liken Avenue.
K	Campground Road and Linda Avenue.
L	Ralph Road and Interstate 264.
M	Campground Road approximately 200 yards south of Schmidt Road.
N	Campground Road and Liken Avenue.
O	Omitted to eliminate confusion.
P	Airco Carbide Corporation side entrance on Bells Lane approximately 400 yards west of B. F. Goodrich Chemical Company main gate.
Q	Interstate 264 Cloverleaf above Bells Lane.
R	Various locations on property of Mid South Coating Corporation (SOP), Bells Lane across from B. F. Goodrich Chemical Company.

Site CodeSite Description

S	Algonquin Parkway approximately 100 yards west of railroad tracks.
T	Bells Lane approximately 400 yards east of Interstate 264 at Cooper-Jarret Trucking Company.
U	Residence at 3613 Campground Road, approximately 200 yards west of Interstate 264. Same site as integrated sample CP.
V	Airco Carbide Corporation, approximately 300 yards south of Bells Lane and approximately 0.2 mile from B. F. Goodrich Chemical Company. Same site as integrated sample DPT.

DISCUSSION

The wind conditions were very unstable and changed frequently. Wind data used were collected by E. I. DuPont de Nemours & Company approximately one mile from B. F. Goodrich Chemical Company at the intersection of Campground Road and Ralph Road. Data reported are hourly averages.

Caution must be exercised in interpreting all vinyl chloride data. Any concentrations of vinyl chloride measured had been exposed to varying degrees of catalysts, pressure, time, temperature, and sunlight which would initiate polymerization during the PVC manufacturing process and the process emissions. This would mean that any levels analyzed are minimum concentrations compared to those actually present at the time of collection.

Caution must also be exercised in interpreting all grab sample data since they are discrete, instantaneous bits of data. They do not

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necessarily reflect the concentration before or after the grab sample was collected. These samples were primarily collected in odor areas. Some samples were collected in the absence of odors to determine if other gases were present which could interfere during the sample analysis. No interfering gases were observed during the analyses.

The Tedlar bag samples which were marked "void" in Table 1 are the result of leaks in the bags which allowed the samples to be lost during shipping.

Four special time periods should be recognized during this study. Each of these periods involve samples collected at the Mid South Coating Corporation, grab sample site code R. These are May 14, 1974, between 2000 hours and 2035 hours; May 14, 1974, between 2337 hours and 2345 hours; May 15, 1974, between 1850 hours and 1946 hours; and May 16, 1974, between 0550 and 0620 hours.

On May 14, 1974, between 2000 hours and 2035 hours, 19 grab samples were collected. These data are plotted in Attachment A, Figure 9.

During this 35 minute time period, sufficient grab samples were collected in short enough time periods that it can be assumed safe to average these grab sample data generating a 35 minute average vinyl chloride concentrations of 5.3 ppm.

The integrated sample data for May 14, 1974, at this site showed 0.53 ppm for the 24-hour average. However, May 12 and 13, 1974, each show 1.5 ppm for the 24-hour average. Insufficient grab samples were collected at peak concentration times to show instantaneous high concentrations on May 12 and 13.

On May 14, 1974, at the SOP site between 2337 hours and 2345 hours, 3 grab samples were collected. The highest and second highest vinyl chloride concentrations measured during the study was measured at this time -- 33 ppm and 23 ppm, respectively.

On May 15, 1974, grab samples were again collected at Mid South Coating Corporation (SOP) between 1850 hours and 1946 hours. The average grab sample concentration for 15 samples during this 56-minute time period was 3.79 ppm.

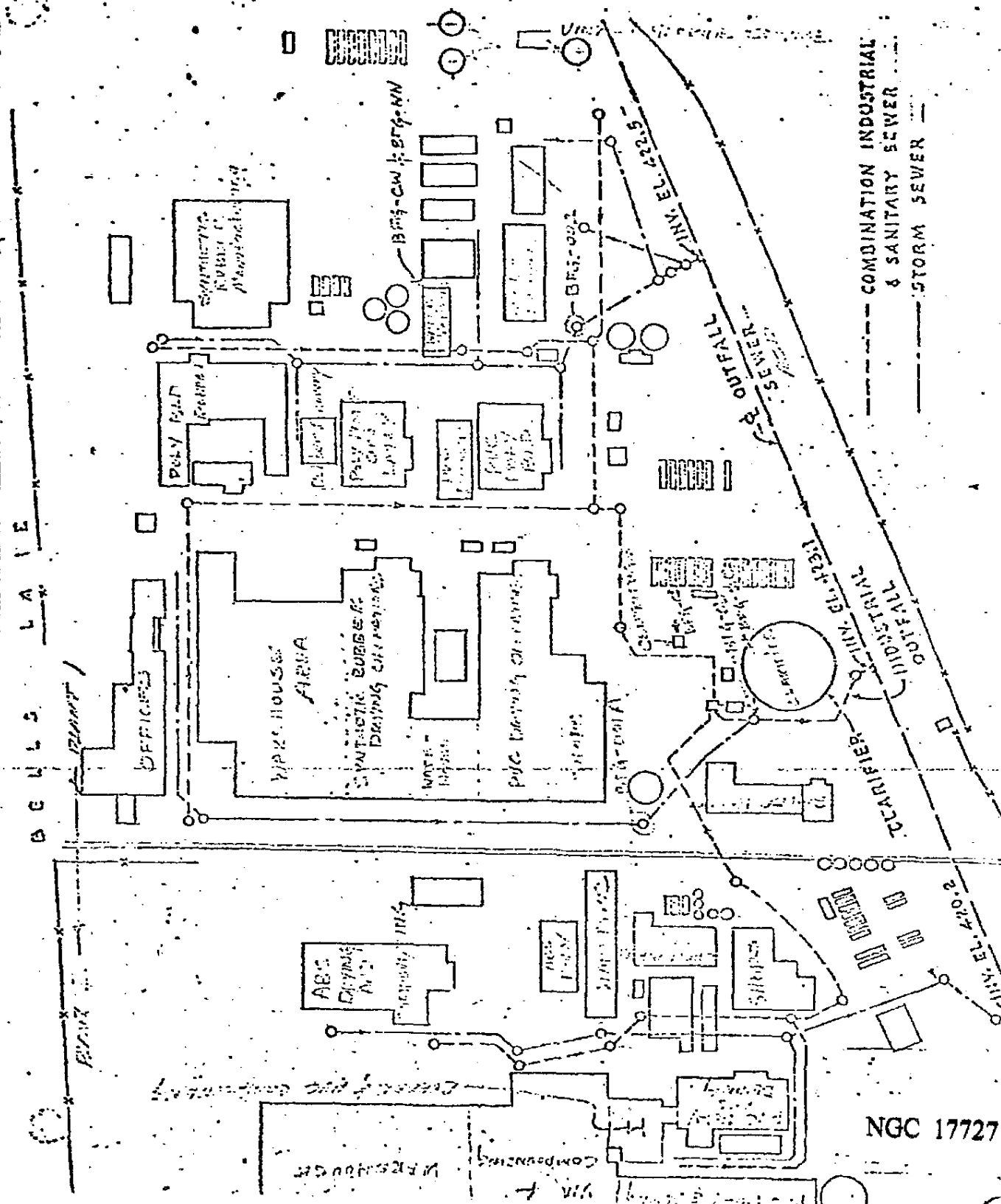
On May 16, 1974, grab samples were collected at Mid South Coating Corporation (SOP) between 0550 hours and 0620 hours. The average grab sample concentration for 7 samples during this 30-minute period was 0.14 ppm.

ATTACHMENT A

List of Figures

Figure 1	-	B. F. Goodrich Chemical Company, Plant Layout
Figure 2	-	Diagram of Charcoal Column
Figure 3	-	Diagram of Tedlar Bag Sampler
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Figure 5	-	Helicopter Sample Sites at 400 Ft Altitude
Figure 6	-	Helicopter Sample Sites at 500 Ft Altitude
Figure 7	-	Integrated Sample Sites
Figure 8	-	Street Map of Louisville, Kentucky, in Vicinity of B. F. Goodrich Chemical Company
Figure 9	-	Grab Sample Data Plot 5/14/74 Mid South Coating Corp. (SOP)

FIGURE 1



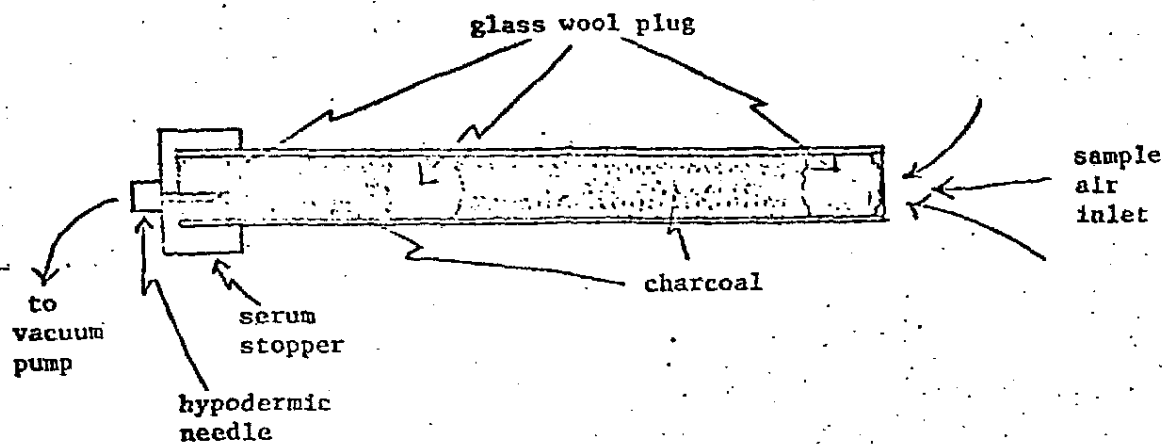


Figure 2
Diagram of Charcoal Column

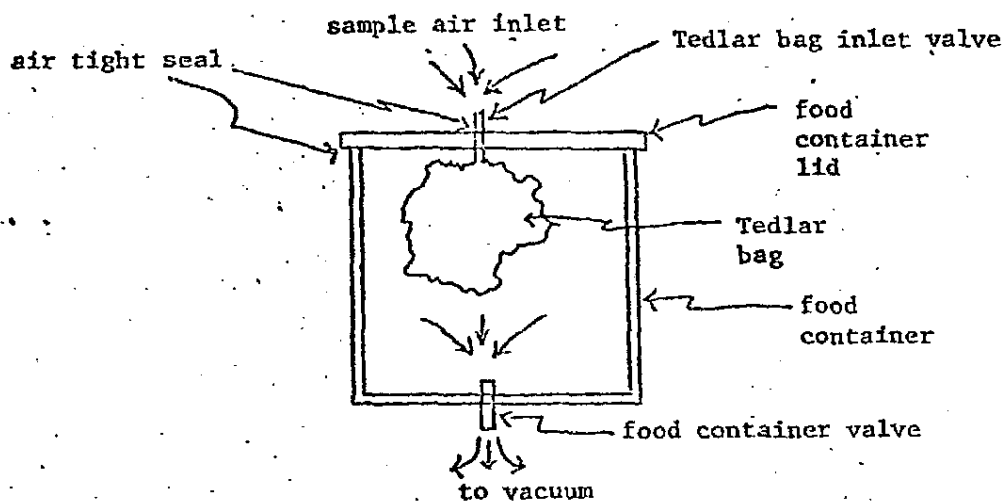


Figure 3
Diagram of Tedlar Bag Sampler

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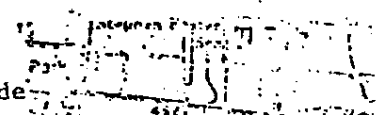
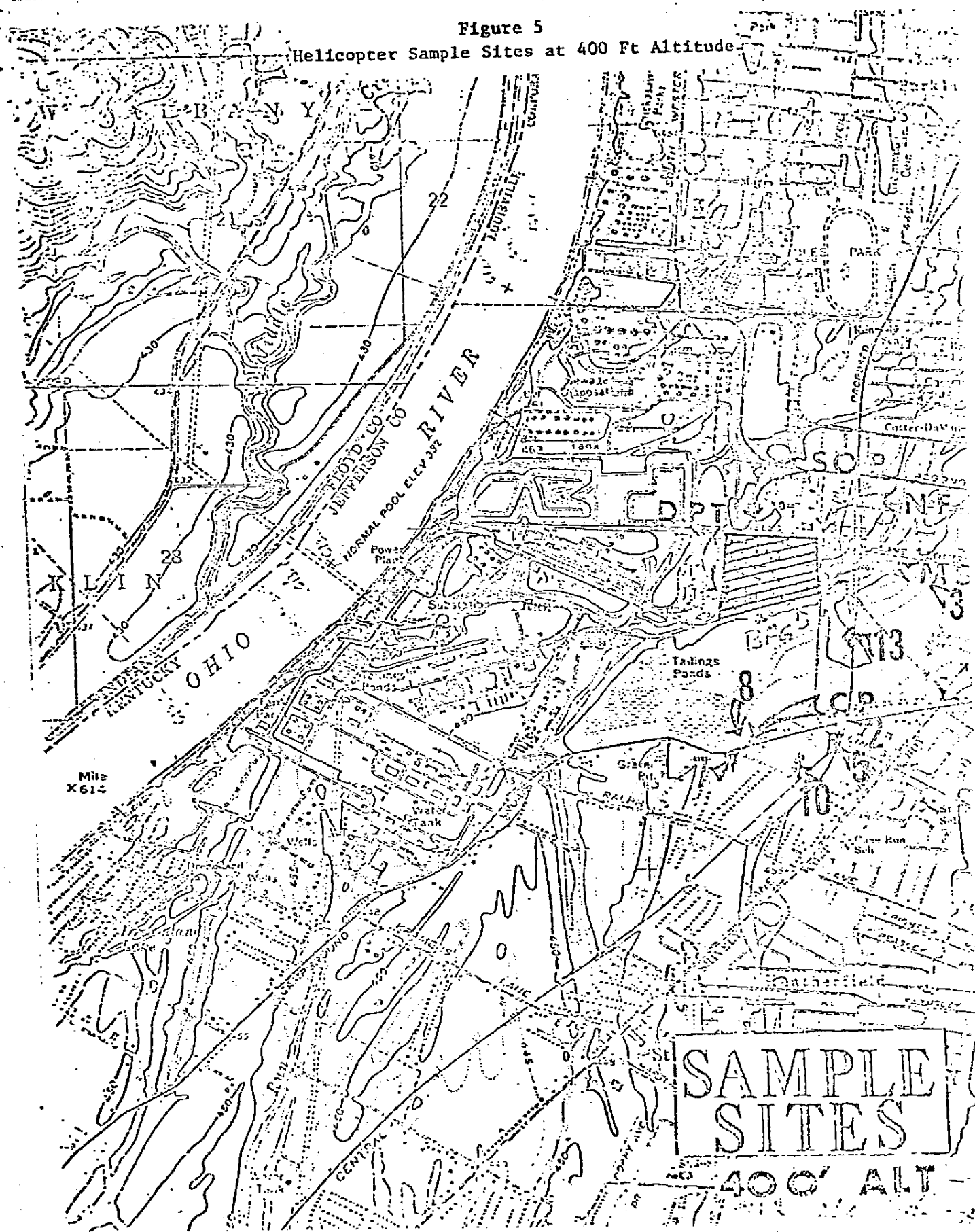


Figure 5

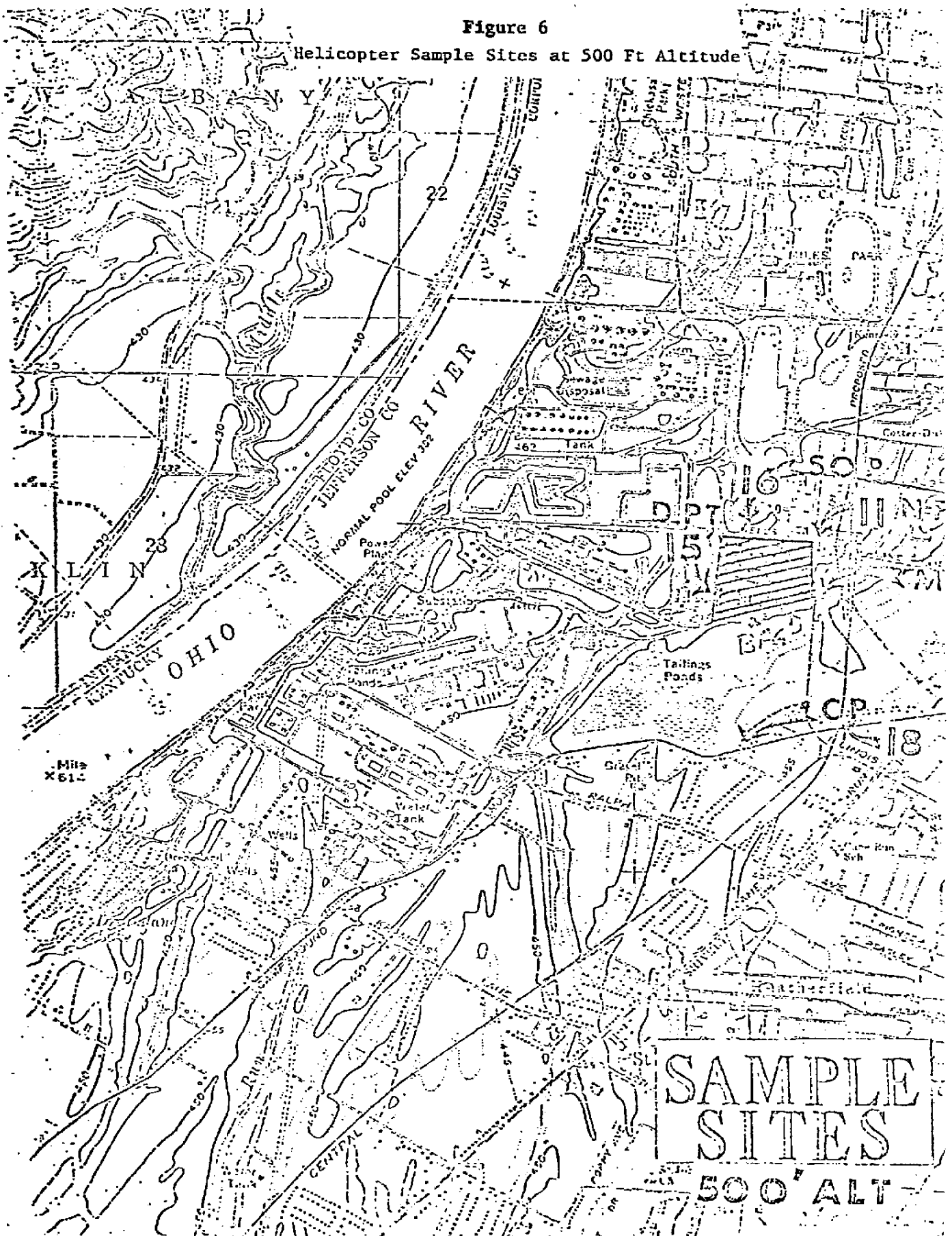
Helicopter Sample Sites at 400 Ft Altitude



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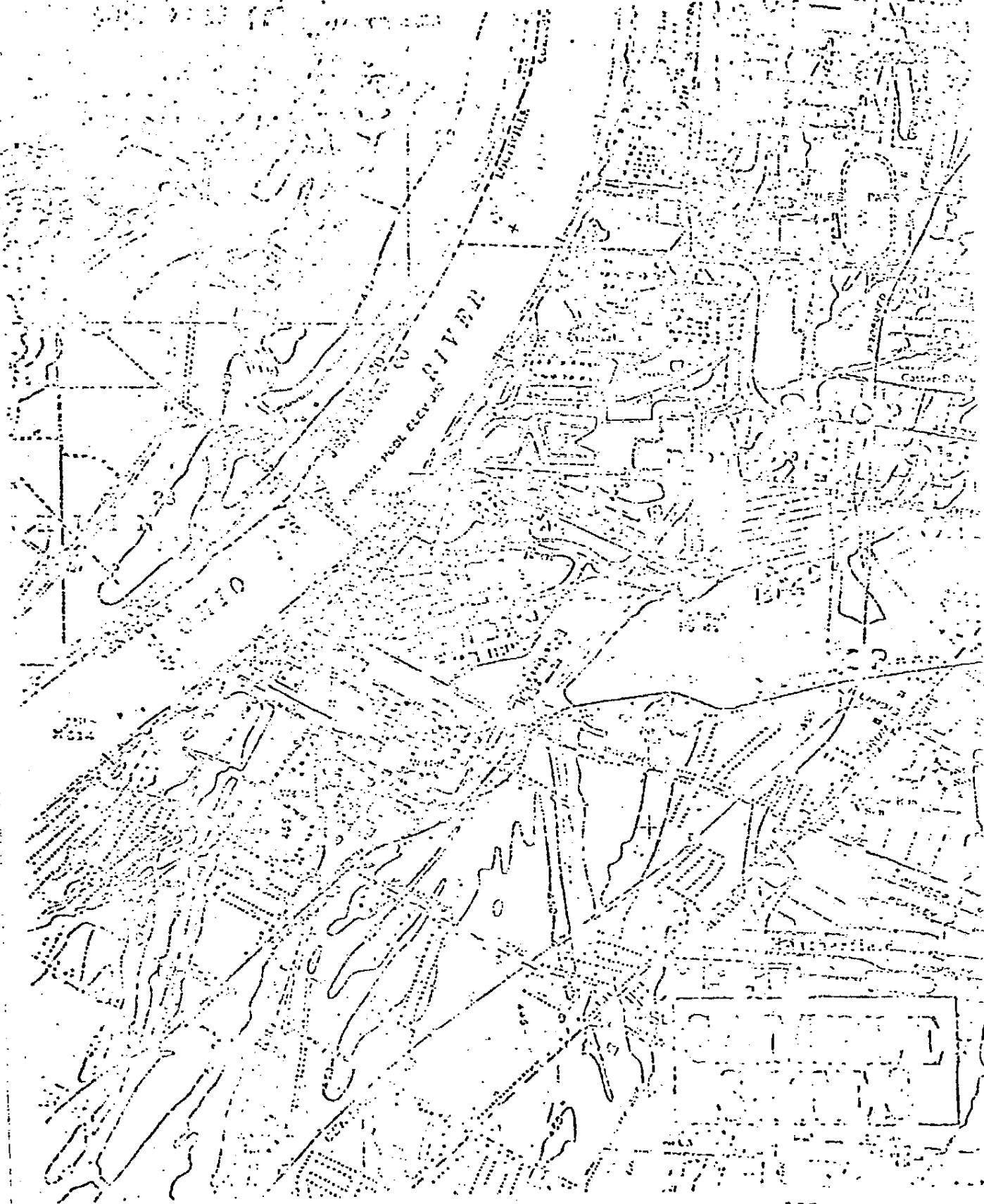
Figure 6

Helicopter Sample Sites at 500 Ft Altitude



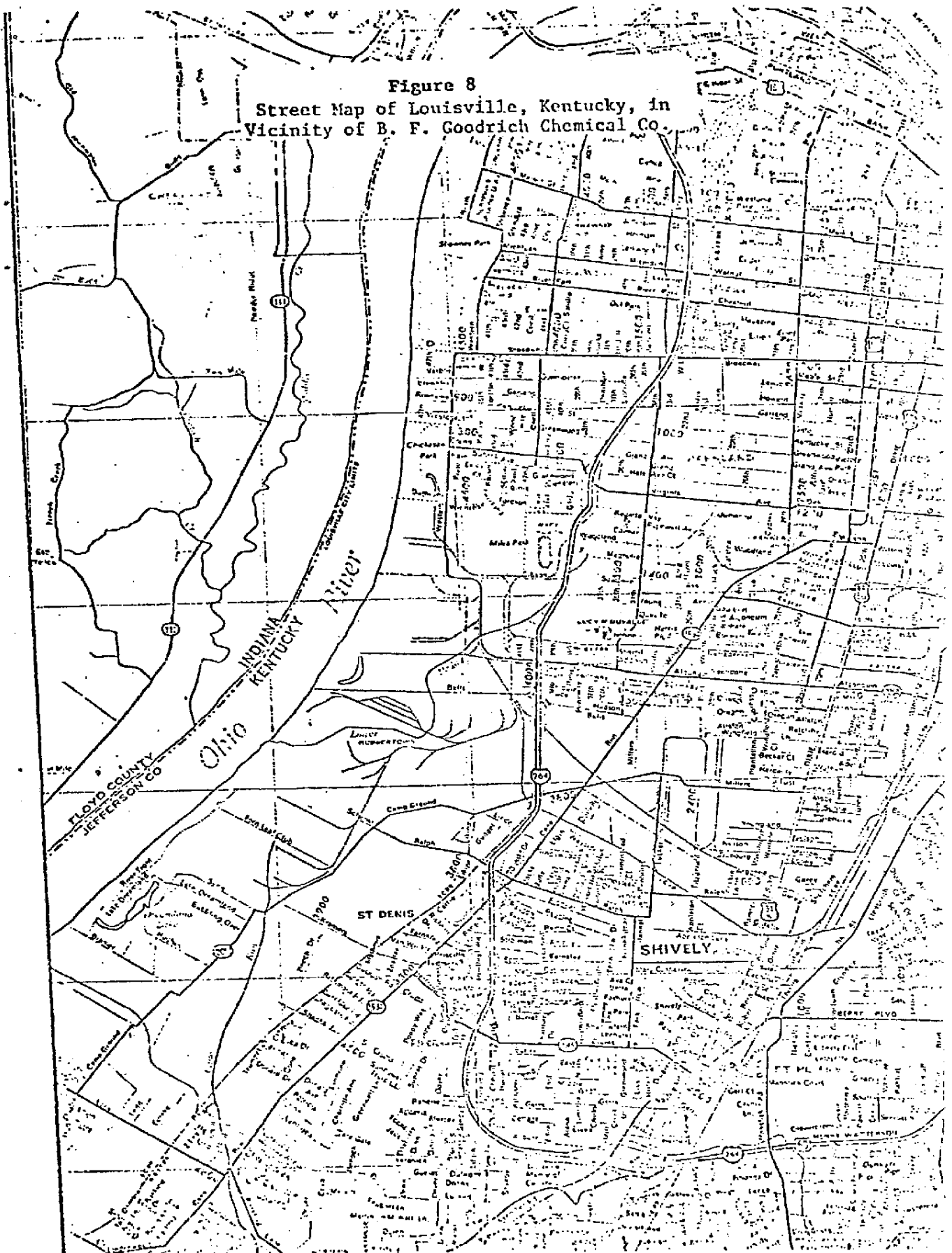
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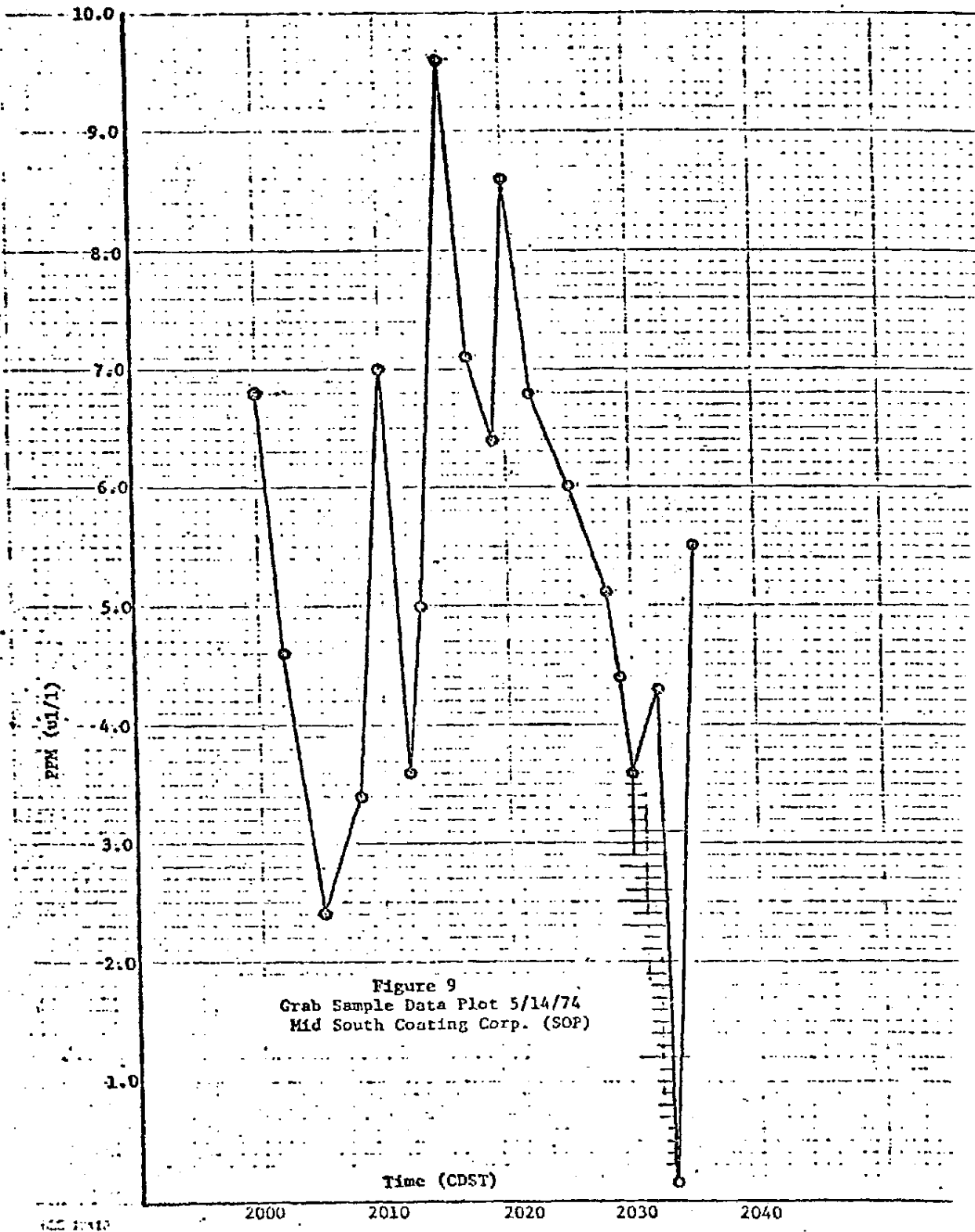
Figure 7
Indicated Sample Sites



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Figure 8
Street Map of Louisville, Kentucky, in
Vicinity of B. F. Goodrich Chemical Co.





ATTACHMENT B

Analytical Procedures for Air Samples for Vinyl Chloride

All samples were analyzed on a Varian 1400 gas chromatograph with a flame ionization detector. An eight foot X 2.5 mm I. D. X $\frac{1}{8}$ " O. D. glass column packed with 0.4% carbowax 1500 on carbopak A at 58° C was used.

INTEGRATED SAMPLES

The carbon filter integrated samples were analyzed as follows:

The major section of the charcoal columns was rapidly emptied into 30 mls of carbon disulfide (which had been cooled to 0° C) in a 50 ml graduated cylinder equipped with a ground glass stopper. The stopper was quickly inserted, and the mixture was gently shaken to settle the carbon to the bottom. This was allowed to stand, with intermediate shaking, for one hour. Then a portion of the carbon disulfide solution was transferred to a 1.85 ml septum sealed vial with a disposable pipet, being careful to completely fill the vial. Three microliter injections of this solution were used on the carbowax 1500 column with a detection limit of 0.42 ng vinyl chloride per microliter. At the air sampling flow rates used and the volume of carbon disulfide used for desorbing, the minimum detectable concentration of vinyl chloride for the integrated samples is 0.001 ppm. However, all positive values for the integrated samples are to be considered as minimum concentration values since the absorption and desorption efficiencies of the charcoal for vinyl chloride are not known.

GRAB SAMPLES

1 ml air samples were injected using a 1 ml gas syringe - the detection limit by this method is 0.05 ppm.

Concentration values for the grab samples should also be considered minimum values.

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ATTACHMENT C

Table 1	-	Grab Sample Data
Table 2	-	Integrated Sample Data
Table 3	-	Helicopter Sample Data

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Table 1
 AMBIENT AIR GRAB SAMPLE DATA

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (u/l)	Approximate Miles to Plant	Type Site Inhabitants
S-01	5-8-74	1330	A	14	SSW	Syringe	<0.05	0	Industrial
S-03	5-8-74	1525	A	10	SSW	Syringe	0.068	0	Industrial
S-05	5-8-74	1925	A	6	SSW	Syringe	<0.05	0	Industrial
S-12	5-10-74	1410	A	4	ESE	Syringe	<0.05	0	Industrial
S-16	5-10-74	1925	A	6	ESE	Syringe	<0.05	0	Industrial
T-25	5-11-74	1135	A	8	S	Tedlar Bag	1.7	0	Industrial
S-02	5-8-74	1405	B	14	SSW	Syringe	<0.05	.4	Industrial
S-04	5-8-74	1625	B	10	SSW	Syringe	<0.05	.4	Industrial
S-07	5-8-74	1935	B	6	SSW	Syringe	0.83	.4	Industrial
S-23	5-11-74	1040	B	8	S	Syringe	2.3	.4	Industrial
S-26	5-11-74	1507	B	12	void	Syringe	1.3	.4	Industrial
S-28	5-11-74	1515	B	12	void	Syringe	0.33	.4	Industrial
S-32	5-11-74	1700	B	12	SSW	Syringe	0.69	.4	Industrial
S-46	5-13-74	2220	B	10	SSW	Syringe	1.8	.4	Industrial
S-51	5-14-74	1035	B	14	SSW	Syringe	0.85	.4	Industrial

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AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/l)	Approximate Miles to Plant	Type Site Inhabitants
T-08	5-9-74	1625	B	6	SW	Tedlar Bag	3.4	.4	Industrial
T-09	5-9-74	1635	B	6	SW	Tedlar Bag	5.3	.4	Industrial
T-11	5-9-74	1700	B	5	WSW	Tedlar Bag	3.6	.4	Industrial
T-17	5-10-74	1310	B	4	SE	Tedlar Bag	<0.05	.4	Industrial
T-24	5-11-74	1130	B	8	S	Tedlar Bag	1.8	.4	Industrial
T-29	5-11-74	1220	B	12	S	Tedlar Bag	0.14	.4	Industrial
T-30	5-11-74	1505	B	12	void	Tedlar Bag	0.98	.4	Industrial
T-32	5-11-74	2205	B	2	W	Tedlar Bag	0.12	.4	Industrial
T-33	5-11-74	2210	B	2	W	Tedlar Bag	0.98	.4	Industrial
T-56	5-13-74	1545	B	8	S	Tedlar Bag	3.4	.4	Industrial
T-59	5-13-74	1935	B	9	SSW	Tedlar Bag	5.6	.4	Industrial
T-60	5-13-74	1940	B	9	SSW	Tedlar Bag	void	.4	Industrial
S-10	5-9-74	1239	C	6	WNW	Syringe	<0.05	.4	Residential & Industrial
S-36B	5-11-74	1945	C	9	W	Syringe	1.8	.4	Residential & Industrial

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AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/l)	Approximate Miles to Plant	Type Site Inhabitants
S-37B	5-11-74	1948	C	9	W	Syringe	0.043	.4	Residential & Industrial
S-38B	5-11-74	1950	C	9	W	Syringe	0.83	.4	Residential & Industrial
S-39	5-11-74	1955	C	9	W	Syringe	1.7	.4	Residential & Industrial
S-36A	5-12-74	0910	C	8	WNW	Syringe	<0.05	.4	Residential & Industrial
S-49	5-14-74	0810	C	12	SSW	Syringe	0.088	.4	Residential & Industrial
S-54	5-14-74	1650	C	17	SSW	Syringe	0.24	.4	Residential & Industrial
S-55	5-15-74	0355	C	12	SSW	Syringe	<0.05	.4	Residential & Industrial
S-58	5-15-74	0450	C	9	WNW	Syringe	void	.4	Residential & Industrial
S-60	5-15-74	0615	C	8	SWW	Syringe	3.2	.4	Residential & Industrial
T-06	5-9-74	1240	C	3	W	Tedlar Bag	<0.05	.4	Residential & Industrial

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AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/l)	Approximate Miles to Plant	Type Site Inhabitants
T-15	5-10-74	0910	C	6	ESE	Tedlar Bag	0.068	.4	Residential & Industrial
T-39	5-12-74	1220	C	20	W to N	Tedlar Bag	0.39	.4	Residential & Industrial
T-41	5-12-74	1410	C	22	W to N	Tedlar Bag	0.077	.4	Residential & Industrial
T-43	5-12-74	1515	C	20	NW	Tedlar Bag	<0.05	.4	Residential & Industrial
T-62	5-14-74	0445	C	10	SSW	Tedlar Bag	5.8	.4	Residential & Industrial
T-63	5-14-74	0455	C	10	SSW	Tedlar Bag	void	.4	Residential & Industrial
T-87	5-15-74	0350	C	12	SSW	Tedlar Bag	void	.4	Residential & Industrial
T-108	5-15-74	2240	C	void	void	Tedlar Bag	<0.05	.4	Residential & Industrial
T-109	5-15-74	2245	C	void	void	Tedlar Bag	0.31	.4	Residential & Industrial
S-11	5-10-74	0910	D	6	ESE	Syringe	<0.05	.4	Residential & Industrial

NGC 17741

AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/l)	Approximate Miles to Plant	Type Site Inhabitants
S-33	5-11-74	1705	D	12	SSW	Syringe	0.17	.4	Residential & Industrial
S-35A	5-12-74	0900	D	8	NNW	Syringe	<0.05	.4	Residential & Industrial
S-50	5-14-74	0820	D	12	SSW	Syringe	0.61	.4	Residential & Industrial
S-57	5-15-74	0435	D	9	WNW	Syringe	0.26	.4	Residential & Industrial
T-01	5-8-74	2220	D	6	SSW	Tedlar Bag	0.43	.4	Residential & Industrial
T-07	5-9-74	1400	D	3	WNW	Tedlar Bag	<0.05	.4	Residential & Industrial
T-36	5-12-74	1105	D	16	W to N	Tedlar Bag	void	.4	Residential & Industrial
T-40	5-12-74	1225	D	20	W to N	Tedlar Bag	0.56	.4	Residential & Industrial
T-47	5-12-74	1930	D	13	NW	Tedlar Bag	0.16	.4	Residential & Industrial
T-54	5-13-74	1540	D	8	SSW	Tedlar Bag	void	.4	Residential & Industrial

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AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/l)	Approximate Miles to Plant	Type Site Inhabitants
T-57	5-13-74	1554	D	8	S	Tedlar Bag	<0.05	.4	Residential & Industrial
T-58	5-13-74	1930	D	9	SSW	Tedlar Bag	2.0	.4	Residential & Industrial
T-88	5-15-74	1320	D	1.5	W	Tedlar Bag	0.14	.4	Residential & Industrial
T-89	5-15-74	1435	D	5	WNW	Tedlar Bag	0.33	.4	Residential & Industrial
T-90	5-15-74	1440	D	5	WNW	Tedlar Bag	void	.4	Residential & Industrial
T-91	5-15-74	1455	D	5	WNW	Tedlar Bag	0.53	.4	Residential & Industrial
T-110	5-15-74	2248	D	void	void	Tedlar Bag	2.8	.4	Residential & Industrial
T-111	5-15-74	2252	D	void	void	Tedlar Bag	2.0	.4	Residential & Industrial
S-24	5-11-74	1115	E	8	S	Syringe	<0.05	.5	Residential & Industrial
S-37A	5-12-74	0935	E	8	NNW	Syringe	0.096	.5	Residential & Industrial

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AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/1)	Approximate Miles to Plant	Type Site Inhabitants
S-34	5-11-74	1715	H	12	SSW	Syringe	void	.3	Residential & Industrial
S-42	5-13-74	2000	H	8	SSW	Syringe	1.2	.3	Residential & Industrial
T-26	5-11-74	1140	H	8	S	Tedlar Bag	0.3	.3	Residential & Industrial
T-12	5-9-74	2315	I	4	NNE	Tedlar Bag	0.39	.8	Residential
T-13	5-9-74	2335	I	4	NNE	Tedlar Bag	1.6	.8	Residential
S-29	5-11-74	1620	L	13	void	Syringe	<0.05	.8	Industrial
T-113	5-15-74	2258	L	void	void	Tedlar Bag	<0.05	.8	Industrial
S-30	5-11-74	1622	N	13	void	Syringe	<0.05	.6	Residential
S-06	5-8-74	1930	P	6	SSW	Syringe	<0.05	.3	Industrial
S-15	5-10-74	1750	P	6	ESE	Syringe	<0.05	.3	Industrial
S-17	5-10-74	1940	P	6	ESE	Syringe	<0.05	.3	Industrial
S-18	5-10-74	2005	P	7	ESE	Syringe	<0.05	.3	Industrial
S-19	5-10-74	2225	P	7	ESE	Syringe	<0.05	.3	Industrial

AMBIENT AIR GRAB SAMPLE DATA - Table 1 (cont'd.)

Sample No.	Date	CDST Time	Site Code	MPH Wind Speed	Wind Direction	Container Type	PPM (ul/l)	Approximate Miles to Plant	Type Site Inhabitants
S-20	5-10-74	2230	P	7	ESE	Syringe	<0.05	.3	Industrial
S-21	5-10-74	2300	P	7	ESE	Syringe	<0.05	.3	Industrial
T-20	5-10-74	2245	P	7.5	ESE	Tedlar Bag	0.08	.3	Industrial
S-08	5-8-74	2255	Q	4	NNW	Syringe	<0.05	.5	Residential & Industrial
S-09	5-8-74	2300	Q	4	NNW	Syringe	0.058	.5	Residential & Industrial
S-39	5-12-74	1425	Q	22	NW	Syringe	1.7	.5	Residential & Industrial
S-40	5-12-74	2135	Q	11	NNW	Syringe	<0.05	.5	Residential & Industrial
T-02	5-8-74	2230	Q	6	SSW	Tedlar Bag	<0.05	.5	Residential & Industrial
T-03	5-8-74	2240	Q	6	SSW	Tedlar Bag	<0.05	.5	Residential & Industrial
T-04	5-9-74	0830	Q	5	WNW	Tedlar Bag	<0.05	.5	Residential & Industrial
T-05	5-9-74	0835	Q	5	WNW	Tedlar Bag	<0.05	.5	Residential & Industrial

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