Analysis of Cancer Incidence:

Comparison of Selected Cancer Incidence Rates between Two Population Groups; Within a 2-mile Radius and Outside a 2-mile Radius of Two Trichloroethylene Emission Sites in Montgomery County, Pennsylvania 1996 – 2002

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Executive Summary

Purpose

An analysis was conducted around the two major **Trichloroethylene (TCE)** emission sites in Collegeville Borough and Trappe Borough in Montgomery County, Pennsylvania to determine the incidence rates of lung, kidney and liver cancers from 1996 to 2002. The incidences for the population Within the 2-mile Radius for the selected cancers were then compared to the incidences for the population Outside the 2-mile Radius but within the county in order to determine if there are elevated incidences of the selected cancers within the 2-mile radius of the two major TCE emission sites. The analysis was conducted in response to residents' concerns voiced at the Pennsylvania Department of Environmental Protection (PADEP) public information meeting about the two major TCE emission manufacturing facilities. TCE is categorized as a probable carcinogen for liver, kidney and lung cancer according to a federal public health agency, Agency for Toxic Substances and Disease Registry (ATSDR).

Methods

Cancer registry data obtained from the Pennsylvania Cancer Incidence Surveillance System (PCISS) at the Pennsylvania Department of Health (PADOH) for the years 1996 to 2002 was used for this analysis. Age-adjusted incidence rates, the number of expected cases, and Standard Incidence Ratios (SIRs, defined as the ratio of the number of observed to expected cases) were calculated. SIRs with values less than 1.0 indicate that fewer cases were observed than would be expected. SIRs with values greater than 1.0 indicate that more cases were observed than would be expected. SIR values were assessed for statistical significance by examining the 95% confidence intervals. A SIR with a 95% confidence interval (CI) that does not contain the null value (1.0) is considered to be statistically significant.

Results

A total of 3,662 new cases of lung cancer were diagnosed among Montgomery County residents from 1996 to 2002. Of those 3,662 new lung cancer cases, 51 cases were from the population residing Within the 2-mile Radius of the two manufacturing sites and 3,611 were from the population residing Outside the 2-mile Radius from the two sites within the county.

There were a total of 728 new kidney cancer cases diagnosed among Montgomery County residents from 1996 to 2002. Of those 728 new kidney

cancer cases, 15 came from the population residing Within the 2-mile Radius from the two manufacturing sites and 713 cases came from the population residing Outside the 2-mile Radius from the two manufacturing sites within the county.

There were 208 new cases of liver cancer diagnosed from 1996 to 2002 among Montgomery County residents. Of those 208 new liver cancer cases, 3 lived Within the 2-mile Radius from the two manufacturing sites and 205 lived Outside the 2-mile Radius from the two sites.

There were no dramatic increases in case incidences in any of the three types of cancers from 1996 to 2002 for either population.

Conclusions

No statistically significant elevated lung cancer, kidney cancer or liver cancer incidence was detected Within the 2-mile Radius of the two manufacturing sites from 1996 – 2002 when compared to the incidences of the same cancers Outside the 2-mile Radius within the county. The SIRs for all three types of cancers were less than 1.0 which means that the incidences of all three types of cancers Within the 2-mile Radius from the two manufacturing sites were lower than expected. The liver cancer SIR was 0.63 with CI from 0.13 to 1.83 and the kidney cancer SIR was 0.90 with CI between 0.5 and 1.48. Neither was statistically significant. Based on the 1996 to 2002 data, the incidence of lung cancer Within the 2-mile Radius from the two manufacturing sites was not elevated and is, in fact, significantly lower than would be expected with SIR of 0.70, CI between 0.52 and 0.92. The expected lung cancer cases would be 73 cases and the actual observed lung cancer cases were 51.

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Introduction

The malfunction of genetic controls can result in uncontrolled cell growth and the spread of abnormal cells in tissues throughout the body (Brownson, Reif, Alavanja, and Bal, 1998). This uncontrolled cell growth and the spread of these abnormal cells is the basic mechanism of cancer. Cancer is not just one disease, but rather a group of more than one hundred diseases, generally classified based on the location and type of abnormal cell growth present. The most serious danger of a cancer is the risk that the cancer will spread or metastasize to other areas of the body, including the vital organs, preventing them from functioning properly (Brownson et al, 1998).

Cancer is the second leading cause of death in adult Pennsylvanians and Americans as a whole, behind only heart disease. It is estimated that American men have a 1 in 2 lifetime risk of developing some form of cancer. The risk of developing cancer increases with age.

Background Information about TCE

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.
TCE evaporates quickly (“volatilizes”) from open containers and surface water, and becomes a vapor in the air. TCE evaporates less easily from soil.
TCE is not thought to occur naturally in the environment. It has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

Some studies with mice and rats have suggested that high levels of TCE may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of TCE in drinking water or in workplace air have found evidence of increased cancer. Although there are some concerns about

the studies of people who were exposed to TCE, some of the effects found in people were similar to effects in animals.
In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that TCE is “reasonably anticipated to be a human carcinogen.” The International Agency for Research on Cancer (IARC) has determined that TCE is “probably carcinogenic to humans.”

Currently there is no Federal or State health standard for TCE in ambient air. The Environmental Protection Agency (EPA) has set a maximum contaminant level for TCE in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water (ppb). The EPA has developed regulations for the handling and disposal of TCE.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of TCE per million parts air (100 ppm, or 100,000 ppb) for an 8-hour workday, 40-hour workweek.

DEP reported a 2005 annual average TCE concentration of 0.26 parts per billion by volume (ppbv) at their monitoring station in Trappe and 0.14 ppbv at the Evansburg monitoring station (black dots in appendixes maps are the locations of the two monitoring sites), with maximum readings of approximately 0.70 ppbv.

Study Design

The cancer assessment was conducted using existing incidence data from the Pennsylvania Cancer Incidence Surveillance System (PCISS), which is maintained by PADOH. MCHD receives the cancer registry data on an annual basis. The Pennsylvania Public Health Code requires that all hospitals, clinical laboratories and health care facilities where cancer is diagnosed or treated must report each newly diagnosed case to PCISS within 180 days. Reported cases of cancer are housed in the PCISS database at the PADOH. MCHD also maintains the received files and analyzes the data on an annual basis or on request.
The software programs ArcGIS 9.2, SPSS15, DataFerrett and Microsoft Excel were used to geocode patients’ addresses, calculate age-category populations, determine centroid points for all Census blocks in Montgomery County, obtain 2000 Census block populations and calculate age-adjusted rates. The age-specific incident rates were calculated for Outside the 2-mile Radius within the County as the basis to project the expected cancer cases for all three cancer types Within the 2-mile Radius from the two manufacturing sites. The SIRs and confidence intervals were calculated using Microsoft Excel.

Methods

PCISS data for diagnosis years 1996 – 2002, which were the most current data available at the time of this assessment, was used. ArcGIS 9.2 was used to geocode all the addresses for all three types of cancers. Approximately 92% of the addresses matched with our standard address file last updated in 2004 by our County GIS staff. The 8% unmatched addresses were carefully decided based on the township code and zip code to see if they fall Within or Outside the 2-mile Radius from the two manufacturing sites. The two companies exact mailing addresses were used as centers to draw the 2-mile radius buffer. If unmatched patients' addresses postal codes fell partially Within the 2-mile Radius from the two manufacturing sites, the County Board of Assessment database was used to determine the locations. The Census block shape file was converted from polygons to centroids to determine if any of the blocks fell Within the 2-mile Radius from the two manufacturing sites. Census block population data were obtained using DataFerrett from the US Census, then linked to the Census Block shape file using common variable STFID. The STFID is a unique identifier that refers to one and only one census unit, and contains all the information needed to find the location of that unit (e.g. a census tract) in the United States. Each state and county in the United States is assigned a Federal Information Processing Standard (FIPS) code.

For reporting purposes, cancer incidence data are generally grouped into twenty-four categories based on sites and types of cancers. PCISS data are coded based on the "International Classification of Diseases for Oncology, Third Edition" codes. There were about 29,000 records in total for Montgomery County from 1996 to 2002. Each of these 29,000 cases was grouped into one of the twenty-four categories based on the criteria used by the Surveillance, Epidemiology, and End Results (SEER) Program at the National Cancer Institute. Duplicate cases were eliminated. A duplicate was defined as multiple case entries of cancer at the same primary site for the same person. Patients with more than one case of cancer at different primary sites were counted as multiple cases. For example, a patient who was diagnosed with cervical cancer in 1998 and then with breast cancer as a separate primary cancer in 2001, counted as one case of cervical cancer and one case of breast cancer. Only lung, kidney and liver cancer were analyzed in this study. Bronchus and Lung cancer is defined as ICD-O-3 site of C340 to C349 and excludes ICD-O-3 histology 9590-9589. Kidney and Renal Pelvis cancer is defined as ICD-O-3 site of C649 or C659 and excludes ICD-O-3 histology 9590-9589. Liver and Intrahepatic Bile Duct cancer is defined as ICD-O-3 site of C220 or C221 and excludes ICD-O-3 histology of 9590-9589.

Age-adjusted incidence rates (see Appendix) were calculated using the 2000 U.S. Standard Age-Adjustment Factor and population data from the 2000 U.S.

Census. Age-adjusted rates were not further calculated based on gender, race or ethnicity.

Standard Incidence Ratios (SIRs), defined as the ratio of the number of observed cases to the number of expected cases, were calculated for all three types of cancers. An SIR with a value greater than 1.0 indicates that more cases were observed than would be expected when compared to a similar population. SIR values less than 1.0 indicate that fewer cases were observed than would be expected. SIRs were assessed for statistical significance by examining 95% confidence intervals using the technique described by Bailar and Ederer (1964). SIRs with confidence intervals that do not contain the null value (1.0) are considered to be statistically significant. The expected cases in this study were derived from the incidence rate Outside the 2-mile Radius from the two manufacturing sites within the County.

Results

A total of 3,662 cases of lung cancer were diagnosed in Montgomery County from 1996 to 2002. Of these 3,662 cases, 3,611 cases were Outside the 2-mile Radius from the two manufacturing sites and 51 of the 3,662 were Within the 2-mile Radius from the two manufacturing sites. A total of 728 kidney cancer cases were diagnosed in Montgomery County from 1996 to 2002. Of those 728 cases, 713 were Outside the 2-mile Radius and 15 were Within the 2-mile Radius from the two manufacturing sites. There were a total of 208 cases of liver cancer diagnosed in Montgomery County from 1996 to 2002 and 205 of them resided Outside the 2-mile Radius, and 3 of them resided Within the 2-mile Radius from the two manufacturing sites.

Standard Incidence Ratios (SIRs) were calculated for all three types of cancers in this study. Overall, 73 lung cancer cases were expected Within the 2-mile Radius from the two manufacturing sites based on the incidence data Outside the 2-mile Radius from the manufacturing sites within Montgomery County. There were 51 lung cancer cases diagnosed Within the 2-mile Radius from the two manufacturing sites, which was less than would be expected. The resulting SIR for lung cancer was 0.63, which was statistically significant at 95% confidence level (see Appendix). That indicates that the lung cancer incidence rate Within the 2-mile Radius from the two manufacturing sites was significantly lower than the cancer incidence rate Outside the 2-mile Radius from the two manufacturing sites.

The number of expected kidney cancer cases was 17 Within the 2-mile Radius from the two manufacturing sites based on the incidence rate Outside the 2-mile Radius from the two manufacturing sites. The actual observed kidney cancer cases were 15. The resulting SIR for kidney cancer was 0.90 with 95% confidence interval between 0.5 and 1.48 meaning there is no

statistical significance between the expected incidence and the observed incidence. The incidence rate Within the 2-mile Radius from the two manufacturing sites is lower than expected when compared with the Outside the 2-mile Radius from the two sites within the county (see Appendix).

Five liver cancer cases were expected Within the 2-mile Radius from the two manufacturing sites based on the incidence rate Outside the 2-mile Radius from the two manufacturing sites. The actual observed liver cancer cases were 3. The resulting SIR for liver cancer was 0.63 with 95% confidence interval between 0.13 and 1.83 which means there is no statistical significance between the expected incidence and the observed incidence. That indicates that the observed liver cancer cases were only 0.63 times the expected number but there is no statistical significance between the observed case number and the actual case number Within the 2-mile Radius from the two manufacturing sites (see Appendix).

There was no consistent increase in incidences of any of the three types of cancer from 1996 to 2002 (see Appendix).

Discussions

Based on the cancer incidence data of the Outside the 2-mile Radius from the two manufacturing sites and the population of the Within the 2-mile Radius from the two manufacturing sites, 73 lung cancer, 17 kidney cancer and 5 liver cancer cases would be expected to be diagnosed Within the 2-mile Radius from the two manufacturing sites from 1996 – 2002. From 1996 to 2002, there were 51 lung cancer cases, 15 kidney cancer cases and 3 liver cancer cases diagnosed, fewer than expected for all three types of cancers. Because fewer cases were observed than were expected, the SIRs for all three types of cancers were less than 1.0 (0.70, 0.90 and 0.63, respectively). The 95% confidence interval for lung cancer SIR does not contain 1.0, indicating that value is statistically significant (see Table 1). The overall number of lung cancer cases Within the 2-mile Radius from the two manufacturing sites from 1996 to 2002 was significantly less than would be expected based on the population Outside the 2-mile Radius from the two manufacturing sites. The 95% confidence intervals for kidney and liver cancer SIRs contain 1 which indicates that the observed kidney and liver cancer cases were less than expected but were not statistically significant (see Table 2 & 3).

Based on cancer incidence data from 1996 to 2002, there is no evidence that the incidence of lung, kidney or liver cancer Within 2-mile Radius from the two manufacturing sites is higher than would be expected. Rather than observing more cases of these three types of cancers than were expected, fewer cases of these cancers were diagnosed during the same time period.

Although any cancer case is one too many, it is difficult to assess the amount and type of cancer-causing agents to which an individual has been exposed. Unfortunately, cancer is often the result of a combination of agents and risk factors that interact in a way that science does not yet fully understand. Studies done by Harvard scholars in 1996 indicated that environmental factors only contribute about 2% of all cancer causes (see table below). Environmental factors include sunlight, water and air pollution, and contaminated soil. According to ATSDR's September 1997 Toxicological Profile for Trichloroethylene (TCE), several retrospective cohort studies of workers exposed to unquantified levels of TCE have been conducted. All of those studies had limitations that restricted their usefulness for evaluating the carcinogenicity of TCE. None showed clear, unequivocal evidence that TCE exposure is linked to increased cancer risk.

Table: Causes of Cancer in the United States

Tobacco	30%
Diet/Obesity	30%
Sedentary lifestyle	5%
Occupation	5%
Family history of cancer	5%
Viruses and other biologic agents	5%
Perinatal factors/growth	5%
Alcohol	3%
Socioeconomic status	3%
Environmental pollution	2%
Ionizing/ultraviolet radiation	2%
Prescription drugs	1%
Salt/other food Additives/contaminants	1%

Source: Cancer Causes & Control, Harvard Report on Cancer Prevention, 1996

DIETARY HABITS: Many dietary factors can affect cancer risk: types of foods, food preparation methods, portion sizes, food variety, and overall caloric balance. Cancer risk can be reduced by an overall dietary pattern that includes a high proportion of plant foods (fruits, vegetables, grains, and beans), limited amounts of meat and other high fat foods, and a balance of caloric intake and physical activity. TOBACCO USE: According to the American Cancer Society, smoking currently accounts for at least 30% of all cancer deaths. Lung cancer mortality rates are about 22 times higher for current male smokers and 12 times higher for current female smokers compared to lifelong never-smokers. In addition to being responsible for 87% of lung cancers, smoking is also associated with cancers of the mouth, nasal cavities, pharynx, larynx, esophagus, stomach, pancreas, liver, uterine cervix, kidney, bladder, and myeloid leukemia1.

ENVIRONMENTAL FACTORS: Factors such as sunlight, industrial products, and air or water pollution may also contribute to the development of certain cancers.

Montgomery County Health Department receives Cancer Registry data from the PADOH for Montgomery County only. Therefore, this analysis considered the 2-mile radius area from the manufacturing sites and did not examine incrementally larger-radius areas, which would have partially fallen out of the county at the next increment. Results from an analysis including several

stratified concentric buffer zones would be more conclusive if not for data limitations.

The analysis took the two manufacturing sites as the TCE-dispensing center points. The 2-mile radius area included the two DEP air sampling sites at Evansburg and Trappe. There were no other known TCE air measurements around those sites.

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Appendix

Table 1
Comparison of Bronchus and Lung Cancer Incidence between Areas Within and Outside the 2-mile Radius of the two Manufacturing Sites in Montgomery County, PA (1996 – 2002)

Age Group	Outside 2-mile Radius				Within 2-mile Radius				
	Cases	Population	Rate*		Population	Expected Cases	Observed Cases	SIR	95%CI
under 5	1	45092	2		2198	0.05	1	20.52	-19.69, 60.72
5-9	0	49375	0		1966	0.00	0	N/A	N/A
10-14	0	51222	0		1652	0.00	0	N/A	N/A
15-19	0	44169	0		1590	0.00	1	N/A	N/A
20-24	0	35386	0		1584	0.00	0	N/A	N/A
25-29	2	43648	5		2168	0.10	0	0.00	N/A
30-34	4	52338	8		2777	0.21	0	0.00	N/A
35-39	10	60229	17		3251	0.54	0	0.00	N/A
40-44	49	61766	79		2707	2.15	0	0.00	N/A
45-49	103	54876	188		2062	3.87	1	0.26	-0.25, 0.76
50-54	175	48049	364		1748	6.37	5	0.79	0.1, 1.47
55-59	276	37283	740		1146	8.48	6	0.71	0.14, 1.27
60-64	367	29264	1254		754	9.46	8	0.85	0.26, 1.43
65-69	607	27196	2232		584	13.03	8	0.61	0.19, 1.04
70-74	702	27348	2567		434	11.14	9	0.81	0.28, 1.34
75-79	652	24348	2678		367	9.83	8	0.81	0.25, 1.38
80-84	406	16585	2448		218	5.34	2	0.37	-0.14, 0.89
85 up	257	14585	1762		132	2.33	2	0.86	-0.33, 2.05
Total	3611	722759	499.61		27338	72.89	51	0.70	0.52 - 0.92

*Rates are per 100,000

Table 2
Comparison of Kidney and Renal Pelvis Cancer Incidence between Areas Within and Outside the 2-mile Radius of the two Manufacturing Sites in Montgomery County, PA (1996 – 2002)

Age Group	Outside 2-mile Radius				Within 2-mile Radius				
	Cases	Population	Rate*		Population	Expected Cases	Observed Cases	SIR	95%CI
under 5	4	45092	9		2198	0.19	0	0.00	N/A
5-9	3	49375	6		1966	0.12	1	8.37	-8.04, 24.78
10-14	0	51222	0		1652	0.00	0	N/A	N/A
15-19	0	44169	0		1590	0.00	0	N/A	N/A
20-24	2	35386	6		1584	0.09	0	0.00	N/A
25-29	3	43648	7		2168	0.15	0	0.00	N/A
30-34	4	52338	8		2777	0.21	0	0.00	N/A
35-39	12	60229	20		3251	0.65	1	1.54	-1.48, 4.57
40-44	24	61766	39		2707	1.05	0	0.00	N/A
45-49	44	54876	80		2062	1.65	2	1.21	-0.47, 2.89
50-54	54	48049	112		1748	1.96	2	1.02	-0.39, 2.43
55-59	68	37283	182		1146	2.09	1	0.48	-0.46, 1.42
60-64	74	29264	253		754	1.91	2	1.05	-0.4, 2.5
65-69	89	27196	327		584	1.91	5	2.62	0.32, 4.91
70-74	119	27348	435		434	1.89	1	0.53	-0.51, 1.57
75-79	114	24348	468		367	1.72	0	0.00	N/A
80-84	55	16585	332		218	0.72	0	0.00	N/A
85 up	44	14585	302		132	0.40	0	0.00	N/A
Total	713	722759	98.65		27338	16.72	15	0.90	0.5 - 1.48

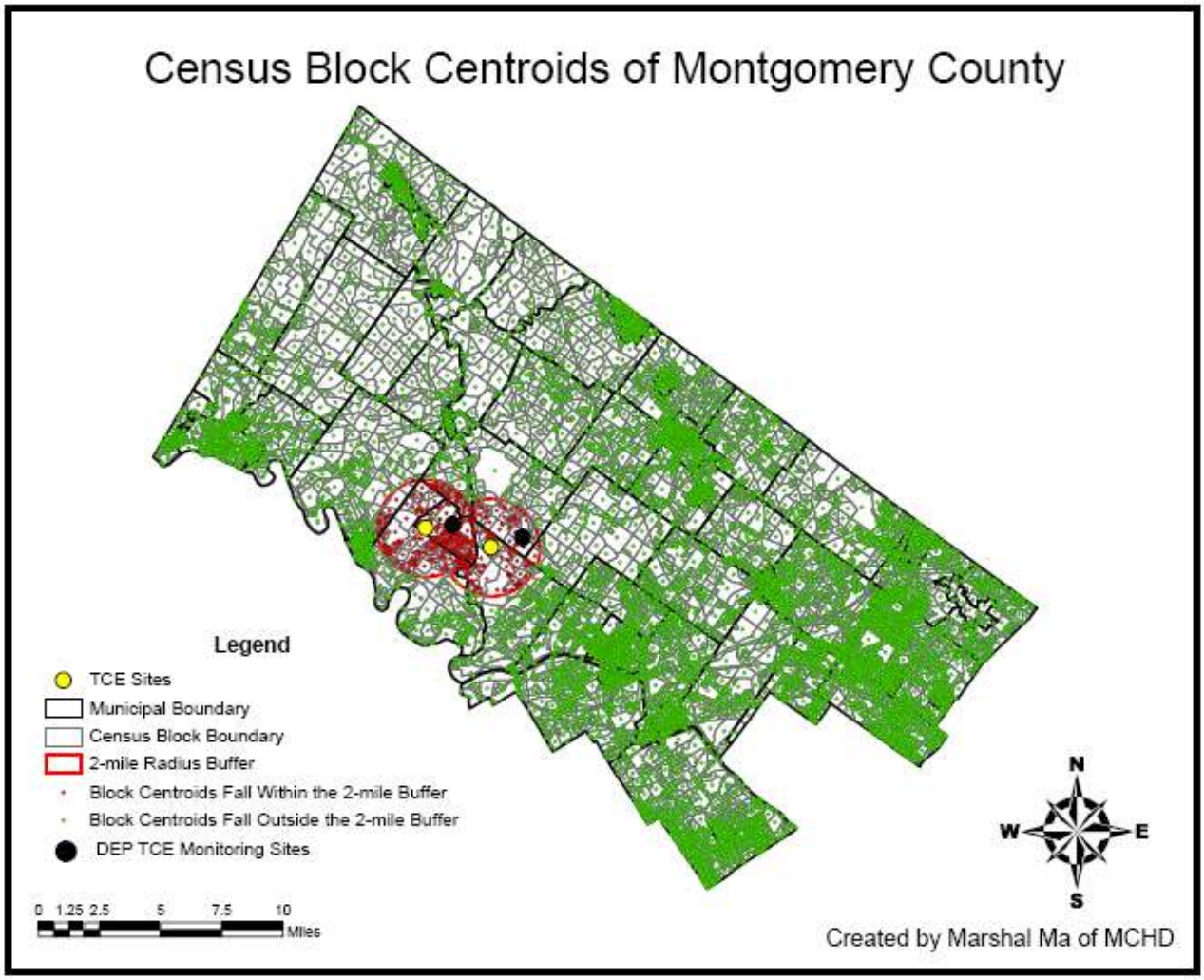
*Rates are per 100,000

Table 3
Comparison of Liver and Intrahepatic Bile Duct Cancer Incidence between Areas Within and Outside the 2-mile Radius of the two Manufacturing Sites in Montgomery County, PA (1996 – 2002)

Age Group	Outside 2-mile Radius				Within 2-mile Radius				
	Cases	Population	Rate*		Population	Expected Cases	Observed Cases	SIR	95%CI
under 5	1	45092	2		2198	0.05	0	0.00	N/A
5-9	1	49375	2		1966	0.04	0	0.00	N/A
10-14	0	51222	0		1652	0.00	0	N/A	N/A
15-19	0	44169	0		1590	0.00	0	N/A	N/A
20-24	0	35386	0		1584	0.00	0	N/A	N/A
25-29	1	43648	2		2168	0.05	0	0.00	N/A
30-34	0	52338	0		2777	0.00	0	N/A	N/A
35-39	2	60229	3		3251	0.11	0	0.00	N/A
40-44	5	61766	8		2707	0.22	0	0.00	N/A
45-49	22	54876	40		2062	0.83	0	0.00	N/A
50-54	20	48049	42		1748	0.73	0	0.00	N/A
55-59	9	37283	24		1146	0.28	0	0.00	N/A
60-64	23	29264	79		754	0.59	0	0.00	N/A
65-69	25	27196	92		584	0.54	1	1.86	-1.79, 5.51
70-74	38	27348	139		434	0.60	0	0.00	N/A
75-79	24	24348	99		367	0.36	2	5.53	-2.13, 13.19
80-84	21	16585	127		218	0.28	0	0.00	N/A
85 up	13	14585	89		132	0.12	0	0.00	N/A
Total	205	722759	28.36		27338	4.78	3	0.63	0.13 - 1.83

*Rates are per 100,000

Figure1


Census Block Centroids of Montgomery County
Legend
TCE Sites
Municipal Boundary
Census Block Boundary
2-mile Radius Buffer
Block Centroids Fall Within the 2-mile Buffer
Block Centroids Fall Outside the 2-mile Buffer
DEP TCE Monitoring Sites
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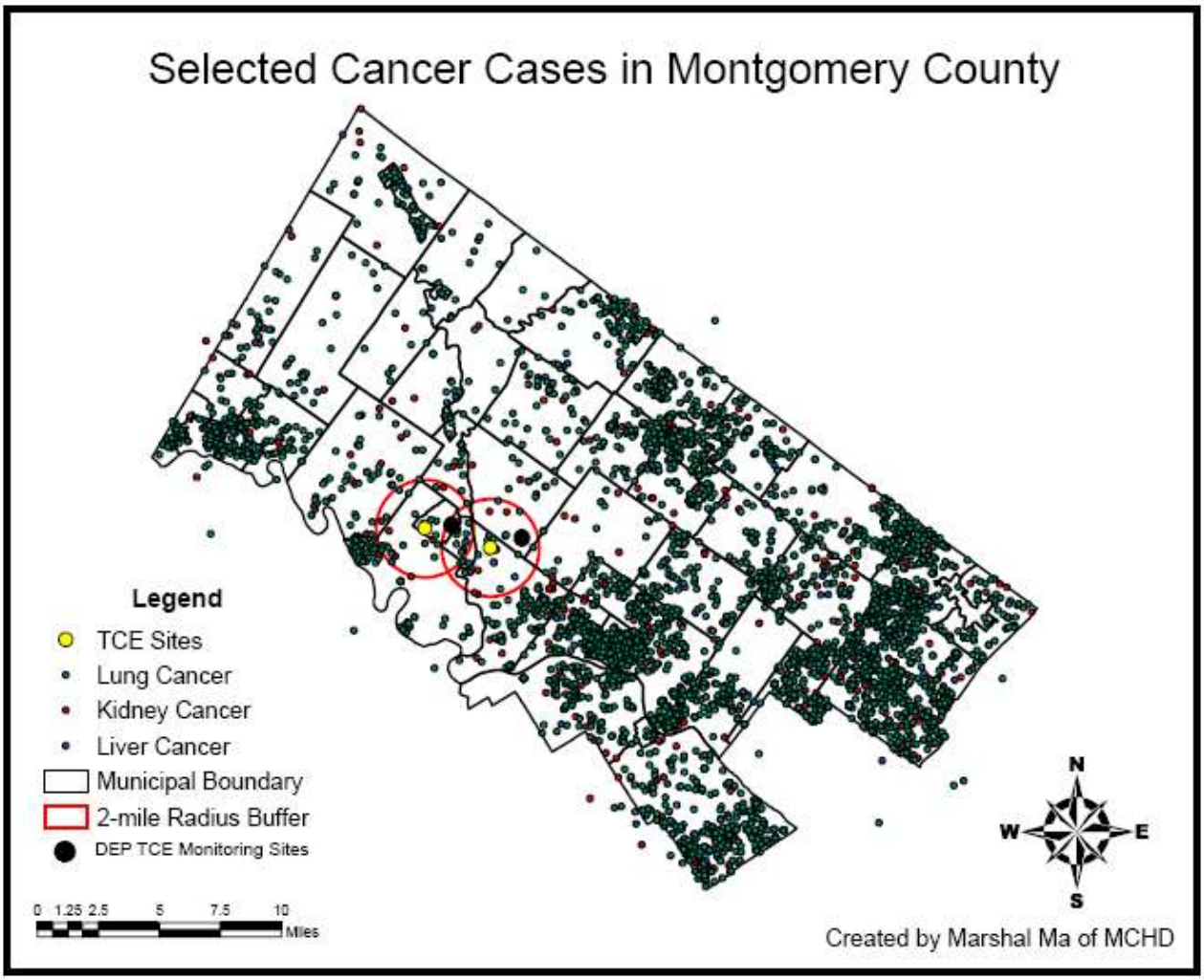
Created by Marshal Ma of MCHD

Figure 2


Selected Cancer Cases in Montgomery County
Legend
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Municipal Boundary
2-mile Radius Buffer
DEP TCE Monitoring Sites
0 1.25 2.5 5 7.5 10
Miles
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Chart 1

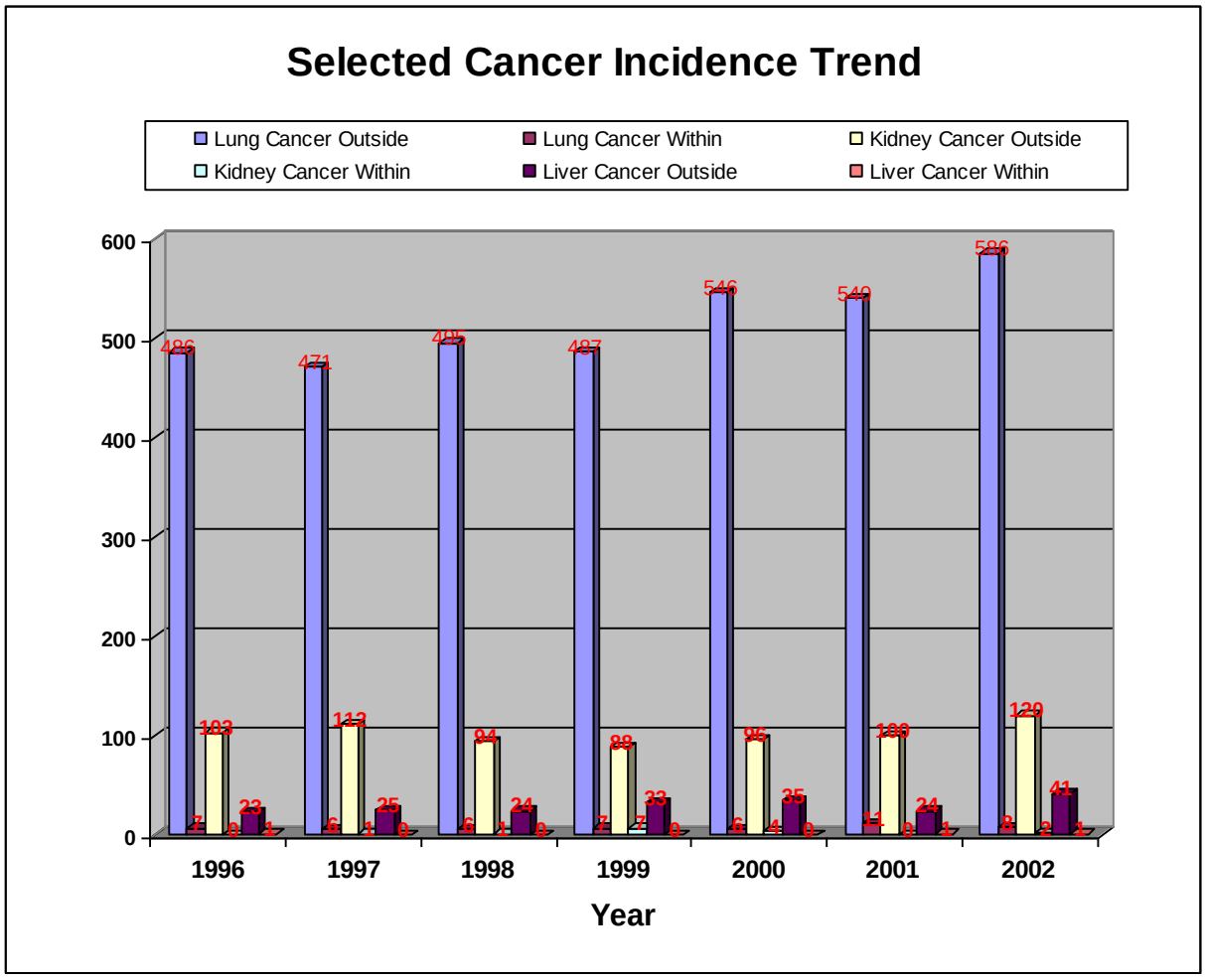

Table 4

Cancer Type	Area	Year						
		1996	1997	1998	1999	2000	2001	2002
Lung Cancer	Outside 2-mile Radius	486	471	495	487	546	540	586
	Within 2-mile Radius	7	6	6	7	6	11	8
Kidney Cancer	Outside 2-mile Radius	103	112	94	88	96	100	120
	Within 2-mile Radius	0	1	1	7	4	0	2
Liver Cancer	Outside 2-mile Radius	23	25	24	33	35	24	41
	Within 2-mile Radius	1	0	0	0	0	1	1

Table 5

Lung Cancer Age-adjusted Incidence Rate (1996-2002)

Within 2-mile Radius						Outside 2-mile Radius				
Age Group	Standard	Pop	cases	Expect		Age Group	Standard	Pop	cases	Expect
under 5	69135	2198	1	0.449		under 5	69135	45092	1	0.022
5-9	72533	1966	0	0.000		5-9	72533	49375	0	0.000
10-14	73032	1652	0	0.000		10-14	73032	51222	0	0.000
15-19	72169	1590	1	0.648		15-19	72169	44169	0	0.000
20-24	66478	1584	0	0.000		20-24	66478	35386	0	0.000
25-29	64529	2168	0	0.000		25-29	64529	43648	2	0.042
30-34	71044	2777	0	0.000		30-34	71044	52338	4	0.078
35-39	80762	3251	0	0.000		35-39	80762	60229	10	0.192
40-44	81851	2707	0	0.000		40-44	81851	61766	49	0.928
45-49	72118	2062	1	0.500		45-49	72118	54876	103	1.934
50-54	62716	1748	5	2.563		50-54	62716	48049	175	3.263
55-59	48454	1146	6	3.624		55-59	48454	37283	276	5.124
60-64	38793	754	8	5.880		60-64	38793	29264	367	6.950
65-69	34264	584	8	6.705		65-69	34264	27196	607	10.925
70-74	31773	434	9	9.413		70-74	31773	27348	702	11.651
75-79	26999	367	8	8.408		75-79	26999	24348	652	10.328
80-84	17842	218	2	2.338		80-84	17842	16585	406	6.240
85 up	15508	132	2	3.357		85 up	15508	14585	257	3.904
Total	1000000	27338	51	43.885		Total	1000000	722759	3611	61.580
Annual Age-adjusted Rate:			95% CI LL	31.279		Annual Age-adjusted Rate:			95% CI LL	58.792
43.89 per 100,000			95% CI UL	56.491		61.58 per 100,000			95% CI UL	64.368
PA Annual Age-adjusted Rate					95% CI LL		68.8			
69.6 per 100,000 (2000-2002)					95% CI UL		70.4			

Table 6

Kidney Cancer Age-adjusted Incidence Rate (1996- 2002)

Within 2-mile Radius					Outside 2-mile Radius				
Age Group	Standard	Pop	cases	Expect	Age Group	Standard	Pop	cases	Expect
under 5	69135	2198	0	0.000	under 5	69135	45092	4	0.088
5-9	72533	1966	1	0.527	5-9	72533	49375	3	0.063
10-14	73032	1652	0	0.000	10-14	73032	51222	0	0.000
15-19	72169	1590	0	0.000	15-19	72169	44169	0	0.000
20-24	66478	1584	0	0.000	20-24	66478	35386	2	0.054
25-29	64529	2168	0	0.000	25-29	64529	43648	3	0.063
30-34	71044	2777	0	0.000	30-34	71044	52338	4	0.078
35-39	80762	3251	1	0.355	35-39	80762	60229	12	0.230
40-44	81851	2707	0	0.000	40-44	81851	61766	24	0.454
45-49	72118	2062	2	0.999	45-49	72118	54876	44	0.826
50-54	62716	1748	2	1.025	50-54	62716	48049	54	1.007
55-59	48454	1146	1	0.604	55-59	48454	37283	68	1.262
60-64	38793	754	2	1.470	60-64	38793	29264	74	1.401
65-69	34264	584	5	4.191	65-69	34264	27196	89	1.602
70-74	31773	434	1	1.046	70-74	31773	27348	119	1.975
75-79	26999	367	0	0.000	75-79	26999	24348	114	1.806
80-84	17842	218	0	0.000	80-84	17842	16585	55	0.845
85 up	15508	132	0	0.000	85 up	15508	14585	44	0.668
Total	1000000	27338	15	10.217	Total	1000000	722759	713	12.423
Annual Age-adjusted Rate:			95% CI LL	4.856	Annual Age-adjusted Rate:			95% CI LL	11.156
10.22 per 100,000			95% CI UL	15.578	12.42 per 100,000			95% CI UL	13.689

PA Annual Age-adjusted Rate	95% CI LL	13.5
13.8 per 100,000 (2000-2002)	95% CI UL	14.2

Table 7

Liver Cancer Age-adjusted Incidence Rate (1996 -2002)

Within 2-mile Radius						Outside 2-mile Radius				
Age Group	Standard	Pop	cases	Expect		Age Group	Standard	Pop	cases	Expect
under 5	69135	2198	0	0.000		under 5	69135	45092	1	0.022
5-9	72533	1966	0	0.000		5-9	72533	49375	1	0.021
10-14	73032	1652	0	0.000		10-14	73032	51222	0	0.000
15-19	72169	1590	0	0.000		15-19	72169	44169	0	0.000
20-24	66478	1584	0	0.000		20-24	66478	35386	0	0.000
25-29	64529	2168	0	0.000		25-29	64529	43648	1	0.021
30-34	71044	2777	0	0.000		30-34	71044	52338	0	0.000
35-39	80762	3251	0	0.000		35-39	80762	60229	2	0.038
40-44	81851	2707	0	0.000		40-44	81851	61766	5	0.095
45-49	72118	2062	0	0.000		45-49	72118	54876	22	0.413
50-54	62716	1748	0	0.000		50-54	62716	48049	20	0.373
55-59	48454	1146	0	0.000		55-59	48454	37283	9	0.167
60-64	38793	754	0	0.000		60-64	38793	29264	23	0.436
65-69	34264	584	1	0.838		65-69	34264	27196	25	0.450
70-74	31773	434	0	0.000		70-74	31773	27348	38	0.631
75-79	26999	367	2	2.102		75-79	26999	24348	24	0.380
80-84	17842	218	0	0.000		80-84	17842	16585	21	0.323
85 up	15508	132	0	0.000		85 up	15508	14585	13	0.197
Total	1000000	27338	3	2.940		Total	1000000	722759	205	3.567
Annual Age-adjusted Rate:			95% CI LL	-0.404		Annual Age-adjusted Rate:			95% CI LL	2.889
2.94 per 100,000			95% CI UL	6.284		3.57 per 100,000			95% CI UL	4.245
PA Annual Age-adjusted Rate					95% CI LL		4.600			
4.9 per 100,000 (2000-2002)					95% CI UL		5.100			