

(Summary Report)  
Environmental Risk Study  
For  
City of Chester, Pennsylvania

Conducted by the U.S. Environmental Protection Agency  
Region III  
in conjunction with the  
Pennsylvania Department of Environmental Resources  
June, 1995

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This report is a condensed version of the **Chester Risk Study, Technical Support Document** written by staff at the U.S. Environmental Protection Agency Region III Office in Philadelphia, Pennsylvania and which is currently undergoing a scientific peer review as required by Agency policy.

The U.S. Environmental Protection Agency (EPA) policy for releasing technical studies of the type outlined in this summary document is that they must clear the peer review process prior to release to the public. The interim draft report summary presented here is being made available to the public for a dual purpose:

- 1.) in order to begin the follow up and mitigation process necessary to better define and subsequently reduce the risks to human health in the City of Chester, Pennsylvania.

- 2.) to provide general guidance as a "model protocol" related to methods of performing aggregated risk studies at other locations. It is generally accepted that cumulative risk studies are needed to provide technical information and a framework for decision-making related to proposed and/or current sources of pollution.

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## Environmental Risk Study for the City of Chester, Pennsylvania

The Chester Risk Assessment Project was part of an initiative by the United States Environmental Protection Agency (USEPA) Region III and agencies of the Commonwealth of Pennsylvania to study environmental risks, health, and regulatory issues in the Chester, Pennsylvania area.

### Study Conclusions and Recommendations

#### CONCLUSIONS

- 1 - Blood lead levels in the children of Chester is unacceptably high with over 60% of the children's blood samples above the Center for Disease Control (CDC) recommended maximum level of 10 micrograms per deciliter ( $\mu\text{g}/\text{dl}$ ).
- 2 - Both cancer and non-cancer risks, e.g. kidney and liver disease and respiratory problems, from the pollution sources at locations in the city of Chester exceed levels which EPA believes are acceptable.
- 3 - Air emissions from facilities in and around Chester provide a large component of the cancer and non-cancer risk to the citizens of Chester.
- 4 - The health risks from eating contaminated fish from streams in Chester and the Delaware River is unacceptably high.
- 5 - Drinking water in Chester is typical of supplies in other cities throughout the country.

#### RECOMMENDATIONS

- 1 - The lead paint education and abatement program in the City of Chester should be aggressively enhanced.
- 2 - Sources of air emissions which impact the areas of the city with unacceptably high risk should be targeted for compliance inspections and any necessary enforcement action.
- 3 - A voluntary emission reduction program should be instituted to obtain emissions reductions from facilities which provide the most emissions in the areas of highest risk.
- 4 - Enhanced public education programs to communicate the reasons behind the existing state mandated fishing ban should be implemented.

5 - While fugitive dust emissions have not shown to be a significant component of risk in the City, a program to minimize fugitive emissions from dirt piles and streets should be instituted to alleviate this nuisance.

6 - While noise and odor levels were not shown to be a significant component of risk in the City, a noise and odor monitoring program should be instituted in areas most likely to suffer from these nuisances. If significant levels are found, a noise and/or odor reduction program should be implemented in those areas.

### Study Method and Procedures

#### Background

The City of Chester is located approximately 15 miles southwest of Philadelphia along the Delaware River. According to the 1990 United States Census, 41,856 persons reside in Chester, which has an area of 4.8 square miles. Surrounding communities also examined in development of this report include Eddystone, Trainer, Marcus Hook, and Linwood. Major surface transportation routes transect Chester including Interstate 95, and US Route 13, which parallels Interstate 95 to the east. US Route 322 bisects Chester from northwest to southeast.

Drinking water for the City of Chester is supplied by the Chester Water Authority (CWA) and Philadelphia Suburban Water Company (PSWC).

Large sources of surface water in the City of Chester include Chester Creek and the Delaware River. All streams in the Chester vicinity ultimately drain into the Delaware River in a branching pattern. The Delaware River is a protected waterway for the maintenance and propagation of fish species that are indigenous to a warm-water habitat.

The hydrogeologic conditions that exist beneath the study area are highly dynamic in nature. Water levels are influenced by tides and high rates of infiltration from storms.

#### Methodology

A key element in the project scope called for environmental risks to be quantitated wherever possible, and supplemented with qualitative information.

Chemical data were gathered from existing sources. The scope of this project did not include collection of new data specifically designed for a Chester risk assessment. Instead the

workgroup performed an examination of available data which yielded the following observations:

- The data had been collected for different programs and different agencies. These data were not originally designed to support a quantitative risk assessment of the Chester area.

- The databases were of varying quality, and certain chemicals and media had not been tested. However, with the limited data available, it was possible for many data sets to be used to generate estimated risks.

Modeling of air data from point sources preceded the air risk assessment, such that point source air risks are based on projected data rather than data actually collected in the field. The lead (Pb) data, area sources of volatile organic compound (VOC) emissions, Resource Conservation and Recovery Act (RCRA) site information, and Toxic Release Inventory (TRI) data did not involve the types of environmental data conducive to quantitative risk assessment.

In a risk assessment, the hazards posed by chemicals detected by chemical analysis are evaluated. Potential risks may exist when chemicals are present in the air, water and soils and sensitive receptors (i.e. humans, wildlife, and plantlife) are present which have access to the chemicals. This constitutes a complete exposure pathway.

To evaluate risks, several steps are taken. First, the data are assessed for usability and comparability. Data may then undergo statistical manipulations for use in the quantitative risk assessment. An initial screening step occurs during data evaluation for the purpose of narrowing down the list of chemicals that are quantitatively assessed. Using conservative assumptions, the chemical concentrations that would correspond to the lower end of the target screening risk range<sup>1</sup> are calculated. These concentrations are called risk-based concentrations (RBCs), and are compared to the site data during the data evaluation stage to rule out chemicals that will not contribute significantly to risks at the site.

Exposure pathways are then determined. The receptors that

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<sup>1</sup> target screening risk range: within the EPA Superfund program defines acceptable cancer risks as those which do not exceed the established range of  $1\text{E-}06$  to  $1\text{E-}04$ . This range corresponds to an additional cancer risk of 1 in one million ( $1\text{E-}06$ ) to 1 in 10,000 ( $1\text{E-}04$ ) from exposure to a given chemical. The lower, more conservative -- and more protective -- end of this range is  $1\text{E-}06$ .

For non-cancer-causing chemicals, the ratio between the calculated potential dose and the dose known to be safe should not exceed one.



may be exposed are also chosen. Both current and future land uses must be considered. Using site-specific or default assumptions, estimated exposure doses are calculated for each receptor.

Once the amount of exposure each receptor receives has been calculated, that amount or dose is compared with values designed to assess the safety or toxicity of a chemical. This step, which is called risk characterization, helps the risk assessor determine the likelihood of adverse effects occurring for that exposure scenario.

Finally, the uncertainty of the risk analysis is described, either quantitatively, qualitatively, or both. This step helps give a more complete picture of environmental risks, and helps risk managers weigh their options in addressing potential hazards.

The data were examined in order to determine chemicals of potential concern (COPCs). COPCs are defined as those substances that are potentially related to the risk source being studied and whose data are of sufficient quality for use in the risk assessment. It is appropriate to select COPCs for each medium of concern.

Data were often screened using RBCs. RBCs were used to determine whether, if included in the risk assessment, the chemical would be likely to contribute significantly to the risk.

#### UNCERTAINTY ANALYSIS

Uncertainty associated with the assessment of risk may be associated with exposure estimation, toxicity assessment, and in risk characterization. The policy of the USEPA is to be protective of human health and the environment. In accordance with this policy, exposure estimates and the parameters used in the characterization of the exposures are of a conservative nature whenever possible. These conservative parameters are designed to ensure that all estimates are protective and that all sensitive subpopulations are considered. Some of these exposure parameters may be overestimates of the actual exposures experienced by receptors.

#### Study Findings

##### Children's Blood Lead Investigation

Historically, inorganic lead has been released to the environment by many human activities such as mining, smelting, use of leaded gasoline, and manufacturing of batteries, plastics,

and chemicals. Lead is not volatile, so it usually moves through the air as fine dust which deposits and contaminates soil within a few miles of its source. People can be exposed to lead in air, food, drinking water (and beverages), soil and dust, and across the placenta before birth.

Important toxic effects of lead include anemia, hypertension, and damage to the kidneys, testicles, and nervous system. Small children are most sensitive to toxic effects of lead because they suffer significant losses in motor skills and cognitive ability at lead doses which do not affect adults. EPA considers children with blood lead levels of 10 or more micrograms of lead per deciliter of blood to be at risk of irreversible damage to the nervous system.

Chester officials provided records of over 10,000 blood lead measurements for children, which EPA entered into a computer database. Age and gender were not reported (although all were reported to be seven years or younger at the time of the test), nor was information available about how the children were chosen for blood lead sampling. Lead concentration data for air, tap water, soil, dust, and food were not available. This limited database allowed EPA to compare blood lead levels in Chester with those in similar Eastern cities, but did not support conclusions about sources of lead exposure.

Average blood lead levels in Chester between 1989 and 1993 (Figure 4-16) were higher than 1990 averages in Boston, Baltimore, or Cincinnati. However, blood lead in Chester decreased significantly during this five-year period, so that in 1992 and 1993 Chester blood lead levels were similar to those in Baltimore. With the limited database it was not possible to tell if the decline in blood lead was real or artificial (caused by sampling different groups of children or by medically treating children with high blood lead levels).

EPA compared the Chester blood lead observations with predictions from a computer model that predicts blood lead. Because lead levels in Chester's air, water, soil, and food were not available, EPA used national averages to make the predictions. To match the Chester blood lead data it was necessary to add 130 micrograms of lead intake per day to the national averages.

EPA determined the average blood lead level for each residence by combining multiple measurements from the same child and from siblings. A map of blood lead levels in Chester was prepared. The map showed no noticeable patterns of blood lead; there appears to be no part of Chester where blood lead is higher or lower than the others.

Overall, EPA's analysis of blood lead suggests that:

1. Recent measurements of Chester children blood lead levels are similar to those in similar Eastern U.S. cities.
2. Children in Chester receive lead exposures which are substantially higher than the U.S. average.
3. It is not possible with the limited data available to tell the source of the children's excess lead exposure.
4. The problem of high blood lead appears to be city-wide rather than confined to specific neighborhoods.

## AIR

### Modeled Air Concentrations

As was previously noted, no new data was gathered for this study. The recent years air data that existed was often developed for specific purposes, e.g. compliance monitoring of permitted emission parameters, or was presented in format which was not compatible for risk calculation purposes. This presented a pattern of data gaps in an important medium of concern, air.

It was decided that sufficient information existed regarding the industry types, geographical locations, and production capabilities, and that meteorologic data combined with actual or generic emission levels could be utilized in a computer modeled simulation of speciated ambient air quality.

Estimated air concentrations for 699 chemicals were provided for approximately 1400 locations in Chester City. Of the pollutants assessed, 640 are gaseous in nature, while 59 exist as particulate matter<sup>2</sup>.

Although emission contributions from many sources were modeled, only the total concentration of each pollutant at each location was considered in risk calculations. Of the 699 chemicals evaluated, 122 have toxicity values in the form of reference dose (RfDs) or cancer slope factors (CSFs). Five of the modeled chemicals are criteria pollutants, and are regulated under the authority of the Clean Air Act via the National Ambient Air Quality Standards (NAAQS).

For chemicals with reference doses (RfDs) or cancer slope factors (CSFs), modeling results were screened using RBCs as described above to identify chemicals of potential concern (COPCs). Accordingly, inhalation under a standard residential exposure scenario was considered. In instances where both an RfD and a CSF exist for a given COPC, only the most sensitive

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<sup>2</sup> small solid particles like dust which move with air currents



endpoint (cancer or non-cancer) was evaluated.

Estimated criteria pollutant concentrations were compared to the NAAQS. (This approach for evaluating potential threats is similar to the methodology employed for assessing non-cancer threats posed by chemicals with RfDs.)

For gasoline and diesel, carcinogenic risks were assessed based upon respective unit risks for these compounds, as determined by a recent USEPA investigation (USEPA, 1993c).

For the criteria pollutants, predicted concentrations at each grid location were compared to NAAQSS.

### Individual Risks

At various locations in Chester, several chemicals were predicted to exist in air at concentrations of potential concern. Chromium VI was determined to contribute the most to carcinogenic<sup>3</sup> risk at any given location, while hydrogen chloride presents the greatest non-cancer threat. A summary of the highest individual risks in Chester City is presented in Table 4-32 for carcinogenic COPCs, and in Table 4-33 for COPCs with non-cancer endpoints.

None of the predicted concentrations of criteria pollutants in Chester exceeded NAAQSS, as illustrated in Table 4-34.

### Cumulative Risks

Cumulative carcinogenic risks and non-cancer threats are predicted to exceed levels considered safe at several locations in Chester City. The range of aggregate carcinogenic risks in Chester as a result of inhalation is estimated to be  $1.1\text{E-}5$  to  $6.6\text{E-}5$ <sup>4</sup>. For non-cancer endpoints, the range of Hazard indices (HI) is predicted to be 1.0 to 3.8. The risks are also displayed on Figures 4-29, 4-30, 4-31, 4-32, 4-33, and 4-34.

Cumulative values for the criteria pollutants were estimated to range from 0.6 to 1.6. This is illustrated on Fig. 4-35.

It is possible to discuss the culpability of various sources of air pollution to these risks. As outlined in the section on

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<sup>3</sup> cancer causing

<sup>4</sup>  $1.1\text{E-}05$  is a scientific notation used in risk characterization to express an excess cancer risk in the general population of 1.1 persons out of 100,000 would be expected to incur (not die from cancer but incur a cancer) a cancer above and beyond the normal incidence of cancer.

air quality modeling, a large number of sources was modeled, the sources vary dramatically in their contribution to both carcinogenic risk and noncarcinogenic hazards.

Point sources accounted for roughly 40 percent of environmental carcinogenic risk in Chester and more than half of the sub-chronic risk. Delcora and Sun each contribute roughly one quarter of the long-term cancer risk. Delcora and P.Q. Inc. emit chromium and arsenic, Delcora emits those and other heavy metals, and Sun emits many organic species. DuPont and Westinghouse account for approximately 80 percent of the non-cancer risk.

#### Area Source Emissions

County-wide estimated emissions were available for area sources of air contaminants. These data were not conducive to the performance of a quantitative risk assessment because of the difficulty in identifying individual chemicals and separating the Chester area out from the county. However, a qualitative/semi-quantitative assessment follows.

Sources of toxic air releases which are small when evaluated individually, but are significant when combined with other facilities of similar type in a given geographic area are termed area sources. Volatile organic compounds (VOCs) are of particular concern because some are classified by USEPA as probable or possible human carcinogens. Also, they photochemically combine with oxides of nitrogen ( $\text{NO}_x$ ) and carbon monoxide (CO) in the presence of sunlight to form ozone, which causes respiratory problems and plant damage.

Information about area sources comes from two sources of data. Information about the location, industry type, and number of employees is available through Dun and Bradstreet. Information about the amount of VOCs released per employee per year is available in USEPA, 1991d. Combining these two databases gives an estimate of VOC emissions per facility per year.

A list of facilities with Standard Industrial Classification (SIC) codes between 4000 and 9999 (which include businesses such as transportation services, gasoline service stations, automobile repair shops, and dry cleaners), and within the study area was retrieved from the Dun and Bradstreet (D&B) data base. [Facilities with SIC codes between 2000 and 3999 (manufacturing) are reported in the TRI data base and are evaluated in the Air Toxics Modeling portion of the study].

A grid system was established for the study area, with each grid square approximately one square kilometer (or about 1/2 mile by 1/2 mile), and the sum of the estimated emissions for each

facility within a given grid square was calculated. The values for the grid system were assigned colors from red to green, with grey indicating no facilities.

Fig. 4-36 shows the estimated emissions for all the grid squares in the study area. Fig. 4-37 highlights the top 9 (15%) grid squares, which represent estimated annual releases of VOCs of over 40,000 pounds. Fig. 4-38 shows the minority distribution of the study area with the 9 high squares indicated in cross-hatching. This indicates that grid squares 6, 7, and 8 are in an area with a very high percentage of minority population, indicating that the potential for impact to the minority community is greatest in these areas.

There are several limitations to the approach used to estimate the VOC emissions for the area sources. First, the D&B data base does not contain every facility in the study area that releases VOCs. In addition, the estimates of VOC releases are based on studies of "typical" facilities and are not actual measures of the releases from the facilities in the study area. The actual type and amount of VOC releases is not available. The estimates are not identified for the specific SIC codes that were identified in the D&B database, so that approximate values were used instead of SIC code-specific ones.

#### EPIDEMIOLOGICAL ISSUES

A study of the existing public health status of the community and a specific epidemiological study to try to establish cause-and-effect links between environmental risks and health effects were beyond the scope of the environmental risk project. However, the state health department, as a preliminary exercise, looked at the mortality rate for certain diseases in the city as compared to the state and county. This exercise may be found in Appendix III. This may give useful information regarding the existing health of the community, although it cannot be used to establish causes of the health conditions.

#### Surface Water, Sediment, Fish Tissue

Three main data sources were used for surface water, sediment, and fish tissue data: the STORET database, CERCLIS files, and the National Study of Chemical Residues in Fish.

The CERCLIS database was described previously. Five CERCLIS sites in the Chester study area had surface water and/or sediment data. These sites underwent data quality review in accordance with the Quality Assurance Plans under which the work was authorized.

The National Study of Chemical Residues in Fish was

performed by USEPA to study fish tissue contamination nationwide (USEPA, 1992b). This study began as an outgrowth of the National Dioxin Study, which found notable concentrations of dioxins in fish tissue. It involved the collection of fish tissue from over 300 stations nationwide.

One station from this study was located within the Chester study area, and these fish tissue results were used for the Chester risk assessment. Analytical data were obtained in accordance with the analytical procedures and quality assurance plans cited in the national study.

Table 4-23 presents the risks associated with direct contact with surface water at each location. It can be seen that the Hazard Indices for each location are less than 1, indicating that significant adverse non-cancer health effects due to contact with surface water at the reported concentrations are not expected. Estimated cancer risks are at or below  $1E-6$  for all locations except the Delaware County Incinerator Landfill #1 ( $3.9E-5$ ). The cancer risk at this site was based on arsenic and beryllium in a drainage ditch water sample taken adjacent to the landfills. The water sample was reported as "greenish brown" and is likely to have contained high amounts of suspended solids. The feasibility of people actually swimming in a drainage ditch depends upon its depth and width, seasons of flow, and may also depend upon its aesthetic appeal.

Table 4-24 presents the risks associated with direct contact with sediment at each location. It can be seen that the Hazard Indices for each location are less than 1, indicating that significant adverse non-cancer health effects due to contact with sediment at the reported concentrations are not expected. Estimated cancer risks were all below  $1E-5$ .

It is likely that most of the general population of Chester does not consume locally-caught fish. However, subpopulations may exist consisting of occasional fishers or possibly even subsistence fishers. Subsistence fishers could have risks higher than those quantitated herein.

#### Drinking Water

This study investigated the drinking water quality of both private and public well users in the City of Chester and surrounding municipalities including Marcus Hook Borough, Trainer Borough, Chester City, Chester Township, Linwood, Upland Borough and Eddystone Borough. The potability of the groundwater in the study area and potential risk to private well users was evaluated by qualitative assessment of the existing monitoring well data from Comprehensive Environmental Response, Compensation, and Liabilities Information System (CERCLIS) and Resource



Conservation and Recovery Act (RCRA) sites. Environmental equity issues that would require further study were identified where appropriate with respect to the data obtained to date.

#### Private Well Investigation

The U.S. Department of Census data obtained in 1990 involved a random door-to-door survey of the housing units (both vacant and occupied) in the study area (see Table 4-1). An assessment of the data indicated that less than 1% of the housing units in the study area may obtain their drinking water source from private wells. The Chester Water Authority and Health Departments are not aware of any residential properties using local groundwater for drinking or bathing purposes. The local health department indicated that the entire population of Chester is connected to a public water supply (PWS). However, the health department did acknowledge that verification that none existed would be quite difficult. Based on U.S. Census data there are an estimated 61 private wells in the study area, of which approximately 31 are believed to be dug wells and approximately 30 are believed to be drilled wells. The data are extrapolations, from a smaller sample size, of the actual figures that would have been obtained from a complete count (USDOC, 1990). Therefore, the exact number of private wells in the study area is largely unknown.

Efforts to obtain locational information for any of the 61 private wells identified on the census tract (Figure 4-2) have been hampered primarily because of those regulations which protect census participants individual rights to privacy. It should be noted that information retrieval from the census tract is limited to a scale of census blocks which are a geographic area of about 200 people.

#### Public Water Supply

Drinking water quality from public water sources in the study area was investigated because greater than 99% of the population is expected to obtain their drinking water from a public supply. The study area is served by the Chester Water Authority except for Eddystone, which is served by the Philadelphia Suburban Water Company. It should be noted that Philadelphia Suburban Water Company purchases water for Eddystone from the Chester Water Authority. This water undergoes no additional treatment; therefore, the actual source of drinking water for Eddystone is the Chester Water Authority.

Tables 4-3, 4-4, and 4-5 summarize risks for the 1-year and 30-year exposure scenarios for the PWSs.

#### TOXIC RELEASE INVENTORY (TRI)



The TRI database contains information about chemical releases from industrial manufacturers and processors (primary Standard Industrial Classification (SIC) codes 20-39) to the environment. Since 1987, facilities meeting established thresholds have been required to report release data according to section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA).

Region III has developed a method for evaluating these releases in terms of their relative toxicity. This method is documented in the Chemical Indexing System for the Toxic Chemical Release Inventory Part I: Chronic Index (USEPA, 1993d). The Chemical Indexing analysis provided in the present report displays the 1992 TRI data in terms of the Chronic Index (toxicity-weighted releases) and Residual Mass (non-weighted releases) for Region III, highlighting TRI facilities in Delaware County, Pennsylvania.

The Regional maps (Figures 4-26, 4-27, and 4-28) show TRI releases in terms of the Chronic Index, including non-carcinogenic and/or carcinogenic index dose. Those releases which do not have an associated toxicity factor are combined according to the amount of the release and are termed Residual Mass. The resultant Chronic Indices and Residual Mass values are summed for each facility and for each 8 x 8 mile geographic grid area in Region III. Combining the facility Chronic Indices within a geographic grid gives an indication of the potential for cumulative hazard from TRI facilities within a given geographic area.

In Delaware County, 28 facilities were subject to TRI reporting under EPCRA for the reporting year (RY) 1992. A summarized priority listing of these facilities is included in Table 4-27 and a complete listing is provided in Tables 4-28 and 4-29. Table 4-27 shows a quantitative summary of the facilities which ranked in the top 90th percentile - 95% confidence of the 28 facilities subject to reporting under EPCRA. Table 4-27 shows the top six TRI facilities in the Chronic Index and Residual Mass ranking.

It has not been determined whether these releases were continuous for the entire year or if they reflect one-time accidental releases or spills. In addition, the proximity of these releases relative to potentially exposed populations has not been established. The determination of a potential health threat of the volumes released depends on the proximity of the stack to residential areas, the surrounding terrain and the meteorological conditions. Furthermore, should it be determined that additional analysis is required at any site listed in this report, documentation which identifies these release as continuous or intermittent should be obtained prior to the

analysis.

#### OTHER ENVIRONMENTAL CONCERNS

One of the study objectives was to be responsive to environmental concerns raised by the citizens in the study area. Some of these were issues for which USEPA had no available database and could therefore not assess with quantitative risk assessment. These issues included odors and noise and are addressed below.

##### Odors

Odor is a very difficult sensory phenomenon to describe objectively. Many attempts and subsequently many descriptors have been utilized in trying to describe the human olfactory system and especially its variability, thresholds and the time duration aspect of the sensation.

It is key to understand that many odors may be perceived at concentrations as low as 1 part per billion (e.g. ammonia ethylacrylate, isopropylmercaptan), while still others can be detected as low as 1 part per trillion (e.g. n-butyric acid). The mere ability to sense an odor does not necessarily mean that it is harmful at threshold levels. On the other hand, some chemicals which are potentially harmful at low concentrations may not be perceived by most humans at levels which are significantly harmful. This certainly exacerbates individual fears and adds to stress associated with the perceived odors which people encounter.

A major source of concern in the Chester neighborhoods are the odors which seem to emanate from the large industries along the Delaware River coastline. It may be that individual small industrial or commercial operations could be sources of these emissions.

Although the incidence of odor complaints has been one of the greatest concerns in Chester, the pervasiveness of odor could not be addressed quantitatively in the environmental risk assessment. This does not diminish the importance of odors to residents, nor is it meant to ignore or screen them out of the assessment. There were virtually no data available at the onset of the study related to odors.

For purposes of this report, odors are being considered only as a source of further investigation. They are a nuisance which may add to the overall stress of residing in an urbanized environment.

##### Noise

Many residents of Chester have complained that environmental noise diminishes the quality of life they experience in a home setting. They cite numerous sources of the noise and have requested help from the industrial community and the environmental agencies in reducing noise to acceptable, non-intrusive levels. Some of the sources identified include:

- truck traffic passing through residential areas
- industrial operating equipment
- aircraft over-flights
- music sources, such as car radios, home hi-fi
- train pass-by

As part of the Chester Risk Project, USEPA staff reviewed applicable environmental noise studies performed in the Chester area and performed a literature search for any applicable mitigation measures. This limited search found a Pre-Operational Noise Monitoring Study (Westinghouse, 1991) and a subsequent Noise Report Summary (Westinghouse, 1993).

In the study, environmental noise monitoring was performed at seven locations. This was considered to be background noise monitoring, at facility site locations, prior to final construction and operation of the Delaware County Resource Recovery facility. A total of three continuous 24-hour time periods were sampled including one weekend day and two weekdays. An additional four locations were sampled in the residential community in February 1991 in areas adjacent to the Resource Recovery facility.

Although there was some variability in the measured noise data due to short-duration transient events, the levels measured in and around the facility and in the residential neighborhoods are typical of urban residential settings and would be considered generally acceptable.

A noise control ordinance for the City of Chester, Pennsylvania was passed on January 14, 1993. This ordinance applies to vehicles, appliances and equipment, and includes many of the "nuisance" type of unwanted sounds. The ordinance includes subjective aspects of noise as well as objective criteria limits for motorized vehicles and property line limits depending on land use zoning.

APPENDIX I

TABLES

**CHESTER RISK PROJECT**  
**TABLE 4-1**  
**U.S. CENSUS OF POPULATION AND HOUSING - STF- 3A SAMPLE COUNT DATA (1990)\***  
**SUMMARY**

Area	Total Housing Units	Occupied Housing Units	Vacant Housing Units	Public	Drilled Well	Dug Well	Other
Marcus Hook Borough	1055	990	65	1055	0	0	0
Trainer Borough	912	871	41	902	7	3	0
Chester City	16,512	14,538	1,975	16,445	18	22	26
Chester Township CDP	1,879	1,778	101	1,868	5	6	0
Linwood	1,190	1,123	67	1,190	0	0	0
Upland Borough	1,224	1,187	37	1,224	0	0	0
Eddystone Borough	1,071	993	78	1,065	0	0	6

\* Data obtained from STF 3A, File 29, Tables H22-H33



**CHESTER RISK PROJECT**  
**TABLE 4-3**  
**RISK SUMMARY**  
**CHESTER WATER AUTHORITY**

DRINKING WATER ADULT		CANCER RISK	NON-CANCER RISK
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		1.34E-07	3.95E-01
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		2.13E-07	2.29E-01
TOTAL RISK WITHOUT FLUORIDE (1991-ED- 1 YEAR)		1.86E-07	2.14E-01
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		1.98E-07	2.27E-01
TOTAL RISK WITHOUT FLUORIDE (1993-ED- 1 YEAR)		1.78E-07	2.39E-01
TOTAL RISK WITHOUT FLUORIDE (1993-ED- 30 YEARS)		4.27E-06	2.39E-01
DRINKING WATER CHILD			
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		3.12E-07	9.21E-01
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		4.96E-07	5.33E-01
TOTAL RISK WITHOUT FLUORIDE (1991-ED- 1 YEAR)		4.35E-07	4.99E-01
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		4.62E-07	5.31E-01
TOTAL RISK WITHOUT FLUORIDE (1993-ED- 1 YEAR)		4.15E-07	5.57E-01
TOTAL RISK WITHOUT FLUORIDE (1993-ED- 30 YEARS)		2.49E-06	5.57E-01
INHALATION ADULT			
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		2.24E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		2.90E-06	4.47E-01
TOTAL RISK FROM ALL SOURCES (1991-ED- 1 YEAR)		3.12E-06	0.00E-01
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		3.32E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1993-ED- 1 YEAR)		2.64E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1993-ED- 30 YEARS)		6.33E-05	0.00E+00
DERMAL CHILD			
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		7.41E-08	8.51E-02
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		1.00E-07	1.13E-01
TOTAL RISK FROM ALL SOURCES (1991-ED- 1 YEAR)		1.03E-07	1.18E-01
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		1.10E-07	1.26E-01
TOTAL RISK FROM ALL SOURCES (1993-ED- 1 YEAR)		1.32E-07	1.06E-01
TOTAL RISK FROM ALL SOURCES (1993-ED- 30 YEARS)		7.95E-07	1.06E-01
TOTAL RISK*			
1989 (1 YEAR)	ADULT	2.37E-06	3.95E-01
1990 (1 YEAR)	ADULT	3.11E-06	2.74E-01
1991 (1 YEAR)	ADULT	3.30E-06	2.14E-01
1992 (1 YEAR)	ADULT	3.51E-06	2.27E-01
1993 (1 YEAR)	ADULT	2.82E-06	2.39E-01
1989 (1 YEAR)	CHILD	3.86E-07	1.01E+00
1990 (1 YEAR)	CHILD	5.96E-07	6.46E-01
1991 (1 YEAR)	CHILD	5.38E-07	6.17E-01
1992 (1 YEAR)	CHILD	5.72E-07	6.57E-01
1993 (1 YEAR)	CHILD	5.48E-07	6.63E-01
1993 (30 YEARS)		7.09E-05	9.02E-01

\*Total Risk without Fluoride

CHESTER RISK PROJECT  
TABLE 4-4  
RISK SUMMARY  
PHILADELPHIA SUBURBAN WATER COMPANY

DRINKING WATER ADULT		CANCER RISK	NON-CANCER RISK
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		1.13E-07	1.30E-01
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		1.51E-07	1.73E-01
TOTAL RISK FROM ALL SOURCES (1991-ED- 1 YEAR)		9.72E-08	1.12E-01
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		8.69E-08	9.97E-02
TOTAL RISK FROM ALL SOURCES (1993-ED- 1 YEAR)		2.34E-07	2.68E-01
TOTAL RISK FROM ALL SOURCES (1993-ED- 30 YEARS)		5.62E-06	2.68E-01
DRINKING WATER CHILD			
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		2.65E-07	3.04E-01
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		3.52E-07	4.03E-01
TOTAL RISK FROM ALL SOURCES (1991-ED- 1 YEAR)		2.27E-07	2.60E-01
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		2.03E-07	2.33E-01
TOTAL RISK FROM ALL SOURCES (1993-ED- 1 YEAR)		5.46E-07	6.26E-01
TOTAL RISK FROM ALL SOURCES (1993-ED- 30 YEARS)		3.28E-06	6.26E-01
INHALATION ADULT			
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		1.90E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		2.52E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1991-ED- 1 YEAR)		1.63E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		1.46E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1993-ED- 1 YEAR)		3.92E-06	0.00E+00
TOTAL RISK FROM ALL SOURCES (1993-ED- 30 YEARS)		9.41E-05	0.00E+00
DERMAL CHILD			
TOTAL RISK FROM ALL SOURCES (1989-ED- 1 YEAR)		6.29E-08	7.21E-02
TOTAL RISK FROM ALL SOURCES (1990-ED- 1 YEAR)		8.35E-08	9.58E-02
TOTAL RISK FROM ALL SOURCES (1991-ED- 1 YEAR)		5.39E-08	6.18E-02
TOTAL RISK FROM ALL SOURCES (1992-ED- 1 YEAR)		4.82E-08	5.53E-02
TOTAL RISK FROM ALL SOURCES (1993-ED- 1 YEAR)		1.30E-07	1.49E-01
TOTAL RISK FROM ALL SOURCES (1993-ED- 30 YEARS)		7.78E-07	1.49E-01
TOTAL RISK*			
1989 (1 YEAR)	ADULT	2.01E-06	1.30E-01
1990 (1 YEAR)	ADULT	2.67E-06	1.73E-01
1991 (1 YEAR)	ADULT	1.73E-06	1.12E-01
1992 (1 YEAR)	ADULT	1.54E-06	9.97E-02
1993 (1 YEAR)	ADULT	4.15E-06	2.68E-01
1989 (1 YEAR)	CHILD	3.28E-07	3.76E-01
1990 (1 YEAR)	CHILD	4.35E-07	4.99E-01
1991 (1 YEAR)	CHILD	2.81E-07	3.22E-01
1992 (1 YEAR)	CHILD	2.51E-07	2.88E-01
1993 (1 YEAR)	CHILD	6.76E-07	7.75E-01
1993 (30 YEARS)		1.04E-04	1.04E+00

\*Note fluoride is not added to the finished water

**CHESTER RISK PROJECT**  
**TABLE 4-5**  
**RISK SUMMARY**  
**PHILADELPHIA WATER DEPARTMENT**

DRINKING WATER ADULT		CANCER RISK	NON-CANCER RISK
Total Risk without Fluoride (1989-ED- 1 YEAR)		1.63E-07	1.87E-01
Total Risk without Fluoride (1990-ED- 1 YEAR)		1.96E-07	2.15E-01
Total Risk without Fluoride (1991-ED- 1 YEAR)		1.97E-07	2.20E-01
Total Risk without Fluoride (1992-ED- 1 YEAR)		1.41E-07	1.61E-01
Total Risk without Fluoride (1993-ED- 1 YEAR)		2.14E-07	2.40E-01
Total Risk without Fluoride (1993-ED- 30 YEARS)		5.14E-06	2.40E-01
DRINKING WATER CHILD			
Total Risk without Fluoride (1989-ED- 1 YEAR)		3.80E-07	4.37E-01
Total Risk without Fluoride (1990-ED- 1 YEAR)		4.58E-07	5.03E-01
Total Risk without Fluoride (1991-ED- 1 YEAR)		4.60E-07	5.14E-01
Total Risk without Fluoride (1992-ED- 1 YEAR)		3.28E-07	3.77E-01
Total Risk without Fluoride (1993-ED- 1 YEAR)		5.00E-07	5.60E-01
Total Risk without Fluoride (1993-ED- 30 YEARS)		3.00E-06	5.60E-01
INHALATION ADULT			
Total Risk from All Sources (1989-ED- 1 Year)		2.73E-06	0.00
Total Risk from All Sources (1990-ED- 1 Year)		2.87E-06	2.92E-02
Total Risk from All Sources (1991-ED- 1 Year)		3.05E-06	1.75E-02
Total Risk from All Sources (1992-ED- 1 Year)		2.35E-06	0.00E+00
Total Risk from All Sources (1993-ED- 1 Year)		3.34E-06	1.75E-02
Total Risk from All Sources (1993-ED- 30 Year)		8.00E-05	1.75E-02
DERMAL CHILD			
Total Risk from All Sources (1989-ED- 1 Year)		9.04E-08	1.04E-01
Total Risk from All Sources (1990-ED- 1 Year)		9.77E-08	1.11E-01
Total Risk from All Sources (1991-ED- 1 Year)		1.03E-07	1.17E-01
Total Risk from All Sources (1992-ED- 1 Year)		7.80E-08	8.95E-02
Total Risk from All Sources (1993-ED- 1 Year)		1.12E-07	1.28E-01
Total Risk from All Sources (1993-ED- 30 Year)		6.73E-07	1.28E-01
TOTAL RISK*			
1989 (1 YEAR)	ADULT	2.89E-06	1.87E-01
1990 (1 YEAR)	ADULT	3.06E-06	2.45E-01
1991 (1 YEAR)	ADULT	3.24E-06	2.38E-01
1992 (1 YEAR)	ADULT	2.49E-06	1.61E-01
1993 (1 YEAR)	ADULT	3.55E-06	2.57E-01
1989 (1 YEAR)	CHILD	4.71E-07	5.40E-01
1990 (1 YEAR)	CHILD	5.55E-07	6.14E-01
1991 (1 YEAR)	CHILD	5.62E-07	6.31E-01
1992 (1 YEAR)	CHILD	4.06E-07	4.66E-01
1993 (1 YEAR)	CHILD	6.12E-07	6.88E-01
1993 (30 YEARS)		8.89E-05	9.45E-01

\*Total Risk without Fluoride

CHESTER RISK PROJECT  
TABLE 4-23  
SURFACE WATER RISKS

STATION	CHEMICAL OF CONCERN	CHILD HAZARD INDEX	ADULT HAZARD INDEX	CANCER RISK
VERMICULITE DUMP (DS)	Aluminum	0.00015	0.000038	N/A
	Chromium	0.00038	0.00011	N/A
	Barium	0.00027	0.000068	N/A
	Cadmium	0.00051	0.00023	N/A
	Nickel	0.00013	0.00003	N/A
	Manganese	0.015	0.0038	N/A
	Zinc	0.00019	0.000056	N/A
	Arsenic	0.0025	0.00065	2.3E-07
	Selenium	0.00075	0.00019	N/A
	Mercury	0.0061	0.0023	N/A
	TOTAL	0.026	0.0075	2.3E-07
VERMICULITE DUMP (US)	Aluminum	0.00014	0.000035	N/A
	Chromium	0.00044	0.00012	N/A
	Barium	0.00025	0.000064	N/A
	Cadmium	0.00045	0.0002	N/A
	Copper	0.000098	0.000027	N/A
	Nickel	0.00013	0.000029	N/A
	Manganese	0.014	0.0036	N/A
	Zinc	0.00013	0.000037	N/A
	Vanadium	0.00035	0.000088	N/A
	Arsenic	0.0057	0.0015	5.2E-07
	Selenium	0.00072	0.00017	N/A
	Mercury	0.014	0.0052	N/A
	TOTAL	0.036	0.011	5.2E-07
WQN0182	Manganese	0.6727	0.17	N/A
	TOTAL	0.67	0.17	N/A
ONROE CHEMICAL	Arsenic	0.014	0.0036	1.3E-06
	TOTAL	0.014	0.0036	1.3E-06
DELAWARE COUNTY INCINERATOR LAND- FILL #1	Arsenic	0.044	0.011	4.0E-06
	Beryllium	0.0061	0.0032	3.5E-05
	Manganese	0.28	0.0703	N/A
	TOTAL	0.33	0.085	3.9E-05
422120	Free cyanide	0.0004	0.0001	N/A
	Total cyanide	0.00044	0.00011	N/A
	Cadmium	0.05	0.023	N/A
	Chromium	0.0038	0.0011	N/A
	Copper	0.00036	0.0001	N/A
	Zinc	0.000071	0.00002	N/A
	TOTAL*	0.055	0.024	N/A
422088	Cadmium	0.07	0.032	N/A
	Chromium	0.0055	0.0016	N/A
	Copper	0.00044	0.00012	N/A
	Zinc	0.00066	0.00019	N/A
	Mercury	0.0022	0.00079	N/A
	TOTAL	0.079	0.035	N/A
WQN0172	Chromium	0.0002	0.00006	N/A
	Copper	0.00043	0.00012	N/A
	Manganese	0.0049	0.0012	N/A
	Nickel	0.00042	0.000095	N/A
	Zinc	0.000044	0.000013	N/A
	Aluminum	0.00007	0.000017	N/A
	TOTAL	0.0061	0.0015	N/A
WQN0158	Chromium	0.00021	0.00006	N/A
	Manganese	0.0023	0.00058	N/A
	Nickel	0.00043	0.000095	N/A
	Zinc	0.0028	0.0006	N/A
	Aluminum	0.000065	0.000016	N/A
	TOTAL	0.0058	0.0014	N/A

\*INCLUDES TOTAL, NOT FREE, CYANIDE

CHESTER RISK PROJECT  
TABLE 4-24  
SEDIMENT RISKS

STATION	CHEMICAL OF CONCERN	CHILD HAZARD INDEX	ADULT HAZARD INDEX	CANCER RISK
MONROE CHEMICAL-POND SED	Antimony	0.024	0.0025	N/A
	Arsenic	0.0013	0.00014	8.2E-08
	Beryllium	0.000015	0.000001	4.0E-08
	Cadmium	0.0087	0.0028	N/A
	Chromium	0.0022	0.00024	N/A
	Silver	0.0037	0.0004	N/A
	TOTAL	0.040	0.0061	1.2E-07
MONROE CHEMICAL-US SED	Benzo[b]fluoranthene	N/A	N/A	4.6E-09
	Arsenic	0.0185	0.002	1.2E-06
	Beryllium	0.000046	0.000004	1.2E-07
	Vanadium	0.0052	0.00056	N/A
	TOTAL	0.024	0.0026	1.3E-06
MONROE CHEMICAL-DS SED	Arsenic	0.0068	0.00073	4.4E-07
	Antimony	0.014	0.0015	N/A
	Beryllium	0.000035	0.000003	9.4E-08
	Chromium	0.012	0.0013	N/A
	Manganese	0.011	0.0012	N/A
	Nickel	0.0026	0.00028	N/A
	Vanadium	0.0032	0.00035	N/A
	TOTAL	0.050	0.0054	5.3E-07
EAST 10TH STREET	Benz[a]anthracene	N/A	N/A	1.3E-07
	Benzo[b]fluoranthene	N/A	N/A	2.0E-07
	Benzo[a]pyrene	N/A	N/A	7.8E-07
	Indeno[1,2,3-c,d]pyrene	N/A	N/A	8.0E-08
	Dibenz[a,h]anthracene	N/A	N/A	2.5E-07
	TOTAL	N/A	N/A	1.4E-06
DELAWARE COUNTY INCINERATOR LAND- FILL #1	Arsenic	0.01	0.0011	6.6E-07
	Beryllium	0.00009	0.000009	2.4E-07
	Cadmium	0.0065	0.0021	N/A
	Chromium	0.0056	0.0006	N/A
	Vanadium	0.0024	0.00026	N/A
	Benz[a]anthracene	N/A	N/A	3.9E-08
	Benzo[b]fluoranthene	N/A	N/A	5.0E-08
	Benzo[a]pyrene	N/A	N/A	6.2E-07
	Dibenz[a,h]anthracene	N/A	N/A	5.3E-08
	TOTAL	0.025	0.0041	1.7E-06
ABM WADE	Arsenic	0.14	0.015	9.0E-06
	TOTAL	0.14	0.015	9.0E-06
422115	Antimony	0.0064	0.00068	N/A
	TOTAL	0.0064	0.00068	N/A



**CHESTER RISK PROJECT**  
**TABLE 4-27**  
**Delaware County, PA. TRI Facilities**  
**Chronic Index and Residual Risk Ranking**

Rank	Company Name	City	TRI Category	Chemical and Issue of Concern
6	Epsilon Prods.	Marcus Hook	Air fugitive, Air stack	Ethylene, Propylene: volume
5	Boeing Defense & Space Group	Ridley Park	Air stack	Volatiles mixture: volume
4	Fornex L.P.	Eddystone	Air fugitive	Dichloromethane: toxicity
3	Scott Paper	Chester	Air fugitive, Air stack	Chloroform: toxicity Acids: volume, acute toxicity
2	Witco Corp.	Trainer	Air fugitive, Air stack	2-Methoxyethanol: volume and toxicity
1	Sun Refining & Marketing	Marcus Hook	Air fugitive, Air stack	Ethylene Oxide: volume, toxicity Benzene and MTBE: volume, toxicity

This analysis does not represent relative risk. The rank provides a rough estimate of potential hazard for screening purposes and must be evaluated with the qualitative information contained in this report.

# CHES RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI TRANSFERS:				TRI TOTALS:			
		POTW Transfers (lb/yr)	POTW Chronic Index	Offsite Transfers (lb/yr)	Offsite Chronic Index	Total Releases and Transfers (lb/yr)	Total Chronic Index	Total Releases and Transfers Sum	Total Chronic Index Sum
TRICHLOROETHYLENE	190138QH4 INDI9	0	0	15950	1594454	24400	24448770		
ACETONE	190138QH4 INDI9	0	0	29000	5141583	81000	14261232		
METHYL ISOBUTYL KETONE	190138QH4 INDI9	0	0	2550	504227	4300	15331428	281760	61820924
SULFURIC ACID	190135CTFM1600E	0	0	0	0	0	0		
TOLENE DIISOCYANATE (MIXED IS)	190135CTFM1600E	0	0	750	0	800	0	34448	39795173
DICHLOROMETHANE	190135CTFM1600E	0	0	0	0	33442	39795173		
HYDROCHLORIC ACID	190135CTPF RONT	0	0	0	0	53200	0		
SULFURIC ACID	190135CTPF RONT	0	0	770	0	118770	0		
BUTYL BENZYL PHTHALATE	190135CTPF RONT	18000	880487	10	800	78310	8744850	264880	43720583
CHLOROFORM	190135CTPF RONT	800	1248008	0	0	14000	36944734		
SULFURIC ACID	19013WTCCR3300W	4	0	0	0	4	0		
METHANOL	19013WTCCR3300W	8700	237501	0	0	263000	8328109	773860	9065410632
2-METHOXYETHANOL	19013WTCCR3300W	20150	356728419	0	0	818770	9056081683		
CHLORINE	190015HRFNQREEN	0	0	0	0	0	0		
CREOSOL (MIXED ISOMERS)	190015HRFNQREEN	0	0	0	0	0	0		
ETHYLENE GLYCOL	190015HRFNQREEN	0	0	0	0	0	0		
PHENOL	190015HRFNQREEN	44000	1300196	0	0	44000	1300196		
SULFURIC ACID	190015HRFNQREEN	0	0	0	0	0	0		
1,3-BUTADIENE	190015HRFNQREEN	0	0	0	0	120	0		
CYCLOHEXANE	190015HRFNQREEN	0	0	0	0	2550	0		
1,2,4-TRIMETHYLBENZENE	190015HRFNQREEN	0	0	0	0	4000	0		
AMMONIA	190015HRFNQREEN	320000	0	0	0	329300	0		
PROPYLENE	190015HRFNQREEN	0	0	0	0	45000	0		
ETHYLENE	190015HRFNQREEN	0	0	0	0	46000	0		
ZINC COMPOUNDS	190015HRFNQREEN	7200	431428	720	43143	8300	490528		
METHANOL	190015HRFNQREEN	76000	2649531	0	0	82800	2936078		
XYLENE (MIXED ISOMERS)	190015HRFNQREEN	29000	257084	0	0	68700	528228		
ETHYLBENZENE	190015HRFNQREEN	3800	486438	0	0	8020	1087342		
TOLENE	190015HRFNQREEN	83000	554832	0	0	101800	8024540		
CHROMIUM COMPOUNDS	190015HRFNQREEN	8400	33332280	480	1737534	11180	38679609		
ANTIMONY COMPOUNDS	190015HRFNQREEN	440	20388432	10800	482697552	11760	820817025		
METHYL TERT-BUTYL ETHER	190015HRFNQREEN	8800	2460710	0	0	21100	74820352		
BENZENE	190015HRFNQREEN	28000	160108731	0	0	83800	431387041	908928	17853002133
ETHYLENE OXIDE	190015HRFNQREEN	0	0	0	0	110400	1677092032		

# CHESTER RISK PROJECT

TABLE 4-28

1982 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI TRANSFERS:				TRI TOTALS:			
		POTW Transfers (lb/yr)	POTW Chronic Index	Offsite Transfers (lb/yr)	Offsite Chronic Index	Total Releases and Transfers (lb/yr)	Total Chronic Index	Total Releases and Transfers Sum	Total Chronic Index Sum
XYLENE (MIXED ISOMERS)	190142NTHP20000	0	0	500	4432	26256	232705	47000	2072187
TOLUENE	190142NTHP20000	0	0	500	4425	20756	1825481		
ETHYLENE GLYCOL	19032MZRC11830C	0	0	2000	17730	2000	17730		
DIETHANOLAMINE	19032MZRC11830C	7	0	727	0	734	0		
DIETHYL SULFATE	19032MZRC11830C	0	0	0	0	234	0		
GLYCOL ETHERS	19032MZRC11830C	8778	120181272	8778	120181272	13588	240772603		
CHLOROMETHANE	19032MZRC11830C	0	0	0	0	583	458876		
BENZYL CHLORIDE	19032MZRC11830C	0	0	0	0	211	4281020	17399	245508229
DECABROMODIPHENYL OXIDE	190137RSC0800WF	0	0	2008	531892	6000	10437965	6000	10637965
XYLENE (MIXED ISOMERS)	19050ALNBS300EB	0	0	4000	35440	26206	232947	126130	8097112
TOLUENE	19050ALNBS300EB	0	0	12222	1092342	80844	8764265		
HYDROCHLORIC ACID	19032TH-ELL16400	0	0	0	0	750	0		
HYDROGEN FLUORIDE	19032TH-ELL16400	0	0	0	0	750	0		
PHOSPHORIC ACID	19032TH-ELL16400	0	0	0	0	750	0		
GLYCOL ETHERS	19032TH-ELL16400	256	4433485	0	0	1809	17729641	3250	17729841
1,1,1-TRICHLOROETHANE	19016TLDYH41HTO	0	0	0	0	111255	21817182	111255	21817182
DIETHANOLAMINE	19061BPLCMAPOSTR	0	0	0	0	0	0		
NICKEL	19061BPLCMAPOSTR	0	0	0	0	0	0		
PHOSPHORIC ACID	19061BPLCMAPOSTR	0	0	0	0	0	0		
SULFURIC ACID	19061BPLCMAPOSTR	0	0	0	0	0	0		
1,2,4-TRIMETHYLBENZENE	19061BPLCMAPOSTR	0	0	0	0	0	0		
CYCLOHEXANE	19061BPLCMAPOSTR	0	0	0	0	415	0		
HYDROGEN FLUORIDE	19061BPLCMAPOSTR	0	0	0	0	645	0		
ETHYLENE	19061BPLCMAPOSTR	0	0	0	0	1267	0		
PROPYLENE	19061BPLCMAPOSTR	0	0	0	0	4483	0		
AMMONIA	19061BPLCMAPOSTR	0	0	0	0	84531	0		
METHANOL	19061BPLCMAPOSTR	0	0	0	0	290	10283		
XYLENE (MIXED ISOMERS)	19061BPLCMAPOSTR	0	0	0	0	4889	42341		
ETHYLBENZENE	19061BPLCMAPOSTR	0	0	0	0	593	105138		
TETRACHLOROETHYLENE	19061BPLCMAPOSTR	0	0	0	0	45	281374		
TOLUENE	19061BPLCMAPOSTR	0	0	0	0	4889	433408		
1,2-DICHLOROETHANE	19061BPLCMAPOSTR	0	0	0	0	133	1437722		
NAPHTHALENE	19061BPLCMAPOSTR	0	0	0	0	648	2960900		
METHYL TERT-BUTYL ETHER	19061BPLCMAPOSTR	0	0	0	0	2982	10574137		
BENZENE	19061BPLCMAPOSTR	0	0	0	0	2058	18722261	108893	31578955
SULFURIC ACID	190138NGHLINDUS	0	0	750	0	1800	0		
METHYL ETHYL KETONE	190138NGHLINDUS	0	0	18550	489051	40800	1205838		
TOLUENE	190138NGHLINDUS	0	0	12550	1112554	70500	8254237		

# CHES. 1 RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI TRANSFERS:				TRI TOTALS:			
		POTW Transfers (lb/yr)	POTW Chronic Index	Offsite Transfers (lb/yr)	Offsite Chronic Index	Total Releases and Transfers (lb/yr)	Total Chronic Index	Total Releases and Transfers Sum	Total Chronic Index
CHROMIUM	19013PANSY1008E	0	0	18150	0	18150	0	29700	10239041
NICKEL	19013PANSY1008E	0	0	11550	10239041	11550	10239041		
SULFURIC ACID	19013NATH1M1200W	0	0	0	0	0	0	1700	0
AMMONIA	19013NATH1M1200W	0	0	0	0	1700	0		
PHOSPHORIC ACID	19031CNCRD000C	0	0	0	0	0	0	5045	0
AMMONIA	19031CNCRD000C	0	0	0	0	0	0		
ETHYLENE	19061PSLNPBLUEB	0	0	0	0	0	0	70200	0
PROPYLENE	19061PSLNPBLUEB	0	0	0	0	0	0		
CHROMIUM COMPOUNDS	19013THOCFRONT	0	0	147535	523157378	147535	523157378		
FORMALDEHYDE	190504HYDRIL52000	0	0	0	0	0	0	619	54874
NAPHTHALENE	19061CNOLMIDGE	0	0	7406	32800381	7416	32844716	60020	37508577
BUTYL BENZYL PHTHALATE	19061CNOLMIDGE	0	443	52166	4818650	52816	4843861		
FREON 113	19014MCCNDKCH02	0	0	0	0	760	443	7650	1399139
1,1,1-TRICHLOROETHANE	19014MCCNDKCH02	0	0	6166	1201506	7166	1306955	103	365237
COPPER COMPOUNDS	19013HRCST661E9	0	0	0	0	103	365237		
1,1,1-TRICHLOROETHANE	19013HRCST661E9	0	0	0	0	1160	216698	22489	4008779
ACETONE	19013HRCST661E9	0	0	19486	3480871	21396	3792090		
XYLENE (MIXED ISOMERS)	19023SNTRY237M1	0	0	16435	136831	16435	173177	34222	1476062
TOLUENE	19023SNTRY237M1	0	0	8867	762122	14487	1302885		
METHANOL	19014CS1MDCCH02	0	0	0	0	16428	586081	16528	586081
DEBUTYL PHTHALATE	19028SSCHM40POM	0	0	600	106380	600	106380	6785	1472683
METHYL METHACRYLATE	19028SSCHM40POM	0	0	2200	708188	6166	1364314		
TOLUENE	19014NTNNT11CNO	0	0	4201	372417	16779	1396804	16779	1396804
1,1,1-TRICHLOROETHANE	1901ELTTNSM40PL	0	0	8006	1652845	13860	2738791	13900	2738791
NICKEL	19018BCHNPPENJ	0	4432	0	0	0	4432		
TOLUENE	19018BCHNPPENJ	0	0	0	0	1002	88827		
1,1,1-TRICHLOROETHANE	19018BCHNPPENJ	0	0	2136	817780	11600	2265793	12407	2390552
N-BUTYL ALCOHOL	19014ZNTHPX000	0	0	0	0	0	0		

# CHESTER RISK PROJECT

## TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI RELEASES:		Air Point Releases (lb/yr)	Air Point Chronic Index	Water Releases (lb/yr)	Water Chronic Index	Land Releases (lb/yr)	Land Chronic Index	Onsite Total Releases (lb/yr)	Onsite Total Chronic Index	Onsite Total Releases Sum	Onsite Total Chronic Index Sum
		Air Nonpoint Releases (lb/yr)	Air Nonpoint Chronic Index										
TRICHLOROETHYLENE	190138QCH,INDUS	260	246662	6400	835053	0	0	9	0	6640	8703715		
ACETONE	190138QCH,INDUS	12000	212753	40000	7091877	0	0	0	0	62000	9219540		
METHYL ISOBUTYL KETONE	190138QCH,INDUS	250	88650	41000	14538502	0	0	0	0	41250	14627202	104400	38308755
SULFURIC ACID	190138CTFA1500E	0	0	0	0	0	0	0	0	0	0		
TOLUENEDIISOCYANATE (MIXED ISC	190138CTFA1500E	0	0	181	0	0	0	0	0	181	0		
DICHLOROMETHANE	190138CTFA1500E	23332	38782308	10	11964	0	0	0	0	23342	38793172	33608	38795173
HYDROCHLORIC ACID	190138CTTFFRONT	0	0	83000	0	0	0	0	0	83000	0		
SULFURIC ACID	190138CTTFFRONT	0	0	110000	0	0	0	0	0	110000	0		
BUTYL BENZYL PHTHALATE	190138CTTFFRONT	7208	847143	68000	8230333	0	0	0	0	68300	8477470		
CHLOROFORM	190138CTTFFRONT	6000	16882702	7500	18721223	0	0	0	0	14300	35715915	243600	41583391
SULFURIC ACID	19013WTCCR3300W	0	0	0	0	0	0	0	0	0	0		
METHANOL	19013WTCCR3300W	207506	7361436	48787	1779081	0	0	0	0	256394	9091417		
2-METHOXYETHANOL	19013WTCCR3300W	362094	824260848	138066	2458749316	0	0	0	0	480658	869035204	747046	8708446682
CHLORINE	190018NFRNGREEN	0	0	0	0	0	0	0	0	0	0		
CRESOL (MIXED ISOMERS)	190018NFRNGREEN	0	0	0	0	0	0	0	0	0	0		
ETHYLENE GLYCOL	190018NFRNGREEN	0	0	0	0	0	0	0	0	0	0		
PHENOL	190018NFRNGREEN	0	0	0	0	0	0	0	0	0	0		
SULFURIC ACID	190018NFRNGREEN	0	0	0	0	0	0	0	0	0	0		
1,3-BUTADIENE	190018NFRNGREEN	120	0	0	0	0	0	0	0	120	0		
CYCLOHEXANE	190018NFRNGREEN	1600	0	860	0	0	0	0	0	2660	0		
1,2,4-TRIMETHYLBENZENE	190018NFRNGREEN	4800	0	86	0	0	0	0	0	4886	0		
AMMONIA	190018NFRNGREEN	8300	0	0	0	0	0	0	0	8300	0		
PROPYLENE	190018NFRNGREEN	33000	0	12000	0	0	0	0	0	45000	0		
ETHYLENE	190018NFRNGREEN	46000	0	0	0	0	0	0	0	46000	0		
ZINC COMPOUNDS	190018NFRNGREEN	0	0	270	15957	0	0	0	0	270	15957		
METHANOL	190018NFRNGREEN	5700	202131	1100	30006	0	0	0	0	6800	2111327		
XYLENE (MIXED ISOMERS)	190018NFRNGREEN	28008	257044	1700	15070	0	0	0	0	30708	527155		
ETHYL BENZENE	190018NFRNGREEN	2000	531898	220	30006	0	0	0	0	3220	510904		
TOLUENE	190018NFRNGREEN	21000	2748141	7800	681448	0	0	0	0	28800	3439409		
CHROMIUM COMPOUNDS	190018NFRNGREEN	0	0	1300	4608785	0	0	0	0	1300	4608785		
ANTHRACENE COMPOUNDS	190018NFRNGREEN	0	0	400	1773841	0	0	0	0	400	1773841		
METHYL TERT-BUTYL ETHER	190018NFRNGREEN	4800	17020744	9400	23332280	0	0	0	0	14200	60333033		
BENZENE	190018NFRNGREEN	51000	262225734	3600	20032556	0	0	0	0	54600	282278290		
ETHYLENE OXIDE	190018NFRNGREEN	110000	16710185920	400	40764312	0	0	0	0	110400	16770950232	368856	17130461033



# CHESTER RISK PROJECT

TABLE 4-28

1982 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TRI RELEASES:		Air NonPoint Releases		Air Point Releases		Water Releases		Land Releases		Onsite Releases		Onsite Total		Onsite Total	
		Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index	Releases (lb/yr)	Chronic Index
XYLENE (MIXED ISOMERS)	19014ZNIH1P20000 19014ZNIH1P20000	250 250	2216 2216	25000 25000	229057 1772904	0 0	0 0	0 0	0 0	0 0	0 0	25750 20250	223273 1783157	46000	2023430		
ETHYLENE GLYCOL	19032MZRH1830C	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
DIETHANOLAMINE	19032MZRH1830C	87	0	0	0	0	0	0	0	0	0	87	0	87	0		
DIETHYL SULFATE	19032MZRH1830C	224	0	0	0	0	0	0	0	0	0	224	0	224	0		
GLYCOL ETHERS	19032MZRH1830C	22	28039	0	0	0	0	0	0	0	0	22	383058	46876	456876		
CHLOROMETHANE	19032MZRH1830C	8	2618	0	0	0	0	0	0	0	0	8	456876	456876			
BENZYL CHLORIDE	19032MZRH1830C	211	4281820	0	0	0	0	0	0	0	0	211	4281820	4281820			
DECABROMODIPHENYL OXIDE	19013TRSC0600WF	2000	8318092	0	0	0	0	0	0	0	0	2000	8319082	3000	6318982		
XYLENE (MIXED ISOMERS)	19050ULNBS300EB 19050ULNBS300EB	18778 72987	164476 6470276	3487 13446	30812 1201847	0 0	0 0	0 0	0 0	0 0	0 0	22296 88443	187387 7671823	108808	7689310		
HYDROCHLORIC ACID	19032THBL1640D	250	0	250	0	0	0	0	0	250	0	750	0	750	0		
HYDROGEN FLUORIDE	19032THBL1640D	250	0	250	0	0	0	0	0	250	0	750	0	750	0		
PHOSPHORIC ACID	19032THBL1640D	250	0	250	0	0	0	0	0	250	0	750	0	750	0		
GLYCOL ETHERS	19032THBL1640D	250	4432485	250	4432485	0	0	0	0	250	4432485	750	13287456	3000	13287456		
1,1,1-TRICHLOROETHANE	19016TLDV44HTO	22261	4383432	88004	17832730	0	0	0	0	0	0	111255	21917162	111255	21917162		
DIETHANOLAMINE	19061BPLCAPOSTR	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
NICKEL	19061BPLCAPOSTR	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PHOSPHORIC ACID	19061BPLCAPOSTR	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
SULFURIC ACID	19061BPLCAPOSTR	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1,2,4-TRIMETHYLBENZENE	19061BPLCAPOSTR	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
CYCLOHEXANE	19061BPLCAPOSTR	362	0	33	0	0	0	0	0	0	0	418	0	418	0		
HYDROGEN FLUORIDE	19061BPLCAPOSTR	645	0	0	0	0	0	0	0	0	0	645	0	645	0		
ETHYLENE	19061BPLCAPOSTR	114	0	113	0	0	0	0	0	0	0	1207	0	1207	0		
PROPYLENE	19061BPLCAPOSTR	1167	0	3286	0	0	0	0	0	0	0	4423	0	4423	0		
ANALOGIA	19061BPLCAPOSTR	79	0	17489	0	0	0	0	0	0	0	84531	0	84531	0		
METHANOL	19061BPLCAPOSTR	0	0	290	10293	0	0	0	0	0	0	290	10293	290	10293		
XYLENE (MIXED ISOMERS)	19061BPLCAPOSTR	4408	39059	483	4282	0	0	0	0	0	0	4689	43341	4689	43341		
ETHYLBENZENE	19061BPLCAPOSTR	861	103611	12	2128	0	0	0	0	0	0	863	105139	863	105139		
TETRACHLOROETHYLENE	19061BPLCAPOSTR	45	281374	0	0	0	0	0	0	0	0	45	281374	45	281374		
TOUJENE	19061BPLCAPOSTR	4406	380191	483	42818	0	0	0	0	0	0	4689	433408	4689	433408		
1,2-DICHLOROETHANE	19061BPLCAPOSTR	133	1437722	0	0	0	0	0	0	0	0	133	1437722	133	1437722		
NAPHTHALENE	19061BPLCAPOSTR	648	2960900	0	0	0	0	0	0	0	0	648	2960900	648	2960900		
METHYL TERT-BUTYL ETHER	19061BPLCAPOSTR	26	127656	2946	10444481	0	0	0	0	0	0	2962	10574137	2962	10574137		
BENZENE	19061BPLCAPOSTR	2544	13504805	414	2129456	0	0	0	0	0	0	2668	15733261	2668	15733261		
SULFURIC ACID	19013BNG14INDUS	0	0	250	0	0	0	0	0	0	0	250	0	250	0		
METHYL ETHYL KETONE	19013BNG14INDUS	250	7387	24000	709198	0	0	0	0	0	0	24250	713585	24250	713585		
TOUJENE	19013BNG14INDUS	1806	88650	87000	8053033	0	0	0	0	0	0	88096	814683	88096	814683		

# CHESTER RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

## TRI RELEASES:

Chemical Name	Facility ID#	Air Nonpoint Releases (lb/yr)	Air Nonpoint Chronic Index	Air Point Releases (lb/yr)	Air Point Chronic Index	Water Releases (lb/yr)	Water Chronic Index	Land Releases (lb/yr)	Land Chronic Index	Onsite Total Releases (lb/yr)	Onsite Total Chronic Index	Onsite Total Releases Sum	Onsite Total Chronic Index
CHROMIUM	19013PNNST100BE	0	0	0	0	0	0	0	0	0	0	0	0
NICKEL	19013PNNST100BE	0	0	0	0	0	0	0	0	0	0	0	0
SULFURIC ACID	19013MRT1H1200W	0	0	0	0	0	0	0	0	0	0	0	0
AMMONIA	19013MRT1H1200W	0	0	1700	0	0	0	0	0	1700	0	1700	0
PHOSPHORIC ACID	19031CNCRCOCONC	0	0	0	0	0	0	0	0	0	0	0	0
AMMONIA	19031CNCRCOCONC	5045	0	0	0	0	0	0	0	5045	0	5045	0
ETHYLENE	19001PSLNPFLUEB	6700	0	2400	0	0	0	0	0	9100	0	70200	0
PROPYLENE	19001PSLNPFLUEB	53008	0	8100	0	0	0	0	0	61100	0	70200	0
CHROMIUM COMPOUNDS	19013THPOCFRONT	0	0	0	17730	0	0	0	0	0	17730	5	17730
FORMALDEHYDE	19006HYDRL52000	78	6015	841	47950	0	0	0	0	919	54874	619	54874
NAPHTHALENE	19001CMLMRIDGE	5	22162	0	22162	0	0	0	0	10	44325	615	89093
BUTYL BENZYL PHTHALATE	19001CMLMRIDGE	250	22162	250	22162	0	443	0	0	500	44768	1750	187443
FREON 113	19014MCCGNDRCRO2	750	443	0	0	0	0	0	0	750	443	1750	187443
1,1,1-TRICHLOROETHANE	19014MCCGNDRCRO2	750	147750	250	40250	0	0	0	0	1000	196800	103	265237
COPPER COMPOUNDS	19013MFCST651E9	0	0	103	265237	0	0	0	0	103	265237	103	265237
1,1,1-TRICHLOROETHANE	19016RND52RACE	1100	216490	0	0	0	0	0	0	1100	216490	2800	518108
ACETONE	19016RND52RACE	1700	201409	0	0	0	0	0	0	1700	201409	2800	518108
XYLENE (MIXED ISOMERS)	19023SNTBY237M	0	0	4100	20346	0	0	0	0	4100	45346	10200	577110
TOLENE	19023SNTBY237M	0	0	6100	540763	0	0	0	0	6100	540763	10200	577110
METHANOL	19014CSTMACRO2	834	29574	19494	556507	0	0	0	0	19528	556081	18528	586081
DIETHYL PHTHALATE	19029SSCH448POM	0	0	0	0	0	0	0	0	0	0	2965	657116
METHYL METHACRYLATE	19029SSCH448POM	2960	656008	0	1108	0	0	0	0	2965	657116	2965	657116
TOLENE	19014NT111CRO	11578	1026386	0	0	0	0	0	0	11578	1026386	11578	1026386
1,1,1-TRICHLOROETHANE	19018LTTSMARPL	2350	462948	3500	880408	0	0	0	0	5850	1182446	6850	1152446
NICKEL	190180CHNPPENJ	0	0	0	0	0	0	0	0	0	0	0	0
TOLENE	190180CHNPPENJ	0	0	1002	88827	0	0	0	0	1002	148827	9266	1716830
1,1,1-TRICHLOROETHANE	190180CHNPPENJ	0	0	8264	1628003	0	0	0	0	8264	1628003	9266	1716830
N-BUTYL ALCOHOL	190142NTHP20000	0	0	0	0	0	0	0	0	0	0	0	0

# CHESAPEAKE RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TOXICITY DATA:					
		Reference Dose (RID)	Confidence Statement	Reference Dose Status	Cancer Potency (CPF)	Weight of Evidence	RID Index CPF Index
TRICHLOROETHYLENE	190135NCH4 INJUS	0			0.011 C-02	0	1.2417726
ACETONE	190135NCH4 INJUS	0.1 low	via		0	7	0
METHYL ISOBUTYL KETONE	190135NCH4 INJUS	0.05	HEAST		0	3.6	0
SULFURIC ACID	190135CTFM1600E	0			0	0	0
TOLUENEDIISOCYANATE (MIXED ISC)	190135CTFM1600E	0			0	0	0
DICHLOROMETHANE	190135CTFM1600E	0.06 medium	via		0.0076 B2	4.2	1.3930355
HYDROCHLORIC ACID	190135CTTFFRONT	0			0	0	0
SULFURIC ACID	190135CTTFFRONT	0			0	0	0
BUTYL BENZYL PHTHALATE	190135CTTFFRONT	0.2 low	via		0 C	14	0
CHLOROFORM	190135CTTFFRONT	0.01 medium	via		0.0061 B2	0.7	1.7127466
SULFURIC ACID	190135WTCCR3300W	0			0	0	0
METHANOL	190135WTCCR3300W	0.6 medium	via		0	36	0
2-METHOXYETHANOL	190135WTCCR3300W	0.001 na	HEAST		0	0.07	0
CHLORINE	190015NRFRNGREEN	0			0	0	0
CRESOL (MIXED ISOMERS)	190015NRFRNGREEN	0			0	0	0
ETHYLENE GLYCOL	190015NRFRNGREEN	2 high	via		0	140	0
PHENOL	190015NRFRNGREEN	0.6 low	via		0	42	0
SULFURIC ACID	190015NRFRNGREEN	0			0	0	0
1,3-BUTADIENE	190015NRFRNGREEN	0			0	0	0
CYCLOHEXANE	190015NRFRNGREEN	0			0	0	0
1,2,4-TRIMETHYLBENZENE	190015NRFRNGREEN	0			0	0	0
AMMONIA	190015NRFRNGREEN	0			0	0	0
PROPYLENE	190015NRFRNGREEN	0			0	0	0
ETHYLENE	190015NRFRNGREEN	0			0	0	0
ZINC COMPOUNDS	190015NRFRNGREEN	0.3 medium	via		0	21	0
METHANOL	190015NRFRNGREEN	0.6 medium	via		0	35	0
XYLENE (MIXED ISOMERS)	190015NRFRNGREEN	2 medium	via		0	140	0
ETHYLBENZENE	190015NRFRNGREEN	0.1 low	via		0	7	0
TOLUENE	190015NRFRNGREEN	0.2 medium	via		0	14	0
CHROMIUM COMPOUNDS	190015NRFRNGREEN	0.005 low	via		0	0.35	0
ANTHRACENE COMPOUNDS	190015NRFRNGREEN	0.0004 low	via		0	0.026	0
METHYL TERT-BUTYL ETHER	190015NRFRNGREEN	0.005 na			0	0.35	0
BENZENE	190015NRFRNGREEN	0			0.009 A	0	0.2413704
ETHYLENE OXIDE	190015NRFRNGREEN	0			1.02 B1	0	0.0081690

# CHESTER RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

## TOXICITY DATA:

Chemical Name	Facility ID#	Reference Dose (RID)	Confidence Statement	Reference Dose Status	Cancer Potency (CPF)	Weight of Evidence	RID Index Dose	CPF Index Dose
XYLENE (MIXED ISOMERS)	190142NTH18200CO 190142NTH18200CO	2 medium 0.2 medium	b/s b/s		0 0		140 14	0 0
ETHYLENE GLYCOL	19032M27NCH18300C	2 high	b/s		0		140	0
DIETHANOLAMINE	19032M27NCH18300C	0			0		0	0
DIETHYL SULFATE	19032M27NCH18300C	0			0		0	0
GLYCOL ETHERS	19032M27NCH18300C	0.001 na	HEAST		0		0.07	0
CHLOROMETHANE	19032M27NCH18300C	0			0.013 C		0	1.6037112
BENZYL CHLORIDE	19032M27NCH18300C	0			0.17 B2		0	0.0014574
DECAHYDROPHENYL OXIDE	190137N5C0A002WTF	0.01 low	b/s		0		0.7	0
XYLENE (MIXED ISOMERS)	19030ULNBS300EB 19030ULNBS300EB	2 medium 0.2 medium	b/s b/s		0 0		140 14	0 0
HYDROCHLORIC ACID	19032THBL16400	0			0		0	0
HYDROGEN FLUORIDE	19032THBL16400	0			0		0	0
PHOSPHORIC ACID	19032THBL16400	0			0		0	0
GLYCOL ETHERS	19032THBL16400	0.001 na	HEAST		0		0.07	0
1,1,1-TRICHLOROETHANE	19016TLDTM4TH1TO	0.09 na	wid from b/s and HEAST		0		6.3	0
DIETHANOLAMINE	19061BPLCAIP05TR	0			0		0	0
NICKEL	19061BPLCAIP05TR	0.02 medium	b/s		0		14	0
PHOSPHORIC ACID	19061BPLCAIP05TR	0			0		0	0
SULFURIC ACID	19061BPLCAIP05TR	0			0		0	0
1,2,4-TRIMETHYLBENZENE	19061BPLCAIP05TR	0			0		0	0
CYCLOHEXANE	19061BPLCAIP05TR	0			0		0	0
HYDROGEN FLUORIDE	19061BPLCAIP05TR	0			0		0	0
ETHYLENE	19061BPLCAIP05TR	0			0		0	0
PROPYLENE	19061BPLCAIP05TR	0			0		0	0
AMMONIA	19061BPLCAIP05TR	0			0		0	0
METHANOL	19061BPLCAIP05TR	0.6 medium	b/s		0		36	0
XYLENE (MIXED ISOMERS)	19061BPLCAIP05TR	2 medium	b/s		0		140	0
ETHYLBENZENE	19061BPLCAIP05TR	0.1 low	b/s		0		7	0
TETRACHLOROETHYLENE	19061BPLCAIP05TR	0.01 medium	b/s		0.052 c-b2		0.7	0.2630510
TOLUENE	19061BPLCAIP05TR	0.2 medium	b/s		0		14	0
1,2-DICHLOROETHANE	19061BPLCAIP05TR	0			0.091 B2		0	0.1148106
NAPHTHALENE	19061BPLCAIP05TR	0.004 na	ECAD: Risk Assessment 2002		0		0.28	0
METHYL TERT BUTYL ETHER	19061BPLCAIP05TR	0.005 na			0		0.35	0
BENZENE	19061BPLCAIP05TR	0			0.029 A		0	0.2413794
SULFURIC ACID	190138NCHL18300S	0			0		0	0
METHYL ETHYL KETONE	190138NCHL18300S	0.6 low	b/s		0		42	0
TOLUENE	190138NCHL18300S	0.2 medium	b/s		0		14	0

# CHES. RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	TOXICITY DATA:				Cancer Potency (CPF)	Weight of Evidence	RID Index	CPF Index
		Reference Dose (RID)	Confidence Statement	Reference Dose Status					
CHROMIUM	19013PNSY1000E	0	0.02 medium	lbs	0	0	1.4	0	0
NICKEL	19013PNSY1000E	0	0	lbs	0	0	0	0	0
SULFURIC ACID	19013NRTM1200W	0	0	lbs	0	0	0	0	0
AMMONIA	19013NRTM1200W	0	0	lbs	0	0	0	0	0
PHOSPHORIC ACID	19031CNCRDCCNDI	0	0	lbs	0	0	0	0	0
AMMONIA	19031CNCRDCCNDI	0	0	lbs	0	0	0	0	0
ETHYLENE	19061PSLNPBLUEB	0	0	lbs	0	0	0	0	0
PROPYLENE	19061PSLNPBLUEB	0	0	lbs	0	0	0	0	0
CHROMIUM COMPOUNDS	19013THPOCFRONT	0.005 low	lbs	lbs	0	0	0.35	0	0
FORMALDEHYDE	19054HYDRLE2000	0.2 medium	lbs	lbs	0	0	14	0	0
NAPHTHALENE	19061CNGLMRIDGE	0.004 na	ECAC: Risk Assessment 2/92	lbs	0	0	0.28	0	0
BUTYL BENZYL PHTHALATE	19061CNGLMRIDGE	0.2 low	lbs	lbs	0	0	14	0	0
FREON 113	19014MCGND9CRO2	30 low	lbs	lbs	0	0	2100	0	0
1,1,1-TRICHLOROETHANE	19014MCGND9CRO2	0.09 na	wild from lbs and breast	lbs	0	0	6.3	0	0
COPPER COMPOUNDS	19013HRCST651E9	0.005 medium	lbs	lbs	0	0	0.35	0	0
1,1,1-TRICHLOROETHANE	19015RIBND52RACE	0.09 na	wild from lbs and breast	lbs	0	0	6.3	0	0
ACETONE	19015RIBND52RACE	0.1 low	lbs	lbs	0	0	7	0	0
XYLENE (MIXED ISOMERS)	190235NTRY237MI	2 medium	lbs	lbs	0	0	140	0	0
TOXUENE	190235NTRY237MI	0.2 medium	lbs	lbs	0	0	14	0	0
METHANOL	19014CSTMACCRO2	0.5 medium	lbs	lbs	0	0	35	0	0
DEBUTYL PHTHALATE	190235SCHM46POM	0.1 low	lbs	lbs	0	0	7	0	0
METHYL METHACRYLATE	190235SCHM46POM	0.09 na	HEAST	lbs	0	0	5.6	0	0
TOXUENE	19014NTRNT11CRO	0.2 medium	lbs	lbs	0	0	14	0	0
1,1,1-TRICHLOROETHANE	19018LTTNSMAPP	0.09 na	wild from lbs and breast	lbs	0	0	6.3	0	0
NICKEL	19018BCHAPPENNJ	0.02 medium	lbs	lbs	0	0	1.4	0	0
TOXUENE	19018BCHAPPENNJ	0.2 medium	lbs	lbs	0	0	14	0	0
1,1,1-TRICHLOROETHANE	19018BCHAPPENNJ	0.09 na	wild from lbs and breast	lbs	0	0	6.3	0	0
N-BUTYL ALCOHOL	19014ZNTNHP2000	0.1 low	lbs	lbs	0	0	7	0	0



# CHESTER RISK PROJECT

## TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	Facility Name	Street Address	Zip Code	City	County	Latitude	Longitude	SIC Code
TRICHLOROETHYLENE	19013BNRGNH	INDUS BOEING DEFENSE & SPACE GROUP STEWART AVE. & INDUSTRIAL HWY.	19103	19103	RIDLEY PARK	DELAWARE	39.5251	-75.1932 3721	
ACETONE	19013BNRGNH	INDUS BOEING DEFENSE & SPACE GROUP STEWART AVE. & INDUSTRIAL HWY.	19103	19103	RIDLEY PARK	DELAWARE	39.5251	-75.1932 3721	
METHYL ISOBUTYL KETONE	19013BNRGNH	INDUS BOEING DEFENSE & SPACE GROUP STEWART AVE. & INDUSTRIAL HWY.	19103	19103	RIDLEY PARK	DELAWARE	39.5251	-75.1932 3721	
SULFURIC ACID	19013SCCTM	1500E FOAMEX L.P.	19022	19022	EDDYSTONE	DELAWARE	39.5119	-71.7006 3086	
TOLUENEDIISOCYANATE (MIXED IS)	19013SCCTM	1500E FOAMEX L.P.	19022	19022	EDDYSTONE	DELAWARE	39.5119	-71.7006 3086	
DICHLOROMETHANE	19013SCCTM	1500E FOAMEX L.P.	19022	19022	EDDYSTONE	DELAWARE	39.5119	-71.7006 3086	
HYDROCHLORIC ACID	19013SCCTM	1500E SCOTT PAPER CO.	19013	19013	CHESTER	DELAWARE	39.5042	-75.2124 2621	
SULFURIC ACID	19013SCCTM	1500E SCOTT PAPER CO.	19013	19013	CHESTER	DELAWARE	39.5042	-75.2124 2621	
BUTYL BENZYL PHTHALATE	19013SCCTM	1500E SCOTT PAPER CO.	19013	19013	CHESTER	DELAWARE	39.5042	-75.2124 2621	
CHLOROFORM	19013SCCTM	1500E SCOTT PAPER CO.	19013	19013	CHESTER	DELAWARE	39.5042	-75.2124 2621	
SULFURIC ACID	19013WT	CCR3300W WITCO CORP.	3300 W. 4TH ST.	19061	TRAINER	DELAWARE	39.4948	-75.2400 2843	
METHANOL	19013WT	CCR3300W WITCO CORP.	3300 W. 4TH ST.	19061	TRAINER	DELAWARE	39.4948	-75.2400 2843	
2-METHOXYETHANOL	19013WT	CCR3300W WITCO CORP.	3300 W. 4TH ST.	19061	TRAINER	DELAWARE	39.4948	-75.2400 2843	
CHLORINE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
CREOSOL (MIXED ISOMERS)	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
ETHYLENE GLYCOL	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
PHENOL	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
SULFURIC ACID	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
1,3-BUTADIENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
CYCLOHEXANE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
1,2,4-TRIMETHYLBENZENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
AMMONIA	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
PROPYLENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
ETHYLENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
ZINC COMPOUNDS	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
METHANOL	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
XYLENE (MIXED ISOMERS)	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
ETHYLBENZENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
TOLUENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
CHROMIUM COMPOUNDS	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
ANTIMONY COMPOUNDS	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
METHYL TERT BUTYL ETHER	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
BENZENE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	
ETHYLENE OXIDE	19061BNRNGRE	1500E SUN REFINING & MARKETING CO.	19061	19061	MARCUS HOOK	DELAWARE	39.4900	-75.2600 2911	

# CHES RISK PROJECT

TABLE 4-28

1992 TRI FOR REGION III  
DELAWARE CO., PA

Chemical Name	Facility ID#	Facility Name	Street Address	Zip Code	City	County	Latitude	Longitude	SIC
XYLENE (MIXED ISOMERS)	19014ZNTHP20000	ZENITH PRODUCTS CORP.	200 COMMERCE DR.	19014	ASTON	DELAWARE	395215	-760015 2514	
TOLUENE	19014ZNTHP20000	ZENITH PRODUCTS CORP.	200 COMMERCE DR.	19014	ASTON	DELAWARE	395216	-760015 2514	
ETHYLENE GLYCOL	19032MZCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-761637 2843	
DIETHANOLAMINE	19032MZCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-761637 2843	
DIETHYL SULFATE	19032MZCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-761637 2843	
GLYCOL ETHERS	19032MZCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-761637 2843	
CHLOROMETHANE	19032MZCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-761637 2843	
BENZYL CHLORIDE	19032MZCH1830C	PPG IND. INC.	1830 COLUMBIA AVE.	19032	FOLCROFT	DELAWARE	395319	-761637 2843	
DECABROMODIPHENYL OXIDE	19013TRSC0900W	TRB ACQUISITION CORP.	800 W. FRONT ST.	19013	CHESTER	DELAWARE	395000	-752230 2952	
XYLENE (MIXED ISOMERS)	19050JULNBS300EB	JULIAN B. BLEVIN CO. INC.	300 E. BALTIMORE AVE.	19050	LANSOWNE	DELAWARE	395600	-761900 2699	
TOLUENE	19050JULNBS300EB	JULIAN B. BLEVIN CO. INC.	300 E. BALTIMORE AVE.	19050	LANSOWNE	DELAWARE	395600	-761900 2699	
HYDROCHLORIC ACID	19032THBL16400	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-761640 2842	
HYDROGEN FLUORIDE	19032THBL16400	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-761640 2842	
PHOSPHORIC ACID	19032THBL16400	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-761640 2842	
GLYCOL ETHERS	19032THBL16400	BULLEN COMPANIES	1640 DELMAR DR.	19032	FOLCROFT	DELAWARE	395343	-761640 2842	
1,1,1-TRICHLOROETHANE	19016ITLDYN4HTO	TELEDYNE PACKAGING	4TH & TOWNSEND STS.	19016	CHESTER	DELAWARE	395030	-762150 3409	
DIETHANOLAMINE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
NICKEL	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
PHOSPHORIC ACID	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
SULFURIC ACID	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
1,2,4-TRIMETHYLBENZENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
CYCLOHEXANE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
HYDROGEN FLUORIDE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
ETHYLENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
PROPYLENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
AMMONIA	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
METHANOL	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
XYLENE (MIXED ISOMERS)	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
ETHYLBENZENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
TETRACHLOROETHYLENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
TOLUENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
1,2-DICHLOROETHANE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
NAPHTHALENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
METHYL TERT-BUTYL ETHER	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
BENZENE	19061BPLCMPOSTRBP	EXPLORATION & OIL INC.	POST RD.	19061	TRAINER	DELAWARE	394900	-762400 2911	
SULFURIC ACID	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP STEWART AVE. & INDUSTRIAL HWY.	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395751	-761932 3721	
METHYL ETHYL KETONE	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP STEWART AVE. & INDUSTRIAL HWY.	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395751	-761932 3721	
TOLUENE	19013BNGHLINDUS	BOEING DEFENSE & SPACE GROUP STEWART AVE. & INDUSTRIAL HWY.	STEWART AVE. & INDUSTRIAL HWY.	19103	RIDLEY PARK	DELAWARE	395751	-761932 3721	

# CHESTER RISK PROJECT

TABLE 4-32

## MAXIMUM CARCINOGENIC RISKS IN AIR

CHEMICAL	MAXIMUM PREDICTED CONCENTRATION (ug/m <sup>3</sup> )	RISK-BASED LEVEL (ug/m <sup>3</sup> )	CARCINOGENIC RISK*
chromium VI	0.0047	0.00015	3E-05
benzene	2.8	0.22	1E-05
gasoline	0.19	5.10E-05 (ug/m <sup>3</sup> ) <sup>-1**</sup>	9E-06
1,3-butadiene	0.044	0.0064	7E-06
cadmium	0.0067	0.00099	7E-06
arsenic	0.0022	0.00041	5E-06
diesel	0.24	1.70E-05 (ug/m <sup>3</sup> ) <sup>-1**</sup>	4E-06
crotonaldehyde	0.012	0.0033	3E-06
acrylonitrile	0.042	0.026	2E-06
formaldehyde	0.30	0.14	2E-06
vinyl chloride	0.025	0.021	1E-06

\*Value represents the maximum carcinogenic risk posed by an individual chemical at a specific location.

\*\*Value represents the unit risk for this compound.

**CHESTER RISK PROJECT****TABLE 4-33****MAXIMUM NON-CANCER THREATS IN AIR**

CHEMICAL	MAXIMUM PREDICTED CONCENTRATION (ug/m <sup>3</sup> )	RISK-BASED LEVEL (ug/m <sup>3</sup> )	HAZARD QUOTIENT*
hydrogen chloride	17	7.3	2.4
acrolein	0.33	0.021	1.6
2-methoxyethanol	19	21	0.9
mercury (inorganic)	0.061	0.31	0.2

\*Value represents the maximum non-cancer threat, as predicted by the Hazard Quotient, posed by an individual chemical at a specific location.

# CHESTER RISK PROJECT

TABLE 4-34

## MAXIMUM RATIO OF PREDICTED CONCENTRATIONS OF CRITERIA POLLUTANTS TO NATIONAL AMBIENT AIR QUALITY STANDARDS

CHEMICAL	MAXIMUM PREDICTED CONCENTRATION (ug/m <sup>3</sup> )	NATIONAL AMBIENT AIR QUALITY STANDARD (ug/m <sup>3</sup> ) *	RATIO**
carbon monoxide (1 hour)	1960	40,000	0.05
carbon monoxide (8 hours)	675	10,000	0.07
lead (quarter)	0.11***	1.5	0.08
nitrogen dioxide (annual)	32	100	0.3
ozone (1 hour)	****	235	-
PM-10 (24 hours)	70	150	0.5
PM-10 (annual)	14	50	0.3
sulfur dioxide (3 hours)	372	1300	0.3
sulfur dioxide (24 hours)	170	365	0.5
sulfur dioxide (annual)	41	80	0.5

\*Please refer to Table 4-31 for a detailed explanation of each standard.

\*\*Value represents the ratio between the maximum predicted concentration and the National Ambient Air Quality Standard.

\*\*\*The modeled concentration for lead represents an annual average level, rather than a quarterly concentration. Although the annual average level was compared to the quarterly standard for lead, inaccuracies related to such a comparison are insignificant in the context of this study.

\*\*\*\*Ozone was not evaluated in the air modeling exercise.



**CHESTER COUNTY RISK PROJECT**  
**TABLE 4-29**  
**SUMMARY RANKING FOR**  
**TOTAL ONSITE RELEASES**

Facility Name	City	Total Onsite Residual Mass Sum	Total Onsite Chronic Index Relative Hazard	Total Onsite Chronic Index and Residual Mass Relative Hazard
28 PENNSYLVANIA MACHINE WORK	ASTON	0	0	0
27 PQ CORP	CHESTER	5	17730	17730
26 HYDROL CHEMICAL CO.	YEADON	519	54874	54874
25 CONGOLEUM CORP.	MARCUS HOOK	515	89093	89093
24 MCGEE INDUSTRIES INC.	ASTON	1750	197443	197443
23 HARCASST CO. INC.	CHESTER	103	365237	365237
22 ORB IND. INC.	UPLAND	2800	518108	518108
21 SENTRY PAINT TECH.	DARBY	10200	577110	577110
20 CUSTOM COMPOUNDING INC.	ASTON	16528	586081	586081
19 ESSCHEM CO.	ESSINGTON	2965	657116	657116
18 NORTH AMERICA SILICA	CHESTER	1700	0	865414
17 INTERNATIONAL ENVELOPE CO.	ASTON	11578	1026386	1026386
16 CLIFTON PRECISION - N.	CLIFTON HEIGHTS	5850	1152446	1152446
15 BUCHAN IND.	CLIFTON HEIGHTS	9266	1716830	1716830
14 ZENITH PRODUCTS CORP.	ASTON	46000	2023430	2023430
13 CONCORD BEVERAGE CO.	CONCORDVILLE	5045	0	2568245
12 PPG IND. INC.	FOLCROFT	1107	5107955	5107955
11 TRS ACQUISITION CORP.	CHESTER	3000	5318982	5318982
10 JULIAN B. SLEVIN CO. INC.	LANSDOWNE	108808	7869310	7869310
9 BULLEN COMPANIES	FOLCROFT	3000	13297456	13297456
8 TELEDYNE PACKAGING	CHESTER	111255	21917162	21917162
7 BP EXPLORATION & OIL INC.	TRAINER	108893	31579585	31579585
6 EPSILON PRODS. CO.	MARCUS HOOK	70200	0	35736527
5 BOEING DEFENSE & SPACE GRO	RIDLEY PARK	184400	38308755	38308755
4 FOAMEX L.P.	EDDYSTONE	33698	39795173	39795173
3 SCOTT PAPER CO.	CHESTER	243600	41593391	41593391
2 WITCO CORP.	TRAINER	747045	870844682	870844682
1 SUN REFINING & MARKETING CO	MARCUS HOOK	368958	17130461033	17130461033

**KEY**

	Order statistic	
	percentile	confidence limit
90th percentile-95% confidence	3	6

## APPENDIX II

### REFERENCES

## REFERENCES V. 0.2

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APPENDIX III

EPIDEMIOLOGIC INFORMATION

Age-adjusted incidence and mortality rates for Chester City, Delaware County and adjacent counties.

The enclosed tables describe the cancer experience for residents of Chester City, Delaware County and adjacent counties. The five cancer sites listed for males and females represent about 62 and 58 percent of the total cancer risk, respectively.

The elevated cancer risk among males for "all sites combined" in Chester City is characteristic of rates seen among black males (549.3, Chester City compared to 523.2 per 100,000 Pennsylvania black males). The rate was 25 percent greater than for all males in the state (549.3 compared to 439.3 per 100,000).

A significant proportion of the male cancers were lung and prostate. Together they represented 49 percent of the total cancer risk in the community. The most significant cause of lung cancer is cigarette smoking which accounts for about 90 percent of all cases. There is no known environmental cause of prostate cancer.

Similarly, the cancer risk for "all sites combined" among females in Chester City is characteristic of rates seen among black females (353.0, Chester City compared to 360.3 per 100,000 Pennsylvania black females). The rate was 5 percent lower than for all females in the state (353.0 compared to 372.6 per 100,000). Lung and breast cancers account for 44 percent of the total cancer risk among females. There is no known environmental cause of breast cancer.

The death rates reflect the incidence rate and the survival by individual cancers. The total cancer death rate in the state for black males was 344 per 100,000 similar to the rate for Chester City males (348 per 100,000). While the death rate for females was 198.1 and 187.1 per 100,000 for Chester City females and Pennsylvania black females, respectively.

Age-adjusted cancer mortality rates for Chester  
City, Delaware and adjacent counties, and  
Pennsylvania by sex, 1989-93

	Chester City	Delaware Co.	Montgomery Co.	Chester Co.	Philadelphia Co.	Pennsylvania
<b>MALES</b>						
All Sites	348.0	231.0	201.6	214.0	294.0	226.8
Lung, trachea, etc	127.0	79.0	62.7	68.3	101.9	75.6
Colon-rectum	27.4	27.0	25.7	23.0	32.0	26.8
Prostate	47.7	25.5	23.7	29.6	30.7	24.7
Non-Hodgkin's Lym.	8.4	7.0	7.7	6.6	7.9	7.9
Leukemia	12.2	7.0	8.3	8.0	8.8	8.3
<b>FEMALES</b>						
All Sites	198.1	157.0	141.9	153.0	177.0	147.7
Lung, trachea	48.6	35.6	28.5	28.2	39.9	29.2
Colon-rectum	16.3	18.2	17.8	18.7	20.6	26.8
Breast	42.7	33.2	30.7	30.1	34.1	29.6
Non-Hodgkin's Lym.	4.8	4.7	4.8	6.6	4.8	5.3
Leukemia	4.8	5.7	4.1	4.9	5.0	5.1

age-adjusted to the 1970 US standard pop.  
:s per 100,000 population.

Source: PA Dept. of Health.



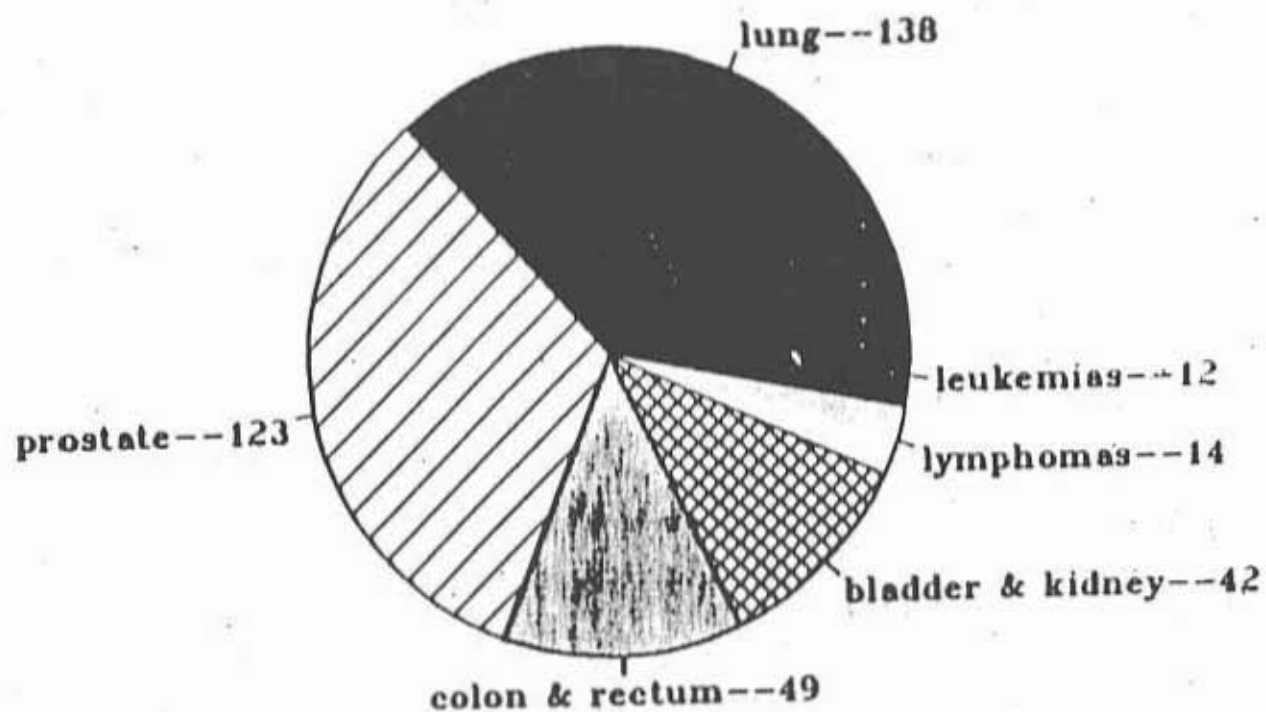
**Age-adjusted cancer incidence rates for Chester  
City, Delaware and adjacent counties, and  
Pennsylvania by sex, 1987-91**

	Chester City	Delaware Co.	Montgomery Co.	Chester Co.	Philadelphia C.	Pennsylvania
<b>MALES</b>						
All Sites	549.2	433.8	432.2	409.4	513.9	439.3
Lung, trachea, etc	150.7	86.1	72.4	79.1	111.6	84.7
Colon/Rectum	55.5	66.3	65.6	67.6	72.4	69.1
Prostate	122.1	99.9	106.0	97.3	108.0	95.1
Kidney/Bladder	43.5	42.2	45.1	37.4	42.8	44.5
Lymphomas	14.4	15.2	15.6	12.5	16.1	15.1
Leukemias	12.7	6.8	10.3	7.5	8.9	10.1
<b>FEMALES</b>						
All Sites	353.0	366.6	372.7	370.3	385.7	372.6
Lung, trachea, etc	52.2	41.5	36.7	33.1	48.5	35.3
Colon/Rectum	41.9	44.4	47.8	51.3	47.0	47.3
Breast	103.1	124.2	131.9	125.3	119.1	117.2
Kidney/Bladder	10.6	13.8	12.6	12.4	14.4	14.1
Lymphomas	3.9	5.7	10.3	9.8	9.9	6.5
Leukemias	4.1	9.3	6.3	5.2	5.3	10.8

age-adjusted to the 1970 US standard pop.  
rates per 100,000 population.

Source; PA Dept. of Health.

Distribution of selected cancers diagnosed among  
residents of Chester City from 1987-1991  
MALES

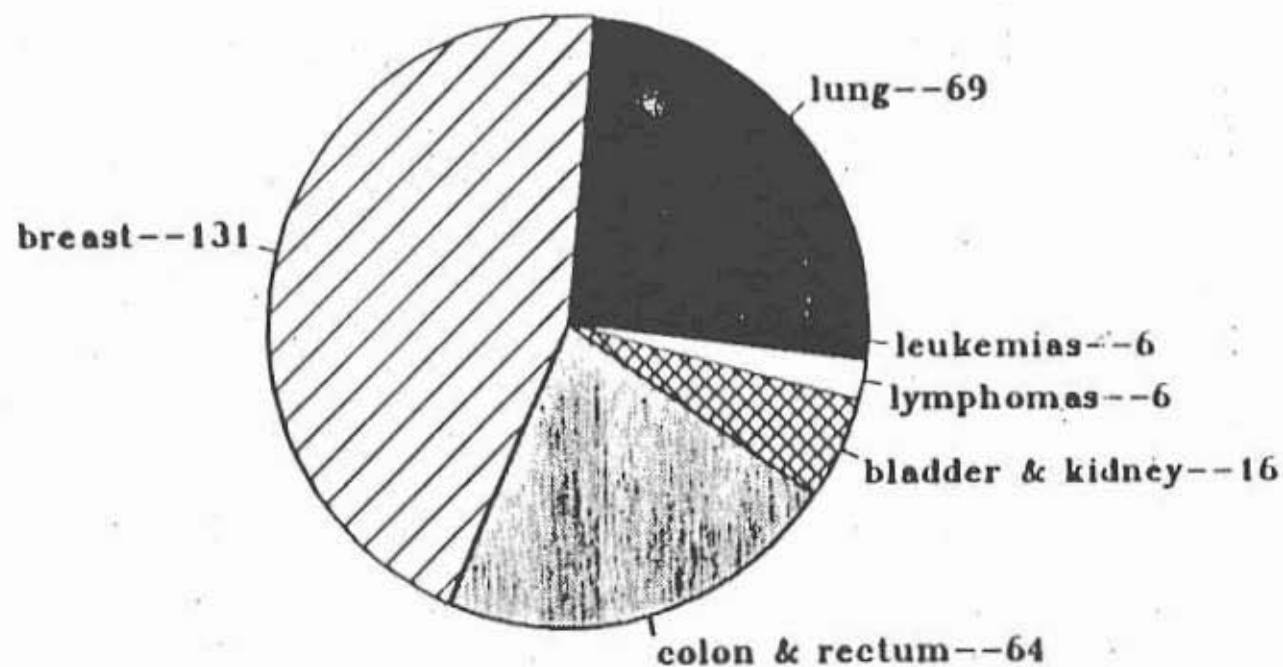


Cases = 378  
72.6% of the total\*

521 total cancers among male residents

Source: PA Dept. of Health

**Distribution of selected cancers diagnosed among  
residents of Chester City from 1987-1991  
FEMALES**

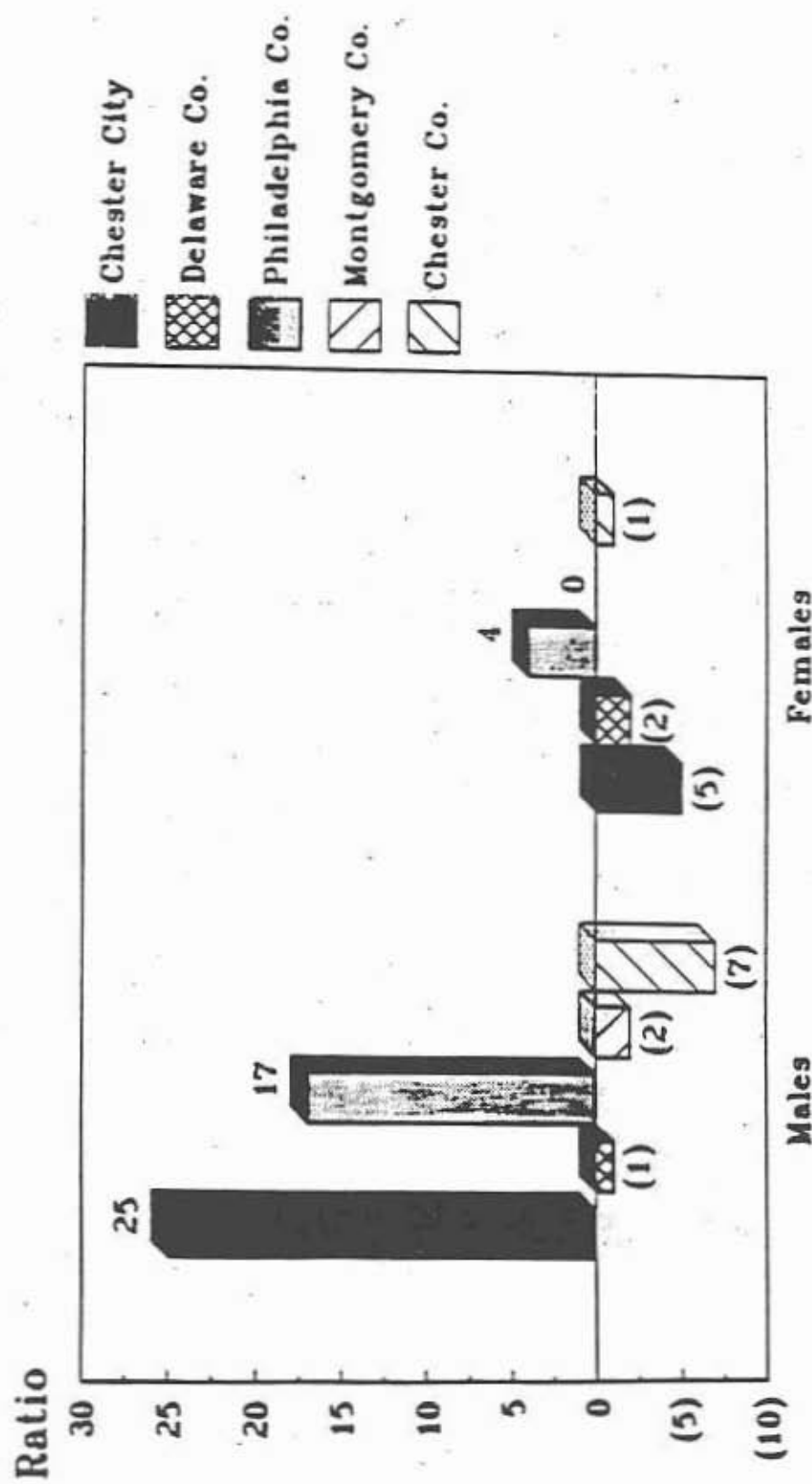


**Cases = 292  
60.1% of the total\***

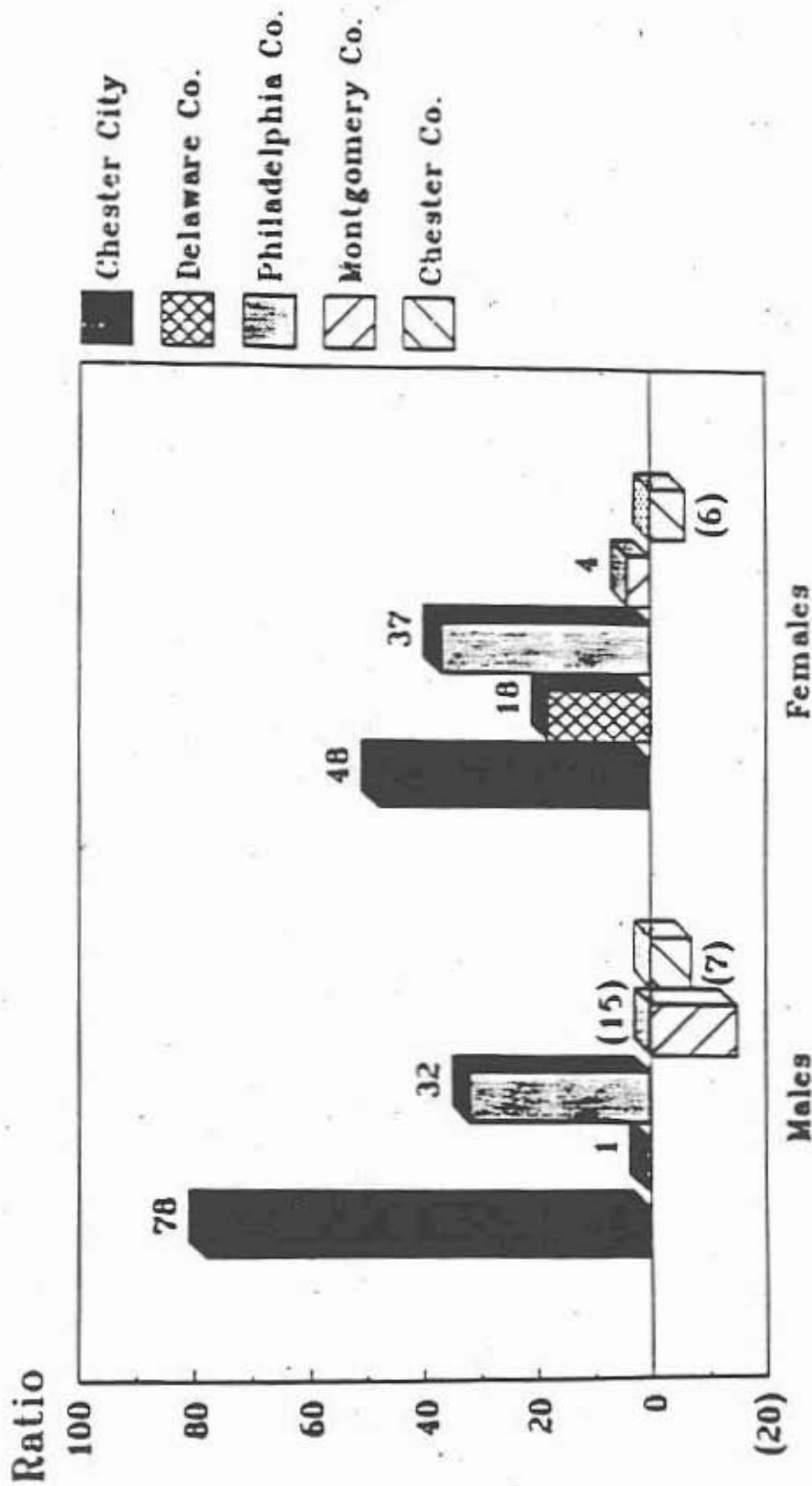
**\* 486 total cancers among female residents.**

**Source: PA Dept. of Health**

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 ALL CANCERS COMBINED



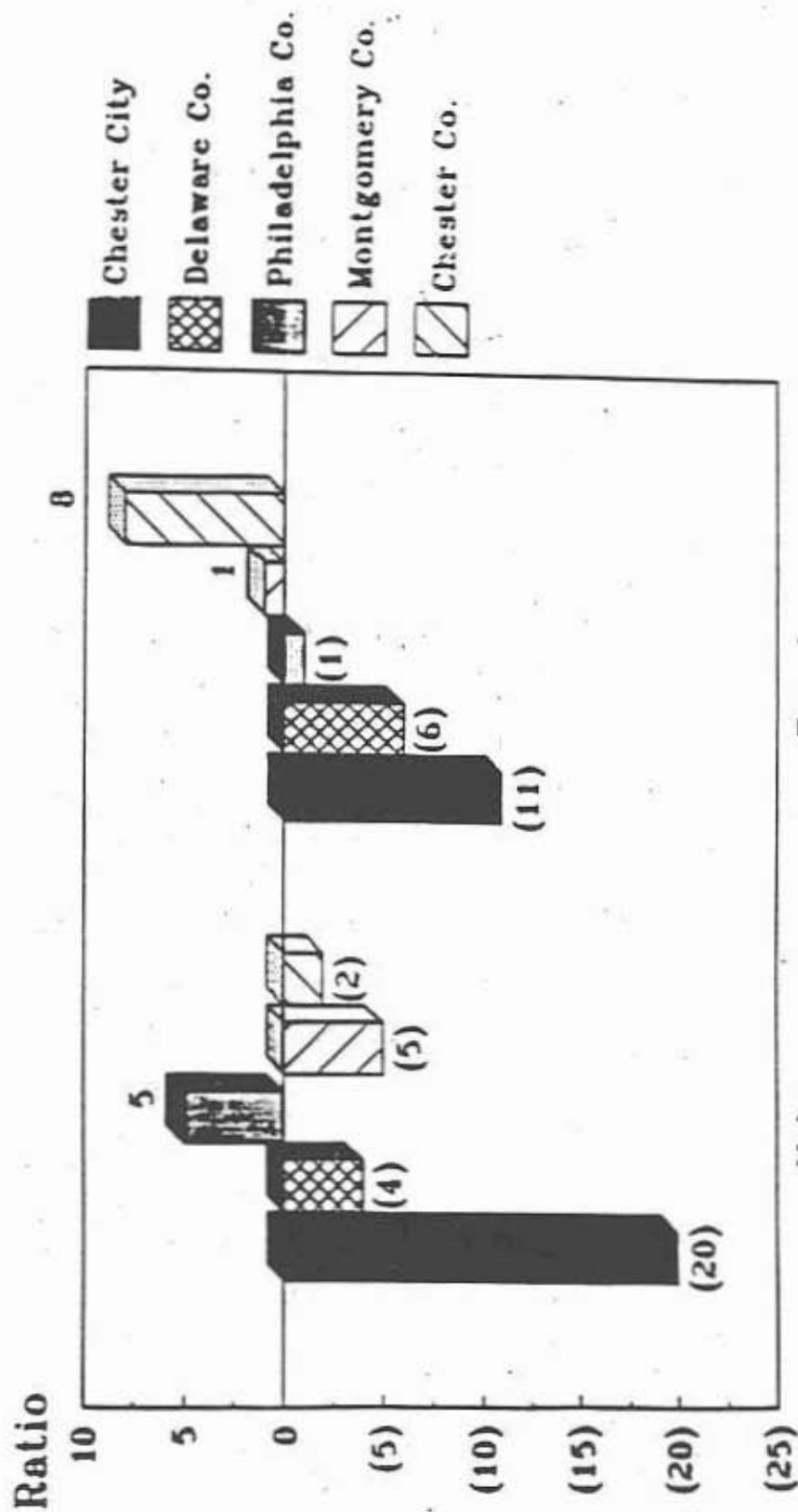
# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 LUNG, TRACHEA, BRONCHUS



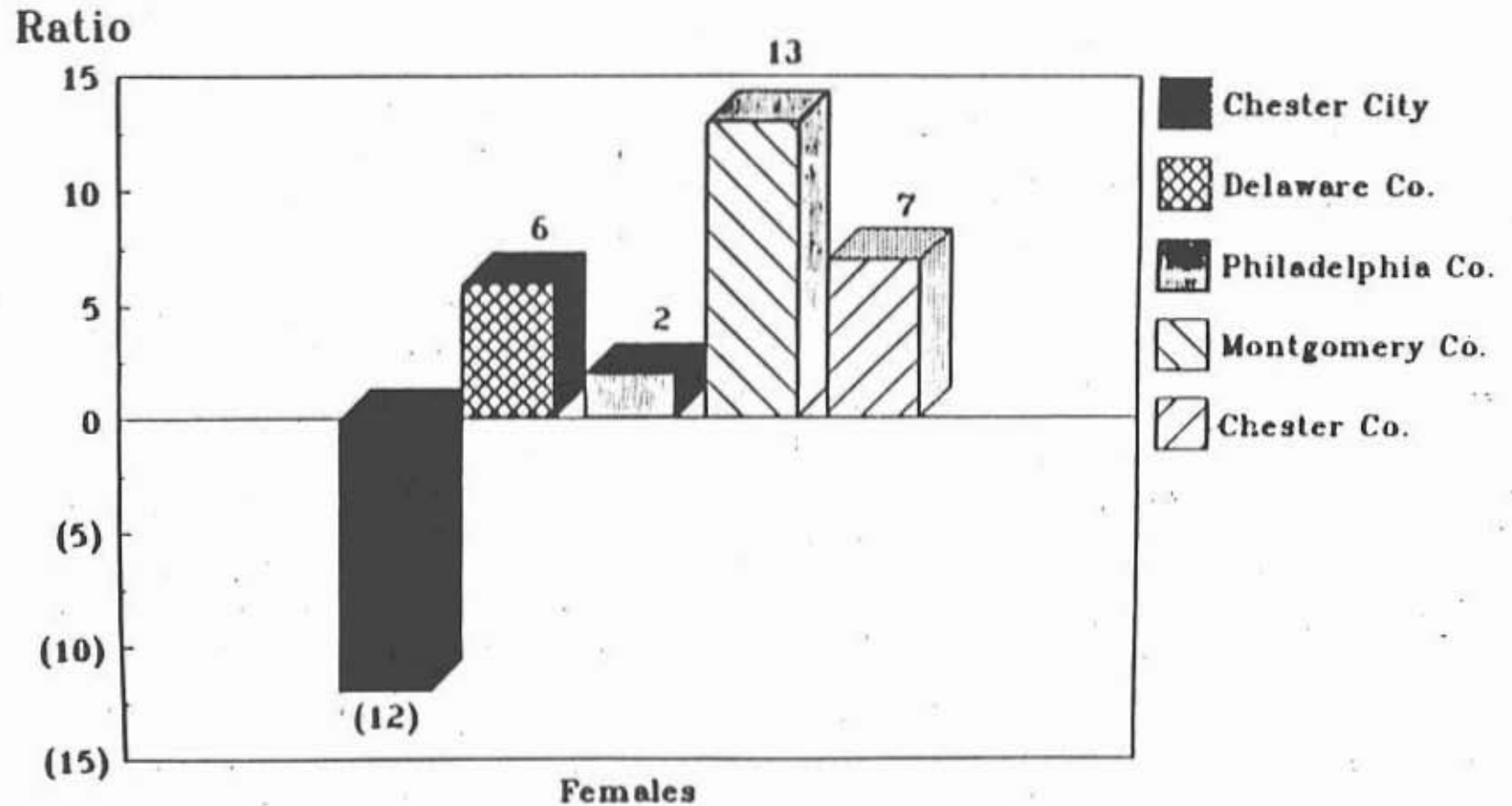
Source: PA Dept. of Health.



# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 COLON-RECTUM



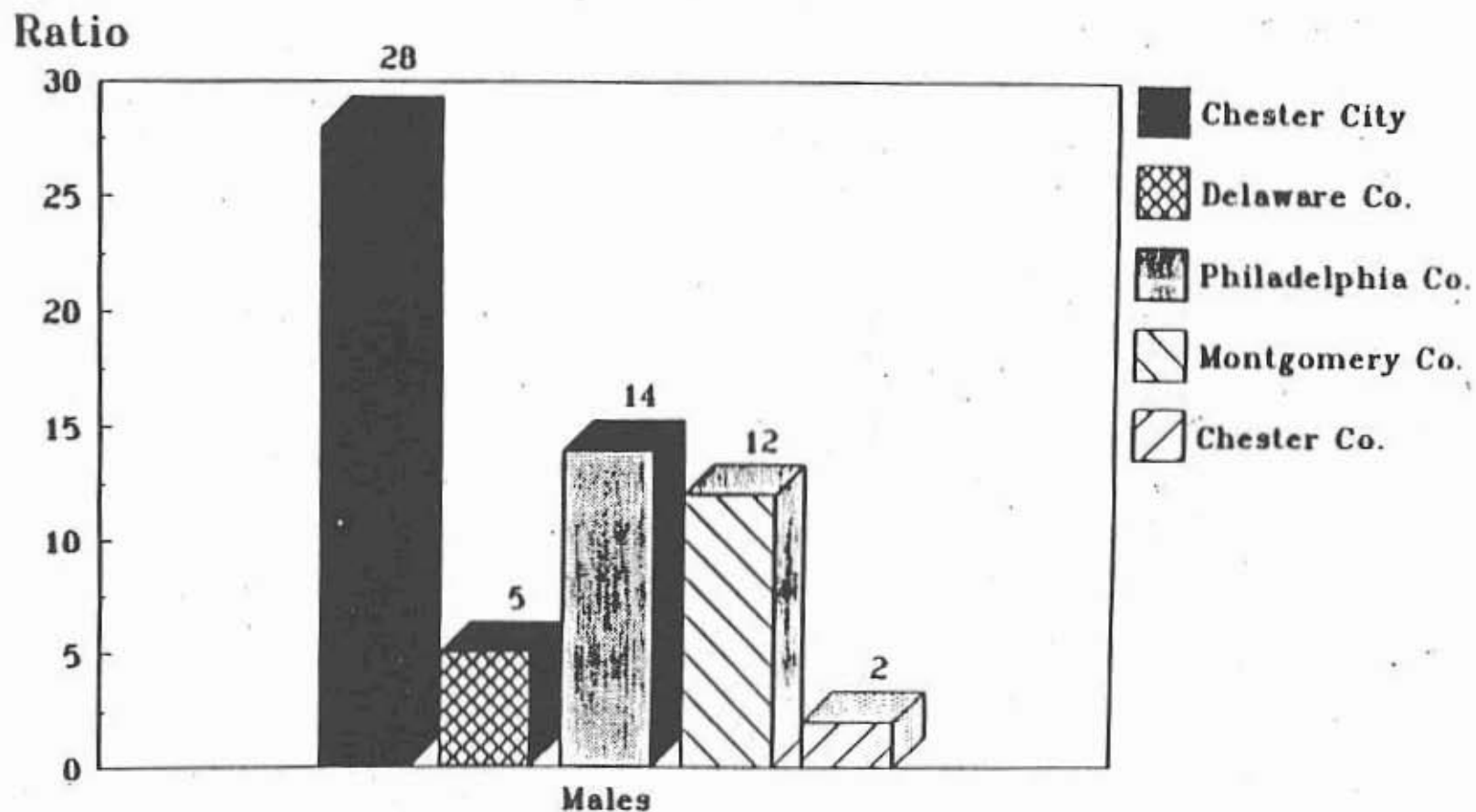
# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 BREAST



Source; PA Dept. of Health.

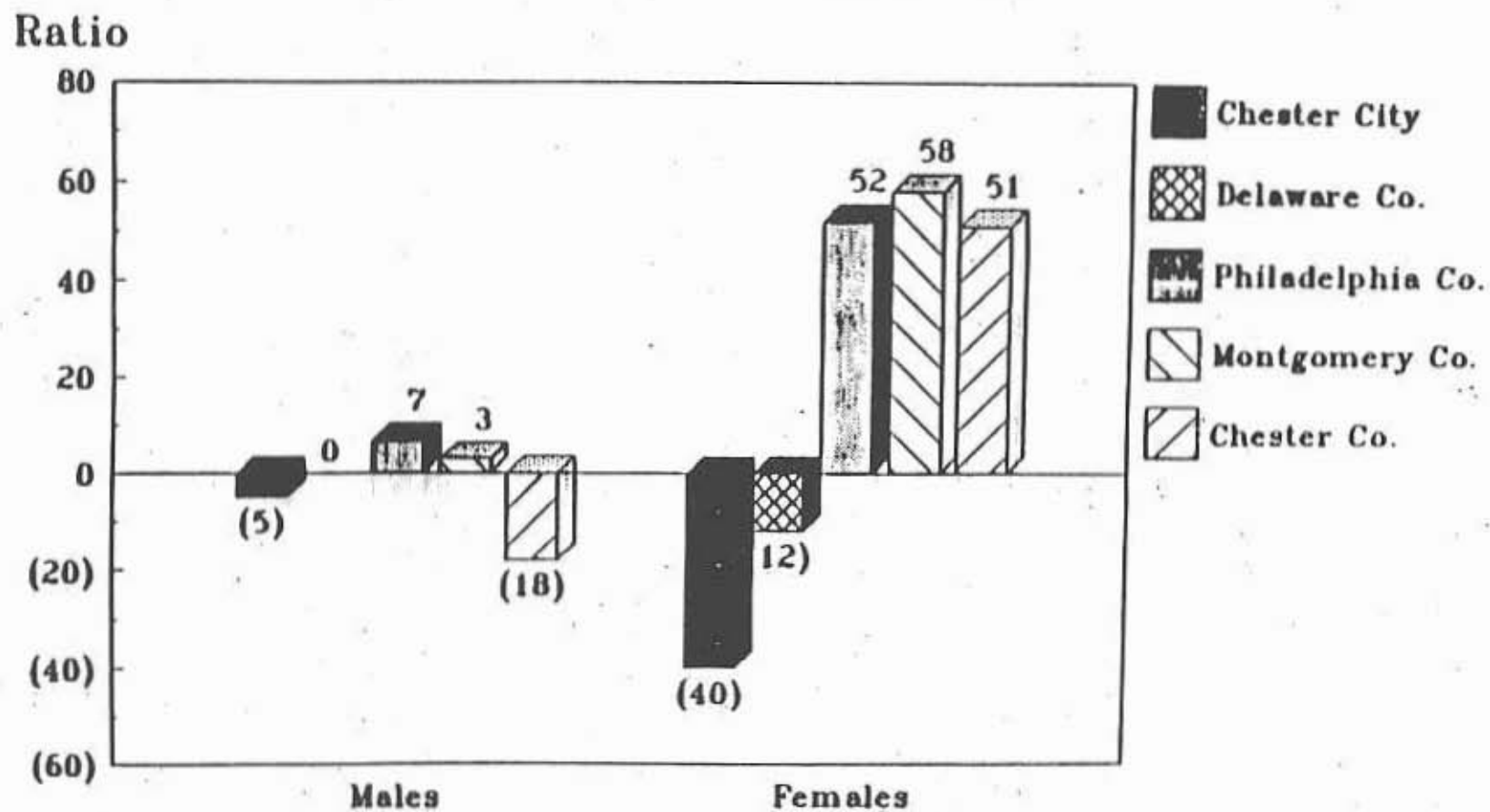


Ratio of Cancer Incidence Rates for Selected  
Populations to Pennsylvania, 1987-1991  
PROSTATE



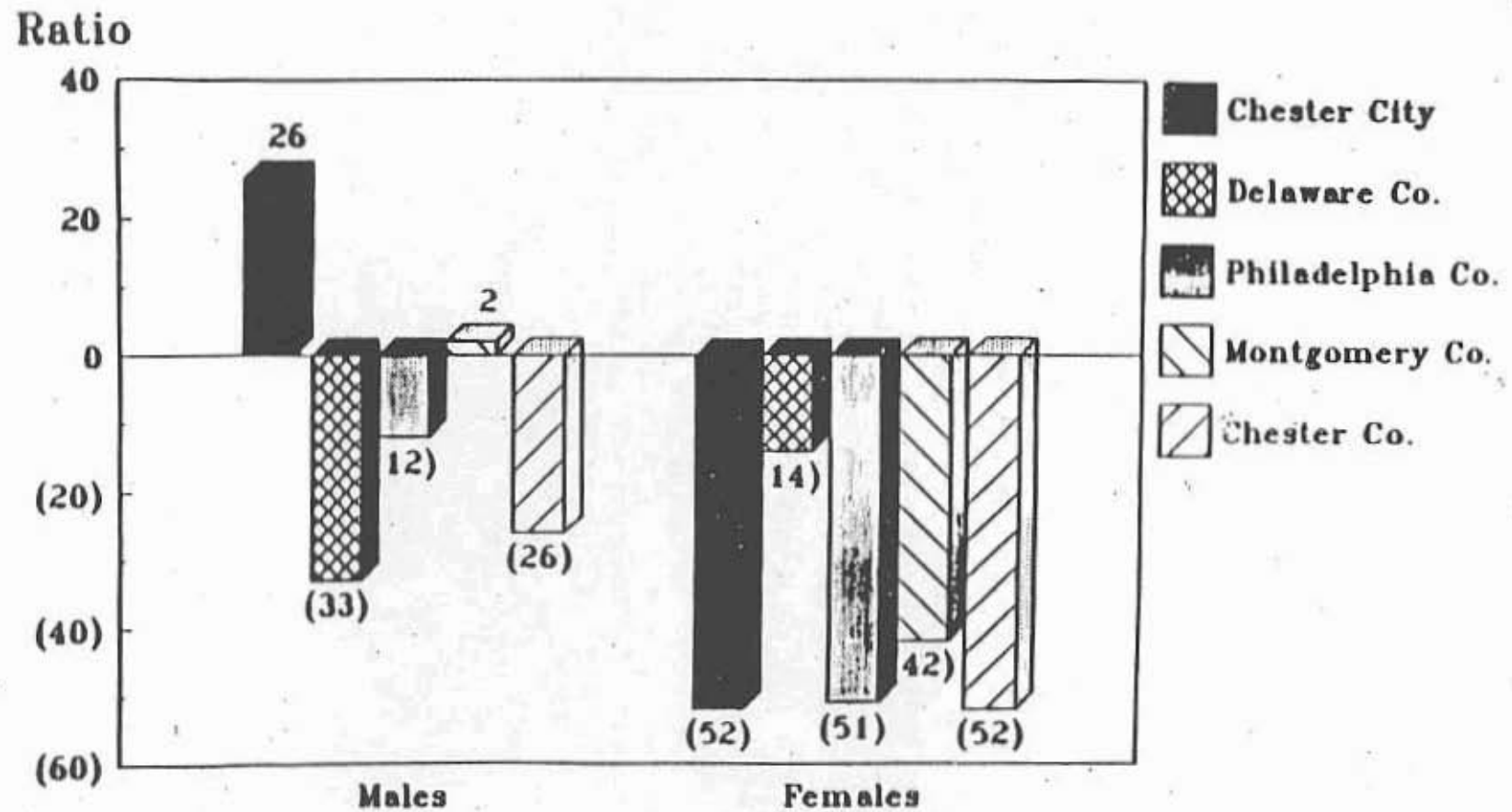
Source; PA Dept. of Health.

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 NON-HODGKIN'S LYMPHOMAS





# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 LEUKEMIAS



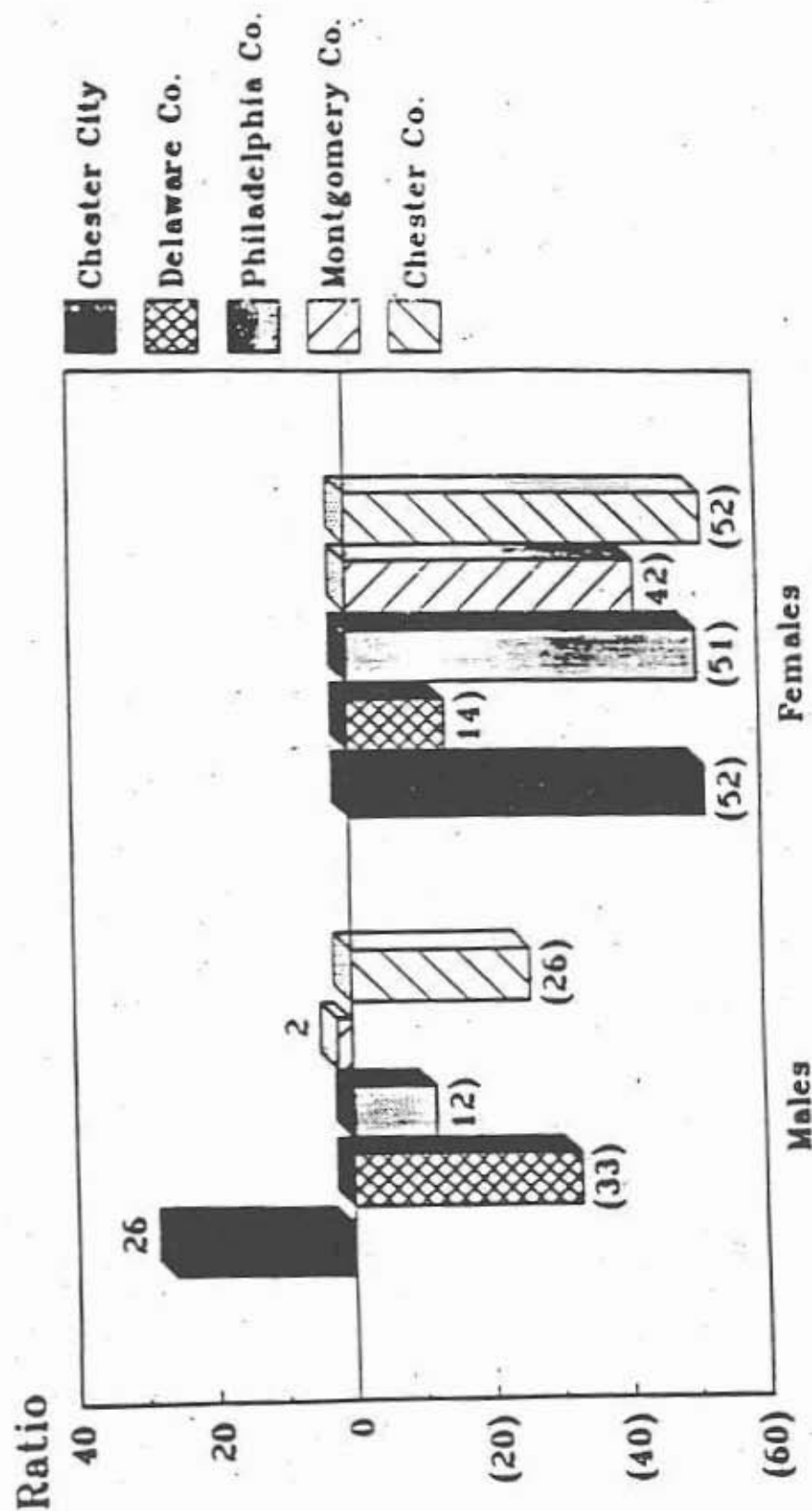
Source; PA Dept. of Health.

These ratios were calculated to provide an epidemiologic picture of the disease burden of the City of Chester compared to other Pennsylvania cities. The actual number of deaths in these selected cities' populations were compared with a calculated number of deaths for each city. These calculated deaths are the number of deaths expected from each city's population if that population had the same mortality rate as some standard population. For this exercise's purpose, the mortality rates of the whole Commonwealth were used as the standard. By multiplying each city's population by the Commonwealth's rates for each cause of death, the expected number for each cause of death was obtained. This expected number was then divided into the actual number for each cause of death per city and multiplied by 100%. A number greater than 100% reflects an excess in actual deaths over expected deaths. A number less than 100% reflects less actual than expected deaths. And a ratio equal to 100% reflects no difference between the actual and expected deaths. For example, the 170% ratio for deaths from hypertension in the city of Chester means that there were 70% more deaths from hypertension in Chester than in the Commonwealth as a whole. These ratios are only estimates that cannot account for the multitude of factors that contribute to a particular population's mortality rate. Thus, caution should be used in interpreting these ratios. Specifically, one cannot determine a cause and effect relationship from any of these ratios. However, they do provide a valuable way of relatively quickly assessing and comparing disease burdens. For example, the ratio of 244% for deaths from live disease in the city of Chester is red warning flag strongly indicating further investigation into this cause of death in this municipality.

Mortality Ratios (1992 Mortality Rates)

	Chstr	Lncstr	Nrrstwn	Phila	Pbrgh
Blood Pressure	170%	109%	122%	179%	149%
Heart Attack	83%	86%	88%	86%	111%
Stroke	149%	96%	113%	105%	116%
Emphysema	129%	145%	124%	91%	136%
Diabetes	84%	161%	100%	108%	108%
Liver Disease	244%	175%	163%	157%	134%
Pnuemonia-Flu	159%	89%	87%	94%	133%
Kidney Disease	88%	79%	119%	123%	135%

# Ratio of Cancer Incidence Rates for Selected Populations to Pennsylvania, 1987-1991 LEUKEMIAS



These ratios were calculated to provide an epidemiologic picture of the disease burden of the City of Chester compared to other Pennsylvania cities. The actual number of deaths in these selected cities' populations were compared with a calculated number of deaths for each city. These calculated deaths are the number of deaths expected from each city's population if that population had the same mortality rate as some standard population. For this exercise's purpose, the mortality rates of the whole Commonwealth were used as the standard. By multiplying each city's population by the Commonwealth's rates for each cause of death, the expected number for each cause of death was obtained. This expected number was then divided into the actual number for each cause of death per city and multiplied by 100%. A number greater than 100% reflects an excess in actual deaths over expected deaths. A number less than 100% reflects less actual than expected deaths. And a ratio equal to 100% reflects no difference between the actual and expected deaths. For example, the 170% ratio for deaths from hypertension in the city of Chester means that there were 70% more deaths from hypertension in Chester than in the Commonwealth as a whole. These ratios are only estimates that cannot account for the multitude of factors that contribute to a particular population's mortality rate. Thus, caution should be used in interpreting these ratios. Specifically, one cannot determine a cause and effect relationship from any of these ratios. However, they do provide a valuable way of relatively quickly assessing and comparing disease burdens. For example, the ratio of 244% for deaths from liver disease in the city of Chester is red warning flag strongly indicating further investigation into this cause of death in this municipality.



Mortality Ratios (1992 Mortality Rates)

	Chstr	Lncstr	Nrrstwn	Phila	Pbrgh
Blood Pressure	170%	109%	122%	179%	149%
Heart Attack	83%	86%	88%	86%	111%
Stroke	149%	96%	113%	105%	116%
Emphysema	129%	145%	124%	91%	136%
Diabetes	84%	161%	100%	108%	108%
Liver Disease	244%	175%	163%	157%	134%
Pnuemonia-Flu	159%	89%	87%	94%	133%
Kidney Disease	88%	79%	119%	123%	135%